

ACCESSORIES AND EQUIPMENT

Audio, Navigation and Anti-Theft - Repair Instructions

RADIO, CD/DVD CHANGER

65 11... NOTES REGARDING THE ADJUSTMENT OF THE INSTALLATION POSITION ON THE CD CHANGER

NOTE: Both suspension springs must be positioned correctly (horizontal/vertical) to ensure trouble-free function of the CD changer. Correct the setting as needed.

The magazine storage flap must always be closed to prevent preliminary contamination of the CD changer.

To avoid premature contamination of the CD changer, make sure the magazine compartment flap is permanently closed.

NOTE: For purposes of clarity, the following graphics show the CD changer removed.

NOTE: Observe the following repair instructions if the magazine cannot be removed from the CD changer.

Remove CD CHANGER MAGAZINE

Remove holder (1) from CD changer (2).

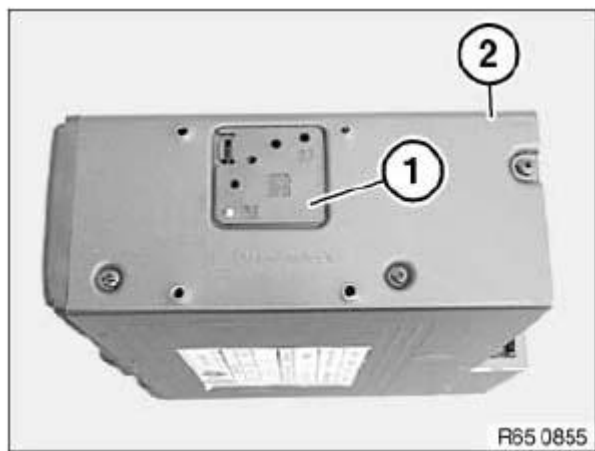


Fig. 1: Identifying Cover Cap And CD Changer
Courtesy of BMW OF NORTH AMERICA, INC.

Move the installation position of the CD changer (2) to the required position by sliding the suspension spring (1) with a suitable tool.

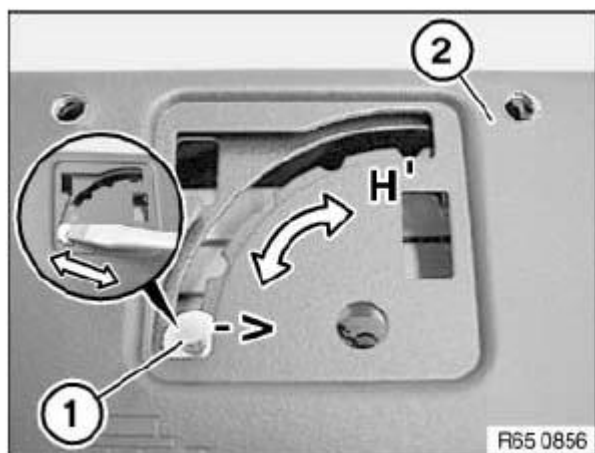


Fig. 2: Sliding Suspension Spring

Courtesy of BMW OF NORTH AMERICA, INC.

65 11... REMOVING AND INSTALLING/REPLACING CD CHANGER MAGAZINE

Special tools required:

65 1 170

NOTE: Carry out the following work steps if the CD changer magazine is not automatically ejected.

Insert special tool **65 1 170** on left under CD changer magazine (1) and carefully remove special tool with CD changer magazine (1) from CD changer (2).

Installation:

Check position of CDs in CD changer magazine.

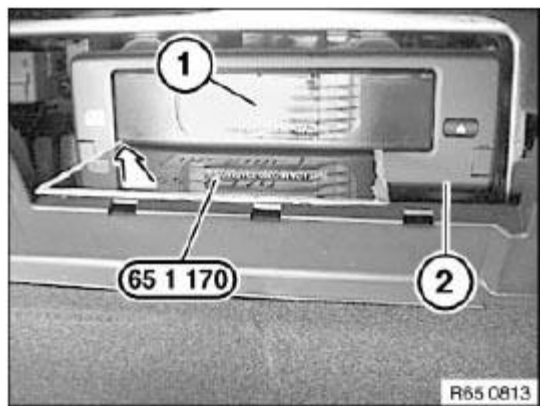


Fig. 3: Inserting Special Tool 65 1 170 In CD Changer Magazine

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A modified CD changer magazine is available from 10/2004 which eliminates incorrect loading.

Checking CD changer magazine:

Pull CD slot (1) out of CD changer (2) and check top side at retaining lugs (3) on right/left.

(A): CD changer magazine before 10/04:

No retaining lugs on right/left.

Replace CD changer magazine.

(B): CD changer magazine from 10/04:

Retaining lugs (3) present on right/left.

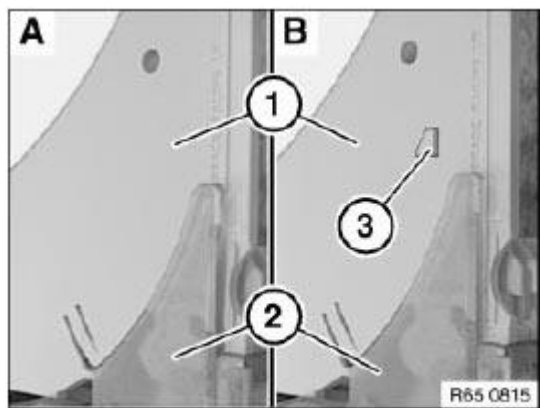


Fig. 4: Identifying CD Slot, CD Changer And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

65 11 072 REMOVING AND INSTALLING/REPLACING CD CHANGER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION).

Necessary preliminary tasks:

- **E60:** Remove LUGGAGE COMPARTMENT TRIM ON SIDE PANEL ON RIGHT
- **E61:** Remove flap in luggage compartment panel on right
- Disconnect BATTERY NEGATIVE LEAD

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Open rotary clips (1) and remove.

Remove cover (2) in direction of arrow.

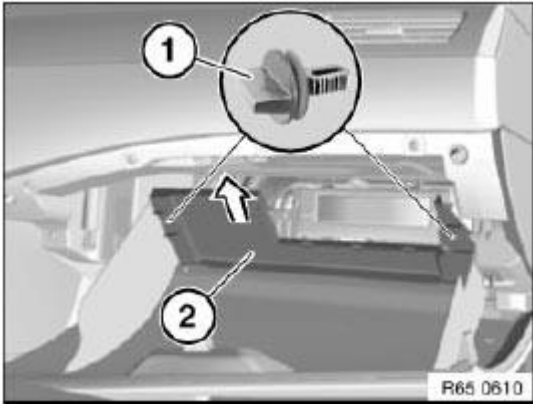


Fig. 5: Removing Cover

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Open glovebox.

Fold back covers (1) on CD changer (3).

Release screws (2).

Pull back CD changer (3) slightly.

Unlock and disconnect associated plug connection, remove CD changer (3).

Installation:

Tightening torque **64 11 1AZ** .

Observe tightening torque (risk of damage).

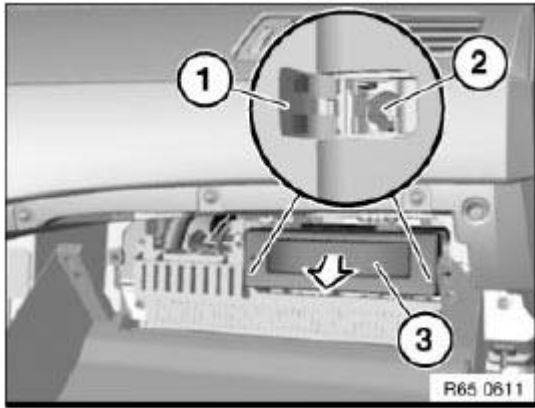


Fig. 6: Pulling Back CD Changer Slightly
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When pushing CD changer in, lay associated wire harness carefully by hand. For this purpose, in advance:

Remove **BOTTOM RIGHT TRIM PANEL FROM INSTRUMENT PANEL** .

Replacement:

Carry out **PROGRAMMING/CODING** .

65 11 074 REPLACING CD-CHANGER TRIM

IMPORTANT: Read and comply with notes on protection against electrostatic discharge (ESD protection).

Necessary preliminary tasks:

Remove CD changer

Release screw (1) of CD-changer cover (2). Lift off lid (2) and flip upwards in direction of arrow.

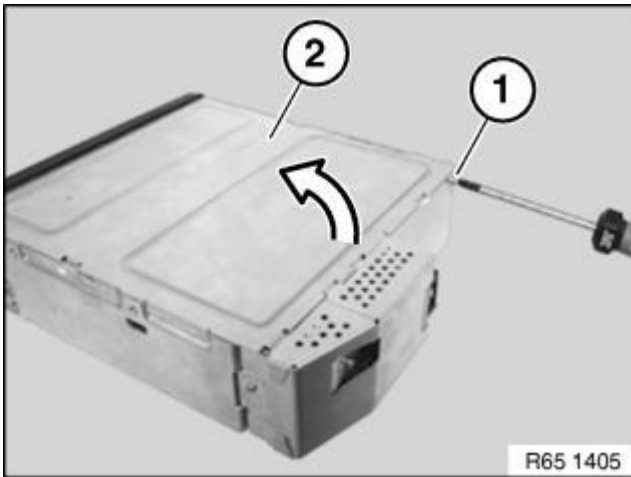


Fig. 7: Release Screw (1) Of CD-Changer Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on the trim (2).

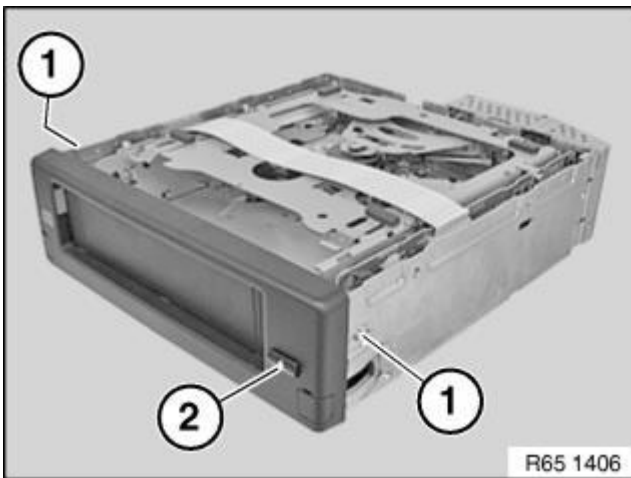


Fig. 8: Release Screws (1) On The Trim (2)
Courtesy of BMW OF NORTH AMERICA, INC.

Bend the side walls of the CD-changer slightly in the direction of the arrow. Pull out trim (1) in direction of arrow.

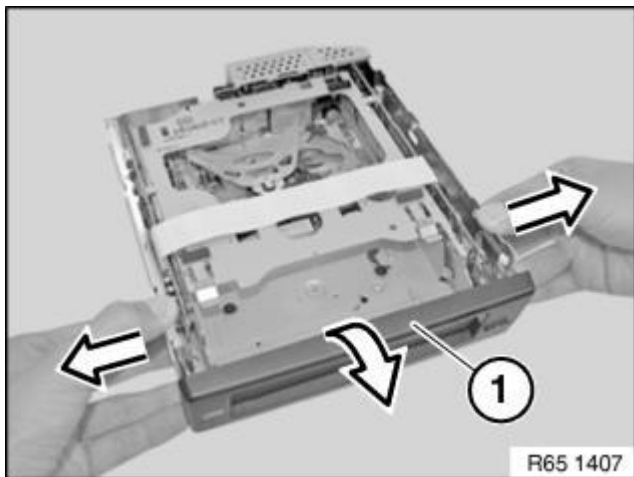


Fig. 9: Pull Out Trim (1) In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

Detach plug (1) from trim (2).

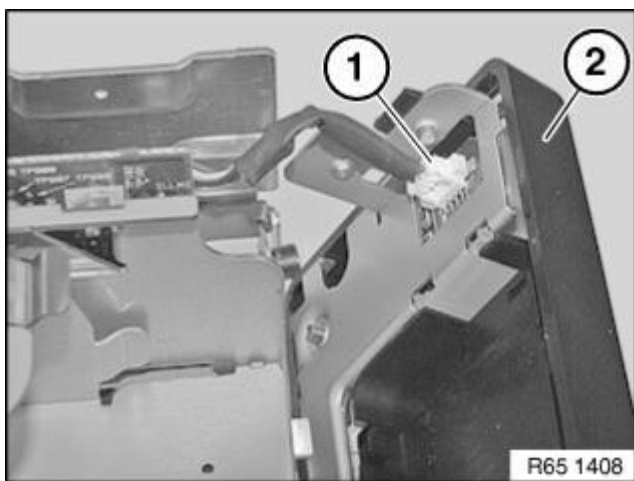


Fig. 10: Detach Plug (1) From Trim (2)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove trim (1) from housing (2). Installation: Position trim (1) on the latch mechanisms of the trim (2).

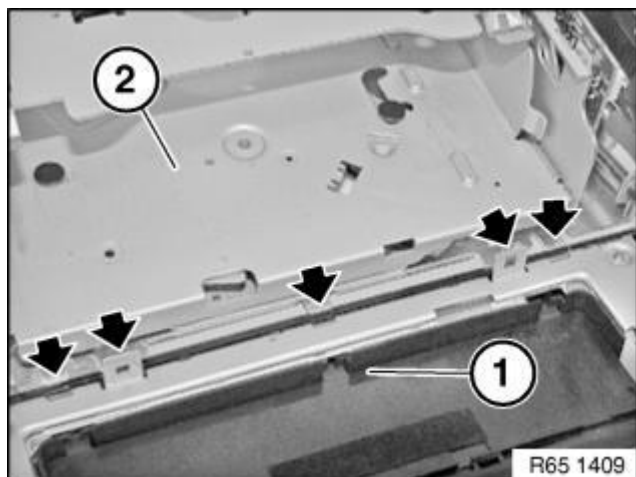


Fig. 11: Remove Trim (1) From Housing (2)
Courtesy of BMW OF NORTH AMERICA, INC.

65 11 075 REMOVING AND INSTALLING/REPLACING DVD CHANGER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove LUGGAGE COMPARTMENT TRIM ON SIDE PANEL ON RIGHT
- Disconnect BATTERY NEGATIVE LEAD
- Remove LUGGAGE COMPARTMENT TRIM ON LEFT SIDE PANEL

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Release screws (1).

Pull DVD changer (2) out of fixture (3).

Unlock and disconnect associated plug connection, remove CD changer (2).

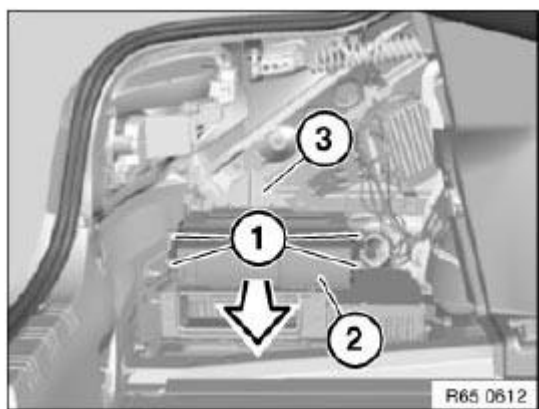


Fig. 12: Removing CD Changer

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1) and remove both holders (2) from DVD changer (3).

Installation:

If necessary, remove transportation lock.

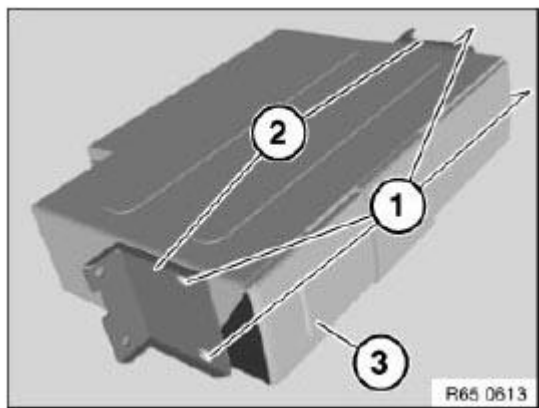


Fig. 13: Identifying Screws, Holders And DVD Changer

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

65 11 220 REMOVING AND INSTALLING SATELLITE RADIO (US VERSION ONLY)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

NOTE: **FOLLOW INSTRUCTIONS FOR HANDLING OPTICAL FIBRES .**

Necessary preliminary tasks:

- Disconnect **NEGATIVE BATTERY CABLE**
- Remove **LUGGAGE COMPARTMENT TRIM** on side panel

Release screws (1).

Remove satellite radio (2) with bracket and disconnect associated plug connection.

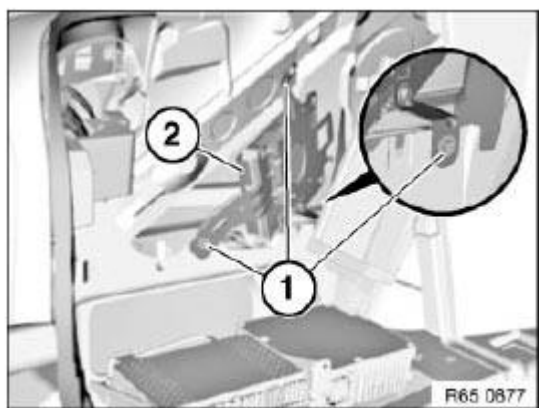


Fig. 14: Identifying Screws And Satellite Radio
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1) and remove satellite radio (2) from bracket (3).

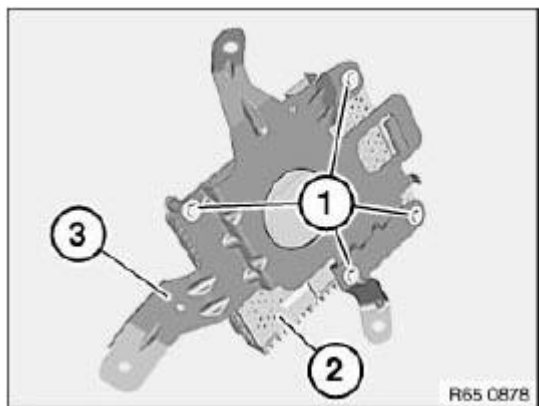


Fig. 15: Identifying Screws, Satellite Radio And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing, please observe:

Record ID number (2) of the removed device.

NOTE: The ID number (2) can be found on the label of the housing. Above the barcode the text reads "Sirius ID" (1) and next to it is the company's logo "Sirius Satellite Radio" (3).

Record ID number (2) of the new device.

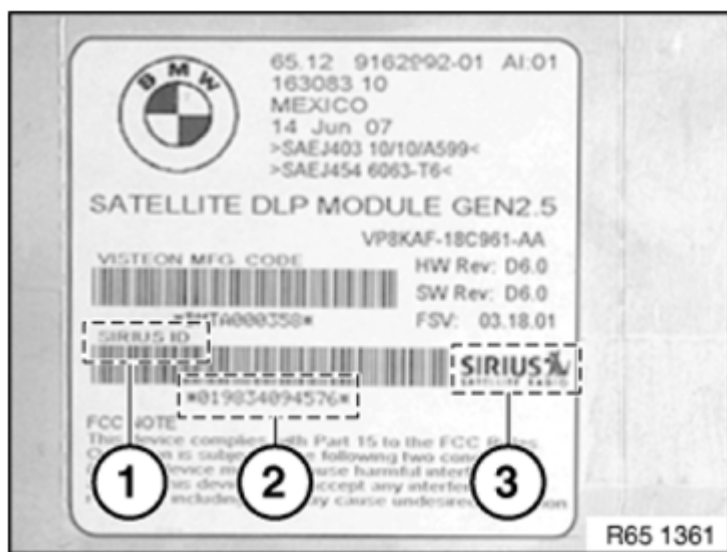


Fig. 16: Identifying Sirius ID, ID Number And Sirius Satellite Radio
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle **PROGRAMMING/ENCODING** .

65 11 240 REMOVING AND INSTALLING DIGITAL RADIO (IBOS)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

NOTE: **FOLLOW INSTRUCTIONS FOR HANDLING OPTICAL FIBRES** .

Necessary preliminary tasks:

- Disconnect **NEGATIVE BATTERY CABLE**
- Remove **LUGGAGE COMPARTMENT TRIM** on left side panel

Release screws (1) and remove digital radio (2) from bracket.

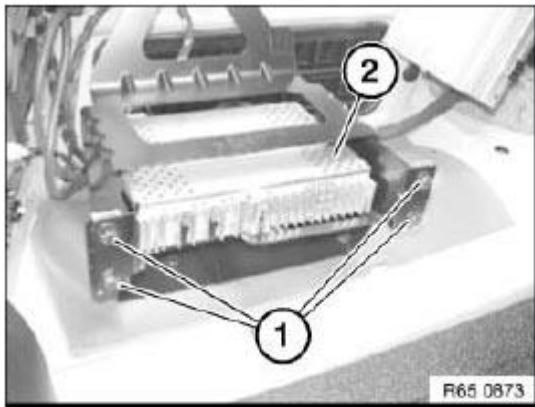


Fig. 17: Identifying Screws And Digital Radio
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

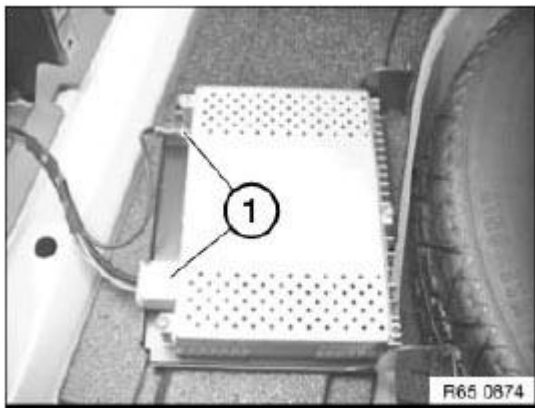


Fig. 18: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1) and remove digital radio (2) from bracket (3).

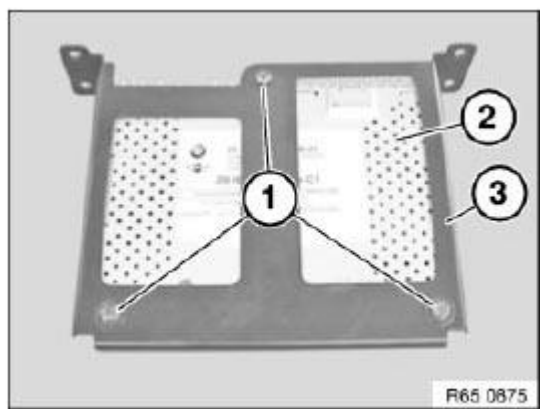


Fig. 19: Identifying Screws, Digital Radio And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 230 REMOVING AND INSTALLING DAB TUNER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

NOTE: FOLLOW INSTRUCTIONS FOR HANDLING OPTICAL FIBRES .

Necessary preliminary tasks:

- Disconnect NEGATIVE BATTERY LEAD
- Remove LUGGAGE COMPARTMENT TRIM on left side panel

Release screws (1).

Disconnect plug connections and remove bracket with DAB tuner (2).

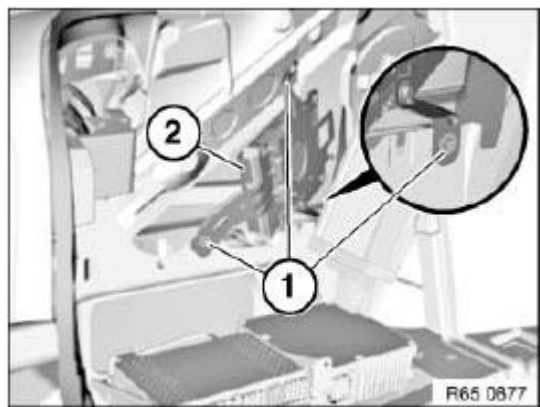


Fig. 20: Identifying Screws And DAB Tuner
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1) and remove DAB tuner (2) from bracket (3).

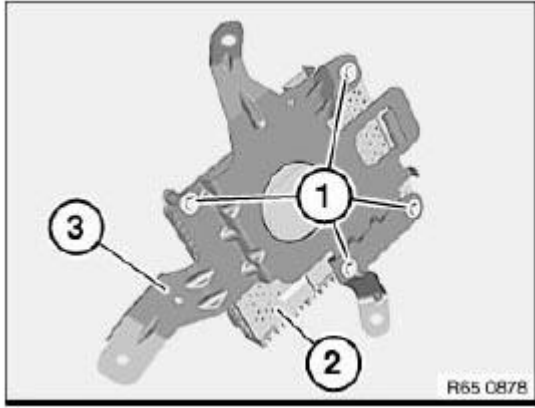


Fig. 21: Identifying Screws, DAB Tuner And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

STEREO RADIO, AMPLIFIER**65 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT CENTRAL BASS SPEAKER (UNDER FRONT SEAT)**

Necessary preliminary tasks:

- Remove front seat. See **REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (NORMAL/ELECTRIC)** or **REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (COMFORT)**.
- Remove **PANEL FOR DOOR PILLAR**.

Release screws (1).

Remove central bass speaker trim (2).

Fold back floor trims (3) in direction of arrow.

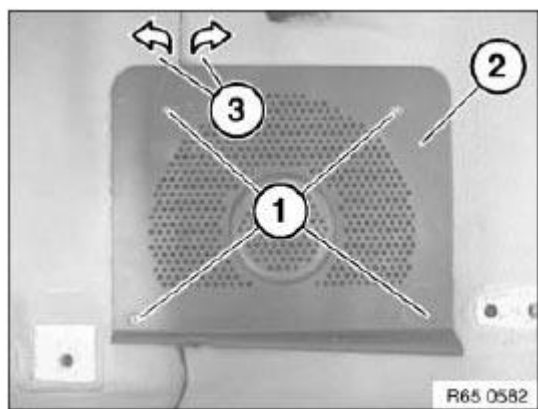


Fig. 22: Folding Back Floor Trims

Courtesy of BMW OF NORTH AMERICA, INC.

Remove clips (1).

Fold back entrance cable cover (2) in direction of arrow.

Unfasten plug connection (3) and disconnect.

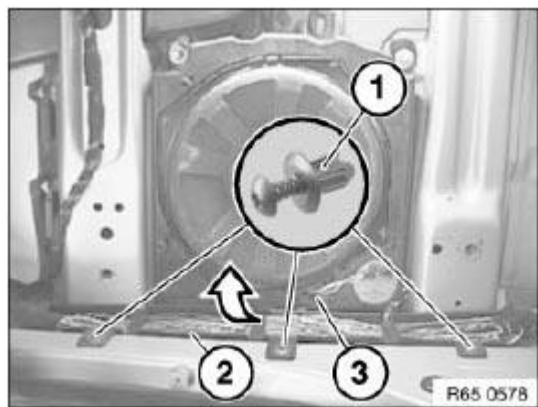


Fig. 23: Folding Back Entrance Cable Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Disconnect rear compartment heating duct (2) in direction of arrow.

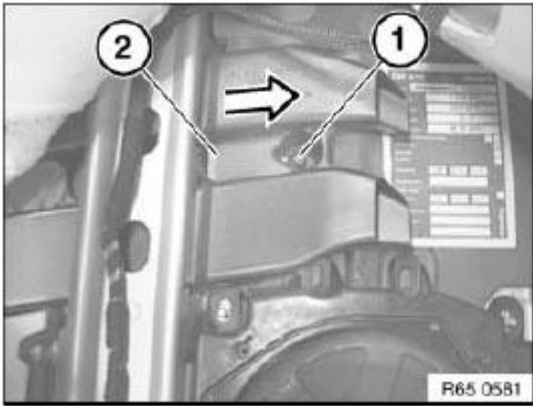


Fig. 24: Disconnecting Rear Compartment Heating Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and screws (2).

Feed out central bass speaker (3) in direction of arrow and remove.

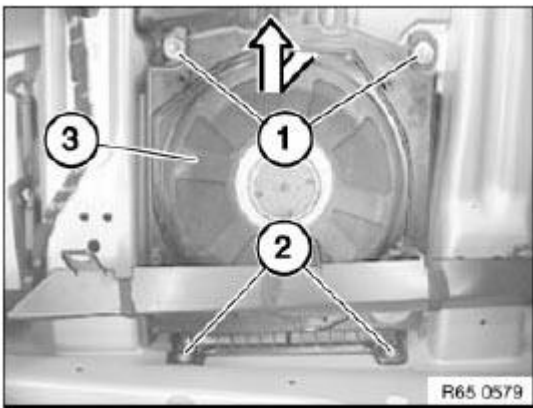


Fig. 25: Feeding Out Central Bass Speaker
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure seal (1) and rubber damper (2) are correctly seated on central bass speaker (3).

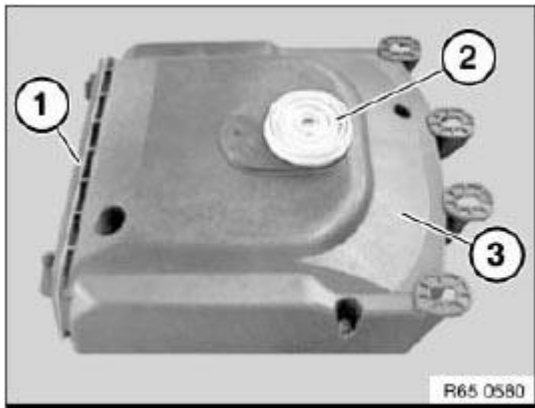


Fig. 26: Identifying Seal, Rubber Damper And Bass Speaker
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 070 REMOVING AND INSTALLING/REPLACING AMPLIFIER

Necessary preliminary tasks:

- Partially remove **LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM**.

Unfasten plug connection (1) and disconnect.

Pull out retaining plate (2) in direction of arrow.

Installation:

Make retaining plate (2) is correctly seated.

Remove amplifier (3) from holder (4).

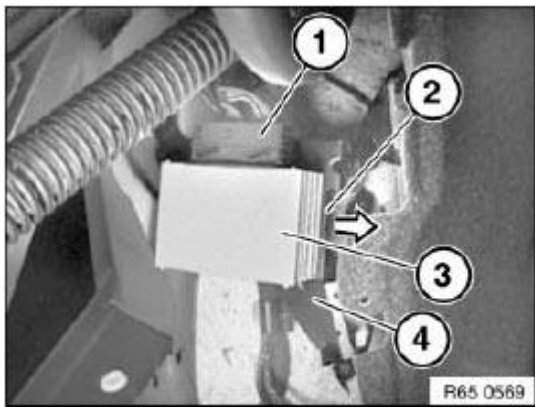


Fig. 27: Pulling Out Retaining Plate
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 072 REMOVING AND INSTALLING (REPLACING) AMPLIFIER (TOP HI-FI SYSTEM)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Partially remove LUGGAGE COMPARTMENT WHEEL ARCH TRIM ON LEFT

NOTE: Follow instructions for HANDLING OPTICAL FIBRES .

Unlock plug connections (1) and disconnect.

Pull out retaining plates (2) in direction of arrow.

Installation:

Make retaining plates (2) are correctly seated.

Remove amplifier (3) from holder (4).

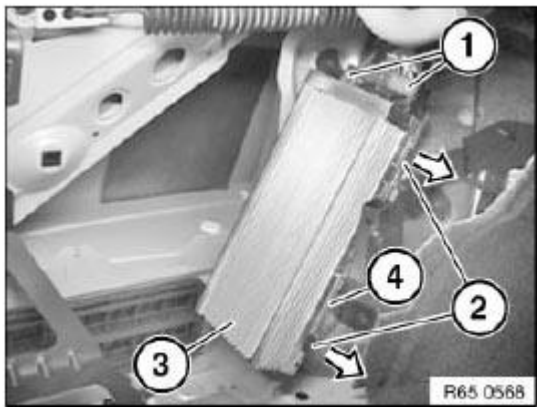


Fig. 28: Pulling Out Retaining Plates
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Until 09/2009 a Top HiFi amplifier with a different pin assignment is installed!

Install cable jumper consisting of socket (1) (BMW Parts Service 6901844) and wire jumper (2) in connector (3).

Create wire jumper (2) from wire (cross-section 0.75 mm) and two stops (BMW Parts Department 1393724). Then connect pins 1 and 2 in the socket (1) with wire jumper (2).

NOTE: Connector chamber (4) is not included in current version and remains unused

in new replacement Top HiFi amplifier!

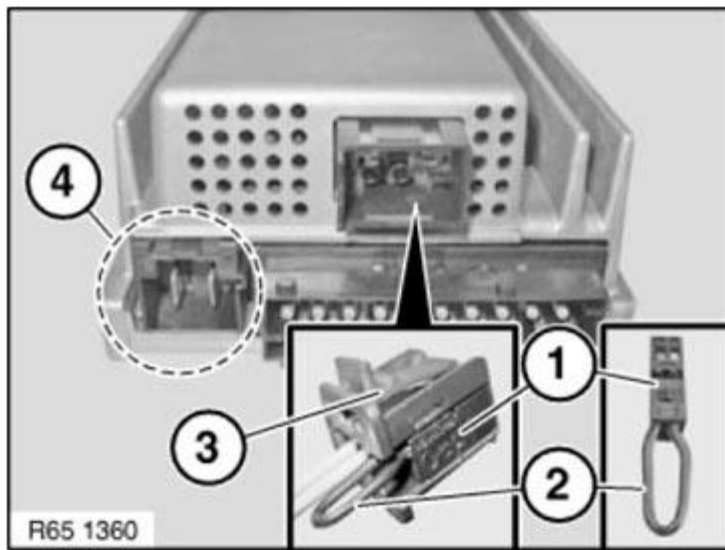


Fig. 29: Identifying Wire Jumper, Socket, Connector, And Connector Chamber
Courtesy of BMW OF NORTH AMERICA, INC.

Carry out PROGRAMMING/CODING .

65 12 200 REMOVING AND INSTALLING (REPLACING) AUDIO SYSTEM CONTROLLER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .
Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Necessary preliminary tasks:

- Disconnect NEGATIVE BATTERY LEAD
- Remove middle trim for instrument panel. See REMOVING AND INSTALLING (REPLACING) CENTRE INSTRUMENT PANEL TRIM (FROM 03/2007) , REMOVING AND INSTALLING (REPLACING) CENTRE INSTRUMENT PANEL TRIM (UP TO 03/2007) , or REMOVING AND INSTALLING/REPLACING CENTRE (BOTTOM) INSTRUMENT PANEL TRIM .

NOTE: Work is shown on the E60 by way of example. There may be differences in detail in the case of other car models.

IMPORTANT: Do not scratch center console trim, cover if necessary.

Release screws (1).

Tightening torque **65 11 6AZ**

Pull back audio system controller (2) slightly.

Disconnect associated plug connections.

Remove audio system controller (2).

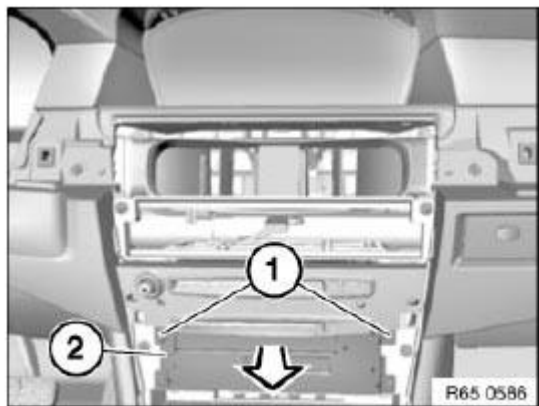


Fig. 30: Pulling Back Audio System Controller Slightly
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

65 12 230 REMOVING AND INSTALLING DAB TUNER

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

NOTE: **FOLLOW INSTRUCTIONS FOR HANDLING OPTICAL FIBRES** .

Necessary preliminary tasks:

- Disconnect **NEGATIVE BATTERY LEAD**
- Remove **LUGGAGE COMPARTMENT TRIM** on left side panel

Release screws (1).

Disconnect plug connections and remove bracket with DAB tuner (2).

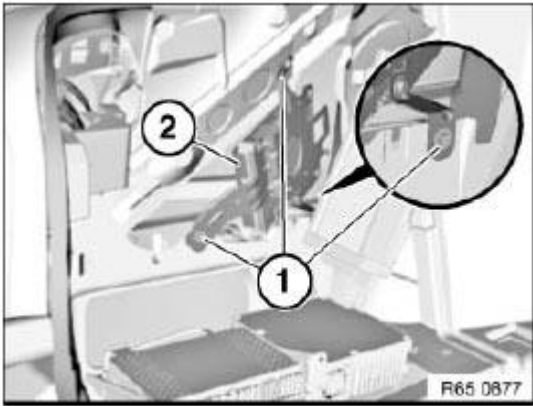


Fig. 31: Identifying Screws And DAB Tuner
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1) and remove DAB tuner (2) from bracket (3).

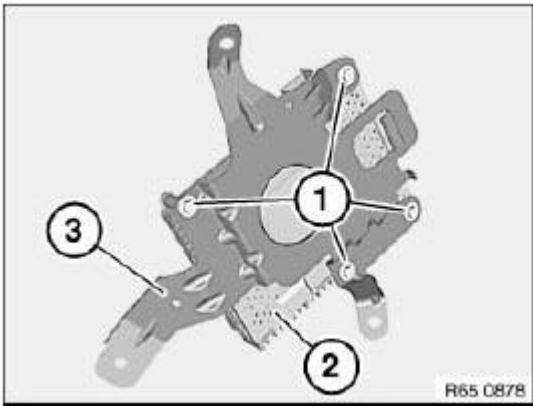


Fig. 32: Identifying Screws, DAB Tuner And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 250 REMOVING AND INSTALLING/REPLACING HEADPHONES MODULE

Necessary preliminary tasks:

- Disconnect **NEGATIVE BATTERY LEAD**
- If necessary, remove emergency wheel

Take off cover for control units (1).

Installation:

Make sure cover for control units (1) is correctly seated on locating pins (2).

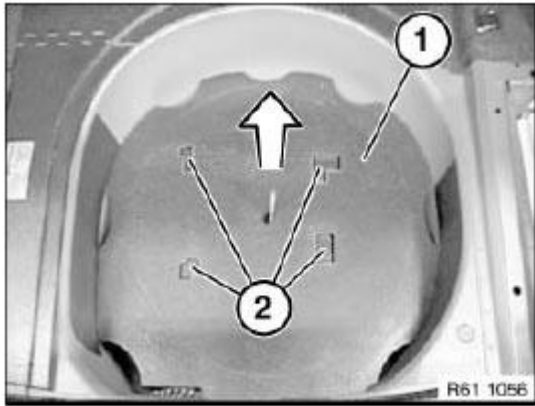


Fig. 33: Identifying Control Units And Pins

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustrations show removal from the E60.

Unfasten plug connection (1) and disconnect.

Remove headphones module (2) upwards out of mounting for control units (3).

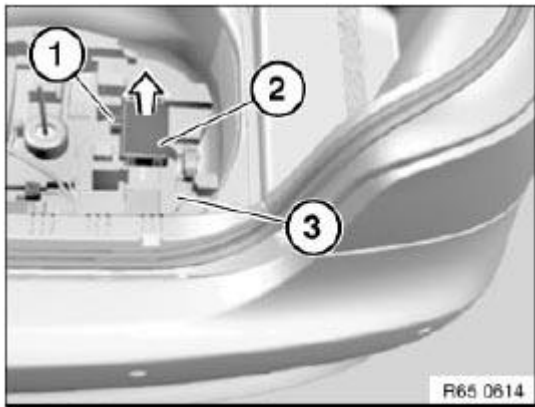


Fig. 34: Removing Headphones Module

Courtesy of BMW OF NORTH AMERICA, INC.

65 12 260 REMOVING AND INSTALLING/REPLACING DVD PLAYER IN REAR CONSOLE (LONG VERSION)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove UPPER REAR CONSOLE TRIM

- Cover, rear console, front

Disconnect plug connection (1).

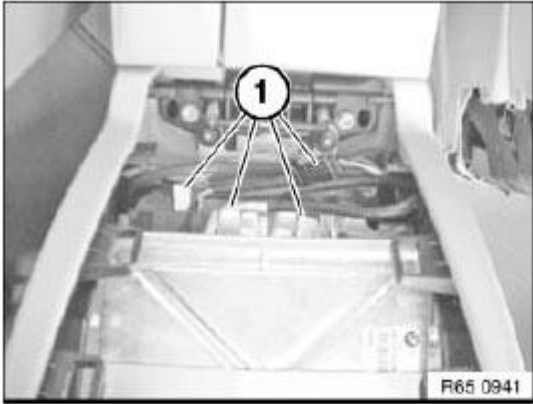


Fig. 35: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove DVD player (2).

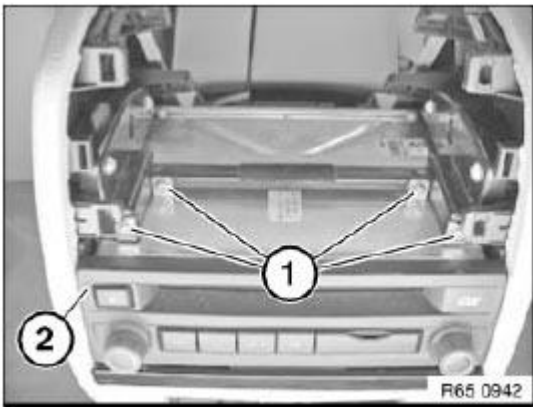


Fig. 36: Identifying Screws And DVD Player
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 350 REMOVING AND INSTALLING/REPLACING FAN (LEFT SIDE PANEL)

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT TRIM** on left side panel

Disconnect plug connection (1).

Loosen screws (2).

Remove fan (3) in direction of arrow from sleeve (4).

Installation:

Make sure fan (3) is correctly seated on sleeve (4).

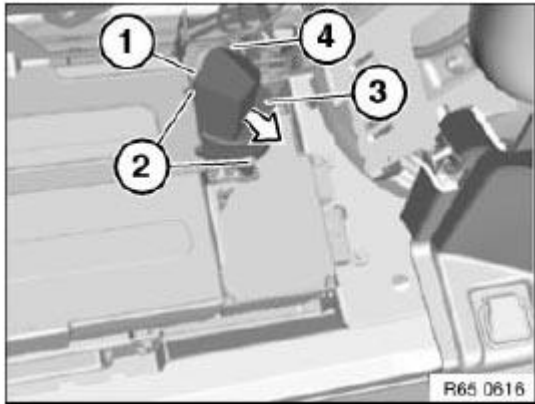


Fig. 37: Removing Fan From Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

65 12 355 REMOVING AND INSTALLING/REPLACING FAN (LUGGAGE COMPARTMENT RECESS)

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL** .
- Remove spare wheel.

Take off cover for control units (1).

Installation:

Make sure cover for control units (1) is correctly seated on locating pins (2).

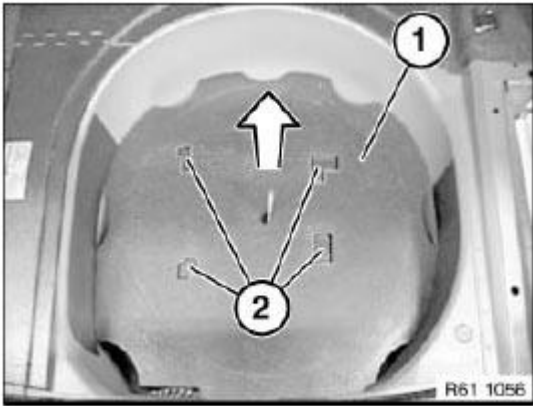


Fig. 38: Identifying Control Units And Pins

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustrations show removal from the E60.

Disconnect plug connection (1).

Lift fan (2) out of mounting for control units (3).

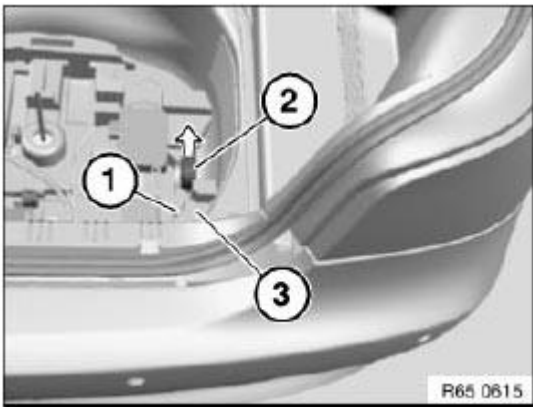


Fig. 39: Identifying Plug Connection, Fan And Control Units

Courtesy of BMW OF NORTH AMERICA, INC.

SPEAKER AND COVER

65 13 050 REMOVING AND INSTALLING/REPLACING SPEAKER (TWEETER, FRONT DOOR)

Necessary preliminary tasks:

- Detach COVER ON DOOR WINDOW FRAME IN FRONT AREA.

NOTE: For purposes of clarity, illustration shows cover removed on door window

frame.

Remove foam wedge (1) from cover on door window frame (2).

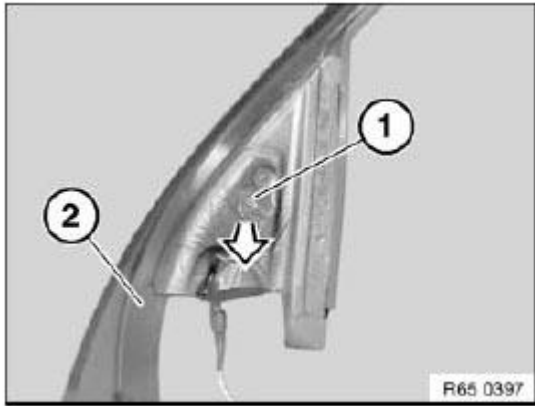


Fig. 40: Removing Foam Wedge

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock catches (1) and remove speaker (2) from cover on door window frame (3).

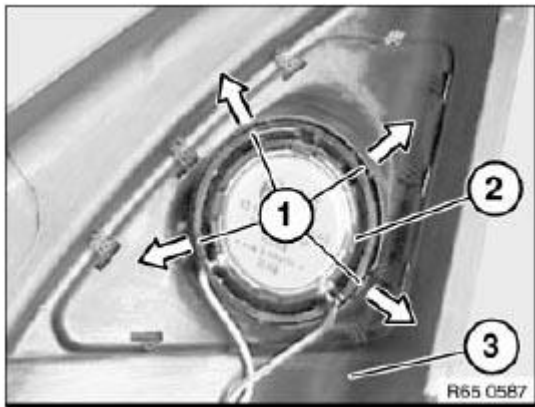


Fig. 41: Unlocking Catches

Courtesy of BMW OF NORTH AMERICA, INC.

65 13 060 REMOVING AND INSTALLING/REPLACING SPEAKER (MID-RANGE SPEAKER, IN INSTRUMENT PANEL)

Necessary preliminary tasks:

- Remove **SPEAKER TRIM**

Release screws (1).

Remove speaker (2).

Disconnect plug connection underneath and remove speaker (2) towards top.

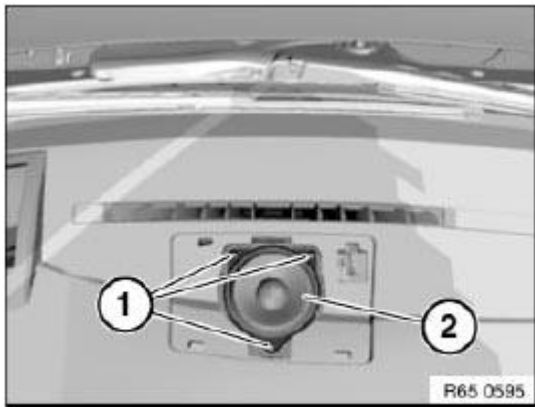


Fig. 42: Identifying Screws And Speaker
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 070 REMOVING AND INSTALLING/REPLACING SPEAKER (MID-RANGE SPEAKER, DOOR AT FRONT)

Necessary preliminary tasks:

- Remove **FRONT DOOR TRIM PANEL** .

Unscrew nuts (1).

Remove retaining plate (2) in direction of arrow.

Installation:

Retaining plate (2) must be positioned over pin (3).

Remove speaker (4) upwards out of front door trim panel (5).

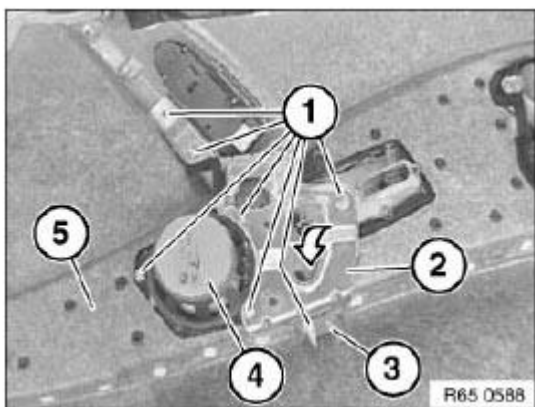


Fig. 43: Removing Retaining Plate

Courtesy of BMW OF NORTH AMERICA, INC.

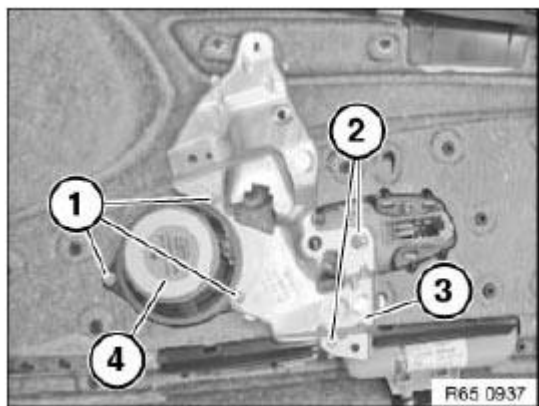
65 13 070 REMOVING AND INSTALLING/REPLACING SPEAKER (MID-RANGE SPEAKER, DOOR AT FRONT) (LONG VERSION)*Necessary preliminary tasks:*

- Remove **FRONT DOOR TRIM**

Unscrew nuts (1).

Release nut (2) and bend retaining plate (3) upwards slightly.

Feed speaker (4) upwards out of door trim panel and retaining plate.

**Fig. 44: Identifying Nuts, Retaining Plate And Speaker**

Courtesy of BMW OF NORTH AMERICA, INC.

65 13 090 REMOVING AND INSTALLING/REPLACING SPEAKER (MID-RANGE SPEAKER, DOOR AT REAR)*Necessary preliminary tasks:*

- Remove rear door trim panel. See **REMOVING AND INSTALLING REAR LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)** or **REMOVING AND INSTALLING REAR LEFT OR RIGHT DOOR TRIM PANEL (UP TO 03/2007)** .

Unscrew nuts (1).

Remove retaining plate (2) in direction of arrow.

Installation:

Retaining plate (2) must be positioned over pin (3).

Remove speaker (4) upwards out of rear door trim panel (5).

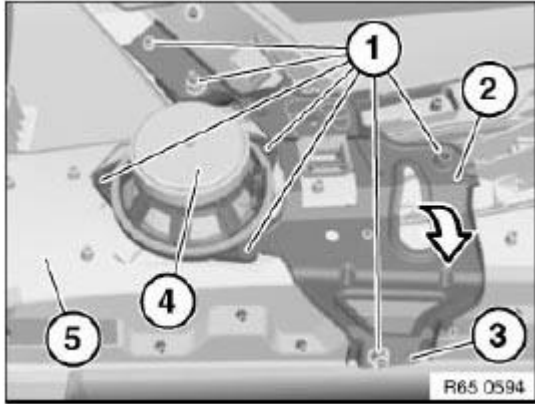


Fig. 45: Removing Retaining Plate

Courtesy of BMW OF NORTH AMERICA, INC.

65 13 188 REMOVING AND INSTALLING/REPLACING REAR MID-RANGE SPEAKER (IN REAR SHELF)

Special tools required:

00 9 341

Lever speaker cover (1) with special tool 00 9 341 out of rear shelf (2).

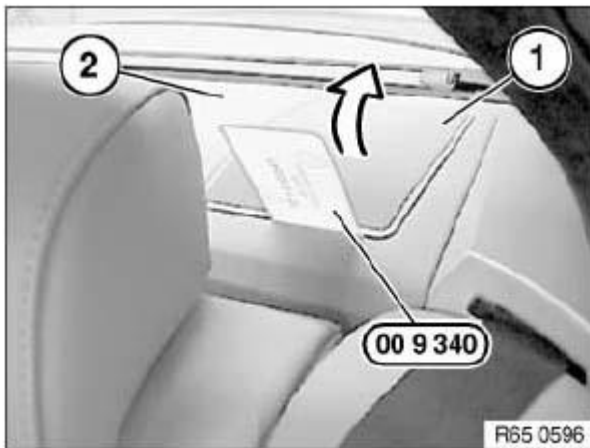


Fig. 46: Removing Speaker Cover With Special Tool 00 9 341 Of Rear Shelf

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lugs (1) and locks (2) of speaker cover (3) must not be damaged.

Make sure speaker cover (3) is fully engaged.

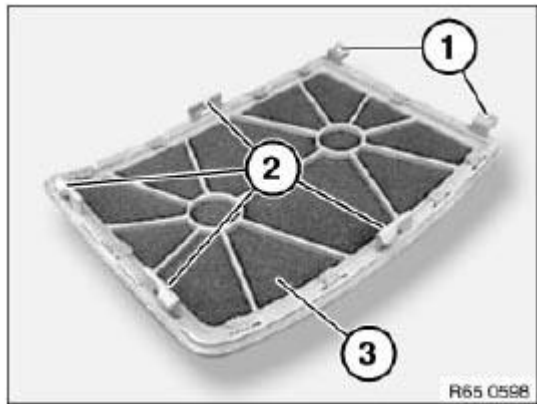


Fig. 47: Identifying Lugs, Locks And Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove mid-range speaker (2) upwards from rear shelf (3).

Disconnect associated plug connection and remove midrange speaker (2).

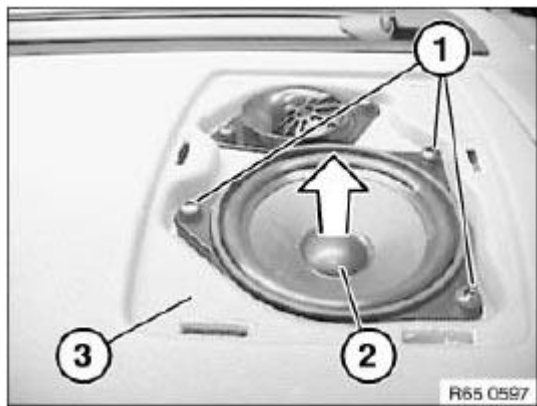


Fig. 48: Removing Mid-Range Speaker
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 195 REMOVING AND INSTALLING/REPLACING REAR TREBLE SPEAKER (IN REAR SHELF)

Necessary preliminary tasks:

- Remove **REAR MID-RANGE SPEAKER**

Disconnect plug connection (1).

Release screws (2).

Remove rear treble speaker (3) from rear shelf (4).

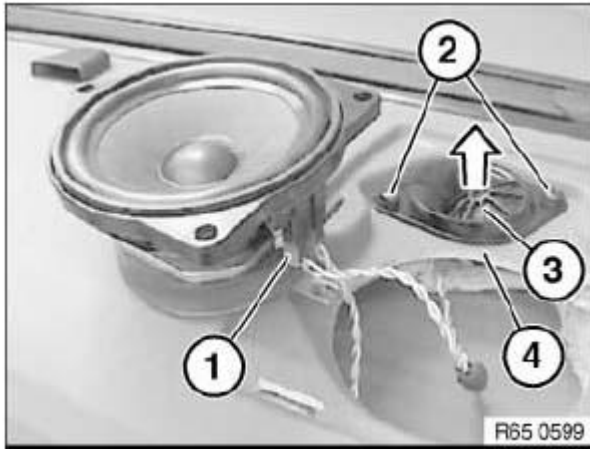


Fig. 49: Removing Rear Treble Speaker
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 400 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FREQUENCY GATE

Necessary preliminary tasks:

- Remove front door trim panel. See **REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)** or **REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (UP TO 03/2007)**

Disconnect plug connection (1).

Release screws (2) and remove frequency gate.

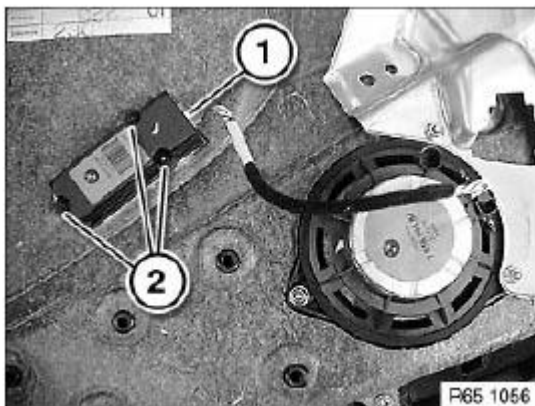


Fig. 50: Identifying Plug Connection And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

AERIAL/ANTENNA

65 20 090 REMOVING AND INSTALLING/REPLACING ANTENNA AMPLIFIER (DIVERSITY)

Necessary preliminary tasks:

- Remove **REAR RIGHT HEAD RESTRAINT** .
- Remove **PANEL FOR ROOF PILLAR AT REAR LEFT** .
- Remove **AUXILIARY BRAKE LIGHT COVER**
- If necessary, remove rear right **HANDLE**

IMPORTANT: Do not bend molded roofliner.

Unlock and disconnect catches (1) along line.

Disconnect plug connection (3, 4).

Feed out antenna amplifier (2).

Installation:

Make sure molded roofliner and antenna amplifier (2) are correctly engaged.

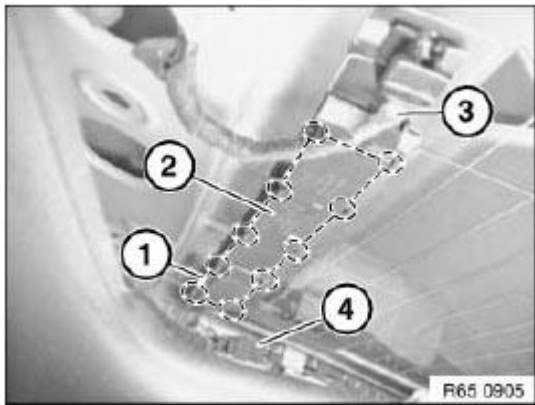


Fig. 51: Identifying Catches, Plug Connection And Antenna Amplifier
 Courtesy of BMW OF NORTH AMERICA, INC.

65 20 150 REMOVING AND INSTALLING/REPLACING BACKUP ANTENNA

Necessary preliminary tasks:

- Remove **PANEL FOR PARCEL SHELF** .

Unfasten plug connection (1) and disconnect.

Loosen screws (2).

Remove back-up antenna (3) towards top from parcel shelf (4).

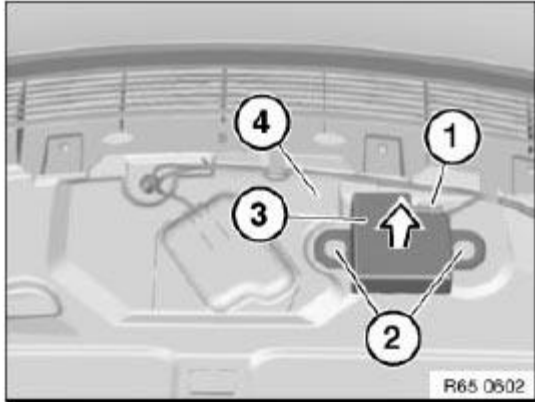


Fig. 52: Removing Back-Up Antenna
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 350 REMOVING AND INSTALLING/REPLACING SUPPRESSION FILTER

Necessary preliminary tasks:

- Remove **PANEL FOR PARCEL SHELF** .

Disconnect plug connections (1).

Release screw (2).

Remove suppression filter (3) from C-pillar (4).

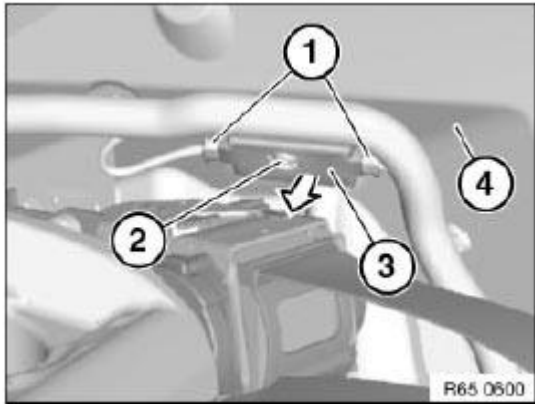


Fig. 53: Removing Suppression Filter

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit suppression filter (1) so that screw (2) engages thread (3) and locating pin (4) engages bore (5).

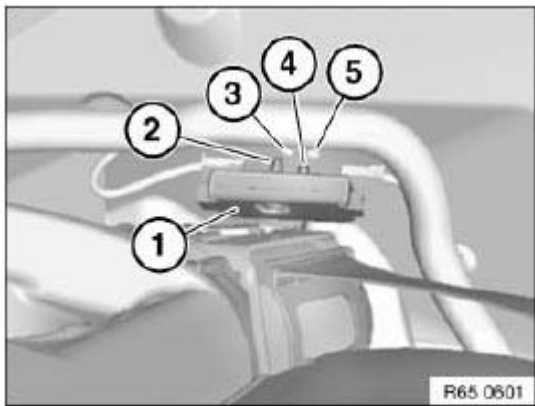


Fig. 54: Identifying Filter, Screw, Thread, Pin And Bore

Courtesy of BMW OF NORTH AMERICA, INC.

REAR WINDOW AERIAL/ANTENNA

65 24 030 REMOVING AND INSTALLING/REPLACING A TV AMPLIFIER

Necessary preliminary tasks:

- Remove **CAPPING IN LUGGAGE COMPARTMENT ON LEFT OR RIGHT**

NOTE: Illustrations show removal of the TV amplifier on the left side. The TV amplifier on the right side is removed in the same way.

Unlock and disconnect plug connection (1) and antenna wire (2).

Release screw (3).

Remove TV amplifier (4) in direction of arrow.

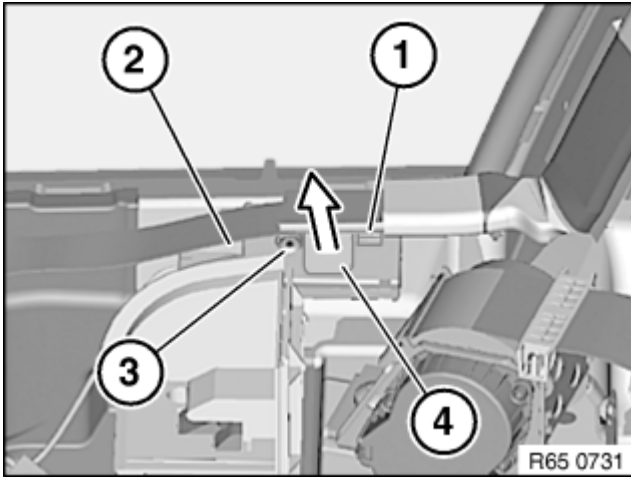


Fig. 55: Identifying Plug Connection, Antenna Wire, And TV Amplifier
Courtesy of BMW OF NORTH AMERICA, INC.

65 24 100 REMOVING AND INSTALLING/REPLACING ANTENNA (AM SENSOR)

Necessary preliminary tasks:

- Remove **REAR SPOILER**

Detach antenna (1) from rear spoiler (2).

Installation:

- Clean adhesive area thoroughly.
- Component and ambient temperatures during bonding at least 18 °C.

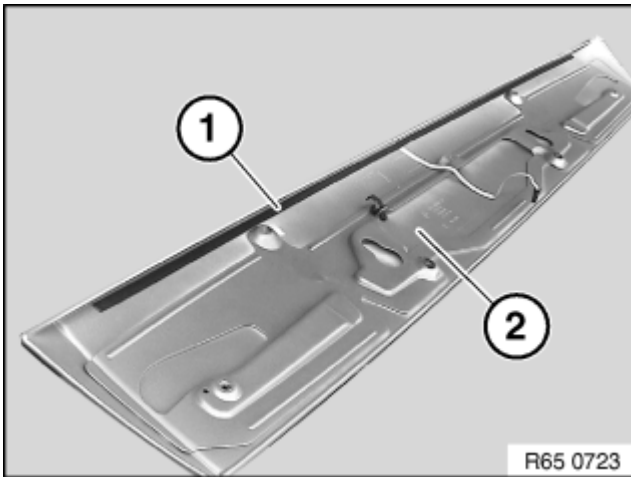


Fig. 56: Locating Antenna On Spoiler

Courtesy of BMW OF NORTH AMERICA, INC.

VIDEO AND TV SETS, CENTRAL INFORMATION DISPLAY (CID)

65 50 011 REMOVING AND INSTALLING (REPLACING) VIDEO MODULE FOR ON-BOARD MONITOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Disconnect BATTERY NEGATIVE LEAD
- Remove LUGGAGE COMPARTMENT TRIM ON LEFT SIDE PANEL

NOTE: Follow instructions for HANDLING OPTICAL FIBRES .

Release screws (1).

Remove storage compartment (2) in direction of arrow from holder (3).

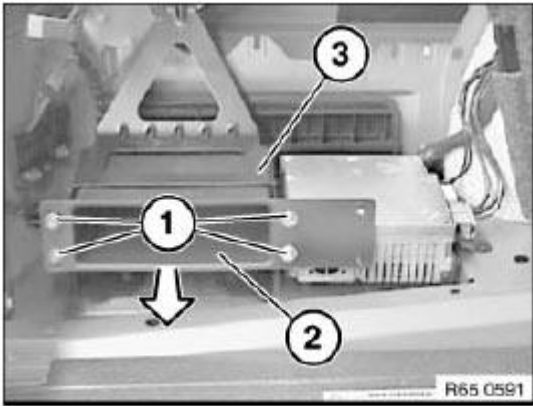


Fig. 57: Removing Storage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Do not mix up antenna connectors (1).

Mark antenna plugs (1) and disconnect.

Unfasten plug connection (2) and disconnect.

Release screws (3).

Remove video module for on-board monitor (4) in direction of arrow.

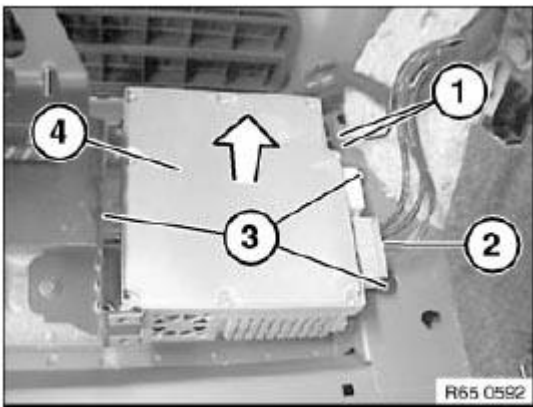


Fig. 58: Removing Video Module For On-Board Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1) and remove holder (2) from video module for on-board monitor (3).

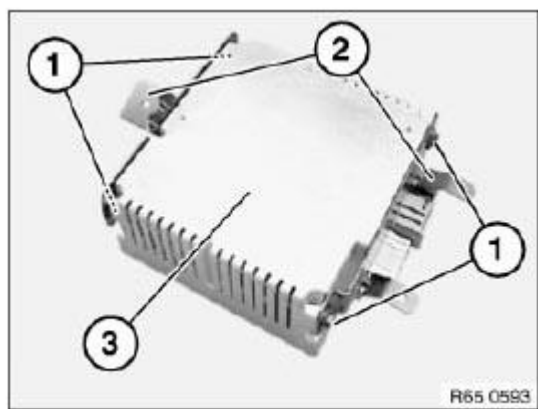


Fig. 59: Identifying Screws, Holder And On-Board Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

65 50 125 REMOVING AND INSTALLING LEFT OR RIGHT REAR CABIN MONITOR (LONG VERSION)

Necessary preliminary tasks:

- Remove upper rear panel from front seat backrest. See **REMOVING AND INSTALLING/REPLACING MONITOR PANEL HOLDER ON LEFT OR RIGHT FRONT SEAT BACKREST (LONG VERSION)** or **REMOVING AND INSTALLING/REPLACING BOTH REAR PANELS ON LEFT OR RIGHT FRONT SEAT BACKREST (LONG VERSION)** .

Release screws (1) on both side and lift out monitor (2).

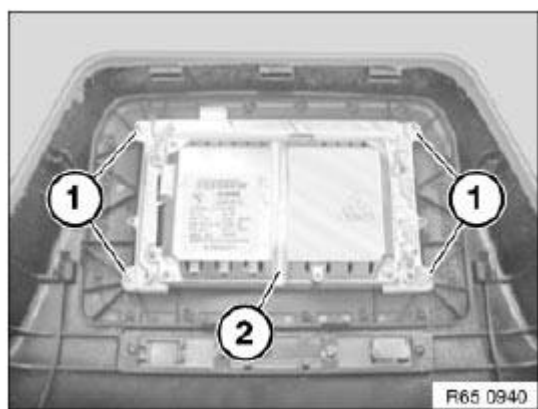


Fig. 60: Identifying Screws And Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

ANTI-THEFT ALARM SYSTEM

65 75 055 REMOVING AND INSTALLING/REPLACING EMERGENCY POWER SIREN WITH TILT SENSOR

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM CARRIER**

Release nut (1) and remove emergency power siren (2).

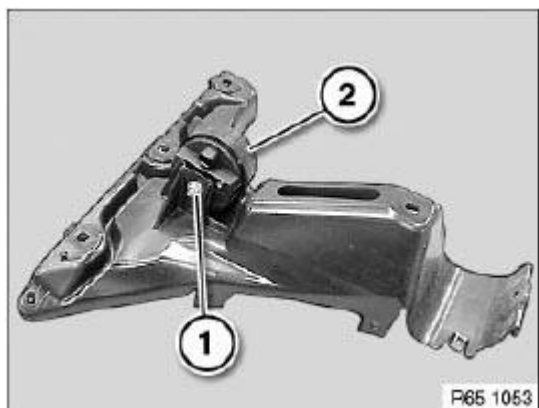


Fig. 61: Identifying Nut And Emergency Power Siren
Courtesy of BMW OF NORTH AMERICA, INC.

65 75 071 REMOVING AND INSTALLING (REPLACING) MODULE FOR PASSENGER COMPARTMENT SENSOR

Special tools required:

- 00 9 340**

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) !

Lever out trim (1) with special tool **00 9 340** and remove.

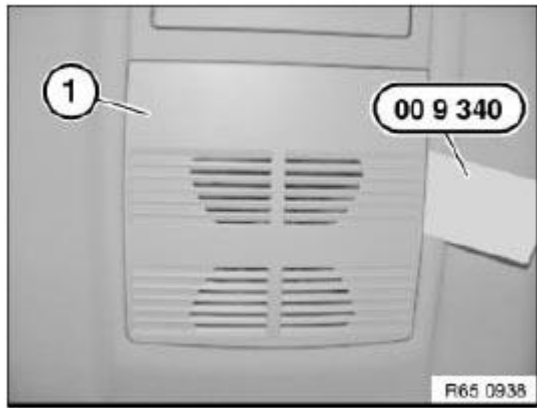


Fig. 62: Removing Trim With Special Tool 00 9 340
 Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove module for passenger compartment sensor with trim.

Replacement:

Open retaining lugs (2) and remove module (3).

Installation:

Arrow (4) printed on module for passenger compartment sensor must be aligned in direction of arrow.

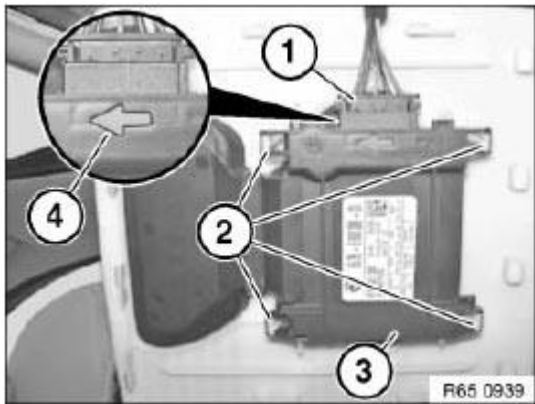


Fig. 63: Identifying Plug Connection, Retaining Lugs And Module
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

AIRBAG TRIGGER UNIT, DIAGNOSTICS

65 77... NOTES ON SCRAPPING BMW VEHICLES WITH GAS GENERATORS (CENTRAL AIRBAG CONTROL UNIT, AIRBAG SYSTEM)

The gas generator is a pyrotechnic component of:

- Airbag module
 - Driver's/passenger airbag
 - Side airbags
 - Head airbag
 - Knee airbag
- Belt pretensioner
- Belt buckle tensioner
- Safety battery terminal

1 Series: E81, E82, E87, E88

3 Series: E46, E90, E91, E92, E93

5 Series: E60, E61 from build date 09/2005

6 Series: E63, E64 from build date 09/2005

X3: E83

X5: E53, E70

Z4: E85, E86

Gas generators that have not fired constitute a hazard (also to the environment)!

In accordance with accident prevention regulations and specific national regulations, gas generators must be rendered unusable before they are scrapped. This is necessary because pyrotechnical objects can cause injury if improperly activated (e.g. scrapping with flame cutters).

With above-mentioned vehicles which are scheduled for scrapping, it is always essential prior to draining and further stripping work to ensure that **all** the gas generators **in the vehicle** are fired. The fired gas generators can then be scrapped together with the vehicle.

Triggering failure

If correct triggering is not possible, the relevant components must (while observing the safety regulations for handling airbag system components) be removed and disposed of by special disposal companies!

If a triggering operation has failed:

- Disconnect the triggering device from the battery and
- only approach the vehicle after a few minutes have elapsed

The components of an airbag system must always be disposed of. Such components must not be sold on as

used parts.

Triggering

Triggering of the gas generators may only be carried out by expert personnel and under the supervision of a responsible person. Other standard accident prevention regulations (safety goggles, ear defenders etc.) must also be observed.

The gas generators must be fired from the outside in the vehicle scheduled for scrapping with the doors closed but with the tailgate, door windows and sunroof open. To fire the gas generators, use the BMW-developed triggering device with the corresponding cables.

WARNING: Once gas generators have been fired, observe a ventilation period of 10 minutes with the doors opened. Only then is it permitted to continue work inside the vehicle.

Wear protective goggles and protective gloves when handling a fired gas generator!

The burning of solid fuel will heat up airbag unit - danger of burning hands!

Wash skin with water after contact with fired gas generators!

1. Vehicles with central airbag control unit (all airbags, seat belt pretensioners, safety battery terminal)

1.1 Expose AIRBAG CONTROL UNIT.

1.2 Connect "Airbagmaster". For subsequent procedure, refer to SEDA operating instructions.

65 77... NOTES ON SCRAPPING BMW VEHICLES WITH GAS GENERATORS (VEHICLES WITH GATEWAY MODULE, AIRBAG SYSTEM, UP TO BUILD DATE 09/2005)

The gas generator is a pyrotechnic component of:

- Airbag module
 - Driver's/passenger airbag
 - Side airbags
 - Head airbag
 - Knee airbag
- Belt tensioner
- Belt buckle tensioner
- Safety battery terminal

5 Series: E60, E61

6 Series: E63, E64

Gas generators that have not fired constitute a hazard (also to the environment)!

In accordance with accident prevention regulations and specific national regulations, gas generators must be rendered unusable before they are scrapped. This is necessary because pyrotechnical objects can cause injury if improperly activated (e.g. scrapping with flame cutters).

With above-mentioned vehicles which are scheduled for scrapping, it is always essential prior to draining and further stripping work to ensure that **all** the gas generators **in the vehicle** are fired. The fired gas generators can then be scrapped together with the vehicle.

Firing failure

If correct firing is not possible, the relevant components must (while observing the safety regulations for handling airbag system components) be removed and disposed of by special disposal companies!

If a firing operation has failed:

- Disconnect the firing device from the battery and
- only approach the vehicle after a few minutes have elapsed

The components of an airbag system must always be disposed of. Such components must not be sold on as used parts.

Firing

Firing of the gas generators may only be carried out by expert personnel and under the supervision of a responsible person. Other standard accident prevention regulations (safety goggles, ear defenders etc.) must also be observed.

The gas generators must be fired from the outside in the vehicle scheduled for scrapping with the doors closed but with the tailgate, door windows and sunroof open. To fire the gas generators, use the BMW-developed firing device with the corresponding cables.

WARNING: Once gas generators have been fired, observe a ventilation period of 10 minutes with the doors opened. Only then is it permitted to continue work inside the vehicle.

Wear protective goggles and protective gloves when handling a fired gas generator!

The burning of solid fuel will heat up airbag unit - danger of burning hands!

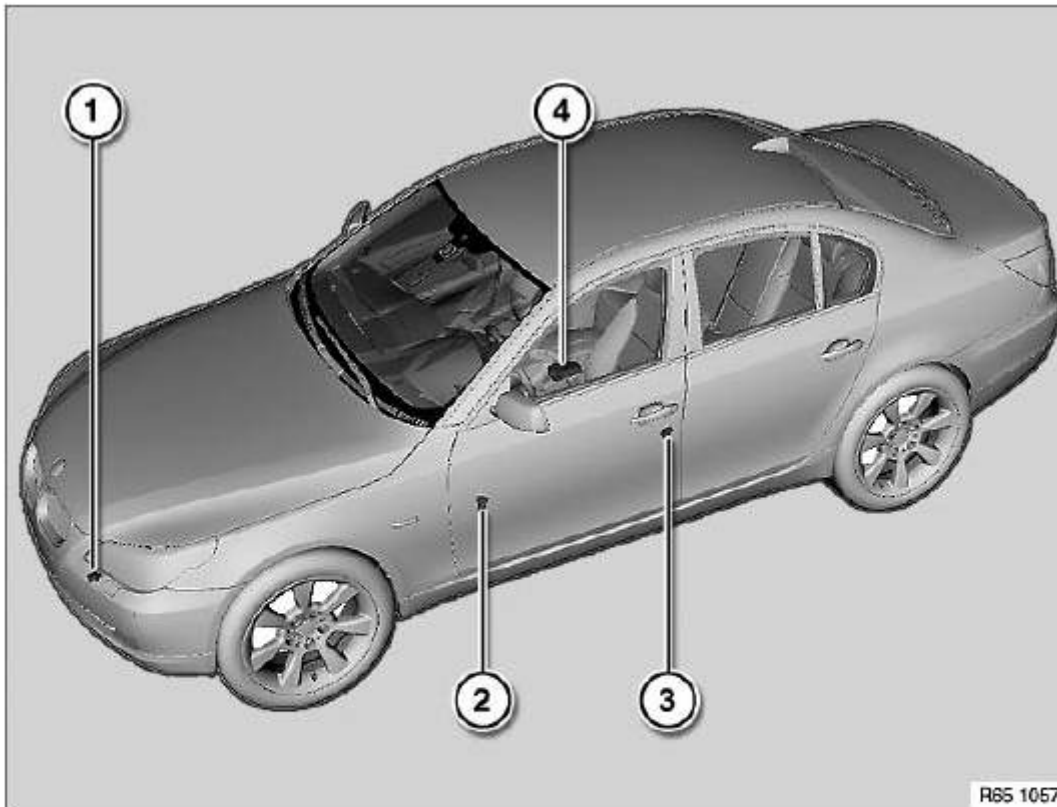
Wash skin with water after contact with fired gas generators!

1. Vehicles with gateway module (all airbags, seat belt tensioners, safety battery terminal)

1.1 Expose **AIRBAG PLUG CONNECTIONS**.

1.2 Connect "Airbagmaster". For subsequent procedure, refer to SEDA operating instructions.

65 77... OVERVIEW OF SENSORS FOR AIRBAG SYSTEM (FROM 09/2005)



R65 1057

1. Acceleration sensors, front (left/right, US version only)
2. Sensor, front door (left/right)
3. Sensor, B-pillar (left/right)
4. Airbag control unit (under centre console)

Fig. 64: Overview Of Sensors For Airbag System
 Courtesy of BMW OF NORTH AMERICA, INC.

65 77 016 REMOVING AND INSTALLING/REPLACING AIRBAG CONTROL UNIT (BUILD DATE FROM 09/2005)

WARNING: Note AIRBAG SAFETY INSTRUCTIONS !
 Incorrect handling can activate airbag and cause injury.

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

Necessary preliminary tasks:

- Disconnect BATTERY NEGATIVE LEAD
- Remove CENTER CONSOLE

If necessary, remove rear compartment air duct and disconnect associated plug connections.

Disconnect plug connection (1).

Release screws (2) and remove airbag control unit (3).

Tightening torque **65 77 1AZ** .

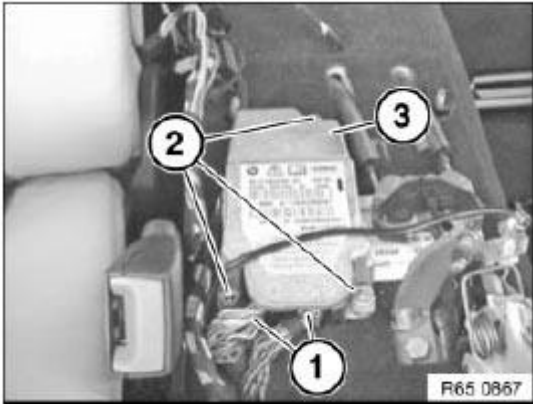


Fig. 65: Identifying Plug Connection, Screws And Airbag Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 541 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT ACCELERATION SENSOR

NOTE: **Acceleration sensor only fitted in US version!**

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM**

Disconnect plug connection (1).

Release screws (2) and remove acceleration sensor (3).

Installation:

Tightening torque **65 77 9AZ** .

Replace screws (2).

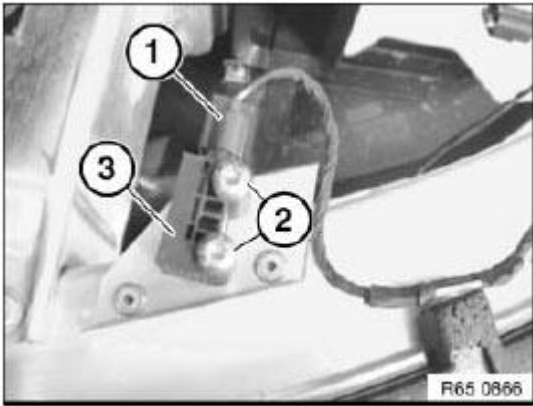


Fig. 66: Identifying Plug Connection, Screws And Acceleration Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

65 77 560 REMOVING AND INSTALLING/REPLACING CONTROL ELECTRONICS FOR PASSENGER SEAT OCCUPANCY DETECTOR

Necessary preliminary tasks:

- Move seat into most upward position.

NOTE: **Seat shown removed for purposes of clarity.**

Unlock plug connections (1) and disconnect.

Unlock catch (2) and remove control electronics for passenger seat occupancy detector (3) in direction of arrow from seat frame (4).

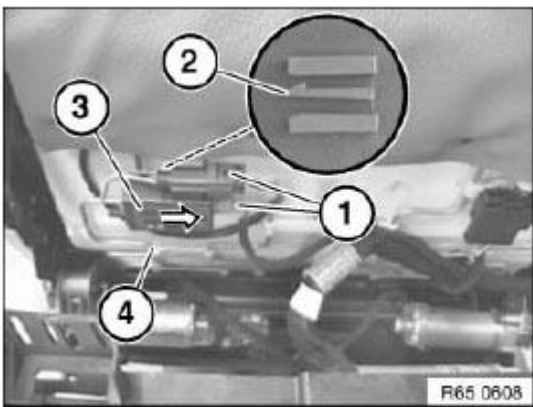


Fig. 67: Removing Control Electronics For Passenger Seat Occupancy Detector

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hook (1) of control electronics for passenger seat occupancy detector (2) must not be damaged.

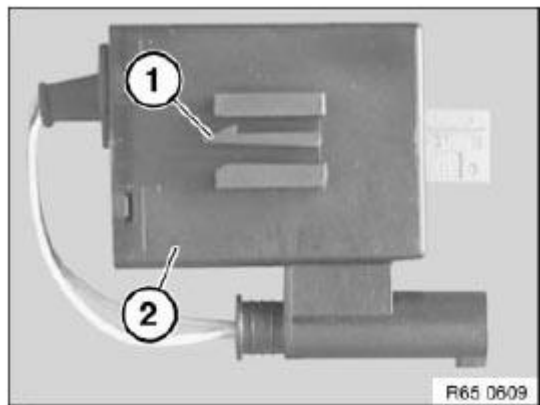


Fig. 68: Identifying Hook And Passenger Seat Occupancy Detector
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 598 REPLACING SENSOR MAT FOR DRIVER'S SEAT OCCUPANCY DETECTOR

Necessary preliminary tasks:

Remove seat cover for front seat. See **REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (NORMAL/SEMI-ELECTRIC)** , **REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (NORMAL/ELECTRIC)** , **REMOVING AND INSTALLING/REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (SPORT/ELECTRIC)** , or **REMOVING AND INSTALLING/REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (COMFORT)** .

NOTE: The comfort seat with air conditioning is shown.

Remove sensor mat for driver's seat occupancy detector (1) from padding (2).

IMPORTANT: To avoid malfunctions, make sure sensor mat (1) is cleanly laid:

- Lay plug-in connection in designated recess.
- Lay sensor mat (1) straight and without kinks (large bending radii).

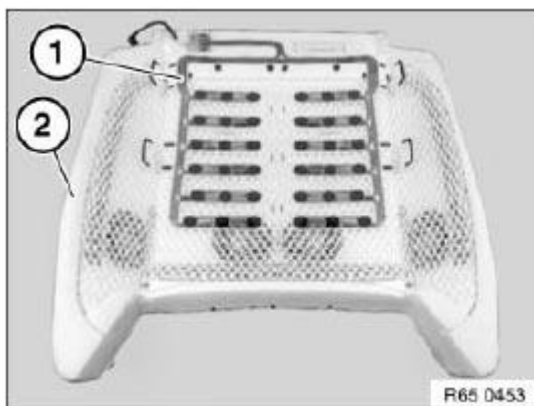


Fig. 69: Identifying Sensor Mat For Driver Seat Occupancy Detector And Padding

Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, secure sensor mat (1) with adhesive tape provided.

65 77 600 REPLACING SENSOR MAT FOR PASSENGER SEAT OCCUPANCY DETECTOR

WARNING: US/CDN front passenger seat (with OC3 mat) only:

The padding can only be removed in conjunction with the OC3 mat.

If padding is defective, both parts may only be replaced together.

After fitting new padding, enable OC3 mat with BMW diagnosis system.

The operation for removing the padding with/without OC3 mat is described in:

Replacing seat cover for front seat. See REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (NORMAL/SEMI-ELECTRIC) , REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (NORMAL/ELECTRIC) , REMOVING AND INSTALLING/REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (SPORT/ELECTRIC) , or REMOVING AND INSTALLING/REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (COMFORT) .

Enabling seat occupancy detector (OC3 mat):

- Connect BMW diagnosis system
- Release seat occupancy detector
- Clear fault memory if necessary

NOTE: The comfort seat with air conditioning is shown.

Remove sensor mat for driver's seat occupancy detector (1) from support (2).

IMPORTANT: To avoid malfunctions, make sure sensor mat (1) is cleanly laid:

- Lay plug-in connection in designated recess.
- Lay sensor mat (1) straight and without kinks (large bending radii).

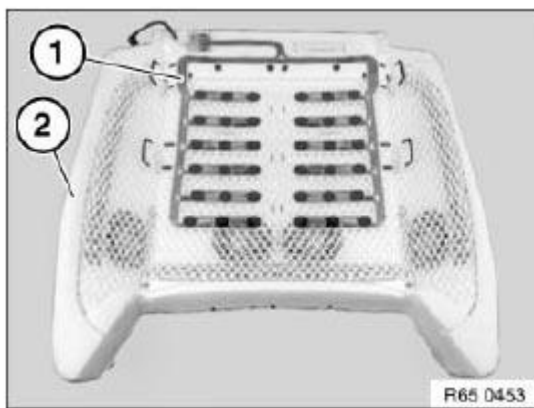


Fig. 70: Identifying Sensor Mat For Driver Seat Occupancy Detector And Support (2)

Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, secure sensor mat (1) with adhesive tape provided.

This operation is described in:

"Replacing SENSOR MAT FOR DRIVER'S SEAT OCCUPANCY DETECTOR."

65 77 602 REPLACING SENSOR MAT (OC3 MAT) FOR PASSENGER SEAT OCCUPANCY

WARNING: US/CDN front passenger seat (with OC3 mat) only: The OC3 mat can only be removed in conjunction with the padding from the seat cover. If OC3 mat or padding is defective, both parts may only be replaced together. After fitting seat cover, enable OC3 mat with BMW diagnosis system.

The operation for removing the OC3 mat is described in:

52 17 415 REPLACING SUPPORT FOR LEFT OR RIGHT FRONT SEAT (COMFORT)

52 14 415 REPLACING SUPPORT FOR LEFT OR RIGHT FRONT SEAT (NORMAL/ELECTRIC)

52 13 400 REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (NORMAL/SEMI-ELECTRIC)

65 77 680 REMOVING AND INSTALLING (REPLACING) AIRBAG CONTROL UNIT WITH GATEWAY MODULE

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS!
Incorrect handling can activate airbag and cause injury.

NOTE: FOLLOW INSTRUCTIONS FOR HANDLING OPTICAL FIBERS .

Necessary preliminary tasks:

- DISCONNECT BATTERY NEGATIVE LEAD and cover
- Remove TRIM FOR INSTRUMENT PANEL at bottom right

Unlock catches (1) in direction of arrow.

Pull airbag control unit with gateway module (2) out of equipment carrier (3) slightly.

Unlock plug connections (4) and disconnect.

Remove airbag control unit with gateway module (2).

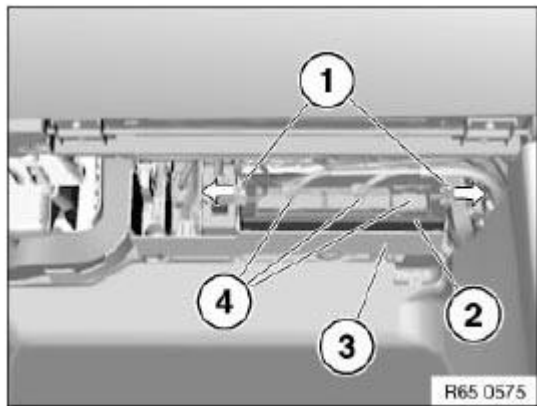


Fig. 71: Removing Airbag Control Unit With Gateway Module
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out PROGRAMMING/CODING .

65 77 720 REMOVING AND INSTALLING (REPLACING) LEFT B-PILLAR SENSOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS!
Incorrect handling can activate airbag and cause injury.

NOTE: Follow instructions for HANDLING OPTICAL FIBERS .

Necessary preliminary tasks:

- DISCONNECT BATTERY NEGATIVE LEAD and cover
- Remove TRIM PANEL FOR DOOR PILLAR (bottom)

Slacken screws (1)

Release screw (2).

Installation:

Tightening torque **65 77 5AZ** .

Raise B-pillar sensor (3) slightly through opening in B-pillar and feed out towards rear.

Unclip cable duct (4) at points (5).

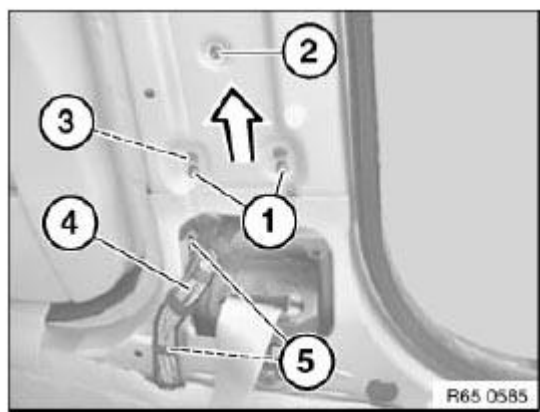


Fig. 72: Identifying Screws, B-Pillar Sensor, Cable Duct And Points
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Feed B-pillar sensor (2) in direction of arrow out of B-pillar (3) and remove.

Installation:

Make sure electrical leads are correctly routed.

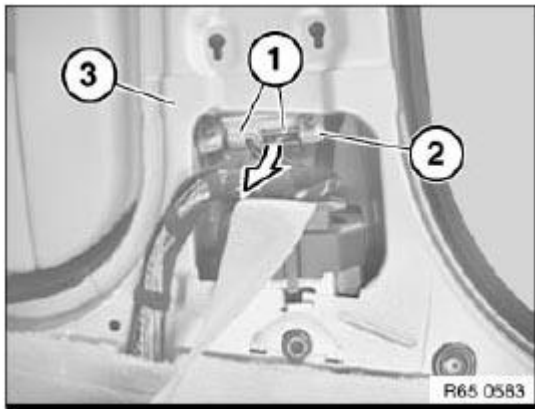


Fig. 73: Feeding B-Pillar Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure metal nut (1) is correctly positioned on B-pillar sensor (2).

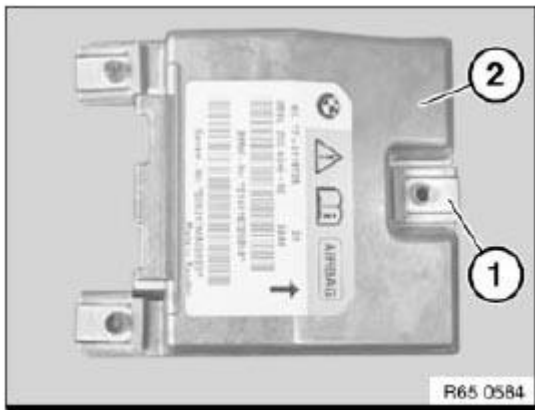


Fig. 74: Identifying Metal Nut And B-Pillar Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

65 77 720 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT B-PILLAR SENSOR (FROM 09/2005)

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**

Remove **TRIM PANEL FOR DOOR PILLAR** (bottom)

Release screw (1).

Slacken screw (2) and feed out B-pillar sensor in downward direction.

Tightening torque **65 77 5AZ** .

Installation:

Make sure centering pin (3) is correctly seated.

Replace screws (1 and 2).

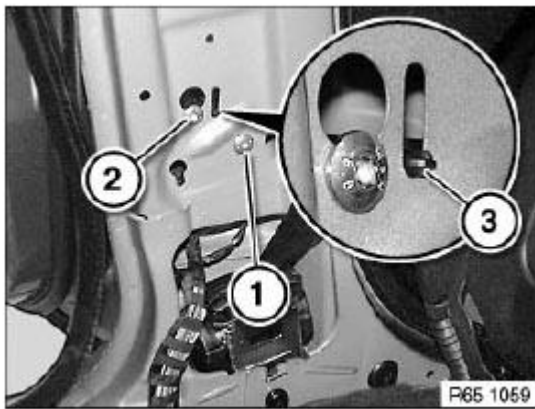


Fig. 75: Identifying Screws And Centering Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove B-pillar sensor.

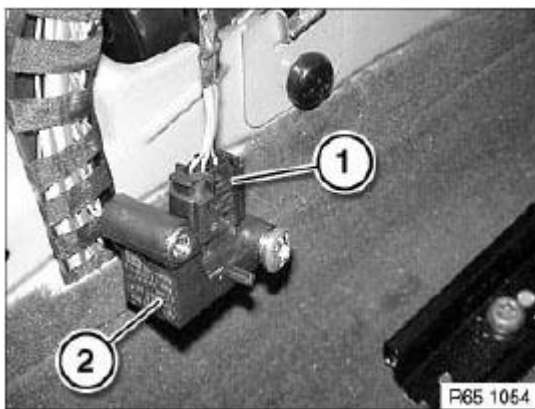


Fig. 76: Identifying Plug Connection And B-Pillar Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 730 REMOVING AND INSTALLING (REPLACING) VEHICLE CENTER SENSOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS!
Incorrect handling can activate airbag and cause injury.

NOTE: Follow instructions for HANDLING OPTICAL FIBERS .

Necessary preliminary tasks:

- DISCONNECT BATTERY NEGATIVE LEAD and cover
- Remove CENTER CONSOLE

NOTE: Middle rear compartment ventilation duct shown removed for purposes of clarity.

Unfasten plug connection (1) and disconnect.

Release screws (2), tightening torque 65 77 6AZ .

Remove vehicle center sensor (3).

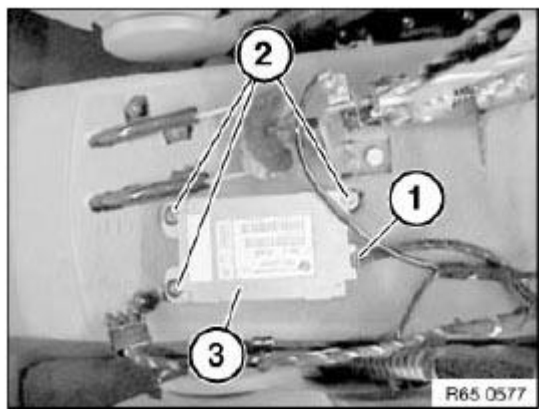


Fig. 77: Identifying Plug Connection, Screws And Vehicle Center Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out PROGRAMMING/CODING .

65 77 740 REMOVING AND INSTALLING (REPLACING) LEFT FRONT DOOR SENSOR

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS!**Incorrect handling can activate airbag and cause injury.****IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) !***Necessary preliminary tasks:*

- Remove front door trim. See **REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)** or **REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (UP TO 03/2007)** .
- Detach **SOUND INSULATION** in work area

Release screw (1) and remove front door sensor (2) from door.

Disconnect plug connection (3).

Installation:

Make sure rubber ring and sensor are securely seated.

Tightening torque **65 77 7AZ** .

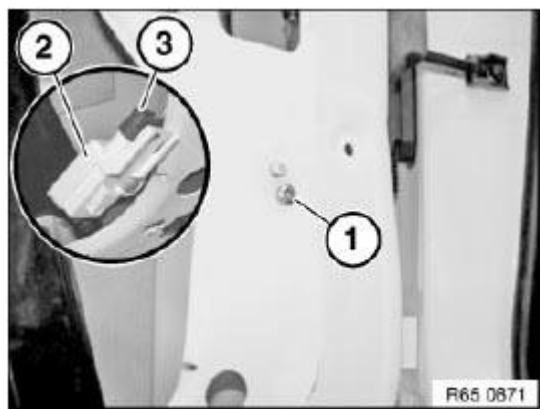
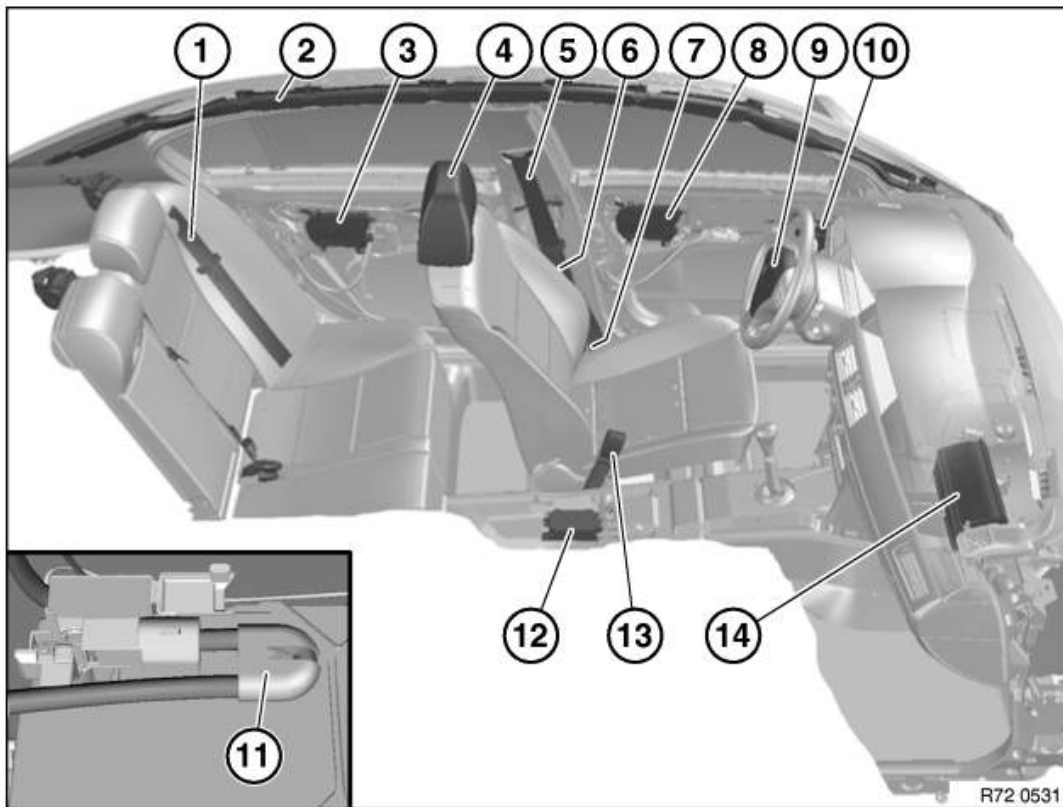


Fig. 78: Identifying Screw, Front Door Sensor And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

72 12... OVERVIEW OF AIRBAG MODULES, SEAT BELTS AND AIRBAG CONTROL UNITS



- | | |
|--|--|
| 1 Seat belt, rear, complete | 8 Airbag module, door, front left/right |
| 2 Head airbag, left/right | 9 Airbag unit, driver's side |
| 3 Airbag module, door, rear left/right | 10 Door module, driver/front passenger |
| 4 Active head restraint, front left/right | 11 Safety battery terminal |
| 5 Seat belt, front left/right | 12 Satellite, vehicle center |
| 6 Satellite, B-pillar, left/right | 13 Seat belt tensioner, front left/right |
| 7 ECE only: Anchor fitting tensioner, driver's side | 14 Airbag module, front passenger side |

Fig. 79: Overview Of Airbag Modules, Seat Belts And Airbag Control Units

Courtesy of BMW OF NORTH AMERICA, INC.

ON-BOARD COMPUTER

65 81 060 REMOVING AND INSTALLING/REPLACING OUTSIDE TEMPERATURE SENSOR

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM**

Disconnect plug connection (1).

Unclip outside temperature sensor (2) in direction of arrow from mounting and remove.

Installation:

Make sure outside temperature sensor (2) is correctly engaged.

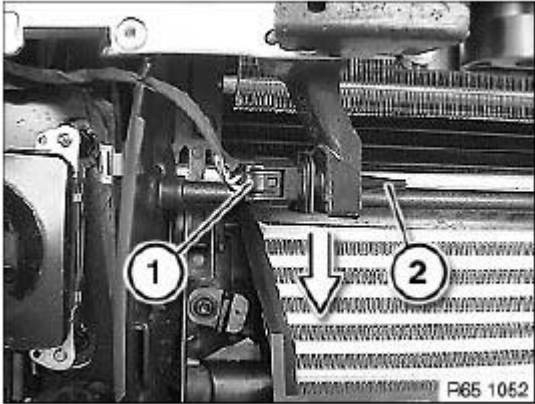


Fig. 80: Unclipping Outside Temperature Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 81 060 REMOVING AND INSTALLING/REPLACING OUTSIDE TEMPERATURE SENSOR (UP TO 03/2007)

Necessary preliminary tasks:

- Remove **FRONT UNDERBODY PROTECTION**

Disconnect plug connection (1).

Unclip outside temperature sensor (2) in direction of arrow from mounting and remove.

Installation:

Make sure outside temperature sensor (2) is correctly engaged.

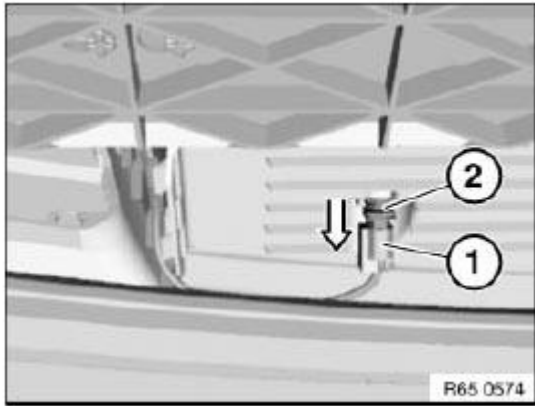


Fig. 81: Unclipping Outside Temperature Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

CENTRAL DISPLAY AND OPERATING UNIT

65 82 050 REMOVING AND INSTALLING (REPLACING) ONBOARD MONITOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

IMPORTANT: Proceed with care so as to avoid damaging the onboard monitor and adjoining trims.

Release screws (1).

Fold out on-board monitor (2) in direction of arrow.

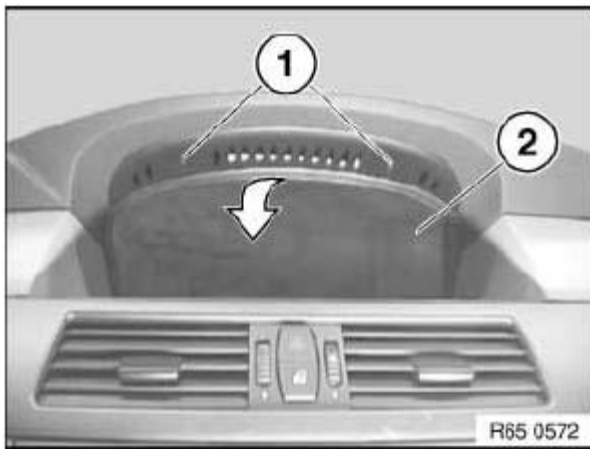


Fig. 82: Folding Out On-Board Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Installation:

Ensure correct cable routing.

Remove on-board monitor (2).

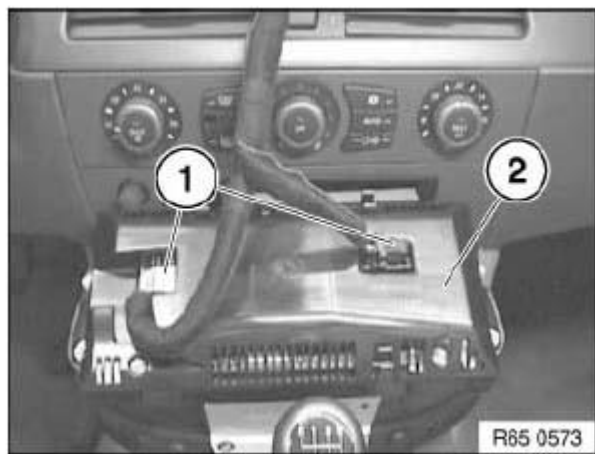


Fig. 83: Identifying Plug Connection And On-Board Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

65 82 XX1 REPLACING FRONT TRIM PANEL OF CENTRAL INFORMATION DISPLAY (CID), (09/2009-)

NOTE: Front trim panel can only be replaced on versions without glass cover from 09/2009 on.

Necessary preliminary tasks:

- Remove **Central Information Display**.

Release screws (1) and remove front trim panel (2).

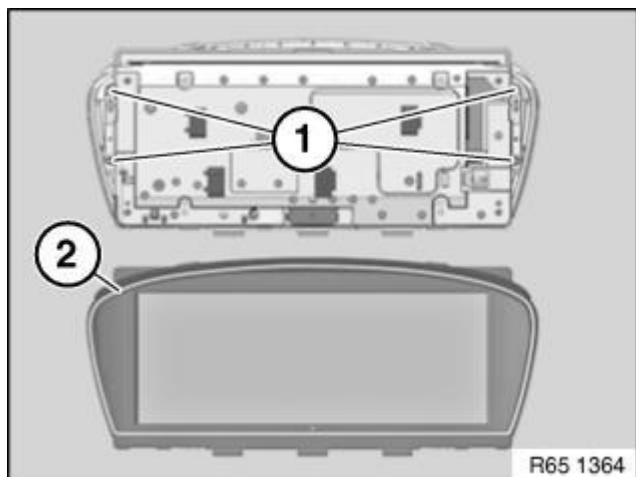


Fig. 84: Release Screws (1) And Remove Front Trim Panel (2)
Courtesy of BMW OF NORTH AMERICA, INC.

CAR COMMUNICATION COMPUTER

65 83... REMOVING AND INSTALLING (REPLACING) CAR INFORMATION COMPUTER (CIC)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Necessary preliminary tasks:

- Disconnect BATTERY NEGATIVE LEAD
- Remove CENTRAL TRIM FOR INSTRUMENT PANEL

Release screws (1).

Pull CIC (2) forwards a little.

Unlock associated plug connections and disconnect.

Remove CIC (2).

Installation:

Make sure CIC (2) is correctly seated in guide lugs (3).

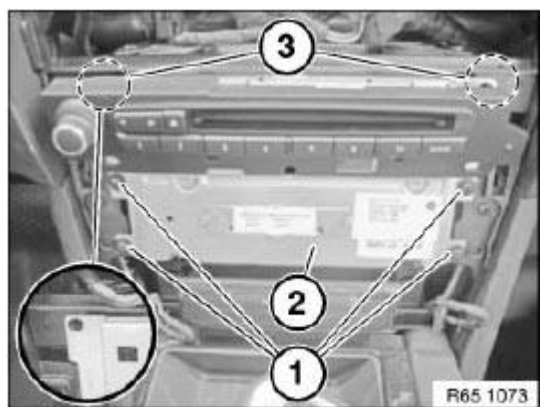


Fig. 85: Identifying Screws, CIC And Guide Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out PROGRAMMING/CODING .

65 83... REMOVING AND INSTALLING/REPLACING FRONT TRIM FOR CAR INFOTAINMENT

IMPORTANT: Risk of damage! A hard disk is installed in the Car Information Computer (CIC). Carry out mechanical work on the CIC and adjacent components with care. Avoid subjecting the CIC to shaking/shocks.

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

Remove middle trim for instrument panel. See REMOVING AND INSTALLING (REPLACING) CENTRE INSTRUMENT PANEL TRIM (FROM 03/2007) , REMOVING AND INSTALLING (REPLACING) CENTRE INSTRUMENT PANEL TRIM (UP TO 03/2007) , or REMOVING AND INSTALLING/REPLACING CENTRE (BOTTOM) INSTRUMENT PANEL TRIM .

Carefully raise catch (1) with a suitable tool in direction of arrow. Feed out front trim for Car Information Computer to right and remove.

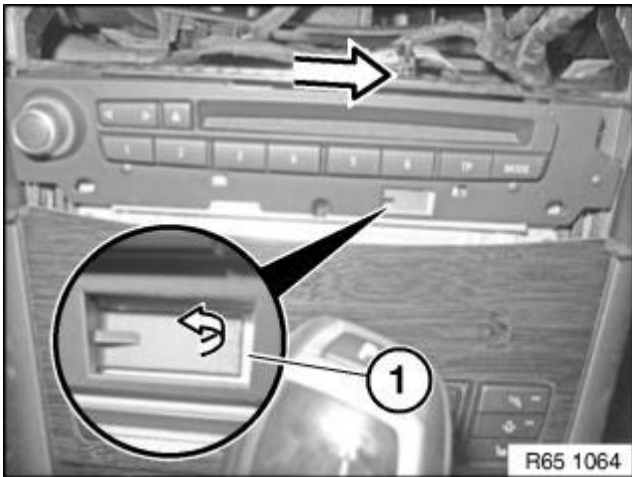


Fig. 86: Carefully Raise Catch (1) With A Suitable Tool In Direction Of Arrow
 Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1). Remove front trim of Car Information Computer. Installation: Make sure guides (2) are correctly seated in designated openings. Replace front trim if guides are damaged.

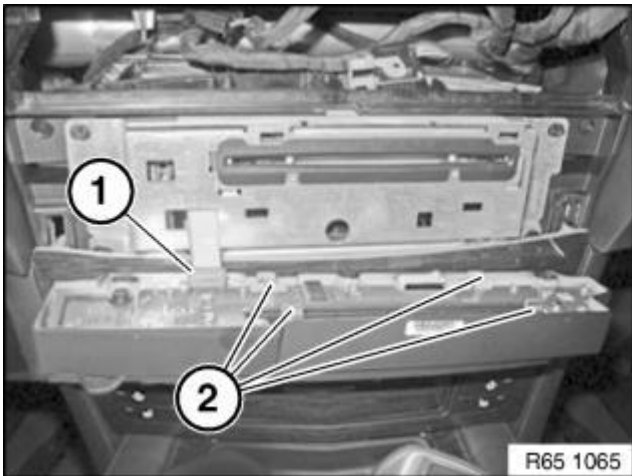


Fig. 87: Disconnect Plug Connection (1)
 Courtesy of BMW OF NORTH AMERICA, INC.

65 83 010 REMOVING AND INSTALLING/REPLACING CAR COMMUNICATION COMPUTER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Necessary preliminary tasks:

- Disconnect BATTERY NEGATIVE LEAD

Remove middle trim for instrument panel. See REMOVING AND INSTALLING (REPLACING) CENTRE INSTRUMENT PANEL TRIM (FROM 03/2007) , REMOVING AND INSTALLING (REPLACING) CENTRE INSTRUMENT PANEL TRIM (UP TO 03/2007) , or REMOVING AND INSTALLING/REPLACING CENTRE (BOTTOM) INSTRUMENT PANEL TRIM .

Release screws (1).

IMPORTANT: Do not scratch center console trim, cover if necessary.

Pull back Car Communication Computer (2) slightly.

Unlock associated plug connections and disconnect.

Remove Car Communication Computer (2).

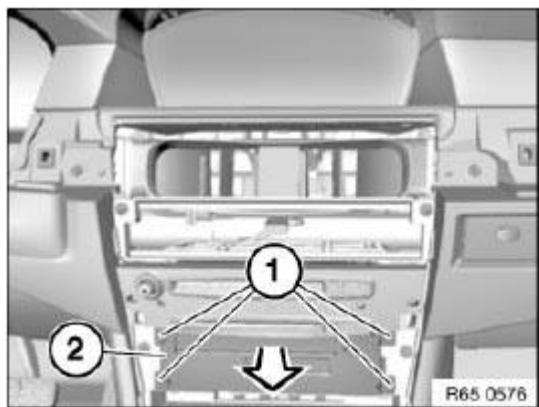


Fig. 88: Pulling Back Car Communication Computer Slightly
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out PROGRAMMING/CODING .

65 83 020 REMOVING AND INSTALLING (REPLACING) CAR INFOTAINMENT COMPUTER (CIC)

IMPORTANT: Risk of damage! A hard disk is installed in the Car Information Computer (CIC). Carry out mechanical work on the CIC and adjacent components with care. Avoid subjecting the CIC to shaking/shocks.

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**
- Remove middle trim for instrument panel. See **REMOVING AND INSTALLING (REPLACING) CENTRE INSTRUMENT PANEL TRIM (FROM 03/2007)** , **REMOVING AND INSTALLING (REPLACING) CENTRE INSTRUMENT PANEL TRIM (UP TO 03/2007)** , or **REMOVING AND INSTALLING/REPLACING CENTRE (BOTTOM) INSTRUMENT PANEL TRIM** .

Release screws (1). Pull CIC (2) forwards a little. Installation: Make sure CIC (2) is correctly seated in guide lugs (3).

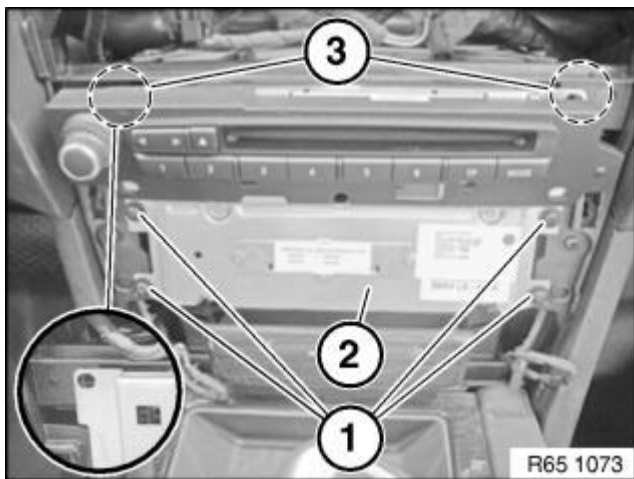


Fig. 89: Release Screws And Pull CIC Forward A Little
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (2) and (3) and disconnect. Remove CIC (1).

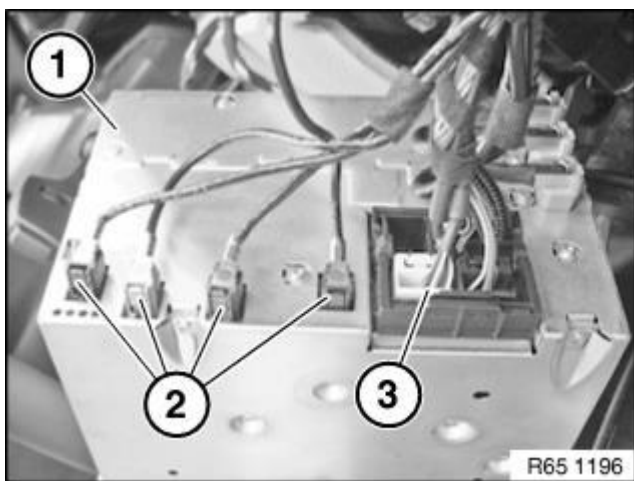


Fig. 90: Unlock Plug Connections And Disconnect
Courtesy of BMW OF NORTH AMERICA, INC.

65 83 550 REMOVING AND INSTALLING/REPLACING FAN FOR CAR COMMUNICATION

COMPUTER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove CAR COMMUNICATION COMPUTER

Raise retaining hook (1) and turn fan for Car Communication Computer (2) in direction of arrow.

Remove fan for Car Communication Computer (2) from Car Communication Computer (3).

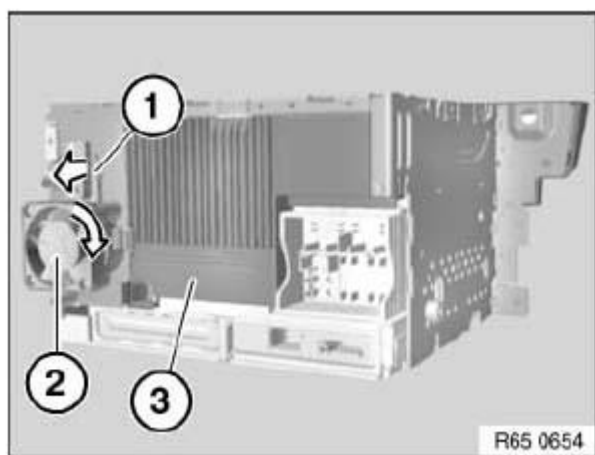


Fig. 91: Raising Retaining Hook And Turning Fan For Car Communication Computer

Courtesy of BMW OF NORTH AMERICA, INC.

65 83 560 REMOVING AND INSTALLING/REPLACING FRONT TRIM FOR CAR COMMUNICATION COMPUTER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove CAR COMMUNICATION COMPUTER

Release screws (1).

Fold down front panel for Car Communication Computer (2) and set down.

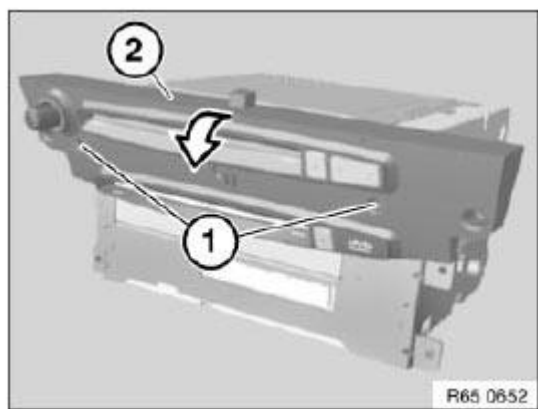


Fig. 92: Folding Down Front Panel For Car Communication Computer
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: "LIF" stands for Low Insert Force.

Open catch of LIF plug (2) in direction of arrow and feed out LIF cable (1).

Remove front trim for Car Communication Computer (4) from Car Communication Computer (3).

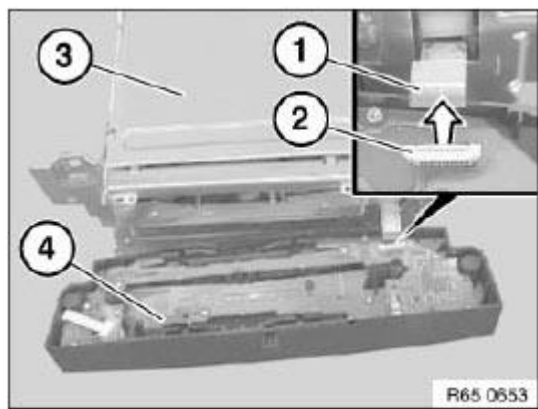


Fig. 93: Opening Catch Of LIF Plug
Courtesy of BMW OF NORTH AMERICA, INC.

65 83 570 REMOVING AND INSTALLING/REPLACING CD DRIVE FOR CAR COMMUNICATION COMPUTER

Special tools required:

64 1 020

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) !**

Necessary preliminary tasks:

- Remove **FRONT TRIM FOR CAR COMMUNICATION COMPUTER**

If necessary, cut through warranty seal.

Raise cover (1) with special tool **64 1 020** all round and remove from Car Communication Computer (2).

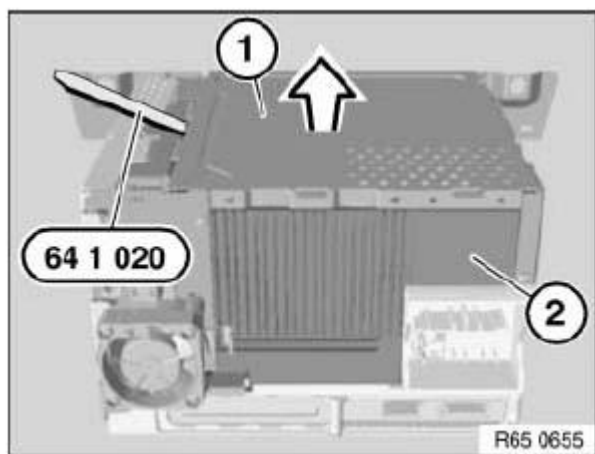


Fig. 94: Raising Cover With Special Tool 64 1 020
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Feed CD drive for Car Communication Computer (2) in direction of arrow out of Car Communication Computer (3) and set down.

Installation:

Ensure correct routing of cables.

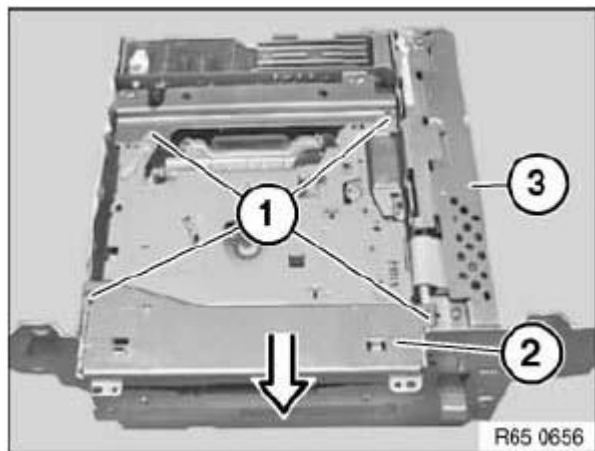


Fig. 95: Feeding CD Drive For Car Communication Computer
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Remove CD drive trim (2) in direction of arrow from CD drive for Car Communication Computer (3).

Installation:

Ensure correct routing of cables.

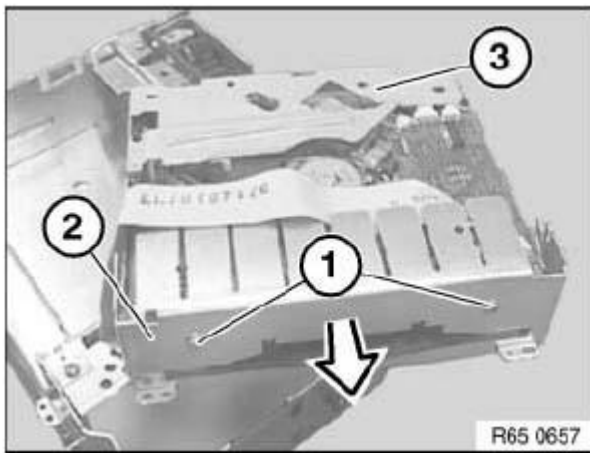


Fig. 96: Removing CD Drive Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through warranty seal (1) at marked point.

Release screw (2).

Lift side cover out of mounting (3) and carefully place to one side.

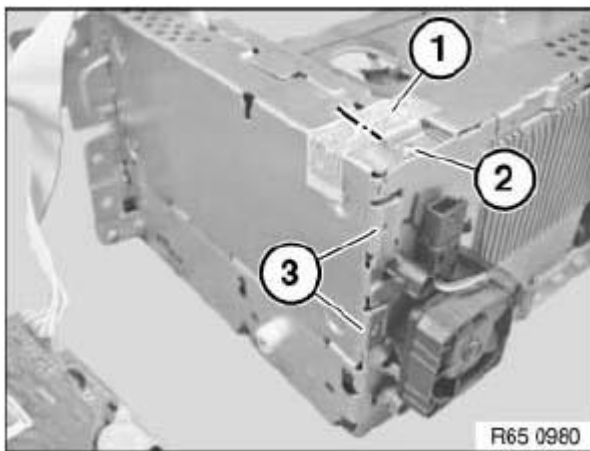


Fig. 97: Identifying Warranty Seal, Screw And Side Cover Out Of Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove CD drive.

Installation:

Ensure correct routing of cables.

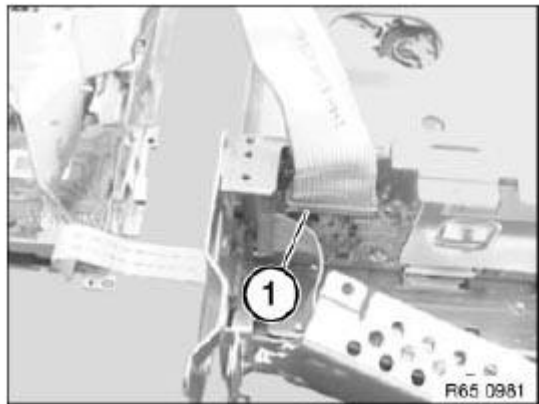


Fig. 98: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

65 83 580 REMOVING AND INSTALLING/REPLACING DVD DRIVE FOR CAR COMMUNICATION COMPUTER

Special tools required:

- **00 9 450**
- **12 7 192**
- **64 1 020**

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Risk of damage!

Place Car Communication Computer on special tool 12 7 192 (antistatic mat) and earth/ground.

Necessary preliminary tasks:

- Remove **FRONT TRIM FOR CAR COMMUNICATION COMPUTER**

If necessary, cut through warranty seal.

Raise cover (1) with special tool **64 1 020** all round and remove from Car Communication Computer (2).

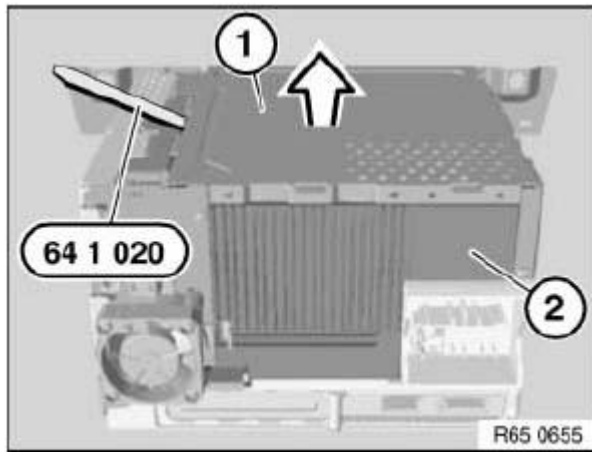


Fig. 99: Raising Cover With Special Tool 64 1 020
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Feed out bridge (2).

Installation:

Use special tool **00 9 450** to tighten down screws.

Tightening torque **65 11 3AZ**.

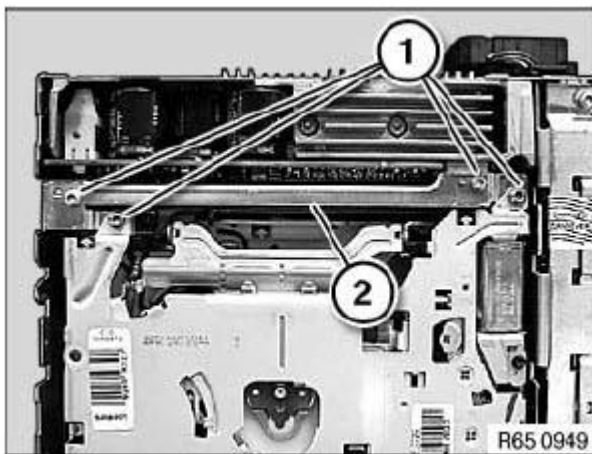


Fig. 100: Identifying Bolts And Bridge
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through stickers at marked points (1).

Release screws (2) and remove trim (3).

Installation:

Use special tool **00 9 450** to tighten down screws.

Tightening torque **65 11 3AZ**.

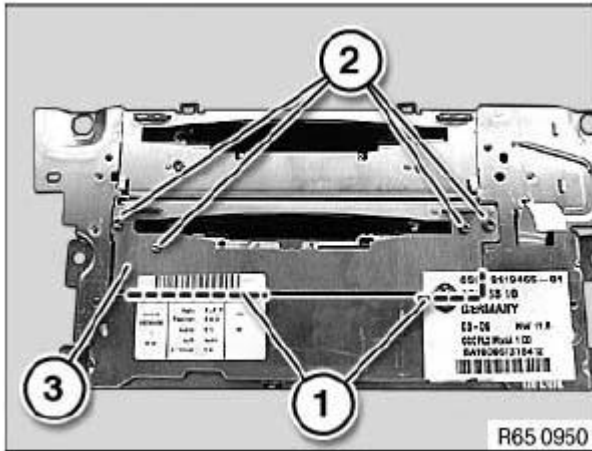


Fig. 101: Identifying Stickers Marked Points, Screws And Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) with magnetic screwdriver.

Installation:

Lug (2) of DVD drive must be above lug (3) of Car Communication Computer.

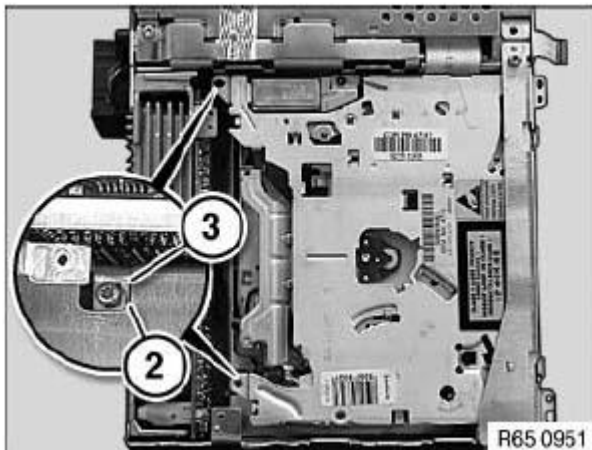


Fig. 102: Identifying Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Turn Car Communication Computer through 180° and carefully feed out DVD drive.

Carefully disconnect plug connections (1, 2).

Remove DVD drive (3).

Installation:

Ensure correct cable routing.

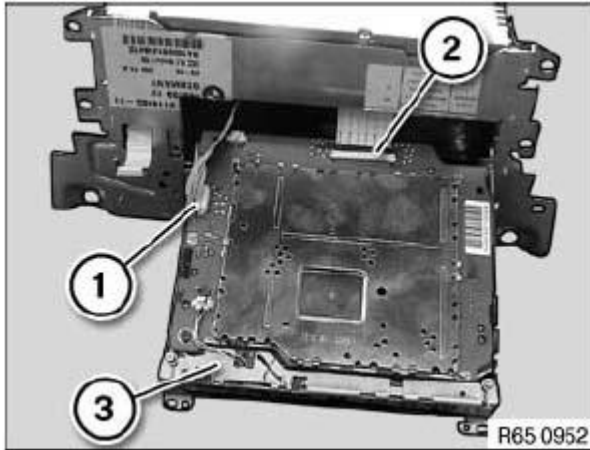


Fig. 103: Identifying Plug Connection And DVD Drive
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: There are two versions of the plug connection (2) shown in Fig. 104:

Previous version: ribbon cable is connected horizontally (see 1 in Fig. 104)

Current version: ribbon cable is connected vertically (see 2 in Fig. 104)

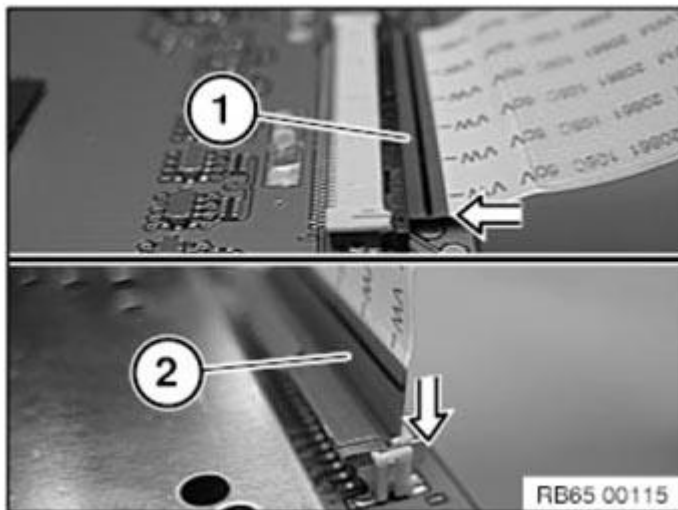


Fig. 104: Identifying Ribbon Cable Connection Horizontally And Vertically
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

On cars before March 2006 it is essential after replacing the DVD drive to carry out a measures plan or a software update as per SSS/PROGMAN/CIP .

65 83 590 REMOVING AND INSTALLING/REPLACING GYRO SENSOR DRIVE FOR CAR COMMUNICATION COMPUTER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove CAR COMMUNICATION COMPUTER

If necessary, cut through warranty seal.

Release bolts (1).

Remove floor pan (2) towards bottom and set down.

IMPORTANT: Contact spring strip (3) on floor pan (2) must not be bent: otherwise risk of short-circuiting!
When reinstalling floor pan (2), make sure individual springs of contact spring strip (3) are correctly seated.

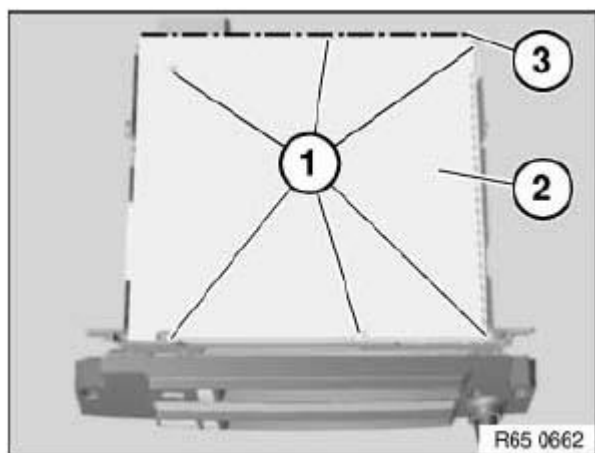


Fig. 105: Identifying Bolts, Floor Pan And Spring Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1).

Detach gyro sensor for Car Communication Computer (2) in direction of arrow from plug-in contact (3).

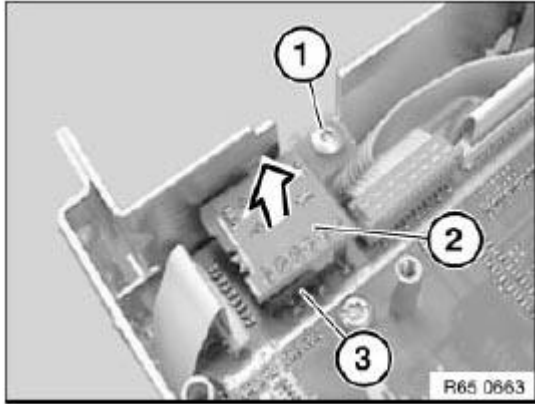


Fig. 106: Detaching Gyro Sensor For Car Communication Computer
Courtesy of BMW OF NORTH AMERICA, INC.

65 83 600 REPLACING HIP MODULE FOR CAR COMMUNICATION COMPUTER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove CAR COMMUNICATION COMPUTER

Release screws (1).

Remove cover (2) towards top.

IMPORTANT: Contact spring strip (3) on floor pan (2) must not be bent: otherwise risk of short-circuiting!
When reinstalling floor pan (2), make sure individual springs of contact spring strip (3) are correctly seated.

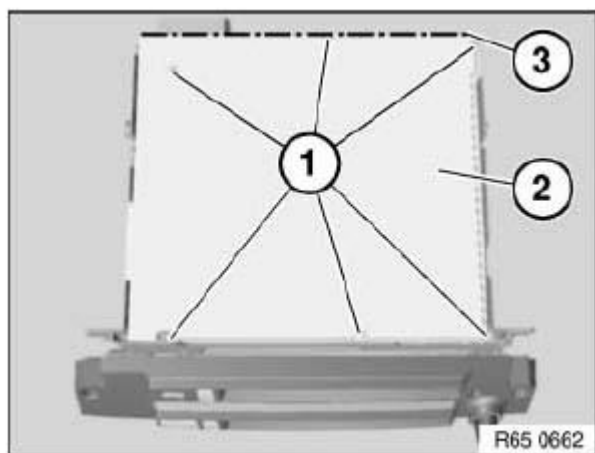


Fig. 107: Identifying Bolts, Floor Pan And Spring Strip
 Courtesy of BMW OF NORTH AMERICA, INC.

Press catches (1) and feed out HIP module (2) in direction of arrow.

Installation:

Make sure front guides (3) of HIP module (2) are correctly seated.

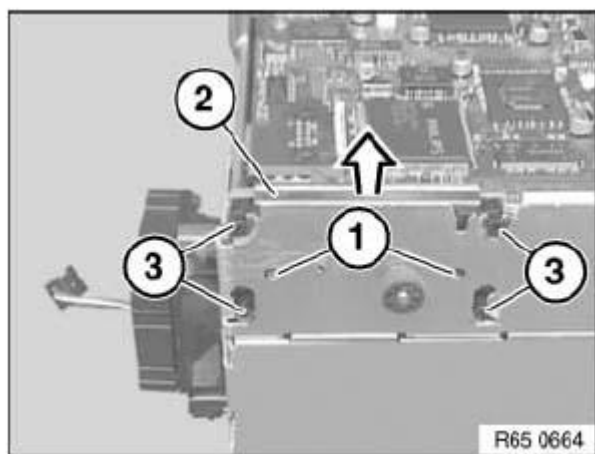


Fig. 108: Pressing Catches And Feeding Out Hip Module
 Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) in direction of arrow and remove HIP module (2).

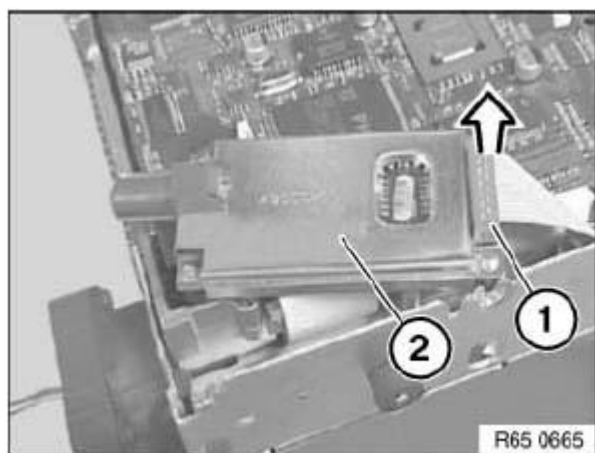


Fig. 109: Disconnecting Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Cars with out-of-date software status at time of repair:

After replacing the HIP module, **program** the Car Communication Computer. Then take the car for an initialization drive.

- Cars with current software status at time of repair:

After replacing the HIP module, take the car for an initialization drive.

Initialization drive:

Drive for 15-20 minutes at 50 km/h and with good GPS reception until correct vehicle position is achieved in the navigation display.

NOTE: During this time, the position pointer of the navigation system can be motionless or move across country.

NAVIGATION SYSTEMS

65 90 511 REMOVING AND INSTALLING/REPLACING NAVIGATION COMPUTER WITH CD/DVD DRIVE (LONG VERSION)

Special tools required:

- 65 5 400

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC

DAMAGE (ESD PROTECTION) !

Necessary preliminary tasks:

- Remove **LEFT LUGGAGE COMPARTMENT TRIM** on side panel

Pull navigation computer (1) with special tool **65 5 400** out of mounting and disconnect associated plug connections.

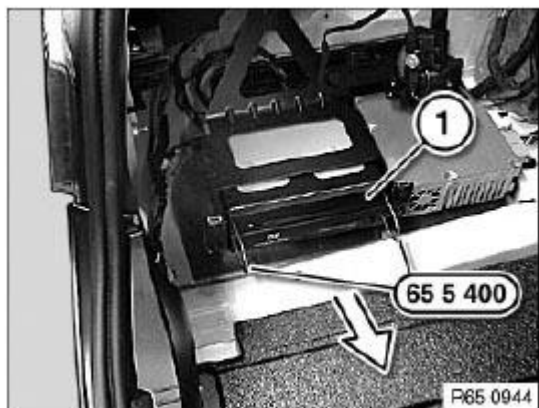


Fig. 110: Pulling Navigation Computer With Special Tool 65 5 400

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

66 54 005 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR NIGHT VISION SYSTEM

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **TRIM FOR INSTRUMENT PANEL ON RIGHT**

Disconnect plug connection (1).

Press tab (2) to side and remove control unit (3) from module carrier.

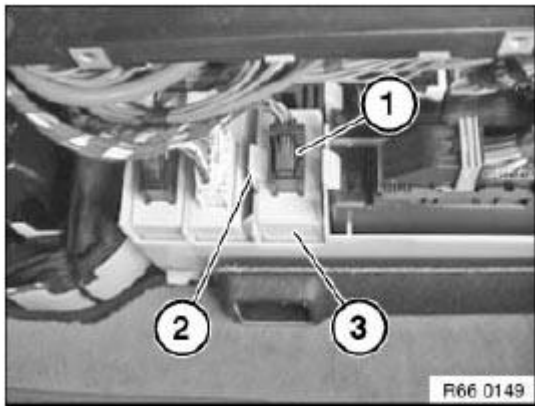


Fig. 111: Identifying Plug Connection, Tab And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

NOTE: **New component contains a CD with deblocking code.**

CD is requested during coding/programming by the SSS.

TRANSMISSION**Automatic Transmission - 535xi****TRANSMISSION ASSEMBLY****00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN****Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN**Danger of injury!**

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

**WARNING: Danger of poisoning if oil is ingested/absorbed through the skin!
Risk of injury if oil comes into contact with eyes and skin!**

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

**00 11 237 CHECKING/TOPPING UP FLUID LEVEL IN AUTOMATIC TRANSMISSION
(GA6HP19Z/6HP19Z) AWD**

**IMPORTANT: Use only the approved transmission fluid .
Failure to comply with this requirement will result in serious damage to the automatic transmission!**

Remove exhaust system bracket (1).

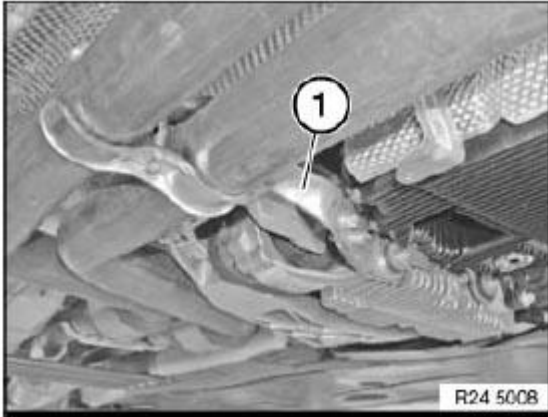


Fig. 1: Identifying Exhaust System Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tighten down filler plug using

1. Hexagon wrench 8 A/F
2. torque wrench
3. Socket 8 A/F

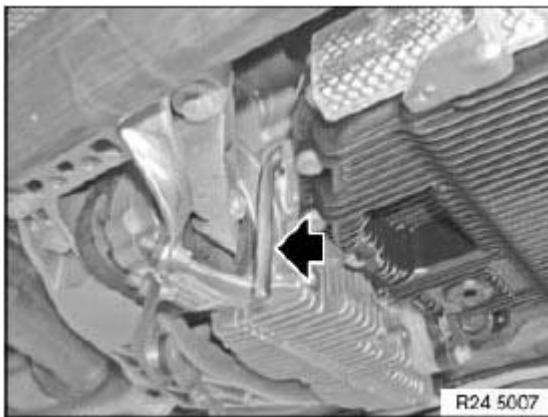


Fig. 2: Tightening Filler Plug Using Hexagon Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Topping up transmission fluid after a repair:

Stand vehicle on a level surface and secure against rolling off.

Undo filler plug (1).

Installation:

Replace sealing ring.

Top up transmission fluid until it emerges from filling orifice.

Start engine.

Replenish transmission fluid until it emerges from filling orifice.

Screw in filler plug (1).

Tightening torque: **24 11 7AZ** .

Press brake pedal to floor and shift through all gears several times at idle speed. Then shift to "P" position (Park).

Then check fluid level.

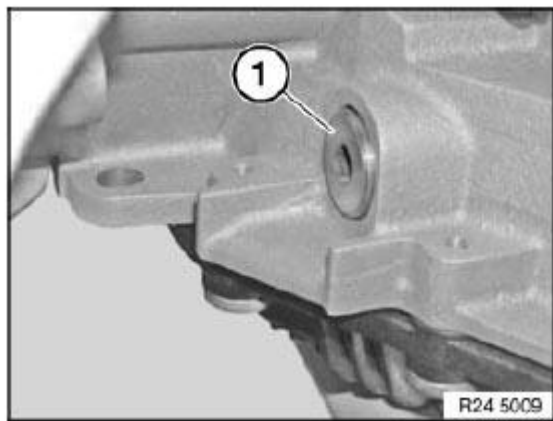


Fig. 3: Identifying Filler Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Checking fluid level:

- Connect BMW Diagnosis and Information System (DIS) or BMW MoDiC to vehicle.
- Call up Service functions (drive).
- Carry out fluid level check in accordance with instructions.

23 TRANSMISSION DESIGNATIONS

Breakdown of BMW designation:

BREAKDOWN OF BMW DESIGNATION (TRANSMISSION DESIGNATIONS)

A5S 300J (old designation)		
A	Transmission type	<ul style="list-style-type: none"> · S = Manual transmission · A = Automatic transmission
5	Number of forward gears	
S	Type of top gear	<ul style="list-style-type: none"> · D = Direct gear · S = Overdrive gear
300	Max. input torque (Nm)	
J	Code letter of transmission manufacturer	<ul style="list-style-type: none"> · G = Getrag · J = Jatco · R = GMPT (General Motors Powertrain) · Z = ZF (Zahnradfabrik Friedrichshafen)
SMG	Notes	SMG = Sequential M gearbox/transmission
GS6-37BZ (new designation according to BMW Group Standard GS 90007)		
G	Transmission	
S	Transmission type	<ul style="list-style-type: none"> · S = Manual transmission · A = Automatic transmission
6	Number of forward gears	
-		<ul style="list-style-type: none"> · - = Standard with manual gearshift · HP = Hydraulic planetary gear · DKG = Twin clutch transmission/gearbox
37	Transmission type	<ul style="list-style-type: none"> · 26 = D-transmission · 31 = C-transmission · 39 = F-transmission · 37 = H-transmission · 53 = G-transmission · 17 = I-transmission · 47 = J-transmission
B	Gear set	<ul style="list-style-type: none"> · B = Petrol/gasoline gear ratio · D = Diesel gear ratio · S = Sport gear ratio
Z	Code letter of transmission manufacturer	<ul style="list-style-type: none"> · G = Getrag · Z = ZF (Zahnradfabrik Friedrichshafen)

Manual transmission:

2010 BMW 535xi

TRANSMISSION Automatic Transmission - 535xi

BREAKDOWN OF BMW DESIGNATION (MANUAL TRANSMISSION)

BMW designation	Manufacturer	Manufacturer designation	Remark
S5D 200G	Getrag	B transmission (220/5)	
S5D 200G	Getrag	B transmission (221/5)	for M41 engine only
S5D 250G	Getrag	B transmission (220/5)	Reinforced design
S5D 260Z	ZF	C-transmission (S5-31 D)	for M51 engine only
S5D 280Z	ZF	C-transmission (S5-31)	
S5D 310Z	ZF	C-transmission (S5-31)	up to 9.95
S5D 320Z	ZF	C-transmission (S5-31)	from 9.95 (reinforced design)
GS5S31BZ (SMG)	ZF	C transmission	SMG
GS5-39DZ	ZF	F transmission	
S6S 420G	Getrag	D-transmission (226/6)	
S6S 420G (SMG)	Getrag	D transmission	SMG
S6S 560G	Getrag	E-transmission (286/6)	
GS6-37BZ	ZF	H-transmission	
GS6S37BZ (SMG)	ZF	H-transmission	
GS6-37DZ	ZF	H-transmission	
GS6-37BG	Getrag	H-transmission	
GS6-53BZ	ZF	G-transmission	
GS6-53DZ	ZF	G-transmission	
GS6-17BG	Getrag	I-transmission	
GS7S47BG (SMG)	Getrag	J-transmission (247)	SMG 7-speed
GS7D36SG	Getrag	DKG436	DKG 7-speed

Automatic transmission:

BREAKDOWN OF BMW DESIGNATION (AUTOMATIC TRANSMISSION)

BMW designation	Manufacturer	Manufacturer designation	Remark
A4S 200R	GMPT	GM4	
A4S 270R	GMPT	THM-R1w	Transmission widesteppped
A4S 310R	GMPT	THM-R1	
A5S 300J	Jatco	Jatco	
A5S 310Z	ZF	5HP-18	
A5S 325Z	ZF	5HP-19	
A5S 440Z	ZF	5HP-24	
A5S 560Z	ZF	5HP-30	
A5S 360R / 390R	GM	GM5	
GA6HP19Z	ZF	6HP19	
GA6HP26Z	ZF	6HP26	
GA6HP32Z	ZF	6HP32	
GA6L45R	GM	GM6	

23... UNIVERSAL BMW TRANSMISSION TAKE-UP

Special tools required:

- 00 2 030
- 23 4 050

NOTE:

- The universal transmission bracket is introduced for the E60 AWD
- Suitable for manual and automatic transmissions

IMPORTANT: Front and rear supports (1) can be laterally adjusted by means of screws (2).
Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.
Supports must be adapted in length and width to the transmission.

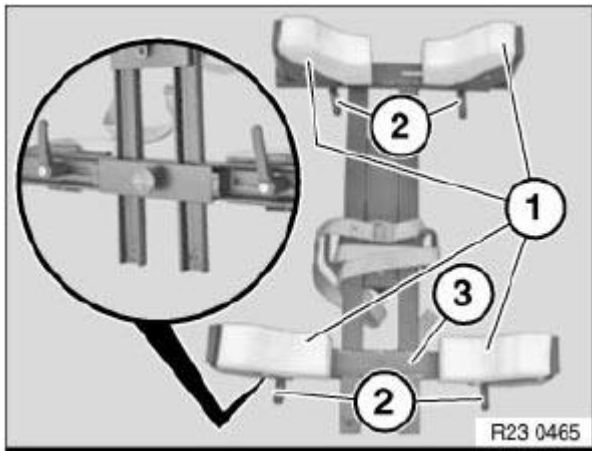


Fig. 4: Identifying Carrier Of Rear Supports
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission:

Support transmission with special tools 23 4 050, 00 2 030.

IMPORTANT: Transmission must be secured with tensioning strap (1).

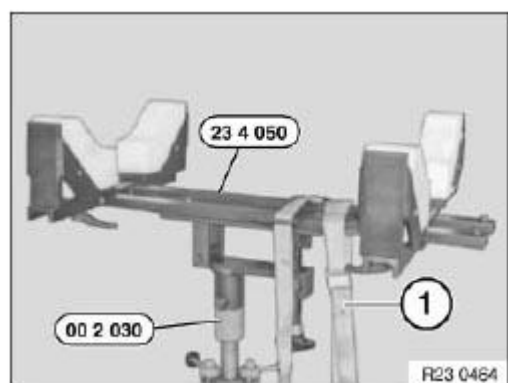


Fig. 5: Supporting Transmission With Special Tools 23 4 050 And 00 2 030
Courtesy of BMW OF NORTH AMERICA, INC.

23..... UNIVERSAL TRANSMISSION RETAINING BRIDGE

Special tools required:

- 00 1 450
- 24 0 200

NOTE: The transmission retaining bridge 24 0 200 is suitable for both manual and automatic transmissions

IMPORTANT: Adapters and spindles must be adapted for positive locking to the transmission.
(Risk of injury)

Adapt adapters (1) and spindle with thrust piece (3) to transmission.

Adapt length with slide (2).

Screw in spindle (4).

IMPORTANT: Before mounting on assembly stand 00 1 450, check retaining bridge for secure seating.

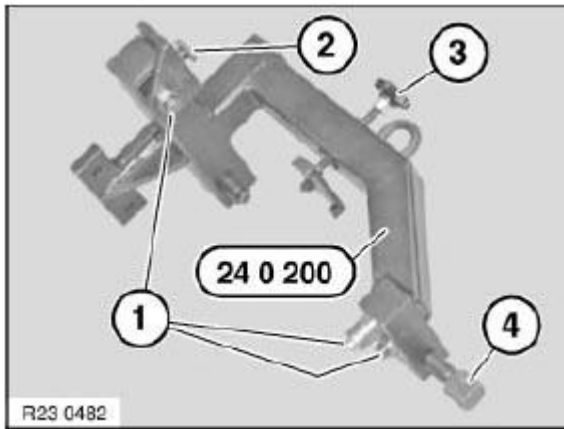


Fig. 6: Identifying Adapters, Spindle And Thrust Piece
Courtesy of BMW OF NORTH AMERICA, INC.

24 00 018 ADJUSTING GEAR LEVER (PARKING LOCK EMERGENCY RELEASE)

NOTE: Check cable for ease of movement.
Move gear selector switch to "P" position.
Control for emergency release must not be actuated.

Unfasten nut.

Tightening torque **25 16 10AZ.**

Remove cable (1).

Installation:

Adjust cable

- Release nut
- Adjust cable by means of holder (2)
- Spacing A = 1.5 mm

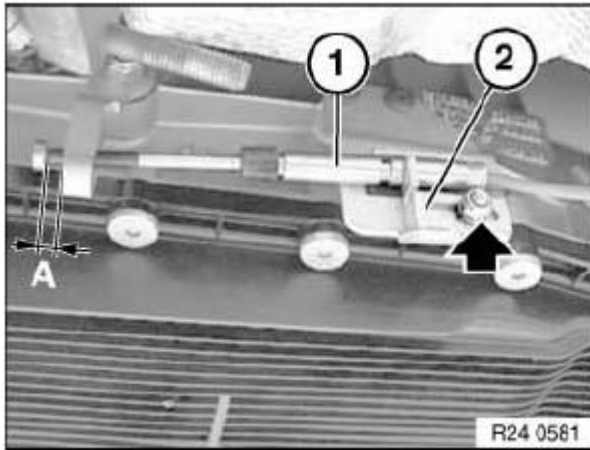


Fig. 7: Identifying Cable And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

24 00 018 ADJUSTING SHIFT LEVER

NOTE: Check cable for ease of movement.
Move selector lever to "P" position.

Press gear lever (1) forward into park position.

Clip shift cable head (2) onto ball head of gear lever.

Unscrew bolt (3).

Press cable (4) in direction of arrow, then release again.

Tighten screw (3).

Tightening torque **25 16 8AZ**.

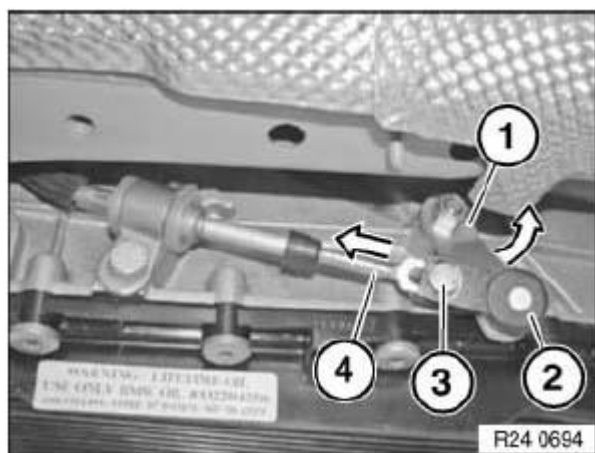


Fig. 8: Adjusting Shift Lever

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Move selector lever to "P" position.

Check whether parking gear is engaged by turning propeller shaft.

24 00 030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (GA6HP19Z AWD) N54

Special tools required:

- 00 2 030
- 00 9 010
- 00 9 120
- 00 9 130
- 23 4 05
- 24 1 110
- 24 2 390
- 24 4 160
- 24 4 161
- 24 4 165

IMPORTANT: After completion of work, check transmission oil level.

Use only the approved transmission fluid .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: E60/E61 and E63/E64 cars are equipped with the Auto-P function as from 03/07

and 09/07 respectively.

Consequence:

With ignition on and selector lever in N position, the P position (transmission parking brake) is automatically engaged after 30 mins.

This can be prevented by manually unlocking the **transmission interlock** .

Car must not be moved when the transmission interlock is engaged.

Failure to comply with this instruction will result in immediate transmission damage.

IMPORTANT: Aluminum screws/bolts must be replaced each time they are *released* .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are *not magnetic* .
Jointing torque and angle of rotation must be observed without fail (*risk of damage*) .

Necessary preliminary tasks:

- Disconnect **battery negative lead**
- Remove underbody protection at front and rear. See **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** and **51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .
- Remove **REINFORCEMENT PLATE** .

Important notes on installation are described in this work step

- Remove complete **exhaust system** .

Remove heat shields (1) and (2) and bracket.

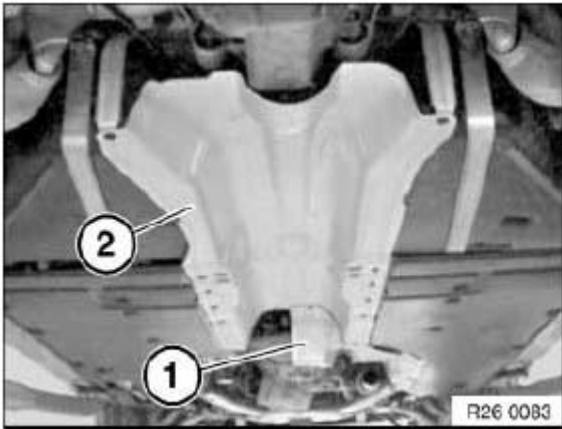


Fig. 9: Identifying Heat Shields

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Release aluminum screw on right next to cable retaining plate with special tool 00 9 010.

Aluminum screws must be replaced. Tightening torque **24 00 2AZ** .



Fig. 10: Identifying Special Tool 00 9 010

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Disconnect connector (2).

Steel screws, tightening torque **24 00 1AZ** .

Aluminum screws, tightening torque **24 00 2AZ** .

Release aluminum screws with special tool 00 9 010.

NOTE: Illustration similar

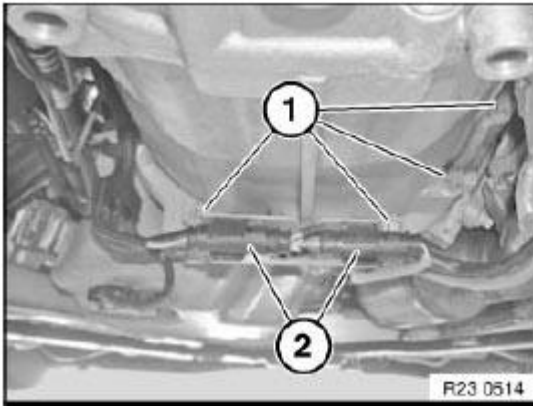


Fig. 11: Identifying Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable (1) from holder.

Release screw (2) and remove holder (3).

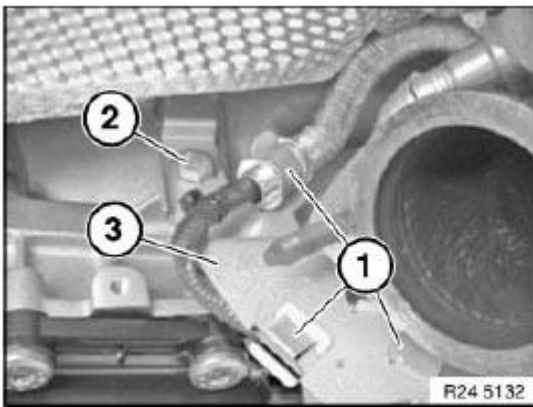


Fig. 12: Identifying Cable And Holder Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove holder (2).

Tightening torque, **24 00 1AZ** .

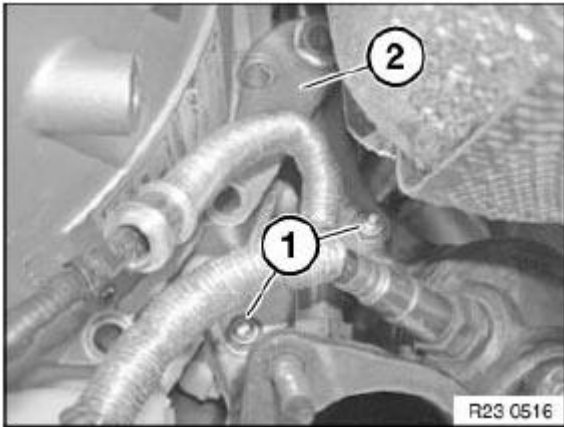


Fig. 13: Identifying Holder

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Version 2

Unfasten nut.

Disconnect cable (1)

Installation:

Unfasten nut.

Adjust cable by means of holder (2) until spacing $A = 1 \text{ mm}$ is obtained

Tighten nut.

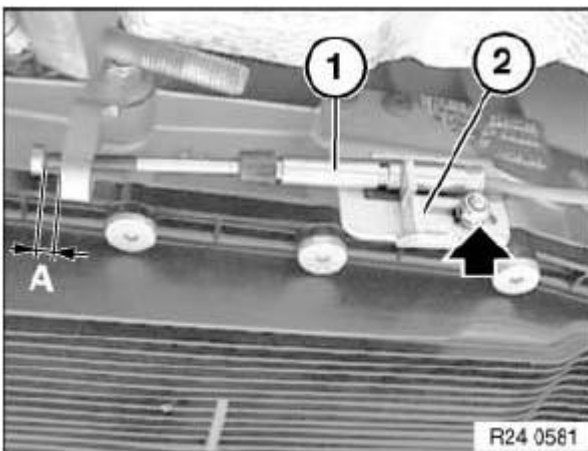


Fig. 14: Identifying Cable And Holder

Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission:

Support transmission with special tools 23 4 050, 00 2 030.

Secure transmission to mounting with tensioning strap (1).

After completion of work, check transmission oil level.

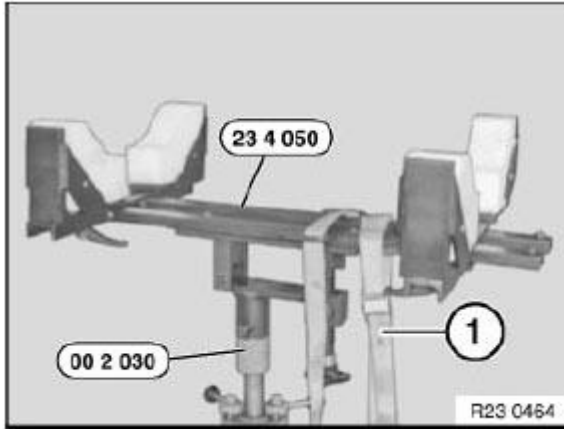


Fig. 15: Supporting Transmission With Special Tools 23 4 050 And 00 2 030
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **26 11 9AZ.** .

Remove front propeller shaft at output flange of transfer case and tie to one side.

Installation:

Replace screws.

NOTE: **Illustration similar**

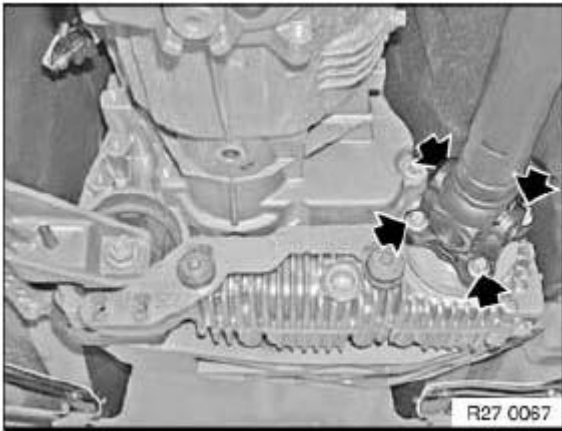


Fig. 16: Locating Front Propeller Shaft Output Flange Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove holder (2).

NOTE: Illustration similar

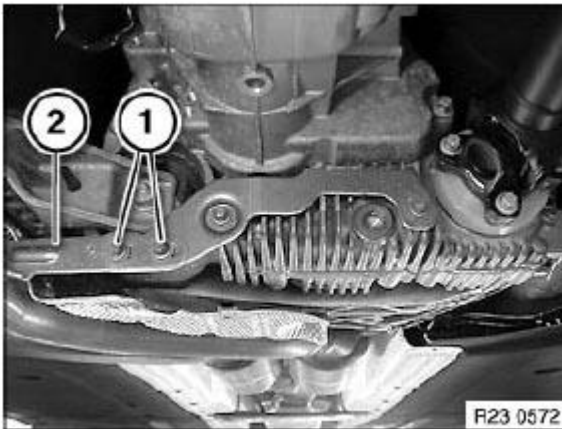


Fig. 17: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove propeller shaft from transmission.
- Release center bearing.
- Tie propeller shaft to one side.

Tasks are described in **26 11 000 REMOVING AND INSTALLING COMPLETE PROPELLER SHAFT (CONSTANT-VELOCITY JOINT)**.

Release screws.

Remove transmission cross-member.

Tightening torque **27 00 10AZ.**

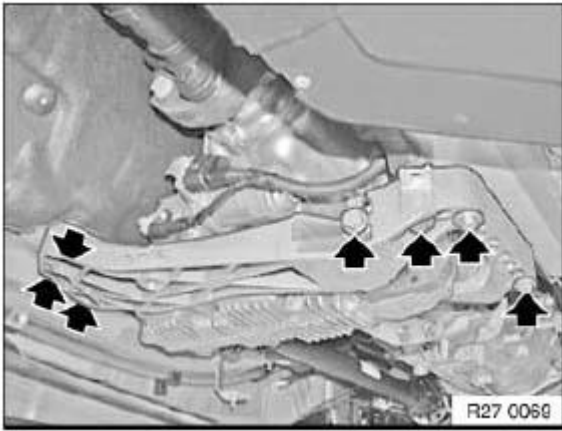


Fig. 18: Locating Transmission Cross-Member Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plugs (1) and (2) from servomotor.

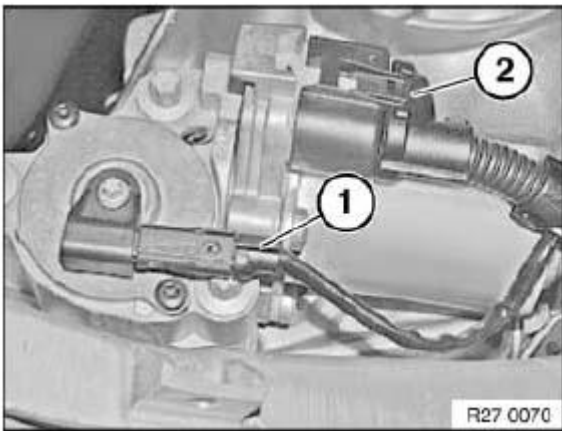


Fig. 19: Identifying Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

- Unlock and disconnect plug (1) by turning.
- Do not touch pins
- Release cable from retainers
- Insert special tool 24 2 390 in sealing sleeve.

These tasks are described in **Notes on mechatronics.**

IMPORTANT: Read and comply with important note.

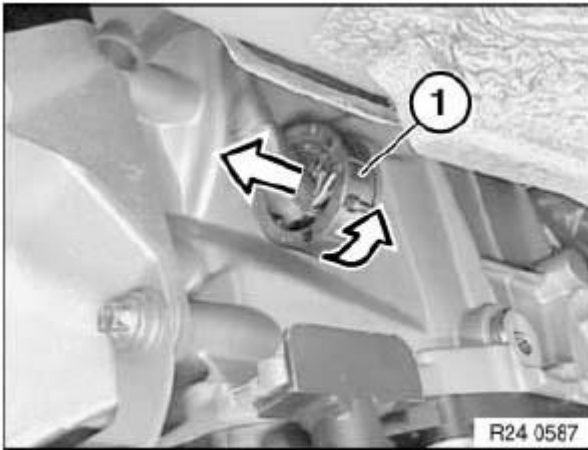


Fig. 20: Disconnecting Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Disconnect hydraulic lines (2) to transmission fluid cooler.

Installation:

Replace sealing rings.

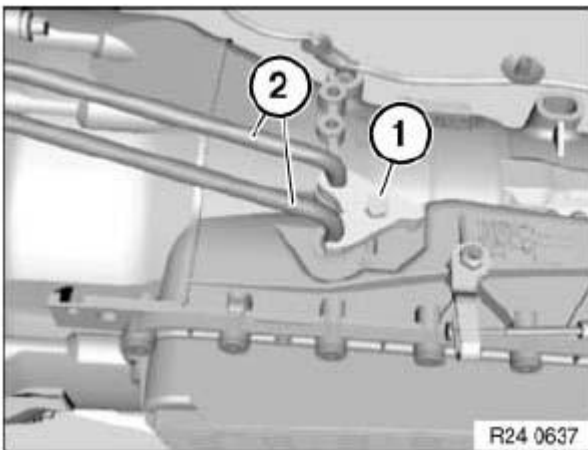


Fig. 21: Identifying Hydraulic Lines

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on holder on transmission oil lines.

Remove holder.

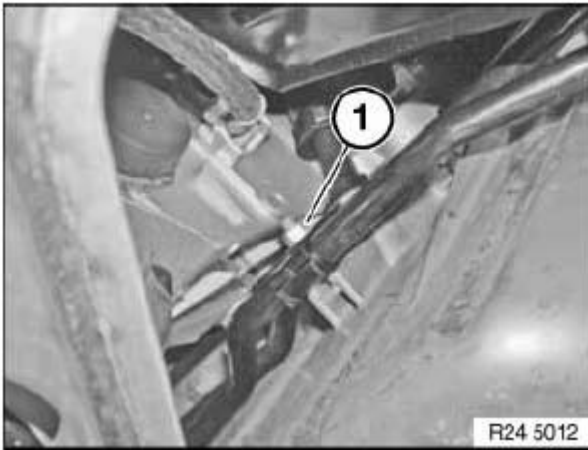


Fig. 22: Identifying Screw On Holder On Transmission Oil Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at vibration damper in direction of rotation until screw (1) is visible in opening.

Release all screws of torque converter with special tool 24 1 110.

Crank engine further and release remaining 5 bolts.

Tightening torque **24 40 1AZ.**

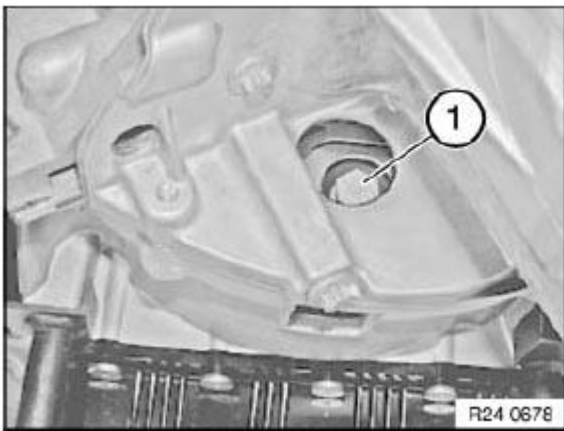


Fig. 23: Identifying Vibration Damper Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool (1) 24 4 161 (A) with shaped section (2) 24 4 165 side (A) to (A).

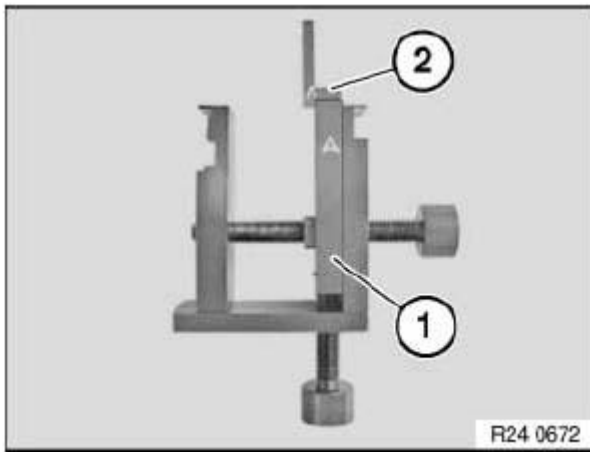


Fig. 24: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 24 4 160 into opening of transmission housing and clamp gently with screw (1).

Twist in screw (2) and clamp down.

Then tighten down screw (1).

NOTE: Illustration similar.

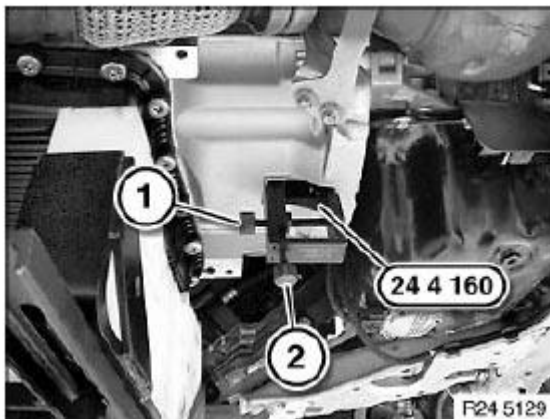


Fig. 25: Identifying Special Tool 24 4 160 And Clamp Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Installation:

Tightening torque, steel screws **24 00 1AZ**.

Aluminum screws/bolts **must** be replaced.

Tightening torque and angle of rotation

Aluminum screws/bolts 24 00 2AZ (7, 8, 9, 10, 11) Screw 9 only on N54.

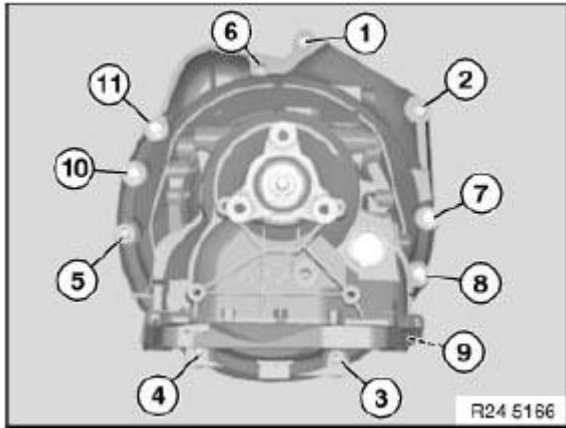


Fig. 26: Identifying Loosening Sequence Of Transmission Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Secure angle of rotation special tool 00 9 120 with magnet 00 9 130 to floor plate.

Screw down aluminum screws/bolts according to angle of rotation.

Angle of rotation **24 00 2AZ.**

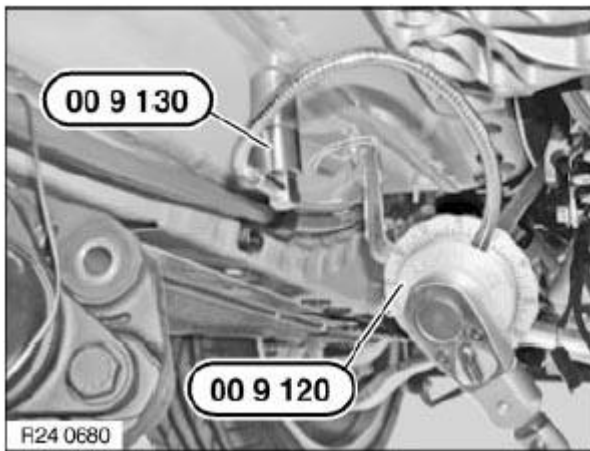


Fig. 27: Identifying Special Tool 00 9 120 And Magnet 00 9 130
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bore (1) in driving disc must be accessible from opening on engine oil pan.

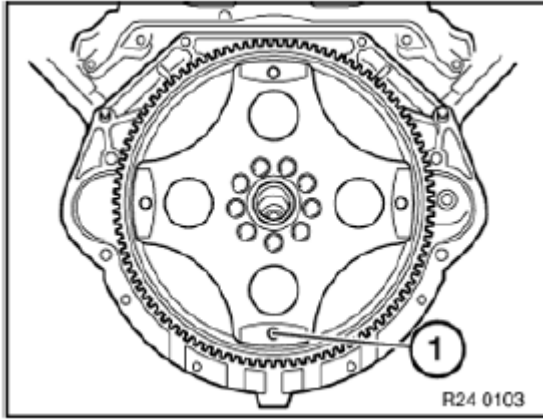


Fig. 28: Identifying Bore In Driving Disc
 Courtesy of BMW OF NORTH AMERICA, INC.

Check that dowel sleeves are correctly seated.

Replace damaged dowel sleeves.

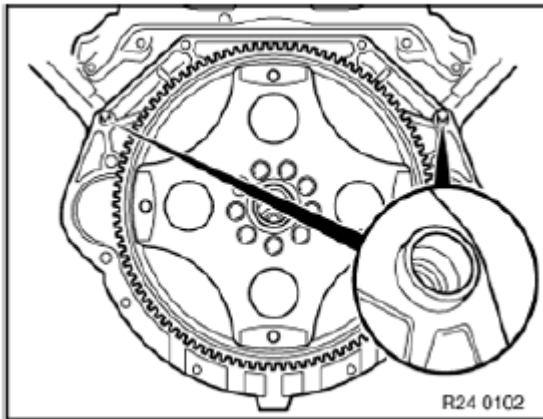


Fig. 29: Identifying Dowel Sleeves
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rotate torque converter until bore in torque converter is flush with bore in driving disc.

Flange automatic transmission to engine.

24 00 050 INSTALLING REPLACEMENT TRANSMISSION (GA6HP19Z/N52/N52K/N53/N54)

Drain automatic transmission fluid at oil drain plug.

Tightening torque: **24 11 6AZ**

IMPORTANT: After completion of work, program transmission control unit.

Recycling:

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations

IMPORTANT:

- Before installing replacement transmission, always flush transmission fluid cooler together with lines .
- After completion of work, check transmission oil level.

Replacement transmission is supplied filled with transmission fluid.

Use only the approved transmission fluid .

Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove automatic transmission.

NOTE: Rear-wheel drive only

Release screws.

Remove and convert transmission bearing block (1).

Tightening torque **24 71 6AZ**.

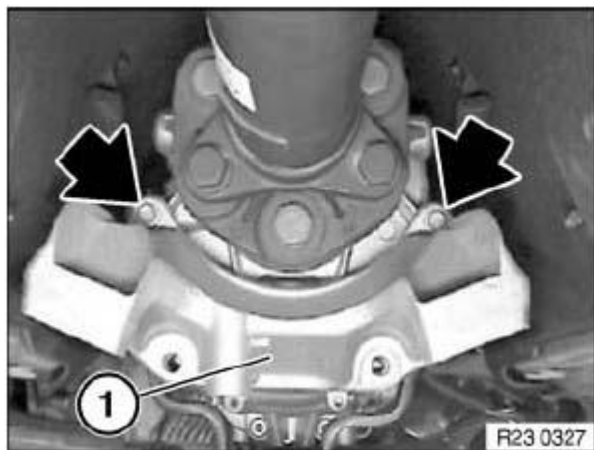


Fig. 30: Identifying Convert Transmission Bearing Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **AWD**

Modify transfer case .

Picture show E60 (not N54).

Release screws.

Remove and modify exhaust system bracket (1).

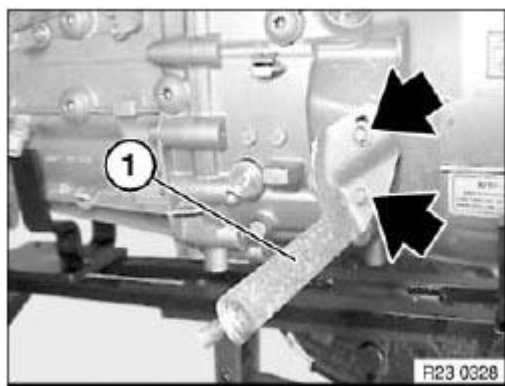


Fig. 31: Identifying Exhaust System Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Convert transportation lock (1).

Convert all cable holders.

Convert all seal plugs.

Convert protective cap on output shaft.

IMPORTANT: After removing transportation lock, secure torque converter against slipping out.

Transmission identification:

On type plate

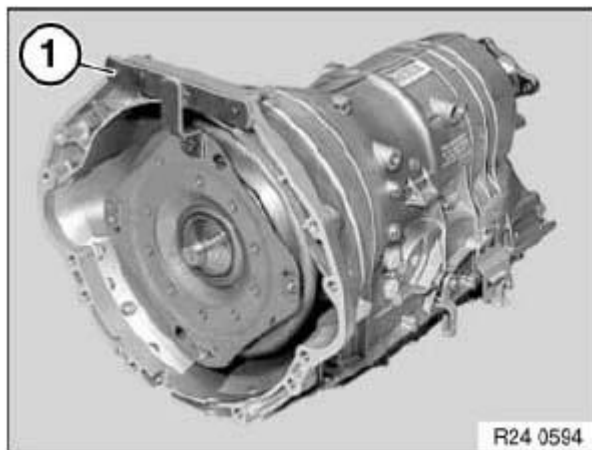


Fig. 32: Identifying Convert Transportation Lock
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION CASE, OIL

24 11 011 REMOVING AND INSTALLING/SEALING OR REPLACING TRANSMISSION SUMP (GA6HP19Z)

IMPORTANT: Remove transmission sump only after it has cooled down.

After completion of work, check transmission oil level.

Use only the approved transmission fluid.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Recycling:

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

Remove rear underbody protection. See **51 47 491 REMOVING AND INSTALLING/REPLACING REAR**

UNDERBODY PROTECTION

Remove exhaust system bracket from transmission.

Remove oil drain plug (1).

Tightening torque: **24 11 6AZ.**

Drain automatic transmission fluid.

Installation:

Replace oil drain plug.

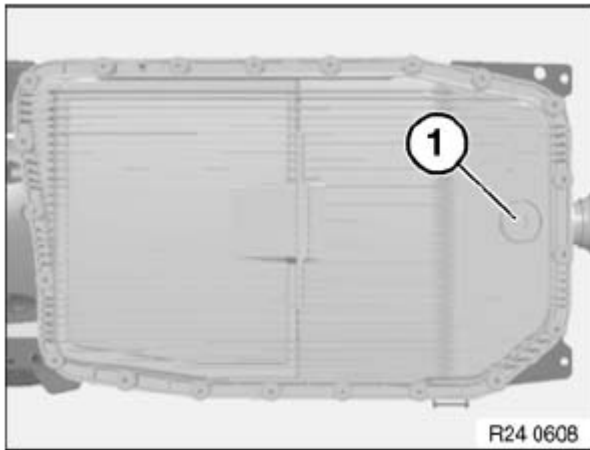


Fig. 33: Identifying Oil Drain Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew all bolts.

Remove transmission sump (1).

IMPORTANT: Transmission with plastic oil sump
From 11/04 new M6x28.5 T40 Torx bolt can be retrospectively replaced.

Installation:

Insert screws (2) until screw heads make contact.

Insert all further screws in diagonal sequence from inside to outside until screw heads make contact.

Tightening torque: **24 11 5AZ.**

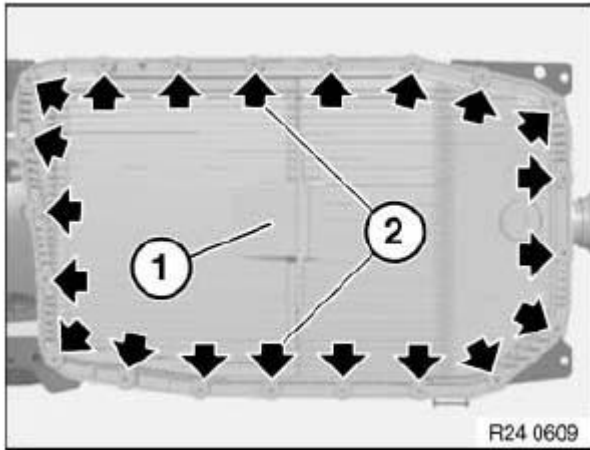


Fig. 34: Locating Transmission Sump Bolts
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove gasket (1) from transmission sump.

Clean transmission oil sump to remove residual oil. Clean sealing faces and groove with a cloth.

Insert new gasket in transmission sump groove.

IMPORTANT: Do not degrease transmission sump with cleaning agent.

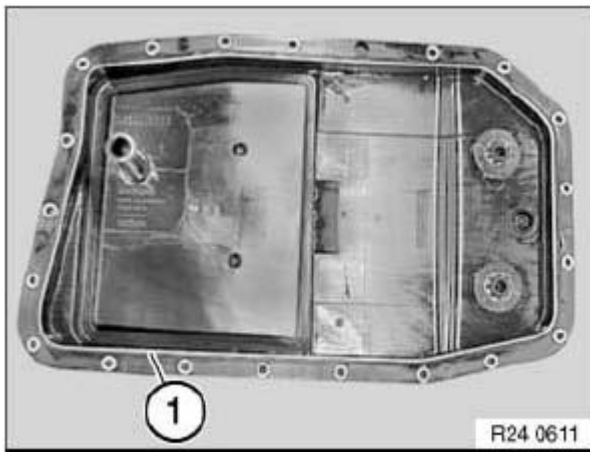


Fig. 35: Identifying Transmission Sump Gasket
 Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing ring (1) on oil filter tube.

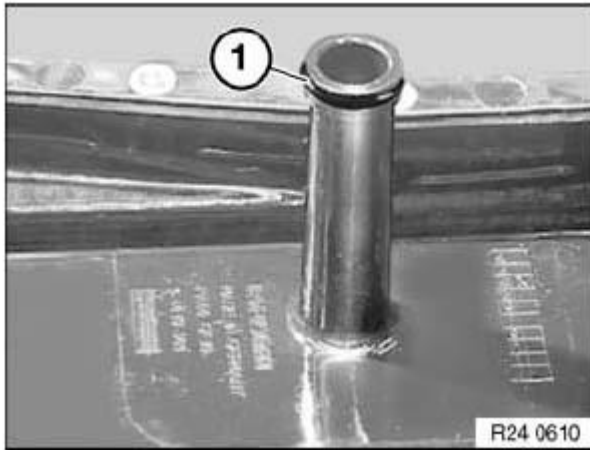


Fig. 36: Identifying Sealing Ring On Oil Filter Tube
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The gasket is correctly installed when it is engaged in the locating opening of the transmission sump.

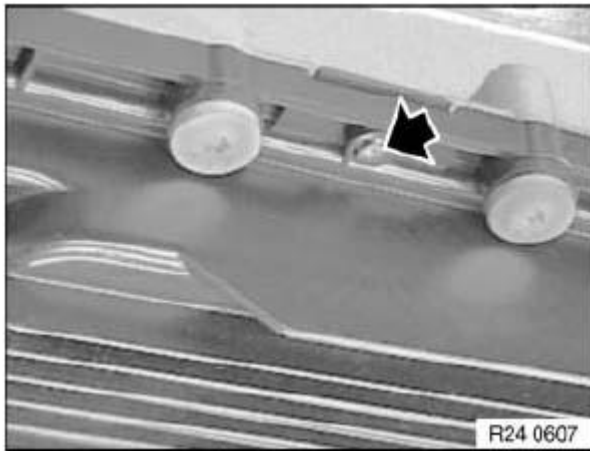


Fig. 37: Locating Opening Of Transmission Sump
Courtesy of BMW OF NORTH AMERICA, INC.

EXTENSION HOUSING, BEARING, SEAL

24 13 013 REPLACING OUTPUT FLANGE SHAFT SEAL (GA6HP19Z)

Special tools required:

- 23 0 020
- 24 2 351
- 24 2 352

- 24 2 353
- 24 2 370
- 24 2 380
- 24 2 410

IMPORTANT: After completion of work, check transmission oil level .

Use only the approved transmission fluid .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Remove rear underbody protection. See **51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION**
- Remove exhaust system after catalytic converter.
- Remove transmission cross-member.

Release screws and remove transmission support block (1) (if fitted).

Tightening torque **24 71 6AZ**.

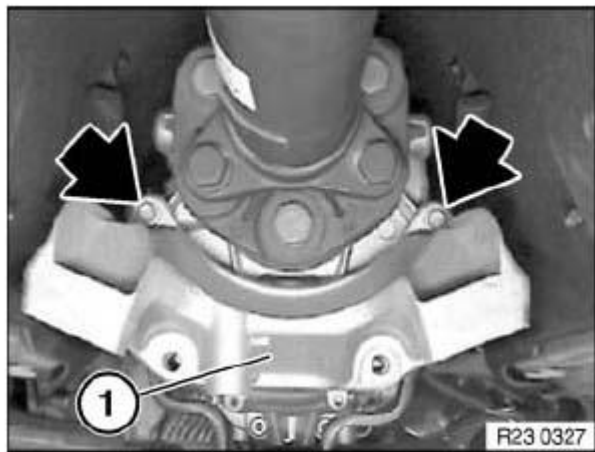


Fig. 38: Identifying Transmission Support Block
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove propeller shaft from transmission.
- Release center bearing.
- Tie propeller shaft to one side.

Tasks are described in **26 11 000 REMOVING AND INSTALLING COMPLETE PROPELLER SHAFT (CONSTANT-VELOCITY JOINT)** .

NOTE: To rotate propeller shaft, unlock parking gear.

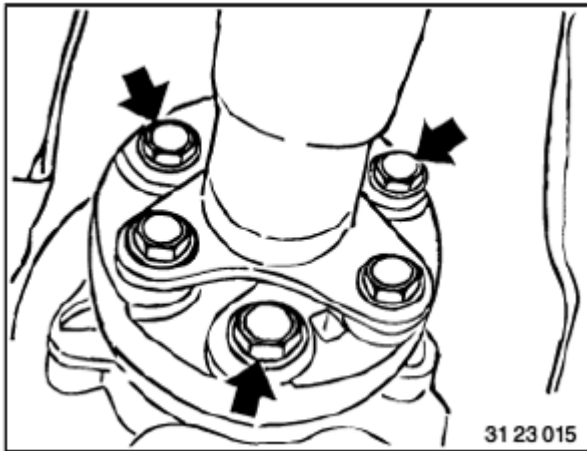


Fig. 39: Locating Propeller Shaft Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Grip output flange (1) with special tool 23 0 020.

Release nut with special tool 24 2 380.

Tightening torque: **24 13 2AZ**.

Installation:

Replace nut and secure with a mandrel (8 mm) by caulking.

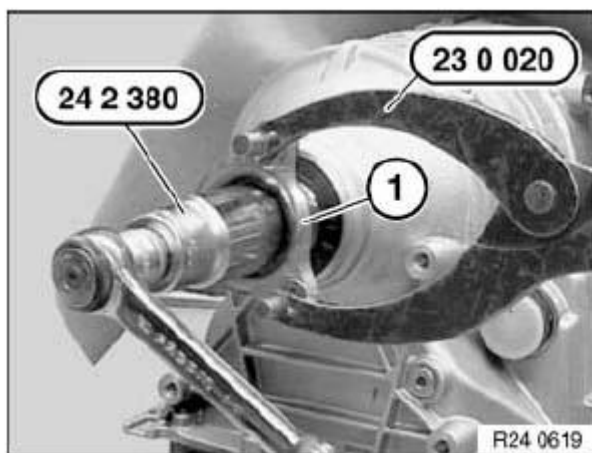


Fig. 40: Removing Propeller Shaft Output Flange Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Detach output flange from output shaft.

Remove spacer.

Attach special tool 24 2 353 to output shaft (1).

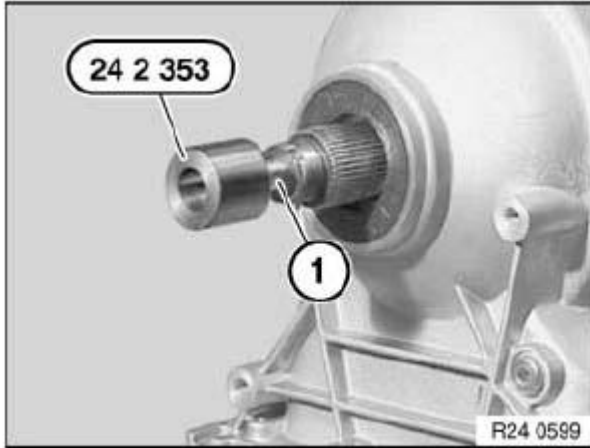


Fig. 41: Attaching Special Tool 24 2 353 To Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 2 351 until it is firmly connected with shaft seal.

Pull out radial shaft seal by screwing in special tool 24 2 352.

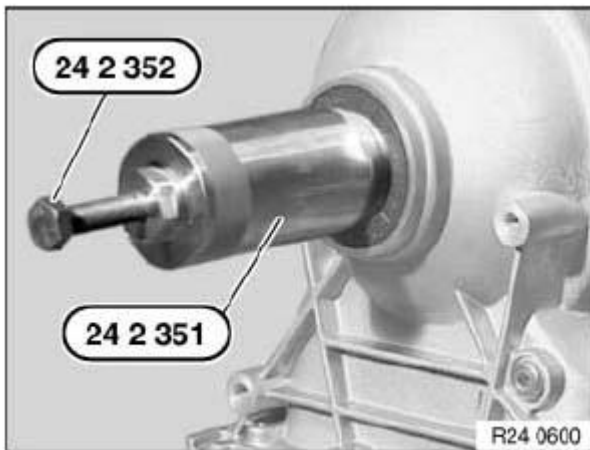


Fig. 42: Removing Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip of radial seal (1). Drive in radial seal (1) with special tool 24 2 370 and adapter ring 24 2 410 as far as it will go.

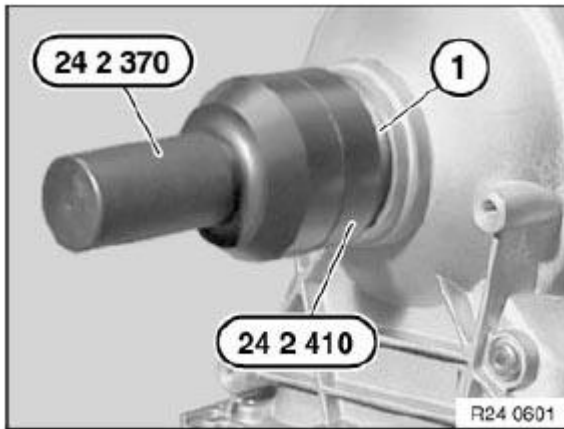


Fig. 43: Installing Radial Shaft Seal

Courtesy of BMW OF NORTH AMERICA, INC.

24 13 013 REPLACING OUTPUT FLANGE SHAFT SEAL (GA6HP19Z) AWD

Special tools required:

- 23 0 490
- 24 4 310

IMPORTANT: After completion of work, check transmission oil level.

Use only the approved transmission fluid .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Remove transfer box

Drive a hole into radial shaft seal (1) using a center punch.

IMPORTANT: Do not use a drill as drillings may result in transmission malfunction.

Screw special tool 23 0 490 into radial shaft seal (1).

Drive out radial shaft seal (1) with impact weight (2).

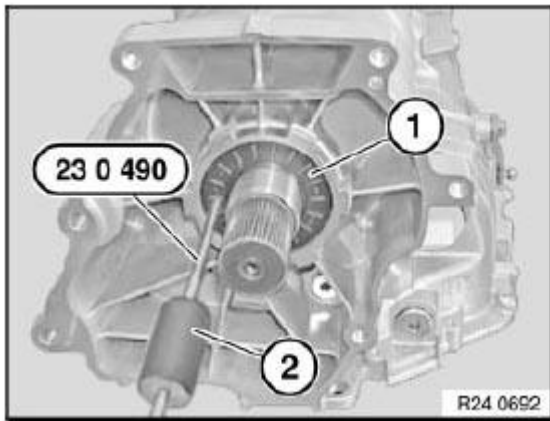


Fig. 44: Removing Radial Shaft Seal

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of new radial seal with clean transmission oil.

Drive shaft seal firmly home with special tool 24 4 310.

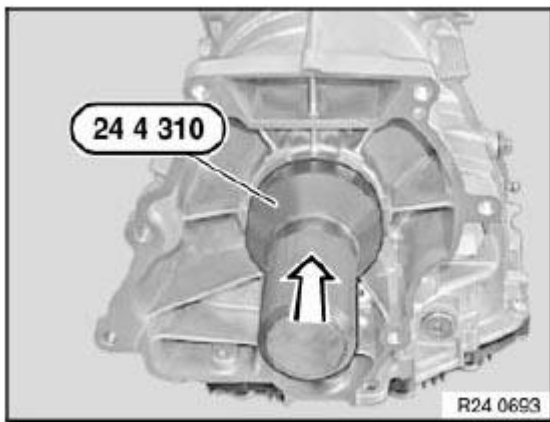


Fig. 45: Installing Radial Shaft Seal

Courtesy of BMW OF NORTH AMERICA, INC.

MECHANICAL ATTACHMENTS

24 14 002 REPLACING SHAFT SEAL FOR SELECTOR SHAFT (GA6HP19Z)

Special tools required:

- 24 5 361
- 24 5 362
- 24 5 364

24 5 366

IMPORTANT: After completion of work, check transmission oil level.

Use only the approved transmission fluid .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Release screws and remove transmission underbody protection (1) (E65 only). See 51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION and 51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION
- Remove rear underbody protection (E60/E61 only). See 51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION

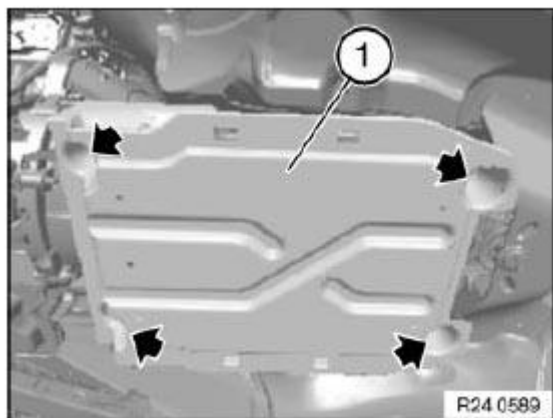


Fig. 46: Identifying Transmission Underbody Protection
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Version 1:

Unfasten nut.

Remove cable (1).

Installation:

Adjusting cable:

- Unfasten nut.
- Adjust cable via holder (2).

Distance A = 1 mm.

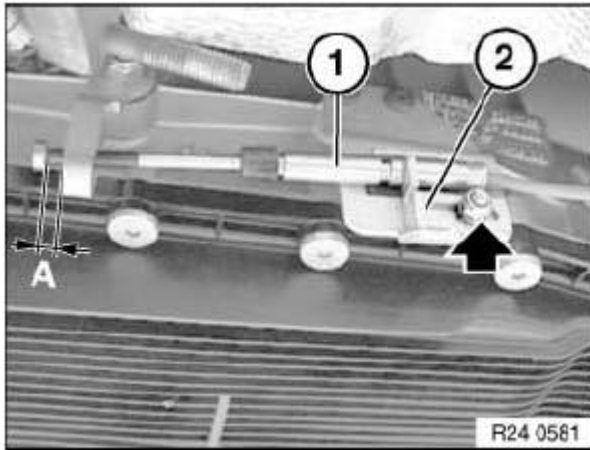


Fig. 47: Identifying Cable And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Version 2:

Grip clamping sleeve (1) and slacken nut (2).

Detach retainer (3) towards bottom using a screwdriver.

Pull cable (4) out of holder.

Installation:

Adjust selector lever .

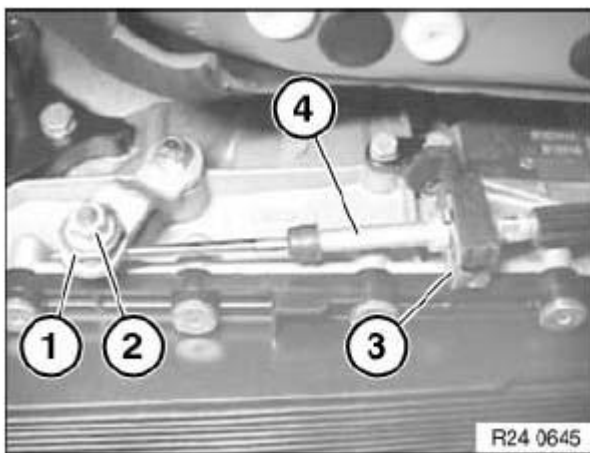


Fig. 48: Identifying Clamping Sleeve, Retainer And Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Version 3:

Release shift cable head (2) from ball head.

Installation:

Adjust selector lever

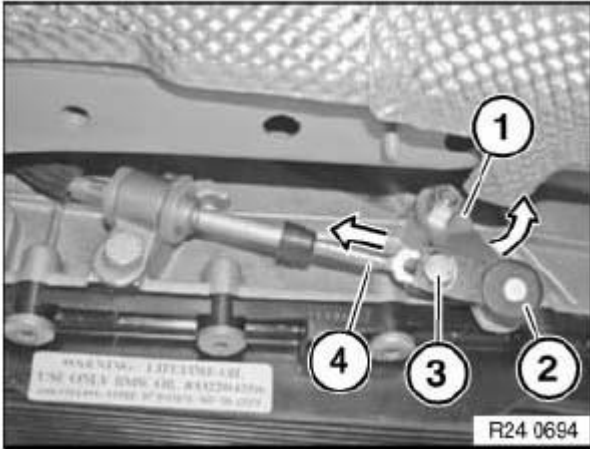


Fig. 49: Releasing Shift Cable Head From Ball Head
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw.

Take off holder (1).

Tightening torque **24 51 1AZ.**

NOTE: Illustration shows E65.

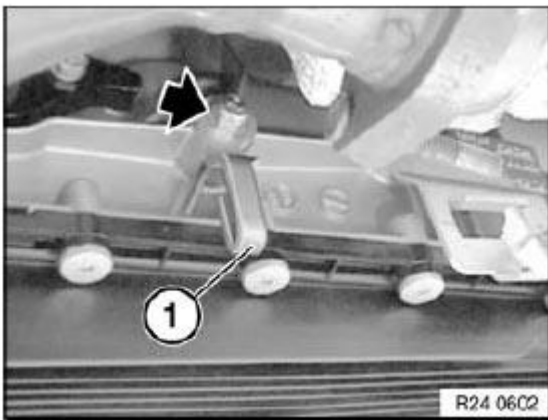


Fig. 50: Identifying Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 5 361 until it is firmly connected with shaft seal.

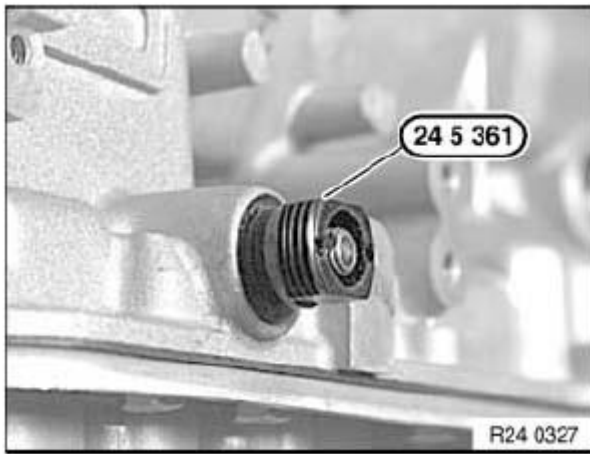


Fig. 51: Identifying Special Tool 24 5 361
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 24 5 362 onto special tool 24 5 361 and tighten down.

This pulls the shaft seal out of the transmission housing.

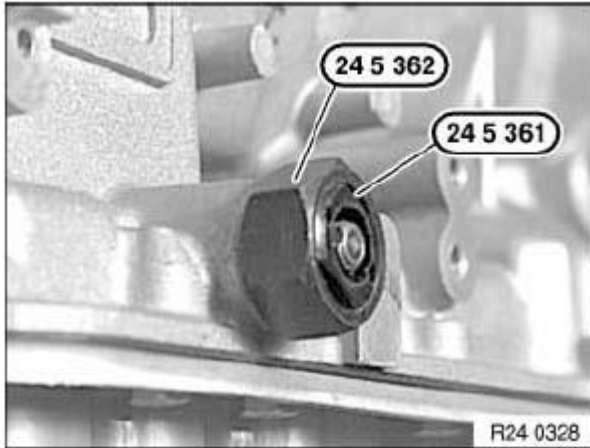


Fig. 52: Identifying Special Tool 24 5 362 Onto Special Tool 24 5 361
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal (1).

Screw in shaft seal (1) with special tools 24 5 366 and 24 5 364 as far as it will go.

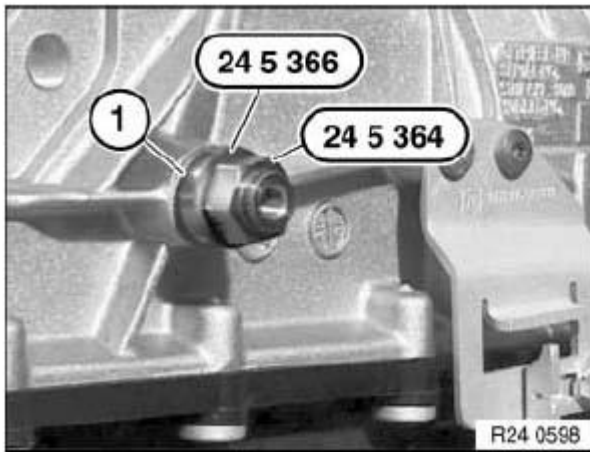


Fig. 53: Screwing In Shaft Seal With Special Tools 24 5 366 And 24 5 364
Courtesy of BMW OF NORTH AMERICA, INC.

OIL PUMP

24 31 011 REPLACING SHAFT SEAL FOR TORQUE CONVERTER (GA6HP19Z)

Special tools required:

- 00 1 450
- 24 0 180
- 24 2 351
- 24 2 352
- 24 2 353
- 24 2 400

Necessary preliminary tasks:

- Remove automatic transmission .

IMPORTANT: After completion of work, check transmission oil level.

Use only approved transmission fluid .

Failure to comply with this instruction will result in serious damage to the transmission.

Secure transmission with special tool 24 0 180 to assembly stand 00 1 450.

Remove torque converter .

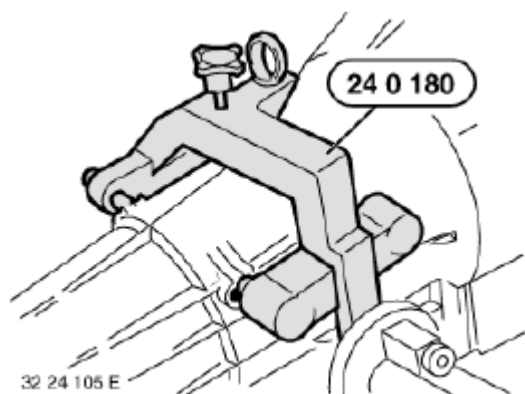


Fig. 54: Securing Transmission With Special Tool 24 0 180
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 24 2 353 to drive shaft (1).

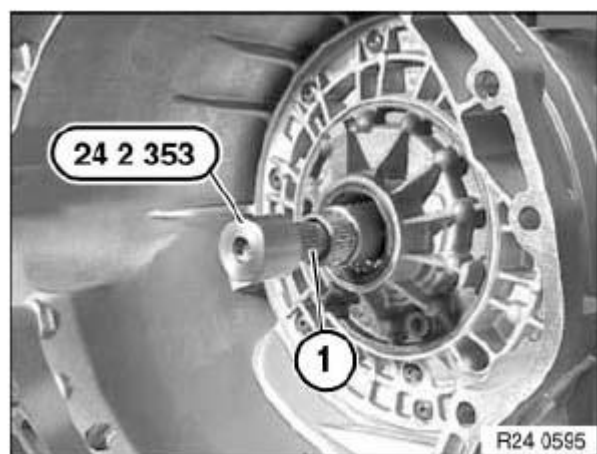


Fig. 55: Attaching Special Tool 24 2 353 To Drive Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 2 351 until it is firmly connected with shaft seal.

Screw in special tool 24 2 352 to remove shaft seal.

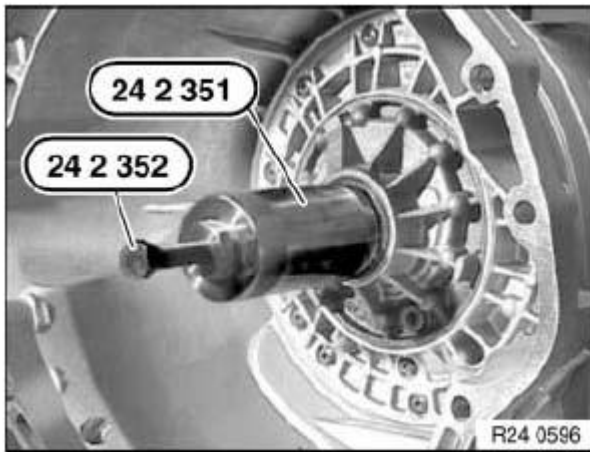


Fig. 56: Removing Shaft Seal

Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal.

Drive in shaft seal (1) with special tool 24 2 400 as far as it will go.

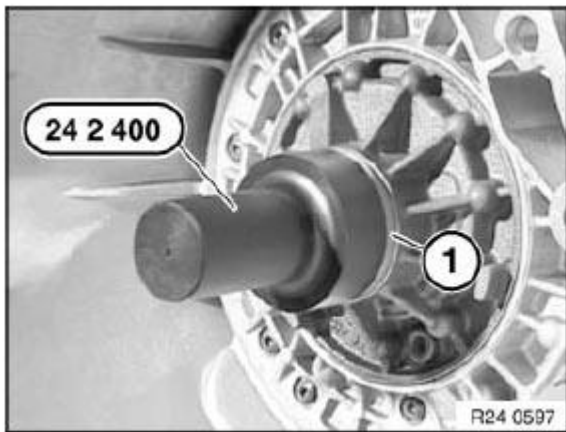


Fig. 57: Installing Shaft Seal

Courtesy of BMW OF NORTH AMERICA, INC.

24 31 575 REPLACING OIL PUMP O-RINGS (GA6HP26/19Z)

Special tools required:

- 24 1 180
- 24 1 184

IMPORTANT: After completion of work, check transmission oil level.
Use only approved transmission fluid .

Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove **automatic transmission**
- Secure transmission **with transmission holding bridge** on assembly stand
- Remove **torque converter**
- Remove **mechatronics**

Remove adapter (1).

Installation:

Note installation position.

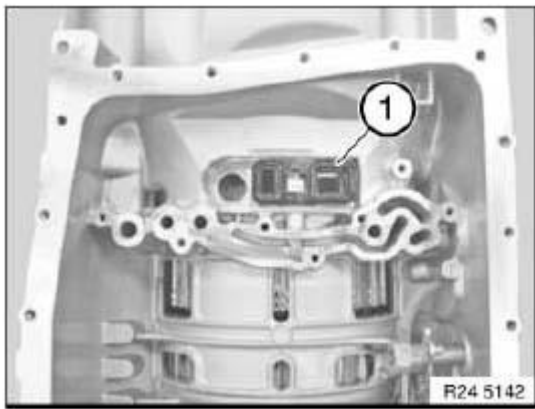


Fig. 58: Identifying Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 3AZ.**

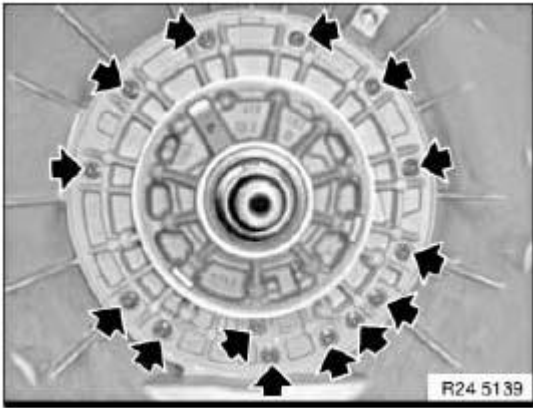


Fig. 59: Locating Torque Converter Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slide special tool 24 1 184 completely into extractor 24 1 180.

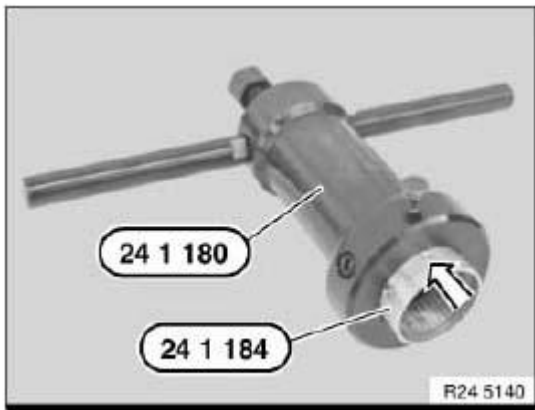


Fig. 60: Sliding Special Tool 24 1 184 Into Extractor 24 1 180
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 24 1 180 and secure with screw (1).

Insert screw (2) and release oil supply unit from transmission housing.

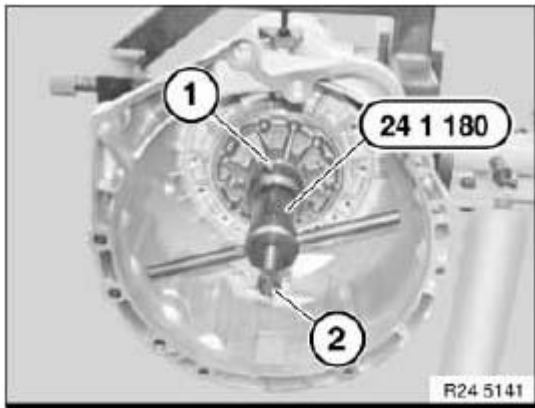


Fig. 61: Identifying Special Tool 24 1 180

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 1AZ.**

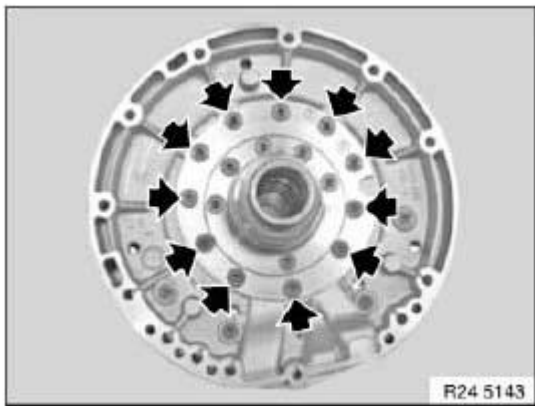


Fig. 62: Locating Transmission Housing Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Detach cover (1) from pump housing (2).

Replace O-rings (3 + 4).

Installation:

Pay attention to installation position of gears during disassembly.

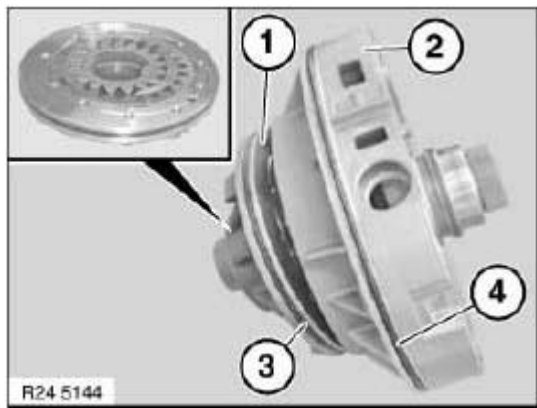


Fig. 63: Identifying Cover, O-Rings And Pump Housing
 Courtesy of BMW OF NORTH AMERICA, INC.

REGULATOR

24 34... MANUAL EMERGENCY RELEASE OF TRANSMISSION LOCK

In the event of a power supply interruption, e.g. flat battery or electrical fault, the transmission lock must be manually released, otherwise the wheel will be locked and the vehicle cannot be moved.

IMPORTANT:

- **Firmly apply handbrake**
- **Manually unlock transmission lock**

NOTE: **The screwdriver for unlocking is located in the onboard tool kit in the luggage compartment!**

Remove **trim for preselector lever** .

Take screwdriver from on-board tool kit and insert into opening (1).



Fig. 64: Inserting Screwdriver Into Opening

Courtesy of BMW OF NORTH AMERICA, INC.

Pull screwdriver towards rear until it engages audibly and leave inserted in opening.

Transmission lock is released!

**Fig. 65: Releasing Transmission Lock**

Courtesy of BMW OF NORTH AMERICA, INC.

Locking transmission lock:

Pull out screwdriver in direction of arrow.

Transmission lock is locked.

**Fig. 66: Pulling Out Screwdriver**

Courtesy of BMW OF NORTH AMERICA, INC.

SHIFT VALVES, PARKING

24 31 575 REPLACING OIL PUMP O-RINGS (GA6HP26/19Z)**Special tools required:**

- 24 1 180
- 24 1 184

IMPORTANT: After completion of work, check transmission oil level.

Use only approved transmission fluid .

Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove automatic transmission
- Secure transmission with **transmission holding bridge** on assembly stand
- Remove torque converter
- Remove mechatronics

Remove adapter (1).

Installation:

Note installation position.

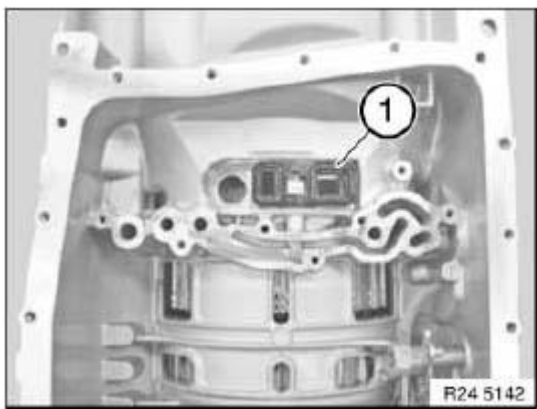


Fig. 67: Identifying Adapter

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 3AZ**.

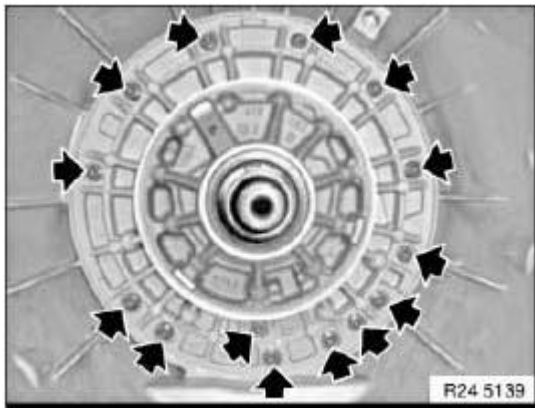


Fig. 68: Locating Torque Converter Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slide special tool 24 1 184 completely into extractor 24 1 180.

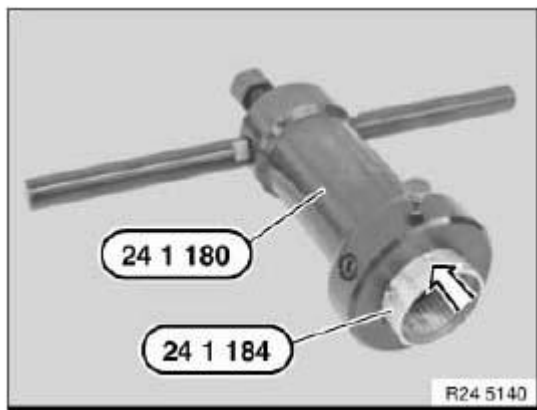


Fig. 69: Sliding Special Tool 24 1 184 Into Extractor 24 1 180
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 24 1 180 and secure with screw (1).

Insert screw (2) and release oil supply unit from transmission housing.

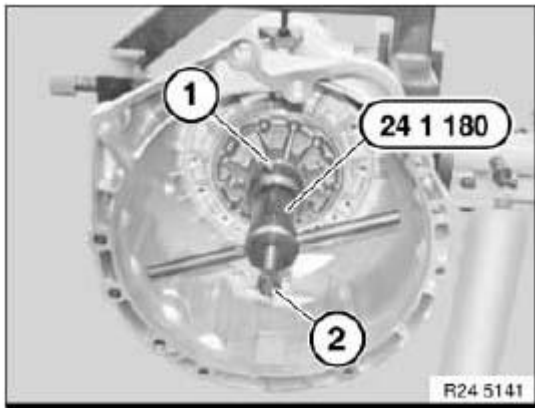


Fig. 70: Identifying Special Tool 24 1 180

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 1AZ.**

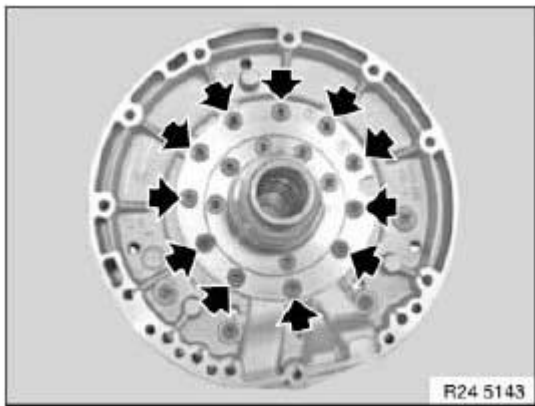


Fig. 71: Locating Transmission Housing Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Detach cover (1) from pump housing (2).

Replace O-rings (3 + 4).

Installation:

Pay attention to installation position of gears during disassembly.

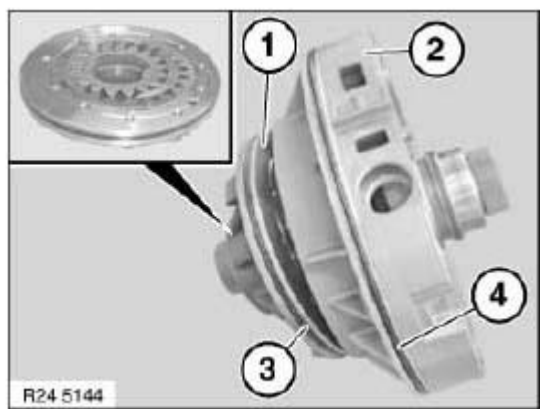


Fig. 72: Identifying Cover, O-Rings And Pump Housing
Courtesy of BMW OF NORTH AMERICA, INC.

24 34... MANUAL EMERGENCY RELEASE OF TRANSMISSION LOCK

In the event of a power supply interruption, e.g. flat battery or electrical fault, the transmission lock must be manually released, otherwise the wheel will be locked and the vehicle cannot be moved.

- IMPORTANT:**
- **Firmly apply handbrake**
 - **Manually unlock transmission lock**

NOTE: **The screwdriver for unlocking is located in the on-board tool kit in the luggage compartment!**

Remove trim for preselector lever .

Take screwdriver from on-board tool kit and insert into opening (1).



Fig. 73: Inserting Screwdriver Into Opening
Courtesy of BMW OF NORTH AMERICA, INC.

Pull screwdriver towards rear until it engages audibly and leave inserted in opening.

Transmission lock is released!



Fig. 74: Releasing Transmission Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Locking transmission lock:

Pull out screwdriver in direction of arrow.

Transmission lock is locked.



Fig. 75: Pulling Out Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

24 34... NOTES ON MECHATRONICS (GA6HP26Z/GA6HP32Z/GA6HP19Z)

Special tools required:

- 24 2 390

IMPORTANT: After completing work:

- Load specific data version with DIS
- Check transmission oil level

Use only approved transmission fluid .

Failure to comply with this requirement will result in se damage to the automatic transmission!

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection) . See 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Unscrew plug (1) and disconnect.

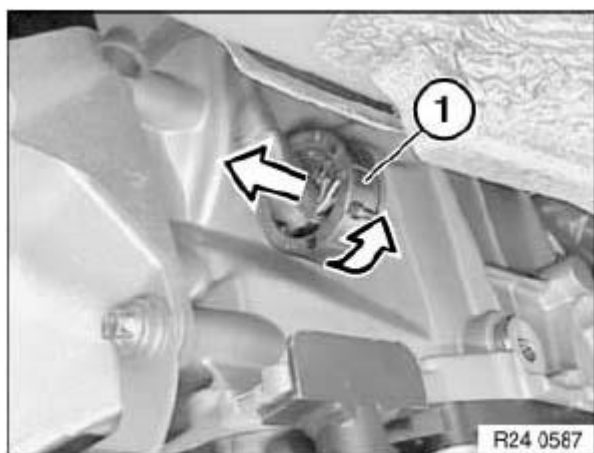


Fig. 76: Disconnecting Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 24 2 390 in sealing sleeve (1).

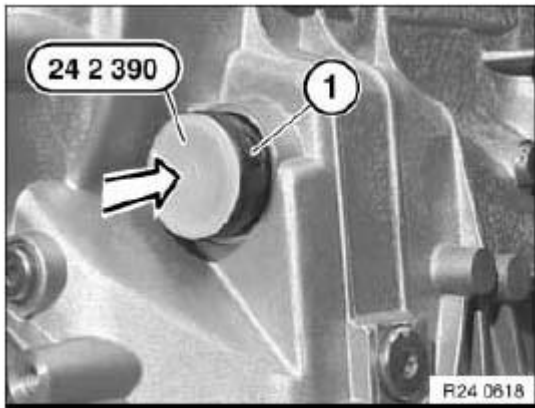


Fig. 77: Inserting Special Tool 24 2 390 In Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

24 34 021 REPLACING SEALING SLEEVE FOR TRANSMISSION HOUSING (GA6HP19Z)

Special tools required:

- 24 2 390

IMPORTANT: After completion of work, check transmission oil level .

Use only approved transmission fluid .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Remove transmission cross-member.
- Remove transmission sump.

IMPORTANT: Support transmission with workshop hoist.

Remove heat shield (1).

NOTE: Illustration similar.

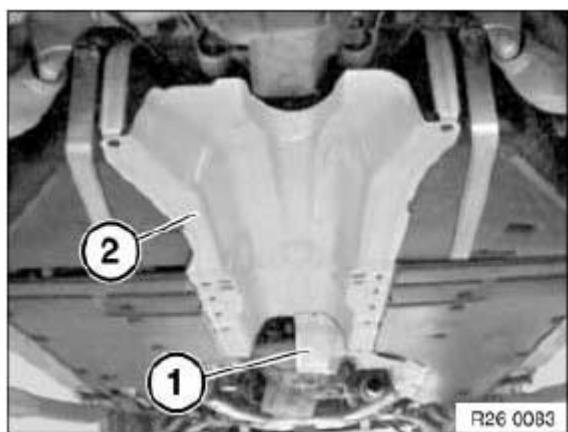


Fig. 78: Identifying Heat Shield

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug (1) by turning.

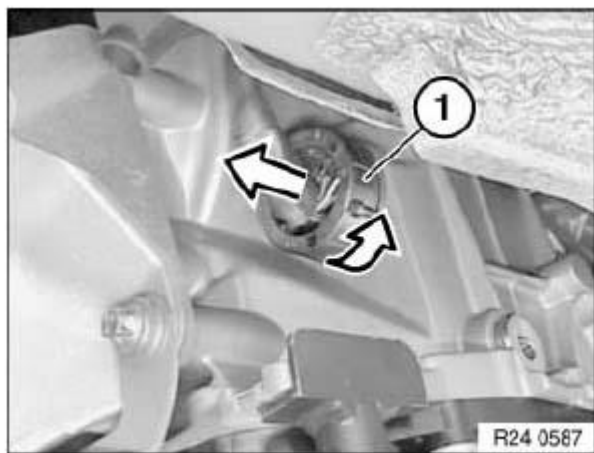


Fig. 79: Disconnecting Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 24 2 390 in sealing sleeve (1).

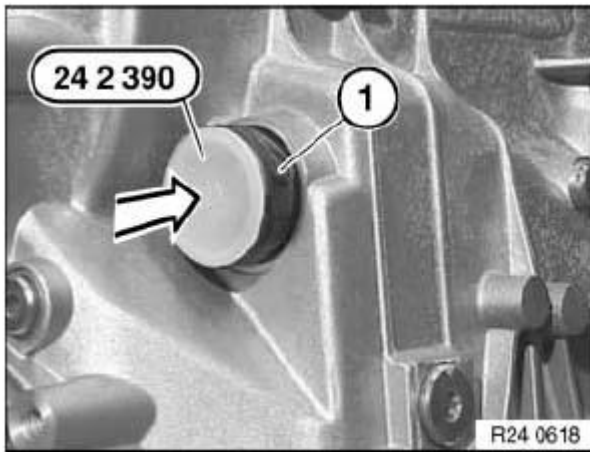


Fig. 80: Inserting Special Tool 24 2 390 In Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock sealing sleeve with slide (1).

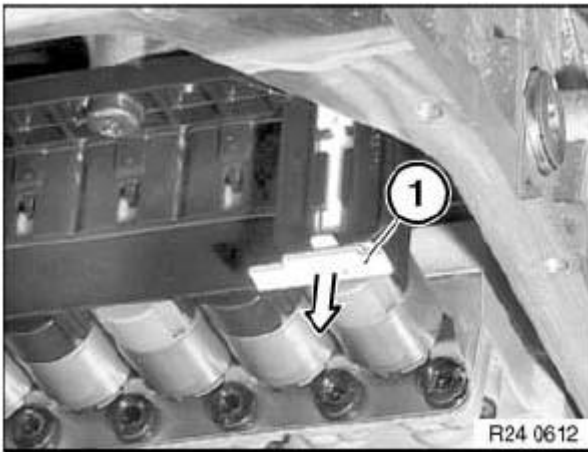


Fig. 81: Unlocking Sealing Sleeve With Slide
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Note position of sealing sleeve.

Pull out sealing sleeve (1).

Installation:

Screw in sealing sleeve partially (lug in upper area).

Turn until lug engages in groove of transmission. Slide in sealing sleeve.

Lug on sealing sleeve must not be damaged!

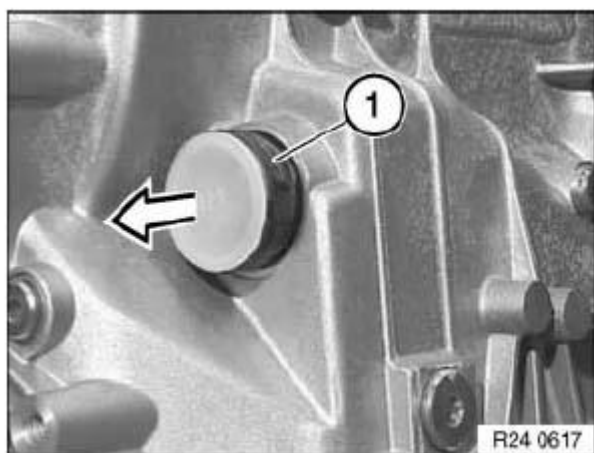


Fig. 82: Pulling Out Sealing Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

24 34 562 REPLACING MECHATRONICS (GA6HP19Z)

Special tools required:

- 24 2 390

NOTE: After completing work:

- Load specific data version with DIS.

IMPORTANT: After completion of work, check transmission oil level .

Use only approved transmission fluid .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection) . See 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks:

- Remove heat shield on right.
- Support automatic transmission with hydraulic lifter.
- Remove **transmission cross-member** .

Version 1:

Grip clamping sleeve (1) and slacken nut (2).

Detach retainer (3) downwards using a screwdriver.

Pull cable (4) out of holder.

Installation:

Adjust selector lever .

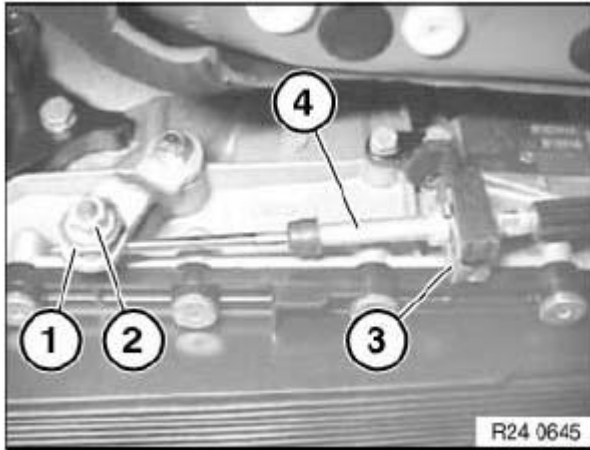


Fig. 83: Identifying Clamping Sleeve, Cable And Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2:

Release screw (1).

Remove clamp (2).

Release shift cable head (3) using a screwdriver from ball head of shift cable lever.

Installation:

Adjust selector lever .

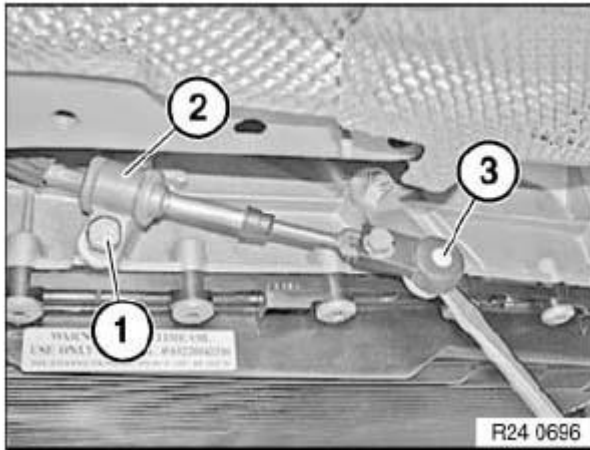


Fig. 84: Releasing Shift Cable Head Using Screwdriver
 Courtesy of BMW OF NORTH AMERICA, INC.

Version 3:

Unfasten nut.

Remove cable (1).

Installation:

Adjusting cable:

- Release nut
- Adjust cable by means of holder (2) until spacing A = 1 mm is obtained
- Tighten down nut

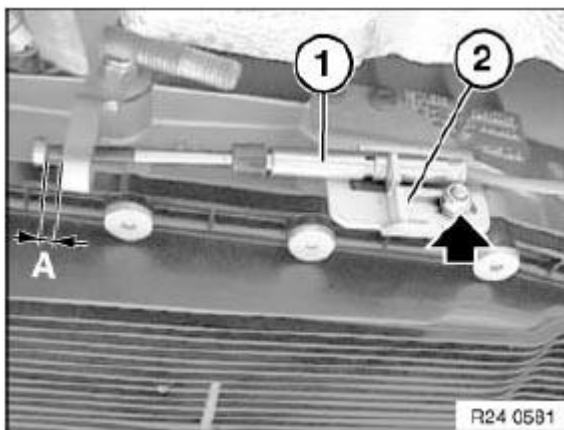


Fig. 85: Identifying Cable And Holder
 Courtesy of BMW OF NORTH AMERICA, INC.

Version 4:

Move selector lever to "Park".

Release shift cable head (1) using a screwdriver from ball head of shift lever.

Detach retainer (2) downwards using a screwdriver.

Slide cable (3) towards rear and disengaged in downward direction.

Installation:

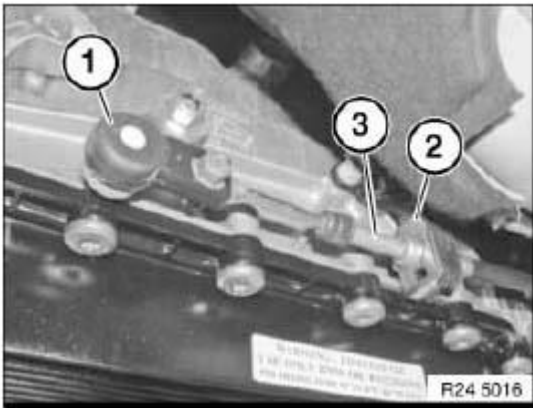
Adjusting shift lever

Fig. 86: Identifying Retainer, Cable And Shift Cable Head
Courtesy of BMW OF NORTH AMERICA, INC.

Secure lever (1) with a cable tie (2) or wire in vertical position.

NOTE: E65 only.

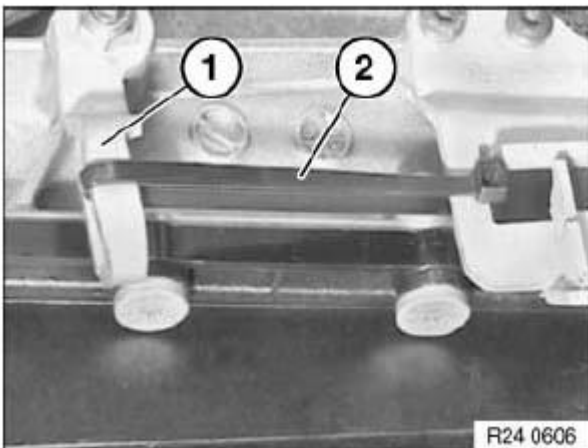


Fig. 87: Securing Lever With Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

M57T2 only

Release screws (1).

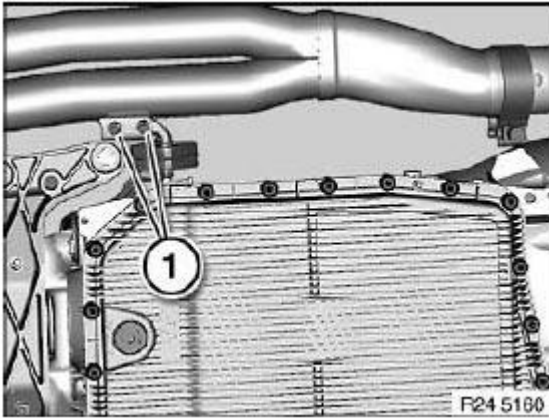


Fig. 88: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

M57T2 only

Release screws (1).

Bracket remove.

Tightening torque **24 71 6AZ.**

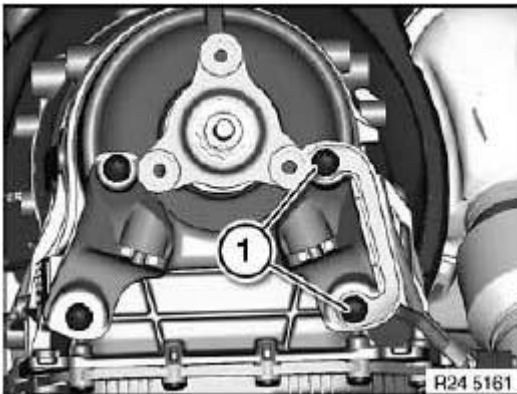


Fig. 89: Identifying Bracket Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mechatronics can be destroyed by static discharges. Therefore the contacts

inside the plug must not be touched. Insert special tool immediately after work step.

Unscrew plug (1) and disconnect.

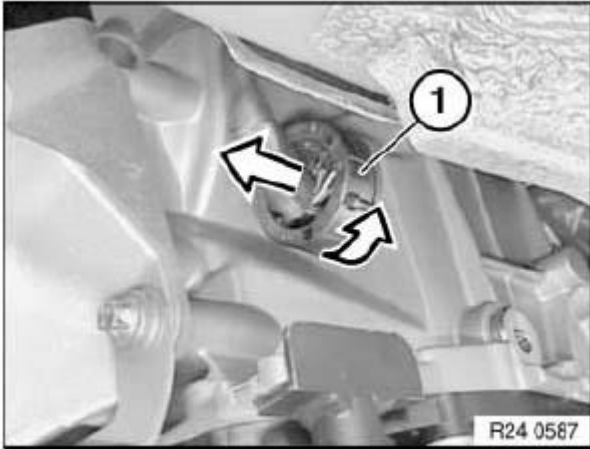


Fig. 90: Disconnecting Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 24 2 390 in sealing sleeve (1).

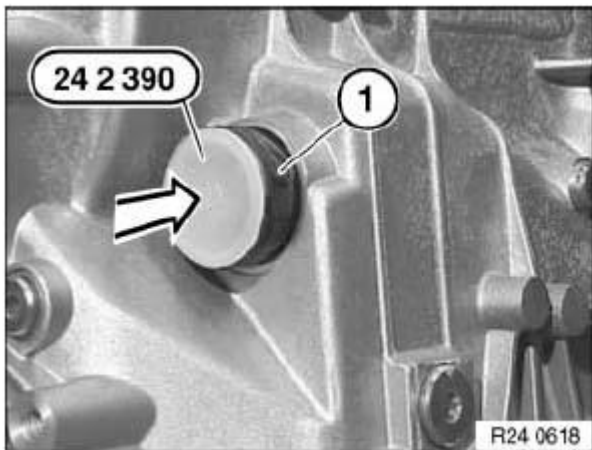


Fig. 91: Inserting Special Tool 24 2 390 In Sealing Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

Remove transmission oil sump.

Unlock sealing sleeve with slide (1).

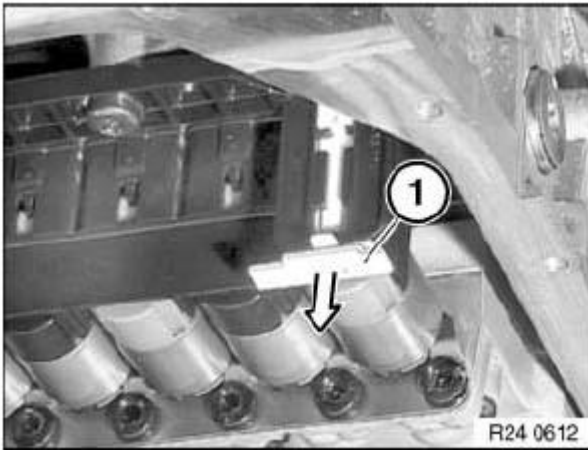


Fig. 92: Unlocking Sealing Sleeve With Slide
Courtesy of BMW OF NORTH AMERICA, INC.

Note position of sealing sleeve.

Pull out sealing sleeve (1).

Installation:

Screw in sealing sleeve partially (lug in upper area).

Turn until lug engages in groove of transmission. Slide in sealing sleeve.

Lug on sealing sleeve must not be damaged!

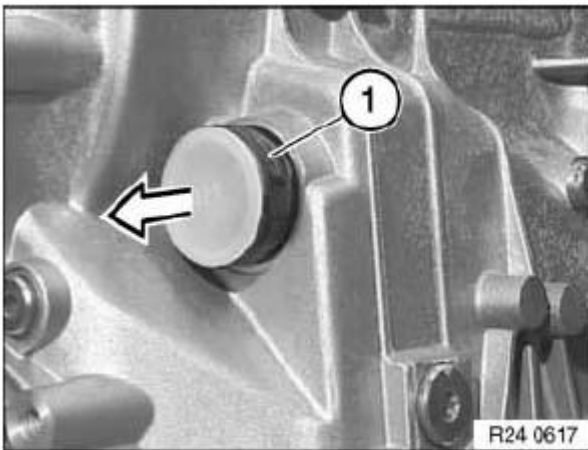


Fig. 93: Pulling Out Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: GA6HP19Z

Release all screws (1 and 2).

- 1 = M6 x 58 mm
- 2 = M6 x 20 mm

Remove mechatronics.

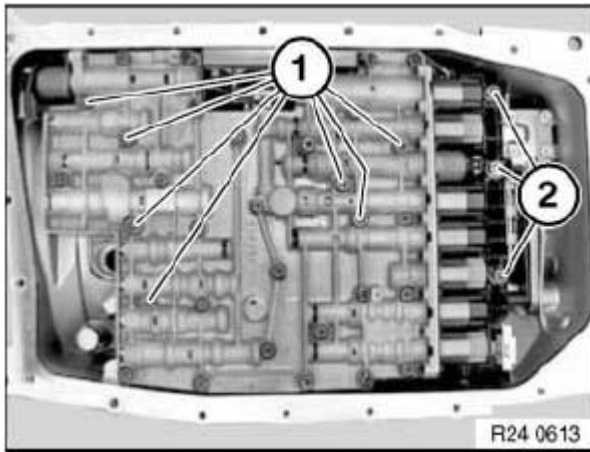


Fig. 94: Identifying Mechatronics Screws (GA6HP19Z)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: GA6HP19Z TU

Release all screws (1 and 2).

- 1 = M6 x 58 mm
- 2 = M6 x 20 mm

Remove mechatronics.

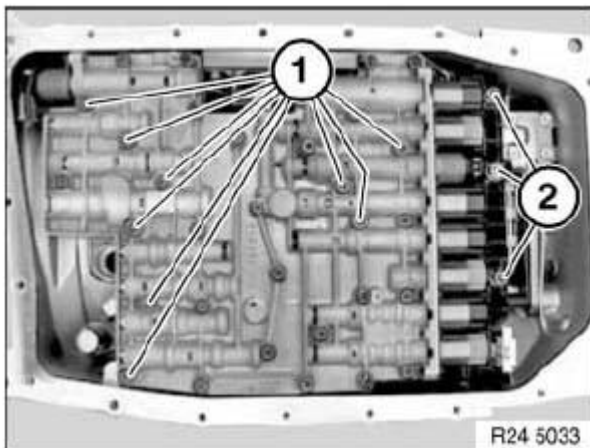
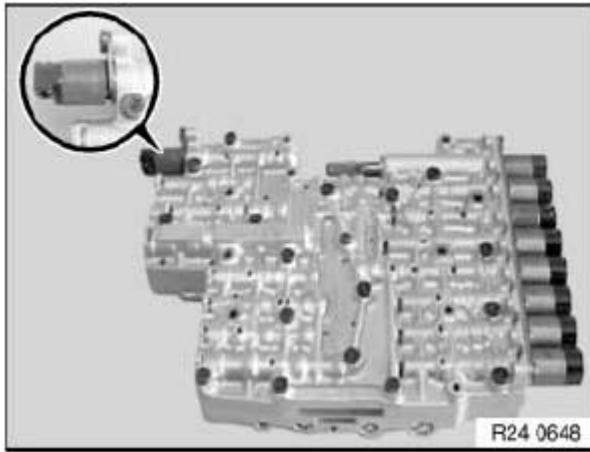
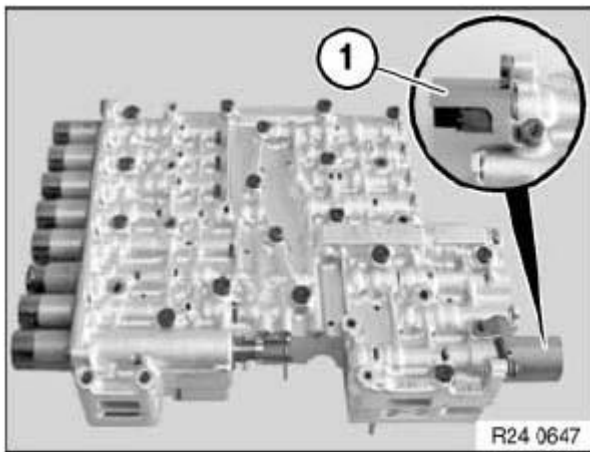


Fig. 95: Identifying Mechatronics Screws (GA6HP19Z TU)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Only installed in E65!**Mechatronics without protective bar for solenoid valve must not be reused after removal.****Fig. 96: Identifying Mechatronics**

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Only installed in E65!**Fit/reuse only mechatronics with protective bar (1) for solenoid valve.****Fig. 97: Identifying Mechatronics With Protective Bar For Solenoid Valve**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check gaskets (1 and 2) for damage, replace gaskets if necessary.

Coat new seals with automatic transmission fluid and install.

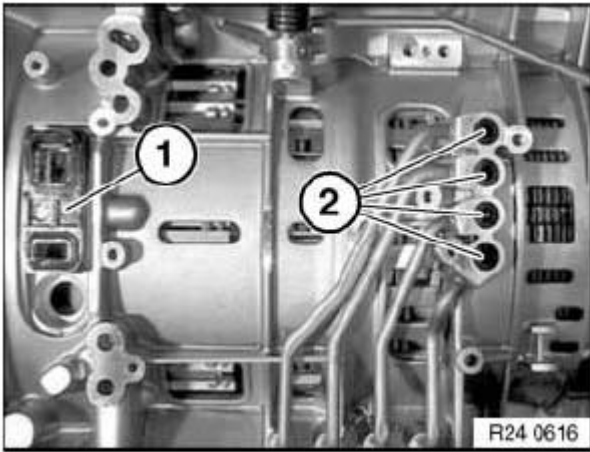


Fig. 98: Identifying Gaskets

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert screws (3) alternately until contact is made with each screw head.

Insert all further screws contact is made with each screw head.

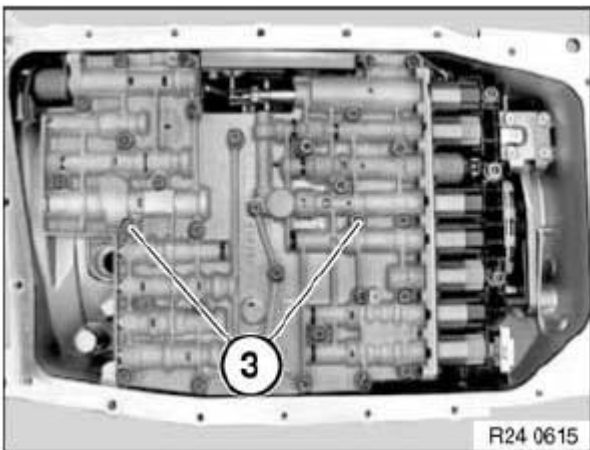


Fig. 99: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Tighten down screws in order 1...10.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Tightening torque **24 30 1AZ**.

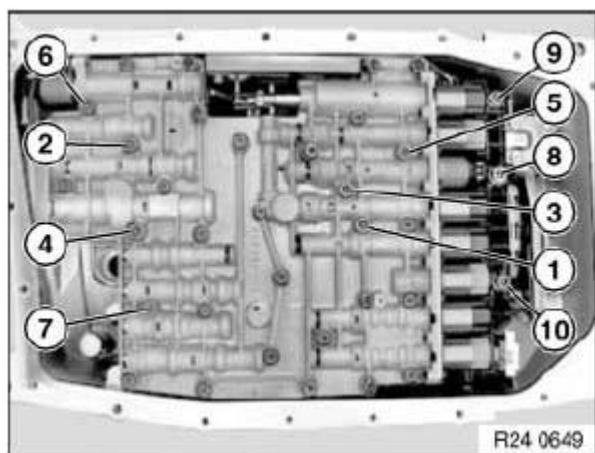


Fig. 100: Identifying Tightening Sequence Of Mechatronics Screws

Courtesy of BMW OF NORTH AMERICA, INC.

TORQUE CONVERTER

24 31 575 REPLACING OIL PUMP O-RINGS (GA6HP26/19Z)

Special tools required:

- 24 1 180
- 24 1 184

IMPORTANT: After completion of work, check transmission oil level.

Use only approved transmission fluid .

Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove automatic transmission
- Secure transmission with transmission holding bridge on assembly stand
- Remove torque converter
- Remove mechatronics

Remove adapter (1).

Installation:

Note installation position.

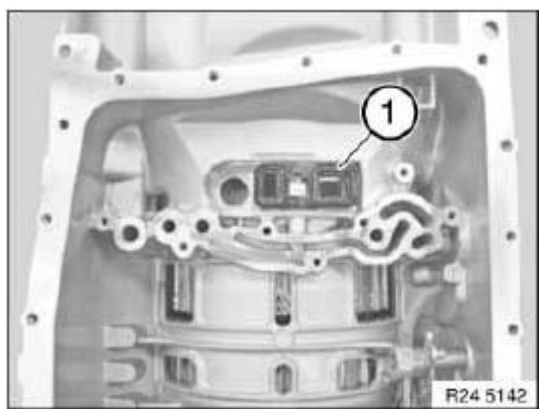


Fig. 101: Identifying Adapter

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque 24 31 3AZ.

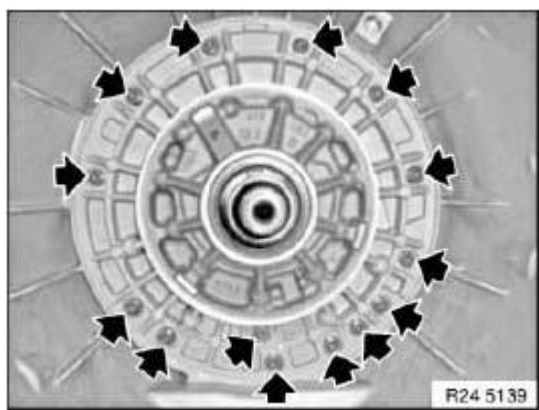


Fig. 102: Locating Oil Pump Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Slide special tool 24 1 184 completely into extractor 24 1 180.

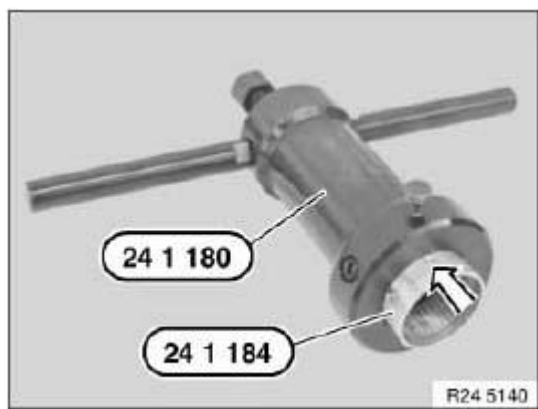


Fig. 103: Sliding Special Tool 24 1 184 Into Extractor 24 1 180
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 24 1 180 and secure with screw (1).

Insert screw (2) and release oil supply unit from transmission housing.

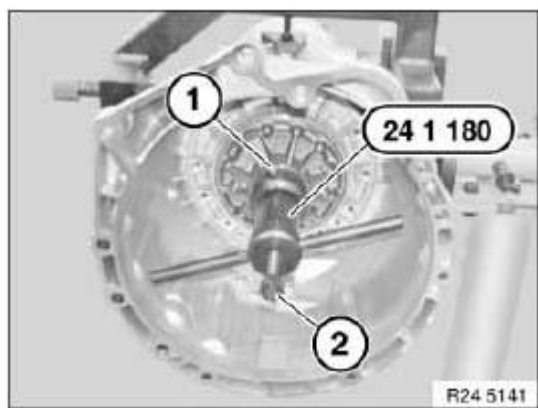


Fig. 104: Identifying Special Tool 24 1 180
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 1AZ.**

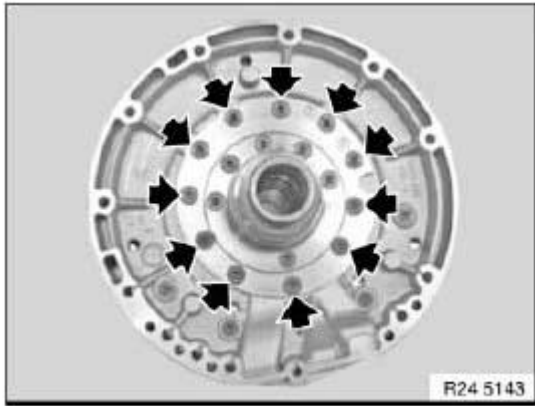


Fig. 105: Locating Transmission Housing Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Detach cover (1) from pump housing (2).

Replace O-rings (3 + 4).

Installation:

Pay attention to installation position of gears during disassembly.

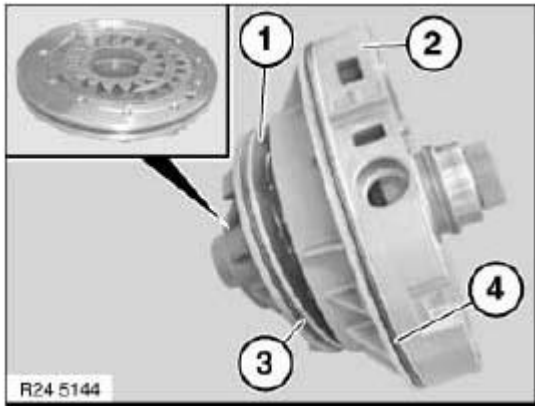


Fig. 106: Identifying Cover, O-Rings And Pump Housing
 Courtesy of BMW OF NORTH AMERICA, INC.

24 40 011 REMOVING AND INSTALLING/REPLACING TORQUE CONVERTER (GA6HP19Z)

Special tools required:

- 00 2 550
- 24 4 000

IMPORTANT: After completion of work, check transmission oil level.
Use only approved transmission fluid .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove automatic transmission

Screw special tool 24 4 000 into torque converter.

Remove torque converter.

NOTE: When torque converter is removed, transmission oil flows out.

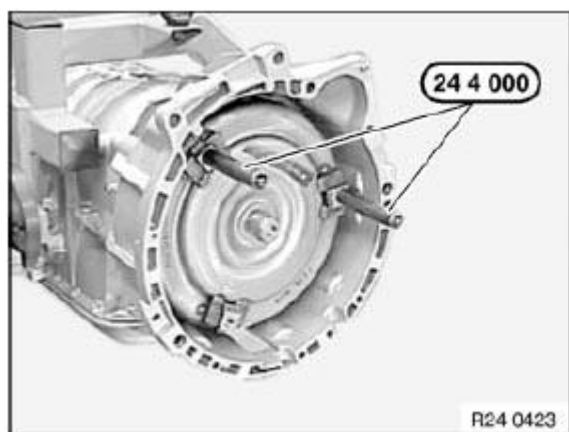


Fig. 107: Identifying Special Tool 24 4 000 Into Torque Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing, do not damage shaft seal and bearing.

If the torque converter is not correctly installed, the driver of the pump impeller may be damaged when the transmission is flanged to the engine.

Remove torque converter and set down vertically.

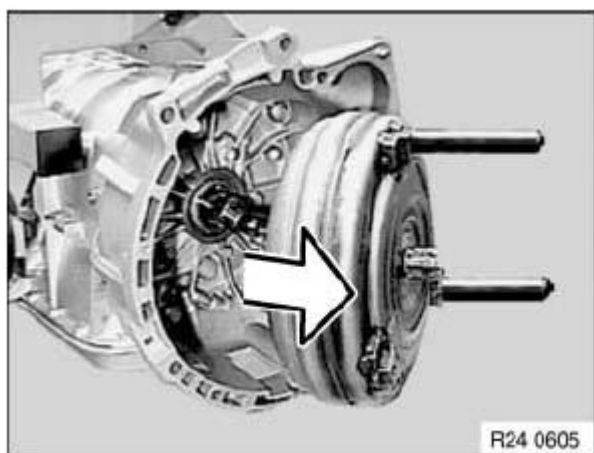


Fig. 108: Removing Torque Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Push torque converter through shaft seal onto transmission shaft as far as it will go.

Press torque converter by hand into converter housing and turn in the process. Converter hub opening must snap into place in driver of pump impeller. Torque converter must be felt to slip inwards.

Determine distance between contact surface and surface (1) of tapped hole in torque converter with special tool 00 2 550.

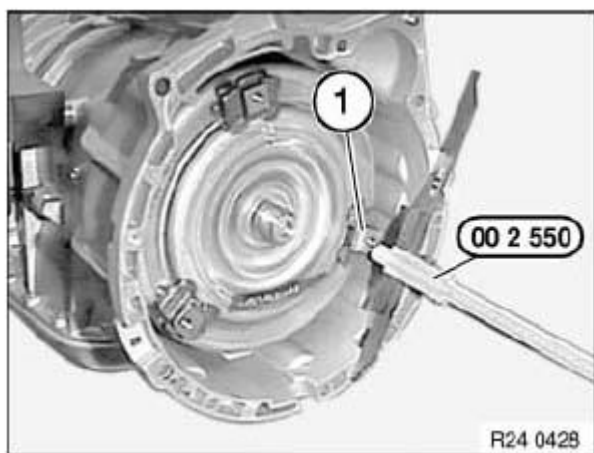


Fig. 109: Checking Distance Between Contact Surface And Tapped Hole Surface In Torque Converter With Special Tool 00 2 550
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Measured value must be greater than 25 mm.

SHIFT FUNCTION

24 50 010 REPLACING EMERGENCY ACTUATOR

Necessary preliminary tasks:

- Remove rear **underbody protection** . See **51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION**
- Remove **center console** . See **51 16 ... REMOVING AND INSTALLING/REPLACING CENTRE CONSOLE COVER (E60)** or **51 16 ... REMOVING AND INSTALLING/REPLACING CENTRE CONSOLE COVER (E61)** .
- Remove **gear selector switch** .
- Remove air duct under storage compartment.

Unfasten nut.

Remove cable (1).

Installation:

Adjust **selector lever** .

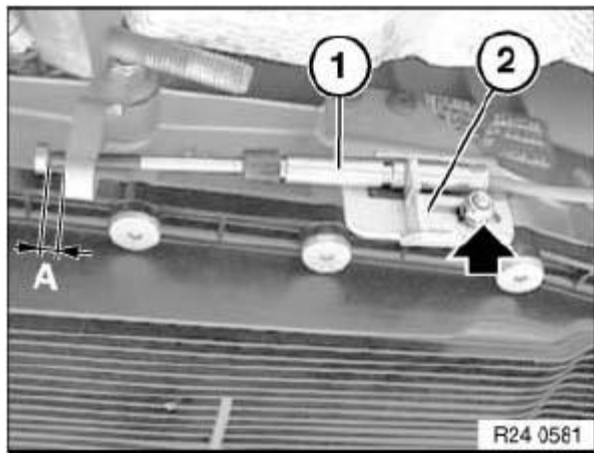


Fig. 110: Identifying Cable

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove emergency actuator (2) in upward direction.

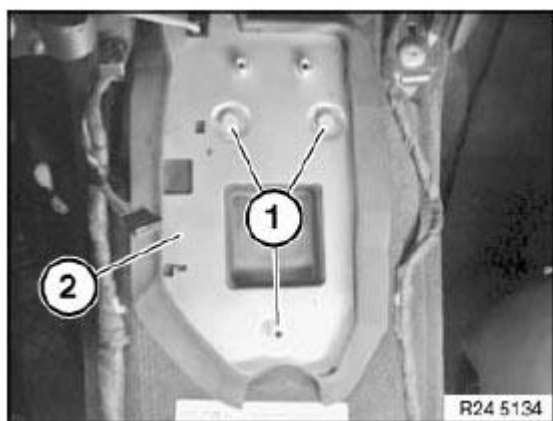


Fig. 111: Identifying Emergency Actuator Screws
Courtesy of BMW OF NORTH AMERICA, INC.

BRAKES**Brakes - Repair Instructions****BRAKE TESTING AND BLEEDING****34 00... GENERAL INFORMATION**

The brake system is one of the most important safety systems on any motor vehicle. It is therefore essential to act with utmost care when working on the brake system and to follow the instructions below.

General:

- Ensure cleanliness and only use rags which do not lose lint.
- Wash away or vacuum up brake dust, do not clear it away using compressed air. This dust is a health hazard.
- Ensure that no oils or grease enter the brake system: these substances would cause complete failure of the entire brake system.
- When cleaning brake components with brake cleaner do not allow brake cleaner to get into the brake system.
- Even the most minute traces of brake cleaner must be avoided.

Brake fluid:

- Replace brake fluid at least every two years.
- Never re-use drained brake fluid.
- Always use BMW-approved brake fluid, refer to **BRAKES - OPERATING FLUIDS** .
- Always dispose of brake fluid in approved receptacles.
- Do not allow brake fluid to drain into drain pipes, into the outside environment or into unsuitable facilities. This would create the risk of groundwater contamination since brake fluid is classed as a fluid that is hazardous to water.
- Do not allow brake fluid to come into contact with paintwork as this will destroy the paint.
- Brake fluid must not be allowed to remain on bare skin too long in order to avoid skin problems. Wash skin coated with brake fluid with water and soap.
- If brake fluid makes contact with eyes, immediately flush with large quantity of clean water and visit eye doctor.

Wheel brakes:

- Brake pads:

Brake pads must be replaced when the warning threshold of the brake pad wear indicator is reached.

Refer to **TECHNICAL DATA** .

Brake pads must always be replaced on both sides of any axle.

The friction surfaces of the brake pads must not come into contact with oils or greases. The brake pads must be replaced if they are fouled by such substances.

In the case of rotation-dependent brake pads, make sure the arrow marking points in the direction of rotation of the brake disk for when the vehicle is moving forward. Brake pads with left/right markings must be fitted on the relevant side of the vehicle.

One-sided angled areas on the brake pads must be located on the disk contact side of the brake caliper for when the vehicle is moving forward.

Brake discs:

Brake disks must not be scored or cracked. Furthermore, minimum brake disk thickness, disk runout, parallelism and surface roughness of the friction surfaces must not exceed or drop below the permitted values.

Refer to **TECHNICAL DATA** .

Always strip preservative off new parts before installation. With the rear brake discs, also strip preservative off brake drum on parking brake.

Brake drums:

Brake drums must not be scored or cracked. Furthermore, the maximum drum inside diameter, radial runout and surface roughness of the friction surfaces must not exceed or drop below the permitted values.

Refer to **TECHNICAL DATA** .

Always strip preservative off new parts before installation.

Brake calipers:

Only approved pastes on the basis of glycine must be used for repairs on brake calipers.

All moving parts on the brake caliper must move freely: note grease specifications.

Use only BMW-approved lubricants to grease caliper guides, refer to **BRAKES - OPERATING FLUIDS** .

Brake lines, brake hoses: brake pad wear indicator

Brake lines and brake hoses must be correctly routed and must not abut with body or components in a way which would cause chafing.

To prevent damage, release and tighten brake line couplings with a special brake line wrench only.

- The system must be bled each time any brake lines have been detached.
- All connection points must be checked for leaks.
- Only tighten down brake hoses on the front axle when wheels are in straight-ahead position.
- Close open connections on brake lines and individual components to prevent dirt from entering the brake system.
- Observe tightening torques when tightening down brake line screw connections.

Tightening torque: **34 32 1AZ** .

Wheel-slip control system:

The slip control system is basically maintenance-free.

However, be sure to adhere to the following:

- When carrying out welding work with electric welding equipment, be sure to disconnect the plug from the electronic control unit (ignition turned off).
- During painting work, the control unit may be subjected for brief periods to loads of max. 95 °C and for long periods (approx. 2 hours) to loads of max. 85 °C.
- Tighten down the battery terminals completely.
- The brake lines on the hydraulic unit must not be mixed up; if necessary, mark them before they are removed and after completing repairs perform the mix-up check with the DIS Tester.

34 00... GENERAL INFORMATION ON BREAKING IN NEW BRAKE DISCS / BRAKE PADS

IMPORTANT: After completing work:

- **Carry out function check on brake analyzer (test stand) to ensure that the brakes complies with legal requirements.**
- **Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.**
- **Exaggerated drastic and continuous braking operations for faster breaking in are not permitted.**
- **Advise the customer not to perform any wilful drastic breaking in the first 200 km after brake replacement.**
- **Attach mirror tag to interior rearview mirror.**

34 00... TESTING AWD VEHICLES ON DYNAMIC BRAKE AND POWER ANALYZERS (E30, E34, E46, E53, E83, E60, E61, E90, E91, E92)

IMPORTANT: Power measurements on single-axle roller dynamometers are generally not permitted as total failure of the transfer case cannot be ruled out during such measurements.

34 00... CHECKING BRAKE DISCS**Special tools required:**

· **34 1 280**

Necessary preliminary tasks:

· Remove wheels.

Checking thickness difference: Measure thickness difference within brake surfaces at 8 point (spread over the circumference) with a micrometer gauge. Compare measurement result with setpoint value. See **BRAKES - TECHNICAL DATA** .

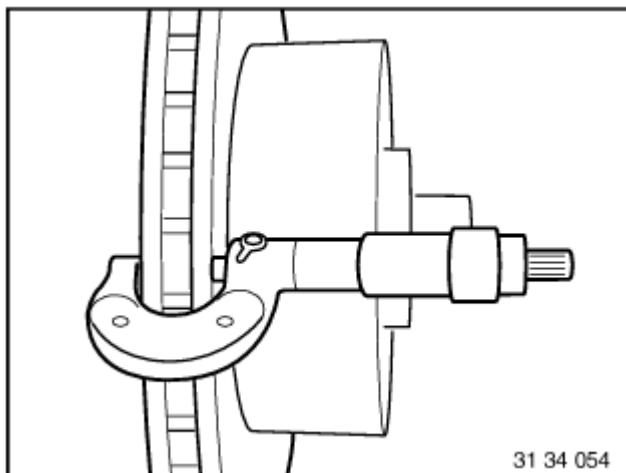


Fig. 1: Checking Rotor Thickness Difference
Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness: Position special tool 34 1 280 at three measuring points in area (1) and measure. Compare measurement result and lowest value with setpoint value. See **BRAKES - TECHNICAL DATA** .

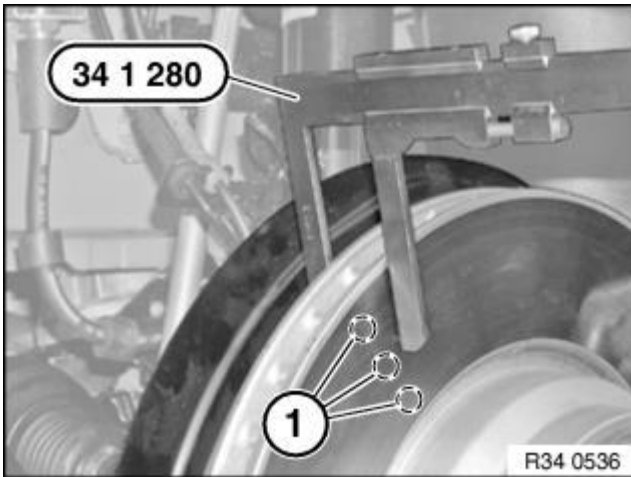


Fig. 2: Checking Minimum Rotor Thickness
 Courtesy of BMW OF NORTH AMERICA, INC.

34 00 009 CHECKING BRAKES ON TEST STAND

Necessary preliminary tasks:

- Check tires for damage
- Check tire treads
- Check tire pressure

In the case of vehicles with DSC, the system must be deactivated with the switch. The DSC telltale and warning light must light up in the instrument cluster!

The brakes must be at normal operating temperature. For this purpose, gently warm up the brake disks/drums while dry by braking the vehicle several times.

E65 and E66: Carry out function check on parking brake.

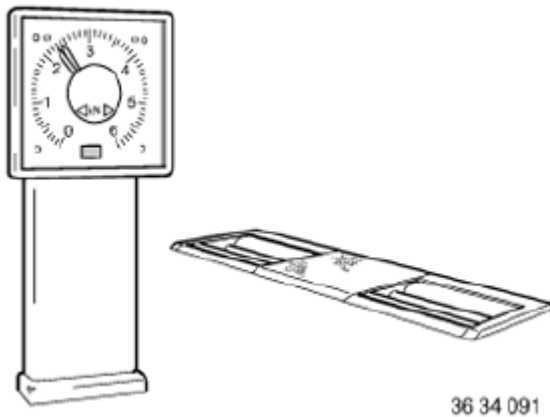


Fig. 3: Identifying Brake Test Stands (Dynamic Analyzers)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Only brake test stands (dynamic analyzers) with test speeds of 2.5-6 km/h may be used.

You must follow without fail the guidelines contained in the operating instructions of the relevant test stand manufacturer.

Failure to do so may result in damage to the vehicle and the system and also personal injury.

34 00 010 CHECKING THICKNESS OF BRAKE PAD

Special tools required:

34 1 260

NOTE: The thickness of the outer brake pads can be determined without removing the wheels.

If necessary, move car until opening for brake pad wear indicator (brake pad) can be seen through rim styling.

Insert special tool 34 1 260 through rim into opening for brake pad wear indicator.

Press special tool onto brake pad. Slide ring (1) in direction of arrow up to stop and read off measured value.

NOTE:

- A. Brake disk
- B. Brake pad with backplate

SAFE LIMIT FOR PAD WEAR, FRONT BRAKE .

SAFE LIMIT FOR PAD WEAR, REAR BRAKE .

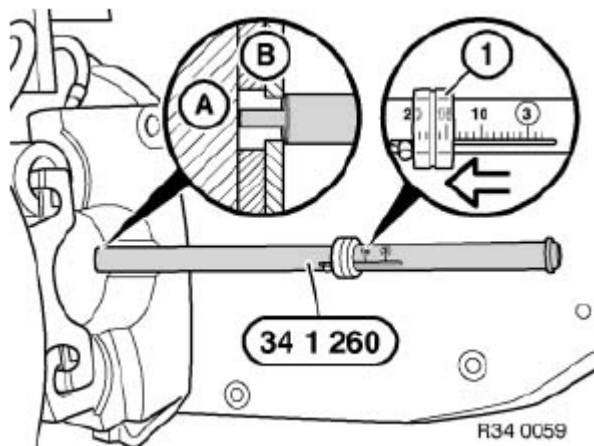


Fig. 4: Inserting Special Tool 34 1 260 Through Rim

Courtesy of BMW OF NORTH AMERICA, INC.

34 00 012 PARKING BRAKE FUNCTION CHECK

NOTE: If deviations are identified during the following check, the parking brake must be adjusted:

Drive vehicle onto chassis dynamometer.

Warm up brakes.

Check handbrake.

0th tooth (handbrake released): Vehicles with manual transmission: Shift lever in neutral position.

Vehicles with automatic transmission: Selector lever in "N" position.

- Without locking differential ≤ 150 N.
- With locking differential ≤ 200 N (possibly odd display).

1st tooth: No increase in braking force with regard to 0th tooth. Indicator lamp can be lit.

2nd tooth: Indicator lamp must be lit.

3rd tooth: Increase in braking force.

5th tooth: The brake force display must have reached ≥ 400 N.

Checking brake force differential at wheel:

Apply handbrake until a wheel circumferential force (measured on brake test stand) of min. 1000 N is reached.

Max. permitted brake force differential right/left $\leq 35\%$ (referred to greater brake value).

It must be possible to brake with locked wheels with the handbrake.

34 00 017 CHECKING BRAKE BOOSTER (LOW-PRESSURE TEST)

Special tools required:

- 34 3 100**

Necessary preliminary tasks:

- REMOVE LEFT MICROFILTER HOUSING**

- Detach hose from connection piece. Install vacuum tester **34 3 100** between connection piece and vacuum hose of non-return valve.
- Start engine.
- Check buildup of partial vacuum.
- Switch off engine.
- Press the brake pedal to set a vacuum pressure of not more than 0.8 bar and wait for the value to stabilize.
- When the brake pedal is not pressed, the vacuum pressure is permitted to drop over a test period of 1 minute by max. 0.06 bar.

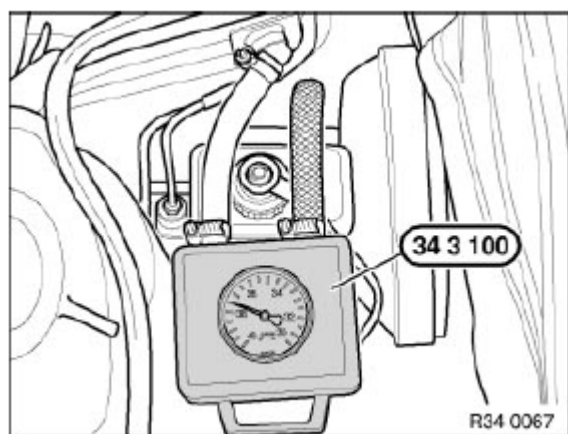


Fig. 5: Identifying Vacuum Tester 34 3 100 Between Connection Piece And Vacuum Hose Of Non-Return Valve

Courtesy of BMW OF NORTH AMERICA, INC.

If specified values are not reached:

- Check line connections for vacuum seal.
- Replace non-return valve.
- Check seal between brake booster and brake master cylinder (sealing ring) for perfect condition and correct seating.
- If the specified values are not achieved when the test is repeated, you must replace the brake booster.

34 00 025 REPLACING FLUID IN ABS/ASC+T BRAKE SYSTEM

Necessary preliminary tasks:

- **READ AND COMPLY WITH GENERAL INFORMATION.**
- **REMOVE LOWER SECTION OF MICROFILTER HOUSING .**

IMPORTANT: When carrying out repairs to the brake system, follow the procedure set out in BLEEDING BRAKE SYSTEM WITH DSC.

Connect bleeder unit to expansion tank and switch on.

NOTE: Check relevant Operating Instructions for each device.
Charging pressure should not exceed 2 bar.

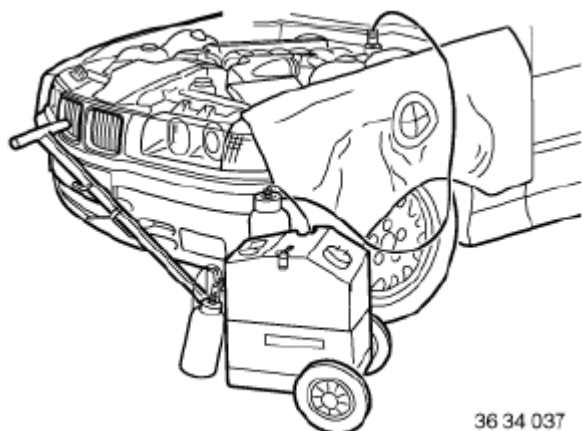


Fig. 6: Connecting Bleeder Unit To Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Flushing brake system completely

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close bleed valve.

Follow same procedure on rear left, front right and front left wheel brake.

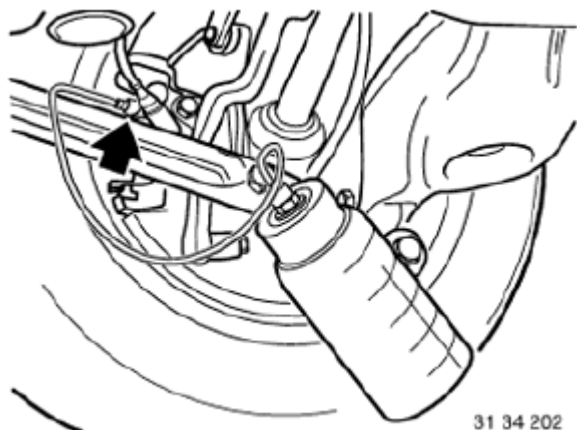


Fig. 7: Connecting Bleeder Hose With Collecting Tray To Bleeder Valve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The clutch slave cylinder must also be scavenged in vehicles with manual transmissions.

Switch off brake fluid changer and remove from expansion tank.

Check brake fluid level. If necessary, top up/draw off to max. level.

Close expansion tank.

NOTE: Pay attention to rubber seal (1) in sealing cap.

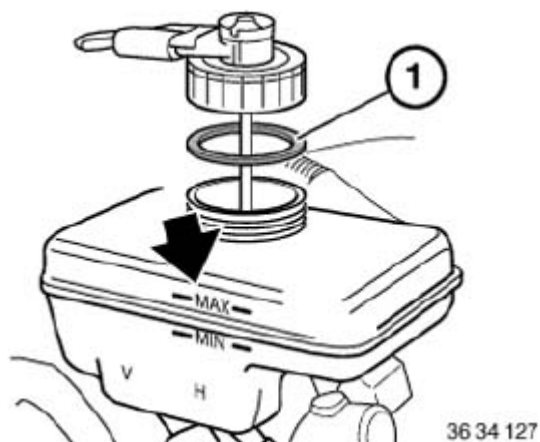


Fig. 8: Identifying Rubber Seal

Courtesy of BMW OF NORTH AMERICA, INC.

34 00 050 BLEEDING BRAKE SYSTEM WITH DSC

Necessary preliminary tasks:

- **REMOVE LOWER SECTION OF MICROFILTER HOUSING .**
- **READ AND COMPLY WITH GENERAL INFORMATION.**

Observe the filling and bleeding instructions when replacing or repairing:

- Replace
- Hydraulic unit
- Components and connecting lines which are fitted between these assemblies.

Connect bleeder unit with max. 2 bar filling pressure.

A second person is needed to help carry out this work.

IMPORTANT: Check relevant Operating Instructions for each device.

Charging pressure should not exceed 2 bar.

- Connect BMW Diagnosis and Information System (DIS).
- Select path: Service functions - Chassis/Suspension - Slip control systems - Bleeding procedure.
- Connect bleeder unit to expansion tank and switch on.

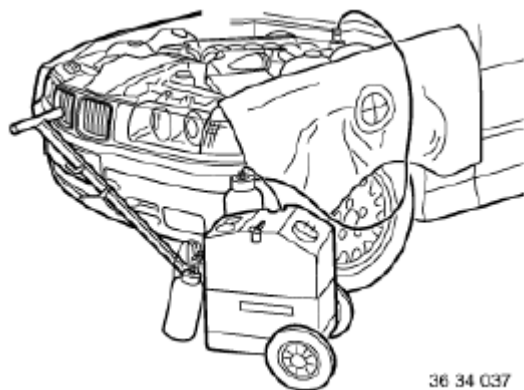


Fig. 9: Connecting Bleeder Unit To Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Flushing brake system completely

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close bleed valve.

Follow same procedure on rear left, front right and front left wheel brake.

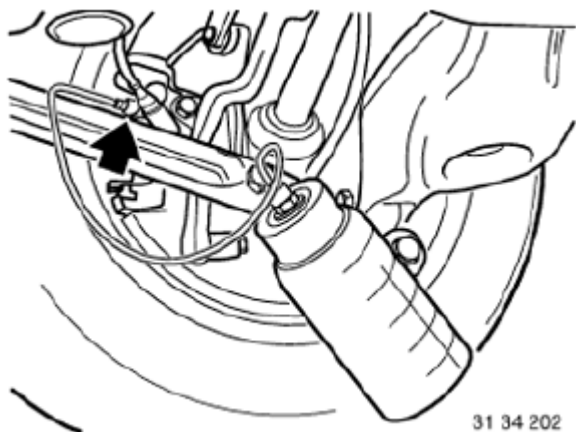


Fig. 10: Connecting Bleeder Hose With Collecting Tray To Bleeder Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding rear-axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Close bleeder valve.

Run through bleeding routine with BMW Diagnosis and Information System (DIS) with bleeder valve open.

After completing routine, press brake pedal 5 times to floor, clear and bubble-free brake fluid must flow out.

Close bleed valve.

Repeat procedure at rear left.

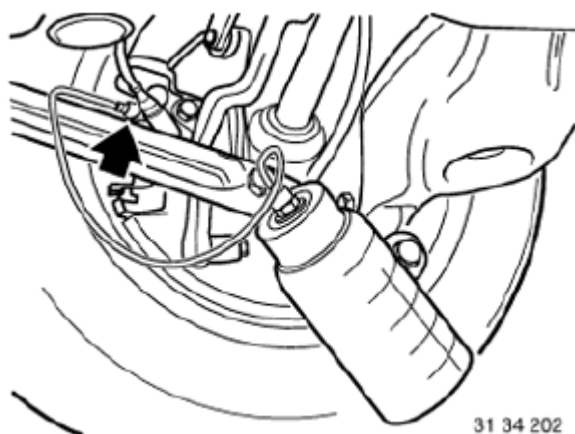


Fig. 11: Connecting Bleeder Hose With Collecting Tray To Bleeder Valve

Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding front-axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on front right brake caliper.

Close bleeder valve.

Run through bleeding routine with BMW Diagnosis and Information System (DIS) with bleeder valve open.

After completing routine, press brake pedal 5 times to floor, clear and bubble-free brake fluid must flow out.

Close bleed valve.

Repeat procedure at front left.

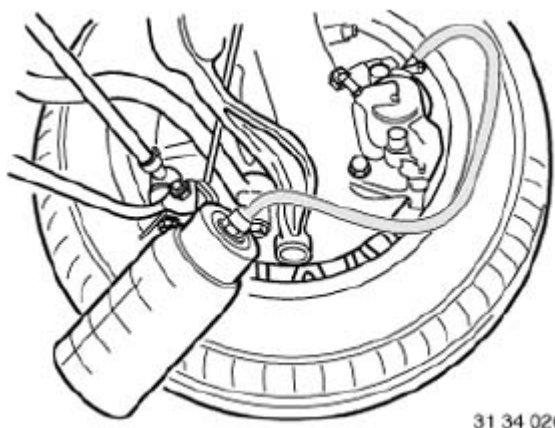


Fig. 12: Connecting Bleeder Hose With Collecting Tray To Bleeder Valve
 Courtesy of BMW OF NORTH AMERICA, INC.

Switch off brake fluid changer and remove from expansion tank.

Check brake fluid level. If necessary, top up/draw off to max. level.

Close expansion tank.

NOTE: Pay attention to rubber seal (1) in sealing cap.

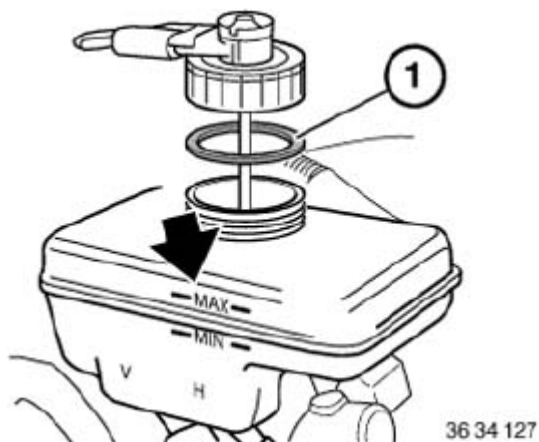
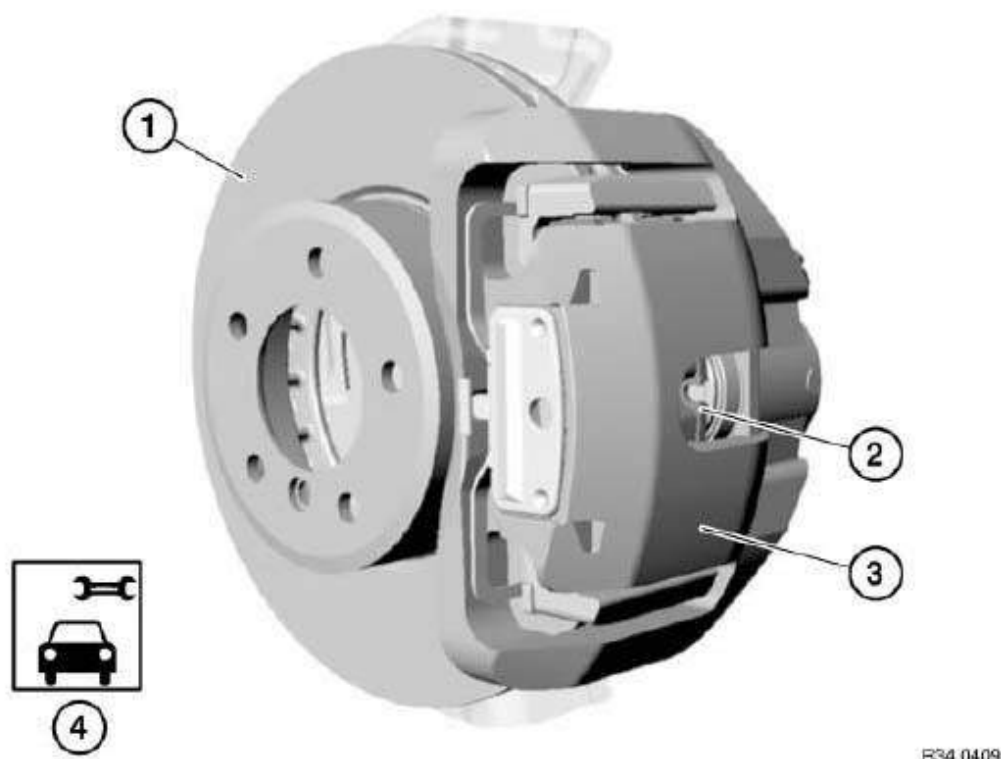


Fig. 13: Identifying Rubber Seal
 Courtesy of BMW OF NORTH AMERICA, INC.

FRONT BRAKES

34 11... OVERVIEW OF FRONT BRAKE

1 [Brake disk](#)2 [Brake pad](#)3 [Brake caliper](#)4 [Checking thickness of brake lining](#)**Fig. 14: Overview Of Front Brake**

Courtesy of BMW OF NORTH AMERICA, INC.

34 11 000 REMOVING AND INSTALLING/REPLACING BRAKE PADS ON BOTH FRONT DISC BRAKES**Special tools required:**

- [34 1 080](#)
- [34 1 280](#)
- [34 6 320](#)

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

IMPORTANT: Sport brake pads for M5 / M6:

Due to the increased strain on the brake discs, we recommend that you also replace the brake discs when fitting this brake pad.

It is absolutely essential to replace the brake discs if cracked > or = 13 mm even before the brake pad is worn.

Necessary preliminary tasks:

- Remove wheels
- Remove **BRAKE PAD WEAR SENSOR**

Observe **SAFETY INSTRUCTIONS** on raising the vehicle.

Lever out retaining spring (1) in direction of arrow towards rear.

Installation:

Attach retaining spring (1) first at top and bottom and then allow retaining lug (2) to engage in recess of brake caliper housing.

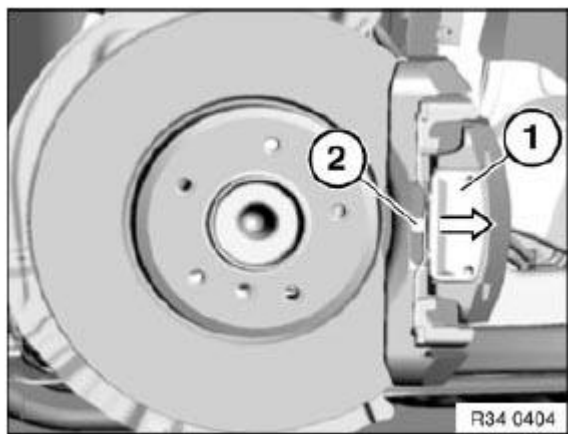


Fig. 15: Identifying Retaining Spring And Retaining Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plastic plugs (1).

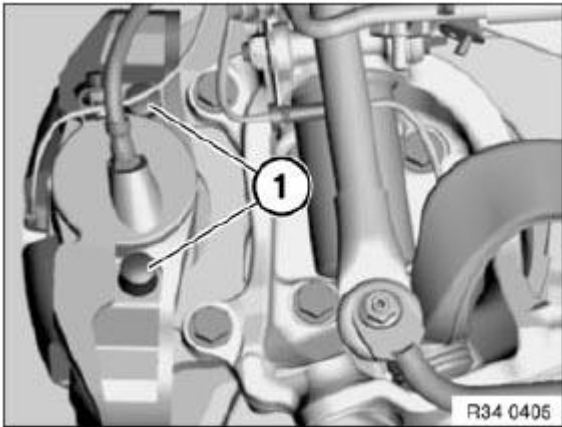


Fig. 16: Identifying Plastic Plugs

Courtesy of BMW OF NORTH AMERICA, INC.

Left:

Pull brake pad wear sensor (1) towards rear out of pad.

Release guide screws (2) with special tool **34 1 080** . Withdraw brake caliper backwards.

Installation:

Only clean guide screws; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

Tightening torque **34 11 3AZ** .

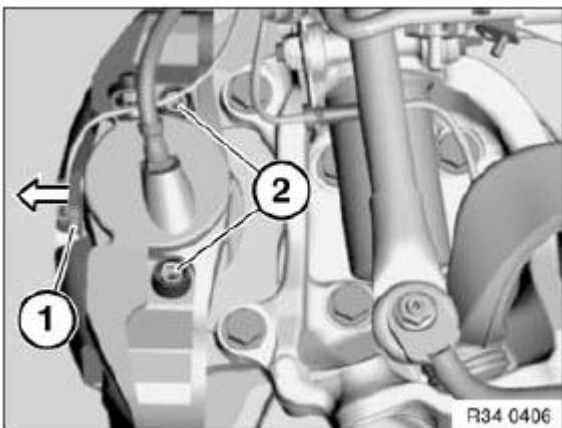


Fig. 17: Identifying Brake Pad Wear Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

Press back brake pads and piston with special tool 34 6 320.

IMPORTANT: When forcing piston back:

Pay attention to brake fluid level in expansion tank; brake fluid that spills over will damage paintwork.

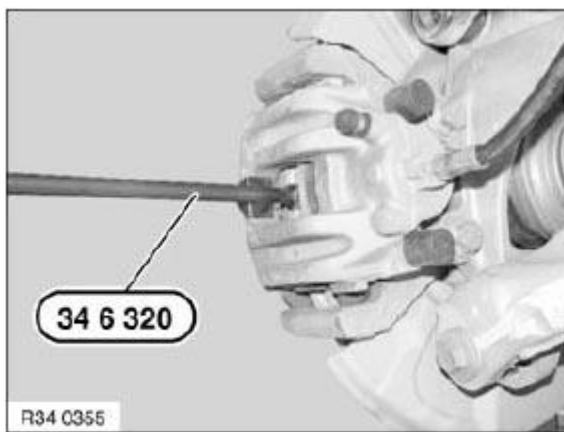


Fig. 18: Pressing Back Brake Pads And Piston With Special Tool 34 6 320
Courtesy of BMW OF NORTH AMERICA, INC.

Press brake pads inwards and remove.

The two brake pads are seated with a spring in the piston or in the brake caliper housing and must not be mixed up.

IMPORTANT: Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

Observe **MINIMUM THICKNESS OF BRAKE PADS** .

Clean brake pads.

Do not apply grease to brake pad backplate.

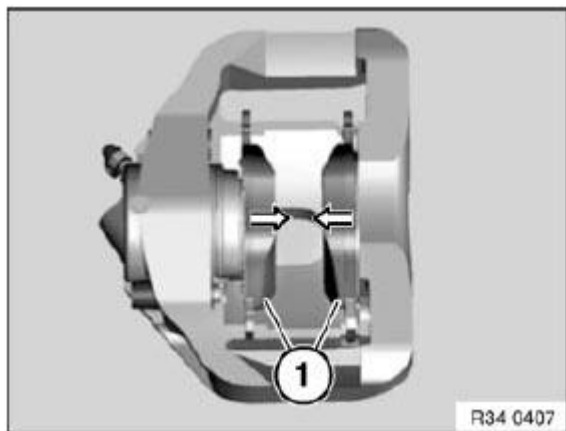


Fig. 19: Identifying Brake Pads

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The outer brake pads gradually need to be changed as well.

The previous version (A) with retaining spring (1) is replaced by brake pads of version (B) without retaining spring!

The use of pad sets of version (A) with retaining spring continues to be permissible!

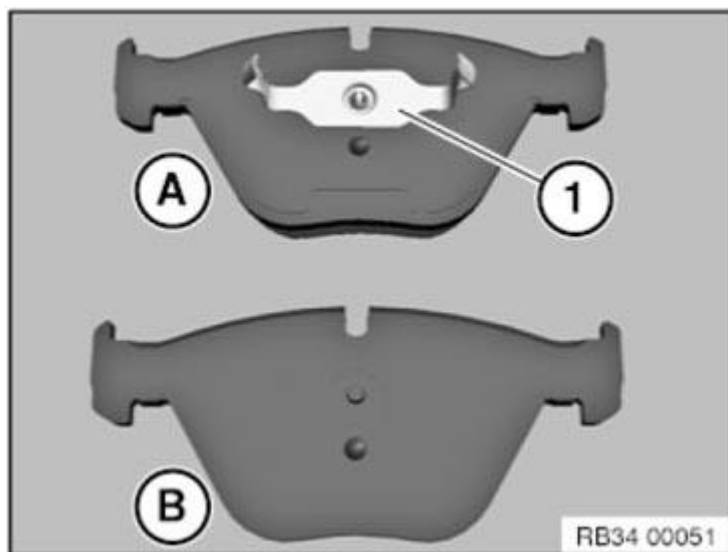


Fig. 20: Identifying Brake Pads With/Without Retaining Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

Position special tool **34 1 280** at three measuring points in area (1) and measure.

Compare measurement result and lowest value with SETPPOINT VALUE .

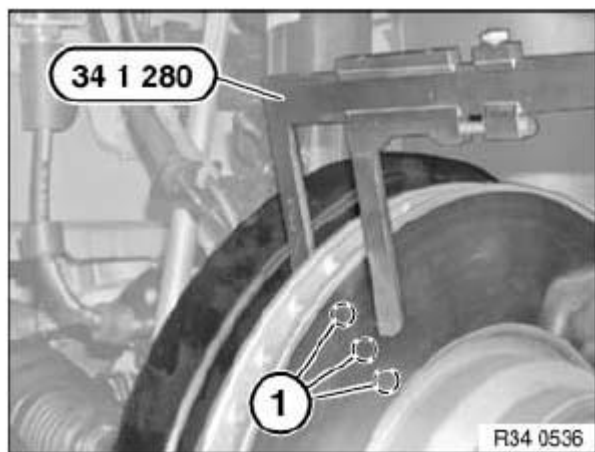


Fig. 21: Identifying Measuring Points Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be installed if the brake disc thickness is greater than or equal to the MINIMUM BRAKE DISC THICKNESS (MIN TH) (not incl. M vehicles).

In the case of M vehicles and perforated brake discs, new brake pads may only be installed if the brake disc thickness is greater than the MINIMUM BRAKE DISC THICKNESS (MIN TH).

NOTE: The minimum brake disc thickness is configured in such a way that it lasts the life of a further set of brake pads (does not apply to M vehicles and perforated brake discs).

Check dust sleeve (1) for damage and replace if necessary.

Clean contact face (2) of brake piston and apply a thin coating of anti-squeak compound.

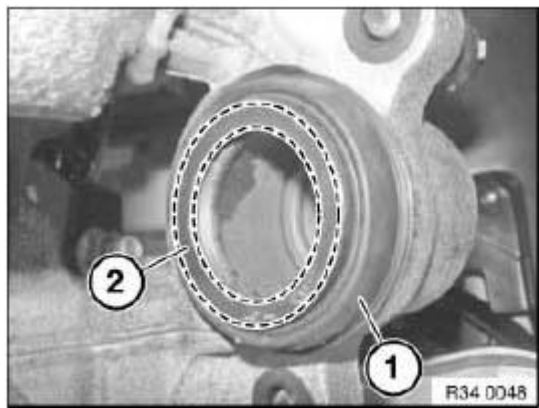


Fig. 22: Identifying Dust Sleeve And Contact Face

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Dust sleeve must not come into contact with anti-squeak compound as this may cause the dust sleeve to swell.

Clean mounting faces (1) and (2) of brake pad hammer heads/brake caliper housing and coat with anti-squeak compound.

NOTE: Grease contact surfaces on brake caliper at top and bottom.

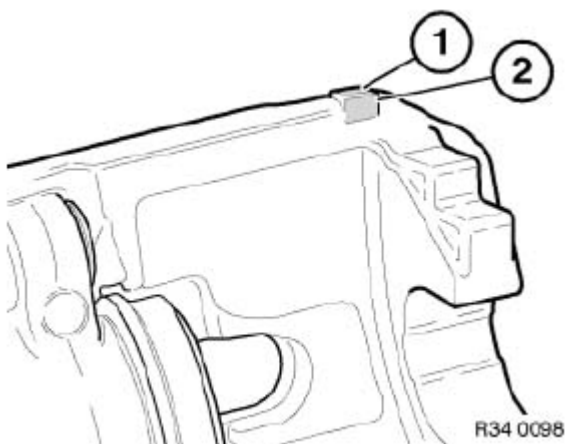


Fig. 23: Identifying Mounting Faces

Courtesy of BMW OF NORTH AMERICA, INC.

Clean mounting face (3) of brake caliper and apply a thin coating of anti-squeak compound.

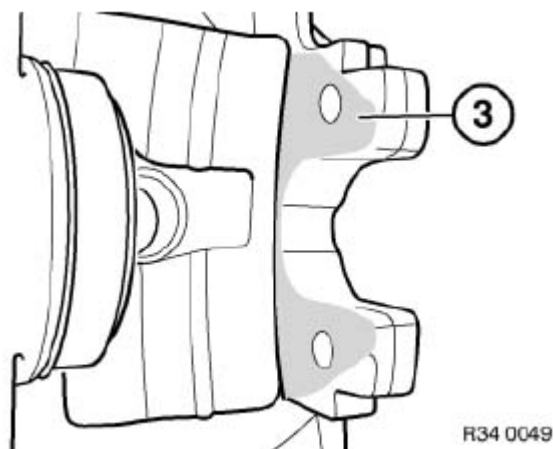


Fig. 24: Identifying Mounting Faces

Courtesy of BMW OF NORTH AMERICA, INC.

Clean brake caliper holder at hammerhead guides and apply a thin coating of anti-squeak compound.

Refer to **BRAKES - OPERATING FLUIDS**.

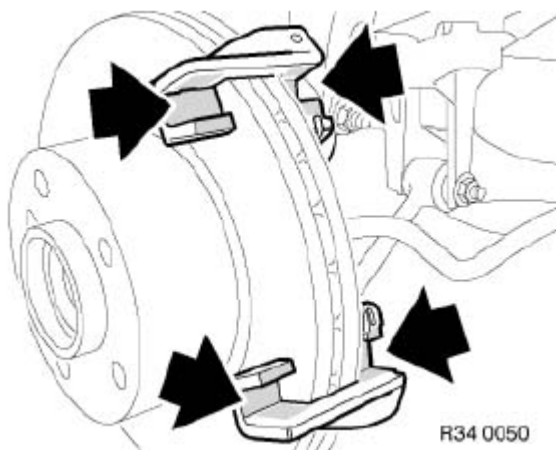


Fig. 25: Locating Brake Caliper Holder

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work:

- Fully depress brake pedal several times so that brake pads contact brake discs.
- When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- Read and comply with notes on **BREAKING IN NEW BRAKE DISCS / BRAKE PADS**.
- When replacing pads, reset CBS display in accordance with

MAINTENANCE REMINDER LIGHT RESET PROCEDURES .

IMPORTANT: On the E60 M5 and E63/E64 M6 the fault memory entry "Mastervac vacuum pressure sensor" may be stored after the brake pads have been replaced. The fault memory entry must be deleted. The vacuum pressure sensor only has to be replaced if the fault is entered repeatedly.

34 00 017 CHECKING BRAKE BOOSTER (LOW-PRESSURE TEST)

Necessary preliminary tasks:

- Remove **LEFT MICROFILTER HOUSING**
- Detach hose from connection piece. Install vacuum tester 34 3 100 between connection piece and vacuum hose of non-return valve.
- Start engine.
- Check buildup of partial vacuum.
- Switch off engine.
- Press the brake pedal to set a vacuum pressure of not more than 0.8 bar and wait for the value to stabilize.
- When the brake pedal is not pressed, the vacuum pressure is permitted to drop over a test period of 1 minute by max. 0.06 bar.

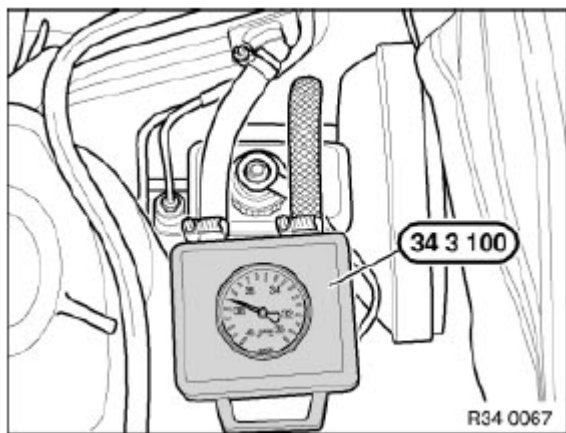


Fig. 26: Installing Vacuum Tester (34 3 100) Between Connection Piece And Vacuum Hose Of Non-Return Valve

Courtesy of BMW OF NORTH AMERICA, INC.

If specified values are not reached:

- Check line connections for vacuum seal.
- Replace non-return valve.
- Check seal between brake booster and brake master cylinder (sealing ring) for perfect condition and

correct seating.

- If the specified values are not achieved when the test is repeated, you must replace the brake booster.

34 11 220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS

Special tools required:

- **34 1 280**

Necessary preliminary tasks:

- Remove wheels
- **IF NECESSARY, REMOVE AND CLEAN BRAKE PADS**

After completing work, read and comply with notes on **BREAKING IN NEW BRAKE DISCS / BRAKE PADS**.

Observe **SAFETY INSTRUCTIONS** on raising the vehicle.

Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **SETPOINT VALUE** .

IMPORTANT: New brake pads may only be installed if the brake disc thickness is greater than or equal to the **MINIMUM BRAKE DISC THICKNESS (MIN TH)** (not incl. M vehicles).

In the case of M vehicles and perforated brake discs, new brake pads may only be installed if the brake disc thickness is greater than the **MINIMUM BRAKE DISC THICKNESS (MIN TH).**

NOTE: The minimum brake disc thickness is configured in such a way that it lasts the life of a further set of brake pads (does not apply to M vehicles and perforated brake discs).

Always replace brake discs in pairs.

If the brake discs are replaced, you must also fit new brake pads.

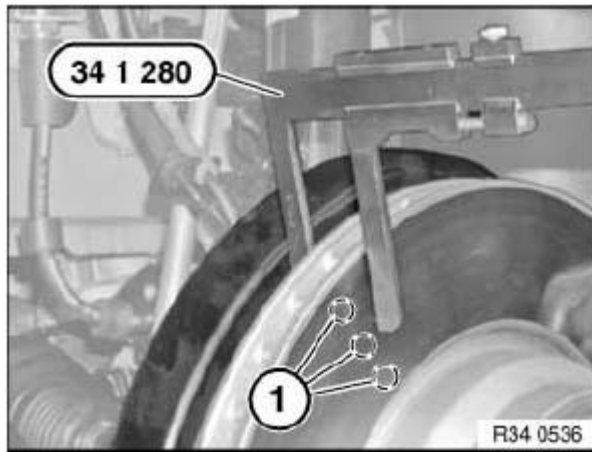


Fig. 27: Identifying Measuring Points Area
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1), remove brake caliper and tie up.

Installation:

Tightening torque **34 11 2AZ** .

NOTE: Brake hose remains connected.
If the brake hose was pulled from the mounting fixture during removal, make sure it is positively attached when installed!

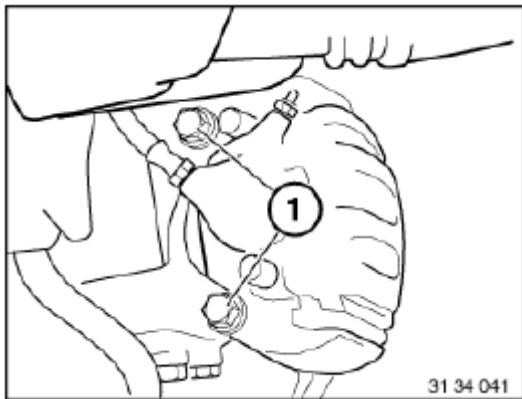


Fig. 28: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolts and take off brake disc.

Installation:

Tightening torque **34 11 1AZ** .

Clean contact surface of brake disc at wheel hub thoroughly and remove traces of corrosion if necessary. Unevenness on contact surface may result in distortion of brake disc!

IMPORTANT: To release brake disc: Do not under any circumstances strike friction ring with a hammer or similar! If necessary, carefully tap on base of brake disc chamber with a rubber mallet.

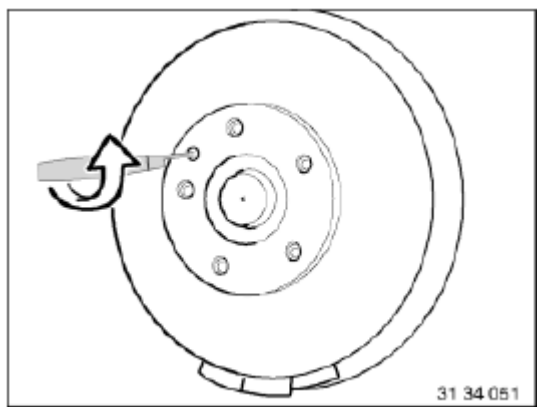


Fig. 29: Unscrewing Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Internally ventilated brake discs are balanced. Never remove or reposition balance clips.

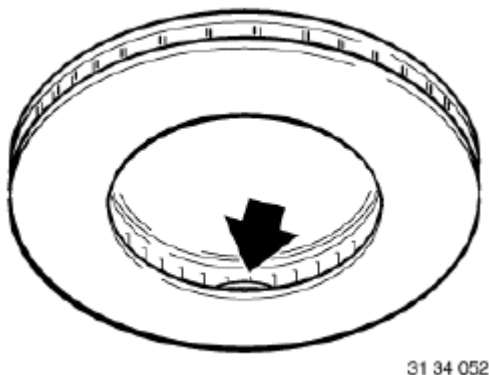


Fig. 30: Locating Balance Clips

Courtesy of BMW OF NORTH AMERICA, INC.

34 11 250 REMOVING AND INSTALLING / REPLACING A BRAKE CARRIER / BRAKE GUARD PLATE AT FRONT

Necessary preliminary tasks:

- Remove front **BRAKE DISKS**

Release screws (1) and remove brake guard plate (2).

Installation:

Tightening torque **34 11 5AZ** .

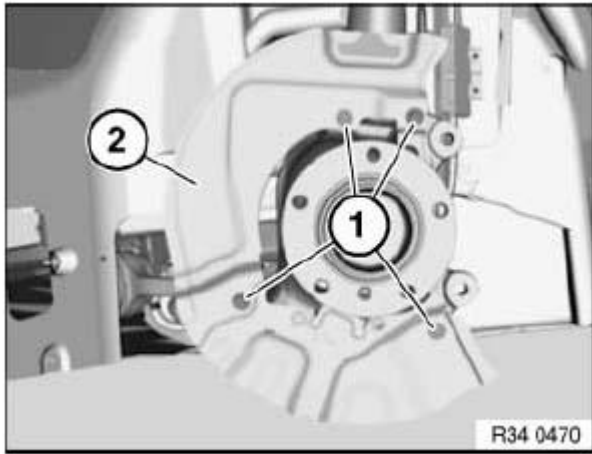


Fig. 31: Identifying Screws And Brake Guard Plate
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 519 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT BRAKE CALIPER

Necessary preliminary tasks:

- Remove wheels

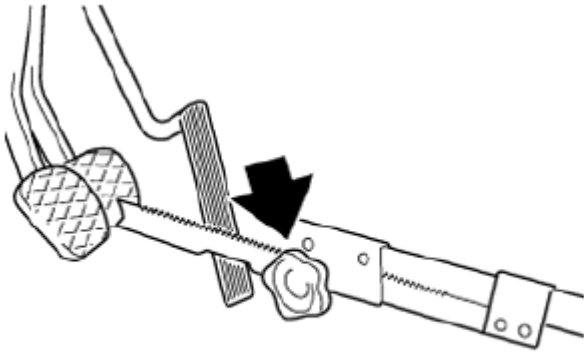
Observe **SAFETY INSTRUCTIONS** on raising the vehicle.

After completing work: **BLEED BRAKING SYSTEM**

Press clutch pedal down to floor and secure with pedal support.

NOTE: **The pedal support may only be released when the brake lines are reconnected.**

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



31 34 021

Fig. 32: Locating Pedal Support**Courtesy of BMW OF NORTH AMERICA, INC.**

Left side: Disconnect plug connection for wear indicator.

Release brake hose on brake caliper.

Slacken connection for brake hose and brake line.

Installation:

Tighten brake hose on brake caliper.

Tightening torque **34 32 4AZ** .

Move steering to straight-ahead position.

Screw brake hose to brake line, ensuring that brake hose is not twisted.

Tightening torque **34 32 1AZ** .

Release screws (1) and remove brake caliper.

Installation:

Tightening torque **34 11 2AZ** .

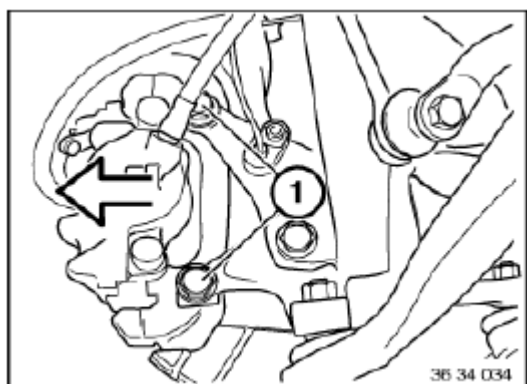


Fig. 33: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

34 11 552 OVERHAULING LEFT OR RIGHT FRONT BRAKE CALIPER (BRAKE CALIPER REMOVED)

Special tools required:

· 34 1 133

NOTE: Use repair kit

Bear in mind that guide sleeves and screws come in different lengths:

- **16" brake system:** two short guide sleeves with two short screws.
- **17" brake system:** one long guide sleeve and one short guide sleeve with one long screw and one short screw.
- **18" brake system:** two long guide sleeves with two long screws.

Take off plastic caps (1).

Unscrew guide screws (2).

Installation:

Only clean guide screws; do not grease. Check guide bolts, replace if necessary.

E65 and E66:

Tightening torque: 34 11 3AZ

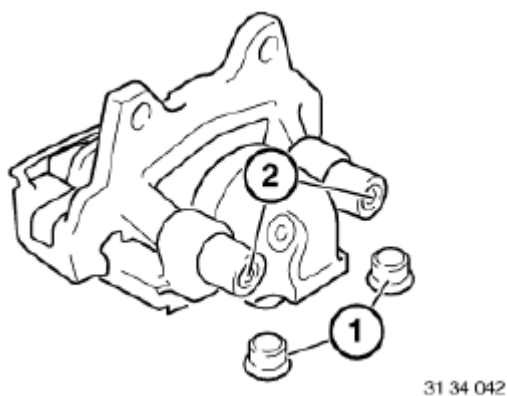


Fig. 34: Identifying Plastic Caps And Guide Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Dismantle brake caliper and remove brake pads.

Installation:

Press brake pads fully outwards and insert spring (4).

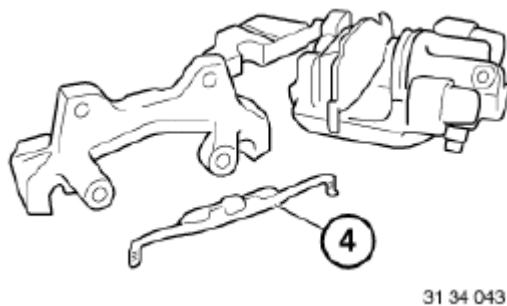


Fig. 35: Identifying Spring
 Courtesy of BMW OF NORTH AMERICA, INC.

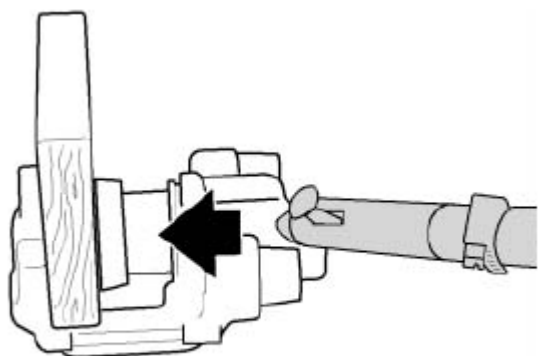
WARNING: *Danger of injury!*

In the following work step, large forces occur at the brake caliper piston up to more than 2800 N.

Carefully force piston out through connection bore with compressed air.

To protect piston, place a protective plate (e.g. hard wood or hard felt) in caliper recess.

Do not grip piston with fingers - risk of trapping!

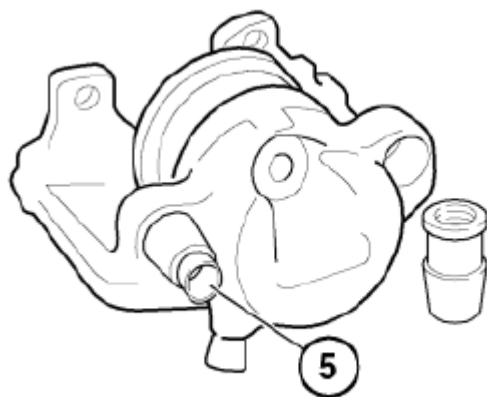


31 34 044

Fig. 36: Placing Protective Plate In Caliper Recess
 Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (5), fitting repair-kit guide sleeve if necessary.

IMPORTANT: Bear in mind that guide sleeves and screws come in different lengths. Long guide sleeve with long screw is seated on disk inlet at bottom, short sleeve with short screw is seated on disk outlet at top.



31 34 045

Fig. 37: Identifying Guide Sleeves
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing ring carefully with a plastic needle.

Clean cylinder bores and parts with alcohol and dry with compressed air.

Thoroughly inspect cylinder bore, piston and flange surfaces. Machining of cylinders and pistons is not permitted.

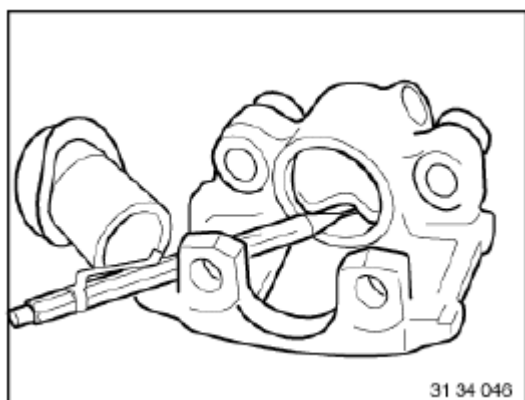


Fig. 38: Removing Sealing Ring With Plastic Needle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Apply a light coat of Ate brake cylinder paste to cylinder bore, piston and sealing sleeve,

Refer to **BRAKES - OPERATING FLUIDS** .

Install sealing cover in rear annular groove of cylinder bore.

Press in piston with a hardwood board.

IMPORTANT: Do not tilt piston.

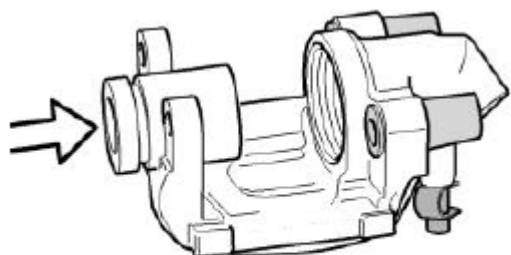


Fig. 39: Pressing Piston With Hardwood Board
Courtesy of BMW OF NORTH AMERICA, INC.

Press on dust protection sleeve evenly up to stop with special tool **34 1 133** .

Installation:

The area between dust protection sleeve and brake caliper housing must be kept dry so as to ensure correct seating for the dust protection sleeve.

Keep Ate brake cylinder paste or brake fluid away from this area.

Make sure dust protection sleeve is correctly seated on piston.

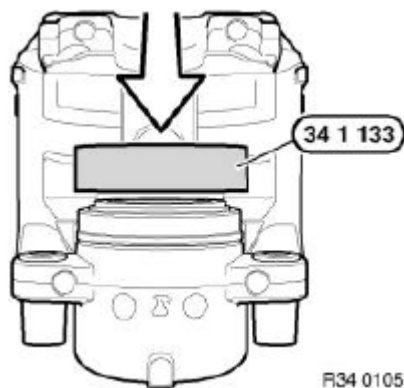


Fig. 40: Pressing Dust Protection Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

34 11 667 PRECISION-TURNING BOTH FRONT BRAKE DISCS ON BOTH SIDES

IMPORTANT: Always precision-turn both sides of both brake discs on one axle.
Observe MAX. MACHINING DIMENSION PER FRICTION RING SIDE
MINIMUM BRAKE DISC THICKNESS (MIN TH)

Brake discs of M models (Compound brake discs) must not be machined!
Only one brake pad set may be used up on brake discs which have been lathe-
turned to MINIMUM THICKNESS (MIN TH) .

Stationary brake disc lathe:

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of stationary brake disc lathes, the BRAKE DISC MUST BE REMOVED.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

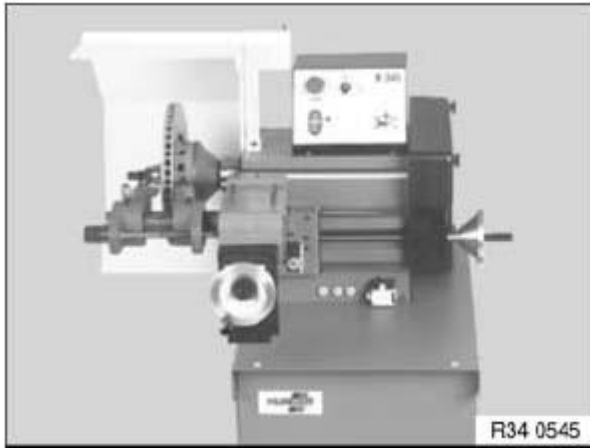


Fig. 41: Identifying Stationary Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

Mobile brake disc lathe:

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of mobile brake disc lathes, the **BRAKE CALIPER** and the brake anchor plate must be removed.

The brake discs remain on the car.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.



Fig. 42: Identifying Mobile Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

After fine-grinding the brake discs, measure the **THICKNESS DIFFERENCE** inside the braking surfaces at 8 points with an external micrometer.

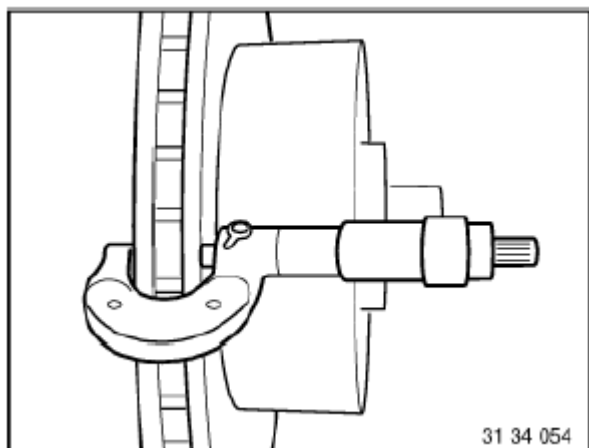


Fig. 43: Measuring Brake Discs Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

REAR BRAKES

34 21... OVERVIEW OF REAR BRAKE

1 [Brake disk](#)2 [Brake pad](#)3 [Brake caliper](#)4 [Checking thickness of brake lining](#)**Fig. 44: Overview Of Rear Brake**

Courtesy of BMW OF NORTH AMERICA, INC.

34 21 171 REMOVING AND INSTALLING / REPLACING A BRAKE CARRIER / BRAKE GUARD AT REAR*Necessary preliminary tasks:*

- Remove **EXPANDER LOCK**
- Remove **WHEEL HUB**

Release screws (1) and remove brake carrier (2).

*Installation:*Tightening torque **34 21 6AZ**.

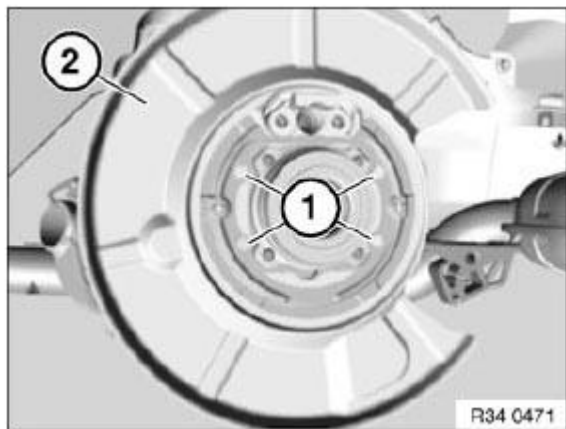


Fig. 45: Identifying Screws And Brake Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 200 REMOVING AND INSTALLING OR REPLACING BRAKE PADS ON BOTH REAR DISC BRAKES

Special tools required:

- 34 1 050
- 34 1 080
- 34 1 280

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

Necessary preliminary tasks:

- Remove wheels
- Remove **BRAKE PAD WEAR SENSOR**

Observe **SAFETY INSTRUCTIONS** on raising the vehicle.

Remove plastic plugs (1).

Right side:

Disconnect plug connection for brake pads wear sensor.

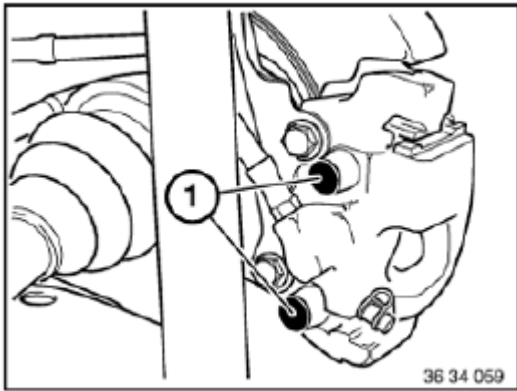


Fig. 46: Identifying Plastic Plugs

Courtesy of BMW OF NORTH AMERICA, INC.

Release guide screws (2) with special tool 34 1 080.

Installation:

Only clean guide screws; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

Tightening torque **34 21 5AZ** .

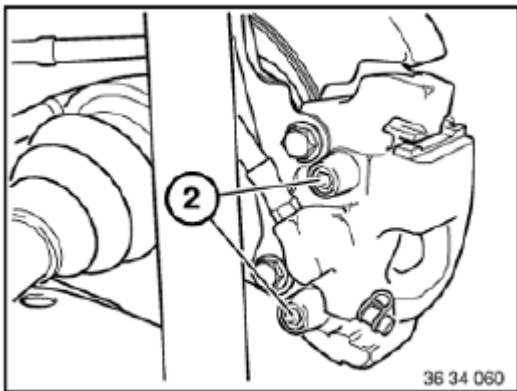


Fig. 47: Identifying Guide Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out retaining spring (3).

Withdraw brake caliper backwards.

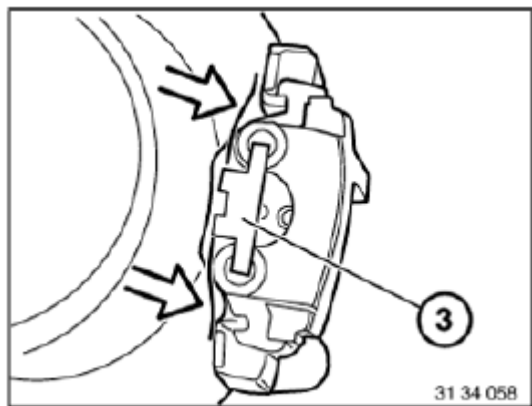


Fig. 48: Identifying Retaining Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Turn piston fully back with special tool 34 1 050.

IMPORTANT: When forcing piston back:

Pay attention to brake fluid level in expansion tank; brake fluid that spills over will damage paintwork.

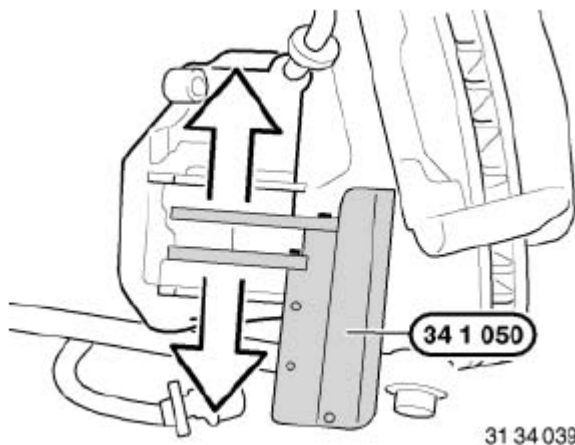


Fig. 49: Turning Piston Fully Back With Special Tool 34 1 050

Courtesy of BMW OF NORTH AMERICA, INC.

Remove outer brake pad.

Inner brake pad is located with its spring in the piston.

IMPORTANT: Mark any worn brake pads.

If the brake pads are worn on one side, they must not be mixed up!

Observe **MINIMUM THICKNESS OF BRAKE PADS** .

Clean brake pads.

Do not apply grease to brake pad backplate.

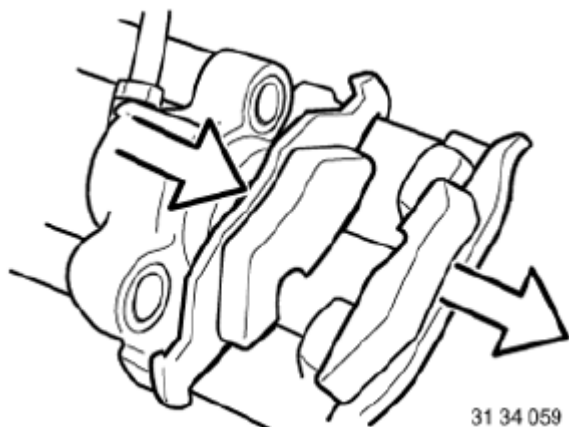


Fig. 50: Removing Outer Brake Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **SETPOINT VALUE** .

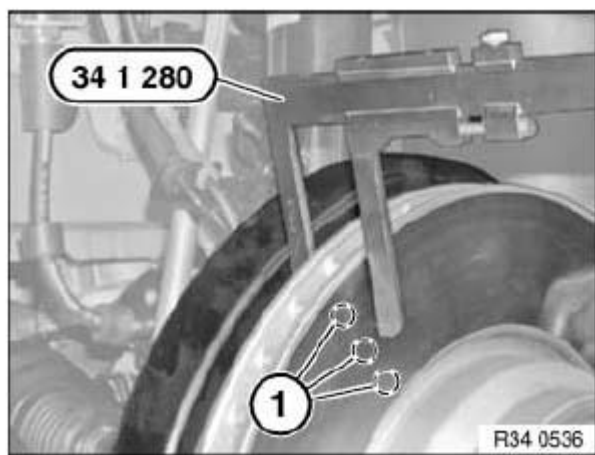


Fig. 51: Measuring Brake Disc Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be installed if the brake disc thickness is greater than or equal to the **MINIMUM BRAKE DISC THICKNESS (MIN TH)** (not incl. M vehicles).

In the case of M vehicles and perforated brake discs, new brake pads may only be installed if the brake disc thickness is greater than the **MINIMUM BRAKE DISC THICKNESS** (MIN TH).

NOTE: The minimum brake disc thickness is configured in such a way that it lasts the life of a further set of brake pads (does not apply to M vehicles and perforated brake discs).

Check dust sleeve (1) for damage and replace if necessary.

Clean contact face (2) of brake piston and apply a thin coating of anti-squeak compound.

IMPORTANT: Dust sleeve must not come into contact with anti-squeak compound as this may cause the dust sleeve to swell.

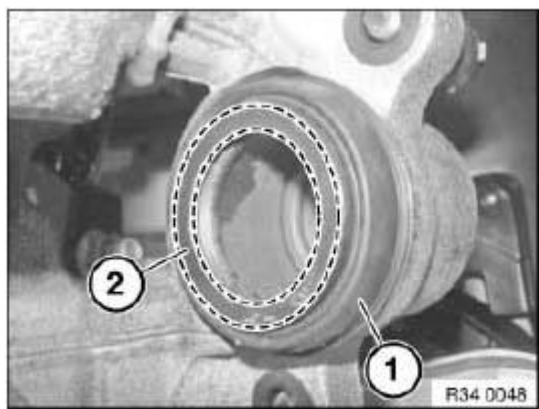


Fig. 52: Identifying Dust Sleeve And Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

Clean mounting faces (1) and (2) of brake pads hammer heads/brake caliper housing and coat with anti-squeak compound.

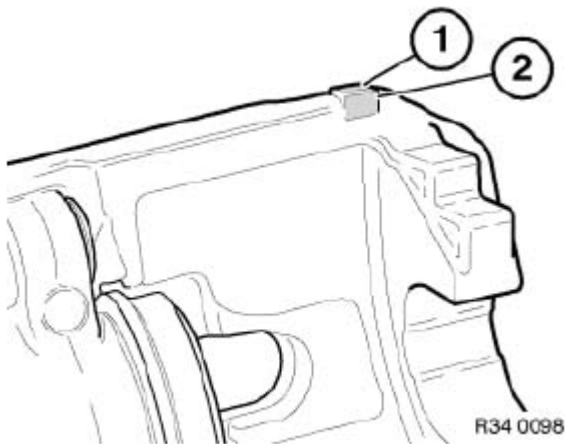


Fig. 53: Identifying Mounting Faces

Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact face (3) of brake caliper and apply a thin coating of anti-squeak compound.

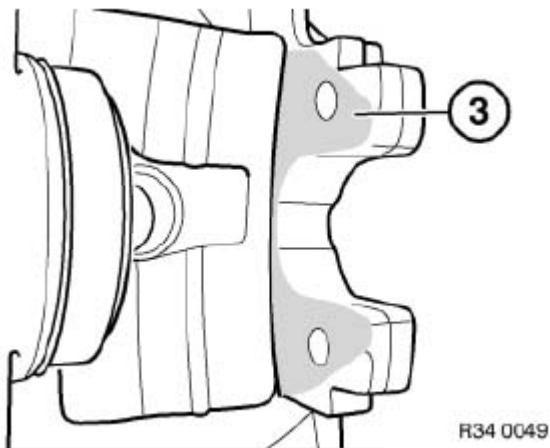


Fig. 54: Identifying Mounting Faces

Courtesy of BMW OF NORTH AMERICA, INC.

Clean brake caliper mounting bracket at hammer head guides and apply a thin coating of anti-squeak compound.

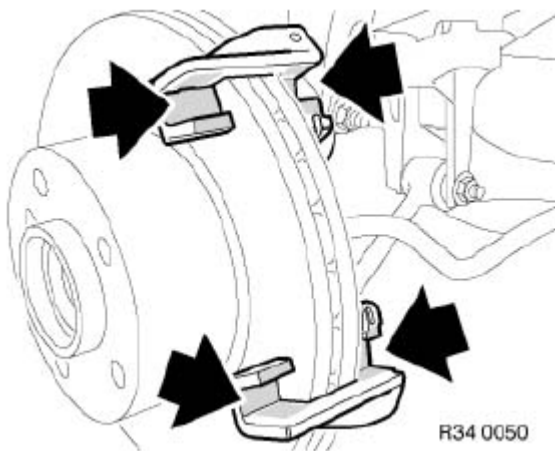


Fig. 55: Locating Brake Caliper Holder
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work:

- Fully depress brake pedal several times so that brake pads contact brake discs.
- When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- Read and comply with notes on BREAKING IN NEW BRAKE DISCS / BRAKE PADS.
- If necessary, when replacing pads, reset CBS display in accordance with MAINTENANCE REMINDER LIGHT RESET PROCEDURES.

IMPORTANT: On the E60 M5 and E63 M6 the fault memory entry "Mastervac vacuum pressure sensor" may be stored after the brake pads have been replaced. The fault memory entry must be deleted. The vacuum pressure sensor only has to be replaced if the fault is entered repeatedly.

34 21 320 REMOVING AND INSTALLING OR REPLACING BOTH REAR BRAKE DISCS

Special tools required:

- 34 1 280

Necessary preliminary tasks:

- Remove wheels
- IF NECESSARY, REMOVE AND CLEAN BRAKE PADS

E65 and E66: Release parking brake (push-button to left of steering wheel).

After completing work:

- **ADJUST HANDBRAKE** (not for E65 and E66)
- Read and comply with notes on **BREAKING IN NEW BRAKE DISCS / BRAKE PADS**.

Observe **SAFETY INSTRUCTIONS** on raising the vehicle.

Check minimum brake disc thickness:

- Position special tool **34 1 280** at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **SETPOINT VALUE**.

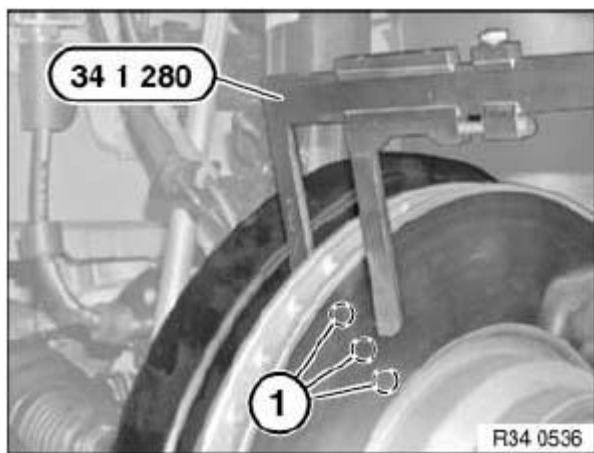


Fig. 56: Measuring Brake Disc Thickness

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be installed if the brake disc thickness is greater than or equal to the **MINIMUM BRAKE DISC THICKNESS (MIN TH)** (not incl. M vehicles).

In the case of M vehicles and perforated brake discs, new brake pads may only be installed if the brake disc thickness is greater than the **MINIMUM BRAKE DISC THICKNESS (MIN TH)**.

NOTE: The minimum brake disc thickness is configured in such a way that it lasts the life of a further set of brake pads (does not apply to M vehicles and perforated brake discs).

Always replace brake discs in pairs.

If the brake discs are replaced, you must also fit new brake pads.

Release screws (1), remove brake caliper and tie up.

NOTE: Brake hose remains connected.

Installation:

Tightening torque **34 21 3AZ** .

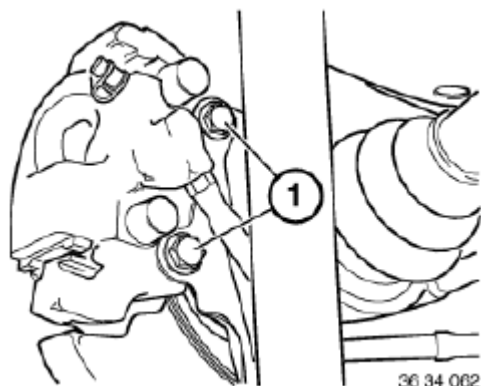


Fig. 57: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolts and take off brake disc.

Installation:

Tightening torque **34 21 1AZ** .

Clean contact surface of brake disc at wheel hub thoroughly and remove traces of corrosion if necessary. Unevenness on contact surface may result in distortion of brake disc!

IMPORTANT: To release brake disc: Do not under any circumstances strike friction ring with a hammer or similar! If necessary, carefully tap on base of brake disc chamber with a rubber mallet.

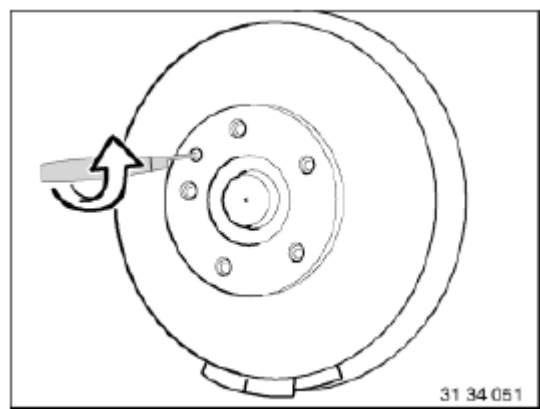
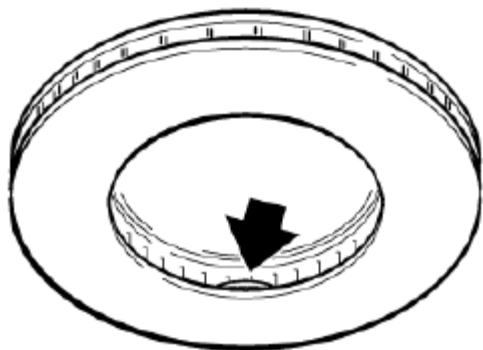


Fig. 58: Unscrewing Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Internally ventilated brake discs are balanced.
Never remove or reposition balance clips.



31 34 052

Fig. 59: Locating Balance Clips

Courtesy of BMW OF NORTH AMERICA, INC.

34 21 745 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT REAR BRAKE CALIPER*Necessary preliminary tasks:*

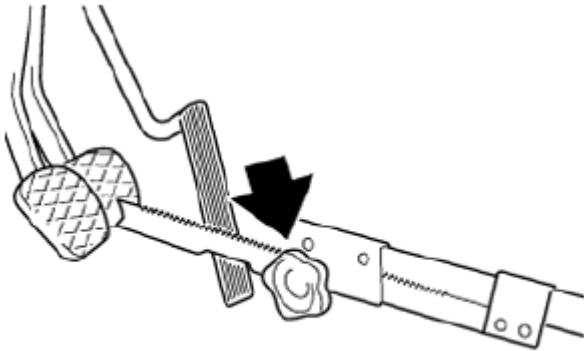
- Remove wheels

Observe **SAFETY INSTRUCTIONS** on raising the vehicle.After completing work: **BLEED BRAKING SYSTEM**

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



31 34 021

Fig. 60: Locating Pedal Support

Courtesy of BMW OF NORTH AMERICA, INC.

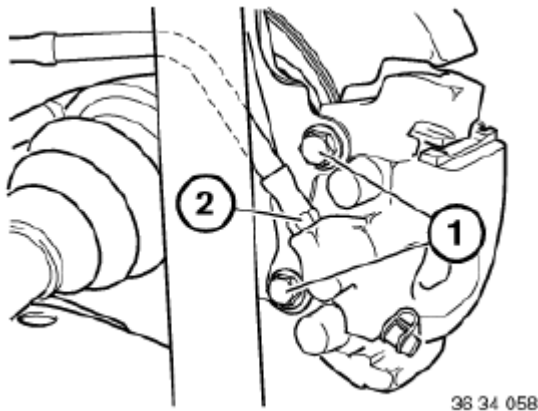
Right side: Disconnect plug connection for brake pads wear sensor.

Release screws (1).

Installation:

Tightening torque **34 21 3AZ** .

Disconnect brake hose (2).



36 34 058

Fig. 61: Identifying Brake Hose And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tightening torque **34 32 5AZ** .

Unfasten brake hose at connection point to brake line.

Tightening torque **34 32 1AZ** .

First tighten the brake hose on the brake cover, then tighten connection on brake line.

Install brake hose without torsional stress.

Pull off fist caliper towards rear of vehicle.

IMPORTANT: Check routing and securing of brake-pad-wear indicator cable. Check for correct securing with tab of dust cap. It is absolutely essential to prevent the cable on the rim from being scuffed.

34 21 812 OVERHAULING LEFT OR RIGHT REAR BRAKE CALIPER (BRAKE CALIPER REMOVED)

Special tools required:

34 1 132

NOTE: Use original BMW repair kit.

Take off plastic caps (1).

Unscrew guide screws (2).

Installation:

Only clean guide screws; do not grease. Check guide bolts, replace if necessary.

Tightening torque: **34 21 5AZ** .

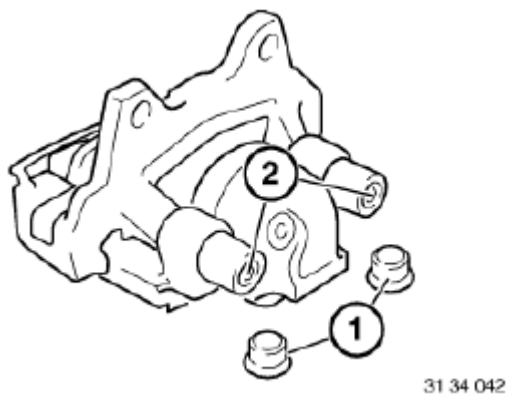
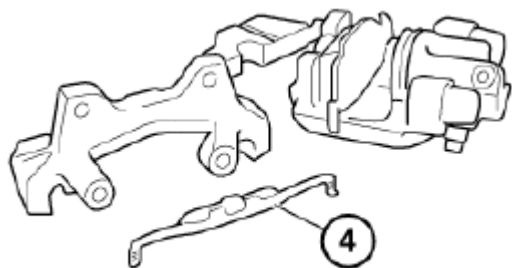


Fig. 62: Identifying Plastic Caps And Guide Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Dismantle brake caliper and remove brake pads.

Installation:

Press brake pads fully outwards and insert spring (4).



31 34 043

Fig. 63: Identifying Spring

Courtesy of BMW OF NORTH AMERICA, INC.

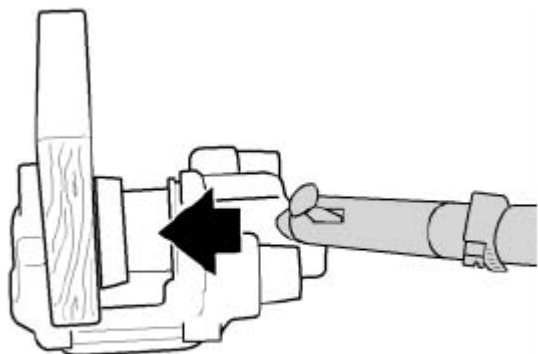
WARNING: Danger of injury!

In the following work step, large forces occur at the brake caliper piston (up to more than 2800 N).

Carefully force piston out through connection bore with compressed air.

To protect piston, place a protective plate (e.g. hard wood or hard felt) in caliper recess.

Do not grip piston with fingers - risk of trapping!

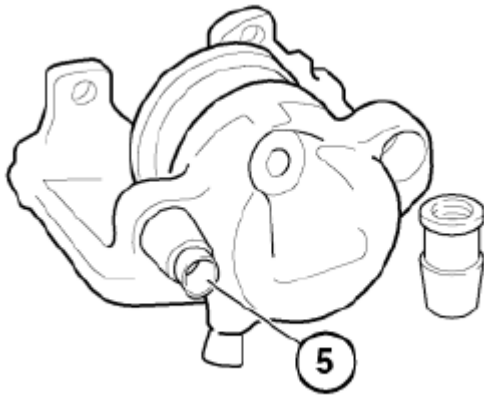


31 34 044

Fig. 64: Placing Protective Plate In Caliper Recess

Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (5), fitting repair-kit guide sleeve if necessary.



31 34 045

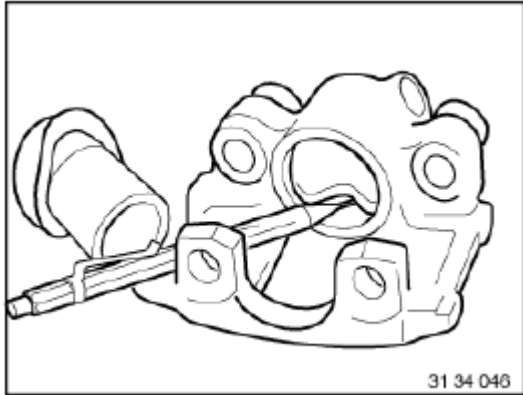
Fig. 65: Identifying Guide Sleeves

Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing ring carefully with a plastic needle.

Clean cylinder bores and parts with alcohol and dry with compressed air.

Thoroughly inspect cylinder bore, piston and flange surfaces. Machining of cylinders and pistons is not permitted.



31 34 046

Fig. 66: Removing Sealing Ring With Plastic Needle

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

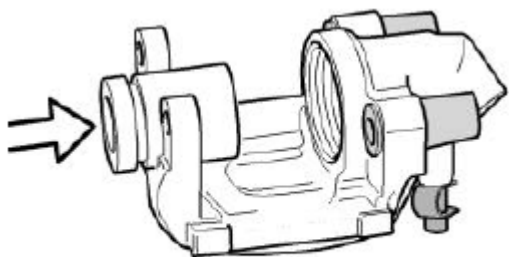
Apply a light coat of Ate brake cylinder paste to cylinder bore, piston and sealing sleeve,

Refer to **BRAKES - OPERATING FLUIDS** .

Install sealing cover in rear annular groove of cylinder bore.

Press in piston with a hardwood board.

IMPORTANT: Do not tilt piston.



R34 0111

Fig. 67: Pressing Piston With Hardwood Board
Courtesy of BMW OF NORTH AMERICA, INC.

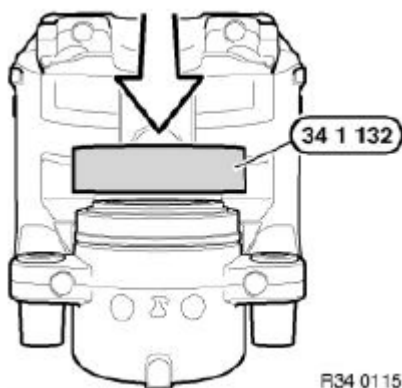
Press on dust protection sleeve evenly up to stop with special tool 34 1 132 .

Installation:

The area between dust protection sleeve and brake caliper housing must be kept dry so as to ensure correct seating for the dust protection sleeve.

Keep Ate brake cylinder paste or brake fluid away from this area.

Make sure dust protection sleeve is correctly seated on piston.



R34 0115

Fig. 68: Pressing Dust Protection Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 947 PRECISION-TURNING BOTH REAR BRAKE DISCS ON BOTH SIDES

IMPORTANT: Always precision-turn both sides of both brake discs on one axle.
Observe MAX. MACHINING DIMENSION PER FRICTION RING SIDE
MINIMUM BRAKE DISC THICKNESS (MIN TH)

**Brake discs of M models (Compound brake discs) must not be machined!
Only one brake pad set may be used up on brake discs which have been lathe-
turned to MINIMUM THICKNESS (MIN TH) .**

Stationary brake disc lathe:

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of stationary brake disc lathes, the **BRAKE DISC MUST BE REMOVED**.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

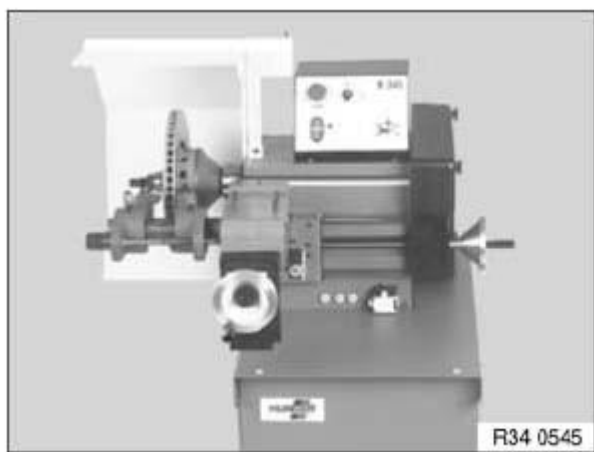


Fig. 69: Identifying Stationary Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

Mobile brake disc lathe:

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of mobile brake disc lathes, the **BRAKE CALIPER** and the brake anchor plate must be removed.

The brake discs remain on the car.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.



Fig. 70: Identifying Mobile Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

After fine-grinding the brake discs, measure the **THICKNESS DIFFERENCE** inside the braking surfaces at 8 points with an external micrometer.

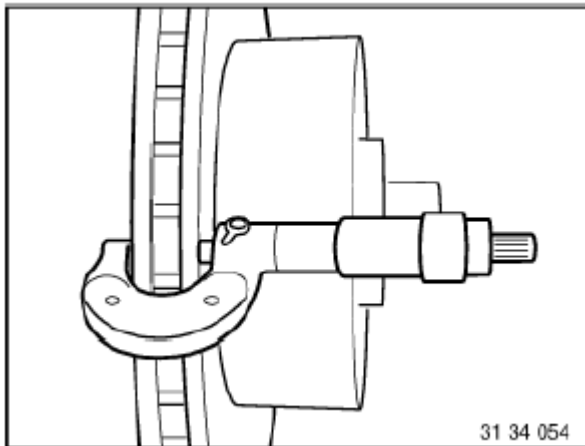
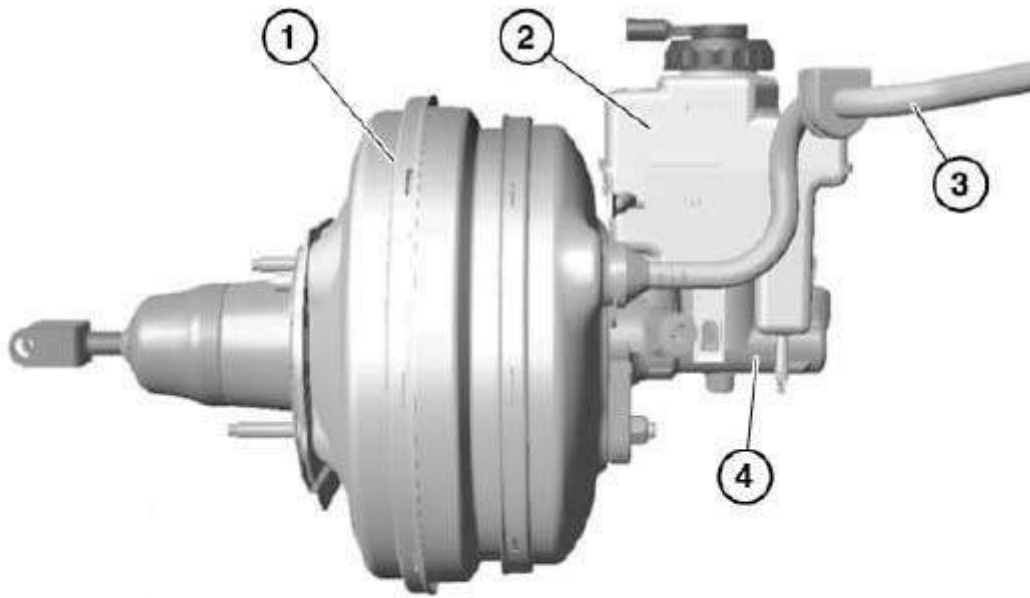


Fig. 71: Measuring Brake Discs Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

MASTER BRAKE CYLINDER

34 31... OVERVIEW OF BRAKE MASTER CYLINDER / BRAKE BOOSTER



R34 0410

- 1 [Brake booster](#)
- 2 [Expansion tank](#)
- 3 [Vacuum hose](#)

- 4 [Brake master cylinder](#)
- 5 [Bleeding braking system](#)
- 6

Fig. 72: Overview Of Brake Master Cylinder / Brake Booster
 Courtesy of BMW OF NORTH AMERICA, INC.

34 31 181 REMOVING AND INSTALLING / REPLACING EXPANSION TANK FOR HYDRAULIC BRAKE ACTUATION

Necessary preliminary tasks:

- **REMOVE LOWER SECTION OF MICROFILTER HOUSING** .
- **READ AND COMPLY WITH GENERAL INFORMATION**.

Suck the brake fluid out of the expansion tank. Use suction bottle exclusively to draw off brake fluid.

IMPORTANT: Do not reuse drawn out brake fluid.



Fig. 73: Identifying Expansion Tank

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Release retaining screw (2).

Installation:

Tightening torque **34 31 3AZ** .

Pull expansion tank vertically out of brake master cylinder.

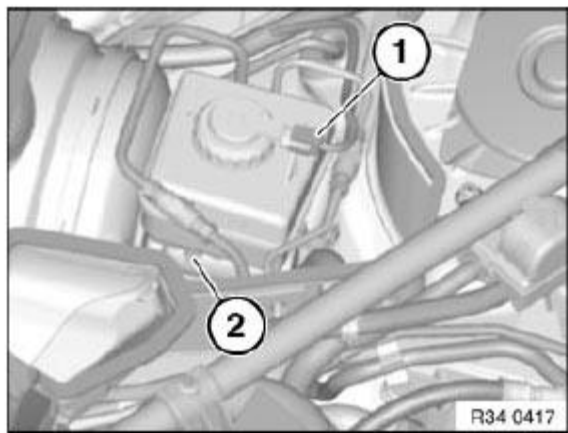


Fig. 74: Identifying Plug Connection And Retaining Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check rubber plug in brake master cylinder for damage and replace if necessary.

Push the expansion tank vertically onto the master brake cylinder.

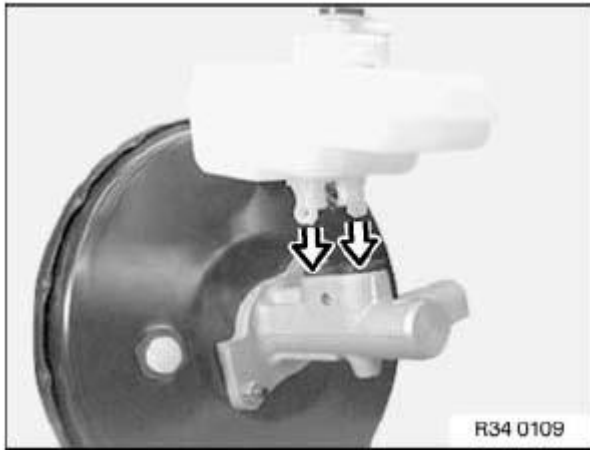


Fig. 75: Pushing Expansion Tank Vertically Onto Master Brake Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

34 31 505 REMOVING AND INSTALLING / REPLACING MASTER BRAKE CYLINDER FOR DSC

Special tools required:

- **32 1 270**

Necessary preliminary tasks:

- **REMOVE EXPANSION TANK.**
- Remove **FOOTWELL TRIM** .
- **READ AND COMPLY WITH GENERAL INFORMATION.**

After completing tasks, **BLEED BRAKE SYSTEM WITH DSC.**

Remove locking clip (1) and disengage and pull out locking pin.

Slacken nuts (2).

Installation:

Replace self-locking nuts.

Tightening torque **35 11 1AZ** .

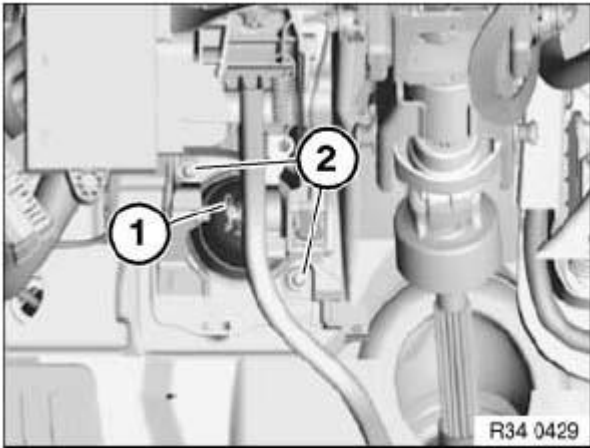


Fig. 76: Identifying Slacken Nuts And Locking Clip
 Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten brake lines (1).

Detach brake lines at junction (2) and remove short sections.

Seal off brake lines and brake master cylinder with plugs **32 1 270** .

Installation:

Fit lines at both connection points and then tighten down.

Tightening torque **34 32 1AZ** .

Release nuts (3) and feed brake master cylinder out of brake booster.

Installation:

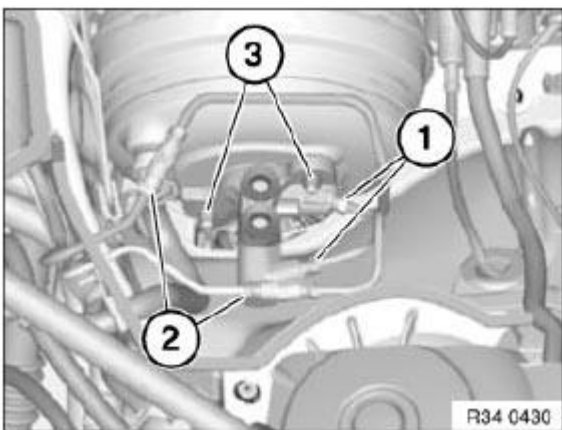


Fig. 77: Identifying Brake Lines And Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Replace self-locking nuts.

Tightening torque **34 31 1AZ** .

Installation:

Replace sealing ring.

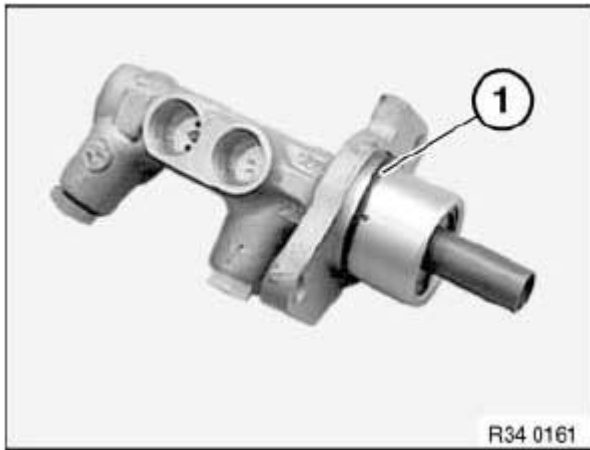


Fig. 78: Identifying Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Brake booster (1) must be loosely screwed into place so as not to jam brake master cylinder (2) during installation.

Installation:

When inserting the brake master cylinder (2) into the brake booster (1), make sure the pressure rod of the brake booster and that of the brake master cylinder meet each other on one level.

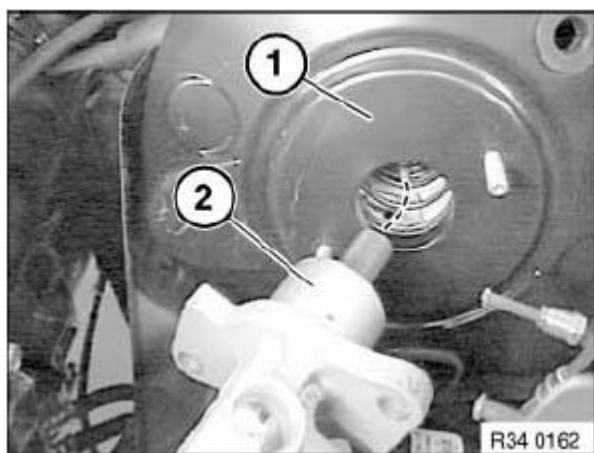
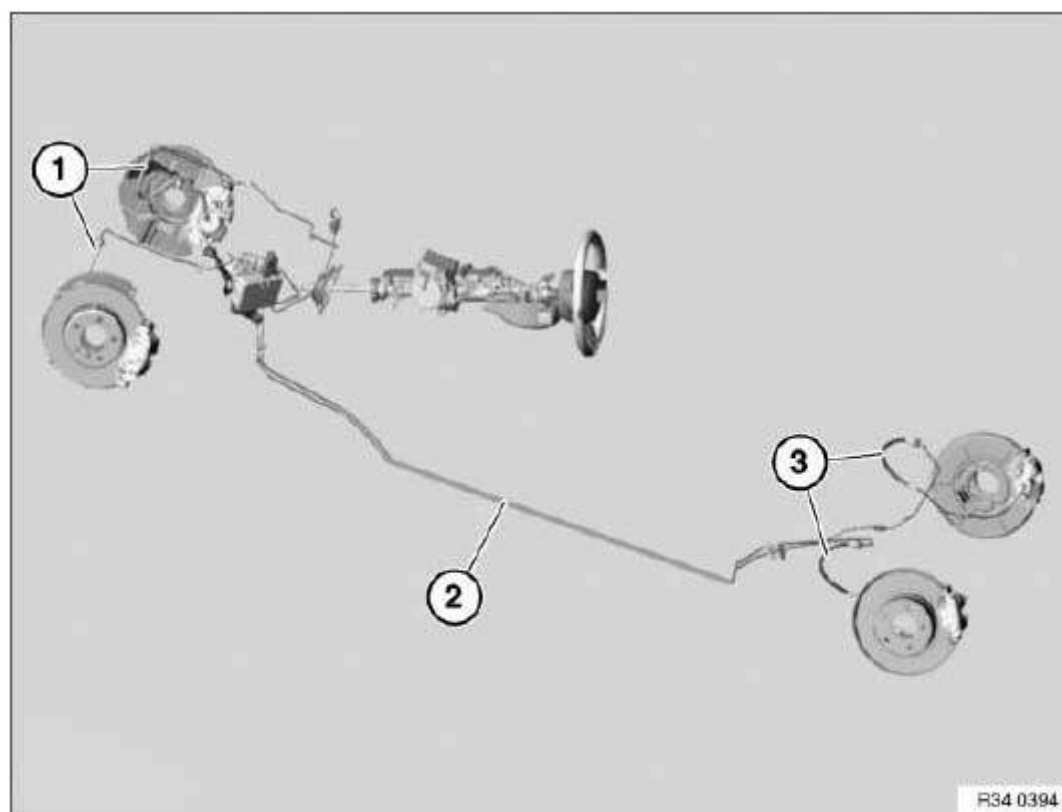


Fig. 79: Identifying Brake Booster And Jam Brake Master Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

BRAKE LINES

34 32... OVERVIEW OF BRAKE LINES

1 [Brake hose, front](#)3 [Brake hose, rear](#)2 [Brake tubes](#)**Fig. 80: Overview Of Brake Lines**

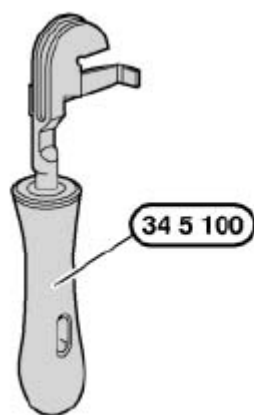
Courtesy of BMW OF NORTH AMERICA, INC.

34 32 861 REPLACING ALL BRAKE PIPES**Special tools required:****34 5 100**

NOTE: The brake lines are only supplied in the straight version and correct length with connecting nipple.
Read and comply with **GENERAL INFORMATION**.
After completing work, **BLEED BRAKE SYSTEM**.
Observe **SAFETY INSTRUCTIONS** on raising the vehicle.

New brake lines are bent into shape with bending tool **34 5 100**.

Removed brake pipes can be used as templates for bending.



36 34 074

Fig. 81: Identifying Bending Tool 34 5 100

Courtesy of BMW OF NORTH AMERICA, INC.

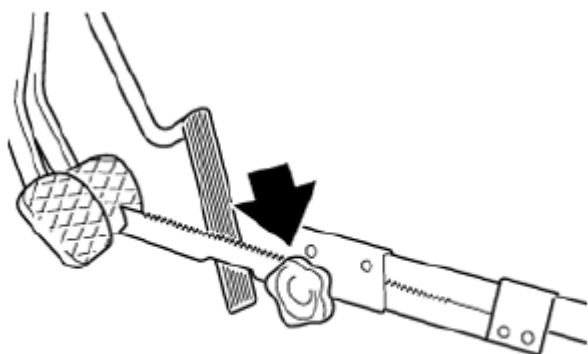
IMPORTANT:

- Protective coating of brake line must not be damaged during bending.
- Do not kink or bend back brake lines.
- Watch distances to rigid and movable vehicle parts. Brake lines may not make contact or rub.
- Tighten down brake line couplings with torque wrench.

*Installation:*Tightening torque **34 32 1AZ**.**34 32 881 REPLACING FRONT LEFT OR RIGHT BRAKE HOSES****NOTE:** After completing work: **BLEED BRAKE SYSTEM**

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected. This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



31 34 021

Fig. 82: Locating Pedal Support

Courtesy of BMW OF NORTH AMERICA, INC.

Pull brake hose out of holder (1).

IMPORTANT: Grip brake hose at square head (3) to prevent connecting piece from turning in retaining bracket.

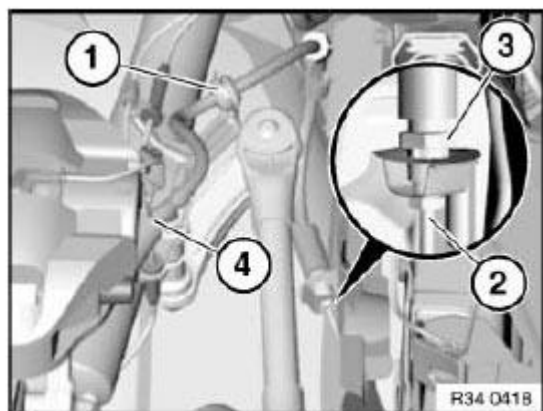
Detach brake hose from brake line (2).

Installation:

Tightening torque **34 32 1AZ** .

Detach brake hose from brake caliper (4).

Tightening torque **34 32 4AZ** .

**Fig. 83: Identifying Brake Caliper, Holder And Square Head**

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

Installation:

First tighten brake hose on brake caliper.

Move wheels into straight-ahead position.

Insert brake hose in bracket and screw onto brake pipe.

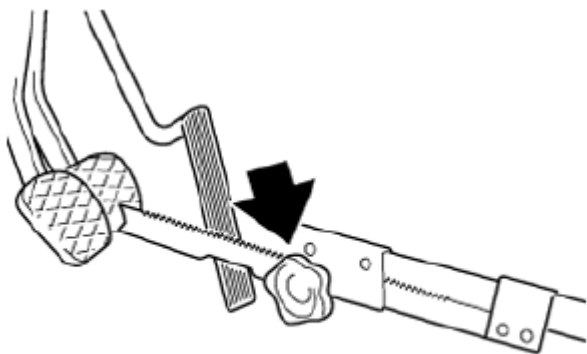
34 32 980 REPLACING REAR LEFT OR RIGHT BRAKE HOSES

NOTE: READ AND COMPLY WITH GENERAL INFORMATION.
Observe SAFETY INSTRUCTIONS on raising the vehicle.
After completing tasks, BLEED BRAKE SYSTEM.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



31 34 021

Fig. 84: Locating Pedal Support
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Grip brake hose at square head (2) so that connecting piece cannot rotate in retaining bracket.

Disconnect brake hose from brake line (1).

Installation:

Tightening torque **34 32 1AZ** .

Detach brake hose from brake caliper (3).

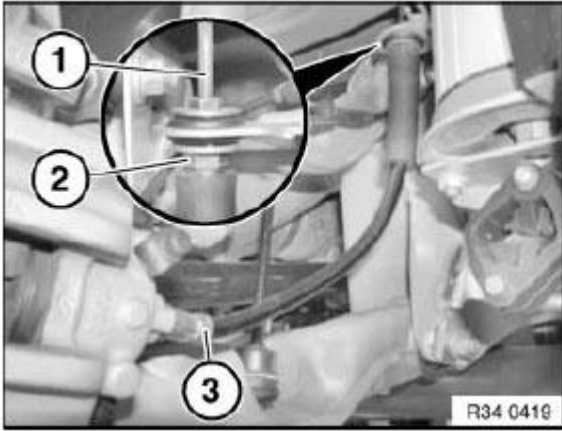


Fig. 85: Identifying Brake Caliper, Brake Line And Square Head
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tightening torque **34 32 5AZ** .

BRAKE BOOSTER

34 33 071 REPLACING VACUUM HOSE FOR BRAKE BOOSTER (M54)

IMPORTANT: Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster. This makes it easier to remove the PA pipe.
Non-return valve and PA pipe are welded together and are replaced together as a single unit.

Necessary preliminary tasks:

- **READ AND COMPLY WITH GENERAL INFORMATION.**
- **REMOVE LOWER SECTION OF MICROFILTER HOUSING .**

Detach non-return valve (1) from brake booster.

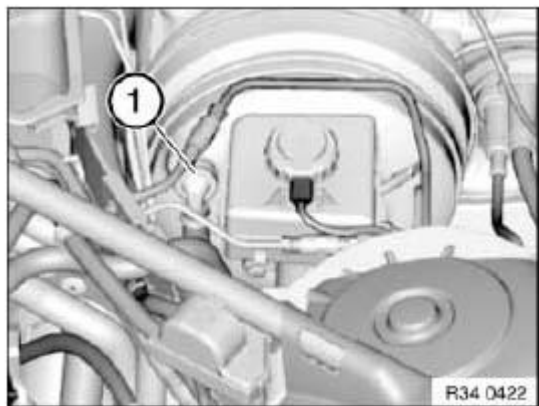


Fig. 86: Identifying Non-Return Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Detach molded hose (3) from PA tube.

Withdraw molded hose (3) from fixture (2).

Installation:

Replace hose clip.

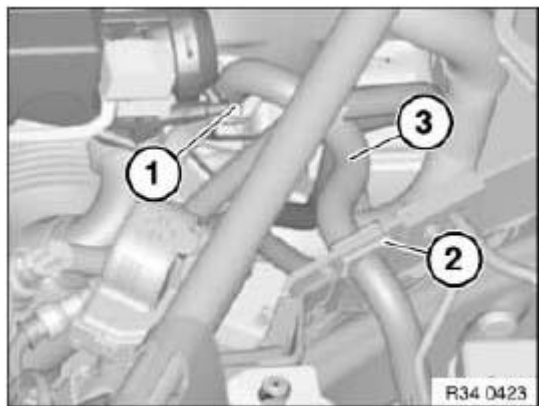


Fig. 87: Identifying Molded Hose, Clip And Fixture
Courtesy of BMW OF NORTH AMERICA, INC.

34 33 071 REPLACING VACUUM HOSE FOR BRAKE BOOSTER (M57TU / M57T2 / M47T2)

READ AND COMPLY WITH GENERAL INFORMATION.

IMPORTANT: Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster. This makes it easier to remove the PA

pipe.

Non-return valve and PA pipe are welded together and are replaced together as a single unit.

Necessary preliminary tasks:

REMOVE LOWER SECTION OF MICROFILTER HOUSING .

Installation:

Replace hose clamps.

Detach non-return valve (1) from brake booster.

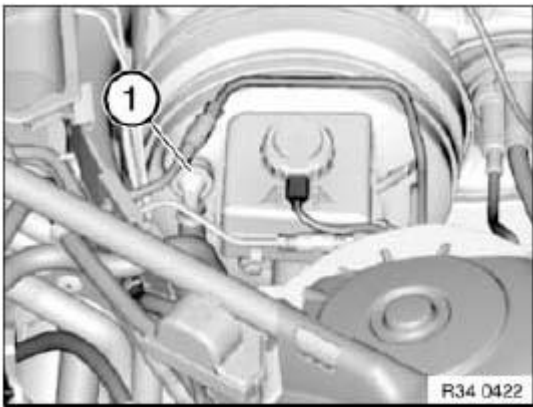


Fig. 88: Identifying Non-Return Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Detach vacuum hose from holder (1).

Unfasten hose clip (2).⁷

Detach molded hose from PA tube.

Installation:

Replace hose clip.

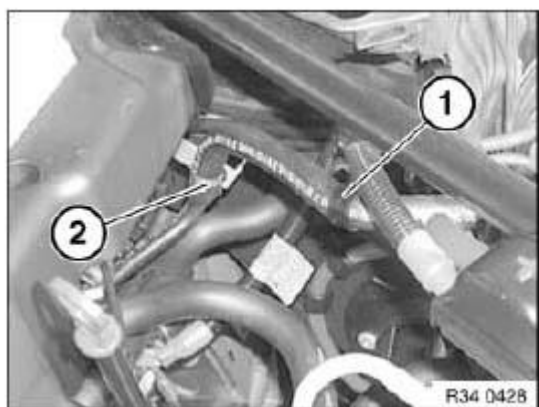


Fig. 89: Identifying Holder And Hose Clip

Courtesy of BMW OF NORTH AMERICA, INC.

34 33 505 REMOVING AND INSTALLING/REPLACING BRAKE BOOSTER

Necessary preliminary tasks:

- **READ AND COMPLY WITH GENERAL INFORMATION**
- **REMOVE BRAKE MASTER CYLINDER**

For cars with S85 engines:

- Remove vacuum pump
- Remove bracket for vacuum pump
- Remove vacuum line

Detach locking clip (1) from brake pedal, disengage and pull out locking pin.

Unscrew nuts (2).

Installation:

Replace self-locking nuts.

Tightening torque **35 11 1AZ** .

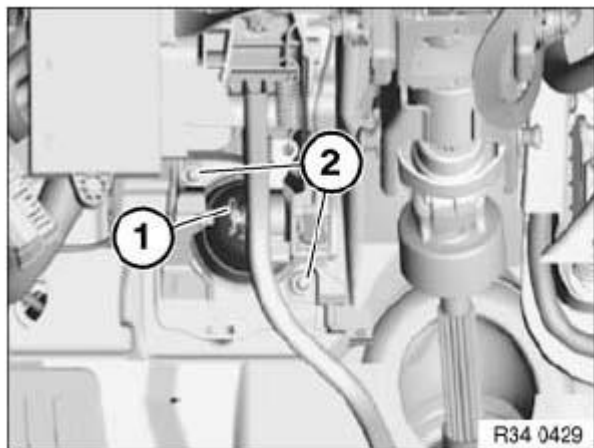


Fig. 90: Identifying Locking Clip And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove non-return valve (1) from brake booster.

Carefully pull brake booster (2) out of bulkhead and tilt out.

Installation:

Replace seal between brake booster and bulkhead.

IMPORTANT: Do not use any force when removing and installing the brake unit; the brake unit can be damaged under certain circumstances.

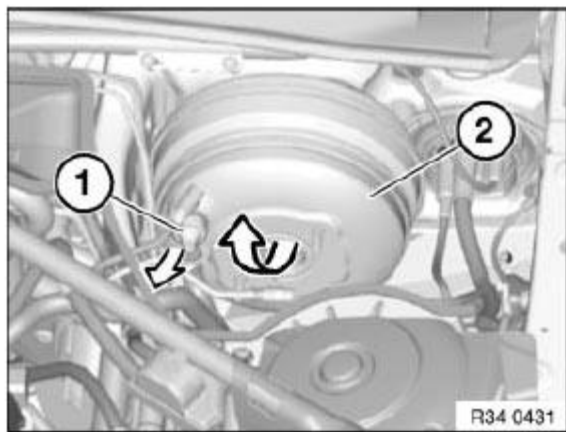


Fig. 91: Identifying Non-Return Valve And Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

ELECTRICAL COMPONENTS/WEAR INDICATOR

34 35 001 REPLACING A BRAKE PAD SENSOR

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Necessary preliminary tasks:

- Remove wheel

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).
If a brake pad sensor that has already been ground has to be replaced even though the **MINIMUM BRAKE PAD THICKNESS** has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

Open cover (1) on plug housing (3).

Unclip lead of brake pad sensor (2) from plug housing (3).

Disconnect associated plug connection of lead from brake pad sensor (2).

Expose lead for brake pad sensor up to brake pad.

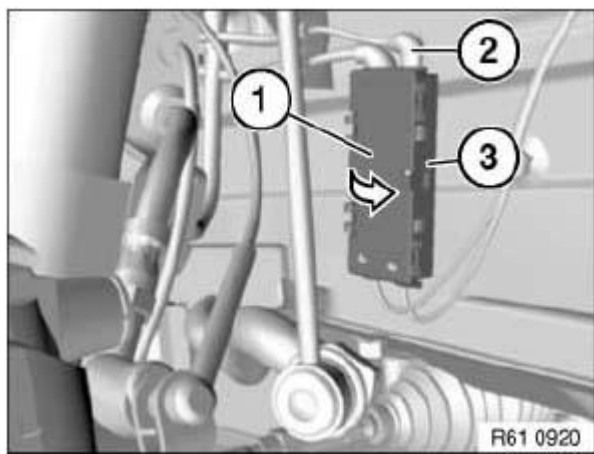


Fig. 92: Identifying Brake Pad Sensor, Plug Housing And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Press clip (1) together and detach brake pad sensor (2) in direction of arrow from brake pad (3).

Installation:

Make sure clip (1) and brake pad sensor (2) are correctly seated in brake pad (3).

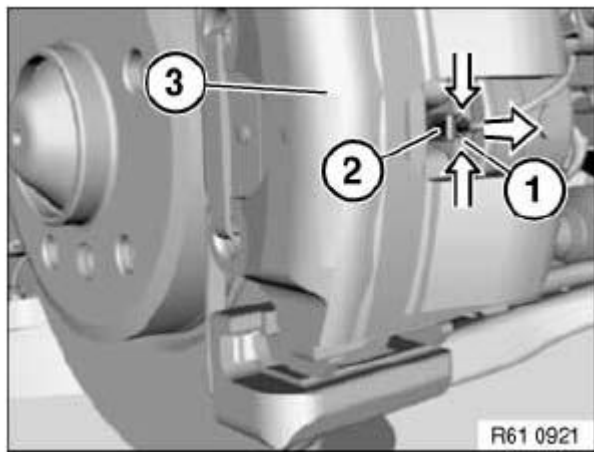


Fig. 93: Identifying Clip, Brake Pad Sensor And Brake Pad
Courtesy of BMW OF NORTH AMERICA, INC.

PARKING BRAKE

34 10 014 ADJUSTING HANDBRAKE

Special tools required:

· **32 1 030**

Perform inspection in the following manner:

When 1st ratchet is engaged, no braking force should be exerted.

The difference in wheel circumferential forces between the left and right wheels may deviate by max. 30 % from the greater value (measured on brake analyzer).

In event of larger deviations of wheel circumferential force: carry out readjustment.

Braking with locked wheels must be possible with the parking brake.

The parking brake must be reset if the actuation stroke is greater than 10 teeth.

NOTE: **Accurate adjustment of the parking brake is only possible if the parking brake Bowden cables and all moving parts on the parking brake move easily and function correctly.**

Basic setting of the parking brake is required whenever:

- **When replacing parking brake pads.**
- **When replacing brake discs.**
- **In event of excessive actuation stroke (10 teeth).**

When replacing parking brake Bowden cables

1. Setting instruction for brake pads (basic setting)

Lock adjuster unit (ASZE).

Actuate parking brake lever. Screw in special tool **32 1 030** partially. Press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

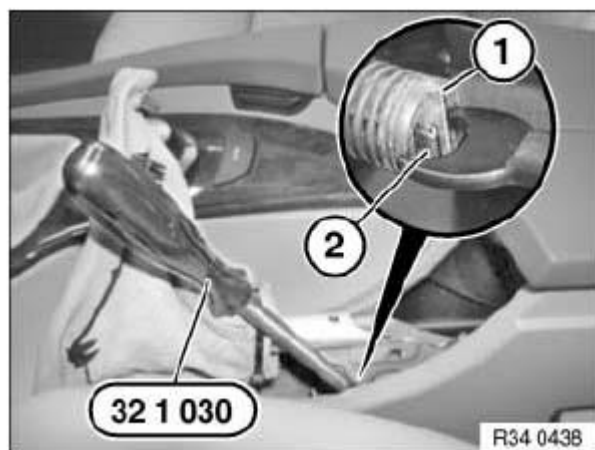


Fig. 94: Identifying Retaining Hook And Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Completely unscrew one wheel stud on each rear wheel.

Installation:

Tightening torque **36 10 1AZ** .

Turn wheel until adjustment screw is visible in tapped hole.



Fig. 95: Locating Adjustment Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Turn adjusting screw with a screwdriver until the wheel is no longer able to turn.

Then unfasten the adjusting screw 8 notches.

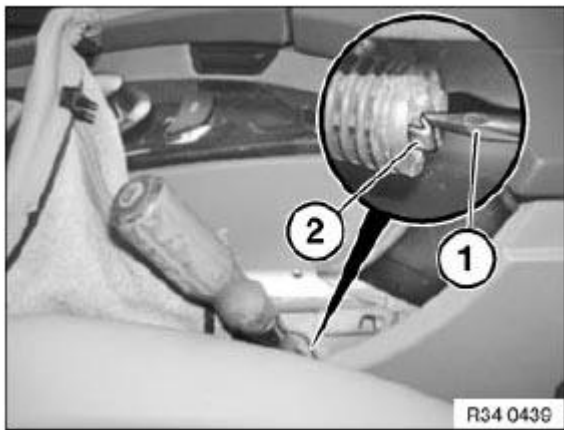
**Fig. 96: Turning Adjusting Screw With Screwdriver**

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock adjuster unit (ASZE).

Lever restraint hook (2) outwards with a suitable screwdriver (1).

Restraint hook (2) must disengage from stop of adjusting spring.

**Fig. 97: Identifying Restraint Hook And Screwdriver**

Courtesy of BMW OF NORTH AMERICA, INC.

2. Setting instruction for parking brake Bowden cables

The parking brake lever must be applied 5 times to approx. 400 N actuating force.

2.1 On brake analyzer

0th tooth (parking brake released): Vehicles with manual transmission: Shift lever in neutral position.

Vehicles with automatic transmission: Selector lever in "N" position.

- Without locking differential $< \text{ or } = 150 \text{ N}$.
- With locking differential $< \text{ or } = 200 \text{ N}$ (possibly odd display).

1st tooth: No increase in braking force with regard to 0th tooth.

Indicator lamp can be lit.

2nd tooth: Indicator lamp must be lit.

3rd tooth: Increase in braking force.

5th tooth: The brake force display must have reached $> \text{ or } = 400 \text{ N}$.

Checking brake force differential at wheel:

Apply parking brake until a wheel circumferential force (brake force display) of min. 1000 N is reached.

Max. permitted brake force differential right/left $> \text{ or } = 35 \%$ (referred to greater brake value).

3. Breaking in the duo-servo parking brake

The following breaking-in procedures are applicable in case of insufficient braking effect or after replacing brake discs and/or brake pads.

3.1 On brake analyzer

Apply parking brake lever until wheel circumferential force at first wheel is 800 N.

Lock parking brake lever in next lower tooth.

Release parking brake lever after approx. 2 minutes.

3.2 When driving on road

(If possible inside the company grounds or on an unused road)

At approx. 40 km/h apply parking brake lever until a braking effect can be felt.

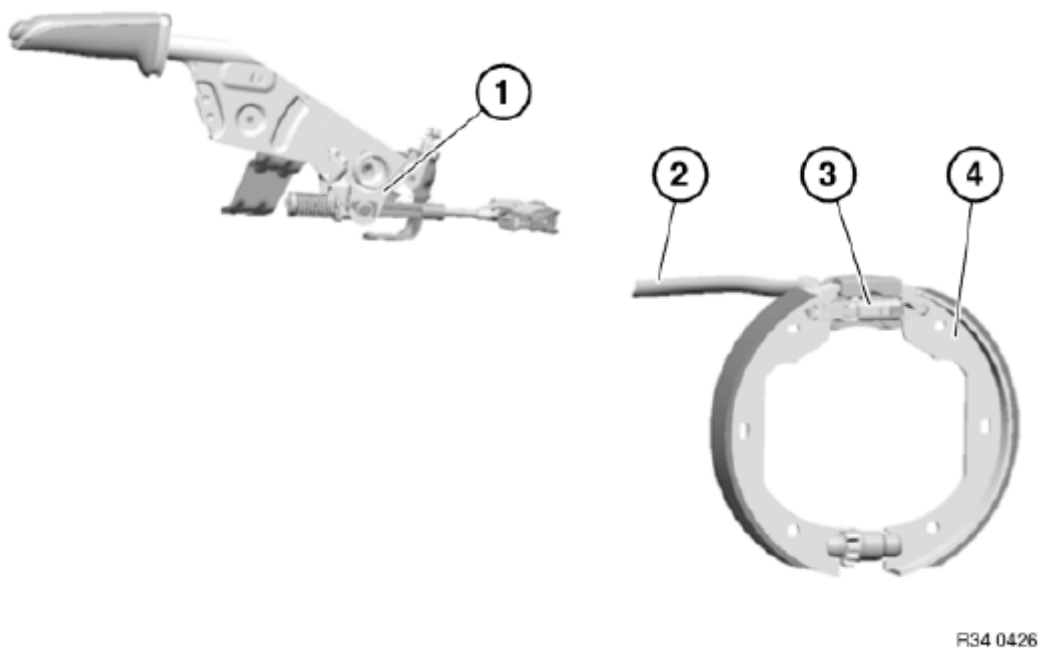
Pull parking brake lever to next notch and drive on for approx. 400 m.

A basic requirement is that parking brake is adjusted uniformly.

NOTE: If necessary, repeat breaking-in procedure.

IMPORTANT: Allow brake to cool down sufficiently.

34 41... OVERVIEW OF PARKING BRAKE



1 [Handbrake lever](#)

2 [Handbrake Bowden cables](#)

3 [Expander lock](#)

4 [Handbrake shoes](#)

5 [Adjusting handbrake](#)

Fig. 98: Overview Of Parking Brake

Courtesy of BMW OF NORTH AMERICA, INC.

34 41 000 REMOVING AND INSTALLING / REPLACING HANDBRAKE LEVER

Special tools required:

32 1 030

Necessary preliminary tasks:

REMOVE CENTRE CONSOLE

After completing tasks, adjust **PARKING BRAKE**.

Lock adjuster unit (ASZE).

Actuate parking brake lever. Screw in special tool **32 1 030** partially. Press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

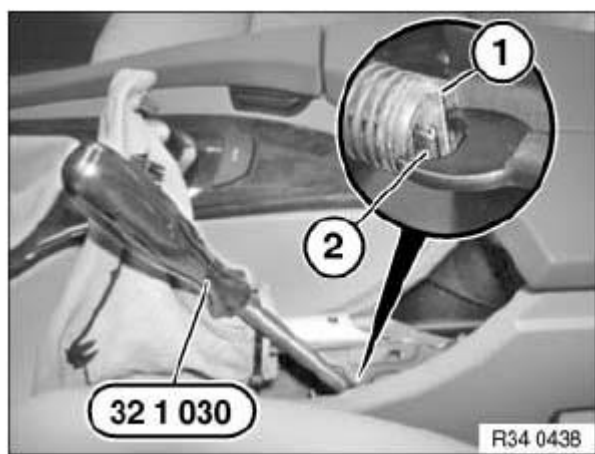


Fig. 99: Identifying Retaining Hook And Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip mounting clip (1) upwards out of balance arm (2).

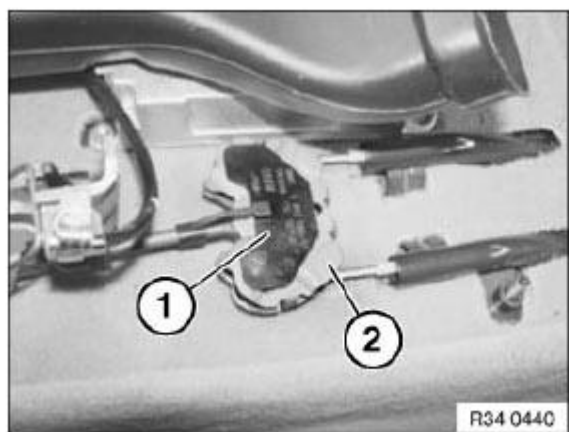


Fig. 100: Identifying Mounting Clip And Balance Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Guide handbrake Bowden cables (1) with a screwdriver inwards and pull out of balance bar (2).

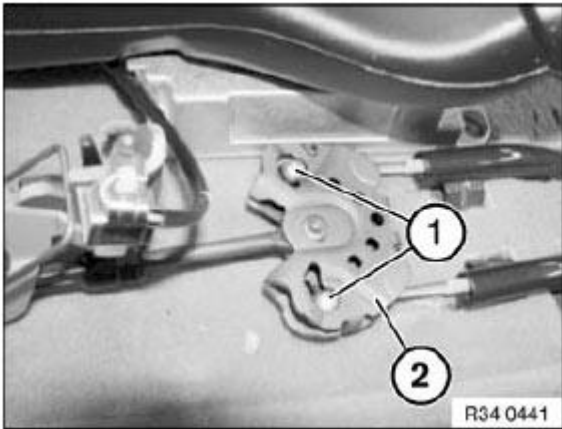


Fig. 101: Identifying Bowden Cables And Balance Bar
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect cable (1) from handbrake check switch.

Release screws (2) and remove parking brake lever (3).

Installation:

Tightening torque **34 41 1AZ** .

Parking brake lever and adjustment unit (ASZE) are only exchanged completely as a single unit.

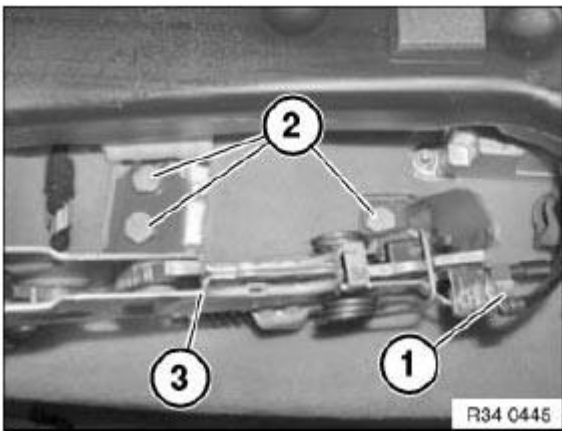


Fig. 102: Identifying Screws And Parking Brake Lever
Courtesy of BMW OF NORTH AMERICA, INC.

34 41 120 REMOVING AND INSTALLING / REPLACING BOTH HANDBRAKE BOWDEN CABLES

Special tools required:

32 1 030

Necessary preliminary tasks:

- **REMOVE CENTRE CONSOLE**
- **REMOVE REAR BRAKE DISCS**
- Remove **EXHAUST SYSTEM** .
- Remove heat shield.

After completing tasks, adjust **PARKING BRAKE**.

Lock adjuster unit (ASZE):

Actuate parking brake lever. Screw in special tool **32 1 030** partially. Press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

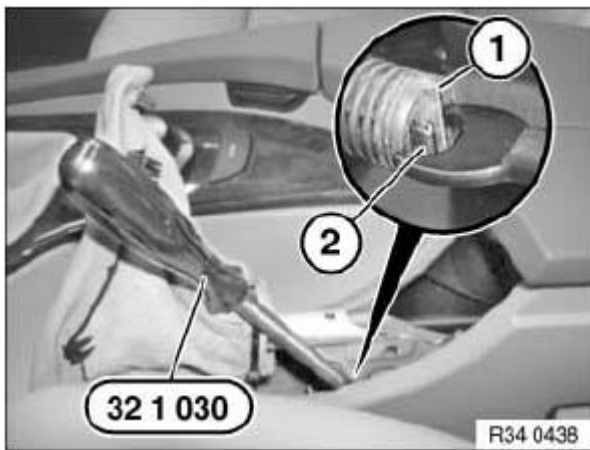


Fig. 103: Identifying Retaining Hook And Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip mounting clip (1) upwards out of balance arm (2).

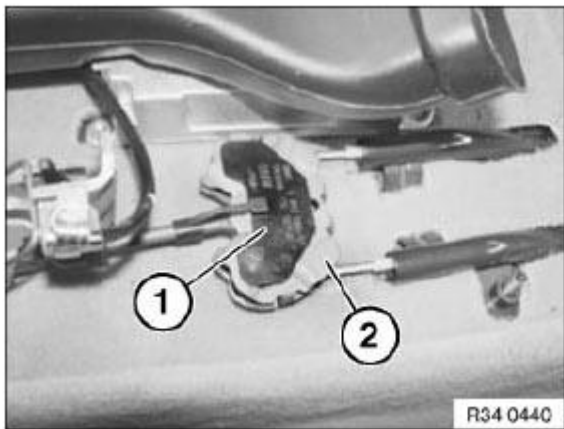


Fig. 104: Identifying Mounting Clip And Balance Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Guide handbrake Bowden cables (1) with a screwdriver inwards and pull out of balance bar (2).

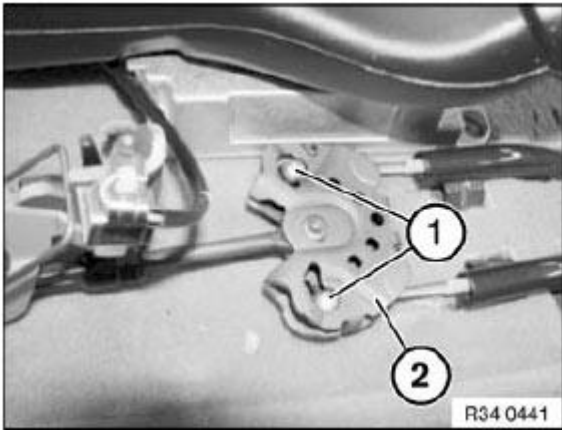


Fig. 105: Identifying Bowden Cables And Balance Bar
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect handbrake Bowden cables at expander locks.

Release screw (1) and remove bracket.

Installation:

Tightening torque **34 41 5AZ** .

Pull handbrake Bowden cables (2) out of wheel carrier.

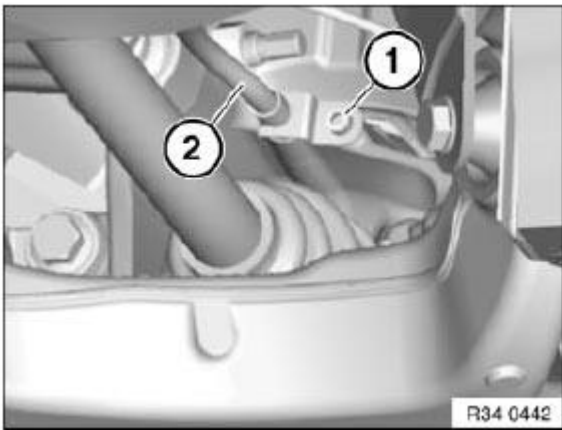


Fig. 106: Identifying Handbrake Bowden Cables And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect handbrake Bowden cables (1) out of mountings.

Pull handbrake Bowden cables (1) out of guide (2) and remove.

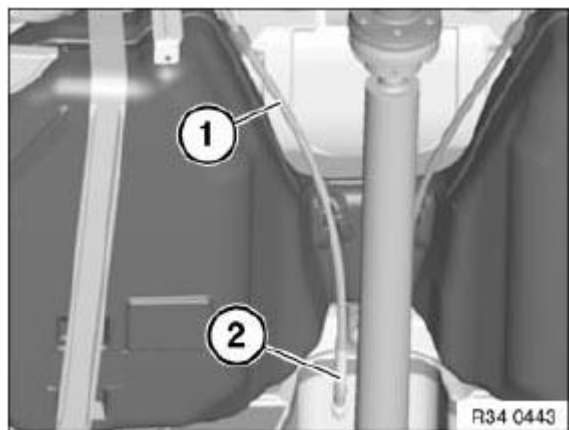


Fig. 107: Identifying Handbrake Bowden Cables And Guide
Courtesy of BMW OF NORTH AMERICA, INC.

34 41 220 REMOVING AND INSTALLING/REPLACING ALL PARKING BRAKE PADS

Special tools required:

- **32 1 030**
- **34 4 000**

Necessary preliminary tasks:

- Remove rear **BRAKE DISC**

Lock adjuster unit (ASZE).

Actuate parking brake lever. Screw in special tool **32 1 030** partially. Press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

Installation:

Unlock adjuster unit (ASZE).

Lever out restraining hook (2) with a suitable screwdriver.

Restraining hook (2) must detach from stop (1) of adjusting spring.

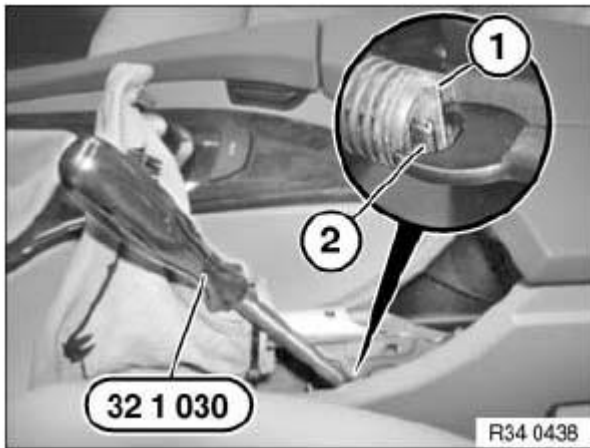


Fig. 108: Identifying Restraining Hook And Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect return spring (1) with brake spring pliers.

Installation:

Check and if necessary replace return spring (1).

Pay attention to installation position of adjustment screw (2).

Apply a thin coat of grease to bush and screw threads.

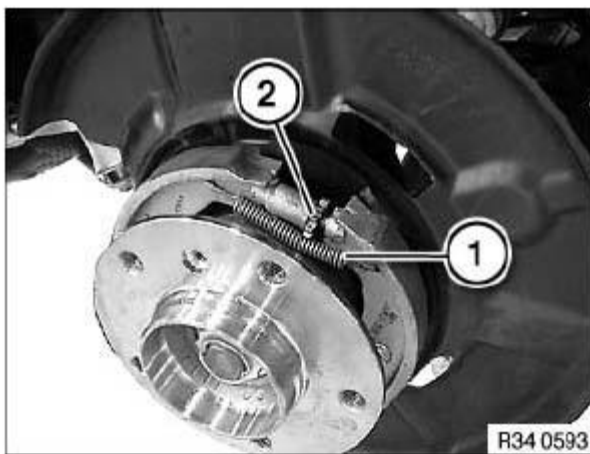


Fig. 109: Identifying Return Spring And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect return spring (1) with brake spring pliers.

Installation:

Check and if necessary replace return spring (1).

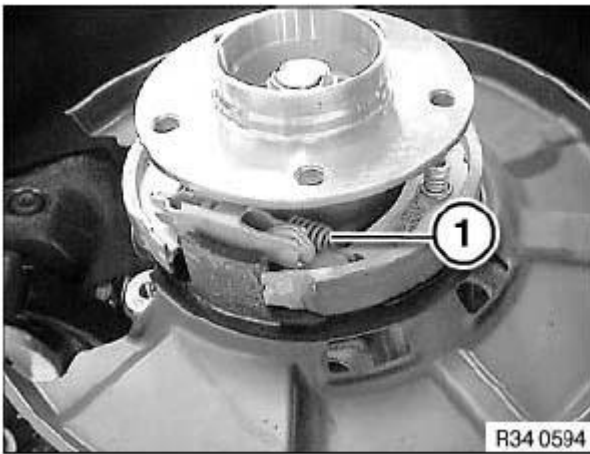


Fig. 110: Identifying Return Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Turn clamping pins (1) with special tool **34 4 000** through 90° and disconnect.

Remove brake pads (2).

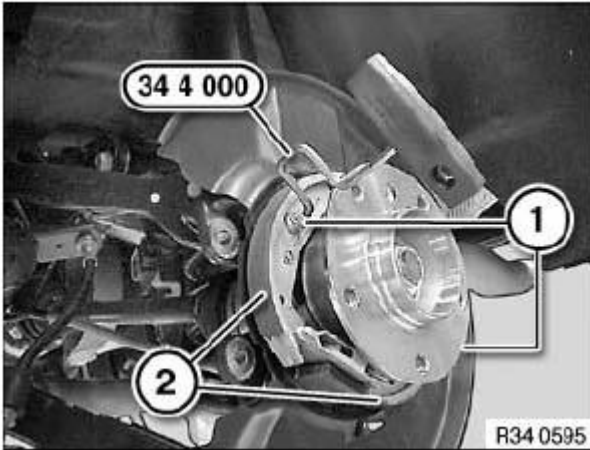


Fig. 111: Identifying Brake Pads And Clamping Pins

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

Adjusting **PARKING BRAKE**

34 41 250 REMOVING AND INSTALLING/REPLACING EXPANDER LOCK FOR PARKING BRAKE SHOES

Special tools required:

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32 1 030

Necessary preliminary tasks:

- Remove **PARKING BRAKE PADS**

Lock adjuster unit (ASZE).

Actuate parking brake lever. Screw in special tool **32 1 030** partially. Press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

Installation:

Unlock adjuster unit (ASZE).

Lever out restraining hook (2) with a suitable screwdriver.

Restraining hook (2) must detach from stop (1) of adjusting spring.

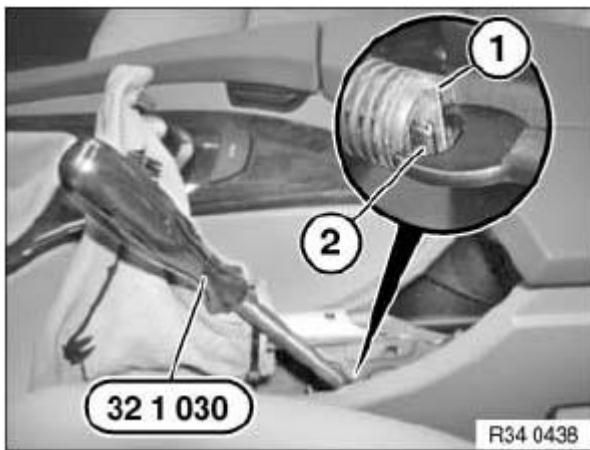


Fig. 112: Identifying Restraining Hook And Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Pull brake shoe expander (1) forwards, disconnect handbrake Bowden cable (2) and remove expander lock.

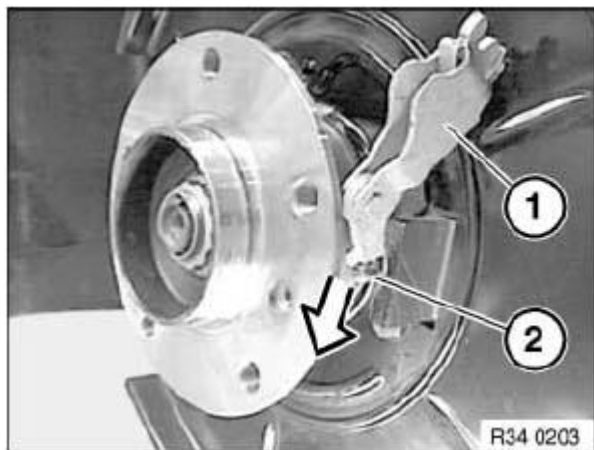


Fig. 113: Identifying Expander Lock And Handbrake Bowden Cable
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Adjusting **PARKING BRAKE**

MECHANICAL/HYDRAULIC COMPONENTS

34 51 527 REMOVING AND INSTALLING/REPLACING HYDRAULIC UNIT FOR DSC (M54 / N62 /N52 /N46)

Necessary preliminary tasks:

- Before removing hydraulic unit, read out control unit fault memory and if necessary print out diagnostic trouble code.
- Read and comply with **General Information**.

After completing work: **Bleed braking system**

Installation:

When replacing the control unit, carry out the following tasks with the DIS (Diagnosis and Information System):

- Vehicle coding (performed by the vehicle itself)
- Adjustment of steering angle sensor (performed by the vehicle itself)
- Adjustment of brake pressure sensor (performed by the vehicle itself)
- Adjustment of lateral acceleration sensors (performed by the vehicle itself)
- Function check, hydraulic unit

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected. This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

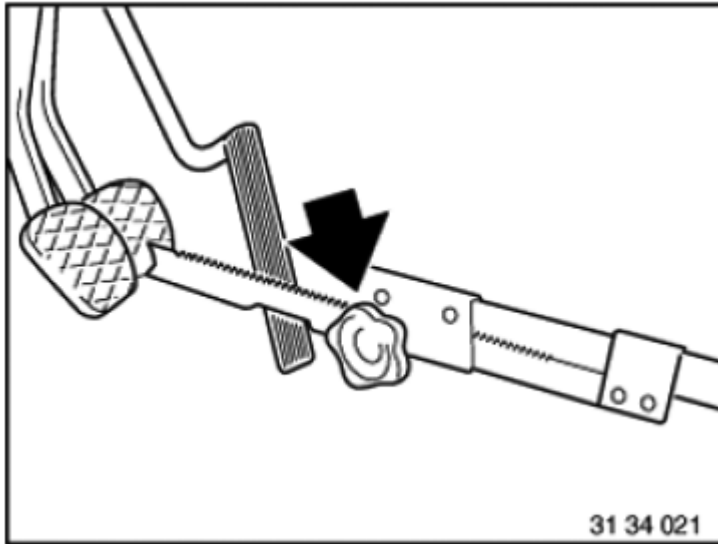


Fig. 114: Locating Brake Tensioner

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up brake pipes (mark if necessary). Close off connection bores with plugs.

Disconnect plug connection (1).

IMPORTANT: Do not bend brake lines.

Unfasten brake lines (2). Installation: Tightening torque 34 32 1AZ. Release screw (3) and remove hydraulic unit.

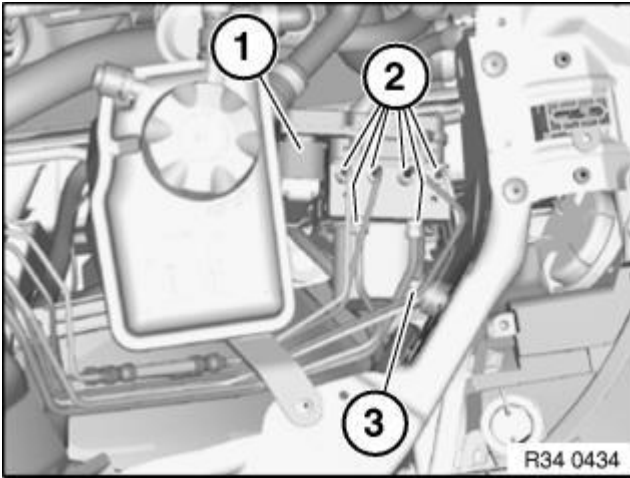


Fig. 115: Release Screw (3) And Remove Hydraulic Unit
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing hydraulic unit: Release screws (1) and convert holder (2).

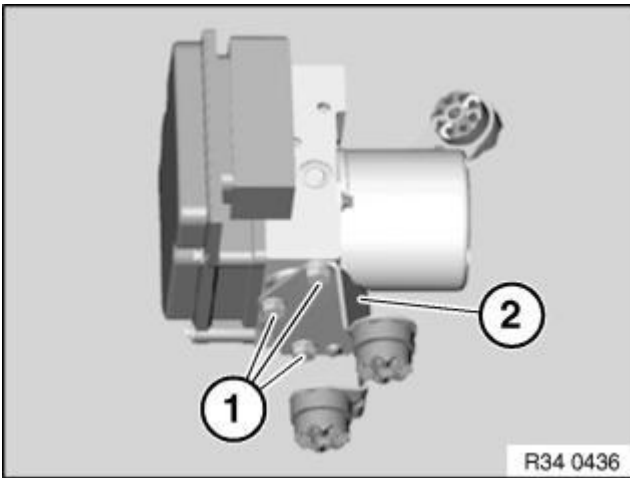
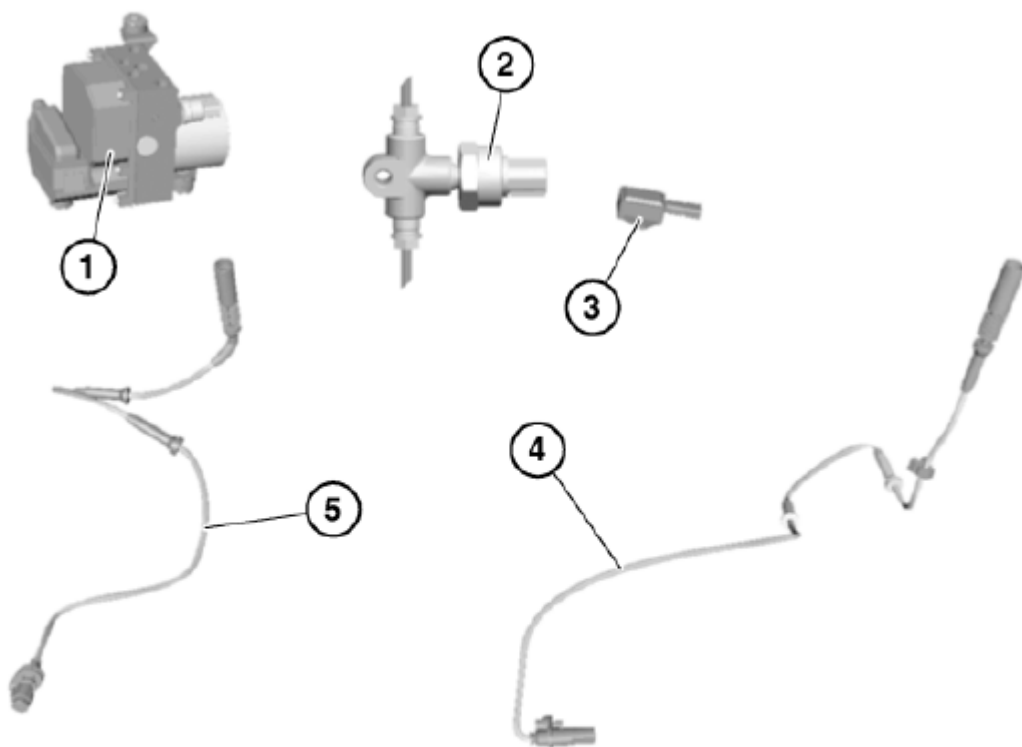


Fig. 116: Release Screws (1) And Convert Holder (2)
Courtesy of BMW OF NORTH AMERICA, INC.

ELECTRONIC COMPONENTS

34 52... OVERVIEW OF ELECTRONIC COMPONENTS



R34 0427

- 1 [DSC control unit](#)
- 2 [ACC pressure sensors](#)
- 3 [Rotation rate sensor](#)

- 4 [Pulse generator, rear](#)
- 5 [Pulse generator, front](#)

Fig. 117: Overview Of Electronic Components
 Courtesy of BMW OF NORTH AMERICA, INC.

34 52 516 REMOVING AND INSTALLING / REPLACING DSC CONTROL UNIT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Before removal, read out the control unit fault memory and if necessary print out the diagnostic trouble code.

Installation:

When replacing the control unit, carry out the following tasks with the DIS (Diagnosis and Information System):

- Vehicle coding (performed by the vehicle itself)
- Adjustment of steering angle sensor (performed by the vehicle itself)
- Adjustment of brake pressure sensor (performed by the vehicle itself)
- Adjustment of lateral acceleration sensors (performed by the vehicle itself)
- Function check, hydraulic unit

Unfasten plug connection (1).

Release screws (2) and carefully detach control unit (3) towards front.

IMPORTANT: Risk of damage to the contacts when removing and installing the hydraulic unit.

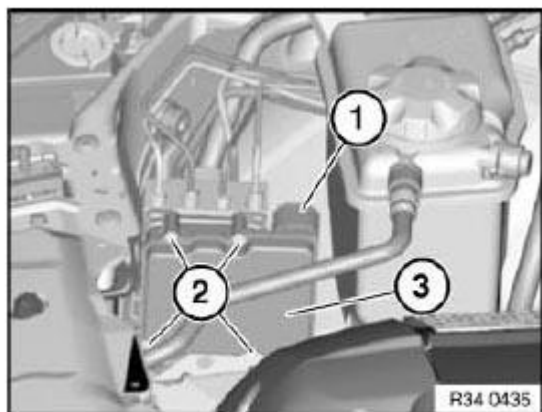


Fig. 118: Identifying Screws, Control Unit And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep sealing faces clean.

Replace screws.

Observe tightening sequence (1-4).

Tightening torque: **34 51 1AZ** .

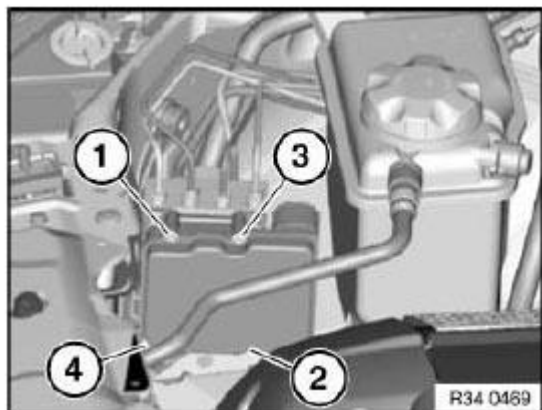


Fig. 119: Tightening Sequence Of Control Unit Screws

Courtesy of BMW OF NORTH AMERICA, INC.

34 52 525 REPLACING ONE FRONT PULSE GENERATOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

NOTE: READ AND COMPLY WITH GENERAL INFORMATION.
Observe SAFETY INSTRUCTIONS on raising the vehicle.

Open plug housing (1), pull plug connection (2) out of bracket and disconnect.

Pull cable with rubber grommet out of bracket on spring strut.

Installation:

Ensure proper locking of plug connector and proper seating of rubber grommets.

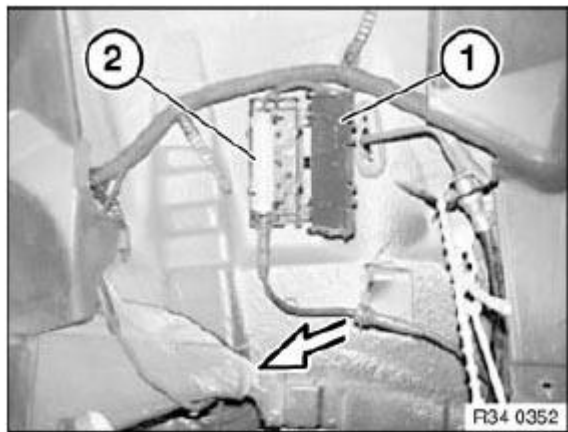


Fig. 120: Identifying Plug Housing And Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket head cap screw (1) and pull wheel speed sensor out of bore.

Installation:

Tightening torque **34 51 6AZ** .

Clean bore hole for pulse generator and grease with Staburags NBU 12/K lubricating grease (refer to **BRAKES - OPERATING FLUIDS**).

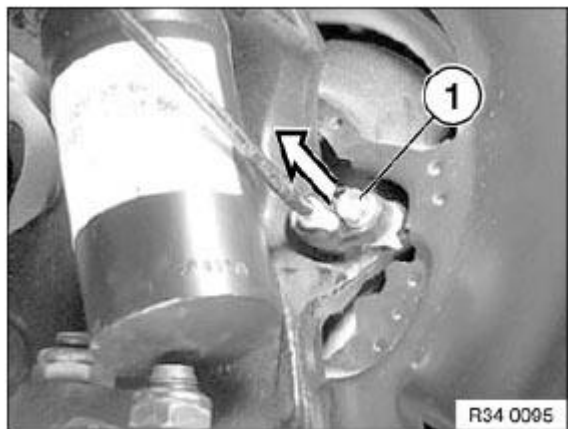


Fig. 121: Identifying Hexagon Socket Head Cap Screw
Courtesy of BMW OF NORTH AMERICA, INC.

34 52 535 REPLACING A REAR PULSE GENERATOR

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Necessary preliminary tasks:

- Remove rear wheel.
- **READ AND COMPLY WITH GENERAL INFORMATION.**

Observe **SAFETY INSTRUCTIONS** on raising the vehicle.

Open plug housing (1).

Pull plug connection (2) out of mounting and disconnect.

Pull cable out of brackets on swinging arm.

Installation:

Ensure proper locking of the plug connector and proper seating of the cable in the brackets.

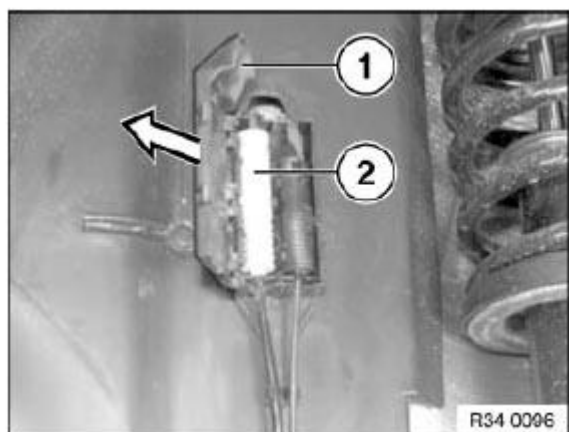


Fig. 122: Identifying Plug Housing And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket head cap screw (1) and pull wheel speed sensor out of bore.

Installation:

Tightening torque **34 51 6AZ** .

Clean bore hole for pulse generator and grease with Staburags NBU 12/K lubricating grease (refer to **BRAKES - OPERATING FLUIDS**).

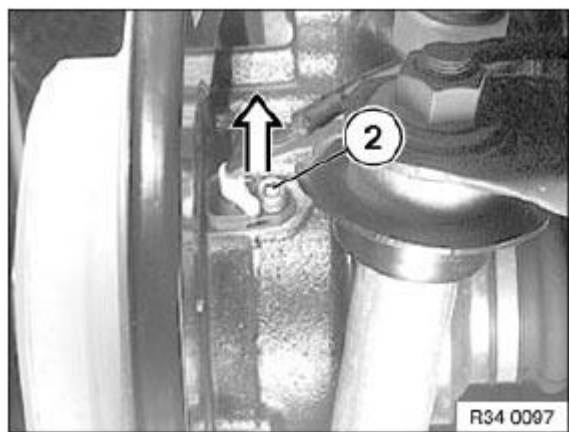


Fig. 123: Identifying Hexagon Socket Head Cap Screw
Courtesy of BMW OF NORTH AMERICA, INC.

34 52 550 REMOVING AND INSTALLING / REPLACING DSC SENSOR

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Necessary preliminary tasks:

- Remove right front seat. See **REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (NORMAL/SEMI-ELECTRIC)** or **REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (COMFORT)**
- Remove **FRONT INSIDE ENTRANCE COVER STRIP**
- Lift carpet and fold back to one side

NOTE: The yaw sensor comprises the function of the transversal-acceleration sensor and the yaw sensor.

Unlock plug connection.

Installation:

Make sure plug connection locks correctly.

Release screws (1) and remove rotation rate sensor.

Installation:

Tightening torque **34 51 3AZ** .

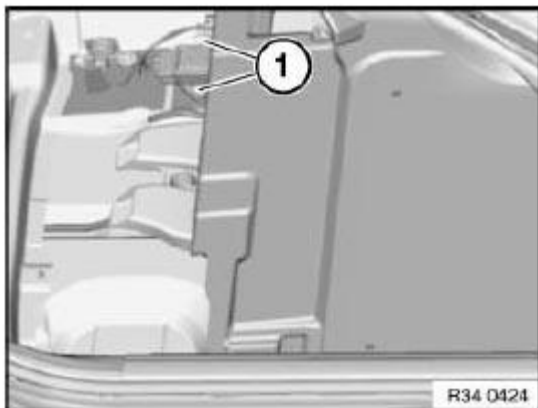


Fig. 124: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Carry out calibration/adjustment of DSC sensor.

34 52 575 REMOVING AND INSTALLING/REPLACING FRONT PRESSURE SENSOR FOR ACC

Necessary preliminary tasks:

- Remove front right **WHEEL ARCH TRIM**

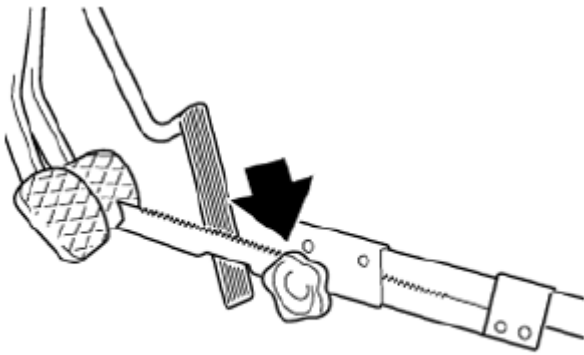
Read and comply with **GENERAL INFORMATION**.

After completing work: **BLEED BRAKING SYSTEM**

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



31 34 021

Fig. 125: Locating Pedal Support

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1).

Release pressure sensor (2) and remove.

Installation:

Tightening torque **34 51 12AZ** .

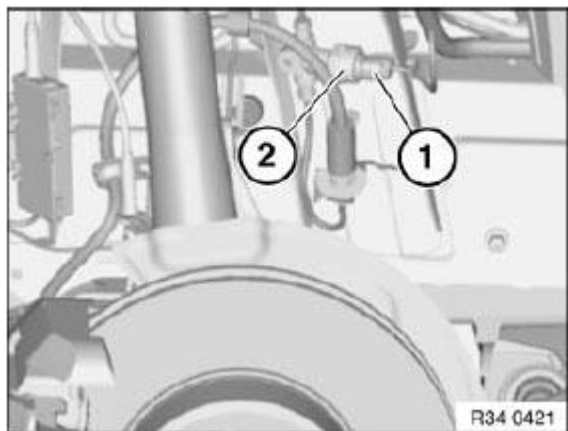


Fig. 126: Identifying Pressure Sensor And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

34 52 580 REMOVING AND INSTALLING / REPLACING REAR PRESSURE SENSOR FOR ACC

NOTE: Read and comply with GENERAL INFORMATION.

After completing work: BLEED BRAKING SYSTEM

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

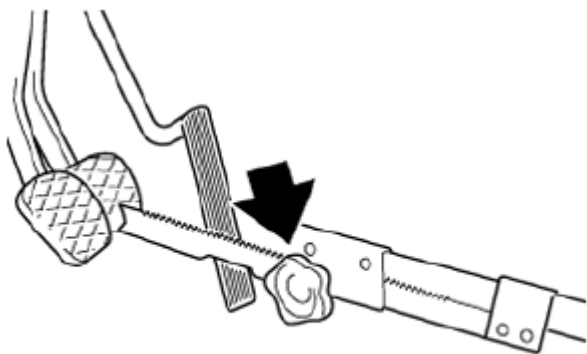


Fig. 127: Locating Pedal Support
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicles with N52 engine:

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If necessary, remove heat shield (1).

Installation:

Make sure heat shield is correctly seated.

If necessary, replace heat shield.

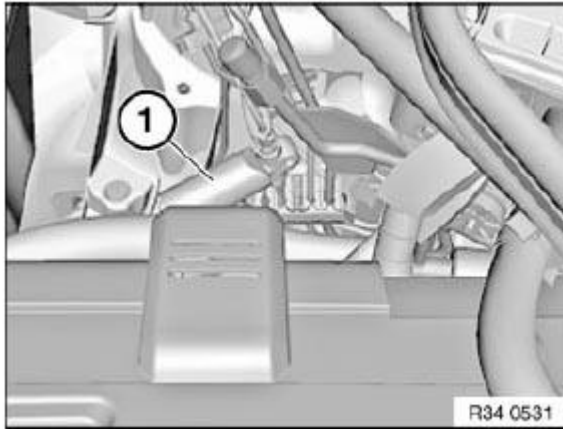


Fig. 128: Identifying Heat Shield

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release pressure sensor (2) and remove.

Installation:

Tightening torque **34 51 12AZ** .

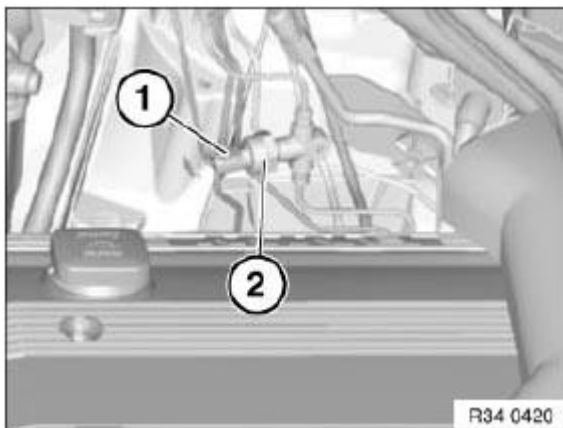


Fig. 129: Identifying Plug Connection And Pressure Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

SUSPENSION

Chassis Dynamics - F10

INTRODUCTION

1.1. DRIVING DYNAMICS AND COMFORT

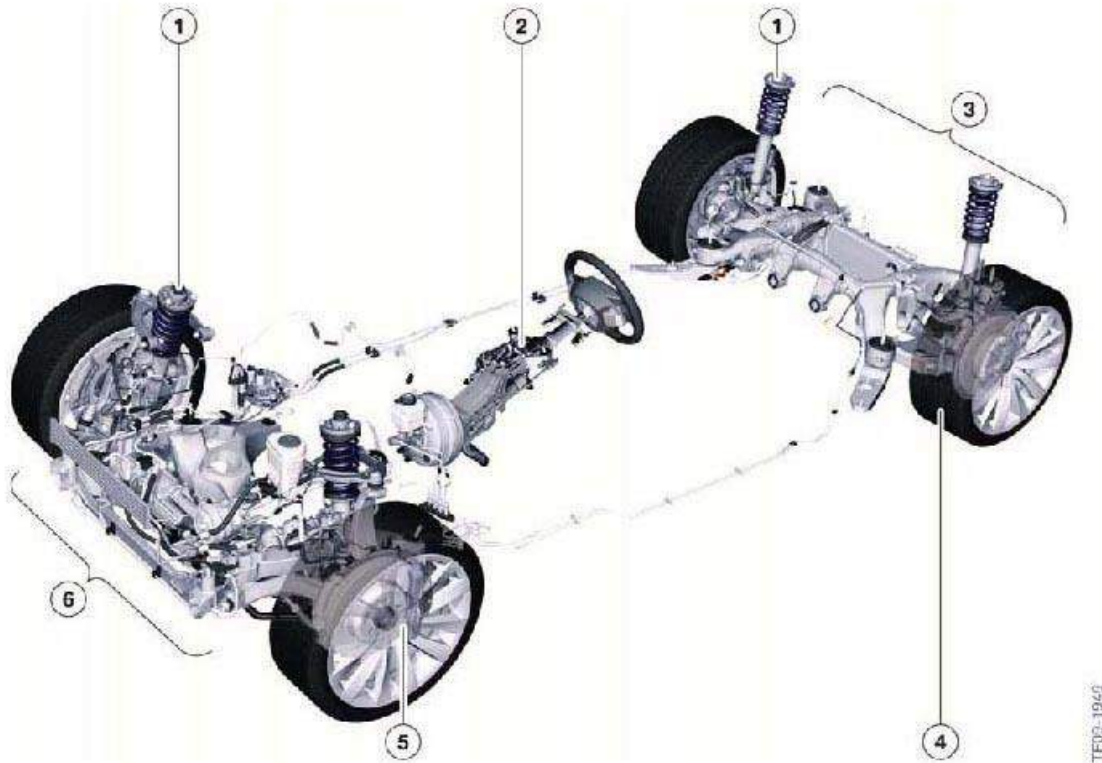


Fig. 1: Identifying F10 Chassis And Suspension
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Suspension/damping
2	Steering
3	Rear axle
4	Wheels
5	Brakes
6	Front axle

The chassis and suspension of the F10 are based on that of the F01, which set new standards in terms of driving dynamics and comfort. The chassis and suspension have been adapted to the F10 requirements resulting in exceptional driving dynamics with a continued very high level of comfort.

The familiar technological innovations from the F01 like Integral Active Steering, Integrated Chassis Management ICM, Dynamic Drive and Electronic Damper Control EDC are also installed in the F10.

1.2. BUS SYSTEM DIAGRAM

Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Wakeable control units
2	Control units authorized to wake up the vehicle
3	Startup node control units, for starting up and synchronizing the FlexRay bus system
ACC-SEN	Active Cruise Control Sensor
ACSM	Advanced Crash Safety Module
AL	Active steering
AMPH	Amplifier High (high fidelity amplifier)
AMPT	Amplifier Top (top high fidelity amplifier)
BSD	Bit-serial data interface
BCU	Battery Charge Unit (charging unit for auxiliary battery)
CAS	Car Access System
CIC	Car Information Computer
CIC Basic	Car Information Computer Basic
CID	Central Information Display
CON	Controller
D-CAN	Diagnosis on Controller Area Network
DDE	Digital Diesel Electronics
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
DVD	DVD changer
EDC SHL	Electronic Damper Control, rear left satellite unit
EDC SHR	Electronic Damper Control, rear right satellite unit
EDC SVL	Electronic Damper Control, front left satellite unit
EDC SVR	Electronic Damper Control, front right satellite unit
EGS	Electronic transmission control
EKPS	Electronic fuel pump control
EMF	Electromechanical parking brake
EPS	Electronic Power Steering
Ethernet	Cabled data network technology for local data networks
FD	Rear display
FD2	Rear display 2
FLA	High-beam assistant
FlexRay	Fast, preset and fault-tolerant bus system for use in automotive applications
FRM	Footwell module
FZD	Roof function center
GWS	Gear selector switch
HKL	Luggage compartment lid lift

HSR	Rear suspension slip angle control
HUD	Head-Up Display
ICM	Integrated Chassis Management
IHKA	Integrated automatic heating/air conditioning
JBE	Junction box electronics
KAFAS	Camera-based driver assistance system
K-Bus	Body bus
K-CAN	Body controller area network
K-CAN2	Body controller area network 2 (500 kBit/s)
KOMBI	Instrument cluster
LIN-Bus	Local Interconnect Network bus
Local-CAN	Local Controller Area Network
MOST	Media Oriented System Transport
MOST port	Media Oriented System Transport port
NVE	Night Vision electronics
PDC	Park Distance Control
PMA	Parking Maneuvering Assistant Control Unit
PT-CAN	Powertrain CAN
PT-CAN2	Powertrain controller area network 2
OBD	Diagnosis socket
RSE	Rear seat entertainment system
SDARS	Satellite tuner
SMBF	Front passenger seat module
SMFA	Seat module, driver
SWW	Blind Spot Detection
SZL	Steering column switch cluster
TCU	Telematics Control Unit
TPMS	Tire Pressure Monitoring System
TRSV	Control unit for reversing camera and side view
ULF-SBX	Universal charger and hands-free unit, interface box (Bluetooth telephone)
VDM	Vertical Dynamics Management
VM	Video Module
VSW	Video switch
ZGM	Central Gateway Module

MODELS

2.1. COMPARISON

The following table provides an overview of the technical data of the chassis and suspensions of the E60 and F07 compared to the F10.

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COMPARISON REFERENCE CHART

Description	E60 BMW 535i	F07 BMW 535i Gran Turismo	F10 BMW 535i
Wheelbase	2888 mm	3070 mm	2968 mm
Track width, front	1558 mm	1611 mm	1600 mm
Track width, rear	1581 mm	1654 mm	1627 mm
Basic wheel tires	225/50 R17 94W	245/50 R18 100WASRSC	245/45 R18 96V RSC
Basic wheel rims	7.5Jx17IS20	8Jx18LM30	8Jx18LM30
Front axle	Two-joint spring strut front axle	Double-wishbone front axle	Double-wishbone front axle
Suspension/damping, front	Steel spring/conventional or EDC	Steel spring/conventional or EDC	Steel spring/conventional or EDC
Stabilizer bar, front	Mechanical or hydraulic (Dynamic Drive)	Mechanical or hydraulic (Dynamic Drive)	Mechanical or hydraulic (Dynamic Drive)
Brake, front	Brake disc 324 mm	Brake disc 348 mm	Brake disc 348 mm
Steering	Hydraulic steering or active steering	Hydraulic or Integral Active Steering IAL	Electromechanical power steering
Rear axle	Integral IV rear suspension.	Integral V rear axle	Integral V rear axle
Suspension/damping, rear	Steel spring or air spring/conventional or EDC	Air spring/conventional or EDC	Steel spring/conventional or EDC
Stabilizer bar, rear	Mechanical or hydraulic (Dynamic Drive)	Mechanical or hydraulic (Dynamic Drive)	Mechanical or hydraulic (Dynamic Drive)
Brake, rear	Brake disc 320 mm	Brake disc 345 mm	Brake disc 345 mm
Parking brake	Drum brake with parking brake lever and automatic cable adjustment	Drum brake with EMF (electromechanical parking brake)	Disc brake with EMF (electromechanical parking brake)

CHASSIS AND SUSPENSION

3.1. FRONT AXLE

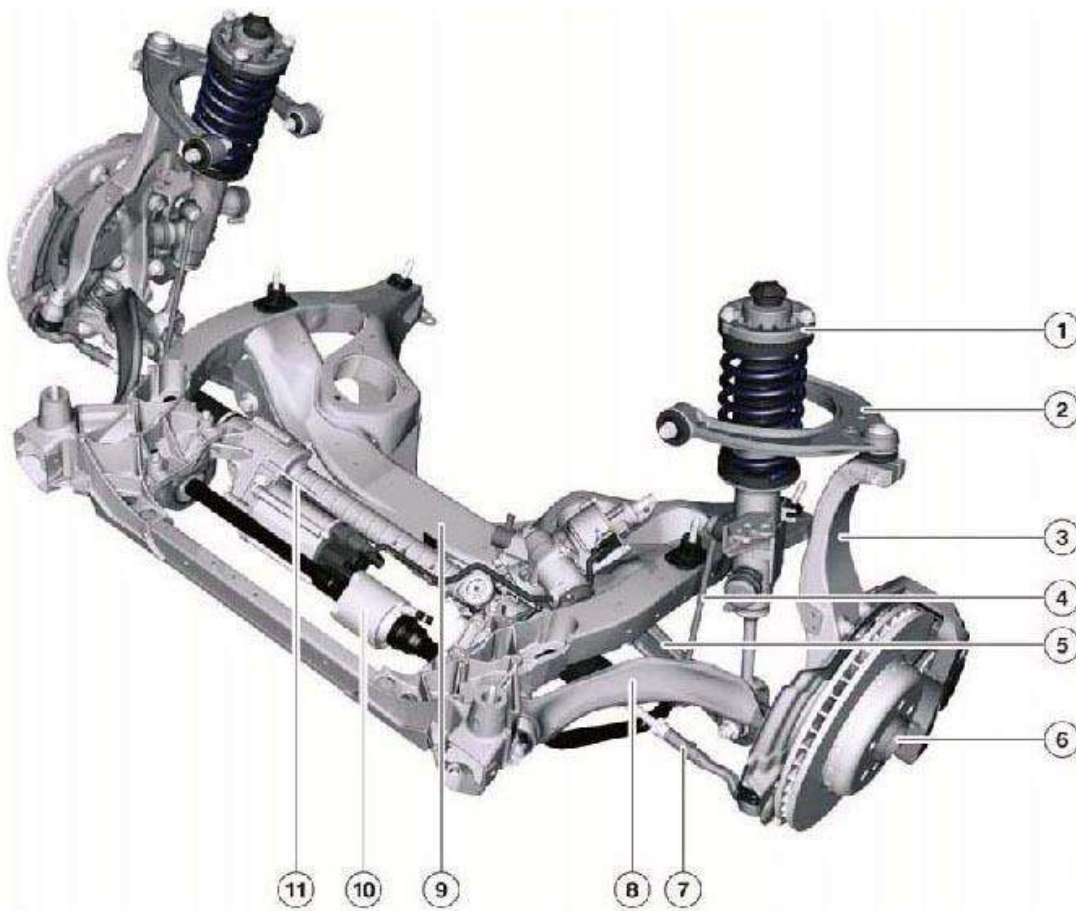


Fig. 3: Identifying F10 Front Axle Components
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Spring strut
2	Top wishbone
3	Swivel bearing
4	Stabilizer link
5	Bottom wishbone
6	Wheel hub
7	Track rod
8	Tension strut with hydraulic mount
9	Front axle subframe
10	Anti-roll bar with hydraulic swivel motor (Dynamic Drive)
11	Steering gear

The double-wishbone front axle introduced with the E70/E71 is used in a refined version in the F01/F02, F07 and F10. The axle is equipped for the use of an all-wheel drive. EDC or conventional shock absorbers can be

installed.

For service, the steering gear can be lowered all the way.

3.1.1. Technical data

TECHNICAL DATA

Description	F10
Caster angle	7° 0'
Camber	-0°12'±30'
Total toe-in	10'±12'
Toe angle difference	< or = 12'
Steering axis inclination	9° 57'
Rim offset IS	30 mm for 17" and 18" 33 mm for 19"
Kingpin offset	2.77 mm for 17" and 18" 5.77 mm for 19"
Track width	1600 mm for 17" and 18" 1594 mm for 19"
Maximum wheel steering lock angle, outer	33° 0'
Maximum wheel steering lock angle, inner	42° 14'

3.1.2. Notes for Service

The following tables show when a wheel alignment at the front axle is necessary.

COMPONENTS CHART

After replacing the following components:	Wheel alignment required
Front axle subframe	YES
Steering gear	YES
Bottom wishbone	YES
Rubber mount for lower transverse control arm	YES
Tension strut	NO
Rubber mount for tension strut	NO
Top wishbone	NO
Rubber mount for upper transverse control arm	NO
Track rod	YES
Swivel bearing	YES
Wheel bearing	NO
Spring strut	NO
Coil spring	NO
Mount	NO

COMPONENTS CHART

Undoing or loosening the following connections:	Wheel alignment required
Front axle subframe to body (lowering)	NO
Steering gear unit to front axle subframe	YES
Lower transverse control arm to front axle subframe	YES
Lower transverse control arm to swivel bearing	NO
Tension strut to front axle subframe	NO
Tension strut to swivel bearing	NO
Upper transverse control arm to body	NO
Upper transverse control arm to swivel bearing	NO
Track rod to steering gear	NO
Track rod head to track rod	YES
Track rod head to swivel bearing	NO
Spring strut to lower transverse control arm	NO
Strut mount to body	NO
Lower steering shaft to steering gear	NO
Steering column to lower steering shaft	NO

3.2. REAR AXLE

The integral V rear axle installed in the F10 is an innovative further development of the Integral IV rear axle from the E60/65. The optimized lightweight construction rear axle made of aluminum has been specifically adapted to the new requirements for more power and torque. It integrates the required chassis control systems such as Integral Active Steering for greater driving dynamics and comfort.

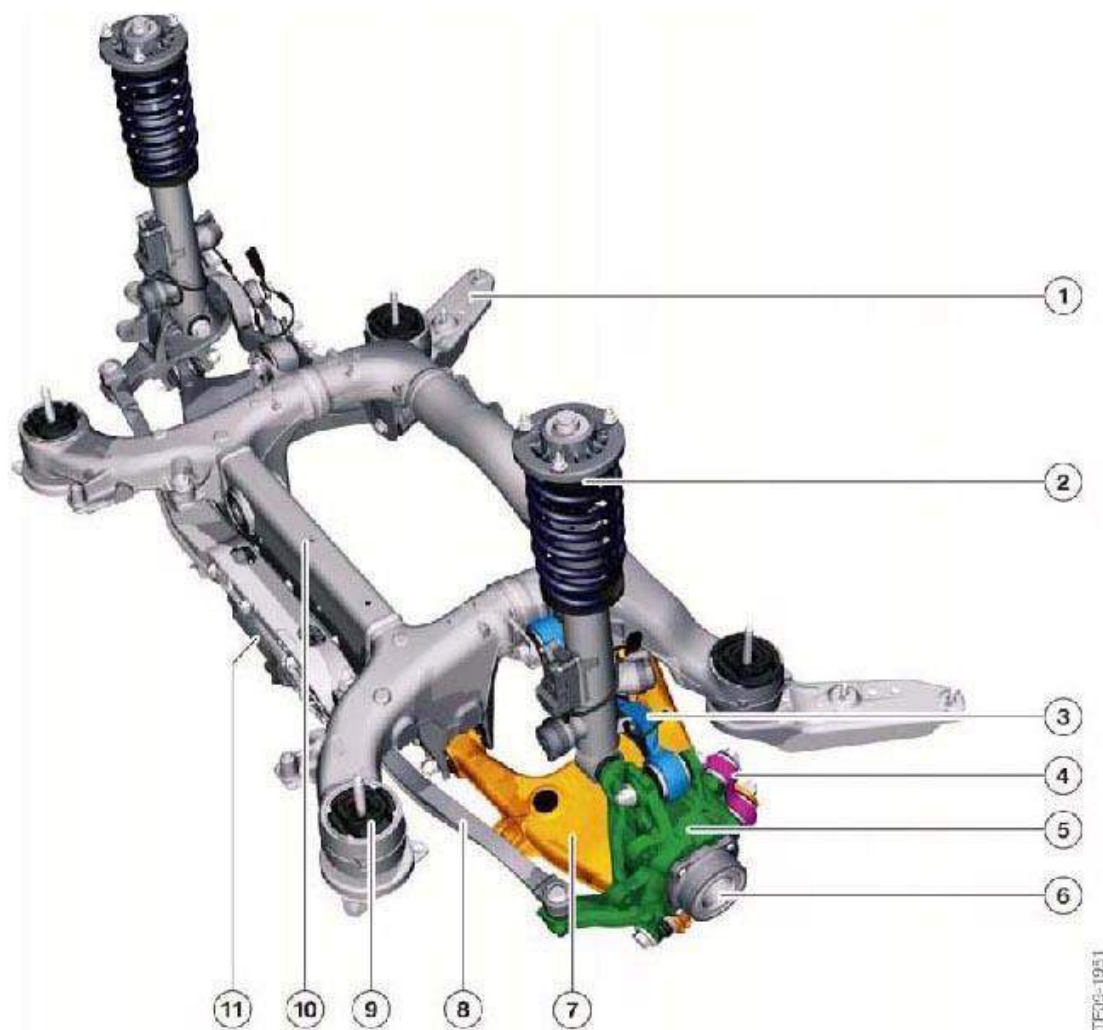


Fig. 4: Identifying F10 Integral V Rear Axle Components
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Thrust strut
2	Spring strut
3	Top wishbone
4	Integral link
5	Wheel carrier
6	Wheel bearing
7	A-arm (swinging arm)
8	Track rod
9	Rubber mount for rear axle
10	Rear suspension subframe
11	HSR actuator

3.2.1. Technical data

TECHNICAL DATA

Tires	Wheel rims	Total toe-in	Camber	Track width	Rim offset IS
225/55 R17	8Jx17	14'±12'	-1°50'±25'	1627 mm	30 mm
245/45 R18	8Jx18	14'±12'	-1°50'±25'	1627 mm	30 mm
275/40 R18	9Jx18	14'±12'	-1°50'±25'	1599 mm	44 mm
275/35R19	9Jx19	14'±12'	-1°50'±25'	1599 mm	44 mm

3.2.2. Notes for Service

The following tables show when a wheel alignment at the rear axle is necessary.

COMPONENTS CHART

After replacing the following components:	Wheel alignment required
Rear suspension subframe	YES
Rubber mount for rear axle	NO
Swinging arm	YES
Integral link	YES
Ball joint in swinging arm	YES
Control arm	YES
Wishbone	YES
Wheel carrier	YES
Wheel bearing	NO
Spring strut	NO
Mount	NO

COMPONENTS CHART

Undoing or loosening the following connections:	Wheel alignment required
Rear axle support on body	NO
Front compression strut on body	NO
Rear compression strut on body	NO
Front swinging arm on rear axle support	YES
Rear swinging arm on rear axle support	YES
Swinging arm on integral link/wheel carrier	YES
Integral link on wheel carrier	NO
Control arm on rear axle support	YES
Control arm on wheel carrier	NO
Wishbone on rear axle support	YES
Wishbone on wheel carrier	YES
Spring strut on wheel carrier/swinging arm	NO

3.3. WHEELS

The F10 comes standard equipped with run-flat tires in all the models.

The following tables list the available tire sizes.

WHEELS SPECIFICATION CHART

	528i	535i	550i
Front tire	225/55 R17 97W	245/45 R18 96V RDC	245/45 R18 96Y RSC
Rear tire	225/55 R17 97W	245/45 R18 96V RDC	245/45 R18 96Y RSC
Front rim	8J x 17 LM IS30	8J x 18 LM IS30	8J x 18 LM IS30
Rear rim	8J x 17 LM IS30	8J x 18 LM IS30	8J x 18 LM IS30
Optional tire available with sport package	275/40 R18	275/35 R19	275/35 R19

NOTE: The Tire Pressure Monitoring System (TPMS), which was introduced in 2005, continues to be used on the F10

3.4. SUSPENSION/DAMPING

The F10 is equipped as standard with conventional shock absorbers and coil springs on the front and rear axle. EDC/VDC is optional and, depending on the model, is also available combined with ARS in the optional equipment Adaptive Drive (option 2VA).

Electronic Damping Control, Active Roll Stabilization, and Adaptive Drive are available only in combination with the ZDH Dynamic Handling Package on the 535i and 550i. EDC is offered independently as an option on the 528i.

The EDC is the same Vertical Dynamic Control (VDC) introduced with the E70/E71 and later installed on FOx models.

The EDC/VDC is a sub-function of the Vertical Dynamics Management (VDM). The servomotors and sensors on the shock absorbers, referred to as satellites, are connected to the VDM control unit via FlexRay. The drive dynamic control switch in the center console makes it possible to select the damping characteristics, which are stored in the VDM control unit.

NOTE: The EDC/VDC system is described in the F01/F02 "Vertical Dynamics Systems" training material available on TIS and ICP.

BRAKES

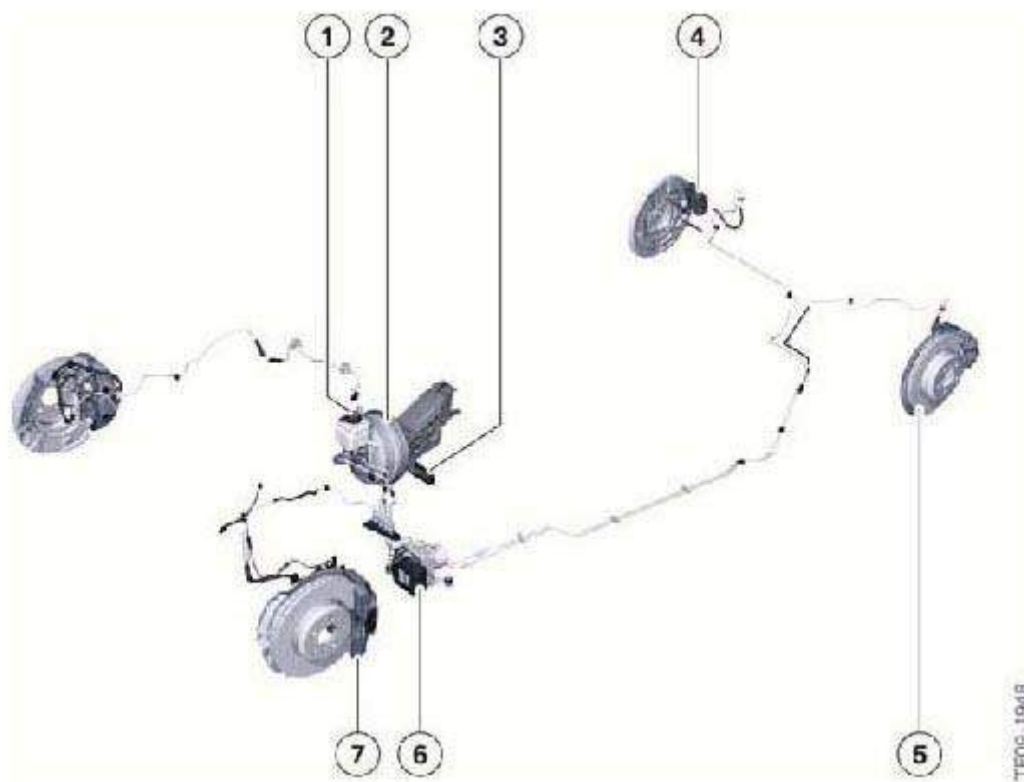


Fig. 5: Overview Of F10 Brakes

Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Brake fluid expansion tank
2	Brake booster
3	Brake pedal
4	Electromechanical parking brake actuator
5	Brake disc
6	Dynamic Stability Control (DSC)
7	Brake caliper

4.1. SERVICE BRAKE

The F10 has a hydraulic dual-circuit brake system with a "front/rear split". Lightweight brake discs with riveted aluminum hubs are installed on all models. Conventional aluminum floating brake calipers are used on the front axle. Spheroidal graphite (SG iron) cast iron floating brake calipers with integrated EMF actuators (for the electromechanical parking brake) are used on the rear axle.

As on all BMW vehicles the brake pad wear monitoring for the Condition Based Service display is used.

The brake discs are ventilated at both the front and rear axle.

The following tables list the brake dimensions of the various engine versions.

FRONT AXLE SPECIFICATION CHART

Front axle	528i	535i	550i
Brake rotor diameter	348 mm	348 mm	374 mm
Brake rotor thickness	30 mm	30 mm 36 mm	36 mm
Brake piston diameter	60 mm	60 mm	60 mm
Type	Lightweight construction	Lightweight construction	Lightweight construction

REAR AXLE SPECIFICATION CHART

Rear axle	528i	535i	550i
Brake rotor diameter	330 mm	330 mm	345 mm
Brake rotor thickness	20 mm	20 mm	24 mm
Brake piston diameter	44 mm	44 mm	44 mm
Type	Lightweight construction	Lightweight construction	Lightweight construction

4.2. ELECTROMECHANICAL PARKING BRAKE EMF

The F10 uses an electromechanical parking brake EMF integrated into the rear brake calipers.

The system is similar to the EMF system introduced in the E89 Z4.

The use of the EMF offers the following advantages:

- Operation via an ergonomic button in the center console
- Reliable engaging and releasing of the EMF under all conditions
- Automatic protection of the hydraulic holding functions
- A dynamic emergency braking function is ensured even with a low coefficient of friction via the (ABS) control systems
- The discontinuation of the parking brake lever in the center console creates space for new equipment features.

4.2.1. System overview

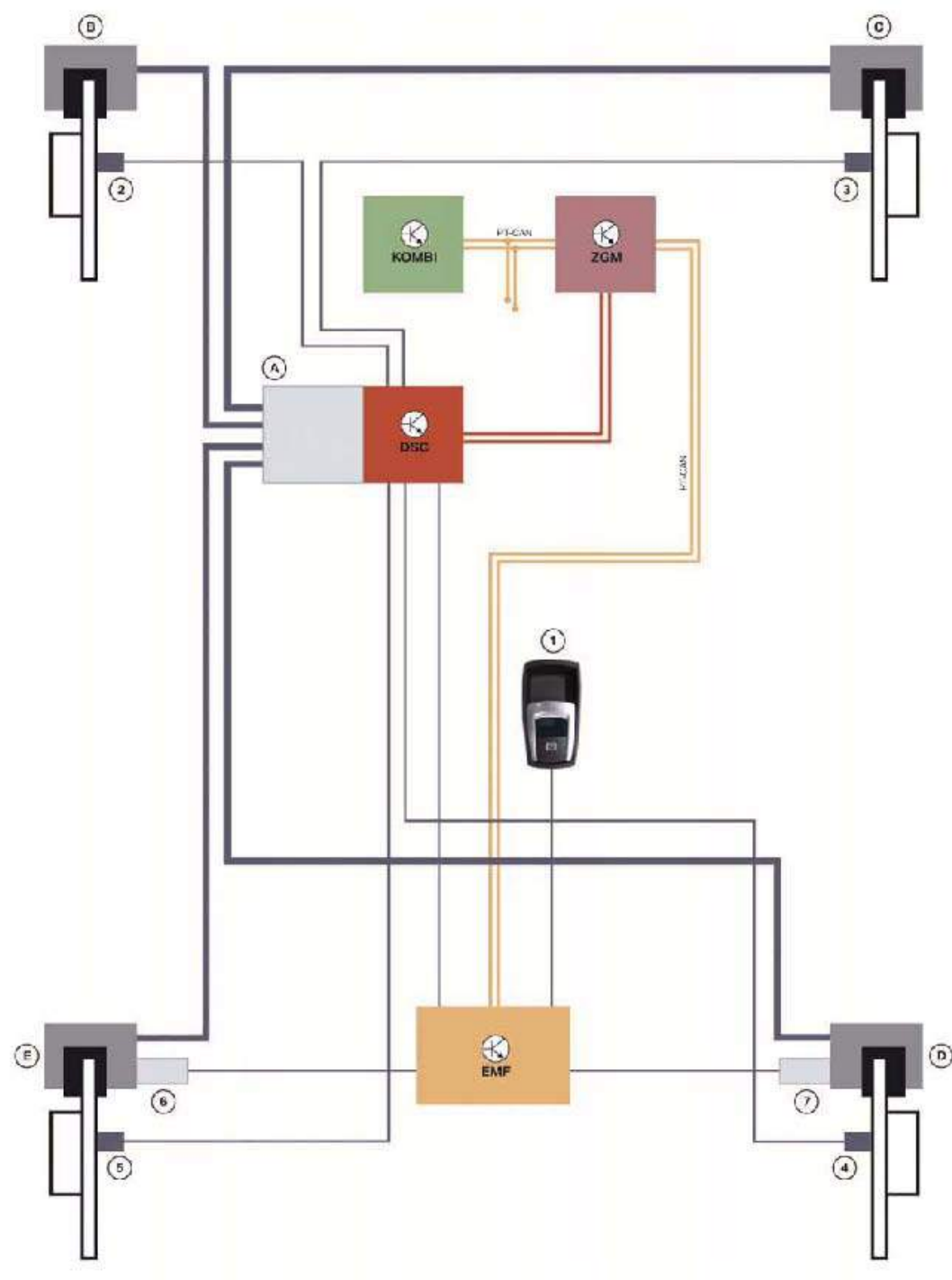


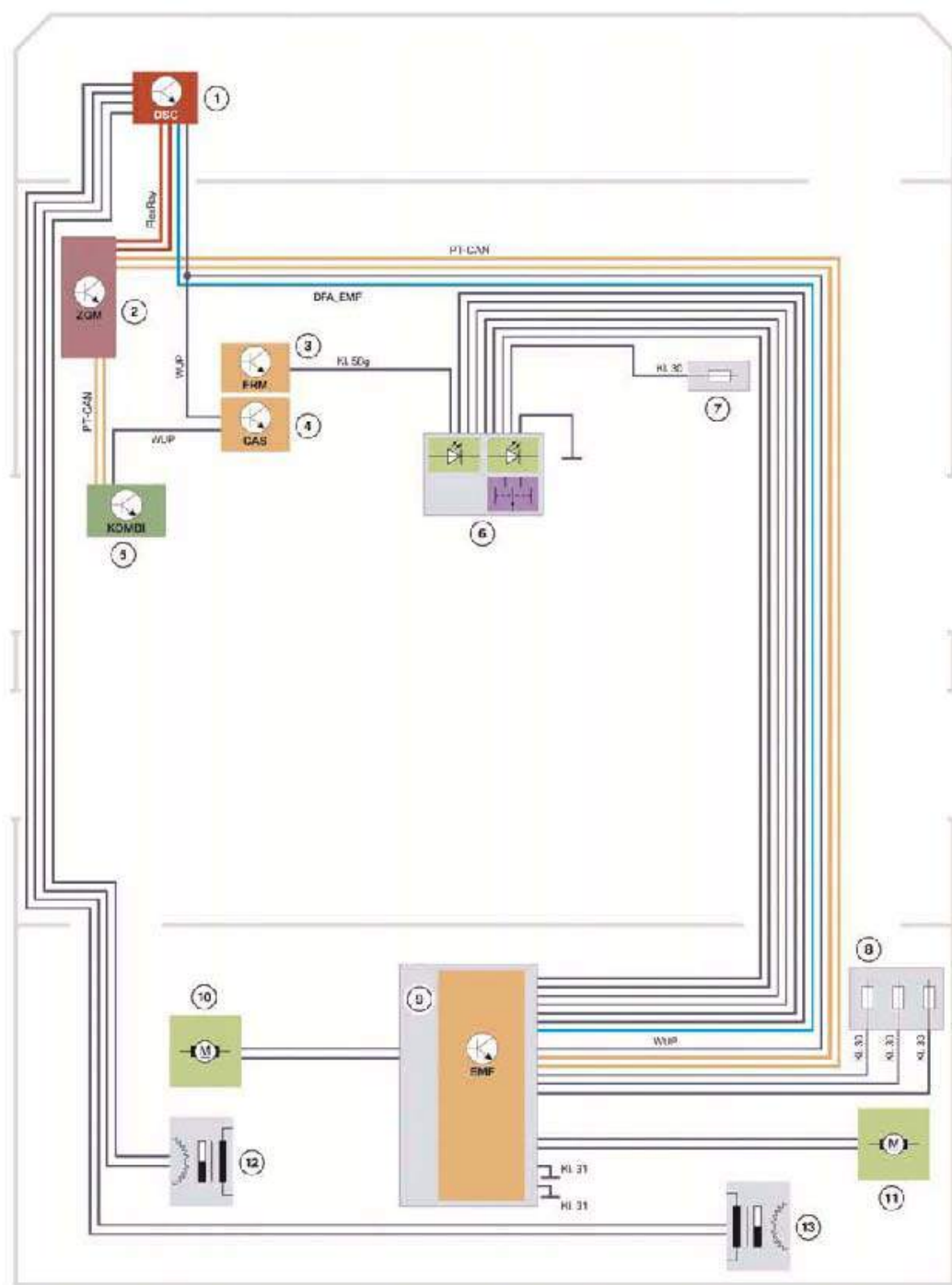
Fig. 6: Overview Of F10 Electromechanical Parking Brake System
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
A	DSC unit

B	Brake caliper, front left
C	Brake caliper, front right
D	Brake caliper, rear right
E	Brake caliper, rear left
1	Parking brake button
2	Wheel speed sensor, front left (not used for the EMF)
3	Wheel speed sensor, front right (not used for the EMF)
4	Wheel-speed sensor, rear right
5	Wheel speed sensor, rear left
6	EMF actuator, rear left
7	EMF actuator, rear right
EMF	Electromechanical parking brake
DSC	Dynamic Stability Control
JBE	Junction box electronics
KOMBI	Instrument cluster
PT-CAN	Powertrain CAN

4.2.2. System wiring diagram



TF03-1938

Fig. 7: F10 EMF System - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Dynamic Stability Control (DSC)

2	Central Gateway Module (ZGM)
3	Footwell module (FRM)
3	Instrument cluster (KOMBI)
4	Car Access System (CAS)
5	Instrument cluster (KOMBI)
6	Parking brake button
7	Front distribution box
8	Rear power distribution box
9	EMF control unit
10	EMF actuator, rear left
11	EMF actuator, rear right
12	Wheel speed sensor, rear left
13	Wheel-speed sensor, rear right
PT-CAN	Powertrain Controller Area Network
DFA_EMF	Redundant hard wired speed signal from DSC to EMF

NOTE: The DFA_EMF is a hard wired signal from DSC to EMF which carries a wheel speed information.

For safety reasons, it is very important, that the EMF NOT be activated as long as the vehicle is moving. Therefore the EMF uses two input signals to confirm vehicle speed: Bus-Signal and the DFA_EMF hard wired signal.

4.2.3. System structure

The EMF control unit receives the driver's command to engage the parking brake through the parking brake button. The vehicle condition is queried/detected via the electrical system connection and the bus systems. The control unit decides whether all conditions for engaging the parking brake are in place. If this is the case, the two EMF actuators on the rear brake calipers are activated.

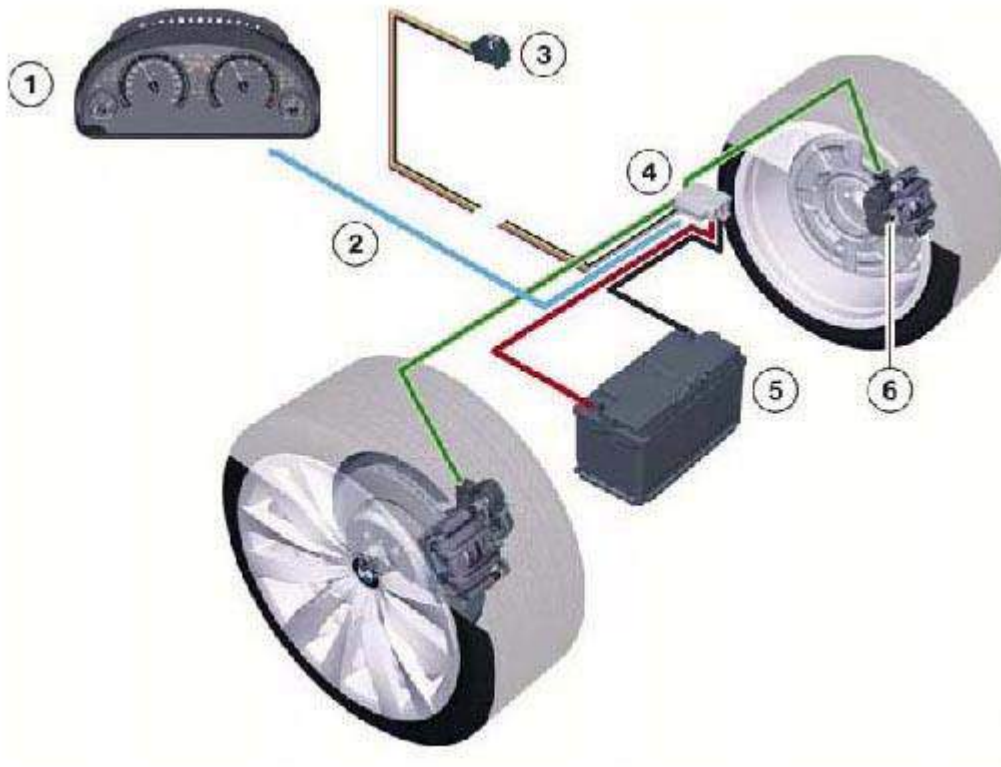


Fig. 8: F10 EMF Communication Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Instrument cluster
2	Flow of information
3	Parking brake button
4	EMF control unit
5	EMF actuator

4.2.4. System function

The self-locking facility in the spindle maintains the tension force even when de-energized, and the vehicle is held securely in place. After the required force is reached, the detected status is indicated by a red indicator light in the instrument panel and an additional red LED in the parking brake button.

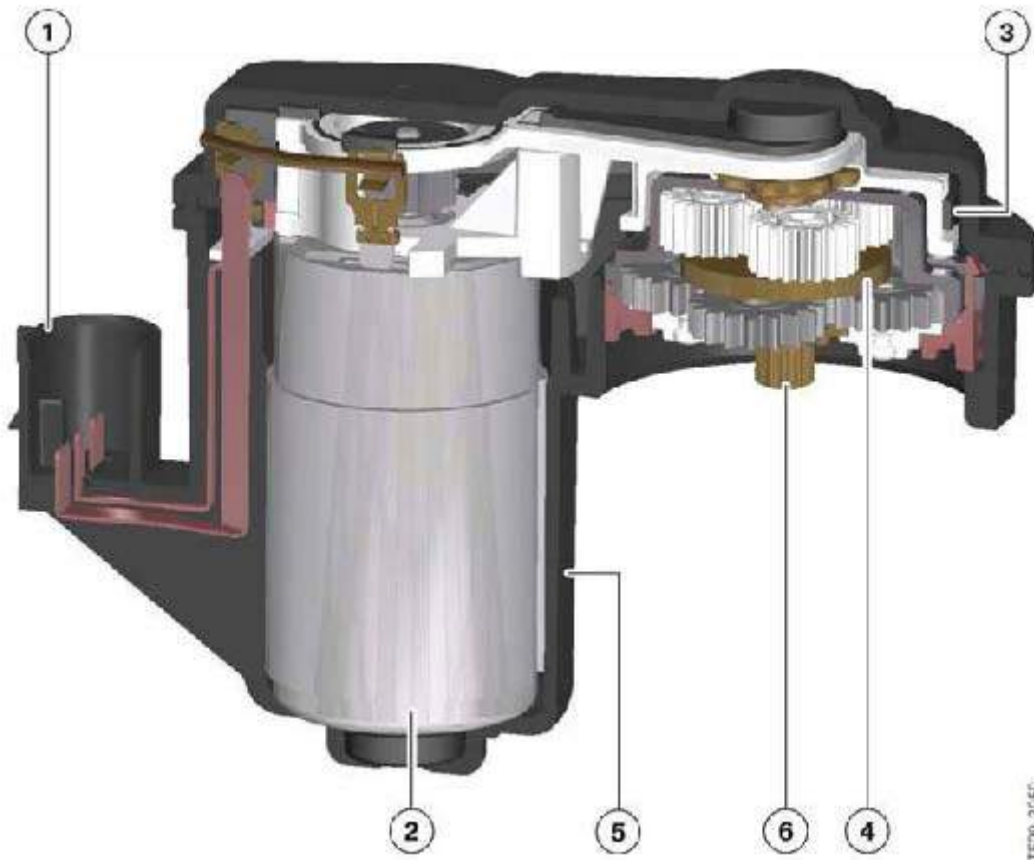


Fig. 9: Structure Of F10 EMF Actuator
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Push-fit connection
2	Electric motor I3 Drive belt
4	Planetary gearing
5	Casing
6	Connection to spindle

The EMF actuator is fastened to the brake caliper and acts directly on the brake piston.

An electric motor (2) and a drive belt (3) transmit the force to a two-stage planetary gear train (4). The spindle shown in the following graphic is driven via the connection to the spindle (6).

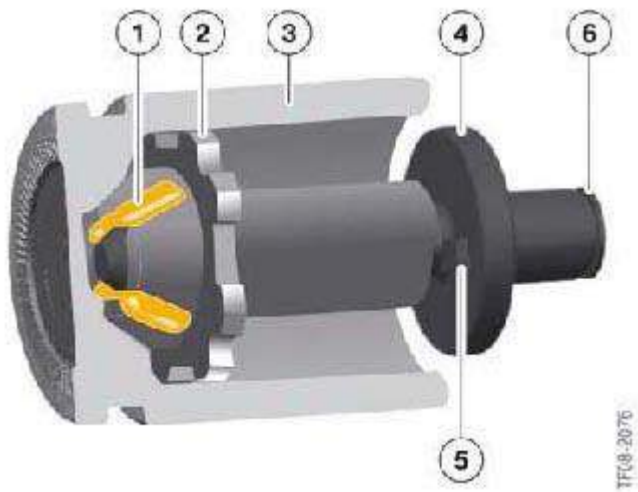


Fig. 10: Identifying F10 Spindle And Spindle Nut In Brake Piston
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Groove
2	Spindle nut with anti-twist lock
3	Brake piston
4	Spindle
5	Spindle end stop
6	Connection to the planetary gear train

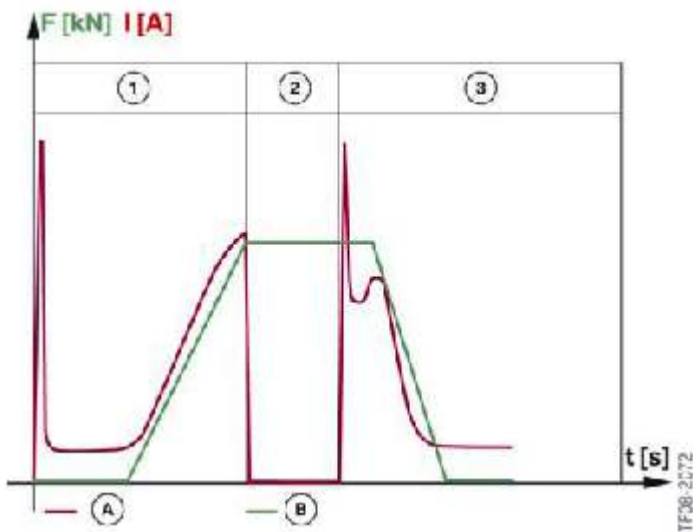


Fig. 11: F10 EMF Current-Force Curve
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
A	Current curve
B	Force curve
1	Engaging the EMF
2	Engaged EMF
3	Disengaging the EMF

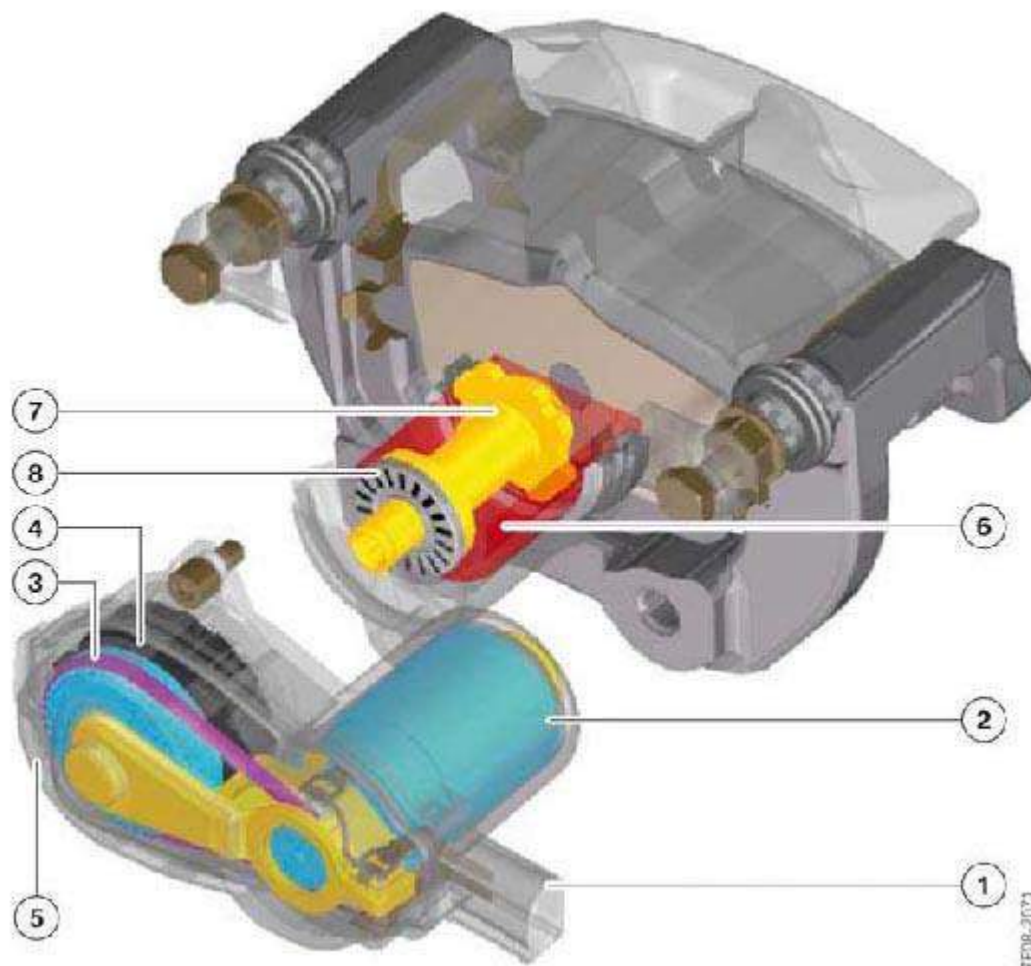


Fig. 12: F10 Overview Of EMF Actuator With Brake Caliper
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Push-fit connection
2	Electric motor
3	Drive belt
4	Planetary gearing

5	Casing
6	Brake piston
7	Spindle with spindle nut
8	Roller bearing

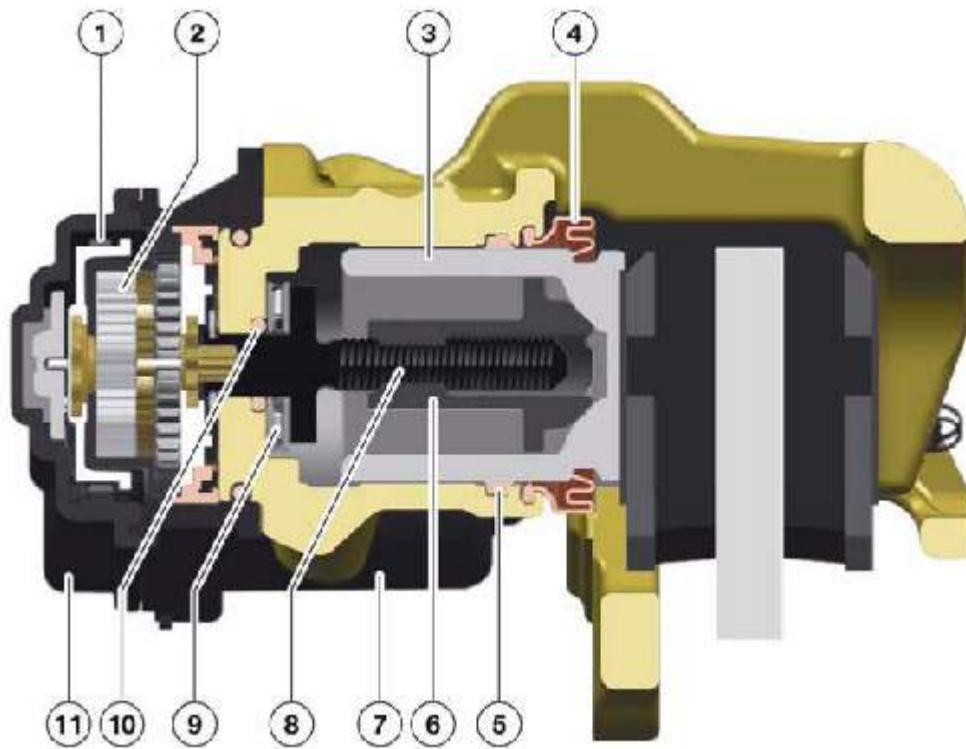


Fig. 13: Cutaway View Of F10 Parking Brake
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Drive belt
2	Planetary gearing
3	Brake piston
4	Dust boot
5	Sealing ring
6	Worm nut
7	Electric motor
8	Spindle
9	Roller bearing
10	Sealing ring
11	Casing

The driver can trigger the process of engaging the vehicle's parking brake by pulling the parking brake button. The operating direction is the same as the operating direction of the previously used mechanical parking brake lever. The signal from the parking brake button is read in by the EMF control unit. The EMF control unit activates the EMF actuators on the rear brake calipers individually.

Engaging is possible in every logical terminal status. Engaging at terminal 0 is made possible by integrating terminal 30 into the EMF control unit. If the driver operates the parking brake button at terminal 0, the EMF control unit is woken up. The EMF control unit in turn wakes up the other control units on the vehicle. Only then can the EMF control unit receive the important information relating to vehicle standstill. In addition, the changed status of the parking brake can be displayed after the system has been woken up.

The status "parking brake engaged" is indicated by a red indicator light in the instrument panel and an additional red LED in the parking brake button. Once the parking brake is on, pulling the parking brake button again has no effect.



Fig. 14: Identifying F10 Indicator Light, Parking Brake Engaged Display
Courtesy of BMW OF NORTH AMERICA, INC.

Rolling monitor with parking brake engaged

The rolling monitor function is intended to prevent the vehicle from rolling with the parking brake engaged. Rolling monitor is engaged whenever a state change of the parking brake from "disengaged" to "engaged" takes place and ends following a defined time after this state change.

A signal from the DSC is used as the input variable for roll-away detection. As soon as this signal indicates that the vehicle has started to roll away, a retensioning of the EMF actuators is carried out immediately. To do so, the EMF actuators are supplied with full current for 100 ms to increase the tension force. Afterwards, the system waits for 400 ms. If the vehicle rolls again, the retensioning process is repeated (a maximum of three times). If rolling of the vehicle is still detected after the third retensioning, the function ends with an entry in the fault memory.

Temperature monitoring

The temperature monitoring ensures compensation for the force reduction that takes effect from when hot brake discs cool off. The temperature monitoring is activated if the temperature exceeds a certain value during the state change of the parking brake from "released" to "engaged".

The temperature of the brake discs is calculated individually for each wheel by the DSC control unit and transmitted to the EMF control unit. During the state change, the higher of the two brake disc temperatures is used for the temperature monitoring. The corresponding temperature ranges are stored in a characteristic map along with the corresponding retensioning times.

Depending on the temperature during the state change, the corresponding retensioning times from the characteristic map are activated. When the first retensioning time is reached, the first retensioning takes place. After the second retensioning time expires, another retensioning takes place; yet another takes place after the third time expires. In the characteristic map, the value 0 can also be stored for one or more specific retensioning times. The respective retensioning operations are then omitted. The function ends when the last retensioning operation is completed.

Disengaging the parking brake

To disengage the parking brake, the parking brake button is pushed. However, for the parking brake to actually released, terminal 15 must also be ON and at least one of the following conditions must be met:

- The brake pedal must be depressed
- The automatic transmission parking lock must be engaged
- The clutch pedal actuated (vehicles with manual transmission only).

This prevents the vehicle rolling if, for example, another occupant of the vehicle (other than the driver) presses in the parking brake button.

Once the parking brake is released, the red indicator lamp in the instrument panel and the red LED in the parking brake button go out.

Activating the EMF actuator sets the spindle in motion. The spindle rotation moves the spindle nut away from the brake piston by a small defined distance.

Dynamic emergency braking

The law requires that vehicles have two means of applying the brakes (with the first being the brake pedal). In the F10, the second is the parking brake button on the center console. If the parking brake button is pulled while the vehicle is in motion, the dynamic emergency braking procedure is applied by the DSC system. This function is intended for emergency situations in which the driver is unable to apply the brakes by pressing the brake pedal. As a safety measure, other occupants of the vehicle can also use this to bring the vehicle to a stop if, for example, the driver suddenly loses consciousness.

Dynamic emergency braking hydraulically applies brake pressure at all four brakes. The DSC functions are fully active and the brake lights are activated. That represents a major advantage over manual parking brakes.

The dynamic emergency braking takes place only while the parking brake button is pulled. The deceleration set by the DSC is increased progressively. During the dynamic emergency braking, the EMF indicator light is activated in the instrument panel. In addition, a Check Control message and an audible warning signal are issued to make the driver aware of the critical situation.

If the driver uses the brake pedal and pulls the parking brake button at the same time to slow down, the DSC control unit prioritizes. The greater braking requirement is put into effect. If dynamic emergency braking is continued to the point of standstill, the vehicle continues to be held stationary after the parking brake button is released. The EMF indicator light on the instrument cluster remains active.

Parking brake fault

In the event of a fault of the parking brake, the EMF indicator light is activated and lights up in yellow in the instrument panel. A Check Control message is output.



Fig. 15: Identifying F10 Indicator Light, Parking Brake Fault Display
Courtesy of BMW OF NORTH AMERICA, INC.

Emergency release

No emergency release of the parking brake is provided for the customer.

The parking brake can be unlocked by unscrewing the EMF actuators and manually turning back the spindles.

NOTE: **No special tools are required to manually release the EMF at the calipers.**

Changing the brake pads

To change the brake pads, the EMF actuator must be in the completely open position so that the brake piston can be pushed back. The EMF actuators can be activated and moved into the completely open position with the BMW (ISTA) diagnostics system. This position is necessary to change the brake pads. Once the installation position is reached, the installation mode is set automatically.

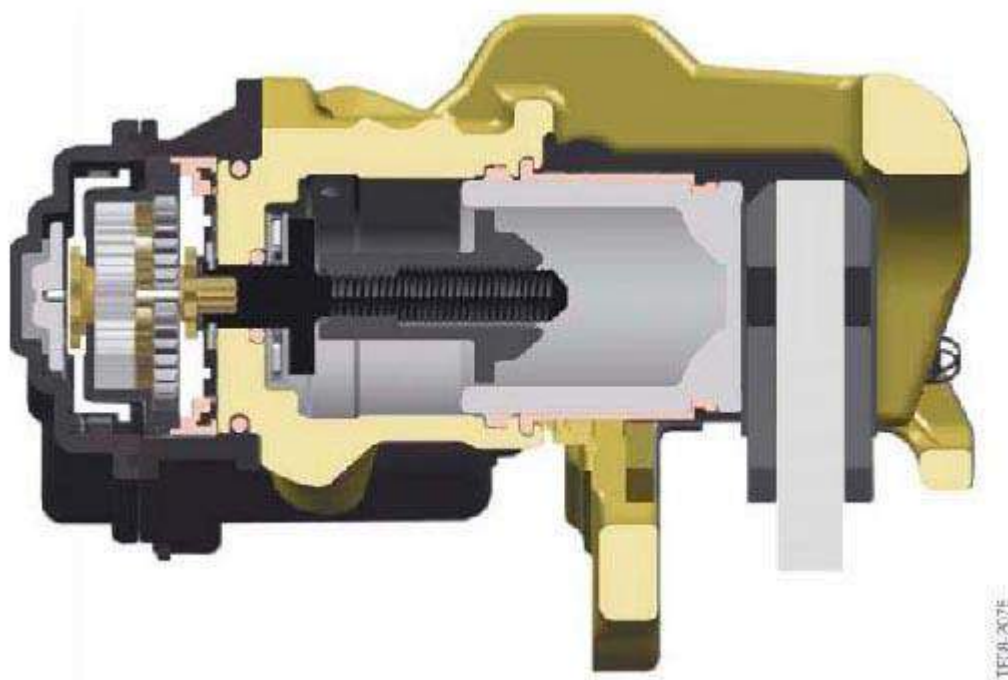


Fig. 16: Identifying F10 Electromechanical Parking Brake With Spindle Nut In Working Position For Exchanging Brake Linings

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For safety reasons, as long as the EMF control unit is in installation mode, the parking brake cannot be activated. If the parking brake button is actuated despite this, the EMF indicator light flashes yellow in the instrument panel.

Installation mode can be cancelled in two ways:

- By running the "Reset installation mode" service function using ISTA
- By driving the car; a programmed minimum speed has to be exceeded.

After being changed, the brake pads must be bedded-in. This is necessary to ensure the brake pad and brake disc pairing assumes the specified friction parameters. Only then will the required braking force be reached.

NOTE: The exact procedure for bedding-in the service brakes is described in the Repair Instructions. The instructions must be followed exactly.

Brake test stand detection

Based on a plausibility check (wheel speed comparison), the EMF control unit detects the brake test stand and switches to brake test stand mode. Detection takes approximately 6 seconds.

By pulling the parking brake button multiple times in succession, the following target positions are approached:

- Brake pads applied
- Force 1 for the brake test stand
- Force 2 for the brake test stand
- Target force.

Alternatively, the parking brake button can also be pulled for a longer time in brake test stand mode. The individual target positions are then cycled through, spaced 3 seconds apart.

When the brake test stand mode is activated and the EMF actuators are released, the EMF indicator lamp flashes slowly.



When the brake test stand mode is activated and the EMF actuators are partially engaged, the EMF indicator lamp starts flashing quickly.







When the brake test stand mode is activated and the EMF actuators are completely engaged, the EMF indicator lamp is activated continuously.







The parking brake can be disengaged on the brake test stand without the brake pedal or clutch pedal being pressed. The brake test stand mode is terminated automatically when the vehicle leaves the brake test stand. The mode is also deactivated when the parking brake button is pressed or a fault is present.











Check Control messages

CENTRAL INFORMATION DISPLAY REFERENCE

Description	Check control message	Central Information Display	Parking brake indicator light	Check Control symbol
Parking brake engaged	-	-		-
Installation mode	-	-		-

Brake test stand detected - actuator released	-	-		-
Brake test stand detected - actuator in intermediate position	-	-		-
Retensioning due to rollaway monitoring - vehicle with manual transmission	Parking brake overloaded!	Parking brake Parking brake overloaded. To park, secure the vehicle against rolling away.	-	
Retensioning due to rollaway monitoring - vehicle with automatic transmission	Parking brake overloaded!	Parking brake To park, ensure that selector lever position is engaged.	-	
Disengaging the parking brake	Disengaging the parking brake	-		
Additionally press foot brake	Additionally press foot brake	-	-	-

				
Additionally engage selector lever position P	Additionally engage transmission P!	Parking brake To release the parking brake, also engage selector lever position P.	-	
Additionally press foot brake or clutch	Additionally press foot brake or clutch	-	-	
Parking brake button sensor fault	-	-		-
Redundancy loss, speeds	Parking brake fault!	Parking brake Parking brake malfunctioning. Please ask your nearest BMW Service Center to check this.		
Redundancy loss, parking brake button	Parking brake malfunctioning!	Parking brake Parking brake malfunctioning. Please ask your nearest BMW Service center to		

		check this.		
Electromechanical mode-vehicle with manual transmission	Parking brake malfunctioning!	Parking brake No emergency braking function. When vehicle is at a standstill, parking brake can be engaged and released via button. Ask your nearest BMW Service Center to check this.		
Electromechanical mode - vehicle with automatic transmission	Parking brake malfunctioning!	No emergency braking function. When vehicle is at a standstill, parking brake can be engaged and released via button. Ask your nearest BMW Service Center to check this.		
immobilization - vehicle with manual transmission	Parking brake defective	Parking brake Parking brake defective. To park, secure the vehicle against rolling away. Ask your nearest BMW Service center to check this.		
immobilization - vehicle with automatic transmission	Parking brake defective	Parking brake Parking brake defective. To park, engage selector lever position P. Ask your nearest BMW Service Center to check this.		

STEERING

A vehicle's steering plays a central role in the chassis and suspension. The technological innovations introduced by BMW like active steering and rear axle slip angle control, are also used in the F10. Furthermore, the steering is now implemented completely electrically with the use of EPS (Electronic Power Steering).

This system is a modified and enhanced version of the E89 Z4 EPS.

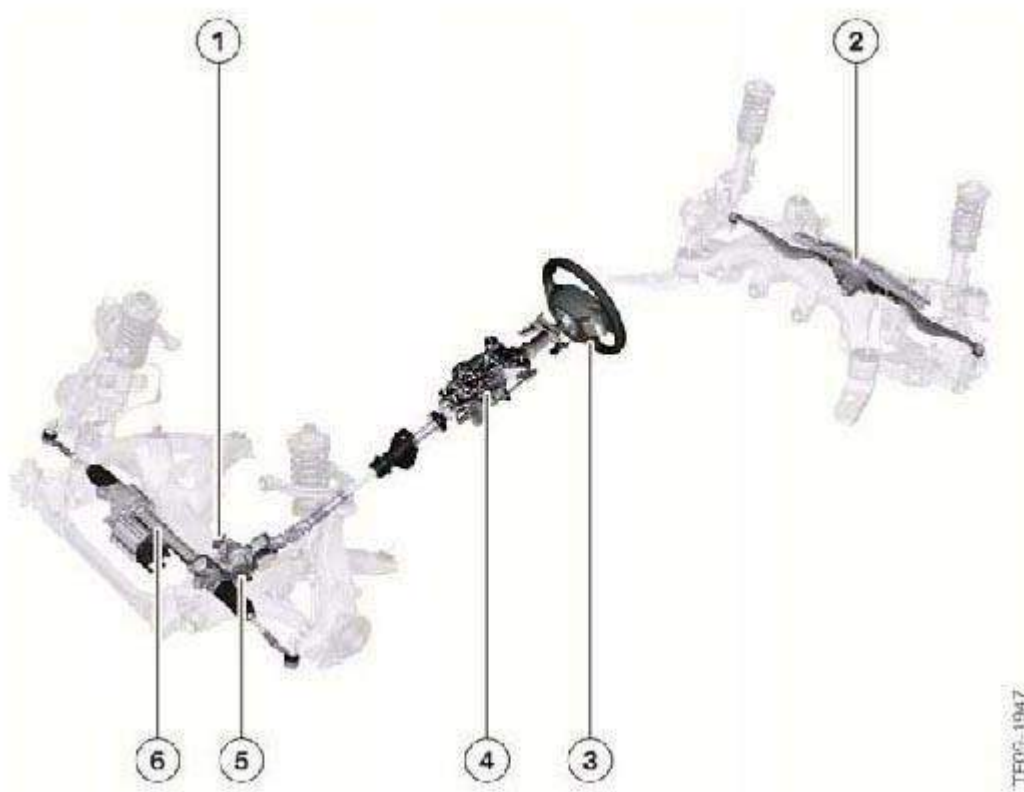


Fig. 17: Identifying F10 Steering Components
Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Active steering lock
2	HSR actuated
3	Steering wheel
4	Steering column
5	Active steering servomotor with motor position angle sensor
6	Electromechanical power steering

5.1. BASIC STEERING

The F10 is the first BMW mid-range vehicle to be equipped with electromechanical power steering (EPS). The

operating principle and structure of the EPS in the F10 is identical to that in the E89 and is explained the E89 Complete Vehicle training material under "Electric power steering with axial parallel arrangement (EPS w/APA)".

5.1.1. System wiring diagram

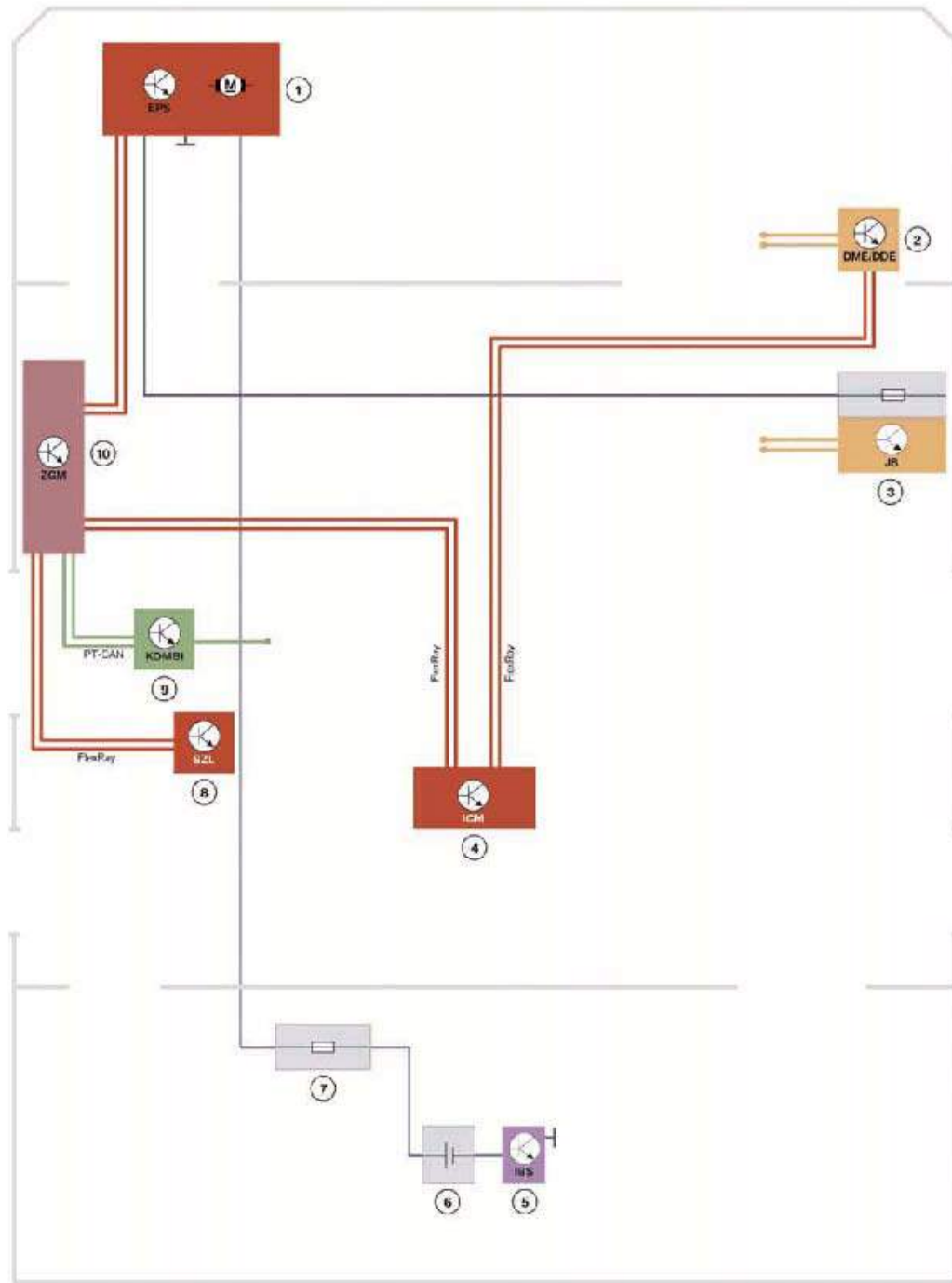


Fig. 18: F10 Basic Steering System - Wiring Diagram

Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	EPS
2	Digital Motor Electronics (DME)
3	Junction box electronics with front power distribution box
4	Integrated Chassis Management (ICM)
5	Intelligent battery sensor (IBS)
6	Battery
7	Battery power distribution box
8	Steering column switch cluster (SZL)
9	Instrument cluster (KOMBI)
10	Central Gateway Module (ZGM)

5.1.2. System overview

The EPS enables average fuel consumption to be reduced by approx. 0.3 l/100 km (0.317 quart/62miles) compared to a conventional hydraulic steering system. This contributes to a reduction of CO₂ emissions.

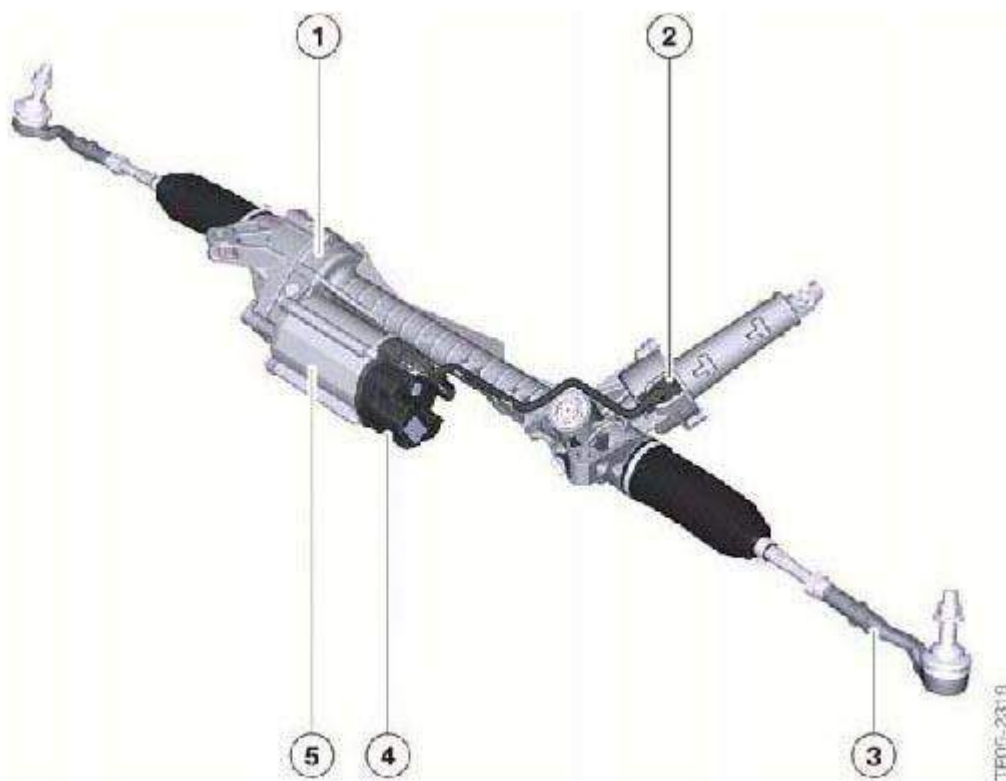


Fig. 19: Overview Of F10 EPS System

Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Speed reducer
2	Steering-torque sensor
3	Track rod
4	EPS control unit
5	Electric motor with motor position sensor

The EPS steering replaces the conventional hydraulic steering system. EPS is always equipped with the Servotronic function. Using the drive dynamic control switch, two different adjustments can be achieved: "Normal" and "Sporty".

The EPS is less sensitive to disturbance variables such as bumps and steering wheel vibration. It also contributes to the driving safety of the F10 with an active roll damping.

Because there is no oil in the EPS, it is more environmentally friendly than conventional hydraulic steering systems.

The EPS has Active return to center, this delivers optimum driveability. The EPS also makes it possible for the parking assistance to be implemented for the first time in a BMW vehicle.

5.2. INTEGRAL ACTIVE STEERING

As with the F01 and F07, the optional equipment Integral Active Steering in the F10 is made up of two components: the rear axle slip angle control HSR and the active steering AL on the front axle. The EPS on the F10 has been especially adapted and modified to work with the active steering on the front axle.

The components of Integral Active Steering, active steering and rear axle slip angle control, cannot be ordered separately, but only as the Integral Active Steering package (option 2VH).

5.2.1. System wiring diagram

2	Active Steering electric servomotor
3	Active Steering motor angular position sensor
4	Dynamic Stability Control (DSC)
5	Digital Motor Electronics (DME)
6	Central Gateway Module (ZGM)
7	Control unit for Active Steering
8	Car Access System (CAS)
9	Instrument cluster (KOMBI)
10	Steering column switch cluster (SZL)
11	Brake light switch (BLS)
12	Front power distribution box
13	Integrated Chassis Management (ICM)
14	Rear right power distribution box
15	Battery power distribution box
16	Control unit for rear axle slip angle control (HSR)
17	HSR actuator
18	Hall-effect sensor
19	Track-rod position sensor

5.2.2. Active steering

With the optional equipment integral active steering, the steering gear is expanded by adding a planetary gearbox with override function, which implements a speed-dependent steering gear ratio that was already introduced with the E60.

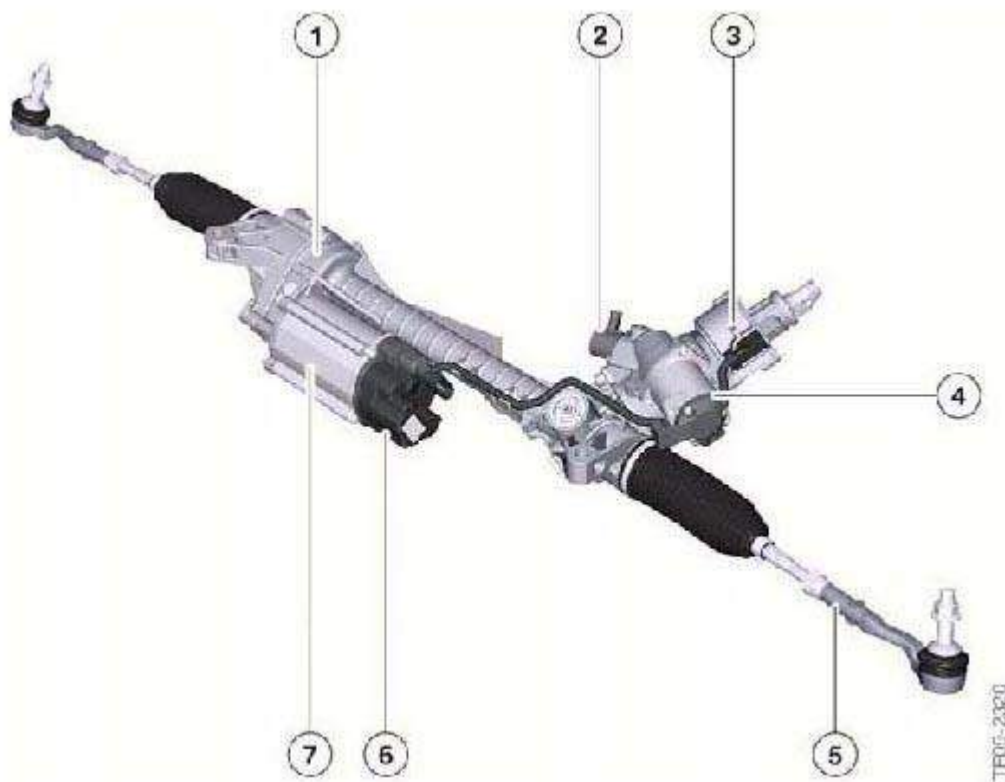


Fig. 21: Identifying F10 Active Steering Components
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Speed reducer
2	Active steering lock
3	Steering-torque sensor
4	Active steering servomotor with motor position angle sensor
5	Track rod
6	EPS control unit
7	Electric motor with motor position sensor

In the F10, electromechanical power steering is combined for the first time with the active steering planetary gearbox with override function (already familiar from the F01). As a result, the steering is implemented completely electrically.

Due to the higher weight of some engines and the higher steering forces associated with the greater front axle load, the power of a typical 12V steering system is no longer sufficient. For this reason, a 24V EPS system is installed in the F10, with the N63 engine and in conjunction with the optional Integral Active Steering equipment.

The following table explains when a 24V EPS is installed.

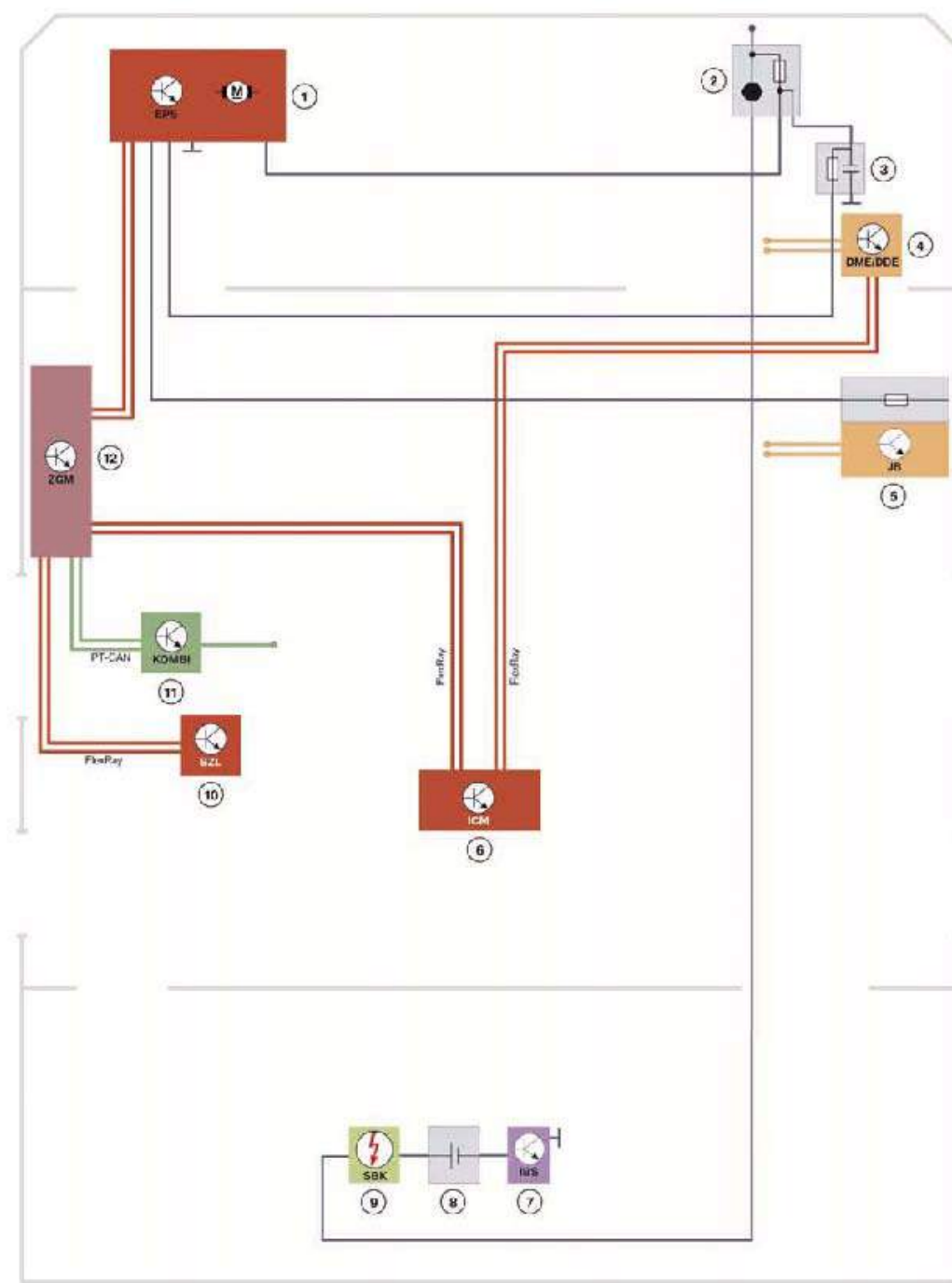
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EPS VOLTAGE SPECIFICATION

Engine	EPS voltage supply (only in combination with option 2VH)
528i	12V
535i	12V
550i	24V

EPS with 12V

Because active steering demands higher forces from the electromechanical steering, to comply with the higher current draw, when active steering is used in a vehicle with 12V EPS, the voltage is supplied by a separate positive battery connection point.



TE09-2234

Fig. 22: F10 EPS With 12V And Active Steering System - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	EPS

2	Positive battery connection point
3	Capacitor box
4	Digital Motor Electronics (DME)
5	Junction box electronics with front power distribution box
6	Integrated Chassis Management
7	Intelligent battery sensor (IBS)
8	Battery
9	safety battery terminal (SBK)
10	Steering column switch cluster
11	Instrument cluster (KOMBI)
12	Central Gateway Module (ZGM)

EPS with 24V

The higher weight of V8 and Diesel engines result in a higher front axle load. This in turn causes the power required for the steering servo to increase. In conjunction with the active steering, an even higher exertion of force is applied, and therefore even higher current is required for the steering servo. These high current made it necessary to increase the voltage supply of the EPS to 24V.

This requires an auxiliary battery, a separator and a charging unit for the auxiliary battery. These components are installed in the luggage compartment of the F10 550i (V8).

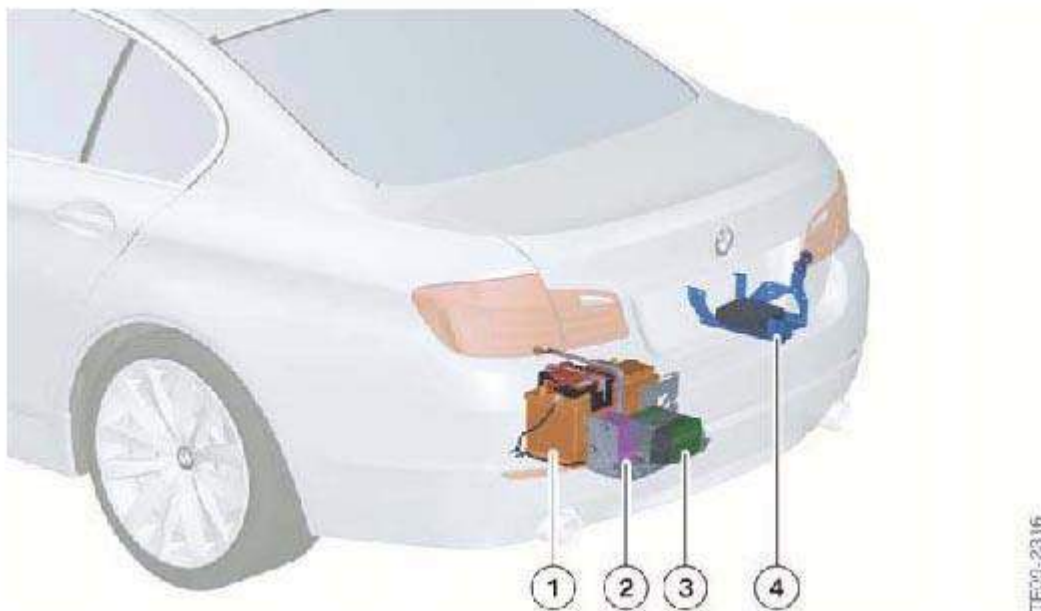


Fig. 23: Identifying F10 550i 24V EPS Components
Courtesy of BMW OF NORTH AMERICA, INC.

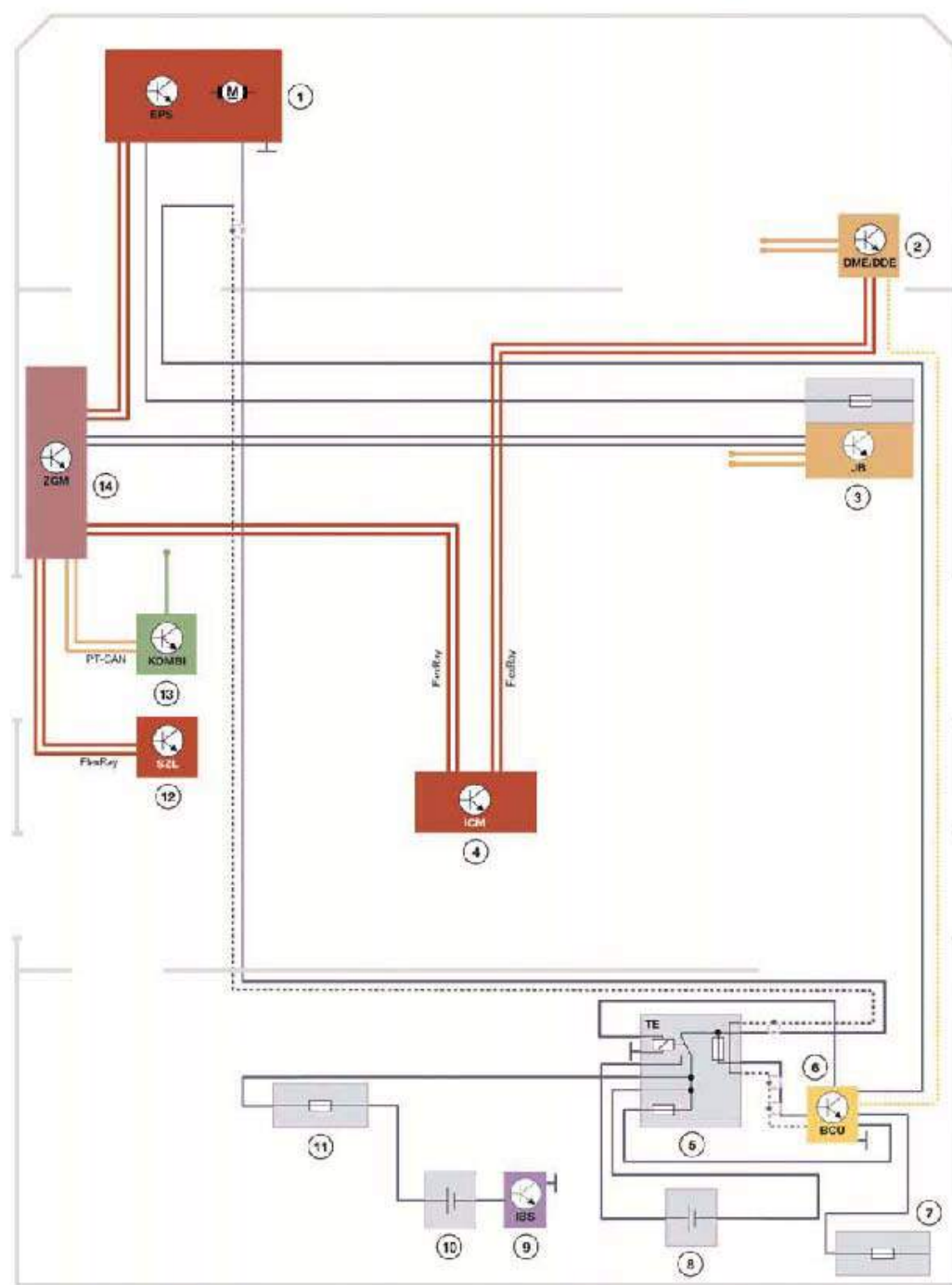
EXPLANATION CHART

Index	Explanation
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1	Battery
2	Separator
3	Auxiliary battery
4	Battery charging unit for auxiliary battery (BCU)

The following system wiring diagram shows the integration of the new components into the vehicle electrical system.

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TE03-2216

Fig. 24: F10 EPS With 24V And Active Steering System - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

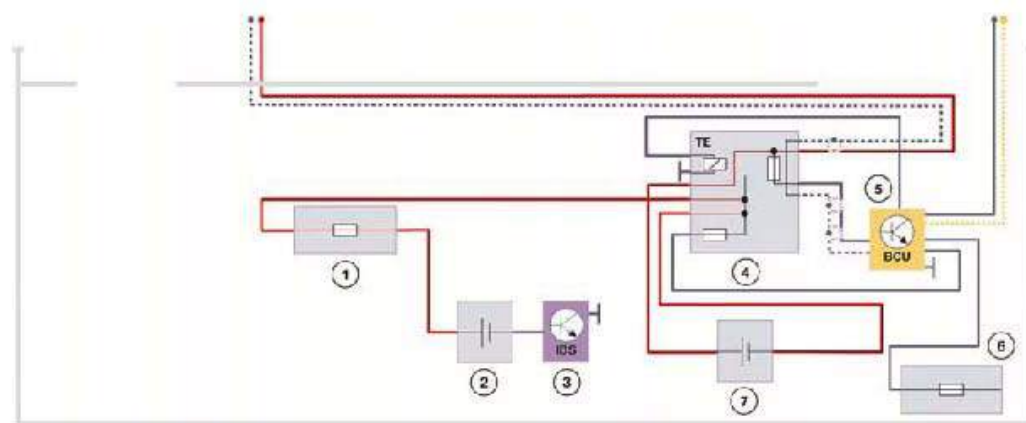
Index	Explanation
1	EPS

2	Digital Motor Electronics (DME)
3	Junction box electronics with front power distribution box
4	Integrated Chassis Management (ICM)
5	Separator
6	Battery charging unit for auxiliary battery (BCU)
7	Rear right power distribution box
8	Auxiliary battery
9	Intelligent battery sensor (IBS)
10	Battery
11	Battery power distribution box
12	Steering column switch cluster (SZL)
13	Instrument cluster (KOMBI)
14	Central Gateway Module (ZGM)

The BCU (charging unit) takes over the monitoring of the state of charge and the charging of the auxiliary battery with a 150W DC/DC converter. It monitors a cable (isolation) sheathing of the 24V line and it switches the relay in the separator with which the auxiliary battery is integrated into the circuit. The EPS is supplied with 24V only after this relay has been switched on. In the event of a fault, the EPS can also be operated with 12V. If there is no fault, the relay in the separator is switched as of terminal 15.

The 24V line is routed on the vehicle floor and is surrounded by a cable sheath which is monitored by the charging unit (BCU).

The following system wiring diagram details the various switch situations and the charging of the auxiliary battery.



TED3-2273

Fig. 25: F10 24V EPS Operation Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

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Index	Explanation
1	Battery power distribution box
2	Battery
3	Intelligent battery sensor IBS.
4	Separator (here: 24V operation)
5	Charging unit for auxiliary battery (Battery Charge Unit BCU)
6	Rear right power distribution box
7	Auxiliary battery

In 24V operation mode, the battery and the auxiliary battery are connected in series by the relay in the separator. As a result, the EPS is operated with 24V.

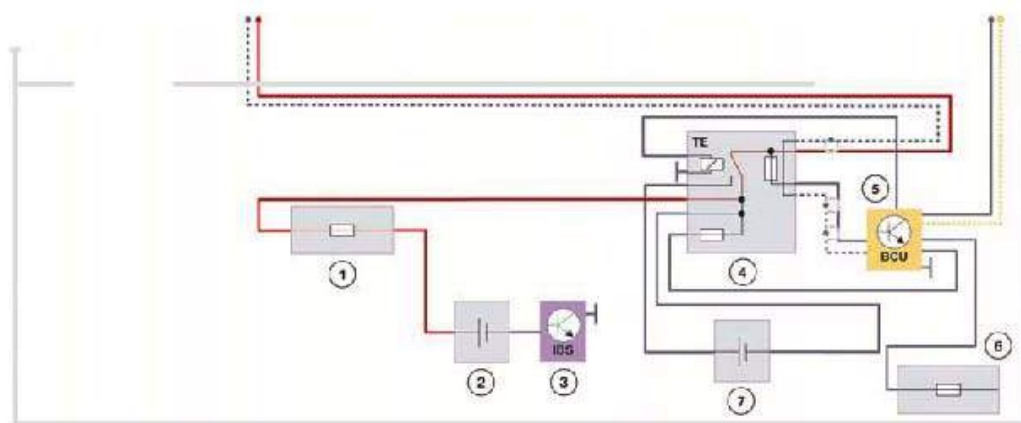
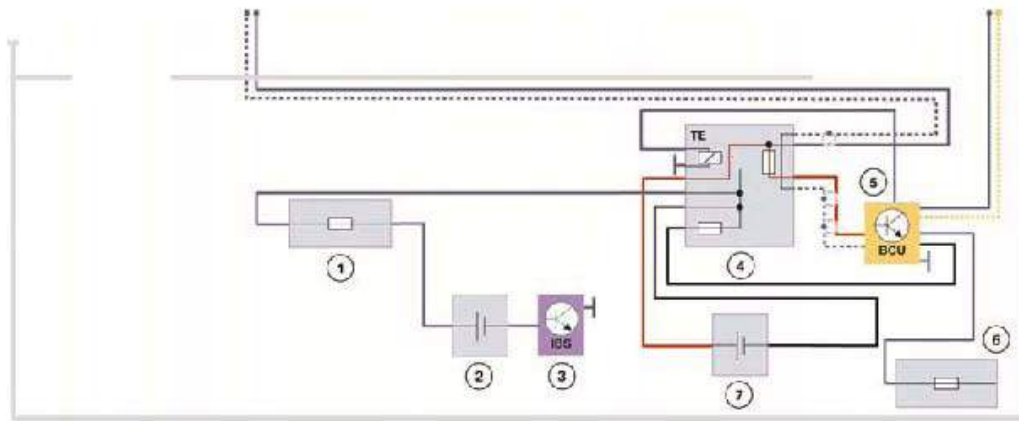


Fig. 26: F10 12V EPS Operation Diagram (Event Of Fault)
Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Battery power distribution box
2	Battery
3	Intelligent battery sensor (IBS)
4	Separator (here: 12V operation)
5	Charging unit for auxiliary battery (Battery Charge Unit BCU)
6	Rear right power distribution box
7	Auxiliary battery

In the event of a fault or before terminal 15, the relay is open and the separator is in the 12V position. The auxiliary battery is no longer connected in series and is no longer in the circuit.



TED3-2275

Fig. 27: F10 Charging Of Auxiliary Battery In 24V Operation
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Battery power distribution box
2	Battery
3	Intelligent battery sensor IBS.
4	Separator (here: 24V operation)
5	Charging unit for auxiliary battery (Battery Charge Unit BCU)
6	Rear right power distribution box
7	Auxiliary battery

The auxiliary battery can be charged in 24V operation using the battery charging unit for the auxiliary battery. To do so, the charging unit takes the energy it uses for charging the auxiliary battery from the vehicle electrical system via the rear right power distribution box.



Fig. 28: Identifying F10 24V Battery Charging Components And Line Routing
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Battery charging unit for auxiliary battery (BCU)
2	Separator and auxiliary battery
3	Battery
4	EPS with active steering

5.2.3. Rear suspension slip angle control

The rear axle is equipped with integral active steering, thus increasing the comfort and driving dynamics. The components of Integral Active Steering include front active steering and rear axle slip angle control. The Integral Active Steering package (option 2VH) cannot be ordered separately on the F10, but only as is part of the (ZDH) Dynamic Handling Package.

The (ZDH) Dynamic Handling Package also includes: Electronic Damping Control, Active Roll Stabilization and Adaptive Drive.

DYNAMIC DRIVING SYSTEMS

6.1. FORCE-TRANSFER DIRECTIONS

The driving stability control systems can be distinguished by their basic force-transfer directions. Driving stability control systems can act both in and around an axis of the vehicle-fixed coordinate system X, Y and Z.

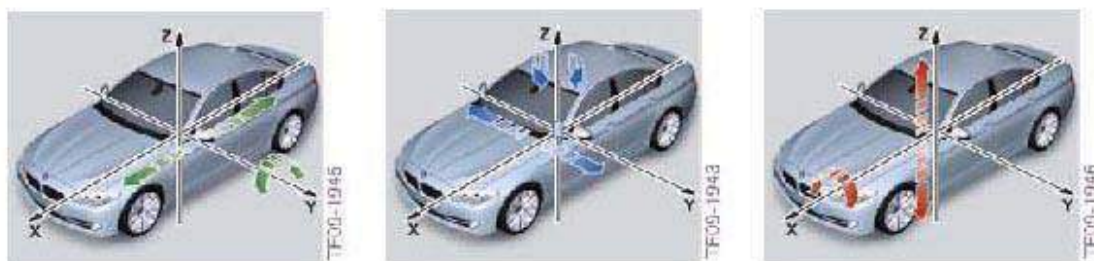


Fig. 29: Identifying Force-Transfer Directions
Courtesy of BMW OF NORTH AMERICA, INC.

FORCE TRANSFER DIRECTION REFERENCE

Force- transfer direction	Longitudinal	Pitch	Transverse	Yaw	Vertical	Roll
DSC	•			•		
Integral Active Steering			•	•		
VDM		•			•	
DCC	•					
ARS						•

6.2. DYNAMIC STABILITY CONTROL

Dynamic Stability Control is standard in all BMW vehicles.

The DSC prevents spinning of the drive wheels when starting up and when accelerating.

The DSC also identifies unstable driving conditions, such as oversteer or understeer. The DSC helps to keep the vehicle on a safe course by applying brake interventions on the individual wheels (within the physical limits) and by reducing the engine output in order to control wheel spin and maintain traction.

NOTE: It always remains the responsibility of the driver to adapt his or her driving style.
Even with the DSC, the laws of physics still apply.
Always Drive Safely!

The DSC system control unit is attached to a hydraulic valve block and it includes many individual functions that are listed in the following table.

FUNCTIONS CHART

Function	Subfunction	Description
ABS		Antilock Brake System
	EBV	Electronic brake force distribution
	CBC	Cornering Brake Control

	DBC	Dynamic Brake Control
ASC		Automatic Stability Control
	MMR	Engine torque control
	MSR	Engine drag torque control
	BMR	Brake torque control
DSC		Dynamic Stability Control
	GMR	Yaw moment control
	SDR	Thrust differential control
	DTC	Dynamic Traction Control

The DSC can be operated in three modes:

- Normal operation
- Dynamic Traction Control (DTC)
- DSC OFF

6.3. ELECTRONIC DAMPER CONTROL (EDC/VDC)

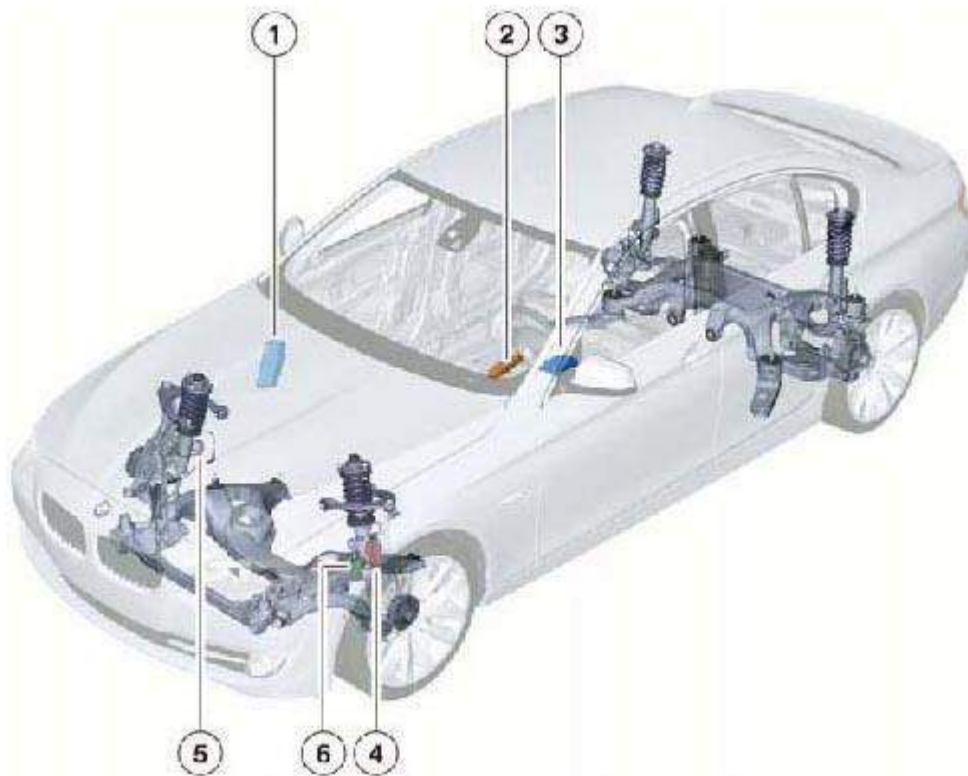


Fig. 30: Identifying F10 Components Of VDM
Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	VDM control unit
2	Drive dynamic control switch
3	ICM control unit
4	EDC satellite, front left
5	EDC control valve for rebound
6	EDC control valve for pressure stage

The F10 uses **Vertical Dynamics Management (VDM) with Electronic Damper Control (EDC)**.

Beginning with the F01/F02, the EDC is also called **VDC (Vertical Dynamic Control)** and is a function of the VDM.

The VDM was introduced with the E70/E71, enhanced for the F01/F02 and now further developed for the F10.

With Vertical Dynamics Control (VDC), independent electronic damper control for each wheel is possible, whereas EDC is only capable of front to rear adjustments.

During this process, the servomotors and the sensors on the shock absorbers, known as satellites, are connected to the VDM control unit via FlexRay.

The VDC and the Dynamic Drive (ARS for the vehicles BMW 535i, BMW 550i) are available only in combination as Adaptive Drive (option 2VA). EDC can only be ordered individually as optional equipment (option 223) on the BMW 528i.

6.4. DYNAMIC DRIVE (ARS)

Dynamic Drive (ARS) was introduced for the first time in the E65/E66. As with EDC/VDC is mapped as a function in the VDM control unit.

Adaptive Drive (option 2VA) is available as and option on the F10 (in the BMW 535i and BMW 550i only)

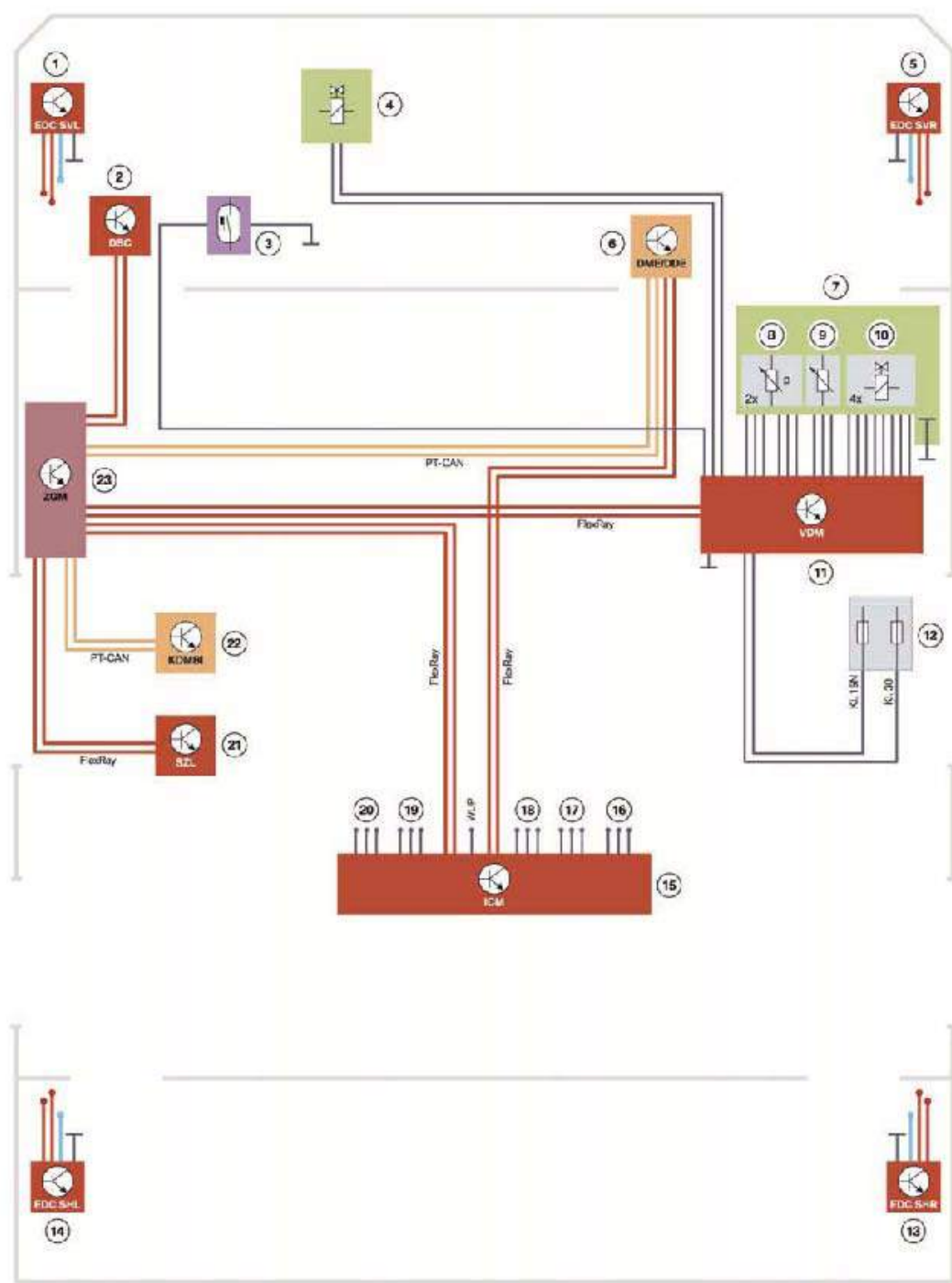


Fig. 31: F10 Adaptive Drive System - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Electronic Damper Control satellite, front left

2	Dynamic Stability Control
3	Hydraulic fluid level sensor
4	Intake restrictor valve
5	Electronic Damper Control satellite, front right
6	Digital Motor Electronics/Digital Diesel Electronics
7	Dynamic Drive valve block
8	Front suspension pressure sensor/rear suspension pressure sensor
9	Shift-position sensor
10	Fail-safe valve, direction valve and low pressure control valve
11	Vertical Dynamics Management
12	Front power distribution box
13	Electronic Damper Control satellite, rear right
14	Electronic Damper Control satellite, rear left
15	Integrated Chassis Management
16	Ride-height sensor, rear left
17	Ride-height sensor, front left
18	Ride-height sensor, front right
19	Ride-height sensor, rear right
20	Connection for driving dynamics control switch
21	Steering column switch cluster
22	Instrument cluster
23	Central Gateway Module

6.5. HANDLING SETTING SWITCH



Fig. 32: Identifying F10 Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Driving dynamics control switch
2	Controller



Fig. 33: Identifying F10 Driving Dynamics Control Switch
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Driving dynamics control switch for equipment without Adaptive Drive
2	Driving dynamics control switch for equipment with Adaptive Drive

In the F10 (as in F01 and F07) we can also control all drive and stability control systems in combination through the driving dynamics control switch. The operating principle is identical to that in the F01. For vehicles with Adaptive Drive (option 2VA), four different modes are available on the driving dynamics control switch. For vehicles without Adaptive Drive (option 2VA), the "Comfort" stage is omitted and only three different modes can be configured. The driving dynamics control switch is then labelled with "Normal" instead of "Comfort".

NOTE: Adaptive Drive combines EDC (Electronic Damper Control) with ARS (Active Roll Stabilization).

Sport mode can be adapted using the controller.



Fig. 34: Identifying F10 Sport Mode Adaptation
Courtesy of BMW OF NORTH AMERICA, INC.

You can determine whether the sport mode is to apply to the chassis and suspension only, to the drive, or to both simultaneously.

6.5.1. Dynamic Driving Programs

For vehicles without Adaptive Drive

DYNAMIC DRIVING PROGRAMS REFERENCE

	Normal	Sport	Sport+
Drive systems			
Accelerator pedal characteristic	Normal	Sports	Sports
Shift program	Normal	Sports	Sports
Shift speed	Normal	Sports	Sports
Suspension control systems			
Power steering assistance	Normal	Sports	Sports
Integral Active Steering	Normal	Sports	Sports
Dynamic Stability Control	DSC on	DSC on	DTC

For vehicles with Adaptive Drive

DYNAMIC DRIVING PROGRAMS REFERENCE

	Comfort	Normal	Sport	Sport+
Drive systems				
Accelerator pedal characteristic	Normal	Normal	Sports	Sports
Shift program	Normal	Normal	Sports	Sports
Shift speed	Normal	Normal	Sports	Sports

Suspension control systems

Power steering assistance	Normal	Normal	Sports	Sports
Integral Active Steering	Normal	Normal	Sports	Sports
Dynamic Stability Control	DSC on	DSC on	DSC on	DTC
Electronic damper control (EDC)	Comfortable	Normal	Sports	Sports
Dynamic Drive (ARS)	Normal	Normal	Sports	Sports

TRANSMISSION

Clutch - Repair Instructions

MAINTENANCE AND INSPECTION

21 00 006 BLEEDING CLUTCH HYDRAULIC SYSTEM

Special tools required:

- 21 5 030

Necessary preliminary tasks:

- Remove transmission underbody protection if necessary.
- Remove microfilter housing is necessary.

IMPORTANT: From 08.06 a plastic clutch slave cylinder is installed in the E8X, E9X. Important notes on installation are described in this work step.

Unfasten nuts and remove clutch slave cylinder (pressure line remains connected).

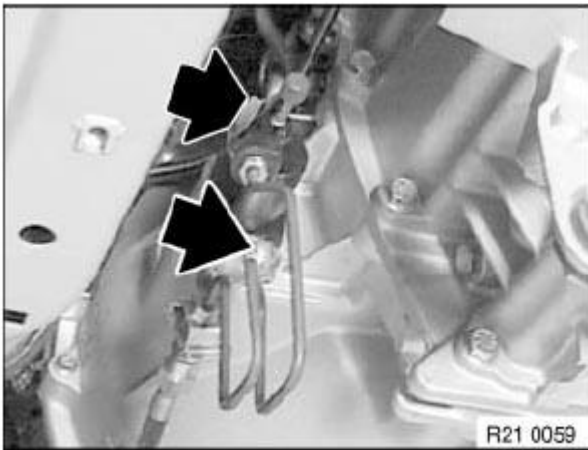


Fig. 1: Locating Clutch Slave Cylinder Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 21 5 030 on clutch slave cylinder (1).

Press piston rod (2) with aid of spindle completely into clutch slave cylinder.

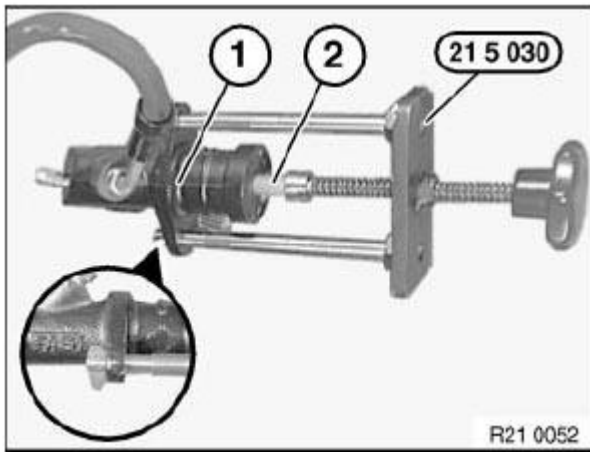


Fig. 2: Fitting Special Tool (21 5 030) On Clutch Slave Cylinder
 Courtesy of BMW OF NORTH AMERICA, INC.

Connect bleeder unit to brake fluid expansion tank.

IMPORTANT: Check relevant Operating Instructions for each device.
Charging pressure should not exceed 2 bar.

Connect bleeder hose to bleed valve (1).

Hold clutch slave cylinder in illustrated position (refer to **Fig. 2**) with special tool **21 5 030**.

Open bleeder valve (1).

If bubble-free brake fluid emerges, retract piston rod (2) of clutch slave cylinder with aid of spindle a little and press in again.

If no air bubbles escape, close bleeder valve (1), otherwise repeat procedure.

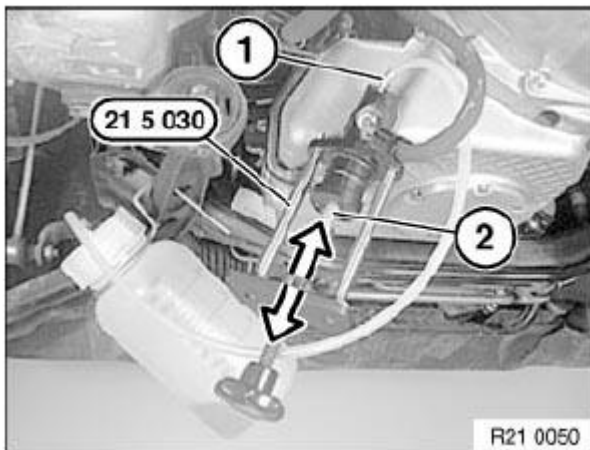


Fig. 3: Identifying Bleeder Valve

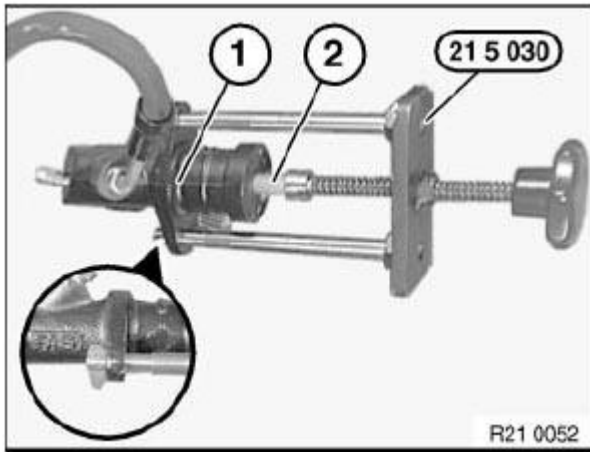
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not under any circumstances remove special tool 21 5 030 from clutch slave cylinder when brake system is pressurized.
Piston with push rod can jump out of clutch slave cylinder.

Switch off bleeder unit or remove from brake fluid expansion tank.

Slowly retract piston rod (2) of clutch slave cylinder (1) with special tool 21 5 030.

Remove special tool 21 5 030 from clutch slave cylinder (1).

**Fig. 4: Fitting Special Tool (21 5 030) On Clutch Slave Cylinder**

Courtesy of BMW OF NORTH AMERICA, INC.

Fit clutch slave cylinder to transmission.

Installation:

Replace self-locking nuts.

Tightening torque **21 52 5AZ** .

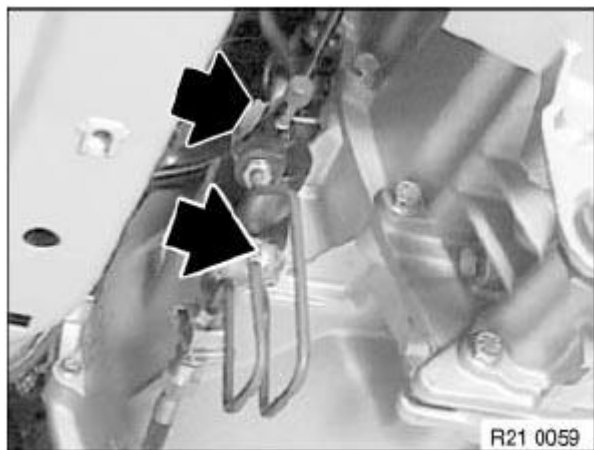


Fig. 5: Locating Clutch Slave Cylinder Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Correct brake fluid level in expansion tank.

CLUTCH WITH DRIVING DISC

11 22 513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL

Special tools required:

- 23 4 031
- 23 4 033
- 23 4 035
- 23 4 036
- 23 4 040

Necessary preliminary tasks:

- **Transmission** removed.
- Remove CLUTCH RELEASE BEARING

Pressing out roller bearing:

Install special tool **23 4 031** in front of drive shaft spline teeth.

Screw in grease spindle **23 4 033** completely.

Brass tip must immerse fully into roller bearing.

Press in grease with grease gun **23 4 040** until roller bearing is disengaged from drive shaft.

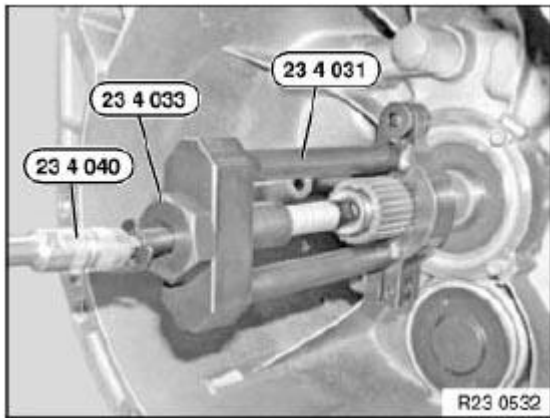


Fig. 6: Identifying Special Tools (23 4 040), (23 4 033) And (23 4 031)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool **23 4 031**.

Remove pressed-in grease (1) from drive shaft completely.

Then reinstall special tool.

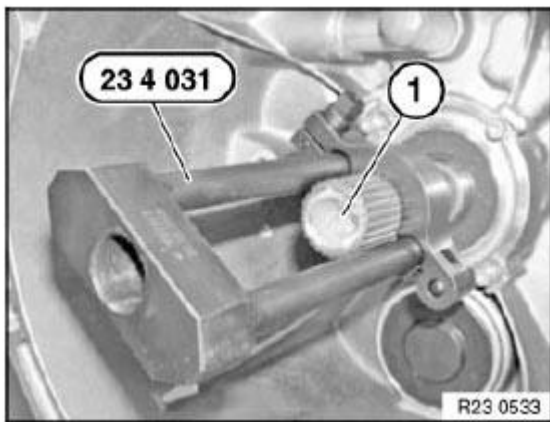


Fig. 7: Identifying Special Tools (23 4 031)
Courtesy of BMW OF NORTH AMERICA, INC.

Pressing in roller bearing:

Slide in pressure spindle **23 4 035**.

Attach thrust piece **23 4 036** to pressure spindle.

Push roller bearing (1) onto thrust piece.

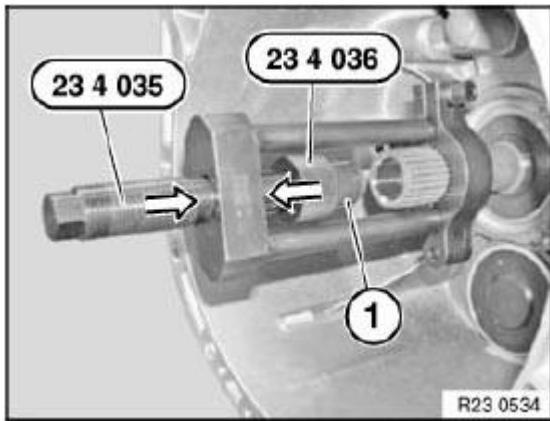


Fig. 8: Identifying Special Tools (23 4 035) And (23 4 036)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in pressure spindle (1) until roller bearing is fully pressed in.

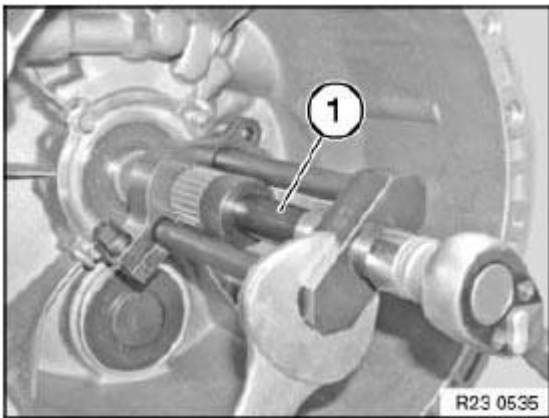


Fig. 9: Screwing Pressure Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

21 21 500 REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240)

Special tools required:

- 11 9 260
- 11 9 265
- 21 2 170
- 21 2 180
- 21 2 270

Necessary preliminary tasks:

Remove **transmission** . See **REMOVING AND INSTALLING TRANSMISSION (GS6-53DZ) N54**
M57T2

Block flywheel with special tools **11 9 260** and **11 9 265** .



Fig. 10: Identifying Special Tools (11 9 260) And (11 9 265)
Courtesy of BMW OF NORTH AMERICA, INC.

N54

Block flywheel with special tools **11 9 260** and **11 9 265** .

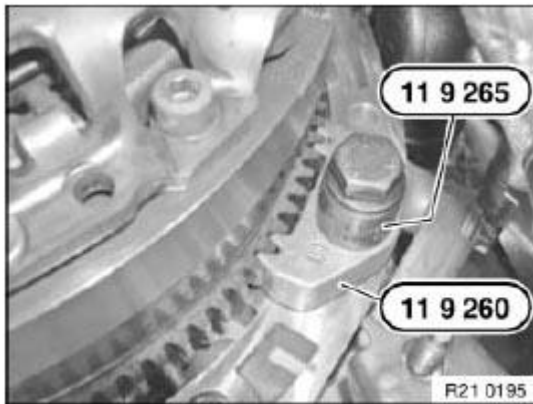


Fig. 11: Identifying Special Tools (11 9 260) And (11 9 265)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove clutch from flywheel.

Installation:

Clean flywheel and check for wear and damage.

Replace damaged flywheel.

IMPORTANT: Always replace clutch plates fouled e.g. by oil, cleaning agent.

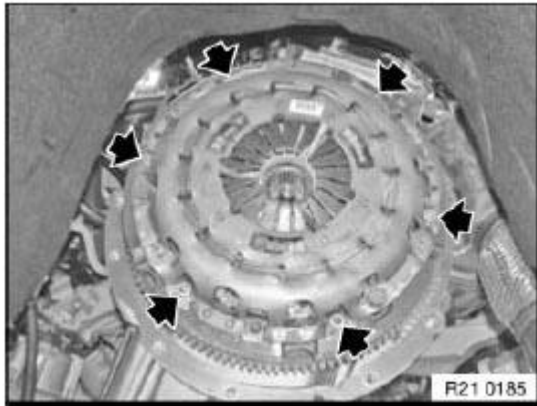


Fig. 12: Locating Flywheel Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Observe the following procedure when installing the removed clutch and clutch plate.

Insert special tool **21 2 180** in clutch.

Press special tool **21 2 180** together at handles (1) as far as it will go and tighten down knurled screws (2).

Adjustment ring of clutch is now secured in its original position (wear position).

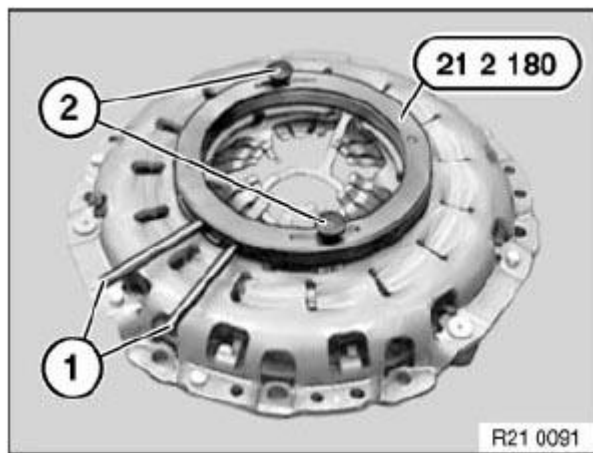


Fig. 13: Identifying Knurled Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Locking hooks (1) of special tool **21 2 180** must engage in openings of pressure spring.

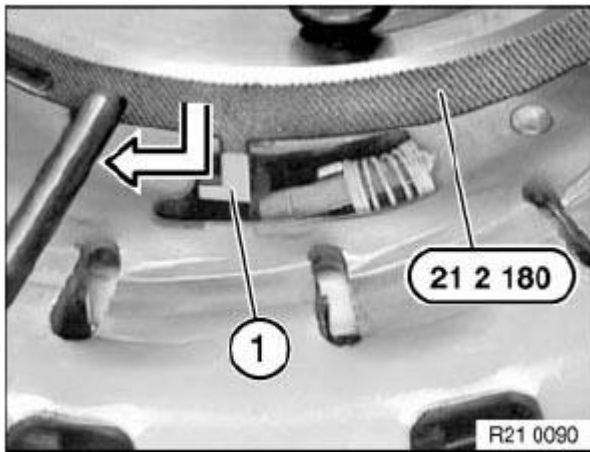


Fig. 14: Locking Hooks Of Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 21 2 170 and tighten down at knurled screw (1).

Screw in spindle (2) until diaphragm spring (3) is tensioned on stop.

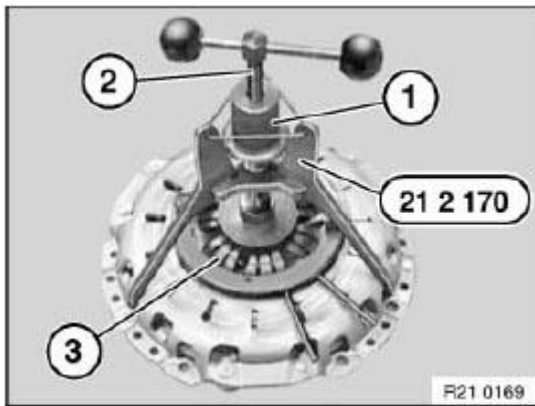


Fig. 15: Identifying Knurled Screws, Spindle And Diaphragm Spring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Insert special tool 21 2 170 only in area of bores for dowel pins.

Centre clutch plate (1) with special tool 21 2 270.

IMPORTANT: Install clutch plate in correct position.
Note designation for "engine side" / "transmission side". Handle clutch plate with care. Do not touch surfaces of friction linings.

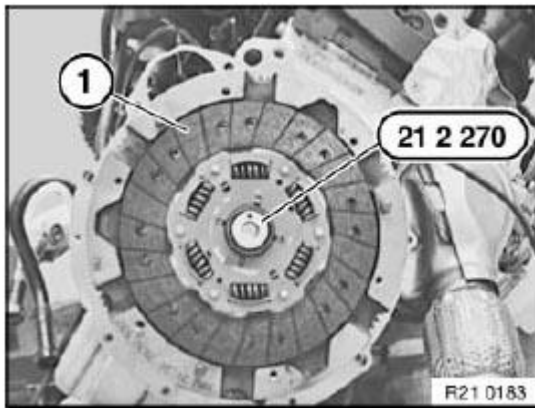


Fig. 16: Identifying Centre Clutch Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Fit clutch (1) to flywheel.

Tightening torque **21 21 1AZ** .

NOTE: Clutch (1) must be secured by way of dowel pins (2).

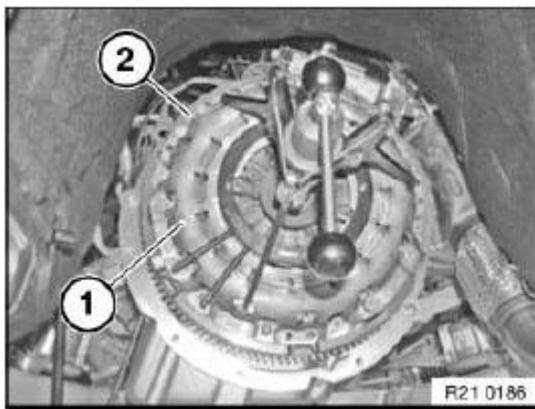


Fig. 17: Identifying Clutch And Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Release spindle (1) until load is fully removed from diaphragm spring (2) Remove special tools **21 2 170** and **21 2 180** .

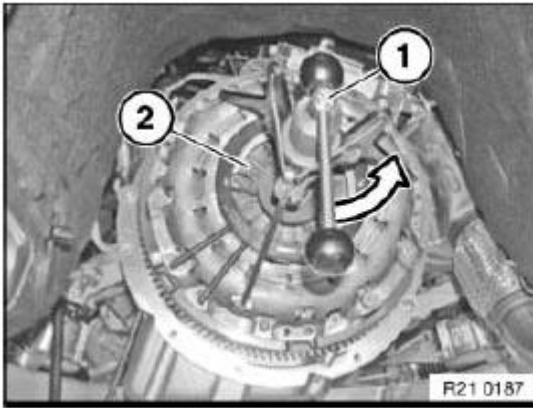


Fig. 18: Identifying Spindle And Diaphragm Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw special tool from clutch plate with aid of accompanying screw (1).

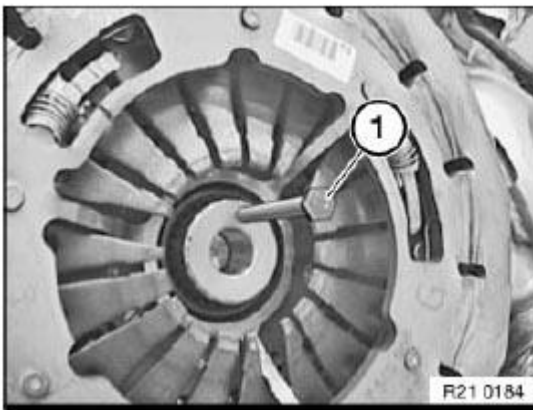


Fig. 19: Identifying Clutch Plate With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installing removed clutch with new clutch plate:

IMPORTANT: Before installing a used clutch with a new clutch plate, always reset adjustment ring in new position.

Set clutch down on a clean surface.

Insert special tool **21 2 180** in clutch (1).

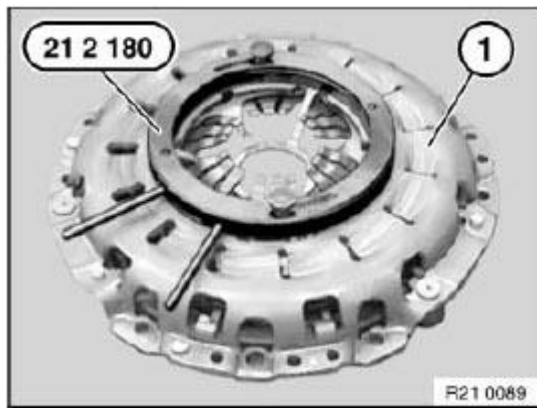


Fig. 20: Identifying Clutch

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Locking hooks (1) of special tool 21 2 180 must engage in openings in clutch.

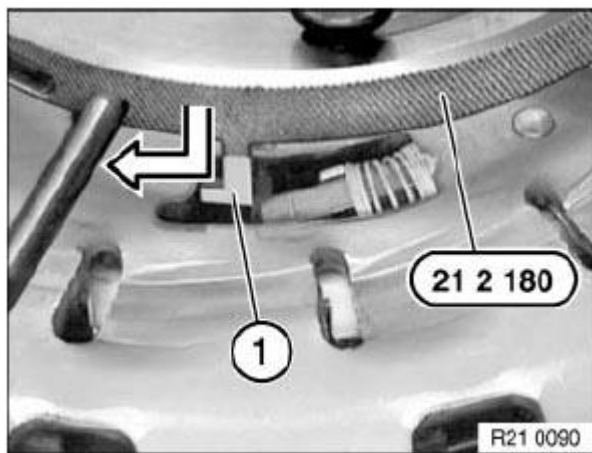


Fig. 21: Identifying Locking Hooks Of Special Tool (21 2 180)

Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 21 2 170 and tighten down at knurled screw (1).

NOTE: Insert special tool 21 2 170 only in area of bores for dowel pins.

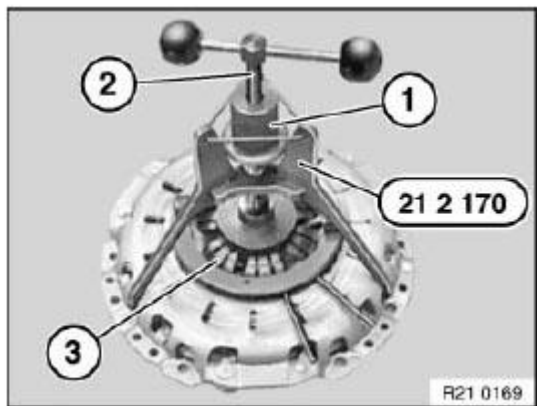


Fig. 22: Identifying Knurled Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Screw in spindle (1) until adjustment ring of clutch (2) can be turned with special tool **21 2 180** at handles (3).

Press special tool **21 2 180** together at handles (3) as far as it will go and grip firmly.

At same time tighten down knurled screws (2).

Adjustment ring of clutch is now secured in new position.

Screw in spindle (1) until diaphragm spring is tensioned on stop.

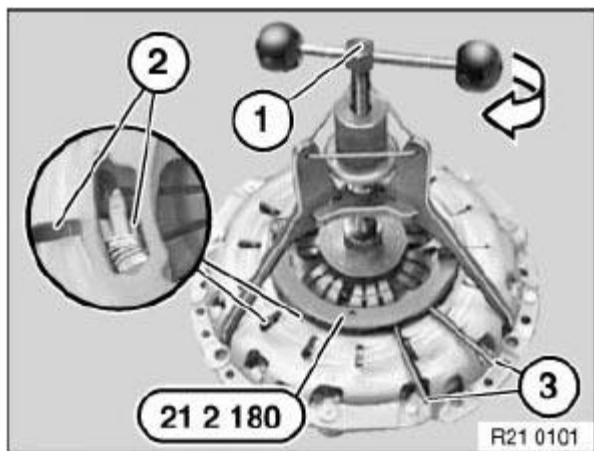


Fig. 23: Screwing Spindle And Ring Of Clutch

Courtesy of BMW OF NORTH AMERICA, INC.

Centre clutch plate (1) with special tool **21 2 270**.

IMPORTANT: Install clutch plate in correct position.

Note designation for "engine side" / "transmission side". Handle clutch plate

with care. Do not touch surfaces of friction linings.

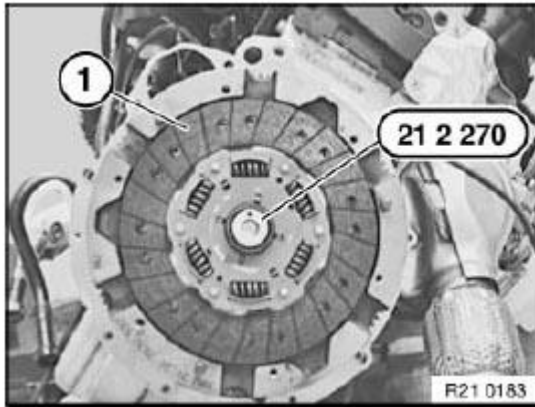


Fig. 24: Identifying Centre Clutch Plate With Special Tool (21 2 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit clutch (1) to flywheel.

Tightening torque **21 21 1AZ** .

IMPORTANT: Clutch (1) must be secured by way of dowel pins (2).

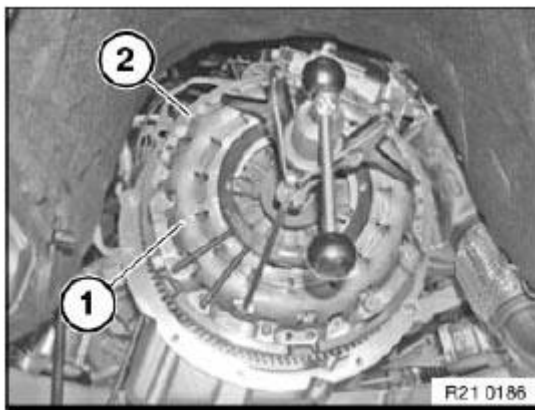


Fig. 25: Identifying Clutch And Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Release spindle (1) until load is fully removed from diaphragm spring (2)

Remove special tools **21 2 170** and **21 2 180** .

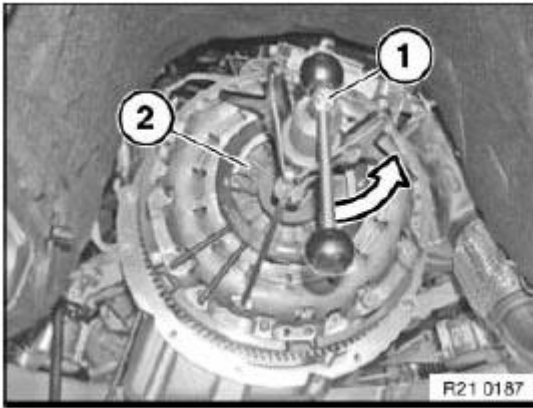


Fig. 26: Identifying Spindle And Diaphragm Spring
 Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw special tool from clutch plate with aid of accompanying screw (1).

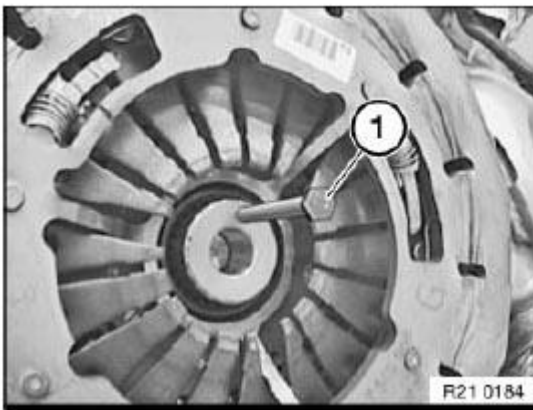


Fig. 27: Identifying Accompanying Screw
 Courtesy of BMW OF NORTH AMERICA, INC.

Installing new clutch

IMPORTANT: Locking piece may only be removed clutch is screwed down!

Centre clutch plate (1) with special tool 21 2 270.

IMPORTANT: Install clutch plate in correct position.

Note designation for "engine side" / "transmission side". Handle clutch plate with care. Do not touch surfaces of friction linings.

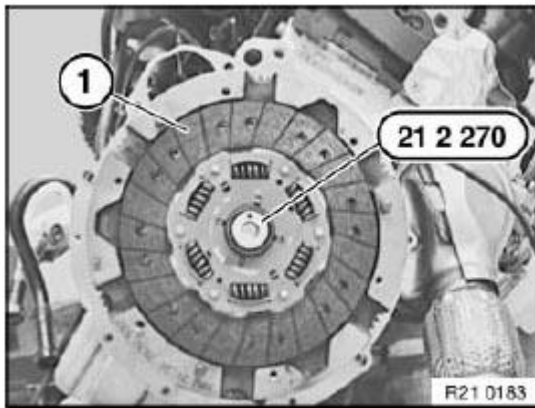


Fig. 28: Identifying Centre Clutch Plate With Special Tool (21 2 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit clutch to flywheel.

Tightening torque **21 21 1AZ** .

IMPORTANT: Clutch must be secured by way of dowel pins (1).

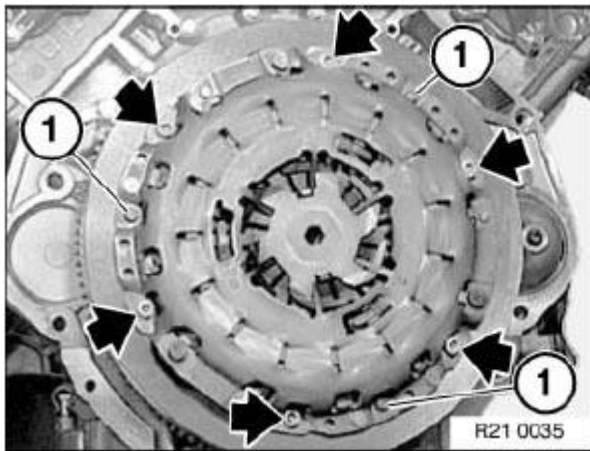


Fig. 29: Identifying Clutch With Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully unscrew locking piece (1) clockwise or counterclockwise with a 14 mm WAF hexagon socket wrench (2).

NOTE: A slight snapping of the plate spring while unscrewing the lock is possible.

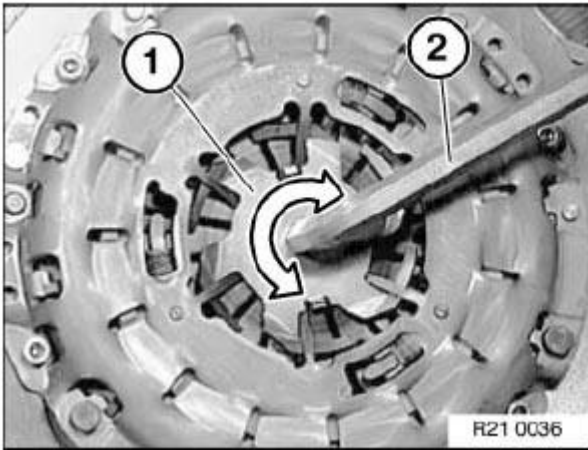


Fig. 30: Unscrewing Locking Piece

Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw special tool from clutch plate with aid of accompanying screw (1).

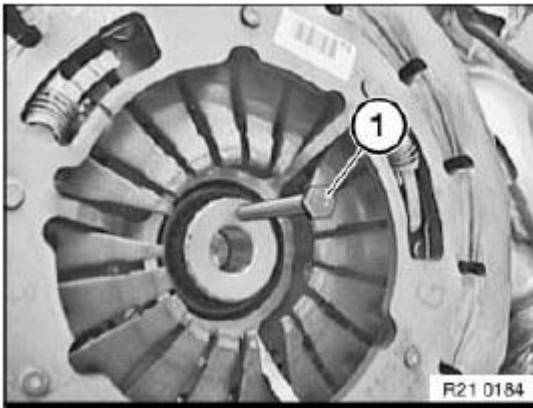


Fig. 31: Identifying Accompanying Screw

Courtesy of BMW OF NORTH AMERICA, INC.

CLUTCH RELEASE CONTROL WITH LEVER

21 51 500 REMOVING AND INSTALLING OR REPLACING CLUTCH RELEASE BEARING/LEVER

NOTE: (transmission removed)

New version (except M models)

Release bearing and release lever have been combined to form a single release module.

If possible, do not disassemble the release module. Otherwise there is a risk of the release module being **incorrectly** reassembled.

Installation:

Make sure that the correct cam (1) of the release bearing is on the sliding surface (2) of the release lever.

The positioning in relation to each other is identified by white dots on the cam (1) and the sliding surface (2).

NOTE: Do not grease sliding surfaces (2).

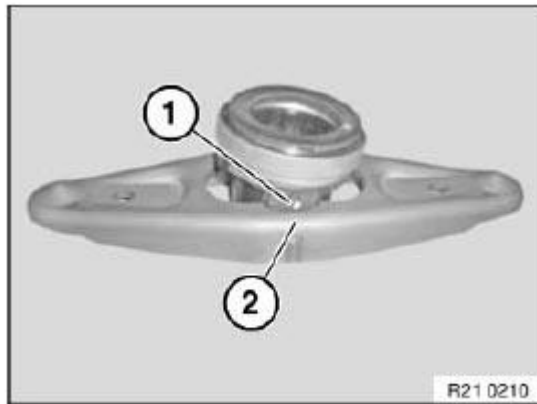


Fig. 32: Identifying Correct Cam Of Release Bearing And Sliding Surface Of Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Fig. A: Cam (1) of release bearing (A=12 mm) is on sliding surface of release lever.

This version is for 4-cylinder gasoline engines.

Fig. B: Cam (1) of release bearing (A=7 mm) is on sliding surface of release lever.

This version is for 6-cylinder gasoline and diesel engines.

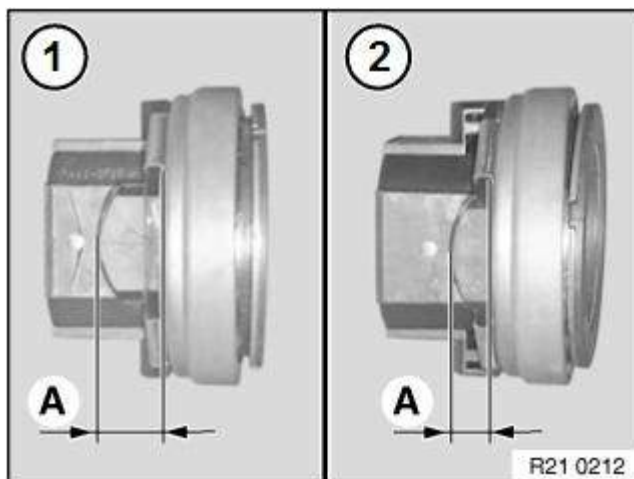


Fig. 33: Checking Release Bearing Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Remove release module (1) from spring wire clip.

Remove release module.

NOTE: Illustration similar.

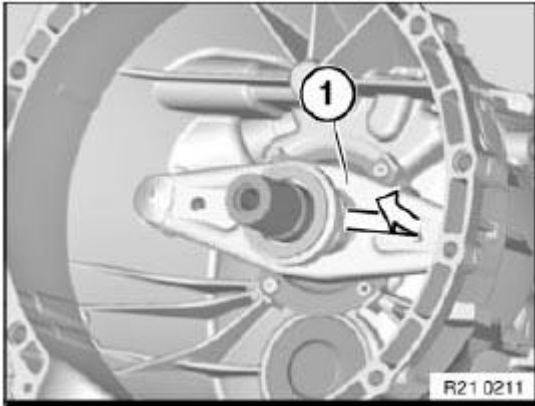


Fig. 34: Identifying Release Module
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spring wire clip (5) and ball pin (6) for damage and replace if necessary.

NOTE: Illustration similar.

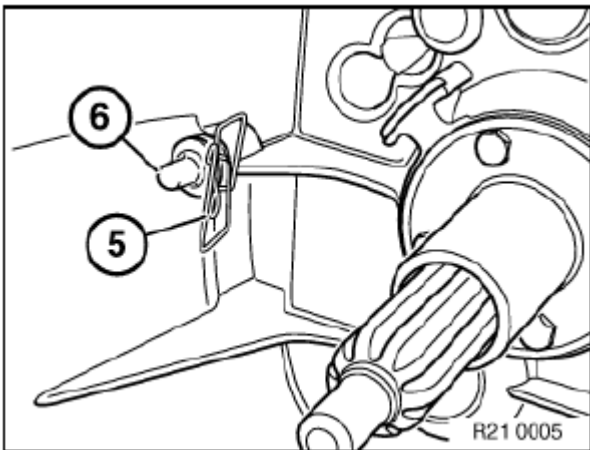


Fig. 35: Identifying Spring Wire Clip And Ball Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Previous version

Detach release bearing (1).

Installation:

Clean all sliding surfaces on clutch release bearing, check for damage and replace if necessary.

Do **not** grease clutch release bearing.

Sliding surfaces (2) of clutch release bearing must rest on sliding surfaces (3) of release lever.

Apply a thin coating of grease to sliding surfaces (2) of release bearing.

Grease , refer to BMW Service Operating Fluids.

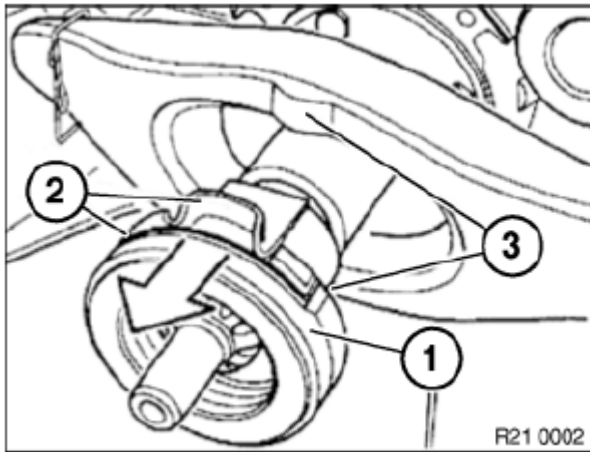


Fig. 36: Detaching Release Bearing

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration similar

IMPORTANT: On E60/E61 M5 and E63/E64 M6 only - apply a light coating of grease to guide sleeve.

Previous clutch release bearing:

Clutch release bearing with moving thrust plate (1).

Swivel motion of thrust plate (1) possible.

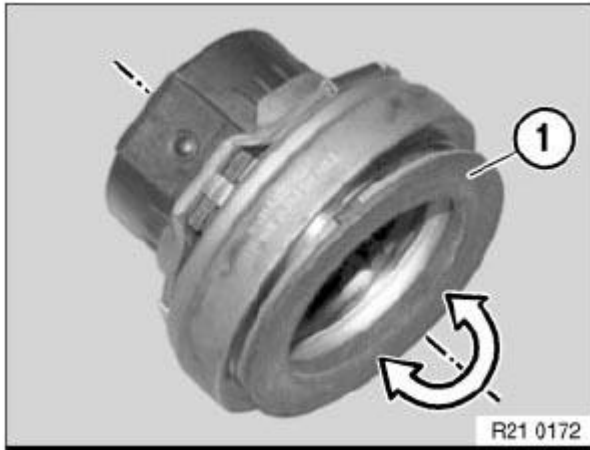


Fig. 37: Identifying Swivel Motion Of Thrust Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw release lever (4) from spring wire clip (5) and remove.

Installation:

Clean release lever.

NOTE: Illustration similar.

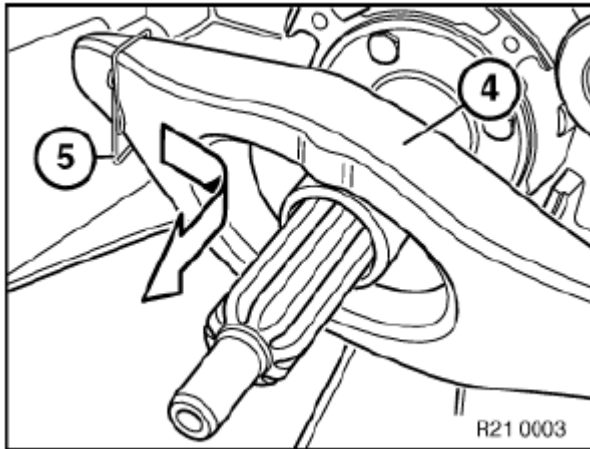


Fig. 38: Identifying Release Lever From Spring Wire Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Previous release lever

Installation:

Apply a thin coating of grease to release lever at sliding surfaces (1 and 2) only.

Grease , refer to BMW Service Operating Fluids.

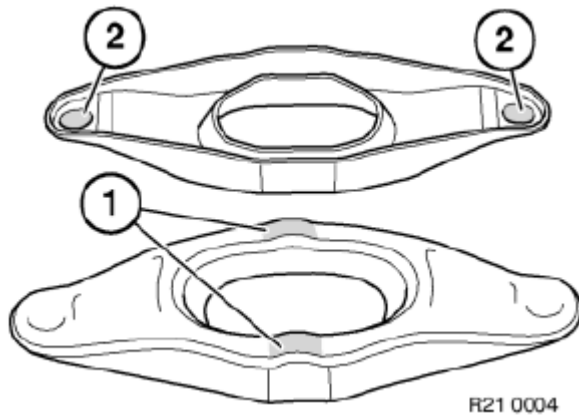


Fig. 39: Identifying Grease Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spring wire clip (5) and ball pin (6) for damage and replace if necessary.

Apply a thin coating of grease to ball pin (6).

Grease , refer to BMW Service Operating Fluids.

NOTE: The spring wire clip and ball pin must always be replaced on the S6S 420G transmission.
Illustration similar.

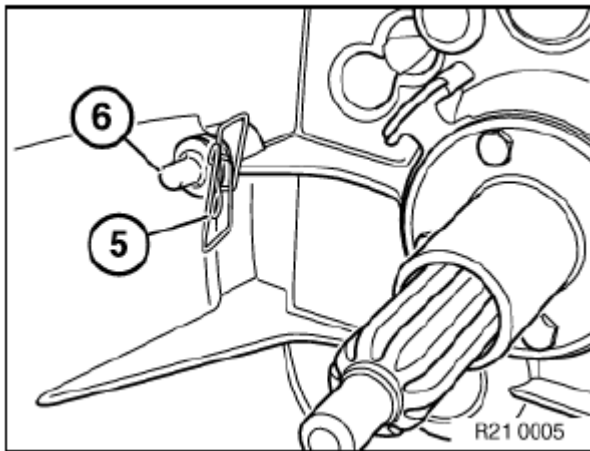


Fig. 40: Identifying Spring Wire Clip And Ball Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Clean guide sleeve (7).

Note on installation: (except for E60/E61 M5 and E63/E64 M6)

Do **not** grease guide sleeve.

If guide sleeve is greased, the release lever can stick on the guide sleeve.

NOTE: Illustration similar.

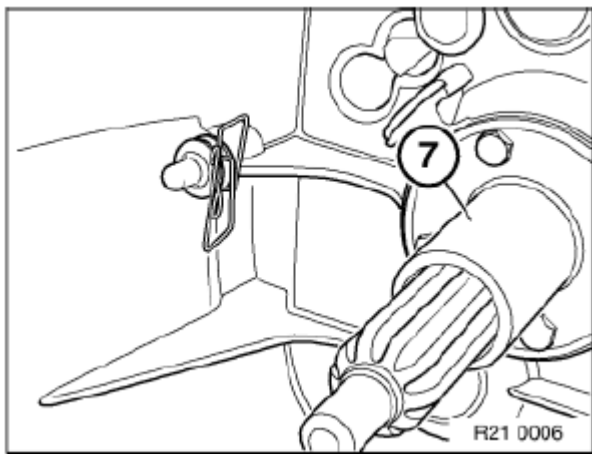


Fig. 41: Identifying Guide Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

CLUTCH OPERATION

21 52 500 REMOVING AND INSTALLING/REPLACING CLUTCH MASTER CYLINDER

NOTE: After completing work, bleed CLUTCH HYDRAULIC SYSTEM.

Necessary preliminary tasks:

- Remove **trim panel** for pedal assembly. See REMOVING AND INSTALLING/REPLACING PANEL FOR PEDALS
- Remove **microfilter housing** on left. See REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT MICROFILTER HOUSING LOWER SECTION
- Remove **light module** . See REMOVING AND INSTALLING (REPLACING) LIGHT MODULE

Draw off brake fluid up to supply hose of clutch hydraulic system (1). For this purpose, use only a vacuum pipe that is exclusively used for removing brake fluid.

Detach supply hose (1) from expansion tank.

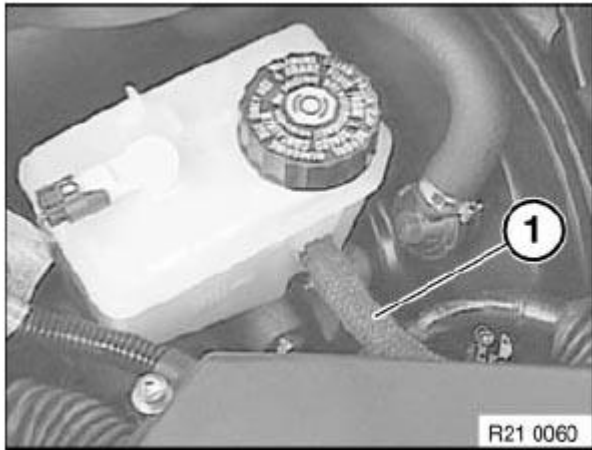


Fig. 42: Identifying Supply Hose Of Clutch Hydraulic System
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect spring (1).

NOTE: Illustration shows component removed.

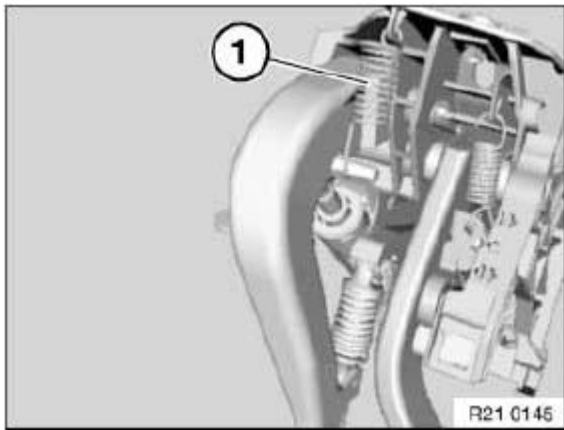


Fig. 43: Identifying Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Remove retainer (1) using screwdriver and press out pin.

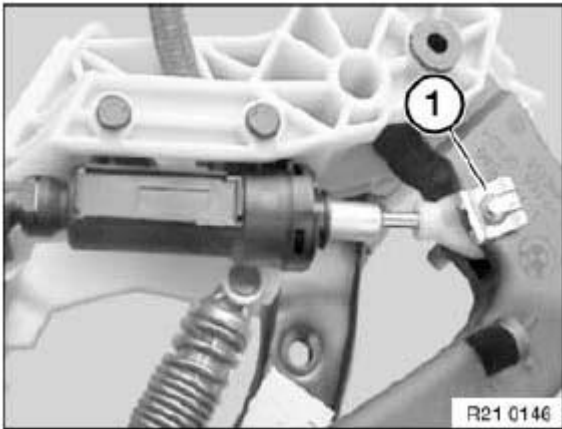


Fig. 44: Removing Retainer

Courtesy of BMW OF NORTH AMERICA, INC.

Detach retainer (1) with a screwdriver (2).

NOTE: Do not foul carpet with brake fluid.

Detach hydraulic line from clutch master cylinder.

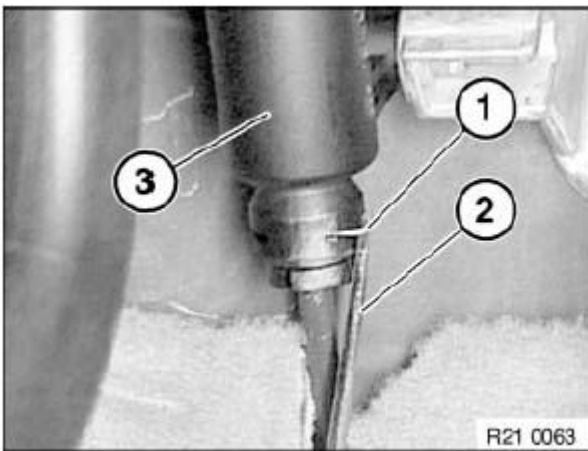


Fig. 45: Identifying Retainer With Screwdriver

Courtesy of BMW OF NORTH AMERICA, INC.

Remove lock (1) from pin with aid of screwdriver (2).

Lever out pin (3) with aid of screwdriver.

Remove clutch master cylinder.

Installation:

Replace pin.

Press in pin until lock (1) can be seen to snap into place.

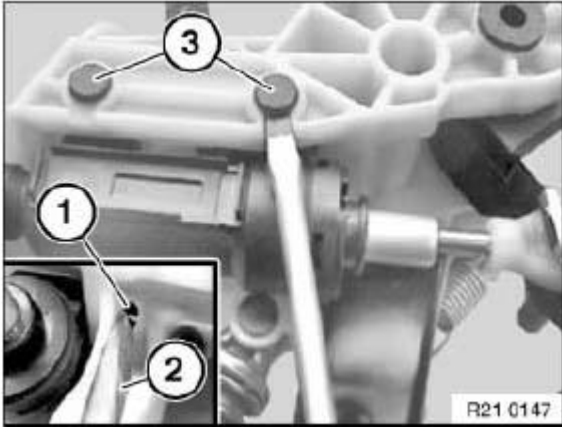


Fig. 46: Levering Out Pin

Courtesy of BMW OF NORTH AMERICA, INC.

Detach supply hose (1) from clutch master cylinder.

IMPORTANT: Do not pull supply hose completely into interior.

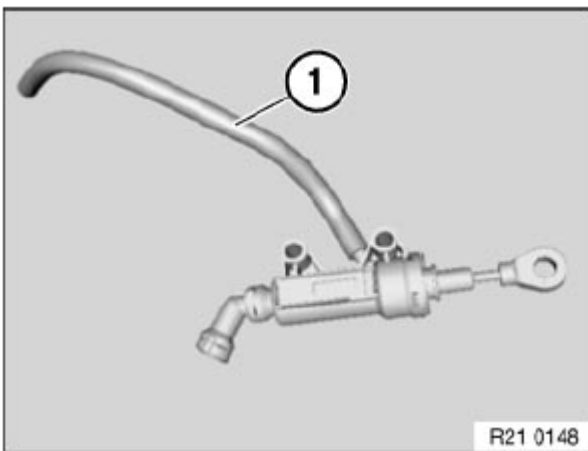


Fig. 47: Identifying Supply Hose From Clutch Master Cylinder

Courtesy of BMW OF NORTH AMERICA, INC.

Lever out shift element (1) from clutch master cylinder (2) with screwdriver.

Release plug connection (3) and disconnect plug (4) from shift element (1).

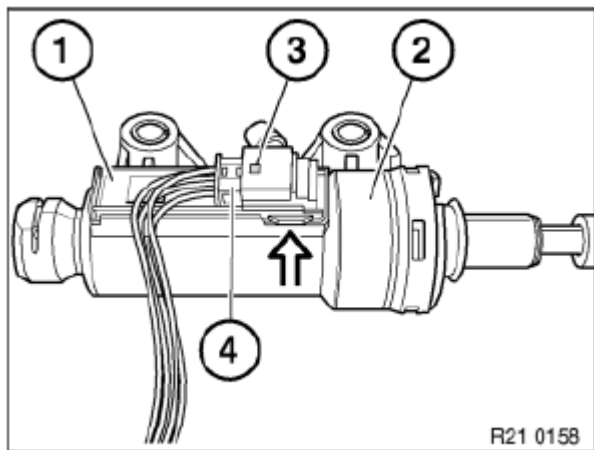


Fig. 48: Identifying Shift Element From Clutch Master Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Shift element is secured against incorrect installation.

Shift element must snap audibly into place.

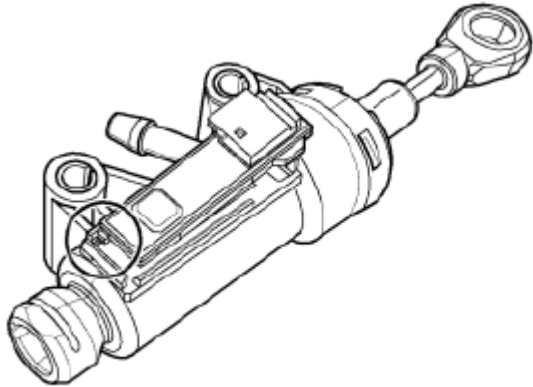


Fig. 49: Identifying Shift Element
Courtesy of BMW OF NORTH AMERICA, INC.

21 52 510 REMOVING AND INSTALLING OR REPLACING CLUTCH SLAVE CYLINDER

Special tools required:

13 3 010

NOTE: After completing work bleed **CLUTCH HYDRAULIC SYSTEM**.

IMPORTANT: From 08.06 a plastic clutch slave cylinder is installed in the E81, E87 and E9X. Important notes on installation are described in this work step.

Seal supply hose to clutch master cylinder with special tool 13 3 010 .

NOTE: Illustration shows E46.

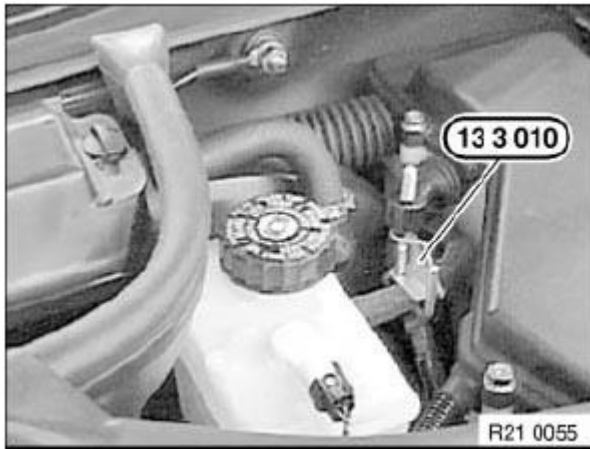


Fig. 50: Identifying Special Tools (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove transmission underbody protection if necessary.

Release union screw (1) on hydraulic line.

Release nut (2) and remove hydraulic line (3) with bracket.

Installation:

Tightening torque 21 52 1AZ .

NOTE: Illustration similar.
Version with throttle valve, tightening torque 21 52 12AZ .

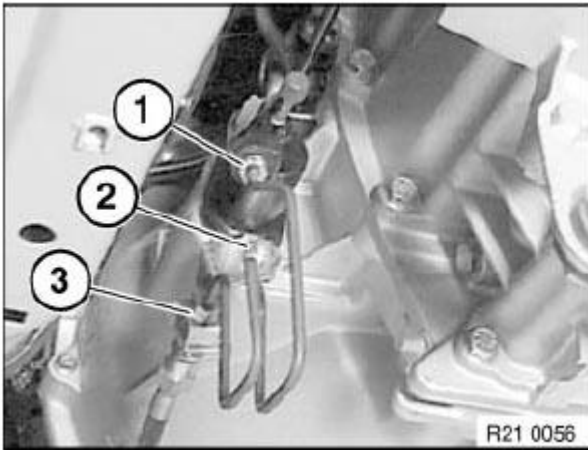


Fig. 51: Identifying Union Screw And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut and remove clutch slave cylinder.

Installation:

Tightening torque **21 52 5AZ** .

IMPORTANT: *N47 with H-transmission only*

Clutch slave cylinder must not rest at the side on the transmission.

Failure to comply with this instruction may result in leaks at the clutch slave cylinder.

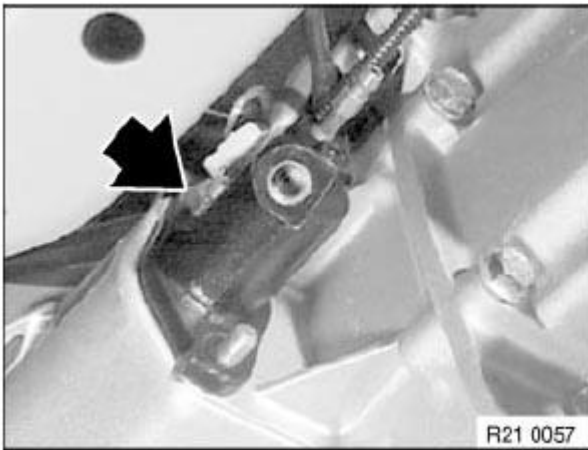


Fig. 52: Identifying Clutch Slave Cylinder Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean thrust member (1) and contact face on release lever (2).

Lightly grease thrust member (1) on contact face (3).

Grease , refer to BMW Service Operating Fluids.

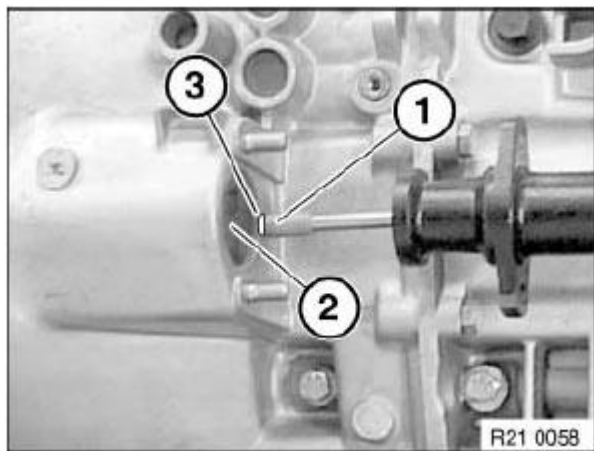


Fig. 53: Identifying Thrust Member And On Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Spacer between fuel line and pressure hose of clutch slave cylinder must be correctly fitted.

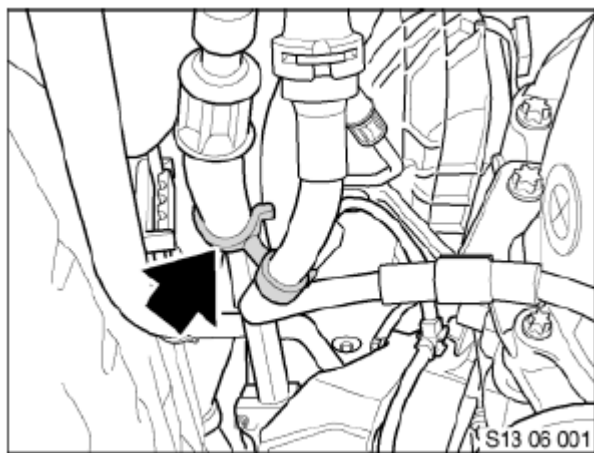


Fig. 54: Identifying Spacer Between Fuel Line And Pressure Hose Of Clutch Slave
Courtesy of BMW OF NORTH AMERICA, INC.

TROUBLESHOOTING

21 90... TROUBLESHOOTING THE CLUTCH

TROUBLESHOOTING CHART

Fault	Cause	Remedy
Clutch slipping	a) Clutch pressure too low. b) Lining too heavily worn. c) Lining oiled- Leaks: <ul style="list-style-type: none"> · Engine Crankshaft radial seal at front and rear incl. end cover, oil sump, cylinder head gasket, cylinder head, oil filler cap, timing case cover, flywheel mounting bolts · Cooling system Hoses and connections, heating valves, sealing plugs on engine block · Steering unit Steering gear, servo pump, hydraulic lines and connections · Transmission Drive shaft radial seal, sealing plugs of countershaft · Release bearing 	a) Replace clutch Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240)</u> . b) Replace clutch plate Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240)</u> . c) Carefully rectify leaks, clean oil contamination and replace clutch plate Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240)</u> . d) Replace clutch Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240)</u> . e) Install original-equipment BMW part.
	d) Clutch was overheated. e) Clutch is not an original equipment BMW part.	
	a) Lining not acc. to specification.	a) Replace clutch plate Refer to <u>REMOVING AND INSTALLING/REPLACING</u>

Clutch stick/slip	<p>b) Lining oiled: Causes: refer to "clutch slipping, point c"</p> <p>c) Release unit presses on one side.</p> <p>d) Clutch presses at an angle.</p> <p>e) Crankshaft does not align with transmission input shaft.</p> <p>f) Engine and transmission suspension defective.</p> <p>g) Clutch plate not an original equipment BMW part.</p> <p>h) Engine, speed characteristics not O.K.</p> <p>i) Engine management not OK (particularly on diesel engine).</p>	<p><u>CLUTCH (SAC 240).</u></p> <p>b) Replace clutch plate Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240).</u></p> <p>c) Check release lever.</p> <p>d) Replace clutch Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240).</u></p> <p>e) Check engine/transmission contact face, adapter sleeves and cover plate for damage.</p> <p>f) Replace engine and transmission suspension.</p> <p>g) Install original-equipment BMW part.</p> <p>h) Eliminate causes according to engine test.</p> <p>i) Check engine control unit.</p>
Clutch releases poorly (Gear difficult to engage)		
Clutch does not separate (Gear cannot be engaged)	<p>a) Lining of clutch plate broken.</p> <p>b) Lining rusted onto flywheel.</p> <p>c) Guide bearing for transmission input shaft in crankshaft defective.</p> <p>d) Leak in clutch hydraulic system.</p> <p>e) Tangential leaf springs of clutch bent down.</p> <p>f) Release unit binds on guide sleeve.</p>	<p>a) Replace clutch plate Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240).</u></p> <p>b) Evenly sand flywheel with sandpaper (120-180 grain) and replace clutch plate.</p> <p>c) Replace guide bearing in crankshaft.</p> <p>d) Replace faulty parts and bleed clutch hydraulics Refer to <u>BLEEDING CLUTCH HYDRAULIC SYSTEM.</u></p> <p>e) Replace clutch Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240).</u></p> <p>f) Clean guide sleeve, remove and install release unit Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240).</u></p>

TROUBLESHOOTING CHART

Fault	Cause	Remedy
Clutch noise	a) Imbalance of clutch and clutch plate too great.	a) Replace clutch/clutch plate Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240).</u>
	b) Torsional-vibration damper defective.	b) Replace clutch plate Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240).</u> or if necessary replace dual-mass flywheel,
	c) Release unit defective.	c) Replace release unit Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240).</u>
	d) Guide bearing for transmission input shaft in crankshaft defective.	d) Replace guide bearing in crankshaft.
	e) Clutch rivet connection loose.	e) Replace clutch Refer to <u>REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240).</u>

GENERAL INFORMATION**Commonly Used Abbreviations***** PLEASE READ THIS FIRST ***

NOTE: This article is intended for general information purposes only. This information may not apply to all makes and models. Not all abbreviations are covered as manufacturers add new ones every day.

"A"**A**

Amperes

ABS

Anti-Lock Brakes

ABRS

Air Bag Restraint System

AC

Alternating Current

A/C

Air Conditioning

ACCS

A/C Cycling Switch

ACCUM

Accumulator

ACCY

Accessory

ACT

Air Charge Temperature Sensor

ADJ

Adjust or Adjustable

ADV

Advance

AFS

Airflow Sensor

AI

Air Injection

AIR or A.I.R.

Air Injection Reactor

AIS

Air Injection System

Alt.

Alternator or Altitude

Amp./amp/amps

Ampere

ASCS

Air Suction Control Solenoid

ASD

Auto Shutdown

ASDM

Air Bag System Diagnostic Module

ASV

Air Suction Valve

A/T

Automatic Transmission/Transaxle

ATC

Automatic Temperature Control

ATDC

After Top Dead Center

ATF

Automatic Transmission Fluid

ATS

Air Temperature Sensor

Aux.

Auxiliary

Avg.

Average

AXOD

Automatic Transaxle Overdrive (Ford Models Only)

"B"**BAC**

By-Pass Air Control

BAP

Barometric Absolute Pressure Sensor

BARO

Barometric

Batt.

Battery

Bbl.

Barrel (Example: 4-Bbl.)

BCM

Body Control Module

BHP

Brake Horsepower

BMAP

Barometric and Manifold Absolute Pressure Sensor

BOO

Brake On-Off Switch

B/P

Backpressure

BPS

Barometric Pressure Sensor

BPT

Backpressure Transducer

BTDC

Before Top Dead Center

BTSI

Brake Transmission Shift Interlock

BTU

British Thermal Unit

BVSV

Bimetallic Vacuum Switching Valve

"C"**° C**

Celsius (Degrees)

Calif.

California

CANP

Canister Purge

CARB

California Air Resources Board

CAT

Catalytic Converter

CB

Circuit Breaker

CBD

Closed Bowl Distributor

cc

cubic centimeter

CCC

Close Coupled Catalyst

CCC

Computer Command Control

CCD

Computer Controlled Dwell

CCOT

Cycling Clutch Orifice Tube

CCW

Counterclockwise

CDI

Capacitor Discharge Ignition

CEC

Computerized Engine Control

CID

Cubic Inch Displacement

cm

Centimeter

CMP

Camshaft Position Sensor

CO

Carbon Monoxide

CO₂

Carbon Dioxide

Cont.

Continued

CONV

Convertible

CP

Canister Purge

CKP

Crankshaft Position Sensor

CTS

Coolant Temperature Sensor

Cu. In.

Cubic Inch

CVC

Constant Vacuum Control

CV

Check Valve or Constant Velocity

CW

Clockwise

CYL or Cyl.

Cylinder

C³ I

Computer Controlled Coil Ignition

C⁴

Computer Controlled Catalytic Converter

"D"**"D"**

Drive

DC

Direct Current Or Discharge

DDD

Dual Diaphragm Distributor

Def.

Defrost

Defog.

Defogger

DERM

Diagnostic Energy Reserve Module

DFI

Digital Fuel Injection

Diag.

Diagnostic

DTC

Diagnostic Trouble Code

DIC

Driver Information Center

DIS

Distributorless Ignition System

DIST

Distribution

DLC

Data Link Connector

DOC

Diesel Oxidation Catalyst

DOHC

Double Overhead Cam

DOT

Department of Transportation

DPF

Diesel Particulate Filter

DRB-II

Diagnostic Readout Box

DVOM

Digital Volt-Ohmmeter

"E"**EACV**

Electric Air Control Valve

EATX

Electronic Automatic Transaxle

EBCM

Electronic Brake Control Module

EBL

Electronic Back Light

ECM

Engine Control Module

ECT

Engine Coolant Temperature Sensor

EDIS

Electronic Distributorless Ignition System

EEC

Electronic Engine Control

EECS

Evaporative Emission Control System

EEPROM

Electronically Erasable PROM

EFE

Early Fuel Evaporation

EGO

Exhaust Gas Oxygen Sensor

EGR

Exhaust Gas Recirculation

EOT

Engine Oil Temperature

ESA

Electronic Spark Advance

ESC

Electronic Spark Control

EST

Electronic Spark Timing

EVAP

Fuel Evaporative System

EVIC

Electronic Vehicle Information Center

EVP

EGR Valve Position Sensor

EWMA

Exponentially Weighted Moving Average (MODE 6)

Exc.

Except

"F"**° F**

Fahrenheit (Degrees)

F/B

Fuse Block

Fed.

Federal

FI

Fuel Injection

FICU

Fuel Injection Control Unit

FIPL

Fuel Injector Pump Lever

FLI

Fuel Level Indicator

FPR-VSV

Fuel Pressure Regulator Vacuum Switching Valve

Ft. Lbs.

Foot Pounds

FWD

Front Wheel Drive

"G"**g**

grams

Gals.

gallons

GND or GRND

Ground

"H"**HAC**

High Altitude Compensation

HC

Hydrocarbons

H/D

Heavy Duty

HO2S

Heated Exhaust Gas Oxygen Sensor

Hg

Mercury

Hgt.

Height

HLDT

Headlight

HO

High Output

HO2S

Heated Oxygen Sensor

HP

High Performance

HSC

High Swirl Combustion

HSO

High Specific Output

HTR

Heater

Hz

Hertz (Cycles Per Second)

"I"**IAC**

Idle Air Control

IACV

Idle Air Control Valve

IAT

Intake Air Temperature

IC

Integrated Circuit

ID

Identification

I.D.

Inside Diameter

IFS

Independant Front Suspension

IFS

Inertia Fuel Shutoff (Ford)

Ign.

Ignition

IMRC

Intake Manifold Runner Control

In.

Inches

INCH Lbs.

Inch Pounds

in. Hg

Inches of Mercury

Inj.

Injector

IP

Instrument Panel

IRS

Independant Rear Suspension

ISC

Idle Speed Control

IVD

Interactive Vehicle Dynamics (Ford)

IVSV

Idle Vacuum Switching Valve

"J"**J/B**

Junction Block

"K"**KAPWR**

Keep Alive Power

k/ohms

kilo-ohms (1000 ohms)

kg

Kilograms (weight)

kg/cm²

Kilograms Per Square Centimeter

KM/H

Kilometers Per Hour

KOEO

Key On, Engine Off

KOER

Key On, Engine Running

KS

Knock Sensor

kW

Kilowatt

kV

Kilovolt

"L"**L**

Liter

lbs. (Lbs. when used in table)

Pounds

LCD

Liquid Crystal Display

L/D

Light Duty

LDP

Leak Detection Pump (Part of EVAP system.)

LED

Light Emitting Diode

LH

Left Hand

"M"

mA

Milliamps

MA or MAF

Mass Airflow

MAFS

Mass Airflow Sensor

MAP

Manifold Absolute Pressure

MAT

Manifold Air Temperature

Mem.

Memory

MEM-CAL

Memory Calibration Chip

mfd.

Microfarads

MFI

Multiport Fuel Injection

MICU

Multiplex Integrated Control Unit (Acura/Honda)

MIL

Malfunction Indicator Light

MPI

Multi-Point (Fuel) Injection

mm

Millimeters

MPH

Miles Per Hour

mV

Millivolts

"N"**NA**

Not Available

NAC

NOx Adsorber Catalyst

NCA

No Color Available (Wiring Diagrams)

NGS

New Generation Star

N.m

Newton Meter

No.

Number

Nos.

Numbers

NOx

Oxides of Nitrogen

"O"**O₂**

Oxygen

OBD

On-Board Diagnostics

OC

Oxidation Catalyst

OD

Overdrive

O.D.

Outside Diameter

OHC

Overhead Camshaft

OSS

Output Speed Sensor

O/S

Oversize

oz.

Ounce

ozs.

Ounces

"P"**"P"**

Park

P/C

Printed Circuit

PCM

Powertrain Control Module

PCS

Purge Control Solenoid

PC-SOL

Purge Control Solenoid

PCV

Positive Crankcase Ventilation

PFI

Port Fuel Injection

PGM-FI

Programmed Fuel Injection

PID

Parameter Identification

PIP

Profile Ignition Pick-up

PNP

Park Neutral Position Switch

P/N

Park/Neutral

PRNDL

Park Reverse Neutral Drive Low

PROM

Programmable Read-Only Memory

psi

Pounds Per Square Inch

P/S

Power Steering

PSPS

Power Steering Pressure Switch

PTC

Positive Temperature Coefficient

PTO

Power Take-Off

Pts.

Pints

Pwr.

Power

"Q"**Qts.**

Quarts

"R"**RABS**

Rear Anti-Lock Brake System

RECIRC

Recirculation

RH

Right Hand

RPM

Revolutions Per Minute

RWAL

Rear Wheel Anti-Lock Brake

RWD

Rear Wheel Drive

"S"**SAS**

Steering Angle Sensor

SBC

Single Bed Converter

SBEC

Single Board Engine Controller

SDARS

Satellite Digital Audio Radio Service

SES

Service Engine Soon

SFI

Sequential (Port) Fuel Injection

SIL

Shift Indicator Light

SIR

Supplemental Inflatable Restraint

SOHC

Single Overhead Cam

SOL or Sol.

Solenoid

SPFI

Sequential Port Fuel Injection

SPK

Spark Control

SPOUT

Spark Output

SRI

Service Reminder Indicator

SRS

Supplemental Restraint System (Air Bag)

STAR

Self-Test Automatic Readout

STO

Self-Test Output

SUB-O₂

Sub Oxygen Sensor

Sw.

Switch

Sys.

System

"T"**TAB**

Thermactor Air By-Pass

TAC

Throttle Actuator Module

TAD

Thermactor Air Diverter

TBC

Body Control Module (General Motors)

TBI

Throttle Body Injection

TCC

Torque Converter Clutch

TDC

Top Dead Center

Temp.

Temperature

TFI

Thick Film Ignition

THERMAC

Thermostatic Air Cleaner

TPM

Tire Pressure Monitor

TPMS

Tire Pressure Monitor System

TPS

Throttle Position Sensor/Switch

TS

Temperature Sensor

TV

Therموالve

TWC

Three-Way Catalyst

"V"**V**

Valve

Vac.

Vacuum

VAF

Vane Airflow

VAPS

Variable Assist Power Steering

VCC

Viscous Converter Clutch

VCRM

Variable Control Relay Module

VIN

Vehicle Identification Number

VM

Vacuum Modulator

Volt.

Voltage

VOM

Volt-Ohmmeter (Analog)

VRV

Vacuum Regulator Valve

VSS

Vehicle Speed Sensor

VSV

Vacuum Switching Valve

"W"**W/**

With

W/O

Without

WAC

Wide Open Throttle A/C Switch

WOT

Wide Open Throttle

ACCESSORIES AND EQUIPMENT**Communication Systems - Repair Instructions****USB HUB****84 10 050 REMOVING AND INSTALLING (REPLACING) USB HUB**

IMPORTANT: Read and comply with notes on protection against electrostatic damage (**ESD PROTECTION**).

Necessary preliminary tasks:

- Remove **luggage compartment trim on left side panel** . See **REMOVING AND INSTALLING/REPLACING TRUNK TRIM PANEL ON LEFT SIDE PANEL**
- Partially detach **left luggage compartment wheel arch trim** . See **REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM**

Release screws (1) and feed out USB hub with holder (2).

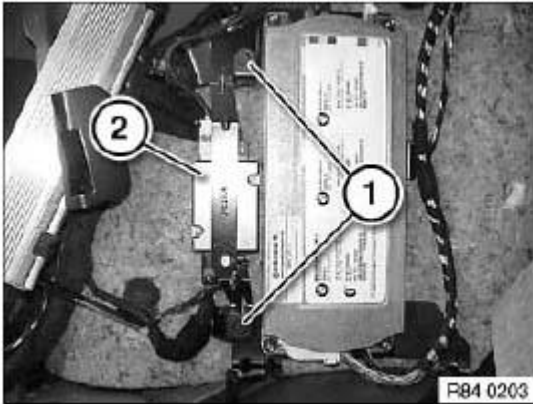


Fig. 1: Identifying Screws And USB Hub With Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and disconnect plug connections (2).

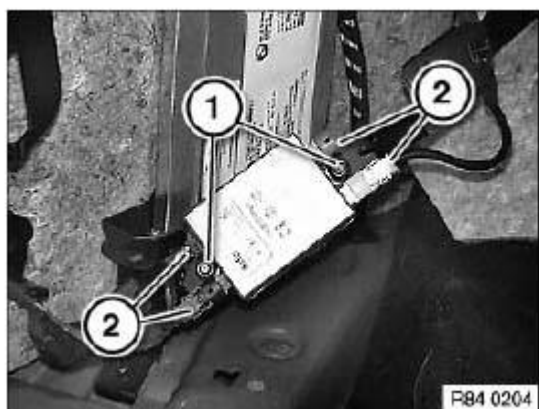


Fig. 2: Identifying Nuts And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

COMBOX, TCB, TELEPHONE

84 11 550 REMOVING AND INSTALLING/REPLACING HANDS-FREE MICROPHONE

Special tools required:

64 1 020

Lever out front microphone trim (1) with special tool **64 1 020**.

Disconnect plug connection underneath and remove microphone trim (1).

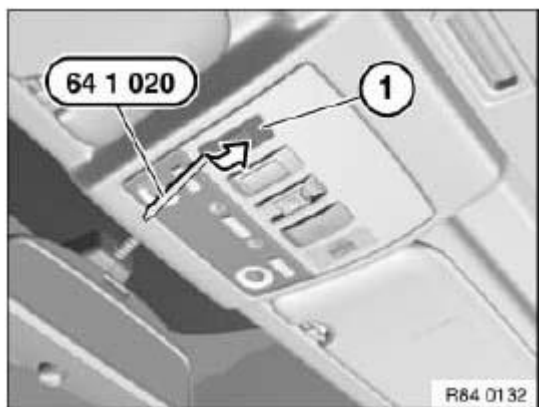


Fig. 3: Removing Front Microphone Trim With Special Tool 64 1 020
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Disconnecting the plug connection for the hands-free microphone or emergency SOS call button results in fault memory entries in the telephone control unit (limitation in the emergency SOS call system).

After fitting, read out fault memory and if necessary delete entries.

Unlock detent lug (1) and feed out hands-free microphone (2) in direction of arrow.

Installation:

Arrow on hands-free microphone (2) points in driving direction.

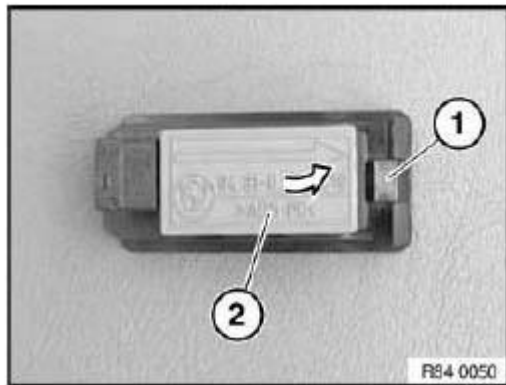


Fig. 4: Unlocking Detent Lug And Feeding Out Hands-Free Microphone
Courtesy of BMW OF NORTH AMERICA, INC.

84 11 600 REPLACING CORDLESS KEYPAD HANDSET

NOTE: For operating cordless keypad handset, refer to operating instructions of corresponding telephone.

84 11 610 REMOVING AND INSTALLING/REPLACING EJECT BOX (CORDLESS KEYPAD HANDSET)

Necessary preliminary tasks:

- If necessary, remove cordless keypad handset from eject box
- Remove **fresh-air grille in rear cabin** . See **REMOVING AND INSTALLING/REPLACING REAR CABIN FRESH-AIR GRILLE**

If necessary, disconnect antenna plug (1).

Disconnect plug connection (2).

Unlock socket housing on plug connection (2) and **SLIDE OUT** contact carrier.

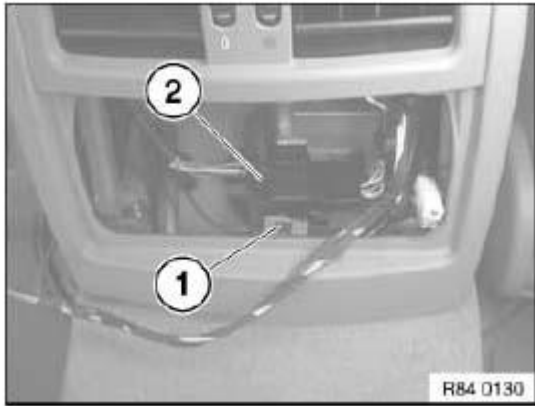


Fig. 5: Identifying Antenna Plug And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Unlock eject box (1) and fold up.**

Release screws (2).

Feed out plug connection and remove eject box (1).

Installation:

Ensure correct cable routing in eject box (1).

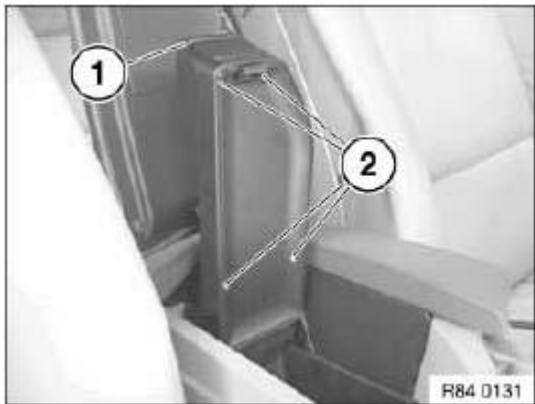


Fig. 6: Identifying Eject Box And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

84 11 650 REMOVING AND INSTALLING/REPLACING TELEMATIC CONTROL UNIT (TCU) (OPTION SA633/SA638/SA639/SA664)

IMPORTANT: *Replacement with option SA638/SA664:*

- Carry out **PROGRAMMING/CODING**
- If necessary, carry out coupling procedure

Replacement with option SA633/SA639:

- Carry out **PROGRAMMING/CODING**
- Via Diagnosis and Information System (DIS):
 - Service functions
 - Start subsequent assessment

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

NOTE: **FOLLOW INSTRUCTIONS FOR HANDLING FIBRE OPTIC CABLES.**

Necessary preliminary tasks:

- Disconnect **battery negative lead**
- Remove **luggage compartment wheel arch trim on left** . See **REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM**

Unlock plug connections (1) and (2) and disconnect.

Unfasten antenna plug (3) and disconnect.

Release nuts (4) and remove TCU (5).

Installation:

Observe color coding of aerial/antenna plugs (3).

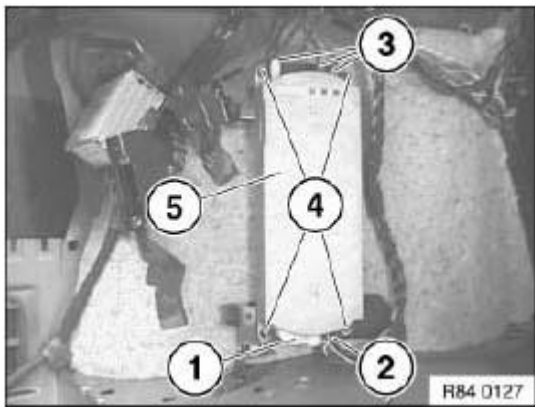


Fig. 7: Identifying Plug Connection, Antenna Plug, Nuts And TCU

Courtesy of BMW OF NORTH AMERICA, INC.

HANDHELD COMPUTER

84 21 526 REMOVING AND INSTALLING/REPLACING LINE COMPENSATOR

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION).

Necessary preliminary tasks:

Remove luggage compartment wheel arch trim on left. . See REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM

Release knurled nuts.

Disconnect antenna plug (1).

Unfasten plug connection (2) and disconnect.

Release screws (3) and remove compensator (4).

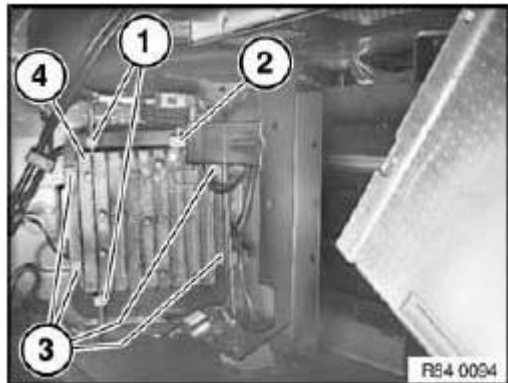


Fig. 8: Identifying Antenna Plug, Plug Connection, Screws And Compensator
Courtesy of BMW OF NORTH AMERICA, INC.

84 21 535 REMOVING AND INSTALLING/REPLACING HANDS-FREE CHARGING ELECTRONICS

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION).

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Necessary preliminary tasks:

CARMANUALSUSA

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- Disconnect **battery negative lead**
- Remove **luggage compartment trim on left side panel** . See **REMOVING AND INSTALLING/REPLACING TRUNK TRIM PANEL ON LEFT SIDE PANEL**
- Partially remove **luggage compartment wheel arch trim on left.** . See **REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM**

Disconnect antenna lead plug connection (1).

Unscrew nuts (2).

Disconnect plug connection (3).

Remove hands-free charging electronics (4) in direction of arrow.

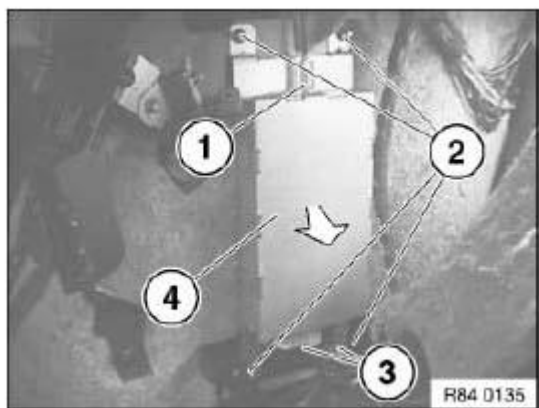


Fig. 9: Removing Hands-Free Charging Electronics

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **VEHICLE PROGRAMMING/CODING**
- If necessary, log mobile phone on to vehicle

84 21 542 REMOVING AND INSTALLING (REPLACING) HANDS-FREE CHARGING ELECTRONICS (HIGH)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (**ESD PROTECTION**).

NOTE: Comply with notes and instructions on **HANDLING OPTICAL WAVEGUIDES** .

Necessary preliminary tasks:

- Disconnect **battery negative lead**

- Partially remove **luggage compartment floor trim panel** . See **REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT FLOOR TRIM PANEL**
- If necessary, remove storage tray for car jack
- If necessary, remove spare wheel
- Remove control unit cover

M5:

Remove hands-free charging electronics (1) from shell insert (2).

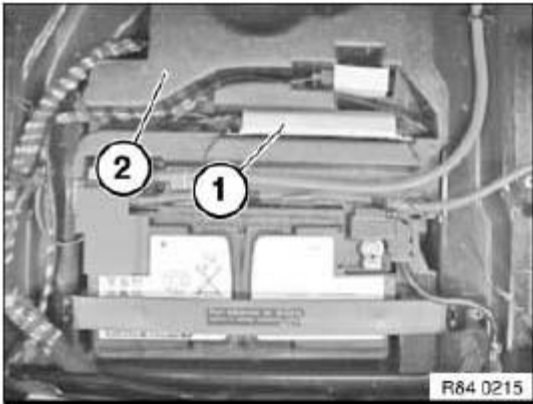


Fig. 10: Identifying Hands-Free Charging Electronics And Shell Insert
Courtesy of BMW OF NORTH AMERICA, INC.

All:

Remove hands-free charging electronics (1) from device mounting (2).

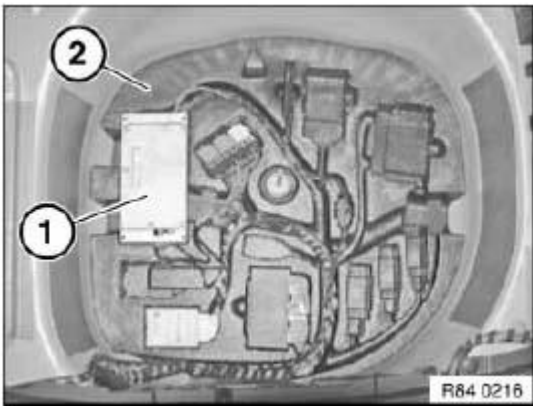


Fig. 11: Identifying Hands-Free Charging Electronics And Device Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Remove hands-free charging electronics (2).

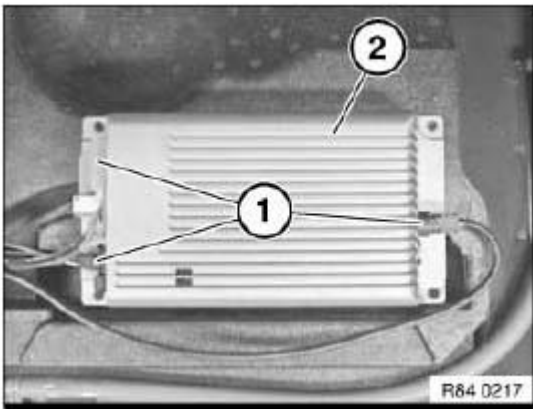


Fig. 12: Identifying Plug Connection And Hands-Free Charging Electronics
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **VEHICLE PROGRAMMING/CODING**
- If necessary, log mobile phone on to vehicle

HANDS-FREE SYSTEM

84 31 020 REMOVING AND INSTALLING/REPLACING HANDS-FREE SYSTEM SPEAKER

Necessary preliminary tasks:

- Remove trim panel for pedal assembly . See **REMOVING AND INSTALLING/REPLACING PANEL FOR PEDALS**

Screw on threaded ring (1) in direction of arrow and remove hands-free system speaker (2) from trim for pedal assembly (3).

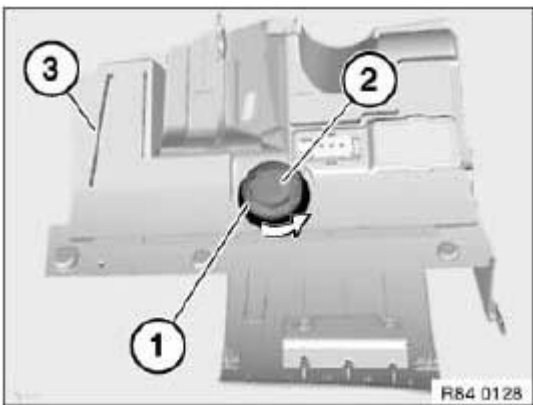


Fig. 13: Screwing On Threaded Ring

Courtesy of BMW OF NORTH AMERICA, INC.

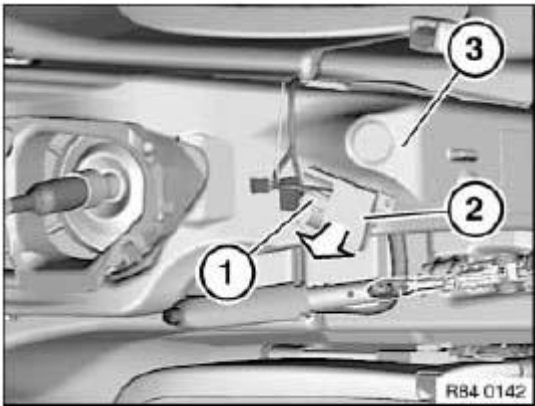
ANTENNA**84 50 060 REMOVING AND INSTALLING/REPLACING BLUETOOTH ANTENNA**

Necessary preliminary tasks:

- Remove **center console** . See **REMOVING AND INSTALLING STORAGE COMPARTMENT**

Unfasten plug connection (1) and disconnect.

Detach Bluetooth antenna (2) in direction of arrow from rear compartment ventilation duct (3).

**Fig. 14: Detaching Bluetooth Antenna**

Courtesy of BMW OF NORTH AMERICA, INC.

When replacing dual-lock tape:

- Clean bonding surfaces.
- Stick on dual-lock tape and press down firmly with fingers for at least 2 secs. (ambient temperature at least 18 °C).
- Fit Bluetooth antenna on rear-compartment ventilation duct only after a minimum period 30 minutes (strain-free dwell time).
- Subjecting the bond to premature load will result in a loss of adhesion and thus a defective bond => use new dual-lock tape.

Installation:

Fit Bluetooth antenna (1) during installation so that dual-lock tapes (2) and (3) coincide exactly.

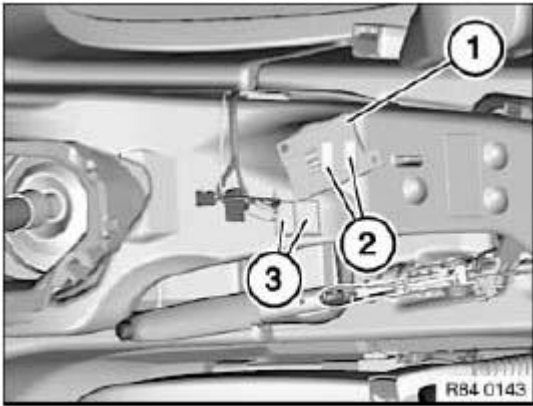


Fig. 15: Identifying Bluetooth Antenna And Dual-Lock Tapes

Courtesy of BMW OF NORTH AMERICA, INC.

65 20 030 REMOVING AND INSTALLING/REPLACING EMPTY HOUSING FOR ROOF-MOUNTED AERIAL

NOTE: **Clean roof.**

Tape off roof surface (2) around aerial cover (3) with yellow adhesive tape (1). To do so, slide adhesive tape slightly under roof aerial.

If necessary, carefully heat vehicle roof in aerial area with a hot air blower (max. 50 °C).

IMPORTANT: Risk of damage!

Handle special tool correctly and make sure you are standing safely with a firm foothold next to vehicle.

In order to prevent dents in the roof outer skin, do not exert any pressure on the roof.

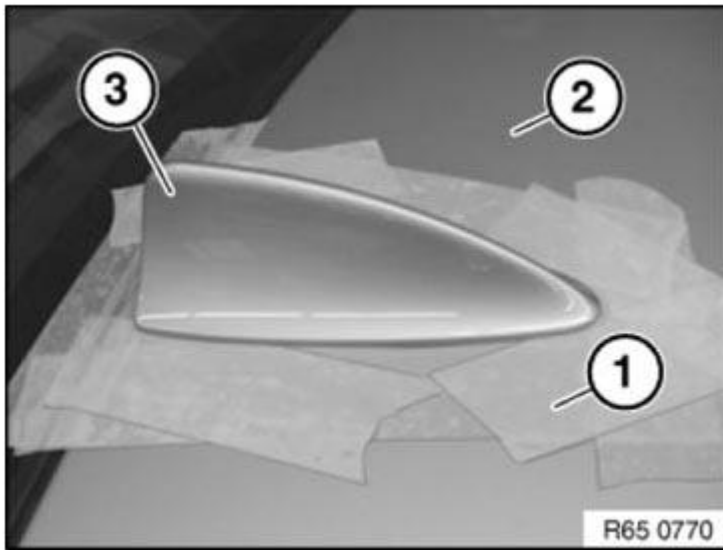


Fig. 16: Identifying Roof With Adhesive Tape And Housing
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Make sure your arms do not cross over (1) when holding special tool 65 2 010 (knife).

Pull handle must always be ahead of the guiding hand (2).

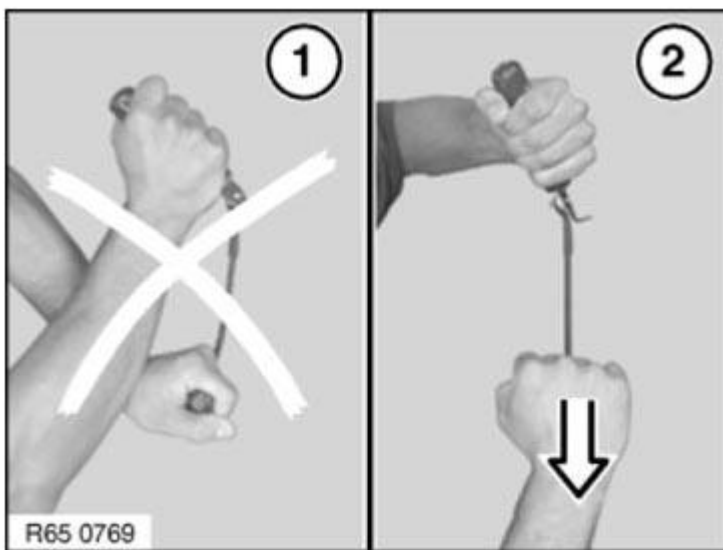


Fig. 17: Identifying Proper Position Of Holding Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through adhesive bead all round with special tool 65 2 010 (knife).

Pull on handle (1) and align blade on handle (2).

NOTE: Use sharp blades only. If necessary, sharpen blade.

Remove cover of multiband telephone aerial (3).

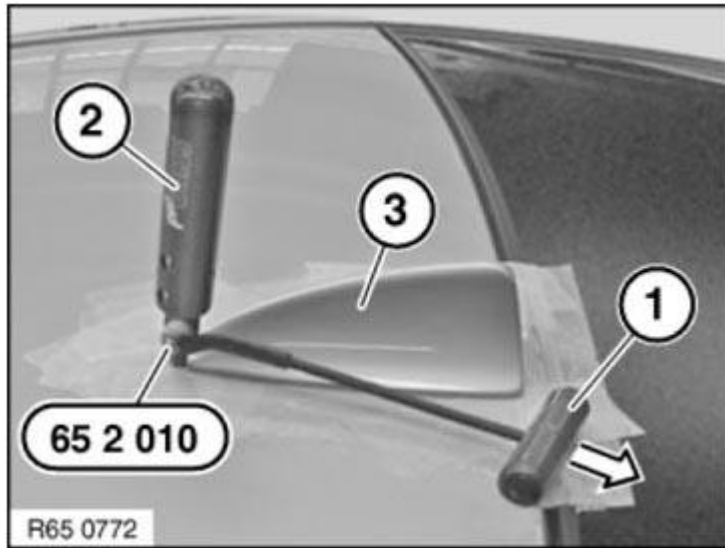


Fig. 18: Cutting Adhesive Bead Using Special Tool 65 2 010
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The cover of the multiband telephone aerial is secured with window adhesive. All preparatory operations correspond to the **WINDOW CEMENTING INSTRUCTIONS**.

NOTE: The aerial cover must be replaced if its centering pins (1) are damaged.

Bonding surface (2) must be clean and free from grease.

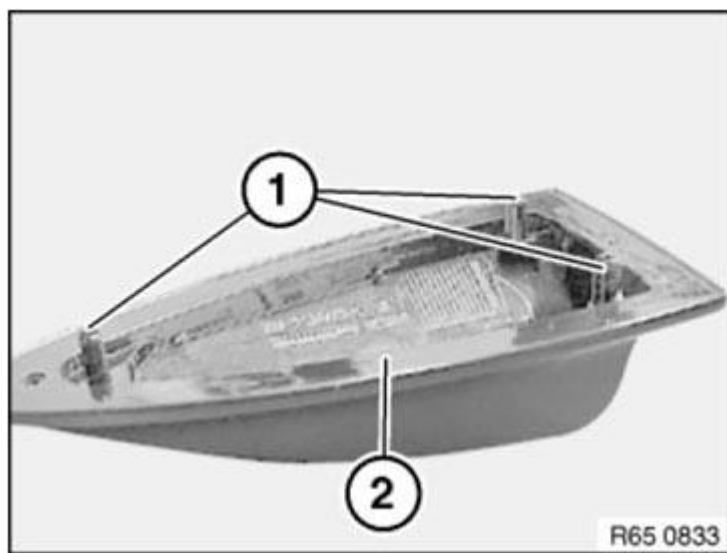


Fig. 19: Identifying Centering Pins And Bonding Surface
 Courtesy of BMW OF NORTH AMERICA, INC.

Position two spacers (1) on cleaned aerial cover.

Dimensions:

- A. 10 mm
- B. 14 mm

Position spacer (2) centrally and flush with shoulder of adhesive flange.

IMPORTANT: Spacers must be used without fail!

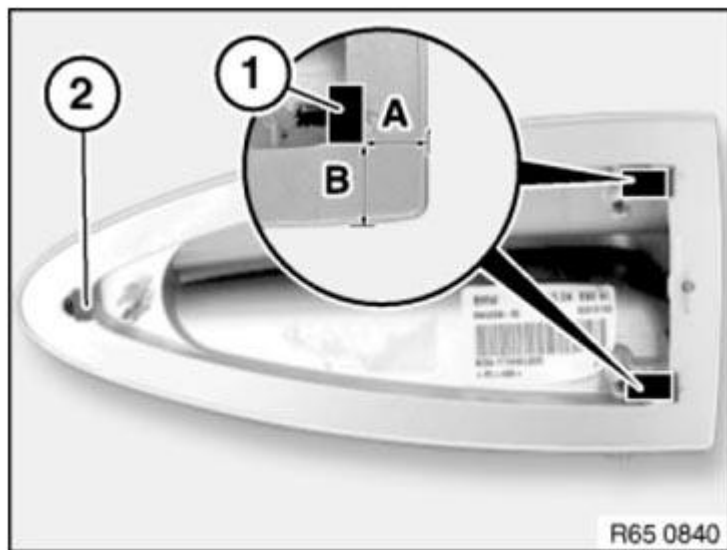


Fig. 20: Identifying Spacer Positions

Courtesy of BMW OF NORTH AMERICA, INC.

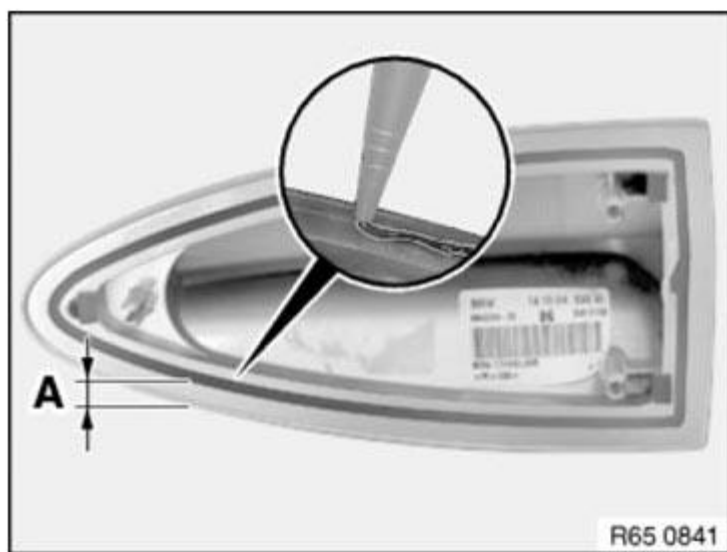
Apply trace of adhesive bead all round outer contour as follows.

Distance between adhesive bead and edge of aerial cover:

A. $6.5 \text{ mm} \pm 1 \text{ mm}$

Start and end of bead trace must have an overlap length of max. 10 mm.

IMPORTANT: To prevent the adhesive from escaping, the adhesive bead diameter must not exceed $3 \text{ mm} \pm 1 \text{ mm}$.

**Fig. 21: Identifying Distance Between Adhesive Bead And Edge Of Aerial Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Attach the aerial cover coated with adhesive by hand. To spread the adhesive better, move the cover back and forth horizontally slightly when pressing down.

If necessary, secure aerial cover with adhesive tape and do not press down on one side of the aerial more firmly than the other.

After bonding, leave vehicle to stand for at least 3 hours at room temperature.

To guarantee a permanent bond:

Only use washing installations after a period of 24 hours has passed.

ENGINE

Cooling system - Repair Instructions

COOLANT, CHECKING COOLING SYSTEM

17 00... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM

WARNING: Danger of scalding! Work on the cooling system should only be carried out when the engine has cooled down.

IMPORTANT: Wear protective gloves and goggles.

IMPORTANT: *Lifetime coolant filling:*

Never reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system. This can cause overheating with permanent damage to the engine.

IMPORTANT: When working on the oil, coolant or fuel circuit, protect the alternator against contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Do not fill coolant expansion tank over MAX level as overfilling will cause the coolant to overflow. This may give rise to traces of residual coolant on the expansion tank or in the engine compartment and wrongly suggest possible leakages.

Recycling

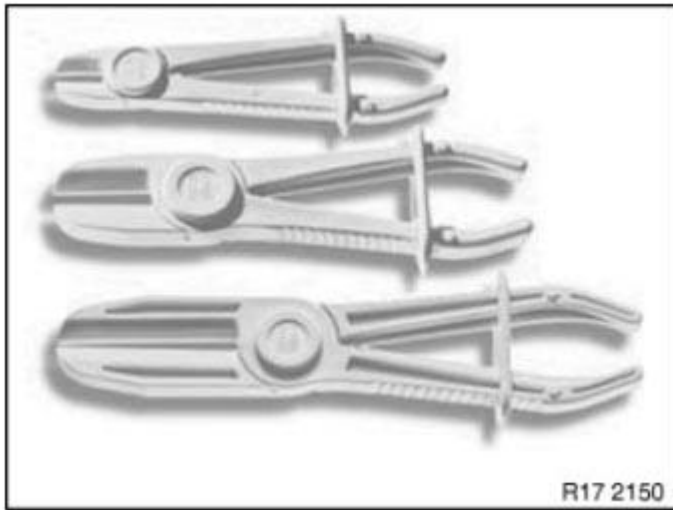
Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

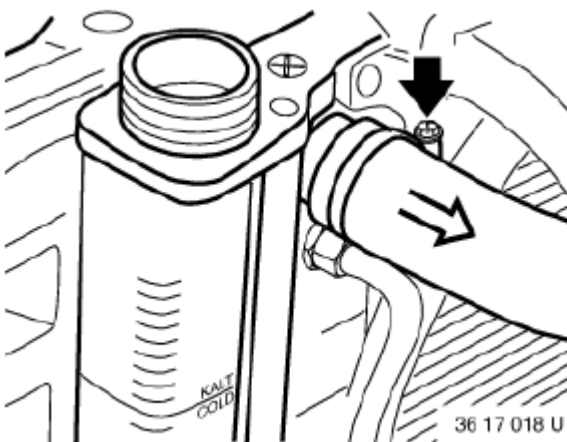
NOTE: To disconnect coolant hoses, use commercially available disconnect tools such as HAZET brand tools (see table).

HAZET TOOLS DESCRIPTION CHART

HAZET no.:	Description
4590-1	Disconnect tool, length (mm): 150
4590-2	Disconnect tool, length (mm): 180
4590-3	Disconnect tool, length (mm): 253
4590/2	Disconnect/plier set
4590/3	Disconnect/plier set

**Fig. 1: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Tightening torque, hose clamps 17 00 1AZ .**Fig. 2: Locating Hose Clamps Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

Instructions for disassembly/assembly of coolant hose fast-release couplings

Disassembly of fast-release coupling

Withdraw lock (1/2), disconnect hose.

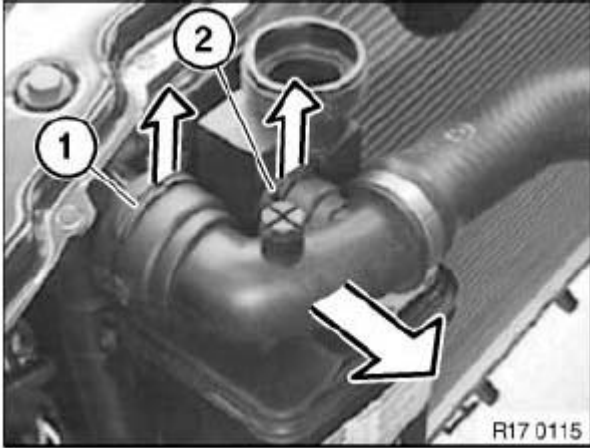


Fig. 3: Disconnecting Hose

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check O-rings (1).

Do not coat O-rings (1) with antiseize agent.

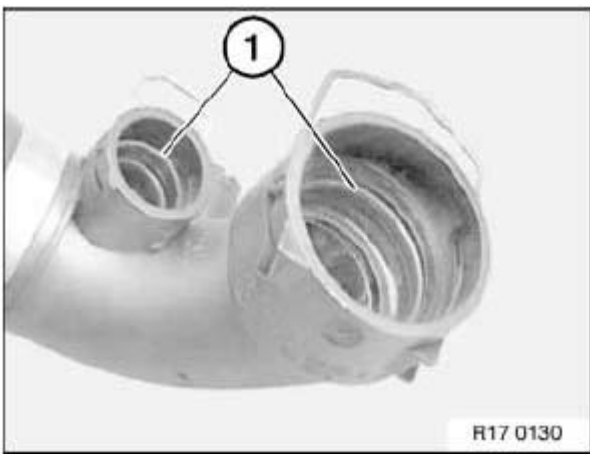


Fig. 4: Identifying O-Rings

Courtesy of BMW OF NORTH AMERICA, INC.

Assembly of fast-release coupling

Press in lock (1) before installing fast-release coupling.

Push on hose.

Fast-release coupling must clearly snap audibly into place.

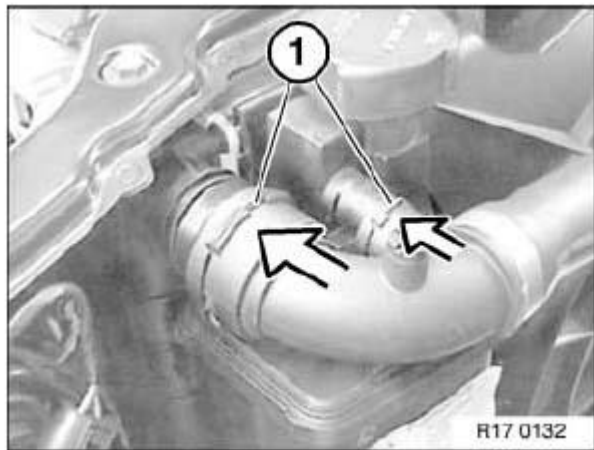


Fig. 5: Pressing Lock

Courtesy of BMW OF NORTH AMERICA, INC.

17 00... NOTES ON RETROFITTING A TRAILER TOWING DEVICE

Starting with delivery of the E90, in certain vehicle types, the size of the electric cooler fan will be linked to the optional extra trailer tow hitch or trailer provision.

A larger fan may therefore be required for retrofits. Please refer to the BMW ETK (Electronic Parts Catalogue) for exact allocation.

The larger fan is necessary to ensure mountain driving with a full trailer load in accordance with BMW-internal specifications. Otherwise the engine electronics will detect possible overheating of the cooling system and activate protective functions.

For the customer, this involves impaired A/C output, automatic transmission and engine power. These will be continuously reduced, which in the end may result in the vehicle coming to a standstill in the mountain area.

17 00 008 DRAINING AND ADDING COOLANT

Special tools required:

00 2 030

WARNING: Danger of scalding!

Only carry out work on the cooling system after the engine has cooled down!

IMPORTANT: Lifetime coolant filling:

If removing radiator, oil-coolant heat exchanger or transmission oil cooler, do not reuse drained coolant!

Installation:

Use only recommended coolant.

Observe mixture ratio (antifreeze/water).

Protective measures/rules of conduct:

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

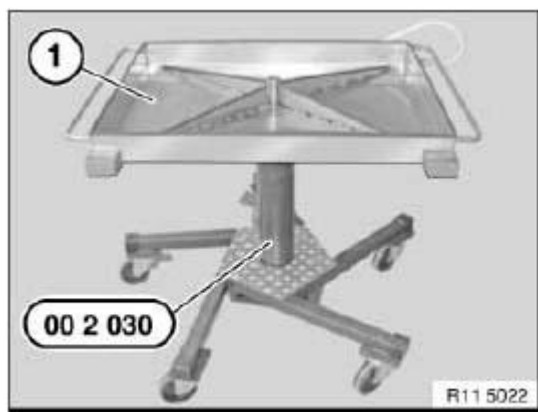


Fig. 6: Identifying Drip Tray

Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove intercooler
- Follow **INSTRUCTIONS FOR WORKING ON COOLING SYSTEM.**

Draining coolant:

Open cap (1) on coolant expansion tank (2).

Installation:

Observe arrow marks on cap and expansion tank.

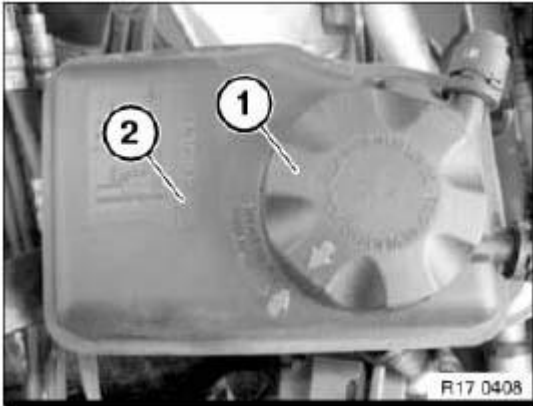


Fig. 7: Identifying Cap And Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten and detach coolant hose (1) from radiator housing.

Drain, catch and dispose of coolant.

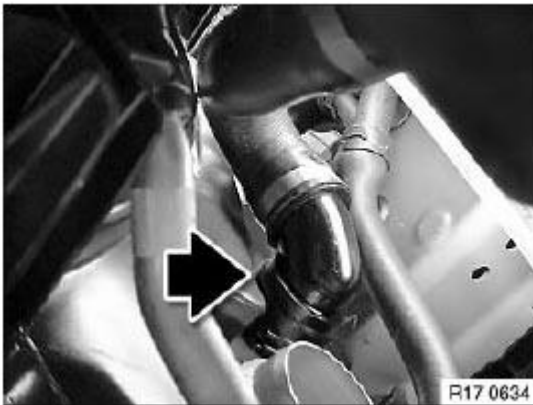


Fig. 8: Identifying Drip Tray
Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant:*Installation:*

Observe venting instructions without fail.

VENT COOLING SYSTEM.

Check **COOLING SYSTEM** for leaks.

17 00 009 CHECKING COOLING SYSTEM FOR WATER LEAKS

Special tools required:

- **00 2 030**
- **17 0 101**
- **17 0 113**
- **17 0 114**

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Protective measures/rules of conduct:

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.
Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

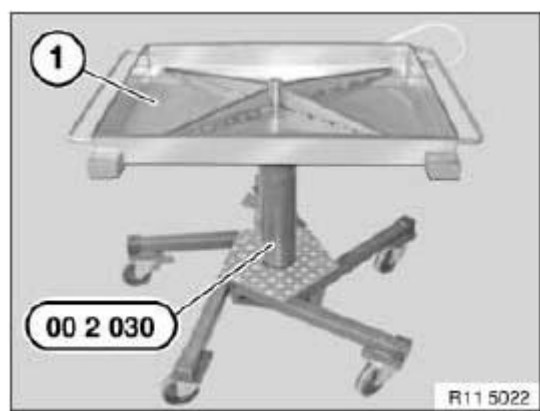


Fig. 9: Identifying Drip Tray

Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system:

Open cap on coolant expansion tank. Fit special tools **17 0 101** / **17 0 113**.

BUILD UP GAUGE PRESSURE , wait approx. 2 minutes.

Cooling system is impervious to leaks if pressure drop is max. 0.1 bar.

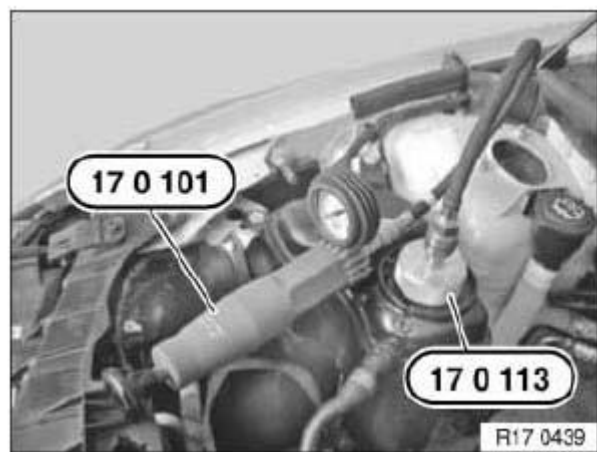


Fig. 10: Identifying Special Tools (17 0 101) And (17 0 113)

Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap:

NOTE: While the vehicle is driven at high outside temperatures, the design may cause the pressure relief valve in the cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces when the vehicle has cooled down. These

traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the cap to stick; therefore check the cap again 2 to 3 times.

Replace the cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in cap:

Screw cap (1) onto special tool 17 0 114 .

Build up pressure with special tool (hand pump) 17 0 101 ; observe pressure gauge to ascertain when opening pressure is achieved.

Compare opening pressure of pressure relief valve.

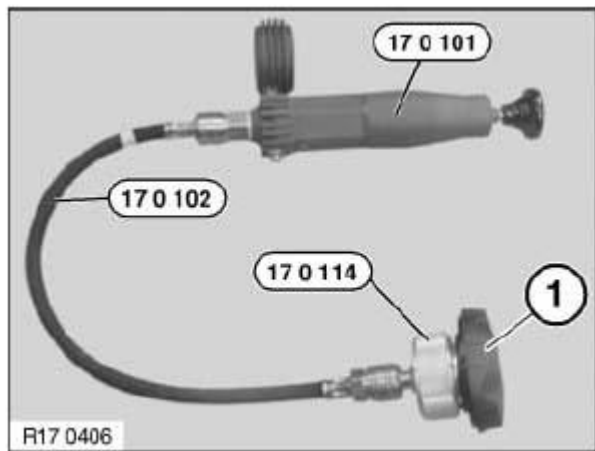


Fig. 11: Identifying Screw Cap Onto Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR WATER LEAKS

WARNING: Danger of scalding!

Open sealing cap only after engine has cooled down.

IMPORTANT: Electric coolant pump!

FOLLOW INSTRUCTIONS FOR WORKING ON COOLING SYSTEM.

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The

**cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.**

Only when refilling!

Use only recommended coolant.

Observe mixture ratio.

Perform filling operation slowly.

Adjust coolant level to MAX.

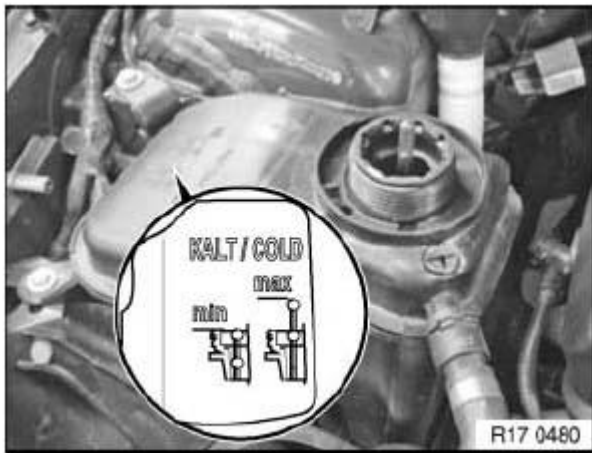


Fig. 12: Identifying Coolant Level Adjusting Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

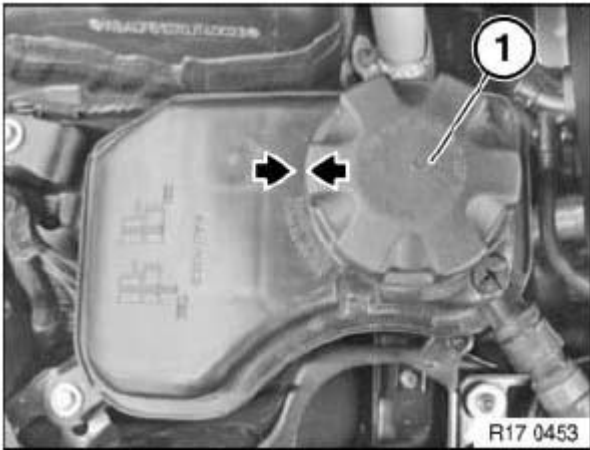


Fig. 13: Identifying Coolant Cap

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following venting procedure is necessary e.g. when a part is replaced in the cooling system or when the cooling system is refilled.

Vehicles with independent heating only:

Open vent screw (1).

Tightening torque **17 00 4AZ** .

Slowly fill coolant expansion tank with recommended coolant.

Close vent screw (1) after coolant emerges.

Installation:

Have a cleaning cloth ready and mop up emerging coolant.

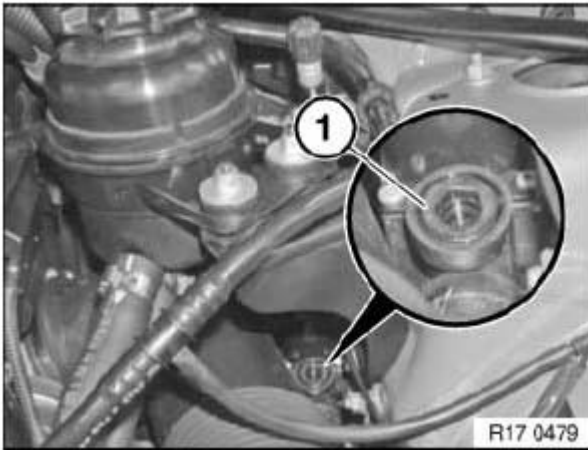


Fig. 14: Identifying Vent Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant:

NOTE: Open vent screw (1).
 Fill coolant expansion tank up to lower edge of filler neck with recommended coolant.
 Observe mixture ratio.
 Close bleed screw (1).
 Close cap on expansion tank.

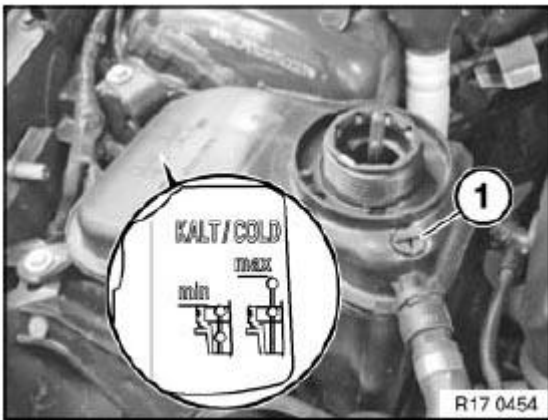


Fig. 15: Identifying Vent Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Have a cleaning cloth ready and mop up emerging coolant.

Only when venting!

NOTE: Do not open the coolant expansion tank cap during the venting procedure.

1. Connect battery charger.
2. Switch on ignition.
3. Set heater to maximum temperature and turn fan down to lowest speed.
4. Press accelerator pedal for 10 seconds to floor. **Engine** must **not** be started.
5. The venting procedure is started when the accelerator pedal is pressed and takes approx. 12 minutes. (Electric coolant pump was activated and shuts down automatically after approx. 12 minutes).
6. Then top up fill level in coolant expansion tank with 100 ml above max (see illustration below).
7. Check **COOLING SYSTEM FOR LEAKS**.
8. If venting has to be carried out again (e.g. if cooling system is leaking), allow DME to fall completely (leave ignition key removed for approx. 3 minutes), then repeat from Point 3.

Only when venting!

Perform filling operation slowly.

Fill coolant expansion tank with 100 ml above max.

100 ml corresponds to A=6 mm.

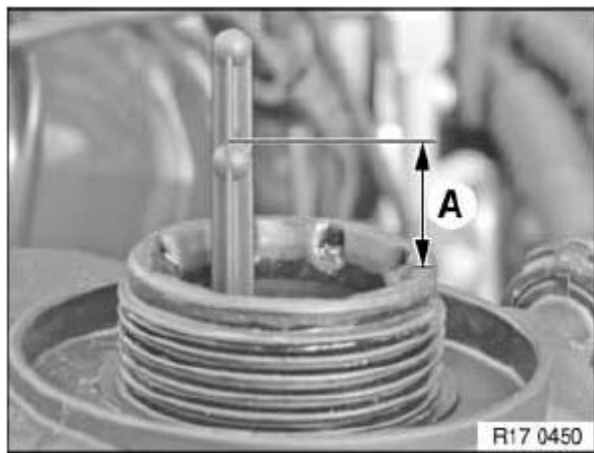


Fig. 16: Identifying Coolant Expansion Tank Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

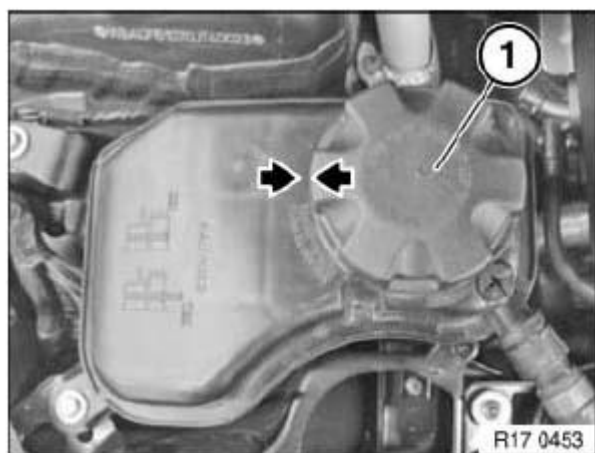


Fig. 17: Identifying Coolant Cap

Courtesy of BMW OF NORTH AMERICA, INC.

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

SPECIAL TOOLS DESCRIPTION

Type	Engine	Adapter Y from tester 17 0 100
E60/E61/E63/E64	All	17 0 113
E65/E66	M54/N52/N62/N62T/N73	17 0 105
E65/E66	M57S/M57T/M67/M67T	17 0 113
E70/E71/E72	All	17 0 113
E81/E82/E84/E87/E88/E89	All	17 0 113
E83	M54/N46/N52K	17 0 105
E83	M47S/M57S/M57T/M57Y/N47	17 0 113
E85/E86	All	17 0 105
E90/E91/E92/E93	All	17 0 113
F01/F02/F03/F04/F07/F10	All	17 0 113
R50/R52	W10	17 0 107 and 17 0 102
R50	W17	17 0 109
R52/R53	W11	17 0 109
R55/R56/R57/R60	All	17 0 109
F25	All	17 0 113

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant when carrying out repair work on the cooling circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- Filler unit no. 81 39 2 152 473
- Collecting vessel no. 81 49 2 152 347
- Adapter from tester 17 0 100

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifter base unit).

Recycling

Observe country-specific waste disposal regulations.

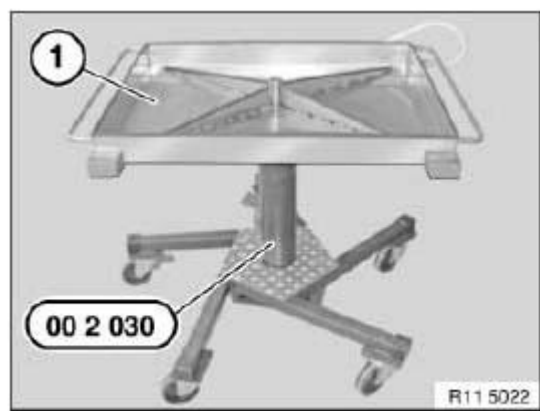


Fig. 18: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.

If necessary, replace damaged and porous coolant hoses.

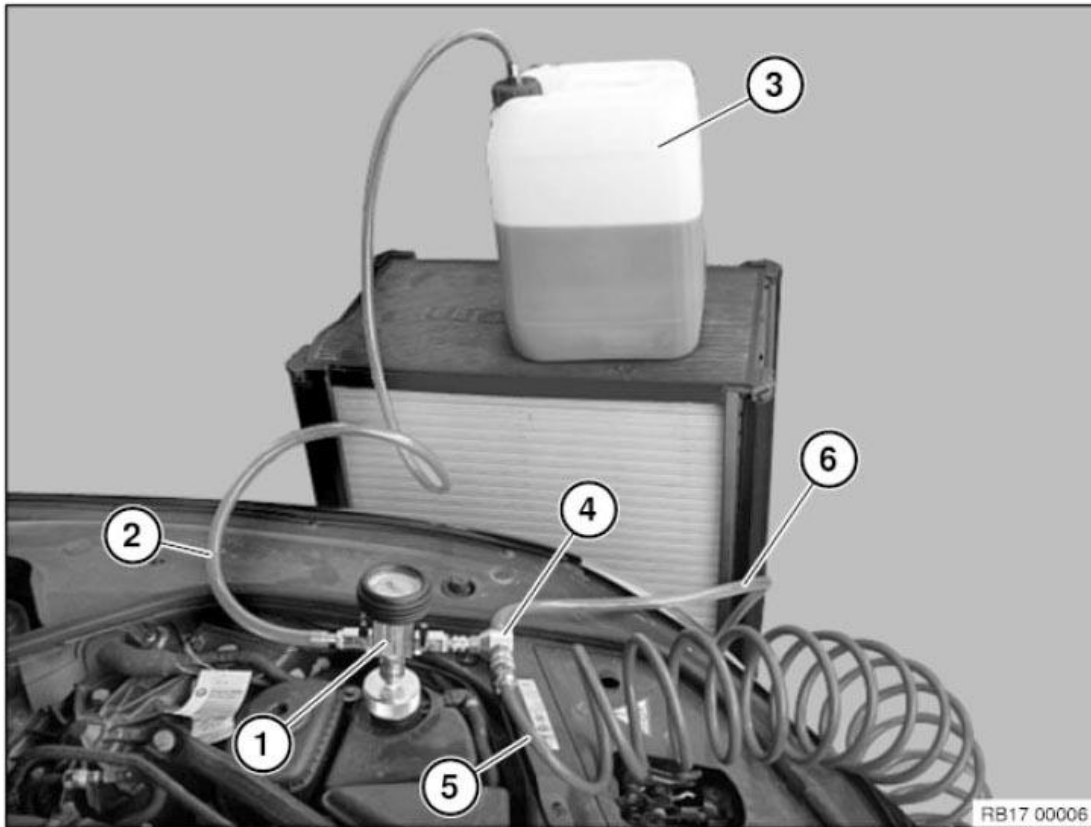


Fig. 19: Identifying Cooling System Components
Courtesy of BMW OF NORTH AMERICA, INC.

- 1) Filling unit with vacuum meter and shut-off valves
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

Requirements

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.

Use **RECOMMENDED COOLANT AND OBSERVE PROPER MIXTURE RATIO** .

- Observe capacities.
- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set vehicle heater to maximum temperature.

Select adapter (Y) according to table and connect to coolant expansion tank.

Connect filler unit to adapter connection (X).

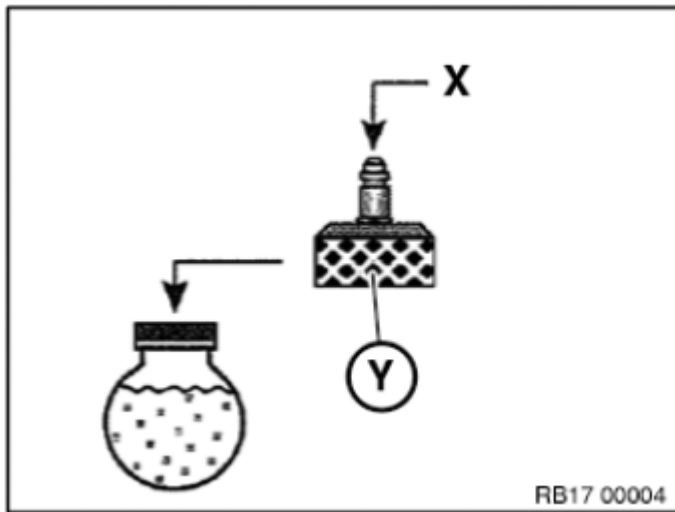


Fig. 20: Identifying Adapter And Adapter Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valves (A) and (B) of the filling unit (1) must be closed.

X) Expansion tank connection

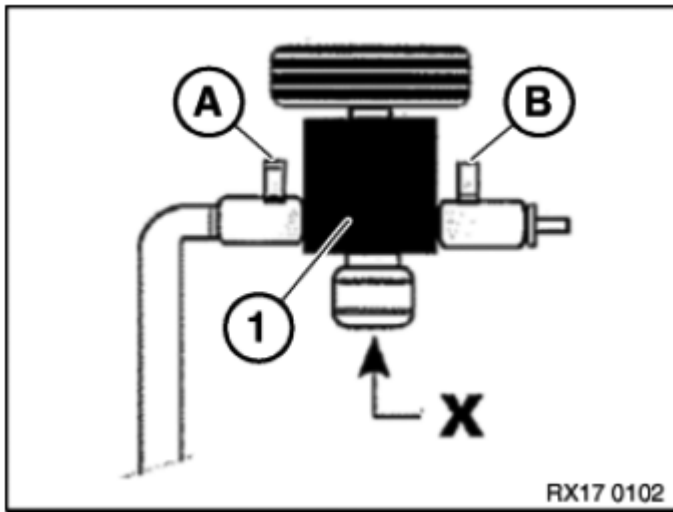


Fig. 21: Identifying Filling Unit Shut-Off Valves
 Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

X) Expansion tank connection

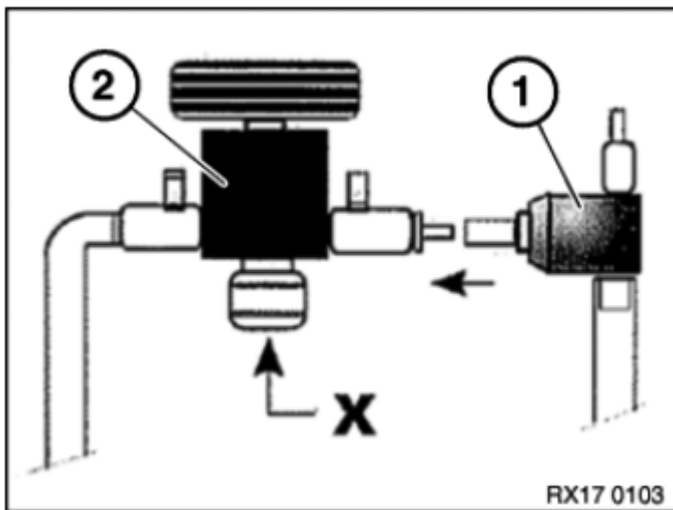


Fig. 22: Connecting Venturi Nozzle To Filling Unit
 Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1).

X) Expansion tank connection

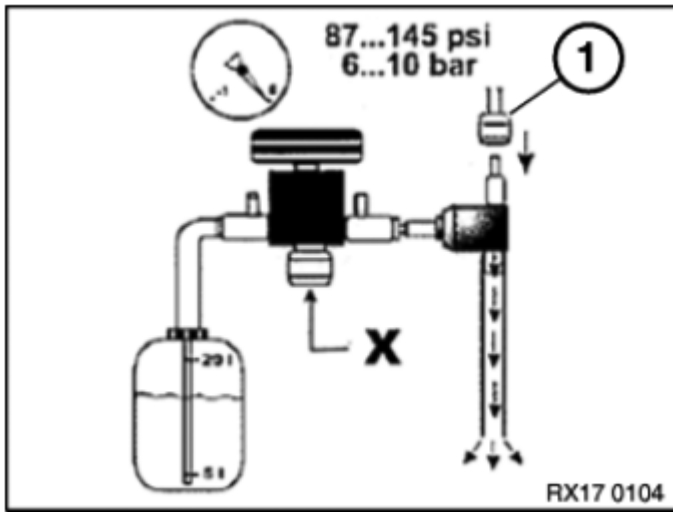


Fig. 23: Connecting Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Open shut-off valve (B).

The venturi nozzle produces a flow noise.

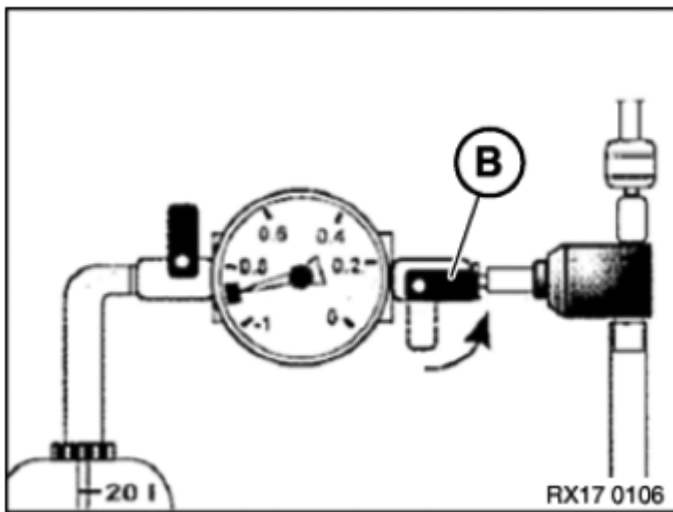


Fig. 24: Opening Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shut-off valve (A) until the filling hose (1) is free of bubbles.

Close shut-off valve (A) again. The filling hose (1) is vented in this way.

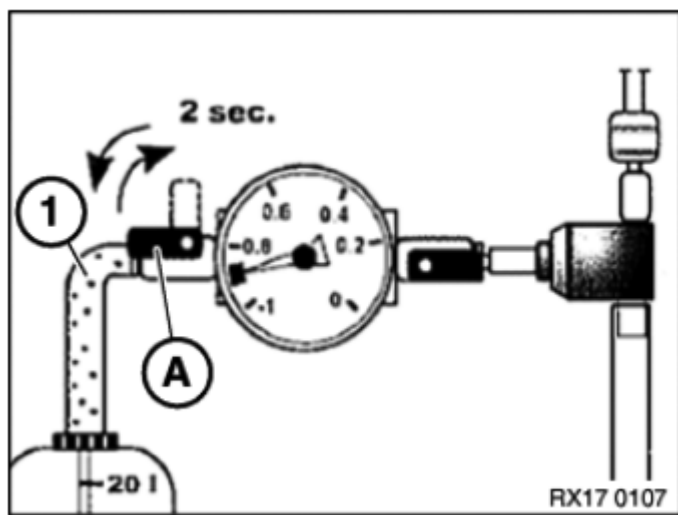


Fig. 25: Opening/Closing Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains open. Generate vacuum in coolant system for approx. 2 minutes. The final vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale on the vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shut-off valve (B) again.

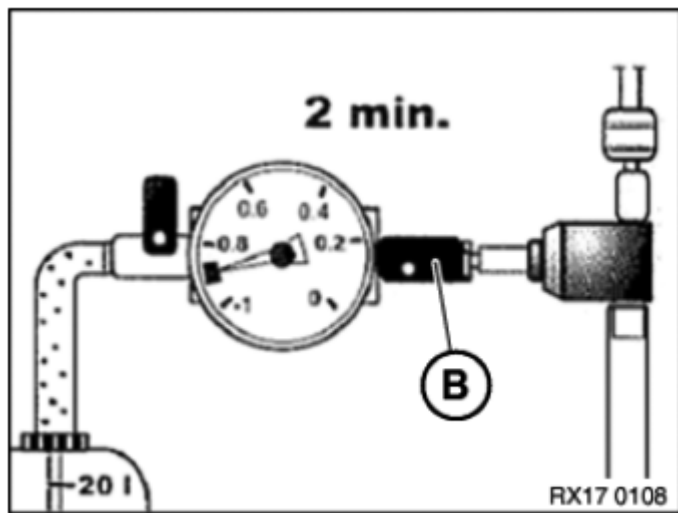


Fig. 26: Identifying Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Both shut-off valves (A) and (B) must be closed. Then seal Venturi nozzle (1).

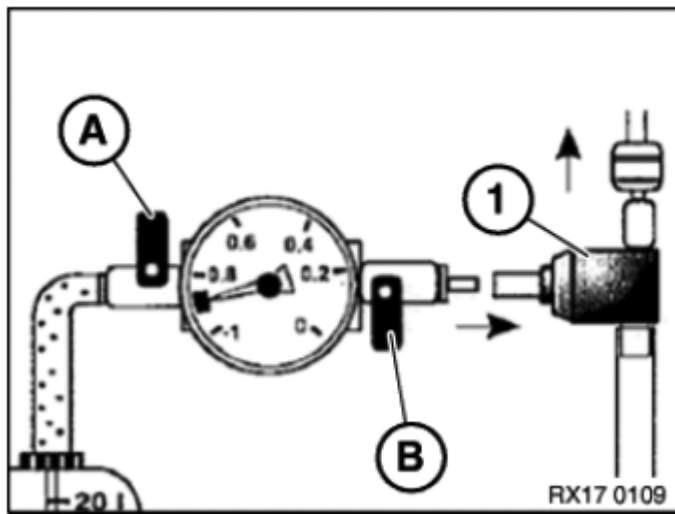


Fig. 27: Sealing Venturi Nozzle

Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must hold the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In event of leaks, check cooling system for leaks.

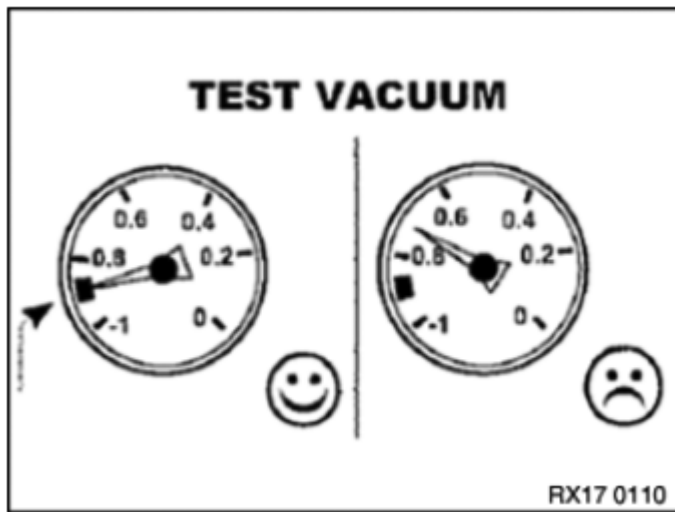


Fig. 28: Testing Cooling System Vacuum

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.

Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shut-off valve (A) to filling unit container.

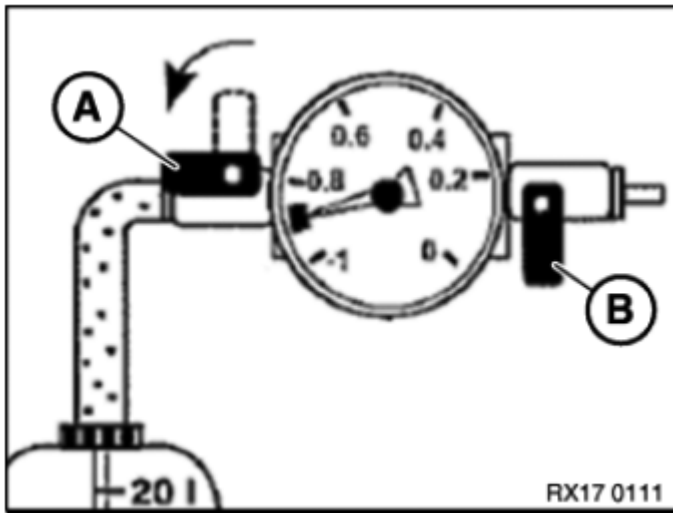


Fig. 29: Opening Shut-Off Valve To Filling Unit Container
Courtesy of BMW OF NORTH AMERICA, INC.

Coolant is now added.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

If necessary, reduce remaining vacuum. Open shut-off valve (B) to do so.

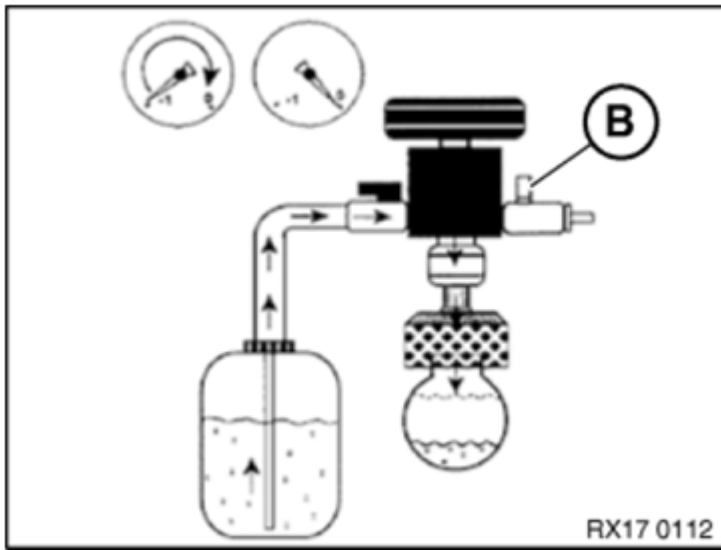


Fig. 30: Identifying Shut-Off Valve

Courtesy of BMW OF NORTH AMERICA, INC.

Remove filling unit with adapter from expansion tank.

Adjust coolant level to maximum.

Close coolant expansion tank.

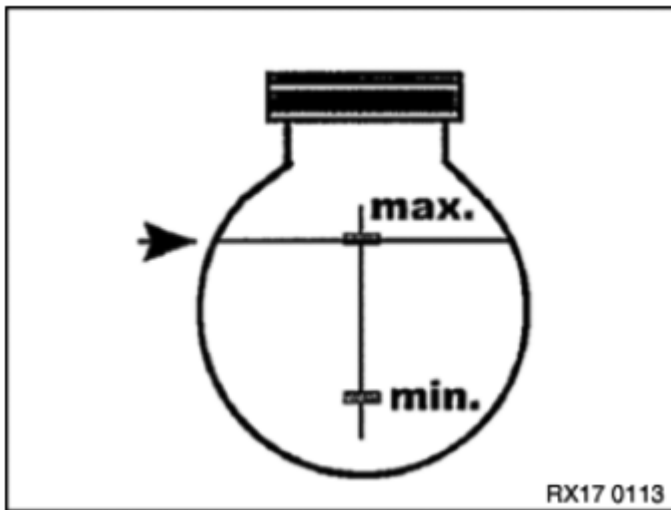


Fig. 31: Adjusting Coolant Level To Max

Courtesy of BMW OF NORTH AMERICA, INC.

After the cooling system has been filled with the vacuum filling unit, another bleeding procedure must be performed for vehicles with an electric coolant pump:

NOTE: Do not open the coolant expansion tank cap during the bleeding procedure.

Switch on the low-beam headlights to perform the bleeding procedure. If the low-beam headlights are not switched on, the ignition (Terminal 15) will switch off automatically after a certain period of time and interrupt the bleeding procedure.

1. Connect battery charger.
2. Switch the ignition on.
3. Switch on low-beam headlight.
4. Set heating to maximum temperature. Take back blower to smallest stage.
5. FES (driving experience switch) must not be in ECO PRO!
6. Press accelerator pedal for 10 seconds to floor. Engine must not be started.
7. The venting procedure is started when the accelerator pedal is pressed and takes approx. 12 minutes. (Electric coolant pump was activated and shuts down automatically after approx. 12 min).
8. Then adjust fluid level in the coolant expansion tank to maximum.
9. Check cooling system for leaks.
10. If the ventilation has to be performed again, deactivate DME completely (remove ignition key for approx. 3 minutes). Then repeat from point 3.

Check function of cooling system.

Check cooling system for tightness.

17 00 515 CHECKING FUNCTION OF RADIATOR AND HEATING SYSTEM

WARNING: Danger of scalding!

Only carry out work on cooling system after engine has cooled down.

Necessary preliminary tasks:

- Switch off ignition.
- Remove air duct.
- Remove fan cowl with electronic fan.

Check production date.

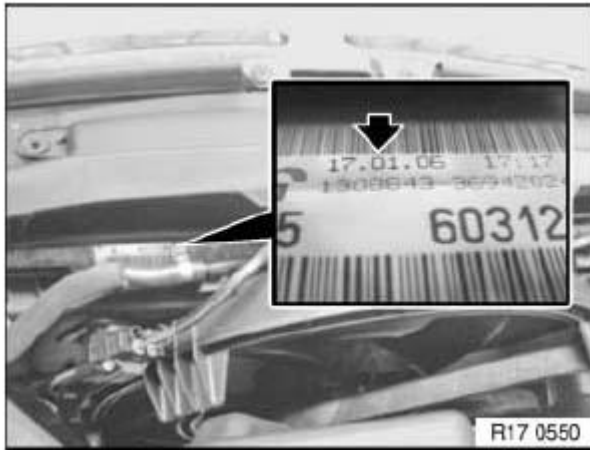


Fig. 32: Identifying Production Date

Courtesy of BMW OF NORTH AMERICA, INC.

Clamp off low-temperature feed lines with special tool 13 3 010.

Function test:

Observe diagnosis instructions.

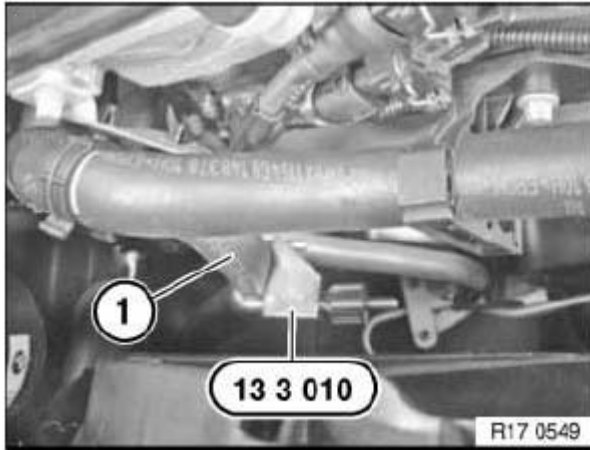


Fig. 33: Identifying Special Tools

Courtesy of BMW OF NORTH AMERICA, INC.

Check function of radiator.

Clamp off low-temperature feed line (1) at coolant pump outlet **or** radiator inlet with special tool 13 3 010 (see arrows).

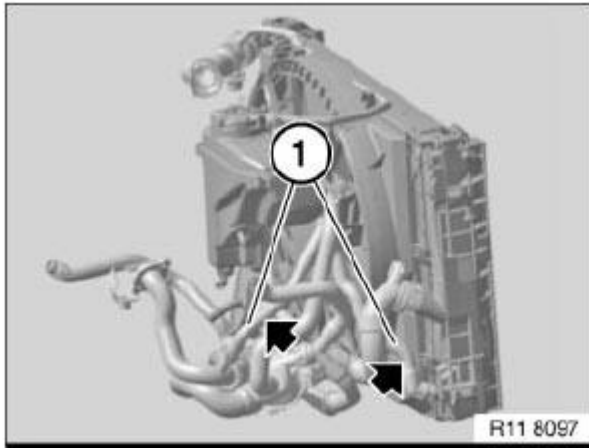


Fig. 34: Identifying Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission only

Check function of heat exchanger.

Clamp off low-temperature feed line (1) at coolant pump outlet with special tool 13 3 010 (see arrow).

Clamp off low-temperature feed line (2) at oil-coolant heat exchanger with special tool 13 3 010 (see arrow).

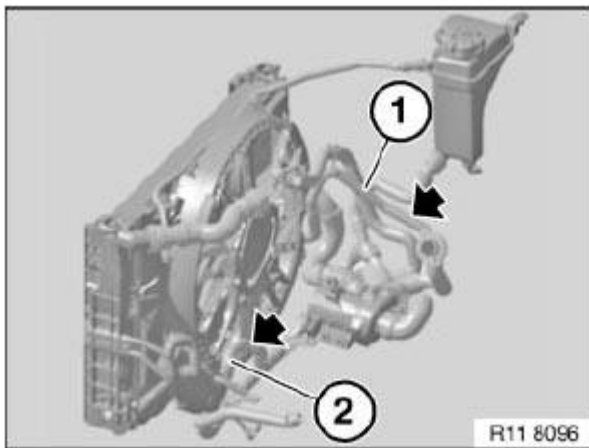


Fig. 35: Identifying Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Check heating and cooling circuits in accordance with diagnosis instruction.

ENGINE RADIATOR

64 53... INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND

RADIATOR/COOLERS

IMPORTANT: Even when they are correctly installed or due to normal driving, coolers (oil cooler, radiator, charge air cooler) or air conditioning capacitors may show slight impressions or deformations on their discs (picture).

This is not damage.

Radiators, cooler or capacitors are not to be replaced in this case.

NOTE: The deformations shown in illustration "1" (see [Fig. 36](#)) can be bent back with a standard fin comb.

Damage to lines carrying media or on the flat pipe require replacement of the radiator/ or air conditioning condenser. Examples of such damage are shown in illustrations "2", "3", "4", "5", and "6" (see [Fig. 36](#)).

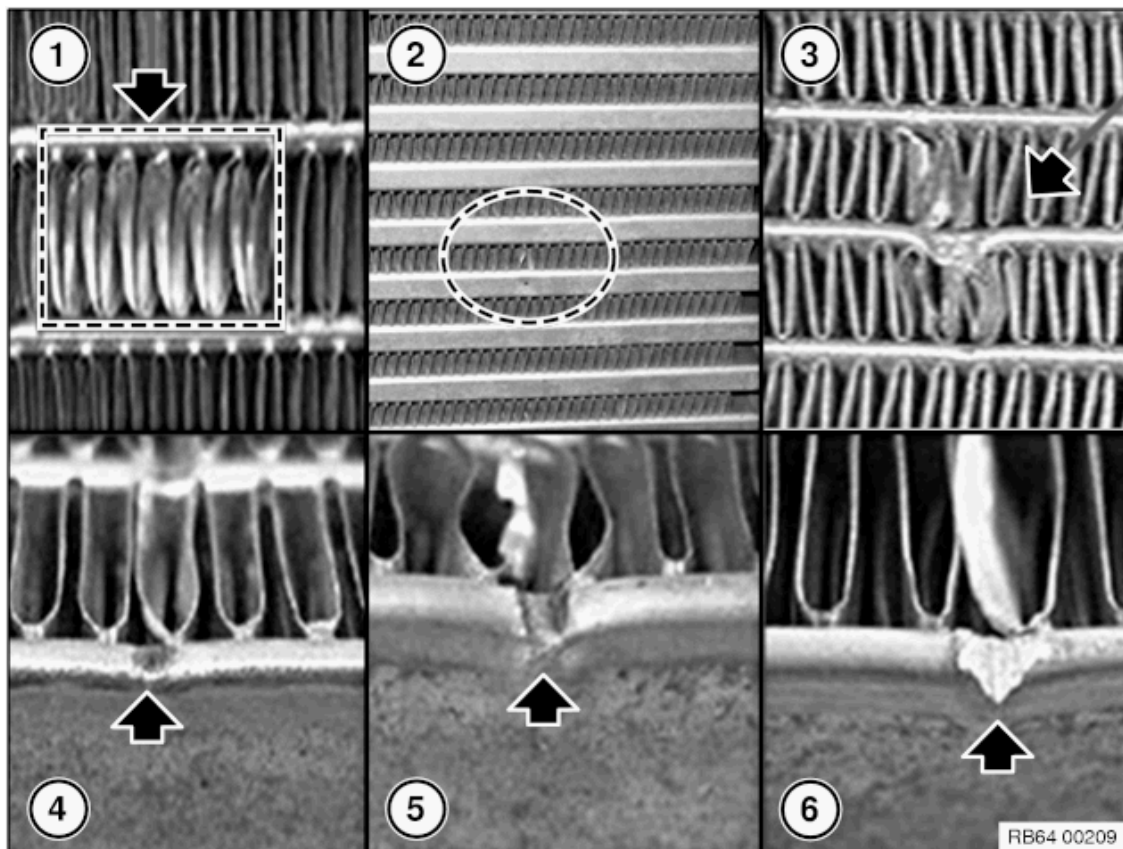


Fig. 36: Identifying Damage And Deformations
Courtesy of BMW OF NORTH AMERICA, INC.

REMOVING RADIATOR COVER

Illustrations show M54:

IMPORTANT: Do not place front panel center section (2) on jump start terminals.
Do not kink Bowden cables for engine hood locking.

Release screws (1).

Remove front panel center section (2) in direction of arrow and place to one side.

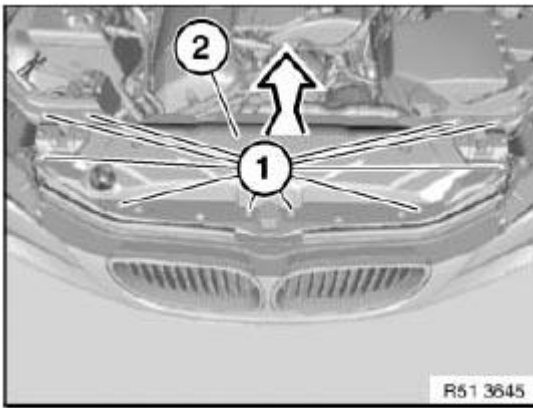


Fig. 37: Removing Front Panel Center Section And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Illustrations show M54:

Release screws (1).

Remove radiator cover (2) in direction of arrow.

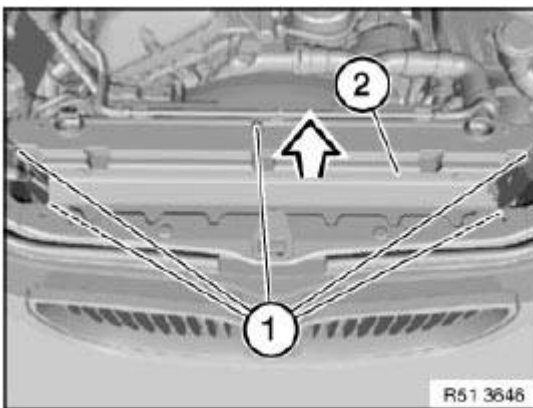


Fig. 38: Removing Radiator Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

17 11 000 REMOVING AND INSTALLING RADIATOR

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Necessary preliminary tasks:

- Follow **INSTRUCTIONS FOR WORKING** on cooling system
- Remove **FAN COWL**
- Drain coolant

Release and disconnect coolant hoses (1).

Lift out radiator (2).

Installation:

Coolant hoses must audibly snap into place.

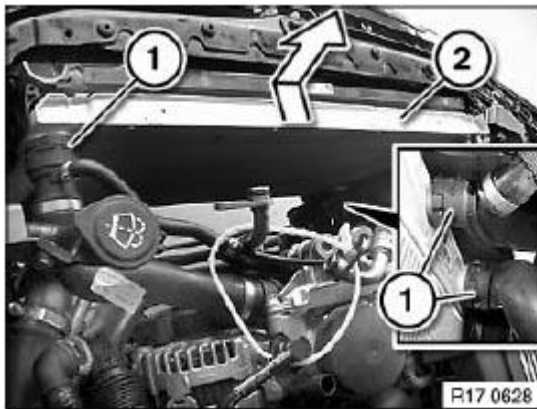


Fig. 39: Lifting Out Radiator

Courtesy of BMW OF NORTH AMERICA, INC.

17 11 035 REPLACING FAN COWL WITH ELECTRIC FAN

Switch off ignition

Necessary preliminary tasks:

- Remove **RADIATOR COVER**
- Disconnect **ENGINE OIL LINES**
- Remove **FRONT UNDERBODY PROTECTION**

Lay coolant line (1) over engine.

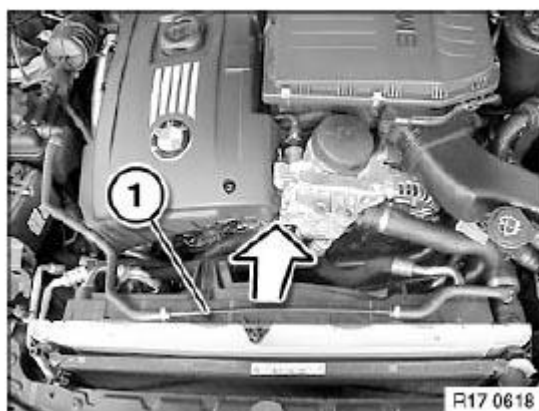


Fig. 40: Laying Coolant Line Over Engine
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

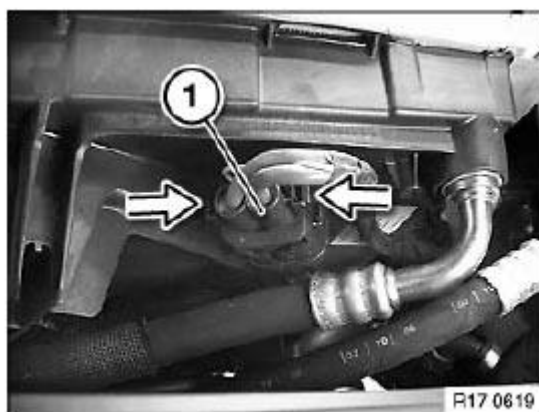


Fig. 41: Unlocking Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip left lines (1) at lower section of fan cowl from holder.

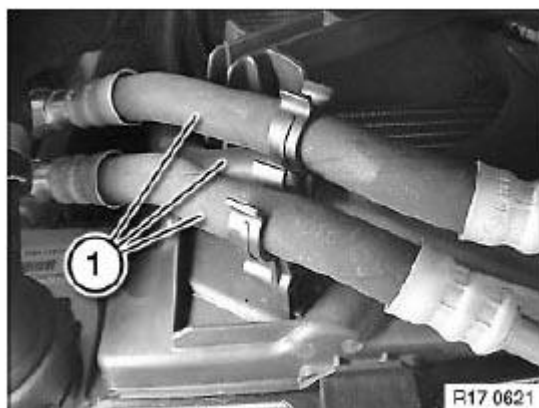
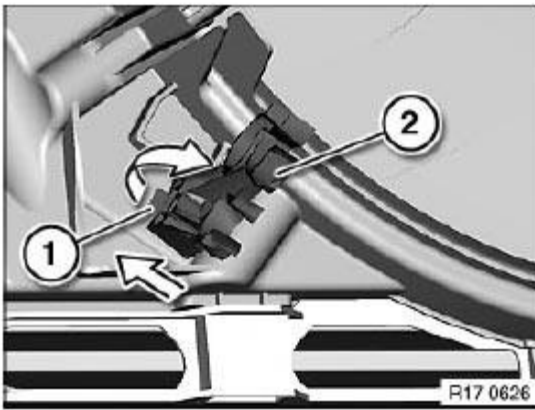


Fig. 42: Identifying Left Lines At Lower Section Of Fan Cowl From Holder

Courtesy of BMW OF NORTH AMERICA, INC.

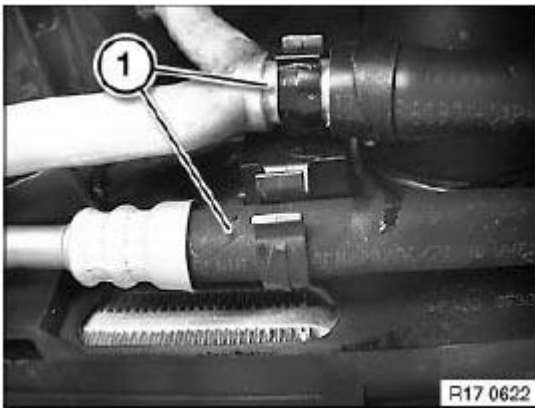
Pull clip (1) on holder (2) in direction of arrow and slide down holder (2) in direction of arrow.

NOTE: For purposes of clarity, this work step is shown with the component removed.

**Fig. 43: Pulling Clip On Holder**

Courtesy of BMW OF NORTH AMERICA, INC.

Unclip right lines (1) at lower section of fan cowl from holder.

**Fig. 44: Identifying Right Lines At Lower Section Of Fan Cowl From Holder**

Courtesy of BMW OF NORTH AMERICA, INC.

Slide screwdriver (1) under holder (2) and press towards radiator. At the same time slowly slide holder (2) under in direction of arrow.

NOTE: For purposes of clarity, this work step is shown with the component removed.

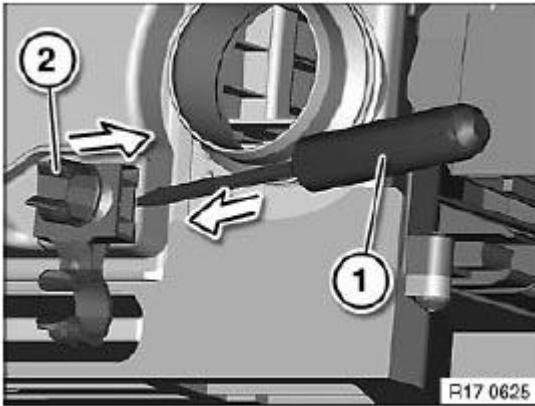


Fig. 45: Sliding Screwdriver Under Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through cable tie (1).

NOTE: For purposes of clarity, this work step is shown with the component removed.

Installation:

Replace cable ties.

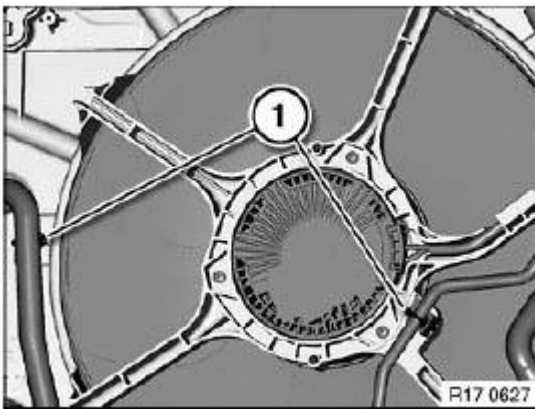


Fig. 46: Identifying Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fan cowl (1) in direction of arrow.

IMPORTANT: Set down fan cowl in upright position, otherwise oil will escape from engine oil cooler.



Fig. 47: Removing Fan Cowl

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up if necessary.
Check function of DME.

17 11 100 REMOVING AND INSTALLING/REPLACING COOLANT EXPANSION TANK

Necessary preliminary tasks:

- Drain coolant from radiator

Release and disconnect coolant hoses (1).

Release screws.

Raise expansion tank, unlock plug on coolant level switch and disconnect.

Remove coolant expansion tank (2).

Installation:

Insert locating pin in rubber grommet.

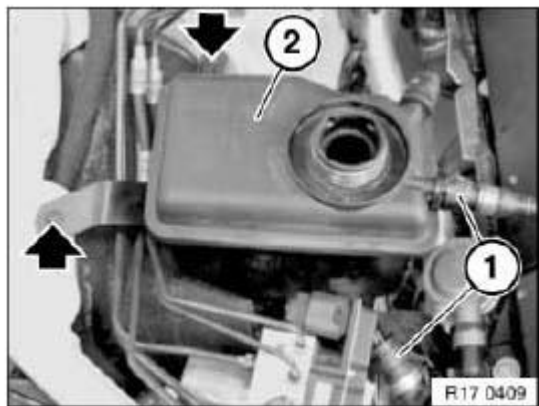


Fig. 48: Identifying Coolant Hoses And Coolant Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Check cooling system for leaks.

17 11 150 REMOVING AND INSTALLING/REPLACING ENGINE OIL COOLER

Necessary preliminary tasks:

- Remove **FAN COWL**

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Recycling:

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Release screw (1).

Tightening torque **17 21 2AZ**.

Detach oil line (2) from engine oil cooler flange.

Catch and dispose of emerging fluid.

Hang oil line upwards so that no more oil can escape.

The same procedure applies to the second oil line.

Installation:

Replace sealing rings.

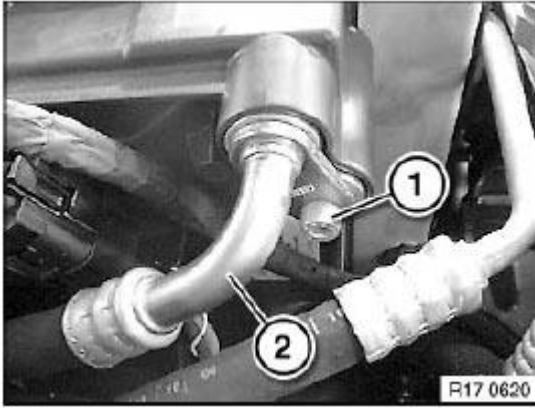


Fig. 49: Identifying Oil Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed out engine oil cooler and remove.

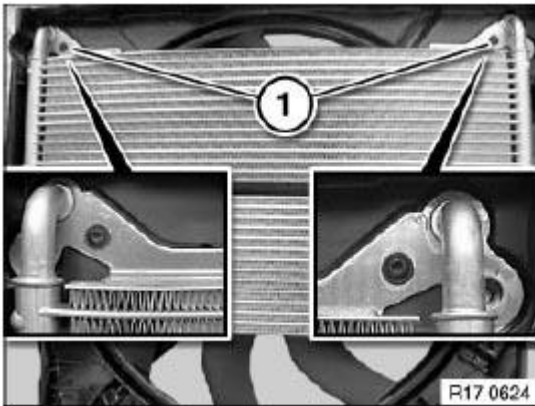


Fig. 50: Identifying Engine Oil Cooler Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up if necessary.

OIL COOLER

64 53... INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

IMPORTANT: Even when they are correctly installed or due to normal driving, coolers (oil cooler, radiator, charge air cooler) or air conditioning capacitors may show slight impressions or deformations on their discs (picture).

This is not damage.

Radiators, cooler or capacitors are not to be replaced in this case.

NOTE: The deformations shown in illustration "1" (see [Fig. 51](#)) can be bent back with a standard fin comb.

Damage to lines carrying media or on the flat pipe require replacement of the radiator/ or air conditioning condenser. Examples of such damage are shown in illustrations "2", "3", "4", "5", and "6" (see [Fig. 51](#)).

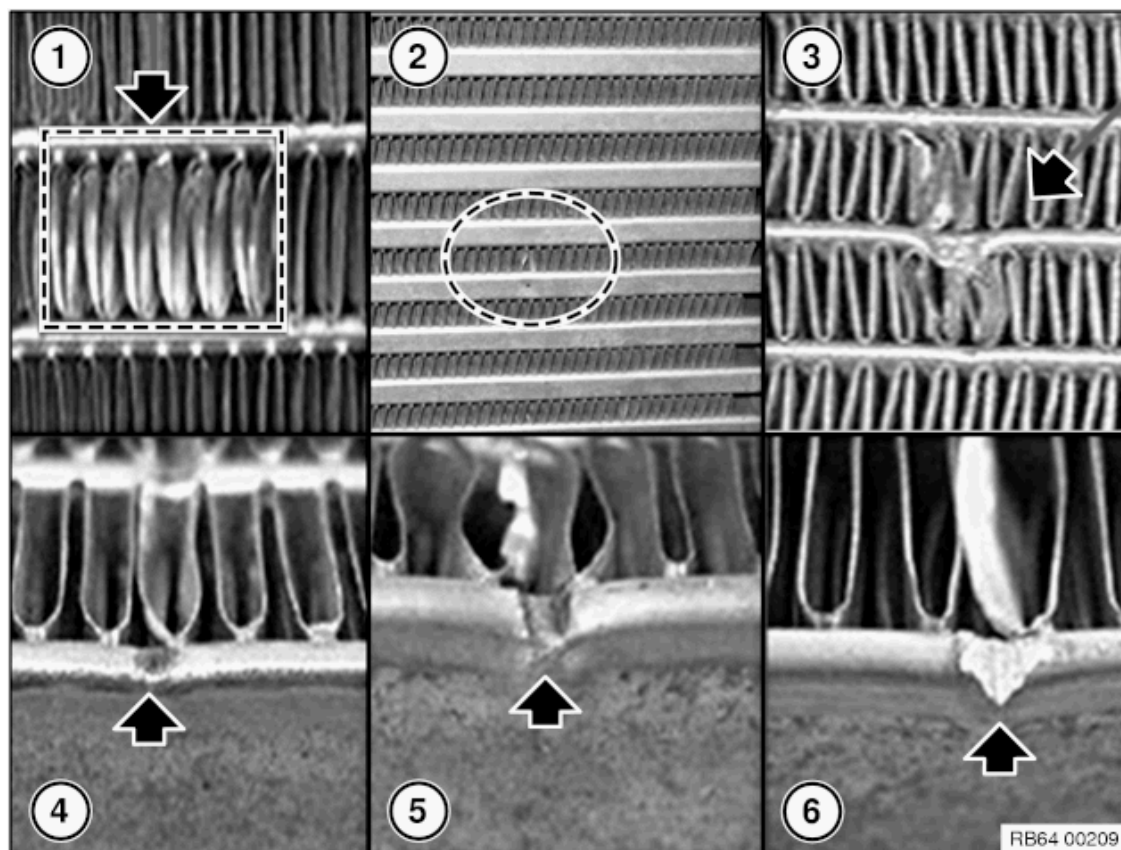


Fig. 51: Identifying Damage And Deformations
Courtesy of BMW OF NORTH AMERICA, INC.

17 21 500 FLUSHING OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

Special tools required:

17 2 018

17 2 019

NOTE: Carry out the work steps listed when:
Fitting a new or replacement transmission
Flushing can only be carried out with the automatic transmission removed.

Procedure:

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect the connecting line **17 2 019** from the oil collection unit with the quick-release coupling.

Connect drain line **17 2 018** using quick-release coupling.

Feed open end of drain line into a suitable collection container.

Using oil collection unit, flush approx. 1 liter of transmission fluid through oil lines and oil cooler.

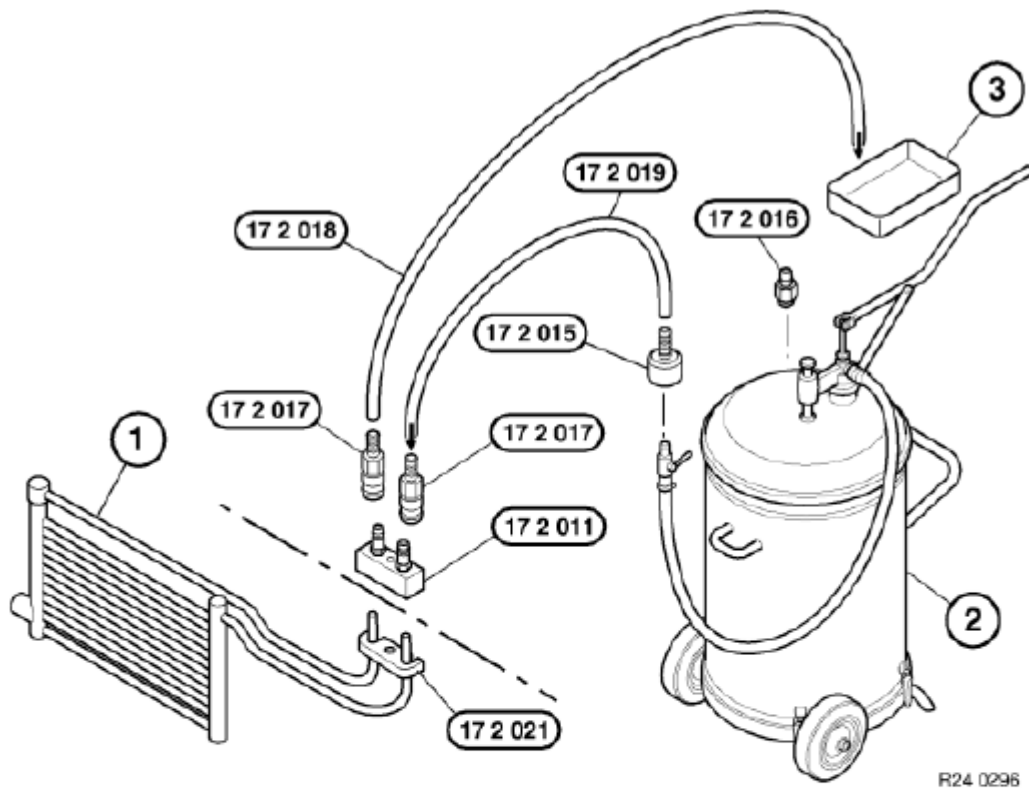
Reposition quick-release couplings.

Flush oil lines/oil cooler in opposite direction with approx. 1 liter of transmission fluid .

Disconnect quick-release couplings, remove adapters.

NOTE: Dispose of flushing oil properly; do not under any circumstances reuse it.

Arrangement of flushing device for transmission A5S 310Z, A5S, 560Z, A5S 360R/390R, A4S 200R, A5S 325Z, GA6HP26Z



R24 0296

- 1) Transmission-oil cooler with lines
- 2) Oil collection unit
- 3) Oil drip tray

17 2 011 Adapter for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

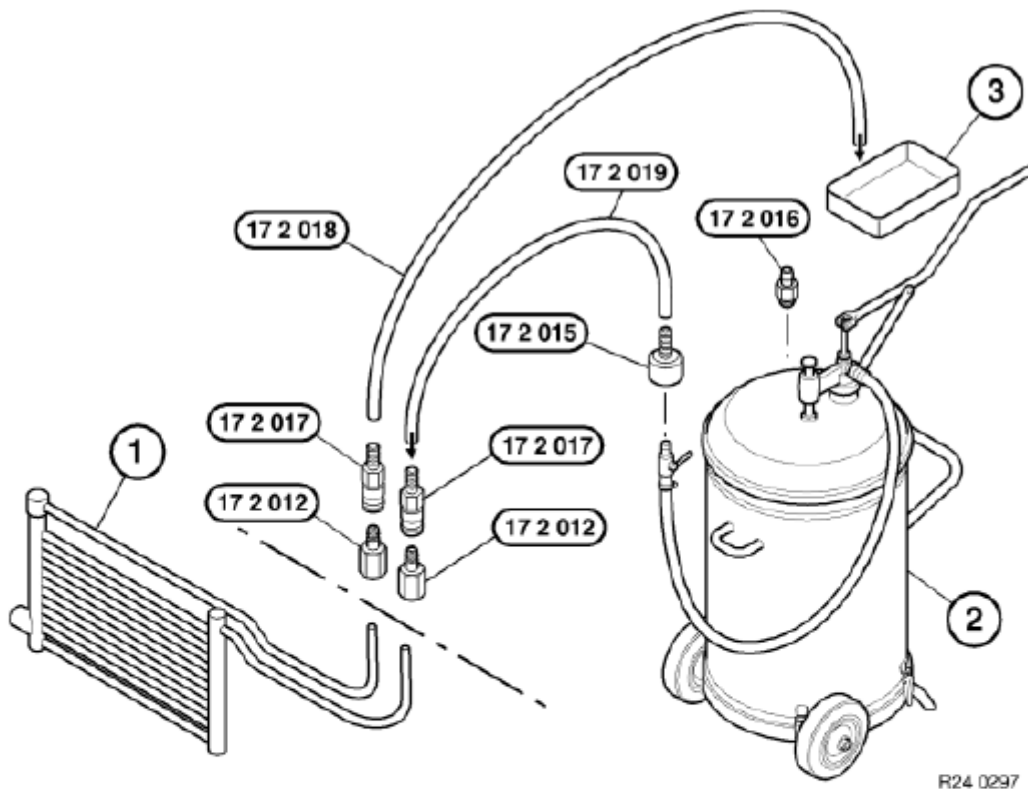
17 2 019 Hose to oil collection unit (2)

17 2 021 Mounting plate for adapter 17 2 011 for transmissions A5S 325Z, GA6HP26Z

Fig. 52: Identifying Radiator Flushing Procedure

Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing device for transmission A4S 310R



- 1) Transmission-oil cooler with lines
- 2) Oil collection unit
- 3) Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecaletit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

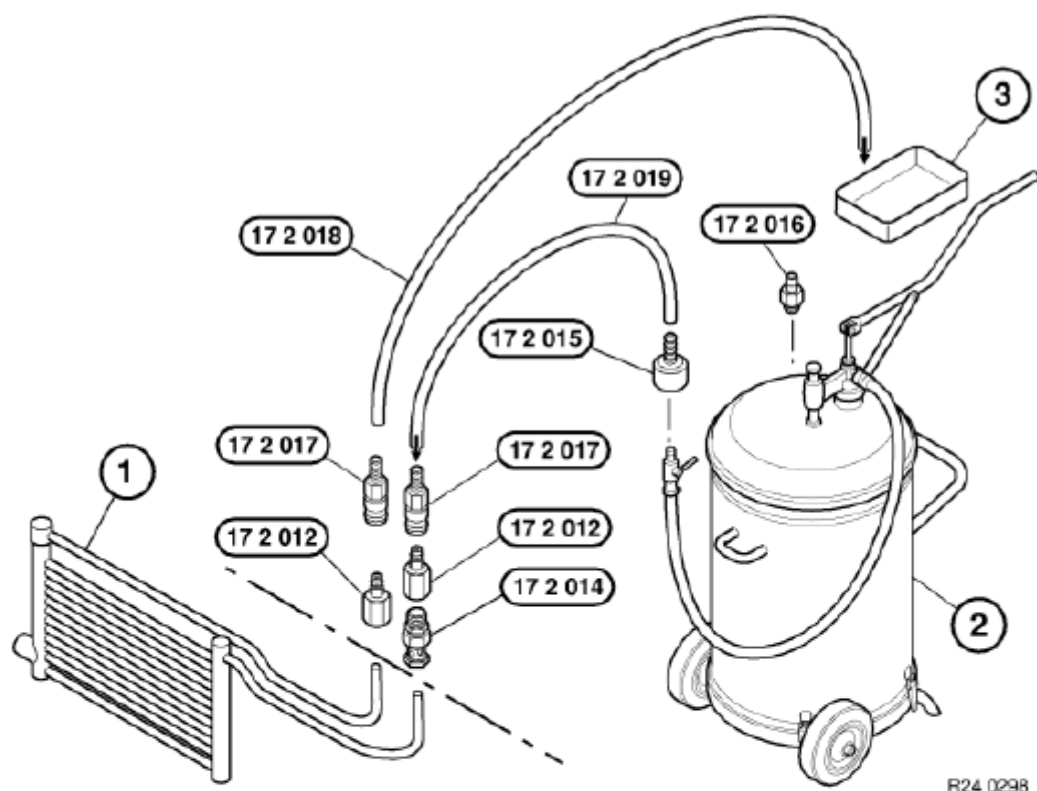
17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Fig. 53: Identifying Radiator Flushing Procedure

Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing device for transmission A4S 300J



R24 0298

- 1) Transmission-oil cooler with lines
- 2) Oil collection unit
- 3) Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecaletit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

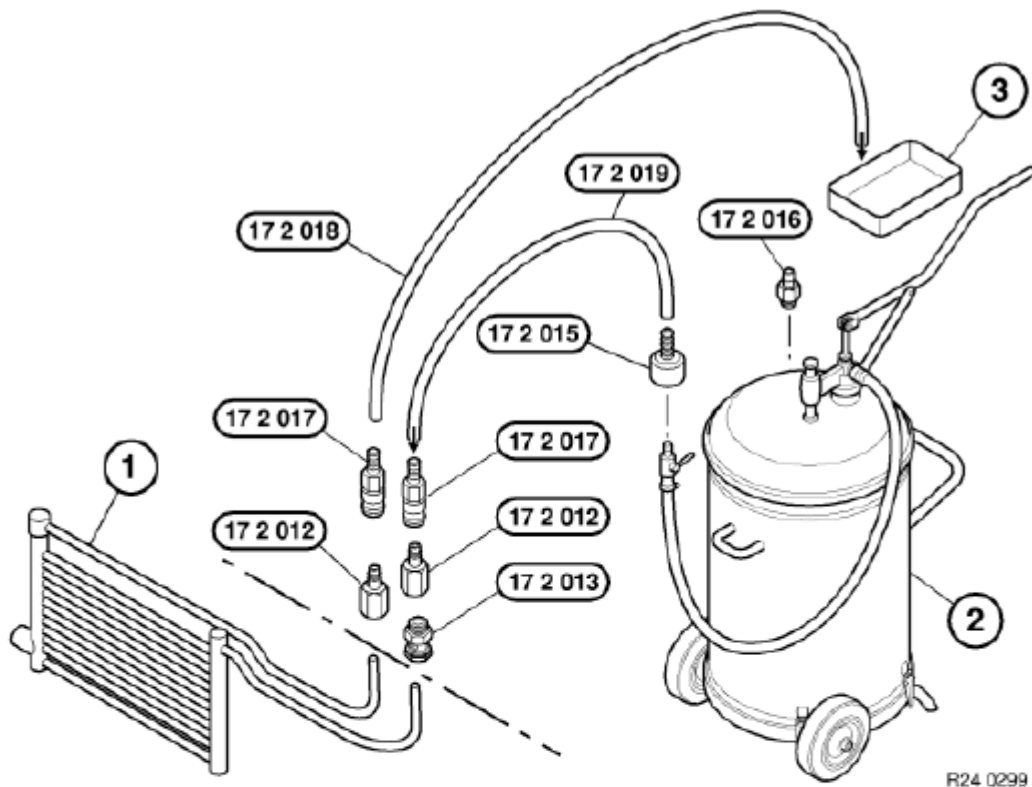
17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Fig. 54: Identifying Radiator Flushing Procedure
 Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing device for transmission A5S 440Z



R24 0299

- 1) Transmission-oil cooler with lines
- 2) Oil collection unit
- 3) Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecaletit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Fig. 55: Identifying Radiator Flushing Procedure

Courtesy of BMW OF NORTH AMERICA, INC.

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION) (GA6HP19Z, GA6HP26Z, GA6HP32Z)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to **AUTOMATIC TRANSMISSION - OPERATING FLUIDS**) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid (refer to **AUTOMATIC TRANSMISSION - OPERATING FLUIDS**).

Disconnect quick-release couplings.

Remove adapter.

NOTE: **Dispose of flushing oil correctly.**
 Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

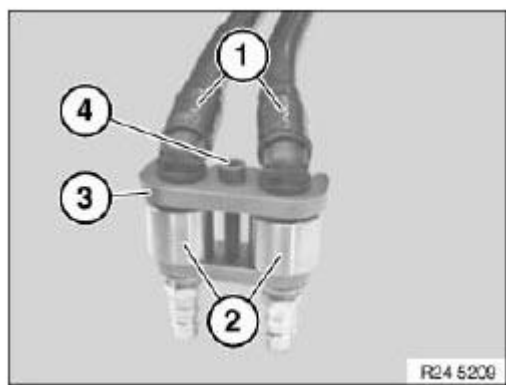
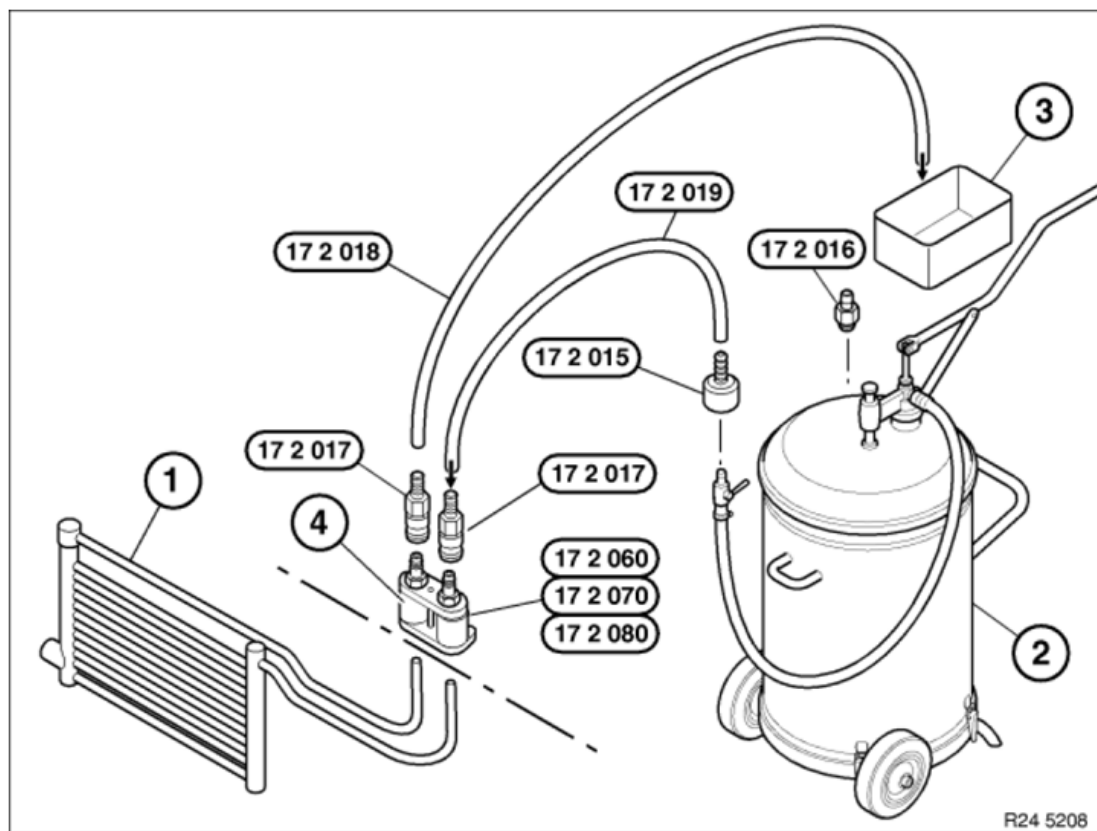


Fig. 56: Identifying Hydraulic Lines, Adapters, Clamping Bar With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for transmissions GA6HP19Z, GA6HP26Z, GA6HP32Z



1) Transmission-oil cooler with lines

2) Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecaletit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 019 Hose to oil collection unit (2)

3) Oil drip tray

17 2 018 Hose to oil drip tray (3)

4) Adapter with clamping bar

17 2 060 Adapter with clamping bar for aluminium lines and steel lines with aluminium connection (line diameter 12 mm) GA6HP19Z

17 2 070 Adapter with clamping bar (line diameter 15 mm) GA6HP26Z, GA6HP32Z, TCT for N54 engine

17 2 080 Adapter with clamping bar for fuel lines GA6HP26Z

Fig. 57: Arrangement - Flushing Apparatus For Transmissions (GA6HP19Z, GA6HP26Z, GA6HP32Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission-oil cooler with lines

2. Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 019 Hose to oil collection unit (2)

3. Oil drip tray

17 2 018 Hose to oil drip tray (3)

4. Adapter with clamping bar

17 2 060 Adapter with clamping bar for aluminium lines and steel lines with aluminium connection (line diameter 12 mm) GA6HP19Z

17 2 070 Adapter with clamping bar (line diameter 15 mm) GA6HP26Z, GA6HP32Z, TCT for N54 engine

17 2 080 Adapter with clamping bar for fuel lines GA6HP26Z

OIL COOLER LINES

64 53... INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

IMPORTANT: Even when they are correctly installed or due to normal driving, coolers (oil cooler, radiator, charge air cooler) or air conditioning capacitors may show slight impressions or deformations on their discs (picture).

This is not damage.

Radiators, cooler or capacitors are not to be replaced in this case.

NOTE: The deformations shown in illustration "1" (see [Fig. 58](#)) can be bent back with a standard fin comb.

Damage to lines carrying media or on the flat pipe require replacement of the radiator/ or air conditioning condenser. Examples of such damage are shown in illustrations "2", "3", "4", "5", and "6" (see [Fig. 58](#)).

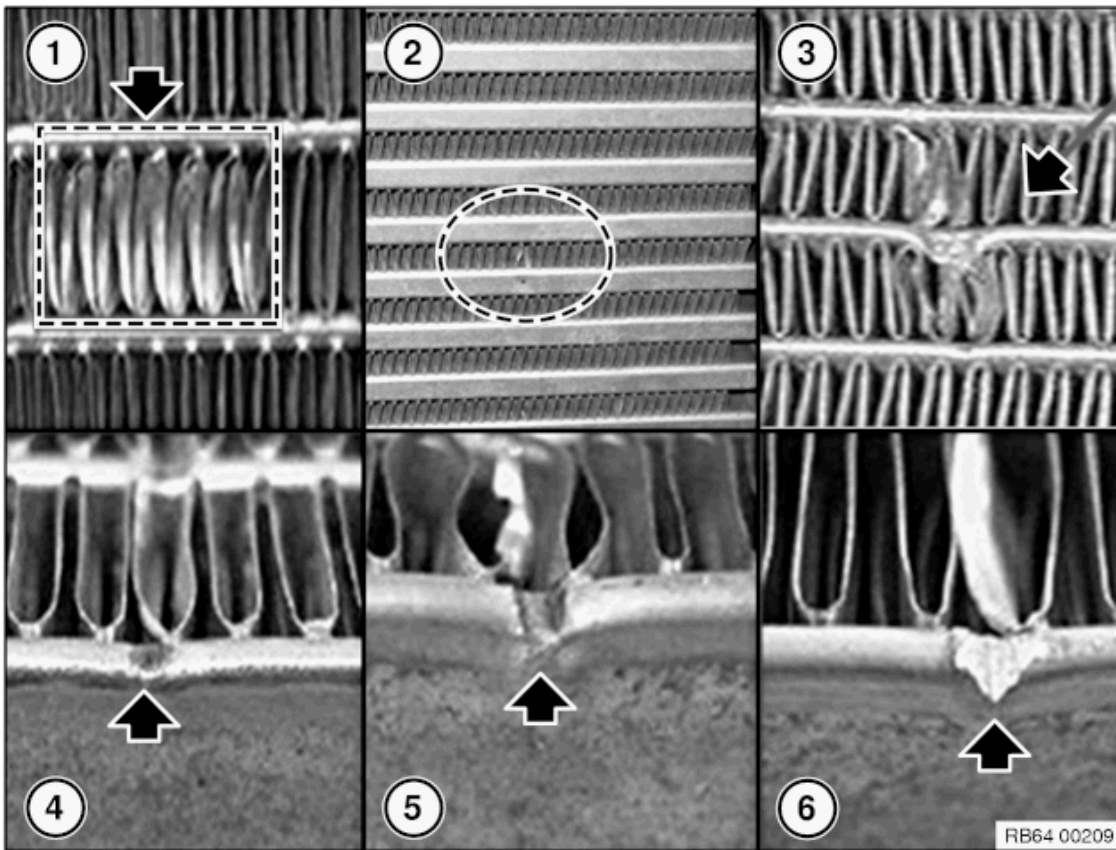


Fig. 58: Identifying Damage And Deformations
 Courtesy of BMW OF NORTH AMERICA, INC.

17 22 030 REMOVING AND INSTALLING/REPLACING OIL LINE FOR ENGINE OIL COOLER

WARNING: Danger of scalding!
 Only perform this work after engine has cooled down.

IMPORTANT: Wear protective gloves and goggles.

Recycling:

Engine oil escapes when oil line is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

REMOVE FAN COWL

Release screw.

Tightening torque **17 22 1AZ** .

Detach oil line from oil filter control housing.

Catch and dispose of emerging fluid.

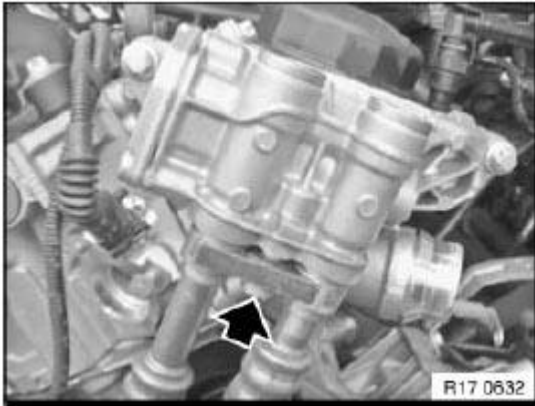


Fig. 59: Detaching Oil Line From Oil Filter Control Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1).

Tightening torque **17 22 2AZ**

Disconnect oil line (2) from engine oil cooler flange and remove.

Catch and dispose of emerging fluid.

IMPORTANT: When tightening down the bolt, use suitable means/equipment to prevent the flange from twisting.

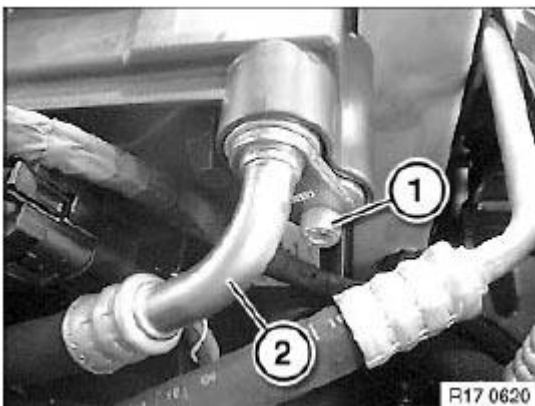
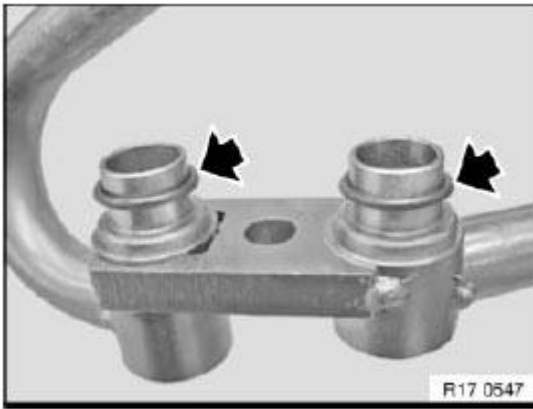


Fig. 60: Identifying Oil Line And Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all sealing rings on oil line.

**Fig. 61: Locating Sealing Rings On Oil Line**

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up if necessary.

CHANGE AIR COOLER

64 53... INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

IMPORTANT: Even when they are correctly installed or due to normal driving, coolers (oil cooler, radiator, charge air cooler) or air conditioning capacitors may show slight impressions or deformations on their discs (picture).

This is not damage.

Radiators, cooler or capacitors are not to be replaced in this case.

NOTE: The deformations shown in illustration "1" (see [Fig. 62](#)) can be bent back with a standard fin comb.

Damage to lines carrying media or on the flat pipe require replacement of the radiator/ or air conditioning condenser. Examples of such damage are shown in illustrations "2", "3", "4", "5", and "6" (see [Fig. 62](#)).

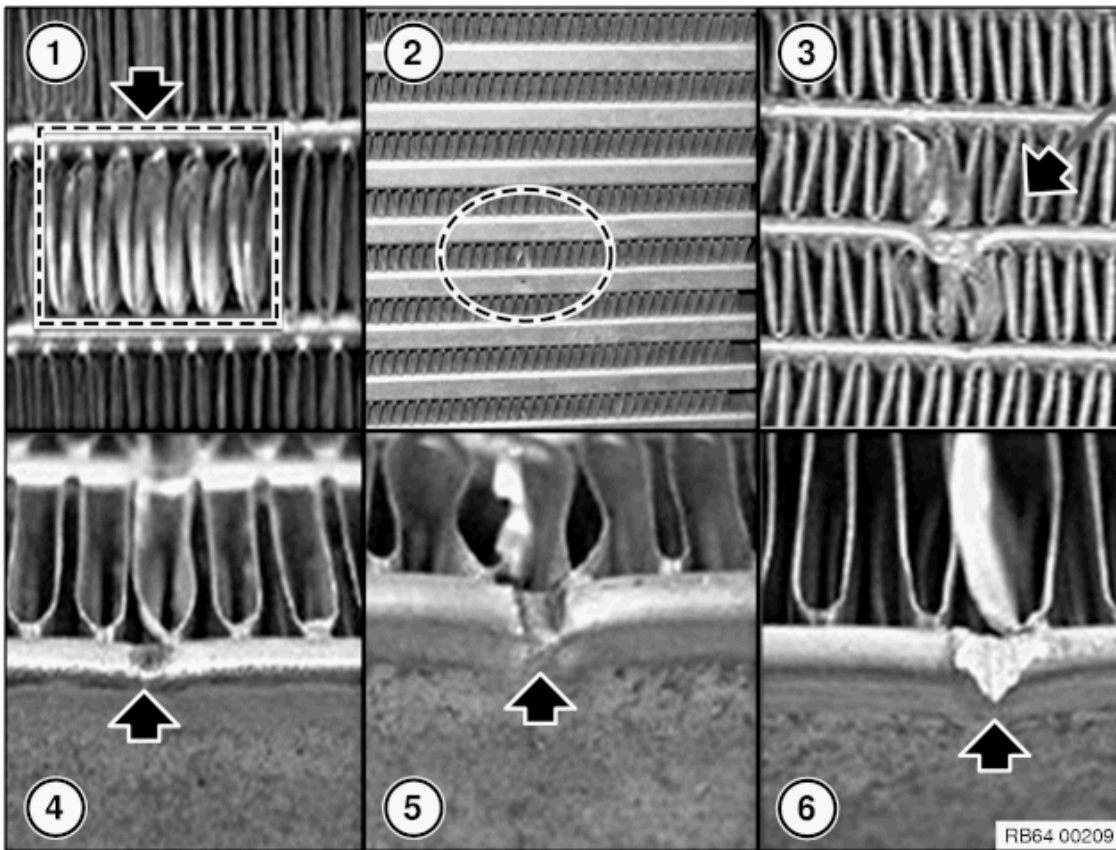


Fig. 62: Identifying Damage And Deformations
 Courtesy of BMW OF NORTH AMERICA, INC.

17 51 000 REMOVING AND INSTALLING/REPLACING INTERCOOLER

Special tools required:

- 11 8 670

Necessary preliminary tasks:

- Remove **FRONT UNDERBODY PROTECTION**
- Unlock charge-air duct on left and right of intercooler and detach

IMPORTANT: Coat sealing rings of quick-connect couplings with antiseize agent. Pressure pipes cannot be fitted without antiseize agent.

Release screws. (Picture shows right side).

Open quick-connect couplings on charge-air hoses.

Remove intercooler.

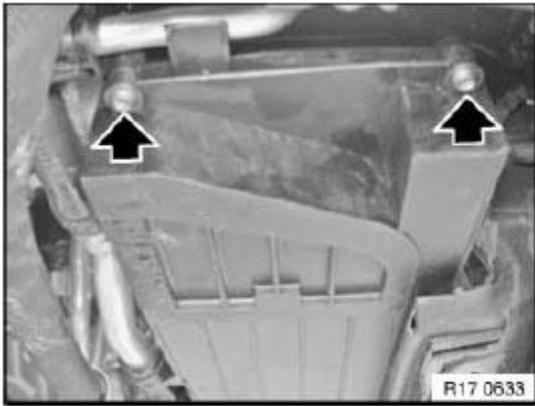


Fig. 63: Locating Intercooler Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

**CAUTION: Risk of damage to sealing rings!
Special tool 11 8 670 is essential!**

- Coat sealing rings with antiseize agent.
- Attach charge-air duct (1) with special tool **11 8 670** to intercooler (2).
- Charge-air ducts must audibly snap into place.

Texts refer to and illustrations show the right side. The procedure is identical for the left side.

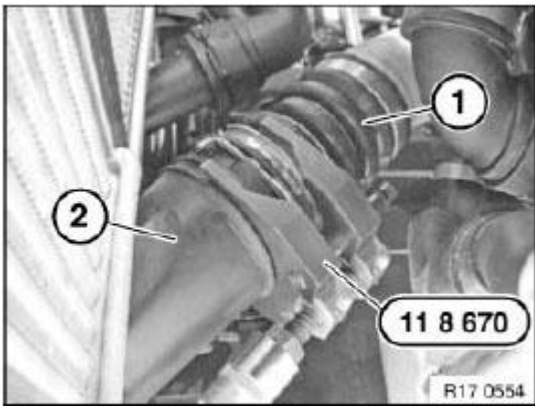


Fig. 64: Locating Charge-Air Duct And Intercooler

Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND EQUIPMENT

Cruise Control Systems - Repair Instructions

RADIO-CONTROLLED LOCKING SYSTEM

66 12 100 REMOVING AND INSTALLING/REPLACING SLIDE-IN UNIT FOR RADIO-OPERATED KEY

Necessary preliminary tasks:

- Remove **FIXTURE FOR STEERING COLUMN STALK** .

Release screws (1).

Remove the radio-operated key insert (2) from the steering column switch intake (3).

IMPORTANT: Carefully unlock and disconnect associated plug connection for ribbon cable.

Replace the ribbon cable if damaged.

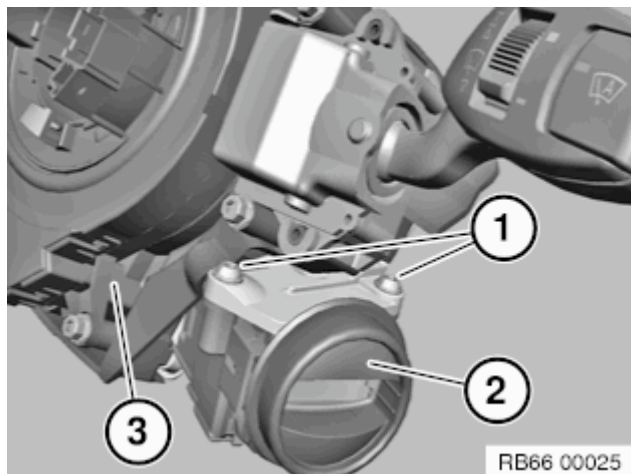


Fig. 1: Removing Radio Operated Key Insert From Steering Column Switch Intake
Courtesy of BMW OF NORTH AMERICA, INC.

PARK DISTANCE CONTROL

66 20 508 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT (PARK DISTANCE CONTROL)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM**
- Remove spare wheel.

Take off cover for control units (1).

Installation:

Make sure cover for control units (1) is correctly seated on locating pins (2).

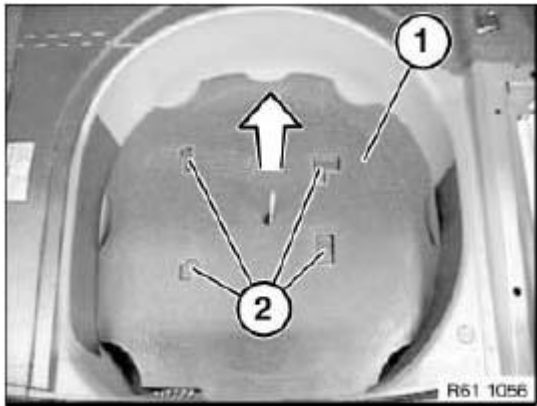


Fig. 2: Identifying Control Units And Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Lift control unit (2) out of mounting for control units (3).

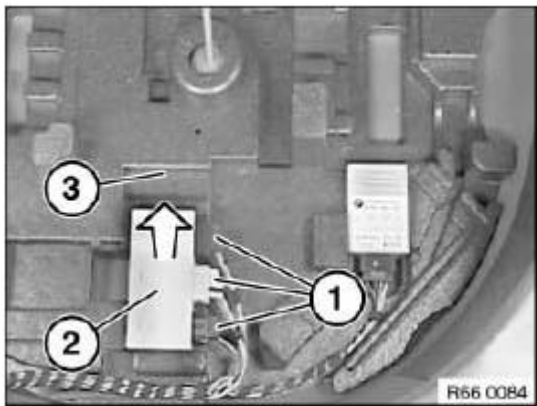


Fig. 3: Lifting Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

CARMANUALSUSA

Saturday, September 05, 2015 9:13:11 AM

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Carry out **PROGRAMMING/CODING** .

66 20 520 REMOVING AND INSTALLING/REPLACING AN ULTRASONIC TRANSDUCER AT FRONT (PARK DISTANCE CONTROL)

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM** .

Unfasten plug connection (1) and disconnect.

Unlock catches (2) in direction of arrow and pull ultrasonic transducer (3) out of bracket (4).

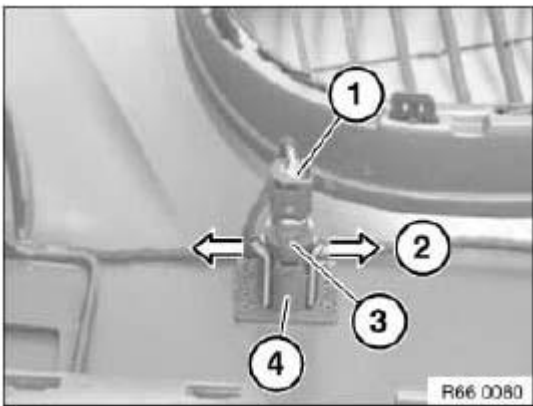


Fig. 4: Unlocking Catches And Pulling Ultrasonic Transducer
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) of ultrasonic transducer (2) must engage exactly in mountings (3).

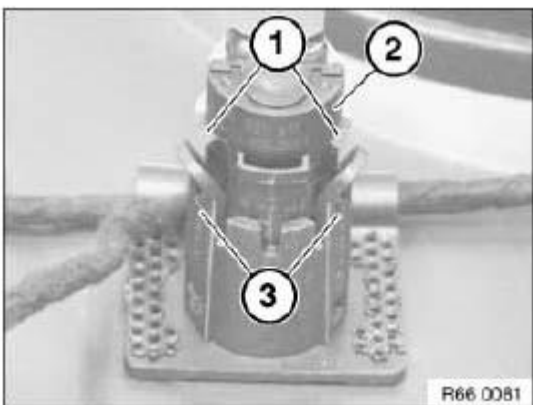


Fig. 5: Identifying Hooks, Ultrasonic Transducer And Mountings
Courtesy of BMW OF NORTH AMERICA, INC.

66 20 540 REMOVING AND INSTALLING/REPLACING A REAR ULTRASONIC TRANSDUCER (PARK DISTANCE CONTROL)

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM**.

Unfasten plug connection (1) and disconnect.

Unlock catches (2) in direction of arrow and pull ultrasonic transducer (3) out of bracket (4).

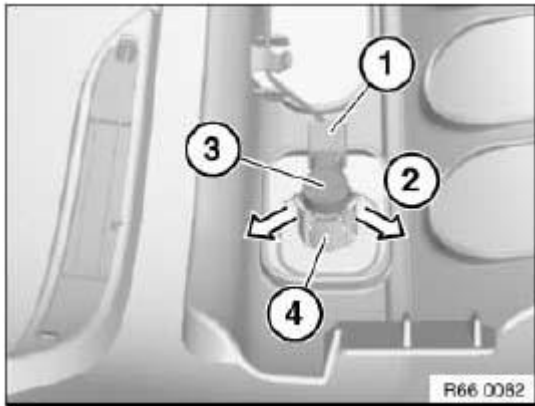


Fig. 6: Unlocking Catches And Pulling Ultrasonic Transducer
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) of ultrasonic transducer (2) must engage exactly in mountings (3).

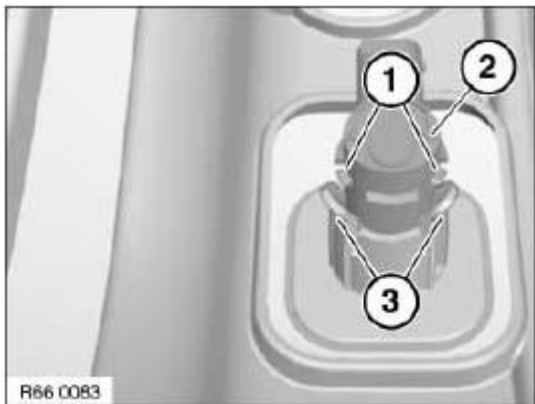


Fig. 7: Identifying Hooks, Ultrasonic Transducer And Mountings
Courtesy of BMW OF NORTH AMERICA, INC.

ADAPTIVE CRUISE CONTROL

66 31... REPLACING SCREWS ON ACC SENSOR UNIT

Necessary preliminary tasks:

- Remove **ACC SENSOR**

IMPORTANT: Visually inspect sensor housing for damage/leaks.

Replace ACC sensor if sensor housing is damaged.

Grip sensor housing (1) by screw in a vice (2).

Release screw by turning sensor housing (2).

IMPORTANT: After releasing screws, check sensor housing (1) again for damage.

Replace ACC sensor if sensor housing (1) is damaged.

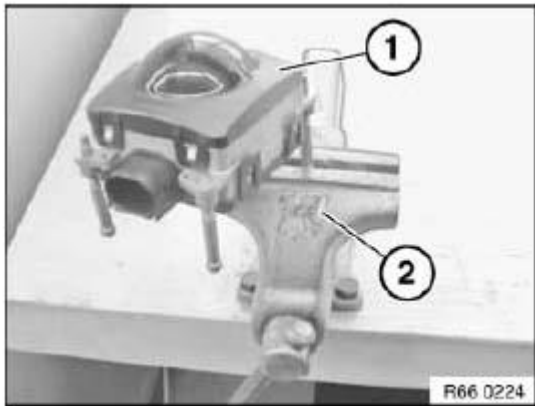


Fig. 8: Identifying Sensor Housing And Screw In Vice
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, graphic show ACC sensor holder removed.

Replace plastic nuts (1).

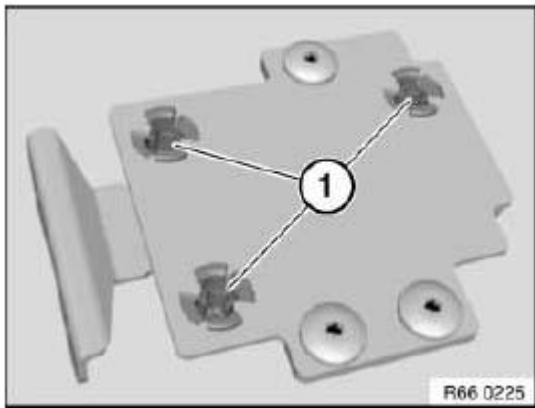


Fig. 9: Identifying Plastic Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Carry out rough adjustment of ACC sensor (1) at adjusting screws (2).

- Measurement A [mm]: 42.5 to 43.5

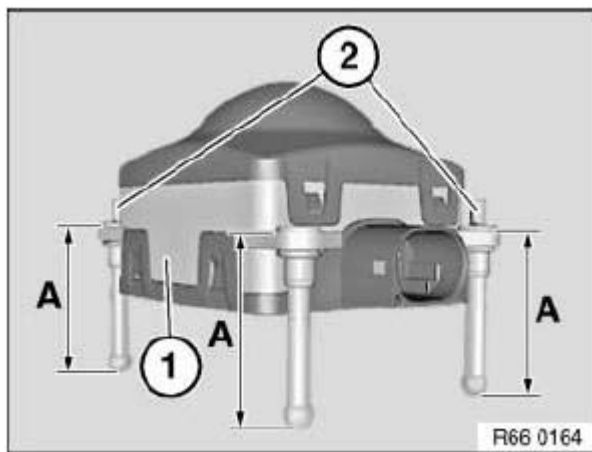


Fig. 10: Identifying ACC Sensor And Adjusting Screws Measurement

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Adjust ACC SENSOR

66 31 001 ADJUSTING ACC SENSOR

Special tools required:

- 36 1 100
- 36 1 130

IMPORTANT: Check ease of movement of adjustment screws prior to adjustment.
Pull-off torque of adjustment screws must not exceed 4 Nm!
Cover the lens to prevent it from coming into contact with rust remover.
Spray adjustment screws with rust remover, then repeat check after rust remover has taken effect.
If the pull-off torque is greater than 4 Nm, observe instructions on replacing adjustment screws.

Lever out cap (1).

Carry out adjustment of ACC sensor (2) with special tool **36 1 130** by means of adjusting screws (3).

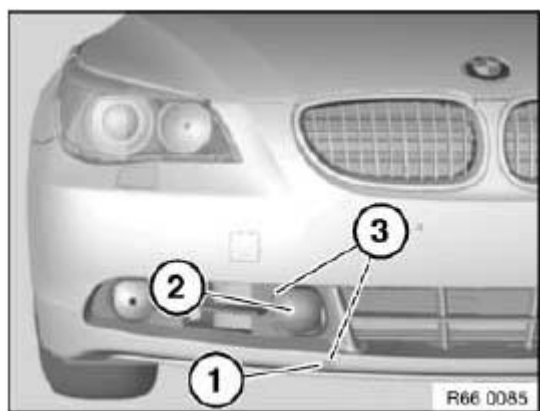


Fig. 11: Identifying Out Cap, ACC Sensor And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool required:

Active Cruise Control ACC adjusting device, complete.

Order number: 81 10 0 021 292

Consisting of:

1. Mirror, complete
2. Wheel laser
3. Slotted diaphragm
4. Control bracket (for initial installation of rail)
5. Rail
6. Setup and Owner's Handbook (not shown)

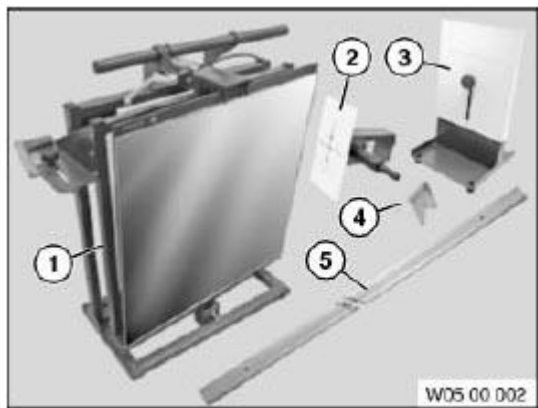


Fig. 12: Identifying Mirror, Wheel Laser, Slotted Diaphragm, Control Bracket And Rail
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A holder which is not included in the scope of delivery is required to support the wheel laser. Use either the quick-action clamp from the existing KDS or ACC wheel holder (36 1 100).

NOTE: To adjust the ACC sensor, connect the BMW diagnosis system and fit the ACC adjusting device.
Select ACC system in diagnosis. Start test module "ACC adjustment" (service functions) and proceed in accordance with instructions.
Handle ACC adjusting device in accordance with mounting and Owner's Handbook provided with device.

NOTE: Further information on the ACC adjusting device can be found in the BMW Workshop Equipment and Planning Documentation.

66 31 006 REMOVING AND INSTALLING (REPLACING) ACC SENSOR

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM**

Lift out wiring harness (1) at points (2).

Disconnect impact absorber (3) at carrier (4) and remove.

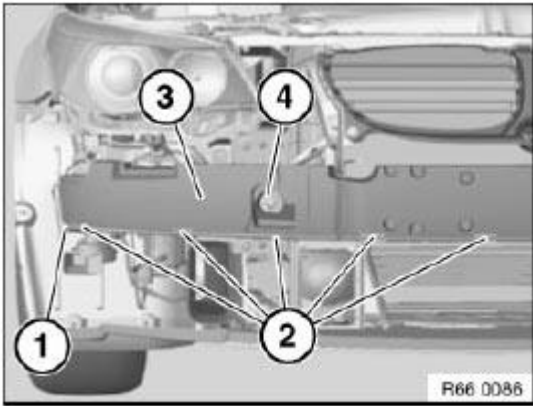


Fig. 13: Identifying Wiring Harness, Points, Impact Absorber And Carrier
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Mountings (1) of impact absorber (2) must not be damaged.

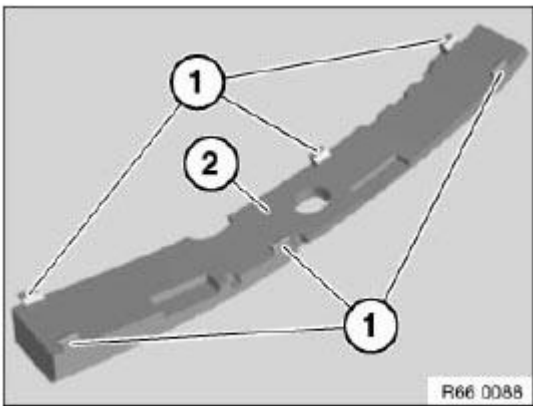


Fig. 14: Identifying Mountings And Impact Absorber
 Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unscrew nuts (2).

Installation:

Replace self-locking nuts.

Release screw (3).

Feed out ACC sensor (4) with retaining plate (5) in direction of arrow and remove.

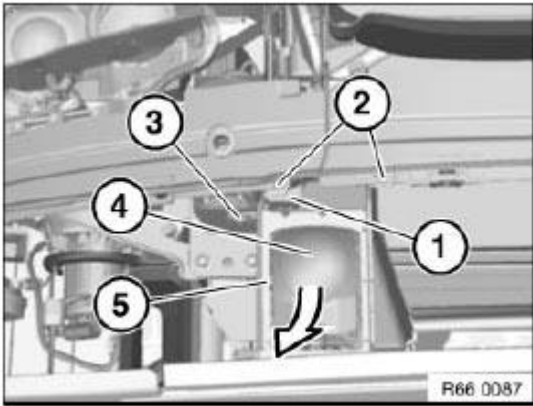


Fig. 15: Feeding Out ACC Sensor With Retaining Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unclip electric cable (2) at cable guides (3).

Release screws (4) and remove ACC sensor (5) from retaining plate (6).

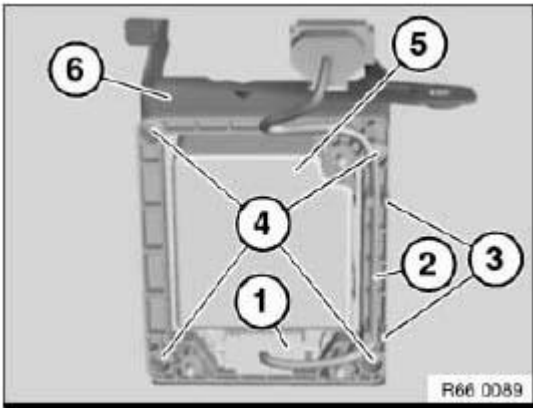


Fig. 16: Identifying Plug Connection, Cable, Cable Guides, Screws And ACC Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Adjustment aid (1) must not be damaged.

If necessary, detach adjustment aid (1) from retaining plate (2). To do so, unlock catches (3) and detach adjustment aid (1) in direction of arrow from retaining plate (2).

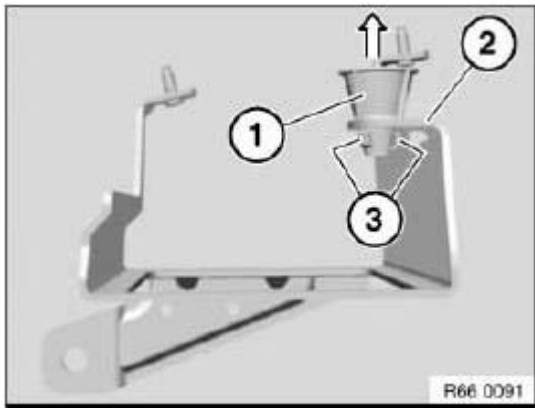


Fig. 17: Detaching Adjustment Aid Of Retaining Plate
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out rough adjustment of ACC sensor (1).

If necessary, perform rough adjustment at adjusting screws (2).

Measurement A [mm]: 22.5 to 25.0

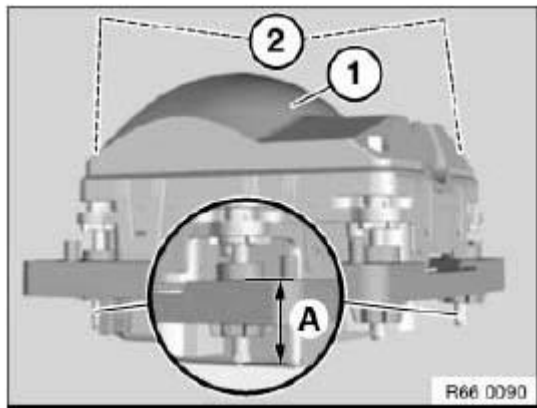


Fig. 18: Identifying ACC Sensor And Adjusting Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out ACC sensor adjustment using BMW diagnostic system.

Replacement:

Carry out **PROGRAMMING/CODING**

66 31 016 REMOVING AND INSTALLING (REPLACING) LONG RANGE SENSOR (LRR SENSOR) (M-KIT)**Special tools required:****00 9 317**

Tape off bumper in working area (1) with yellow plastic adhesive tape.

Lever out trim with special tool **00 9 317** and remove.

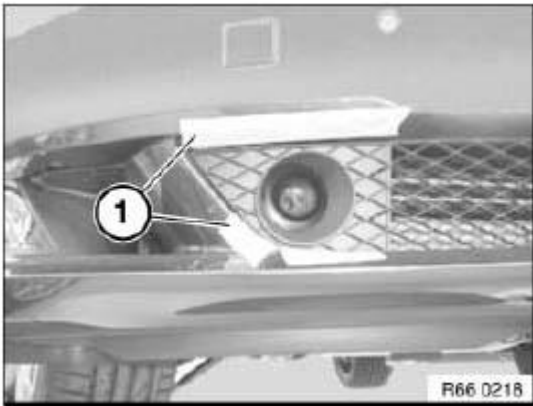


Fig. 19: Identifying Bumper In Working Area With Yellow Plastic Adhesive Tape
Courtesy of BMW OF NORTH AMERICA, INC.

Firmly press down plastic adhesive tape (1) in working area again.

Unclip long range sensor (2) from mounting.

Installation:

Make sure long range sensor (2) is correctly and securely seated.

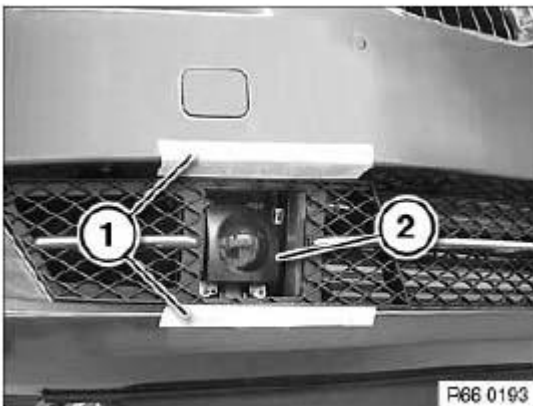


Fig. 20: Identifying Plastic Adhesive Tape And Long Range Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Secure long range sensor (1) against falling out.

Disconnect plug connection (2) and remove long range sensor (1).

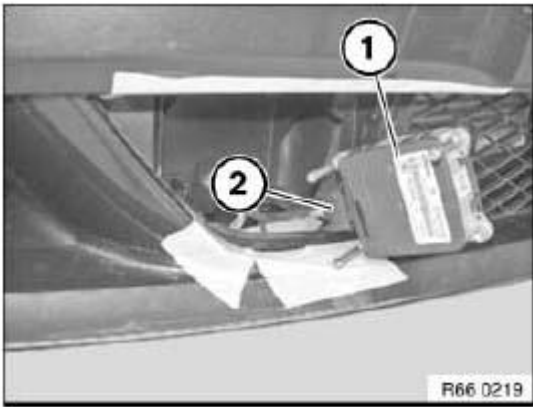


Fig. 21: Identifying Long Range Sensor And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **LRR SENSOR ADJUSTMENT** using BMW diagnosis system
- Carry out **PROGRAMMING/CODING**

**66 31 016 REMOVING AND INSTALLING/REPLACING LONG RANGE SENSOR (LRR SENSOR)
(FROM BUILD DATE 03/2007)**

Special tools required:

- **00 9 317**

Lever out trim (1) with special tool **00 9 317** and remove.

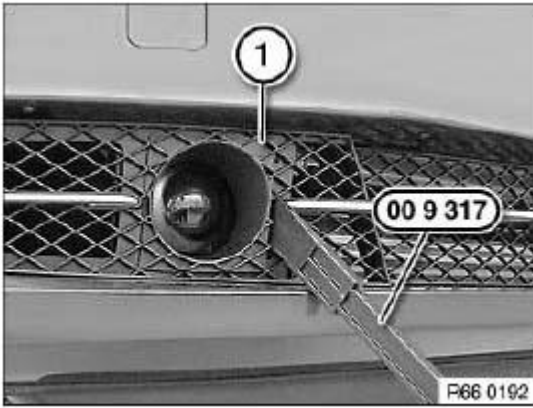


Fig. 22: Removing Trim With Special Tool 00 9 317
Courtesy of BMW OF NORTH AMERICA, INC.

Tape off bumper in working area (1) with yellow plastic adhesive tape.

Unclip long range sensor (2) from mounting.

Installation:

Make sure long range sensor (2) is correctly seated.

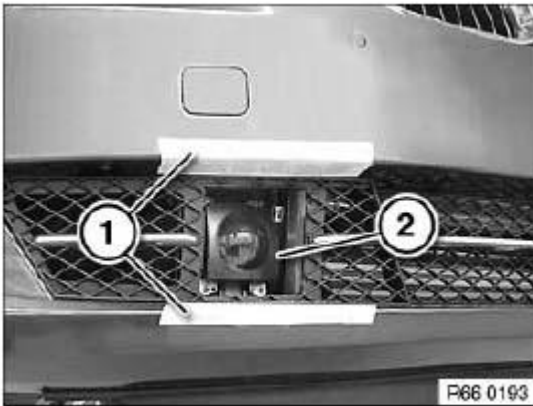


Fig. 23: Identifying Bumper In Working Area With Yellow Plastic Adhesive Tape And Long Range Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Secure long range sensor (1) against falling out.

Disconnect plug connection (2) and remove long range sensor (1).

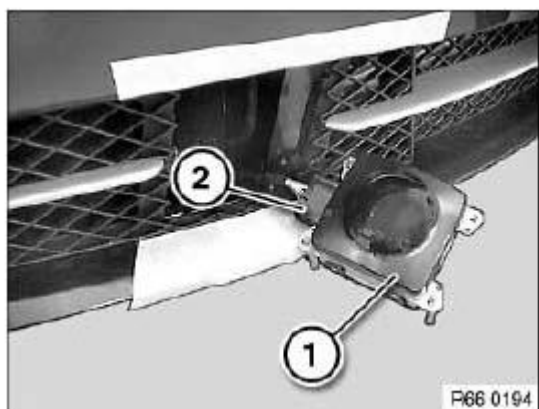


Fig. 24: Identifying Long Range Sensor And Plug Connection
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **LRR SENSOR ADJUSTMENT** using BMW diagnosis system.
- Carry out **PROGRAMMING/CODING** .

66 31 020 REMOVING AND INSTALLING (REPLACING) LEFT OR RIGHT SHORT RANGE SENSOR (SRR SENSOR) (M TECHNIK AERODYNAMIC KIT)

IMPORTANT: To ensure correct SRR operation, there must be no mechanical damage (e.g. dents) to the bumper in the SRR area, nor must filler work or multilayer paintwork (more than two paint coats) have been carried out.

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM**

Remove impact absorber (1) and carefully detach adhesive tape in area (2).

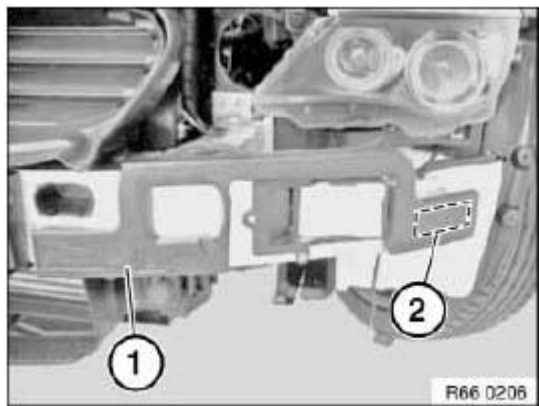
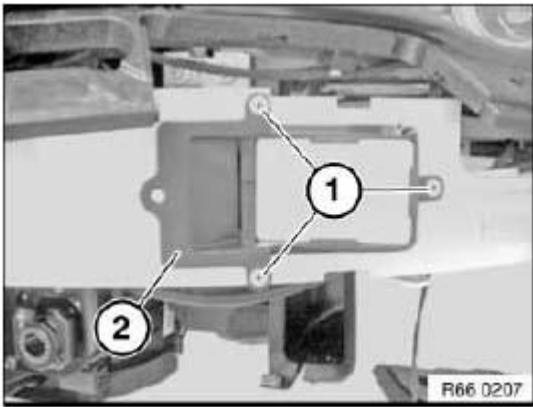


Fig. 25: Identifying Impact Absorber And Adhesive Tape In Area (2)

Courtesy of BMW OF NORTH AMERICA, INC.

Drill out riveted joints (1) and remove bracket (2) for SRR sensor.

Disconnect associated plug connection and remove SRR sensor from bracket (2).

**Fig. 26: Identifying Riveted Joints And Bracket For SRR Sensor**

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

Adjustment can only be carried out with the BMW diagnosis system:

Service functions:

- Chassis
 - Cruise control (ACC)
 - Adjust short range sensors

66 31 020 REMOVING AND INSTALLING/REPLACING SHORT RANGE SENSOR (SRR SENSOR)**Special tools required:**

- 00 9 317

IMPORTANT: To ensure correct SRR operation, there must be no mechanical damage (e.g. dents) to the bumper in the SRR area, nor must filler work or multilayer paintwork (more than two paint coats) have been carried out.

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM**

Lever off impact absorber (1) with special tool **00 9 317** and remove.

Installation:

Impact absorber (1) must not be broken.

Make sure impact absorber (1) is firmly held.

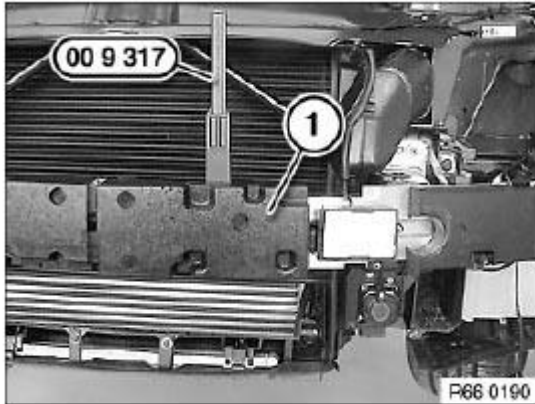


Fig. 27: Identifying Impact Absorber With Special Tool 00 9 317
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unlock retaining tab (2) and slide out SRR sensor (3) in direction of arrow.

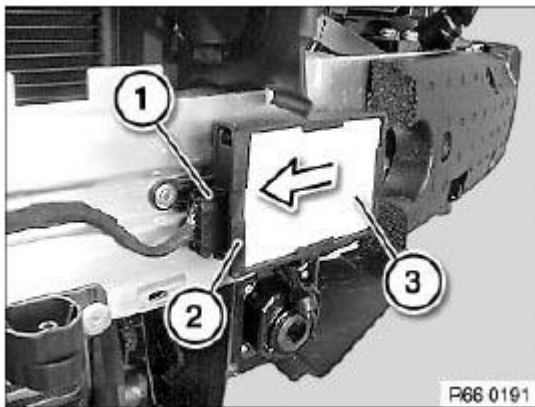


Fig. 28: Unlocking Retaining Tab And Sliding Out SRR Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

Adjustment can only be carried out with the BMW diagnosis system:

Service functions:

- Chassis
 - Cruise control (ACC)
 - Adjust short range sensors

66 31 100 REMOVING AND INSTALLING/REPLACING LONGITUDINAL DYNAMICS MODULE

Necessary preliminary tasks:

- Disconnect battery negative lead
- Release **DISTRIBUTION BOX** and place to one side

Disconnect plug connection (1).

Unlock retaining tab (2) and remove longitudinal dynamics module.

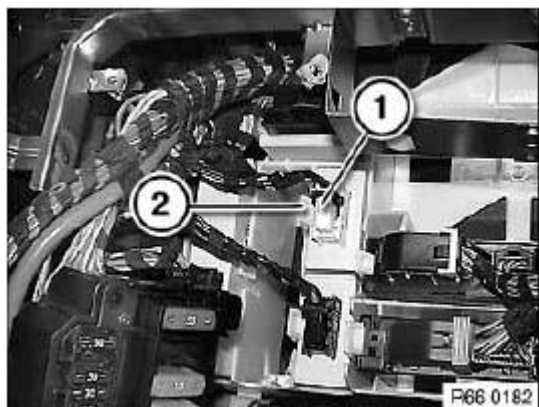


Fig. 29: Identifying Plug Connection And Retaining Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

FRONT CAMERA

66 51 010 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR LANE DEPARTURE WARNING

Necessary preliminary tasks:

- Remove **RIGHT GLOVEBOX WITH HOUSING**

Version with CD changer:

- Remove **CD CHANGER**

Version with CD changer:

Release screw (1).

Slacken screw (2) and slide CD changer bracket to one side.

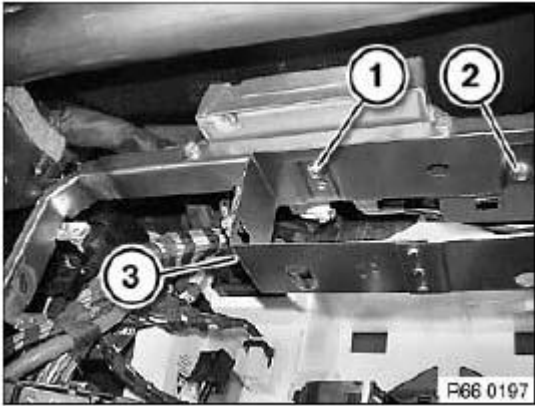


Fig. 30: Identifying Screws And CD Changer Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove control unit for Lane Departure Warning (2) and disconnect associated plug connections.

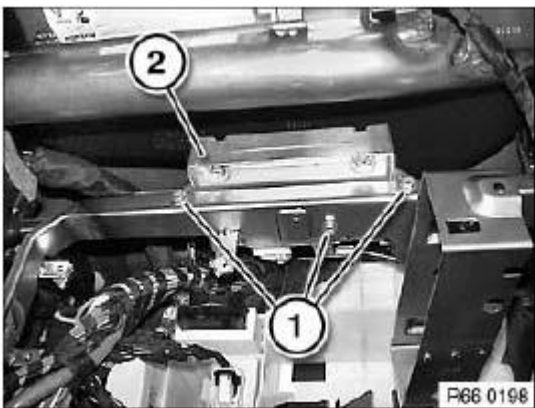


Fig. 31: Identifying Screws And Lane Departure Warning
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1) and remove bracket (2) from control unit.

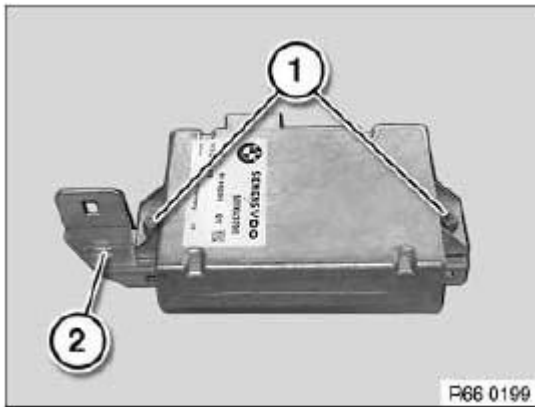


Fig. 32: Identifying Screws And Bracket Of Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

66 51 030 REMOVING AND INSTALLING/REPLACING CAMERA FOR LANE DEPARTURE WARNING

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Expand two-part mirror base cover (1) by pressing from below and detach.

Feed out two-part mirror base cover (1) and remove.

NOTE: Catches of two-part mirror base cover (1) must not be damaged.

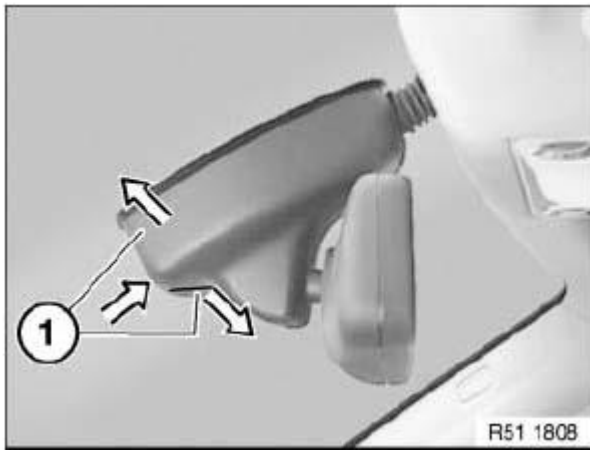


Fig. 33: Feeding Out Two-Part Mirror Base Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Slide camera (1) in direction of arrow out of mounting.

Disconnect plug connection (2).

Installation:

Make sure camera (1) is firmly seated in mounting.

Replacement:

Carry out calibration via BMW diagnosis system:

Service functions:

- Body
 - Lane Departure Warning
 - Calibrate camera

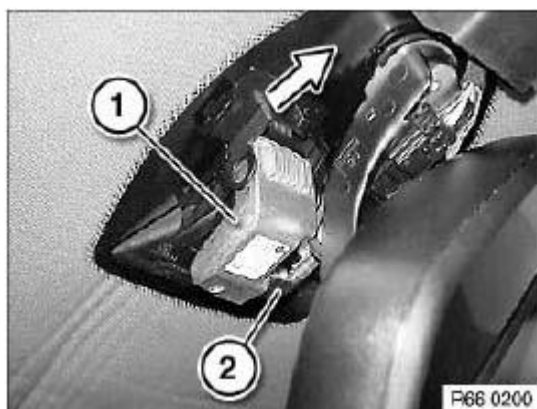


Fig. 34: Sliding Camera

Courtesy of BMW OF NORTH AMERICA, INC.

NIGHT VISION

66 54 001 ADJUSTING NIGHT VISION CAMERA

NOTE: Mechanical adjustment - as described in the following - is only possible axially .

Vertical adjustment can only be carried out with the BMW diagnosis system:

- Service functions
 - > Body
 - > Night vision
 - > Night vision camera
 - > Vertical adjustment

Necessary preliminary tasks:

- Remove grille in bumper trim on left. See **REMOVING AND INSTALLING/REPLACING GRILLE IN BUMPER TRIM (M5 OR M AERODYNAMIC KIT)** or **REMOVING AND INSTALLING/REPLACING TRIM GRILLE IN BUMPER TRIM (UP TO 03/2007)**

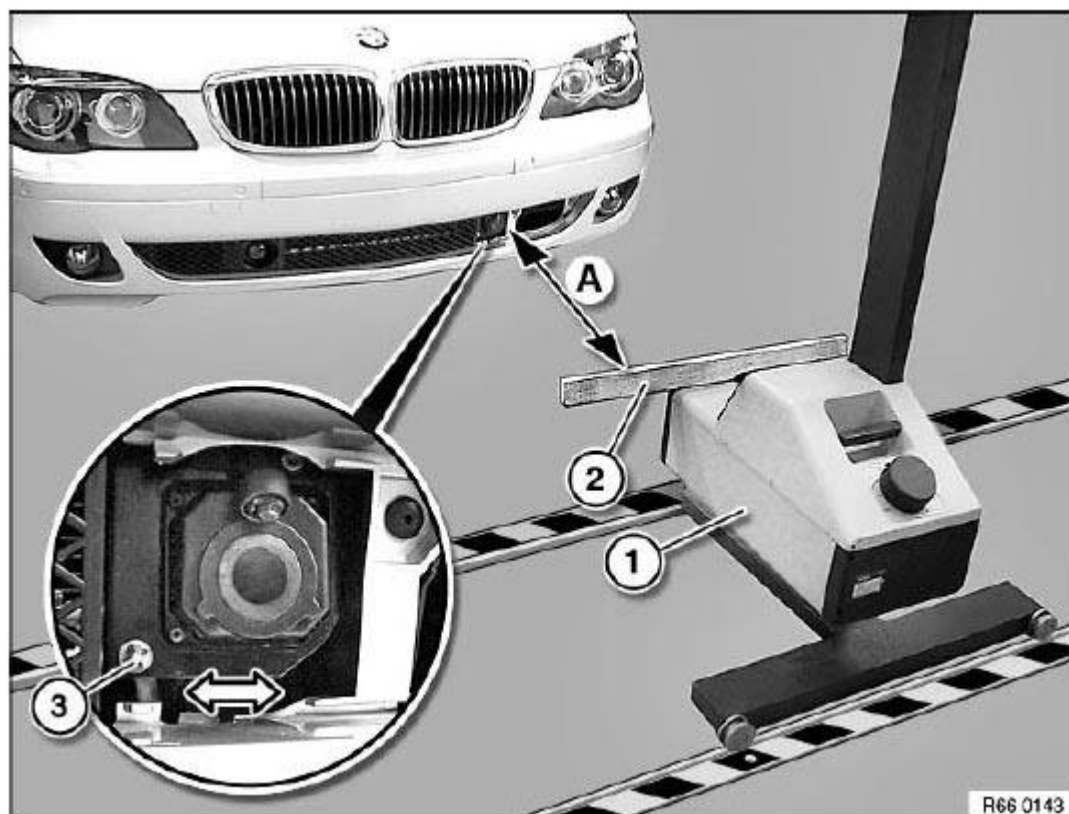


Fig. 35: Identifying Parallel Distance To Headlight Aiming Device
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Front of car must be parallel at distance (A) to headlight aiming device (1).
A = 1.5 m

Align a suitable straight object (2), e.g. a spirit level, horizontally on headlight aiming device.

Slowly carry out axial adjustment of night vision camera at adjusting screw (3).

NOTE: Illustration shows the in-car monitor view.

If necessary, align the picture of the night vision camera with aid of a second person.

Top edge (A) must be aligned parallel to top edge of screen (B).

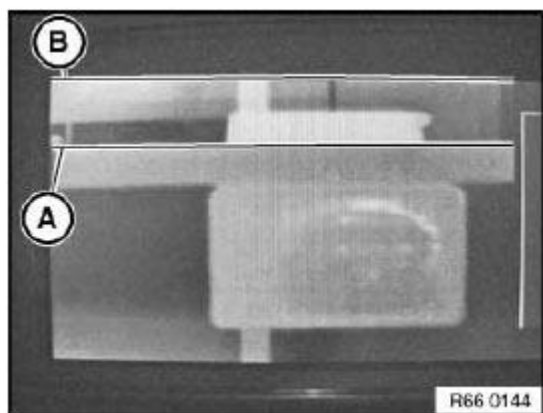


Fig. 36: Identifying Top Edge And Top Edge Of Screen
Courtesy of BMW OF NORTH AMERICA, INC.

66 54 005 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR NIGHT VISION SYSTEM

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Disconnect **battery negative lead**
- Remove TRIM FOR INSTRUMENT PANEL ON RIGHT

Disconnect plug connection (1).

Press tab (2) to side and remove control unit (3) from module carrier.

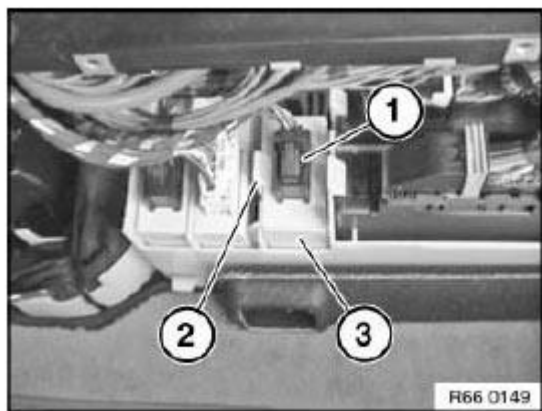


Fig. 37: Identifying Plug Connection, Tab And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING** .

NOTE: New component contains a CD with deblocking code.
CD is requested during coding/programming by the SSS.

66 54 010 REMOVE AND INSTALLING COMPLETE NIGHT VISION CAMERA (FROM 03/2007)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM**
- Remove impact absorber in working area

Drill out rivets (1).

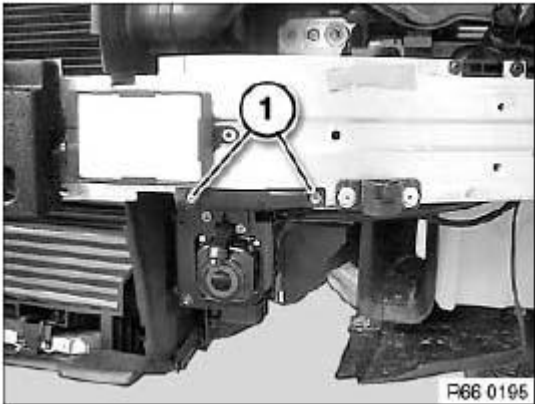


Fig. 38: Identifying Rivets

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Secure night vision camera (1) against falling down.

Disconnect plug connection (2) and release screw (3).

Tightening torque **66 54 1AZ** .

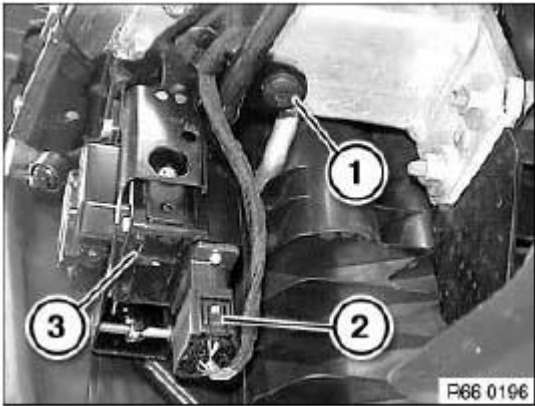


Fig. 39: Identifying Night Vision Camera, Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Secure night vision camera (1) against falling down.

Disconnect hose connection (2) and unclip cable fastener (3).

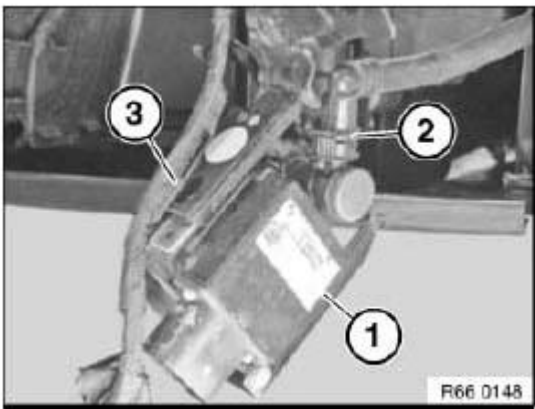


Fig. 40: Identifying Night Vision Camera, Hose Connection And Cable Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill up with washer fluid

Replacement only:

- Replace **NIGHT VISION CAMERA**

66 54 010 REMOVE AND INSTALLING COMPLETE NIGHT VISION CAMERA (UP TO 03/2007)

Special tools required:

00 9 317

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) !

Necessary preliminary tasks:

Remove **FRONT BUMPER TRIM**

Disconnect plug connection (1).

Disengage cable guide (2).

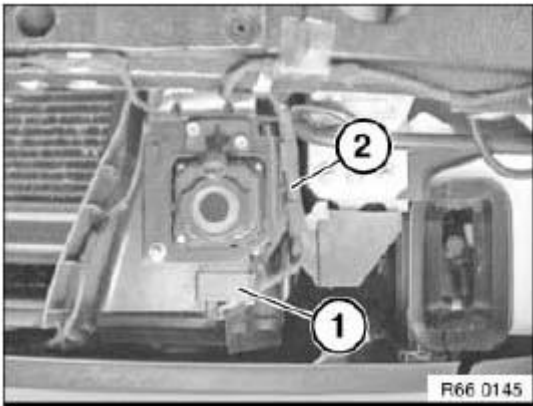


Fig. 41: Identifying Plug Connection And Cable Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Gently lever out impact absorber (1) with special tool **00 9 317** .

Unscrew nuts (2).

Installation:

Make sure impact absorber (1) is correctly seated.

Tightening torque **66 54 1AZ**

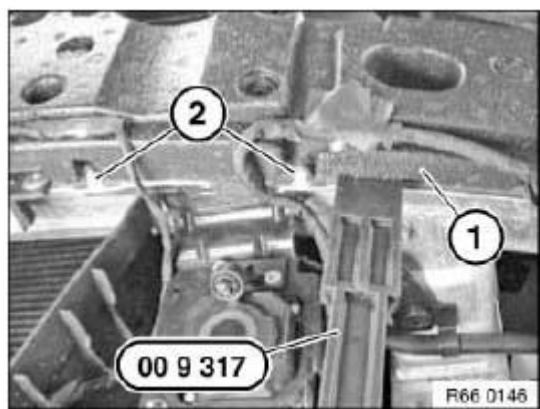


Fig. 42: Identifying Nuts And Impact Absorber With Special Tool 00 9 317
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Secure night vision camera (3) against falling down.

Release screw (1) and disengage tube (2) from mounting.

Tightening torque **66 54 1AZ** .

Remove night vision camera (3) complete with holder.

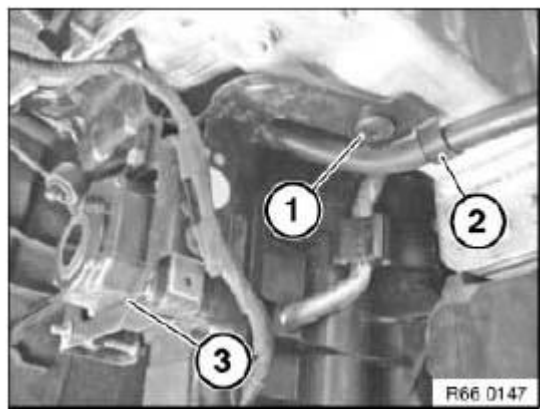


Fig. 43: Identifying Night Vision Camera, Screws And Tube
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Secure night vision camera (1) against falling down.

Disconnect hose connection (2) and unclip cable fastener (3).

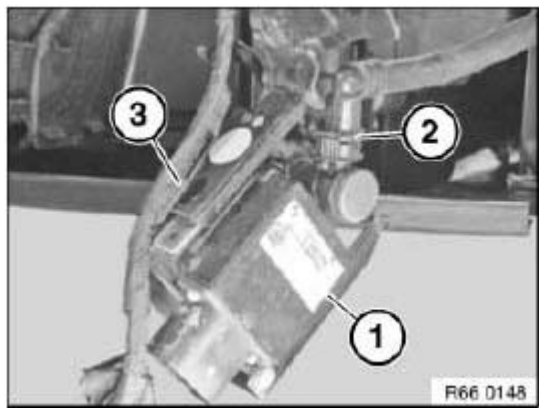


Fig. 44: Identifying Night Vision Camera, Hose Connection And Cable Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill up with washer fluid

Replacement only:

- Replace **NIGHT VISION CAMERA**

66 54 511 REPLACING NIGHT VISION CAMERA

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

IMPORTANT: New component contains a CD with deblocking code.
Deblocking code CD is requested during coding/programming by the SSS.
Coding/programming without the deblocking code CD is not possible!

Necessary preliminary tasks:

- Remove **NIGHT VISION CAMERA**

Release screw (1) on both sides.

Remove camera (2) from holder (3).

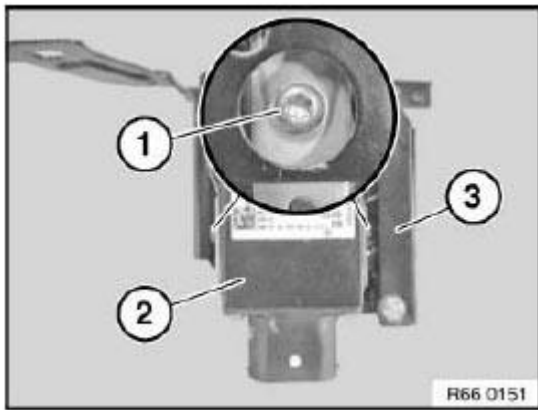


Fig. 45: Identifying Screw, Camera And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert camera (1) in holder (2).

Left guide pin (3) must be correctly seated in holder (2).

Apply screw securing adhesive to screw (4) and tighten screw.

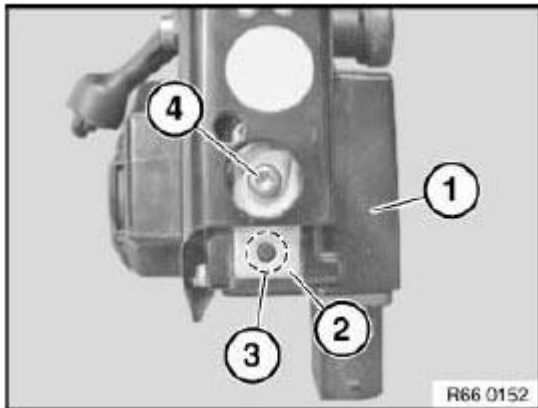


Fig. 46: Identifying Camera, Holder, Guide Pin And Adhesive To Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Tab (1) must snap noticeably into holder (2).

Make sure guide pin (3) is correctly seated in holder.

Apply screw securing adhesive to screw (4) and tighten screw.

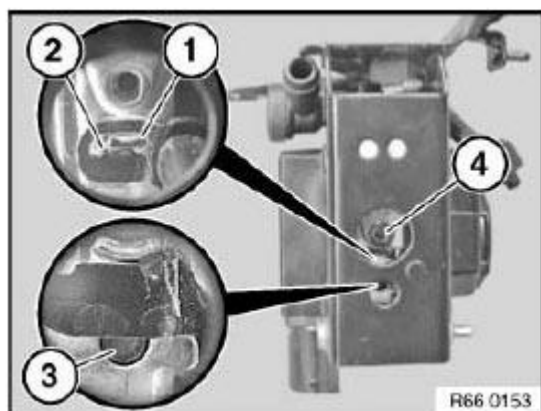


Fig. 47: Identifying Tab, Holder, Guide Pin And Adhesive To Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Carry out **PROGRAMMING/CODING** .
- Adjust **NIGHT VISION CAMERA**

ACCESSORIES AND BODY, CAB**Displays, Indicators and Controls****SYSTEM OVERVIEW****1.1. INTRODUCTION**

As in all other BMW models, the operating and control concept of the new BMW 5 Series F10 is based on clear and optimum structuring of the cockpit. A reduced number of switches simplifies the logical operation. The display, indicator and control elements are organized in a hierarchical arrangement corresponding to their function.



Fig. 1: Identifying F10 Overview Of Display, Indicator And Control Elements
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Head-up display HUD
2	Central Information Display, CID
3	Favorite buttons for individual assignment and operation of the heating and air conditioning system
4	Controller CON
5	Gear selector switch GWS
6	Steering wheel buttons
7	Driver assistance systems operating unit
8	Instrument cluster KOMBI

SYSTEM COMPONENTS**2.1. INSTRUMENT CLUSTER**

The instrument panel receives information on the wiring harness in the form of analog and digital electrical signals. These signals are processed and displayed in the instrument panel or passed on as information to other control units.

As a control unit, the instrument panel is a bus device in the MOST bus and in the powertrain CAN.

2.1.1. Basic instrument panel

The basic instrument panel already familiar from the F07 is used in all versions of the F10. A TFT display with a resolution of 640 x 160 pixels is located in the basic instrument panel under the round instruments. It has a screen diagonal of 5.7". The round instruments are always surrounded by a closed ring.



Fig. 2: Identifying F10 Basic Instrument Panel (Not US)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	TFT display
2	Closed instrument ring

2.1.2. Brake energy display

The F10 comes standard with Brake Energy Regeneration. Brake Energy Regeneration transforms the vehicle's kinetic energy into electricity, and uses this power to charge the battery. As a result, the battery draws less power from the engine and fuel consumption is reduced.

The kinetic energy of the vehicle is converted into electrical energy while the vehicle is in coasting mode or under braking. The battery is partially charged and the fuel consumption can be reduced.

The blue indicator in the instrument panel below the tachometer, which lights up whenever kinetic energy is converted into electricity (while coasting off the accelerator or under braking). The red section of the display

below the "P" is the mile per gallon gauge.



Fig. 3: Identifying F10 Current Fuel Consumption Display In Coasting (Overrun) Mode
Courtesy of BMW OF NORTH AMERICA, INC.

2.1.3. On-board computer

The on-board computer functions can be called up by briefly pressing the on-board computer button on the steering column switch.

Pressing the on-board computer button again displays information in the following order:

- Range
- Average fuel consumption
- Average speed
- Distance (with activated route guidance)
- Estimated time of arrival (with activated route guidance)
- Date
- Road sign recognition.



Fig. 4: Identifying F10 Buttons On Steering Column Switch
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Button for on-board computer
2	High-beam assistant button
3	Steering-column switches

More detailed information can be found in the current vehicle owner's manual for the BMW 5 Series.

2.2. CENTRAL INFORMATION DISPLAY

Depending on the equipment, two different versions of the Central Information Display CID are installed in the F10.

As on all new BMW models, the system is operated by means of the central control element, the controller.

The central information display is an integrated display and operating unit for the following functions:

- Audio functions, for example radio, CD, MP3
- Telephone and data services
- On-board computer, journey computer
- Vehicle info, integrated operating instructions IBA
- Heating and air conditioning system
- Personalized features, for example radio station selection
- Vehicle functions, for example PDC and EDC
- BMW Services.

2.2.1. CID with 10.2" screen diagonal

In conjunction with the Navigation system (option 609), a CID with 10.2" screen diagonal is installed. The resolution of the display is 1280 x 480 pixels.



Fig. 5: Identifying F10 CID With 10.2 Screen Diagonal
Courtesy of BMW OF NORTH AMERICA, INC.

2.2.2. CID with 7" screen diagonal

In conjunction with a vehicle configuration without a navigation system, a CID with 7" screen diagonal is installed. The resolution of this display is 800 x 480 pixels.



Fig. 6: Identifying F10 CID With 7 Screen Diagonal
Courtesy of BMW OF NORTH AMERICA, INC.

2.3. HEAD-UP DISPLAY

The very name "Head-Up" describes the principle benefit of this system. The Head-Up Display HUD projects a virtual image into the driver's field of vision. Important information such as cruise control details or arrow displays from the navigation system are projected onto the windscreen and are thus permanently visible within the driver's field of view.

The head-up display (option 610) in the F10 contains various functions aimed at enhancing road safety and driving comfort.

- The head-up display includes the following:
- the Dynamic Cruise Control DCC
- the Active Cruise Control with Stop&Go function
- the collision warning with brake application function

- information from the navigation system
- Check Control messages
- road speed.

Having the displays in the driver's direct field of view increases safety, as the eyes are always on the traffic.



Fig. 7: Identifying F10 Head-Up Display
Courtesy of BMW OF NORTH AMERICA, INC.

2.4. NIGHT VISION 2

The BMW Night Vision 2 system provides the driver with a black-and-white image of the driving environment ahead of the vehicle in the Central Information Display CID.

BMW Night Vision 2 is a 100 % passive system without active infrared illumination. Objects situated ahead of the vehicle are shown in varying degrees of brightness depending on their temperature. This enables the driver to detect in good time heat-emitting objects, such as people, animals and other vehicles.

This information is recorded with a far infrared camera via a special imaging sensor which detects the infrared radiation in a specific wavelength range.

Intelligent algorithms in the control unit makes it possible to automatically detect persons in the image. Following evaluation of distance and direction of movement, a symbol on the central information display and in the head-up display warns the driver of any persons at risk.



Fig. 8: Identifying F10 Night Vision Display In Head-Up Display
Courtesy of BMW OF NORTH AMERICA, INC.

Night Vision 2 is available for the F10 as the optional equipment BMW Night Vision with pedestrian detection (option 6UK).

As in the F01/F02, the video camera for BMW Night Vision is installed in the F10 behind the radiator grill, on the top left corner.

2.5. CONTROLS ON THE STEERING WHEEL

There is a switch block in the steering wheel on the left and right.

The operating elements for cruise control with braking function (Dynamic Cruise Control DCC) and the Active Cruise Control ACC are located on the left side of the steering wheel.

The controls for operation of the radio and telephone functions are on the right.

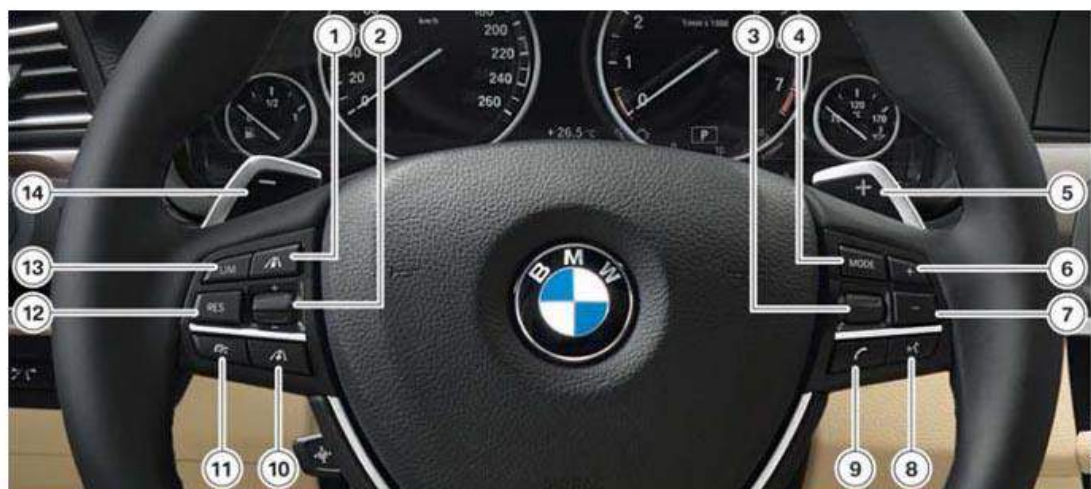


Fig. 9: Identifying F10 Controls On Steering Wheel
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Reduce distance button (only with option 5DF)
2	± rocker switch, change speed, set speed
3	Knurled wheel, select/set radio station or music track
4	MODE button, switch audio sources
5	Shift up shift paddle (only with option 2TB)
6	+ rocker switch, increase volume
7	-rocker switch, reduce volume
8	Voice control button
9	Telephone button
10	Increase distance button (only with option 5DF)
11	Switch on/off, interrupt ACC/DCC
12	Resume, call up stored speed button
13	Speed limit button or the "SET" speed button in the US
14	Shift down shift paddle (only with option 2TB)

2.6. OPERATING CONTROLS IN THE CENTER CONSOLE

The operating elements in the center console have the same function and arrangement as those in the F01.



Fig. 10: Identifying F10 Operating Controls In Center Console
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Gear selector switch
2	Controller
3	Parking brake
4	Automatic Hold
5	Park Distance Control or parking assistance
6	Handling setting switch
7	Dynamic Stability Control

2.7. DRIVER ASSISTANCE SYSTEMS OPERATING UNIT

The individual assist systems can be activated or deactivated via the assist system operating unit. It is located next to the steering wheel in the dashboard.

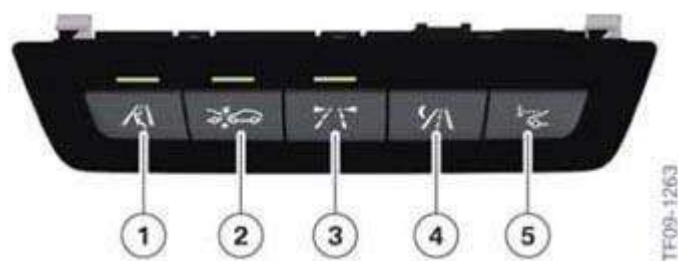


Fig. 11: Identifying F10 Assist System Operating Unit
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Blind Spot Detection
2	Collision warning (adaptive dynamic brake control with warning function)
3	Lane Departure Warning
4	Night Vision with person recognition
5	Head-Up Display

DRIVELINE/AXLES

Driveline/Axles - Repair Instructions - 525xi & 530xi

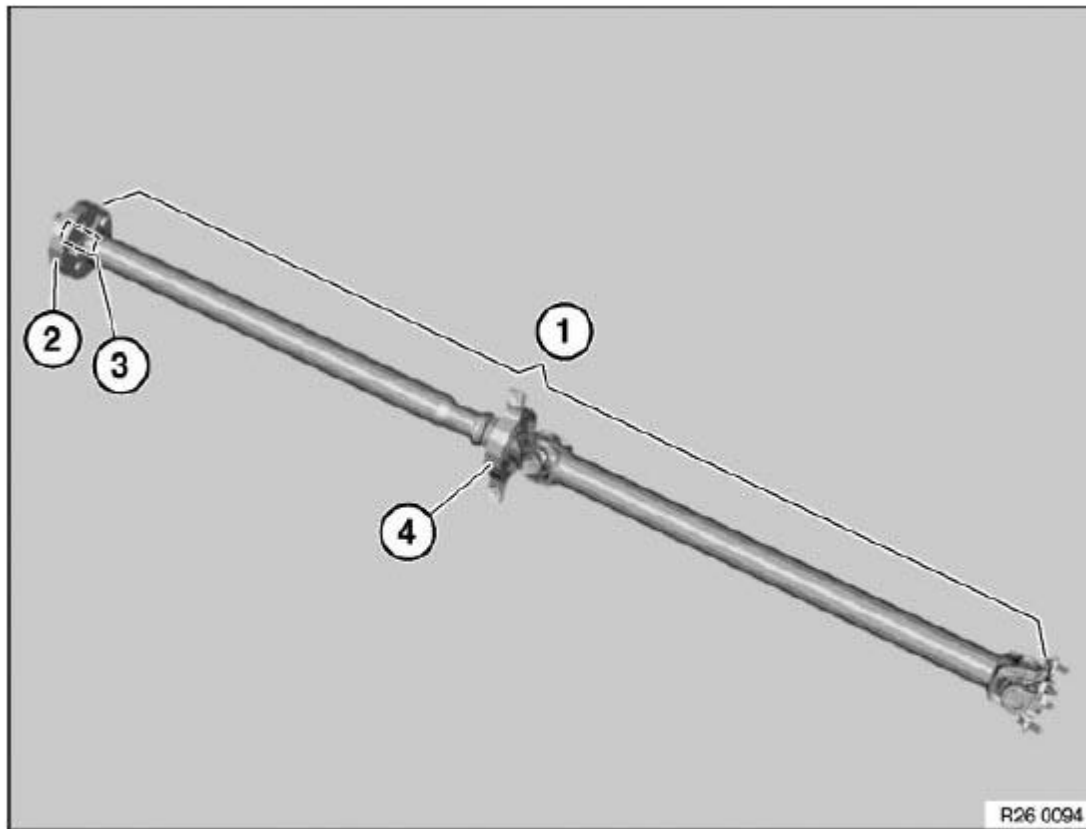
00 PROPELLER SHAFT GENERAL

26 00... PROPELLER SHAFT DEFLECTION ANGLES

IMPORTANT: Specifications on propeller shaft deflection are only possible on request with the vehicle identification number of the problem vehicle via PuMA.

11 PROPELLER SHAFT ASSEMBLY

26 11... OVERVIEW OF PROPELLER SHAFT WITH UNIVERSAL JOINT



0 General information

1 Complete propeller shaft

2 Flexible disk

3 Centring mount

4 Centre mount

Fig. 1: Identifying Propeller Shaft With Universal Joint

Courtesy of BMW OF NORTH AMERICA, INC.

26 11 000 REMOVING AND INSTALLING COMPLETE PROPELLER SHAFT (CONSTANT-VELOCITY JOINT)

Necessary preliminary tasks:

- Remove rear underbody protection.
- Remove complete **EXHAUST SYSTEM** .

Remove heat shields (1) and (2).

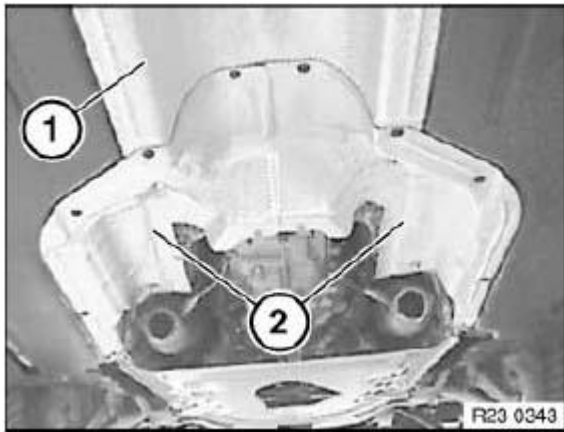


Fig. 2: Identifying Heat Shields

NOTE: Graphic similar.

NOTE: N43, N46T only Remove transmission bearing block. Tightening torque **23 71 4AZ**

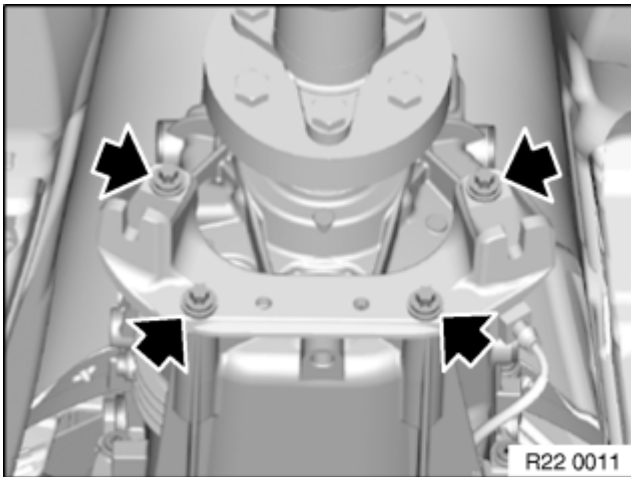


Fig. 3: Identifying Transmission Support Block Bolts

IMPORTANT: To avoid buzzing sound after refitting the propeller shaft:

1. The flexible disc connection (1) on the front at the propeller shaft must be marked in one plane with the flexible disc (2) and the three-bolt flange (3) before removal.
2. During installation the three-bolt flange (3) must be forced back together again with the flexible disc (2) in the same position.
3. Replace ZNS bolts and self-locking nuts.

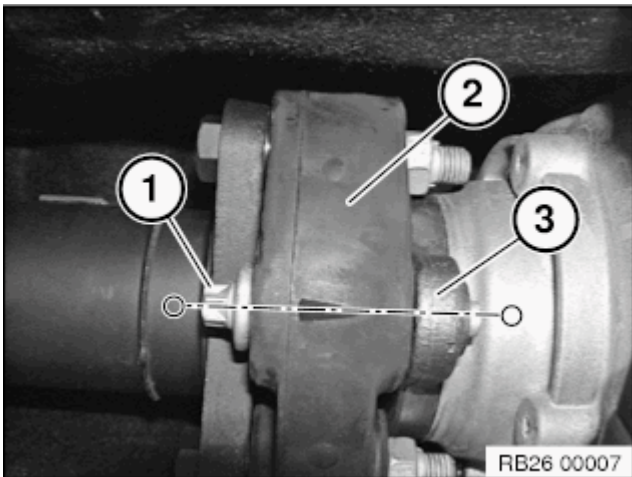


Fig. 4: Refitting Propeller Shaft

Release screws.

Installation note: ZNS bolts and nuts must be replaced. Replace self-locking nuts.

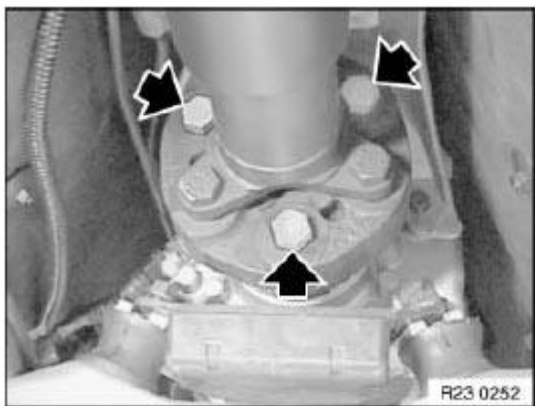


Fig. 5: Identifying ZNS Bolts

Important! M57 only: The bolt without washer may only be tightened by means of the nut. The bolt with rolled-on washer which has ribbed teeth facing the support side must be tightened by means of the bolt. Observe different tightening torques. Tightening torque, **26 11 1AZ**.

Release bolts and replace.

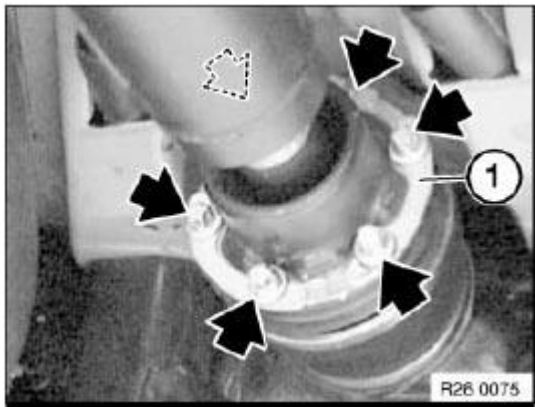


Fig. 6: Locating Flange Bolts

Using a screwdriver, press constant velocity joint off drive flange at dismantling grooves.

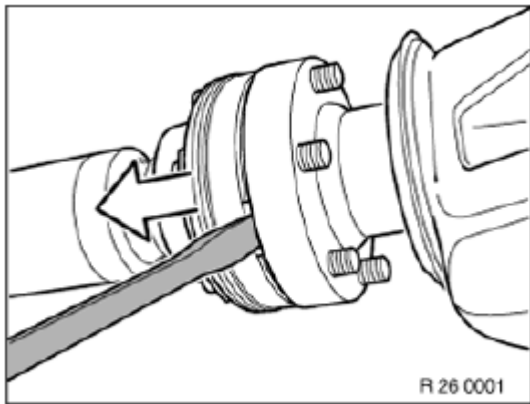


Fig. 7: Pressing Constant Velocity Joint Off Drive Flange

Important! Do not let propeller shaft fall into joints. Joints and rubber cup can be damaged on constant velocity joint.

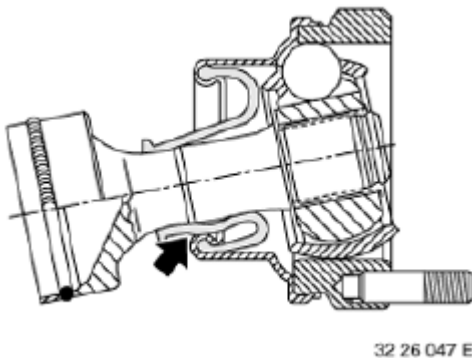
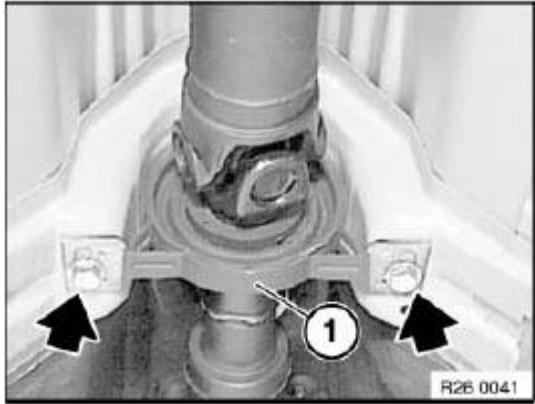
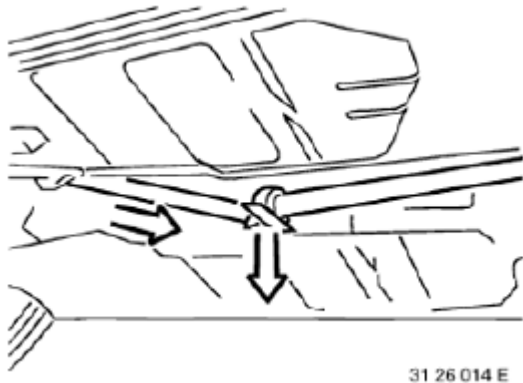


Fig. 8: Sectional View Of Constant Velocity Joint

Grip propeller shaft at center mount and release screws. Tightening torque, **26 11 6AZ**

**Fig. 9: Locating Propeller Shaft At Centre Bearing Screws**

Bend propeller shaft downwards at center bearing. Remove propeller shaft from transmission output flange and detach constant velocity joint from rear axle final drive.

**Fig. 10: Identifying Bend Propeller Shaft At Centre Bearing**

Installation note: Withdraw constant velocity joint (1) up to limit position. Fit shims. Attach propeller shaft with pulled-apart constant velocity joint to drive flange of rear axle final drive.

Alternately tighten 2 opposing screws to draw constant-velocity joint evenly into the input flange. Replace ZNS bolts. Tightening torque, **26 11 4AZ.**

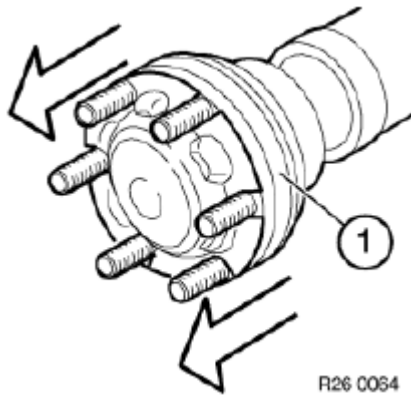


Fig. 11: Identifying Constant-Velocity Joint

Installation:

Check centering mount (4).

Replace damaged centering mount.

Grease centering mount.

Grease.

Refer to **OPERATING FLUIDS - DRIVE SHAFT** .

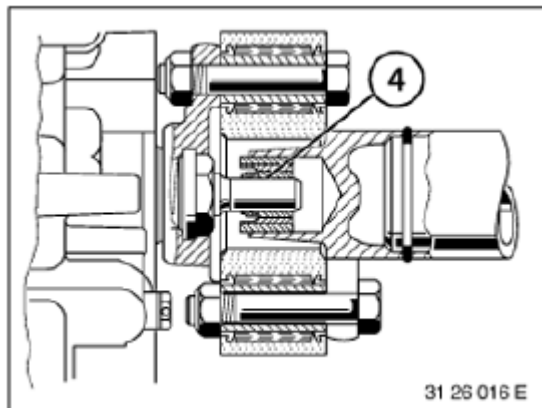


Fig. 12: Identifying Centering Mount Grease Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The aluminum propeller shaft contains a crash element.

Check the crash element before installing the propeller shaft.

Replace the propeller shaft if the crash element has been pushed together.

1. Deformation travel approx. 100 mm
2. Aluminum tubing
3. Bearing journal

Propeller shafts.

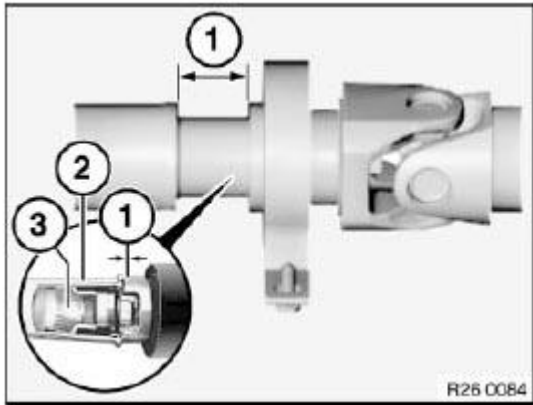


Fig. 13: Identifying Propeller Shaft Aluminum Tubing And Bearing Journal
Courtesy of BMW OF NORTH AMERICA, INC.

26 11 051 REPLACING FLEXIBLE DISK FOR PROPELLER SHAFT

Necessary preliminary tasks:

- Remove rear underbody protection.
- Remove complete **EXHAUST SYSTEM** .

NOTE: To protect constant-velocity joint, tie back propeller shaft in area of center bearing.

Remove heat shields (1) and (2).

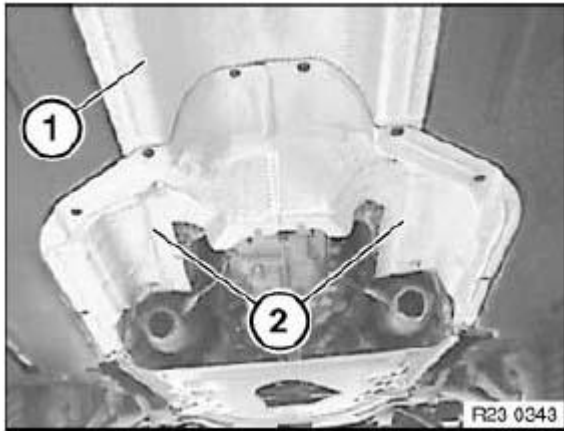


Fig. 14: Identifying Heat Shields

Remove **CROSS-MEMBER FOR TRANSMISSION MOUNTING** .

Remove **propeller shaft** at transmission and center bearing.

Release screws and remove flexible disc (1) from propeller shaft.

Tightening torque **26 11 1AZ** .

Installation:

Arrows (3) on circumference of flexible disk must point to flange arms (2).

Replace ZNS bolts and self-locking nuts.

Tighten down screw connection via nut only.

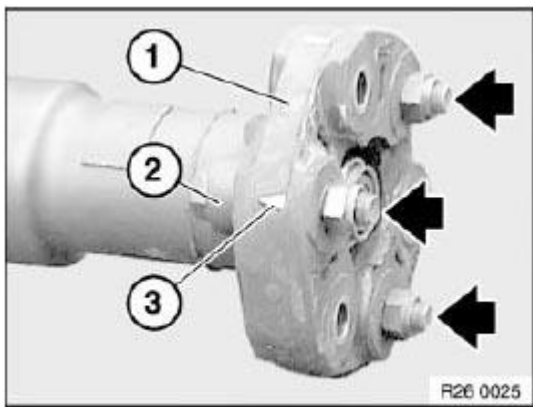


Fig. 15: Identifying Flexible Disk At Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check centering element, replace **centering element** if damaged.

Grease centering mount.

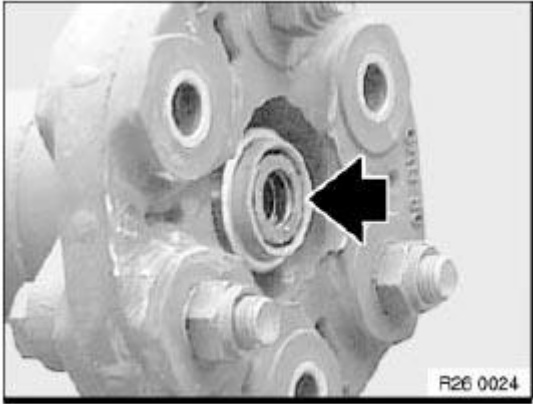


Fig. 16: Locating Centering Mount

Courtesy of BMW OF NORTH AMERICA, INC.

26 11 090 REMOVING AND INSTALLING/REPLACING CENTERING MOUNT FOR PROPELLER SHAFT

Special tools required:

- 00 5 500
- 11 1 310
- 11 2 030

Necessary preliminary tasks:

- Remove **propeller shaft**.

Fill centering bore (1) completely with viscous grease.

Drive special tool 11 1 310 with a plastic hammer into centering bore.

The centering mount (1) is forced out of the propeller shaft by the pressure on the grease filling.

If necessary, top up grease repeatedly.

NOTE: To drive out the mount, you can also fill the centering bore with water instead of grease.

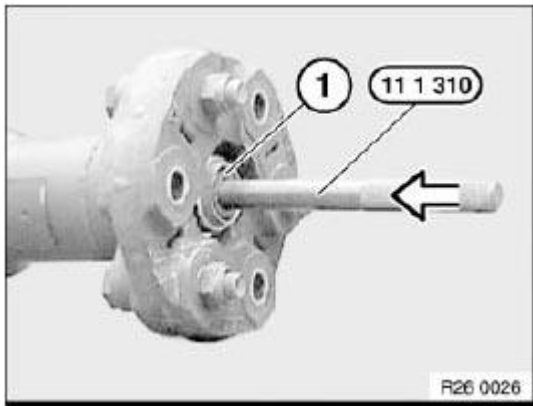


Fig. 17: Identifying Special Tool (11 1 310) Into Centering Bore
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Remove grease/water from mount bore.

Drive in centering (1) with special tools 11 2 030 and 00 5 500 into propeller shaft (observe protrusion).

Grease centering mount.

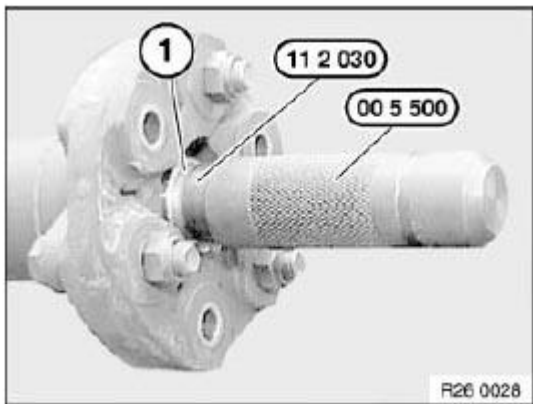


Fig. 18: Identifying Special Tools (11 2 030 And 00 5 500) Into Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe protrusion $A = 4^{+2}$ mm of centering (1).

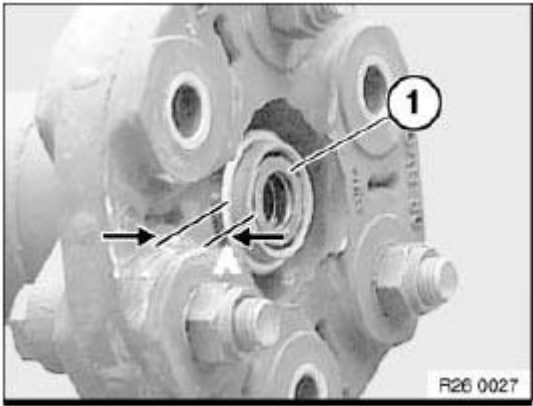


Fig. 19: Identifying Centering Bore

Courtesy of BMW OF NORTH AMERICA, INC.

26 11 160 REPLACING CONSTANT-VELOCITY JOINT FOR PROPELLER SHAFT

Special tools required:

- 23 1 160
- 26 1 110
- 26 1 121
- 26 1 122
- 31 2 102
- 31 2 104

Necessary preliminary tasks:

- Remove **propeller shaft**.

Lever sealing cap (1) with screwdriver (2) out of constant-velocity joint (3).

NOTE: **Replace sealing cap (1) with seal.**

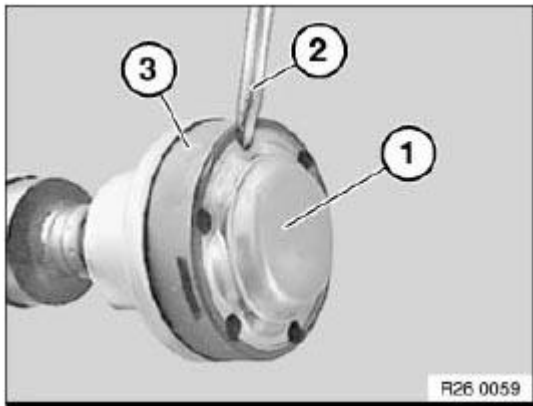


Fig. 20: Identifying Sealing Cap With Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Installation sequence:

1. Constant-velocity joint
2. Seal
3. Sealing cap

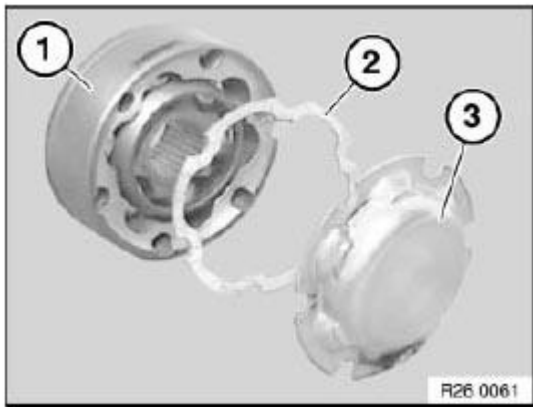


Fig. 21: Identifying Constant-Velocity Joint Installation Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Lift off retainer

Installation:

Replace circlip.

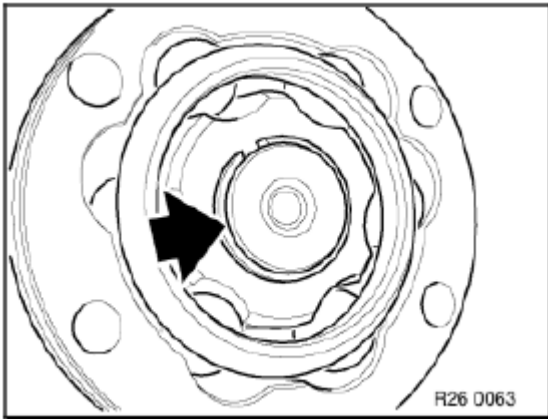


Fig. 22: Locating Circlip

Courtesy of BMW OF NORTH AMERICA, INC.

Force cap off constant velocity joint.

Installation:

Insert sealing washer (1) into constant-velocity joint.

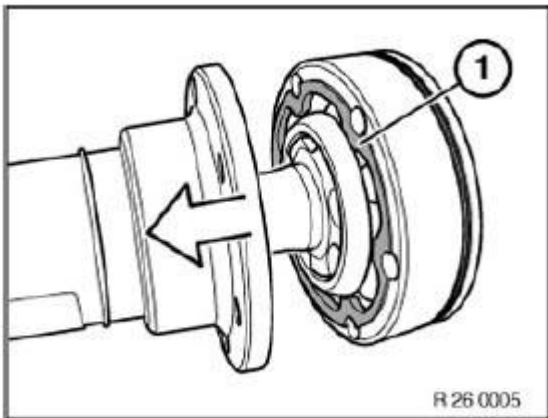


Fig. 23: Inserting Sealing Washer Into Constant-Velocity Joint

Courtesy of BMW OF NORTH AMERICA, INC.

Detach constant-velocity joint (1) with special tool 26 1 110 and commercially available special tool (2).

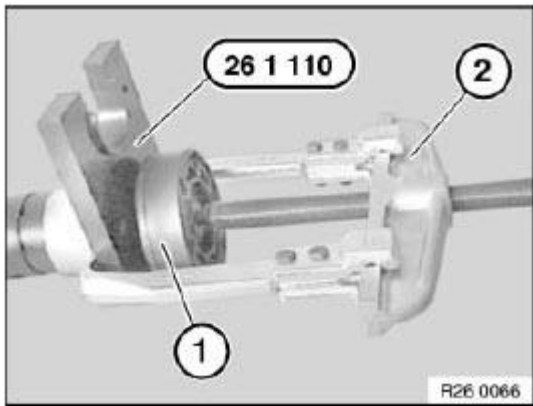


Fig. 24: Identifying Special Tool (26 1 110) On Constant-Velocity Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp (1) and detach cap with gaiter.

Push on new cap with gaiter.

NOTE: Do not tighten down clamp (1) yet.

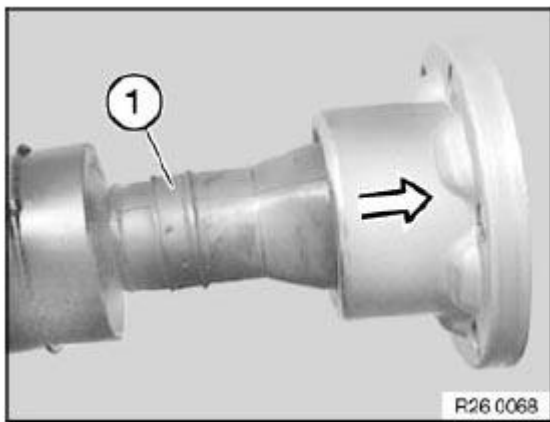


Fig. 25: Identifying Special Tool (26 1 110) On Constant-Velocity Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Mount constant-velocity joint with special tool 23 1 160 up to stop.

Align bores of constant velocity joint and cap to each other.

Tighten down clamp on gaiter.

NOTE: Keep toothing free of grease.
Inject new grease into constant velocity joint from rubber gaiter and flange sides.

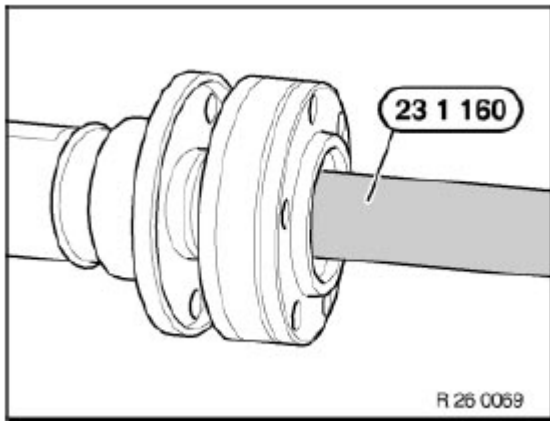


Fig. 26: Identifying Special Tool (23 1 160)

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Prepare special tools 31 2 102 and 31 2 104.

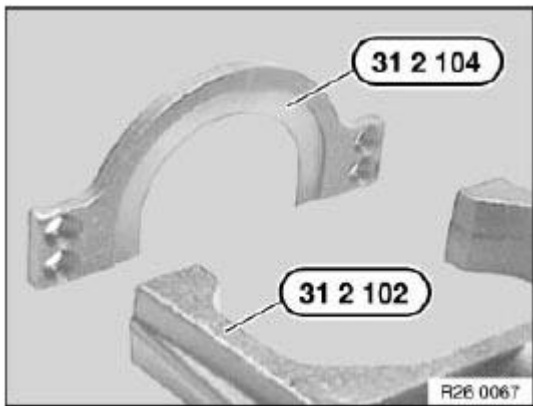


Fig. 27: Identifying Special Tools (31 2 102 And 31 2 104)

Courtesy of BMW OF NORTH AMERICA, INC.

Press sealing cap with special tools 26 1 121, 26 1 122, 31 2 102 and 31 2 104 into constant-velocity joint (1).

NOTE: Align sealing cap and seal to bores of constant-velocity joint with screw.

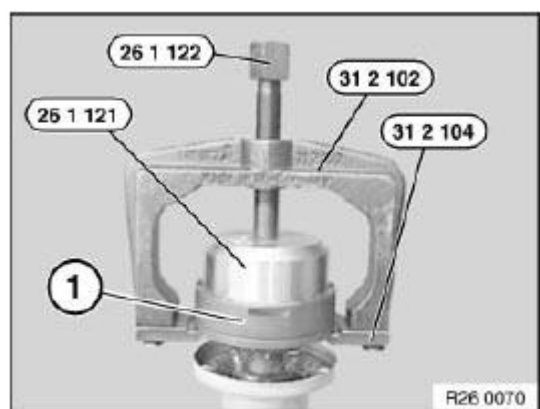


Fig. 28: Identifying Special Tools (26 1 121, 26 1 122, 31 2 102 And 31 2 104) Into Constant-Velocity Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Push cap (1) onto constant-velocity joint (2).

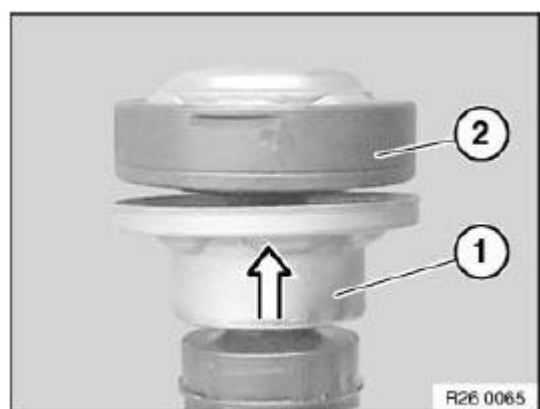


Fig. 29: Pulling Cap Onto Constant-Velocity Joint
Courtesy of BMW OF NORTH AMERICA, INC.

12 CENTER CONSOLE ASSEMBLY

26 12 001 REPLACING COMPLETE PROPELLER SHAFT CENTER BEARING (CONSTANT-VELOCITY JOINT)

Special tools required:

- 00 7 500
- 24 0 090
- 24 1 050
- 33 1 307

Remove **propeller shaft**.

IMPORTANT: Propeller shaft is balanced as a unit.

Mark front propeller shaft relative to rear propeller shaft with paint stick.

Marking by means of engraving which causes surface damage (e.g. center mark) is not permitted.

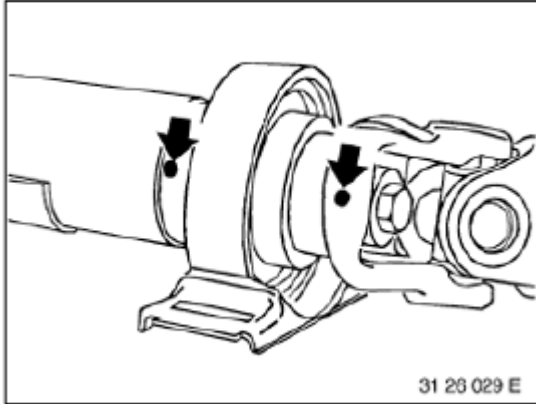


Fig. 30: Locating Propeller Shaft With Paint Stick
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Pull propeller shaft apart.

Installation:

Thread free from grease.

When pushing shaft together, make sure that markings match up.

Insert bolt (1) with thread-locking liquid, refer to BMW Parts Service.

Tightening torque **26 11 5AZ.**

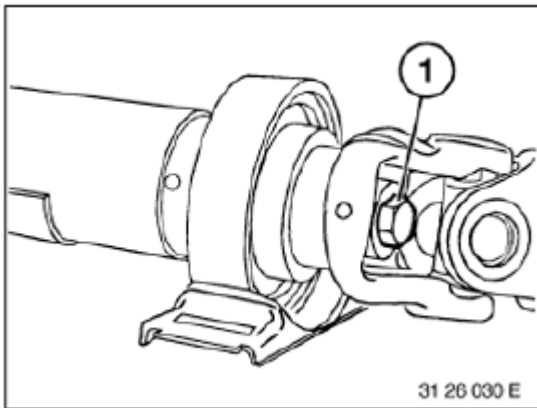


Fig. 31: Identifying Thread-Locking Liquid
Courtesy of BMW OF NORTH AMERICA, INC.

Remove shim and dust gaiter.

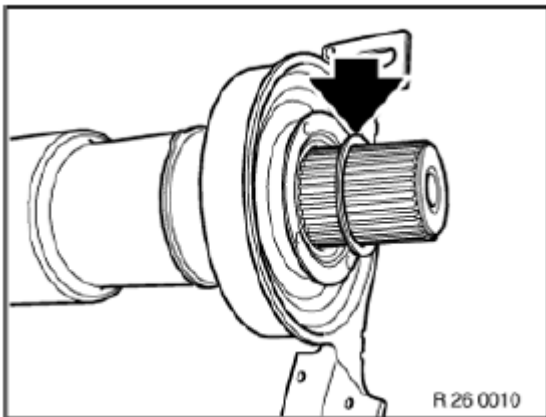


Fig. 32: Locating Shim And Dust Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off center bearing with special tool 00 7 500 / 33 1 307 and commercially available puller.

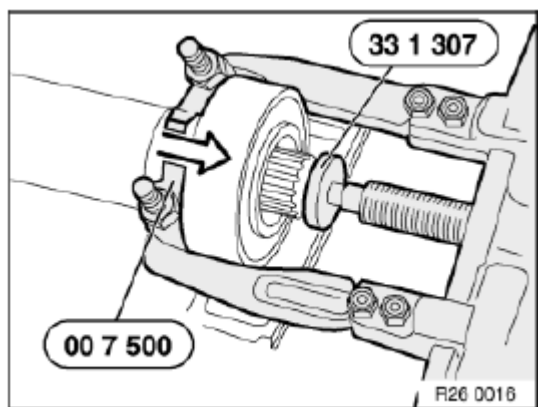


Fig. 33: Identifying Special Tool (00 7 500, 33 1 307) On Center Bearing
 Courtesy of BMW OF NORTH AMERICA, INC.

Drive new center bearing firmly home with special tool 24 0 090 or 24 1 050.

NOTE: **Bearing inside diameter 30 mm, use special tool 24 0 090.**
 Bearing inside diameter 35 mm, use special tool 24 1 050.

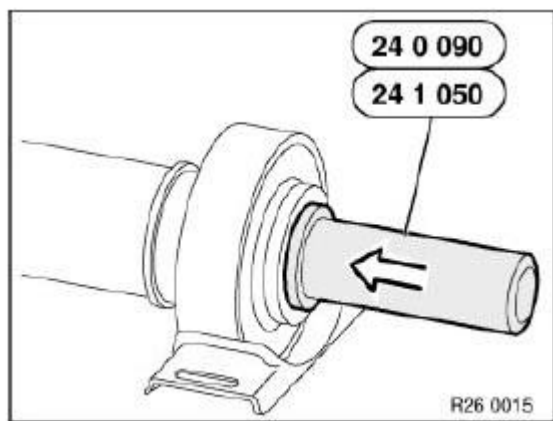


Fig. 34: Identifying Special Tool (24 0 090, 24 1 050) On Center Bearing Installation Positions
 Courtesy of BMW OF NORTH AMERICA, INC.

26 12 001 REPLACING COMPLETE PROPELLER SHAFT CENTER MOUNT

Special tools required:

- 00 7 500
- 23 1 160

Necessary preliminary tasks:

- Remove **propeller shaft**.

NOTE: The propeller shaft is balanced. The front and rear propeller shafts must be reassembled in the same position.

Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

Installation:

Make sure gaiter (1) is securely seated in groove (2).

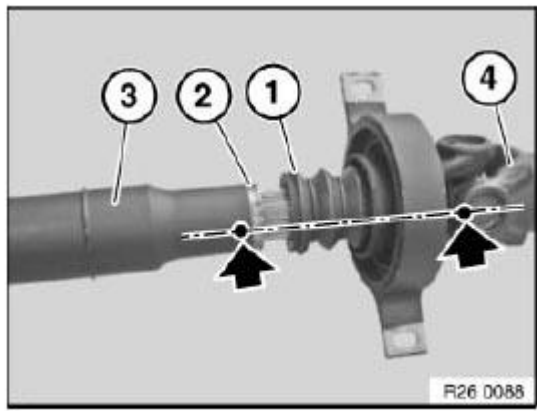


Fig. 35: Locating Propeller Shaft Center Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Pull propeller shaft apart.

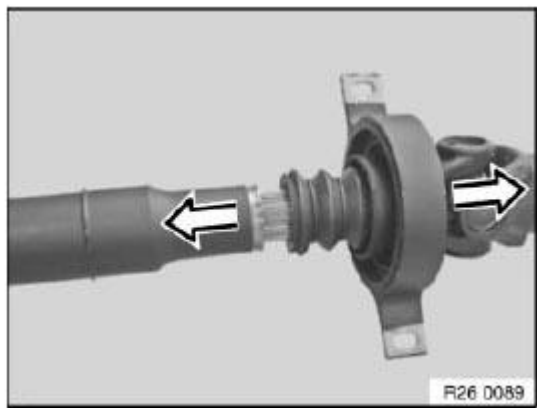


Fig. 36: Pulling Propeller Shaft Apart
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, insert new clamping ring (1) into front propeller shaft (2).

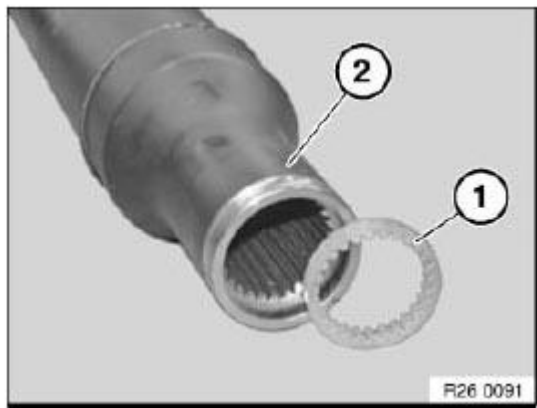


Fig. 37: Inserting Clamping Ring Into Front Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

Installation:

Apply a coating of grease to longitudinal splines on shaft.

Grease. Refer to **OPERATING FLUIDS - DRIVE SHAFT** .

Push gaiter (1) during installation into groove (2) and make sure it is firmly seated.

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

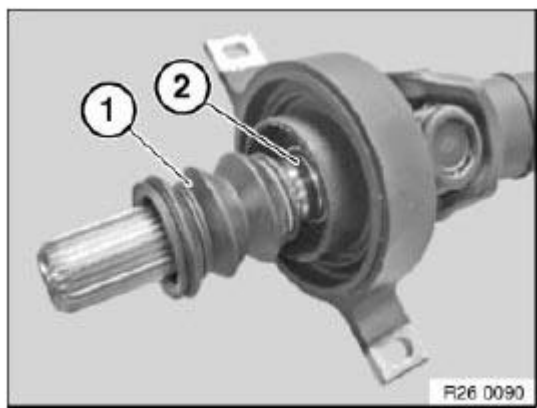


Fig. 38: Identifying Gaiter Installation Into Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 00 7 500 between center mount (1) and universal joint (2).

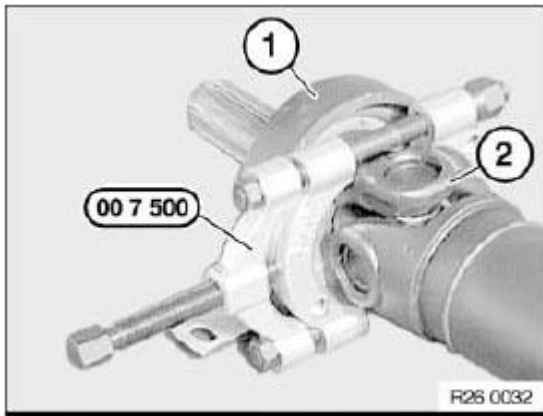


Fig. 39: Identifying Special Tool (00 7 500) On Center Mount And Universal Joint (2)
Courtesy of BMW OF NORTH AMERICA, INC.

Using a hydraulic press, force center mount (1) off propeller shaft (2).

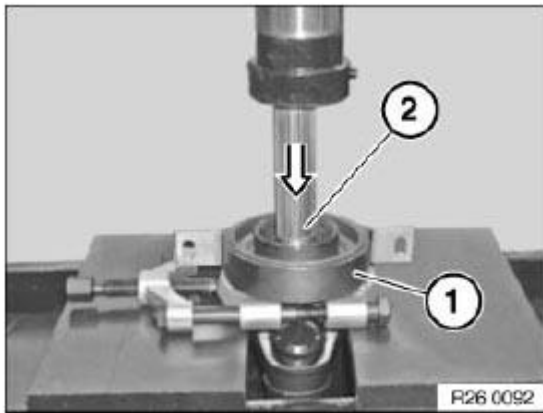


Fig. 40: Pressing Center Mount Off Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Force new center mount (1) onto propeller shaft. Collar (2) must point in direction of travel towards front propeller shaft. Drive center mount firmly home with special tool 23 1 160.

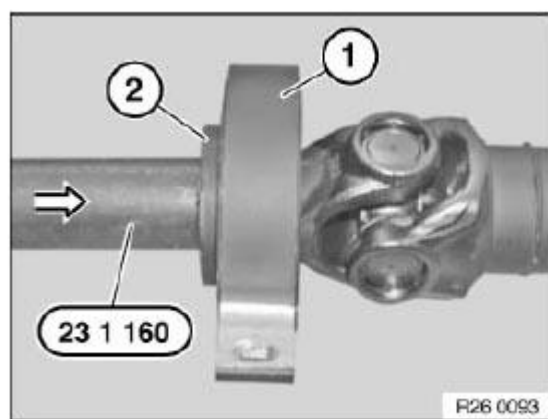


Fig. 41: Identifying Special Tool (23 1 160) On Center Mount
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Driver Assistance Systems

INTRODUCTION

BMW has always offered a comprehensive range of driver assistance systems.

These systems make it easier for the driver to control the vehicle, by:

- providing the driver with information,
- prompting the driver how to act or
- actively intervening if necessary in order to ensure maximum performance efficiency and safety

This training information provides an overview of all the driver assistance systems available in the F10, including the new Parking Assistance and Surround View (with side view cameras) features.

The Driver Assistance Package (ZDA) is available on the F10. The following options are included in the ZDA package and they are not available separately:

- Automatic High beams
- Lane Departure Warning
- Active Blind Spot Detection
- Parking Assistant

NOTE: Night Vision w/pedestrian detection and Head-Up Display are available as separate options.

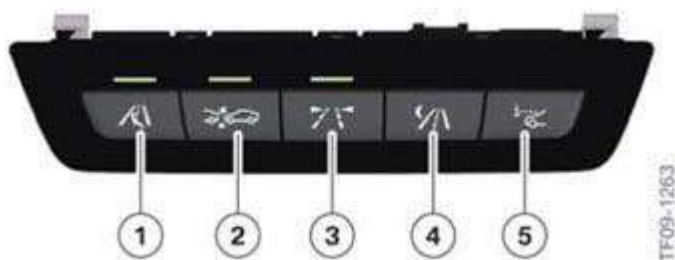


Fig. 1: Identifying F10 Assist System Operating Unit
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Active Blind Spot Detection
2	Collision warning with brake application function (adaptive dynamic brake control with warning function)

3	Lane Departure Warning
4	Night Vision with pedestrian detection
5	Head-Up Display

BMW Night Vision with person recognition and Head-Up Display are not described in this document, since these systems have been taken over from the F01/F02.

1.1. BUS SYSTEM DIAGRAM

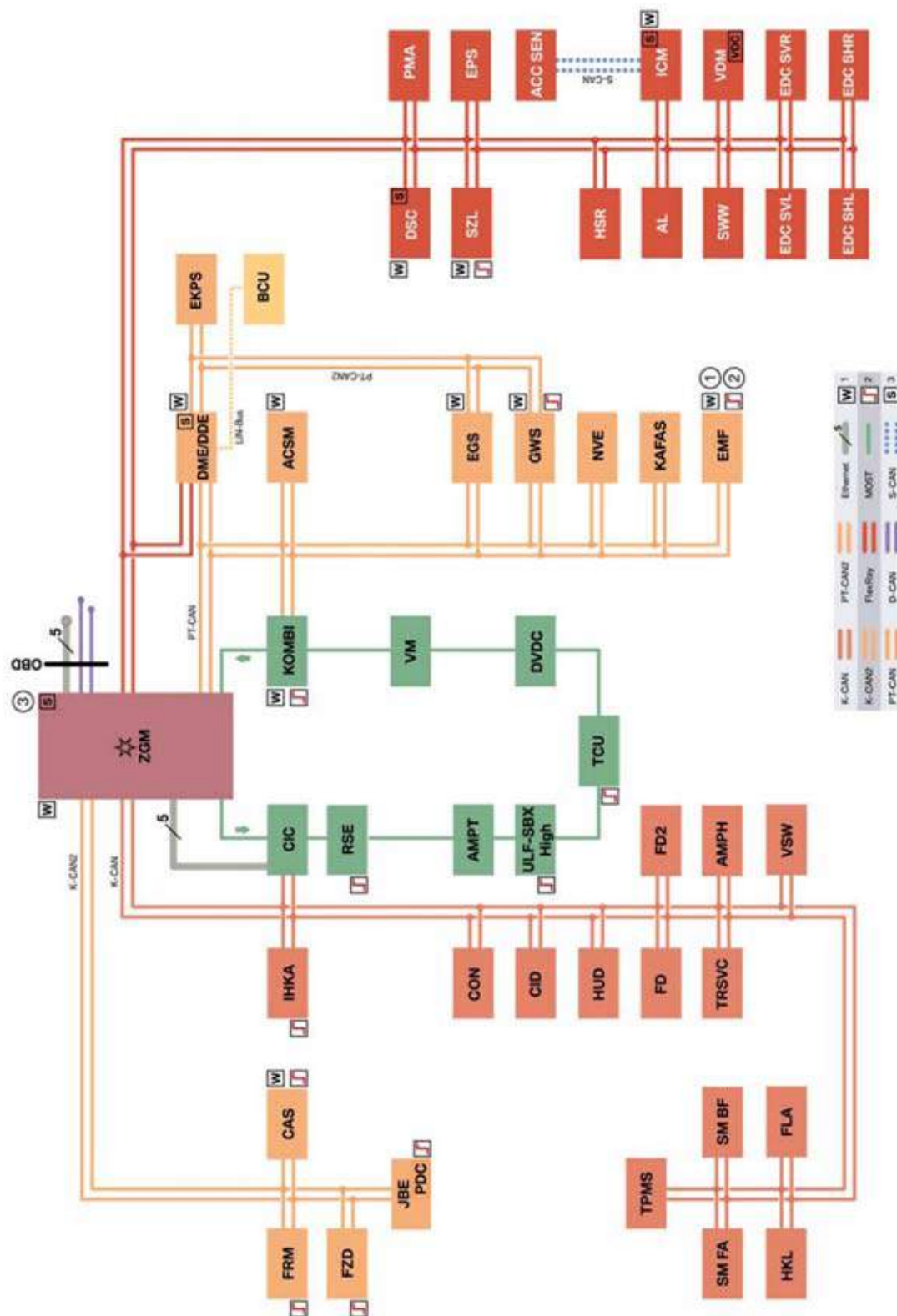


Fig. 2: F10 Bus System Communication Diagram

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Wakeable control units
2	Control units authorized to wake up the vehicle
3	Start-up node control units, for starting up and synchronizing the FlexRay bus system
ACC-SEN	Active Cruise Control- Sensor
ACSM	Advanced Crash Safety Module
AHM	Trailer module
AL	Active steering
AMPH	Amplifier High (high fidelity amplifier)
AMPT	Amplifier Top (top high fidelity amplifier)
BSD	Bit-serial data interface
BCU	Battery Charge Unit (charging unit for auxiliary battery)
CAS	Car Access System
CIC	Car Information Computer
CIC	Basic Car Information Computer Basic
CID	Central Information Display
CON	Controller
D-CAN	Diagnosis on Controller Area Network
DDE	Digital Diesel Electronics
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
DVD	DVD changer
EDC	SHL Electronic Damper Control, rear left satellite unit
EDC	SHR Electronic Damper Control, rear right satellite unit
EDC	SVL Electronic Damper Control, front left satellite unit
EDC	SVR Electronic Damper Control, front right satellite unit
EGS	Electronic transmission control
EKPS	Electronic fuel pump control
EMF	Electromechanical parking brake
EPS	Electronic power steering
Ethernet	Cabled data network technology for local data networks
FD	Rear display
FD2	Rear display 2
FLA	High-beam assistant
FlexRay	Fast, preset and fault-tolerant bus system for use in automotive applications
FRM	Footwell module
FZD	Roof function center
GWS	Gear selector switch

HKL	Luggage compartment lid lift
HSR	Rear suspension slip angle control
HUD	Head-Up Display
ICM	Integrated Chassis Management
IHKA	Integrated automatic heating/air conditioning
JBE	Junction box electronics
KAFAS	Camera-based driver assistance system
K-Bus	Body bus
K-CAN.	Body controller area network
K-CAN2	Body controller area network 2 (500 kBit/s)
KOMBI	Instrument cluster
LIN-Bus	Local Interconnect Network bus
Local-CAN	Local Controller Area Network
MOST	Media Oriented System Transport
MOST	port Media Oriented System Transport port
NVE	Night Vision electronics
PDC	Park Distance Control
PMA	Parking Maneuvering Assistant
PT-CAN	Powertrain CAN
PT-CAN2	Powertrain controller area network 2
OBD	Diagnosis socket
RSE	Rear seat entertainment system
SDARS	Satellite tuner (US)
SMBF	Front passenger seat module
SMFA	Seat module, driver
SWW	Blind Spot Detection
SZL	Steering column switch cluster
TCU	Telematic Control Unit
TPMS	Tire Pressure Monitoring System
TRSV	Control unit for rear view camera and side view
ULF-SBX	Universal charger and hands-free unit, interface box (Bluetooth telephony)
VDM	Vertical Dynamics Management
VM	Video Module
VSW	Video switch
ZGM	Central Gateway Module

ACTIVE BLIND SPOT DETECTION

The active blind spot detection system (option 5AG) is meant to assist the driver during lane changes. To do this, the active blind spot detection system monitors traffic at the rear and sides of the vehicle with two radar sensors. The radar sensors are located above the rear bumper support.

You can see the components that make up the active blind spot detection system in the following graphic.

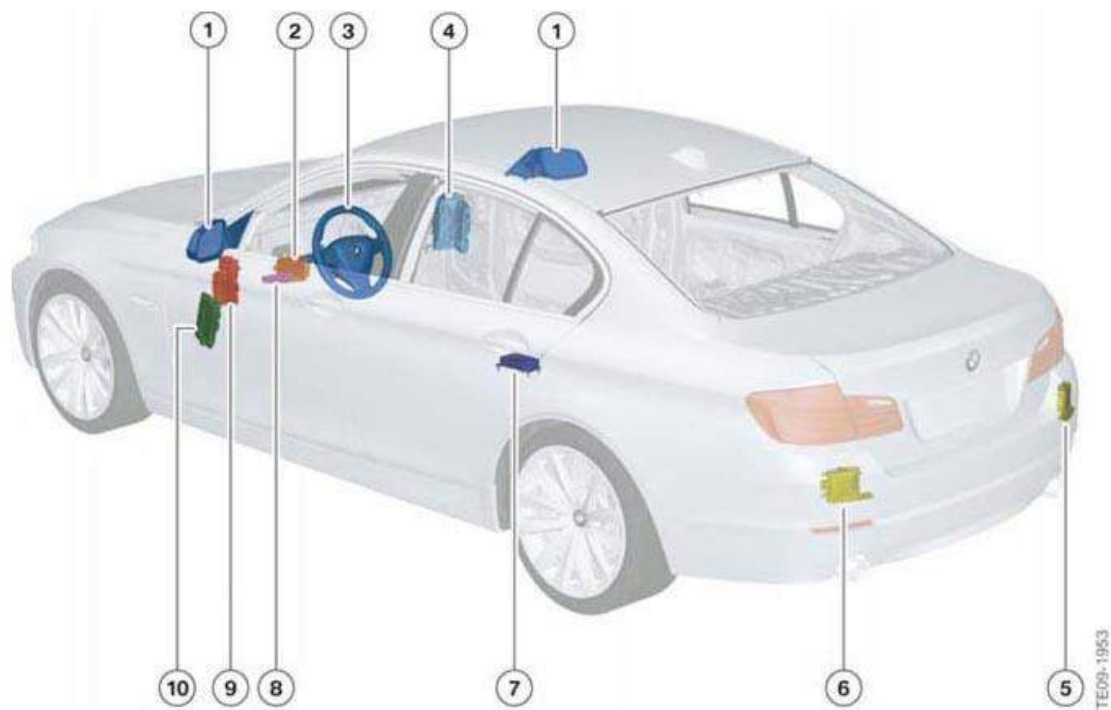


Fig. 3: Identifying F10 Active Blind Spot Detection System Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Exterior mirrors
2	Car Access System
3	Steering wheel with vibration actuator
4	Junction box (junction box electronics and front power distribution box)
5	Radar sensor, right
6	Radar sensor, left
7	Integrated Chassis Management
8	Driver assistance systems operating unit
9	Central Gateway Module
10	Footwell module
11	Steering column switch cluster

The system can detect traffic situations that could be dangerous or result in a collision if your vehicle changes lanes. The driver is first informed by a warning light in the exterior mirrors.

If the driver intends to change lanes in this situation and indicates this by operating the turn indicator, the driver is warned by a vibrating steering wheel and a flashing warning light in the exterior mirror.



Fig. 4: Identifying F10 Active Blind Spot Detection System In Exterior Mirror
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The system is not a substitute for the driver's assessment of the traffic situation. In the event of a warning, do not turn the steering wheel with unnecessary force, as this could cause the vehicle to vibrate and lose control.

LANE DEPARTURE WARNING

The lane departure warning (option 5AD) warns the driver in the event that the vehicle deviates from the lane it is currently traveling without the driver's intention. For this function to work properly recognizable road and lane markings should be present and detected by the system. The KAFAS control unit performs an evaluation of the images recorded by the forward-pointing video camera, located near the rear-view mirror base.

Although the driver continues to have full responsibility for driving the vehicle, the system is only designed to assist the driver in case of a lapse of attention.

This system will only operate as intended on highways, major roads and well maintained country roads. Therefore, warnings are only given at speeds of over 70 km/h/43mph.

The driver activates the system using the lane departure warning button in the driver assistance control panel (to the left of the steering column).

The following graphic contains the components of the lane departure warning system.

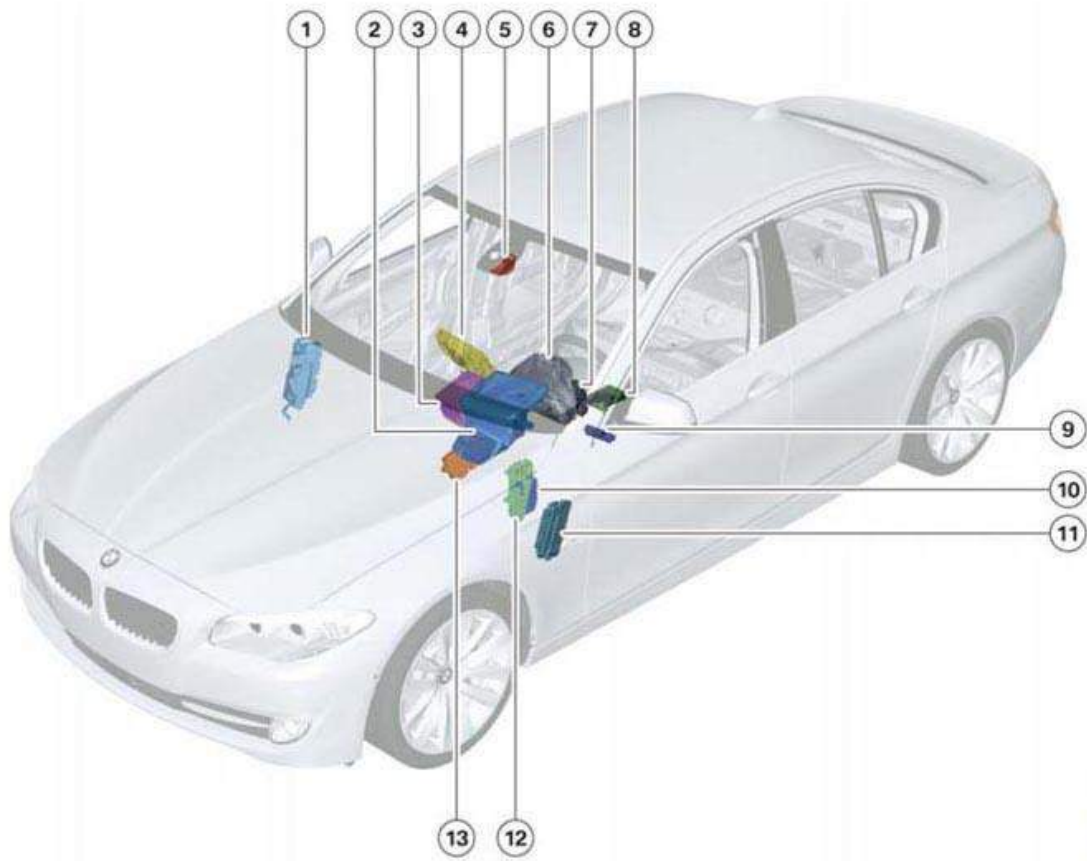


Fig. 5: Identifying F10 Lane Departure Warning System Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Junction box (junction box electronics and front power distribution box)
2	Head-up display (HUD)
3	Car Information Computer (CIC)
4	Central Information Display (CID)
5	Video camera
6	Instrument cluster
7	Steering column switch cluster (SZL)
8	Integrated Chassis Management (ICM)
9	Driver assistance systems operating unit
10	Camera-based driver support systems (KAFAS) control unit
11	Footwell module (FRM)
12	Central Gateway Module (ZGM)
13	Car Access System (CAS)

NOTE: This system is not a substitute for the driver's assessment of the road's course or traffic situation. In the event of a warning, do not turn the steering wheel with unnecessary force, as this could cause the vehicle to vibrate and lose control.

HIGH-BEAM ASSISTANT

The high-beam assistant FLA (option 5AC) assists the customer with the use of the high-beam headlights. Depending on the traffic situation, prevailing ambient light conditions and which vehicle lights are on, the FLA automatically switches the high-beam headlights on or off and thereby assists or relieves the driver of having to operate the high-beam headlights.

High beam can still be switched on and off manually as usual. The driver always has the capability, and the obligation, to override the system whenever the situation is required.

In the F10, the high-beam assistant option can only be ordered with the ZDA Driver Assistance Package.

- Lane departure warning and the high-beam assistant functions are combined in the KAFAS control unit and share the same video camera.

The FLA video camera is a simplified image sensor that can detect light color and intensity.



Fig. 6: Identifying F10 High-Beam Assistant Display And Button
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Steering column stalk
2	High-beam assistant button
3	Display when high-beam assistant activated
4	Display when high-beam headlights on

NOTE: The high-beam assistant is not a substitute for the driver's decision of when to use the high-beam headlights. For safety reasons, always manually dip the high-beam headlights when confronted with oncoming traffic.

PARK DISTANCE CONTROL

The Park Distance Control PDC (option 508) assists the driver when maneuvering in and out of parking spaces. Acoustic signals and a visual display indicate the current distance to an obstacle. The Park Distance Control of

the F10 is similar to the F01/F02/F07 and uses the measured data from four ultrasonic sensors on both the front and rear bumper.

PDC is activated when reverse is engaged or the PDC button is pressed. The PDC button is located next to the electronic gear selector/switch.

The audible and visual distance warnings are the results of distance measurements and are provided to the driver via the speaker system and by displays in the CID respectively.

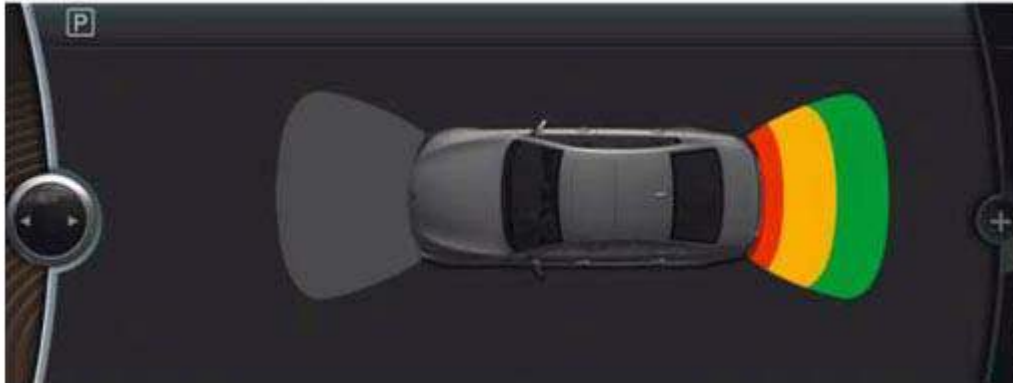


Fig. 7: Identifying F10 Distance Warning Display In CID
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The PDC is not a substitute for the driver's assessment of the traffic situation. The driver must always obtain a direct view of the situation all round the vehicle in order to assess the traffic situation. Failure to exercise due diligence in this way could result in an accident risk on account of road users or objects not located within the detection range of the PDC. Loud sounds outside and inside the car can render the PDC signal inaudible.

PARKING ASSISTANT

For the first time in a BMW vehicle, a system is being introduced in the F10 that assists the driver when performing a parallel parking maneuver. Parking Assistant is available as optional equipment (option 5DP) in conjunction with the optional Park Distance Control (option 508)

Parking Assistant makes it easier to maneuver the vehicle into parking spaces parallel to the roadway. The system measures potential parking spaces (on both sides of the road) when driving by them at speeds less than 35 km/h/22mph, regardless of whether parking assistant has been activated or not. When a parking space 1.2m larger than the vehicle length is detected and the system has been activated, the space is shown to the driver in the central information display. The driver remains responsible for the acceleration and braking of the vehicle while the parking assistant system takes over only the steering function and the PDC monitors the distances and obstacles. The driver is led through the parallel parking process with detailed instructions for action displayed on the CID and, where applicable, additional acoustic warnings and acknowledgments are issued.

NOTE: The Parking Assistant system does not relieve the driver of personal responsibility. The driver is still responsible for monitoring the parking space and the parking process. The driver should intervene if necessary in order to avoid any potential accident.

6.1. SYSTEM COMPONENTS

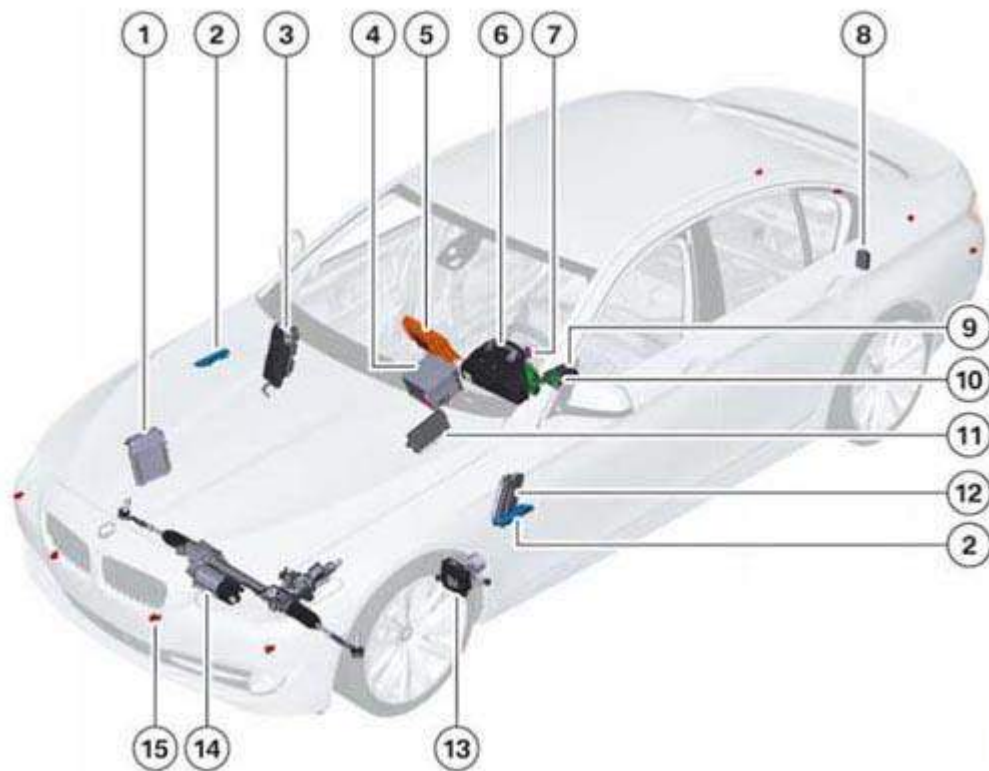


Fig. 8: Identifying F10 Parking Assistant System Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Digital Motor Electronics or Digital Diesel Electronics
2	Parking assistant ultrasonic sensor in the auxiliary turn indicator
3	Junction box (junction box electronics and front power distribution box)
4	Car Information Computer
5	Central Information Display
6	Instrument cluster
7	Center console operating unit and controller
8	Parking Maneuvering Assistant (PMA)
9	Integrated Chassis Management (ICM)

10	Steering column switch cluster
11	Car Access System
12	Footwell module
13	Dynamic Stability Control
14	Electromechanical power steering
15	Park Distance Control sensors

6.1.1. System Wiring Diagram

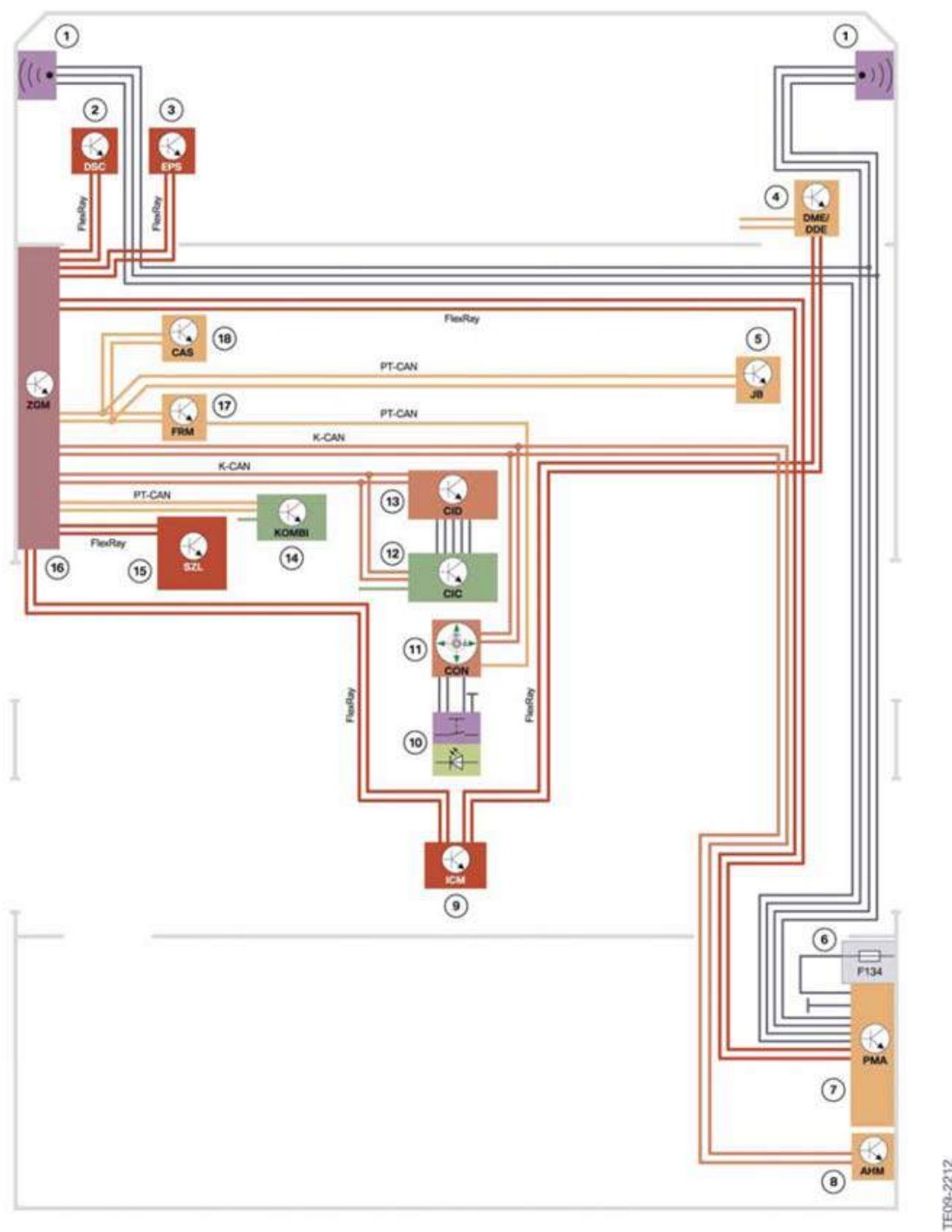


Fig. 9: F10 Parking Assistant System - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Parking assistant ultrasonic sensors

2	Dynamic Stability Control (DSC)
3	Electromechanical Power Steering (EPS)
4	Digital Motor Electronics (DME)
5	Junction box JB with junction box electronics
6	Luggage compartment junction box
7	Parking Maneuvering Assistant (PMA)
8	Trailer module (AHM) Not for US
9	Integrated Chassis Management (ICM)
10	Park button in the center console
11	Controller (CON)
12	Car Information Computer (CIC)
13	Central Information Display (CID)
14	Instrument cluster (KOMBI)
15	Steering column switch cluster (SZL)
16	Central Gateway Module (ZGM)
17	Footwell module (FRM)
18	Car Access System (CAS)

6.1.2. Sensors

The two ultrasonic sensors of parking assistant are integrated in the side marker turn signal indicators (installed in the front fenders).

The function of these two ultrasonic sensors is similar to the function of the ultrasonic sensors of the Park Distance Control (PDC). Ultrasonic pulses are sent out and echo impulses are received. The signals are evaluated by the Parking Maneuvering Assistant (PMA) control unit. This is used along with the distance information from the Dynamic Stability Control to calculate the length and width of the parking space.

The ultrasonic sensors communicate with the parking assistance control unit via a LIN-Bus.



Fig. 10: Identifying F10 Installation Location Of Parking Assistant Ultrasonic Sensor In Side Marker

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Parking assistant ultrasonic sensor in the side marker turn signal indicator

The sensor has a horizontal opening angle of $\pm 10^\circ$ and a vertical opening angle of $\pm 60^\circ$. It has a range of approximately 4.5 m.



Fig. 11: Identifying F10 Parking Assistant Ultrasonic Sensor In Right Side Marker Turn Signal Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Parking assistant ultrasonic sensor

6.1.3. Parking Maneuvering Assistant (PMA)

The Parking assistant control module or Parking Maneuvering Assistant (PMA) is located in the luggage compartment behind the battery (beneath the trunk latch mechanism). It evaluates the signals from the sensors and thereby determines potential parking spaces. It also calculates the optimum path into a parking space and monitors the parking process. It activates the electromechanical steering via the ICM.

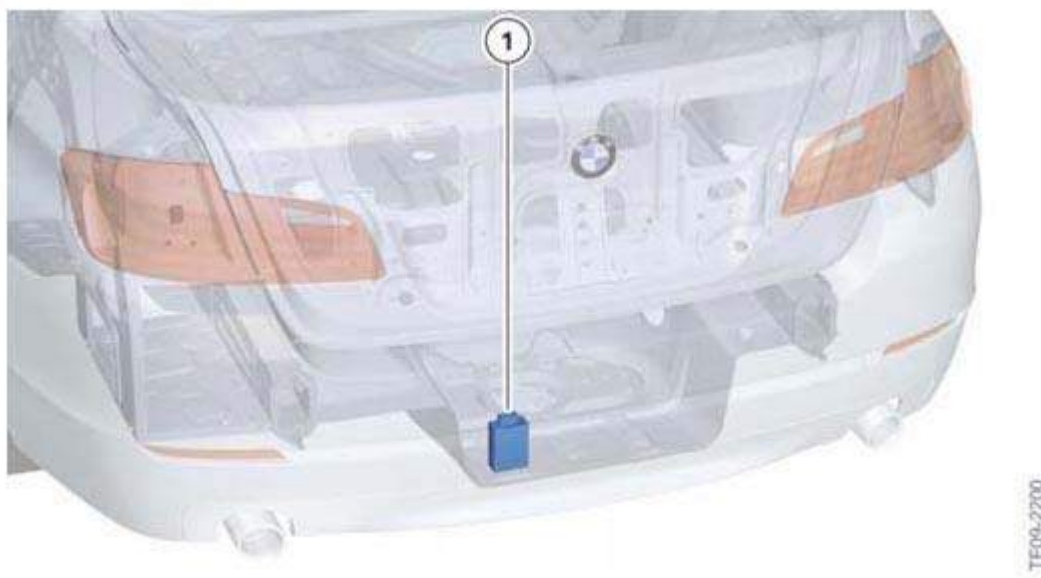


Fig. 12: Identifying F10 Installation Location Of Parking Maneuvering Assistant (PMA)
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Parking Maneuvering Assistant (PMA)

6.2. PARKING PROCESS

6.2.1. Measuring parking spaces

At a speed of up to 35 km/h/22mph and a maximum distance of 1.5 m/5 ft. from the row of parked vehicles, the Parking Maneuvering Assistant (PMA) determines suitable parking spaces using the wheel speed and the sensor data from the respective ultrasonic sensor. The parking space length is determined from the distance travelled based on the distance signals and from the sensor data from the ultrasonic sensors. The width of the parking space is determined using the sensor data from the ultrasonic sensor.

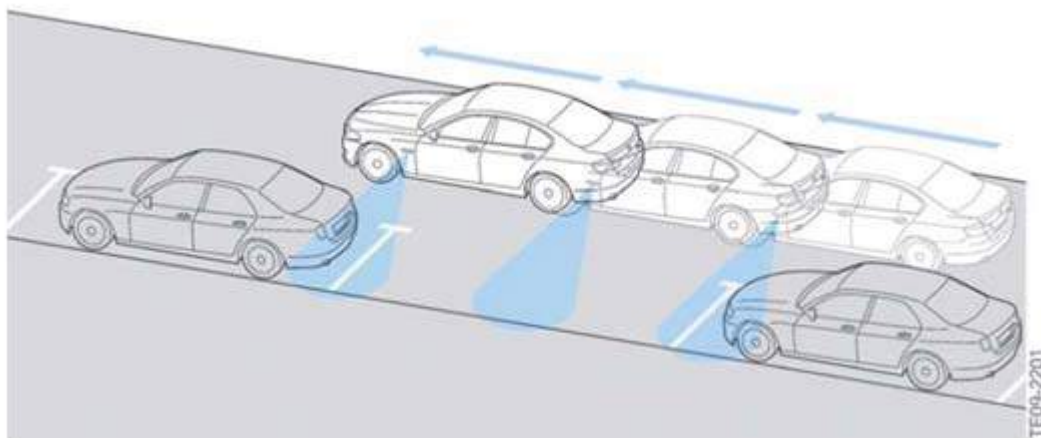


Fig. 13: Identifying F10 Parking Space Measurement
 Courtesy of BMW OF NORTH AMERICA, INC.

The following preconditions are placed on the parking space:

- The parking space must be between two objects each with a minimum length of about 1.5 meters (5 feet).
- The minimum width of the parking space must be about 1.5 meters (5 feet).
- The minimum length of the parking space must be at least the length of your vehicle plus about 1.2 meters (4 feet).

The requirements for the parking space and the opening angles of the ultrasonic sensor can be seen in the following graphic.



Fig. 14: Identifying F10 Requirements For Parking Space
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Maximum distance to the row of parked vehicles: 1.5 m (5 ft.)
2	Horizontal opening angle of the ultrasonic sensor: $\pm 10^\circ$, range approximately 4.5 m (14.8 ft.)
3	Vehicle or object length at least 1.5 m (5 ft.)
4	Length of the parking space, vehicle length plus approximately 1.2 m (4 ft.)
5	Vehicle or object length at least 1.5 m (5 ft.)

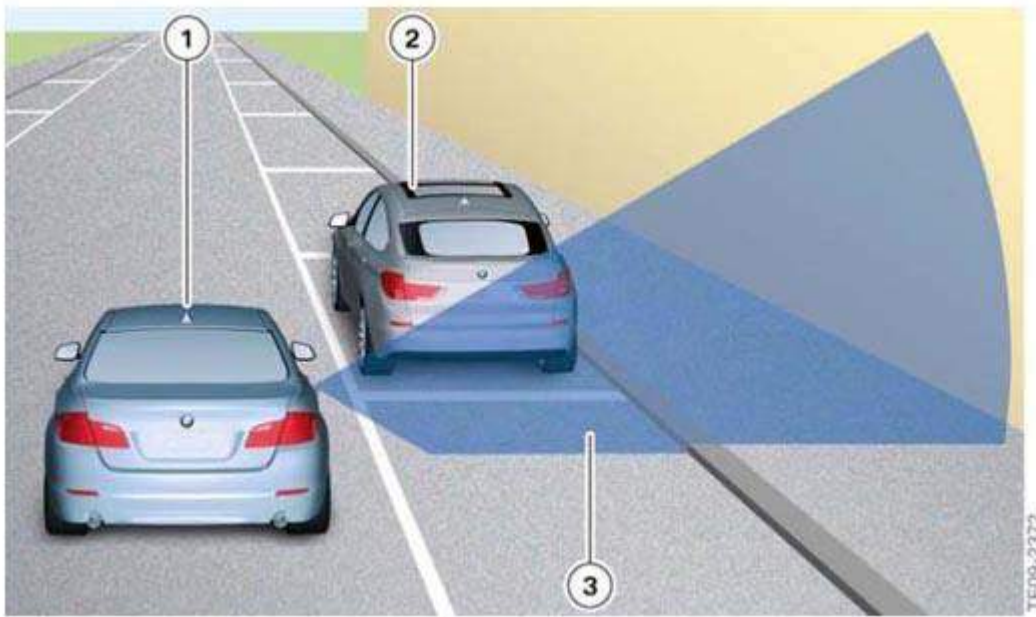


Fig. 15: Identifying F10 Parking Space Measurement
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Your vehicle
2	Vehicle in front of parking space
3	Vertical opening angle of the ultrasonic sensor: $\pm 60^\circ$, range approximately 4.5 m (14.8 ft.)

6.2.2. Activation

Basically there are two options for activating parking assistant:

- Activation via the park button in the center console
- Activation via "shifting into reverse gear" and then operating the controller.

Activation via the park button

For activation via the park button, the parking display appears in the central information display. As soon as a parking space has been found, the driver needs only to shift into reverse gear to use the parking assistant system.



Fig. 16: Identifying F10 Parking Display With Parking Assistant Activated
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Activation status of parking assistant (in activated mode)
2	Status of the parking space search (in search mode)
3	Potential parking space to the right

Activation by "shifting into reverse gear"

When you shift into reverse gear, the parking display appears in the central information display; however, the parking assistant is not yet activated. Even in this state, parking spaces are already being measured and, where applicable, displayed. To park using the system, the controller must be operated.



Fig. 17: Identifying F10 Parking Display (Parking Assistant Is Not Activated, With Parking Space Found To Right)

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Suitable parking space

6.2.3. Schedule of events

The sequence described here is with the parking assistant is already activated.

NOTE: The Parking Assistant system does not relieve the driver of personal responsibility when parking.

For safety reasons, the driver must always monitor the parking space and the parking process and intervene if necessary.

The Parking Assistant assists the driver in searching for a suitable parking space. If a suitable parking space (vehicle length plus 1.2 m/4 ft.) has been found while travelling forwards, the driver is directed to this parking space by a blue-lit parking space on the corresponding side of the vehicle and the blue-lit "P" in the central information display. The parking process with parking assistant can only be carried out in reverse.

By using the turn indicator, the "parking space search" display or "suitable parking space" on the opposite side disappears from the central information display. Parking spaces on this side continue to be measured in the background.

If a parking space has been found on the passenger side, the driver can use the parking assistant to maneuver into the parking space without using a turn signal. You can drive into a parking space on the driver's side only by using the left turn signal.

If a parking space has been found and the driver does not use a turn signal indicator, the central information display prompts the driver to do so.



Fig. 18: Identifying F10 Parking Assistant, Parking Space Found
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Status of the parking space search (suitable parking space detected)
2	Suitable parking space

After a suitable parking space has been found and the vehicle has reached a position from which it can be parked, the driver is prompted to stop the vehicle.



Fig. 19: Identifying F10 Parking Assistant Prompts To Stop Vehicle
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Symbol for action prompt (to stop the vehicle)
2	Please stop the vehicle to start parking maneuver.

After the vehicle has come to a complete stop, the driver is prompted to shift into reverse and let go of the steering wheel. If the driver grabs the steering wheel during the parking process, parking assistance is terminated. If need be, the parking process can later be resumed. Thus the driver can end the parking process at any time.

The PMA control unit calculates an optimum path for the parking process. The steering, and thus the transverse control, is taken over by activating the electromechanical power steering EPS) via the Integrated Chassis Management (ICM). Communication between the control units takes place via the FlexRay data bus.



Fig. 20: Identifying F10 Parking Assistant Prompts Driver To Select Reverse
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Please engage reverse gear and remove hands from the steering wheel.

Once the driver has shifted into reverse and lets go of the steering wheel, the parking process can be started with the parking assistant. The parking assistant takes over the control of steering once the vehicle is shifted into reverse. This is indicated by a steering wheel symbol in the central information display. The "Drive slowly in reverse and brake" prompt appears in the central information display.



Fig. 21: Identifying F10 Parking Assistant Prompts Driver To Drive In Reverse
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Carefully reverse and brake manually.

While the vehicle is moving, the driver must continuously observe the traffic and that what is happening around the vehicle. During the parking process, The parking assistant only takes over the steering of the vehicle, the driver is still responsible for accelerating and braking and thus safely driving the vehicle.

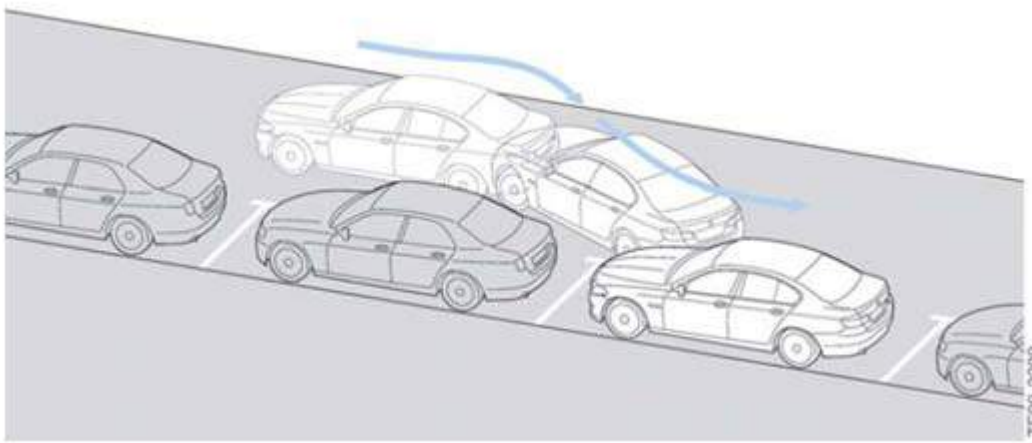


Fig. 22: Identifying F10 Parking Process
 Courtesy of BMW OF NORTH AMERICA, INC.

While driving in reverse, the driver is continuously shown the parking display in the central information display. The path during the parking process is continuously monitored by the PMA and corrected if necessary.

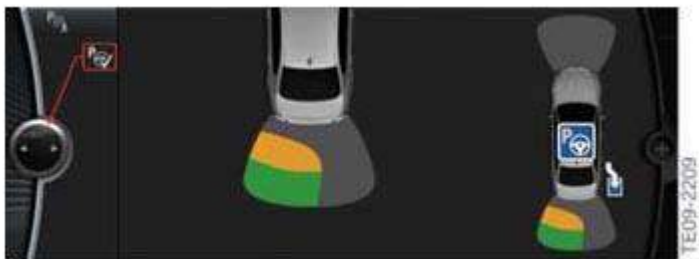


Fig. 23: Identifying F10 Parking Assistant, Parking Display During Parking Process
 Courtesy of BMW OF NORTH AMERICA, INC.

In the event that the parking assistant does not make it into the parking space in one try, it prompts the driver to drive forwards upon reaching a certain precalculated point. In some cases, the sensor data from the Park Distance Control will also be used to do this. The prompt appears in the central information display and an acoustic signal is emitted. The prompt to change directions repeats until the vehicle is completely in the parking space.



Fig. 24: Identifying F10 Parking Assistant Prompt For Driving Forwards
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Carefully drive forward and brake manually.

After the parking process has been completed and the vehicle is completely in the parking space, the driver receives an acoustic signal and information in the central information display. The parking assistant is then deactivated.



Fig. 25: Identifying F10 Parking Assistant Completion Of Parking Process
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Parking completed, please secure the vehicle.

The parking process is cancelled in the following cases:

- Maximum parking speed of 10 km/h (6 mph) exceeded
- Incorrect selection of turn signal indicator (for example left instead of right)
- The driver turns the steering wheel
- A door is opened
- Incorrect gear selection
- DSC detects a slip.

Each of these reasons for cancelling the process is documented in the fault memory of the Parking Maneuvering

Assistant (PMA) with an info entry. Consequently, this is not a system fault, but incorrect operation by the user. After a cancellation, the system checks to see whether it is possible to resume the parking process. The driver can immediately resume the parking process where appropriate.

6.2.4. Service Information

Notes for Service

After replacing the PMA or an ultrasonic sensor, no special start-up is required. However, each time the start-up process begins, the control unit checks whether the sensor software is compatible with the control unit software. In the event that they are not compatible, a corresponding fault code is set in the PMA control unit. In this case, the "Update software of the ultrasonic sensors" service function must be carried out.

The PMA monitors itself for faults and, if necessary, makes the corresponding fault entries. In exceptional cases, this is not always possible. The control unit cannot detect if the ultrasonic sensors (including the sealing ring) are incorrectly installed or clipped, or if the side wall in the area of the ultrasonic sensors is damaged.

This can lead to the following customer complaints without fault entries:

- Small parking spaces are only rarely detected
- While parking, the vehicle drives very close to or very far from the vehicle in front of the parking space
- After the parking process, the vehicle is either far from, very close to or on the curb
- The vehicle is crooked in the parking space.

In this case, the ultrasonic sensors must be checked for correct installation and damage on the side wall in the area of the ultrasonic sensors must be ruled out.

Parking assistant relieves the driver in two respects. First, from the task of estimating the size of a parking space and deciding based on this whether the space is large enough. Second, from the task of steering into the space on his or her own. Braking and accelerating the vehicle still remains the responsibility of the driver. While searching for a parking space and parking, the driver is presented with all relevant information, from the results of the parking space measurement, to the parking assistant status and corresponding handling instructions, to the distances to other objects, e.g. via the PDC image in an integrated display. This makes it particularly easy to monitor the parking process and simultaneously control the vehicle.

SURROUND VIEW

A "Surround View" of the entire vehicle can be displayed in the CID with the combination of the Side View and Top View cameras systems (option 5DL) It can only be ordered as part of the ZCE Camera Package, in conjunction with the rear view camera (option 3AG) and Park Distance Control (option 508).

The Side View and Top View systems can no longer be ordered individually.

7.1. SIDE VIEW

The Side View Camera function was first introduced in a BMW with the F01/F02 and is now installed in the

F10. This feature makes it easier for the driver to pull into roads or tight intersections in which the driver's view to the side is obstructed. The function is implemented by two digital cameras installed on the right and left front wheel arches.

The driver can activate the Side View using a button in the control panel next to the gear selector lever or with the iDrive controller.

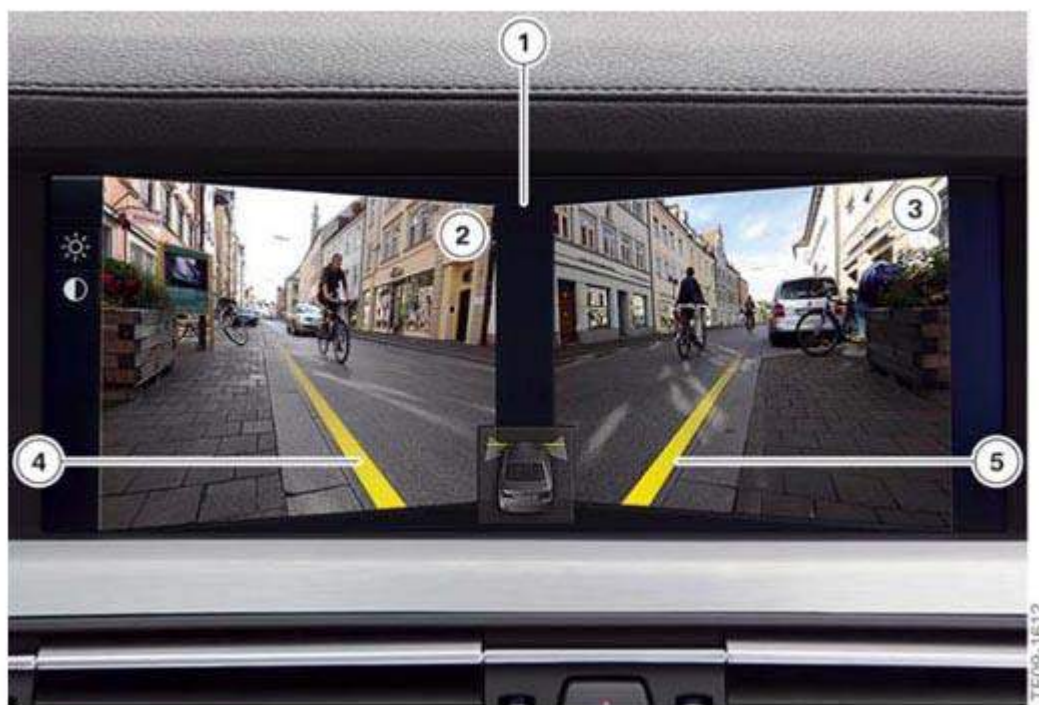


Fig. 26: Identifying F10 Side View Display In CID
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Split screen images from the bumper cameras
2	Image from the bumper camera in the left wheel arch
3	Image from the bumper camera in the right wheel arch
4	Projected front of vehicle, view to left
5	Projected front of vehicle, view to right

The video camera images are shown in the CID in a split screen display up to 30 km/h. Like the top and rear view cameras, the two bumper cameras send their signals to the TRSVC control unit via LVDS data lines. The signals are then forwarded via CVBS (composite video) lines to the video switch (VSW) and to the CIC. The CIC transmits the image data via LVDS data lines to the CID where it is displayed.

Side View Camera (option 5DK) can only be installed in conjunction with the rear view camera (option 3AG) and is part of the ZCE Camera Package.

NOTE: The driver must always obtain a direct view all round the vehicle in order to assess the driving situation. Failure to do so could result in an accident, in case pedestrians or objects are found beyond the viewing range of the bumper cameras.

7.2. TOP VIEW

The Top View function familiar from the F07 is also offered in the F10. It is included in the optional equipment as part of the ZCE Camera Package.

With the Top View function, two exterior mirror cameras show the driver a view of the sides of the vehicle from above. The image is displayed on the CID. This enables the driver to see areas around the vehicle that are not directly visible both when parking and when driving slowly.



Fig. 27: Identifying F10 Exterior Mirror Camera
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Exterior mirror camera

The driver can activate the Top View using a button in the control panel next to the gear selector or with the controller.

Top View uses both the exterior mirror cameras and the rear view camera to generate the image.

Like the side and rear view cameras, the two top view cameras send their signals to the TRSVC control unit via LVDS data lines.

The driver is shown the turning-circle and tracking lines already familiar from the rear view camera system on previous vehicles.

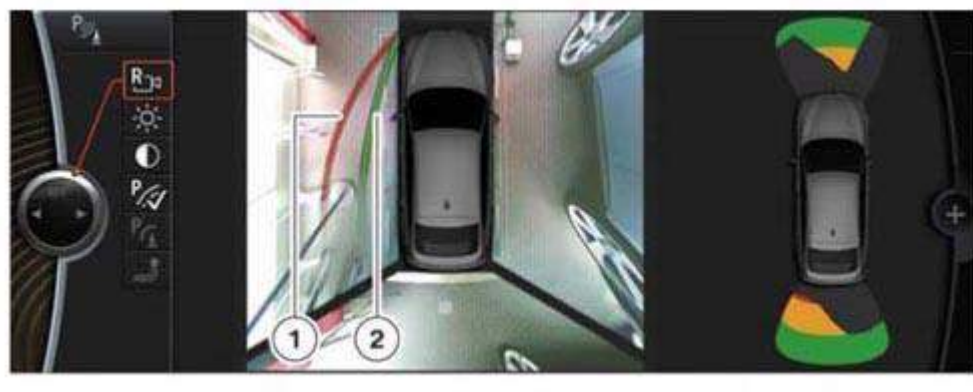
**Fig. 28: Identifying F10 Top View**

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Obstacle
2	Obstacle warning

The PDC information is used to warn the driver of an obstacle both audibly and visually in the CID.

**Fig. 29: Identifying F10 Top View With Tracking Line And Turning-Circle Line**

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Turning-circle line
2	Tracking line

The turning-circle line shows the tightest possible turning circle on a level road surface.

When the steering wheel is turned, only one turning-circle line is displayed.

The tracking line is of assistance for estimating the space needed for parallel parking and maneuvering on level roads.

The tracking line depends on the steering angle and changes continuously in response to movements of the steering wheel.

NOTE: The driver must always obtain a direct view all round the vehicle in order to assess the driving situation. Failure to exercise due diligence could result in an accident involving other road users or objects outside of the viewing range of the cameras.

DCC

8.1. INTRODUCTION

The cruise control with braking function has been used in many BMW models since the BMW 3 Series (E9x). It is also called "Dynamic Cruise Control" (DCC) and installed in the F10 as standard. It relieves the burden on the driver on quiet roads by maintaining a constant speed regardless of the resistance to vehicle motion (gradient, payload). Despite the support offered by this and other systems, the driver invariably bears full and sole responsibility for control of the vehicle. The driver can brake or accelerate at any time to override the DCC function.

DCC also offers the driver the option of adjusting the set speed in small or large increments, which is then set and maintained by the system by controlling power output and braking. The brakes are also controlled during steep downhill driving if sufficient deceleration is not achieved by engine drag-torque alone.

The cruise control with braking function is implemented in the F10 within the ICM control unit.

8.2. CONTROL FUNCTIONS

8.2.1. Cruise control

Cruise control computes a target acceleration or target deceleration on the basis of the set speed input by the driver and the car's actual speed.

8.2.2. Acceleration and deceleration

The driver can specify the set speed or acceleration by using the rocker switch on the multifunction steering wheel.

8.2.3. Cruise control in curves

This function, also known as "lateral acceleration control", is designed to prevent the lateral acceleration forces generated by cornering from rising above a certain level of perceived comfort when the car is being driven with the cruise control engaged. Driving speed and yaw rate are used to compute a figure for lateral acceleration. This value is compared to a speed-dependent limit value in order to achieve the following, seemingly contradictory objectives:

- if the driver takes complete control, disruptive and overly restricted interventions are avoided, even if the car is driven at high speed.
- Most car occupants find high lateral acceleration uncomfortable so useful interventions and a perceptible restriction on dynamic handling at higher speeds are applied under these circumstances.

The output variable from cornering speed control is also a set-point for longitudinal acceleration.

8.2.4. Prioritization of the set-point value

A set-point value is selected as highest-priority set-point from the set of longitudinal-acceleration set-points obtained from the above-mentioned control functions; this selection is situation-dependent. Signal filtering is applied to prevent sudden jumps when the system switches from the set-points.

8.2.5. Interference-force estimation

An acceleration or deceleration force has to be calculated so that the prioritized longitudinal acceleration can be implemented using the actuators. Example: when the car is driving up hill the propulsive forces needed in order to achieve a given longitudinal acceleration are higher than when the car is travelling on a flat surface. Deceleration as the car ascends a gradient, on the other hand, requires less braking force than is the case on the flat. If these forces are to be computed correctly, exact values are required not only for the gradient, but also for the mass of the vehicle, rolling resistance, drag and other accelerating forces. There is no adequate system of sensors for all these interfering forces, so an estimated value is derived from a comparison of the following two variables:

- actual motion variables of the vehicle
- expected motion variables of the vehicle, forecast on the basis of the driving and braking forces currently applied.

The magnitude of the interference force estimated in this way is taken into account by addition or subtraction in the subsequent processing of the longitudinal-acceleration set-point.

8.2.6. Activation of the actuators

Driving forces and/or braking forces have to be applied in order to achieve the longitudinal acceleration

computed by the control functions and thereby compensate for the acting interference forces. Usually a set-point is given for the drive train to accelerate the vehicle. In the exceptional circumstances that apply going down a steep hill, it might also be necessary to apply the brakes in order to limit the acceleration to a certain value.

If the vehicle needs to be decelerated, first the magnitude of the drive train's potential deceleration percentage is determined, and thus the braking effect of the engine and transmission. This value is sent to the Digital Motor Electronics or the Digital Diesel Electronics and electronic transmission control. If the drive train is unable to achieve this value alone, the additionally required value is sent to the Dynamic Stability Control.

If the brakes are perceptibly actuated to achieve the desired degree of vehicle deceleration, the car's brake lights are also actuated.

ACC STOP & GO

9.1. INTRODUCTION

The optional Active Cruise Control with Stop & Go function (ACC Stop & Go) offers optimum assistance to the driver not only in smoothly flowing traffic but also in traffic jam situations.

The Active Cruise Control with Stop & Go function (option 5DF) can be ordered only in conjunction with an automatic transmission (option 205 or option 2TB).

The purpose of ACC Stop & Go is to relieve the strain on the driver, therefore, further enhancing comfort and convenience.

The connection between the ACC Stop & Go equipment and the navigation system (as on the E60) is no longer necessary as from the introduction of the F10. In the E60, the navigation data was required in order to switch off the short-range radar sensors of the ACC Stop & Go in the vicinity of radio astronomical telescope/stations. The radar waves of the new ACC Stop & Go sensors no longer disrupt function of these radio telescopes, and therefore they no longer need to be switched off in their vicinity.

Active Cruise Control with Stop & Go function is a system designed to ease the strain on the driver, but it is by no means intended as a system that can relieve the driver of the obligation to exercise due diligence at all times. The driver bears full responsibility at all times for using the system in a practical way. It is self-evident that the driver must remain fully aware of traffic conditions at all times; this system simply makes it easier for the driver to do just that.

Active Cruise Control with Stop & Go function is designed to operate from high speeds down to a complete standstill. Speed and distance from the vehicle in front are automatically controlled in this speed range.

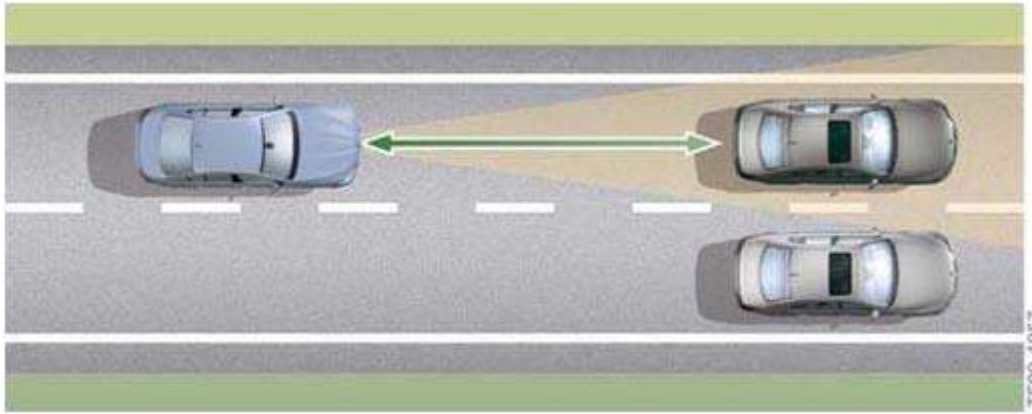


Fig. 30: Identifying F10 Active Cruise Control
Courtesy of BMW OF NORTH AMERICA, INC.

Active Cruise Control regulates speed when the road ahead is clear and switches automatically to distance control when the sensor for ACC Stop & Go detects a slower moving vehicle in the lane ahead. In this way Active Cruise Control not only assists the driver on little-used roads, but also in heavy traffic. Active Cruise Control takes over the routine of accelerating and braking for precision adjustment of distance and speed to suit other road users.

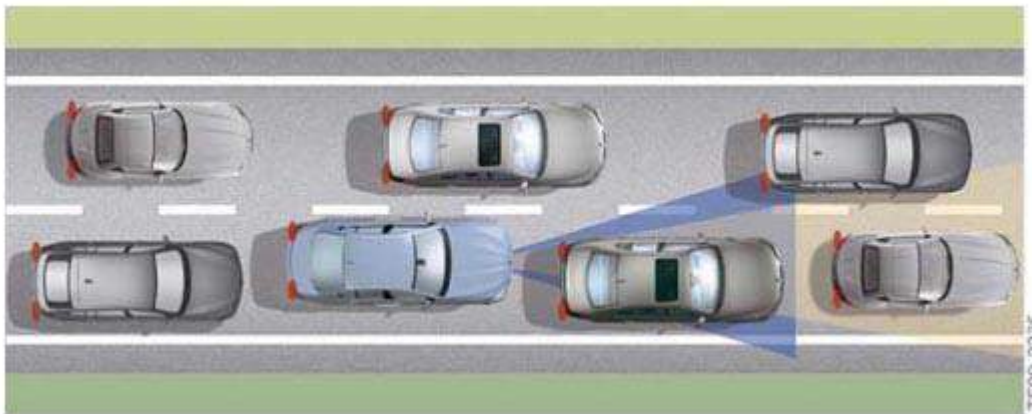


Fig. 31: Identifying F10 Active Cruise Control
Courtesy of BMW OF NORTH AMERICA, INC.

The Stop & Go function of the Active Cruise Control brings the vehicle to a complete stop if necessary. If the vehicle ahead begins to move again after having stopped, the driver is notified. To pull away again, the driver has to acknowledge this message. The pulling-away process is controlled fully automatically by ACC Stop & Go only if the duration of the standstill is very short.

This way ACC Stop & Go assists the driver not only in flowing traffic, but also in traffic jam situations. However, is not suited for use in urban areas for negotiating junctions or traffic lights.

The following aspects of the ACC Stop & Go assist system are considered in more detail here:

- System components
- Information regarding the vicinity of the car in front
- Control functions
- Operation and display
- Behavior in response to driver's intention to exit the vehicle
- Monitoring functions.

9.2. SYSTEM COMPONENTS

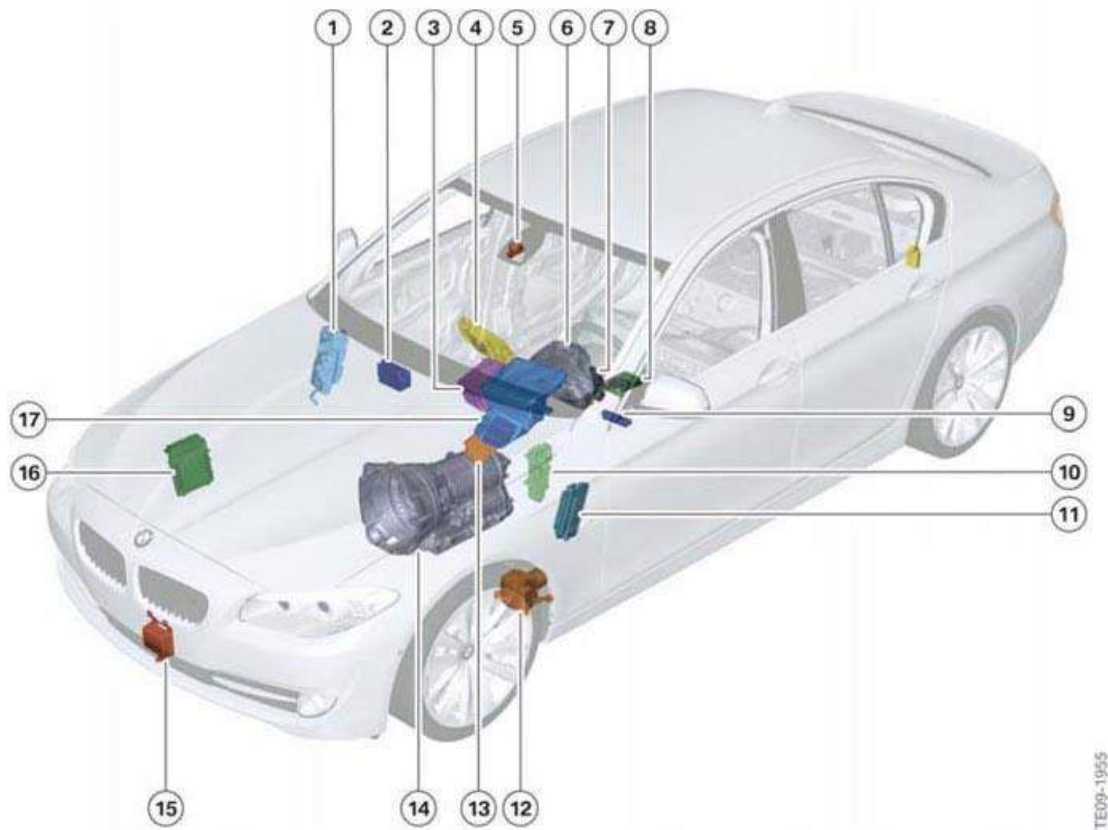


Fig. 32: Identifying F10 ACC Stop & Go System Components
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Junction box (junction box electronics and front power distribution box)
2	Crash Safety Module
3	Car Information Computer
4	Central Information Display
5	Rain-light-solar-condensation sensor
6	Instrument cluster

7	Steering column switch cluster
8	Integrated Chassis Management
9	Driver assistance systems operating unit
10	Central Gateway Module
11	Footwell module
12	Dynamic Stability Control
13	Car Access System
14	Electronic transmission control
15	Sensor for ACC Stop&Go
16	Digital Motor Electronics or Digital Diesel Electronics
17	Head-Up Display

9.2.1. System Wiring Diagram

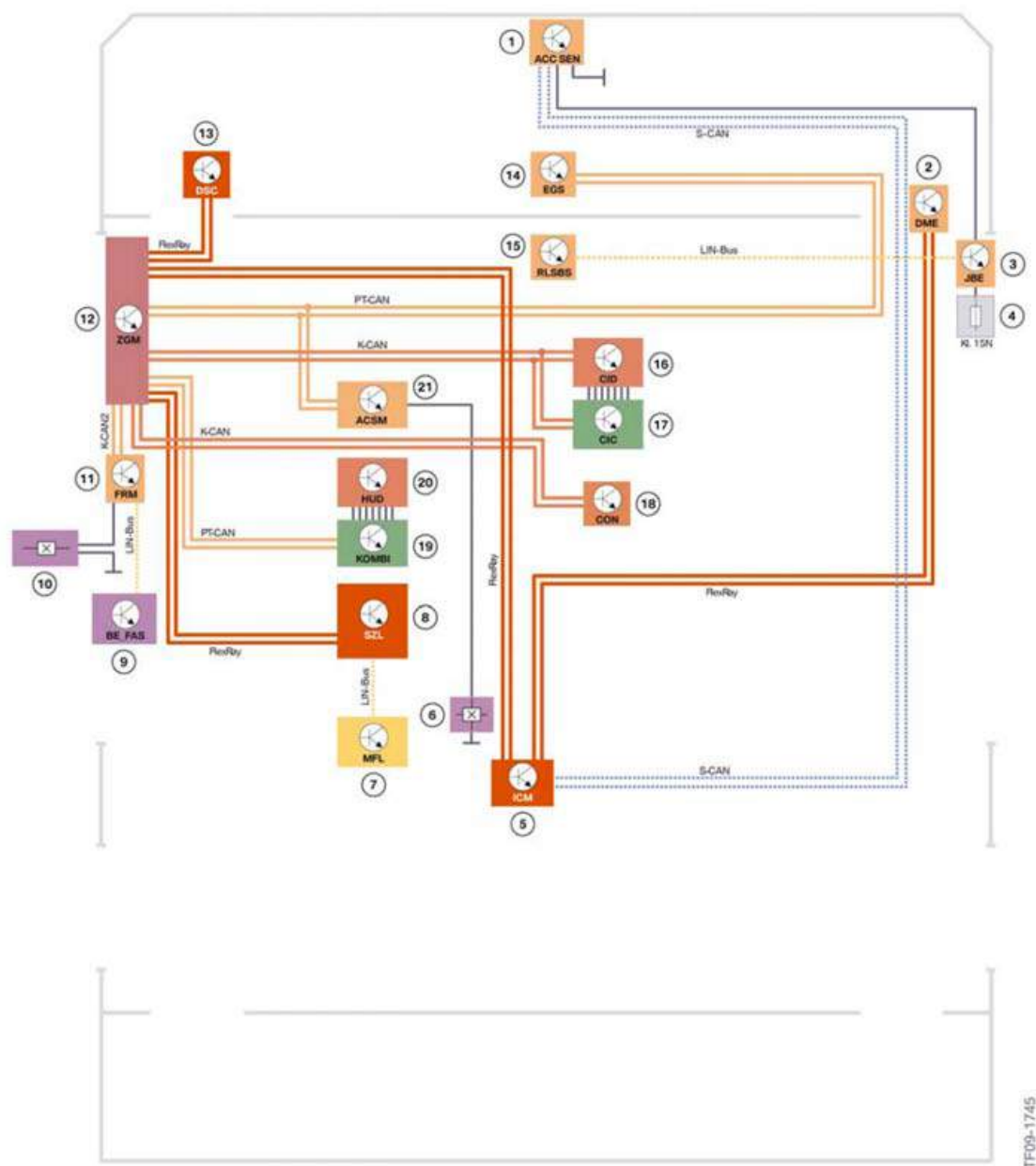


Fig. 33: F10 ACC Stop & Go System - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Sensor for ACC Stop&Go
2	Digital Motor Electronics or Digital Diesel Electronics
3	Junction box electronics
4	Fuse for the sensor for ACC Stop&Go in the front distribution box
5	Integrated Chassis Management

6	Seat belt buckle contact, driver's seat
7	Multifunction steering wheel
8	Steering column switch cluster
9	Driver assistance systems operating unit
10	Door switch, driver's door
11	Footwell module
12	Central Gateway Module
13	Dynamic Stability Control
14	Electronic transmission control
15	Rain-light-solar-condensation sensor
16	Central Information Display
17	Car Information Computer
18	Controller
19	Instrument cluster
20	Head-Up Display
21	Crash Safety Module

9.2.2. Sensor for ACC Stop & Go

The sensor for ACC Stop & Go is a radar-based sensor for detecting the area ahead of the vehicle. Both the short and long range are detected by a sensor using internal electronic and mechatronic measures. The transmission frequency is 76-77 GHz.

The sensor sends out focused electromagnetic waves. The echoes reflected from objects are received and evaluated by the sensor. In this way, the sensor can gain information about objects in front of it. This information includes size, distance and the speed.



Fig. 34: Identifying F10 ACC Stop & Go Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

The sensor is located behind a removable grille on the front apron.



Fig. 35: Identifying F10 Installation Location Of Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Sensor for ACC Stop&Go
2	

In order to achieve a low overall height for the sensor, complex measures have been taken inside the sensor. There is a continuously rotating roller inside the sensor. The roller has various mouldings and emits electromagnetic waves with various characteristics, depending on the range to be detected. Thus both the short and long range are detected with each revolution of the roller. The roller turns at 900 RPM using a brushless motor. Since the sensor becomes functional only upon reaching this speed, in cold temperatures, it can sometimes take a certain time for the sensor to become available. The cover of the sensor is coated with a transreflective layer. This permits the penetration and passage of waves at a certain angle to allow beams to enter and exit. The beams are led through the waveguide and reflected on the transreflective layer. At a shallower angle, it is reflective in order to guide beams within the housing to the various components. They strike the mirror, upon which the waves have their phase rotated and are reflected. Then they leave the housing through the transreflective layer. If these beams strike objects, they are reflected from these and travel back to the sensor. The beams are captured and measured in the waveguide. The evaluation electronics within the sensor evaluates these beams and forwards detected objects via the CAN bus to the Integrated Chassis Management.

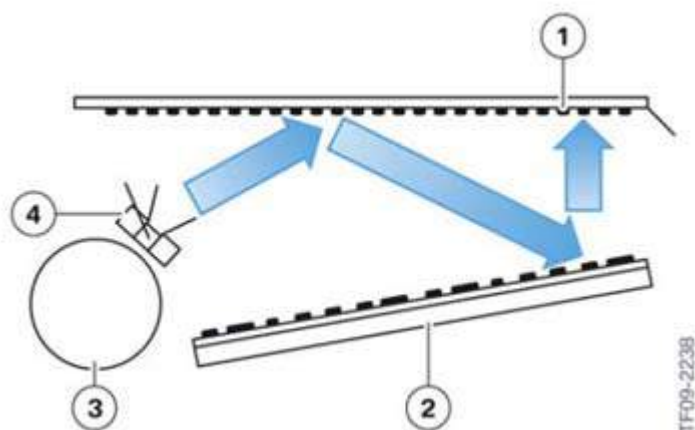


Fig. 36: F10 Schematic Structure Of Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Transreflective layer
2	Mirrors
3	Roller (phase-controlled radar)
4	Waveguide (antenna)



Fig. 37: F10 Structure Of Sensor For ACC Stop & Go
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Mirrors
2	Connector
3	Waveguide (antenna)
4	Roller

NOTE: The cover of the sensor is coated with a transreflective layer that is permits the penetration and passage of waves at a certain angle to allow beams to enter and exit. At a shallower angle, it is reflective in order to guide beams within the housing to the various components.

The sensor for ACC Stop & Go is connected by a waterproof plug connection to the sensor CAN, terminal 15 N, and ground. The sensor for ACC Stop & Go receives its power supply via terminal 15N, so it is switched on and off with this supply. Terminal 15N is tapped off at the front fuse carrier. There is a fault memory in the sensor for ACC Stop & Go. The fault memory can be read out in diagnosis via Integrated Chassis Management. If the sensor is defective, replace it and calibrate the new sensor.

The following graphic shows the working range of the sensor with a large opening angle for short range and a small opening angle for long range detection.

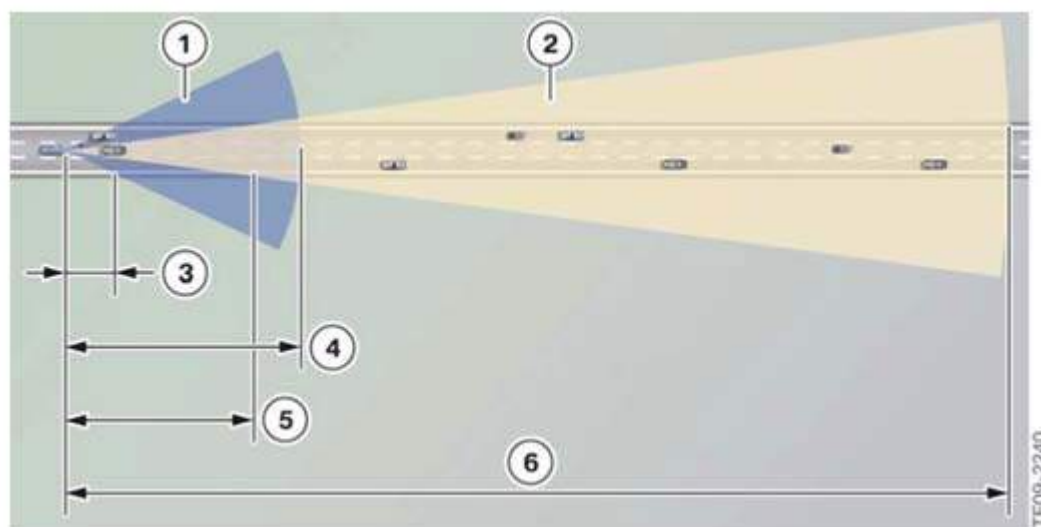


Fig. 38: Identifying F10 Reception Area Of Sensor
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Short-range sensing
2	Long-range sensing
3	Distance at which the short-range radar can detect objects over the full width of a three-lane highway (approx. 10.5 m)
4	Range of short-range radar (approx. 50 m)
5	Distance at which the long-range radar can detect objects over the full width of a three-lane highway (approx. 40 m)
6	Range of radar (approx. 200 m)

The sensor uses the data on the objects detected to calculate their speeds relative to our car. These data are pre-processed in the sensor, prepared for post-processing and filtered.

If ACC Stop & Go brings the car to a standstill on account of an object it has detected, the ACC sensor switches to a reduced-power mode (FCC requirement). When driving resumes or automatic drive off is active (set speed LED in the speed reading is green) it is switched back to normal power. Short and long range are permanently scanned and the detected objects are combined.

The following is an overview of faults that can occur when using the ACC Stop & Go.

If the ACC Stop & Go Sensor is dirty

The sensor can no longer function reliably if the antenna is obscured by snow, slush or ice. If this condition is detected, a corresponding signal is sent to Integrated Chassis Management (ICM) and the ACC Stop & Go function is deactivated as a result. A Check Control message informs the driver about this special case. At the same time a fault entry is stored in the ACC sensor.

External disruption of radar-signal processing

Radar sensors used by other automobile manufacturers can disrupt the signal evaluation of the ACC sensor. If such a problem is detected, the ACC Stop & Go is deactivated. It can be switched on again by the driver as soon as the car is far enough away from the vehicle causing the interference. This fault is stored in the fault memory of the Integrated Chassis Management and of the ACC sensor. This does not, however, necessitate any repair measures. Instead, the customer should be informed of the cause of the fault, which is external interference.

Temporary faults

The potential causes of this type of fault include communication faults, overvoltage, undervoltage and thermal overloads in the ACC sensor. In these cases it is necessary to proceed as instructed by the test plan in the diagnostic system. Do not replace the ACC sensor until the test schedule prompts you to do so.

Control unit fault

If the ACC sensor is affected by a control unit fault, the only way to rectify the fault is to replace the defective sensor.

Misaligned Sensor

The interaction between the ACC Stop & Go sensor and the Integrated Chassis Management can detect misalignment caused by an accident (e.g. by bumping something while parking or being bumped when parked). If the computed maladjustment drift exceeds a certain threshold the ACC Stop & Go function is switched off. A fault entry indicates the cause of the fault. To correct the fault, observe the instructions in the diagnostic system and Repair Instructions.

If the ACC Stop & Go sensor is replaced, the diagnosis system must be used to perform a start-up procedure to initialize the sensor. In the course of the start-up procedure, the installation position is entered in the newly installed sensor and it is adjusted. An adjustment may also be required after an accident without damage to the sensor.

NOTE: Always follow proper repair instructions.
It is essential to observe the following important notes in order to adjust the ACC Stop & Go sensor properly:

- Make sure the measurement setup is exactly in accordance with the repair instructions
- Park the vehicle on a perfectly smooth, level surface
- Connect the ISTA diagnosis system
- Make sure that the reflector for adjusting the ACC Stop & Go sensor is correctly positioned
- Perform the adjustment in accordance with the action plan in diagnosis
- Complete the adjustment and clear fault memory, etc.

NOTE: The ACC Stop & Go sensor must not be adjusted mechanically. Only the

housing can be mechanically aligned, the fine adjustment occurs within the sensor.

NOTE: Extra care must be taken while doing repair work on the front end of these vehicles. If the bumper support is deformed or if there are scratches on the cover of the ACC Stop & Go sensor, there is a possibility of the sensor failing to work correctly. It is essential to follow the repair instructions when dealing with these components.

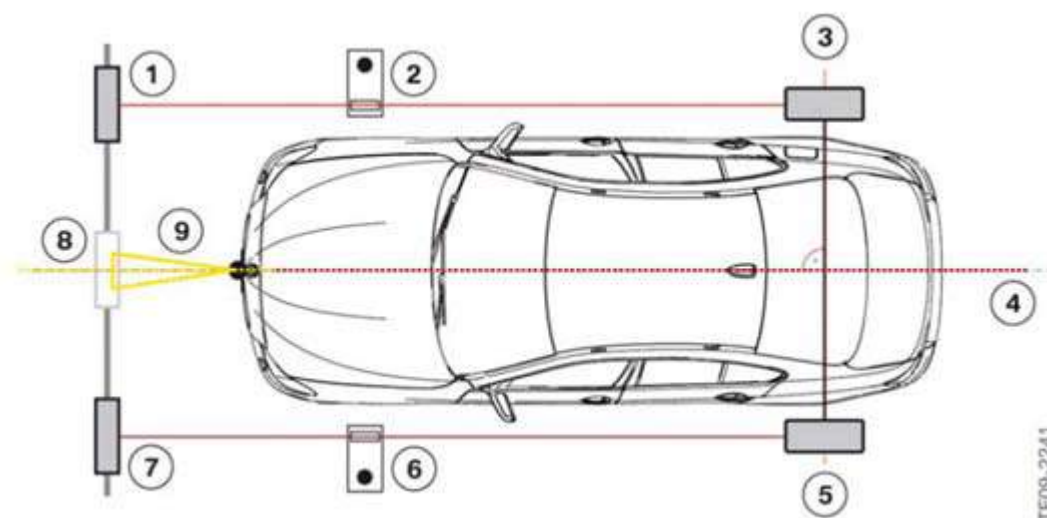


Fig. 39: F10 Setting ACC Stop & Go Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Reflector, right
2	Slotted cover, right
3	Laser pointer right
4	Longitudinal axis of the vehicle
5	Laser pointer, left
6	Slotted cover, left
7	Reflector, left
8	Reflector for adjustment
9	Sensor for ACC Stop&Go

9.2.3. Integrated Chassis Management

You will find a precise description of the Integrated Chassis Management (ICM) in the F01 driving stability control training material available on TIS and ICP. The present document provides a brief overview and covers points of interest relating to the topics featured here.

The Integrated Chassis Management in the F10 calculates for the control functions, sensor data and vehicle values that influence the longitudinal and transverse dynamics. The Integrated Chassis Management also includes the control functions of "Cruise control with braking function" and "Active Cruise Control with Stop & Go function" as well as "Collision warning with brake application function". Micro-mechanical sensors that supply signals for the drive dynamics systems are also incorporated into Integrated Chassis Management.

Two different versions of the Integrated Chassis Management are used in the F10. A basic version for vehicles without ACC Stop & Go and a high-end version for vehicles with the optional ACC Stop & Go equipment (or for vehicles with active steering).

The high-end version differs from the basic version in the following ways:

- Larger microprocessor (needed for the calculations involved in Active Cruise Control)
- Redundant sensors for lateral acceleration and yaw rate.

The control unit has a 54-pin plug by which the power supply, sensors, actuators and bus systems are connected. Nor the controller housing or the plug connector are waterproof. This is not necessary as it is installed on the inside of the vehicle.

The FlexRay is carried to the Integrated Chassis Management from the central gateway module and on from there to the Digital Motor Electronics. The Integrated Chassis Management is based on the FlexRay, therefore it is not an end node. This is why it does not have a terminating resistor for the FlexRay.

Another bus system is connected to the Integrated Chassis Management in addition to the FlexRay. The Sensor CAN is used exclusively for communication between the Integrated Chassis Management and the ACC Stop & Go sensor. It transmits traffic condition information that has been detected by the sensor.

The Sensor CAN operates with a transmission speed of 500 kBit/s. There are two terminal resistors for the Sensor CAN, each with 120 ohms. One of them is located in the Integrated Chassis Management, the second terminal resistor is integrated in the ACC sensor.

The Integrated Chassis Management is installed in the center console behind the sensor for the Crash Safety Module. This means that the control unit and its integrated sensor system are ideally positioned (with regard to driving dynamics) near the vehicle's center of gravity. The mounting points on the body are precisely determined and are measured when the vehicle is manufactured and must not be replaced with any other mounting points.

9.3. OBSTACLE/VEHICLE DETECTION PROCESS

The ACC Stop & Go function requires information on other vehicles in front of the car. This is gained using the ACC sensor and processed in the Integrated Chassis Management.

To do so, the electronics proceed as follows:

- Object detection
- Object-data processing

Object evaluation

9.3.1. Object detection

Detecting the presence of vehicles in front of the car is one of the most important functions of Active Cruise Control. The introduction of the Stop & Go function entails extending this functionality to include not only long-range detection but also short-range detection right through to the area directly in front of the car's front bumper. This is necessary, since the vehicle will travel very close to the vehicle in front of it, (see the "**DISTANCE CONTROL**" section). The ACC Stop & Go sensor scans the short and long range ahead of the vehicle using radar waves. As well as detecting objects, the ACC sensor also determines the position of the objects in the x and y directions and computes their speed relative to our vehicle. The ACC sensor uses this relative-speed information to compute the acceleration of the objects relative to the car. These values are needed for distance control.

9.3.2. Object-data processing

Initial processing of the object data values for position and motion takes place right in the ACC sensor. Individual objects are grouped and tracked in time in order to bridge measurement gaps. The initial filtering of the object data also takes place at this stage. The second step of the process takes place in Integrated Chassis Management. There, the object data from the ACC sensor are combined, because the long-range and short-range fields overlap. This overlap mainly occurs in short-range detection. The combined object data are subjected to further filtration, which takes into account the special requirements for distance control.

9.3.3. Object evaluation

In order to decide which object is to be used for distance control, an evaluator value is calculated for each object.

The following are the two most important criteria for this calculation:

- Position and movement of the object relative to our vehicle. The closer the object is to our vehicle and/or the faster it is approaching, the higher the evaluator value.
- Presence of the object in our lane. The radar sensors cannot detect the actual lane or the lane markings on the surface of the road. The information from the camera-based system installed for the Lane Departure Warning system is not yet available for ACC Stop & Go. Therefore, ACC Stop & Go computes a probable course for the lane ahead of the car. While the car is on the move, variables are used in this process that describe the motion of the car and the position of motionless objects detected by the sensors. If the car is at a standstill, computation is based primarily on analysis of the signal from the steering angle sensor. This means that steering wheel movements while the car is at a standstill produce changes in the lane calculated by the ACC Stop & Go function and have a corresponding effect on evaluation of the detected objects.

The object with the highest evaluator value is used for distance control. In this step in processing, the objects are also classified by their evaluation status. A distinction is drawn between moving and stationary objects. The control algorithm has a special way of treating objects which have been classified as stationary after first being detected.

9.4. CONTROL FUNCTIONS

9.4.1. Cruise control

Cruise control in the ACC Stop & Go system works basically in the same way as in the DCC system.

9.4.2. Distance control

Distance control is the core function of the ACC Stop & Go system and is integrated into Integrated Chassis Management. Two buttons on the multifunction steering wheel enable the driver to select a desired distance from one of four stages. The ACC Stop & Go system uses this preselection to calculate the set-point distance to be used in control.

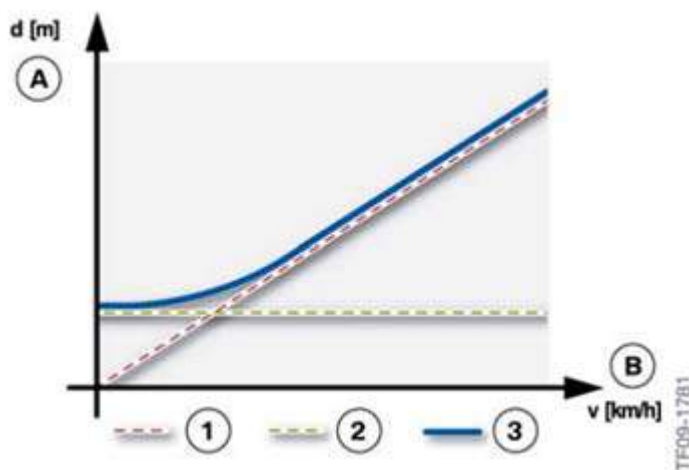


Fig. 40: F10 Distance Control Graph
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Set-point distance
B	Vehicle driving speed
1	Set-point distance, vehicle on the move, in proportion to driving speed
2	Set-point distance, vehicle at standstill, constant
3	Resulting set-point distance from the proportions

The set-point distance with the car on the move is proportional to driving speed (1). At low driving speeds and at a standstill, the proportional distance to the driving speed is no longer used for ACC Stop & Go, but instead a fixed value in metres (2). Distance control uses the processed data for the object with the highest evaluator value as its input variables.

Distance control takes the following situations in particular into account:

Maximum values for acceleration and deceleration:

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The maximum values for acceleration and deceleration of the ACC Stop & Go system below approx. 50 km/h/31mph are dynamic values. They correspond to the acceleration values which the driver personally would use and sense as comfortable. Depending on the situation, ACC Stop & Go accelerates at a maximum of up to approximately 2 m/s^2 and decelerates at maximum of up to approximately 4 m/s^2 .

Congested-traffic stability:

In very tight traffic and at very low driving speeds, there is an increased risk of collisions from sharp acceleration and braking. Therefore the ACC Stop & Go distance controller is designed to decelerate as early as possible, but not more than the vehicle ahead. In following mode, the system can decelerate at a maximum of up to 2.5 m/s^2 , during a stopping procedure at a maximum of up to 4 m/s^2 .

9.4.3. Cruise control in curves

The ACC Stop & Go system's cruise control in curves is based on the counterpart function in Dynamic Cruise Control. The scope has been extended to include the lateral detection range of the sensor for ACC Stop & Go. If an object is lost in turning a curve, the system waits a while to see whether the object reappears (alternating curve). Acceleration begins only when it does not reappear.

9.4.4. Prioritization of the set-points

Set-point prioritization in the ACC Stop & Go system is basically the same as in the Dynamic Cruise Control system. The only major difference is the inclusion of an extra control set-point from the distance control function.

9.4.5. Interference-force estimation

Interference-force estimation as implemented in the ACC Stop & Go system is based on the counterpart function in Dynamic Cruise Control. However, a considerable degree of optimization is necessary, since inaccuracies in the interference-force estimation become much more perceptible in the low range of driving speeds (less than 30 km/h/20mph) than at higher driving speeds. Consequently, the estimation precision is better than that of the Dynamic Cruise Control system and the reaction to changes in interference forces is faster.

9.4.6. Activation of the actuators

Except for the situation that applies when the vehicle is at a standstill, the activation of the actuators in the ACC Stop & Go function is the same as that in Dynamic Cruise Control.

NOTE: When ACC Stop & Go causes brake intervention, the brake lights are also activated.

9.5. OPERATION AND DISPLAY

9.5.1. Activation and deactivation

ACC Stop & Go and Dynamic Cruise Control are activated and deactivated in nearly the same way. The driver is able to activate ACC Stop & Go not only while the vehicle is in motion, but also when it is stationary, if the

system has detected another vehicle ahead of it. To activate ACC Stop & Go at a standstill, the driver has to depress the brake pedal and simultaneously press the SET (if preset) or RES button.

The following additional conditions must also be satisfied:

- Seat belt buckled and door closed
- Drive position "D" engaged
- Engine running
- Parking brake must not be activated
- ACC Stop & Go Sensor operational
- There must be no system fault present.

If the status of Dynamic Stability Control beforehand was DTC or DSC Off, (in the F10) it switches on as soon as ACC Stop & Go is activated. If the vehicle was previously operated in sport+ mode, it automatically switches to sport mode. Dynamic Stability Control always switches automatically to its "Normal" status. If Dynamic Stability Control is set to DTC or DSC Off while ACC Stop & Go is operating, the ACC Stop & Go function is automatically deactivated.

ACC Stop & Go cannot be deactivated by means of the ON/OFF button while the vehicle is stationary unless the brake pedal is depressed at the same time.

The adjustment range for set speed in the F10 is 30 km/h to 180 km/h (20 mph to 115 mph). Compared to DCC, a vehicle with ACC Stop & Go has a keypad on the multifunction steering wheel that additionally features a rocker switch for making distance adjustments.

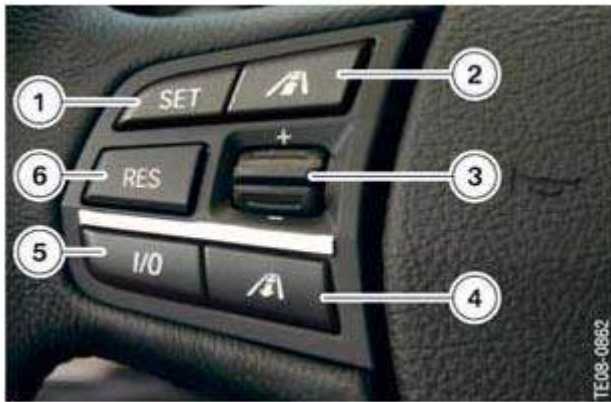


Fig. 41: Identifying F10 ACC Stop & Go Steering Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	SET button to activate
2	Button for reducing the distance
3	Rocker switch to change the set speed

4	Button for increasing the distance
5	Button to activate or deactivate ACC Stop&Go
6	RES button to resume a stored speed

Briefly pressing the respective button to change the distance increases or decreases the desired distance used by ACC Stop & Go for its control process. A total of four increments are available to the driver. The selected distance stage is faded into the instrument panel.

As with Dynamic Cruise Control, the display symbols for ACC Stop & Go are supplemented as needed by notes displayed in the instrument panel. The display symbols are, for example, the set speed and the distance bars. The status indicators are displayed for approx. 3 seconds. Each time the driver operates a control, the symbol reappears and remains visible for another 3 seconds.

In addition, ACC Stop & Go information is displayed in the Head-Up Display.

9.5.2. Changing the set speed

When ACC Stop & Go is switched on, the driver can change the set speed in the same way as with the Dynamic Cruise Control system. This adjustment can be made even when the car is being held stationary by the ACC Stop & Go system. The adjustment range for set speed is 30 to 180 km/h (20 to 115 mph).

9.5.3. Changing the set distance

The desired distance can be changed by briefly pressing the corresponding button on the multifunction steering wheel with the system switched on. The driver has the usual choice of four distance stages, symbolized by bars in the instrument panel. Changing the set distance while the car is on the move immediately produces a perceptible reaction by the vehicle. The car accelerates or decelerates slightly to take up the new set distance. Making this change while at a standstill does not set the car in motion.

If the driver overrides ACC Stop & Go, the desired distance cannot be changed. When the driver overrides the system, the distance bars in the instrument panel disappear.

9.5.4. Stopping and pulling away

Even though the "distance control" function works in principle right down to a speed of zero (complete standstill), the system incorporates additional software functions that control the stopping and pulling away procedures. It is their job to control the drivetrain and the brakes in such a way that the driver and other vehicle occupants perceive driving as a thoroughly comfortable and enjoyable experience. In addition, it would be unacceptable for the vehicle to be permitted to roll backward during these processes.

In order to meet these requirements, drivetrain and brakes are actuated simultaneously and under precision control in the processes of stopping and pulling away. This is very much the same as what the driver does when using the parking brake and the accelerator pedal to pull away on an uphill gradient without allowing the car to roll backward.

Under extreme external circumstances, for example on a particularly steep uphill gradient, ACC Stop & Go might not be able to set the car in motion. If this happens the braking pressure necessary to hold the car

stationary is applied and the system remains in this state until the driver switches it off or assumes full manual control for pulling away. This is not a fault; instead, it represents a situation in which the limits defining the operating range of ACC Stop & Go have been exceeded.

The maximum level of support and assistance that a Stop & Go system could offer the driver would be the ability to undertake all actions from stopping through to pulling away in fully automatic mode. The technical implementation of this is a function that automatically brings the car to a complete stop, but automatically drives off only if the vehicle remains motionless briefly. If the car is at a standstill for longer than a few seconds, ACC Stop & Go does not attempt automatic pulling away. Instead, ACC Stop & Go sends the driver a signal in the instrument panel that it has recognized a drive off situation, but will not set the car in motion unless the driver confirms this signal by operating a control.

This acknowledgment of the drive-off prompt ensures that the driver is fully aware of the traffic situation even after a prolonged stop in traffic. Because even with ACC and the Stop & Go function, the driver remains fully and solely responsible for control of the vehicle and the use of the assistance and support functions at his or her disposal.

ACC Stop & Go uses standstill management, a function of Dynamic Stability Control (DSC) for longer stops. Standstill management incorporates a rolling detection function. Rolling detection ensures that the braking pressure needed to keep the vehicle stationary is increased when necessary (if any unintentional movement is detected by the vehicle). Standstill management also monitors the stopping procedure and is aware of ABS action (if it is used in bring the car to a stop). In this case, a slip detector is activated while the vehicle is at a standstill to reduce the pressure at an individual wheel brake. If a wheel at which brake pressure has been reduced starts to turn, standstill management identifies the car is sliding and the ACC Stop & Go is switched off, brake pressure is relieved at all wheel brakes and the driver is notified by a Check Control message. Relieving the brake pressure at all four wheels turns a slide into a situation in which the car is again steerable. Of course, the driver can still decelerate the vehicle back to a standstill by depressing the brake pedal, if the road conditions permit.

9.5.5. Behavior in response to driver's intention to exit the vehicle

ACC Stop & Go uses the DSC hydraulics to slow the vehicle reliably to a halt and keep it stationary. Without a supply of electricity, the DSC hydraulics are, however, unable to indefinitely maintain the braking force necessary to keep the vehicle stationary. The F10 is equipped with an electronic parking brake (EMF).

The EMF is capable of holding the vehicle stationary in the following situations:

- in certain failure events of the Dynamic Stability Control,
- if the driver gets out or
- the engine is switched off.

The ability of the electronic parking brake to hold the vehicle is a comfort enhancement for situations in which the vehicle is at a standstill. In the F10, the lock function of the electronic parking brake is activated automatically whenever the driver is about to exit the vehicle with ACC Stop & Go still active.

The driver's intention to exit the vehicle is detected by the signals of the seat belt buckle contact (driver's side) and door contact (driver's door). A signal from the seat occupancy detector (driver's seat) is not used in the F10

for this function.

While the vehicle is being held stationary by ACC Stop & Go, the DSC unit takes over all monitoring and control processes. The DSC also controls the system's behavior in response to the driver's intention to exit the vehicle. For ACC Stop & Go, this is very similar to that implemented for the DSC- internal Automatic Hold function.

ACC Stop & Go is deactivated automatically if, from the bus signals it receives, it detects that the parking brake function has been activated. Now the vehicle is still held stationary but by the parking brake function instead.

9.6. MONITORING FUNCTIONS

Integrated Chassis Management monitors the system network to verify that all participating subsystems are operational, all input signals required for operation are valid, and the electronics of the native control unit are in full working order. When troubleshooting this system, it is important to include all participating systems in the system network and not just the individual components. If a fault occurs, the function is shut down completely. A status indicator in the instrument panel and a Check Control message notify the driver that the system is not available. Reactivation is not possible until the fault is no longer present.

COLLISION WARNING W/BRAKE APPLICATION

With the optional ACC Stop & Go equipment (option 5DF) in the F10, the customer automatically receives the collision warning with brake application function. It shares the sensor system and system components with ACC Stop & Go.

10.1. OPERATION

The collision warning with brake application function is switched on or off with the driver assistance system control panel.

Upon switching on the function, a display opens in the central information display. Here the driver can configure the time of the advance warning in two stages, or deactivate/reactivate the advance warning. The setting selected by the driver is maintained on a key-specific basis via a terminal change.

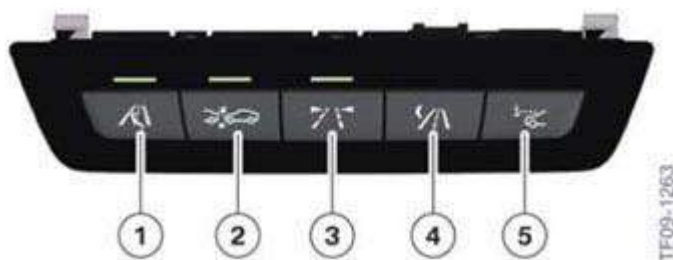


Fig. 42: Identifying F10 Driver Assistance System Control Panel
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

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Index	Explanation
1	Active Blind Spot Detection
2	Collision warning with brake application function (adaptive brake assistant)
3	Lane Departure Warning
4	Night Vision with pedestrian detection
5	Head-Up Display

10.2. FUNCTIONAL PRINCIPLE

The system warns of a possible danger of collision in two stages at speeds of approx. 15 km/h/10mph or higher.

The collision warning is also available when the cruise control is deactivated.

Stationary or moving objects are taken into consideration only if they are in the detection range of the sensor for ACC Stop & Go.

If you purposely approach an object, the collision warning comes later to avoid unwarranted warnings.

10.3. WARNING FUNCTION

The warning function is divided into two stages. It is displayed in the instrument panel and, if equipped, in the Head-Up Display.



Fig. 43: Identifying Collision Warning In Head-Up Display

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	1st stage: advance warning, red symbol depicting a car
B	2nd stage: acute warning, red flashing symbol depicting a car

10.3.1. Advance Warning

The advance warning comes e.g. if there is an apparent danger of collision or if there is very little distance to the vehicle driving in front.

The advance warning is signalled by a red-lit vehicle in the instrument panel and, if equipped, in the Head-Up Display.

10.3.2. Acute Warning with Brake Application Function

The acute warning comes if there is an imminent danger of collision, whenever the vehicle approaches another object with a relatively high speed difference.

If there is an acute warning, the driver is shown a red flashing vehicle in the instrument panel and, if present, in the Head-Up Display. Additionally, an audible warning signal sounds. The driver is prompted to brake and, where appropriate, to take evasive action.

The acute warning prompts you to intervene and, if there is a danger of collision, usually assists with brake intervention.

The brake intervention has a maximum brake force of 3 m/s^2 and is only for a limited time. Brake intervention occurs only in the case of detected objects that are moving or have stopped. In the case of objects that were already still when they entered the detection range of the sensor, there is no braking.

The system cannot brake the vehicle to a standstill.

Brake intervention occurs only if the Dynamic Stability Control is switched on.

NOTE: **The acute warning does not relieve the driver of the responsibility for adjusting the speed and driving style to the traffic conditions.**

The brake intervention can be cancelled by depressing the accelerator pedal or by an active steering wheel movement.

When towing or being towed, switch off the collision warning with braking function in order to avoid malfunctions.

The brake application function is deactivated if the Dynamic Stability Control DSC or Dynamic Traction Control DTC is deactivated.

NOTE: **Due to system limitations, it can happen that warnings are issued without cause, too late or not at all. For safety reasons, you must be attentive in order to be able to take action at any time.**

DTC INDEX

N55

SELF-DIAGNOSTICS DTCS

DIAGNOSTIC TROUBLE CODE INDEX

DTC	Description
<u>DTC P1638; BMW DTC 100001</u>	Throttle valve, function: jammed briefly
<u>DTC P1639; BMW DTC 100101</u>	Throttle valve, function: jammed permanently
<u>DTC P11AA; BMW DTC 100201</u>	Throttle valve, function: sluggish, too slow
<u>DTC P1637; BMW DTC 100210</u>	Throttle-valve actuator, position monitoring: positional variation
<u>DTC P110D; BMW DTC 100A02</u>	Throttle valve, throttle potentiometer 1 and 2: Double fault
<u>DTC P1141; BMW DTC 100C08</u>	Throttle valve, throttle potentiometer 1: Signal implausible for air mass
<u>DTC P1162; BMW DTC 100E08</u>	Throttle valve, throttle potentiometer 2: Signal implausible for air mass
<u>DTC P0123; BMW DTC 101001</u>	Throttle valve, throttle-valve potentiometer 1, electric: short circuit to positive or open circuit
<u>DTC P0122; BMW DTC 101002</u>	Throttle valve, throttle-valve potentiometer 1, electric: short circuit to ground
<u>DTC P0223; BMW DTC 101201</u>	Throttle valve, throttle potentiometer 2, electrical: Short circuit to B+
<u>DTC P0222; BMW DTC 101202</u>	Throttle valve, throttle potentiometer 2, electrical: Short circuit to earth or line disconnection
<u>DTC P1632; BMW DTC 101401</u>	Throttle valve, adaptation: Marginal conditions not met
<u>DTC P1633; BMW DTC 101402</u>	Throttle valve, adaptation: emergency running position not adapted
<u>DTC P16BC; BMW DTC 101408</u>	Throttle valve, adaptation: Initial adaptation, lower limit position not taught in
<u>DTC P16E6; BMW DTC 101410</u>	Throttle valve, adaptation: Marginal conditions not met; battery voltage too low
<u>DTC P115F; BMW DTC 101C08</u>	Throttle valve, throttle potentiometer: plausibility Timing fault between potentiometer 1 and potentiometer 2
<u>DTC P112F; BMW DTC 101F01</u>	Throttle-valve angle - intake-manifold pressure, correlation: limit value exceeded
<u>DTC P112E; BMW DTC 101F02</u>	Throttle-valve angle - intake-manifold pressure, correlation: limit value undershot
<u>DTC P00BD; BMW DTC 102001</u>	none
<u>DTC P115D; BMW DTC 102001</u>	none

<u>DTC P00BC; BMW DTC 102002</u>	none
<u>DTC P115C; BMW DTC 102002</u>	none
<u>DTC P115D; BMW DTC 102010</u>	Air-mass sensor, plausibility: air mass too high in relation to model
<u>DTC P115C; BMW DTC 102011</u>	Air-mass sensor, plausibility: air mass too low in relation to model
<u>DTC P0103; BMW DTC 102610</u>	Air-mass sensor, signal: implausible period duration, loose contact at low frequency
<u>DTC P0102; BMW DTC 102611</u>	Air-mass sensor, signal: implausible period duration, loose contact at high frequency
<u>DTC P0100; BMW DTC 102612</u>	Air-mass sensor, signal: short circuit or open circuit
<u>DTC P00BC; BMW DTC 102801</u>	none
<u>DTC P0102; BMW DTC 102801</u>	none
<u>DTC P0100; BMW DTC 102A01</u>	none
<u>DTC P00BD; BMW DTC 102A02</u>	none
<u>DTC P0103; BMW DTC 102A02</u>	none
<u>DTC P2123; BMW DTC 103001</u>	Accelerator-pedal module, pedal-travel sensor 1, electric: short circuit to positive
<u>DTC P2122; BMW DTC 103002</u>	Accelerator-pedal module, pedal-travel sensor 1, electric: short circuit to ground or open circuit
<u>DTC P2128; BMW DTC 103101</u>	Accelerator-pedal module, pedal-travel sensor 2, electric: short circuit to positive
<u>DTC P2127; BMW DTC 103102</u>	Accelerator-pedal module, pedal-travel sensor 2, electric: short circuit to ground or open circuit
<u>DTC P2138; BMW DTC 103308</u>	Accelerator-pedal module, pedal-travel sensor, plausibility: synchronism fault between signal 1 and signal 2
<u>DTC P11C8; BMW DTC 10351C</u>	Accelerator-pedal module, pedal-travel sensor Multiple fault
<u>DTC P1250; BMW DTC 104301</u>	none
<u>DTC P12A5; BMW DTC 104301</u>	none
<u>DTC P1255; BMW DTC 104302</u>	none
<u>DTC P12A4; BMW DTC 104302</u>	none
<u>DTC P0108; BMW DTC 104401</u>	none
<u>DTC P119A; BMW DTC 104401</u>	none
<u>DTC P0107; BMW DTC 104402</u>	Absolute pressure sensor, intake pipe, electrical: Short circuit to earth
<u>DTC P119B; BMW DTC 104402</u>	Absolute pressure sensor, intake pipe, electrical: Short circuit to earth
<u>DTC P1250; BMW DTC 104610</u>	Absolute-pressure sensor, intake manifold, plausibility: intake-manifold pressure too high
<u>DTC P1255; BMW DTC 104611</u>	Absolute-pressure sensor, intake manifold, plausibility: intake-manifold pressure too low

<u>DTC P119A; BMW DTC 104A40</u>	Absolute-pressure sensor, intake manifold, electric: short circuit to positive
<u>DTC P2229; BMW DTC 105001</u>	Ambient-pressure sensor, electric: short circuit to positive or open circuit
<u>DTC P2228; BMW DTC 105002</u>	Ambient-pressure sensor, electric: short circuit to ground
<u>DTC P11CB; BMW DTC 105101</u>	none
<u>DTC P0129; BMW DTC 105102</u>	none
<u>DTC P12B9; BMW DTC 105201</u>	Ambient pressure sensor, overrun: Pressure too high
<u>DTC P12B8; BMW DTC 105202</u>	Ambient-pressure sensor, run-on: pressure too low
<u>DTC P2227; BMW DTC 105A30</u>	Ambient-pressure sensor: collective error: electrical and plausibility
<u>DTC P11CB; BMW DTC 105A40</u>	Ambient-pressure sensor, plausibility: pressure too high
<u>DTC P0129; BMW DTC 105A41</u>	Ambient-pressure sensor, plausibility: pressure too low
<u>DTC P1247; BMW DTC 105A42</u>	Ambient pressure sensor, plausibility: Pressure implausible
<u>DTC P323C; BMW DTC 105A42</u>	Ambient pressure sensor, plausibility: Pressure implausible
<u>DTC P1247; BMW DTC 105A43</u>	Ambient pressure sensor, plausibility: Pressure implausible
<u>DTC P323C; BMW DTC 105A43</u>	Ambient pressure sensor, plausibility: Pressure implausible
<u>DTC P0121; BMW DTC 107A22</u>	Throttle valve, throttle potentiometer 1: Signal implausible in relation to substitute value from filling
<u>DTC P0223; BMW DTC 107A30</u>	Throttle valve, throttle-valve potentiometer 2, electric: short circuit to positive or open circuit
<u>DTC P0222; BMW DTC 107A31</u>	Throttle valve, throttle-valve potentiometer 2, electric: short circuit to ground
<u>DTC P0221; BMW DTC 107A32</u>	Throttle valve, throttle-valve potentiometer 2: signal implausible in rel. to substitute value from charge
<u>DTC P110D; BMW DTC 107A40</u>	Throttle-valve potentiometer: throttle-valve potentiometer 1 or 2, function
<u>DTC P169F; BMW DTC 107A50</u>	Throttle valve: Limp-home operating mode active
<u>DTC P2103; BMW DTC 107A70</u>	DME, internal fault, activation of throttle valve: Short circuit
<u>DTC P2118; BMW DTC 107A71</u>	DME, internal fault, activation of throttle valve: Excess temperature or current too high
<u>DTC P061F; BMW DTC 107A72</u>	DME, internal fault, activation of throttle valve: Internal communication fault
<u>DTC P2100; BMW DTC 107A73</u>	DME, internal fault, activation of throttle valve: Line disconnection

<u>DTC P1634; BMW DTC 107A80</u>	Throttle-valve actuator, closing spring check: abort check, spring does not close
<u>DTC P1631; BMW DTC 107A81</u>	Throttle-valve actuator, closing spring check: error during spring check
<u>DTC P1629; BMW DTC 107A90</u>	Throttle-valve actuator, opening spring check: abort check, spring does not open
<u>DTC P1628; BMW DTC 107A91</u>	Throttle-valve actuator, opening spring check: error during spring check
<u>DTC P1644; BMW DTC 107AE0</u>	Throttle valve, adaptation: Re-teach, lower limit position not taught in
<u>DTC P1643; BMW DTC 107AF0</u>	Throttle valve actuator, amplifier adjustment: malfunction
<u>DTC P0113; BMW DTC 108001</u>	Intake air temperature sensor, electrical: Short circuit to B+
<u>DTC P0112; BMW DTC 108002</u>	Intake-air temperature sensor, electric: short circuit to ground
<u>DTC P0111; BMW DTC 108010</u>	Intake-air temperature sensor, electrical: signal not plausible
<u>DTC P007D; BMW DTC 108A01</u>	Charge-air temperature sensor, electrical: Short circuit to B+
<u>DTC P007C; BMW DTC 108A02</u>	Charge-air temperature sensor, electric: short circuit to ground
<u>DTC P007B; BMW DTC 108A10</u>	Charge-air temperature sensor, electrical: Signal not plausible
<u>DTC P10B0; BMW DTC 108C01</u>	none
<u>DTC P10B8; BMW DTC 108C08</u>	Charge-air temperature sensor, plausibility: Signal hangs
<u>DTC P0118; BMW DTC 109001</u>	Coolant-temperature sensor, electric: short circuit to positive or open circuit
<u>DTC P0117; BMW DTC 109002</u>	Coolant-temperature sensor, electric: short circuit to ground
<u>DTC P112B; BMW DTC 109208</u>	none
<u>DTC P316B; BMW DTC 109208</u>	none
<u>DTC P0116; BMW DTC 109308</u>	Coolant-temperature sensor, plausibility: signal change too fast
<u>DTC P3198; BMW DTC 109308</u>	Coolant-temperature sensor, plausibility: signal change too fast
<u>DTC P10D5; BMW DTC 10AA20</u>	Coolant temperature sensor, cold start: Coolant temperature too high
<u>DTC P10D4; BMW DTC 10AA21</u>	Coolant temperature sensor, cold start: Coolant temperature too low
<u>DTC P0115; BMW DTC 10AA40</u>	Coolant-temperature sensor, electrical: no signal
<u>DTC P112A; BMW DTC 10AA50</u>	Coolant-temperature sensor, plausibility: engine temperature in rel. to model implausibly too high

<u>DTC P112B; BMW DTC 10AA51</u>	Coolant-temperature sensor, plausibility: engine temperature in rel. to model implausibly too low
<u>DTC P0116; BMW DTC 10AA52</u>	Coolant-temperature sensor, plausibility: engine temperature implausible
<u>DTC P3199; BMW DTC 10AA52</u>	Coolant-temperature sensor, plausibility: engine temperature implausible
<u>DTC P0073; BMW DTC 10B101</u>	none
<u>DTC P0072; BMW DTC 10B102</u>	none
<u>DTC P110F; BMW DTC 10B104</u>	none
<u>DTC P0073; BMW DTC 10BA20</u>	Outside temperature sensor, signal: Upper threshold value exceeded
<u>DTC P0072; BMW DTC 10BA21</u>	Outside temperature sensor, signal: Lower threshold value undershot
<u>DTC P110F; BMW DTC 10BA22</u>	Ambient-temperature sensor, signal: CAN message incorrect
<u>DTC P0071; BMW DTC 10BA40</u>	Outside temperature sensor, plausibility: Ambient temperature higher than model temperature
<u>DTC P10EA; BMW DTC 10BA40</u>	Outside temperature sensor, plausibility: Ambient temperature higher than model temperature
<u>DTC P0071; BMW DTC 10BA41</u>	Outside temperature sensor, plausibility: Ambient temperature less than model temperature
<u>DTC P10EB; BMW DTC 10BA41</u>	Outside temperature sensor, plausibility: Ambient temperature less than model temperature
<u>DTC P10C9; BMW DTC 10BA42</u>	Intake-air temperature sensor, cold start: intake-air temperature too high
<u>DTC P105D; BMW DTC 10BA43</u>	Intake-air temperature sensor, cold start: intake-air temperature too low
<u>DTC P0127; BMW DTC 10BA48</u>	Intake air temperature sensor, plausibility: Intake air temperature too high
<u>DTC P11C9; BMW DTC 10BA49</u>	Intake air temperature sensor, plausibility: Intake air temperature too low
<u>DTC P10D0; BMW DTC 10BA4A</u>	Charge-air temperature sensor, cold start: charge-air temperature too high
<u>DTC P10D1; BMW DTC 10BA4B</u>	Charge-air temperature sensor, cold start: charge-air temperature too low
<u>DTC P10B0; BMW DTC 10BA4F</u>	Charge-air temperature sensor, plausibility: Charge air temperature too high
<u>DTC P10D2; BMW DTC 10BA4F</u>	Charge-air temperature sensor, plausibility: Charge air temperature too high
<u>DTC P007B; BMW DTC 10C001</u>	none
<u>DTC P10B4; BMW DTC 10C001</u>	none
<u>DTC P10D0; BMW DTC 10C004</u>	none
<u>DTC P10B4; BMW DTC 10C005</u>	Charge-air temperature sensor, gradient: Rise too

	high
<u>DTC P142E; BMW DTC 110001</u>	none
<u>DTC P306F; BMW DTC 110001</u>	none
<u>DTC P3149; BMW DTC 110101</u>	Injector, cylinder 1, activation: high-voltage side; short circuit to ground
<u>DTC P3102; BMW DTC 110102</u>	Injector, cylinder 1, activation: low-voltage side; short circuit to positive
<u>DTC P3150; BMW DTC 110104</u>	Injector, cylinder 1, activation: high-voltage side; short circuit to positive
<u>DTC P3101; BMW DTC 110108</u>	Injector, cylinder 1, activation: low-voltage side; short circuit to ground
<u>DTC P3152; BMW DTC 110201</u>	Injector, cylinder 2, activation: high-voltage side; short circuit to ground
<u>DTC P3106; BMW DTC 110202</u>	Injector, cylinder 2, activation: low-voltage side; short circuit to positive
<u>DTC P3153; BMW DTC 110204</u>	Injector, cylinder 2, activation: high-voltage side; short circuit to positive
<u>DTC P3105; BMW DTC 110208</u>	Injector, cylinder 2, activation: low-voltage side; short circuit to ground
<u>DTC P3155; BMW DTC 110301</u>	Injector, cylinder 3, activation: high-voltage side; short circuit to ground
<u>DTC P3110; BMW DTC 110302</u>	Injector, cylinder 3, activation: low-voltage side; short circuit to positive
<u>DTC P3156; BMW DTC 110304</u>	Injector, cylinder 3, activation: high-voltage side; short circuit to positive
<u>DTC P3109; BMW DTC 110308</u>	Injector, cylinder 3, activation: low-voltage side; short circuit to ground
<u>DTC P3158; BMW DTC 110401</u>	Injector, cylinder 4, activation: high-voltage side; short circuit to ground
<u>DTC P3114; BMW DTC 110402</u>	Injector, cylinder 4, activation: low-voltage side; short circuit to positive
<u>DTC P3159; BMW DTC 110404</u>	Injector, cylinder 4, activation: high-voltage side; short circuit to positive
<u>DTC P3113; BMW DTC 110408</u>	Injector, cylinder 4, activation: low-voltage side; short circuit to ground
<u>DTC P3161; BMW DTC 110501</u>	Injector, cylinder 5, activation: high-voltage side; short circuit to ground
<u>DTC P3118; BMW DTC 110502</u>	Injector, cylinder 5, activation: low-voltage side; short circuit to positive
<u>DTC P3162; BMW DTC 110504</u>	Injector, cylinder 5, activation: high-voltage side; short circuit to positive
<u>DTC P3117; BMW DTC 110508</u>	Injector, cylinder 5, activation: low-voltage side; short circuit to ground
<u>DTC P3164; BMW DTC 110601</u>	Injector, cylinder 6, activation: high-voltage side;

	short circuit to ground
<u>DTC P3122; BMW DTC 110602</u>	Injector, cylinder 6, activation: low-voltage side; short circuit to positive
<u>DTC P3165; BMW DTC 110604</u>	Injector, cylinder 6, activation: high-voltage side; short circuit to positive
<u>DTC P3121; BMW DTC 110608</u>	Injector, cylinder 6, activation: low-voltage side; short circuit to ground
<u>DTC P3148; BMW DTC 111020</u>	Injector, cylinder 1, high-voltage side, activation: coil-winding short circuit
<u>DTC P3151; BMW DTC 111021</u>	Injector, cylinder 2, high-voltage side, activation: coil-winding short circuit
<u>DTC P3154; BMW DTC 111022</u>	Injector, cylinder 3, high-voltage side, activation: coil-winding short circuit
<u>DTC P3157; BMW DTC 111023</u>	Injector, cylinder 4, high-voltage side, activation: coil-winding short circuit
<u>DTC P3160; BMW DTC 111024</u>	Injector, cylinder 5, high-voltage side, activation: coil-winding short circuit
<u>DTC P3163; BMW DTC 111025</u>	Injector, cylinder 6, high-voltage side, activation: coil-winding short circuit
<u>DTC P3103; BMW DTC 111030</u>	Injector, cylinder 1, low-voltage side, activation: booster time window
<u>DTC P3107; BMW DTC 111031</u>	Injector, cylinder 2, low-voltage side, activation: booster time window
<u>DTC P3111; BMW DTC 111032</u>	Injector, cylinder 3, low-voltage side, activation: booster time window
<u>DTC P3115; BMW DTC 111033</u>	Injector, cylinder 4, low-voltage side, activation: booster time window
<u>DTC P3119; BMW DTC 111034</u>	Injector, cylinder 5, low-voltage side, activation: booster time window
<u>DTC P3123; BMW DTC 111035</u>	Injector, cylinder 6, low-voltage side, activation: booster time window
<u>DTC P3100; BMW DTC 111040</u>	Injector, cylinder 1, low-voltage side, activation: open circuit
<u>DTC P3104; BMW DTC 111041</u>	Injector, cylinder 2, low-voltage side, activation: open circuit
<u>DTC P3108; BMW DTC 111042</u>	Injector, cylinder 3, low-voltage side, activation: open circuit
<u>DTC P3112; BMW DTC 111043</u>	Injector, cylinder 4, low-voltage side, activation: open circuit
<u>DTC P3116; BMW DTC 111044</u>	Injector, cylinder 5, low-voltage side, activation: open circuit
<u>DTC P3120; BMW DTC 111045</u>	Injector, cylinder 6, low-voltage side, activation: open circuit
<u>DTC P16A5; BMW DTC 111110</u>	DME, internal fault, HDEV output-stage module 1:

	SPI communication faulty
<u>DTC P16A5; BMW DTC 11111</u>	DME, internal fault, HDEV output-stage module 2: SPI communication faulty
<u>DTC P16A5; BMW DTC 11112</u>	DME, internal fault, HDEV output-stage module 1: SPI communication implausible
<u>DTC P16A5; BMW DTC 11113</u>	DME, internal fault, HDEV output-stage module 2: SPI communication implausible
<u>DTC P16A5; BMW DTC 11114</u>	DME, internal fault, HDEV output-stage module 1: SPI communication, signal error
<u>DTC P16A5; BMW DTC 11115</u>	DME, internal fault, HDEV output-stage module 2: SPI communication, signal error
<u>DTC P0171; BMW DTC 118001</u>	none
<u>DTC P2177; BMW DTC 118001</u>	none
<u>DTC P0172; BMW DTC 118002</u>	none
<u>DTC P2178; BMW DTC 118002</u>	none
<u>DTC P0171; BMW DTC 118401</u>	none
<u>DTC P306D; BMW DTC 118401</u>	none
<u>DTC P0172; BMW DTC 118402</u>	none
<u>DTC P306E; BMW DTC 118402</u>	none
<u>DTC P2097; BMW DTC 118601</u>	Oxygen sensor before catalytic converter, fine mixture control: exhaust gas after catalytic converter too rich
<u>DTC P2096; BMW DTC 118602</u>	Oxygen sensor before catalytic converter, fine mixture control: exhaust gas after catalytic converter too lean
<u>DTC P119D; BMW DTC 118C02</u>	Mixture adaptation, injector ageing: cylinder bank 1: long-term adaptation too high
<u>DTC P2187; BMW DTC 118E01</u>	Mixture adaptation, idle: mixture too lean
<u>DTC P2188; BMW DTC 118E02</u>	Mixture adaptation, idle: mixture too rich
<u>DTC P2177; BMW DTC 118F20</u>	Mixture adaptation, lower speed range: mixture at part load too lean
<u>DTC P2178; BMW DTC 118F21</u>	Mixture adaptation, lower speed range: mixture at part load too rich
<u>DTC P0193; BMW DTC 119001</u>	Rail pressure sensor, electrical: Short circuit to B+
<u>DTC P0192; BMW DTC 119002</u>	Rail-pressure sensor, electric: short circuit to ground
<u>DTC P2542; BMW DTC 119201</u>	Fuel low-pressure sensor, electric: short circuit to positive
<u>DTC P2541; BMW DTC 119202</u>	Fuel low-pressure sensor, electrical: Short to earth
<u>DTC P10CE; BMW DTC 119301</u>	Rail-pressure sensor, voltage test: upper threshold exceeded
<u>DTC P10CF; BMW DTC 119302</u>	Rail-pressure sensor, voltage test: lower threshold undershot
<u>DTC P0088; BMW DTC 119304</u>	Rail pressure sensor, plausibility: Maximum

	pressure exceeded
<u>DTC P0087; BMW DTC 119308</u>	Rail pressure sensor, plausibility: Minimum pressure undershot
<u>DTC P10D9; BMW DTC 119404</u>	Rail pressure sensor, plausibility: Signal frozen
<u>DTC P0088; BMW DTC 11A001</u>	Fuel high-pressure system, fuel pressure: maximum pressure exceeded
<u>DTC P302A; BMW DTC 11A001</u>	Fuel high-pressure system, fuel pressure: maximum pressure exceeded
<u>DTC P0087; BMW DTC 11A002</u>	Fuel high-pressure system, fuel pressure: minimum pressure undershot
<u>DTC P302C; BMW DTC 11A002</u>	Fuel high-pressure system, fuel pressure: minimum pressure undershot
<u>DTC P008B; BMW DTC 11A201</u>	none
<u>DTC P008A; BMW DTC 11A204</u>	none
<u>DTC P10A2; BMW DTC 11A701</u>	none
<u>DTC P10A3; BMW DTC 11A702</u>	none
<u>DTC P306A; BMW DTC 11AA01</u>	Fuel supply system: Pressure too high, emergency operation with low pressure
<u>DTC P306B; BMW DTC 11AA02</u>	Fuel supply system: Pressure too high, emergency operation with injection deactivation
<u>DTC P306C; BMW DTC 11AA04</u>	Fuel supply system: Pressure too high for a short time, engine speed and load are restricted
<u>DTC P15DE; BMW DTC 11AC01</u>	Fuel high-pressure system, cold start: pressure too high
<u>DTC P15DF; BMW DTC 11AC02</u>	Fuel high-pressure system, cold start: pressure too low
<u>DTC P306F; BMW DTC 11AD10</u>	Fuel pressure: Pressure below minimum pressure; injection deactivation for catalytic converter protection
<u>DTC P306D; BMW DTC 11AE01</u>	Fuel supply system, oxygen sensor emissions control: upper limit exceeded
<u>DTC P306E; BMW DTC 11AE02</u>	Fuel supply system, oxygen sensor emissions control: lower limit undershot
<u>DTC P0004; BMW DTC 11C401</u>	Fuel-supply control valve, activation: short circuit to positive
<u>DTC P0003; BMW DTC 11C402</u>	Fuel-supply control valve, activation: short circuit to ground
<u>DTC P0001; BMW DTC 11C404</u>	Fuel-supply control valve, activation: open circuit
<u>DTC P0234; BMW DTC 120208</u>	Charge-air pressure control, upper value: charge-air pressure too high
<u>DTC P0299; BMW DTC 120308</u>	Charge-air pressure control, lower value: charge-air pressure too low
<u>DTC P1260; BMW DTC 120408</u>	Charge-air pressure control, deactivation: charge-air

	pressure buildup disabled
<u>DTC P0238; BMW DTC 121001</u>	Charge-air pressure sensor, electric: short circuit to positive
<u>DTC P0237; BMW DTC 121002</u>	Charge-air pressure sensor, electric: short circuit to ground
<u>DTC P12A9; BMW DTC 121201</u>	none
<u>DTC P12A8; BMW DTC 121202</u>	none
<u>DTC P0236; BMW DTC 121521</u>	Charging pressure sensor, multiple fault: electrical and plausibility
<u>DTC P0234; BMW DTC 121530</u>	Charge-air pressure sensor, plausibility: pressure before throttle valve too high
<u>DTC P12A0; BMW DTC 121530</u>	Charge-air pressure sensor, plausibility: pressure before throttle valve too high
<u>DTC P0299; BMW DTC 121531</u>	Charge-air pressure sensor, plausibility: pressure before throttle valve too low
<u>DTC P12A1; BMW DTC 121531</u>	Charge-air pressure sensor, plausibility: pressure before throttle valve too low
<u>DTC P10F2; BMW DTC 121532</u>	Boost pressure sensor, plausibility: Pressure before throttle valve too high when engine not running
<u>DTC P12DA; BMW DTC 121532</u>	Boost pressure sensor, plausibility: Pressure before throttle valve too high when engine not running
<u>DTC P10F3; BMW DTC 121533</u>	Boost pressure sensor, plausibility: Pressure before throttle valve too low when engine not running
<u>DTC P12DB; BMW DTC 121533</u>	Boost pressure sensor, plausibility: Pressure before throttle valve too low when engine not running
<u>DTC P0234; BMW DTC 121601</u>	Charge-air pressure sensor: pressure too high
<u>DTC P12A9; BMW DTC 121601</u>	Charge-air pressure sensor: pressure too high
<u>DTC P0299; BMW DTC 121602</u>	Charge-air pressure sensor: pressure too low
<u>DTC P12A8; BMW DTC 121602</u>	Charge-air pressure sensor: pressure too low
<u>DTC P0035; BMW DTC 122001</u>	Bypass blow-off valve, activation: short circuit to positive
<u>DTC P0034; BMW DTC 122002</u>	Bypass blow-off valve, activation: short circuit to ground
<u>DTC P0033; BMW DTC 122004</u>	Bypass blow-off valve, activation: open circuit
<u>DTC P0246; BMW DTC 123001</u>	Wastegate, activation: short circuit to positive
<u>DTC P0245; BMW DTC 123002</u>	Wastegate, activation: short circuit to ground
<u>DTC P0243; BMW DTC 123004</u>	Wastegate, activation: open circuit
<u>DTC P2195; BMW DTC 128101</u>	Oxygen sensor before catalytic converter, system check: Signal fixed at lean
<u>DTC P2196; BMW DTC 128301</u>	Oxygen sensor before catalytic converter, system check: Signal fixed at grease
<u>DTC P2297; BMW DTC 128501</u>	Oxygen sensor before catalytic converter, in coasting/overrun mode: Signal outside limit value

<u>DTC P0133; BMW DTC 128901</u>	Oxygen sensor before catalytic converter, dynamic response: slow response
<u>DTC P2414; BMW DTC 128B01</u>	Oxygen sensor before catalytic converter, installation: sensor not connected
<u>DTC P2243; BMW DTC 128E01</u>	Oxygen sensor before catalytic converter, line fault: open circuit, nearest line
<u>DTC P2626; BMW DTC 128E08</u>	Oxygen sensor before catalytic converter, line fault: open circuit, compensation line
<u>DTC P0132; BMW DTC 129001</u>	Oxygen sensor before catalytic converter, signal lines: Short circuit to B+
<u>DTC P0131; BMW DTC 129002</u>	Oxygen sensor before catalytic converter, signal lines: Short circuit to earth
<u>DTC P3024; BMW DTC 129201</u>	DME, internal fault, oxygen sensor before catalytic converter: initialization fault
<u>DTC P3022; BMW DTC 129202</u>	DME, internal fault, oxygen sensor before catalytic converter: communication fault
<u>DTC P3012; BMW DTC 129A20</u>	DME, internal fault, oxygen sensor before catalytic converter: oxygen-sensor module, signal-circuit adaptation values too high
<u>DTC P3014; BMW DTC 129A21</u>	DME, internal fault, oxygen sensor before catalytic converter: oxygen-sensor module, undervoltage
<u>DTC P2271; BMW DTC 12A101</u>	Oxygen sensor after catalytic converter, system check: signal fixed at rich
<u>DTC P2270; BMW DTC 12A102</u>	Oxygen sensor after catalytic converter, system check: signal fixed at lean
<u>DTC P013A; BMW DTC 12A308</u>	Oxygen sensor after catalytic converter, dynamic response, from rich to lean: slow response
<u>DTC P0138; BMW DTC 12A701</u>	Oxygen sensor after catalytic converter, electrical: Short circuit to B+
<u>DTC P0137; BMW DTC 12A902</u>	Oxygen sensor after catalytic converter, electrical: Short circuit to earth
<u>DTC P0136; BMW DTC 12AB04</u>	Oxygen sensor after catalytic converter, electrical: Line disconnection
<u>DTC P013E; BMW DTC 12AF08</u>	Oxygen sensor after catalytic converter, trailing throttle, from rich to lean: delayed response
<u>DTC P0032; BMW DTC 12B101</u>	Oxygen-sensor heater before catalytic converter, activation: short circuit to positive
<u>DTC P0031; BMW DTC 12B102</u>	Oxygen-sensor heater before catalytic converter, activation: short circuit to ground
<u>DTC P0030; BMW DTC 12B104</u>	Oxygen-sensor heater before catalytic converter, activation: open circuit
<u>DTC P0038; BMW DTC 12B301</u>	Oxygen-sensor heater after catalytic converter, activation: short circuit to positive
<u>DTC P0037; BMW DTC 12B302</u>	Oxygen-sensor heater after catalytic converter,

	activation: short circuit to ground
<u>DTC P0036; BMW DTC 12B304</u>	Oxygen-sensor heater after catalytic converter, activation: open circuit
<u>DTC P102A; BMW DTC 12B505</u>	Oxygen sensor heating before catalytic converter, function: Heater fault
<u>DTC P0141; BMW DTC 12B701</u>	Oxygen-sensor heater after catalytic converter, function: internal resistance too high
<u>DTC P3026; BMW DTC 12BD20</u>	Oxygen-sensor heater before catalytic converter, function: operating temperature not reached
<u>DTC P0135; BMW DTC 12BD21</u>	Oxygen-sensor heater before catalytic converter, function: lack of signal readiness
<u>DTC P3016; BMW DTC 12BD22</u>	Oxygen-sensor heater before catalytic converter, function: internal resistance of signal circuit too highly resistant
<u>DTC P0139; BMW DTC 12BD33</u>	Oxygen sensor after catalytic converter, ageing: voltage threshold not reached
<u>DTC P0138; BMW DTC 12BD40</u>	Oxygen sensor after catalytic converter, electrical: short circuit to positive
<u>DTC P0137; BMW DTC 12BD41</u>	Oxygen sensor after catalytic converter, electrical: intercore short circuit or oxygen sensor contaminated
<u>DTC P0136; BMW DTC 12BD43</u>	Oxygen sensor after catalytic converter, electrical: open circuit
<u>DTC P3018; BMW DTC 12BD50</u>	Oxygen sensor before catalytic converter, pump current line: lambda control value above threshold due to open pump current line
<u>DTC P3020; BMW DTC 12BD51</u>	Oxygen sensor before catalytic converter, pump current line: signal voltage in overrun mode too low due to open pump current line
<u>DTC P2237; BMW DTC 12BD52</u>	Oxygen sensor before catalytic converter, line fault: Open circuit, pump current lead
<u>DTC P2251; BMW DTC 12BD60</u>	Oxygen sensor before catalytic converter, line fault: Open circuit, virtual ground
<u>DTC P0130; BMW DTC 12BD70</u>	Oxygen sensor before catalytic converter, electrical: Nernst-cell resistance or ceramic temperature implausible, line or heater fault
<u>DTC P2097; BMW DTC 12BD90</u>	Oxygen sensor before catalytic converter, plausibility: mixture after catalytic converter too rich
<u>DTC P2096; BMW DTC 12BD91</u>	Oxygen sensor before catalytic converter, plausibility: mixture after catalytic converter too lean
<u>DTC P2195; BMW DTC 12BD92</u>	Oxygen sensor before catalytic converter, plausibility: fixed at lean

<u>DTC P2196; BMW DTC 12BD93</u>	Oxygen sensor before catalytic converter, plausibility: fixed at rich
<u>DTC P2089; BMW DTC 130001</u>	VANOS solenoid valve, inlet, activation: short circuit to positive
<u>DTC P2088; BMW DTC 130002</u>	VANOS solenoid valve, inlet, activation: short circuit to ground
<u>DTC P0010; BMW DTC 130004</u>	VANOS solenoid valve, inlet, activation: open circuit
<u>DTC P13C0; BMW DTC 130104</u>	VANOS, inlet: control fault, camshaft jammed
<u>DTC P0012; BMW DTC 130108</u>	VANOS, inlet: control fault, position not reached
<u>DTC P2091; BMW DTC 130201</u>	VANOS solenoid valve, exhaust, activation: short circuit to positive
<u>DTC P2090; BMW DTC 130202</u>	VANOS solenoid valve, exhaust, activation: short circuit to ground
<u>DTC P0013; BMW DTC 130204</u>	VANOS solenoid valve, exhaust, activation: open circuit
<u>DTC P13C9; BMW DTC 130304</u>	VANOS, exhaust: control fault, camshaft jammed
<u>DTC P0015; BMW DTC 130308</u>	VANOS, exhaust: control fault, position not reached
<u>DTC P0341; BMW DTC 130E11</u>	Inlet-camshaft sensor: signal implausible
<u>DTC P1338; BMW DTC 130E20</u>	Inlet camshaft: offset angle to crankshaft outside tolerance
<u>DTC P0366; BMW DTC 130F11</u>	Exhaust-camshaft sensor: signal implausible
<u>DTC P1339; BMW DTC 130F20</u>	Exhaust camshaft: offset angle to crankshaft outside tolerance
<u>DTC P054B; BMW DTC 131401</u>	VANOS, exhaust, cold start: not controllable
<u>DTC P052B; BMW DTC 131501</u>	VANOS, inlet, cold start: not controllable
<u>DTC P1325; BMW DTC 132408</u>	VANOS, exhaust: camshaft not at locking position at start
<u>DTC P1323; BMW DTC 132508</u>	VANOS, inlet: camshaft not at locking position at start
<u>DTC P10D8; BMW DTC 133101</u>	Valvetronic relay, activation: short circuit to positive
<u>DTC P10D7; BMW DTC 133102</u>	Valvetronic relay, activation: short circuit to ground
<u>DTC P10D6; BMW DTC 133104</u>	Valvetronic relay, activation: open circuit
<u>DTC P1047; BMW DTC 133201</u>	Valvetronic servomotor, activation: short circuit to positive
<u>DTC P1048; BMW DTC 133202</u>	Valvetronic servomotor, activation: short circuit to ground
<u>DTC P1050; BMW DTC 133208</u>	Valvetronic servomotor, activation: open circuit
<u>DTC P10DF; BMW DTC 133304</u>	none
<u>DTC P1030; BMW DTC 133B04</u>	none
<u>DTC P10E8; BMW DTC 134A02</u>	none
<u>DTC P101A; BMW DTC 134F02</u>	Valvetronic, adjustment range: stop not learned

<u>DTC P1023; BMW DTC 134F04</u>	Valvetronic, adjustment range: error, range check
<u>DTC P1023; BMW DTC 134F08</u>	Valvetronic, adjustment range: range check, deviation from original learning
<u>DTC P10DF; BMW DTC 135301</u>	Valvetronic, component protection, output stage: deactivation, system
<u>DTC P10E0; BMW DTC 135302</u>	Valvetronic, component protection, servomotor: deactivation, system
<u>DTC P10E7; BMW DTC 135401</u>	Valvetronic, overload protection: output stage overloaded
<u>DTC P10E8; BMW DTC 135402</u>	Valvetronic, overload protection: servomotor overloaded
<u>DTC P1030; BMW DTC 135604</u>	Valvetronic system: control deviation too great
<u>DTC P10E1; BMW DTC 135608</u>	Valvetronic system: no movement detected
<u>DTC P10E2; BMW DTC 135808</u>	Valvetronic servomotor, position sensors: Short-circuit or line break (open circuit)
<u>DTC P10E6; BMW DTC 135908</u>	Valvetronic servomotor, position sensors: Supply voltage faulty
<u>DTC P1017; BMW DTC 135A08</u>	Valvetronic servomotor, position sensors: Signal implausible
<u>DTC P10F4; BMW DTC 135B10</u>	Valvetronic servomotor, activation, voltage phase: Line disconnection
<u>DTC P10F5; BMW DTC 135B11</u>	Valvetronic servomotor, activation, volt phase: Line disconnection
<u>DTC P10F6; BMW DTC 135B12</u>	Valvetronic servomotor, activation, watt phase: Line disconnection
<u>DTC P0478; BMW DTC 138101</u>	Exhaust flap, activation: short circuit to positive
<u>DTC P0477; BMW DTC 138102</u>	Exhaust flap, activation: short circuit to ground
<u>DTC P0475; BMW DTC 138104</u>	Exhaust flap, activation: open circuit
<u>DTC P303E; BMW DTC 138201</u>	Radiator shutter, top, supply voltage, actuator: voltage fault
<u>DTC P303F; BMW DTC 138301</u>	Radiator shutter, top, overtemperature, actuator: limit value exceeded
<u>DTC P304A; BMW DTC 138401</u>	Radiator shutter, top, actuator internal: electrical fault
<u>DTC P304B; BMW DTC 138501</u>	Radiator shutter, top, lower stop: not detected
<u>DTC P304C; BMW DTC 138601</u>	Radiator shutter, top, upper stop: not detected
<u>DTC P304D; BMW DTC 138701</u>	Radiator shutter, top, upper stop: detected too early
<u>DTC P300D; BMW DTC 138901</u>	Radiator shutter, bottom, electrical: Short circuit to B+
<u>DTC P300E; BMW DTC 138902</u>	Radiator shutter, bottom, electrical: Short circuit to earth
<u>DTC P300F; BMW DTC 138904</u>	Radiator shutter, bottom, electrical: Line disconnection

<u>DTC P0300; BMW DTC 140001</u>	Misfire, several cylinders: injection is cut out
<u>DTC P0300; BMW DTC 140002</u>	Misfire, several cylinders: damaging exhaust gas after starting
<u>DTC P0300; BMW DTC 140004</u>	Misfire, several cylinders: damaging exhaust gas
<u>DTC P0301; BMW DTC 140101</u>	Combustion misfiring, cylinder 1: Injection is switched off
<u>DTC P0301; BMW DTC 140102</u>	Combustion misfiring, cylinder 1: damaging exhaust gas after start sequence
<u>DTC P0301; BMW DTC 140104</u>	Combustion misfiring, cylinder 1: damaging exhaust gas
<u>DTC P0302; BMW DTC 140201</u>	Misfire, cylinder 2: injection is cut out
<u>DTC P0302; BMW DTC 140202</u>	Misfire, cylinder 2: damaging exhaust gas after starting
<u>DTC P0302; BMW DTC 140204</u>	Misfire, cylinder 2: damaging exhaust gas
<u>DTC P0303; BMW DTC 140301</u>	Misfire, cylinder 3: injection is cut out
<u>DTC P0303; BMW DTC 140302</u>	Misfire, cylinder 3: damaging exhaust gas after starting
<u>DTC P0303; BMW DTC 140304</u>	Misfire, cylinder 3: damaging exhaust gas
<u>DTC P0304; BMW DTC 140401</u>	Misfire, cylinder 4: injection is cut out
<u>DTC P0304; BMW DTC 140402</u>	Misfire, cylinder 4: damaging exhaust gas after starting
<u>DTC P0304; BMW DTC 140404</u>	Misfire, cylinder 4: damaging exhaust gas
<u>DTC P0305; BMW DTC 140501</u>	Misfire, cylinder 5: injection is cut out
<u>DTC P0305; BMW DTC 140502</u>	Misfire, cylinder 5: damaging exhaust gas after starting
<u>DTC P0305; BMW DTC 140504</u>	Misfire, cylinder 5: damaging exhaust gas
<u>DTC P0306; BMW DTC 140601</u>	Misfire, cylinder 6: injection is cut out
<u>DTC P0306; BMW DTC 140602</u>	Misfire, cylinder 6: damaging exhaust gas after starting
<u>DTC P0306; BMW DTC 140604</u>	Misfire, cylinder 6: damaging exhaust gas
<u>DTC P1301; BMW DTC 150102</u>	Ignition, cylinder 1: combustion duration too short
<u>DTC P1302; BMW DTC 150202</u>	Ignition, cylinder 2: combustion duration too short
<u>DTC P1303; BMW DTC 150302</u>	Ignition, cylinder 3: combustion duration too short
<u>DTC P1304; BMW DTC 150402</u>	Ignition, cylinder 4: combustion duration too short
<u>DTC P1305; BMW DTC 150502</u>	Ignition, cylinder 5: combustion duration too short
<u>DTC P1306; BMW DTC 150602</u>	Ignition, cylinder 6: combustion duration too short
<u>DTC P050B; BMW DTC 151001</u>	Ignition timing adjustment in idle, cold start Ignition timing too early
<u>DTC P13EA; BMW DTC 151101</u>	Ignition timing adjustment at partial load, cold start Ignition timing too early
<u>DTC P13A0; BMW DTC 152108</u>	Super-knocking, cylinder 1: Injection switch-off
<u>DTC P13A1; BMW DTC 152208</u>	Super-knocking, cylinder 2: Injection switch-off

<u>DTC P13A2; BMW DTC 152308</u>	Super-knocking, cylinder 3: Injection switch-off
<u>DTC P13A3; BMW DTC 152408</u>	Super-knocking, cylinder 4: Injection switch-off
<u>DTC P13A4; BMW DTC 152508</u>	Super-knocking, cylinder 5: Injection switch-off
<u>DTC P13A5; BMW DTC 152608</u>	Super-knocking, cylinder 6: Injection switch-off
<u>DTC P137F; BMW DTC 152D08</u>	Super-knocking: Injection switch-off
<u>DTC P0335; BMW DTC 160001</u>	Crankshaft sensor, signal: no signal
<u>DTC P0336; BMW DTC 160020</u>	Crankshaft sensor: disturbed crankshaft signal
<u>DTC P13CE; BMW DTC 160510</u>	Crankshaft sensor, parked position: Not plausible
<u>DTC P0343; BMW DTC 164020</u>	Inlet-camshaft sensor: signal high
<u>DTC P0342; BMW DTC 164021</u>	Inlet-camshaft sensor: signal low
<u>DTC P0368; BMW DTC 164030</u>	Exhaust-camshaft sensor: signal high
<u>DTC P0367; BMW DTC 164031</u>	Exhaust-camshaft sensor: signal low
<u>DTC P13CA; BMW DTC 164040</u>	Inlet camshaft, mechanism: installation faulty
<u>DTC P13CB; BMW DTC 164041</u>	Exhaust camshaft, mechanism: installation faulty
<u>DTC P0324; BMW DTC 168A20</u>	Knock control, fault check: malfunction, system fault
<u>DTC P13AF; BMW DTC 168A30</u>	Knock sensor, electrical: signal input A, short circuit to positive
<u>DTC P13AE; BMW DTC 168A31</u>	Knock sensor, electrical: signal input A, short circuit to ground
<u>DTC P13B9; BMW DTC 168A40</u>	Knock sensor, electrical: signal input B, short circuit to positive
<u>DTC P13B8; BMW DTC 168A41</u>	Knock sensor, electrical: signal input B, short circuit to ground
<u>DTC P13BF; BMW DTC 168A50</u>	Knock sensor 2, electrical: signal input A, short circuit to positive
<u>DTC P13BE; BMW DTC 168A51</u>	Knock sensor 2, electrical: signal input A, short circuit to ground
<u>DTC P13C8; BMW DTC 168A60</u>	Knock sensor 2, electrical: signal input B, short circuit to positive
<u>DTC P13C7; BMW DTC 168A61</u>	Knock sensor 2, electrical: signal input B, short circuit to ground
<u>DTC P0328; BMW DTC 168A70</u>	Knock sensor, signal: engine mechanically too loud or KS outside tolerance (sensitivity)
<u>DTC P0327; BMW DTC 168A71</u>	Knock sensor, signal: electrical fault KS (loose contact) or KS loose
<u>DTC P1328; BMW DTC 168A80</u>	Knock sensor 2, signal: engine mechanically too loud or KS outside tolerance (sensitivity)
<u>DTC P1327; BMW DTC 168A81</u>	Knock sensor 2, signal: electrical fault KS (loose contact) or KS loose
<u>DTC P0420; BMW DTC 180001</u>	Catalytic converter: efficiency below limit value
<u>DTC P2420; BMW DTC 190001</u>	DMTL solenoid valve, activation: short circuit to positive

<u>DTC P2419; BMW DTC 190002</u>	DMTL solenoid valve, activation: short circuit to ground
<u>DTC P2418; BMW DTC 190004</u>	DMTL solenoid valve, activation: open circuit
<u>DTC P0442; BMW DTC 190201</u>	Fuel tank ventilation system and purge air system, minor leak: Leak greater than 1.0 mm
<u>DTC P0456; BMW DTC 190302</u>	Fuel tank ventilation system and purge air system, micro-leak: Leak greater than 0.5 mm
<u>DTC P1449; BMW DTC 190401</u>	DMTL, system fault: pump current too high during reference measurement
<u>DTC P1448; BMW DTC 190402</u>	DMTL, system fault: pump current too low during reference measurement
<u>DTC P1434; BMW DTC 190404</u>	DMTL, system fault: abort due to current fluctuations during reference measurement
<u>DTC P1447; BMW DTC 190408</u>	DMTL, system fault: pump current reaches limit value during valve test
<u>DTC P240C; BMW DTC 190501</u>	DMTL, heating, activation: short circuit to positive
<u>DTC P240B; BMW DTC 190502</u>	DMTL, heating, activation: short circuit to ground
<u>DTC P240A; BMW DTC 190504</u>	DMTL, heating, activation: open circuit
<u>DTC P2402; BMW DTC 190601</u>	DMTL leak diagnosis pump, activation: Short circuit to B+
<u>DTC P2401; BMW DTC 190702</u>	DMTL leak diagnosis pump, activation: Short to earth
<u>DTC P2400; BMW DTC 190704</u>	DMTL leak diagnosis pump, activation: Open circuit
<u>DTC P0459; BMW DTC 191001</u>	Tank-venting valve, activation: short circuit to positive
<u>DTC P0458; BMW DTC 191002</u>	Tank-venting valve, activation: short circuit to ground
<u>DTC P0444; BMW DTC 191004</u>	Tank-venting valve, activation: open circuit
<u>DTC P2421; BMW DTC 191A21</u>	Tank-venting valve: jammed open
<u>DTC P149C; BMW DTC 191B01</u>	Tank safety valve shut-off valve, activation: Short circuit to B+
<u>DTC P149B; BMW DTC 191B02</u>	Tank safety valve shut-off valve, activation: Short circuit to earth
<u>DTC P149A; BMW DTC 191B04</u>	Tank safety valve shut-off valve, activation: Line disconnection
<u>DTC P149D; 191C01</u>	Tank safety valve shut-off valve: jammed open
<u>DTC P0440; BMW DTC 191C02</u>	Tank safety valve: malfunction
<u>DTC P143F; BMW DTC 191C03</u>	Tank safety valve, after-run: malfunction
<u>DTC P0440; BMW DTC 191D01</u>	Tank safety valve: malfunction
<u>DTC P0462; BMW DTC 193002</u>	Fuel level sensor, left, signal: Short to earth
<u>DTC P1407; BMW DTC 193008</u>	Fuel level sensor, left, signal: CAN value implausible

<u>DTC P2068; BMW DTC 193011</u>	Fuel level sensor, right, signal: Short circuit to B+
<u>DTC P2067; BMW DTC 193102</u>	Fuel level sensor, right, signal: Short to earth
<u>DTC P1408; BMW DTC 193108</u>	Fuel level sensor, right, signal: CAN value implausible
<u>DTC P0463; BMW DTC 193111</u>	Fuel level sensor, left, signal: Short circuit to B+
<u>DTC P144B; BMW DTC 193221</u>	Fuel level sensor: Deviation between consumption and fill-level change
<u>DTC P0692; BMW DTC 1A2001</u>	Electric fan, activation: short circuit to positive
<u>DTC P0691; BMW DTC 1A2002</u>	Electric fan, activation: short circuit to ground
<u>DTC P0480; BMW DTC 1A2004</u>	Electric fan, activation: open circuit
<u>DTC P14C0; BMW DTC 1A2108</u>	Electric fan, self-diagnosis, stage 1: minor fan fault
<u>DTC P14C0; BMW DTC 1A2308</u>	Electric fan, self-diagnosis, stage 2: fan fault with potential danger to fan
<u>DTC P14C0; BMW DTC 1A2408</u>	Electric fan, self-diagnosis, stage 3: fan fault with restricted motor function
<u>DTC P14C0; BMW DTC 1A2508</u>	Electric fan, self-diagnosis, stage 4: serious fan fault
<u>DTC P144E; BMW DTC 1A2601</u>	Fuse relay, electric fan, activation: short circuit to positive
<u>DTC P144D; BMW DTC 1A2602</u>	Fuse relay, electric fan, activation: short circuit to ground
<u>DTC P144C; BMW DTC 1A2604</u>	Fuse relay, electric fan, activation: open circuit
<u>DTC P1518; BMW DTC 1B0A20</u>	Poor-road-surface detection: wheel speed too high
<u>DTC P1517; BMW DTC 1B0A21</u>	Poor-road-surface detection: no wheel-speed signal received
<u>DTC P0503; BMW DTC 1B0A40</u>	Vehicle speed: signal too high
<u>DTC P152A; BMW DTC 1B0A60</u>	Vehicle speed, plausibility: minimum speed under load not reached
<u>DTC P152B; BMW DTC 1B0A61</u>	Vehicle speed, plausibility: minimum speed in overrun mode not reached
<u>DTC P0501; BMW DTC 1B0A62</u>	Vehicle speed, plausibility: implausible speed signal
<u>DTC P15DC; BMW DTC 1B0A64</u>	Vehicle speed, wheel sensor rear/left, plausibility: signal implausible
<u>DTC P15DA; BMW DTC 1B0A65</u>	Vehicle speed, wheel sensor front/left, plausibility: signal implausible
<u>DTC P15DD; BMW DTC 1B0A66</u>	Vehicle speed, wheel sensor rear/right, plausibility: signal implausible
<u>DTC P15DB; BMW DTC 1B0A67</u>	Vehicle speed, wheel sensor front/right, plausibility: signal implausible
<u>DTC P1667; BMW DTC 1B2002</u>	EWS anti-tampering protection: no starting value programmed
<u>DTC P16CF; BMW DTC 1B2008</u>	EWS anti-tampering protection: expected response implausible
<u>DTC P165A; BMW DTC 1B2101</u>	Interface EWS-DME: hardware fault

<u>DTC P1660; BMW DTC 1B2102</u>	Interface EWS-DME: frame fault
<u>DTC P1661; BMW DTC 1B2104</u>	Interface EWS-DME: timeout
<u>DTC P165C; BMW DTC 1B2201</u>	DME, internal fault, EWS data: no available memory possibility
<u>DTC P165D; BMW DTC 1B2202</u>	DME, internal fault, EWS data: fault-activation-code storage
<u>DTC P165E; BMW DTC 1B2208</u>	DME, internal fault, EWS data: checksum fault
<u>DTC U1166; BMW DTC 1B2302</u>	Message, EWS-DME, incorrect: frame fault
<u>DTC U0167; BMW DTC 1B2304</u>	Message, EWS-DME, incorrect: timeout
<u>DTC P15B0; BMW DTC 1B5101</u>	Terminal 15_3, line from CAS, electrical: short circuit to positive
<u>DTC P15B1; BMW DTC 1B5102</u>	Terminal 15_3, line from CAS, electrical: short circuit to ground or open circuit
<u>DTC P15D9; BMW DTC 1B5202</u>	Terminal 15N_1, power supply switched by CAS, electrical: Short to earth or open circuit
<u>DTC P15ED; BMW DTC 1B5302</u>	Terminal 15N_2, power supply switched by CAS, electrical: Short to earth or open circuit
<u>DTC P15F8; BMW DTC 1B5402</u>	Terminal 15N_3, power supply switched by CAS, electrical: Short to earth or open circuit
<u>DTC P0571; BMW DTC 1B6008</u>	Brake-light switch, plausibility: signal implausible
<u>DTC P15E8; BMW DTC 1B9508</u>	Engine switch-off time, plausibility: time too short in correlation to engine-coolant cooling
<u>DTC P15E9; BMW DTC 1B9608</u>	Engine switch-off time, plausibility: time too long in correlation to engine-coolant cooling
<u>DTC P15FA; BMW DTC 1B9701</u>	Engine switch-off time: too fast during engine operation
<u>DTC P15FB; BMW DTC 1B9702</u>	Engine switch-off time: too slow during engine operation
<u>DTC P15FE; BMW DTC 1B9804</u>	Engine switch-off time, signal: no signal
<u>DTC P15FC; BMW DTC 1B9A01</u>	Engine switch-off time: too fast during run-on
<u>DTC P15FD; BMW DTC 1B9A02</u>	Engine switch-off time: too slow during run-on
<u>DTC P159E; BMW DTC 1C0001</u>	Engine-oil pressure control, dynamic: pressure fluctuations
<u>DTC P159F; BMW DTC 1C0101</u>	Engine-oil pressure control, static: engine-oil pressure too high, limp-home operation
<u>DTC P15A0; BMW DTC 1C0102</u>	Engine-oil pressure control, static: engine-oil pressure too low, limp-home operation
<u>DTC P15EC; BMW DTC 1C0201</u>	Oil-pressure regulating valve, activation: short circuit to positive
<u>DTC P15EB; BMW DTC 1C0202</u>	Oil-pressure regulating valve, activation: short circuit to ground
<u>DTC P15EA; BMW DTC 1C0204</u>	Oil-pressure regulating valve, activation: open circuit

<u>DTC P15A1; BMW DTC 1C0301</u>	Oil-pressure regulating valve, mechanical: sticks in fully energized position (minimum oil pressure)
<u>DTC P15A2; BMW DTC 1C0302</u>	Oil-pressure regulating valve, mechanical: sticks in non-energized position (maximum oil pressure)
<u>DTC P15A3; BMW DTC 1C2001</u>	Oil pump, mechanical: oil pressure too high
<u>DTC P0524; BMW DTC 1C2002</u>	Oil pump, mechanical: oil pressure too low
<u>DTC P0523; BMW DTC 1C3001</u>	Engine-oil pressure sensor, electric: short circuit to positive
<u>DTC P0522; BMW DTC 1C3002</u>	Engine oil pressure sensor, electrical: Short to earth
<u>DTC P0521; BMW DTC 1C3108</u>	Engine-oil pressure sensor, plausibility: signal hangs
<u>DTC P250F; BMW DTC 1C4002</u>	Engine-oil level: too low
<u>DTC P252A; BMW DTC 1C4110</u>	Oil-condition sensor, electrical: malfunction
<u>DTC P1587; BMW DTC 1C4111</u>	Oil-condition sensor, plausibility: level implausible
<u>DTC P1586; BMW DTC 1C4112</u>	Oil-condition sensor, plausibility: temperature implausible
<u>DTC P1587; BMW DTC 1C4113</u>	Oil-condition sensor, plausibility: level implausible
<u>DTC P1586; BMW DTC 1C4115</u>	Oil-condition sensor, plausibility: temperature implausible
<u>DTC P1587; BMW DTC 1C4116</u>	Oil-condition sensor, electrical: level, malfunction
<u>DTC P1588; BMW DTC 1C4117</u>	Oil-condition sensor, electrical: permittivity, malfunction
<u>DTC P1586; BMW DTC 1C4118</u>	Oil-condition sensor, electrical: temperature, malfunction
<u>DTC P0195; BMW DTC 1C4119</u>	Engine-oil temperature sensor, electrical: malfunction
<u>DTC P0196; BMW DTC 1C4120</u>	Engine-oil temperature sensor, plausibility: temperature implausible
<u>DTC P1521; BMW DTC 1C5A20</u>	BSD message from oil-condition sensor: no message
<u>DTC P0128; BMW DTC 1D2008</u>	Map thermostat, mechanical: jammed open
<u>DTC P0599; BMW DTC 1D2401</u>	Map thermostat, activation: short circuit to positive
<u>DTC P0598; BMW DTC 1D2402</u>	Map thermostat, activation: short circuit to ground
<u>DTC P0597; BMW DTC 1D2404</u>	Map thermostat, activation: open circuit
<u>DTC P0507; BMW DTC 1E0001</u>	Idle-speed control: speed too high
<u>DTC P0506; BMW DTC 1E0002</u>	Idle-speed control: speed too low
<u>DTC P1562; BMW DTC 1E0101</u>	Idle-speed control, cold start: engine speed too high
<u>DTC P1561; BMW DTC 1E0102</u>	Idle-speed control, cold start: engine speed too low
<u>DTC P10E3; BMW DTC 1F0514</u>	Valvetronic relay, supply voltage: Short to earth
<u>DTC P10E4; BMW DTC 1F0515</u>	Valvetronic relay, supply voltage: Open circuit
<u>DTC P326A; BMW DTC 1F0516</u>	DME, internal fault, electric accelerator pedal monitoring: A/D converter idling test pulse check

<u>DTC P326A; BMW DTC 1F0517</u>	DME, internal fault, electric accelerator pedal monitoring: AD converter, test voltage check
<u>DTC P326B; BMW DTC 1F0518</u>	DME, internal fault, electric accelerator pedal monitoring: Air quantity adjustment
<u>DTC P060D; BMW DTC 1F0519</u>	DME, internal fault: monitoring, signal plausibilization, accelerator-pedal module or pedal-travel sensor
<u>DTC P325C; BMW DTC 1F0520</u>	DME, internal fault, electric accelerator pedal monitoring: Speed sensor
<u>DTC P3237; BMW DTC 1F0521</u>	DME, internal fault: monitoring, plausibilization of mixture-correction factors
<u>DTC P325D; BMW DTC 1F0522</u>	DME, internal fault: monitoring, injection-rate limitation, level 1
<u>DTC P325D; BMW DTC 1F0523</u>	DME, internal fault: monitoring, injection-rate limitation, level 2
<u>DTC P3337; BMW DTC 1F0524</u>	DME, internal fault: Monitoring of the nominal oxygen sensor value
<u>DTC P325F; BMW DTC 1F0525</u>	DME, internal fault: monitoring, plausibilization of relative fuel mass
<u>DTC P061B; BMW DTC 1F0526</u>	DME, internal fault: monitoring, torque comparison
<u>DTC P326C; BMW DTC 1F0527</u>	DME, internal fault, electric accelerator pedal monitoring: Drive train transmission ratio implausible
<u>DTC P3235; BMW DTC 1F0528</u>	DME, internal fault: monitoring, variant coding
<u>DTC P325E; BMW DTC 1F0529</u>	DME, internal fault, electric accelerator pedal monitoring: Ignition-timing monitoring
<u>DTC P326D; BMW DTC 1F0530</u>	DME, internal fault: Switch-off path test by monitoring module
<u>DTC P325F; BMW DTC 1F0531</u>	DME, internal fault: Plausibility monitoring, fuel mass
<u>DTC P1646; BMW DTC 1F0532</u>	DME, internal fault, monitoring MSC communication Malfunction in module R2S2/1
<u>DTC P1646; BMW DTC 1F0533</u>	DME, internal fault, monitoring MSC communication Malfunction in module R2S2/2
<u>DTC P10E5; BMW DTC 1F0904</u>	DME, internal fault, activation Valvetronic: malfunction
<u>DTC P062F; BMW DTC 1F1A50</u>	DME, internal fault: erase EEPROM faulty
<u>DTC P062F; BMW DTC 1F1A52</u>	DME, internal fault: write EEPROM faulty
<u>DTC P060A; BMW DTC 1F1A60</u>	DME, internal fault: monitoring-module fault
<u>DTC P16EA; BMW DTC 1F1A80</u>	DME, internal fault, watchdog output: malfunction
<u>DTC P16EB; BMW DTC 1F1A81</u>	DME, internal fault, watchdog output: faulty question/answer communication
<u>DTC P16EC; BMW DTC 1F1A82</u>	DME, internal fault, watchdog output: overvoltage detection

<u>DTC P16E7; BMW DTC 1F1A90</u>	DME, internal fault, monitoring 5V sensor supply: voltage outside valid range
<u>DTC P16E8; BMW DTC 1F1A91</u>	DME, internal fault, monitoring 5V sensor supply 2: voltage outside valid range
<u>DTC P16E9; BMW DTC 1F1A92</u>	DME, internal fault, monitoring 5V sensor supply 3: voltage outside valid range
<u>DTC P0617; BMW DTC 1F1B40</u>	Starter, activation: short circuit to positive
<u>DTC P0616; BMW DTC 1F1B41</u>	Starter, activation: short circuit to ground
<u>DTC P0615; BMW DTC 1F1B42</u>	Starter, activation: open circuit
<u>DTC P0687; BMW DTC 1F1B50</u>	System voltage, DME master relay: voltage too high
<u>DTC P3288; BMW DTC 1F2104</u>	Incorrect data record: CAN timeout
<u>DTC P3289; BMW DTC 1F2108</u>	Incorrect data record: Variant monitoring
<u>DTC P0634; BMW DTC 1F5020</u>	DME, internal fault, interior-temperature sensor: value too high
<u>DTC P163A; BMW DTC 1F5021</u>	DME, internal fault, interior-temperature sensor: value too low
<u>DTC P0634; BMW DTC 1F5101</u>	DME temperature: Overtemperature
<u>DTC P10DC; BMW DTC 201010</u>	CAN hardware: Faulty
<u>DTC P10DD; BMW DTC 201020</u>	FlexRay hardware: Faulty
<u>DTC P15D0; BMW DTC 20A701</u>	Coolant pump, speed deviation: outside tolerance
<u>DTC P15D1; BMW DTC 20A801</u>	Coolant pump, deactivation: internal temperature too high
<u>DTC P15D2; BMW DTC 20A802</u>	Coolant pump, shutdown: Overvoltage detected
<u>DTC P15D3; BMW DTC 20A804</u>	Coolant pump, shutdown: Pump blocked
<u>DTC P15D4; BMW DTC 20A901</u>	Coolant pump, operation with reduced output: Dry running detected
<u>DTC P15D5; BMW DTC 20A902</u>	Coolant pump, operation with reduced output: Undervoltage detected
<u>DTC P15D6; BMW DTC 20A904</u>	Coolant pump, power-reduced operation: temperature limit 1 exceeded
<u>DTC P15D7; BMW DTC 20A908</u>	Coolant pump, power-reduced operation: temperature limit 2 exceeded
<u>DTC U1170; BMW DTC 20AA04</u>	Coolant pump, communication: malfunction
<u>DTC P0620; BMW DTC 210201</u>	Alternator, electric: malfunction
<u>DTC P325A; BMW DTC 210301</u>	Alternator, plausibility, electric: calculated
<u>DTC P0A3B; BMW DTC 210401</u>	Alternator, temperature: overtemperature
<u>DTC P324C; BMW DTC 210501</u>	Alternator, plausibility, temperature: overtemperature calculated
<u>DTC P3223; BMW DTC 210601</u>	Alternator, mechanical: malfunction
<u>DTC P324E; BMW DTC 210701</u>	Alternator, regulator: model incorrect
<u>DTC P324A; BMW DTC 210801</u>	Alternator, model incorrect
<u>DTC P160C; BMW DTC 213301</u>	Power management: Overvoltage

<u>DTC P160D; BMW DTC 213401</u>	Power management: Undervoltage
<u>DTC P160A; BMW DTC 213501</u>	Power management: Exhaustive battery charge
<u>DTC P160F; BMW DTC 213604</u>	Power management: Closed-circuit current fault
<u>DTC P160E; BMW DTC 213701</u>	Power management: Ripple in system voltage too high
<u>DTC P0563; BMW DTC 213A20</u>	System voltage: voltage too high
<u>DTC P0562; BMW DTC 213A21</u>	System voltage: voltage too low
<u>DTC P0560; BMW DTC 213A22</u>	System voltage: analogue-digital converter faulty
<u>DTC P150A; BMW DTC 215001</u>	Intelligent battery sensor, signal: bus fault
<u>DTC P150D; BMW DTC 215101</u>	Intelligent battery sensor (IBS): Internal temperature measurement implausible
<u>DTC P150E; BMW DTC 215104</u>	Intelligent battery sensor (IBS): Internal voltage measurement implausible
<u>DTC P150F; BMW DTC 215108</u>	Intelligent battery sensor (IBS): Internal current measurement implausible
<u>DTC P15CE; BMW DTC 215801</u>	Intelligent battery sensor (IBS): Wake-up line, short circuit to B+ or earth
<u>DTC P15CF; BMW DTC 215901</u>	Intelligent battery sensor (IBS): Incorrect version
<u>DTC P15C3; BMW DTC 215A01</u>	Intelligent battery sensor (IBS): Wake-up line, line disconnection
<u>DTC P0A16; BMW DTC 219001</u>	Active engine mount, electric: short circuit to positive
<u>DTC P0A15; BMW DTC 219002</u>	Active engine mount, electric: short circuit to ground
<u>DTC P0A14; BMW DTC 219004</u>	Active engine mount, electric: open circuit
<u>DTC U1190; BMW DTC 231F04</u>	Electronic transmission control (EGS), PT-CAN, PT-CAN2: Communication fault
<u>DTC U1169; BMW DTC 233004</u>	No message (OBD sensor, diagnosis, status, 0x5E0, 0x8C), receiver DME, IHKA, transmitter KOMBI
<u>DTC U1185; BMW DTC CD840A</u>	DME/DDE PT-CAN: Communication fault
<u>DTC U119E; BMW DTC CD8420</u>	DME/DDE FlexRay bus: Communication fault
<u>DTC U1184; BMW DTC CD8486</u>	DME/DDE PT-CAN2: Communication fault
<u>DTC U1117; BMW DTC CD9902</u>	Message (vehicle speed, 55.3.4) not current, receiver DME/DDE, transmitter ICM
<u>DTC U1118; BMW DTC CD9904</u>	No message (vehicle speed, 55.3.4), receiver DME/DDE, transmitter IC
<u>DTC U1119; BMW DTC CD9908</u>	Message (vehicle speed, 55.3.4) checksum error, receiver DME/DDE, transmitter ICM
<u>DTC U11C6; BMW DTC CD9932</u>	Message (yaw rate, vehicle, 38.0.2) alive check
<u>DTC U0123; BMW DTC CD9933</u>	No message (yaw rate, vehicle, 38.0.2)
<u>DTC U11C7; BMW DTC CD9934</u>	Message (yaw rate, vehicle, 38.0.2) checksum error
<u>DTC U0122; BMW DTC CD9935</u>	No message (data, driving dynamics sensor, extended, 38.0.2)

<u>DTC U1197; BMW DTC CD9A02</u>	Message (actual braking torque, sum, 43.3.4) not current, receiver DME/DDE, transmitter DSC
<u>DTC U1198; BMW DTC CD9A04</u>	No message (actual braking torque, sum, 43.3.4), receiver DME/DDE, transmitter DSC
<u>DTC U1199; BMW DTC CD9A08</u>	Message (actual braking torque, sum, 43.3.4) checksum error, receiver DME/DDE, transmitter DSC
<u>DTC U1195; BMW DTC CD9B02</u>	Message (actual wheel speed, 46.0.1) not current, receiver DME/DDE, transmitter DSC
<u>DTC U116D; BMW DTC CD9B04</u>	No message (actual wheel speed, 46.0.1), receiver DME/DDE, transmitter DSC
<u>DTC U1196; BMW DTC CD9B08</u>	Message (actual wheel speed, 46.0.1) checksum error, receiver DME/DDE, transmitter DSC
<u>DTC U1125; BMW DTC CD9F02</u>	Message (Dynamic Stability Control stabilization, 47.1.2) not current, receiver DME/DDE, transmitter DSC
<u>DTC U1126; BMW DTC CD9F04</u>	No message (Dynamic Stability Control stabilization, 47.1.2), receiver DME/DDE, transmitter DSC
<u>DTC U1127; BMW DTC CD9F08</u>	Message (Dynamic Stability Control stabilization, 47.1.2) checksum error, receiver DME/DDE, transmitter DSC
<u>DTC U1101; BMW DTC CDA804</u>	No message (relative time, 0x328), receiver DME/DDE, transmitter KOMBI
<u>DTC U0137; BMW DTC CDA904</u>	No message (status, trailer, 0x2E4), receiver DME/DDE, transmitter AH
<u>DTC U1129; BMW DTC CDAB04</u>	No message (reverse gear, 0x3B0), receiver DME/DDE, transmitter FRM, FEM
<u>DTC U11A5; BMW DTC CDAC04</u>	No message (status, transmission control unit, 0x39A), receiver DME/DDE, transmitter EGS
<u>DTC U112D; BMW DTC CDAD04</u>	No message (control, crash shutdown, electric fuel pump, 0x135), receiver DME/DDE, transmitter ACSM
<u>DTC U113C; BMW DTC CDAE04</u>	No message (time display, 0x2F8), receiver DME/DDE, transmitter KOMB
<u>DTC U113A; BMW DTC CDAF04</u>	No message (central locking and lid status, 0x2FC), receiver DME/DDE, transmitter CAS, FEM
<u>DTC U119B; BMW DTC CDB204</u>	No message (ambient temperature, 0x2CA), receiver DME/DDE, transmitter KOMBI
<u>DTC U111C; BMW DTC CDB504</u>	No message (kilometer reading / range, 0x330), receiver DME/DDE, transmitter KOMBI
<u>DTC U111D; BMW DTC CDB602</u>	Message (terminals, 0x12F) not current, receiver DME/DDE, transmitter CAS
<u>DTC U111E; BMW DTC CDB604</u>	No message (terminals, 0x12F), receiver

	DME/DDE, transmitter CAS, FEM
<u>DTC U111F; BMW DTC CDB608</u>	Message (terminals, 0x12F) checksum error, receiver DME/DDE, transmitter CAS
<u>DTC U11A7; BMW DTC CDB904</u>	No message (diagnosis, OBD gearbox, 0x396), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11B3; BMW DTC CDBB02</u>	Message (request, torque, crankshaft, gearbox 2, 0xA0) not current, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11B4; BMW DTC CDBB04</u>	No message (request, torque, crankshaft, gearbox 2, 0xA0), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11B5; BMW DTC CDBB08</u>	Message (request, torque, crankshaft, gearbox 2, 0xA0) checksum error, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A6; BMW DTC CDBF04</u>	No message (status, transmission control unit, 0x39A), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A4; BMW DTC CDC004</u>	No message (diagnosis, OBD gearbox, 0x396), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A1; BMW DTC CDC102</u>	Message (data, transmission line, 0x1AF) not current, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A2; BMW DTC CDC104</u>	No message (data, transmission line, 0x1AF), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A3; BMW DTC CDC108</u>	Message (data, transmission line, 0x1AF) checksum error, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11AD; BMW DTC CDC202</u>	Message (request, torque, crankshaft, EGS, 0x0B0) not current, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11AE; BMW DTC CDC204</u>	No message (request, torque, crankshaft, EGS, 0x0B0), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11AF; BMW DTC CDC208</u>	Message (request, torque, crankshaft, EGS, 0x0B0) checksum error, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U1128; BMW DTC CDC304</u>	No message (status, electric fuel pump, 335), receiver DME/DDE, transmitter EKP

ACCESSORIES AND EQUIPMENT**Electrical drives - Repair Instructions****CENTRAL LOCKING UNIT/UNLOCKING****67 11 510 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR FRONT LEFT OR RIGHT DOOR LOCKING MECHANISM**

NOTE: Servodrive for door locking mechanism is integrated in door lock in front door.

Procedure is described in the information "DOOR LOCK IN FRONT DOOR..." .

67 11 530 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR REAR LEFT OR RIGHT DOOR LOCKING MECHANISM

This operation is described in:

"REMOVING DOOR LOCK FOR REAR DOOR."**67 11 555 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR TANK FILLER FLAP**

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT TRIM ON SIDE PANEL ON RIGHT** .
- Disconnect **BATTERY NEGATIVE LEAD** .

Unfasten plug connection (1) and disconnect.

Slacken screws (2) and feed servodrive for tank filler flap (3) towards rear out of retaining plate.

Remove servodrive for tank filler flap (3) in direction of arrow.

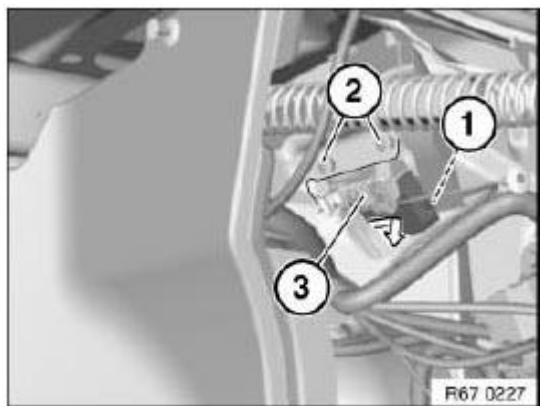


Fig. 1: Removing Servodrive For Tank Filler Flap
Courtesy of BMW OF NORTH AMERICA, INC.

Turn sleeve (1) with a suitable tool (e.g.: pointed pliers) approx. 45° in direction of arrow and pull out of cover housing (2).

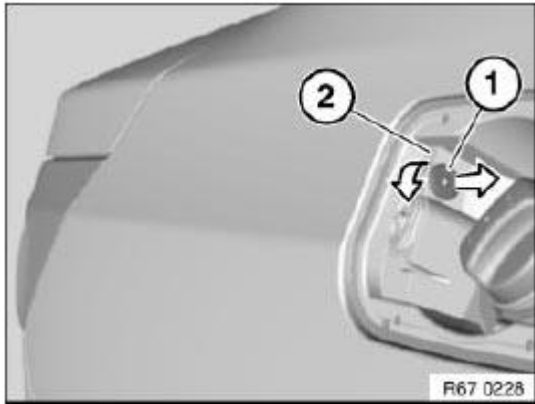


Fig. 2: Turning Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Slide sleeve (1) over tank filler flap locking pin (2).

Make sure sleeve (1) is correctly engaged in cover housing (3).

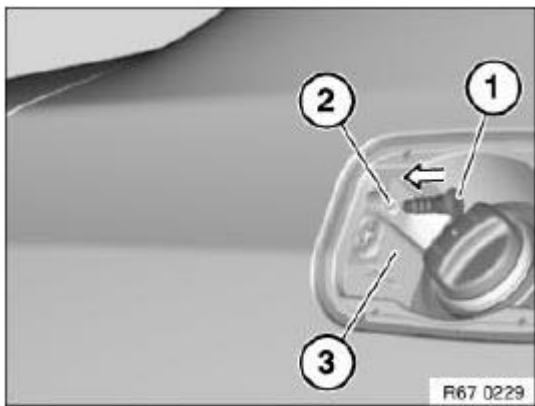


Fig. 3: Identifying Sleeve, Tank Filler Flap Locking Pin And Cover Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1).

Unclip tank filler flap Bowden cable (2) in direction of arrow from servodrive for tank filler flap (3).

Remove servodrive for tank filler flap (3) from retaining mount (4).

Installation:

Make sure clamp (5) is installed in correct position.

Carry out adjustment of servodrive for tank filler flap (3) via elongated holes (6). It must be possible to lock or unlock the fuel filler flap completely.

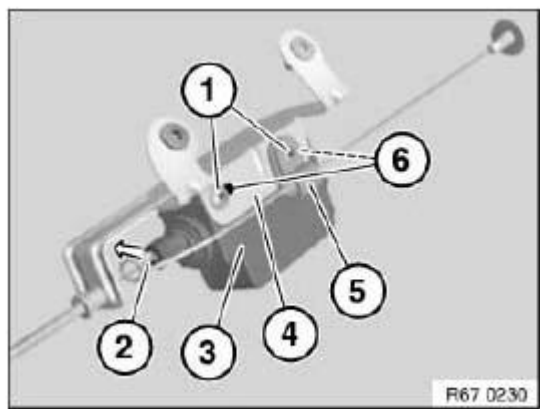


Fig. 4: Unclipping Tank Filler Flap Bowden Cable
Courtesy of BMW OF NORTH AMERICA, INC.

67 11 560 REPLACING SERVODRIVE FOR REAR LID LOCK

This operation is described under:

"Removing **REAR LID LOCK** "

MIRROR ADJUSTMENT

67 13 001 REPLACING DRIVE UNIT FOR ELECTRICALLY OPERATED LEFT OR RIGHT DOOR MIRROR

Necessary preliminary tasks:

- Remove **MIRROR GLASS** for rearview mirror.

Release screws (1).

Remove drive unit for electrically operated door mirror (2) slightly in direction of arrow.

Unfasten plug connection (3) and disconnect.

Remove drive for electrically adjustable door mirror (2).

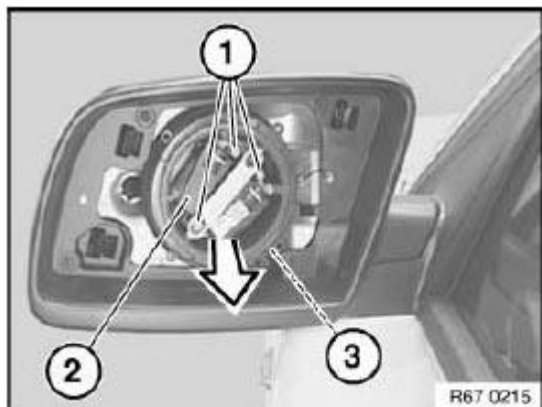


Fig. 5: Removing Drive Unit For Electrically Operated Door Mirror
Courtesy of BMW OF NORTH AMERICA, INC.

Build date from 03/2007:

Release screw (1) and remove drive (2).

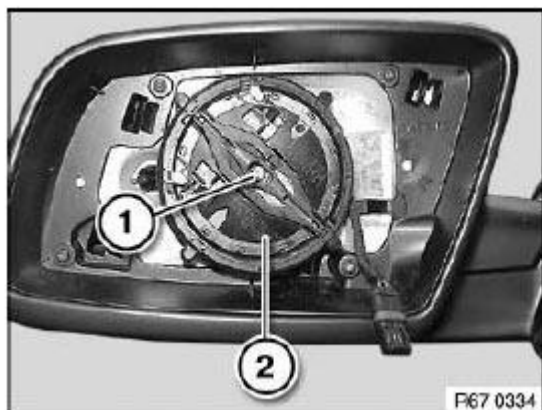


Fig. 6: Identifying Screw And Drive
Courtesy of BMW OF NORTH AMERICA, INC.

SERVO/POSITIONING DRIVES

67 16 011 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT VERTICAL AIM ADJUSTER (XENON HEADLIGHT)

WARNING: Xenon headlights: Danger to life due to high voltage! Therefore disconnect xenon headlights from the power supply. Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks:

- Remove **LEFT HEADLIGHT**

Unlock catches (1) and remove cap (2) in direction of arrow.

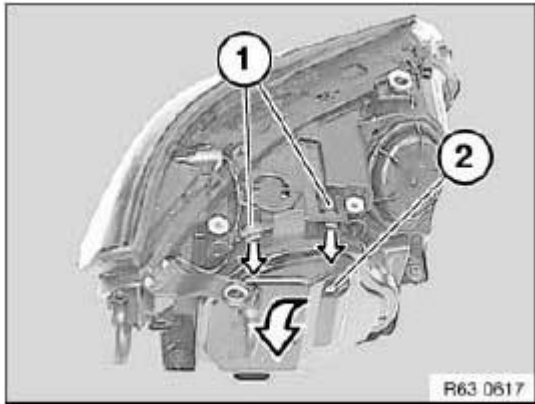


Fig. 7: Unlocking Catches And Removing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Loosen screws (2).

Feed headlight vertical aim adjuster (3) out of mounting (4) and remove.

Installation:

Headlight vertical aim adjuster (3) must be correctly seated in mounting (4).

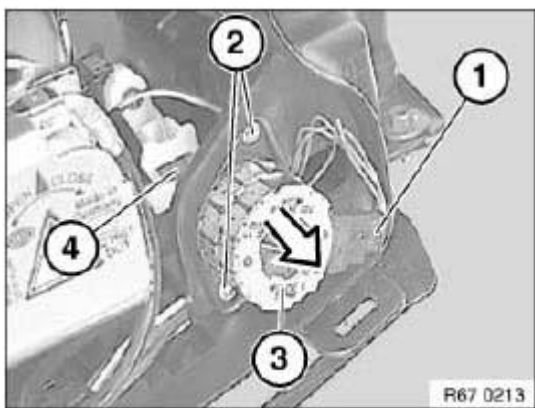


Fig. 8: Feeding Headlight Vertical Aim Adjuster Out Of Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

ADJUST HEADLIGHT .**DRIVE, SEAT ADJUSTMENT****67 31... NOTES ON INITIALIZING ELECTRIC SEAT ACTUATOR DRIVES**

NOTE: Initialization is carried out at the adjusting switch of the relevant seat.

In this process, the end positions of the relevant electric seat servodrive are recorded and stored.

An initialization must be performed:

- After replacing a drive unit for seat adjustment.
- After replacing/programming control unit for seat adjustment.

Operating sequence for initialization:

Move corresponding seat servodrive(s) into both end positions.

67 31 500 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR LONGITUDINAL SEAT ADJUSTMENT

Necessary preliminary tasks:

- Remove **TRIMS FOR TOP RAIL**

Disconnect plug connection (1).

Release expander rivets (2).

Installation:

If necessary, replace faulty expander rivets (2).

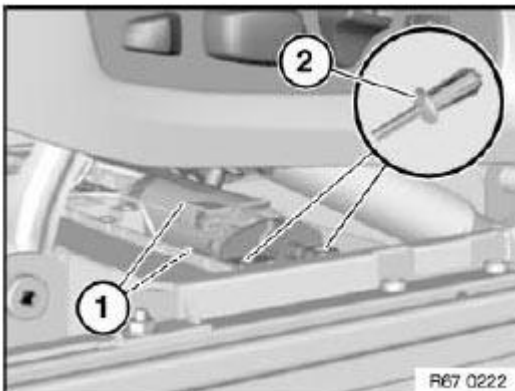


Fig. 9: Identifying Plug Connection And Expander Rivets

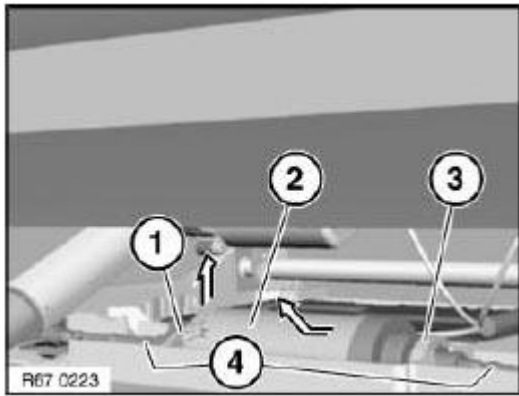
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: View from rear.**IMPORTANT: Risk of damage!**
Do not kink drive shafts (4).

Lever out guide clip (3).

Raise flange (1) with drive unit for longitudinal seat adjustment (2) slightly and detach from left drive shaft.

Feed out drive unit for longitudinal seat adjustment (2) in direction of arrow and detach from right drive shaft.

**Fig. 10: Feeding Out Drive Unit For Longitudinal Seat Adjustment**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure guide clips (3) and both drive shafts (4) are correctly seated.

Replacement:**INITIALIZE** drive unit for longitudinal seat adjustment.**67 31 510 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR SEAT TILT ADJUSTMENT***Necessary preliminary tasks:*

- Remove **FRONT SEAT**

NOTE: Front left trim shown removed for purposes of clarity.

Release screws (1).

Tightening torque **52 10 6AZ** .

Fold back seat rail (2) slightly from seat frame (3) in direction of arrow.

IMPORTANT: Risk of damage!

Avoid subjecting electric leads to tensile load.

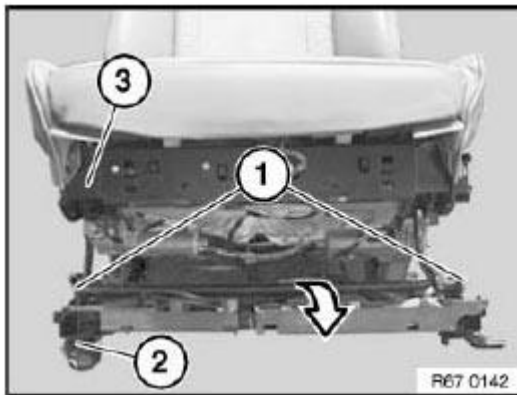


Fig. 11: Folding Back Seat Rail Slightly Of Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!

Do not move torsion bar.

Installation:

Make sure plastic bushings (1) are correctly seated in seat rail (2).

Faulty plastic bushings (1) cause noises and must be replaced.

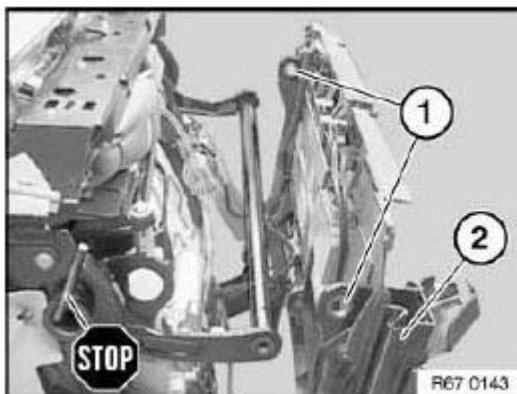


Fig. 12: Identifying Plastic Bushings And Seat Rail

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on drive unit for seat tilt adjustment (2).

NOTE: Relieve load on drive unit for seat tilt adjustment (2).

To do so, insert a suitable slotted screwdriver (3) into receptacle (4), press drive unit for seat tilt adjustment (2) downwards slightly using a lever action and release screw (5).

Tightening torque **67 31 2AZ**.

Then slowly move screwdriver (3) upwards and relieve load on drive unit for seat tilt adjustment (2) completely.

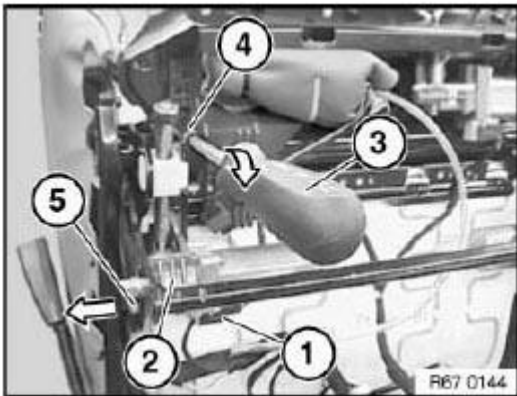


Fig. 13: Inserting Suitable Slotted Screwdriver Into Receptacle
Courtesy of BMW OF NORTH AMERICA, INC.

Tilt drive unit for seat tilt adjustment (1) upwards and feed out from receptacle (2).

If necessary, twist out drive unit for seat tilt adjustment (1) at spindle (3) to such an extent that it can be removed.

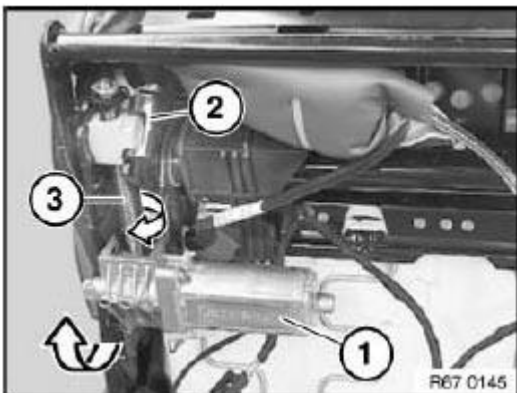


Fig. 14: Twisting Out Drive Unit For Seat Tilt Adjustment Of Spindle
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Measure dimension (A) and adjust by turning holder (1) on new drive unit for seat tilt adjustment (2).

INITIALIZE drive unit for seat tilt adjustment.

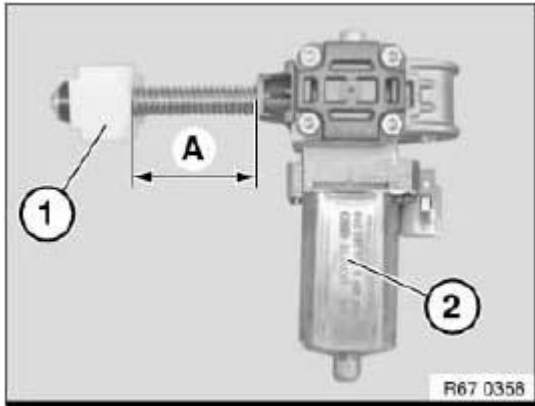


Fig. 15: Identifying Holder And Seat Tilt Adjustment
 Courtesy of BMW OF NORTH AMERICA, INC.

67 31 520 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR SEAT HEIGHT ADJUSTMENT

Necessary preliminary tasks:

- Remove front seat. See **REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (NORMAL/ELECTRIC)** or **REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (COMFORT)**
- Remove **OUTER COVER ON FRONT SEAT**

Set down front seat sideways on a suitable surface.

Disconnect plug connection (1).

Release screws (2).

Tightening torque **67 31 1AZ** .

Feed out drive unit for seat height adjustment (3) and remove.

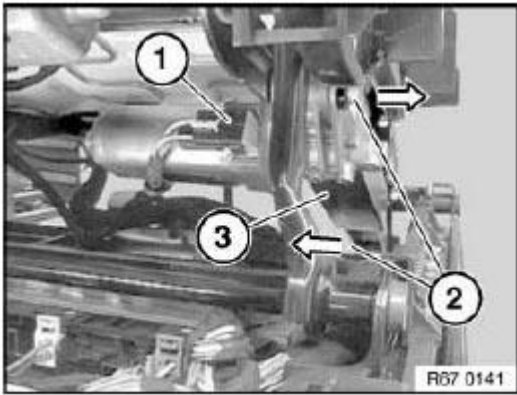


Fig. 16: Identifying Plug Connection, Screws And Seat Height Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit drive unit for seat height adjustment (1) with plastic clip (2) only.

Make sure plastic clip (2) is correctly seated.

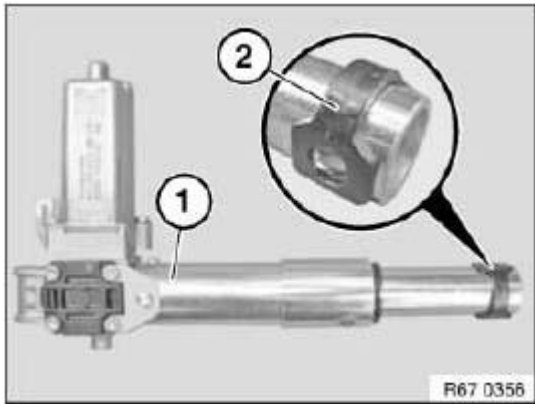


Fig. 17: Identifying Seat Height Adjustment And Plastic Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

INITIALIZE drive unit for seat height adjustment.

67 31 530 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR BACKREST ANGLE ADJUSTMENT

Necessary preliminary tasks:

- Remove front seat. See **REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT**

(NORMAL/ELECTRIC) or REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (COMFORT)

- Remove rear panel on front seat backrest. See **REMOVING AND INSTALLING / REPLACING REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST (NORMAL / ELECTRIC)** or **52 17 205 REMOVING AND INSTALLING/REPLACING BOTH REAR PANELS ON LEFT OR RIGHT FRONT SEAT BACKREST (COMFORT)**
- Remove covers on front seat. See **REMOVING AND INSTALLING/REPLACING OUTER COVER ON LEFT OR RIGHT FRONT SEAT (BASIC/ELECTRIC)** and **REMOVING AND INSTALLING INNER COVER ON LEFT OR RIGHT FRONT SEAT (NORMAL/ELECTRIC)**

Unhook backrest cover (1) on left and right on backrest frame (2).

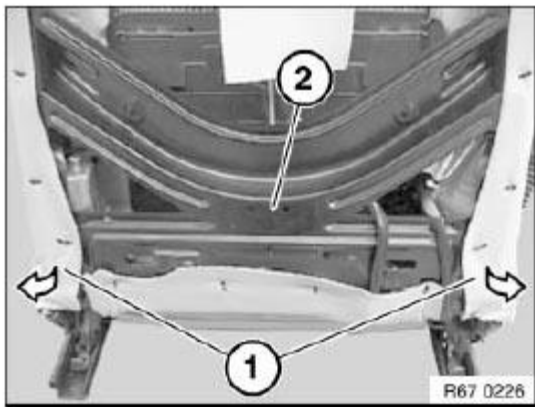


Fig. 18: Unhooking Backrest Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Remove metal retaining ring (1) on left and right in direction of arrow from drive rod (2).

Installation:

Always replace metal retaining ring (1).

Make sure metal retaining ring (1) is correctly seated.

Unscrew bolt (3).

Disconnect plug connection (4).

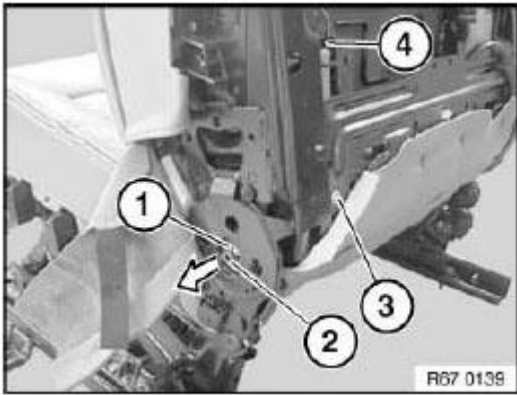


Fig. 19: Removing Metal Retaining Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Pull out drive rod (1) until drive unit for backrest angle adjustment (2) is free.

Installation:

Make sure drive rod (1) is correctly seated in drive unit for backrest angle adjustment (2).

Feed drive unit for backrest angle adjustment (2) out of backrest frame (3) and remove.

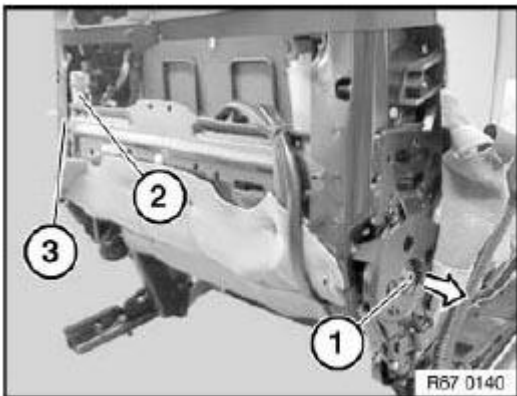


Fig. 20: Pulling Out Drive Rod

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

INITIALIZE drive unit for backrest angle adjustment.

67 31 540 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR HEAD RESTRAINT ADJUSTMENT (COMFORT SEAT)

Necessary preliminary tasks:

- Remove **FRONT SEAT** .
- Remove **BOTH REAR PANELS ON FRONT SEAT BACKREST** .

Pull backrest cover (1) in direction of arrow over metal lugs (2) and detach.

If necessary, detach backrest cover (1) on both sides from backrest frame.

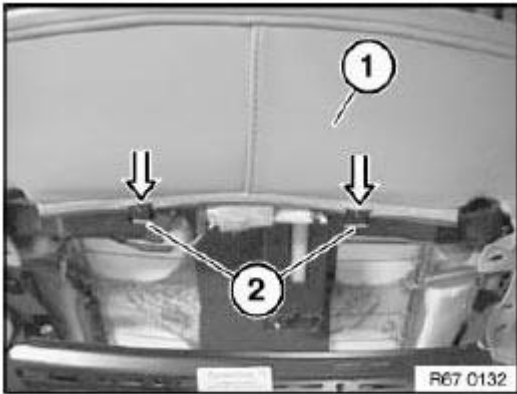


Fig. 21: Pulling Backrest Cover

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, illustration shows backrest cover removed.

Release screw connections (1) on AKS carrier.

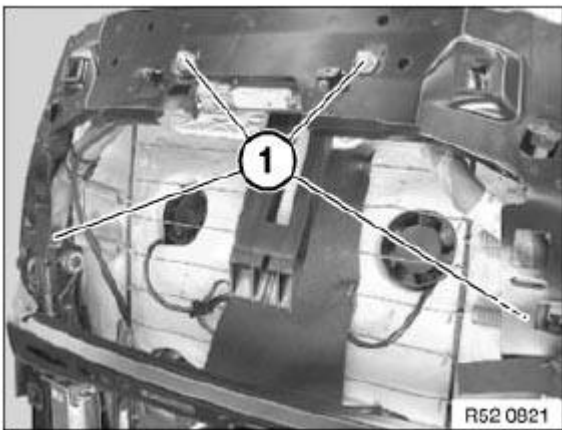
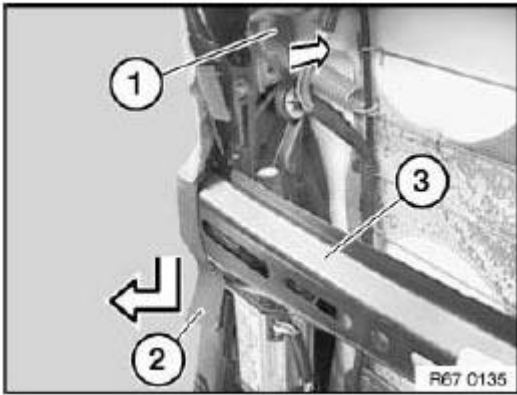


Fig. 22: Identifying Screw Connections On AKS Carrier

Courtesy of BMW OF NORTH AMERICA, INC.

Move AKS carrier (1) in direction of arrow.

Unhook backrest cover (2) on backrest frame (3).

**Fig. 23: Moving AKS Carrier**

Courtesy of BMW OF NORTH AMERICA, INC.

Pull drive shaft (1) in direction of arrow out of drive shaft receptacle (2).

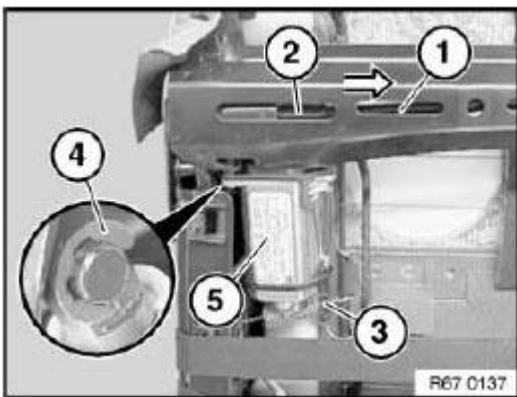
Installation:

Make sure drive shaft (1) is correctly seated in receptacle (2).

Disconnect plug connection (3).

Remove circlip (4).

Feed out drive unit for backrest head adjustment (5) and remove.

**Fig. 24: Pulling Drive Shaft Of Drive Shaft Receptacle**

Courtesy of BMW OF NORTH AMERICA, INC.

Removal and installation only:

Do not turn spindle (1) in order not to change measurement A.

Replacement only:

Adopt measurement A of removed drive unit for backrest head adjustment (2). If necessary, adjust measurement A by turning spindle (1).

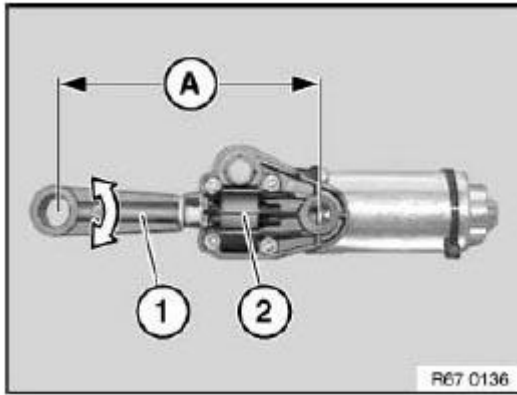


Fig. 25: Identifying Adjust Measurement By Turning Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

INITIALIZE drive unit for backrest head adjustment.

67 31 560 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR THIGH SUPPORT

This operation is described in:

"REMOVING ADJUSTMENT UNIT FOR THIGH SUPPORT ."

67 31 570 REMOVING AND INSTALLING/REPLACING DRIVE FOR HEAD RESTRAINT HEIGHT ADJUSTMENT ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks:

Version without crash-active head restraint:

- Remove head restraint. See **REMOVING AND INSTALLING OR REPLACING FRONT LEFT OR RIGHT HEAD RESTRAINTS (NORMAL/ELECTRIC)** or **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT HEAD RESTRAINT (COMFORT)**
- **REMOVE REAR PANEL ON FRONT SEAT BACKREST .**

Version with crash-active head restraint:

- Remove **CRASH-ACTIVE HEAD RESTRAINT**

Pull backrest cover (1) in direction of arrow over metal lugs (2) and detach.

Detach backrest cover (1) on both sides from backrest frame.

Feed backrest cover (1) out of upper backrest frame.

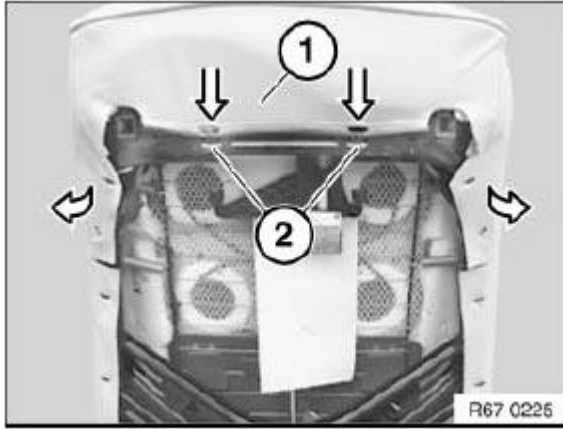


Fig. 26: Pulling Backrest Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release screws (2).

Tightening torque **67 31 3AZ** .

Feed out drive for head restraint height adjustment (3) in direction of arrow and remove.

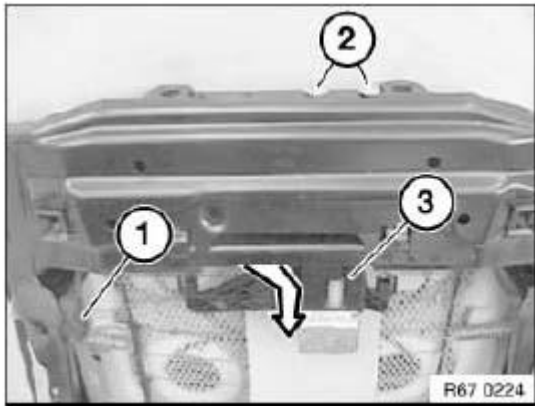


Fig. 27: Feeding Out Drive For Head Restraint Height Adjustment

Courtesy of BMW OF NORTH AMERICA, INC.

67 31 572 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR HEAD RESTRAINT HEIGHT ADJUSTMENT ON LEFT OR RIGHT FRONT SEAT (COMFORT SEAT)

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS!

Incorrect handling may result in triggering of active head restraint and thereby cause injury.

Necessary preliminary tasks:

- Remove **BOTH REAR PANELS ON FRONT SEAT BACKREST**
- Remove **FRONT HEAD RESTRAINT** .
- **DISCONNECT AND COVER BATTERY NEGATIVE LEAD** .

Pull backrest cover (1) in direction of arrow over metal lugs (2) and detach.

If necessary, detach backrest cover (1) on both sides from backrest frame.

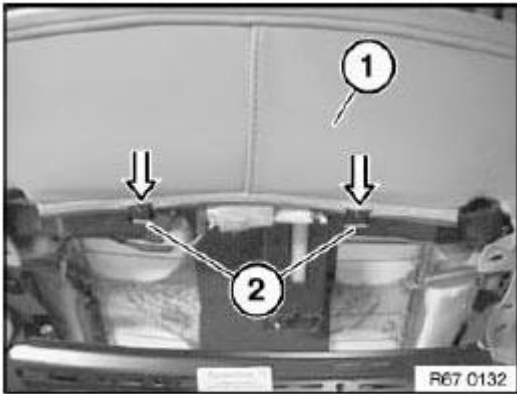


Fig. 28: Pulling Backrest Cover

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, illustration shows backrest cover removed.

Unfasten plug connection (1) and disconnect.

Release screw connections (2).

Feed out AKS carrier (3) in direction of arrow and secure against falling out.

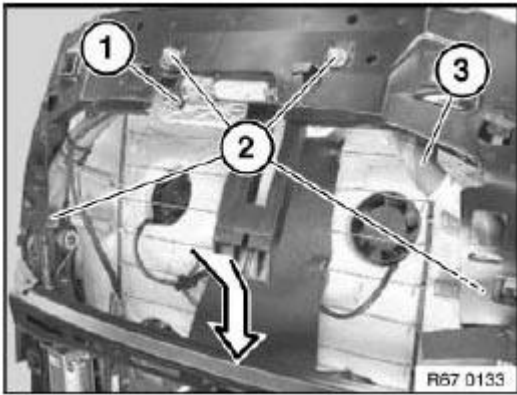


Fig. 29: Feeding Out AKS Carrier

Courtesy of BMW OF NORTH AMERICA, INC.

Cut through cable tie (1).

Disconnect plug connection (2).

Release screws (3).

Feed drive unit for head restraint height adjustment (4) in direction of arrow out of AKS carrier (5) and remove.

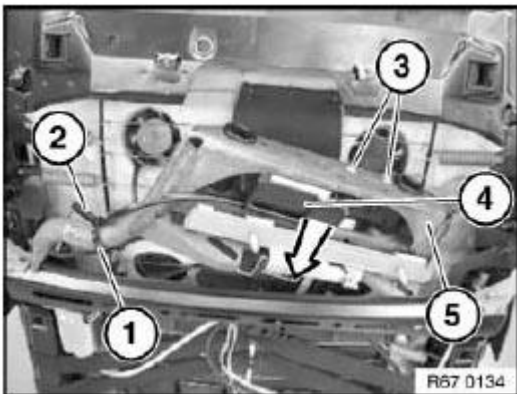


Fig. 30: Feeding Drive Unit For Head Restraint Height Adjustment

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

INITIALIZE drive unit for head restraint height adjustment.

FAN (SEAT)

67 32 600 REPLACING FAN FOR FRONT SEAT SURFACE (COMFORT SEAT)

WARNING: US/CND front passenger seat (with OC3 mat) only:
 Seat cover must not be separated from padding.
 All parts must be replaced completely and released with the diagnosis system in event of defective fan, seat cover, seat heating, OC3 mat or padding.

Necessary preliminary tasks:

- Remove **FRONT SEAT**
- Partially remove **COVER FOR FRONT SEAT**

NOTE: For purposes of clarity, illustration shows seat padding and seat cover removed.

Lift dividing net (1), pull fan for seat surface (2) out of seat padding (3) slightly and disconnect plug connection behind.

Remove fan for seat surface (2).

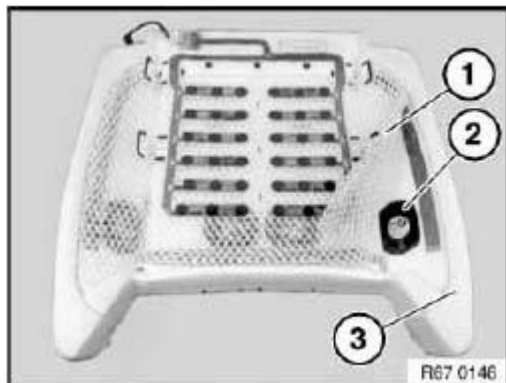


Fig. 31: Identifying Dividing Net, Seat Surface And Seat Padding
 Courtesy of BMW OF NORTH AMERICA, INC.

67 32 610 REPLACING FAN FOR BACKREST ON FRONT SEAT (COMFORT SEAT)

Necessary preliminary tasks:

- Remove both rear panels on front seat backrest. See **REMOVING AND INSTALLING/REPLACING BOTH REAR PANELS ON LEFT OR RIGHT FRONT SEAT BACKREST (COMFORT)** or **REMOVING AND INSTALLING/REPLACING BOTH REAR PANELS ON LEFT OR RIGHT FRONT SEAT BACKREST (LONG VERSION)**.

Lay felt (1) slightly to one side and disconnect plug connection (2). If necessary, cut through cable tie.

Installation:

Ensure correct cable routing.

If necessary, raise load-area net in working area.

Feed fan for backrest (3) in direction of arrow out of cushion section and remove.

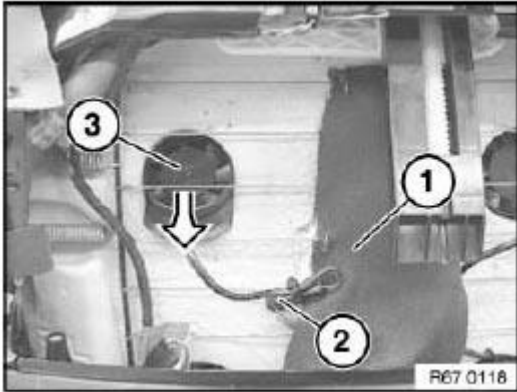


Fig. 32: Feeding Fan For Backrest

Courtesy of BMW OF NORTH AMERICA, INC.

67 32 620 REPLACING FAN FOR THIGH SUPPORT ON FRONT SEAT (COMFORT SEAT)

Necessary preliminary tasks:

- Remove thigh support. See **REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT THIGH SUPPORT** and **REPLACING PADDING FOR FRONT SEAT THIGH SUPPORT**

Unhook seat cover (1) in area (2).

Feed out plug housing (3) through opening in trim (4).

Remove trim (4).

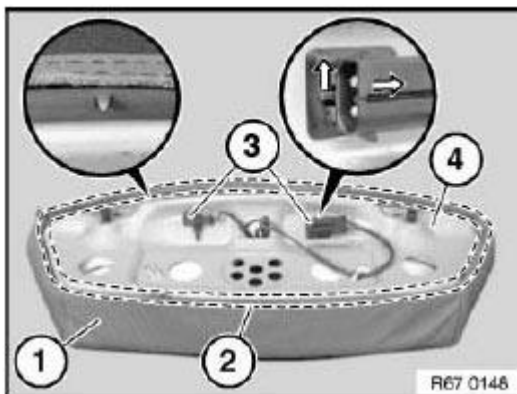


Fig. 33: Identifying Seat Cover Area, Plug Housing And Trim

Courtesy of BMW OF NORTH AMERICA, INC.

Feed fan (1) in direction of arrow out of thigh support cushion section (2) and remove.

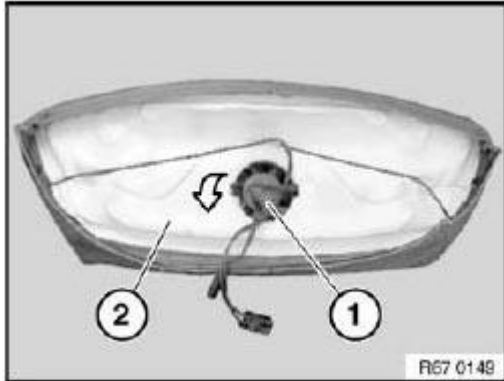


Fig. 34: Feeding Fan Of Thigh Support Cushion Section
Courtesy of BMW OF NORTH AMERICA, INC.

DRIVE, SLIDE-TILT SUNROOF CONVERTIBLE TOP

67 61 005 REMOVING AND INSTALLING/REPLACING DRIVE UNIT WITH GEARING FOR SLIDE/TILT SUNROOF

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove FRONT ROOFLINER TRIM

NOTE: Secure drive unit with gearing for slide/tilt sunroof (2) against falling out.

Release screws (1), tightening torque 54 13 1AZ .

Lower drive unit with gearing for slide/tilt sunroof (2).

NOTE: Screws (1) are microencapsulated.

Unlock plug connection (3), disconnect and remove drive unit with gearing for slide/tilt sunroof (2).

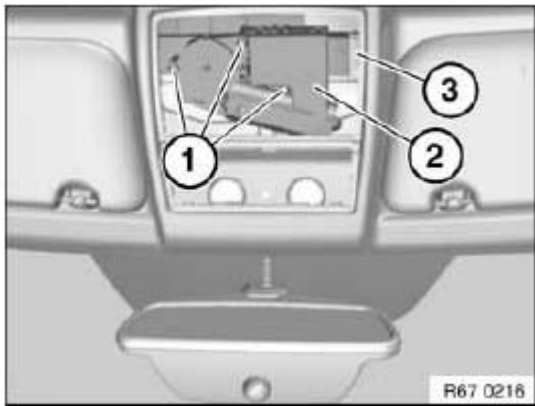


Fig. 35: Identifying Slide/Tilt Sunroof, Screws And Plug Connection
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert gear wheel (1) of drive with gear for actuating slide/tilt sunroof (2) in gear teeth.

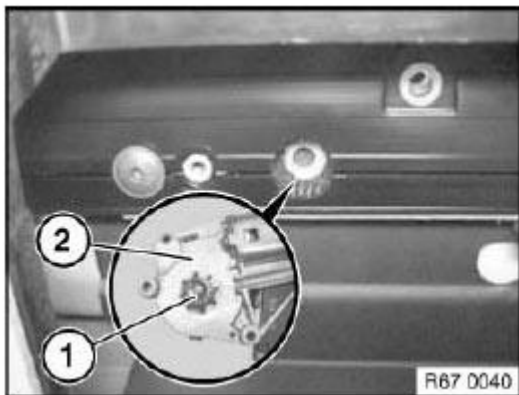


Fig. 36: Identifying Gear Wheel And Slide/Tilt Sunroof
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Initialize **SLIDE/TILT SUNROOF**.

Replacement:

Carry out **VEHICLE PROGRAMMING AND CODING**

IMPORTANT: There is a risk of permanent battery discharge if programming/coding is not carried out!

67 61 007 REMOVING AND INSTALLING/REPLACING DRIVE WITH GEAR (REAR) FOR

ACTUATING SLIDE/TILT SUNROOF (REAR) (SPORTS WAGON)

Necessary preliminary tasks:

- Remove **BOTH TRIM PANELS FOR REAR ROOF PILLAR** (C-pillars)
- Remove both trim panels for rear roof pillar (D-pillars). See **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR REAR LEFT OR RIGHT ROOF PILLAR (D-PILLAR)** or **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR REAR ROOF PILLAR (D-PILLAR WITH OPTION SA316 FROM 03/2006), LEFT OR RIGHT (AUTOMATIC REAR LID ACTUATION)**.
- Remove **BOTH INTERIOR LIGHTS**
- Remove **BOTH REAR GRAB HANDLES**

NOTE: Remove both rear and if necessary front counter supports for luggage compartment net.

Fold up cover (1).

Release screw (2) and remove counter support for luggage compartment net (3).

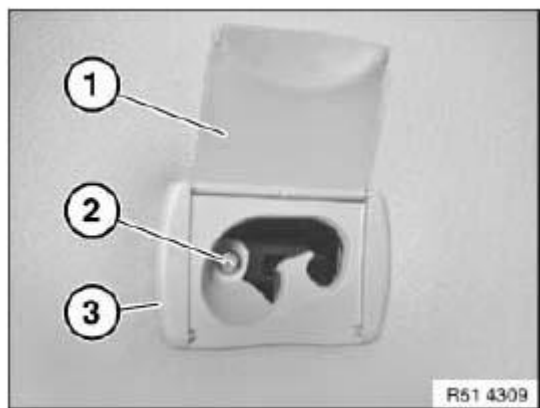


Fig. 37: Identifying Dividing Net Mounts And Back Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off roofliner mocket in work area.

IMPORTANT: Do not under any circumstance kink roofliner (1).

Unclip and lower roofliner (1) in rear area.

Unfasten plug connection (2) and disconnect.

NOTE: Secure drive with gear for actuating slide/tilt sunroof (4) against falling out.

Release screws (3), tightening torque **54 13 1AZ** .

NOTE: **Screws (3) are microencapsulated.**

Remove drive with gear for actuating slide/tilt sunroof (4).

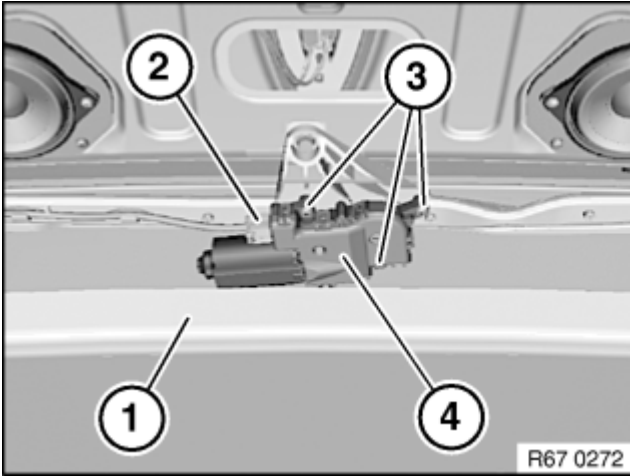


Fig. 38: Identifying Drive With Gear, Plug Connection, And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert gear wheel (1) of drive with gear for actuating slide/tilt sunroof (2) exactly in gear teeth (3).

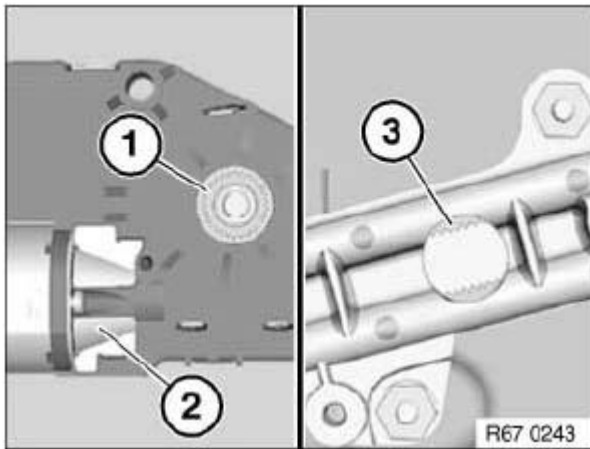


Fig. 39: Identifying Gear Wheel, Sunroof And Gear Teeth
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Initialize **SLIDE/TILT SUNROOF** .

DRIVE, POWER WINDOW

67 62... NOTES ON INITIALIZING POWER WINDOW

NOTE: *Initialization is performed on the power window switch of the relevant door.*

Initialization comprises:

- Normalization
- Learning characteristic curve

With normalization, the mechanical end stops of the power window are recorded and stored.

The characteristic curve is learned immediately after normalization.

When the characteristic curve is learned, the mechanical closing forces of the power window are recorded and stored for correct operation of the anti-trapping mechanism.

Initialization, i.e. normalization and learning of characteristic curve, is performed in a continuous operation.

NOTE: **An initialization must be performed:**

- **In the event of malfunctions, e.g. no one-touch function, no opening or no comfort function possible.**
- **After the power window drive or door module has been replaced.**
- **After work is carried out on the power window mechanism.**

WARNING: There is no anti-trapping protection during initialization.

Operating sequence for initialization:

- Move side window into lower end position.
- Press switch into "Open one-touch operation" (second switch position) for approx. 15 to 25 s and hold down.
- Release switch, then immediately press into "Close one touch operation" (second switch stage) and hold down.
- The side window now moves to the lower end position and then back to the upper end position.

Initialization is completed once the side window has returned to the upper end position.

NOTE: **Carry out function check (one-touch function, anti-trapping protection and, if necessary, comfort function).**

67 62 000 REMOVING AND INSTALLING/REPLACING FLAT MOTOR FOR FRONT LEFT OR RIGHT POWER WINDOW

Necessary preliminary tasks:

- Detach **SOUNDPROOFING ON FRONT DOOR** in working area.

Unfasten plug connection (1) and disconnect.

Release screw (2) of locking bar (3).

Remove locking bar (3) in direction of arrow from flat motor for power window unit (5).

Release screws (4).

Carefully press flat motor for power window unit (5) towards rear out of mounting.

If necessary, pull power window unit forwards slightly and feed out flat motor for power window unit (5) and remove.

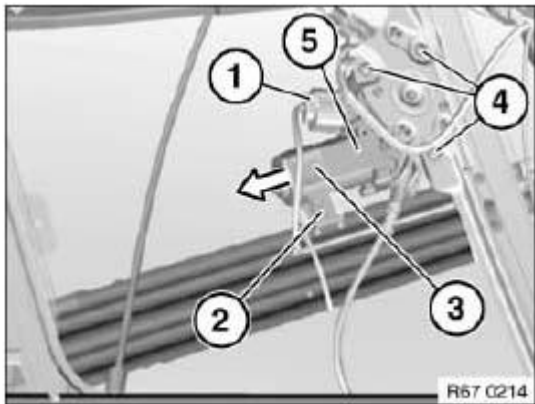


Fig. 40: Removing Locking Bar

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure guides (1) are correctly seated when fitting retaining clip (2).

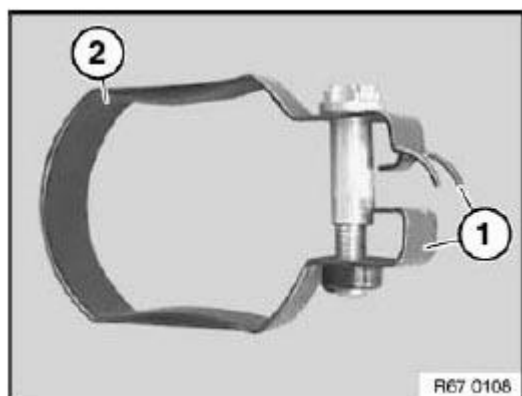


Fig. 41: Identifying Guide And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

A normalization must be carried out in order to activate anti-trapping protection.

Operating sequence for normalization:

- Open corresponding window completely.
- Press corresponding power window switch into "Close one-touch operation" (second switch stage).
- Once the upper end position has been reached, hold power window switch down for approx. 500 secs. more.

NOTE: Carry out function check (one-touch function, anti-trapping protection and, if necessary, comfort function).

67 62 020 REMOVING AND INSTALLING/REPLACING FLAT MOTOR FOR REAR LEFT OR RIGHT POWER WINDOW REGULATOR

Necessary preliminary tasks:

- Detach **SOUNDPROOFING ON REAR DOOR** in working area.

Unfasten plug connection (1) and disconnect.

Release screw (2) of locking bar (3).

Remove locking bar (3) in direction of arrow from flat motor for power window unit (5).

Release screws (4).

Carefully press flat motor for power window unit (5) towards rear out of mounting.

If necessary, pull power window unit forwards slightly and feed out flat motor for power window unit (5) and remove.

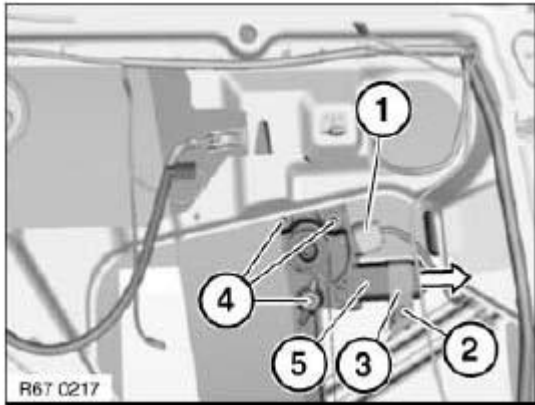


Fig. 42: Removing Locking Bar
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure guides (1) are correctly seated when fitting retaining clip (2).

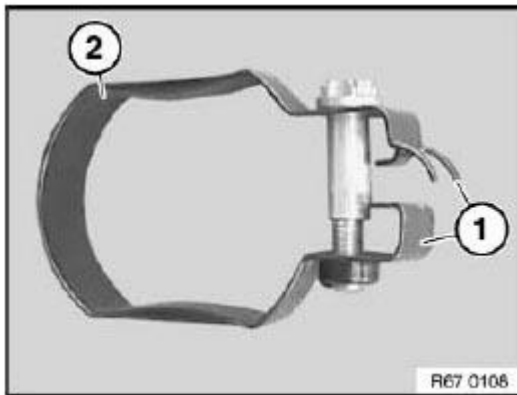


Fig. 43: Identifying Guides And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

INITIALIZE power window.

NOTE: Carry out function check (one-touch function, anti-trapping protection and, if necessary, comfort function).

WIPER MOTOR, ACTUATOR DRIVE

67 63 512 REPLACING WIPER MOTOR

This operation is described under:

Removing complete CONSOLE FOR WINDSHIELD WIPER SYSTEM .

DRIVE, STEERING COLUMN ADJUSTMENT**67 64 010 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR ELECTRIC STEERING COLUMN ADJUSTMENT**

Necessary preliminary tasks:

- Move steering wheel into maximum "lower" and "extended" position
- Remove DRIVER'S SIDE STORAGE COMPARTMENT

Unlock plug connections (1) and (2) of drive unit for electric steering column adjustment (3) and disconnect.

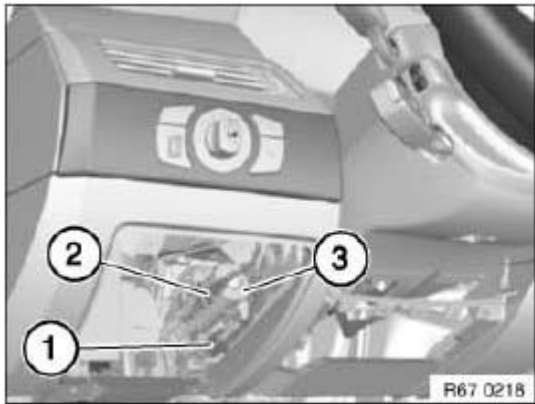


Fig. 44: Identifying Plug Connections And Electric Steering Column Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, illustrations show steering column removed.

Remove screws (1) and (2).

Installation:

Replace screws (1) and (2).

Tightening torque, 32 31 12AZ .

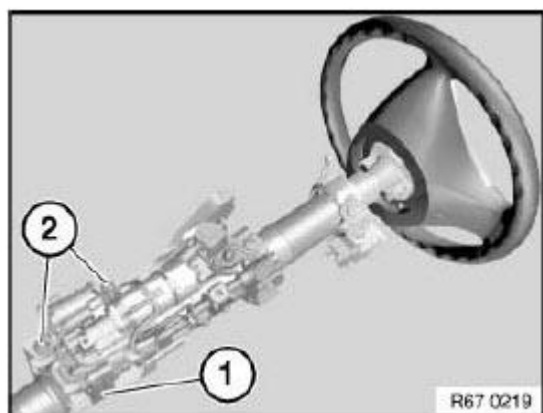


Fig. 45: Identifying Steering Column Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to drive shafts (1) and (3) when removing and installing drive unit for electric steering column adjustment (4). Do not bend or twist.
Drive shafts (1) and (3) must be exactly inserted in associated mountings (2).

Detach drive shafts (1) and (3) from associated mountings (2) and remove drive unit for electric steering column adjustment (4).

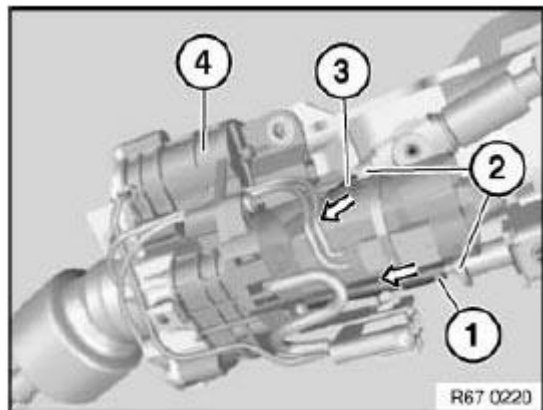


Fig. 46: Identifying Drive Shafts, Electric Steering Column Adjustment And Associated Mountings

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Longer drive shaft (1) is located in installation position under shorter drive shaft (2).

Drive shafts (1) and (2) must be exactly inserted in associated mountings (4).

If necessary, replace plastic mount (3).

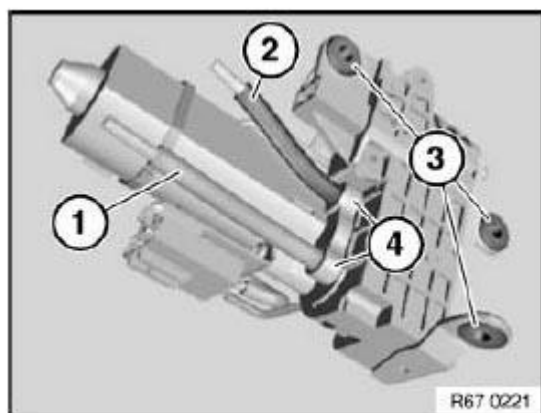


Fig. 47: Identifying Drive Shafts, Associated Mountings And Plastic Mount
 Courtesy of BMW OF NORTH AMERICA, INC.

DRIVE, ROLLER SUN BLIND/SUN VISOR

67 65 010 REMOVING AND INSTALLING OR REPLACING DRIVE UNIT FOR ROLLER SUN BLIND

Necessary preliminary tasks:

- Remove **PANEL FOR PARCEL SHELF** .

IMPORTANT: Do not power up the drive unit if it is not completely connected to the roller sun blind.

If the roller sun blind is not completely rolled up, there is spring pressure on the drive linkage.

In this case, maintain the roller sun blind under pretension and carefully lever out the linkage. Now allow the roller sun blind to roll up slowly.

Remove locking clips (1) towards bottom.

Installation:

Replace locking clips (1).

Lever out drive linkage (2) on left and right.

Release screw (3) and remove complete drive linkage (4) towards top.

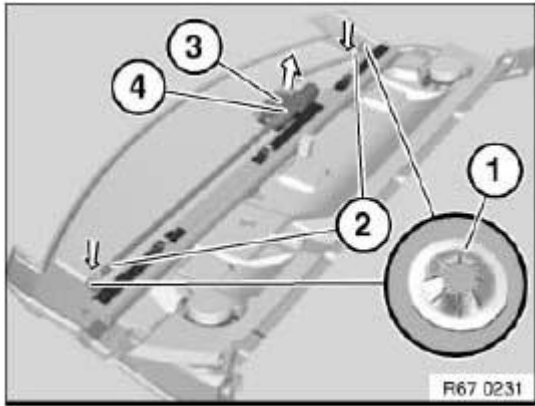


Fig. 48: Releasing Screw And Removing Complete Drive Linkage
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure drive linkage (1) is correctly positioned on drive shaft (2).

Drive linkage (1) can only rest in one single position on the drive shaft (2).

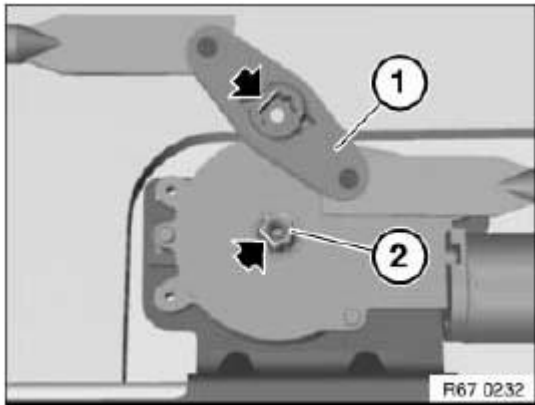


Fig. 49: Identifying Drive Linkage And Drive Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook electric lead (1) in area (2) and unclip at points (3).

Release screws (4) and remove drive unit for roller sun blind (5) in direction of arrow.

Installation instructions:

Attach screws (4) loosely only. Attach drive linkage and tighten down screws (4).

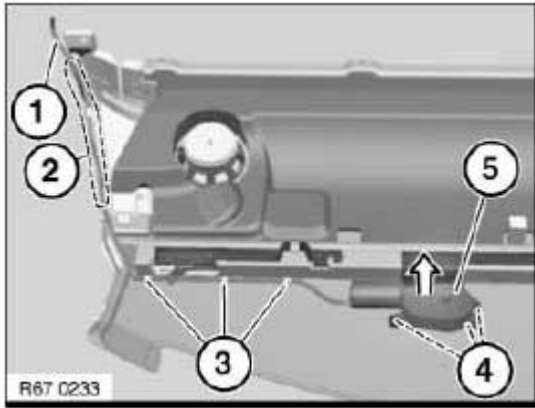


Fig. 50: Releasing Screws And Removing Drive Unit For Roller Sun Blind
 Courtesy of BMW OF NORTH AMERICA, INC.

DRIVE, SEAT ADJUSTMENT

67 66 010 REMOVING AND INSTALLING/REPLACING LUMBAR SUPPORT DRIVE MECHANISM ON FRONT SEAT, LEFT OR RIGHT

Necessary preliminary tasks:

- Remove **REAR PANEL ON FRONT SEAT BACKREST** .

Cut through cable tie (1).

Pull drive unit for lumbar support (2) with jacket slightly out of backrest frame (3).

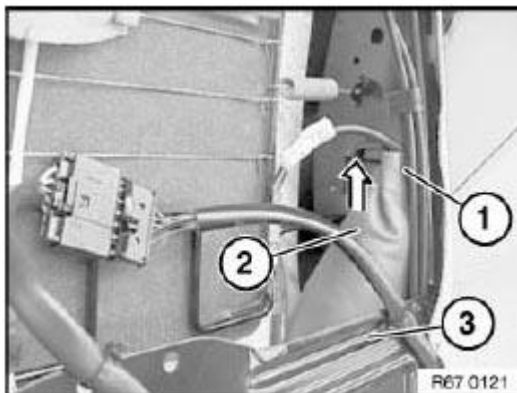


Fig. 51: Identifying Cable Tie, Lumbar Support And Backrest Frame
 Courtesy of BMW OF NORTH AMERICA, INC.

Cut through cable tie (1) on jacket of drive unit for lumbar support (2).

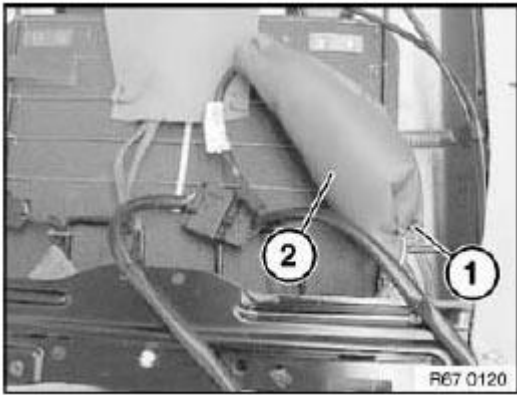


Fig. 52: Identifying Cable Tie And Lumbar Support
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Detach hose (2).

NOTE: If firmly seated, gently heat hose (2) on drive unit for lumbar support (3).

Installation:

Make sure hose (2) is laid without kinks.

Remove drive unit for lumbar support (3).

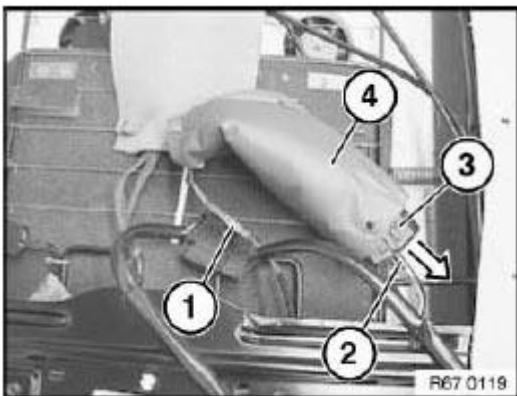


Fig. 53: Removing Drive Unit For Lumbar Support
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Pull drive unit for lumbar support (3) in direction of arrow out of jacket (4).

67 66 012 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR LUMBAR SUPPORT ON LEFT OR RIGHT FRONT SEAT (COMFORT SEAT)

Necessary preliminary tasks:

Remove both rear panels on front seat. See **REMOVING AND INSTALLING/REPLACING UPPER REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST (COMFORT)** and **REMOVING AND INSTALLING/REPLACING LOWER REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST (COMFORT)** .

If necessary, unhook backrest cover (1) from backrest.

Cut through cable ties (2).

Unclip wiring harness at point (3) towards front.

Release screw (4) and feed out valve unit (5) towards top.

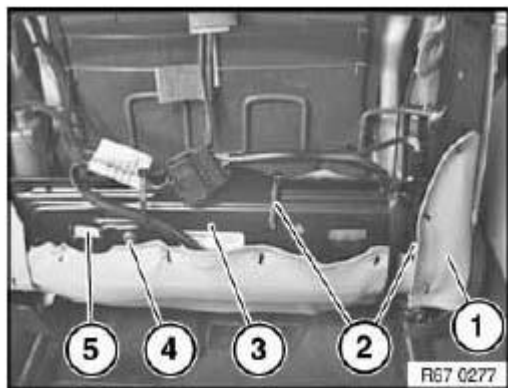


Fig. 54: Identifying Backrest Cover, Cable Ties, Screw And Valve Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through cable tie (1).

Push jacket of drive unit for lumbar support (2) in direction of arrow over drive unit for lumbar support (3).

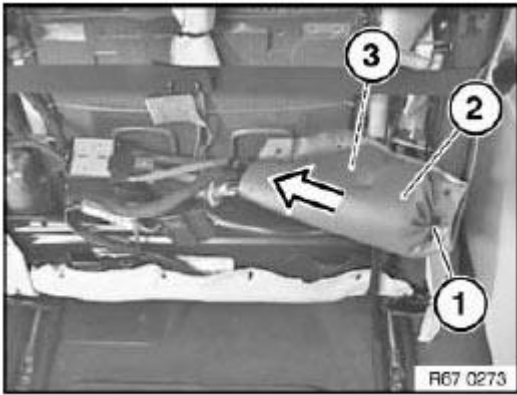


Fig. 55: Pushing Jacket Of Drive Unit For Lumbar Support
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Detach hose (2).

NOTE: If firmly seated, gently heat hose (2) on drive unit for lumbar support (3).

Installation:

Make sure hose (2) is laid without kinks.

Remove drive unit for lumbar support (3).

Replacement:

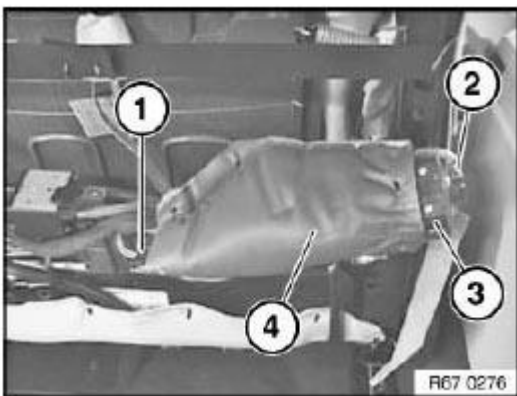


Fig. 56: Identifying Plug Connection, Hose, Lumbar Support And Jacket
Courtesy of BMW OF NORTH AMERICA, INC.

Pull drive unit for lumbar support (3) out of jacket (4).

67 66 013 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR LUMBAR SUPPORT ON LEFT OR RIGHT FRONT SEAT (ACTIVE SEAT)

Cut through cable ties (1).

Set down drive unit for lumbar support (2) with jacket towards bottom.

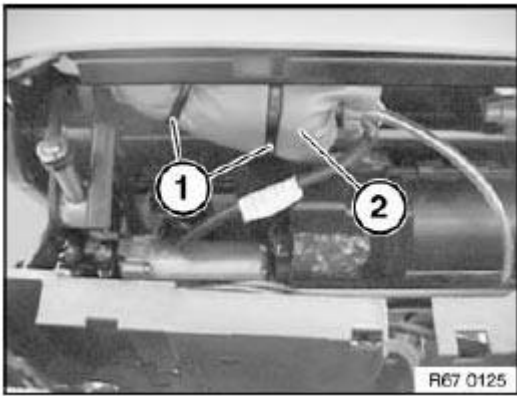


Fig. 57: Identifying Cable Ties And Lumbar Support
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through cable tie (1) on jacket of drive unit for lumbar support (2).

Disconnect plug connection (3).

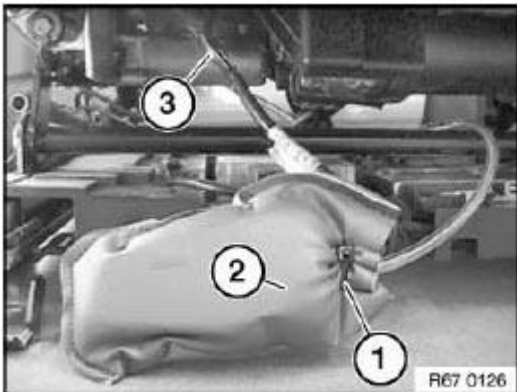


Fig. 58: Identifying Cable Ties, Lumbar Support And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Detach hose (1) in direction of arrow.

NOTE: If firmly seated, gently heat hose (1) on drive unit for lumbar support (2).

Installation:

Make sure hose (1) is laid without kinks.

Remove drive unit for lumbar support (2).

Replacement:

Pull drive unit for lumbar support (2) out of jacket (3).

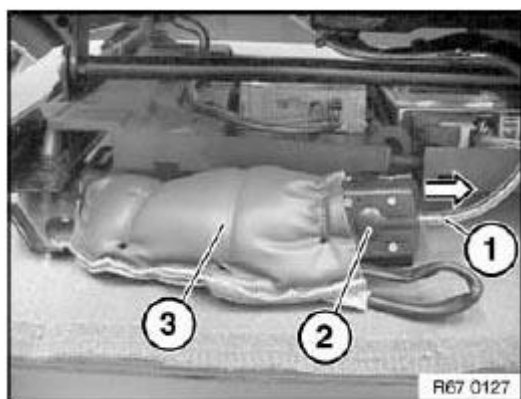


Fig. 59: Detaching Hose

Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE

Engine - Repair Instructions - N51, N52, N52K 6-Cylinder

00 ENGINE, GENERAL

NOTE: Removal and installation procedures apply to 3-Series; 5-Series is similar.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: Danger Of Poisoning if oil is ingested/absorbed through the skin!

Risk Of Injury if oil comes into contact with eyes and skin!

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N52)**IMPORTANT: Aluminium-magnesium materials.**

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Unfasten screws (1 and 3).

If necessary, release oil cap (2) in direction of arrow.

Lift off acoustic cover (4)

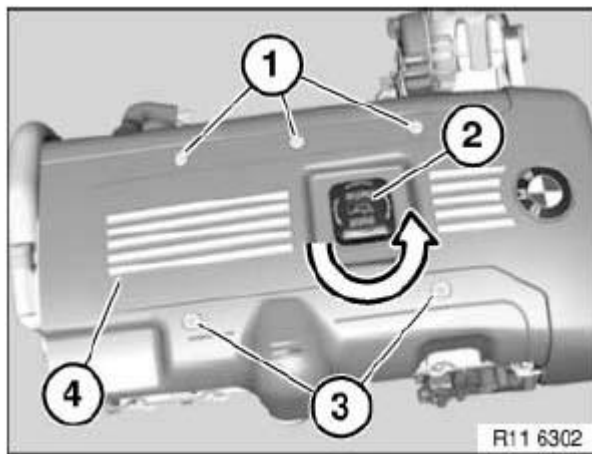


Fig. 1: Identifying Oil Cap, Acoustic Cover And Retaining Screws
Courtesy of BMW OF NORTH AMERICA, INC.

E87, E90, E91:

Necessary preliminary tasks:

Remove **Microfilter Housing**

For tightening torque refer to 11 12 7AZ in **11 12 CYLINDER HEAD WITH COVER** .

Remove acoustic cover.

NOTE: For purposes of improved clarity, illustration and descriptions shows wiring harness and tension strut removed.

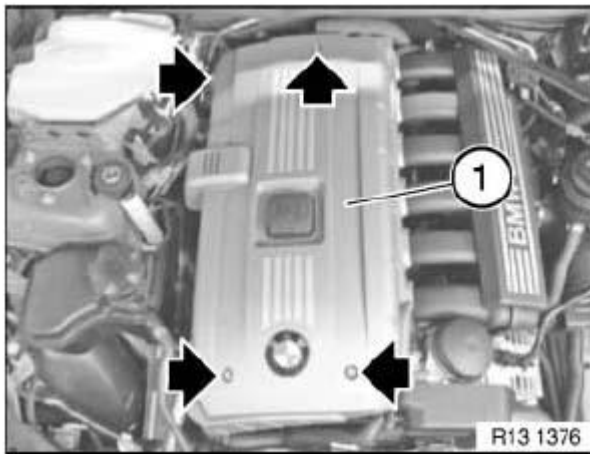


Fig. 2: Identifying Acoustic Cover And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

11 ... MOUNTING ENGINE ON ASSEMBLY STAND (N52)

Special tools required:

- 00 1 450
- 11 3 370
- 11 4 440
- 11 9 261
- 11 9 265

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

Remove **Engine**.

Bolt engine or engine block with steel bolts (1) and aluminium bolts (2) to special tool 11 4 440.

To release central bolt, bolt on special tools 11 9 261 and 11 9 265 as well.

Mount engine with special tool 11 3 370 to special tool 00 1 450.

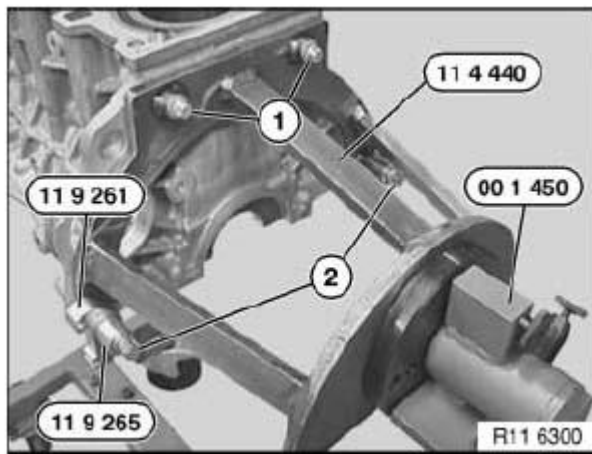


Fig. 3: Identifying Special Tool (11 9 261), (11 9 265), (11 4 440),(00 1 450), Steel Bolts And Aluminium Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

11 00 050 REMOVING AND INSTALLING ENGINE (N52)

NOTE: Following procedure is for 3-Series and 5-Series. Specific Z4 information is not available from manufacturer. It is suggested to use 3-Series information.

Special tools required:

11 0 020

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Lift engine hood into **Assembly Position.**
- Remove exhaust system.
- Remove **Transmission.**
- Drain **Engine Oil.**
- Disconnect **Negative Battery Lead.**
- Remove **Air Cleaner Housing.**
- Remove fan cowl with electric fan.
- Remove **Radiator.**
- Remove **Water Pump.**
- Remove **Thermostat.**
- Detach **All Coolant Hoses** from engine.
- Remove **Left And Right Fresh Air Duct.**
- Remove **Intake Air Manifold.**
- Detach **Vacuum Line From Brake Booster.**
- Unfasten **Ignition Wiring Harness** and lay to one side.
- Unfasten **Engine Wiring Harness** and lay to one side.
- Remove **Fuel Injector Rail** and place to one side.

Release **A/C Compressor** (1) and set down on front axle carrier.

IMPORTANT: A/C lines are pressurized.

Do not disconnect A/C lines.

Do not disconnect coolant pipe from crankcase.

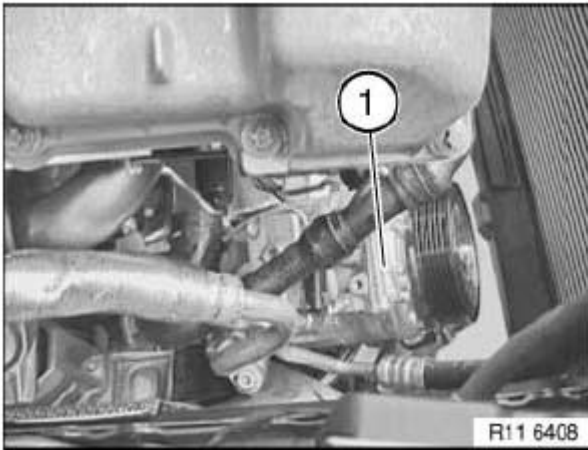


Fig. 4: Identifying A/C Compressor
Courtesy of BMW OF NORTH AMERICA, INC.

Release power steering pump (1) and set down on front axle carrier.

NOTE: Do not disconnect hydraulic lines.

If Dynamic Drive optional extra is fitted, release bracket.

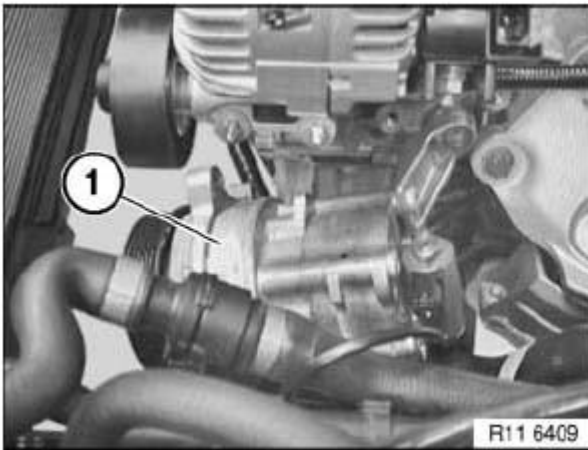


Fig. 5: Identifying Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in towing hook (1).

Suspend special tool 11 0 020 from engine crane.

Suspend special tool 11 0 020 from the designated mounting eyelets (2) only.

Lift engine out with crane.

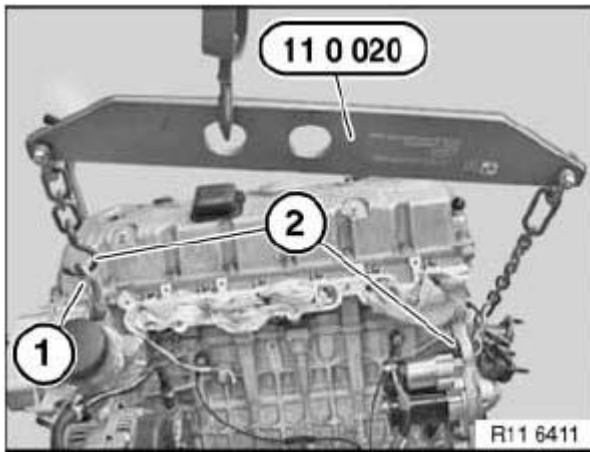


Fig. 6: Identifying Special Tool (11 0 020), Towing Hook And Engine Mounting Eyelets
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If automatic transmission optional extra is fitted: Raise engine approx. 10 cm.

Release screws (1).

Remove lines (2) with oil-water heat exchanger in direction of arrow.

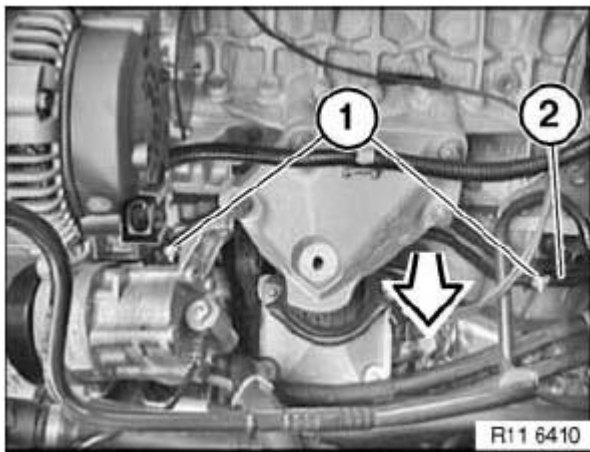


Fig. 7: Identifying Oil-Water Heat Exchanger Lines And Retaining Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 00 610 REPAIRING THREADS ON MAGNESIUM ENGINE BLOCK

IMPORTANT: Any work on the magnesium that creates dust must not be carried out without

suitable dust extraction apparatus in place.

Magnesium and water can react by forming magnesium hydroxide and hydrogen.

Do not use any emulsions containing water to lubricate the magnesium material.

Only engine oil may be used for lubrication.

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Tape off parts to be cleaned (3) cleanly and protect against chips.

Use core drill bit (2) with hand drill (1).

Installation:

Ensure exact angularity to workpiece.

Blow out core bore cleanly.

No chips are permitted in the drilled hole.

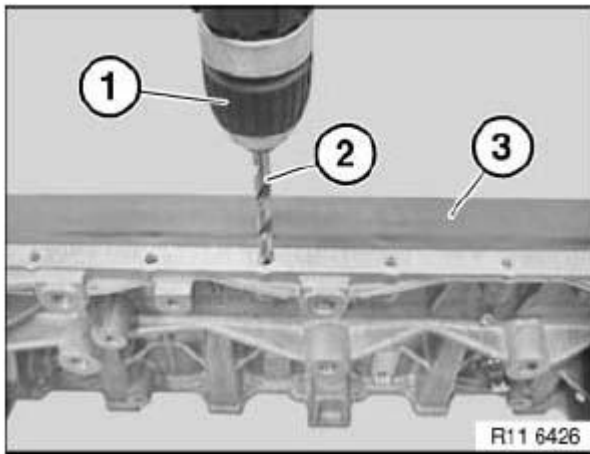


Fig. 8: Identifying Core Drill Bit, Hand Drill And Clean Area
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in Helicoil drill bit (2) with die (1).

Installation:

Ensure exact angularity to workpiece.

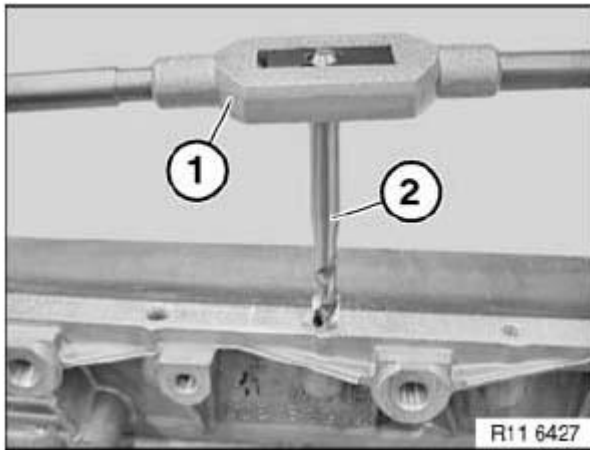


Fig. 9: Identifying Helicoil Drill Bit And Die
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not allow chips (1) to come into contact with water.

Danger of fire and explosion.

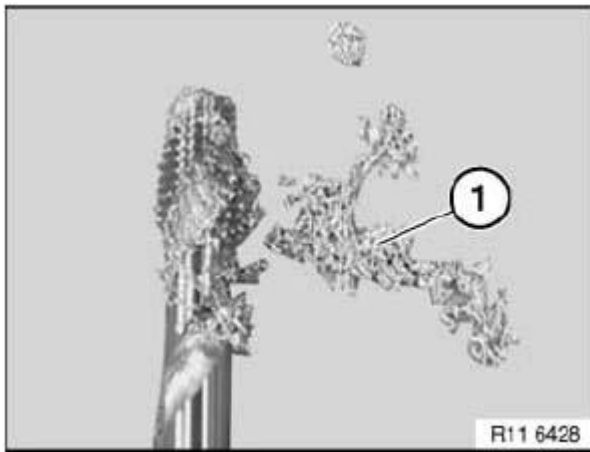


Fig. 10: Identifying Magnesium Chips
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in aluminium Helicoil (1) by hand in direction of arrow as far as it will go.

Adjust spacer (2) approx. 1 mm.

Secure spacer (2) with lock nut (3).

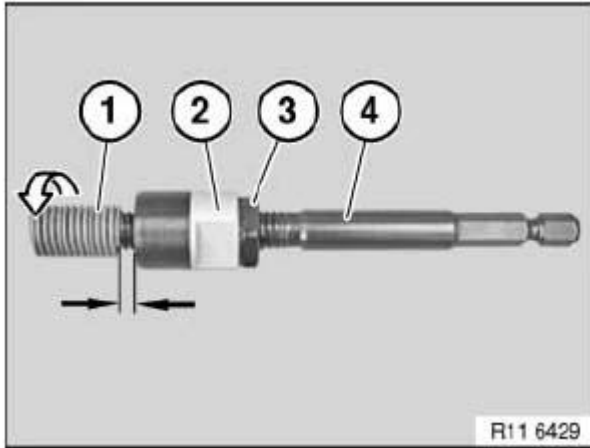


Fig. 11: Identifying Spacer, Lock Nut, Helicoil-Plus And Helicoil
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in Helicoil-Plus (1) with preassembled aluminium Helicoil.

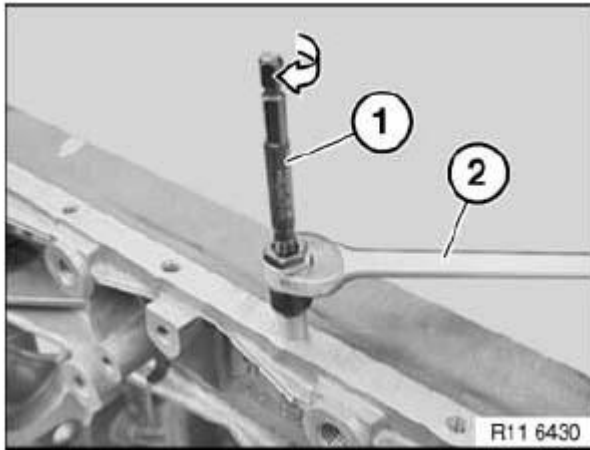


Fig. 12: Identifying Helicoil-Plus
Courtesy of BMW OF NORTH AMERICA, INC.

Screw aluminium Helicoil into workpiece (1) as far as it will go.

Remove Helicoil-Plus (2) again after screwing in.

Installation:

Aluminium Helicoil remains in workpiece (1).

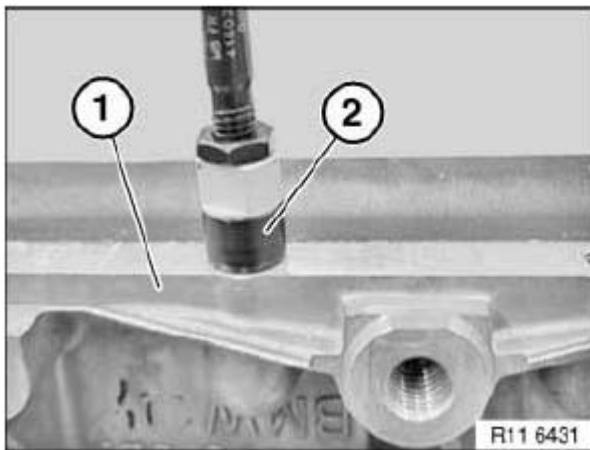


Fig. 13: Identifying Helicoil-Plus And Workpiece
Courtesy of BMW OF NORTH AMERICA, INC.

Break mounting hook off with mounting mandrel (1).

NOTE: **Blow mounting hook out of pocket hole with compressed air.**

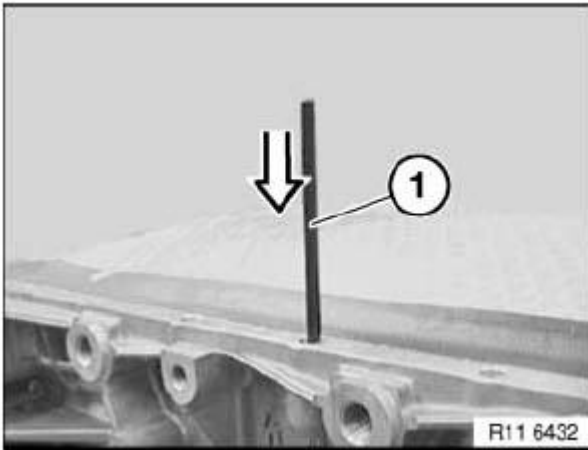


Fig. 14: Identifying Mounting Mandrel
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)

Special tools required:

- 00 0 200
- 00 0 202
- 00 0 204
- 00 0 208
- 11 0 000

WARNING: Danger of injury!

Observe following instructions relating to special tool:

- 1. Prior to each use, check the special tools for defects, modifications and operational reliability.**
- 2. Damaged/modified special tools must not be used!**
- 3. No changes or modifications may be made to the special tools!**
- 4. Keep special tools dry, clean and free of grease.**

Necessary preliminary tasks:

- Secure **Engine Bonnet/Hood In Service Position**
- Remove **cowl panel cover**
- **Remove Both Tension Struts From Spring Strut Dome**

- Remove **Intake Filter Housing**
- Remove ignition coil cover

Assemble cross member 00 0 200 with special tools 00 0 202, 00 0 204, 00 0 208.

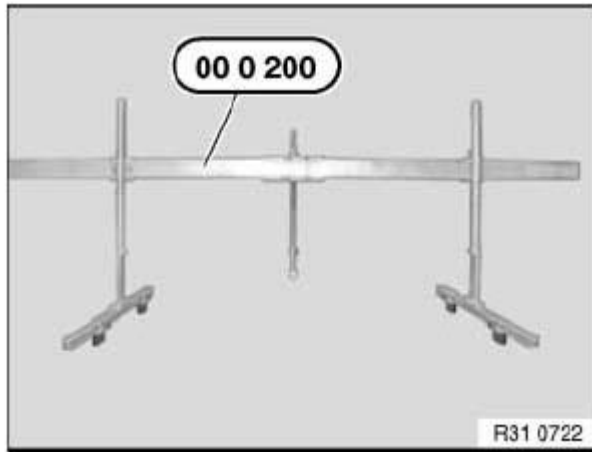


Fig. 15: Identifying Special Tool (00 0 200)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Use towing hook (72 15 8 108 670).

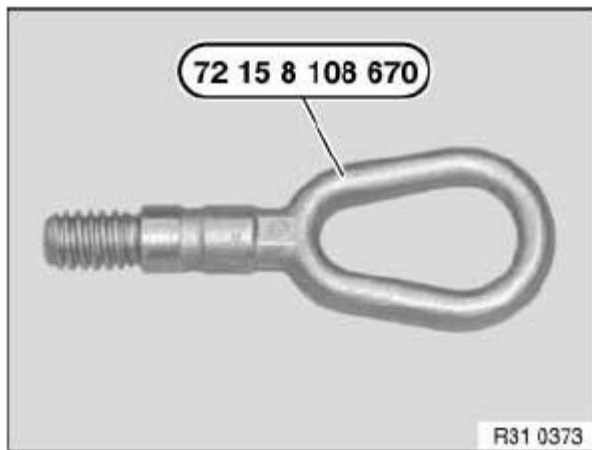


Fig. 16: Identifying Special Tool (72 15 8 108 670)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction.

Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

IMPORTANT: Risk of damage!

With the aid of an assistant and the supports (2), place cross member 00 0 200 on the screw connections of the side panels.

Screw in towing hook (1) and tighten down to approx. 30 Nm.

Secure special tool 11 0 000 to spindle 00 0 202.

Fit suitable chains to special tool 11 0 000 and attach to towing hook (1) or engine lifting eye.

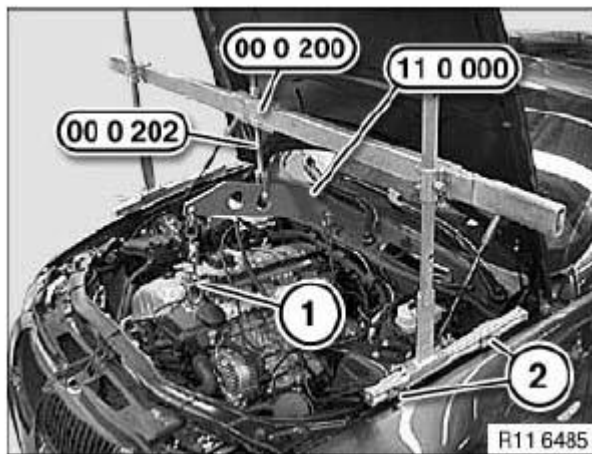


Fig. 17: Identifying Special Tool (00 0 202), (00 0 200), (11 0 000), Towing Hook And Supports
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!

Tighten down all adjusting screws and nuts on cross member 00 0 200.

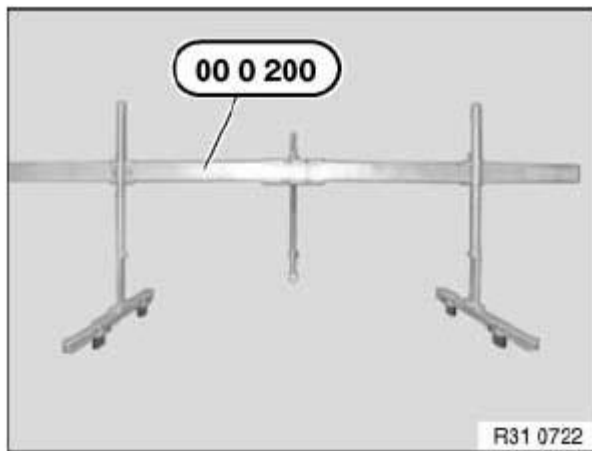


Fig. 18: Identifying Special Tool (00 0 200)

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Raise engine approx. 10 mm with cross member.

Installation:

Replace self-locking nuts.

For tightening torque refer to 22 11 2AZ in **22 11 ENGINE SUSPENSION** .

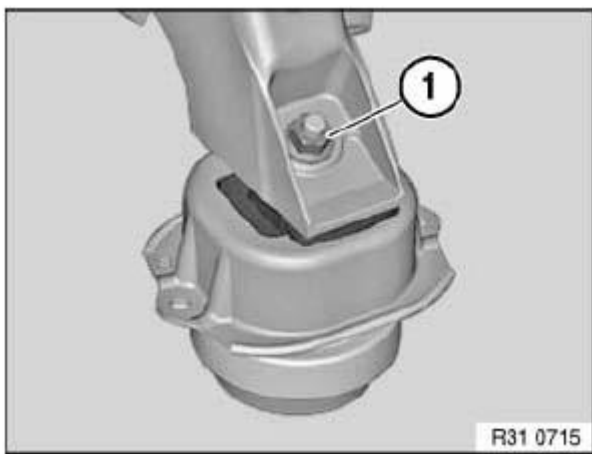


Fig. 19: Identifying Self-Locking Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE IDENTIFICATION

Drive in engine numbers at marked surface with impact tool.

M47 / M47TU / M47T2

M47 / M47TU / M47T2

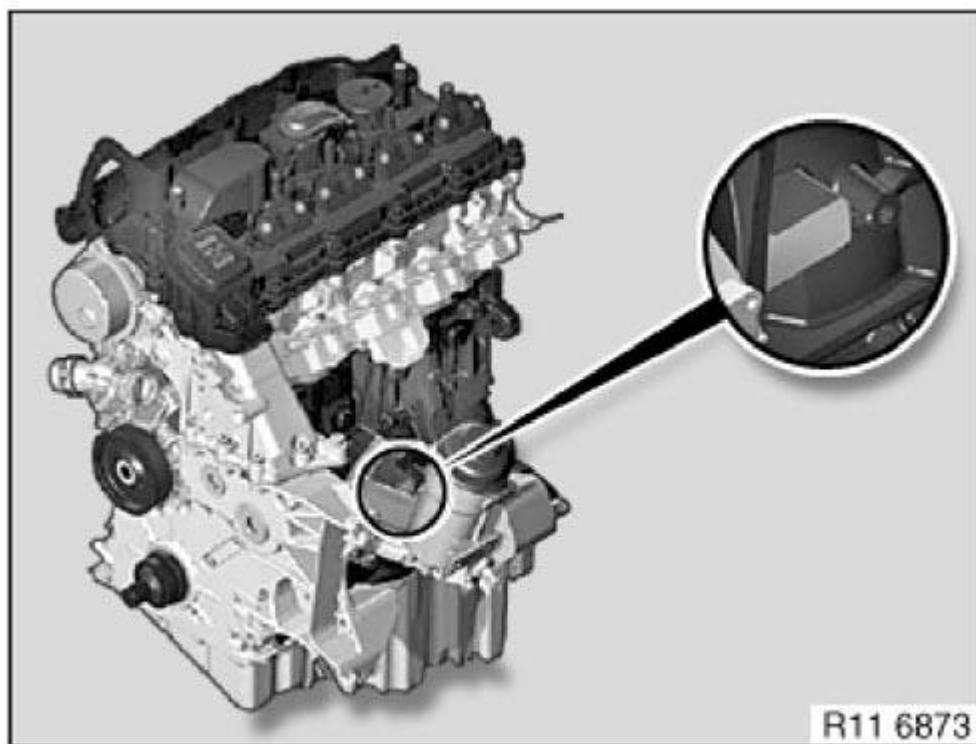


Fig. 20: Identifying Engine Identification Numbers - M47 / M47TU / M47T2
Courtesy of BMW OF NORTH AMERICA, INC.

M57 / M57TU / M57T2

M57 / M57TU / M57T2

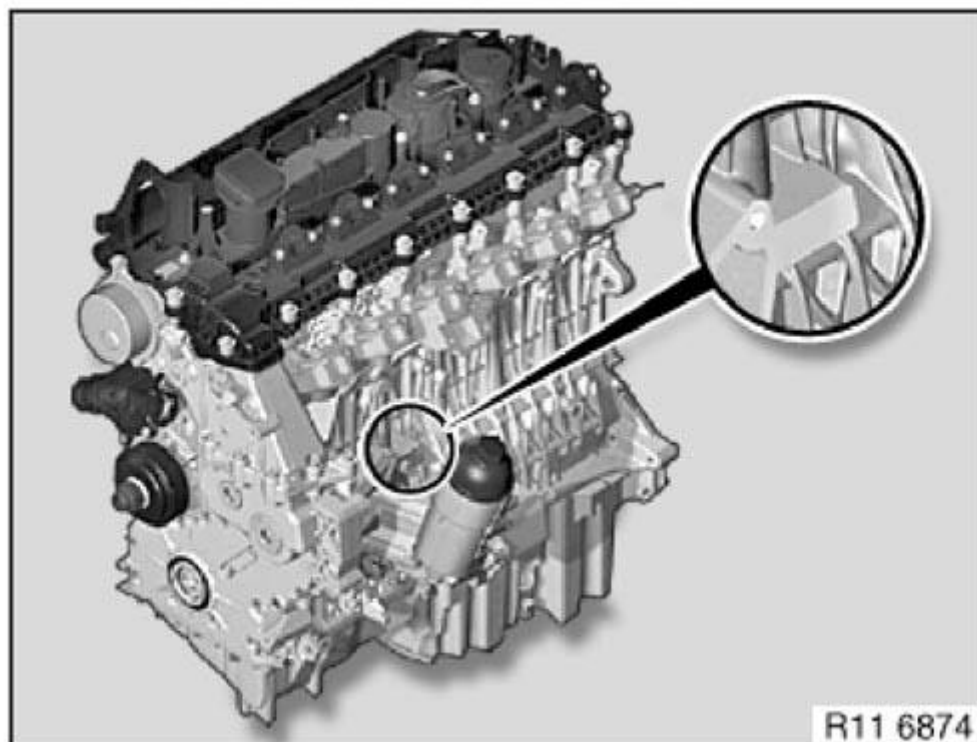


Fig. 21: Identifying Engine Identification Numbers - M57 / M57TU / M57T2
Courtesy of BMW OF NORTH AMERICA, INC.

M67 / M67TU

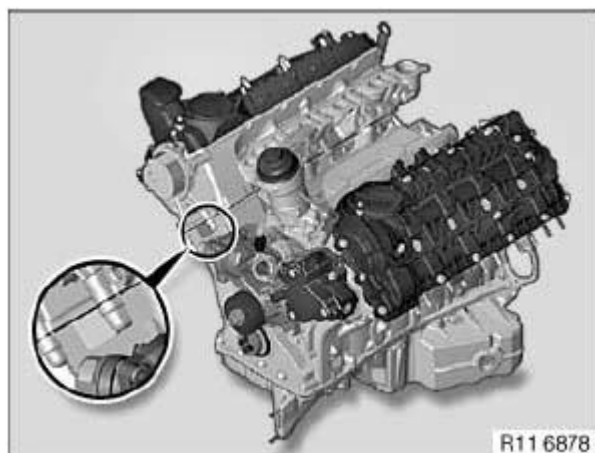


Fig. 22: Identifying Engine Identification Numbers - M67 / M67TU
Courtesy of BMW OF NORTH AMERICA, INC.

N47

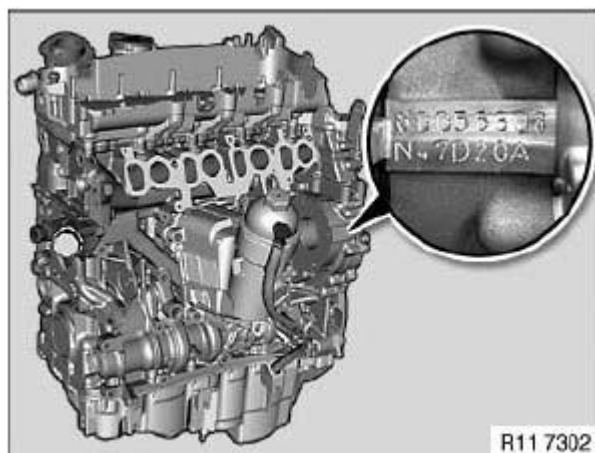


Fig. 23: Identifying Engine Identification Numbers - N47
Courtesy of BMW OF NORTH AMERICA, INC.

M52 / M52TU

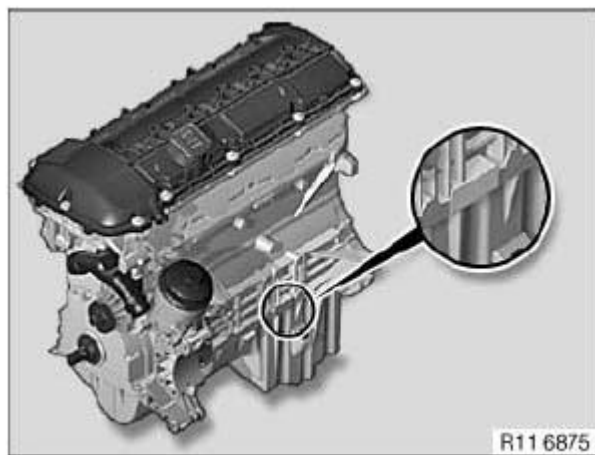


Fig. 24: Identifying Engine Identification Numbers - M52 / M52TU
Courtesy of BMW OF NORTH AMERICA, INC.

M54

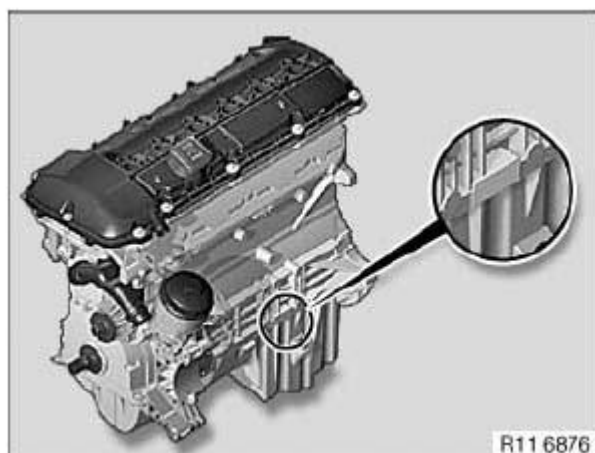


Fig. 25: Identifying Engine Identification Numbers - M54
Courtesy of BMW OF NORTH AMERICA, INC.

M56

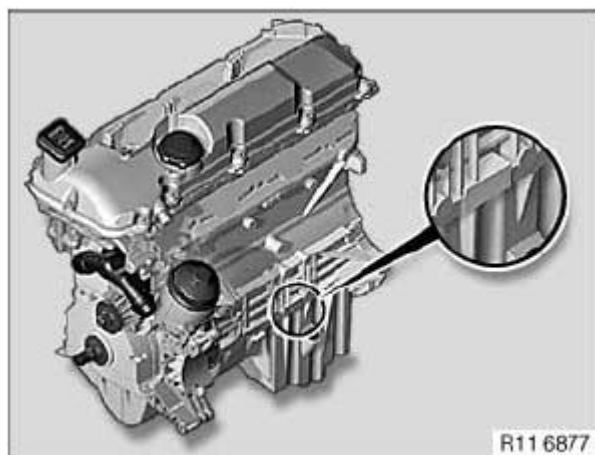


Fig. 26: Identifying Engine Identification Numbers - M56
Courtesy of BMW OF NORTH AMERICA, INC.

N40 / N45

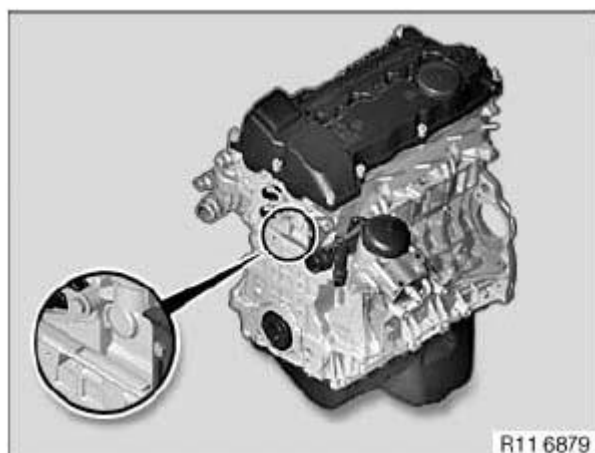


Fig. 27: Identifying Engine Identification Numbers - N40 / N45
Courtesy of BMW OF NORTH AMERICA, INC.

N42 / N46 / N46T

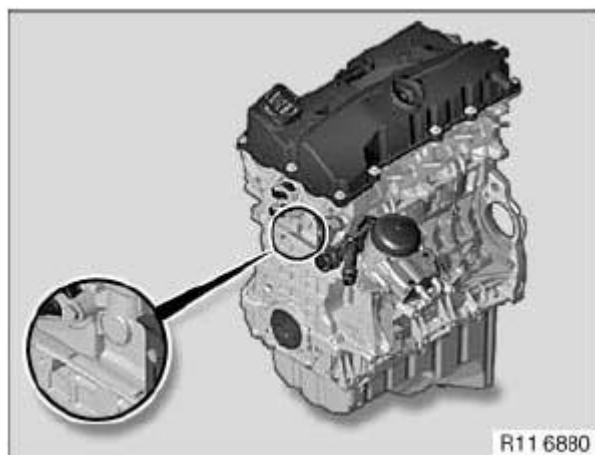


Fig. 28: Identifying Engine Identification Numbers - N42 / N46 / N46T
Courtesy of BMW OF NORTH AMERICA, INC.

N51 / N52 / N52K / N53 / N54

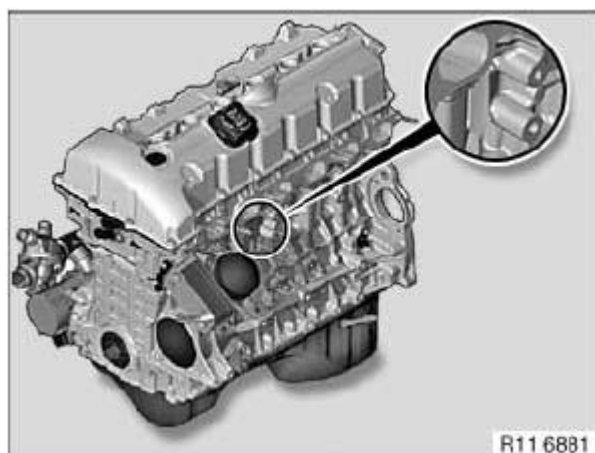


Fig. 29: Identifying Engine Identification Numbers - N51 / N52 / N52K / N53 / N54
Courtesy of BMW OF NORTH AMERICA, INC.

N62

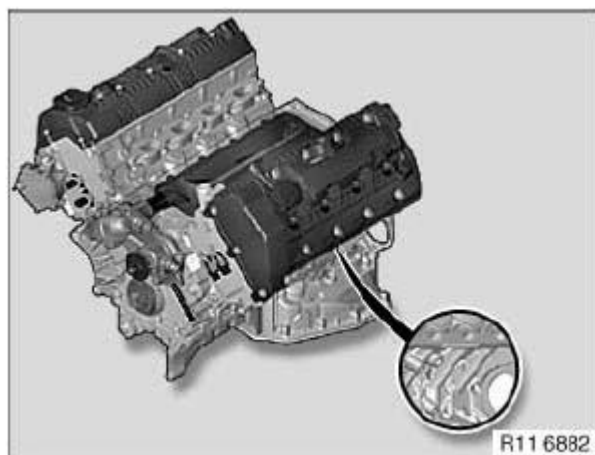


Fig. 30: Identifying Engine Identification Numbers - N62
Courtesy of BMW OF NORTH AMERICA, INC.

N73

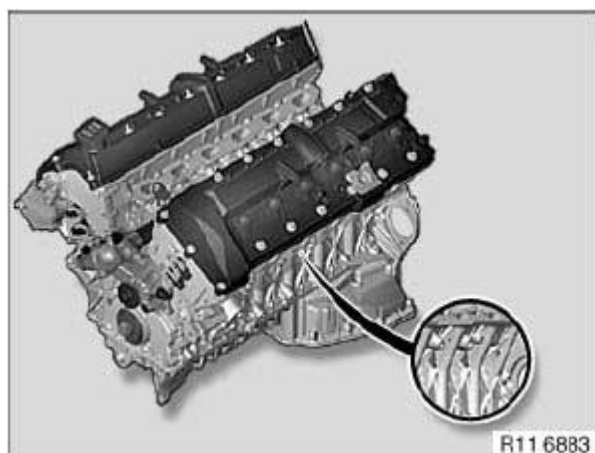


Fig. 31: Identifying Engine Identification Numbers - N73
Courtesy of BMW OF NORTH AMERICA, INC.

S54

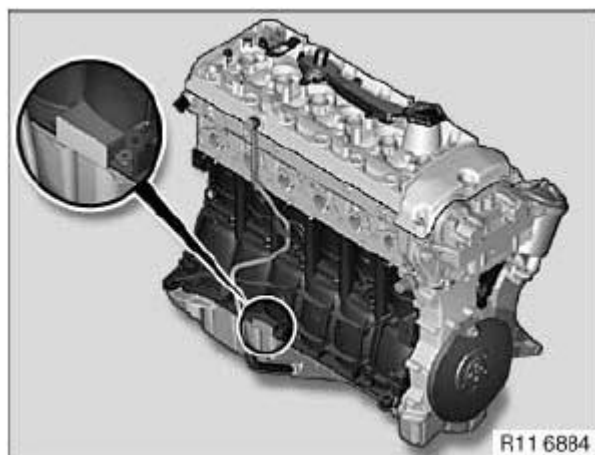


Fig. 32: Identifying Engine Identification Numbers - S54
Courtesy of BMW OF NORTH AMERICA, INC.

S85

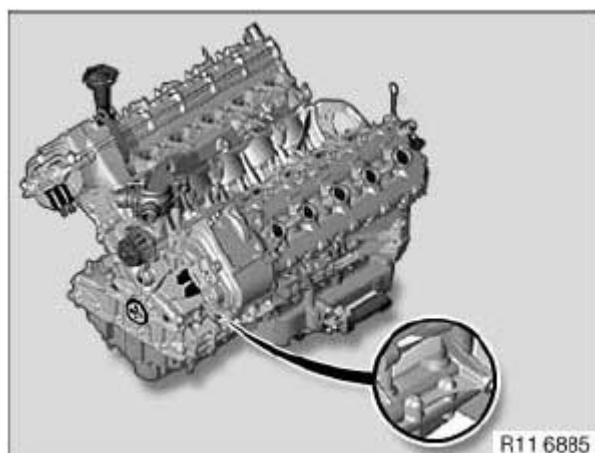


Fig. 33: Identifying Engine Identification Numbers - S85
Courtesy of BMW OF NORTH AMERICA, INC.

W10 / W11



Fig. 34: Identifying Engine Identification Numbers - W10 / W11
Courtesy of BMW OF NORTH AMERICA, INC.

W17

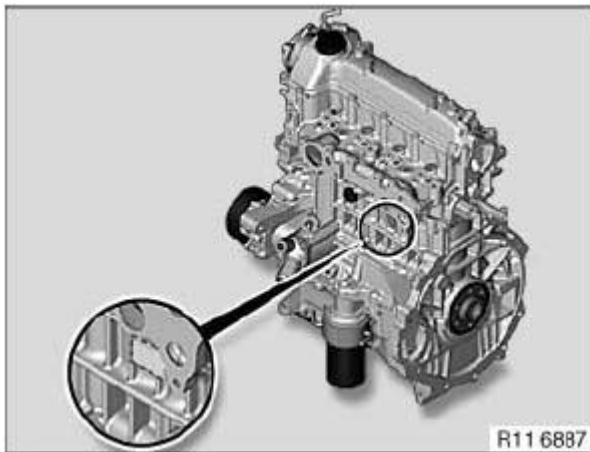


Fig. 35: Identifying Engine Identification Numbers - W17
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

MOUNTING ENGINE ON ASSEMBLY STAND (N52)

Special tools required:

- 00 1 450
- 11 3 370
- 11 4 440
- 11 9 261
- 11 9 265

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

Remove **Engine**.

Bolt engine or engine block with steel bolts (1) and aluminium bolts (2) to special tool 11 4 440.

To release central bolt, bolt on special tools 11 9 261 and 11 9 265 as well.

Mount engine with special tool 11 3 370 to special tool 00 1 450.

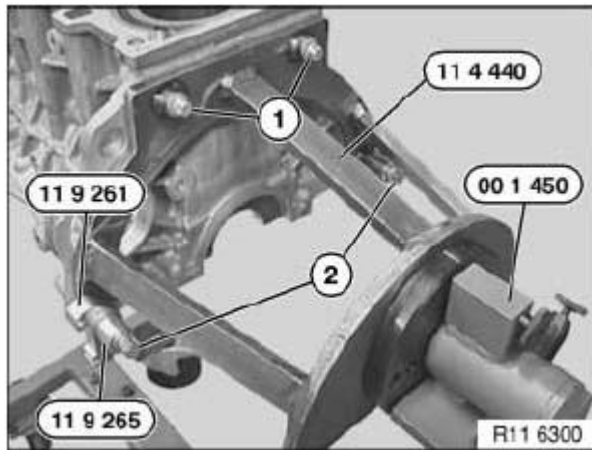


Fig. 36: Identifying Special Tool (11 9 261), (11 9 265), (11 4 440), (00 1 450), Steel Bolts And Aluminium Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

12 CYLINDER HEAD WITH COVER

11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N52)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove acoustic cover.
- Remove rod-type ignition coils.
- Unclip wiring harness for fuel injectors.
- Remove **Tension Strut**.
- Remove **Clean Air Duct**.

Unlock and detach engine vent hose (1).

If necessary, pull off metal bracket (2) in direction of arrow.

Release screws (3).

For tightening torque refer to 11 37 3AZ in **11 37 VARIABLE VALVE GEAR (N52)** .

Remove servodrive (4) in direction of arrow.

If necessary, release nuts (5).

If necessary, remove secondary air valve (6).

Installation:

Replace aluminium screws.

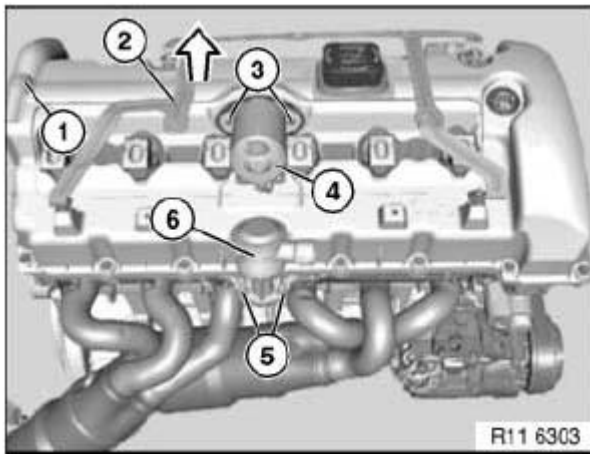


Fig. 37: Identifying Secondary Air Valve, Metal Bracket, Engine Vent Hose, Servodrive And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws in area (1).

Installation:

For tightening torque refer to **11 12 4AZ** .

Release screws (2).

For tightening torque refer to **11 12 4AZ** .

Installation:

Replace aluminium screws.

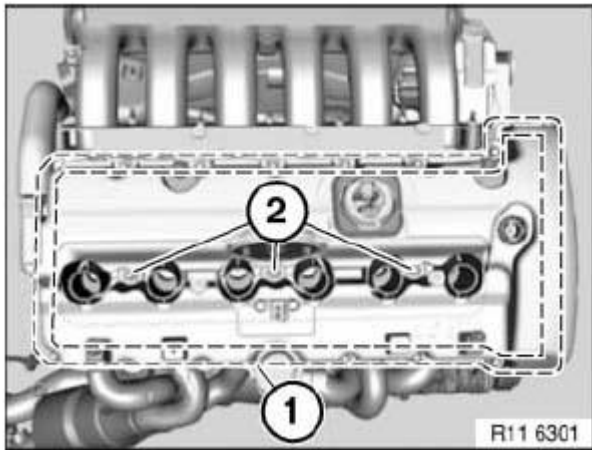


Fig. 38: Identifying Aluminium Engine Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replace seal (1).

Replace seal (2).

Installation:

Clean all sealing surfaces.

Do not clean sealing faces (1 and 2) with a metal cutting tool.

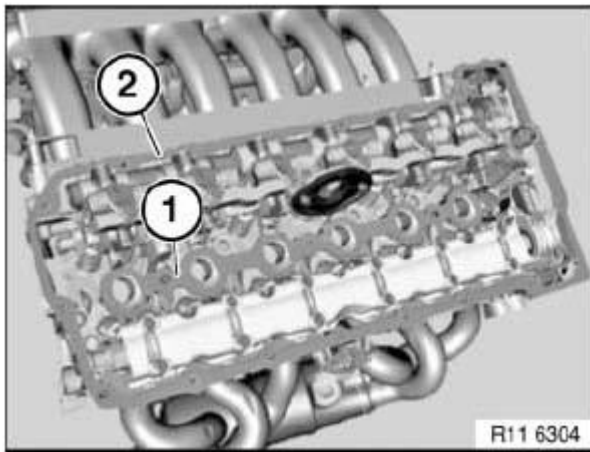


Fig. 39: Identifying Engine Seals

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N52)

Special tools required:

- 11 0 320
- 11 4 420
- 11 4 430
- 11 4 471
- 11 4 472
- 11 8 580

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **Exhaust System**.
- Drain **Coolant**
- Drain off **Engine Oil**.
- Remove both **Exhaust Manifolds**
- Remove **Intake Air Manifold**
- Detach coolant hoses from cylinder head
- Remove **Inlet And Exhaust Adjustment Unit**

IMPORTANT: Fit new cylinder head screws.

Do not wash off bolt coating.

There must be no coolant, water or engine oil in the pocket holes.

Risk of corrosion and cracking!

Release screws (1).

Unclip timing chain module (2) at junction (3) and remove towards top.

Set down timing chain.

IMPORTANT: If the timing chain is stowed in the gearcase, the crankshaft must no longer be rotated.

This would cause the timing chain on the crankshaft sprocket wheel to jam or jump.

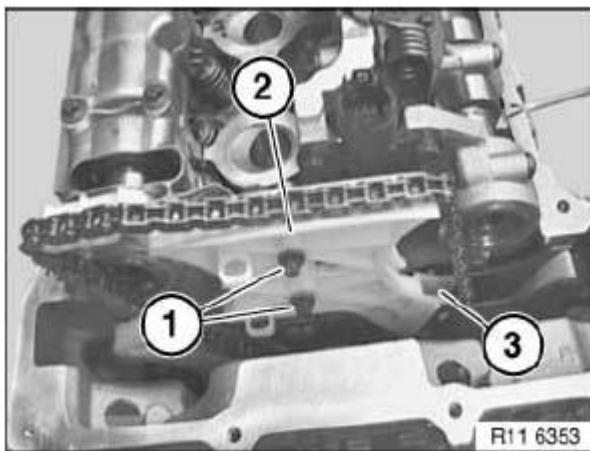


FIG. 40: Identifying Engine Timing Chain Module, Junction And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The timing chain is lifted out with a hook only during assembly.

Release screws (2).

Remove eccentric shaft sensor (1) towards front.

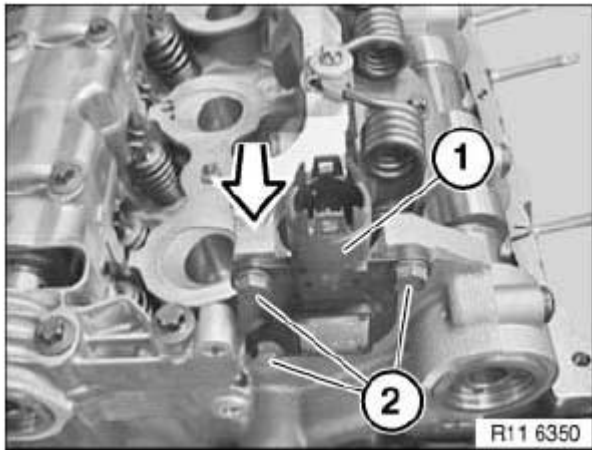


Fig. 41: Identifying Eccentric Shaft Sensor And Mounting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screw (1) is not magnetic and must be secured against falling down.

Release screw (1).

Remove magnet wheel (2) towards front.

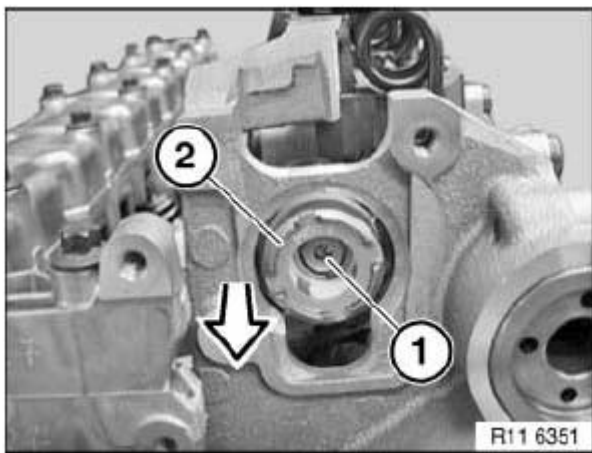


Fig. 42: Identifying Magnet Wheel And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Magnet wheel (1) is highly magnetic and must be protected against metal filings/borings.

After removing, place magnet wheel (1) in a plastic bag (2) with a seal.

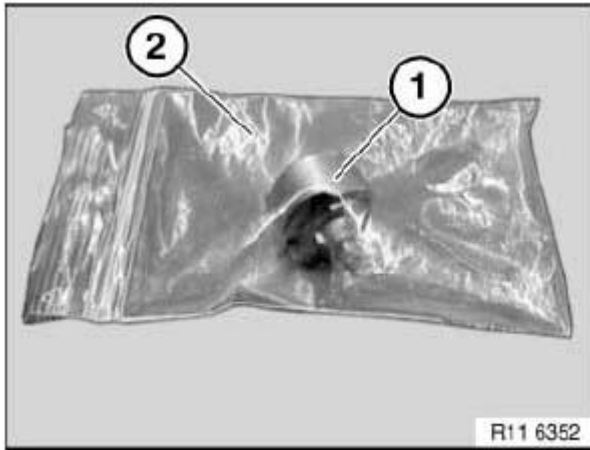


Fig. 43: Identifying Magnet Wheel And Plastic Bag

Courtesy of BMW OF NORTH AMERICA, INC.

Pretension eccentric shaft (1) upwards in direction of arrow.

Remove stop screw between 1st and 2nd cylinders.

For tightening torque refer to 11 37 6AZ in **11 37 VARIABLE VALVE GEAR (N52)** .

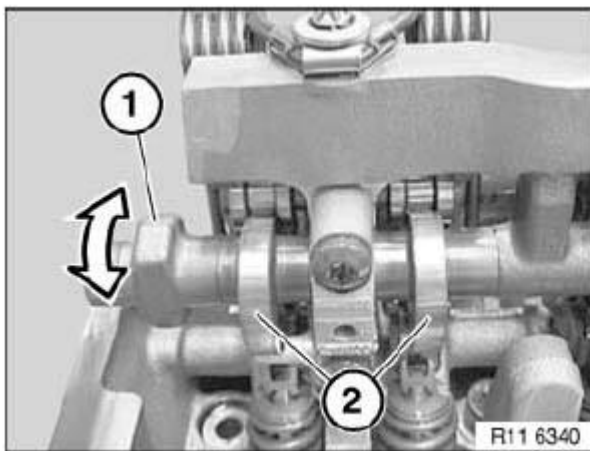


Fig. 44: Identifying Eccentric Shaft Screw

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Screw (2) can only be released when the timing chain module is pressed forward slightly.

IMPORTANT: Secure screw (2) with a gripper against falling down.

Release bolt (2).

For tightening torque refer to 11 12 3AZ .

Release screws (1).

For tightening torque refer to 11 12 4AZ .

Installation:

Replace aluminium screws.

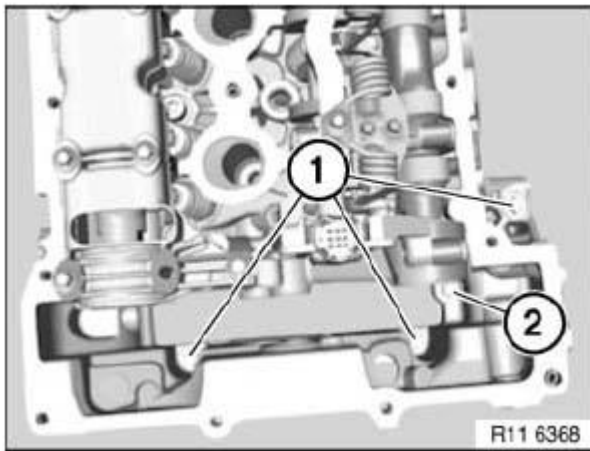


Fig. 45: Identifying Engine Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different bolt heads.

Release M10 cylinder head bolts (1) with special tool 11 8 580.

Release M9 cylinder head bolts (2) with special tool 11 4 420.

NOTE: Picture shows inlet and exhaust camshafts removed.

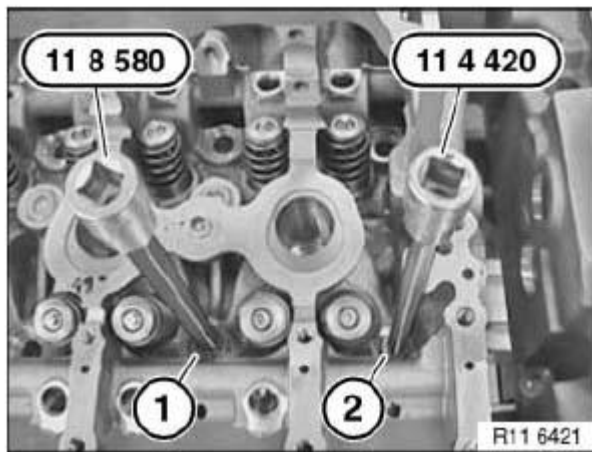


Fig. 46: Identifying Special Tool (11 4 420) And (11 8 580)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different M9 bolt lengths (1 and 3).

Release M9 cylinder head bolts (1 and 3) with special tool 11 4 420.

For tightening torque refer to 11 12 2AZ in **11 12 CYLINDER HEAD WITH COVER** .

Release M10 cylinder head bolts (2) with special tool 11 8 580 from outside inwards.

For tightening torque refer to 11 12 1AZ in **11 12 CYLINDER HEAD WITH COVER** .

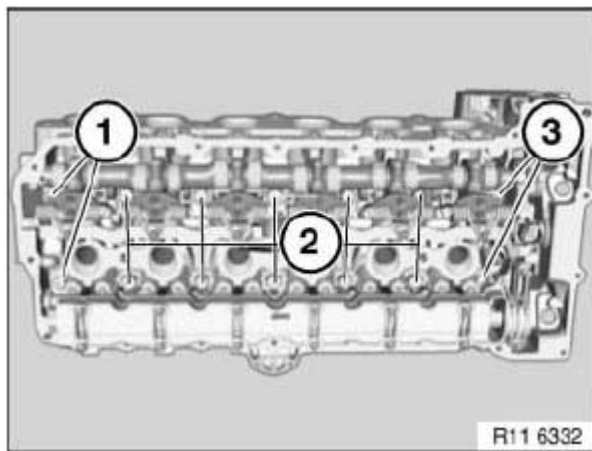


Fig. 47: Identifying Engine Cylinder Head Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: All cylinder head bolts (1, 2 and 3) must be replaced.

Jointing torque and angle of rotation must be observed without fail.

Risk of damage!

Secure special tool 11 0 320 with existing cylinder head cover bolts (1).

For tightening torque refer to 11 12 5AZ in **11 12 CYLINDER HEAD WITH COVER** .

IMPORTANT: Removing and install cylinder head with a second person helping.

Weight of cylinder head with add-on parts is approx. 40 kg.

Do not set cylinder head down on sealing face, risk of damage to valves.

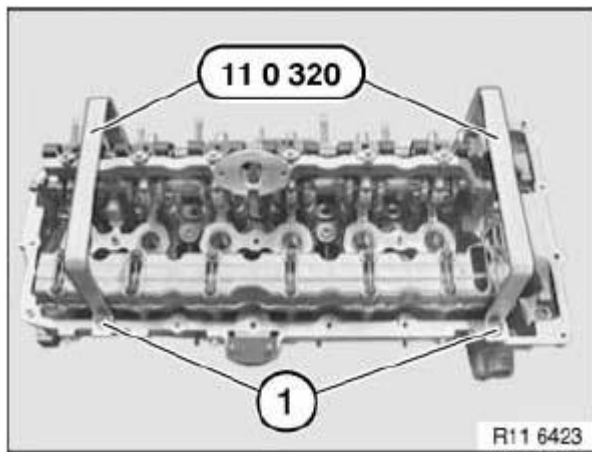


Fig. 48: Identifying Special Tool (11 0 320) And Cylinder Head Cover Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 4 430 into bores.

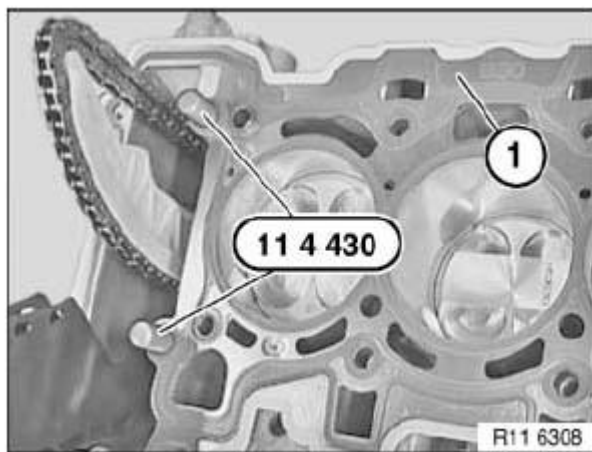


Fig. 49: Identifying Special Tool (11 4 430)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove coarse residues on sealing faces with special tool 11 4 471 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

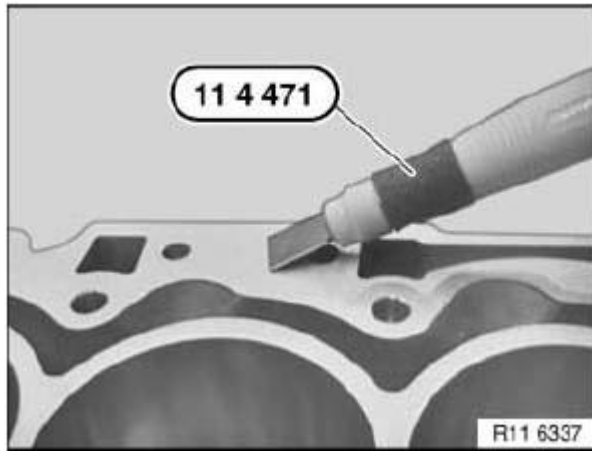


Fig. 50: Identifying Special Tool (11 4 471)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove fine residues on sealing faces with special tool 11 4 472 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

There must be no coolant, water or engine oil in the pocket holes.

Risk of corrosion and cracking!

Clean all pocket holes.

Replace Cylinder Head Gasket.

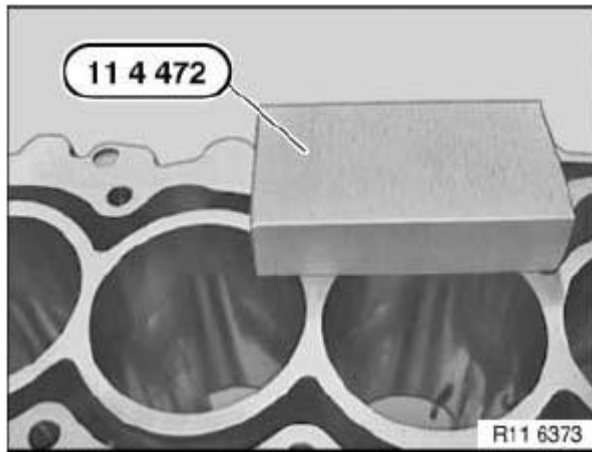


Fig. 51: Identifying Special Tool (11 4 472)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe sequence for tightening cylinder head bolts without fail.

Fit new cylinder head screws.

Insert cylinder head bolts (1 to 10) with special tool 11 8 580.

For tightening torque refer to 11 12 1AZ in **11 12 CYLINDER HEAD WITH COVER** .

Insert cylinder head bolts (11 to 14) with special tool 11 4 420.

For tightening torque refer to 11 12 2AZ in **11 12 CYLINDER HEAD WITH COVER** .

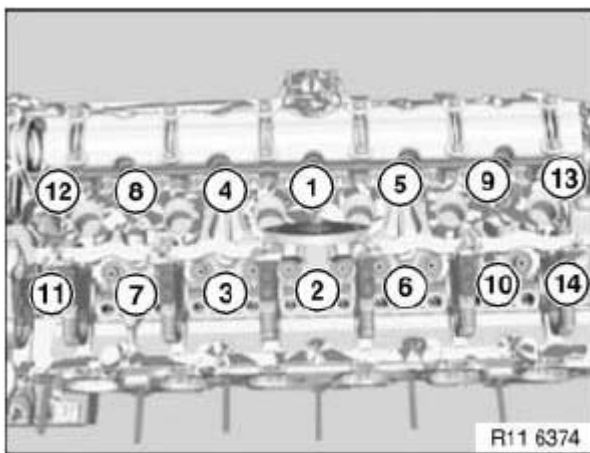


Fig. 52: Identifying Cylinder Head Bolt Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows inlet and exhaust camshafts removed.

Observe sequence for tightening cylinder head bolts without fail.

IMPORTANT: The 2nd torsion angle relates only to cylinder head bolts 1 to 10.

Installation:

- Jointing torque:

All cylinder head bolts 1 to 14 to 30 Nm

- 1st angle of rotation:

All cylinder head bolts 1 to 14 to 90°

- 2nd angle of rotation:

Only cylinder head bolts 1 to 10 to 90°

- 3rd angle of rotation:

All cylinder head bolts 1 to 14 to 45°

Insert bolts (1).

For tightening torque refer to 11 12 3AZ in **11 12 CYLINDER HEAD WITH COVER** .

IMPORTANT: Secure bolt (2) with a gripper against falling down.

Insert bolt (2).

For tightening torque refer to 11 12 3AZ in **11 12 CYLINDER HEAD WITH COVER** .

Installation:

Replace aluminium screws.

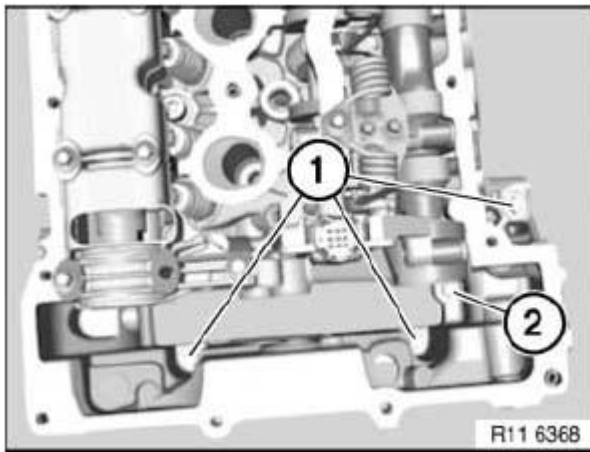


Fig. 53: Identifying Engine Cylinder Head Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 101 REPLACING CYLINDER HEAD GASKET (N52)

Special tools required:

- 11 4 430
- 11 4 470

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **Cylinder Head.**

Insert special tool 11 4 430 into bores.

Remove head gasket.

IMPORTANT: Check identification (1) on cylinder head gasket (B25 or B30).

- B= petrol/gasoline engine
- 30= displacement (3 liters)

Do not mix them up as this will cause engine damage.

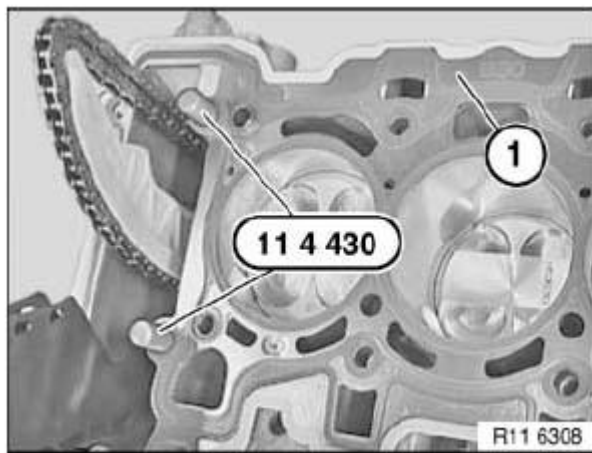


Fig. 54: Identifying Special Tool (11 4 430) And Special Tool (11 4 430)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove remnants of oil and dirt from pocket holes (1).

IMPORTANT: Work on sealing face on engine block and on cylinder head with special tool 11 4 470 only.

Do not use any metal-cutting tools.

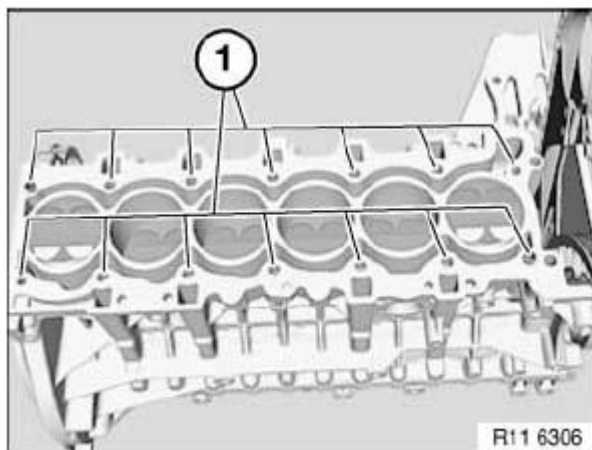


Fig. 55: Identifying Engine Pocket Holes

Courtesy of BMW OF NORTH AMERICA, INC.

Identification (1) of head gasket.

IMPORTANT: Rubber coating (2) on cylinder head gasket must not under any circumstances be damaged (electrochemical corrosion).

Gasket (3) is a sheet-metal gasket

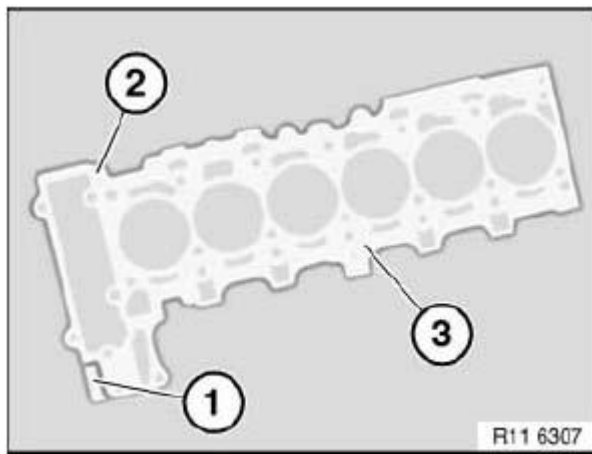


Fig. 56: Identifying Sheet-Metal Gasket, Rubber Coating And Head Gasket Identification

Courtesy of BMW OF NORTH AMERICA, INC.

Check adapter sleeves (1) for damage and firm seating.

Place head gasket (2) in direction of arrow on engine block.

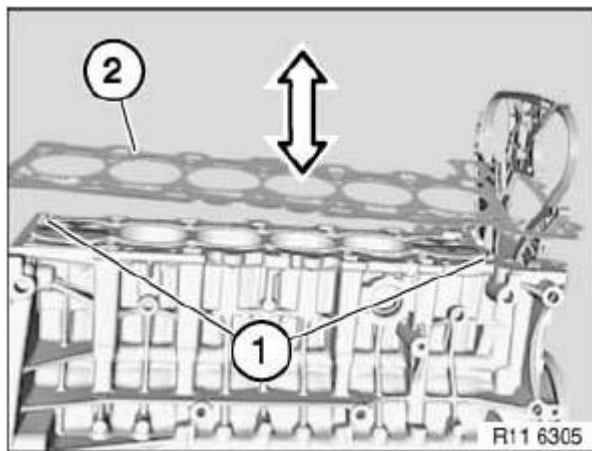


Fig. 57: Identifying Head Gasket And Adapter Sleeves

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cylinder head for Deviation From Flatness.

Check cylinder head for Water Leaks.

Assemble engine.

11 12 527 REMACHINING A VALVE SEAT - DISASSEMBLING CYLINDER HEAD (N52)

Special tools required:

- 00 5 380
- 11 9 001

Necessary preliminary tasks:

- Remove Cylinder Head.
- Remove Inlet Camshaft.
- Remove Exhaust Camshaft.
- Remove All Valves.

Place cylinder head on special tool 11 9 001.

Inset pilot from special tool 00 5 380 5 mm into a valve stem.

Select a suitable valve seat milling cutter (1).

Turn the milling cutter clockwise while applying low pressure. When the milling operation is finished, perform a further 2 turns without applying pressure to the cutter.

IMPORTANT: If necessary, perform inner and outer seat corrections. See 11 12 CYLINDER HEAD WITH COVER N52 B25

Assemble engine.

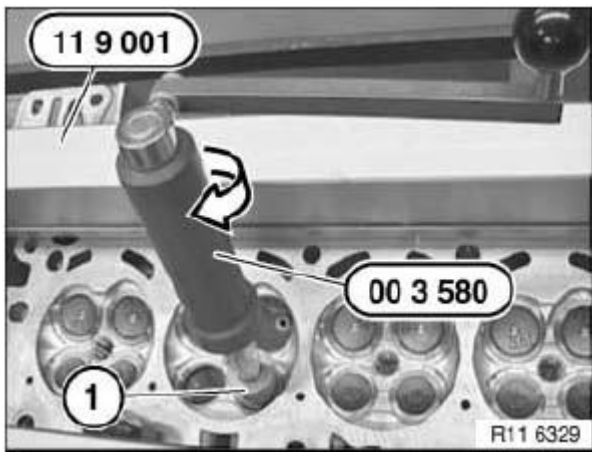


Fig. 58: Identifying Special Tools (11 9 001), (00 3 580) And Valve Seat Milling Cutter
Courtesy of BMW OF NORTH AMERICA, INC.

11 12 595 CHECKING A VALVE GUIDE FOR WEAR (N52)

Necessary preliminary tasks:

- Remove **All Valve Springs.**

To measure tilt clearance, install a new valve so that end of valve stem is flush with valve guide.

Attach dial gauge and measure **tilt clearance.**

NOTE: See illustration in **Fig. 59.**

Max. permissible tilt clearance 0.5 mm.

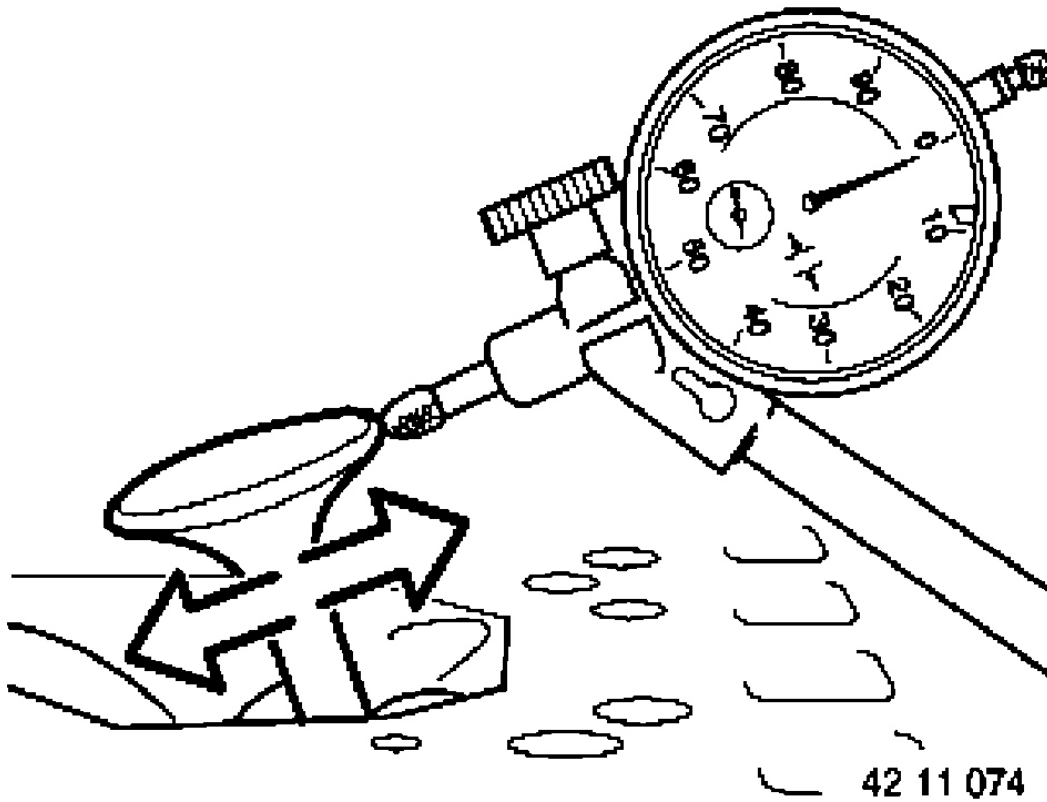


Fig. 59: Measuring Tilt Clearance Using Dial Gauge
 Courtesy of BMW OF NORTH AMERICA, INC.

If the valve guide is outside the tolerance, the cylinder head must be replaced.

Assemble engine.

11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N52)

Necessary preliminary tasks:

- Remove **Cylinder Head**.
- Remove **Exhaust Camshaft**.
- Remove **Intermediate Lever** on inlet side.

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

NOTE: **Max. deviation from level (longitudinal) 0.10 mm**

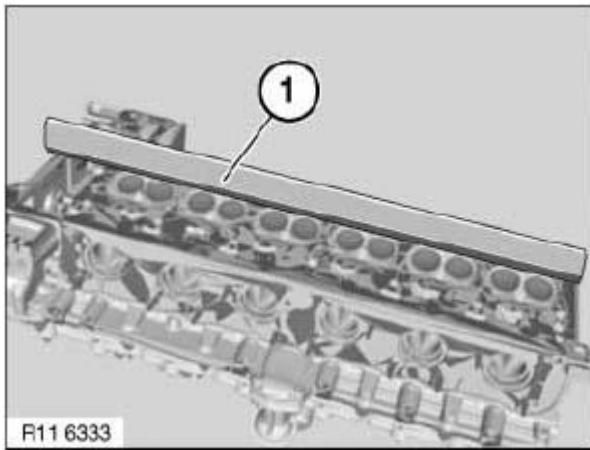


Fig. 60: Identifying Evenness Of Cylinder Head Sealing Faces Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

NOTE: Max. deviation from level (transversal) 0.05 mm

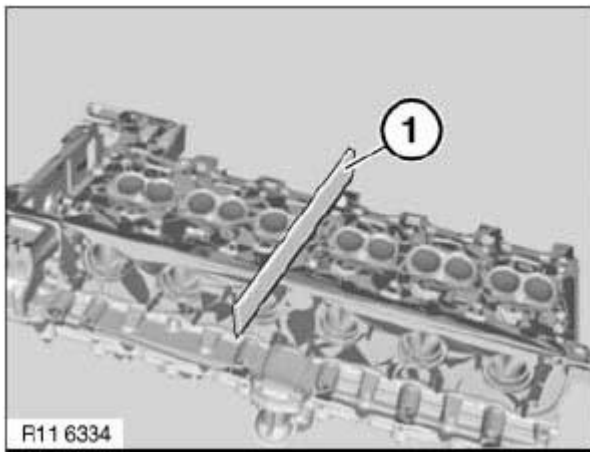


Fig. 61: Identifying Evenness Of Cylinder Head Sealing Faces Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for Water Leaks.

Assemble engine.

11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N52)

Special tools required:

- 11 4 341

- 11 4 342
- 11 4 343

Necessary preliminary tasks:

- Remove **Cylinder Head.**
- Disassemble cylinder head.

Set up special tool 11 4 341 with existing cylinder head bolts.

Installation:

1 cyl is marked.

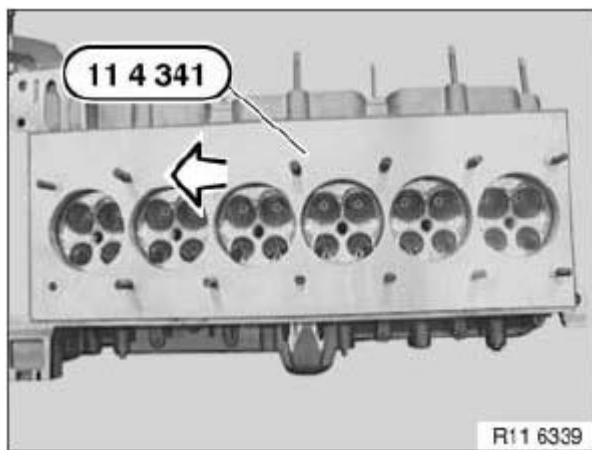


Fig. 62: Identifying Special Tool (11 4 341)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 4 342, insert knurled screw (1) in direction of arrow.

Sealing flange must rest flat.

Fit special tool 11 4 343.

NOTE: Compressed air at valve (2) must not exceed 3 bar.

Heat cylinder head to 60°.

Visually inspect for formation of bubbles.

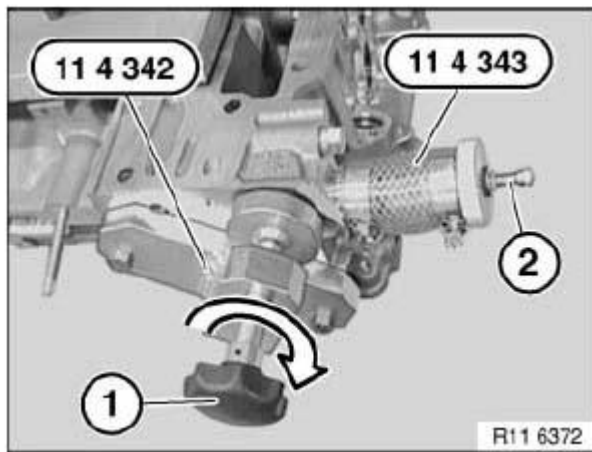


Fig. 63: Identifying Special Tool (11 4 342), (11 4 343), Knurled Screw And Valve
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

13 OIL SUMP

11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N52)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove engine splash guard.
- Secure engine in **Installation Position**.
- Lower **Front Axle**.

NOTE: The lines must be detached from the engine oil sump in the case of the optional

side.

Release bolts (3) on transmission.

Detach return hose (2).

Release screws along line (1).

For tightening torque refer to 11 13 1AZ in **11 13 OIL PAN (N52)** .

Installation:

Replace aluminium screws.

If necessary, release bolts (4), remove oil level sensor.

Installation:

Replace all seals.

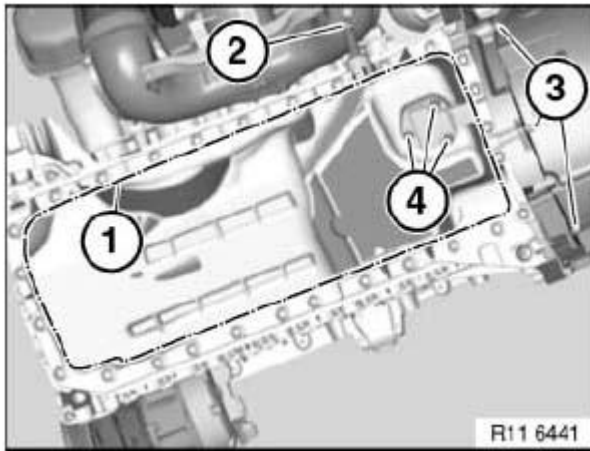


Fig. 64: Identifying Oil Level Sensor, Return Hose, Retaining Screws And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N52) AWD

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove engine splash guard.
- Secure engine in **Installation Position**.
- Lower **Front Axle**.
- Remove left drive shaft.
- Remove right drive shaft.
- Remove front axle differential.

NOTE: **The lines must be detached from the engine oil sump in the case of the optional extra automatic transmission; if necessary, detach vane pump and place to one side.**

Release bolts (3) on transmission.

Detach return hose (2).

Release screws along line (1).

Installation:

Replace aluminium screws.

Replace all seals.

If necessary, release bolts (4), remove oil level sensor.

NOTE: **Fig. 65 shows N52.**

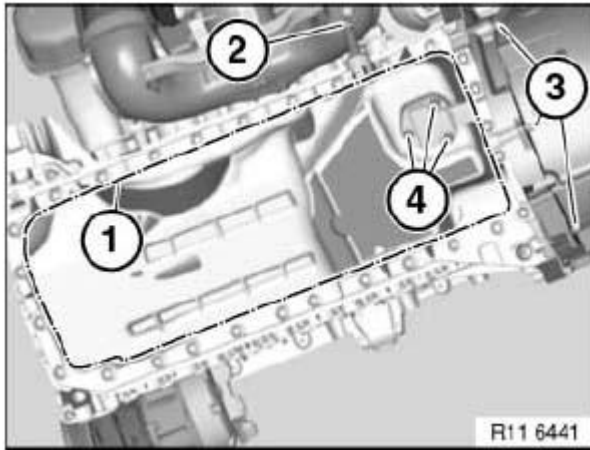


Fig. 65: Identifying Oil Level Sensor, Return Hose, Retaining Screws And Bolts
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

14 HOUSING COVER

11 14 005 REPLACING FRONT CRANKSHAFT RADIAL SEAL (N52)

Special tools required:

- 11 9 221
- 11 9 222
- 11 9 223
- 11 9 224
- 11 9 231
- 11 9 232
- 11 9 233

Necessary preliminary tasks:

- Remove Vibration Damper.

IMPORTANT: Do not release central bolt.

If the central bolt is released, the sprocket wheels of the timing chain and the oil pump will no longer be nonpositively connected to the crankshaft. The camshafts to the crankshaft can warp (**risk of damage**).

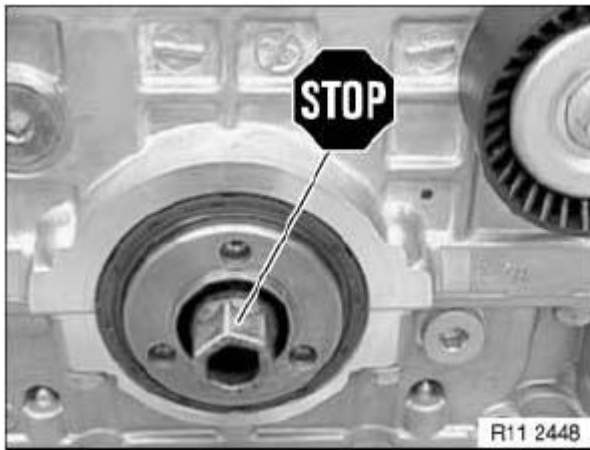


Fig. 66: Identifying Central Bolt For Warning
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back special tool 11 9 222.

Push special tool 11 9 221 onto crankshaft.

IMPORTANT: When screws are tightened down (special tool 11 9 224), radial seal is pressed inwards approx. 1 mm and thus slackened for subsequent removal.

Insert screws (special tool 11 9 224) and tighten down to approx. 20 Nm.

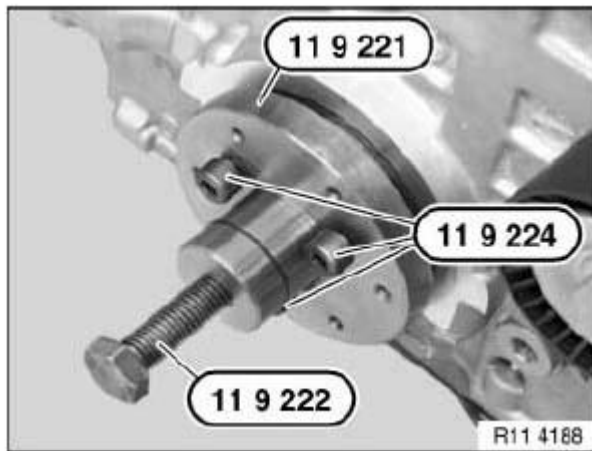


Fig. 67: Identifying Special Tool (11 9 224), (11 9 222) And (11 9 221)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (special tool 11 9 223) and screw in until they make contact without play.

IMPORTANT: Do *not* overload special tool 11 9 223 (metal screws).

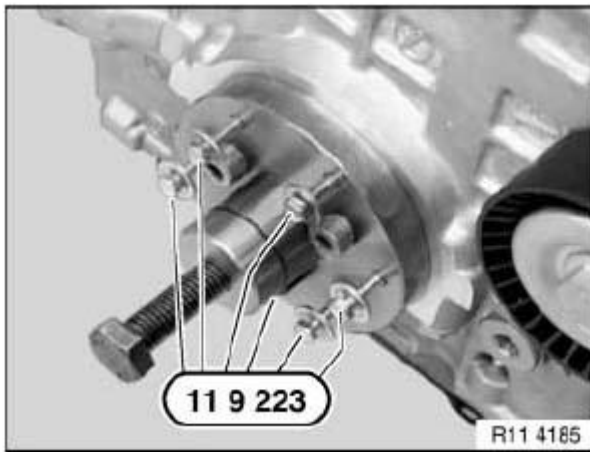


Fig. 68: Identifying Special Tool (11 9 223) And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screws (special tool 11 9 224).

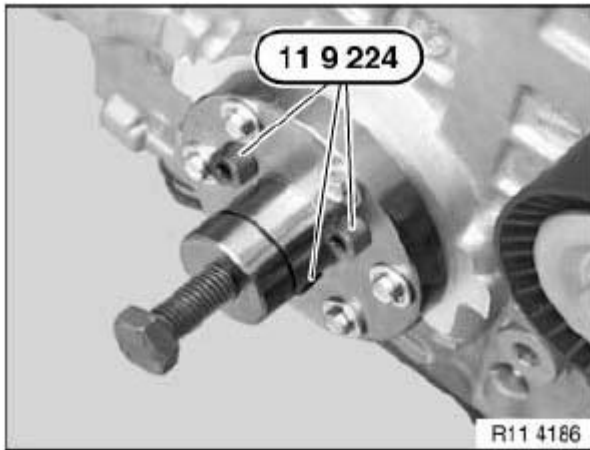


Fig. 69: Identifying Special Tool (11 9 224) And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (special tool 11 9 222) carefully and slowly and withdraw radial seal (1).

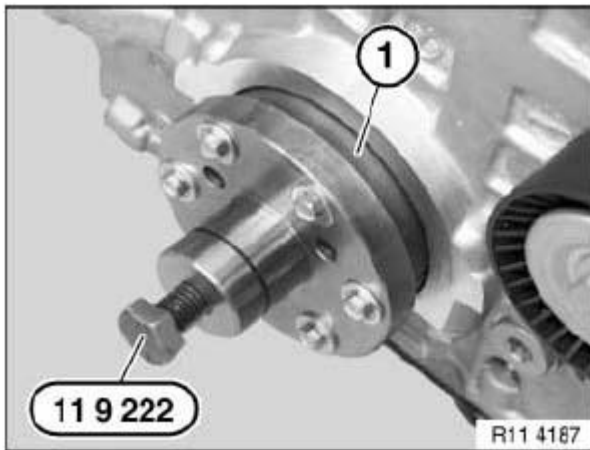


Fig. 70: Identifying Special Tool (11 9 222) And Radial Seal
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of radial shaft seal.

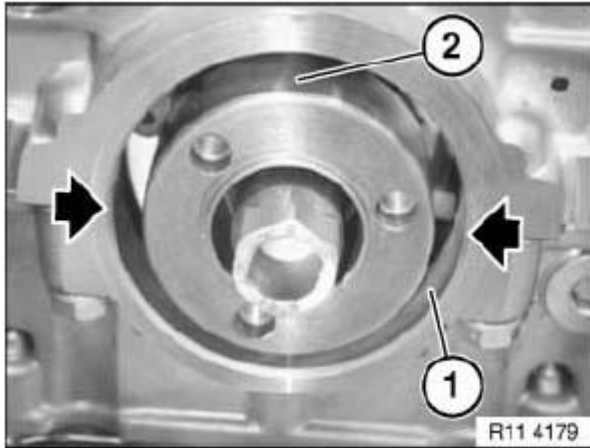


Fig. 71: Identifying Shaft Seal And Radial Shaft Seal Running Surface
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support sleeve (1) is supplied with radial seal (2).

When radial seal (2) is installed, only support sleeve (1) may be used as a slip sleeve.

Radial seal (2) has a groove on both left and right sides.

IMPORTANT: After installation, the grooves must be filled with sealing compound.

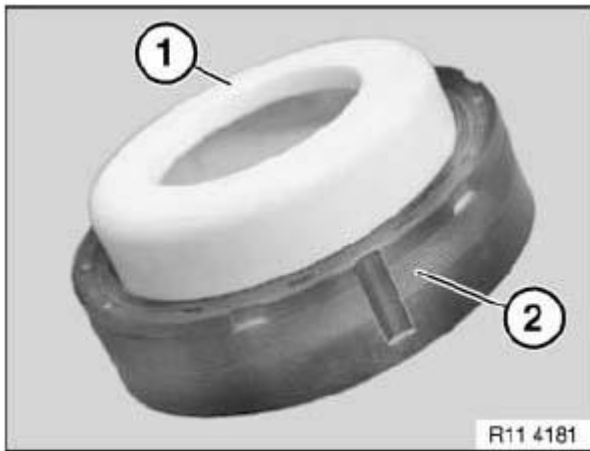


Fig. 72: Identifying Radial Seal And Support Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Attach support bushing (2) with radial shaft seal (1). Push on radial shaft seal (1) in direction of arrow.

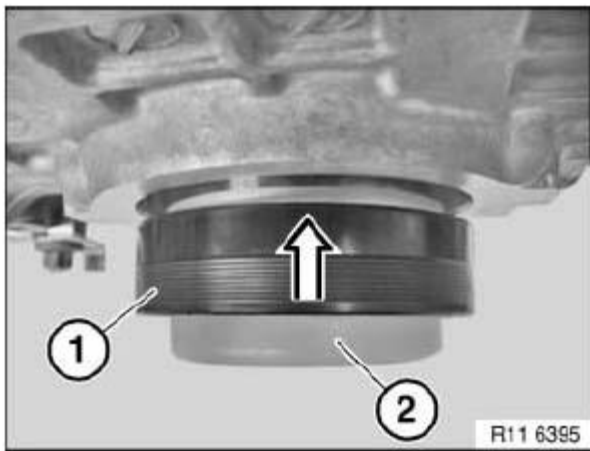


Fig. 73: Identifying Radial Shaft Seal And Support Bushing
Courtesy of BMW OF NORTH AMERICA, INC.

Pay attention to opening on radial shaft seal (1) on left and right.

Remove support bushing (2).

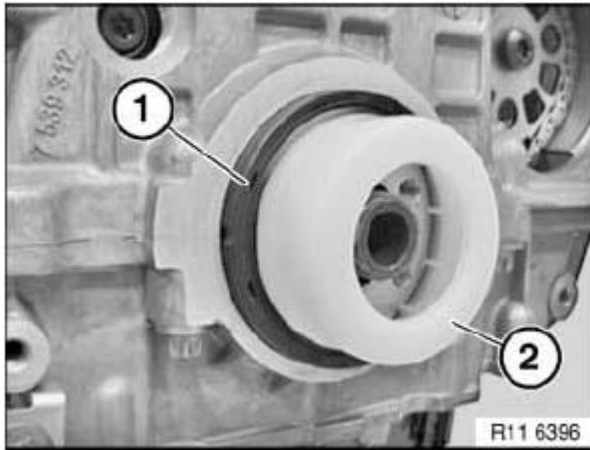


Fig. 74: Identifying Radial Shaft Seal And Bushing
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following text describes installation and sealing between the engine block and radial seal.

The engine block will not be leakproof at the outside of the radial seal if you fail to comply with the individual work steps and the work sequence.

NOTE: The required parts are available from the BMW Parts Service (EPC).

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

Injector (2) contains the sealing compound Loctite, manufacturer's number 128357.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

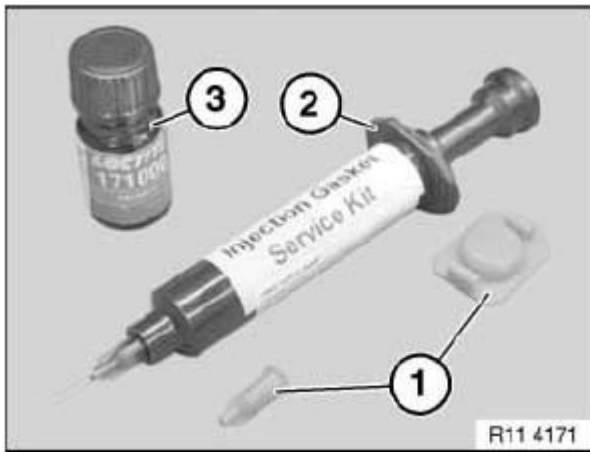


Fig. 75: Identifying Screw Caps, Injector And Loctite Sealing Compound (128357)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 232.

Coat both grooves on radial shaft seal with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

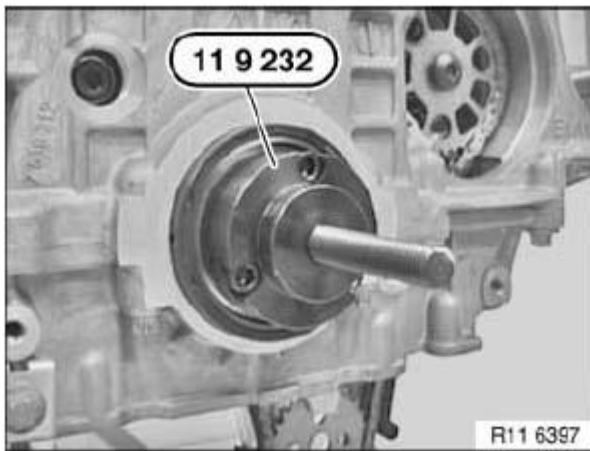


Fig. 76: Identifying Special Tool (11 9 232)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

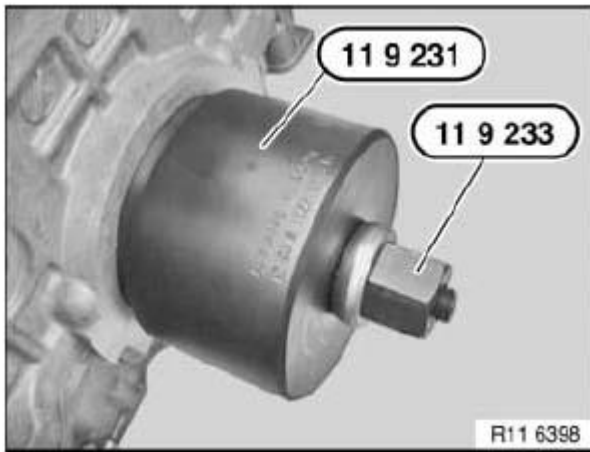


Fig. 77: Identifying Special Tool (11 9 231) And (11 9 233)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Insert brush with Loctite primer, manufacturer's number 171000, as far as possible into grooves (1) on radial shaft seal and coat housing partition on engine block.

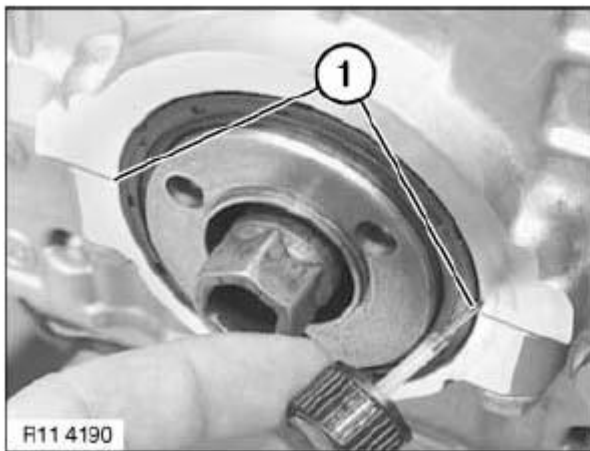


Fig. 78: Identifying Radial Shaft Seal Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Using injector (2), fill both grooves (3) flush with Loctite sealing compound, manufacturer's number 128357.

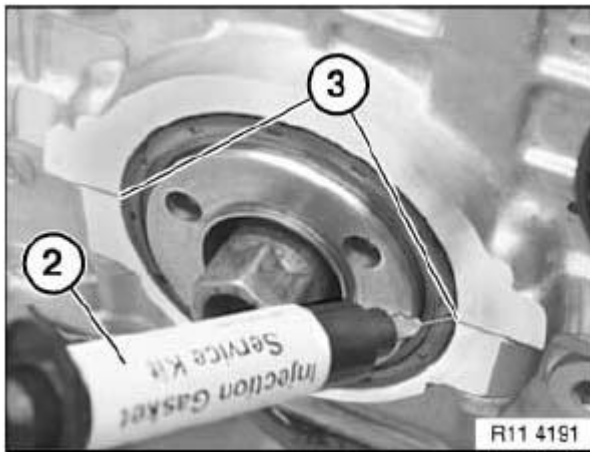


Fig. 79: Identifying Radial Shaft Seal Groove And Loctite Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage. Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

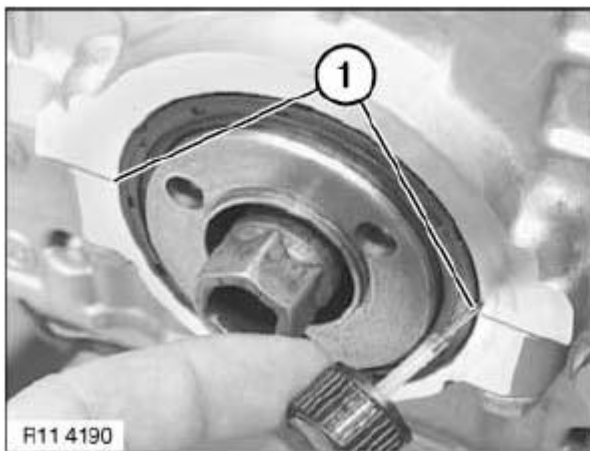


Fig. 80: Identifying Radial Shaft Seal Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 010 REPLACING VACUUM PUMP SEALING COVER (N52)

Special tools required:

- 11 4 361
- 11 4 362

- 11 4 363
- 11 4 364
- 11 9 200

Necessary preliminary tasks:

- Remove fan cowl.
- Remove Alternator Drive Belt.
- Remove Tensioner For Drive Belt.

NOTE: Procedure is identical to that for radial shaft seal.

Expose removal openings on sealing cover.

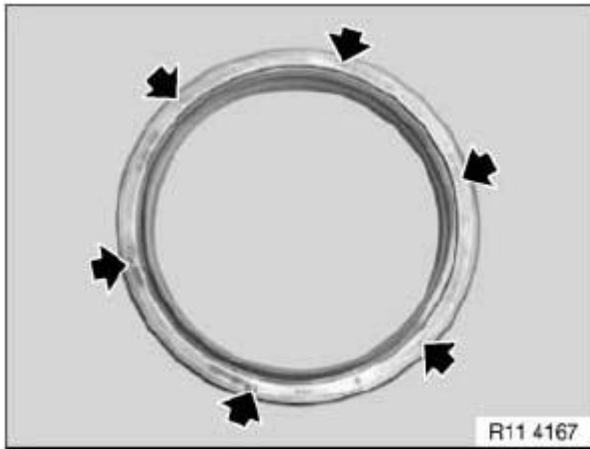


Fig. 81: Identifying Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Convert special tool 11 9 200 (see **Fig. 82**).

Screw special tool 11 9 200 onto end cover.

NOTE: Insert screws until flush only with special tool 11 9 200.

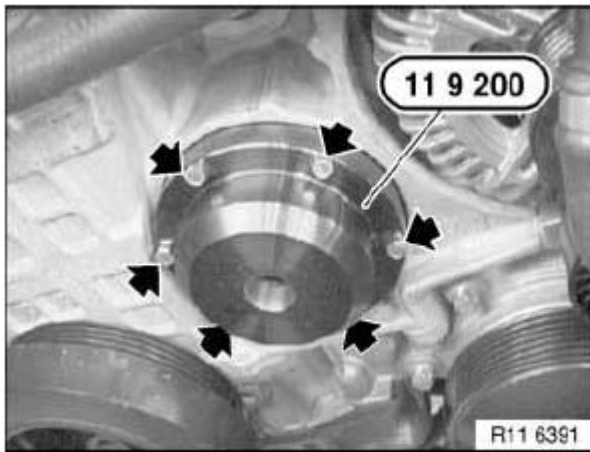


Fig. 82: Identifying Special Tool (11 9 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 4 362.

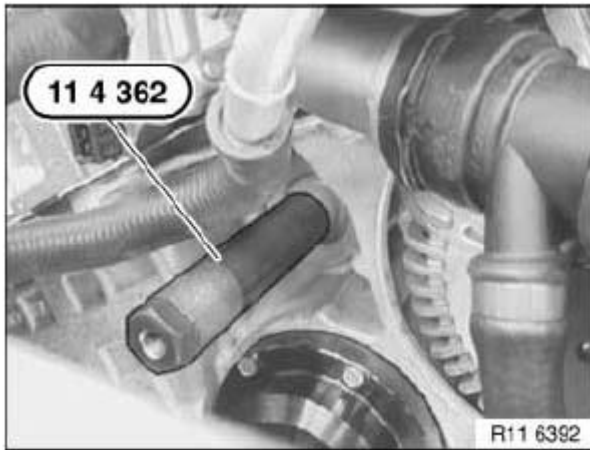


Fig. 83: Identifying Special Tool (11 4 362)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 4 361 to Bedplate screw connection (see arrow in **Fig. 84**).

Secure with knurled screw (1).

Screw special tool 11 4 364 into special tool 11 9 200 and screw out in direction of arrow.

NOTE: For purposes of clarity, illustrations show alternator and servo pump.

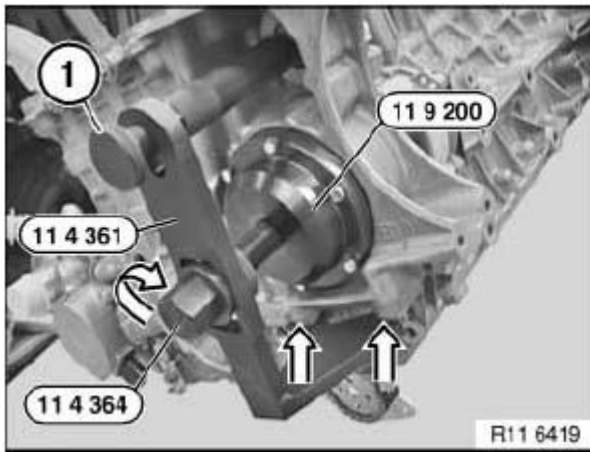


Fig. 84: Identifying Special Tool (11 4 361), (11 4 364), (11 9 200) And Knurled Screw
 Courtesy of BMW OF NORTH AMERICA, INC.

Prepare new sealing cover (1) with special tool 11 9 200 **without** screws.

Screw in sealing cover with special tool 11 4 363 until it is flush.

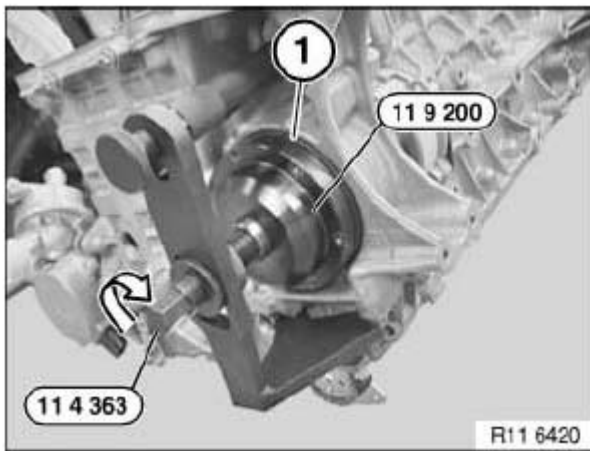


Fig. 85: Identifying Special Tool (11 4 363), (11 9 200) And New Sealing Cover
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 151 REPLACING CRANKSHAFT RADIAL SEAL (N52)

Special tools required:

- 11 9 181
- 11 9 182
- 11 9 183

- 11 9 184
- 11 9 200

Necessary preliminary tasks:

- Remove **Transmission.**
- Remove **Flywheel.**

NOTE: Radial seal has six removal openings for removal with special tool 11 9 200.

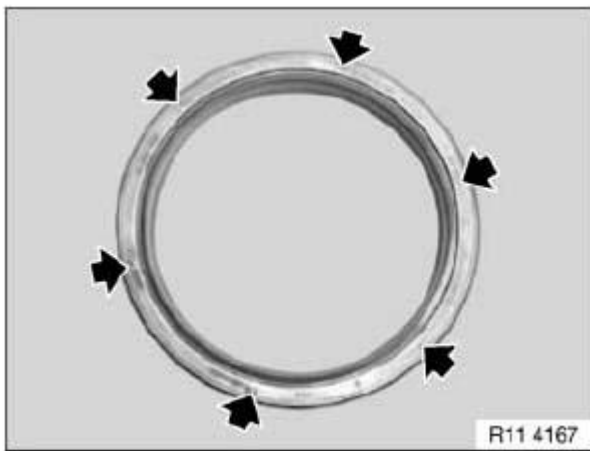


Fig. 86: Identifying Radial Seal

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If necessary, remove rubber coating (1) on top side of radial seal and expose a removal opening (2) (see Fig. 87).

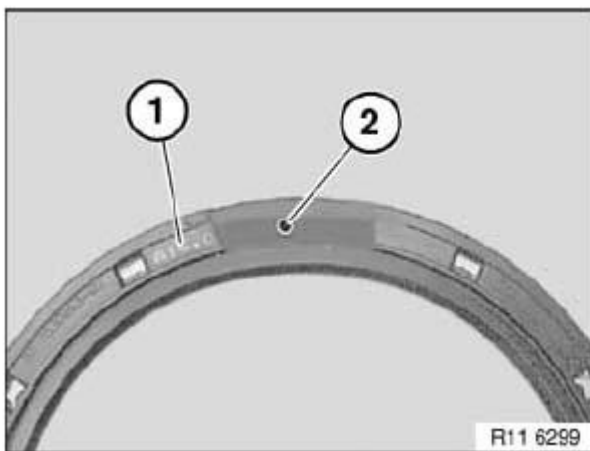


Fig. 87: Identifying Radial Seal Rubber Coating And Removal Opening

Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 200. Insert metal screws into removal opening of radial seal and initially tighten without play (do **not** overtighten metal screws).

Screw in spindle (1) slowly and carefully and detach radial seal.

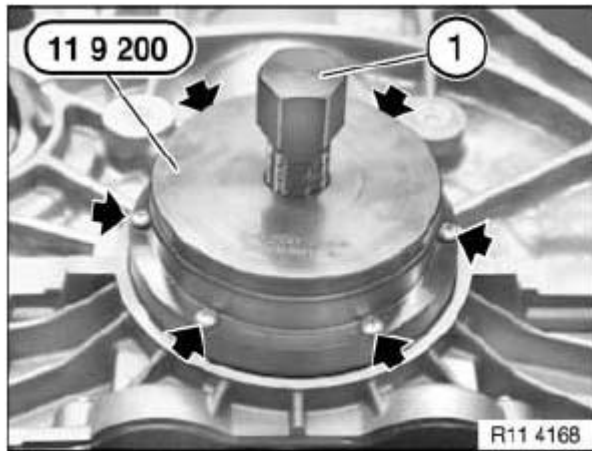


Fig. 88: Identifying Special Tool (11 9 200) And Crankshaft Radial Seal Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of radial shaft seal.

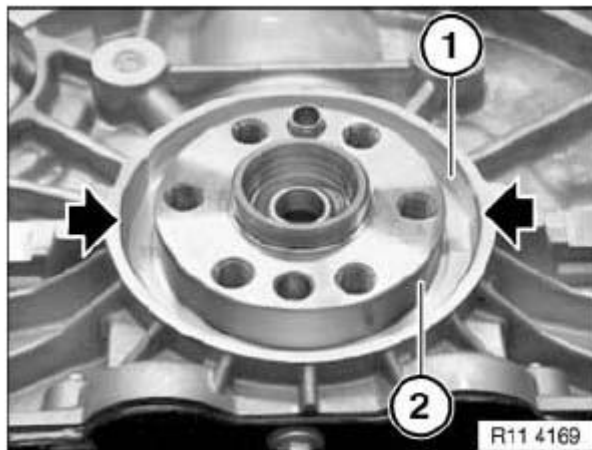


Fig. 89: Identifying Radial Shaft Sealing And Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support sleeve (4) is supplied with radial shaft seal (1).

When radial shaft seal (1) is installed, only support sleeve (4) may be used as a slip sleeve.

Radial shaft seal (1) has a groove (2) on both left and right sides.

IMPORTANT: After installation, grooves (2) must be filled with sealing compound.

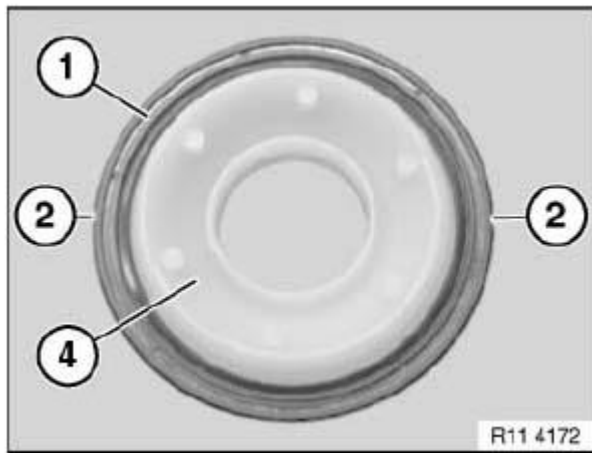


Fig. 90: Identifying Radial Shaft Seal, Groove And Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The seal between the engine block and radial seal is described below.

The engine block will not be leakproof at the outside of the radial seal if you fail to comply with the individual work steps and the work sequence.

NOTE: The required parts are available from the BMW Parts Service (EPC).

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

Injector (2) contains the sealing compound Loctite, manufacturer's number 128357.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

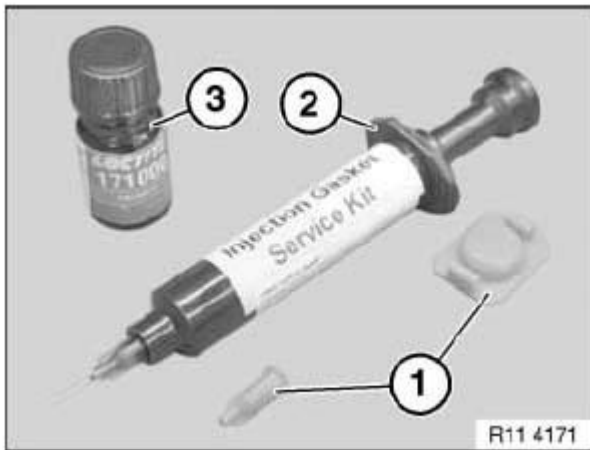


Fig. 91: Identifying Screw Caps, Injector And Bottle Of Loctite (171000)
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit support sleeve (4) with radial shaft seal (1) on crankshaft.

Align groove (2) centrally to housing partition (3).

Coat both grooves (2) on radial shaft seal (1) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

Push radial shaft seal (1) by hand as far as possible onto running surface.

Carefully remove support sleeve (4).

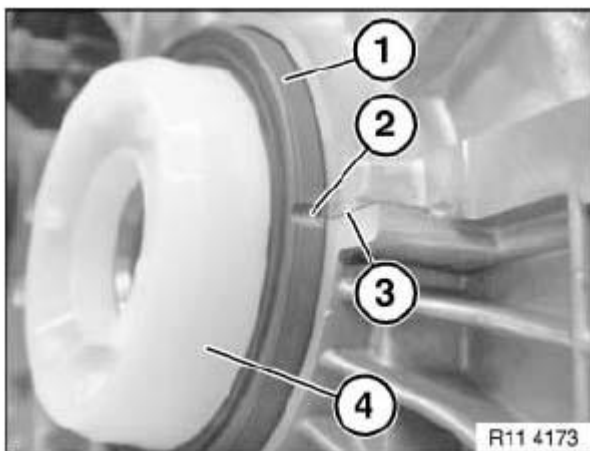


Fig. 92: Identifying Support Sleeve, Radial Shaft Seal, Groove And Housing Partition
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Spacer ring (1) is supplied with radial shaft seal.

Screw special tool 11 9 182 with screws (special tool 11 9 184) to crankshaft.

Fit spacer ring (1) on preassembled radial shaft seal

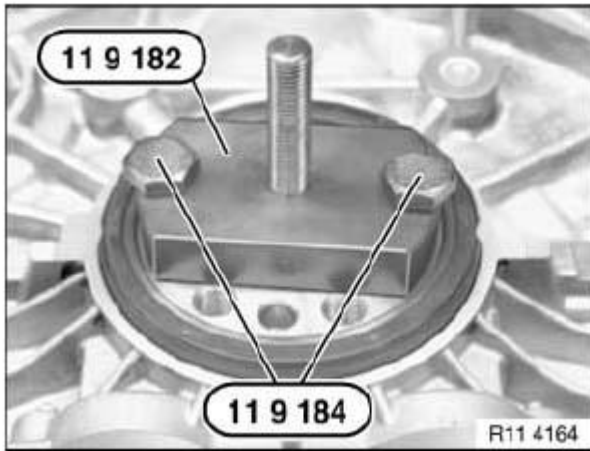


Fig. 93: Identifying Special Tool (11 9 182) And (11 9 184)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal with special tool 11 9 181 in conjunction with special tool 11 9 183 until flush.

Then remove spacer ring again.

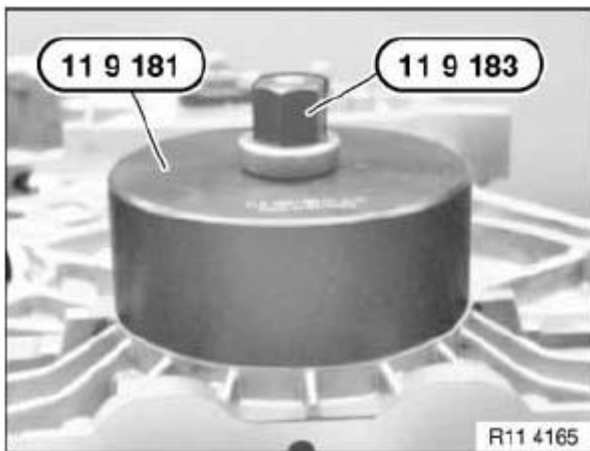


Fig. 94: Identifying Special Tool (11 9 181) And (11 9 183)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Insert brush with Loctite primer, manufacturer's number 171000, as far as possible into grooves (1) on radial

shaft seal and coat housing partition on engine block.

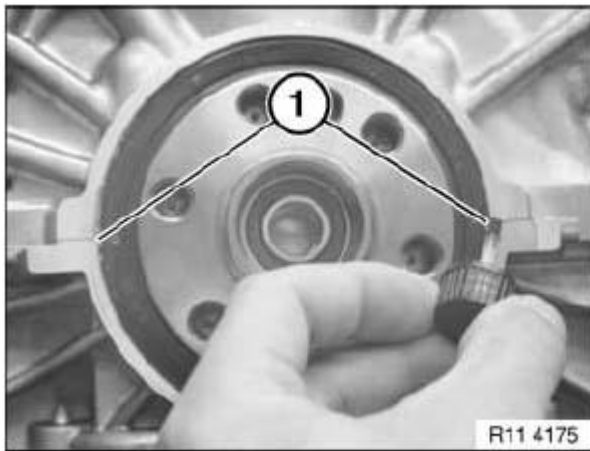


Fig. 95: Using Loctite Sealing Compound (171000) On Groove (1 of 3)
Courtesy of BMW OF NORTH AMERICA, INC.

Fill both grooves (1) flush with Loctite sealing compound, manufacturer's number 128357.

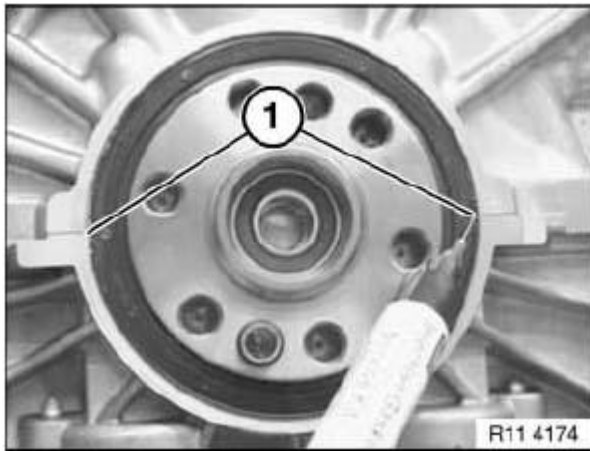


Fig. 96: Using Loctite Sealing Compound (171000) On Groove (2 Of 3)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

NOTE: **Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage.**

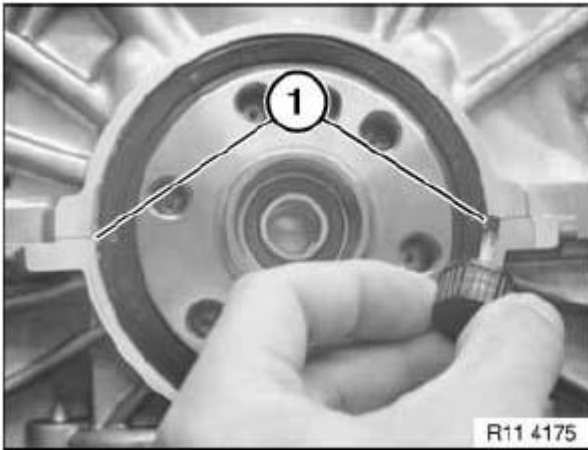


Fig. 97: Using Loctite Sealing Compound (171000) On Groove (3 Of 3)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

21 CRANKSHAFT WITH BEARING

11 21 500 REPLACING CRANKSHAFT (N52)

Special tools required:

- 00 2 510
- 00 9 120
- 11 4 370
- 11 4 440
- 11 9 360

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **Engine.**
- Mount engine on **Assembly Stand.**
- Remove **Vibration Damper.**
- Removing **Oil Pan.**
- Remove **Oil Pump.**
- Remove **Triangular Drive** for oil pump.
- Remove **Timing Chain Module.**
- Remove **Cylinder Head.**
- Remove **Flywheel.**
- Remove all **Pistons.**

Release screws (1).

For tightening torque refer to 11 13 5AZ in **11 13 OIL PAN (N52)** .

Installation:

Replace aluminium screws.

Remove oil deflector (2).

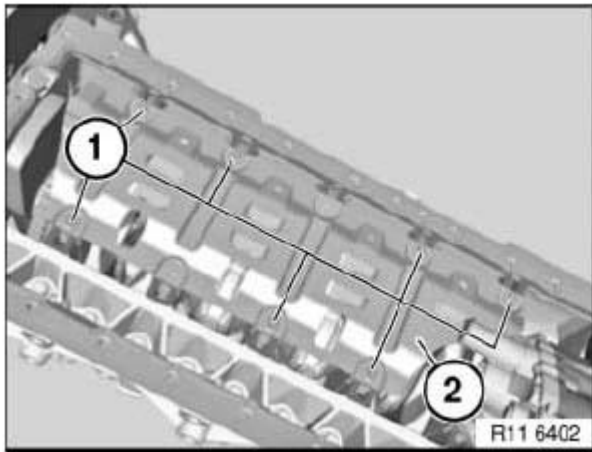


Fig. 98: Identifying Oil Deflector And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

For tightening torque refer to 11 11 2AZ in **11 11 ENGINE BLOCK (N52)** .

For tightening torque refer to 11 11 3AZ in **11 11 ENGINE BLOCK (N52)** .

Installation:

Replace aluminium screws.

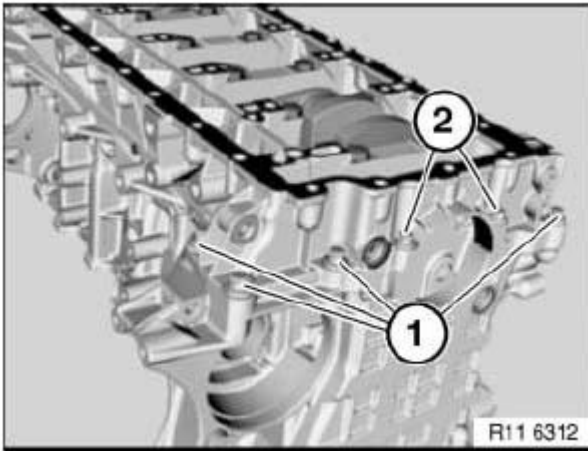


Fig. 99: Identifying Engine Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

For tightening torque refer to 11 11 2AZ in **11 11 ENGINE BLOCK (N52)** .

Release screws (2).

For tightening torque refer to 11 11 4AZ in **11 11 ENGINE BLOCK (N52)** .

Installation:

Replace aluminium screws.

Release steel screws (1 to 14) from outside inwards.

For tightening torque refer to 11 11 1AZ in **11 11 ENGINE BLOCK (N52)** .

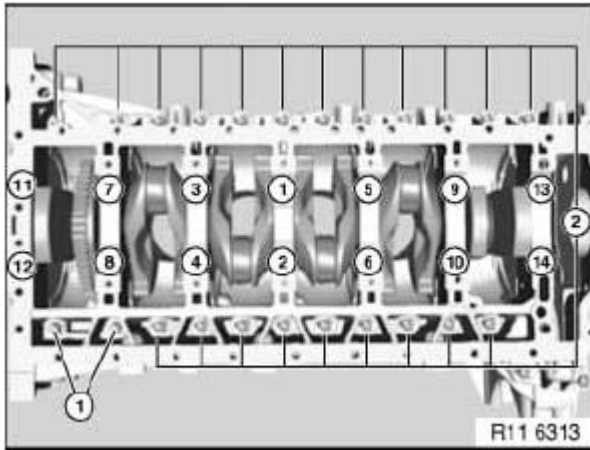


Fig. 100: Identifying Tightening Sequence Of Crankshaft Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

For tightening torque refer to 11 11 3AZ in **11 11 ENGINE BLOCK (N52)** .

Installation:

Replace aluminium screws.

Lift out bedplate.

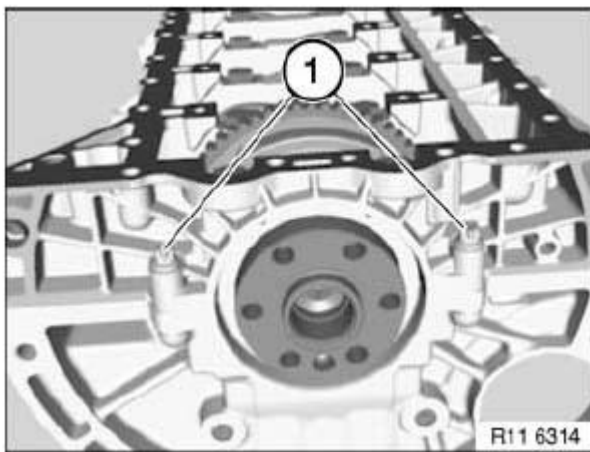


Fig. 101: Identifying Radial Shaft Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove both radial shaft seals (1).

NOTE: Illustrations show N46.

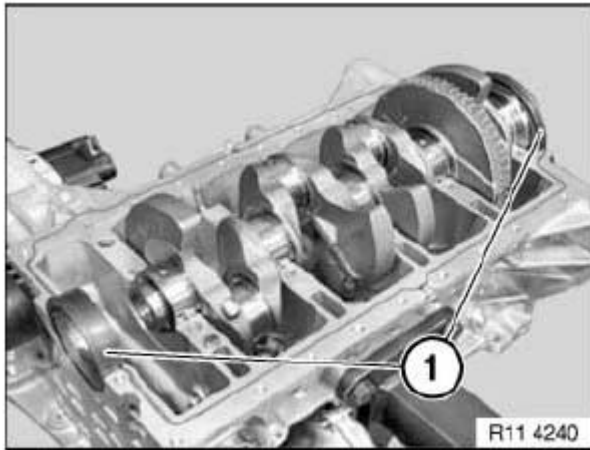


Fig. 102: Identifying Radial Shaft Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **Main Bearing Shells** (2 and 3), replace if necessary.

Remove and install crankshaft (1) in direction of arrow.

IMPORTANT: Remove crankshaft with aid of a second person.

Weight of crankshaft approx. 23 kg.

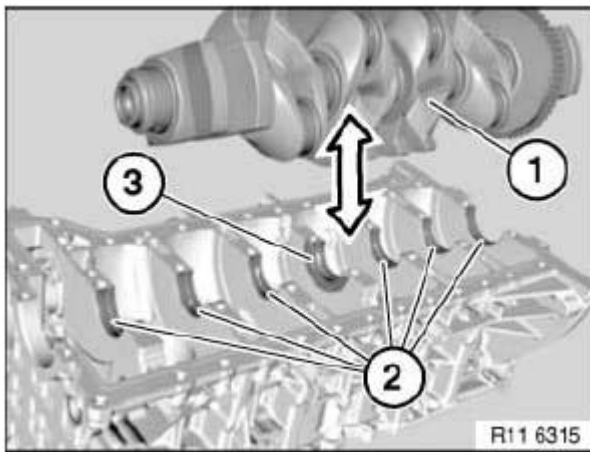


Fig. 103: Identifying Main Bearing Shells And Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (1) for damage and correct seating.

Reinstall crankshaft.

Installation:

Lubricate all bearing points with engine oil.

Clean all sealing surfaces.

NOTE: Illustrations show N46.

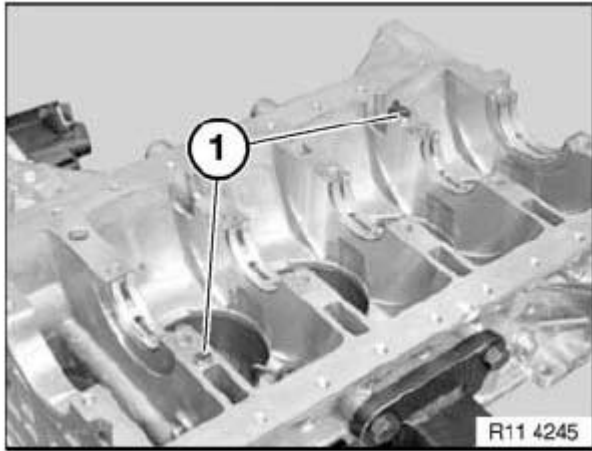


Fig. 104: Identifying Crankshaft Guide Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten steel screws (1 to 14) from inside outwards.

For tightening torque refer to 11 11 1AZ in **11 11 ENGINE BLOCK (N52)** .

Tighten screws (2) from inside outwards.

For tightening torque refer to 11 11 4AZ in **11 11 ENGINE BLOCK (N52)** .

Tighten screws (1).

For tightening torque refer to 11 11 2AZ in **11 11 ENGINE BLOCK (N52)** .

Installation:

Replace aluminium screws.

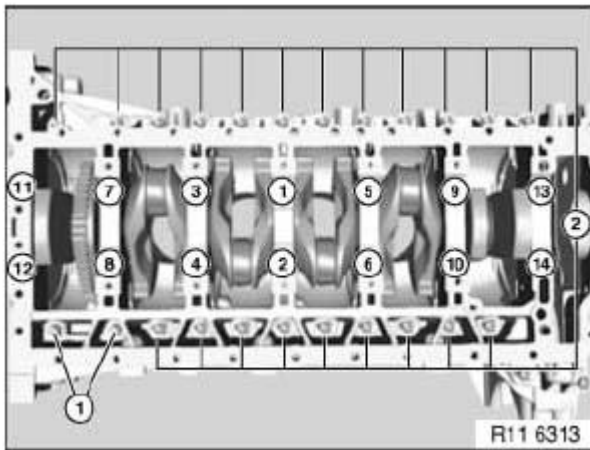


Fig. 105: Identifying Tightening Sequence Of Crankshaft Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten aluminium screws exclusively with special tool 00 9 120.

IMPORTANT: In the case of aluminium screws, jointing torque and angle of rotation must be observed without fail.

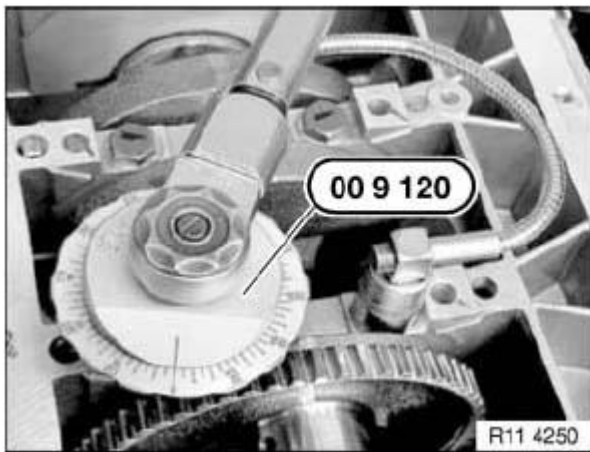


Fig. 106: Identifying Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Set up stand with magnetic base on special tool 11 4 440.

Set up special tool 00 2 510 on stand.

Position special tool 00 2 510 on crankshaft.

Move crankshaft in direction of arrow.

Determine **Bearing Play.**

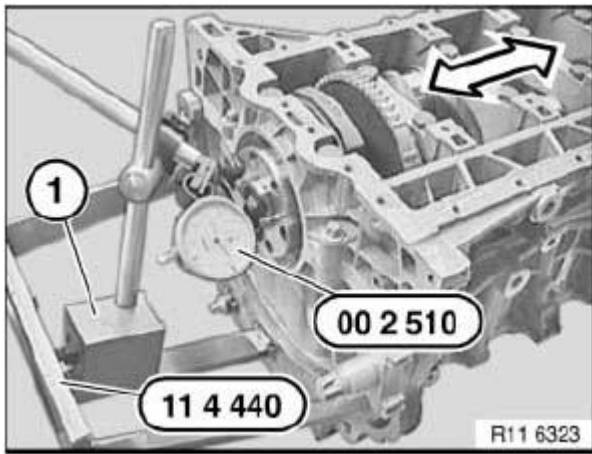


Fig. 107: Identifying Special Tool (00 2 510) And (11 4 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Drive in both nozzles (1) with special tool 11 9 360 on left and right into crankcase.

Installation:

Always replace nozzles (1).

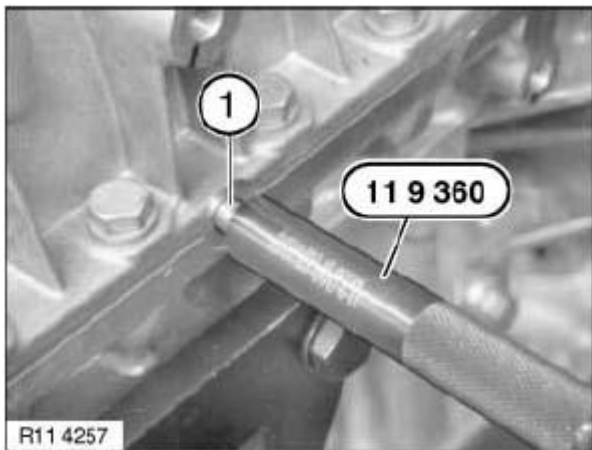


Fig. 108: Identifying Special Tool (11 9 360) And Crankcase Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Prepare sealing compound (1) in special tool 11 4 370.

Screw on nozzle for injecting sealing compound.

Slowly insert sealing compound (1) with special tool 11 4 370 in direction of arrow.

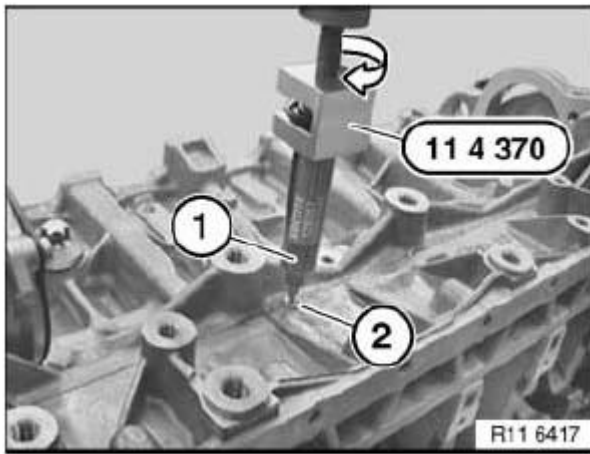


Fig. 109: Identifying Special Tool (11 4 370)
Courtesy of BMW OF NORTH AMERICA, INC.

Replace radial shaft seal at **Front**.

Replace radial shaft seal at **Rear**.

Assemble engine.

11 21 531 REPLACING ALL CRANKSHAFT MAIN BEARINGS (N52)

Special tools required:

- 00 2 590
- 11 4 251
- 11 4 252
- 11 4 470

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

Remove **Crankshaft**.

Check setting of oil spray nozzles, adjusting if necessary:

Attach special tool 11 4 251 to screw connection on main bearing.

Special tool 11 4 252 must be pre-installed at the seventh main bearing block.

For tightening torque refer to 11 11 5AZ in **11 11 ENGINE BLOCK (N52)**.

NOTE: See **Fig. 110**.

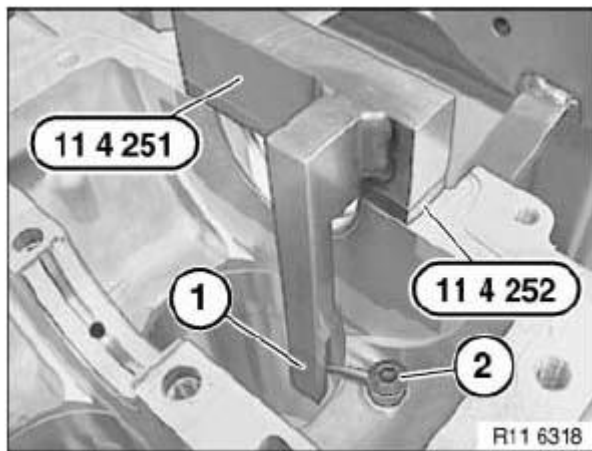


Fig. 110: Identifying Special Tool (11 4 251) And (11 4 252)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing shells (2) and (3).

NOTE: Guide bearing shell (3) is a thrust bearing.

Observe Bearing Classification.

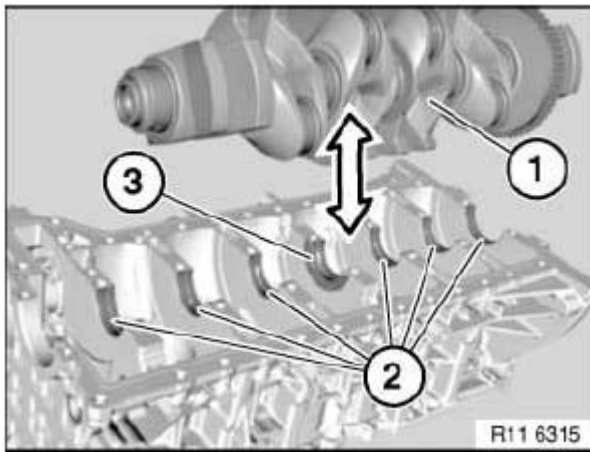


Fig. 111: Identifying Bearing Shells And Crankshaft
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bearing shell (1) with lubricant groove must be fitted in crankcase upper section.

Bearing shell (2) without lubricant groove must be fitted in crankcase lower section (bedplate).

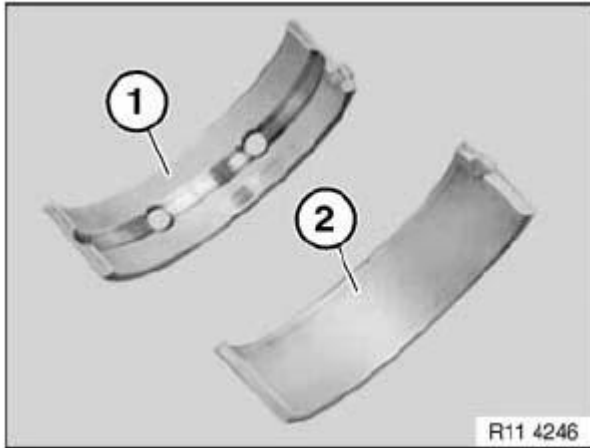


Fig. 112: Identifying Bearing Shell With And Without Lubricant Groove
 Courtesy of BMW OF NORTH AMERICA, INC.

Surface (1) for identification.

Seven-digit part number (2).

Bearing classification (3) of crankshaft as per table (values 1 to 3).

Reworking (4) as per table (main bearing).

B= build date 1 (-0.25mm).

B= build date 2 (-0.50mm).

Reworking (5) as per table (lift bearing).

B= construction stage 1 (-0.25mm).

C = construction stage 2 (-0.50mm)

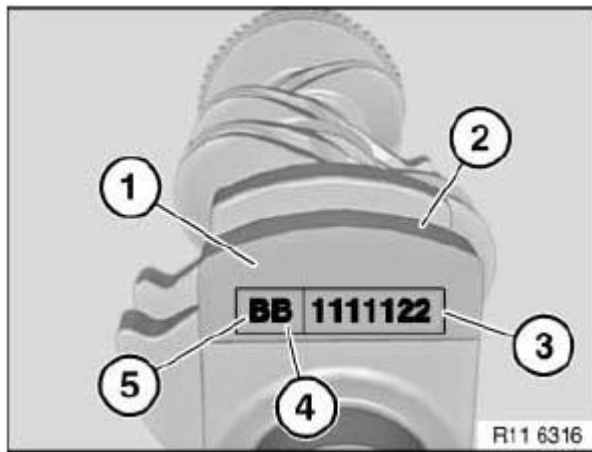


Fig. 113: Identifying Bearing Classification Tag
Courtesy of BMW OF NORTH AMERICA, INC.

Bearing classification (1) in crankcase as per table (values of A/B/C).

Installation:

When all the letters and number code have been determined, the bearing shell colour must be allocated, see **BEARING SPECIFICATION** table.

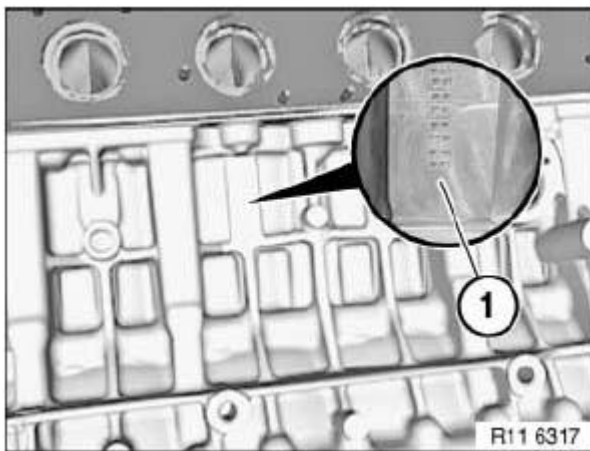


Fig. 114: Identifying Bearing Classification In Crankcase

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Engine damage will result if a small bearing play is determined.

The colour combination Yellow and Red must not be fitted.

Possible colour combinations, see **BEARING SPECIFICATION**.**BEARING SPECIFICATION**

(A1) Bedplate / Yellow	(B1) Bedplate / Yellow	(C1) Bedplate / Green
(A1) Crankcase / Yellow	(B1) Crankcase / Green	(C1) Crankcase / Green
(A2) Bedplate / Green	(B2) Bedplate / Green	(C2) Bedplate / Green
(A2) Crankcase / Yellow	(B2) Crankcase / Green	(C2) Crankcase / Red
(A3) Bedplate / Green	(B3) Bedplate / Red	(C3) Bedplate / Red
(A3) Crankcase / Green	(B3) Crankcase / Green	(C3) Crankcase / Red

Insert all bearing shells (2 and 3).

IMPORTANT: Clean sealing surfaces.**Do not clean sealing faces with a metal-cutting tool.**

Clean sealing faces with special tool 11 4 470 only.

Determine bearing play with special tool 00 2 590.

Installation:

All measuring points must be free from oil and grease.

Use used screws to determine bearing play.

Set up **Bedplate** with bearing shells.

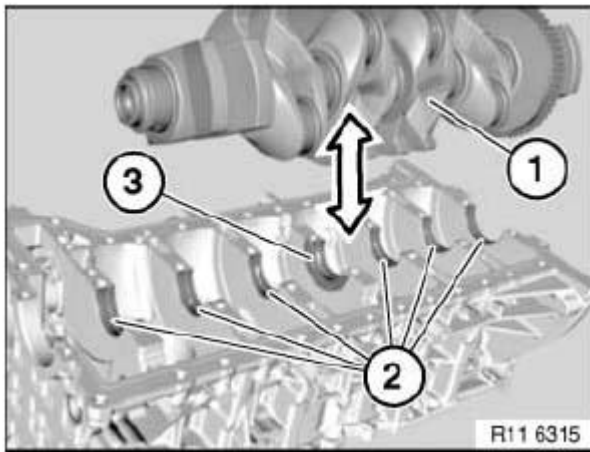


Fig. 115: Identifying Bearing Shells And Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bedplate.

Read off bearing play at width of flattened plastic thread and measurement scale.

Crankshaft bearing clearance radial.

Installation:

Remove plastic thread.

Apply a light coat of oil to bearing shells and crankshaft.



Fig. 116: Identifying Crankshaft Bearing Clearance Radial
Courtesy of BMW OF NORTH AMERICA, INC.

Install **Bedplate**.

Assemble engine.

22 FLYWHEEL

11 22 500 REMOVING AND INSTALLING OR REPLACING FLYWHEEL (N52)

Special tools required:

- 11 4 180
- 11 9 260
- 11 9 265

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **Transmission.**
- Remove **Clutch.**

Block flywheel (1) with special tool 11 9 260, use an old transmission screw for this purpose.

Installation:

Replace aluminium screws.

Unfasten flywheel screws.

For tightening torque refer to 11 22 1AZ in **11 22 FLYWHEEL (N52)** .

Installation:

Flywheel (1) is secured with an alignment pin.

Fit new flywheel screws.

Clean crankshaft thread for flywheel screws.

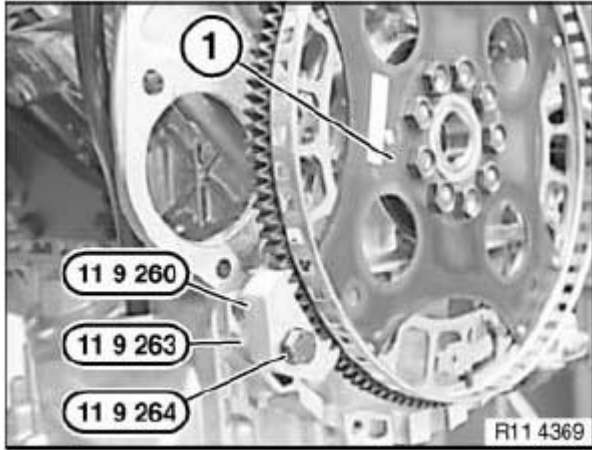


Fig. 117: Identifying Special Tools (11 9 260), (11 9 263), (11 9 264) And Flywheel
Courtesy of BMW OF NORTH AMERICA, INC.

Secure flywheel with an old transmission screw (1) and special tools 11 9 260 and 11 9 265.

Installation:

Replace aluminium screws.

Release flywheel screws with special tool 11 4 180.

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

For tightening torque refer to 11 22 2AZ in **11 22 FLYWHEEL (N52)** .

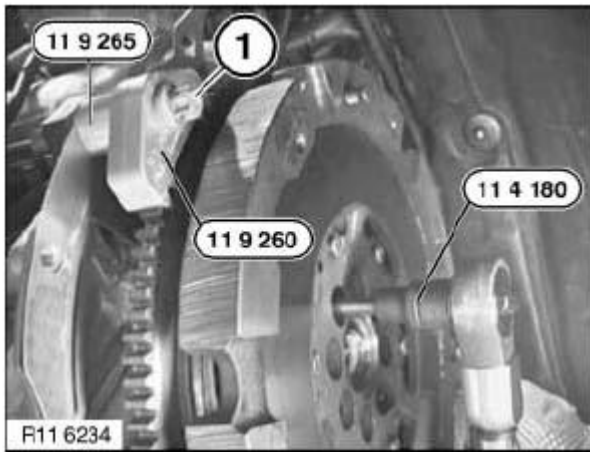


Fig. 118: Identifying Special Tools (11 9 265), (11 9 260), (11 4 180) And Flywheel Transmission Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 22 513 REPLACING ROLLER BEARING FOR DUALMASS FLYWHEEL

Special tools required:

- 21 2 051
- 21 2 052

NOTE: **Flywheel removed!**

Using hydraulic press (1) and special tool 21 2 051, press out dual-mass flywheel downwards on engine side.

IMPORTANT: Risk of damage:

Roller bearing must not be driven out.

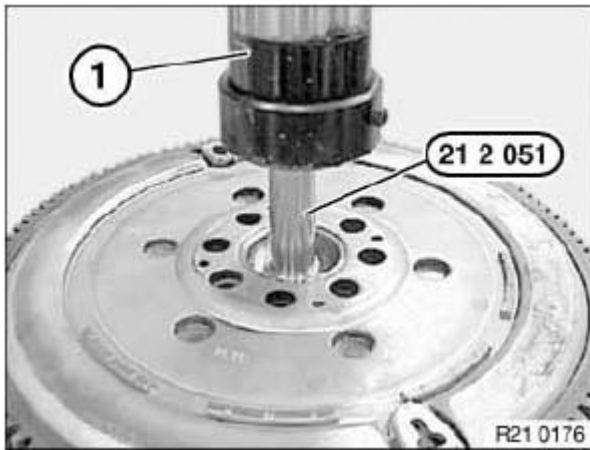


Fig. 119: Identifying Special Tool (21 2 051) And Hydraulic Press
 Courtesy of BMW OF NORTH AMERICA, INC.

Push roller bearing (2) onto special tool 21 2 052.

Using hydraulic press (1), press roller bearing into dualmass flywheel as far as it will go on clutch side.

IMPORTANT: Risk of damage:

Observe press-in instruction:

- Roller bearing must not be driven in.
- Roller bearing mounting force/travel monitored:

Min. 2000N 1 mm before end of pressing in.

Max. 15000N during entire press-in procedure.

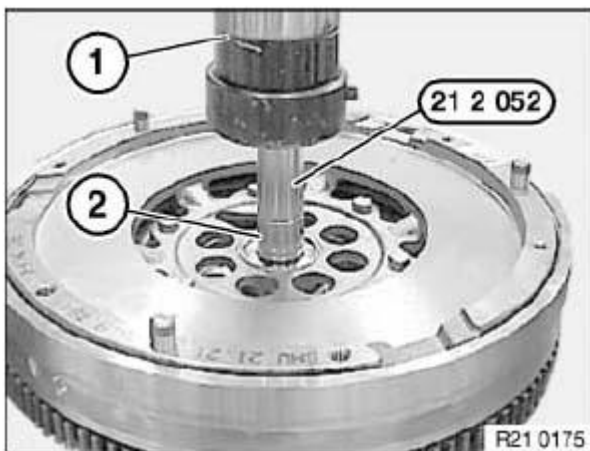


Fig. 120: Identifying Special Tool (21 2 052), Roller Bearing And Hydraulic Press
 Courtesy of BMW OF NORTH AMERICA, INC.

11 22 513 REPLACING ROLLER BEARING FOR DUALMASS FLYWHEEL WITH HYDRAULIC PRESS**Special tools required:**

- 00 5 500
- 11 2 010
- 11 2 343
- 11 2 350

NOTE: **Flywheel removed!**

Position special tool 11 2 010 in roller bearing.

Twist out roller bearing with special tool 11 2 343.



Fig. 121: Identifying Special Tool (11 2 010) And (11 2 343)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tools 11 2 350 and 00 5 500.

Drive in roller bearing with special tools 11 2 350 and 00 5 500 in direction of arrow as far as it will go.

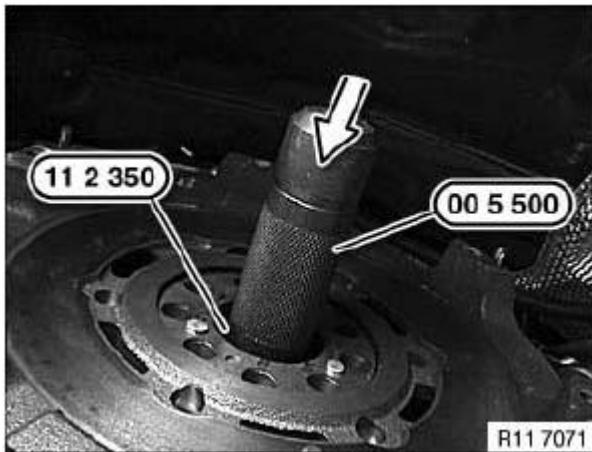


Fig. 122: Identifying Special Tool (11 2 350) And (00 5 500)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 22 513 REPLACING ROLLER BEARING FOR DUALMASS FLYWHEEL MANUALLY

Special tools required:

- 00 5 500
- 11 2 010
- 11 2 343
- 11 2 350

NOTE: **Flywheel removed!**

Position special tool 11 2 010 in roller bearing.

Twist out roller bearing with special tool 11 2 343.



Fig. 123: Identifying Special Tool (11 2 010) And (11 2 343)
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tools 11 2 350 and 00 5 500.

Drive in roller bearing with special tools 11 2 350 and 00 5 500 in direction of arrow as far as it will go.

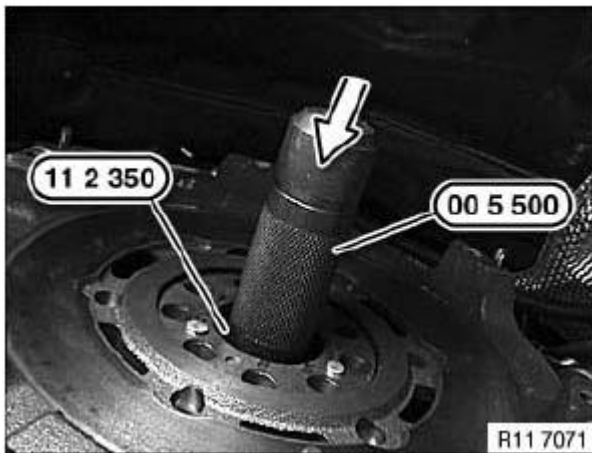


Fig. 124: Identifying Special Tool (11 2 350) And (00 5 500)
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

23 VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING OR REPLACING VIBRATION DAMPER (N52)

Necessary preliminary tasks:

- Detach **Front Underbody Protection.**

- Remove **Drive Belt**.

Release screws (1).

For tightening torque refer to 11 23 1AZ in **11 23 VIBRATION DAMPER (N52)** .

Remove vibration damper (2). **Vibration Damper**

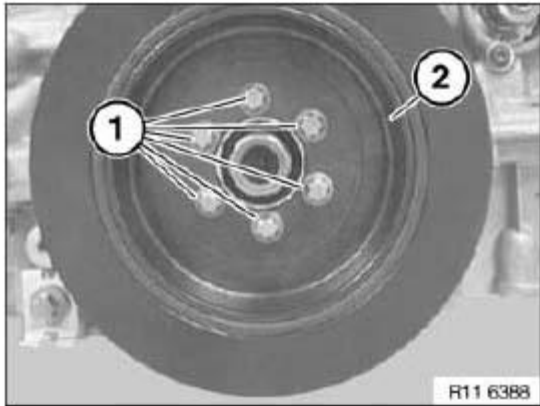


Fig. 125: Identifying Vibration Damper And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

24 CONNECTING ROD WITH BEARING

11 24 571 REPLACING ALL CONNECTING ROD BEARINGS (N52)

Special tools required:

- 00 2 590
- 00 9 120

IMPORTANT: All crank pins are connected with the crankshaft.

Modified procedure; the bearing shell colours are the same at the top and bottom.

Blue / Red bearing shell colours are no longer used in combination.

Necessary preliminary tasks:

- Remove all **Pistons**.

IMPORTANT: Note Grinding Stages On Crankshaft.

Reworking (5) as per table (lift bearing).

B = construction stage 1 (- 0.25 mm)

C = construction stage 2 (- 0.50 mm)

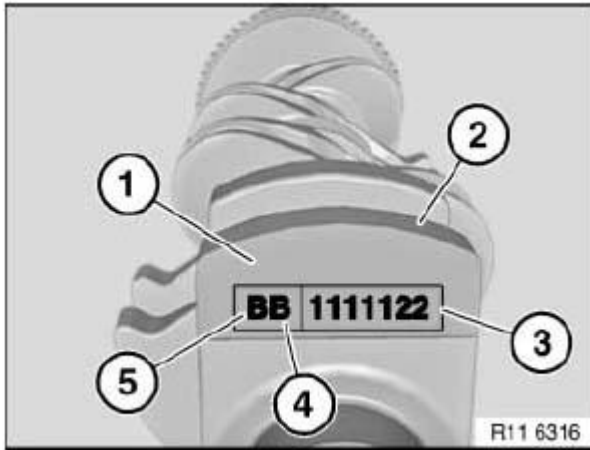


Fig. 126: Identifying Bearing Identification Tag
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: All crankshaft crank pins are classified.

Possible classifications per connecting rod at top and bottom:

r: Red

b: Blue

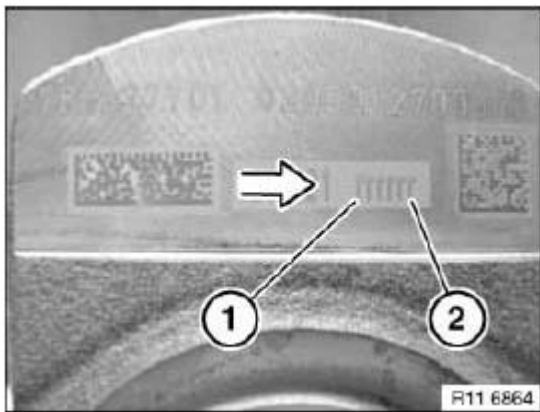


Fig. 127: Identifying Crankshaft Crank Pins

Courtesy of BMW OF NORTH AMERICA, INC.

Only one colour may be fitted per big end and connecting rod shank.

In direction of arrow from (1 to 2) crank pin (1 to 6).

Example:

Possible classification: rbbrrb.

Cylinder classification Red.

1:

Cylinder classification Blue.

2:

Cylinder classification Blue.

3:

Cylinder classification Red.

4:

Cylinder classification Red.

5:

Cylinder classification Blue.

6:

Install new conrod bearing shells.

In each case insert only one colour of bearing shell (1 and 2) for each conrod.

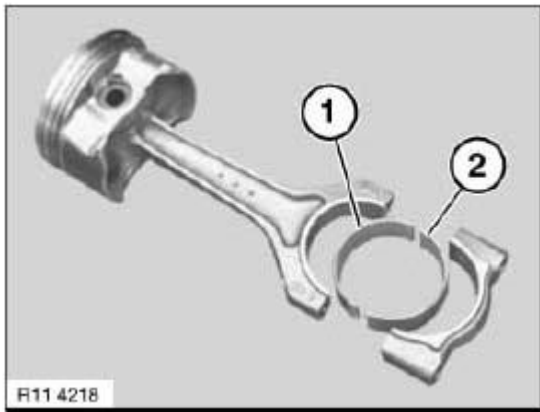


Fig. 128: Identifying Connecting Rod Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Check conrod bearing clearance.

Piston in BDC position.

Fit special tool 00 2 590 (Plastigage Type PG 1) to oilfree crankshaft.

Fit bearing cap so that pairing letters match up.



Fig. 129: Locating Conrod Bearing Clearance
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort conrods or crankshaft.

Use the old conrod bolts to check conrod clearance. Tighten down conrod bolts with special tool 00 9 120. For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)**.

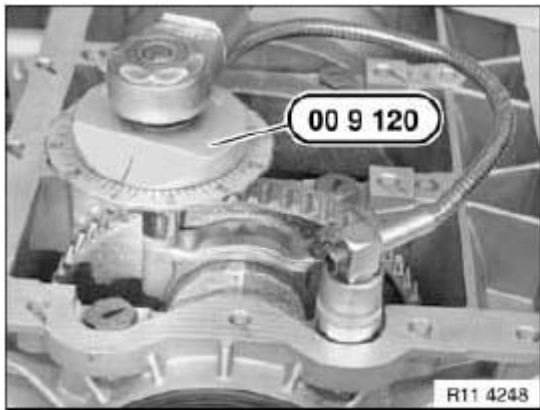


Fig. 130: Identifying Special Tool (00 9 120)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing cap. Read off bearing clearance at width of crushed plastic thread with aid of measuring scale.

Conrod Bearing Clearance.

- Remove plastic thread.
- Coat crankshaft and bearing shells with oil.
- Install new conrod bolts and tighten down with special tool 00 9 120.

For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)** .

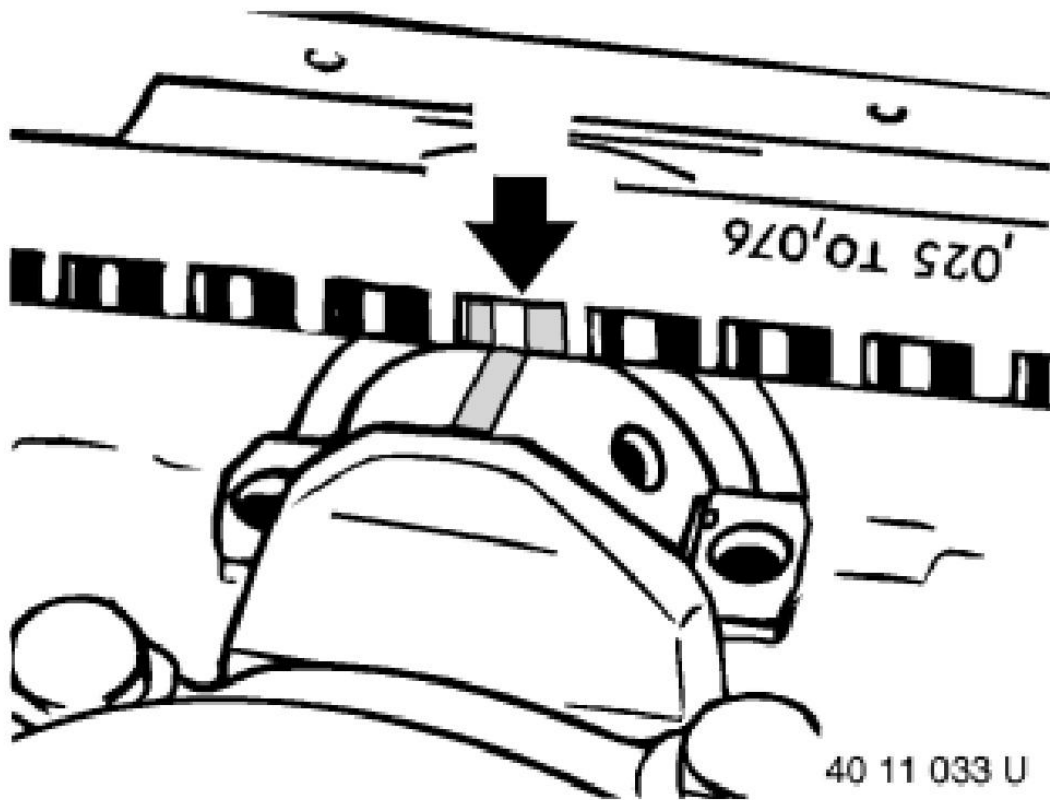


Fig. 131: Checking Connecting Rod Bearing Clearance With Measuring Scale
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

25 PISTON WITH RING AND PIN

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N52)

Special tools required:

- 00 9 120
- 11 4 491
- 11 4 492
- 11 4 493
- 11 6 241
- 11 6 261
- 11 8 330

- 11 9 493
- 11 9 494

WARNING: Protective goggles must be worn when working on the piston pin circlip.

IMPORTANT: If pistons, conrods and bearing shells are reused, they must be reinstalled in the same places.

Individual conrod replacement is not permitted; they are classified according to weight categories.

Conrods and conrod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

Piston and piston pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove **Engine.**
- Mount engine on **Assembly Stand.**
- Remove **Intake Air Manifold.**
- Remove **Cylinder Head.**
- Remove **Engine Oil Sump.**
- Remove **Oil Pump.**

NOTE: In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

NOTE: Illustrations show N46.

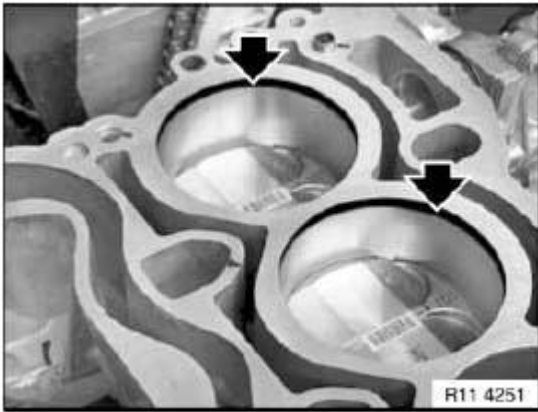


Fig. 132: Identifying Engine Cylinder Wall
Courtesy of BMW OF NORTH AMERICA, INC.

Do **not** release screw (1).

Oil Spray Nozzle (2) must not be maladjusted or bent.

If necessary, **Readjust** (risk of damage).

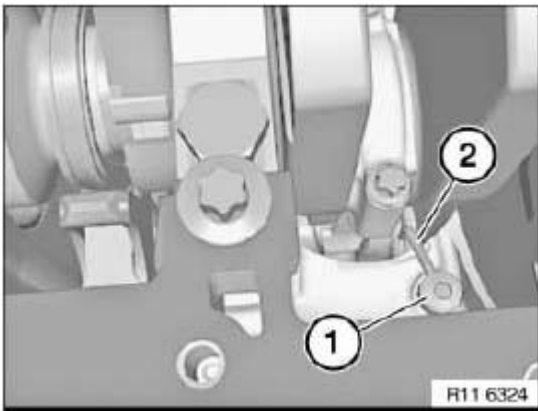


Fig. 133: Identifying Oil Spray Nozzle And Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release conrod bolts (1).

For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)** .

Remove conrod bearing cap (2) in direction of arrow.

IMPORTANT: Conrods and conrod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

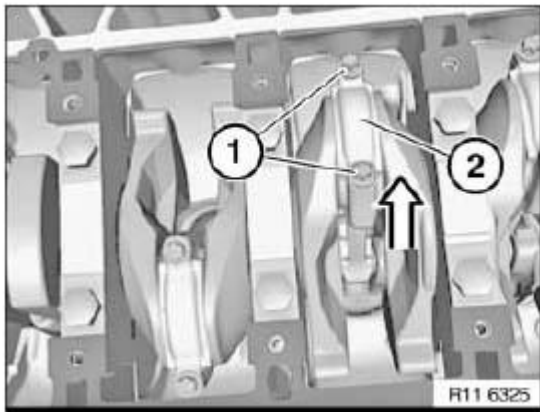


Fig. 134: Identifying Connecting Rod Bearing Cap And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 8 330 in conrod big end.

Press out conrod and piston to cylinder head side.

IMPORTANT: Risk of damage to oil spray nozzle.

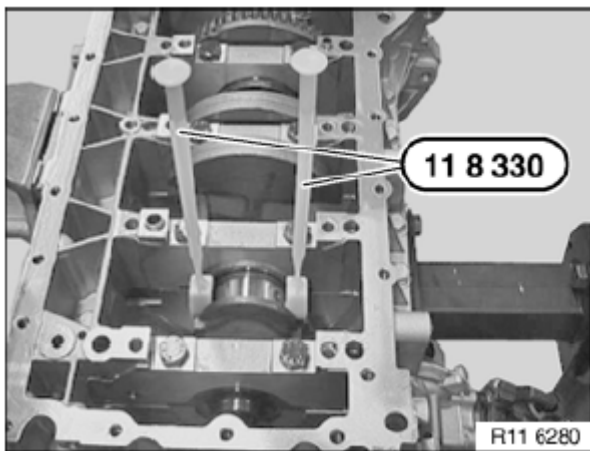


Fig. 135: Identifying Special Tool (11 8 330)
Courtesy of BMW OF NORTH AMERICA, INC.

Preliminary work:

Clamp special tool 11 4 491 in a vice.

Secure piston (1) with conrod to special tool 11 4 491.

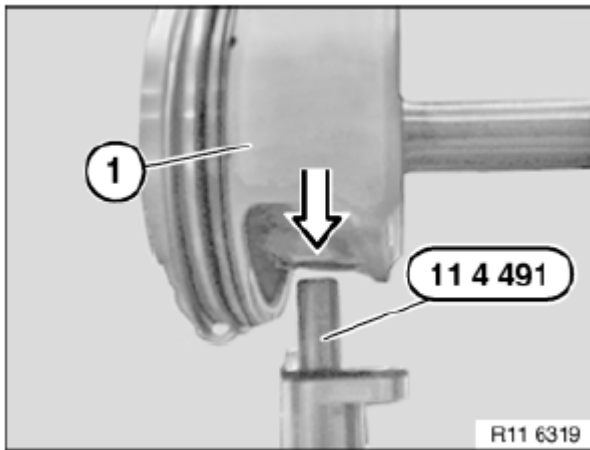


Fig. 136: Identifying Special Tool (11 4 491) And Piston
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Protective goggles must be worn for the next work step.

WARNING: Protective goggles must be worn.

Lever out piston circlip with special tool 11 4 492 in direction of arrow.

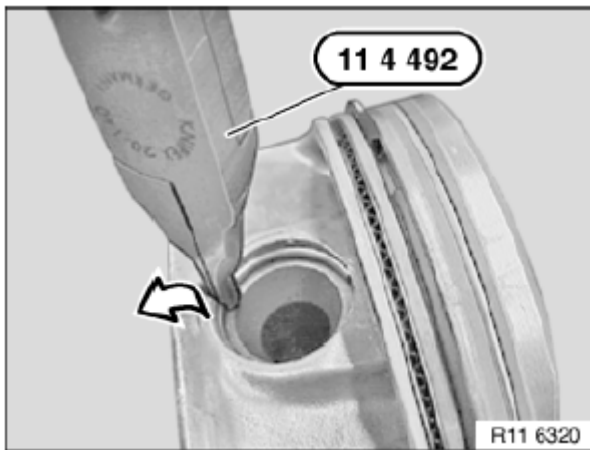


Fig. 137: Identifying Special Tool (11 4 492)
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

IMPORTANT: Connecting rods are divided into weight categories and are only available as a set.

Old and new connecting rods must not be installed in mixed combinations.

Installation:

The piston pin must be able to be pressed through the liner by hand with little force and must not display any significant play.

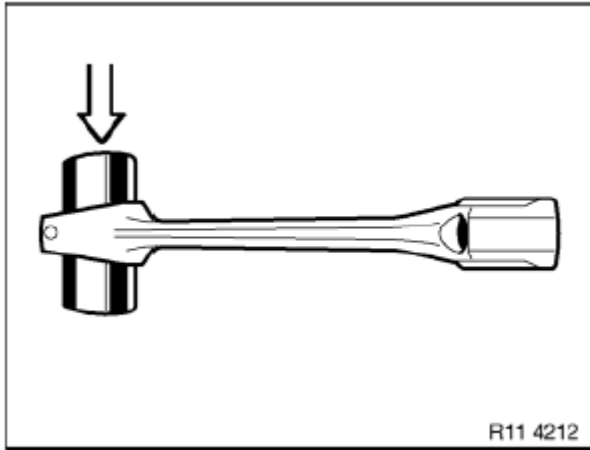
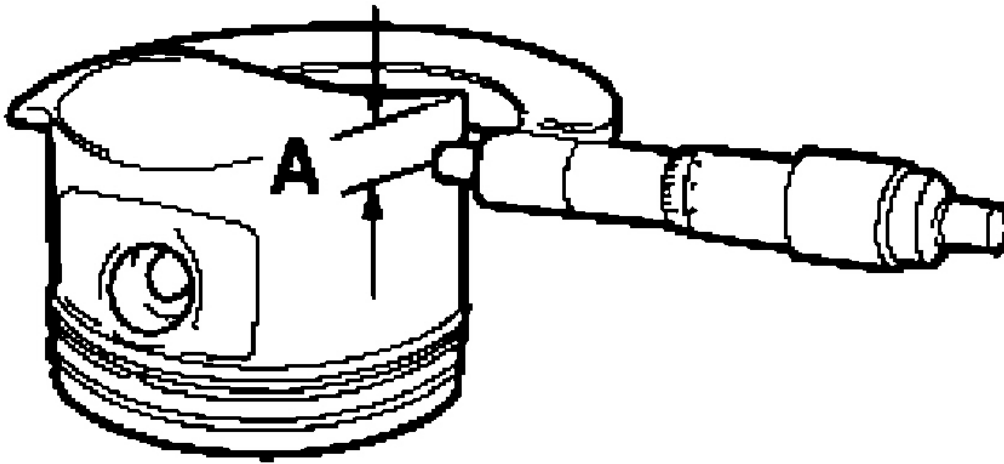


Fig. 138: Identifying Piston Pin In Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point A from bottom edge of piston and offset at 90° to the axis of the piston pin.

Piston diameter at measuring point A.



88 11 051 U

Fig. 139: Measuring Piston Clearance

Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal caliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

Total Permissible Wear Tolerance.

If necessary, replace piston.

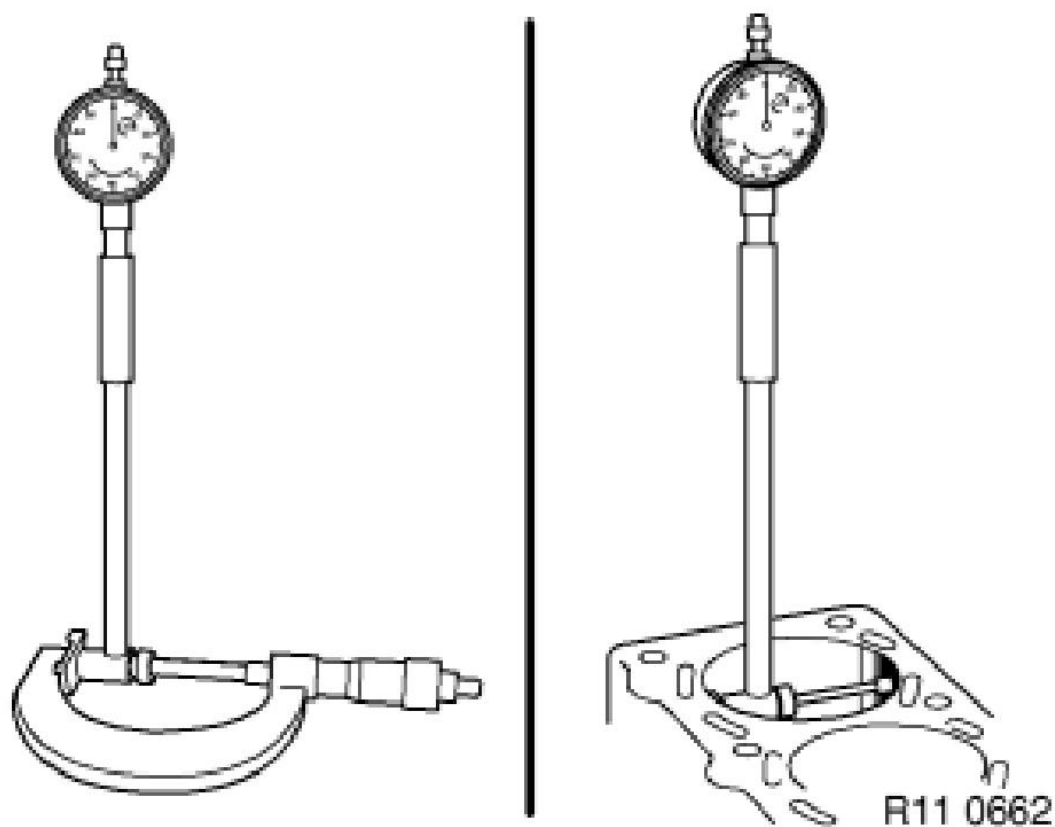


Fig. 140: Measuring Diameter Of Cylinder Bore Of Engine Block
 Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Protective goggles must be worn.

Insert piston circlip (2) into groove (1) of special tool 11 4 493.

Bring piston circlip into assembly position.

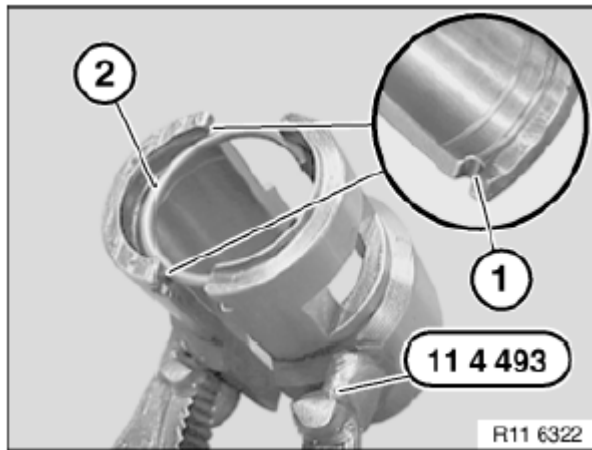


Fig. 141: Identifying Special Tool (11 4 493), Piston Circlip And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Protective goggles must be worn.

Guide lug and cutout on special tool 11 9 493 must point to the piston crown; only then can special tool 11 9 494 be correctly fitted.

When special tools 11 9 493 and 11 9 494 are correctly positioned, the piston pin circlip must be driven in with a plastic hammer in the direction of the arrow.

NOTE: See **Fig. 142.**

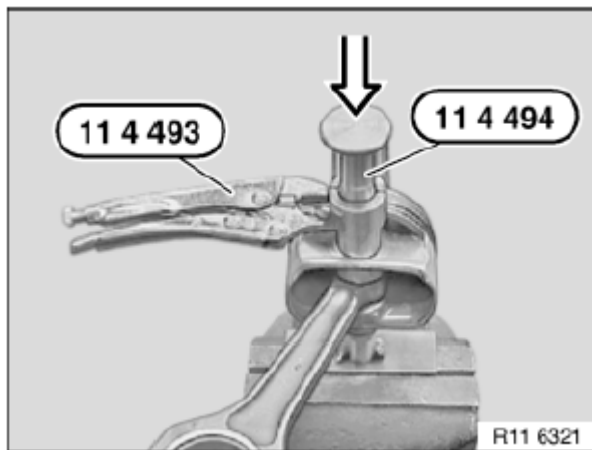


Fig. 142: Identifying Special Tool (11 4 493) And (11 4 494)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: B 30.

Install all **Piston Rings.**

Install all **Bearing Shells.**

Coat piston and piston rings with oil.

Pre-install piston (2) in special tool 11 6 261.

Attach special tool 11 8 330 in conrod (1).

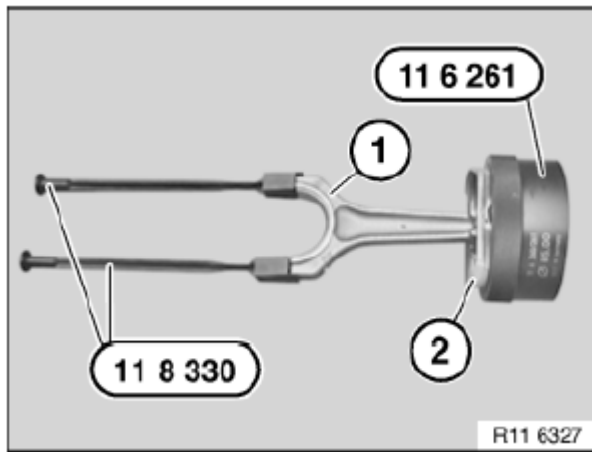


Fig. 143: Identifying Special Tool (11 8 330), (11 6 261), Piston And Conrod
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check protective lugs (1) on special tool 11 8 330 for correct position and damage.

NOTE: B 25.

Install all **Piston Rings.**

Install all **Bearing Shells.**

Coat piston and piston rings with oil.

Pre-install piston (2) in special tool 11 6 241.

Attach special tool 11 8 330 in conrod (1).

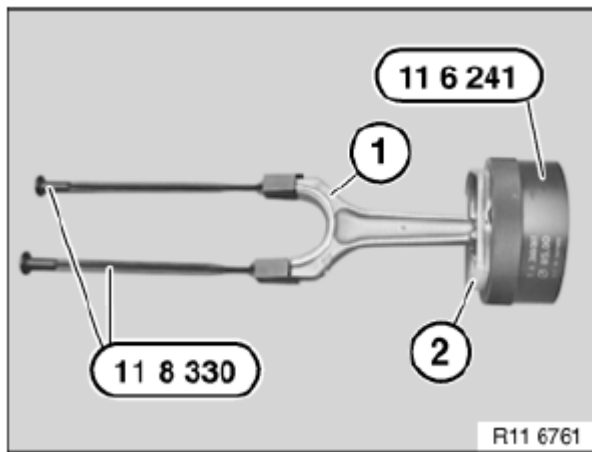


Fig. 144: Identifying Special Tool (11 8 330), (11 6 241), Piston And Conrod
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check protective lugs (1) on special tool 11 8 330 for correct position and damage.

Insert piston with conrod in cylinder.

IMPORTANT: Risk of damage to oil spray nozzle.

Danger of piston ring failure.

Press in piston with finger pressure only, do not drive in (see arrows in Fig. 145).

Insert piston (1) so that arrow (2) on piston crown points to camshaft drive.

Press in piston (1) with special tools 11 6 261/11 6 241.

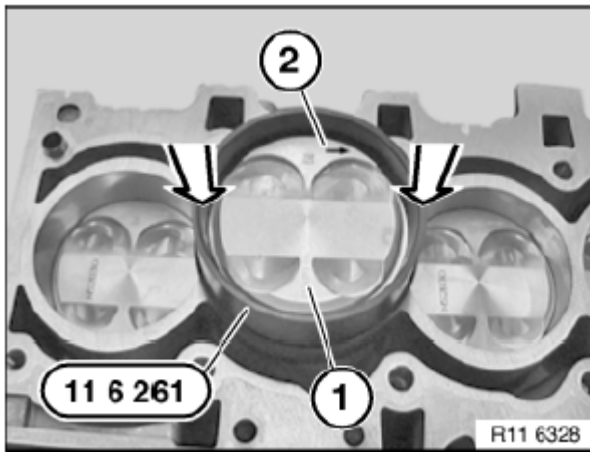


Fig. 145: Identifying Special Tools (11 6 261) And Piston
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Conrod and conrod bearing cap are identified with pairing letters (1) and must not be mixed up.

Mixing them up or incorrectly fitting the conrod bearing cap on the big end will result in engine damage.

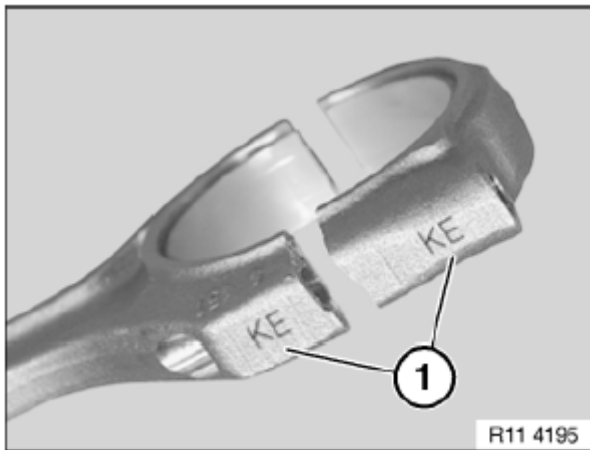


Fig. 146: Identifying Conrod Bearing Cap Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crank pin.

Assemble conrod and crank pin.

Detach special tool 11 8 330.

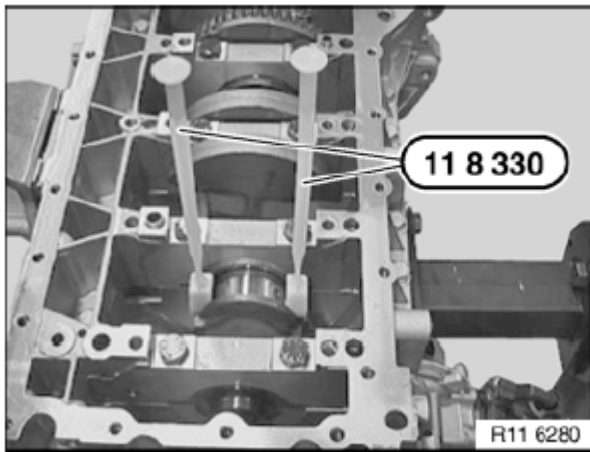


Fig. 147: Identifying Special Tool (11 8 330)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing caps (2) so that pairing letters match up.

Install new conrod bolts (1).

For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)** .

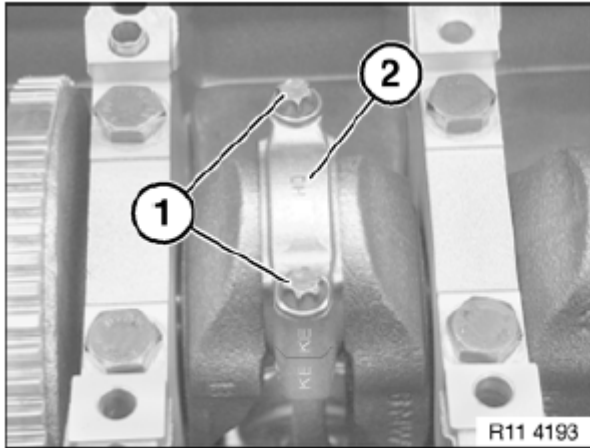


Fig. 148: Identifying Conrod Bearing Caps And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust torsion angle of conrod with special tool 00 9 120 (see **Fig. 149**).

For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)**

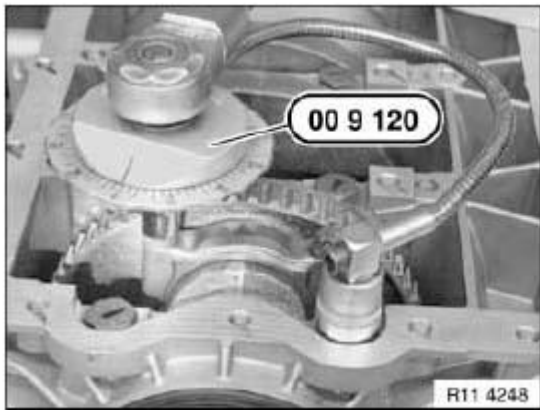


Fig. 149: Identifying Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N52)

Necessary preliminary tasks:

- Remove all **Pistons**.

Measuring axial clearance of piston rings in piston ring groove.

Technical Data.

NOTE: It is not possible to measure the axial clearance of the oil scraper rings.

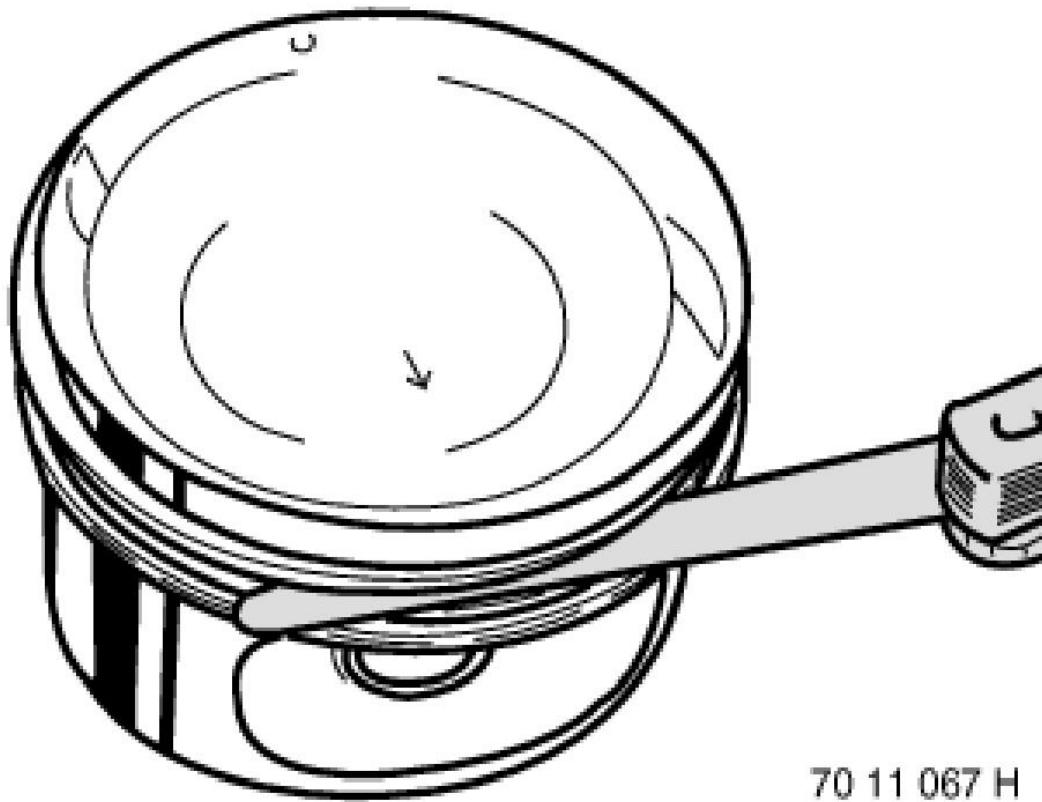


Fig. 150: Measuring Axial Clearance Of Piston Rings In Piston Ring Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Remove compression ring and stepped ring upwards with piston ring pliers.

Oil scraper ring comprises two steel band rings and a support spring.

- NOTE:**
- Oil scraper ring cannot be removed with piston ring pliers.**
 - Put aside piston rings in correct sequence and installation position.**
 - It might not be possible to find the identification on used piston rings.**

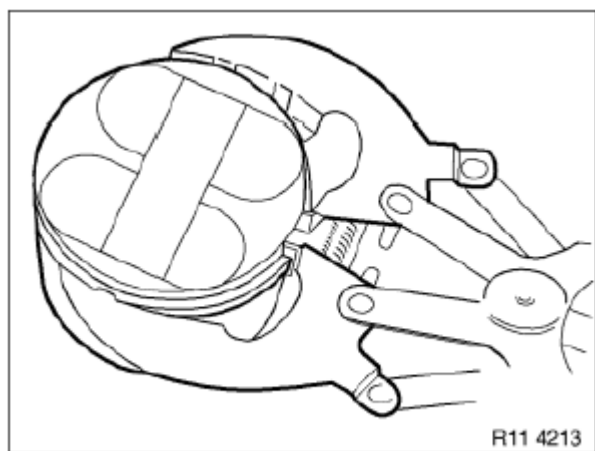


Fig. 151: Identifying Compression Ring With Piston Ring Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

New pistons may only be installed together with new piston rings.

Determine **Gap** with a feeler gauge.

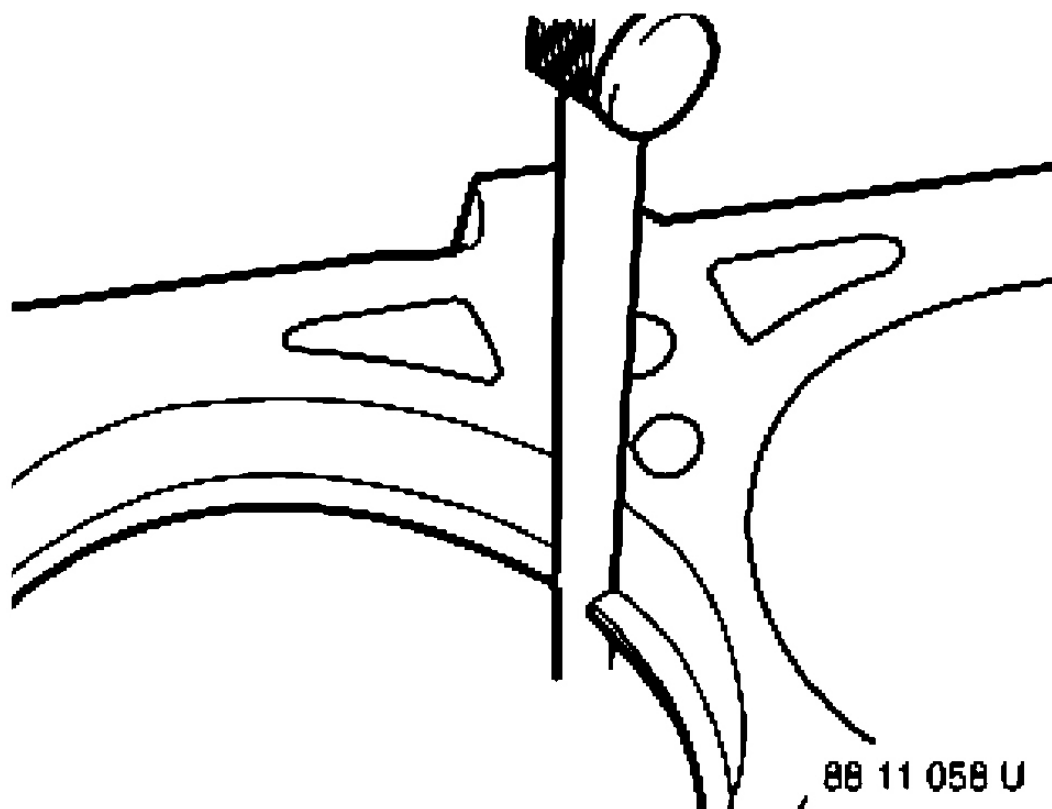


Fig. 152: Checking Piston Ring Gap With Feeler Gauge
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic representation of piston rings.

Installation:

Piston rings with "TOP" identification must point to piston crown.

1. Plain compression ring
2. Stepped compression ring "Top"
3. Two-part oil scraper ring

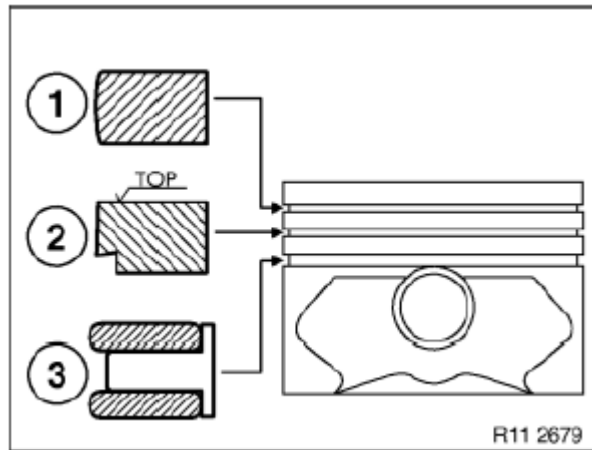


Fig. 153: Identifying Piston Rings Components And Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil control ring comprises two steel band rings (1) and a support spring (2).

Installation:

Insert support spring (2) into piston ring groove and then fit steel band rings (1) so that contact points are offset by approx. 120°.

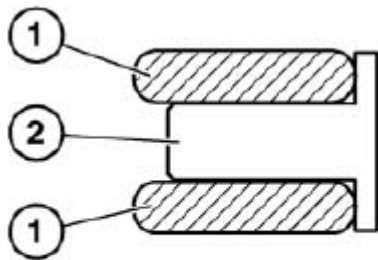


Fig. 154: Identifying Piston Support Spring And Steel Band Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Offset the contact points (1) of the piston rings by approx. 120° to each other but do not position above the piston pin boss.

NOTE: See Fig. 155.

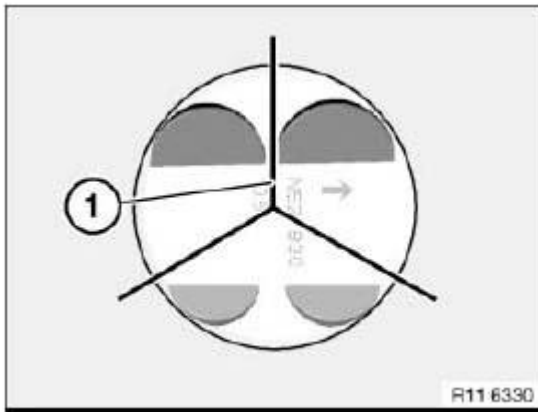


Fig. 155: Identifying Offset Contact Points Of Piston Rings
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

28 V-RIBBED BELT WITH TENSIONER

11 28 010 REPLACING ALTERNATOR DRIVE BELT (N52)

Special tools required:

- 11 3 340

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove fan cowl.
- Mark the direction of rotation of the drive belt if it is to be reused.

Turn belt tensioner (4) in direction of arrow until bore (2) is flush on housing.

Hold belt tensioner (4) under tension.

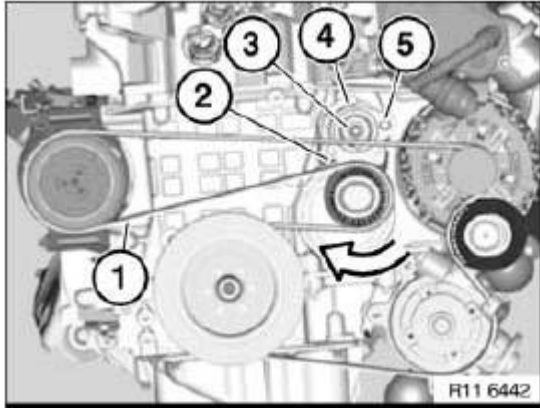


Fig. 156: Identifying Belt Tensioner And Bore
Courtesy of BMW OF NORTH AMERICA, INC.

Secure belt tensioner with special tool 11 3 340.

NOTE: Illustration N42.

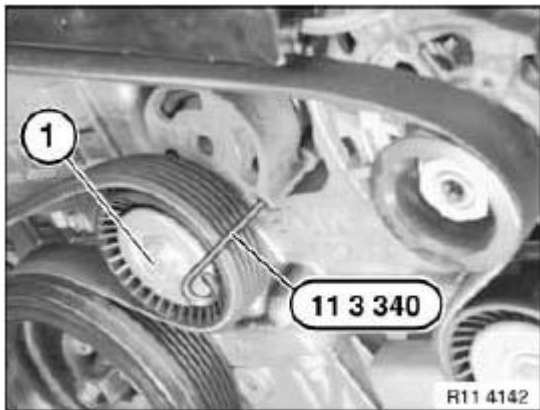


Fig. 157: Identifying Special Tool (11 3 340) And Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Remove drive belt (1) towards top.

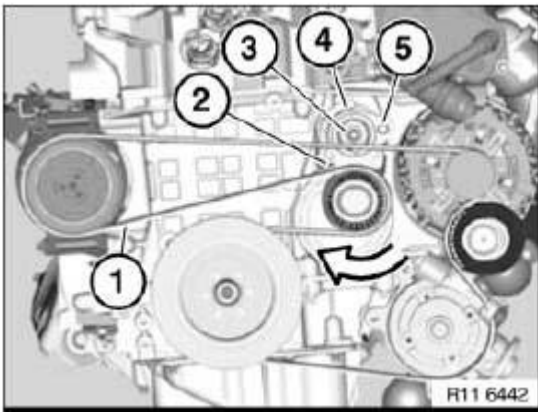


Fig. 158: Identifying Drive Belt And Tensioner
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Check that drive belt for is in correct installation position - **risk of damage**.

11 28 020 REPLACING ALTERNATOR DRIVE BELT TENSIONER (N52)

Special tools required:

- 11 3 340

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **Drive Belt**.

Remove special tool 11 3 340.

Release screw (3).

For tightening torque refer to 11 28 1AZ in **28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT** .

Installation:

Replace aluminium screws.

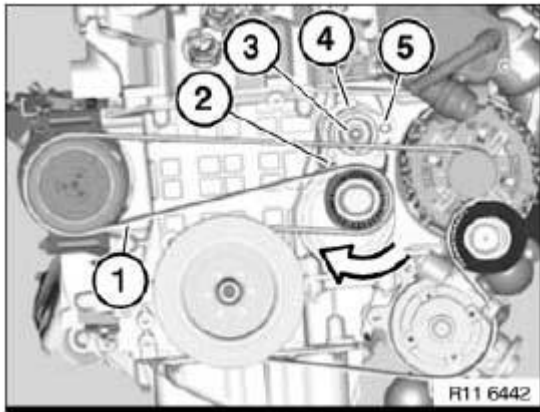


Fig. 159: Identifying Belt Tensioner, Screw And Belt Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

31 CAMSHAFT

11 31 005 CHECKING CAMSHAFT TIMING

Special tools required:

- 11 0 300
- 11 4 281
- 11 4 282
- 11 4 283

Necessary preliminary tasks:

- Remove **Cylinder Head Cover**.
- Remove front splash guard.

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

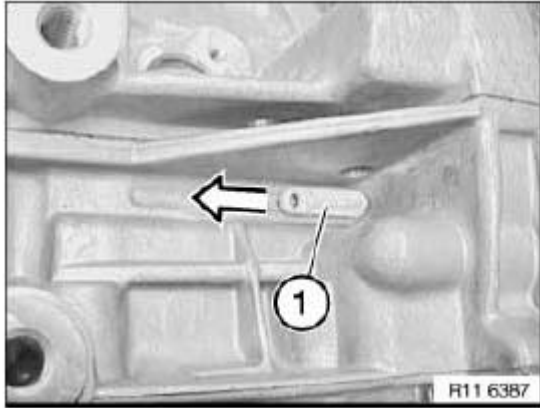


Fig. 160: Identifying Crankshaft Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide in special tool 11 0 300 in direction of arrow and block crankshaft.

IMPORTANT: On engines with automatic transmissions, there is shortly before the special tool bore for the TDC position a large bore which can be confused with the special tool bore.

If the flywheel is secured in the correct bore with special tool 11 0 300, the engine can no longer be moved at the central bolt.

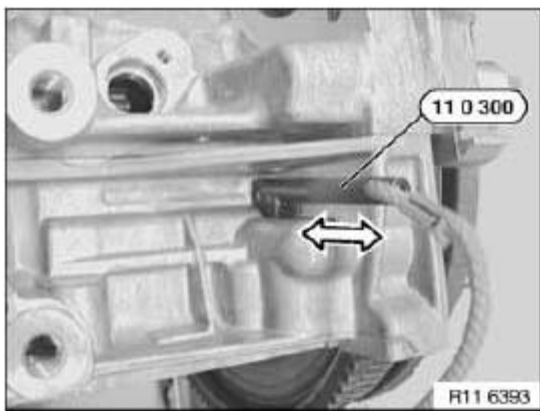


Fig. 161: Identifying Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 283 on cylinder head with screws (1).

NOTE: Fit special tool 11 4 282 underneath on inlet side.

Mount special tool 11 4 281 on inlet and exhaust camshafts.

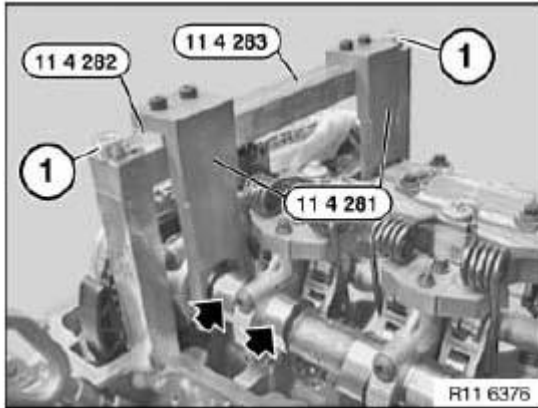


Fig. 162: Identifying Special Tool (11 4 281), (11 4 282), (11 4 283) And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

The timings are correct when the part number (2) can be read from above on the camshafts (1).

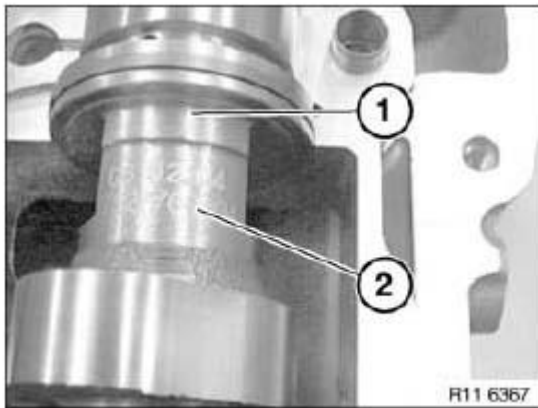


Fig. 163: Identifying Inlet Camshaft And Part Number Position
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of inlet camshaft (1) at 1st cylinder point upwards at an angle.

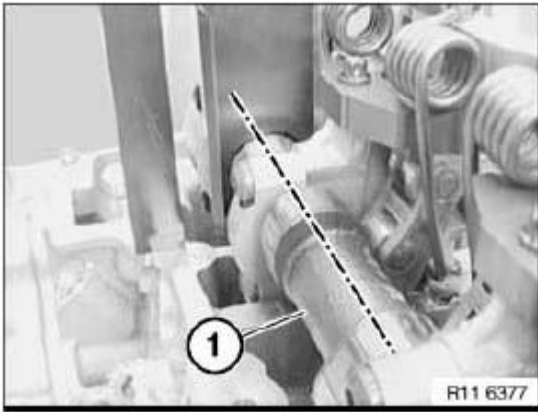


Fig. 164: Identifying Inlet Camshaft TDC Position
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (3) at 6th cylinder point downwards at an angle.

Roller cam follower (1) is not actuated.

NOTE: If the timing is checked while the engine is installed, the position of the camshaft can only be checked with a mirror.

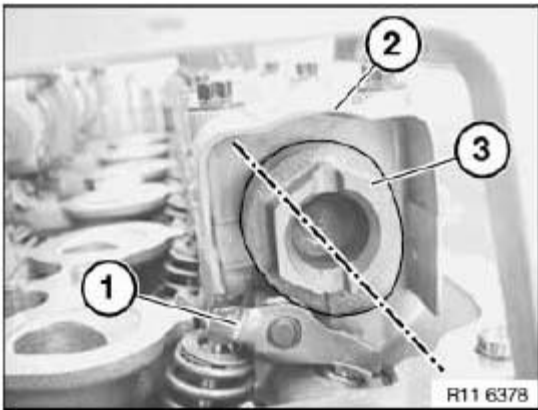


Fig. 165: Identifying Roller Cam Follower And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 025 REMOVING AND INSTALLING/REPLACING INLET CAMSHAFT (N52)

Special tools required:

- 11 4 281

11 4 481

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **Cylinder Head Cover**.
- Remove **Adjusting Unit** for inlet camshaft.
- Remove **Intermediate Lever**.
- Adjust **Valve Timing**.

Bearing cap (1) is a thrust bearing.

Release screws of bearing caps (1 and 2).

Set all bearing caps down in special tool 11 4 481 in a tidy and orderly fashion.

All bearing caps are identified from 1 to 6.

For tightening torque refer to 11 31 1AZ in **11 31 CAMSHAFT (N52)** .

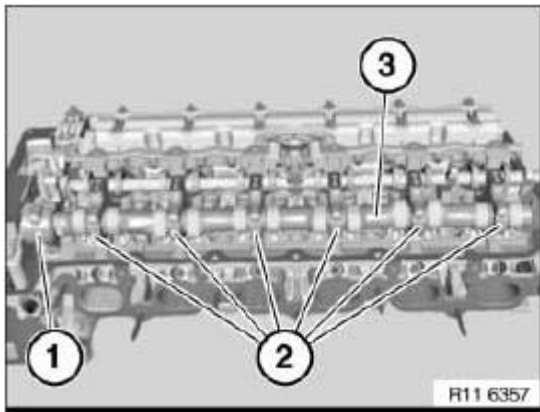


Fig. 166: Identifying Thrust Bearing Screws And Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out camshaft (2).

Installation:

Clean all bearing points and lubricate with oil.

Check plain compression rings (1) for damage and replace if necessary.

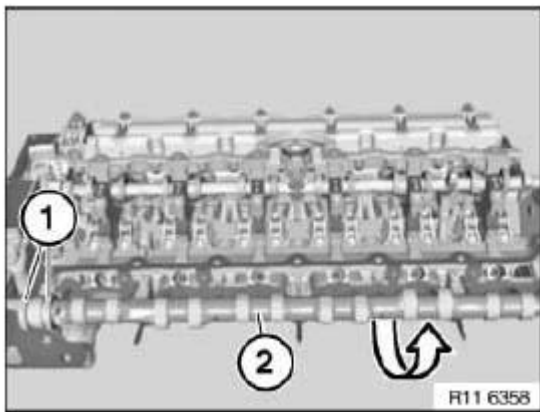


Fig. 167: Identifying Camshaft And Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace plain compression rings (1).

The plain compression rings have catches at the joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

IMPORTANT: Plain compression rings (1) can easily break.

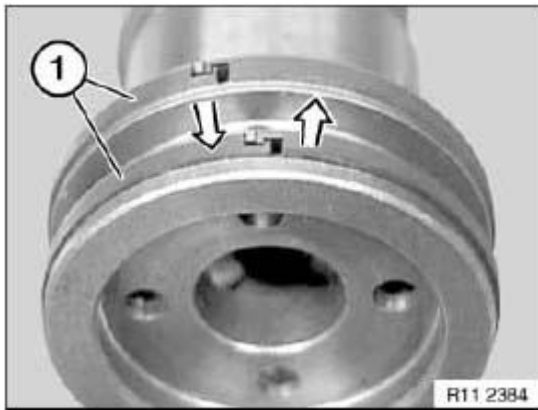


Fig. 168: Identifying Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Both camshafts have different identifications.

Mixing up the two camshafts will result in engine damage.

A Exhaust camshaft.

E Inlet camshaft.

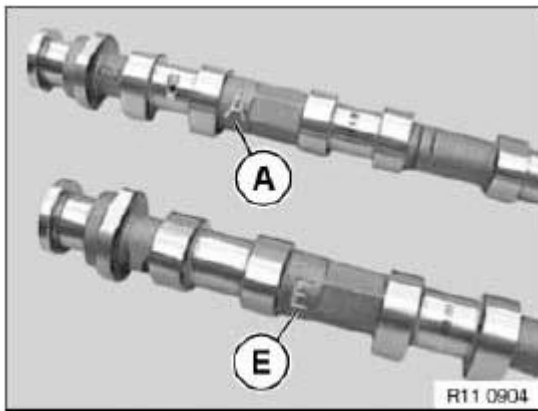


Fig. 169: Identifying Exhaust Camshaft And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Insert camshaft (1) so that part number on twin surface points upwards.

Position inlet camshaft (1) so that cams point upwards at an angle.

Attach special tool 11 4 281 to twin surface.

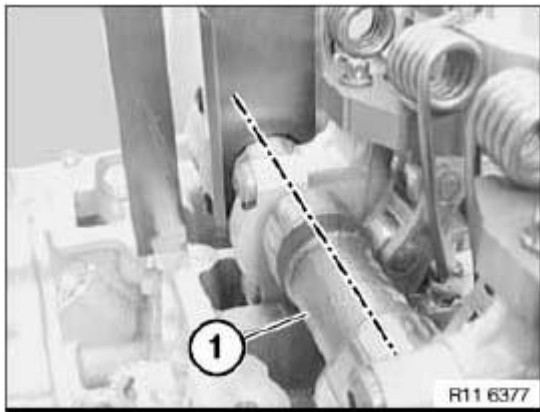


Fig. 170: Identifying Inlet Camshaft Position
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 028 REMOVING AND INSTALLING / REPLACING EXHAUST CAMSHAFT (N52)

Special tools required:

- 00 9 120
- 11 4 350
- 11 4 461
- 11 4 462
- 11 4 463
- 11 9 000

IMPORTANT: It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.

Risk of damage!

The upper and lower bearing banks must be pretensioned with a total of six special tools 11 4 461.

Necessary preliminary tasks:

- Remove **Cylinder Head Cover**.
- Remove exhaust adjusting unit for exhaust camshaft.
- Adjust **Valve Timing**.

Release bearing cap screw connections from outside inwards.

Lift out lower and upper bearing banks (1) with camshaft.

Remove upper bearing bank (1).

Remove exhaust camshaft from lower bearing bank.

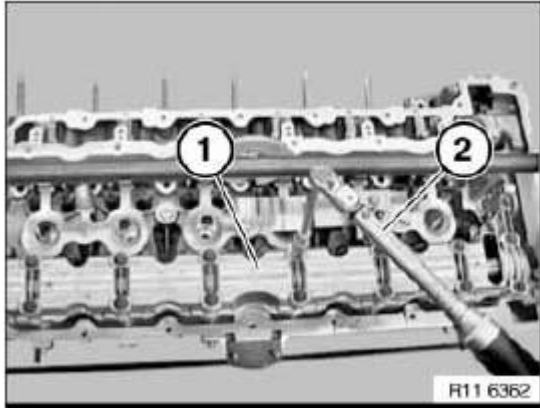


Fig. 171: Identifying Upper Bearing Bank
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Both camshafts have different identifications.

Mixing up the two camshafts will result in engine damage.

A Exhaust camshaft.

E Inlet camshaft.

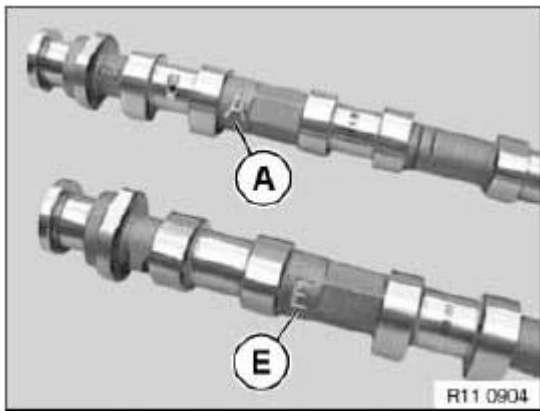


Fig. 172: Identifying Exhaust Camshaft And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Check plain compression rings (1) for damage and replace if necessary.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

IMPORTANT: Plain compression rings (1) can easily break.

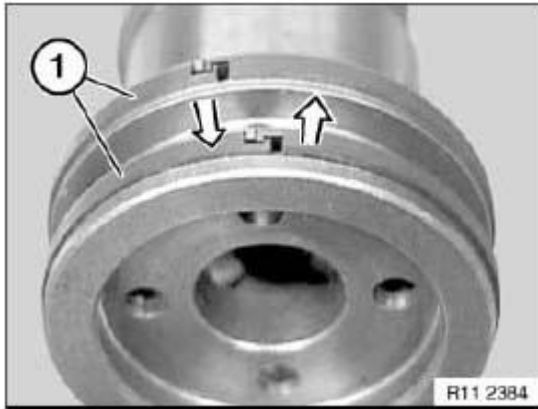


Fig. 173: Identifying Plain Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removal on engine:

Set engine to firing TDC at 1st cylinder.

Removed cylinder head:

When using special tool 11 9 000, it will be necessary to remove the aluminium profile insert.

Installing camshaft bearing bank:

Pre-install special tool 11 4 462 on cylinder 2.

Insert special tool 11 4 463 in screw connection of cylinder head cover.

IMPORTANT: Special tool 11 4 463 is a special screw.

Press down roller rocker arms (3) on 2nd cylinder with spindle nut (2) of special tool 11 4 462.

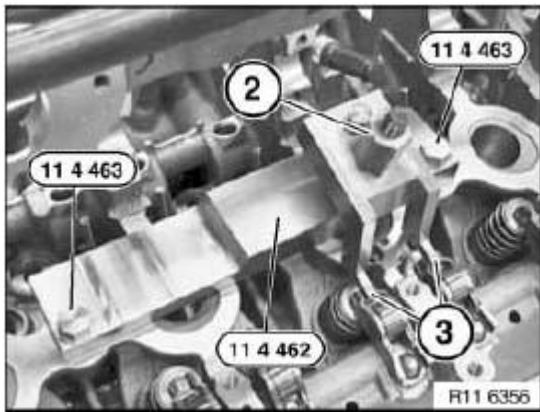


Fig. 174: Identifying Special Tools (11 4 463), (11 4 462), Roller Rocker Arms And Cylinder
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before installing exhaust camshaft, make sure roller rocker arm is correctly seated HVCA element and valve.

Refer to **Removing and installing roller rocker arms**.

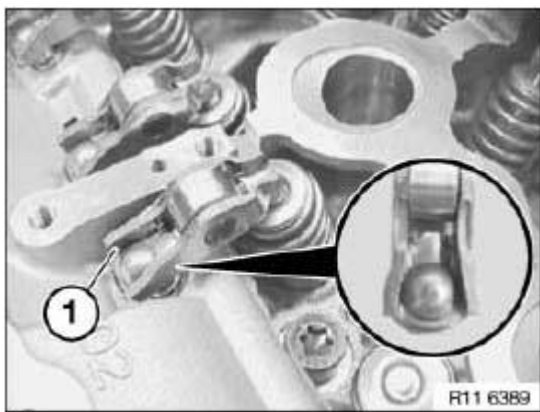


Fig. 175: Identifying Rocker Arms Position
 Courtesy of BMW OF NORTH AMERICA, INC.

Position lower bearing bank (1) with exhaust camshaft (2) on roller rocker arms.

Align exhaust camshaft (2).

Cylinders 2 and 4 are at overlap.

Cams (3) on 1st cylinder point upwards at an angle.

Part number (4) on dihedron points upwards.

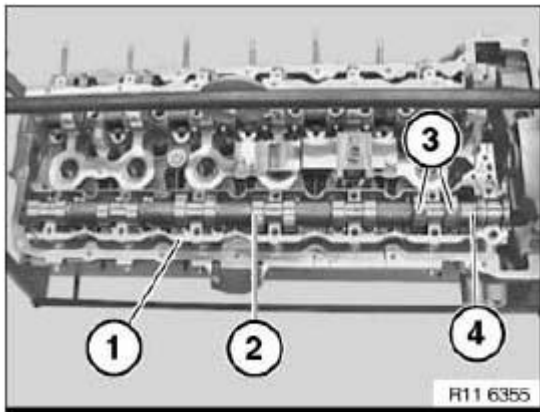


Fig. 176: Identifying Lower Bearing Bank, Camshaft, Exhaust Camshaft, Cams And Part Number
 Courtesy of BMW OF NORTH AMERICA, INC.

Join exhaust camshaft to lower and upper bearing banks (1) with torque wrench (2) from inside outwards to **8 Nm**.

Release all screws of bearing bank (1) from outside inwards by 90°.

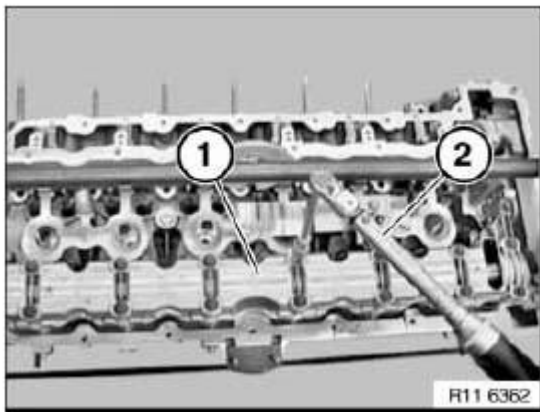


Fig. 177: Identifying Lower, Upper Bearing Banks And Torque Wrench
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lower and upper bearing banks must be aligned to each other at ground surfaces (1 and 2).

Bring thrust piece and legs of special tool 11 4 461 into contact at milled surfaces.

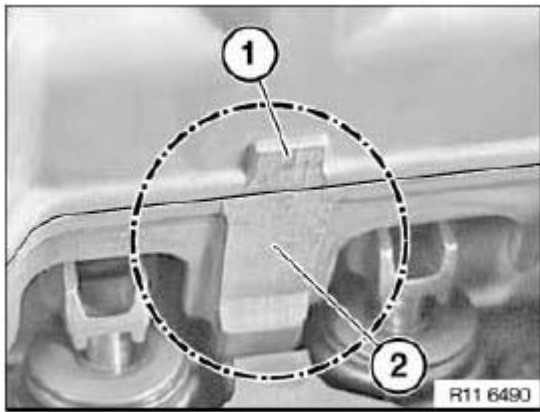


Fig. 178: Aligning Mark Of Lower Bearing Bank And Upper Bearing Banks
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic depiction of special tool 11 4 461 at lower bearing bank (1) and upper bearing bank (2).

IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm.

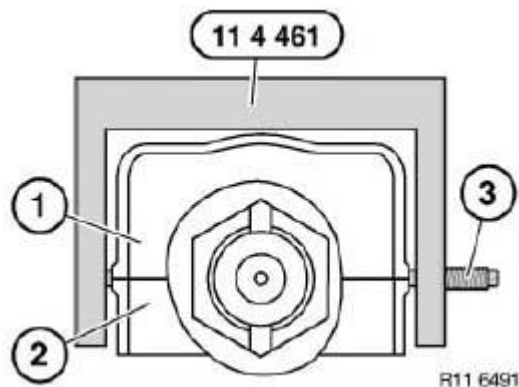


Fig. 179: Identifying Special Tool (11 4 461), Lower Bearing Bank And Upper Bearing Bank
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 4 461 over screw connection of bearing banks.

Make sure that legs come into exact contact on ground surfaces, lower bearing bank (1) and upper bearing bank (2).

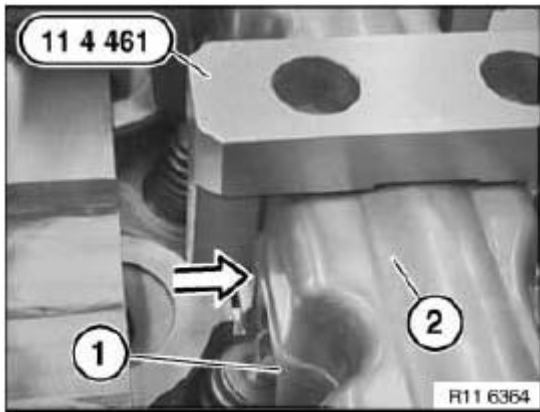


Fig. 180: Identifying Special Tool (11 4 461, Lower Bearing Bank And Upper Bearing Bank)
 Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool 11 4 461 to ground surfaces of lower bearing bank (1) and upper bearing bank (2).

IMPORTANT: Tighten screws on thrust piece to 2 Nm.

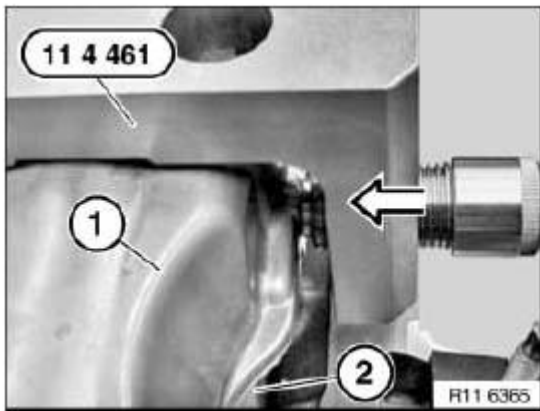


Fig. 181: Identifying Special Tool (11 4 461), Lower Bearing Bank And Upper Bearing Bank
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set special tool 11 4 350 to 2 Nm.

Pretension all special tools 11 4 461 with special tool 11 4 350 only.



Fig. 182: Identifying Torque Wrench
 Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tools 11 4 461 with screw (1) to inside of cylinder head.

On cylinder 2 mount special tool 11 4 461 with screw (1) facing outwards.

Position special tools 11 4 461 so that screw connections (2) of bearing bank are easily accessible.

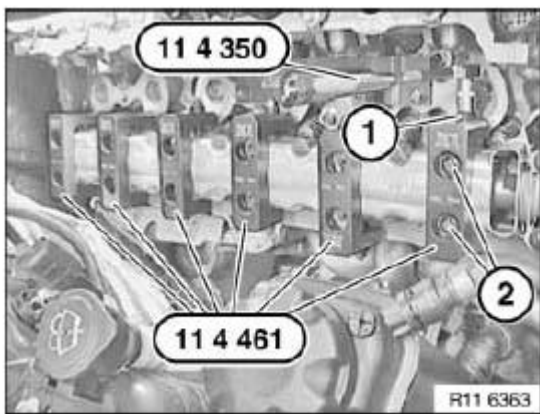


Fig. 183: Identifying Special Tools (11 4 461), (11 4 350), Screw And Connections
 Courtesy of BMW OF NORTH AMERICA, INC.

Tighten lower and upper bearing banks with special tool 00 9 120.

For tightening torque refer to 11 31 1AZ in **11 31 CAMSHAFT (N52)** .

IMPORTANT: Remove special tool 11 4 461 only when camshaft screw connection is completed.

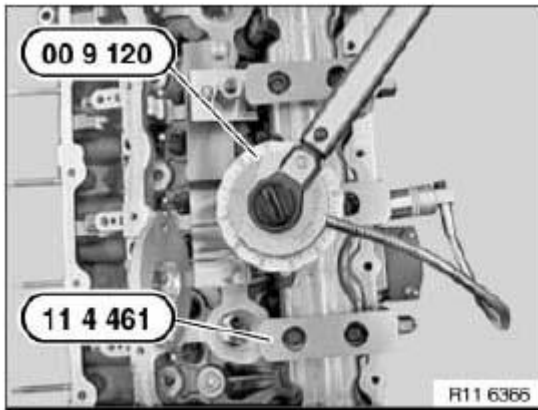


Fig. 184: Identifying Special Tools (11 4 461) And (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 051 REPLACING TIMING CHAIN (N52)

Special tools required:

- 11 0 300
- 11 4 280
- 11 4 360
- 11 4 362
- 11 5 200
- 11 9 280

Necessary preliminary tasks:

- Remove **Cylinder Head Cover**.
- Remove all spark plugs.
- Remove **Chain Tensioner**.
- Remove **Radial Shaft Seal** at front.
- Remove **Belt Tensioner**.
- Remove **Vibration Damper**.

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

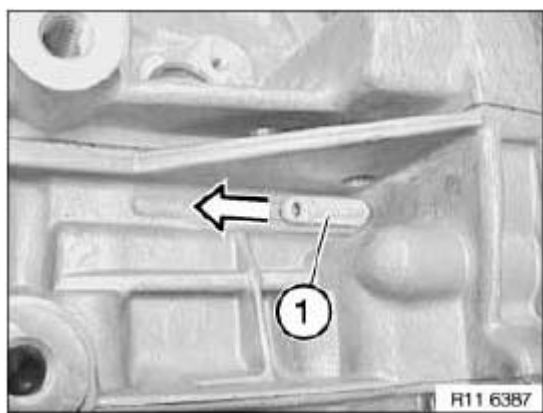


Fig. 185: Identifying Fastener Directions
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankshaft during entire repair operation with special tool 11 0 300.

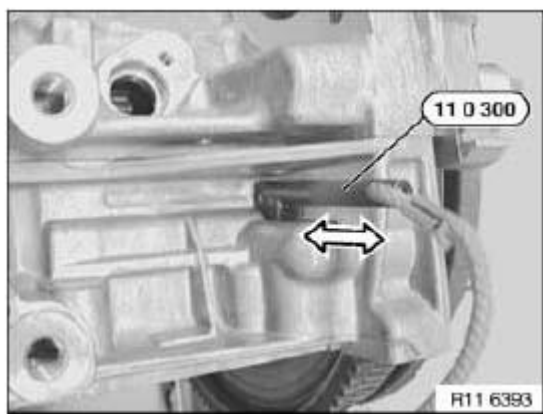


Fig. 186: Identifying Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Do not remove special tool 11 4 280.

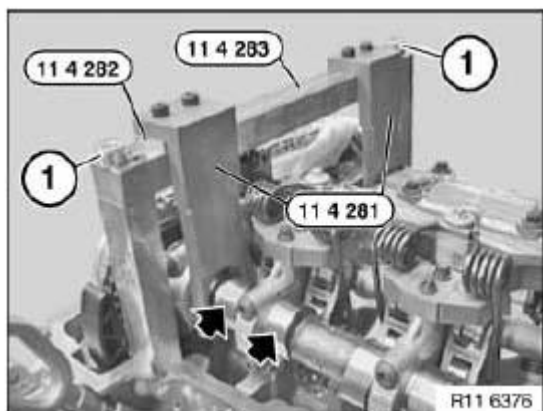


Fig. 187: Identifying Special Tool (11 4 281), (11 4 282), (11 4 283) And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not remove special tool 11 0 300 to release central bolt (1).

Employ a *second* person for gripping when releasing central bolt (1).

Mount special tool 11 9 280 on hub for vibration damper.

Release central bolt (1).

For tightening torque refer to 11 21 1AZ **11 21 CRANKSHAFT AND BEARINGS (N52)** .

Remove central bolt with hub towards front.

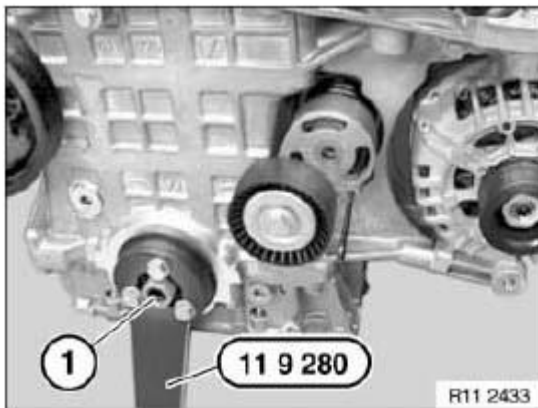


Fig. 188: Identifying Special Tool (11 9 280) And Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

For tightening torque refer to 11 31 6AZ in **11 31 CAMSHAFT (N52)** .

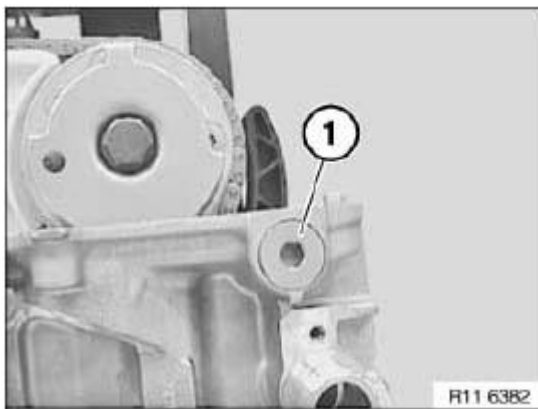


Fig. 189: Identifying Engine Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

For tightening torque refer to 11 31 6AZ in 11 31 CAMSHAFT (N52) .

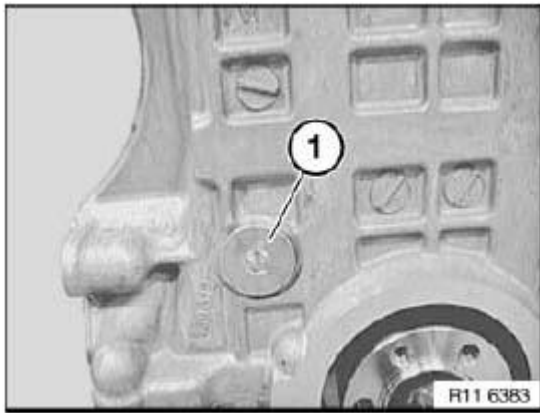


Fig. 190: Identifying Engine Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on chain drive at top.

For tightening torque refer to 11 31 2AZ in 11 31 CAMSHAFT (N52) .

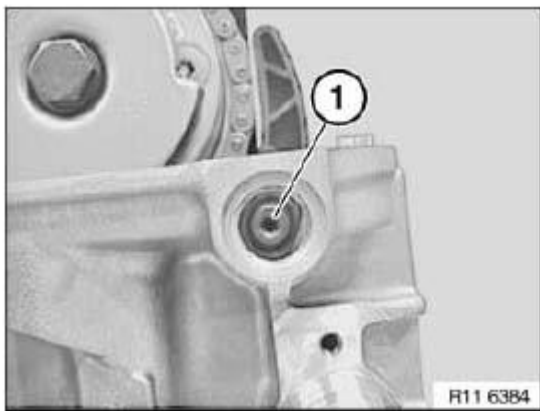


Fig. 191: Identifying Screw On Chain Drive At Top

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on chain drive at bottom.

For tightening torque refer to 11 31 3AZ in 11 31 CAMSHAFT (N52) .

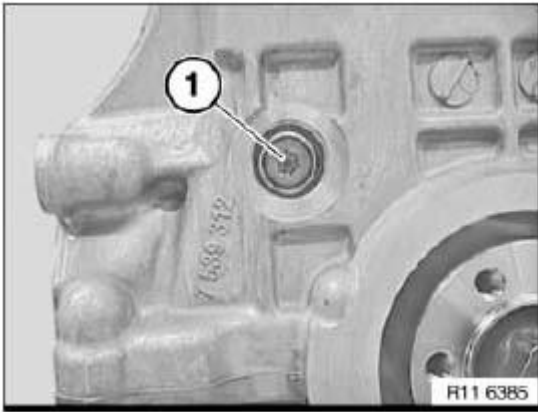


Fig. 192: Identifying Screw On Chain Drive At Bottom
Courtesy of BMW OF NORTH AMERICA, INC.

Remove both adjusting units.

Release screws (1).

For tightening torque refer to 11 31 2AZ in **11 31 CAMSHAFT (N52)** .

Remove timing chain module with timing chain and sprocket wheel upwards in direction of arrow.

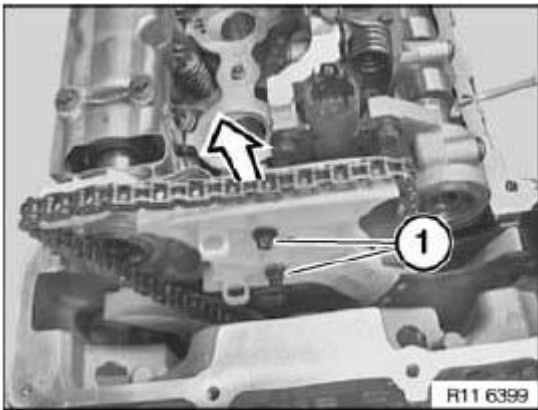


Fig. 193: Identifying Timing Chain Module Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket wheel (2).

Collar (see arrow in **Fig. 194**) on sprocket wheel (2) points to crankshaft.

Incorrect assembly will result in engine damage.

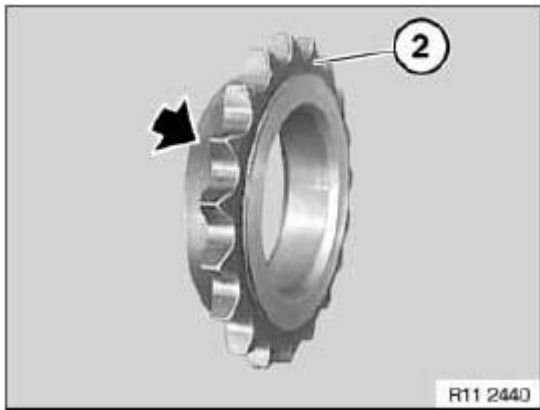


Fig. 194: Identifying Collar On Sprocket Wheel
 Courtesy of BMW OF NORTH AMERICA, INC.

Pull timing chain (1) upwards until sprocket wheel (2) engages chain guide (3).

Install timing chain (1) and sprocket wheel (2) in this position.

Installation:

Always keep timing chain tensioned; it is possible for timing chain (1) to jam on chain module (3).

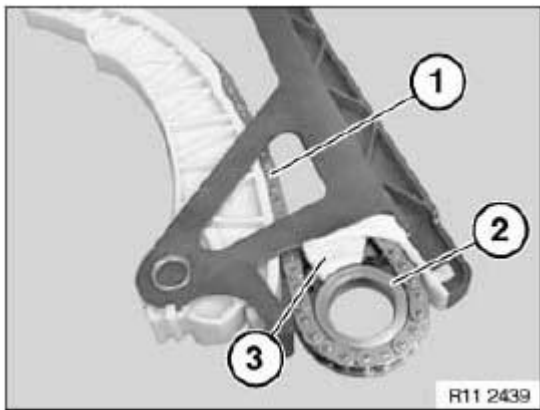


Fig. 195: Identifying Timing Chain, Sprocket Wheel And Chain Guide
 Courtesy of BMW OF NORTH AMERICA, INC.

Install hub with central bolt.

Tighten down special tool 11 5 200 with screws (1).

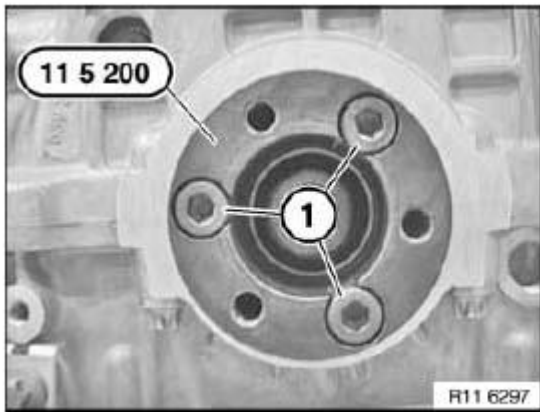


Fig. 196: Identifying Special Tool (11 5 200) And Mounting Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove belt tensioner.

Screw in special tool 11 4 360.

Mount special tool 11 9 280 on 11 5 200.

Support special tool 11 9 280 on special tool 11 4 362.

Special tool 11 0 300 secures crankshaft.

Tighten central bolt (1) to jointing torque.

For tightening torque refer to 11 21 1AZ in **11 21 CRANKSHAFT AND BEARINGS (N52)** .

Mark central bolt and hub with paint.

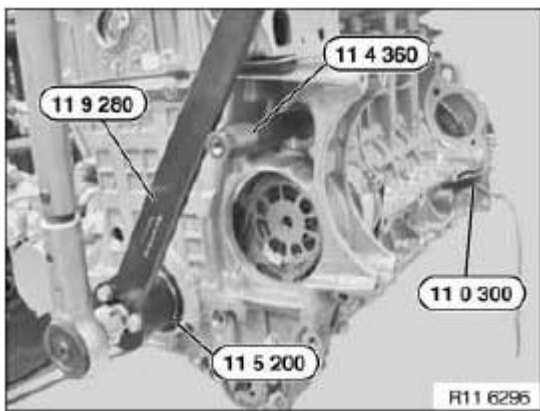


Fig. 197: Identifying Special Tool (11 9 280), (11 5 200), (11 4 360) And (11 0 300)
 Courtesy of BMW OF NORTH AMERICA, INC.

Apply stroke of paint (1) for torsion angle tightening to tool.

See **Fig. 198**.

IMPORTANT: Do not remove tool from central bolt during torsion angle tightening - risk of damage.

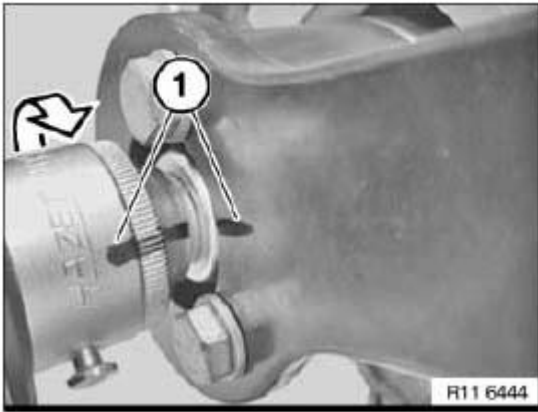


Fig. 198: Identifying Torsion Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten central bolt with two persons.

For tightening torque refer to 11 21 1AZ. in **11 21 CRANKSHAFT AND BEARINGS (N52)**

Install both **Adjusting Units**.

Install **Chain Tensioner**.

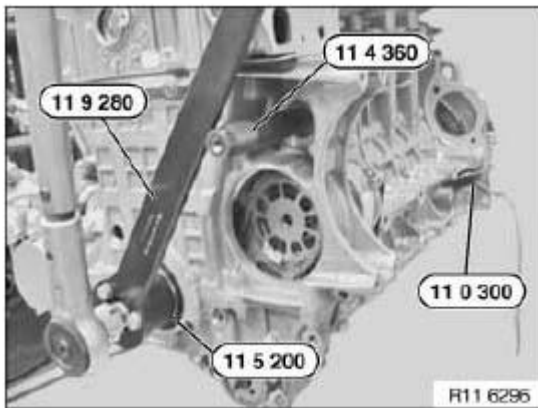


Fig. 199: Identifying Special Tools (11 9 280), (11 5 200), (11 4 360) And (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine twice.

Check **Timing**.

Assemble engine.

11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N52)

Release chain tensioner (1).

For tightening torque refer to 11 31 5AZ in **11 31 CAMSHAFT (N52)** .

IMPORTANT: Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.

Make sure no oil runs onto the belt drive.

Installation:

No sealing ring is fitted during series-production assembly.

A sealing ring must be fitted by service personnel when the chain tensioner is fitted.

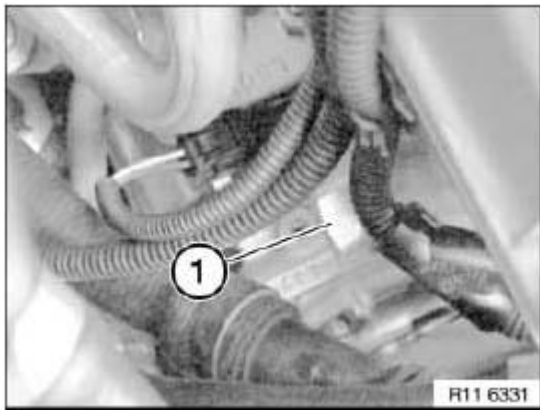


Fig. 200: Identifying Chain Tensioner

Courtesy of BMW OF NORTH AMERICA, INC.

If the chain tensioner is reused, its oil chamber must be drained. Place chain tensioner on a level working surface and slowly compress.

Repeat procedure twice.



Fig. 201: Identifying Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 505 ADJUSTING CAMSHAFT TIMING (N52)

Special tools required:

- 00 9 120
- 00 9 250
- 11 0 300
- 11 4 281
- 11 4 282
- 11 4 283
- 11 4 290
- 11 9 340

Necessary preliminary tasks:

- Remove **Cylinder Head Cover**.

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

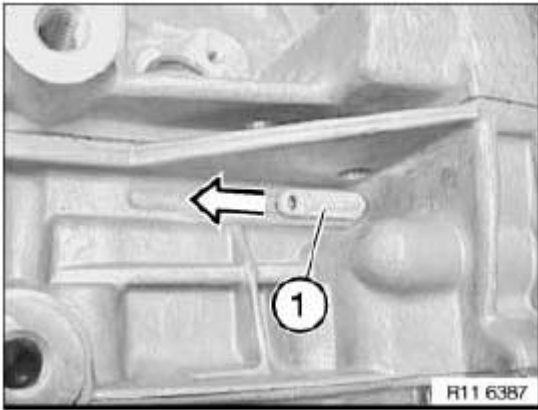


Fig. 202: Identifying Engine Cover Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide in special tool 11 0 300 in direction of arrow and block crankshaft.

IMPORTANT: On engines with automatic transmissions, there is shortly before the special tool bore for the TDC position a large bore which can be confused with the special tool bore.

If the flywheel is secured in the correct bore with special tool 11 0 300, the engine can no longer be moved at the central bolt.

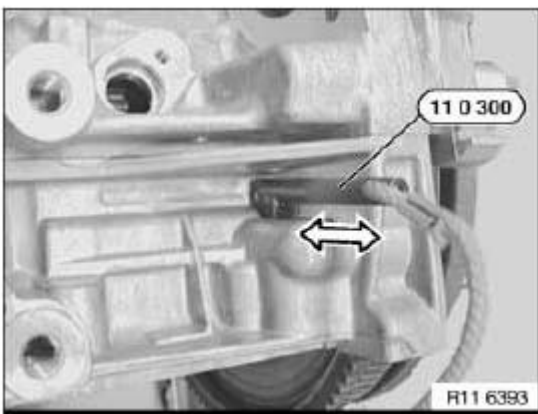


Fig. 203: Identifying Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: *Risk of damage!*

To open central bolt, mount special tools 11 4 283 11 4 281 and 11 4 282 on camshaft.

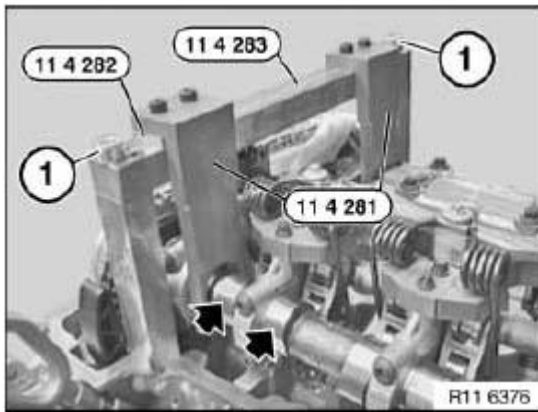


Fig. 204: Identifying Special Tool (11 4 281), (11 4 282), (11 4 283) And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

To release central bolts (1), grip camshaft at hexagon head at rear.

Release chain tensioner (2) (have a cleaning cloth ready).

NOTE: Illustrations in CAD do not show special tools.

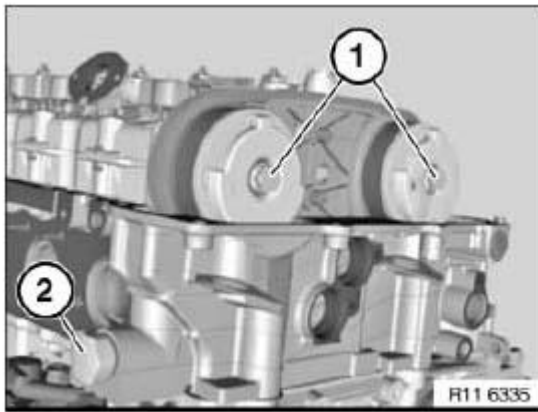


Fig. 205: Identifying Central Bolts And Chain Tensioner
 Courtesy of BMW OF NORTH AMERICA, INC.

Part numbers (2) on twin surface of inlet and exhaust camshafts (1) point upwards.

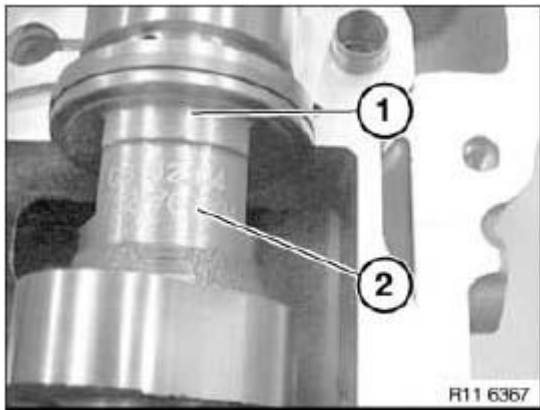


Fig. 206: Identifying Inlet And Exhaust Camshafts Part Number
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of inlet camshaft (1) point upwards at an angle.

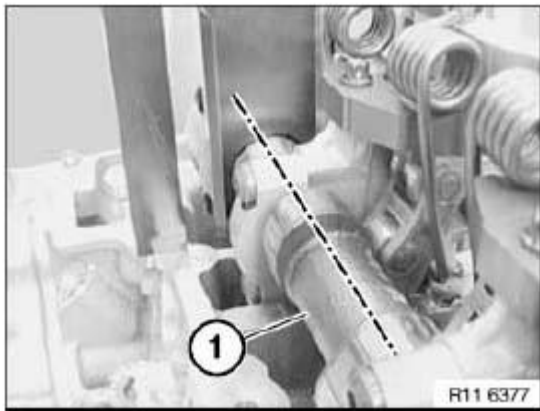


Fig. 207: Identifying Camshaft Angle
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (3) at 6th cylinder point downwards at an angle.

NOTE: If the timing is checked while the engine is installed, the position of the camshaft can only be checked with a mirror.

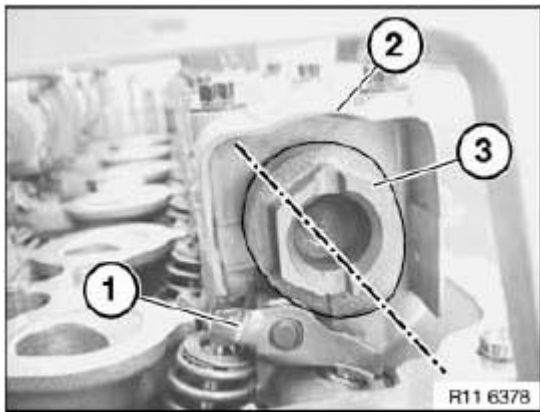


Fig. 208: Identifying Camshaft Position
Courtesy of BMW OF NORTH AMERICA, INC.

Turn sensor gears (2) in direction of arrow until locating pins (1) on special tool 11 4 290 match up.

Slide on special tool 11 4 290 in direction of arrow.

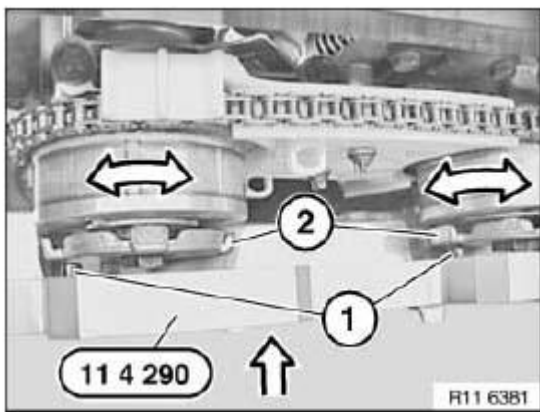


Fig. 209: Identifying Special Tool (11 0 290), Sensor Gears And Locating Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 290 with old cylinder head cover bolts (1).

Screw special tool 11 9 340 into cylinder head.

Pretension timing chain with special tool 00 9 250 to **0.6 Nm**.

Tighten both central bolts of camshaft adjustment units with special tool 00 9 120. For tightening torque refer to 11 36 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL (N52)**.

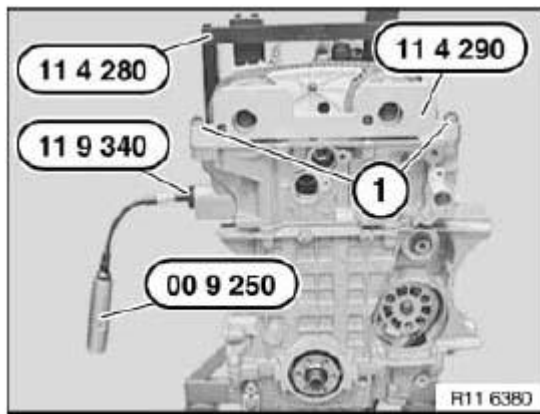


Fig. 210: Identifying Special Tool (11 4 280), (11 4 290), (11 9 340), (11 9 350) And Cover Bolts
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

33 ROCKER ARM WITH BEARING MOUNT/CAM FOLLOWERS

11 33 050 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS (N52)

Special tools required:

- 11 4 480

Necessary preliminary tasks:

- Remove Cylinder Head Cover.
- Remove Intermediate Lever.
- Remove Exhaust Camshaft.

IMPORTANT: Rocker arms (1) are divided into bearing categories.

The tolerance classes are designated as illustrated with numbers from 1 to 5.

Already used rocker arms (1) may only be reused in the same position.

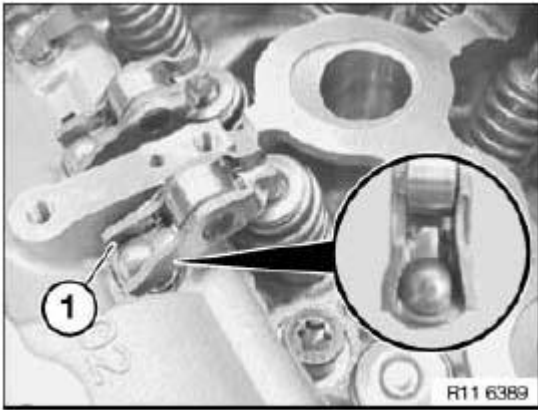


Fig. 211: Identifying Rocker Arms

Courtesy of BMW OF NORTH AMERICA, INC.

Detach roller cam followers (1) from HVC element and remove.

Set all roller cam followers down in special tool 11 4 480 in a tidy and orderly fashion.

Installation:

Before installing exhaust camshaft and intermediate lever, make sure roller cam followers are correctly seated.

Remove HVC element in direction of arrow.

Installation:

If the HVC elements are to be reused, set them down in special tool 11 4 480 in a tidy and orderly fashion with the roller cam followers.

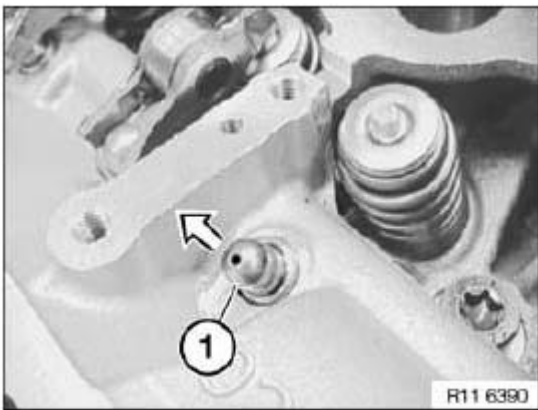


Fig. 212: Identifying Roller Cam Followers

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine

Check function of DME; if necessary, readjust uniform mixture distribution.

34 VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N52)

Special tools required:

- 00 3 580
- 11 4 480

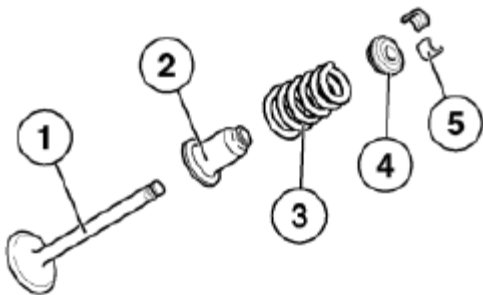
Necessary preliminary tasks:

- Remove Cylinder Head.
- Remove Intermediate Lever.
- Remove Eccentric Shaft.
- Remove Inlet Camshaft.
- Remove Exhaust Camshaft.
- Remove Roller Cam Follower.
- Remove Valve Springs.
- Remove Valve Stem Seals.

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve tapers

If the valves are to be reused, set them down in special tool 11 4 480 in a tidy and orderly fashion.



R11 4170

Fig. 213: Identifying Valve Assembly Components
 Courtesy of BMW OF NORTH AMERICA, INC.

Then remachine valve seat if necessary.

All valves removed.

Use pilot no. 5.

Remachine valve seat with special tool 00 3 580.

Valve seat correction, see **TECHNICAL DATA** .

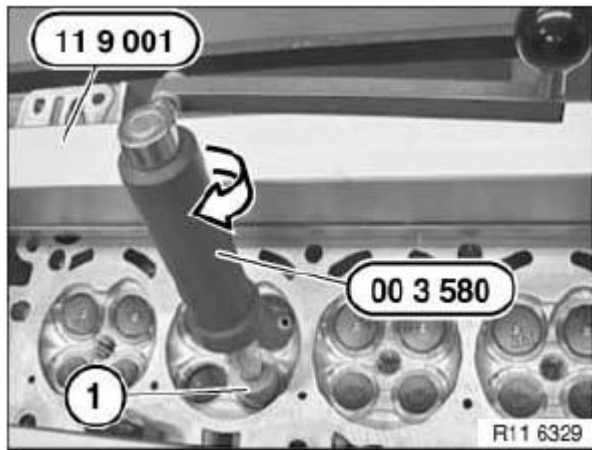


Fig. 214: Identifying Special Tool (11 9 001) And (00 3 580)
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

11 34 560 REPLACING ALL VALVE STEM SEALS (N52)

Special tools required:

- 11 6 370
- 11 6 380

Necessary preliminary tasks:

- Remove **Cylinder Head**.
- Remove **Intermediate Lever**.
- Remove **Eccentric Shaft**.

- Remove **Inlet Camshaft.**
- Remove **Exhaust Camshaft.**
- Remove **Roller Cam Follower.**

Installation:

Insert all **Valves.**

Firmly press special tool 11 6 370 onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool 11 6 370.

NOTE: **Illustration N42.**



Fig. 215: Identifying Special Tool (11 6 370)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N52 engine, special tool 11 6 380 must be remachined according to the sketch with a 10 mm dia. drill bit to a depth of B = approx. 23 mm.

This modification has already been taken into account for reordering.

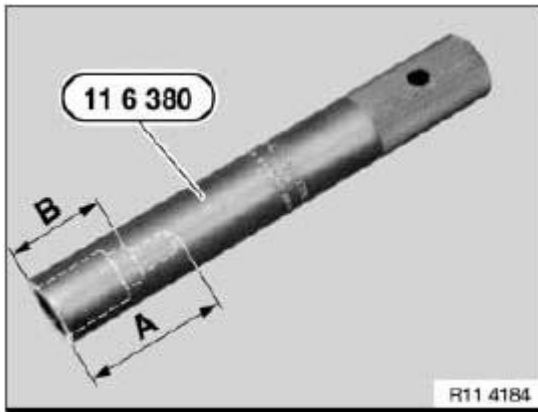


Fig. 216: Identifying Special Tool (11 6 380)
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit the mounting sleeves (plastic sleeves) supplied in the spare part on the valve stem end. Lubricate mounting sleeve.

Press on valve stem seal by hand with special tool 11 6 380 as far as it will go.

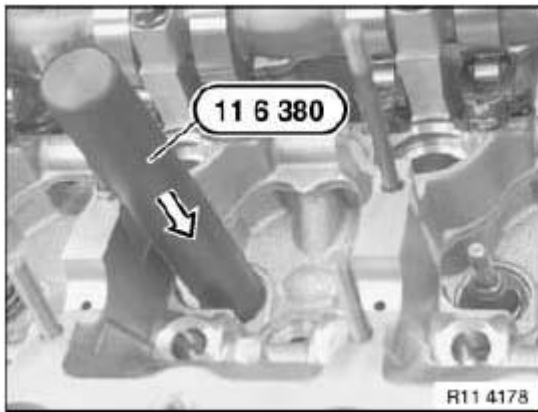


Fig. 217: Identifying Special Tool (11 6 380)
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 34 715 REPLACING ALL VALVE SPRINGS (N52)

Special tools required:

- 11 4 480
- 11 9 000

· 11 9 017

Necessary preliminary tasks:

- Remove **Cylinder Head Cover.**
- Remove **Exhaust Camshaft.**
- Remove **Intermediate Lever.**
- Remove **Inlet Camshaft.**
- Remove **Roller Cam Follower.**

Place cylinder head on special tool 11 9 000.

Press valve spring down on spring retainer with special tool 11 9 017.

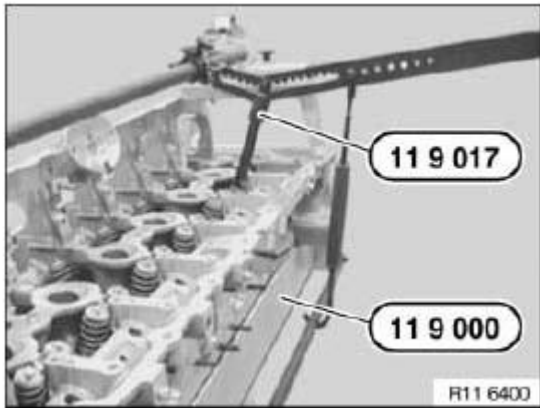


Fig. 218: Identifying Special Tool (11 9 000) And (11 9 017)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve tapers with a magnet.

Remove valve spring and spring retainer.

Set down on special tool 11 4 480 in a tidy and orderly fashion.

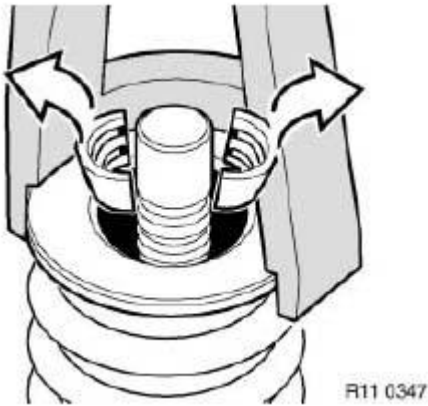


Fig. 219: Identifying Valve Spring Cotter Pin
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.
Incorrect installation will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

Only the diameter pointing to the spring retainer at the bottom is required for correct installation of the valve spring.

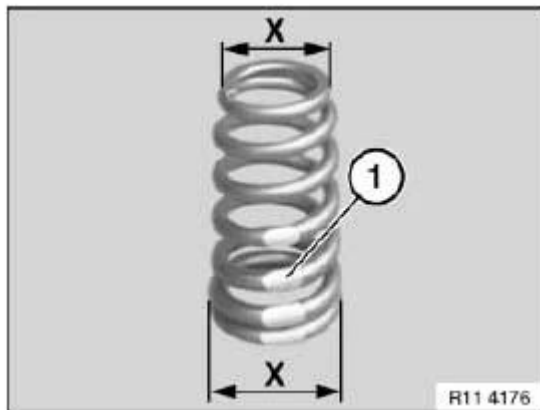


Fig. 220: Identifying Valve Spring Color Marking
 Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring

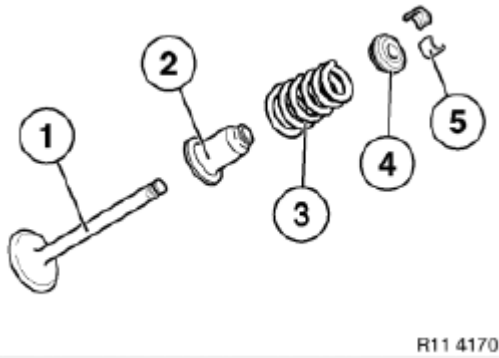


Fig. 221: Identifying Valve Spring Assembly And Components
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

36 VARIABLE CAMSHAFT TIMING

11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N52)

Special tools required:

- 11 4 280
- 11 4 281
- 11 4 282
- 11 4 283

Necessary preliminary tasks:

- Remove Cylinder Head Cover.

IMPORTANT: To open central bolts on adjustment units and camshafts.

Fit special tool 11 4 280.

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

IMPORTANT: Special tool 11 4 282 must be fitted underneath on inlet camshaft.

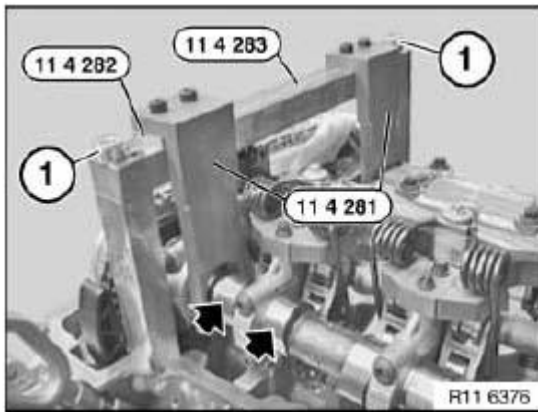


Fig. 222: Identifying Special Tool (11 4 281), (11 4 282), (11 4 283) And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Release chain tensioner (2).

For tightening torque refer to 11 31 5AZ in **11 31 CAMSHAFT (N52)** .

Release central bolt on inlet/exhaust adjustment units (1).

For tightening torque refer to 11 36 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL (N52)** .

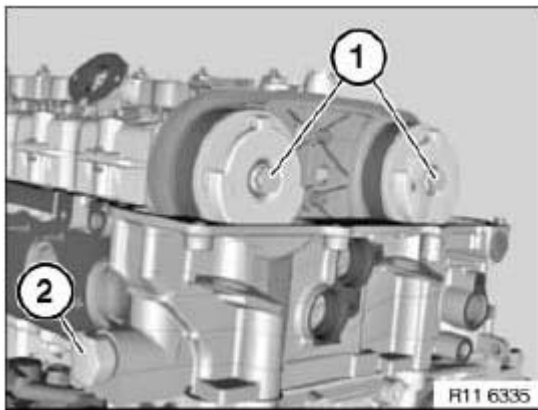


Fig. 223: Identifying Engine Central Bolt And Chain Tensioner
 Courtesy of BMW OF NORTH AMERICA, INC.

Detach exhaust adjustment unit (1) from exhaust camshaft.

Detach inlet adjustment unit (2) from inlet camshaft.

Installation:

To facilitate removal and installation of adjustment units, turn sensor gears at cutout downwards.

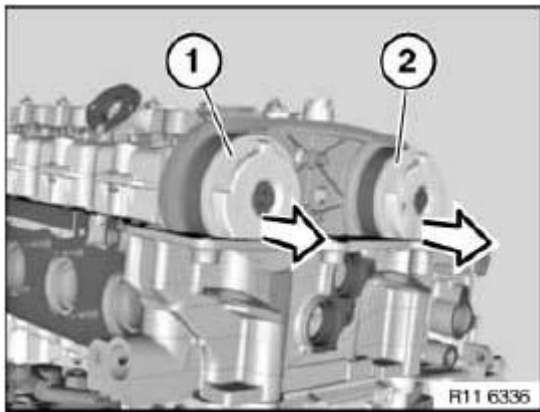


Fig. 224: Identifying Engine Inlet And Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

- IMPORTANT:**
- **Danger of mixing up adjustment units.**
 - **Mixing up the adjustment units will result in engine damage.**

The inlet and exhaust adjustment units are different.

VANOS is marked with AUS and EX for the exhaust camshaft.

VANOS is marked with EIN and IN for the inlet camshaft.

Sensor gears can be fitted alternatively.

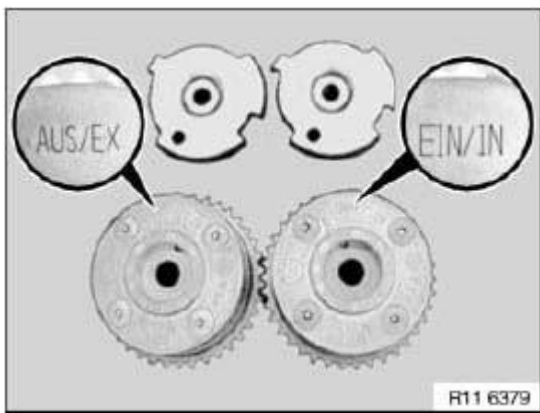


Fig. 225: Identifying Inlet And Exhaust Camshaft Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Fit both adjustment units on camshafts.

The installation position of the adjustment units can be freely selected.

Insert screws (1).

For tightening torque refer to 11 36 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL (N52)** .

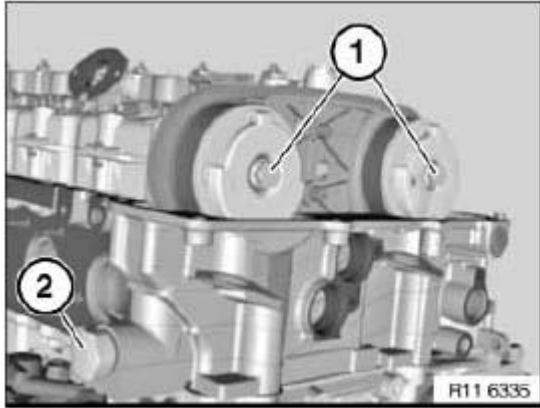


Fig. 226: Identifying Central Screw And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Press clamping rail (1) by hand against timing chain and make sure timing chain is guided in clamping rail (1).

NOTE: Schematic representation on removed chain drive.

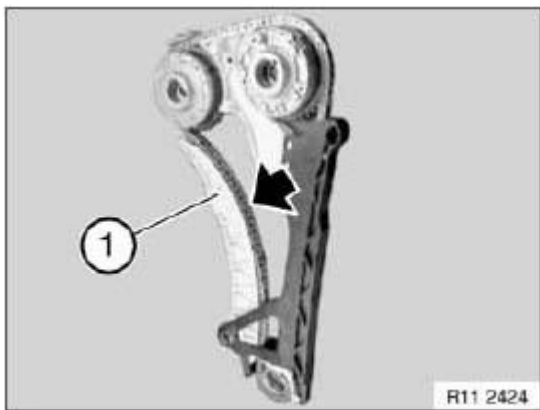


Fig. 227: Identifying Clamping Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust **Valve Timing**.

Fit **Chain Tensioner**.

Assemble engine.

11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N52)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunction if valves are contaminated:

- **Rough running.**
- **OBD fault entry.**
- **Exhaust emission behavior.**
- **Low engine power.**

Necessary preliminary tasks:

- Remove **Acoustic Cover**

Disconnect plug connection (1) for inlet solenoid valve (2).

Unscrew bolt (3).

Remove inlet solenoid valve (2) with bracket towards front.

Disconnect plug connection (6) for exhaust solenoid valve (5).

Release screw (4).

Remove exhaust solenoid valve (5) with bracket towards front.

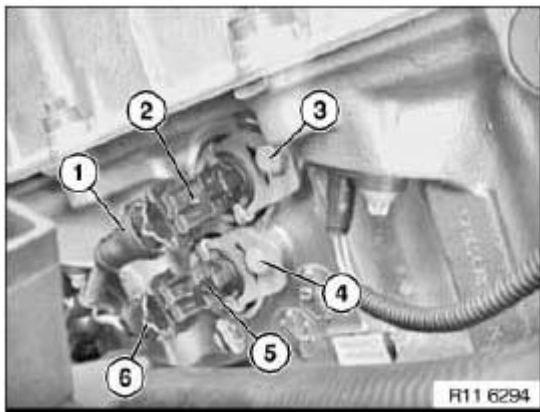


Fig. 228: Identifying Inlet Solenoid Valve, Plug Connections, Exhaust Solenoid Valve, Screw And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of mixing up plug connections (1 and 6)

Assemble engine.

Check function of DME.

37 VARIABLE VALVE GEAR

11 37 005 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT (N52)

Special tools required:

- 11 4 481

Necessary preliminary tasks:

- Remove Cylinder Head Cover.
- Remove Intermediate Lever.

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

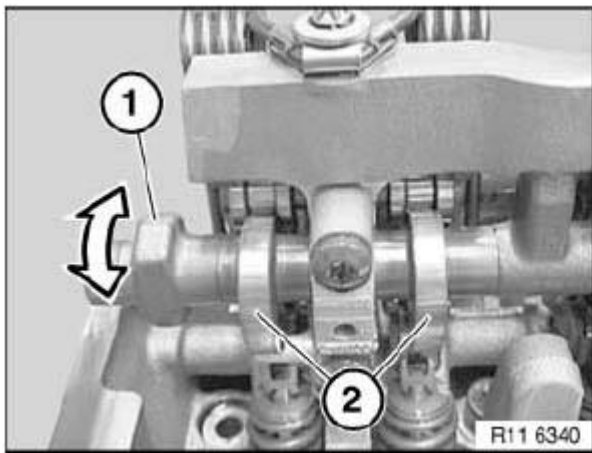


Fig. 229: Identifying Eccentric Shaft And Lift
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on bearing cap number (1).

Release screws on all bearing caps (2).

All bearing caps are identified with numbers; set caps down in special tool 11 4 481 in a tidy and orderly fashion.

Remove intermediate shaft with a light tilting and rotating motion.

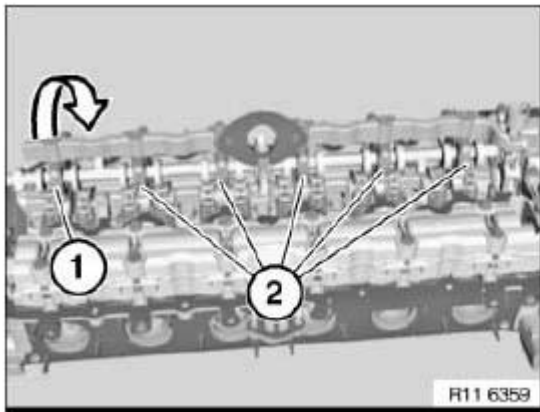


Fig. 230: Identifying Bearing Cap And Number
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw and remove magnet wheel (1).

IMPORTANT: Screw is not magnetic and is secured against falling out.

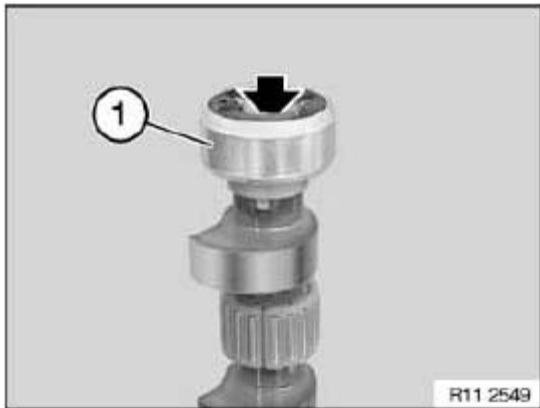


Fig. 231: Identifying Magnet Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Magnet wheel (1) is extremely magnetic.

After removing, protect magnet wheel (1) against metal chips by placing it in a plastic bag (2) with a seal.

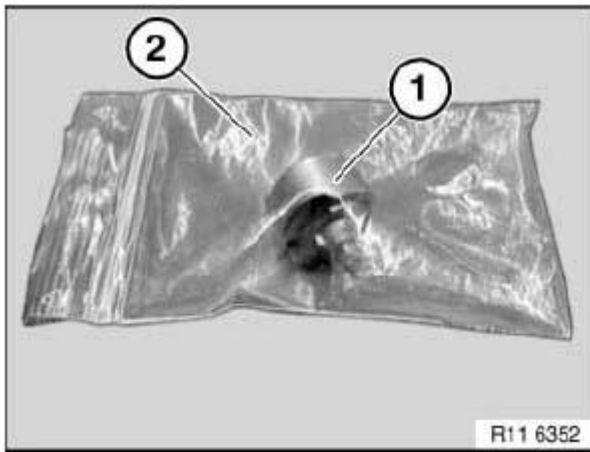


Fig. 232: Identifying Magnet Wheel And Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully press needle bearing (1) apart at split position only to such an extent that it can be removed from eccentric shaft.

IMPORTANT: Needle bearing (1) can break very easily.

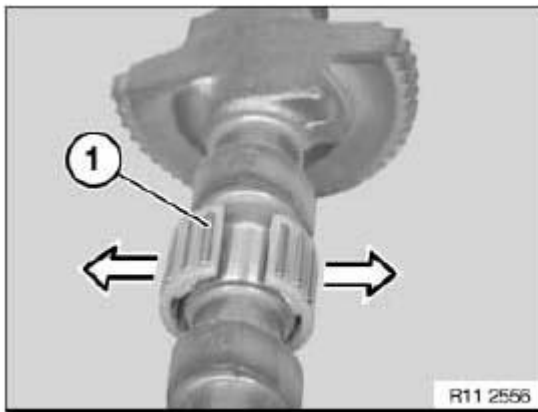


Fig. 233: Identifying Needle Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shells (1) in such a way that ends of bearing shells (1) face each other as shown in **Fig. 234**.

NOTE: Always replace bearing shells and needle bearings together.

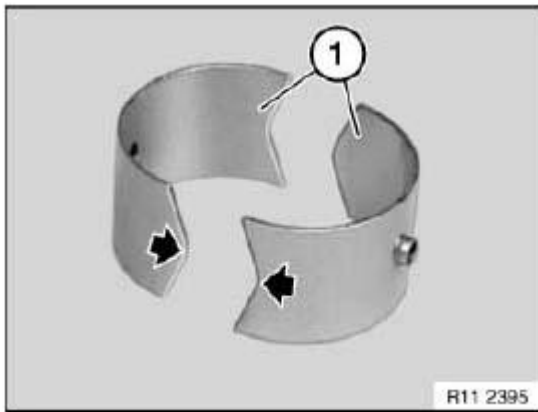


Fig. 234: Identifying Bearing Shells

Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shell (1) with tip facing down (see arrow in **Fig. 235**) in cylinder head.

Install bearing shell (2) with tip facing up in bearing cap.

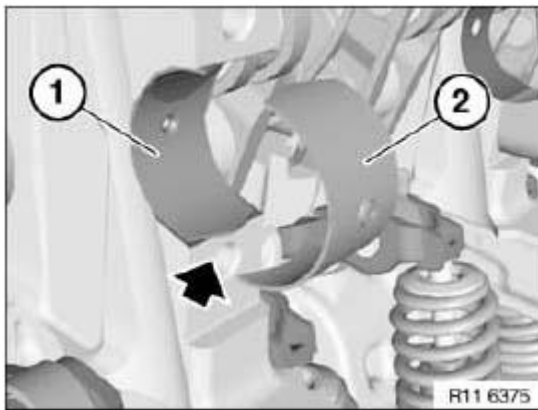


Fig. 235: Identifying Bearing Shell Installation Orientation

Courtesy of BMW OF NORTH AMERICA, INC.

Install eccentric shaft and set to minimum lift.

Bearing cap number 6 (1) is provided with a stop.

All bearing caps (2) are identified with numbers from 1 to 5.

For tightening torque refer to 11 37 7AZ in **11 37 VARIABLE VALVE GEAR (N52)**.

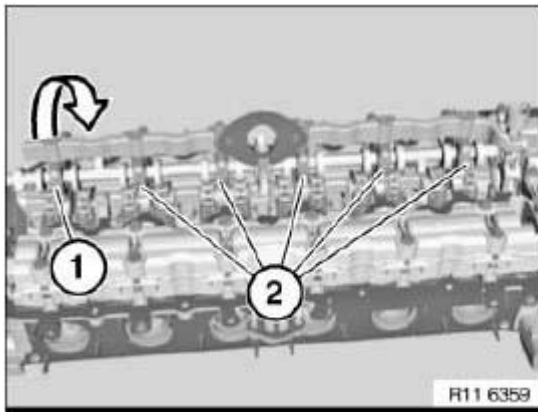


Fig. 236: Identifying Bearing Caps And Bearing Cap Number
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 37 010 REMOVING AND INSTALLING/REPLACING INTERMEDIATE LEVERS (N52)

Special tools required:

- 11 4 270
- 11 4 450
- 11 4 481

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **Cylinder Head Cover**.

If necessary, set eccentric shaft (1) on twin surface to minimum lift (2).

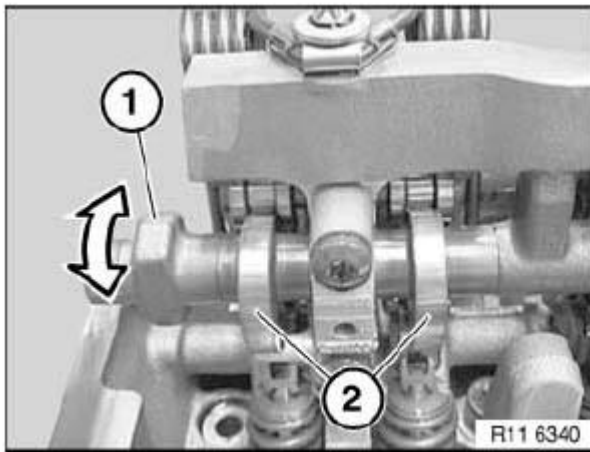


Fig. 237: Identifying Eccentric Shaft And Lift
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 270 with gripping pliers (3) to guide block (2).

IMPORTANT: Special tool 11 4 270 is only secured to guide block.

Adjusting the gripping pliers (3) is not permitted (risk of damage) on special tool 11 4 270.

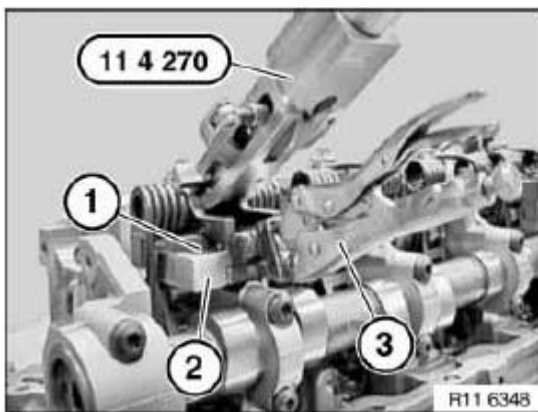


Fig. 238: Identifying Special Tool (11 4 270), Gripping Pliers And Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The oil nozzle must be removed beforehand from cylinder no. 3.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Incorrect handling risk of damage.

Secure both bearing pins (2) in return spring with knurled screw (1) on special tool 11 4 270.

Press special tool 11 4 270 in direction of arrow as far as it will go.

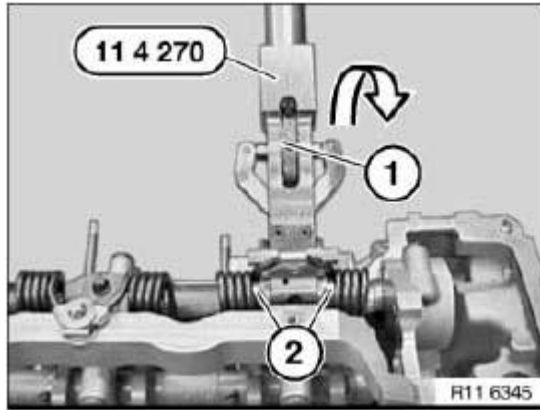


Fig. 239: Identifying Special Tool (11 4 270), Screw And Bearing Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Release steel screw (2).

To avoid jamming with screw (2) and return spring, it is necessary when releasing screw (2) to relieve the pretension on special tool 11 4 270 uniformly.

IMPORTANT: Risk of damage to cylinder head thread.

For tightening torque refer to 11 37 2AZ in 11 37 VARIABLE VALVE GEAR (N52) .

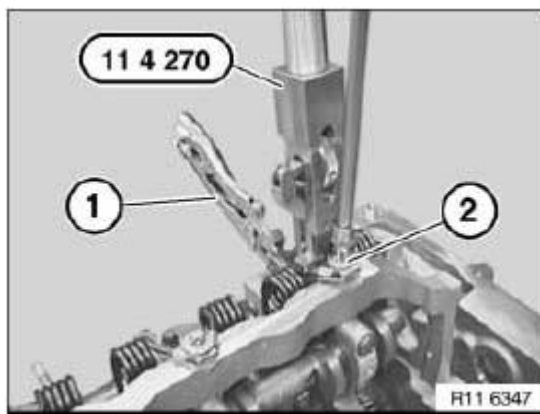


Fig. 240: Identifying Special Tool (11 4 270) And Steel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve tension on return spring (1) with special tool 11 4 270.

NOTE: Metal lug (2) cannot be disassembled and must not be removed.

Installation:

Replace metal lug if tab washer is defective.

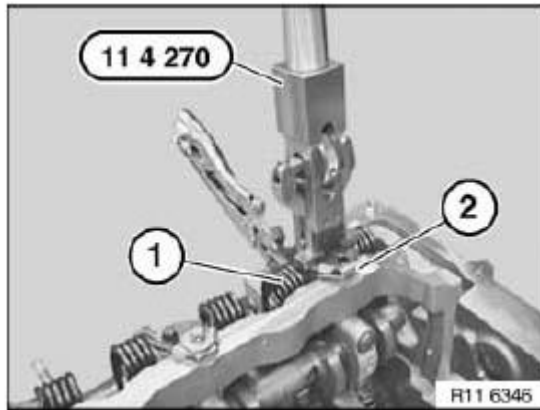


Fig. 241: Identifying Special Tool (11 4 270), Return Spring And Metal Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Press return spring apart at position (1) and remove towards top.

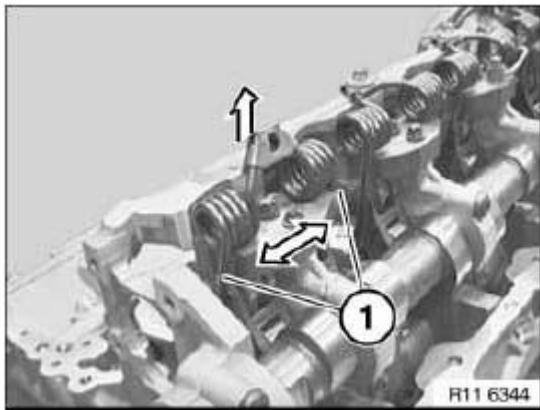


Fig. 242: Identifying Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Uniform distribution must not be changed.

All components must be set down in a clean and orderly fashion.

All components must be reinstalled in the same positions in an engine which has already been in use.

1. Eccentric shaft with bearing.

2. Bearing caps of eccentric shaft set out in order.
3. Inlet camshaft.
4. Bearing caps of inlet camshaft set out in order.
5. Inlet valves with valve springs.
6. Valve plates and valve tapers.
7. Roller cam followers with HVC element set out in order.
8. Return springs.
9. Guide blocks set out in order.
10. Intermediate levers set out in order.

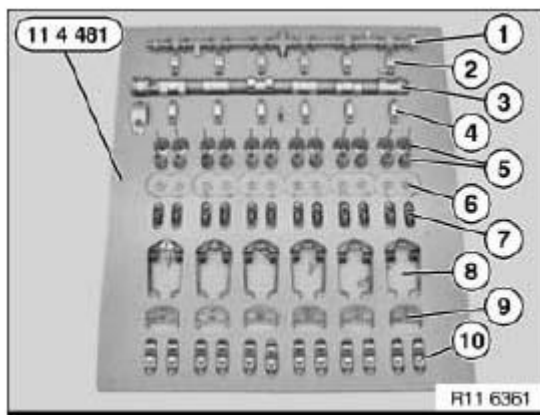


Fig. 243: Identifying Special Tool (11 4 481)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

For tightening torque refer to 11 37 1AZ in **11 37 VARIABLE VALVE GEAR (N52)** .

Set down guide blocks (2) in special tool 11 4 481 in neat order.

Installation:

Mixing up the guide blocks may cause the engine to demonstrate idle fluctuations.

This will result in maladjustment of uniform distribution.

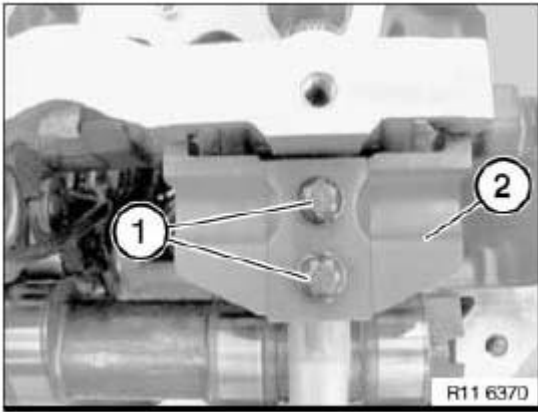


Fig. 244: Identifying Guide Blocks And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Contact surfaces (1) must be clean and oil-free.

Clean if necessary.

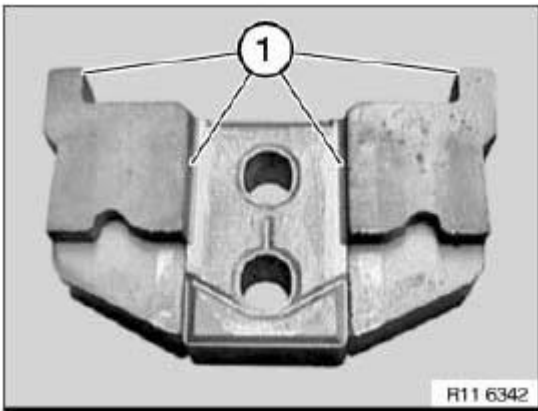


Fig. 245: Identifying Guide Block Contact Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out intermediate levers (2).

Intermediate levers (2) set out in special tool 11 4 481 in order.

Installation:

Mixing up the intermediate levers may cause the engine to demonstrate RPM fluctuations.

Installation:

Contact surfaces (1) must be clean and oil-free.

Clean if necessary.

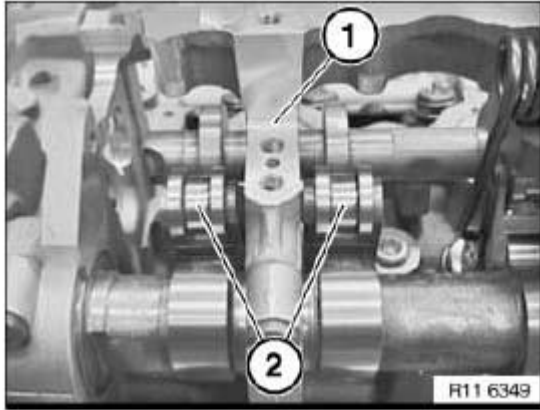


Fig. 246: Identifying Intermediate Levers And Contact Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

All intermediate levers (1) are classified.

Reinstall intermediate levers which have already been used in the same positions.

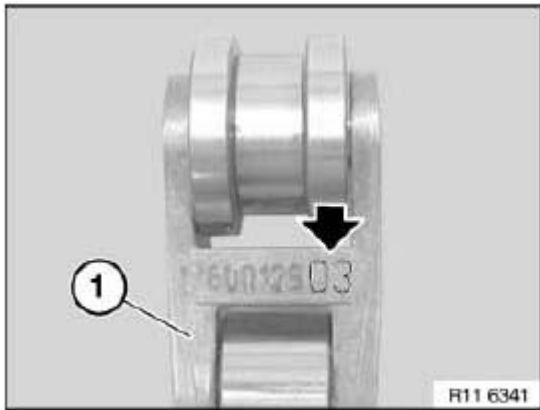


Fig. 247: Identifying Intermediate Levers Classification Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before reinstalling the intermediate levers, make sure the roller cam followers are correctly positioned (**risk of damage**).

Install intermediate levers (2).

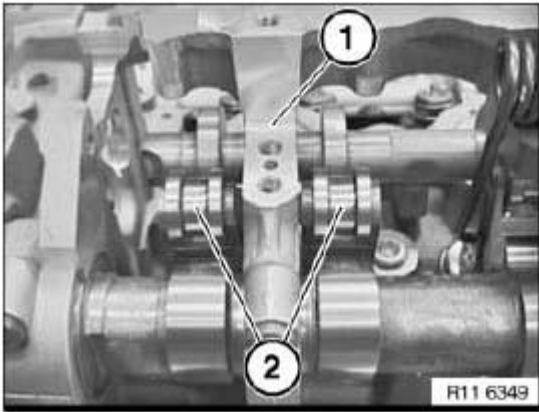


Fig. 248: Identifying Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten bolts (1) hand-tight.

Check both intermediate levers again to ensure correct installation position.

Release bolts (1) again by a 1/4 turn.

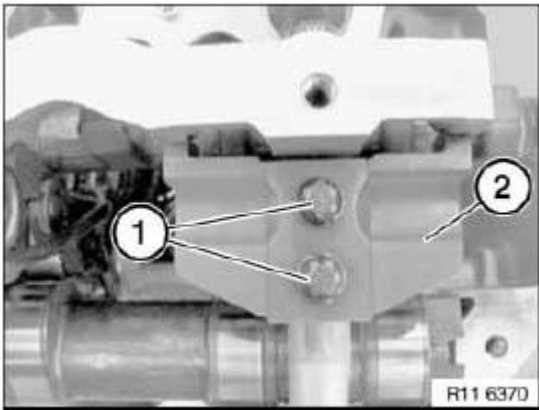


Fig. 249: Identifying Guide Blocks And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 450 to bolt connection (1) of eccentric shaft.

Turn eccentric lever (3) on special tool 11 4 450 in direction of arrow.

Guide block is now tensioned.

Secure bolts (2).

For tightening torque refer to 11 37 1AZ in **11 37 VARIABLE VALVE GEAR (N52)** .

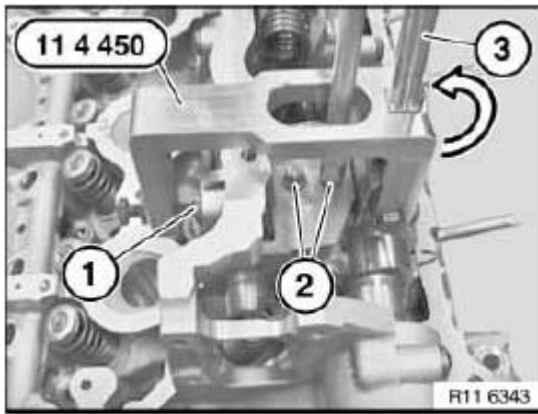


Fig. 250: Identifying Special Tool (11 4 450), Eccentric Lever, Bolt And Bolt Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

At cylinder no. 3, the guide block can be pre-installed with one bolt (2) only.

Fit oil pump only after retaining spring has been fitted.

Fit return spring on guide block.

Installation:

Insert return spring (2) in intermediate lever (1).

Check roller cam follow (3) again to ensure correct installation position.

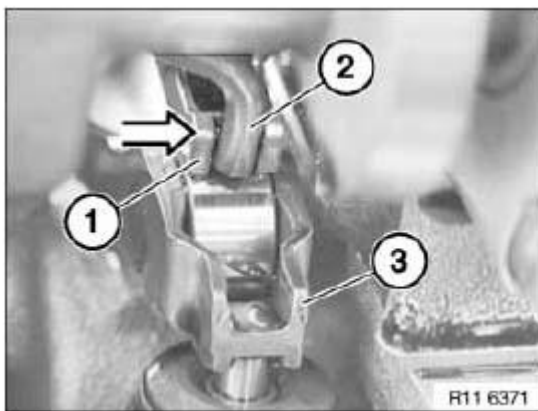


Fig. 251: Identifying Roller Cam Follow, Return Spring And Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 270 with gripping pliers (3) to guide block (1).

IMPORTANT: Special tool 11 4 270 is only secured to guide block.
Adjusting the gripping pliers (3) is not permitted (risk of damage) on special tool 11 4 270.

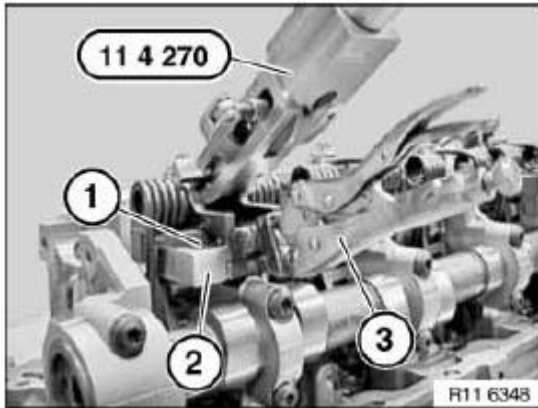


Fig. 252: Identifying Special Tool (11 4 270) And Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Incorrect handling risk of damage.

Secure both bearing pins (2) in return spring with knurled screw (1) on special tool 11 4 270.

IMPORTANT: Check return spring again on intermediate lever to ensure correct installation position.

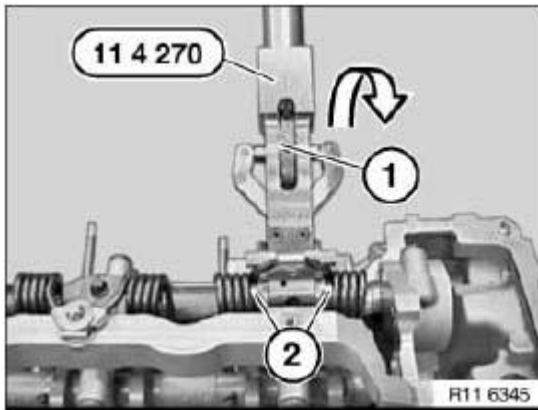


Fig. 253: Identifying Special Tool (11 4 270), Bearing Pins And Knurled Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 4 270 in direction of arrow as far as it will go.

Insert steel screw (2).

To avoid jamming with screw (2) and return spring, it is necessary when inserting screw (2) to increase the pretension on special tool 11 4 270 uniformly.

IMPORTANT: Risk of damage to cylinder head thread.

For tightening torque refer to 11 37 2AZ in 11 37 VARIABLE VALVE GEAR (N52).

Remove special tool 11 4 270.

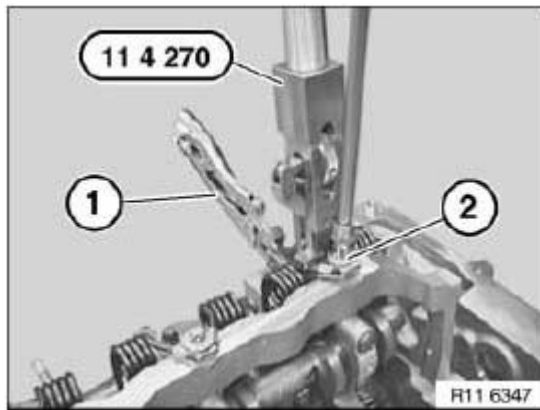


Fig. 254: Identifying Special Tool (11 4 270) And Steel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, adjust oil nozzle (2) exactly so that oil spray (3) points precisely towards spline teeth.

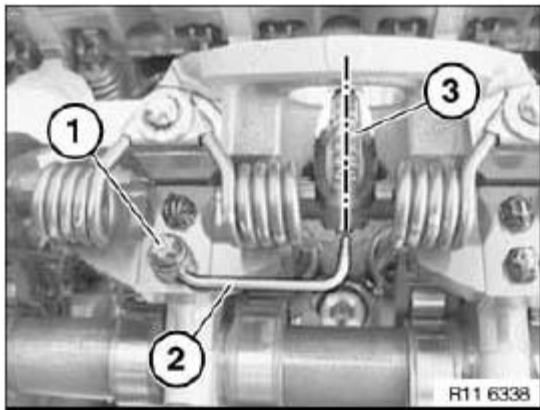


Fig. 255: Identifying Oil Spray And Oil Nozzle

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 37 020 REMOVING AND INSTALLING/REPLACING POSITIONING MOTOR FOR ECCENTRIC SHAFT (N52)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **Acoustic Cover**.
- Unfasten ignition wiring harness and lay to one side.
- Remove the two rod-type ignition coils next to electric motor.

IMPORTANT: The screw connection must not be released before the servodrive is in the service position.

Risk of damage to intermediate shaft.

Turn ratchet (1) with Allen key (2) clockwise in direction of arrow and relieve tension on intermediate shaft.

NOTE: Do not turn shaft (2) too far.

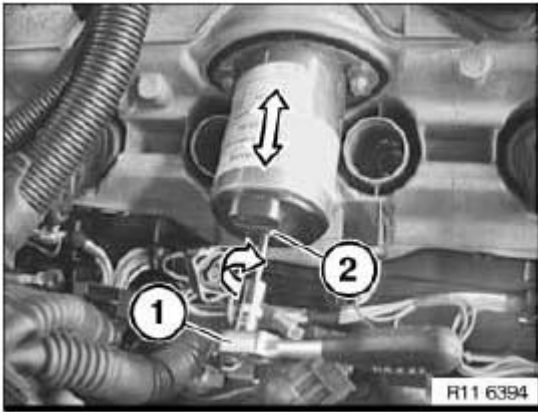


Fig. 256: Turning Ratchet And Allen Key
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (3).

For tightening torque refer to 11 12 5AZ in 11 12 CYLINDER HEAD WITH COVER (N52) .

NOTE: Screw (4) is under servodrive.

Release screw (4).

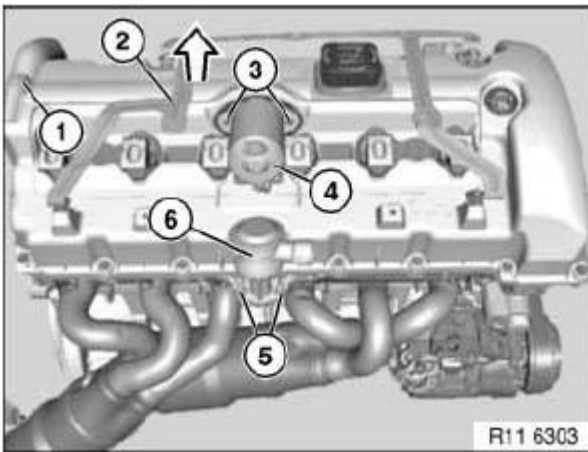


Fig. 257: Identifying Intermediate And Servodrive Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Turn servodrive with screw (2) counterclockwise in direction of arrow.

Servodrive can now be withdrawn in direction of arrow.

Installation:

All removed subassemblies are reinstalled in reverse sequence.

Screw in shaft (2) in counterclockwise direction until servodrive rests on flange of cylinder head cover.

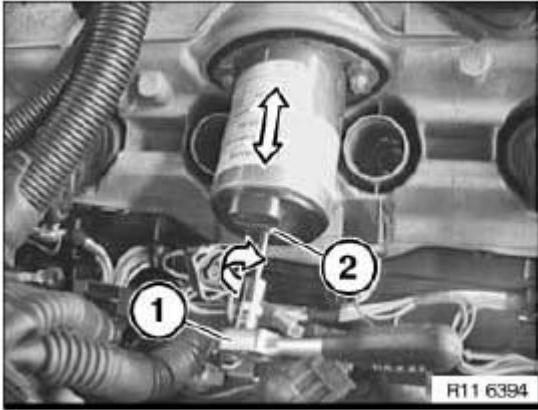


Fig. 258: Turning Servodrive With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 37 030 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT SENSOR (N52)

Necessary preliminary tasks:

- Remove Cylinder Head Cover.

IMPORTANT: All bolts are secured against falling out, release bolts (2) on cylinder head only but do not unscrew fully.

Bolts (2) can fall out.

Risk of damage to timing chain drive.

Release screws (2).

Lift out sensor (1).

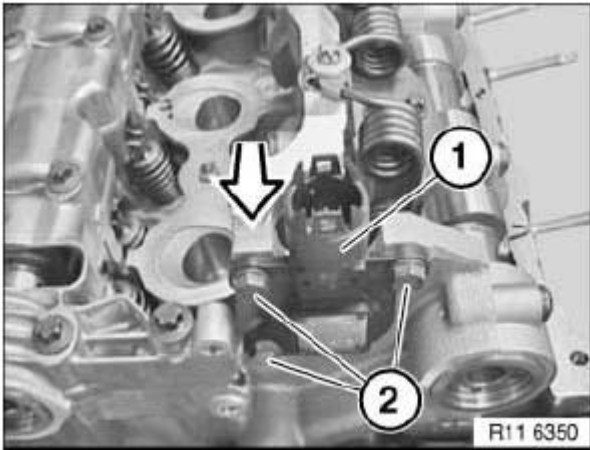


Fig. 259: Identifying Cylinder Head Bolts And Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustrations show timing chain removed.

Assemble engine.

40 OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (N52)

Special tools required:

- 11 4 050
- 13 3 061
- 13 3 063
- 13 6 051
- 13 6 054

Necessary preliminary tasks:

- Remove Acoustic Cover.

Disconnect plug connection on oil pressure switch (3)

Remove oil pressure switch (3).

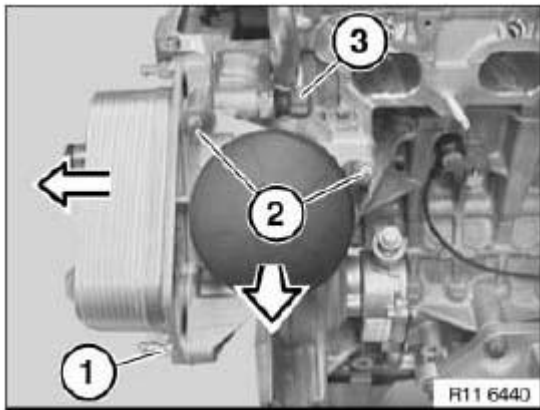


Fig. 260: Identifying Oil Pressure Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 4 050 with sealing ring.

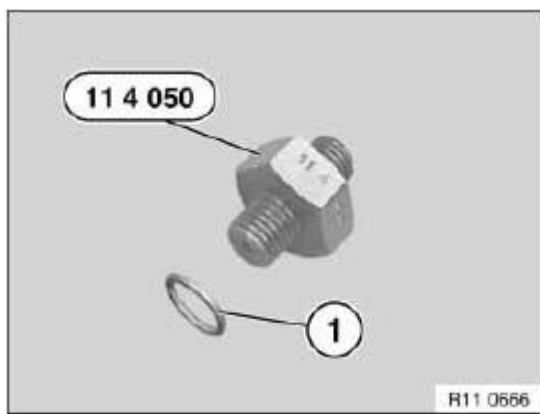


Fig. 261: Identifying Special Tool (11 4 050) And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Check engine oil pressure with diagnosis tester.

Connect special tools 13 6 054 and 13 6 051.

Check engine oil pressure with pressure gauge.

Connect special tools 13 3 063 and 13 3 061.

Start engine and check engine oil pressure.

Specified values. **11 41 OIL PUMP WITH STRAINER AND DRIVE N52 B25**

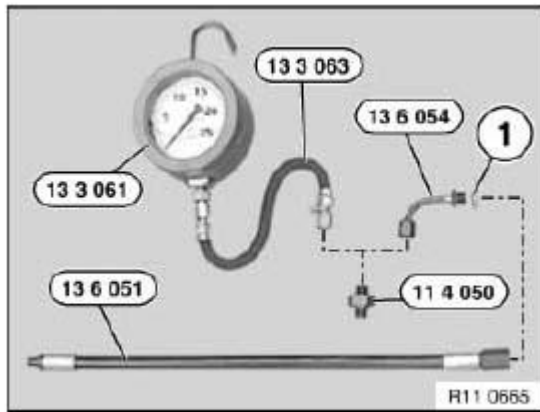


Fig. 262: Identifying Special Tools (13 3 063), (13 6 054), (13 6 051), (11 4 050), (13 3 061) And Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

41 OIL PUMP WITH FILTER AND DRIVE

11 41 000 REMOVING AND INSTALLING OIL PUMP (N52)

Necessary preliminary tasks:

- Removing **Oil Pan**.

Release screws (1).

For tightening torque refer to 11 41 1AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

Installation:

Replace aluminium screws.

Remove intake pipe (2) in direction of arrow.

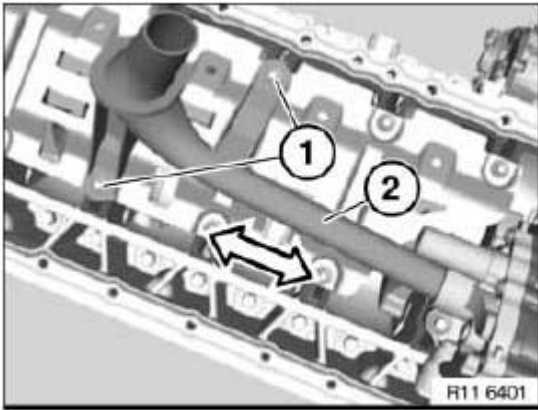


Fig. 263: Identifying Intake Pipe And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

For tightening torque refer to 11 41 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

Release screws (2).

For tightening torque refer to 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

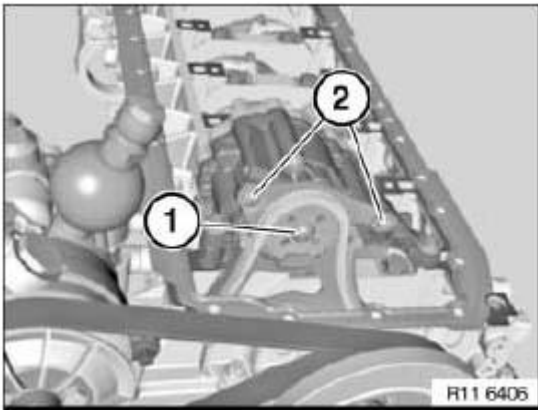


Fig. 264: Identifying Oil Pump Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

For tightening torque refer to 11 41 2AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

Installation:

Replace aluminium screws.

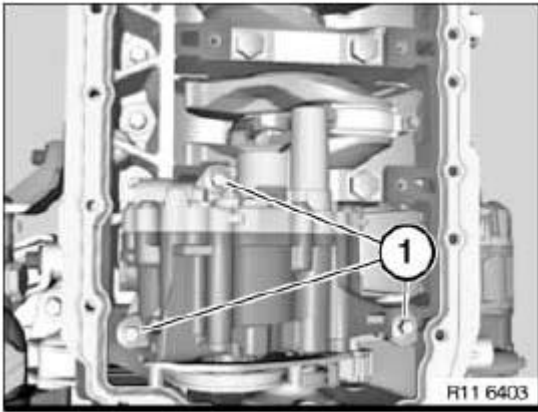


Fig. 265: Identifying Oil Pump Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket wheel (1) in direction of arrow.

NOTE: Timing chain (3) of triangular drive is pressed upwards by chain tensioner.

Do not remove sprocket wheel.

Remove oil pump (2) in direction of arrow.

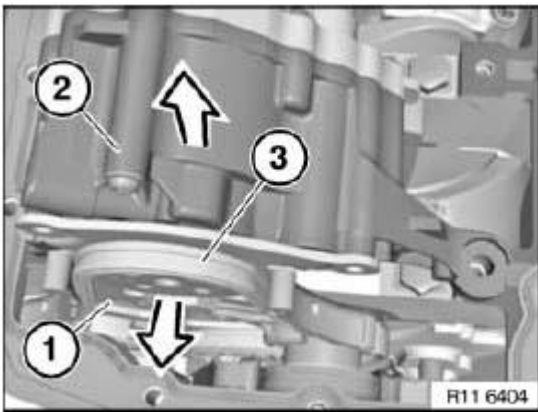


Fig. 266: Identifying Oil Pump, Timing Chain And Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spacer bushings (1) for secure seating and damage; replace if necessary.

Align twin surface (3) on oil pump (2) to sprocket wheel. Install oil pump (2).

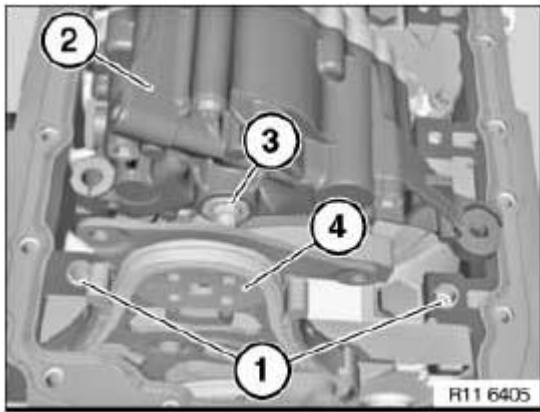


Fig. 267: Identifying Spacer Bushings, Twin Surfaces And Oil Pump
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N52)

Special tools required:

- 11 0 290
- 11 0 300
- 11 4 120
- 11 4 280
- 11 4 360
- 11 4 362
- 11 4 440
- 11 5 200
- 11 9 280

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Joining torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **Cylinder Head Cover**.
- Remove **Engine Oil Sump**.
- Remove **Drive Belt**.
- Remove **Tensioner** for drive belt.
- Remove **Vibration Damper** at front.
- Remove **Sealing Cover** for vacuum pump.

Turn sprocket wheel (3) at central bolt (crankshaft) into position.

Secure special tool 11 0 290 to sprocket wheel (3) and special tool 11 4 362.

Release screw (2).

For tightening torque refer to 11 66 2AZ in **11 66 VACUUM PUMP (N52)** .

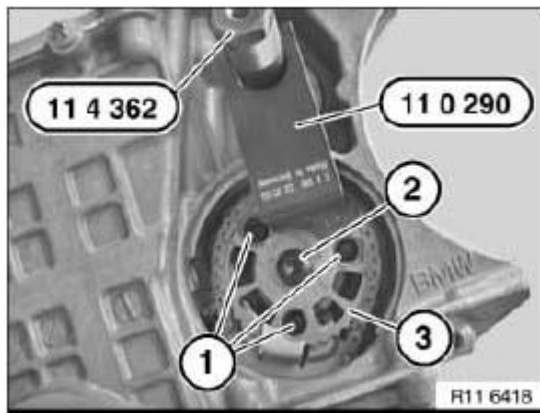


Fig. 268: Identifying Special Tool (11 0 290), (11 4 362), Crankshaft Sprocket Wheel And Mounting Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Press timing chain with chain tensioner (1) in direction of arrow.

Disconnect timing chain with special tool 11 4 120.

Feed out sprocket wheel (3) at hexagon head of vacuum pump (4).

Installation:

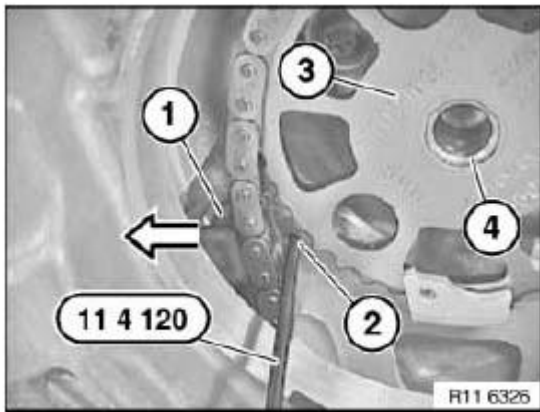


Fig. 269: Identifying Special Tool (11 4 120), Sprocket Wheel, Chain Tensioner And Vacuum Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on sprocket wheel.

For tightening torque refer to 11 41 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

Release bolts (2).

For tightening torque refer to 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

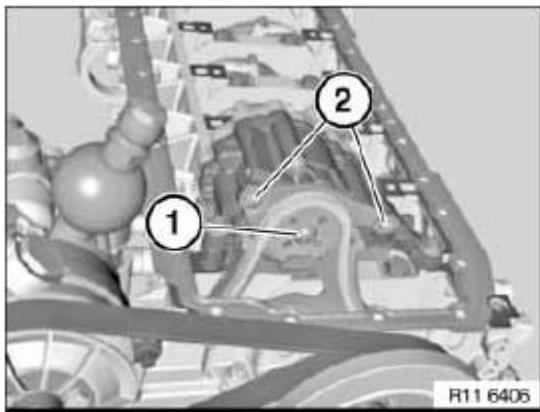


Fig. 270: Identifying Bolt On Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Secure **Crankshaft And Camshaft**.

Do **not** remove special tools 11 0 300 and 11 4 280.

Fit special tool 11 9 280.

Release central bolt (1).

NOTE: A second person is required.

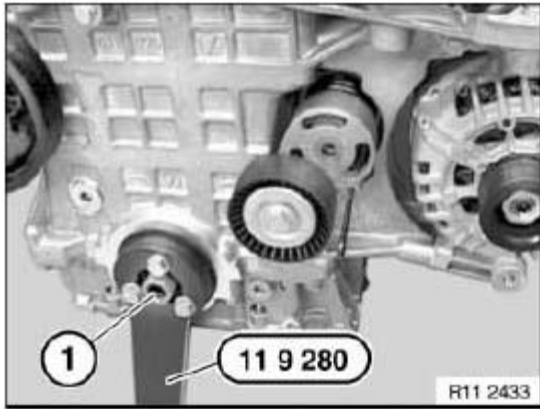


Fig. 271: Identifying Special Tool (11 9 280) And Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Remove hub (2) towards front.

Installation:

Replace **Radial Seal** at front.

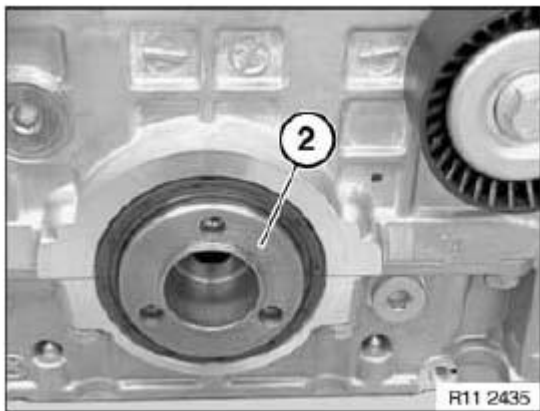


Fig. 272: Identifying Radial Seal Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Open screw plug on bedplate.

Installation:

Replace seal.

Release bolt on triangular drive.

For tightening torque refer to 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

Installation:

Replace aluminium screws.

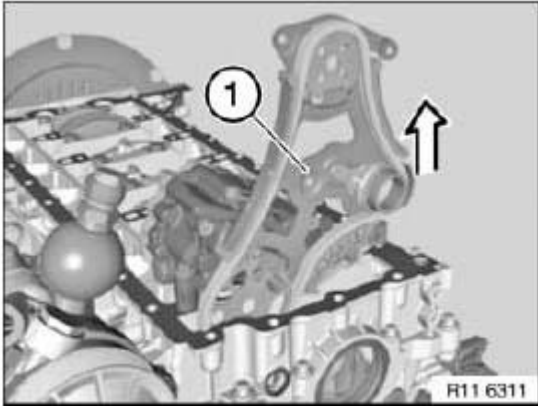


Fig. 273: Identifying Triangular Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Remove triangular drive (1) in direction of arrow.

IMPORTANT: Note installation direction of sprocket wheel (2).

Collar on sprocket wheel (2) points to timing chain drive.

Incorrect assembly will result in engine damage.

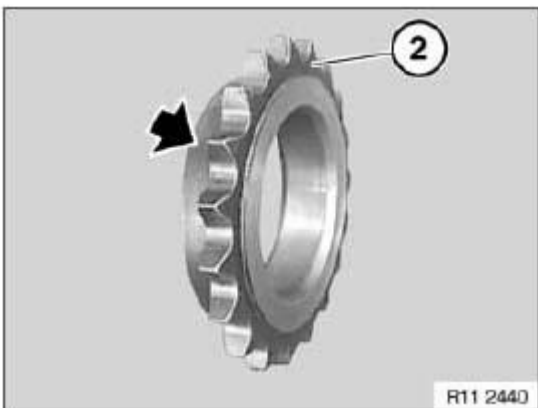


Fig. 274: Identifying Collar On Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Procedure if engine is mounted on special tool 11 4 440.

Release screw (1).

For tightening torque refer to 11 66 2AZ in **11 66 VACUUM PUMP (N52)** .

Release screw (2).

For tightening torque refer to 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

Release screw (3).

For tightening torque refer to 11 21 1AZ in **11 21 CRANKSHAFT AND BEARINGS (N52)** .

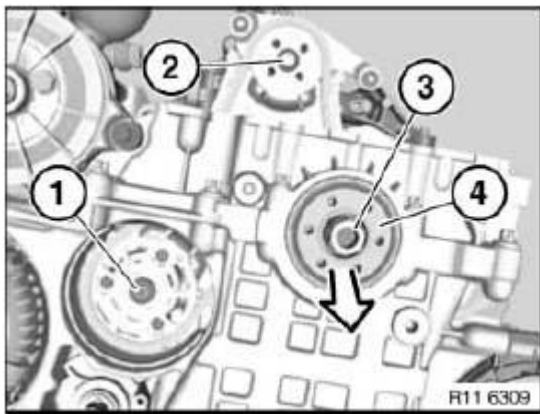


Fig. 275: Identifying Engine Screws And Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Mark screw (3) with a coloured spot.

Remove hub (4) towards front.

Tighten down special tool 11 5 200 with screws (1) to hub.

Do **not** remove special tools 11 0 300 and 11 4 280.

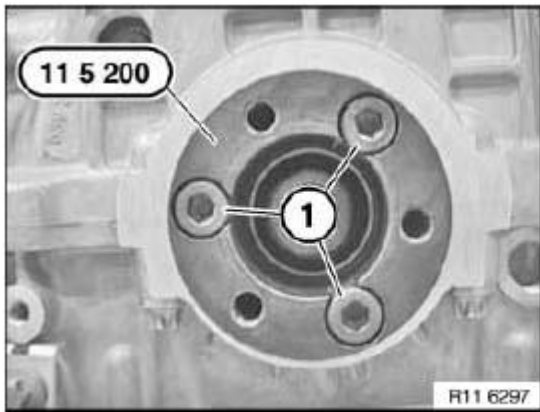


Fig. 276: Identifying Special Tool (11 5 200)
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove **Belt Tensioner**.

Screw in special tool 11 4 360.

Mount special tool 11 9 280 on 11 5 200.

Support special tool 11 9 280 on special tool 11 4 360.

Special tool 11 0 300 secures crankshaft.

Tighten central bolt (1) to jointing torque.

For tightening torque refer to 11 21 1AZ in **11 21 CRANKSHAFT AND BEARINGS (N52)** .

Mark central bolt and hub with paint.

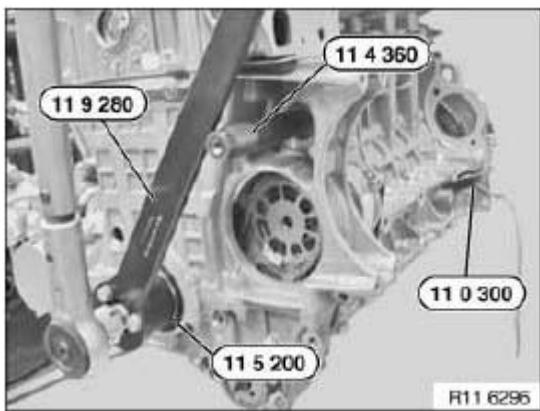


Fig. 277: Identifying Special Tool (11 9 280), (11 5 200), (11 0 300) And (11 4 360)
 Courtesy of BMW OF NORTH AMERICA, INC.

Apply stroke of paint (1) for torsion angle tightening to tool.

See **Fig. 278**.

IMPORTANT: Do not remove tool from central bolt during torsion angle tightening - *risk of damage*.

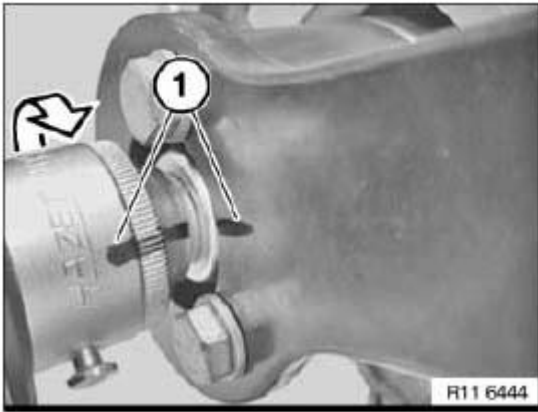


Fig. 278: Identifying Stroke Of Paint For Torsion Angle Tightening
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace **Radial Seal** at front.

Assemble engine.

11 41 115 REMOVING AND INSTALLING/REPLACING HYDRAULIC VALVE (N52K)

IMPORTANT: Aluminium-magnesium materials.

- No steel screws/bolts may be used due to the threat of electrochemical corrosion.
- A magnesium crankcase requires aluminium screws/bolts exclusively.
- Aluminium screws/bolts must be replaced each time they are released .
- Aluminium screws/bolts are permitted with and without colour coding (blue).
- For reliable identification: Aluminium screws/bolts are not magnetic
- Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Have a cleaning cloth ready to catch escaping oil
- Remove front underbody protection. See **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** .

Detach plug (1) from hydraulic valve (2).

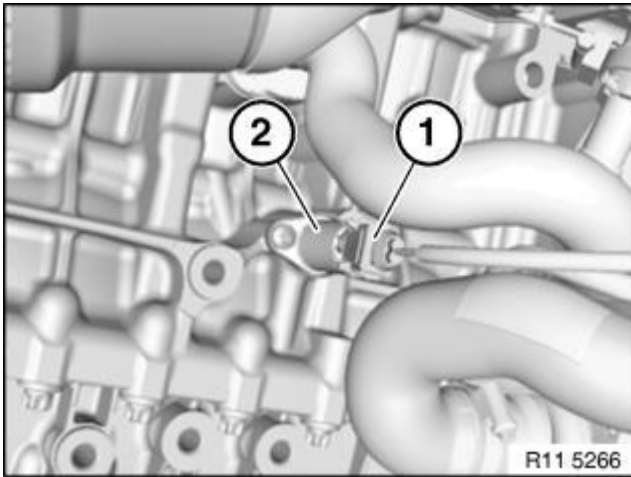


Fig. 279: Detach Plug (1) From Hydraulic Valve (2)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove hydraulic valve (2). Tightening torque

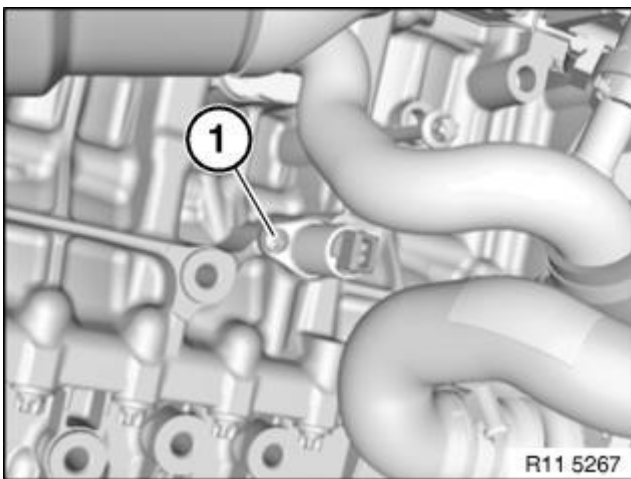


Fig. 280: Release Screw (1) And Remove Hydraulic Valve (2)
Courtesy of BMW OF NORTH AMERICA, INC.

Replace O-ring (1).

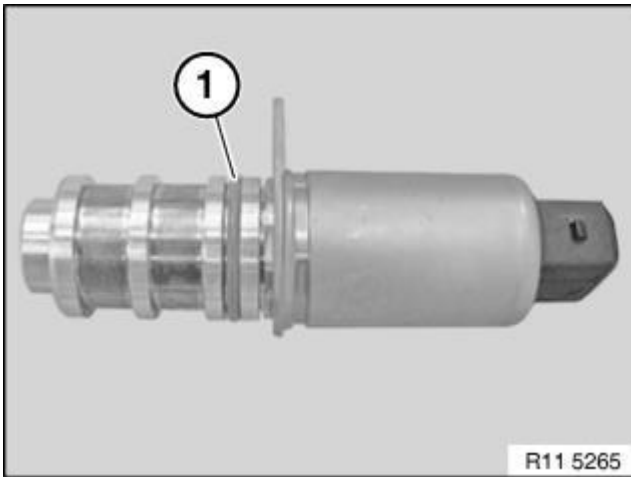


Fig. 281: Replace O-Ring (1)

Courtesy of BMW OF NORTH AMERICA, INC.

42 OIL FILTER AND LINES

11 42 020 REMOVING AND INSTALLING/REPLACING FULL-FLOW OIL FILTER (N52)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Drain **Coolant** .
- If necessary, remove air filter housing. On 3-Series, detach air intake hose (1) and remove Intake filter housing (2). On 5-Series, release clamp (1) and detach air intake hose. Unlock plug (2) and remove. Unfasten screws. Remove intake filter housing (3) towards top. On Z4, Unlock plug (1) and remove. Release clamp and detach air intake hose. Detach intake filter housing (2) from bearing pins of rubber mounts and from intake duct and remove.

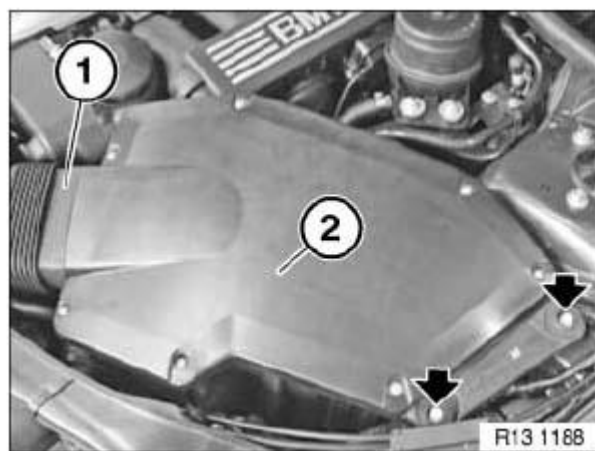


Fig. 282: Identifying Filter Housing And Air Intake Hose (3-Series)
Courtesy of BMW OF NORTH AMERICA, INC.

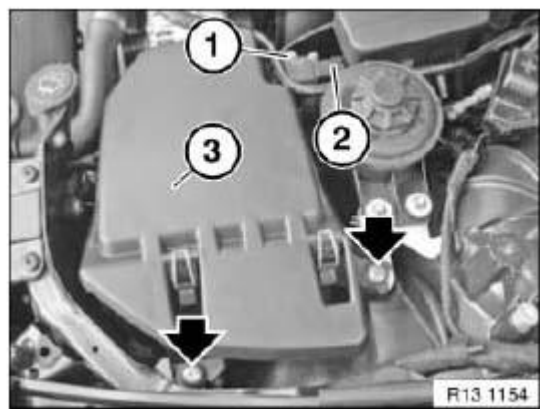


Fig. 283: Identifying Plug And Filter Housing (5-Series)

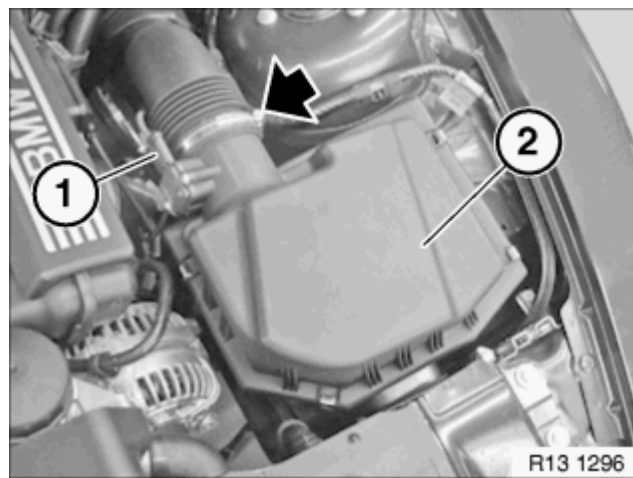


Fig. 284: Removing Air Filter Housing (Z4)

Protect drive belt against dirt.

Release screw (1).

For tightening torque refer to 11 42 2AZ in **11 42 OIL FILTER AND PIPES (N52)** .

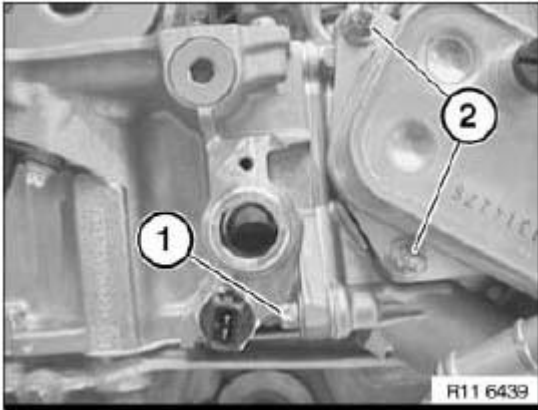


Fig. 285: Identifying Screw (1 Of 2)

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2).

NOTE: Have cleaning cloth ready to catch residual oil.

For tightening torque refer to 11 42 2AZ in **11 42 OIL FILTER AND PIPES (N52)** .

Installation:

Replace all seals.

If necessary, replace filter element.

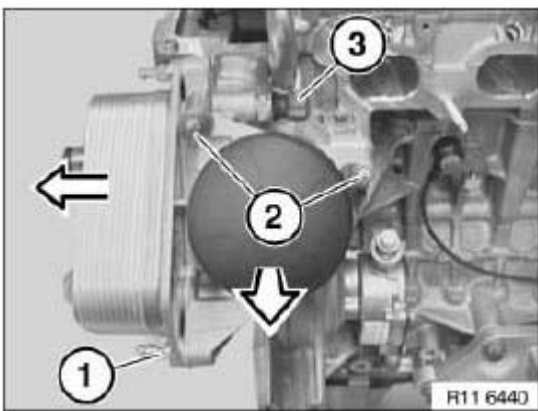


Fig. 286: Identifying Oil Filter Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

NOTE: **Protect drive belt against dirt.**

Installation:

Venting instructions must be observed without fail.

44 OIL COOLER

11 44 000 REMOVING AND INSTALLING/REPLACING OIL-WATER HEAT EXCHANGER (N52)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Detach coolant hoses.
- Pull off protective cap.

Release screws (2).

For tightening torque refer to 11 42 3AZ in **11 42 OIL FILTER AND PIPES (N52)** .

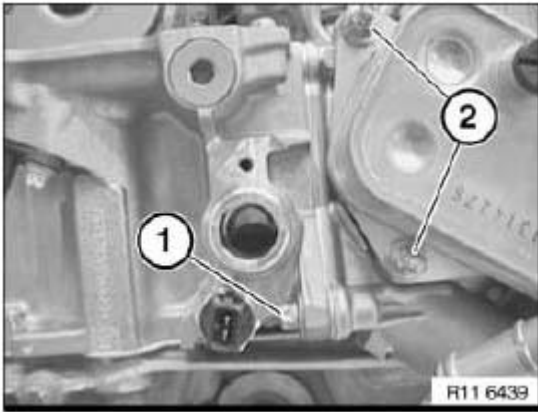


Fig. 287: Identifying Screw (1 Of 2)

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

For tightening torque refer to 11 42 3AZ in **11 42 OIL FILTER AND PIPES (N52)** .

Remove heat exchanger in direction of arrow.

Installation:

Replace all seals.

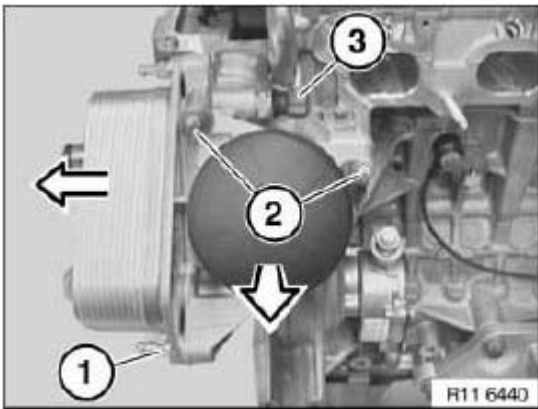


Fig. 288: Identifying Screw (2 Of 2)

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Venting Instructions must be observed without fail.

Fill Cooling System.

51 WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N52)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are released.

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

If a water pump which has already been operated is reused, it must be filled immediately after being removed with coolant (mixture ratio 1:1 / water : coolant).

Necessary preliminary tasks:

- Remove Coolant Thermostat.

Disconnect water hose (1).

Disconnect plug connection (4).

Release screws (5).

Installation:

Replace aluminium screws.

For tightening torque refer to 11 51 1AZ in **11 51 WATER PUMP AND DRIVE (N52)** .

Installation:

If the water pump is to be reused, it must be mechanically rotated once (breakaway torque at impellers).

One water pump rotation will be sufficient.

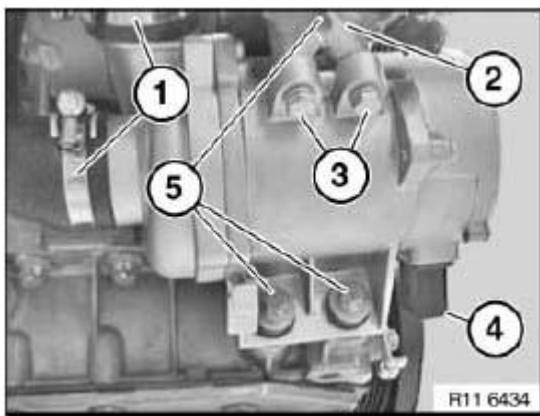


Fig. 289: Identifying Water Hose, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Venting Instructions must be observed without fail.

53 THERMOSTAT AND CONNECTING

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N52)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Remove front splash guard.
- Drain **Coolant** from radiator.

Release hose clamp (1) and detach coolant hose.

Release hose clamp (2) and detach coolant hose.

Unlock and detach coolant hose (3).

Unlock and detach coolant hose (4).

Disconnect plug connection (5).

Release screws (6).

For tightening torque refer to 11 53 1AZ in **11 53 THERMOSTAT AND CONNECTIONS (N52)** .

Remove coolant thermostat (7).

NOTE: Illustration shows coolant thermostat removed.

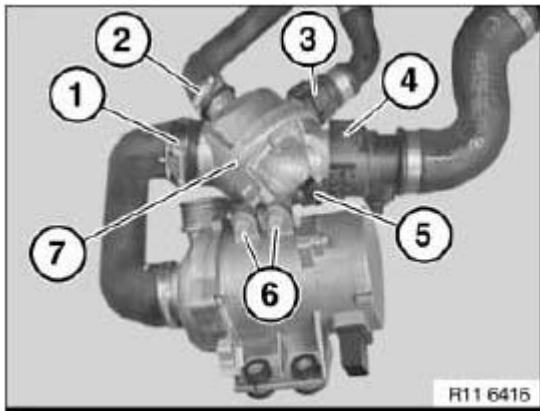


Fig. 290: Identifying Coolant Thermostat, Hose Clamp, Screws, Plug Connection And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 53 740 REMOVING AND INSTALLING/REPLACING WATER PIPE (N52)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Remove front splash guard.
- Drain **Coolant** from radiator.

Release screws (2).

For tightening torque refer to 11 53 2AZ in **11 53 THERMOSTAT AND CONNECTIONS (N52)** .

Remove water pipe in direction of arrow.

Installation:

Seal (1) must not show any traces of damage; check and if necessary replace.

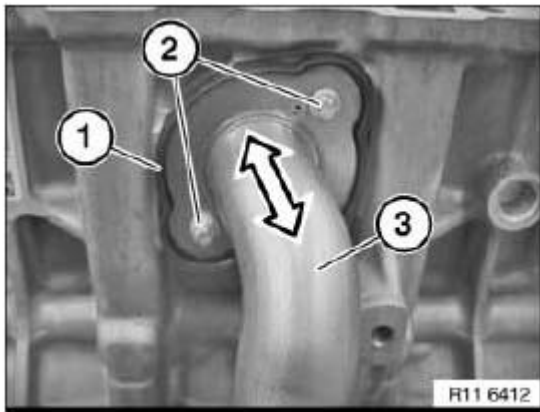


Fig. 291: Identifying Water Pipe Mounting Screws And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Detach water pipe in direction of arrow from water pump (2).

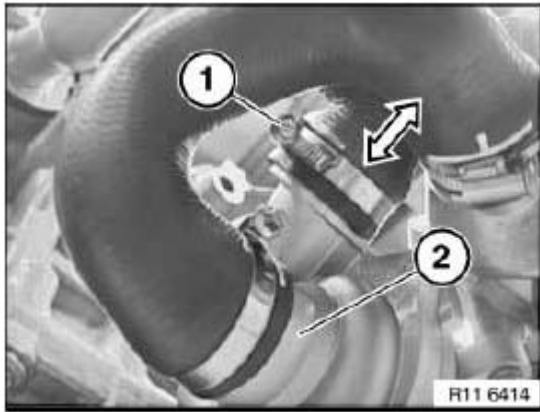


Fig. 292: Identifying Water Pipe Hose Clip And Water Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Detach water hose (3) from water pipe (2).

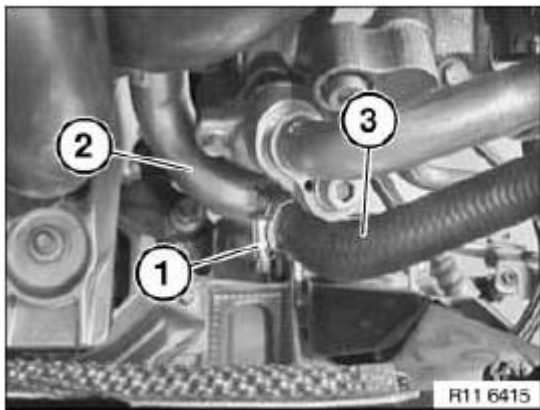


Fig. 293: Identifying Water Hose, Water Pipe And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring (2).

Sealing lip (1) on water pipe (3) must not show any traces of damage.

If necessary, replace water pipe (2).

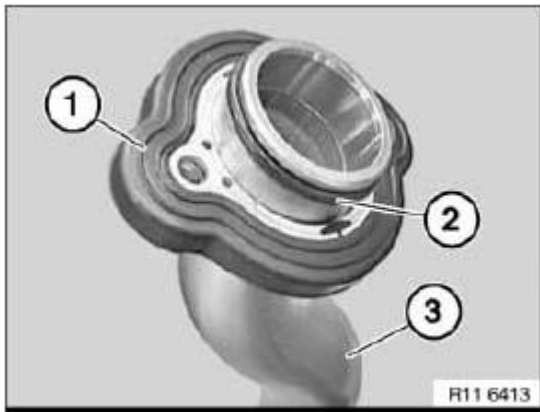


Fig. 294: Identifying Sealing Lip On Water Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent Cooling System and check for leaks.

61 INTAKE MANIFOLD

11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N52)

Necessary preliminary tasks:

- Remove Tension Strut.
- Remove Suction Filter Housing.
- Remove Engine Cover.)

Open holder (2).

Disconnect plug connection (1) under manifold.

Release both crankcase breathers (3).

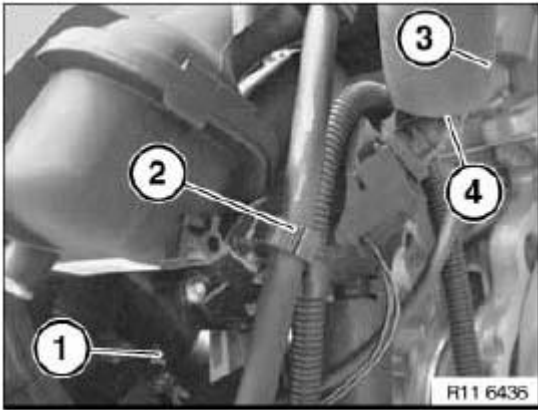


Fig. 295: Identifying Plug Connection, Crankcase Breathers And Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect plug connection (3).

Release screws (4).

Detach engine wiring harness (2) from manifold and lay to one side.

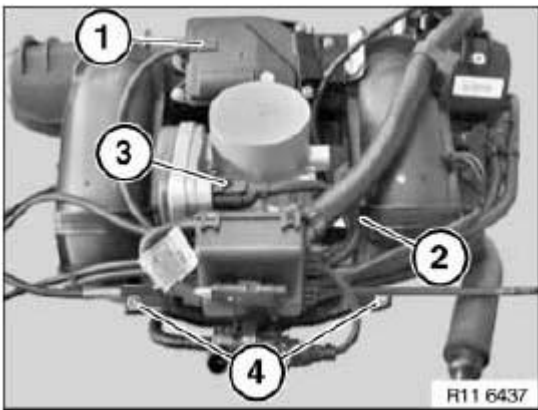


Fig. 296: Identifying Plug Connection And Engine Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on oil pressure switch.

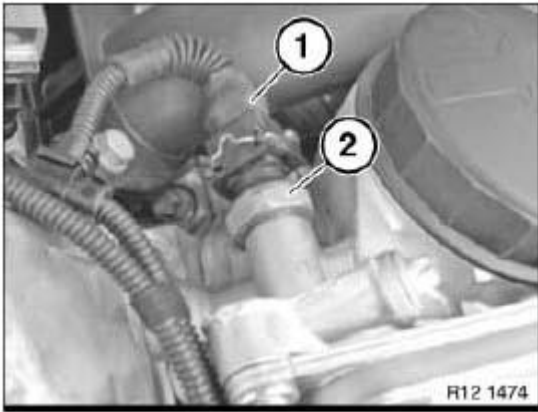


Fig. 297: Identifying Plug Connections, Wiring Harness And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release fuel rail (2) and lay to one side.

NOTE: Do not detach fuel line.

Release screw (1).

Unscrew nuts (3).

For tightening torque refer to 11 61 1AZ in **11 61 INTAKE MANIFOLD (N52)** .

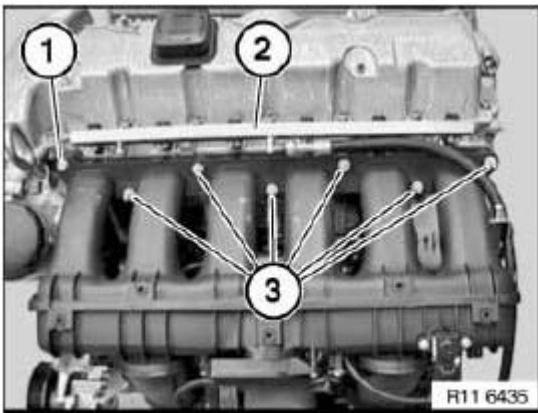


Fig. 298: Identifying Fuel Rail And Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Raise intake manifold approx. 10 cm.

Disconnect plug connection (1) at bottom.

Release tank vent line behind throttle valve assembly.

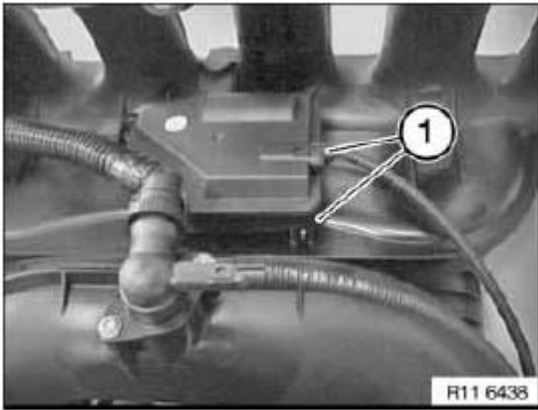


Fig. 299: Identifying Plug Connection At Bottom
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all seals.

Assemble engine.

62 EXHAUST MANIFOLD

11 62 000 REMOVING AND INSTALLING, SEALING/REPLACING BOTH EXHAUST MANIFOLDS (N52)

Necessary preliminary tasks:

- Remove engine splash guard.
- Remove reinforcement plate.
- Remove **Exhaust System**.
- Remove **Monitor Sensor** from cylinders 4 to 6.

Release all nuts (2).

For tightening torque refer to 11 62 1AZ in **61 INTAKE MANIFOLD**.

Feed out exhaust manifold (3) downwards (cylinders 1 to 3)

Release all nuts (1).

For tightening torque refer to 11 62 1AZ in **61 INTAKE MANIFOLD**.

Feed out exhaust manifold (4) downwards (cylinders 4 to 6)

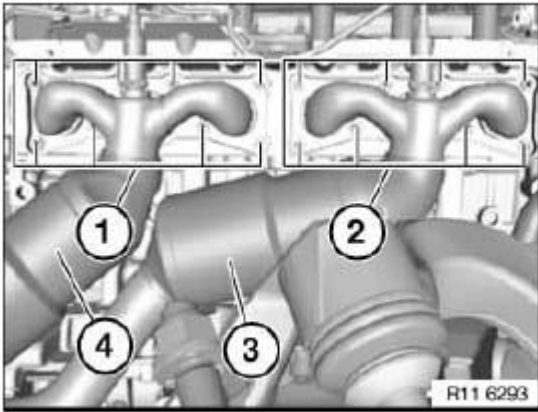


Fig. 300: Identifying Exhaust Manifold Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

18 40 050 REMOVING AND INSTALLING/REPLACING FRONT EXHAUST MANIFOLD (N52/N52K/N51)

Necessary preliminary tasks:

- Remove **Rear Exhaust Manifold**

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **Control Sensor** from cylinders 1 to 3.

Remove **Monitor Sensor** from cylinders 1 to 3.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

For tightening torque refer to 18 40 1AZ in **18 40 EXHAUST MANIFOLD**

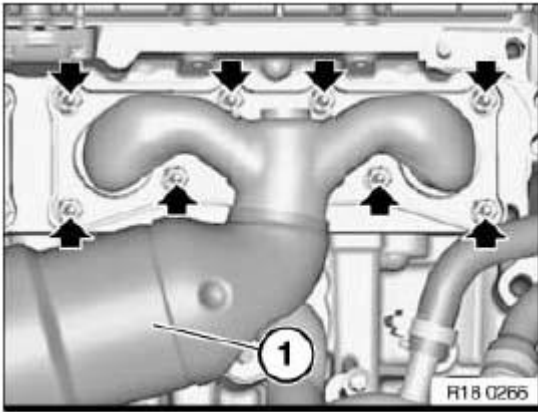


Fig. 301: Identifying Exhaust Manifold
Courtesy of BMW OF NORTH AMERICA, INC.

18 40 060 REMOVING AND INSTALLING/REPLACING REAR EXHAUST MANIFOLD (N52/N52K/N51)

Necessary preliminary tasks:

- Remove **Ignition Coil Cover**
- Remove **Coolant Expansion Tank**
- Remove **Underbody Protection**
- Remove complete **Exhaust System**.

NOTE: **The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.**

Remove **Control Sensor** from cylinders 4 to 6.

Remove **Monitor Sensor** from cylinders 4 to 6.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

For tightening torque refer to 18 40 1AZ **18 40 EXHAUST MANIFOLD**

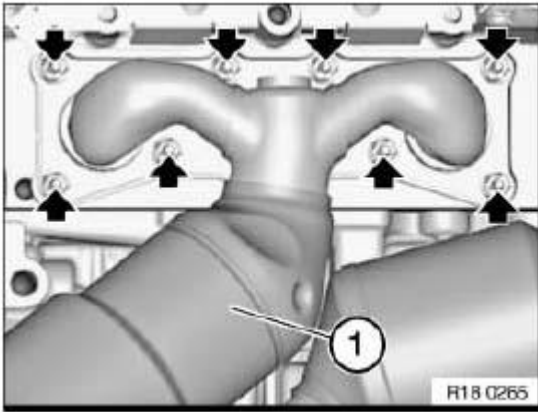


Fig. 302: Identifying Exhaust Manifold And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

66 VACUUM PUMP

11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N52)

Special tools required:

- 11 0 290
- 11 4 120
- 11 4 362

Necessary preliminary tasks:

- Remove **Drive Belt**.
- Remove **Tensioner** for drive belt.
- Remove **Sealing Cover** for vacuum pump.
- Remove **Intake Air Manifold**.

Rotate crankshaft at central bolt.

Turn sprocket wheel (3) until drilled holes and screws (1) match up.

Screw in special tool 11 4 362.

Secure special tool 11 0 290 in sprocket wheel (3) and to special tool 11 4 362.

Release screw (2).

For tightening torque refer to 11 66 2AZ in **11 66 VACUUM PUMP (N52)** .

For tightening torque refer to 11 66 1AZ in **11 66 VACUUM PUMP (N52)** .

Remove vacuum pump towards rear.

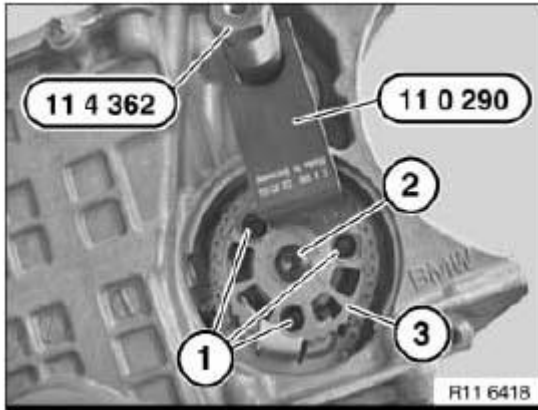


Fig. 303: Identifying Special Tool (11 0 290), (11 4 362), Sprocket Wheel And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace seal.

Press chain tensioner (1) with chain in direction of arrow.

Insert special tool 11 4 120.

Remove sprocket wheel (2) in direction of arrow.

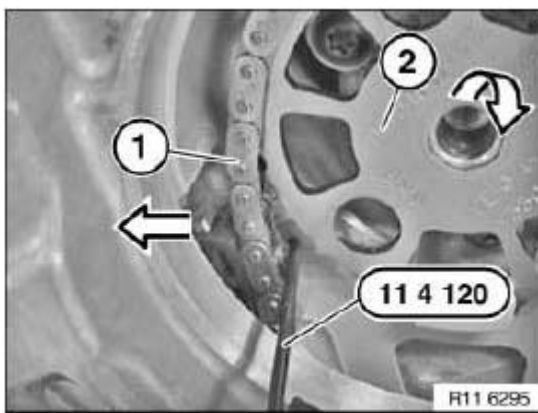


Fig. 304: Identifying Special Tool (11 4 120), Chain Tensioner And Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

78 EMISSION CONTROL, OXYGEN SENSOR

11 78 513 REMOVING AND INSTALLING/REPLACING BOTH LAMBDA OXYGEN CONTROL SENSORS (N52)

Special tools required:

- 11 4 260

WARNING: Scalding hazard!

Only perform these tasks after the exhaust system has cooled down.

Necessary preliminary tasks:

- Remove **Exhaust System.** .

Installation:

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound to thread.

The part of the oxygen control sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for lambda control sensor.

Detach oxygen sensor (1) from cylinders 4 to 6 with special tool 11 4 260.

Oxygen sensor at cylinders 1 to 3 is accessible from above without the exhaust system having to be removed.

Installation:

Cable colour black, cylinders 1 to 3.

Cable colour gray, cylinders 4 to 6.

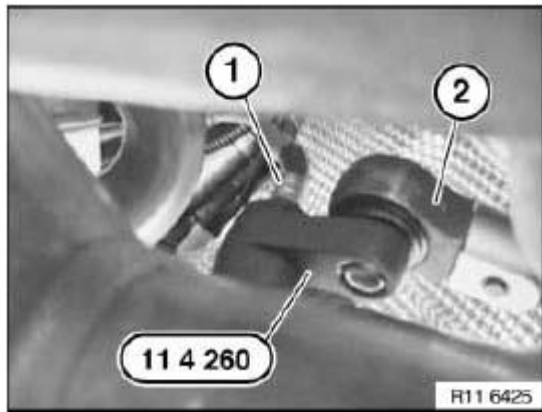


Fig. 305: Identifying Special Tool (11 4 260) And Oxygen Sensor
 Courtesy of BMW OF NORTH AMERICA, INC.

For tightening torque refer to 11 78 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITOR SENSOR (N52)** .

Assemble engine.

Check function of DME.

11 78 545 REMOVING AND INSTALLING/REPLACING BOTH LAMBDA OXYGEN MONITOR SENSORS (N52)

Special tools required:

- 11 4 260

WARNING: Scalding hazard!

Only perform these tasks after the exhaust system has cooled down.

Necessary preliminary tasks:

- Remove engine splash guard.
- Remove **Exhaust System** .

Installation:

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound to thread.

The part of the oxygen monitor sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

For tightening torque refer to 11 78 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITOR SENSOR (N52)** .

Installation:

Cable colour black, cylinders 1 to 3.

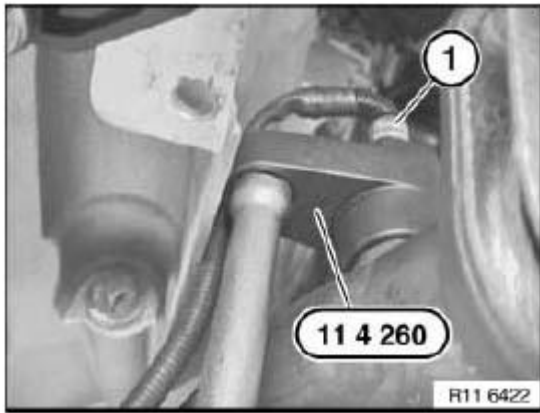


Fig. 306: Identifying Special Tool (11 4 260) And Monitor Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To remove the monitor sensor for cylinders 4 to 6, it is necessary to remove the exhaust system.

Disconnect plug connection for lambda **Monitor Sensor**.

Release monitor sensor (1) with special tool 11 4 260.

For tightening torque refer to 11 78 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITOR SENSOR (N52)** .

Installation:

Cable colour gray, cylinders 4 to 6.

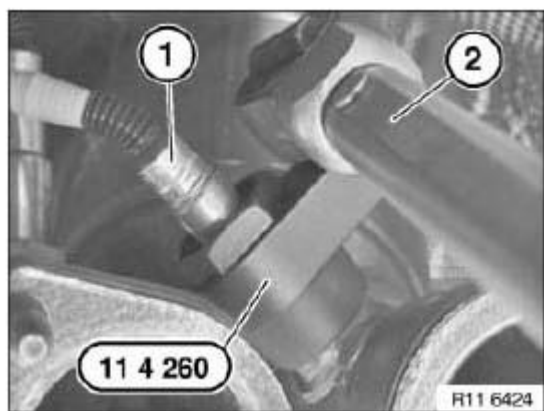


Fig. 307: Identifying Special Tool (11 4 260) And Monitor Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

ENGINE**N55 - Service Information****INTRODUCTION**

The N55 engine is the successor to the N54, Re-engineering and modifications have made it possible to now use only one exhaust turbocharger. Against the backdrop of reduced costs and improved quality, the technical data have remained virtually the same.

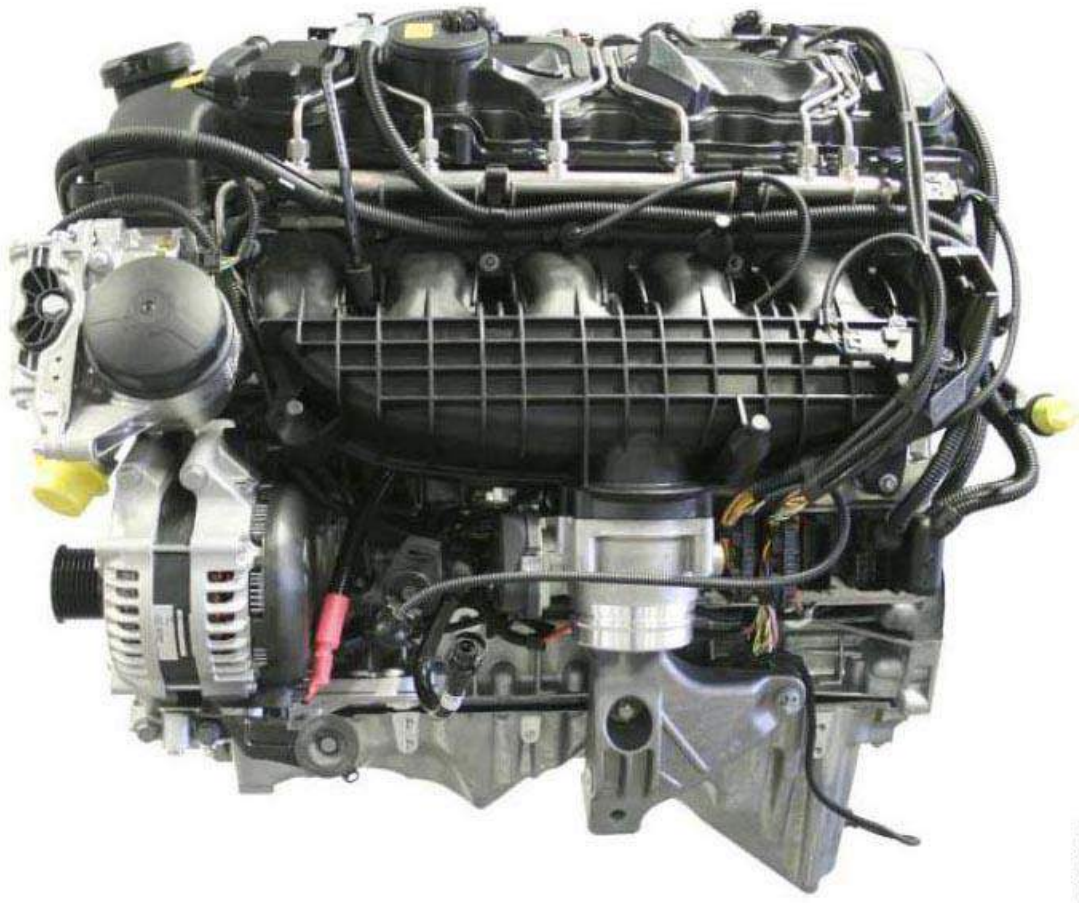


Fig. 1: Identifying BMW N55 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE SYSTEM OVERVIEW

The following provides an overview of the features of the N55 engine:

Crankcase:

- Large longitudinal ventilation holes inter-connect the crankcase lower chambers and relieve unwanted crankcase pressure between cylinders.

- Modified oil galleries enhance the supply of oil to vacuum pump.

Crankshaft: Is light weight design and has an asymmetric counterweight arrangement.

Pistons and connecting rods:

- A specially formed bushing/bore in small end of the connecting rods evenly distributes the force of the pistons on the power stroke.
- Lead-free bearing shells are installed on the big-end of the connecting rods.

Cylinder head:

- Specially designed water passages intergraded into the cylinder head enhance injector cooling.
- The combustion chambers are machined to work in conjunction with the Valvetronic III system with regard to promoting air turbulence and mixture formation.

Crankcase ventilation:

- In contrast to the N54, the N55 crankcase ventilation does not use cyclone separators.
- The cylinder and head cover have integrated blow-by passages that connect the crankcase ventilation directly to the intake ports.

VANOS:

- The N55 VANOS oil passages are simplified compared to the N54 engine.
- The solenoid valves have integrated non-return valve and 3 screen filters.
- The VANOS units are of a lightweight design for increased adjustment speed and have a reduced susceptibility to soiling.

Valvetrain:

- The N55 is the first BMW turbo engine to incorporate Valvetronic.
- The valvetrain is a new designed that combines Valvetronic III with Double VANOS.
- With Valvetronic III the 3rd generation brushless servomotor is introduced.
- The position detection sensor of eccentric shaft is now integrated in the servomotor.

Oil supply:

- An enhanced and simplified oil circuit design is used.
- The inlet pipe, oil deflector, and oil collector are combined in one component.
- Oil pump uses a Duroplast slide valve and it is electronically controlled based on a characteristic map within the engine management.

Forced induction:

- The N55 uses a single twin scroll turbocharger with vacuum operated, electronically controlled wastegate valve.
- The electric diverter valve is intergraded into the turbocharger compressor housing.

Air intake and exhaust system:

- Air intake system is similar in configuration as the N54 with the exception of the intake manifold and the use of a single turbo.
- The intercooler is an air to air type mounted in the lower area of the front bumper cover.
- The exhaust system uses no underbody catalytic converter.

Vacuum system:

- The N55 engine has a two-stage vacuum pump as on the N54.
- The vacuum system has the vacuum reservoir built into the cylinder head cover.

Fuel injection:

- HDE (high pressure fuel injection) system is installed on the N55.
- The HDE system uses solenoid valve fuel injectors instead of the piezoelectric type used on HPI.
- The high pressure pump and pressure sensors are similar in design and function in both the HDE and HPI systems.

Digital Motor Electronics (DME):

- The DME is mounted on the intake manifold and cooled by intake air.
- The location of the DME facilitates the installation of the N55 engine in several current BMW platforms/models.

TECHNICAL DATA

TECHNICAL DATA

	Unit	N54B30O0 (E71/X6 xDrive35i)	N55B30M0 (F07/535i)
Configuration		6 inline	6 inline
Cylinder capacity	[cm ³]	2979	2979
Bore/stroke	[mm]	84.0/89.6	84.0/89.6
Power output at engine speed	[kW/bhp] [rpm]	225/306 5800 - 6250	225/306 5800 - 6400
Power output per liter	[kW/l]	75.53	75.53
Torque at engine speed	[Nm] [rpm]	400 1300 - 5000	400 1200 - 5000
Compression ratio	[]	10.2	10.2
Valves/cylinder		4	4

2011 BMW 535xi**ENGINE N55 - Service Information**

Fuel consumption, EU combined	[l/100 km]	10.9	8.9
CO2 emission	g/km	262	209
Digital Motor Electronics		MSD81	MEVD17.2
Exhaust emission legislation, US		ULEV	ULEV II
Engine oil specification		BMW Longlife-01 BMW Longlife-01 FE BMW Longlife-04	-
Top speed	[km/h]	240	250
Acceleration 0 - 100 km/h/62mph	[s]	6.7	6.3
Vehicle curb weight DIN/EU	[kg]	2070/2145	1940/2015
* = Electronically governed			

Full Load Diagram

Compared to its predecessor, the N55 engine is characterized by lower fuel consumption with the same power output and torque data.

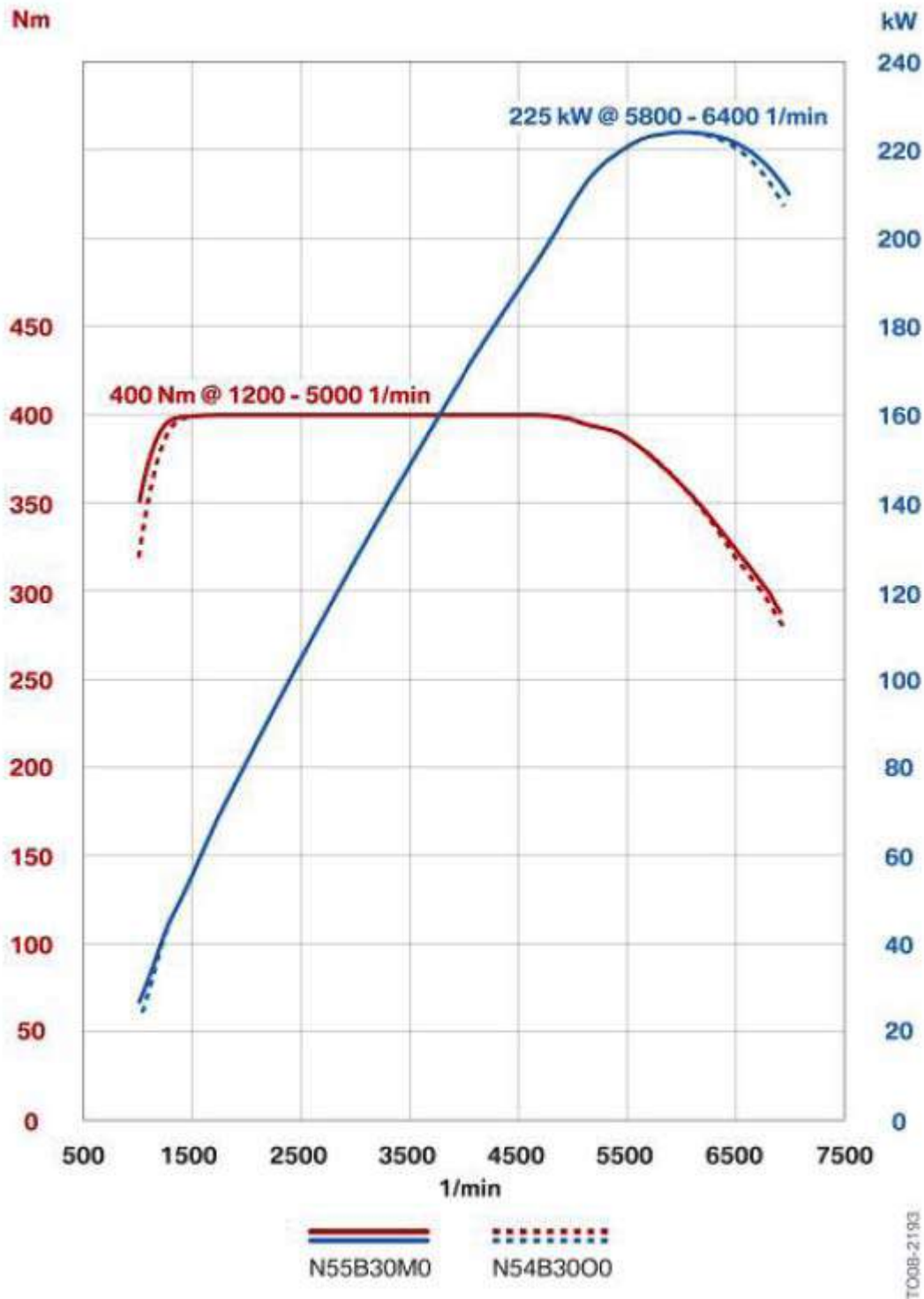


Fig. 2: Lower Fuel Consumption Characteristic Graph - E90 335I With N54B30O0 Engine To F07 535I With N55B30M0 Engine

Courtesy of BMW OF NORTH AMERICA, INC.

CURRENT MODELS

N54B30O0 ENGINE VARIANTS

Model	Version	Series	Displacement in cm ³	Stroke/bore in mm	Power output in kW/bhp at rpm	Torque in Nm at rpm
135i	US	E82, E88	2979	89.6/84.0	300 SAE hp 5800 - 6250	407 (300 ft-lbs) 1400 - 5000
335i	US	E90, E92, E93	2979	89.6/84.0	300 SAE hp 5800 - 6250	407 (300 ft-lbs) 1400 - 5000
335i xDrive	US	E90, E92	2979	89.6/84.0	300 SAE hp 5800 - 6250	407 (300 ft-lbs) 1400 - 5000
335 is	US	E92, E93	2979	89.6/84.0	320 SAE hp 5800 - 6250	450 (332 ft-lbs) 1400 - 5000
Z4 sDrive35i	US	E89	2979	89.6/84.0	300 SAE hp 5800 - 6250	407 (300 ft-lbs) 1400 - 5000
Z4 sDrive35is	US	E89	2979	89.6/84.0	335 SAE hp 5800 - 6250	450 (332/369 ft-lbs) ⁽¹⁾ 1400 - 5000
535i	US	E60	2979	89.6/84.0	300 SAE hp 5800 - 6250	407 (300 ft-lbs) 1400 - 5000
535i xDrive	US	E60, E61	2979	89.6/84.0	300 SAE hp 5800 - 6250	407 (300 ft-lbs) 1400 - 5000
X6 xDrive35i	US	E71	2979	89.6/84.0	300 SAE hp 5800 - 6250	407 (300 ft-lbs) 1400 - 5000
740i	US	F01, F02	2979	89.6/84.0	315 SAE hp 5800 - 6250	450 (330 ft-lbs) 1600 - 4500

(1) The enhanced engine management system of the BMW Z4 sDrive35is and the 335is include an electronically controlled overboost function to briefly increase torque under full load by another 37 ft-lbs. This temporary torque peak of 369 ft-lbs gives the car a significant increase in acceleration for approximately 5 seconds.

ENGINE DESIGNATION AND ENGINE IDENTIFICATION

Engine Designation

This training material describes the N55B30M0 in detail.

In the technical documentation, the engine designation is used for unique identification of the engine. In the technical documentation you will also find the abbreviated engine designation, i.e. N55, that only indicates the engine type.

ENGINE DESIGNATION

Item	Meaning	Index/explanation
1	Engine developer	M, N = BMW Group P = BMW Motorsport S = BMW M mbH

		W = Non-BMW engines
2	Engine type	1 = R4 (e.g. N12) 4 = R4 (e.g. N43) 5 = R6 (e.g. N55) 6 = V8 (e.g. N63) 7 = V12 (e.g. N73) 8 = V10 (e.g. S85)
3	Change to the basic engine concept	0 = basic engine 1 - 9 = changes, e.g. combustion process
4	Working method or fuel type and possibly installation position	B = Gasoline, longitudinal installation D = Diesel, longitudinal installation H = Hydrogen
5	Displacement in liters	1 = 1 liter (whole number of liters)
6	Displacement in 1/10 liter	8 = 0.8 liter (tenth of liter)
7	Performance class	K = Smallest U = Lower M = Middle O = Upper (standard) T = Top S = Super
8	Revision relevant to approval	0 = New development 1 - 9 = Revision

Breakdown of N55 Engine Designation

ENGINE DESIGNATION

Index	Explanation
N	BMW Group Development
5	Straight 6 engine
5	Engine with direct injection, Valvetronic and exhaust turbocharger
B	Gasoline engine, longitudinal
30	3.0-liter capacity
M	Medium performance class
0	New development

Engine Identification

The engines are marked on the crankcase with an engine identification code for unique identification. This engine identifier is also required for approval by the authorities. The N55 engine further develops this identification system and the code has been reduced from previously eight to seven characters. The engine serial number can be found under the engine identifier on the engine. Together with the engine identifier, this consecutive number enables unique identification of each individual engine.

INDEX EXPLANATION

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Item	Meaning	Index/explanation
1	Engine developer	M, N = BMW Group P = BMW Motorsport S = BMW M GmbH W = Non-BMW engines
2	Engine type	1 = R4 (e.g. N12) 4 = R4 (e.g. N43) 5 = R6 (e.g. N55) 6 = V8 (e.g. N63) 7 = V12 (e.g. N73) 8 = V10 (e.g. S85)
3	Change to the basic engine concept	0 = basic engine 1 - 9 = changes, e.g. combustion process
4	Working method or fuel type and possibly installation position	B = Gasoline, longitudinal installation D = diesel, longitudinal installation H = hydrogen
5	Displacement in liters	1 = 1 liter (whole number of liters)
6	Displacement in 1/10 liter	8 = 0.8 liter (tenth of liter)
7	Type test concerns (changes that require a new type test)	A. A = Standard B. B - Z = Depending on requirement, e.g. RON 87

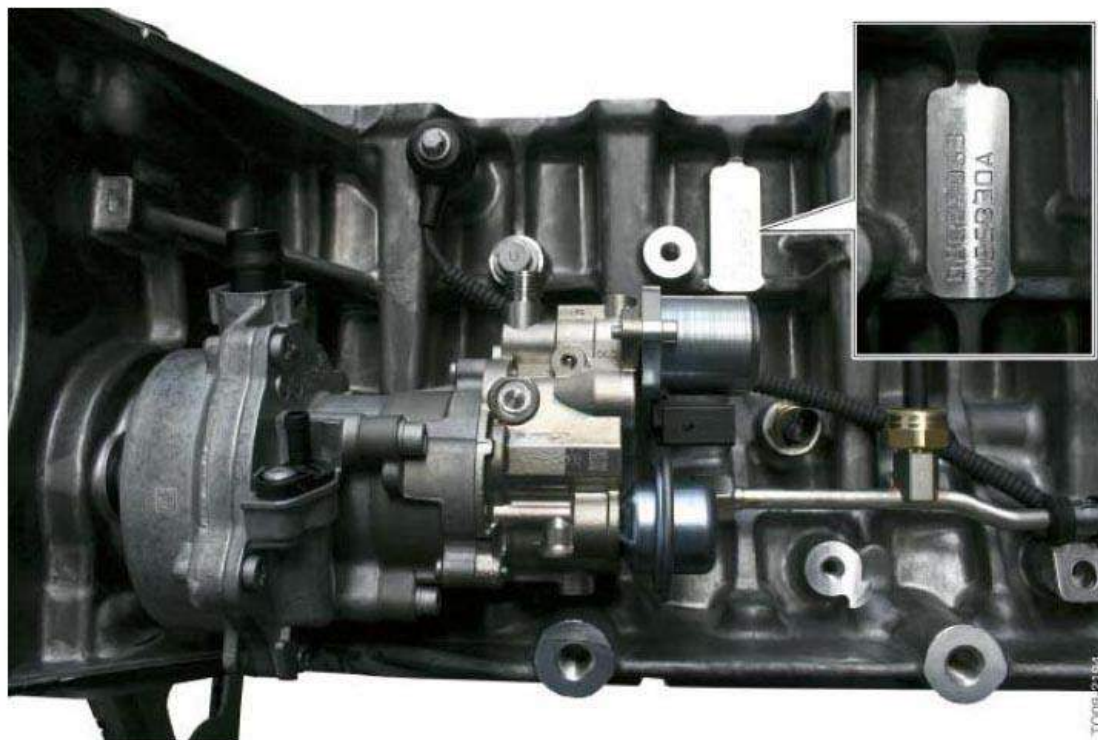


Fig. 3: Locating Engine Identification And Engine Serial Number - N55 Engine
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
08027053	Individual consecutive engine serial number
N	Engine developer, BMW Group
5	Engine type, straight 6
5	Change to basic engine concept, turbocharging, Valvetronic, direct fuel injection
B	Operating principle or fuel supply and installation position, petrol engine longitudinal
30	Displacement in 1/10 liter, 3 liter
A	Type approval requirements, standard

ENGINE COMPONENTS**ENGINE HOUSING**

The engine housing consists of the engine block (crankcase and bedplate), cylinder head, cylinder head cover, oil pan and gaskets.

Engine Block

The engine block is made from an aluminum die-casting and consists of the crankcase with bedplate.

Crankcase and Bedplate

The crankcase features cast iron cylinder liners (2). A new feature is that the webs between two cylinders on the deck of the block now have a grooved cooling passage (3). Coolant can flow along these grooves from one side of the crankcase to the other, thus enhancing cooling of this area.

Five oil return ducts on the exhaust side (4) now permit oil to return from the cylinder head into the oil pan. These oil return channels extend into the bedplate up to below the oil deflector. They help reduce churning losses as the returning engine oil can no longer reach the crankshaft even at high transverse acceleration.

Five oil return channels on the intake side (5) also ensure that the blow-by gasses can flow unobstructed from the crankshaft area into the cylinder head and to the crankcase breather in the cylinder head cover.

The cooling duct (1) in the engine block is split and coolant flows directly through it.

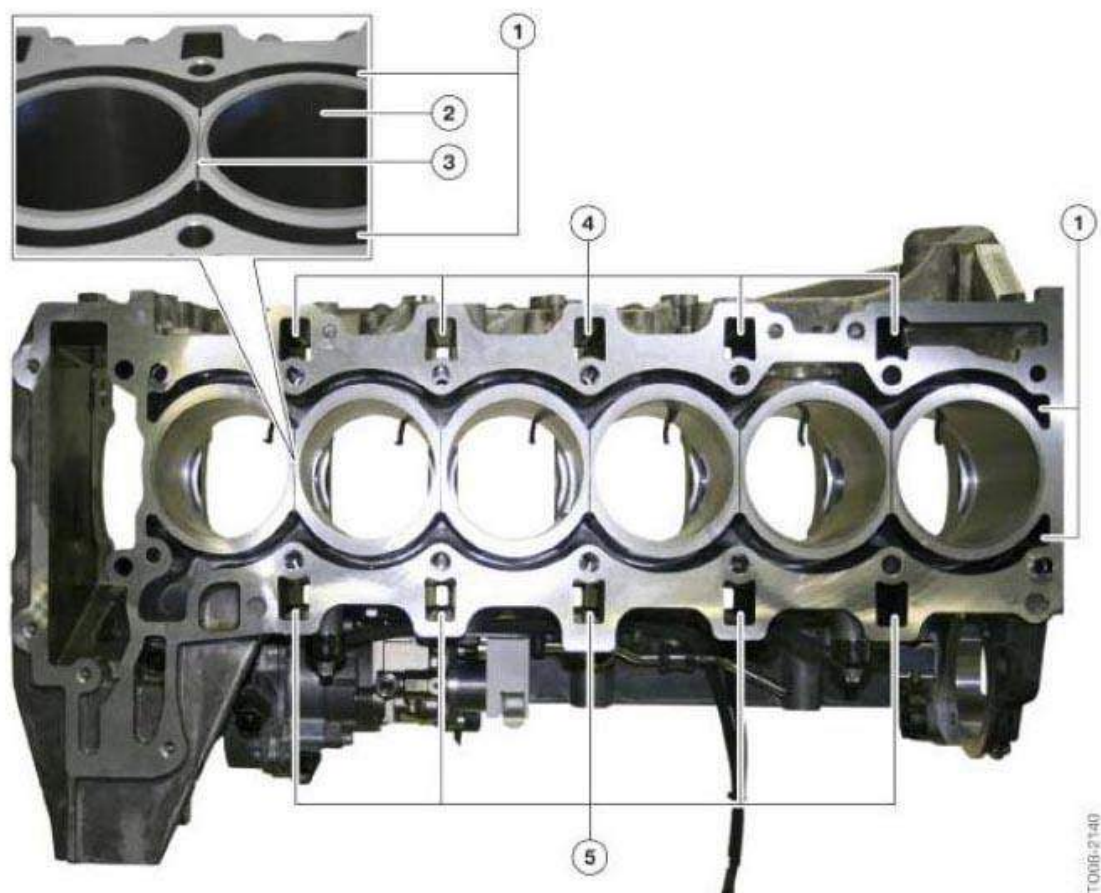


Fig. 4: Identifying Crankcase With Web Cooling Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Cooling duct
2	Cylinder liner
3	Grooved cooling passage
4	Oil return ducts, exhaust side
5	Oil return ducts, intake side

The crankcase has large longitudinal ventilation holes bored between the lower chambers of the cylinders. The longitudinal ventilation holes improve the pressure equalization, between the oscillating air columns that are created in the crankcase, by the up and down movement of the pistons.

This enhances power by relieving the unwanted pressure that acts against the downward movement of the pistons. It also enhances crankcase ventilation and adds to oil service life by promoting the movement of blow-by gasses within the engine.

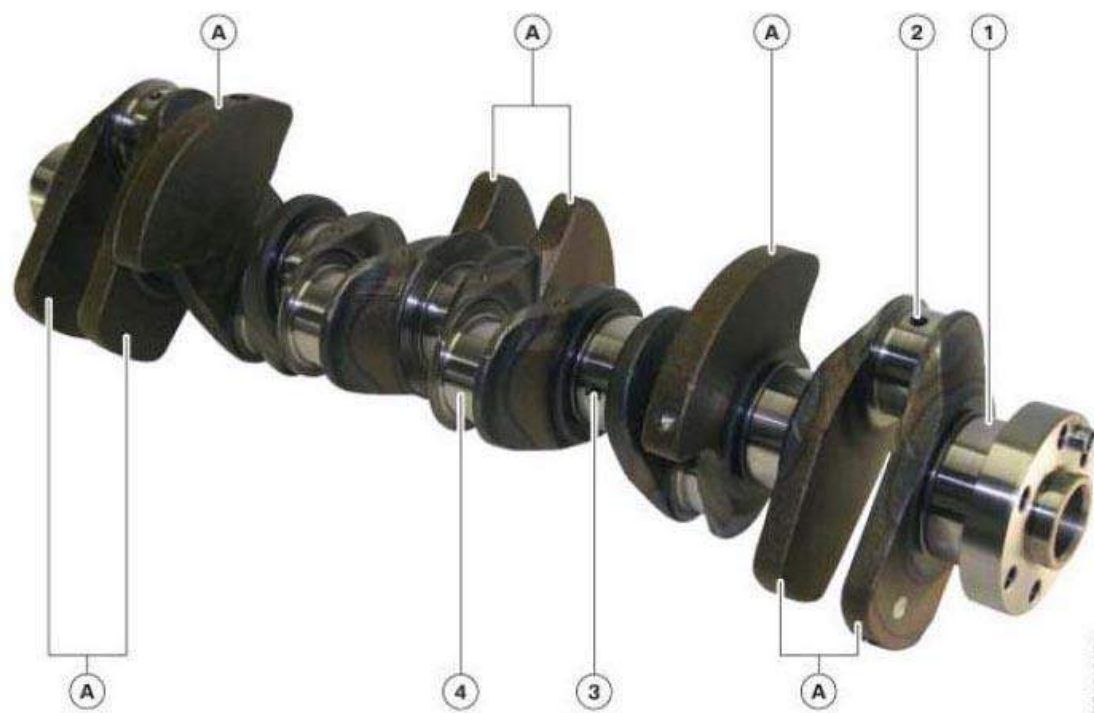


Fig. 5: Identifying Ventilation Holes In Crankcase - N55
Courtesy of BMW OF NORTH AMERICA, INC.

CRANKSHAFT

The crankshaft of the N55 is of lightweight design, at 20.3 kg it's approximately 3 kg lighter than the crankshaft in the N54 engine.

The crankshaft is made from cast iron (GGG70). The counterweights are arranged asymmetrically. There is no incremental wheel installed on the crankshaft. The timing chains are mounted by means of an M18 central bolt.

**Fig. 6: Identifying N55 Crankshaft**

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Counterweights
1	Main bearing journal 7
2	Oil hole from big-end bearing to main bearing
3	Oil hole from main bearing to big-end bearing
4	Big-end bearing journal, cylinder 4

Crankshaft Main Bearings

As on the N54 engine, the main bearings on the crankshaft are designed as two component bearings free of lead. The thrust bearing is mounted at the fourth bearing position.

PISTONS AND RINGS

A full slipper skirt type piston with a diameter of 82.5 mm is used. The first piston ring is a plain rectangular compression ring with a chrome-ceramic coating on the contact surface. The second piston ring is a tapered faced Napier type ring. The oil scrape ring is designed as a steel band ring with spring that is also known as VF system.



Fig. 7: Identifying Piston With Piston Rings - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Plain rectangular compression ring
2	Tapered faced Napier ring
3	VF system ring
4	Steel inlay for first piston ring
5	Groove for first piston ring
6	Groove for second piston ring
7	Groove for oil scraper ring
8	Hole for lubricating oil drain
9	Graphite coating

CONNECTING ROD AND BEARINGS

The size of the connecting rod of the N55 engine is 144.35 mm. A new feature is the specially formed hole in the small end of the connecting rod. This formed hole is machined wider on the lower edges of the wrist pin bushing/bore. This design evenly distributes the force acting on the wrist pin over the entire surface of the rod

bushing and reduces the load at the edges, as the piston is forced downward on the power stroke.

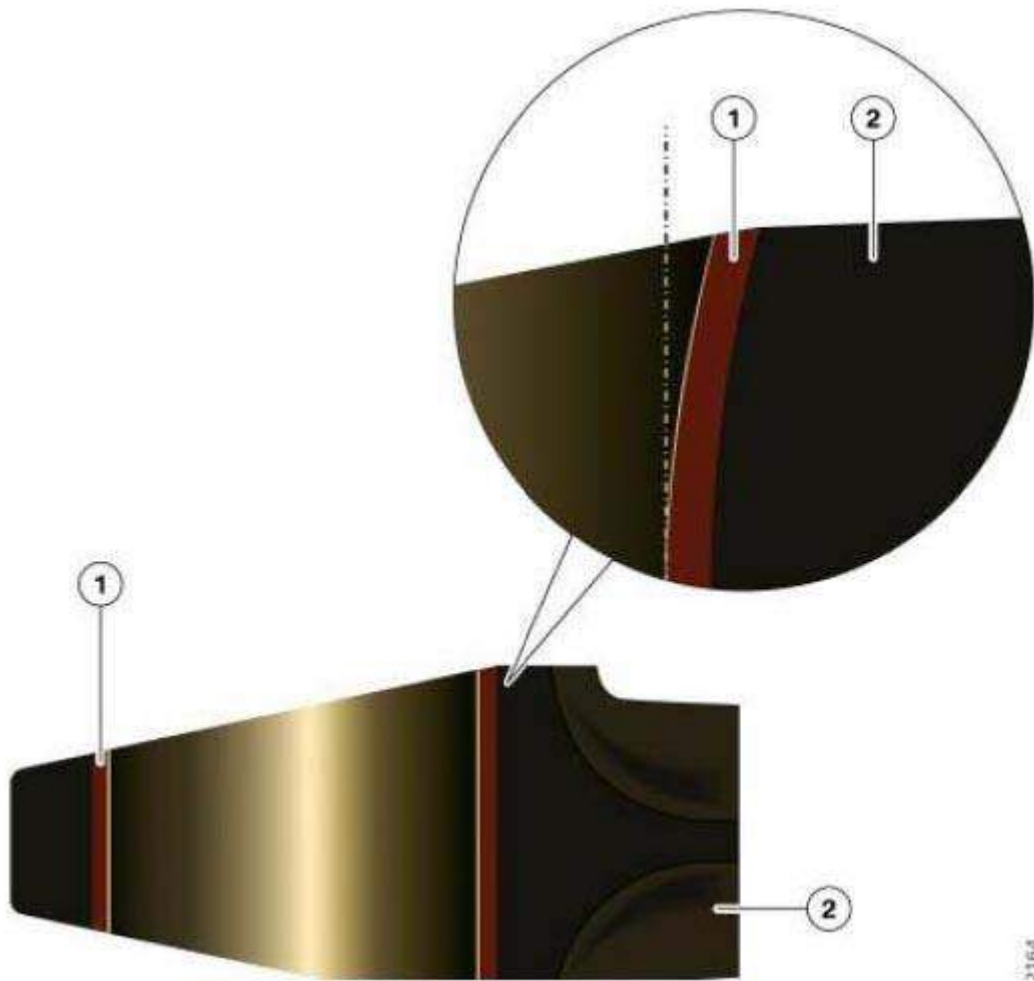


Fig. 8: Identifying Small End Of Connecting Rod And Bushing - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Bushing
2	Connecting rod

The following graphic shows the surface load on a standard connecting rod without the formed hole. Due to combustion pressure, the force exerted by the piston via the wrist pin is mainly transmitted to the edges of the rod bushing.

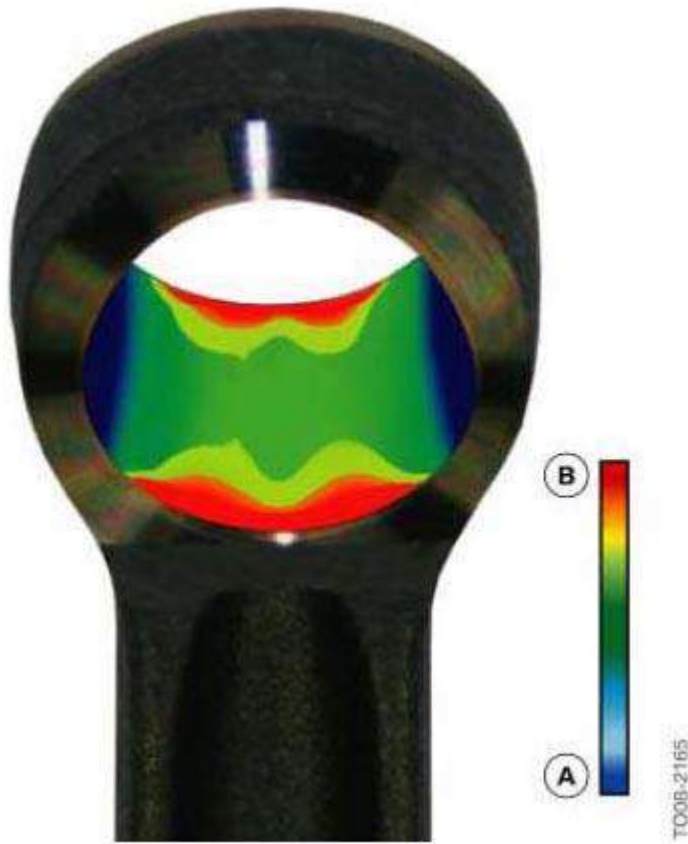


Fig. 9: Identifying Connecting Rod Small End Without Formed Hole - N54
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Low surface load
B	High surface load

The graphic below illustrates the small end of the connecting rod with a formed hole. The force is more evenly distributed over a larger area and the load on the edges of the rod bushing is reduced considerably.

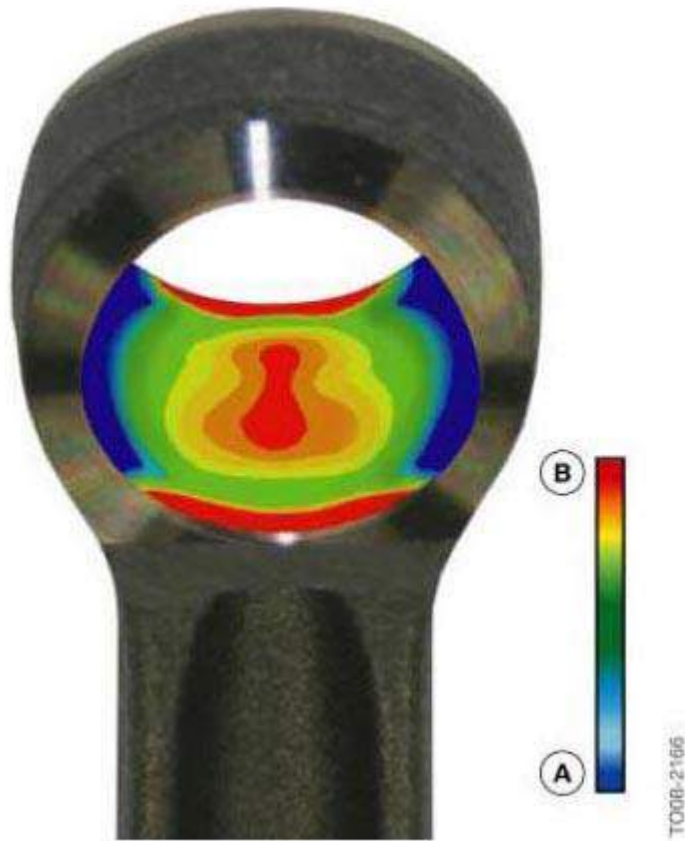


Fig. 10: Identifying Connecting Rod Small With Formed Hole - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Low surface load
B	High surface load

Lead-free bearing shells are used on the large connecting rod end. The material G-488 is used on the connecting rod side and the material G-444 on the bearing cap side.

The size M9 x 47 connecting rod bolts are the same on the N55 and N54 connecting rod.

OIL PAN

The oil pan is made from an aluminum casting. The oil deflector and the intake pipe to the oil pump are designed as one component. To facilitate attachment to the bedplate, the oil return ducts are designed so that they extend over the oil deflector. Consequently, the oil return ducts end in the oil sump.

Ducts are provided for the oil supply to the vacuum pump as it is now lubricated by filtered oil and not by unfiltered oil as on the N54 engine.

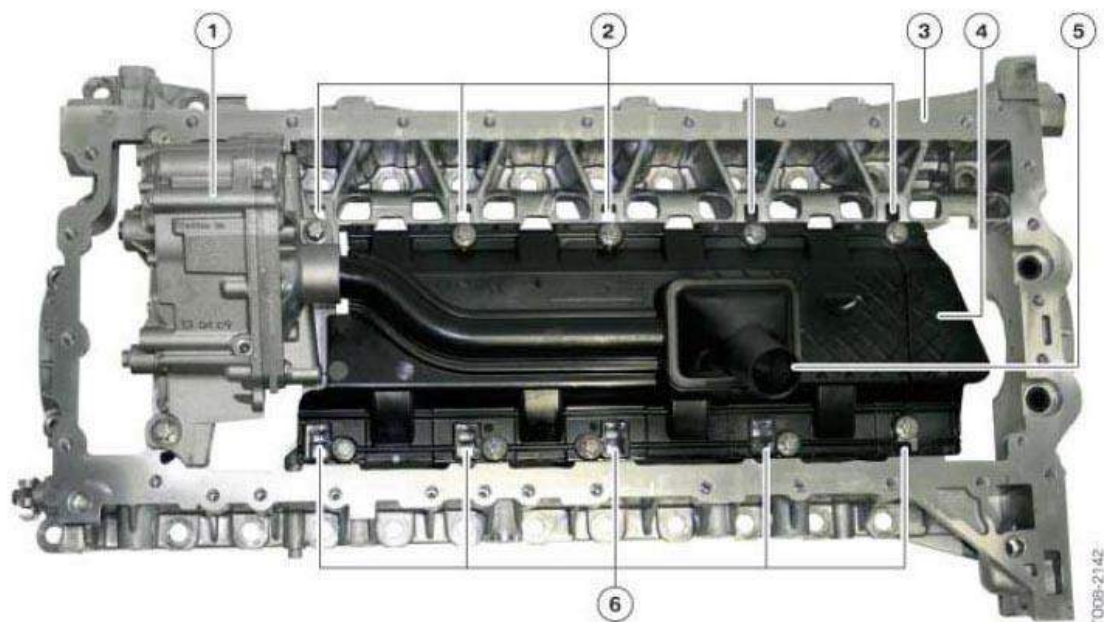


Fig. 11: Identifying Bedplate With Oil Pump And Oil Deflector - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Oil pump
2	Oil return ducts, intake side
3	Bedplate
4	Oil deflector
5	Intake manifold with oil screen filter
6	Oil return ducts, exhaust side

ELECTRONIC VOLUME-CONTROLLED OIL PUMP

A modified version of the volume control oil pump of the N54 engine is used. For the first time a Duroplast reciprocating slide valve is installed. The volumetric flow control system operating principle of the oil pump is described in the E71 X6 training material under the "N63 Engine" available on TIS and ICP.

This type of pump delivers only as much oil as is necessary under the respective engine operating conditions. No surplus quantities of oil are delivered in low-load operating ranges. This operating mode reduces the pump work and therefore the fuel consumption of the engine while also slowing down the oil aging process. The pump is designed as a slide valve-type vane pump. In delivery mode, the pump shaft is positioned off-center in the housing and the vanes are displaced radially during rotation. As a result, the vanes form chambers of differing volume. The oil is drawn in as the volume increases and expelled into the oil galleries as the volume decreases.

The oil pressure in the system (downstream of the oil filter) acts on the slide against the force of a compression springs in the control oil chamber. The slide element rotates about a pivot axis.

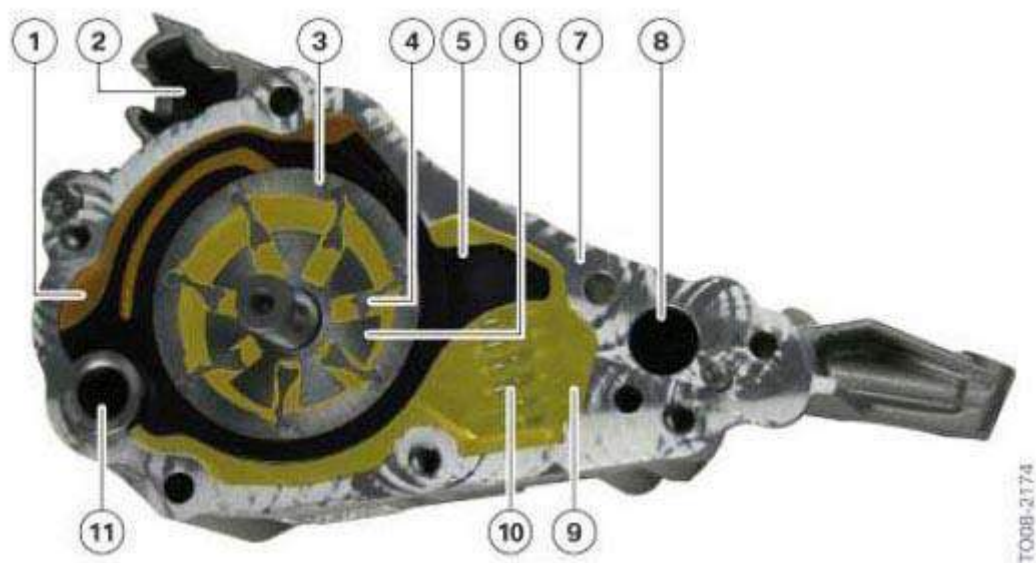


Fig. 12: Identifying Oil Pump Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Control oil chamber
2	Pressure limiting valve
3	Rotor
4	Vane
5	Duroplast slide valve
6	Inner rotor
7	Housing
8	Hole for pressure control valve
9	Damping oil chamber
10	Compression spring (2x)
11	Pivot axis of rotation

Oil Pump and Pressure Control

The oil pump has been redesigned with regard to the functionality and durability of the Duroplast reciprocating slide valve. The oil pump used in the N55 engine is a further development of the shuttle slide valve volume control oil pump. The activation of the oil pump is adapted by the engine management and controlled through an oil pressure control valve.

The delivered oil volume is controlled by means of the oil pressure, based on specific requirements. The modifications, compared to previous pumps, are primarily in the pump activation system. The oil pressure no longer acts directly on the control piston but rather directly on the slide valve. The engine management activates the electrohydraulic pressure control valve, which affects the oil pressure at the slide valve control mechanism within the oil pump, altering the pump output. This has the advantage of avoiding power losses by running the

oil pump only when needed.

The electrohydraulic pressure control valve controls the pump output and is bolted to the front of the engine block. It is operated based on a characteristic map within the DME (ECM) which in turn is based on feedback from the oil pressure sensor. The N55 uses a special oil pressure sensor for this purpose which functions in the similar way as the HPI fuel pressure sensor.

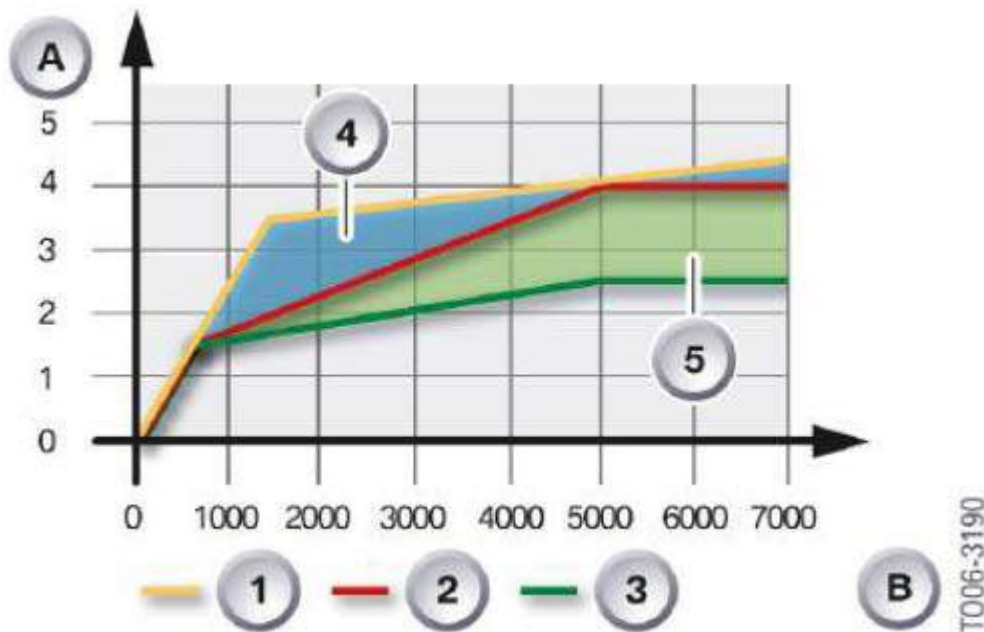


Fig. 13: Oil Pump And Pressure Control Characteristic Graph
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Oil pressure (bar)
B	Engine speed (rpm)
1	Oil pressure control, hydraulic/mechanical
2	Characteristic map-controlled oil pressure, full load
3	Characteristic map-controlled oil pressure, no load
4	Saving potential, full load
5	Saving potential, no load

The oil pressure generated by the oil pump (2) is delivered to the engine's lubricating points and hydraulic actuators. This system uses oil pressure feed back to control the desired operating oil pressure. For this purpose, the oil pressure downstream of the oil filter (7) and engine oil-to-coolant heat exchanger (9) is adjusted by the DME (map-controlled) via the pressure control valve (4) to the pressure control valve (3).

The actual generated oil pressure is registered by the oil pressure sensor (10) and recognized by the engine management.

In the event of an electrical malfunction, the oil pressure is set to the default control setting. The pump compression springs are allowed to expand, moving the slide valve to its maximum oil pressure position.

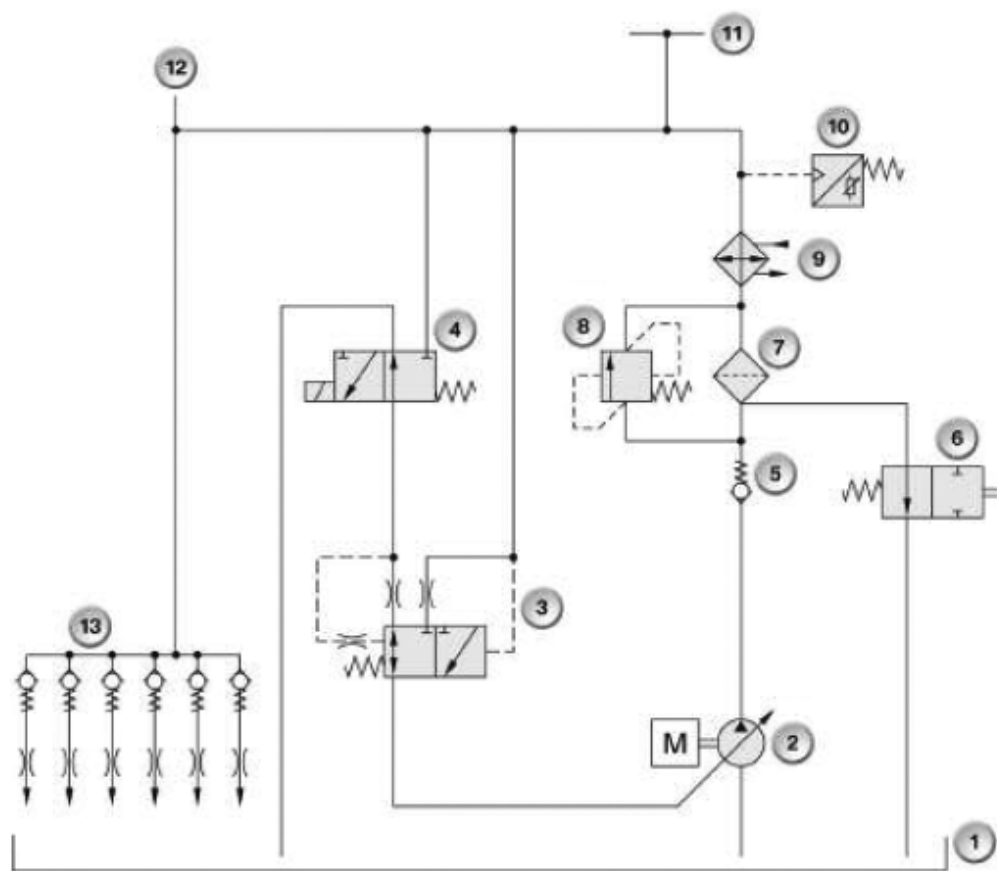


Fig. 14: Hydraulic Diagram Of N53 Engine Oil Circuit With Electronic Pressure Control
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Oil Pan
2	Volume controlled oil pump
3	Pressure regulating valve
4	Electro-hydraulic pressure regulating valve
5	Non-return valve
6	Outlet valve at the filter
7	Oil filter
8	Filter By-pass valve
9	Engine oil to coolant heat exchanger
10	Oil Pressure sensor
11	Lubricating points, cylinder head

12	Lubricating points, engine block
13	Oil spray nozzles, piston crowns

NOTE: The N53 hydraulic circuit diagram shown is for explanation of the oil pressure control only, and does not apply directly to the N55 engine.

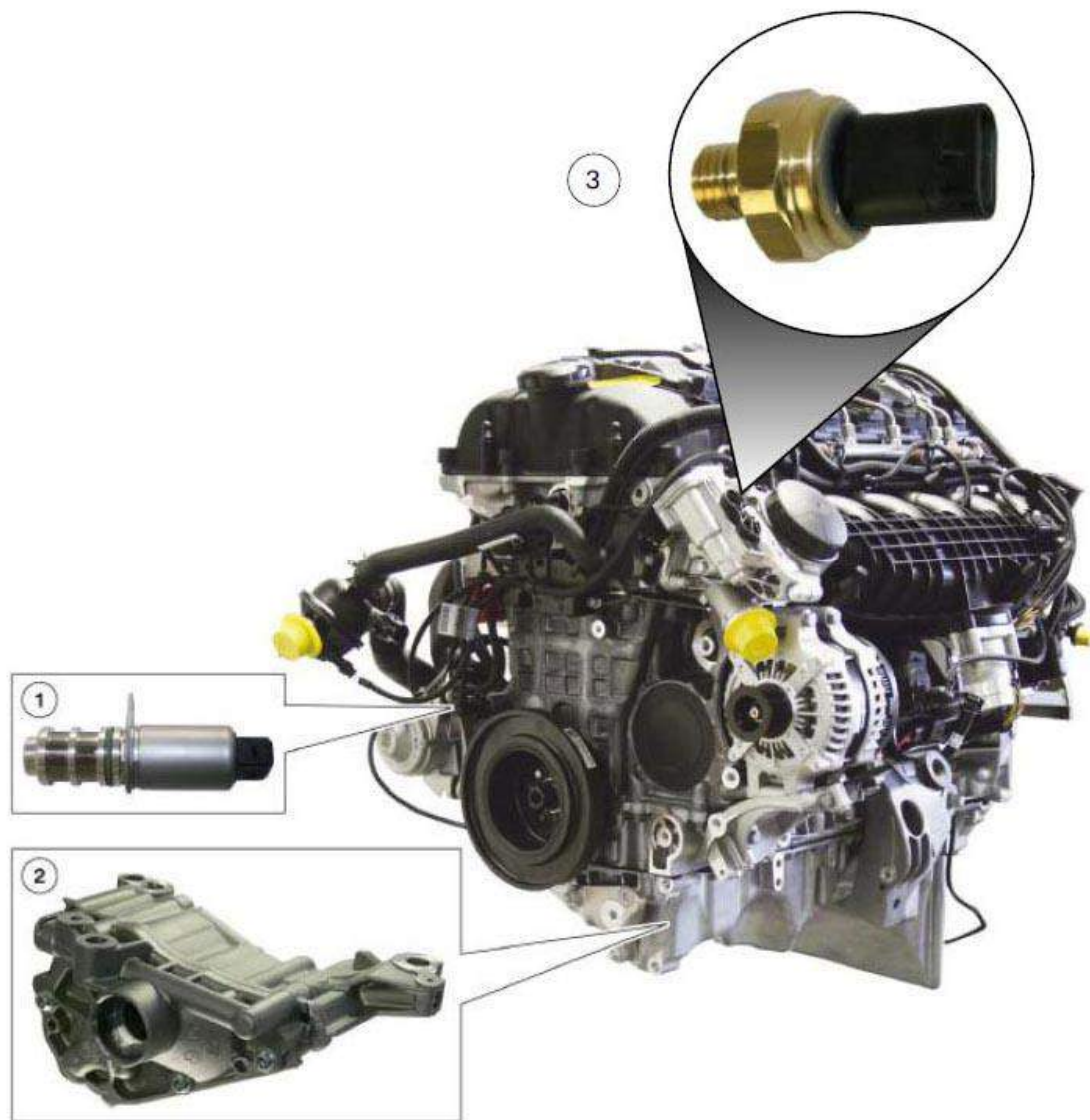


Fig. 15: Identifying Oil Pump, Oil Pressure Sensor And Pressure Control Valve - N55
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Oil pressure control valve
2	Oil pump

3

Oil pressure sensor

OIL SUPPLY

The following graphics show an overview of the oil circuit of the N55. Compared to the N54 engine, there are considerably fewer oil ducts in the cylinder head. This is mainly due to the use of the new VANOS solenoid valves.

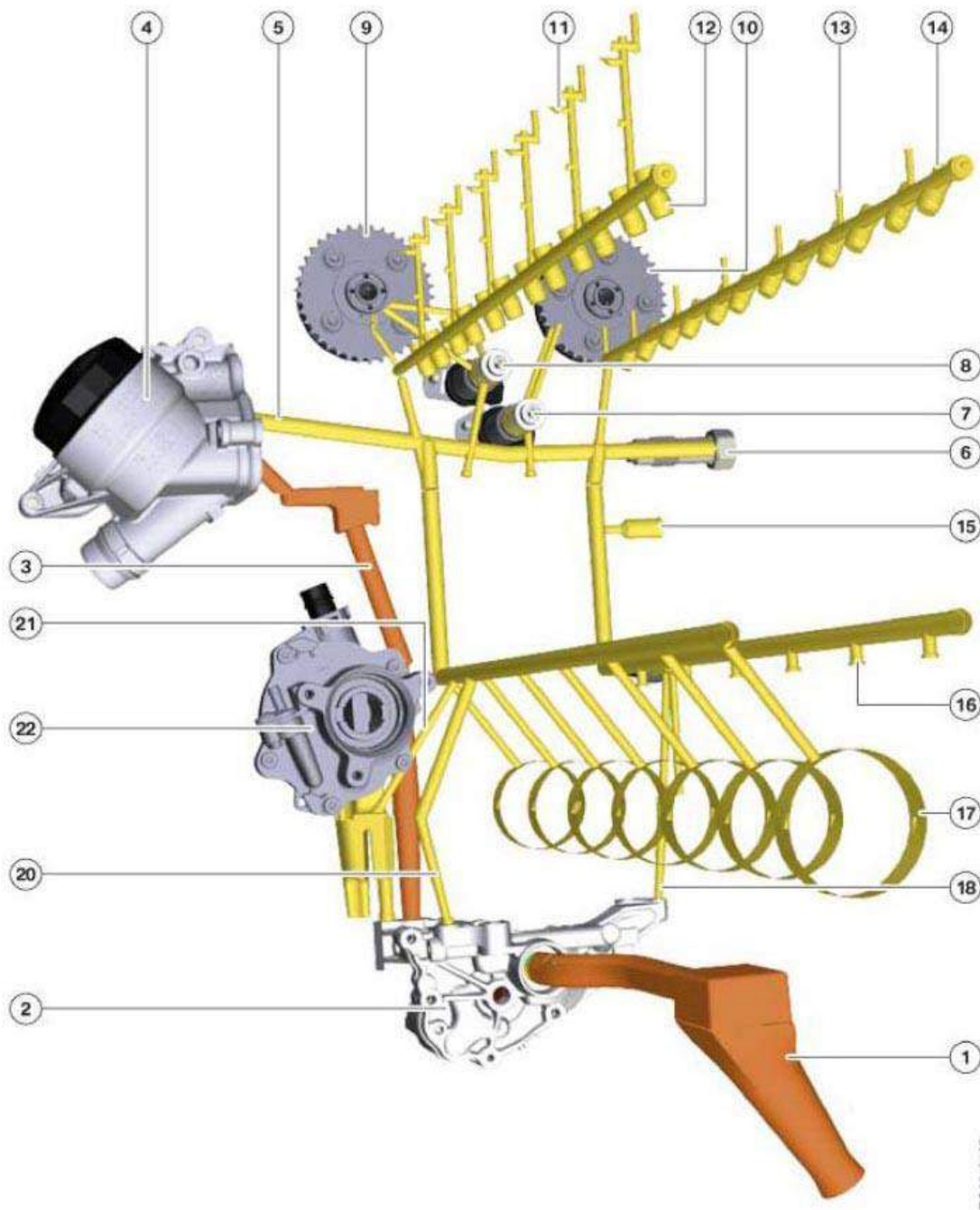
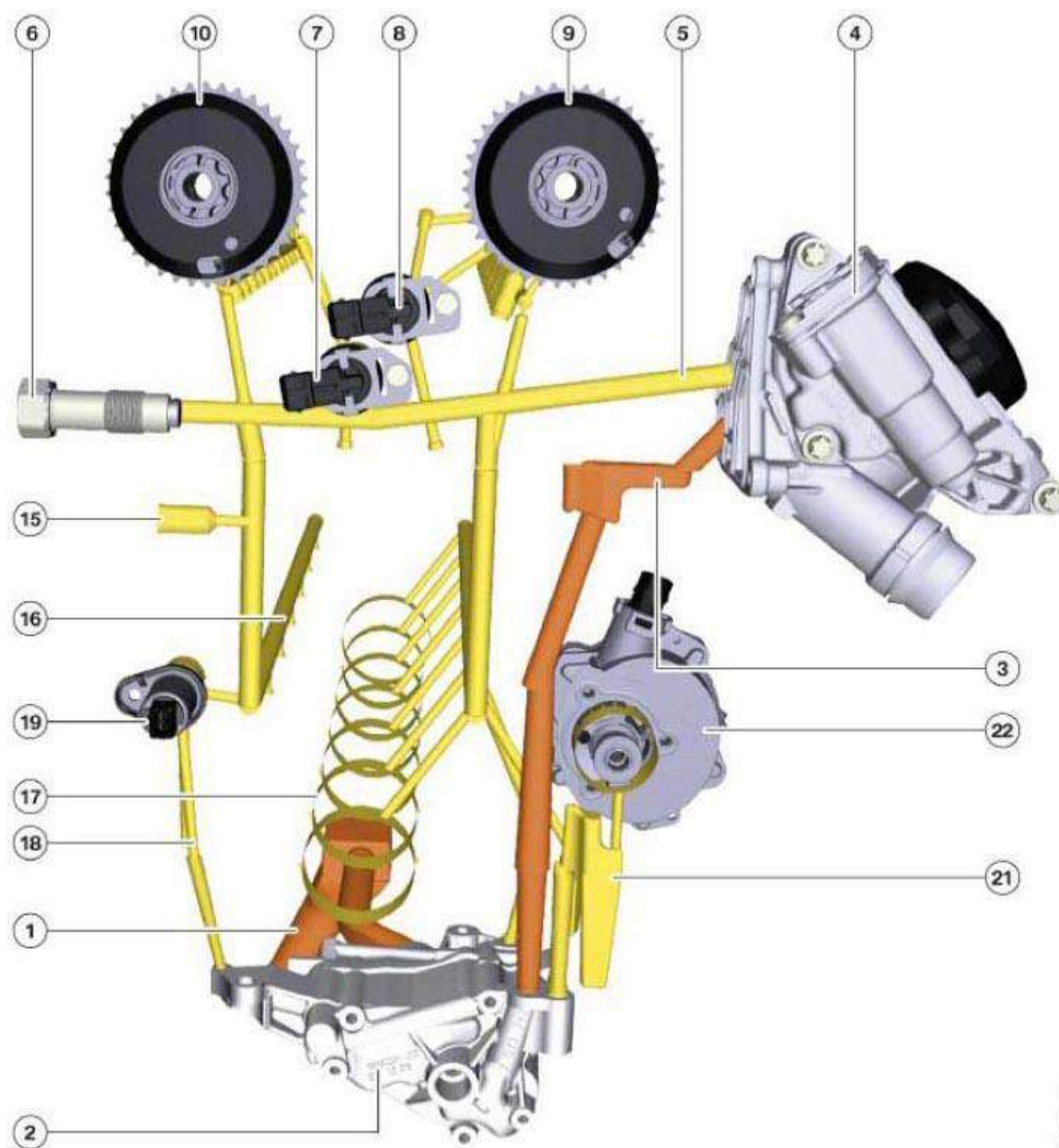


Fig. 16: Identifying Oil Passages Rear View - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Intake pipe
2	Oil pump
3	Unfiltered oil duct
4	Oil filter
5	Main oil duct (filtered oil duct)
6	Chain tensioner
7	VANOS solenoid valve, exhaust side
8	VANOS solenoid valve, intake side
9	VANOS adjustment unit, intake side
10	VANOS adjustment unit, exhaust side
11	Oil duct for intake camshaft and eccentric shaft lubrication
12	Hydraulic valve lash adjustment
13	Oil duct for exhaust camshaft lubrication
14	Hydraulic valve lash adjustment
15	Connection to exhaust turbocharger lubrication
16	Connection for oil spray nozzles
17	Crankshaft bearing
18	Oil duct for oil pressure control
20	Oil duct for oil pressure control
21	Oil duct for vacuum pump lubrication
22	Vacuum pump



INDEX EXPLANATION CHART

Index	Explanation
1	Intake pipe
2	Oil pump
3	Unfiltered oil duct
4	Oil filter
5	Main oil duct (filtered oil duct)
6	Chain tensioner
7	VANOS solenoid valve, exhaust side

8	VANOS solenoid valve, intake side
9	VANOS adjustment unit, intake side
10	VANOS adjustment unit, exhaust side
15	Connection to exhaust turbocharger lubrication
16	Connection for oil spray nozzles
17	Crankshaft bearing
18	Oil duct for oil pressure control
19	Oil pressure control valve
21	Oil duct for vacuum pump lubrication
22	Vacuum pump

Oil Filtration and Oil Cooling

The oil filter housing is made from Duroplast. Based on the application, two types of engine oil coolers may be used. Depending on the oil temperature, a thermostat on the oil filter housing controls the oil flow through the oil cooler.

Oil Spray Nozzles

The N55 engine is equipped with oil spray nozzles for the purpose of cooling the piston crown. A special tool is required for positioning the oil spray nozzles.

Oil Pressure

Since the N55 engine has an oil pump with electronic volumetric flow control, it is necessary to measure the oil pressure precisely. For this reason, a new oil pressure sensor is installed.

Advantages of the new oil pressure sensor:

- It now measures absolute pressure (previous measured relative pressure).
- It is characteristic map control in all speed ranges.

Oil Level

The oil quality sensor is used for measuring the oil level as on previous BMW engines.

Oil Return

The following graphics show the integrated oil deflector. It combines the following components:

- Oil deflector (4)
- Intake snorkel (5)

The oil sump (1) and crankshaft are separated by the integrated oil deflector. Oil scraper edges are installed on the bedplate to direct the spray oil from the crankshaft.

Depending on the model, the oil pan can be adapted to different installation configurations by simply changing the intake snorkel. The oil, flowing back from the cylinder head (2, 6) is directed under the oil deflector. In this way, even under high transverse acceleration conditions, no returning oil can reach the crankshaft and cause churning losses.

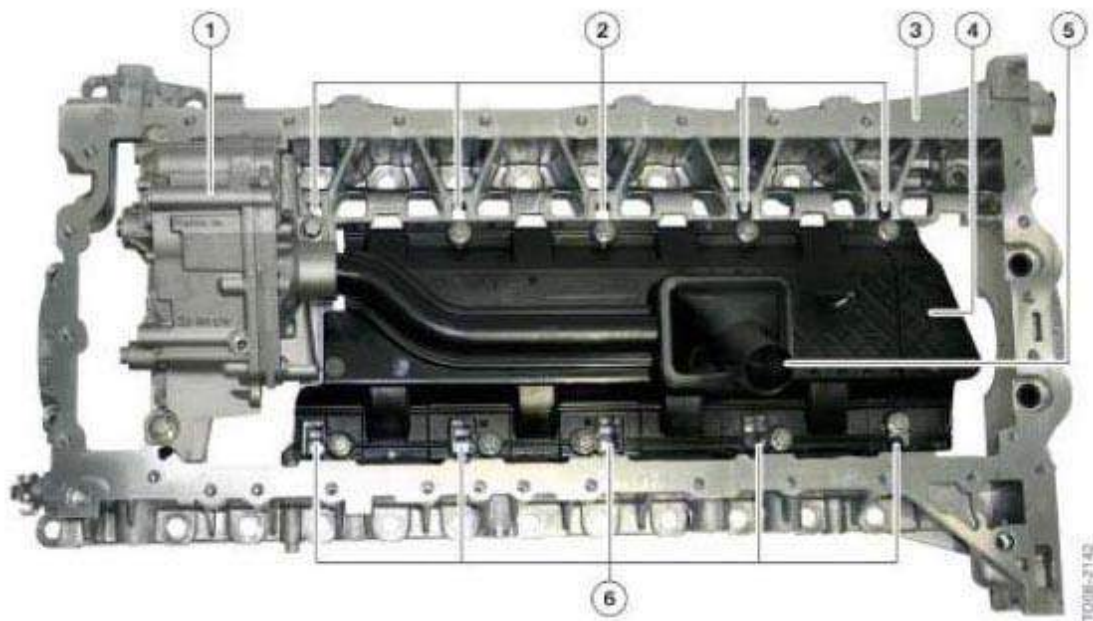


Fig. 18: Identifying Cylinder Head, Oil Sump, Oil Deflector And Intake Snorkel
Courtesy of BMW OF NORTH AMERICA, INC.

CYLINDER HEAD

Direct fuel injection, turbocharging and Valvetronic systems are combined for the first time on a BMW 6-cylinder engine. The cylinder head of the N55 engine is a new development. It features a very compact design and is equipped with third generation Valvetronic.

The combination is referred to as Turbo-Valvetronic-Direct-Injection (TVDI).

This system reduces CO₂ emission and fuel consumption by 3 - 6%.

There are now no connections for the VANOS non-return valves as they have been integrated in the solenoid valves. The cylinder head also features cooling passages near the fuel injectors; providing indirect cooling.

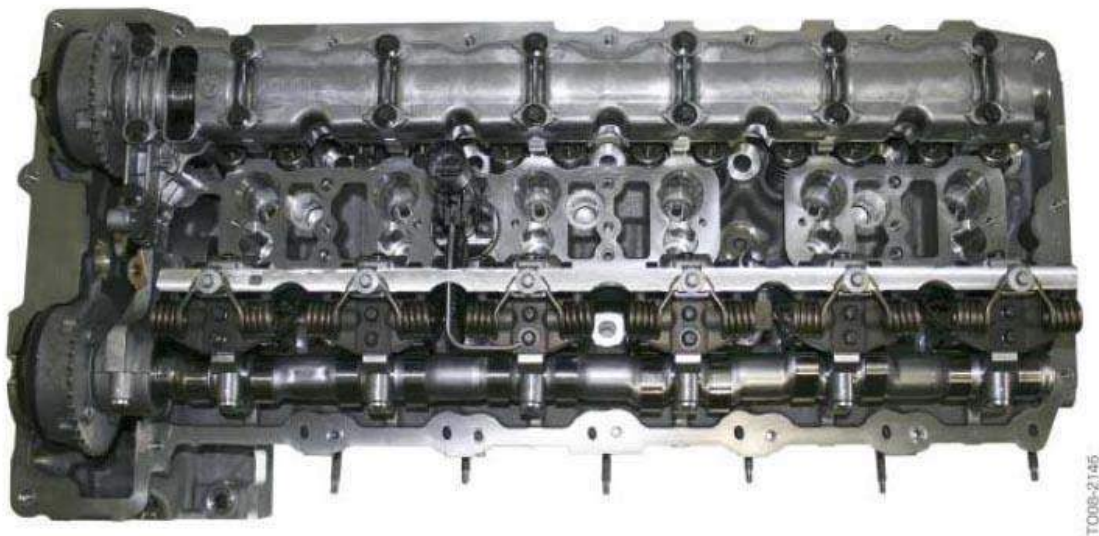


Fig. 19: Identifying Cylinder Head - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

Cylinder Head Cover

The cylinder head cover is a new development. The accumulator for the vacuum system is built into the cylinder head cover.

All components for crankcase ventilation and the blow-by channels are also integrated into the cylinder head cover. The non-return valves ensure that the blow-by gasses are reliably added to the intake air in both engine modes (NA and Boost)

The N55 engine is equipped with a vacuum-controlled crankcase ventilation system; therefore, a regulated negative pressure of approximately 38 mbar is maintained.



Fig. 20: Identifying Cylinder Head Cover Components With Crankcase Ventilation - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Connection, blow-by gas to clean air pipe
2	Connection, vacuum line to vacuum pump
3	Reserve, vacuum connection
4	Vacuum connection to electropneumatic pressure converter EPDW for wastegate valve
5	Duct for blow-by gas feed into intake system with integrated non-return valve
6	Blow-by gas duct with settling chamber, impact plate, pressure control valve and non-return valves
7	Pressure regulating valve

CRANKCASE VENTILATION

The blow-by gasses flow into the settling chamber of the cylinder head cover through an opening located in the rear of the cover. Here, the blow-by gasses are directed through holes on to an impact plate, against which the oil impacts at high speed, and drains off. The blow-by gasses, cleaned of oil, flow via the pressure control valve (depending on the operating mode) through the non-return valves into the inlet pipe upstream of the turbocharger, or via passages in the cylinder head ahead of the intake valves. The separated oil is drained via a return flow duct into the oil pan.

Naturally Aspirated Mode

The standard function can only be used as long as a vacuum prevails in the intake air manifold, i.e. in naturally-aspirated engine mode.

With the engine operating in naturally-aspirated mode, the vacuum in the intake air manifold opens the non-return valve (15) in the blow-by duct within the cylinder head cover. This draws off blow-by gasses via the pressure control valve. At the same time, the vacuum also closes the second non-return valve (12) in the duct to the charge air intake pipe.

The blow-by gasses flow via a distribution rail integrated in the cylinder head cover, through the intake passages (16) in the cylinder head, which lead directly into the intake ports, ahead of the valves.

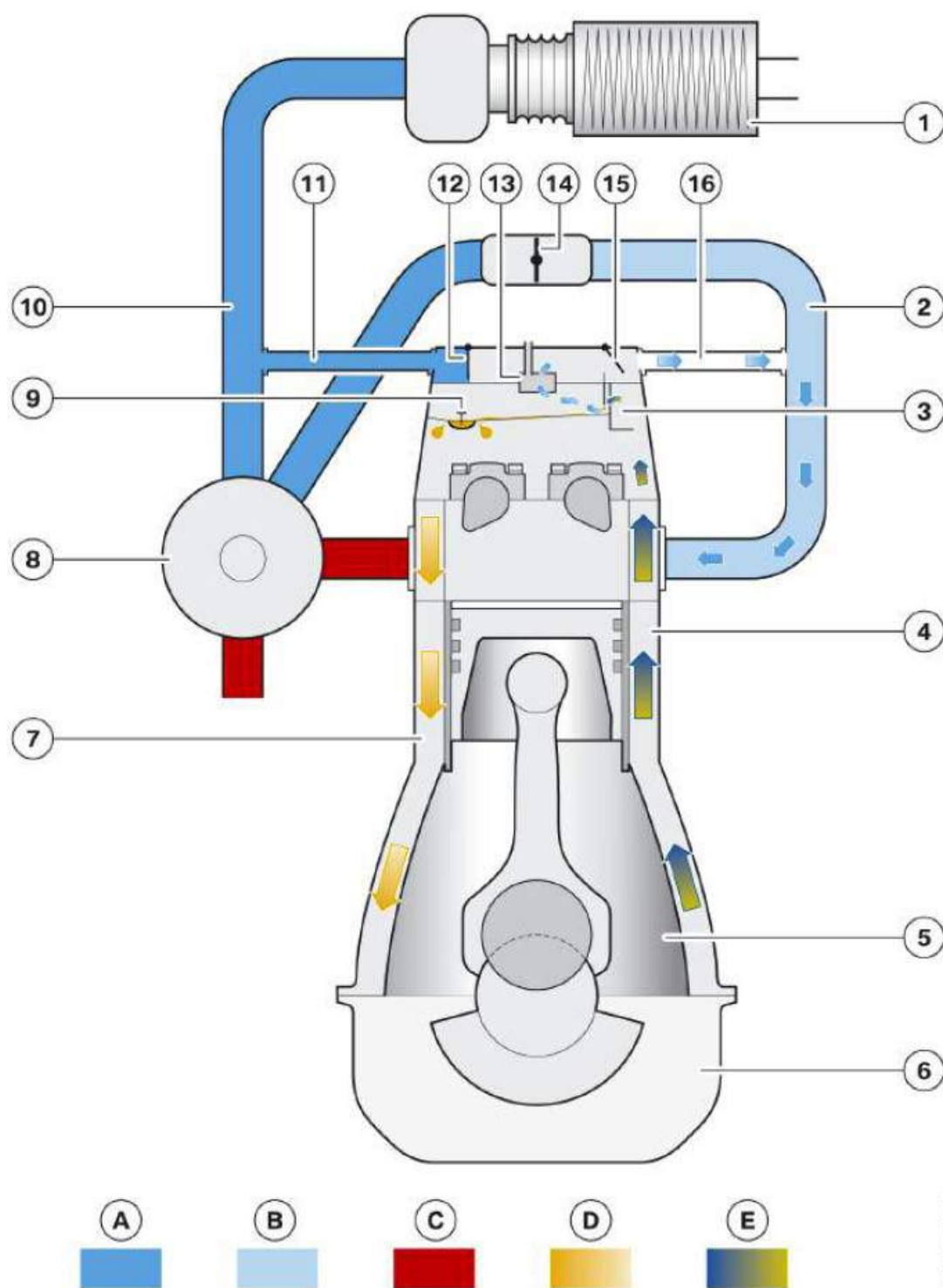


Fig. 21: Identifying Crankcase Ventilation Flow Diagram (Naturally-Aspirated Mode) - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
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A	Ambient pressure
B	Vacuum
C	Exhaust gas
D	Oil
E	Blow-by gas
1	Air cleaner
2	Intake manifold
3	Impact plates
4	Oil return channel
5	Crankcase
6	Oil sump
7	Oil return channel
8	Exhaust turbocharger
9	Oil drain valve
10	Charge air intake line
11	Hose to charge air intake line
12	Non-return valve
13	Pressure regulating valve
14	Throttle valve
15	Non-return valve
16	Passages in cylinder head and cylinder head cover

Boost Mode

As the pressure in the intake air manifold increases in boost mode, blow-by gasses can no longer be introduced via the passages in the cylinder head, otherwise, the boost pressure could enter the crankcase. A non-return valve (15) in the blow-by channel within the cylinder head cover closes the connection (16) to the intake air manifold. This protects the crankcase from excess pressure.

The increased demand for fresh air creates a vacuum in the clean air pipe between the turbocharger and intake silencer. This vacuum is sufficient to open the non-return valve (12) and draw the blow-by gasses via the pressure control valve.

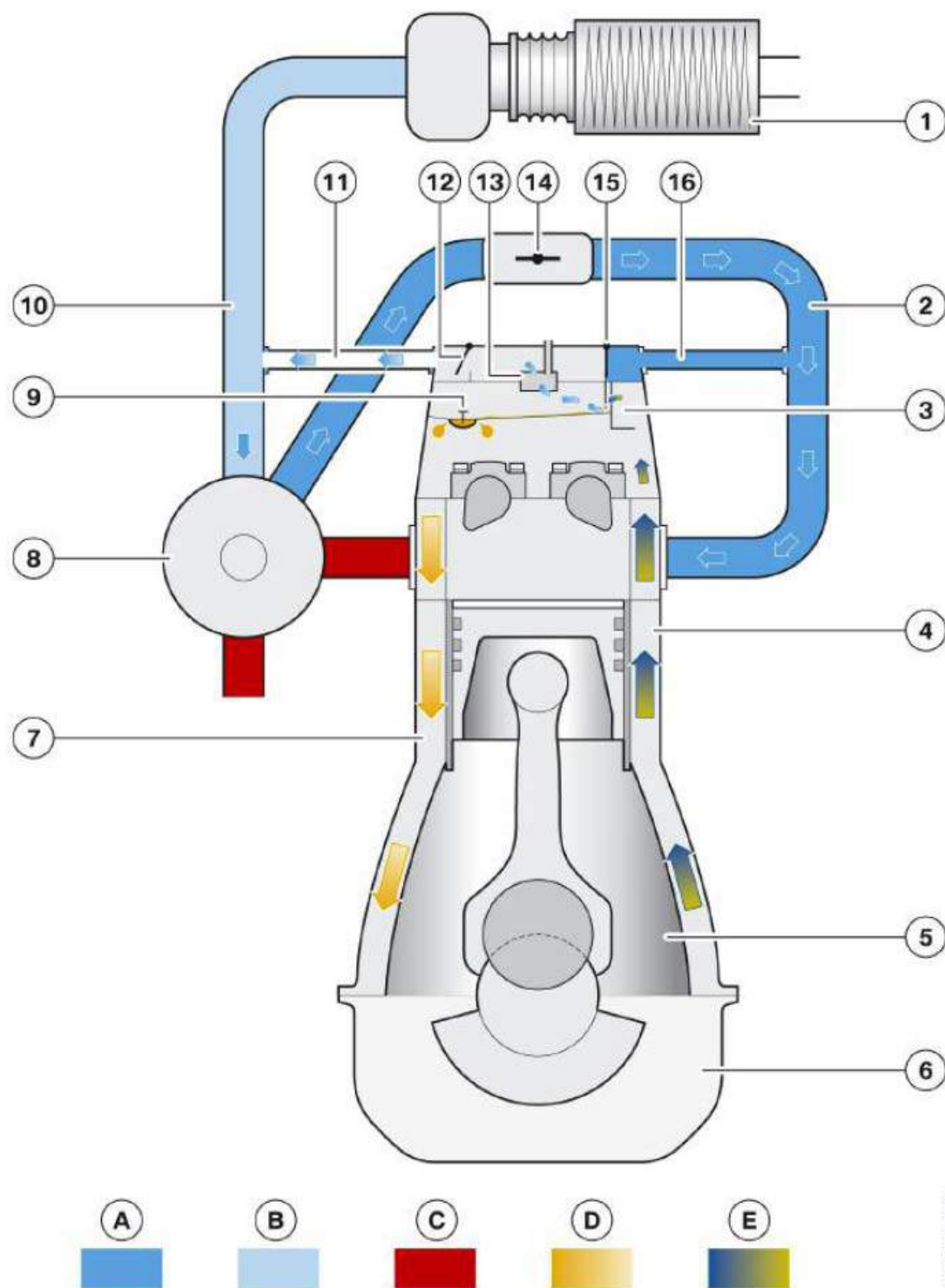


Fig. 22: Identifying Crankcase Ventilation Flow Diagram, Turbocharged (Boost) Mode - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
CARMANUALSUSA	
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A	Excess pressure
B	Vacuum
C	Exhaust gas
D	Oil
E	Blow-by gas
1	Air cleaner
2	Intake manifold
3	Impact plates
4	Oil return channel
5	Crankcase
6	Oil sump
7	Oil return channel
8	Exhaust turbocharger
9	Oil drain valve
10	Charge air intake line
11	Hose to charge air intake line
12	Non-return valve
13	Pressure regulating valve
14	Throttle valve
15	Non-return valve
16	Passages in cylinder head and cylinder head cover

NOTE: If a customer complains about high oil consumption and oil is discovered in the turbocharger, it should not be immediately assumed that the turbocharger is defective. If the oil is present in the fresh air pipe (before the turbocharger) then the entire engine should be checked.

VALVETRAIN

The following graphic shows the design of the cylinder head on the N55 engine with Valvetronic III and direct fuel injection.

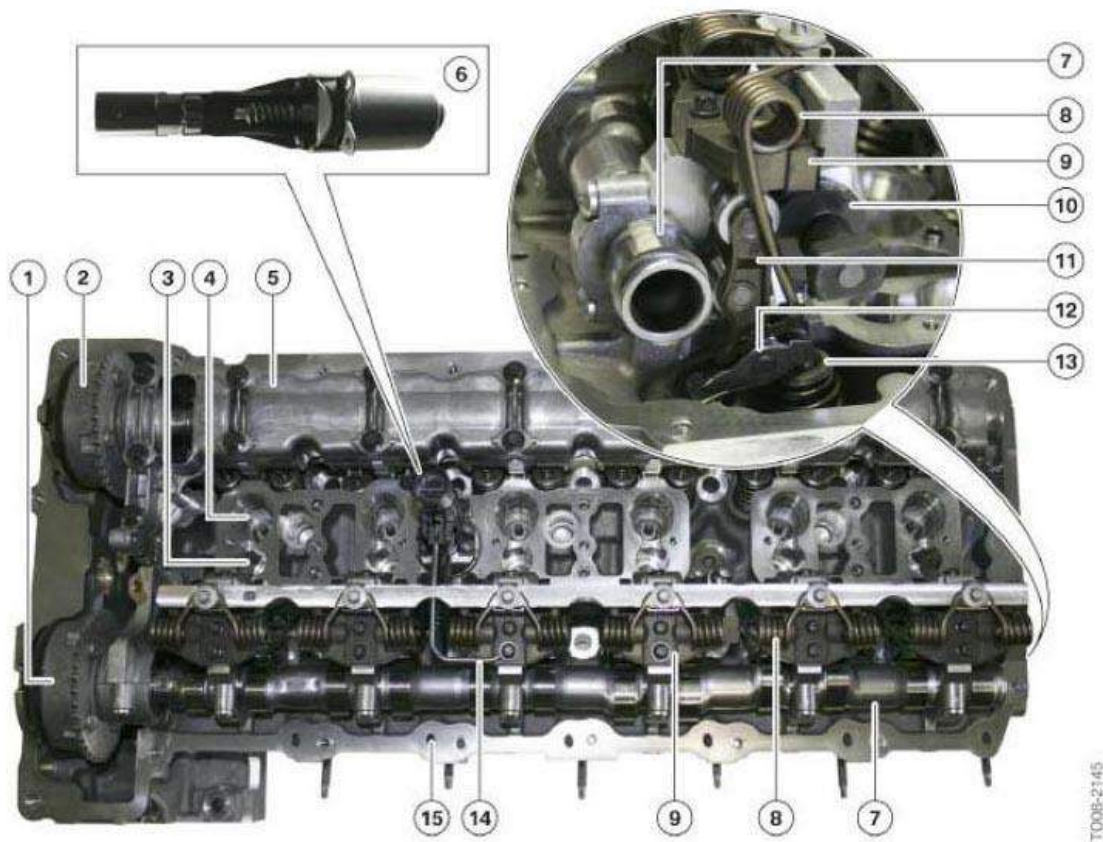


Fig. 23: Identifying Valvetrain Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Notice the hollow, lightweight design of the camshafts (7) and the blow-by passages leading into the intake ports (15).

INDEX EXPLANATION CHART

Index	Explanation
1	VANOS unit, intake camshaft
2	VANOS unit, exhaust camshaft
3	Injector well
4	Spark plug well
5	Camshaft housing
6	Valvetronic servomotor
7	Inlet camshaft
8	Torsion spring
9	Gate
10	Eccentric shaft
11	Intermediate lever
12	Roller lever tappet

13	Valve head
14	Oil spray nozzle
15	Passages for introducing blow-by gas into the intake ports

Intake and Exhaust Valves

The valve stems have a diameter of 5 mm on the intake valve and 6 mm on the exhaust valve. The larger diameter exhaust valve are hollow and filled with sodium. In addition, the valve seat of the exhaust valves are reinforced.

Valve Springs

The valve springs are different for the intake side and exhaust side.

CAMSHAFTS

Lightweight camshafts as well as cast camshafts or a mixture of both were installed in N54 engines. Only lightweight construction camshafts are used on the N55 engine. The lightweight camshafts for the N55 are manufactured in an internal high pressure forming process called hydroforming. The exhaust camshaft features bearing races and is encapsulated in a camshaft housing. The camshaft housing reduces oil foaming during operation.

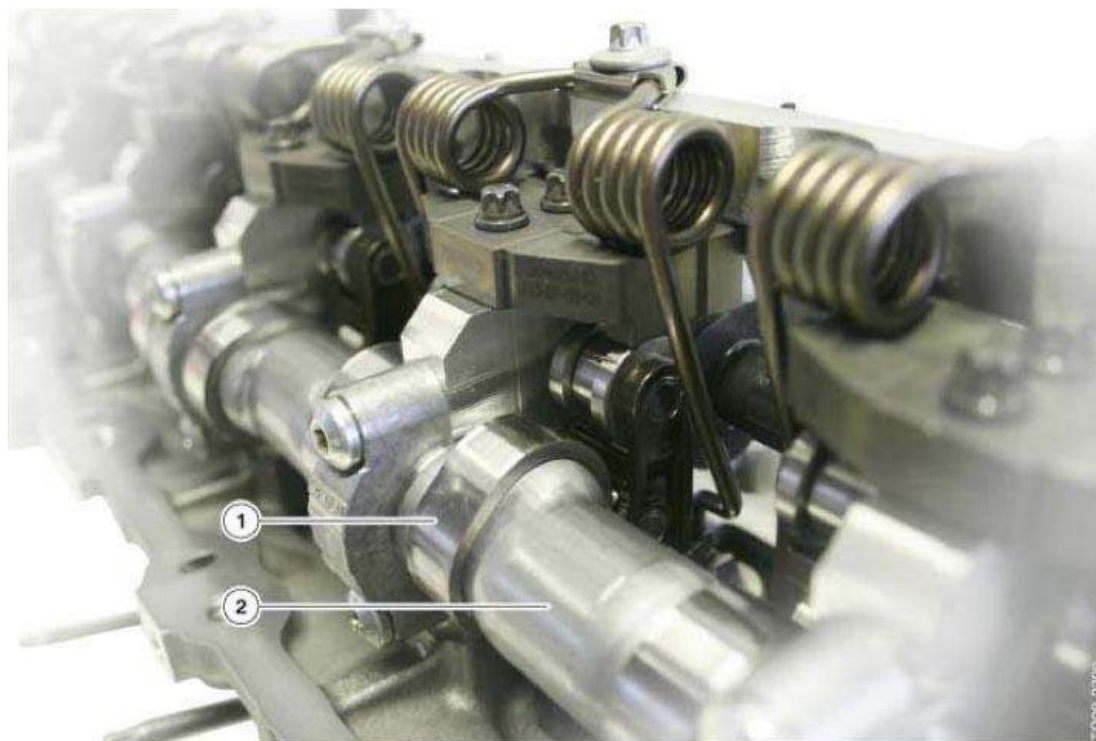


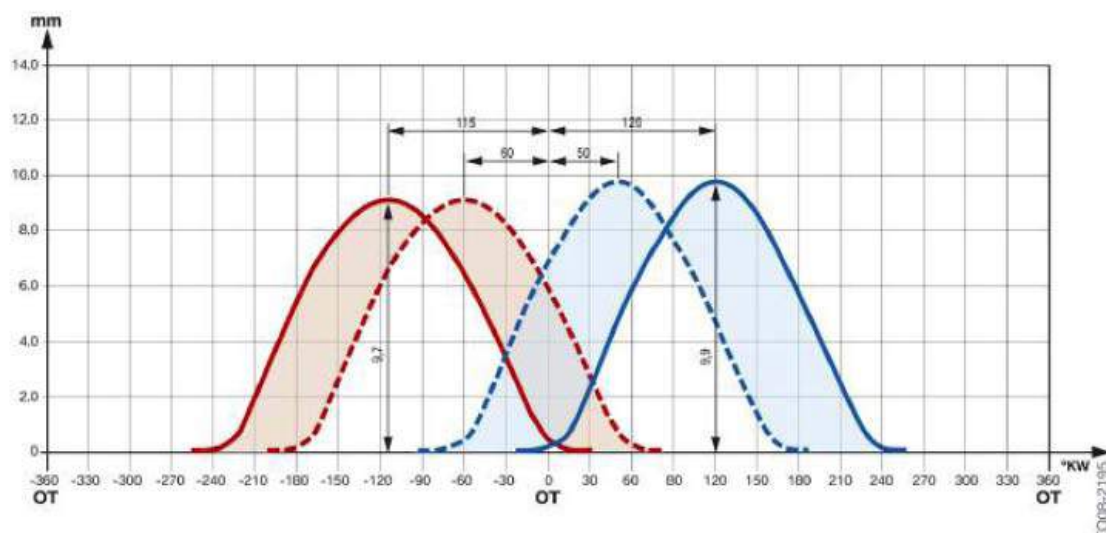
Fig. 24: Identifying Camshaft - N55

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Shell-shaped cam
2	Corrugated tube

Valve Timing

**Fig. 25: Identifying Valve Timing Diagram - N55**

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

		N54B30O0	N55B30M0
Intake valve Ø	[mm]	31.4	32
Exhaust valve Ø	[mm]	28	28
Maximum valve lift, intake valve/exhaust valve	[mm]	9.7/9.7	9.9/9.7
Intake camshaft spread (VANOS adjustment range)	[°crankshaft]	55	70
Exhaust camshaft spread (VANOS adjustment range)	[°crankshaft]	45	55
Intake camshaft opening angle (max.-min. spread)	[°crankshaft]	125 - 70	120 - 50
Exhaust camshaft opening angle (max.-min. spread)	[°crankshaft]	130 - 85	115 - 60
Opening period intake camshaft	[°crankshaft]	245	255
Opening period exhaust camshaft	[°crankshaft]	261	261

NOTE: The N55 has a larger intake and exhaust VANOS adjustment range as well as larger intake valve lift, and cam duration than the N54 engine.

VANOS SYSTEM

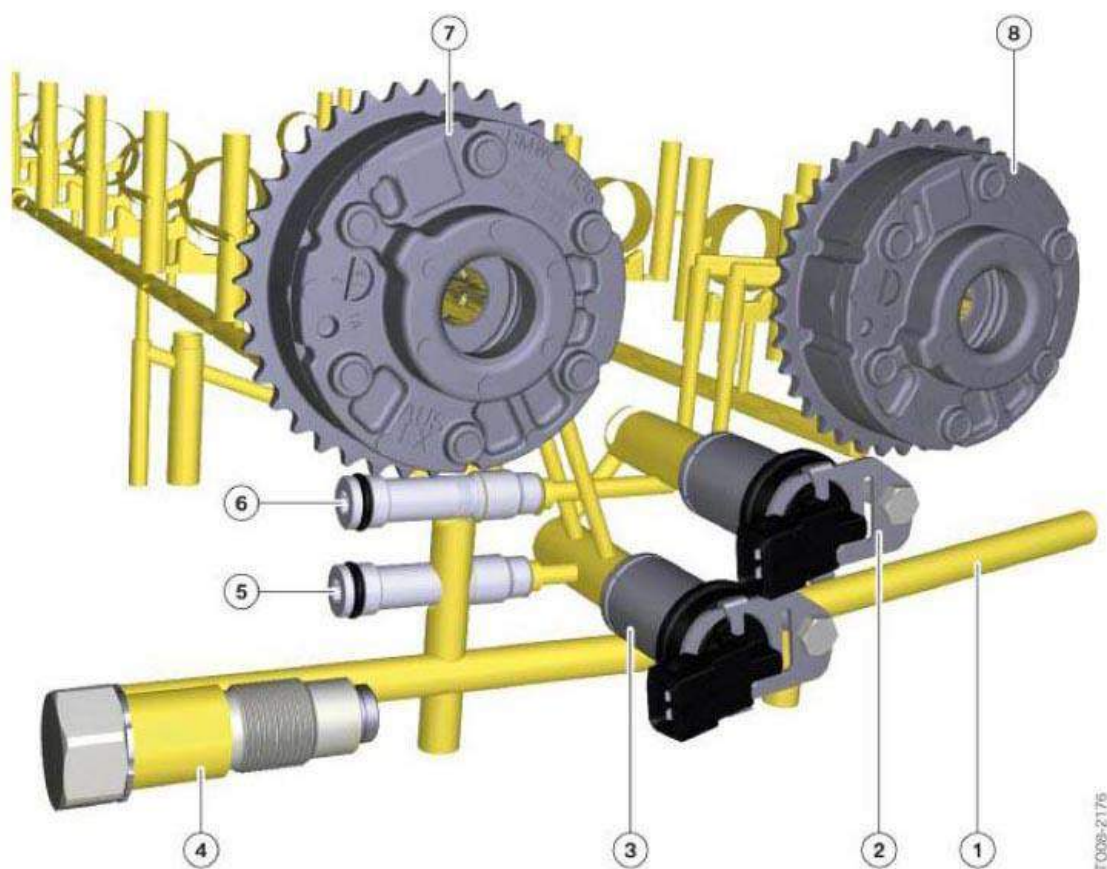


Fig. 26: Identifying VANOS With Oil Supply - N54
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Main oil duct
2	VANOS solenoid valve, intake side
3	VANOS solenoid valve, exhaust side
4	Chain tensioner
5	Non return valve, exhaust side
6	Non return valve, intake side
7	VANOS adjustment unit, exhaust side
8	VANOS adjustment unit, intake side

Overview

The VANOS system has been optimized to provide even faster adjustment speeds of the VANOS units. The aluminum VANOS units are much lighter and are also less susceptible to soiling. It can be seen by comparing the N54 VANOS system with the N55 VANOS that fewer oil passages are required and that the non-return valves are no longer on the cylinder head but rather incorporated into the solenoid valves on N55.

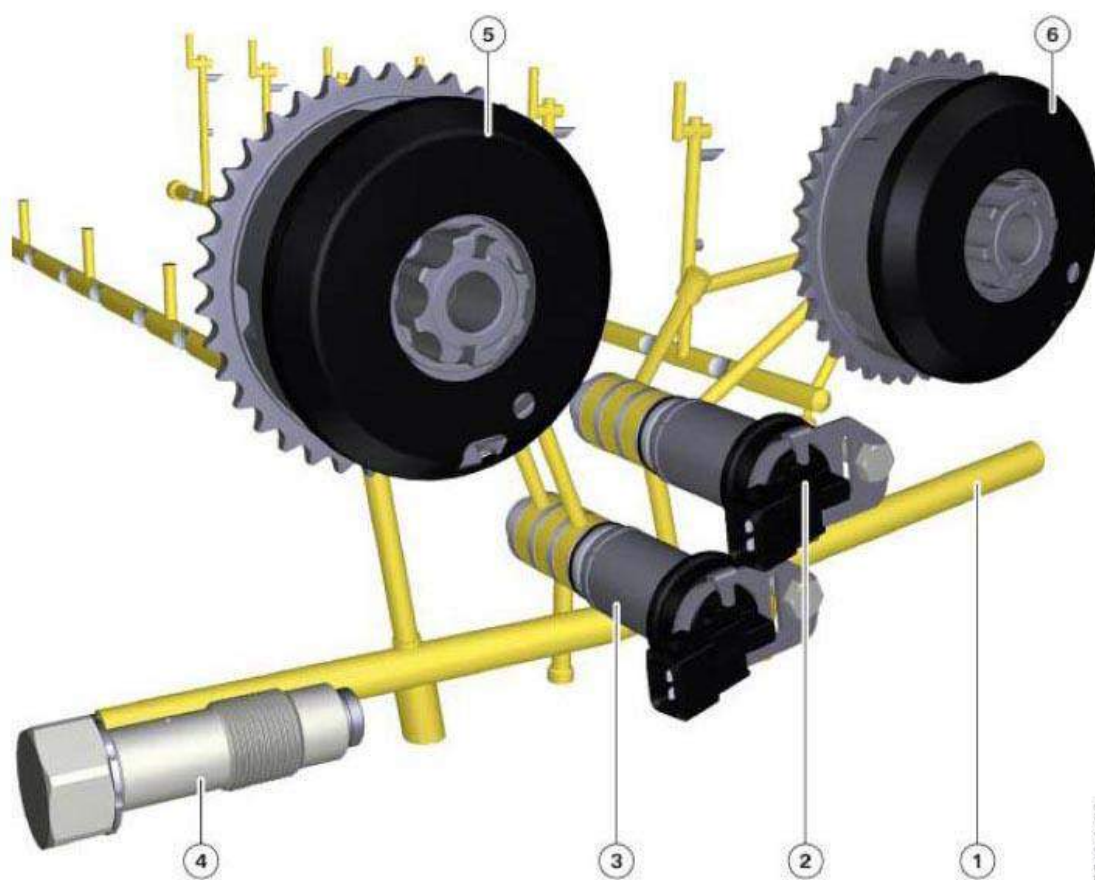


Fig. 27: Identifying VANOS With Oil Supply - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Main oil duct
2	VANOS solenoid valve, intake side
3	VANOS solenoid valve, exhaust side
4	Chain tensioner
5	VANOS adjustment unit, exhaust side
6	VANOS adjustment unit, intake side

VANOS Solenoid Valves

The non-return valve with screen filter used on the N54 engine have now been integrated in the VANOS solenoid valves on the N55 engine. This measure has made it possible to reduce the number of oil ducts in the cylinder head. The screen filters on the VANOS solenoid valve ensure trouble-free operation and reliably prevent the VANOS solenoid valve from sticking due to dirt particles.

Cam Sensor Wheels

The sensor wheels are now "deep-drawn" sheet metal components and no longer made from two parts. This design increases production accuracy while reducing manufacturing costs.



Fig. 28: Identifying Camshaft Sensor Wheel (Rear And Front View) - N55
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Rear View
B	Front view

VALVETRONIC III

The main differences between Valvetronic III and Valvetronic II are in the arrangement of the Valvetronic servomotor and the Valvetronic sensor. As in Valvetronic II, the turbulence level is increased at the end of the compression cycle for the purpose of optimizing the mixture formation with the use of phasing and masking measures. This movement of the cylinder charge improves the combustion during partial load operation and in catalytic converter heating mode. The quench areas also contribute to mixture formation.

Phasing

Phasing results in a lift difference between both intake valves of up to 1.8 mm in the lower partial load range. Consequently, the flow of fresh air is distributed asymmetrically.

Masking

Masking refers to the design of the valve seats. This machining ensures that the incoming fresh air is aligned in such a way as to give rise to the required cylinder charge movement. The advantage of this measure is that the combustion retardation is reduced by approximately 10° of crankshaft rotation. The combustion process takes place faster and a larger valve overlap can be achieved, thus considerably reducing NOx emissions.

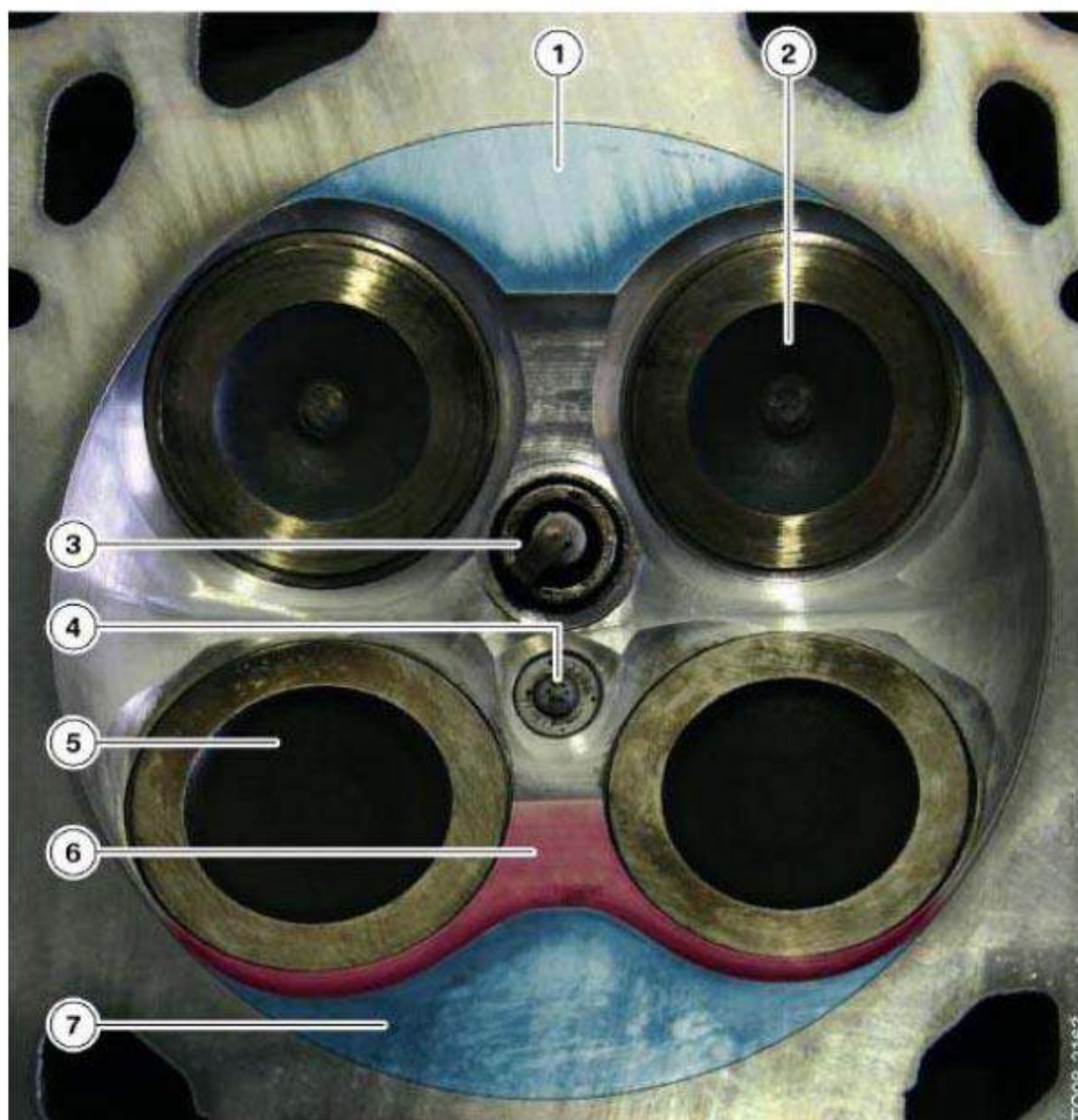


Fig. 29: Identifying Top Of Combustion Chamber - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Quench area
2	Exhaust valves
3	Spark plug
4	Fuel injector
5	Intake valve
6	Masking
7	Quench area

The following graphic shows the effect of the previously described measures. These measures achieve improved and faster combustion in the red area. Technically, this is known as the turbulent kinetic energy.

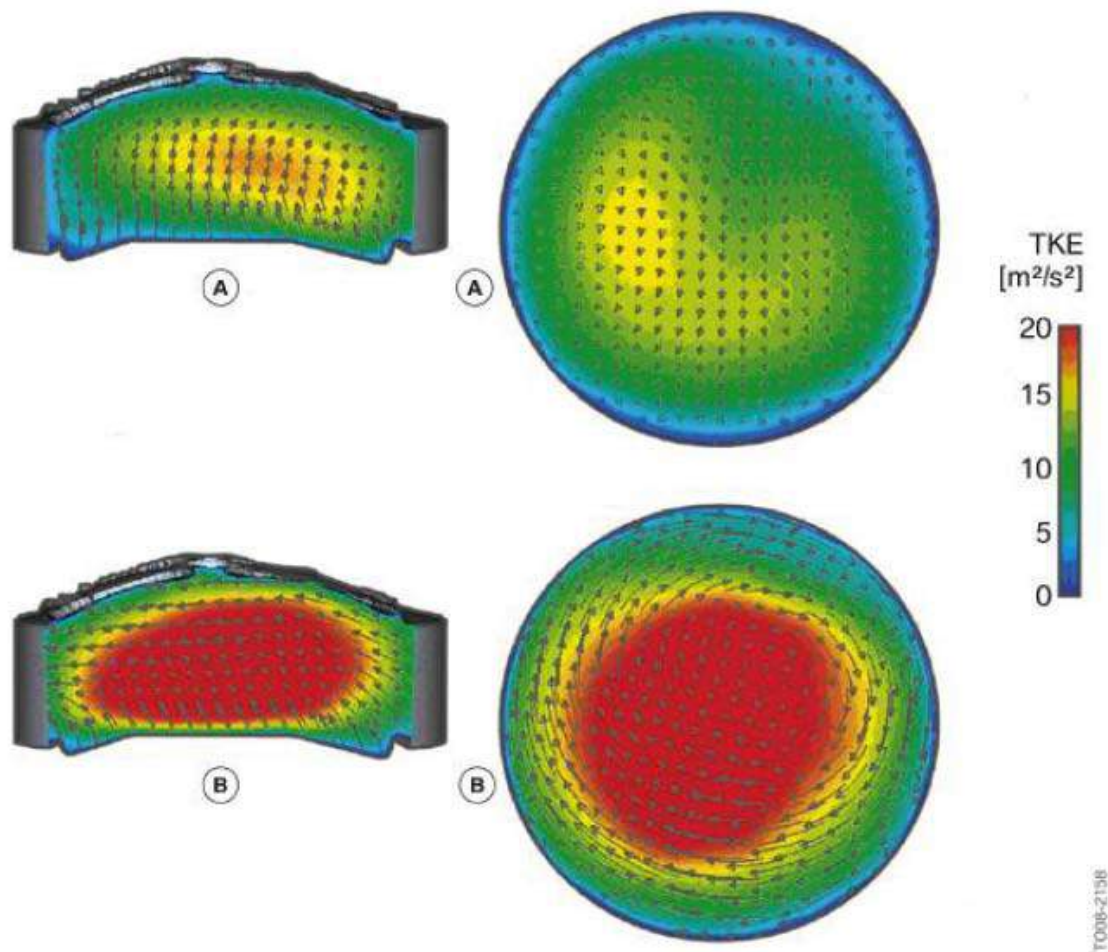


Fig. 30: Identifying Influence Of Phasing And Masking On Flow In Combustion Chamber
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Valvetronic I
B	Valvetronic II and III with Phasing and masking
TKE	Turbulent kinetic energy

Engine response is improved by the combination of Valvetronic III, direct injection and turbocharging. The response up to naturally aspirated full load is shortened on a naturally aspirated engine with Valvetronic as there is now no need wait for the intake air manifold to be filled. The subsequent torque buildup as the turbocharger starts up can be accelerated with the partial lift setting at low engine speed. This effectively flushes out residual gas, thus resulting in faster torque build-up.

Combustion Chamber Geometry

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The following graphic shows the arrangement of the individual components in the combustion chamber. It can be seen that the BMW (spray-guided) high precision injection (HPI) system is not used but rather a Bosch solenoid valve fuel injector with multi-hole nozzle. The fuel injection is specially adapted to the combination of Valvetronic III and turbocharging. For better illustration, a set of valves has been removed in the graphic.

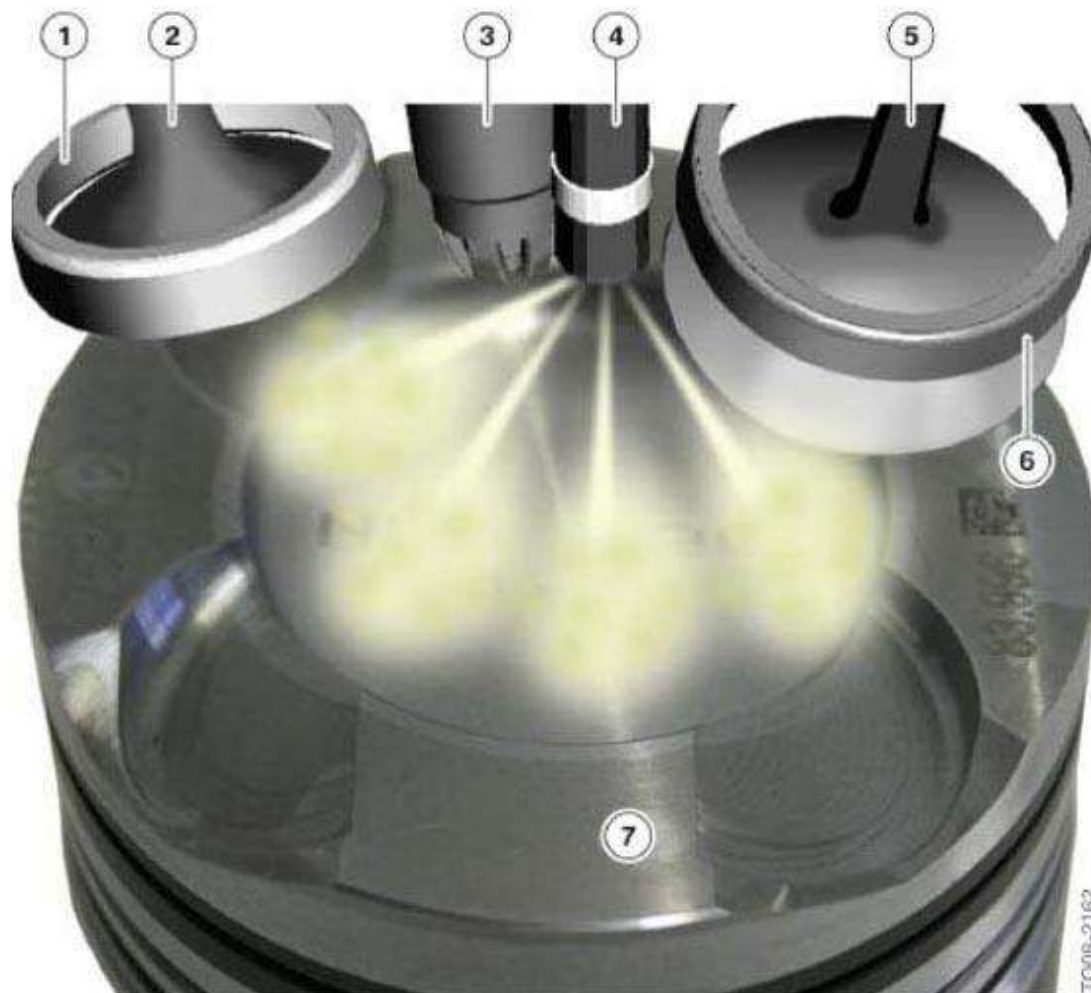


Fig. 31: Identifying Combustion Chamber Components - N55

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Valve seat, exhaust valve
2	Exhaust valve
3	Spark plug
4	Fuel injector
5	Intake valve
6	Valve seat, intake valve

Valve Lift Adjustment Overview

As can be seen from the following graphic, the installation location of the servomotor has changed with Valvetronic III. Another new feature is that the eccentric shaft sensor is no longer mounted on the eccentric shaft but has been integrated into the servomotor.

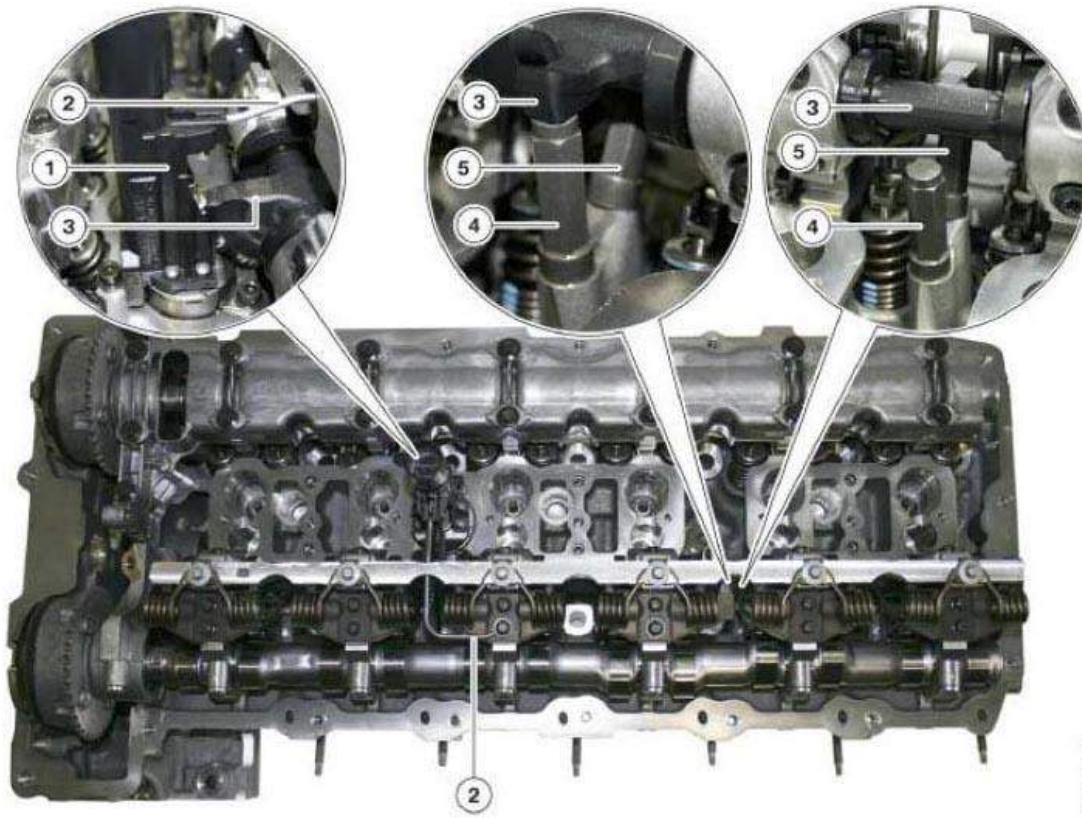


Fig. 32: Valve Lift Adjustment Overview - N55
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Valvetronic servomotor
2	Oil spray nozzle
3	Eccentric shaft
4	Eccentric shaft minimum stop
5	Eccentric shaft maximum stop

The Valvetronic III servomotor contains a sensor for determining the position of the motor and the eccentric shaft. The servomotor is lubricated with engine oil by means of an oil spray nozzle (1) aimed directly at the worm drive and the eccentric shaft mechanism.



Fig. 33: Design Of Valve Lift Adjustment - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Oil spray nozzle
2	Eccentric shaft
3	Return spring
4	Gate block
5	Inlet camshaft
6	Intermediate lever
7	Roller cam follower, intake
8	Hydraulic valve lash adjustment
9	Valve spring 18 Socket
10	Intake valve
11	Valvetronic servomotor
12	Exhaust valve
13	Valve spring

14	Hydraulic valve lash adjustment
15	Roller cam follower, exhaust
16	Exhaust camshaft
17	Sealing sleeve

Valvetronic Servomotor

A brushless direct current motor (BLDC motor) is used. The BLCD motor is maintenance- free and very powerful, due to the contactless energy transfer system. The use of integrated electronic modules ensures precision control.

The Valvetronic servomotor has the following special features:

- Open concept (engine oil is directly supplied to the motor).
- The eccentric shaft angle is determined by angle increments from the integrated sensor system.
- Power consumption is reduced by about 50%.
- Higher actuating dynamics (e.g. cylinder-selective adjustment, idle speed control, etc.).
- Lightweight design is approximately 600 grams.

Function

Actuation of the Valvetronic servomotor is limited to a maximum of 40 amps. A maximum of 20 amps are available over a period of > 200 milliseconds. The Valvetronic servomotor is actuated by a pulse width modulated signal. The duty cycle is between 5% and 98%.

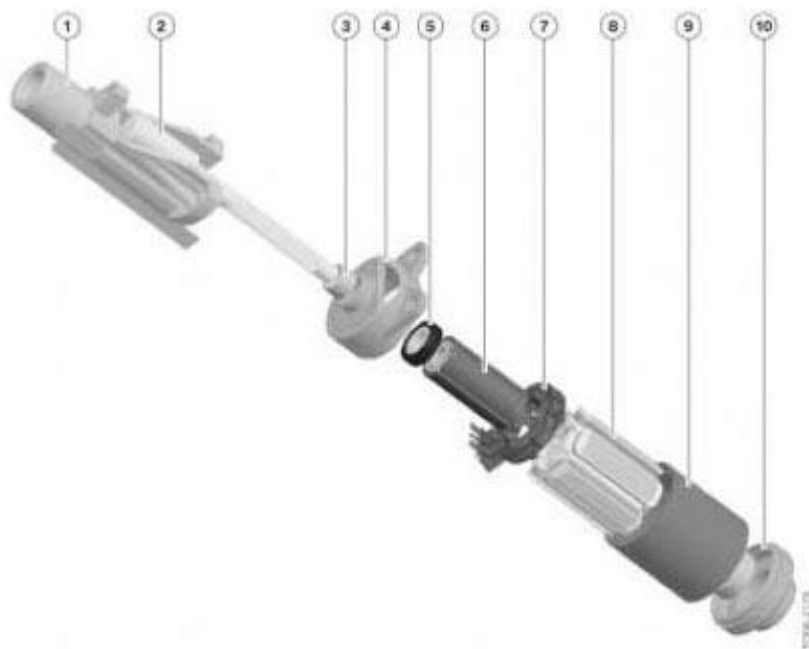


Fig. 34: Identifying Valvetronic Servomotor Components

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Socket
2	Worm shaft
3	Needle bearing
4	Bearing cover
5	Magnetic sensor wheel
6	Rotor with four magnets
7	Sensor
8	Stator
9	Housing
10	Bearing

DRIVE BELT ROUTING & AUXILIARY COMPONENTS

The belt drive has two deflection pulleys and one double ribbed belt.

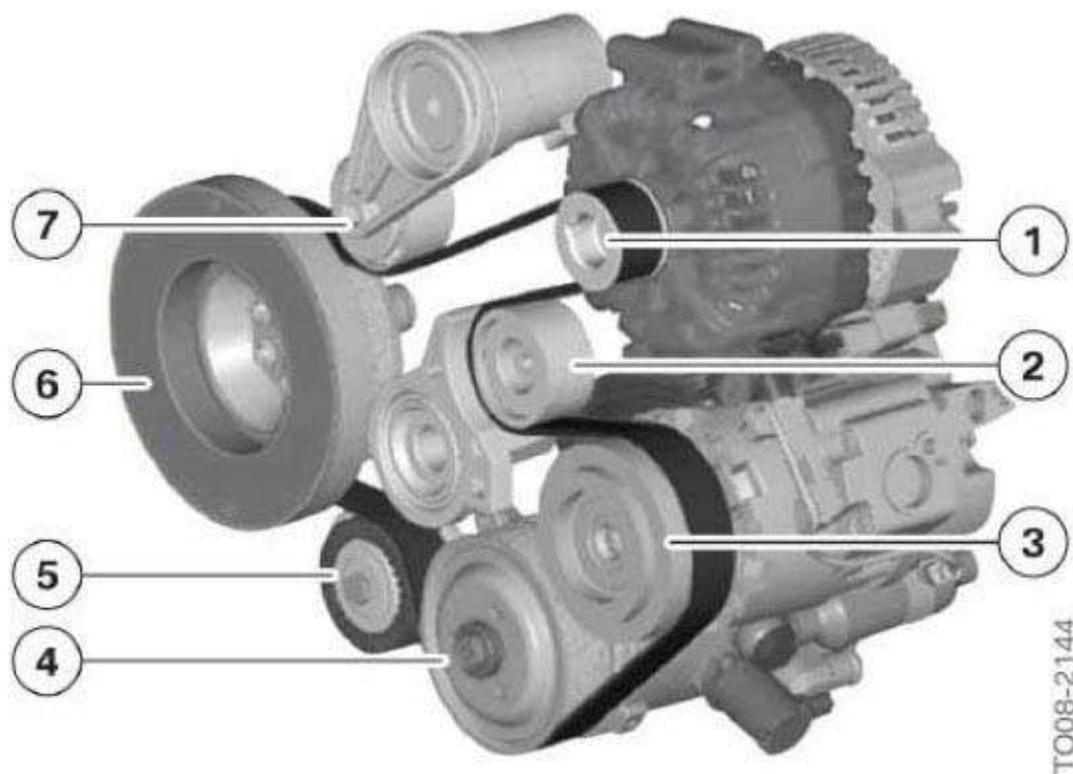


Fig. 35: Identifying Belt Drive Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

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Index	Explanation
1	Belt pulley, alternator
2	Deflection pulley
3	Belt pulley, A/C compressor
4	Belt pulley, power steering pump
5	Deflection pulley
6	Vibration absorber with belt pulley
7	Belt tensioner

VIBRATION DAMPER

A single-mass vibration damper is used on the N55 engine. The belt pulley is mounted on the secondary pulley. Compared to the N54 engine, this design layout additionally reduces the belt load as the vulcanization decouples the belt pulley with flywheel mass from the crankshaft.

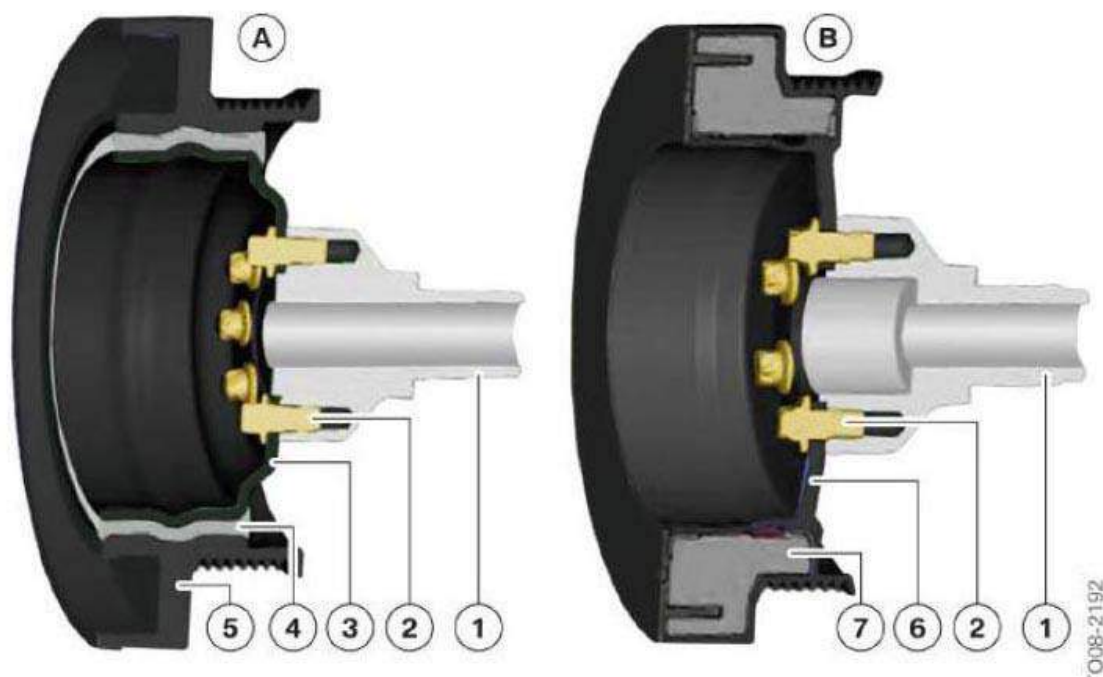


Fig. 36: Identifying Vibration Damper Components - N54
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Vibration damper, N55 engine
B	Vibration damper, N54 engine
1	Crankshaft
2	Bolts
3	Primary pulley

4	Vulcanization
5	Secondary belt pulley with flywheel mass
6	Primary belt pulley
7	Flywheel mass



Fig. 37: Identifying Vibration Damper Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Secondary belt pulley with flywheel mass
2	Flange
3	Vulcanization

AIR INTAKE AND EXHAUST SYSTEM

Air Intake System

Several functions of the air intake system have been optimized for the N55 engine:

- The unfiltered air is routed up to the intake silencer (similar to the N54 engine).
- The filtered air duct is completely new and simplified to accommodate the new turbocharger.
- The crankcase ventilation system has been redesigned.
- The diverter valve has been integrated into the compressor housing of the turbocharger.
- The fuel tank ventilation has been correspondingly adapted.

The design layout of the air intake system has been simplified, compared to the dual turbocharger set up of the N54.

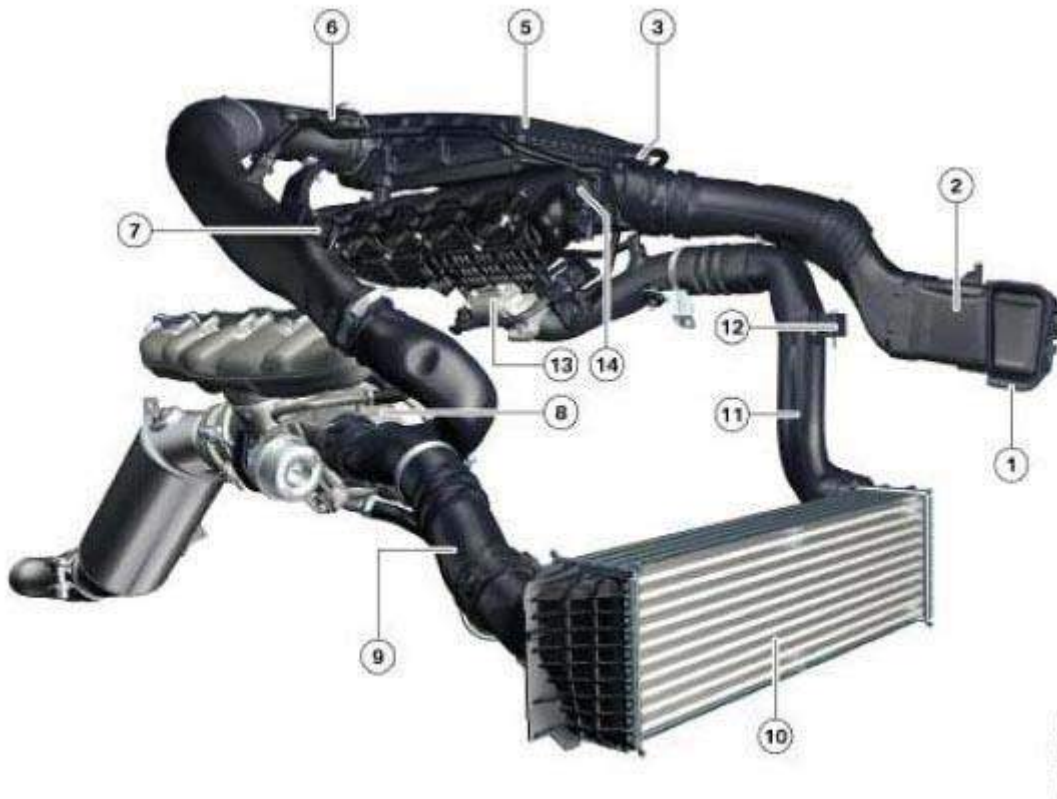


Fig. 38: Identifying Air Intake System Components - N55

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Intake snorkel
2	Unfiltered air pipe
3	Intake silencer
5	Air intake silencer cover
6	Hot-film air mass meter
7	Crankcase ventilation connection
8	Exhaust turbocharger

9	Charge-air pipe
10	Intercooler
11	Charge-air pipe
12	Boost pressure-temperature sensor
13	Throttle valve
14	Intake manifold

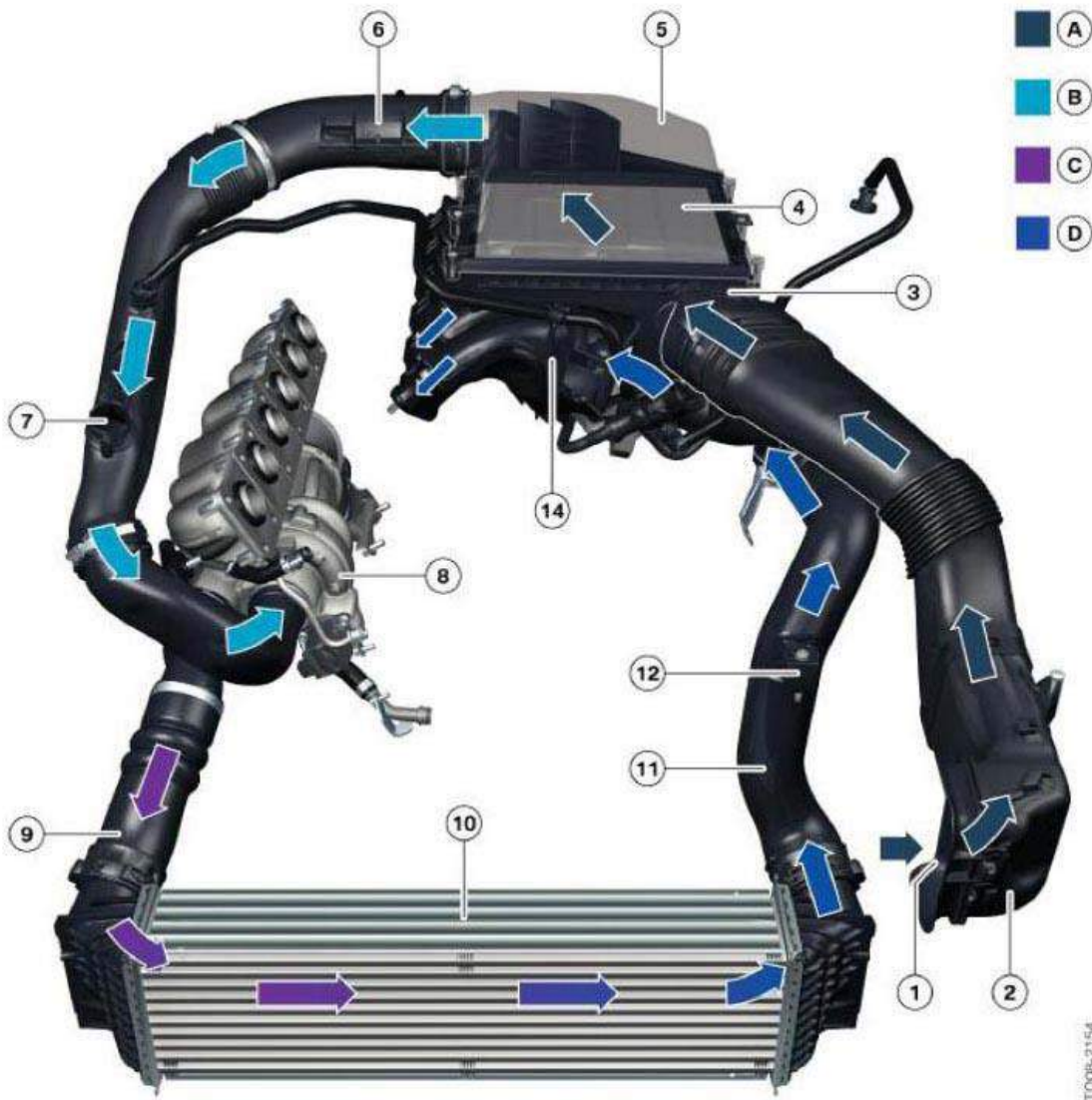


Fig. 39: Identifying Air Intake And Exhaust System Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Unfiltered air
B	Purified air

C	Heated charge air
D	Cooled charge air
1	Intake snorkel
2	Unfiltered air pipe
3	Intake silencer
4	Filter element
5	Air intake silencer cover
6	Hot-film air mass meter
7	Crankcase ventilation connection
8	Exhaust turbocharger
9	Charge-air pipe
10	Intercooler
11	Charge air pipe
12	Boost pressure-temperature sensor
14	Intake air manifold

Intake Manifold

The engine control unit is mounted on the intake manifold. The intake air is used to cool the engine control unit.

Thanks to this arrangement, the engine comes down the assembly line completely assembled with the control unit, the sensors, and actuators already connected.

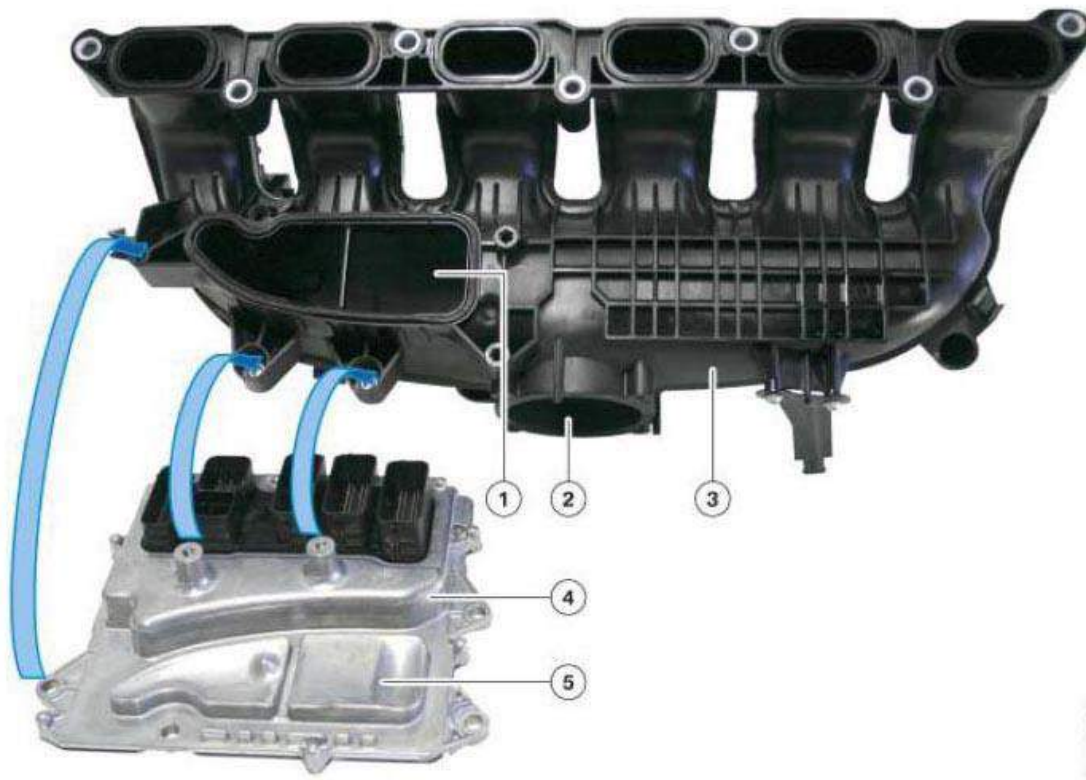


Fig. 40: Identifying Intake System With DME Control Unit - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Mounting flange for engine control unit cooling
2	Mounting flange for throttle valve
3	Air intake system
4	Engine control unit
5	Cooling fins

Fuel Tank Ventilation System

The fuel vapors are stored in a charcoal canister and then fed via the fuel tank vent valve to the combustion process. It was also necessary to adapt this system to all the given conditions related to turbocharging.



Fig. 41: Identifying Fuel Tank Ventilation System Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Connection to ventilation line from charcoal canister
2	Connection upstream of throttle valve
3	Fuel tank vent valve
4	Connection downstream of throttle valve
5	Connection upstream of turbocharger

Exhaust Manifold

The exhaust manifold is air-gap insulated and designed as a six ports into two chamber manifold. Dividing six exhaust ports into two exhaust chambers is necessary in order to ensure optimum flow to the twin scroll turbocharger. The exhaust pulses from the first three cylinders (1-3) feed one scroll (duct 1) of the turbo, while the last three (4-6) feed the second scroll (duct 2). The exhaust manifold and turbocharger are welded together to form one component.

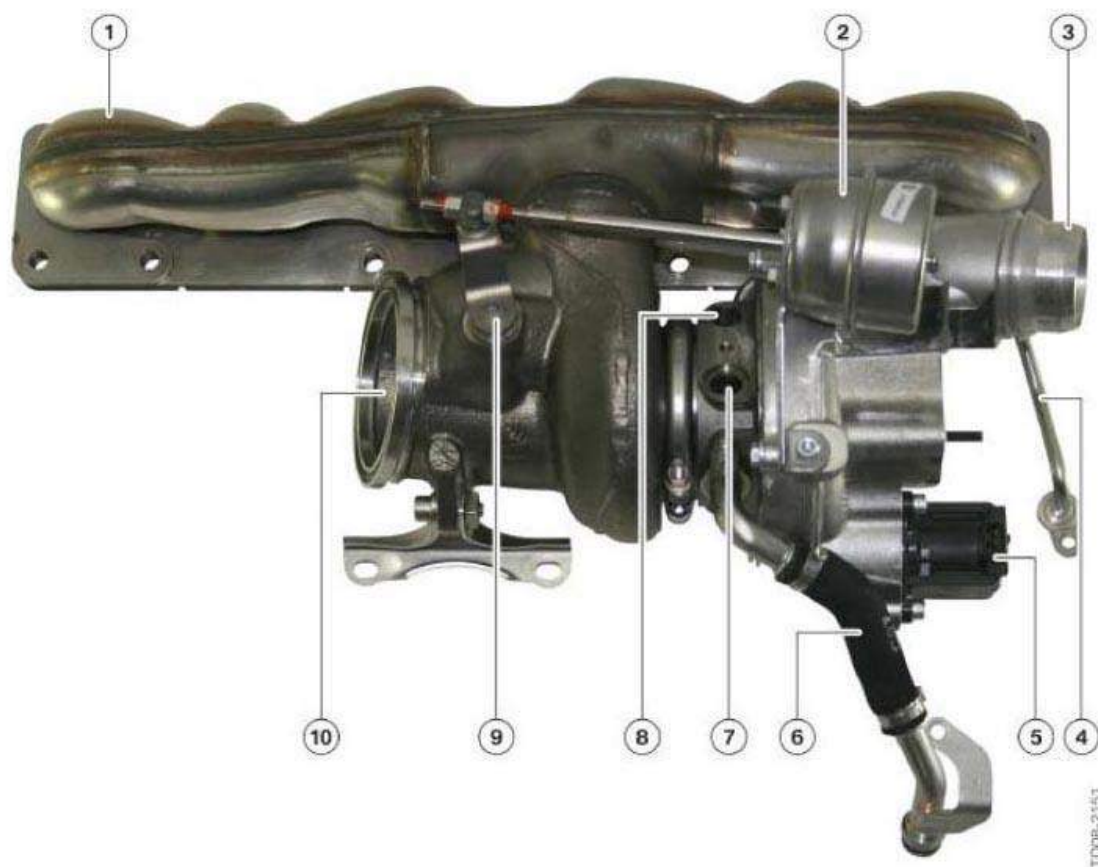


Fig. 42: Identifying Attachment Of Exhaust Manifold And Turbocharger To Engine Block - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Exhaust manifold
2	Vacuum unit
3	Connection to intercooler
4	Oil feed line
5	Diverter valve
6	Oil return line
7	Coolant infeed
8	Coolant return
9	Shaft, wastegate valve
10	Connection to exhaust system

Turbocharger

The N55 is equipped with a single twin scroll turbocharger instead of two separate small turbochargers as on the N54 engine. The following graphics shows the operating principle of the twin scroll turbocharger.

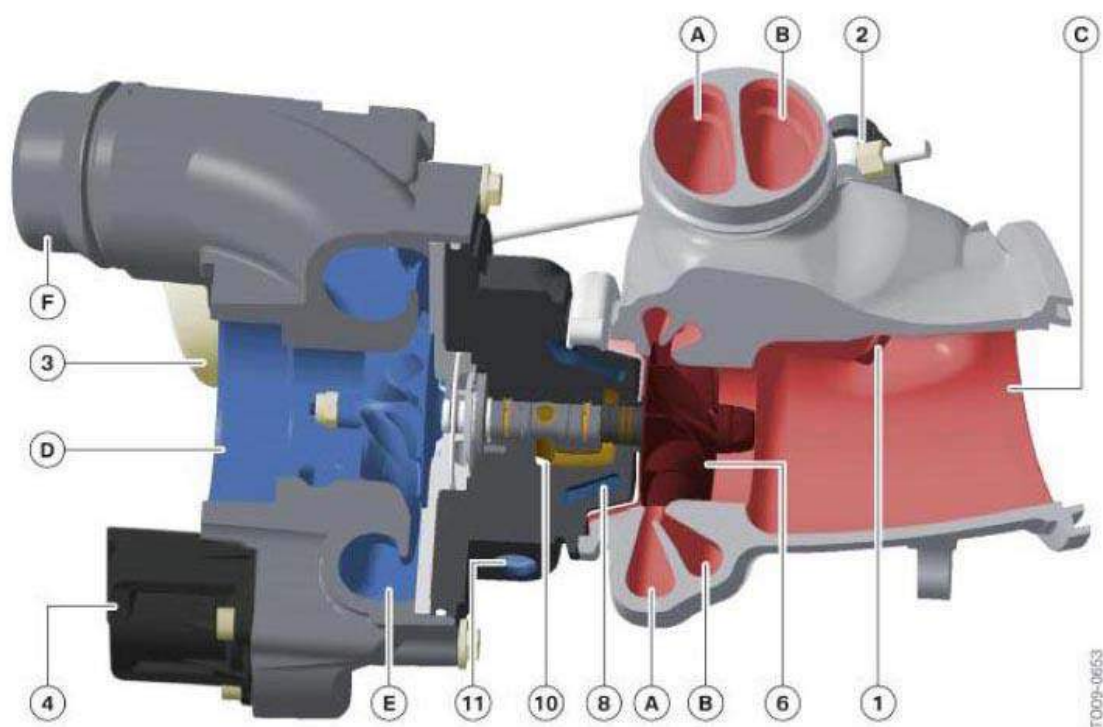


Fig. 43: Identifying Twin Scroll Turbocharger Components Rear View
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Exhaust duct 1 (cylinders 1 - 3)
B	Exhaust duct 2 (cylinders 4 - 6)
C	Connection to catalytic converter
D	Inlet from intake silencer
E	Ring channel
F	Outlet to intercooler
1	Wastegate valve
2	Lever arm, wastegate valve
3	Vacuum unit for wastegate valve
4	Diverter valve
6	Turbine wheel
8	Cooling duct
10	Oil return
11	Coolant return

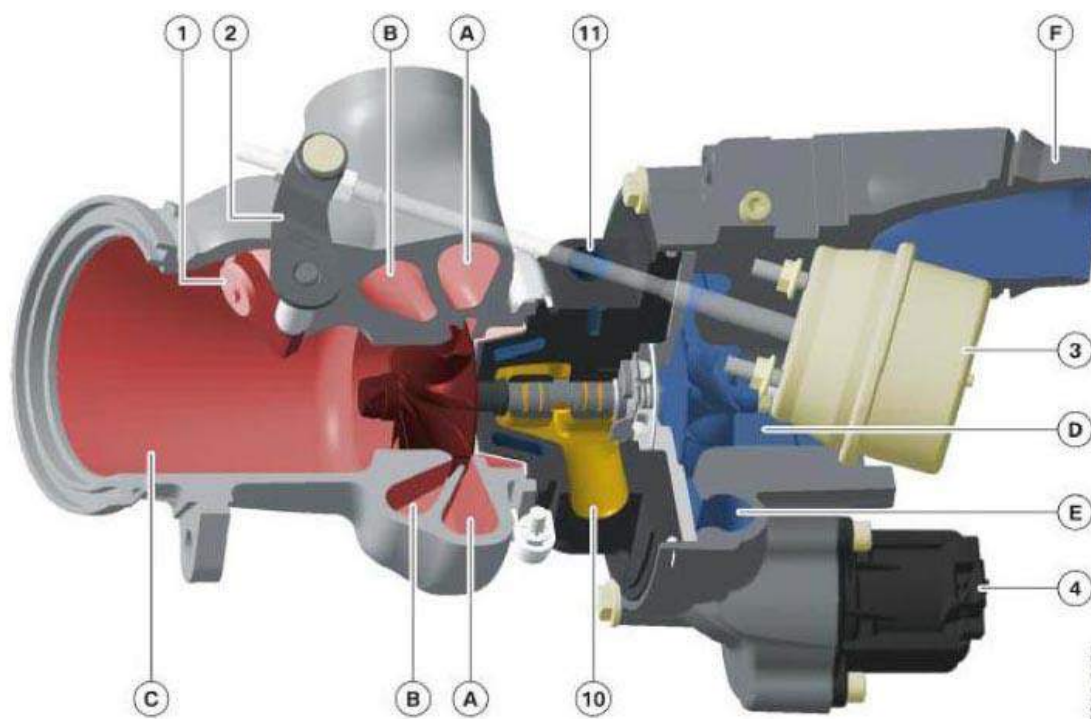


Fig. 44: Identifying Twin Scroll Turbocharger Components Front View
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Exhaust duct 1 (cylinders 1 - 3)
B	Exhaust duct 2 (cylinders 4 - 6)
C	Connection to catalytic converter
D	Inlet from intake silencer
E	Ring channel
F	Outlet to intercooler
1	Wastegate valve
2	Lever arm, wastegate valve
3	Vacuum unit for wastegate valve
4	Diverter valve
10	Oil return
11	Coolant return

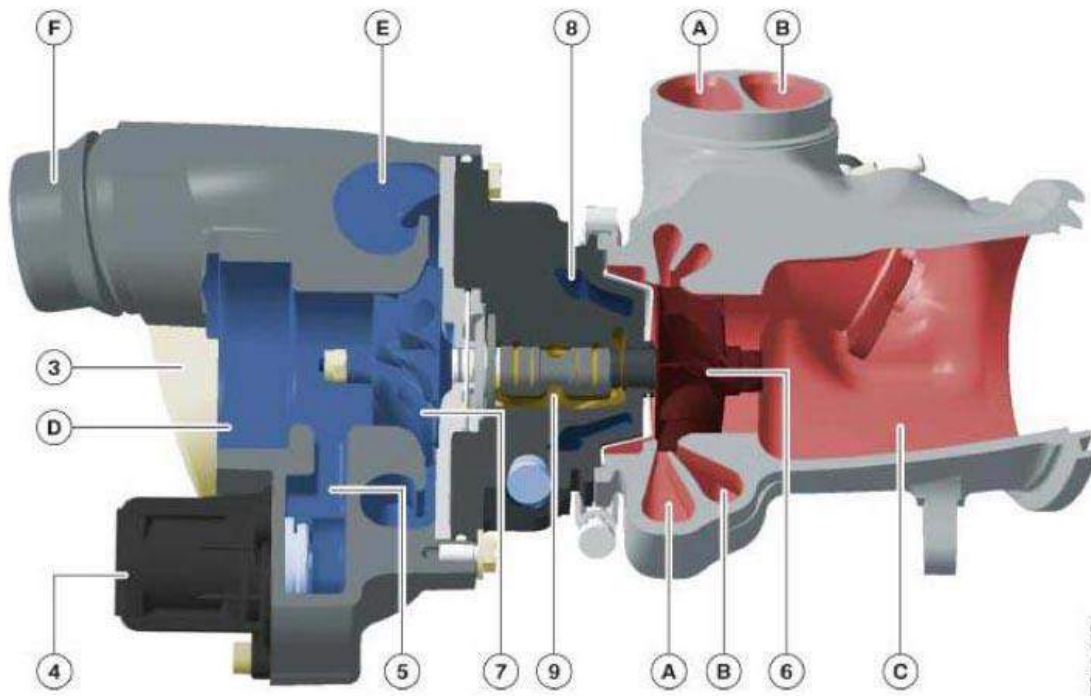


Fig. 45: Identifying Twin Scroll Turbocharger Components
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Exhaust duct 1 (cylinders 1 - 3)
B	Exhaust duct 2 (cylinders 4 - 6)
C	Connection to catalytic converter
D	Inlet from intake silencer
E	Ring channel
F	Outlet to intercooler
1	Wastegate valve
2	Lever arm, wastegate valve
3	Vacuum unit for wastegate valve
4	Diverter valve
5	By-pass
6	Turbine wheel
7	Compressor wheel
8	Cooling duct
9	Turbine shaft

Function of the twin scroll turbocharger

The system is designed so that constant exhaust gas pressure is applied to the turbocharger. At low engine

speeds, the exhaust reaches the turbine in tuned pulsed form. Due to this pulsation, a higher pressure ratio is temporarily reached in the turbine. Since the efficiency increases as the pressure rises, the pulsation improves the boost pressure progression and thus the torque progression of the engine. This is the case particularly at low engine speeds.

To limit the back pressure and ensure that the individual cylinders do not mutually influence each other during the cylinder charging process, cylinders 1 - 3 (bank 1) and cylinders 4 - 6 (bank 2) are combined to form two exhaust channels. The exhaust gas pulses in the exhaust channels (1 and 2) are directed into two scrolls (spirals) within the turbocharger to drive the turbine wheel. This design layout makes it possible to optimally use the exhaust pulsations for generating boost pressure based on the firing order of the engine. This improves engine efficiency by enhancing throttle response and limiting unwanted turbo lag.

The wastegate valve is used for the purpose of limiting the boost pressure and is already known from previous BMW turbo engines. It is vacuum operated and electronically controlled through a vacuum control solenoid by the DME (ECM).

Diverter valve

The basic function of the diverter valve remains the same. The difference compared to the N54 engine is that the diverter valve is not operated pneumatically. The diverter valve on the N55 engine is an electric actuator that is controlled directly by the DME. The number of components has been greatly reduced by positioning the diverter valve on the turbocharger compressor housing.

The diverter valve is designed to release unwanted pressure in the intake by connecting the pressure side of the induction system to the inlet side under deceleration. The undesirable peaks in the boost pressure that can occur when the throttle valve is quickly closed are reduced. This means the diverter valve plays an important role in terms of the engine acoustics while protecting the components of the turbocharger.

Catalytic Converter

Two ceramic honeycomb structures are contained in the catalytic converter housing. The catalytic converter has a volume of 2.7 liters. Depending on the type of vehicle the ceramic structures have different coatings.

Ceramic structure 1 has a volume of 1.2 liters, a diameter of 125 mm, and contains 600 cells.

Ceramic structure 2 has a volume of 1.5 liters, a diameter of 125 mm, and contains 400 cells.

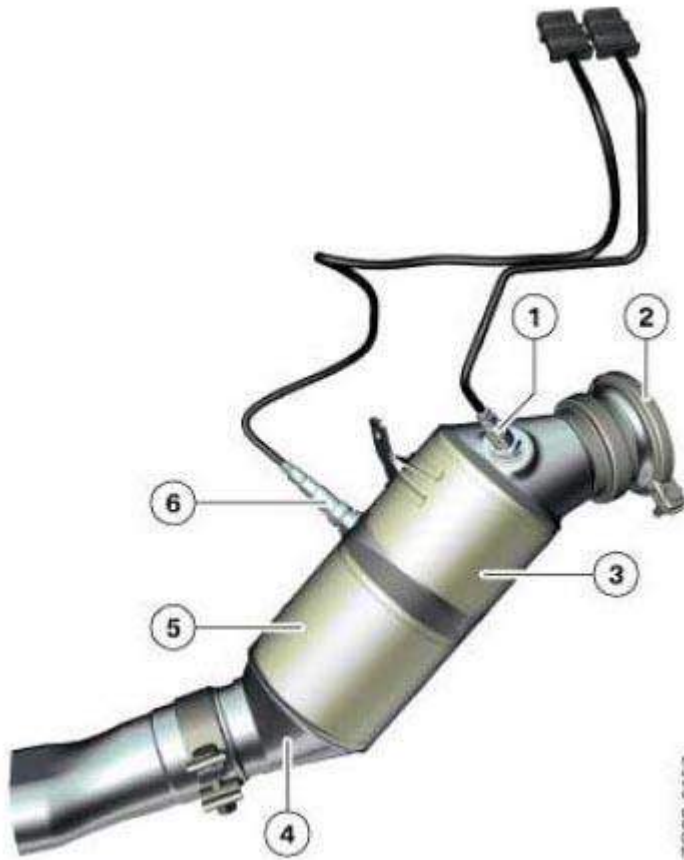


Fig. 46: Identifying Catalytic Converter Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Oxygen sensor upstream of catalytic converter
2	Connection to the turbocharger
3	Ceramic structure 1
4	Catalytic converter outlet funnel
5	Ceramic structure 2
6	Oxygen sensor after ceramic structure 1

Exhaust System

With the single twin scroll turbocharger, the design of the exhaust system is less complicated than that of the N54 engine, with two turbochargers. In addition to a "near-engine" catalytic converter design, the exhaust system also features a center silencer and two rear silencers.



Fig. 47: Identifying Exhaust System F07 Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Exhaust manifold
2	Exhaust turbocharger
3	Catalytic converter
4	Center silencer
5	Rear silencer, right
6	Rear silencer, left

NOTE: Due to the high efficiency of the "near engine" three way catalytic converter, no additional catalytic converters are necessary.

VACUUM SYSTEM

The N55 engine is equipped with a vacuum pump for generating the vacuum required by the brake booster and the auxiliary consumers (exhaust flaps and wastegate). A vacuum accumulator (built into the cylinder head cover) is used to ensure there is sufficient vacuum for the wastegate valve at all times.

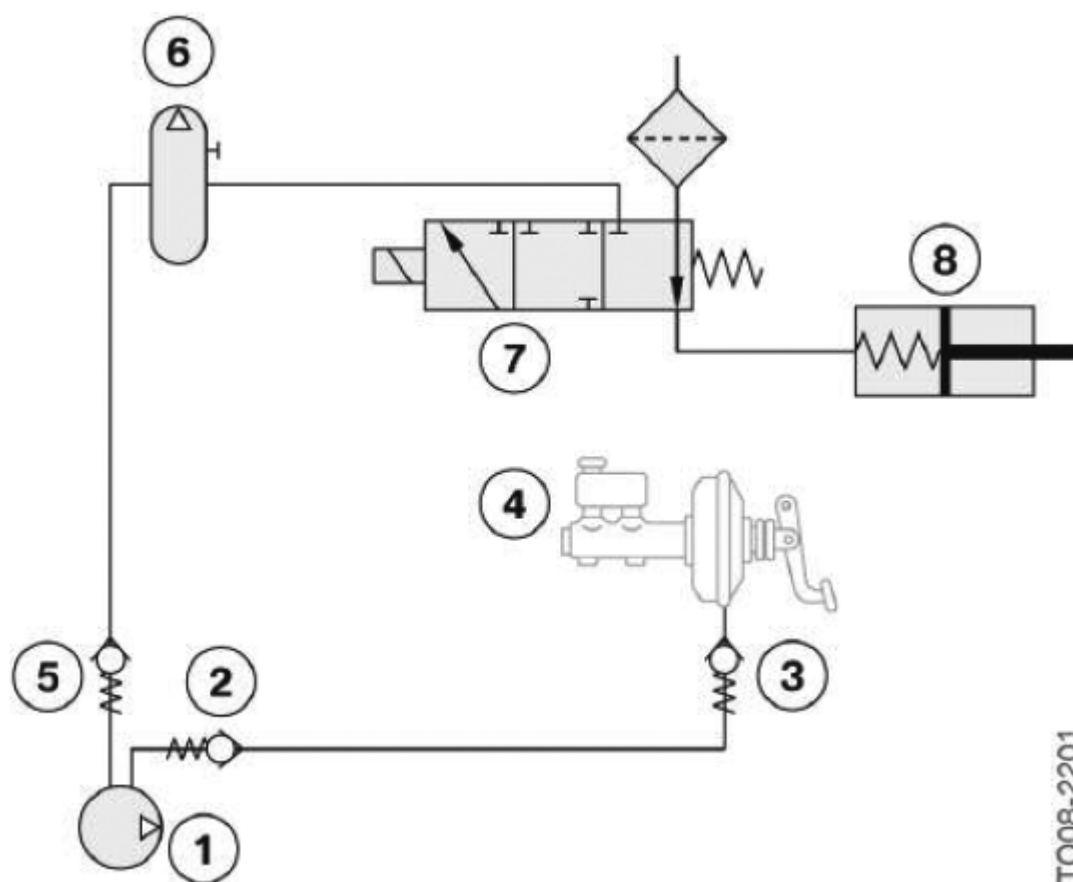


Fig. 48: Identifying Vacuum System - N55

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Vacuum pump
2	Non-return valve
3	Non-return valve
4	Brake servo unit
5	Non-return valve
6	Vacuum accumulator (Integrated into the cylinder head cover)
7	Electropneumatic pressure converter (Vacuum solenoid)
8	Vacuum unit, wastegate valve

Vacuum Pump

The vacuum pump is similar to that used on the N63 engine. It is a two-stage pump and therefore has two connections. The first stage is for the brake booster and the second for the auxiliary consumers.

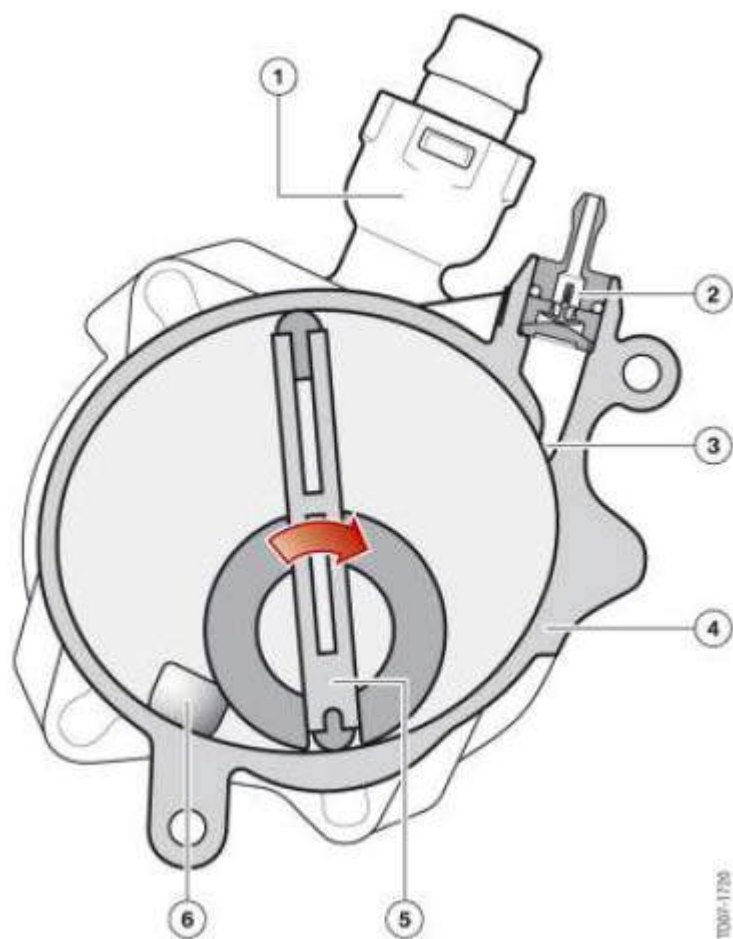


Fig. 49: Identifying Vacuum Pump Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Non-return valve for brake booster
2	Non-return valve for auxiliary consumer
3	Connection opening for auxiliary consumers
4	Vacuum pump housing
5	Vane
6	Connection opening for brake booster

The largest area is used for the first stage, ensuring vacuum is built up at a rapid rate for the brake booster. The last section is the opening stage for the auxiliary consumers. It therefore takes longer to build up the vacuum here, as shown in the following diagram.

This solution takes into account the different requirements for the brake booster and the auxiliary consumers.

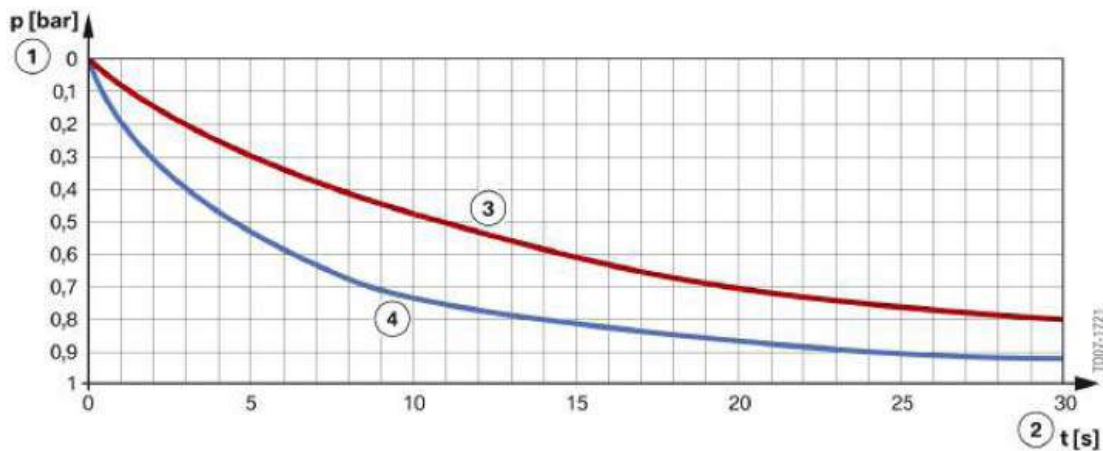


Fig. 50: Delivery Rate Of Two-Stage Vacuum Pump - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Vacuum
2	Time
3	Delivery rate for auxiliary consumers
4	Delivery rate for brake booster

FUEL INJECTION

The high pressure fuel injection system (HDE) is used on the N55 engine. In contrast to high precision injection (HPI), HDE uses solenoid fuel injectors with multi-hole nozzles.

The following overview shows the complete fuel injection system. The system is similar to the N54 fuel injection. Although the same high pressure pump, pressure sensor, and fuel rail are used, the high pressure fuel injection valves are new. The HDE system uses Bosch high pressure solenoid type fuel injection valves with the designation HDEV5.2.

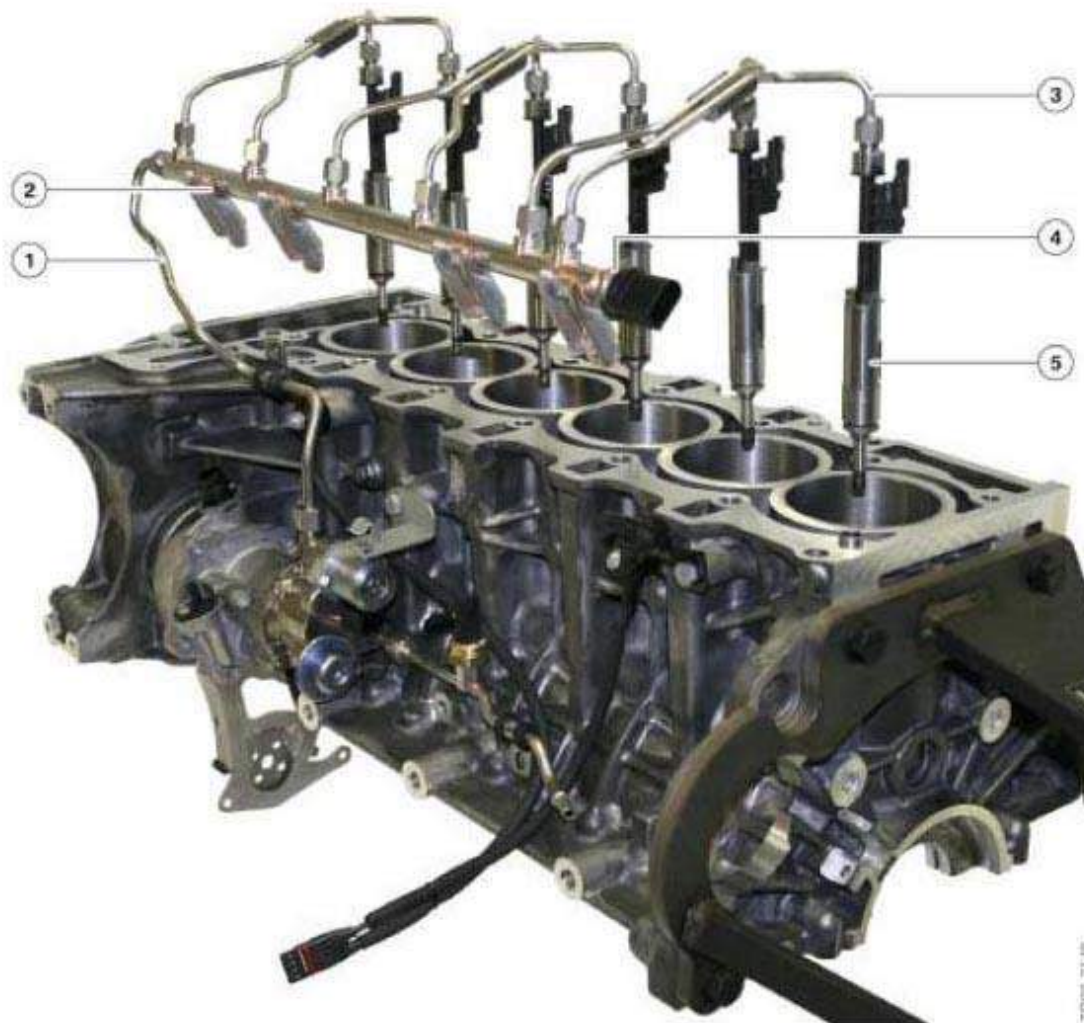


Fig. 51: Identifying High Pressure Fuel Injection System Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	High pressure line
2	Rail
3	High pressure line
4	Fuel rail pressure sensor
5	Solenoid valve fuel injector

Fuel Pressure Sensor

The fuel is supplied at a primary pressure of 5 bar by the electric fuel pump from the fuel tank via the supply line to the high pressure pump. The primary pressure is monitored by the fuel pressure sensor (5). The fuel is delivered by the electric fuel pump corresponding to engine requirements. The fuel pressure sensor known from the N54 and N63 is used.

In the event of the fuel pressure sensor failing, the electric fuel pump continues operation at 100% delivery rate as from terminal 15 ON.

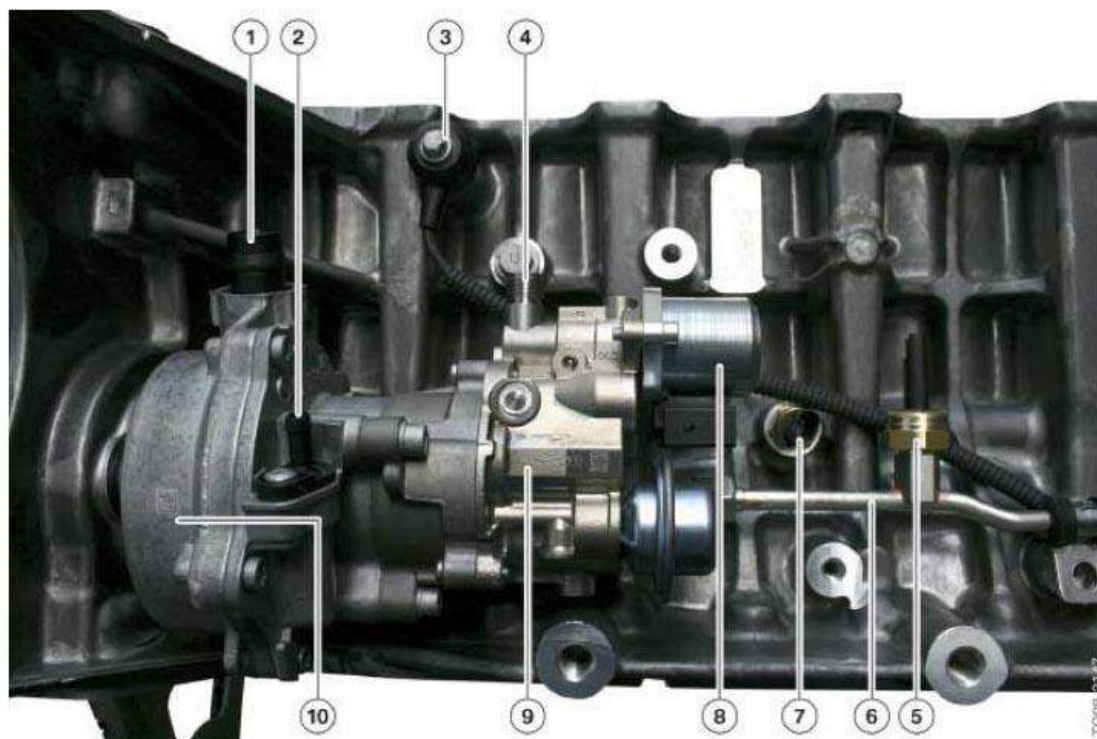


Fig. 52: Locating Fuel Pressure Sensor - N55
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Non-return valve for brake booster
2	Non-return valve for auxiliary consumers
3	Knock sensor
4	Connection, high pressure line to fuel rail
5	Fuel pressure sensor
6	Fuel supply line
7	Oil pressure sensor
8	Quantity control valve
9	High pressure pump
10	Vacuum pump

High Pressure Fuel Pump

The fuel is pressurized in the permanently driven three-piston high pressure pump and delivered to the fuel rail via the high pressure line. The fuel stored under pressure in the fuel rail is distributed via the high pressure lines to the high pressure fuel injection valves. The required fuel pressure is determined by the engine management as

a function of the engine load and engine speed. The pressure level is registered by the rail pressure sensor and sent to the engine control unit. The fuel is regulated by the quantity control valve based on a target/actual value comparison of the rail pressure. The pressure level is configured such to achieve the smoothest running properties with the best possible fuel consumption. A pressure of 200 bar is only required at high load and low engine speed.

The high pressure pump is of the same design as the high pressure pump used on the N54 engine.

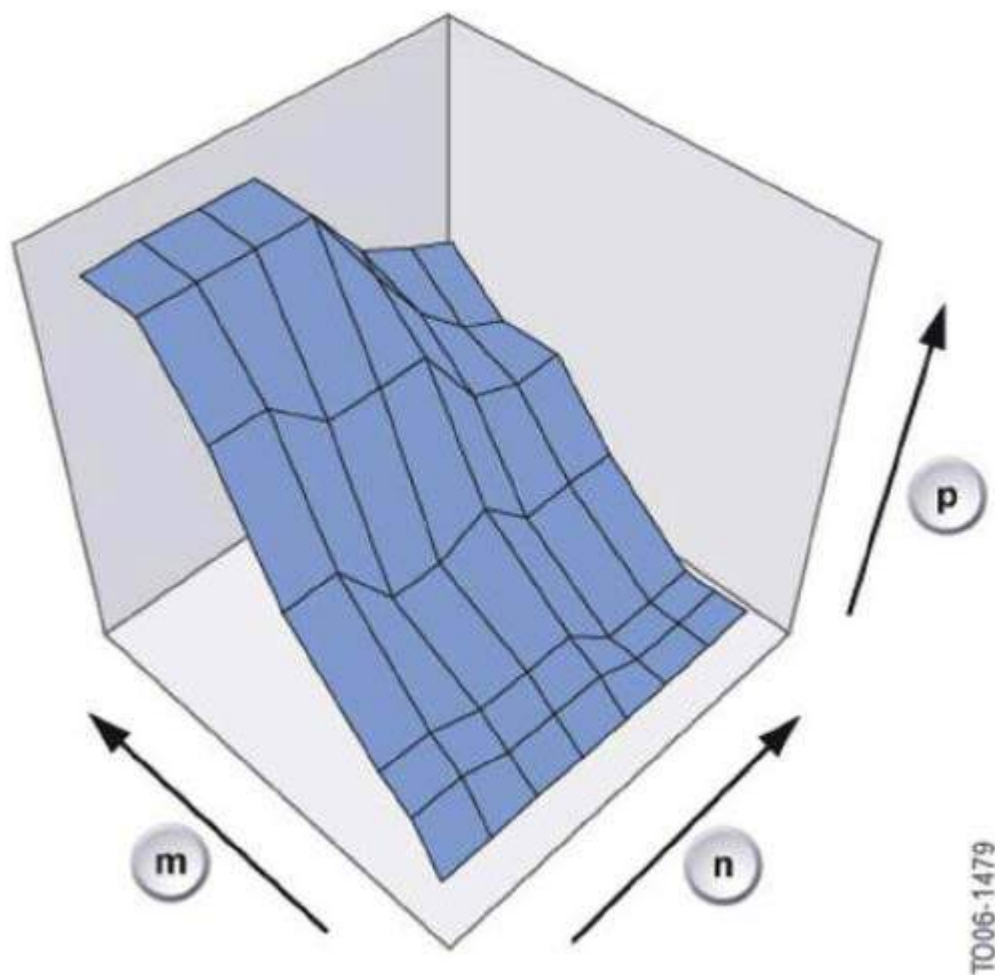


Fig. 53: Fuel Pressure Diagram - N55
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
m	Engine Load
n	Engine Speed
p	Pressure

Fuel Injectors

The high pressure fuel injection valve Bosch HDEV5.2 is a solenoid type injector. In contrast to the piezo-electric injectors used on the current BMW engines, the solenoid valve fuel injectors are designed as inward-opening multi-hole valves with highly variable jet angle and form. They operate at a system pressure of up to 200 bar.

CAUTION: Do not open the fuel system if the coolant temperature is above 40°C/104° F. The residual pressure in the high pressure fuel system could cause bodily injury.

It is essential to observe the utmost cleanliness when working on the high pressure fuel system and to follow the proper working procedures described in the repair instructions. Even minute soiling or damage at the thread connections of the high pressure lines could cause leaks.

NOTE: Special tool # 13 0 270 must be used to remove the HDEV5.2 high pressure injector valves from the engine. Damage to the injector or the related components may occur otherwise. See the SERVICE INFORMATION section in this training material for more information.

Particular care must be taken when working on the fuel system of the N55 engine to ensure that the ignition coils are not wet with fuel. The resistance of the silicone insulating material of the coils is greatly reduced by the contact with fuel. This could result in arcing at the top of the spark plug and misfiring. See the SERVICE INFORMATION section and repair instructions for more information.

COOLING SYSTEM

The cooling system of the N55 is enhanced with additional oil cooling.

Two different types of oil cooling systems are used depending on the model and application. In the "hot climate" version, heat transfer from the engine oil to the engine coolant is avoided by separating the oil cooler from the engine coolant circuit. The other version uses an auxiliary radiator in combination with an oil to coolant heat exchanger bolted to the oil filter housing. The auxiliary radiator enhances cooling efficiency by adding surface area to the cooling system.

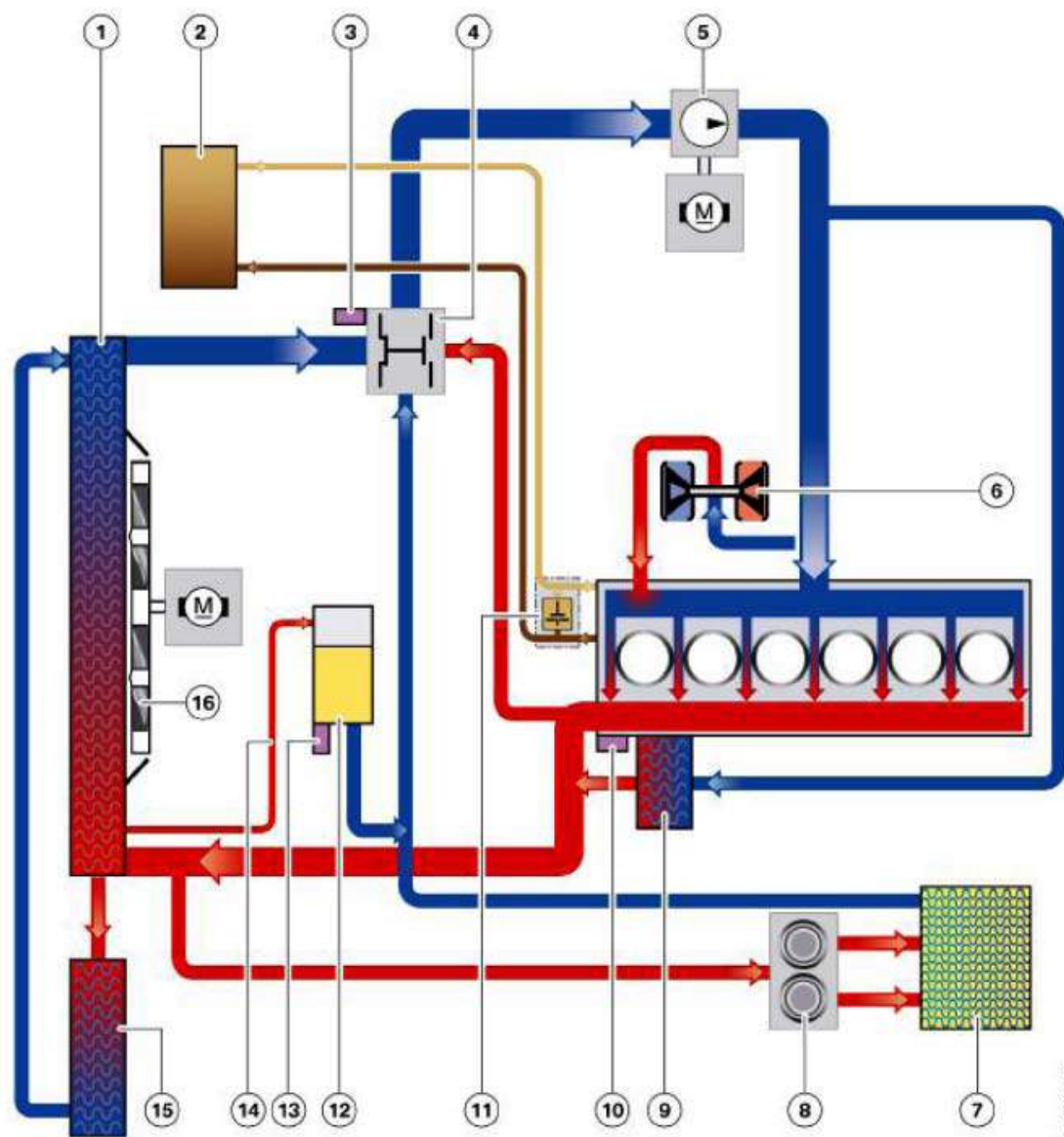


Fig. 54: Cooling System Flow Diagram - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Radiator
2	Engine oil to air cooler (hot climate version)
3	Heater coil
4	Characteristic map thermostat
5	Electric coolant pump
6	Exhaust turbocharger
7	Heating heat exchanger

8	Coolant valve
9	Oil-to-coolant heat exchanger
10	Coolant temperature sensor
11	Engine oil thermostat (hot climate version)
12	Expansion tank
13	Coolant level switch
14	Equalization line
15	Auxiliary radiator
16	Electric fan

Components

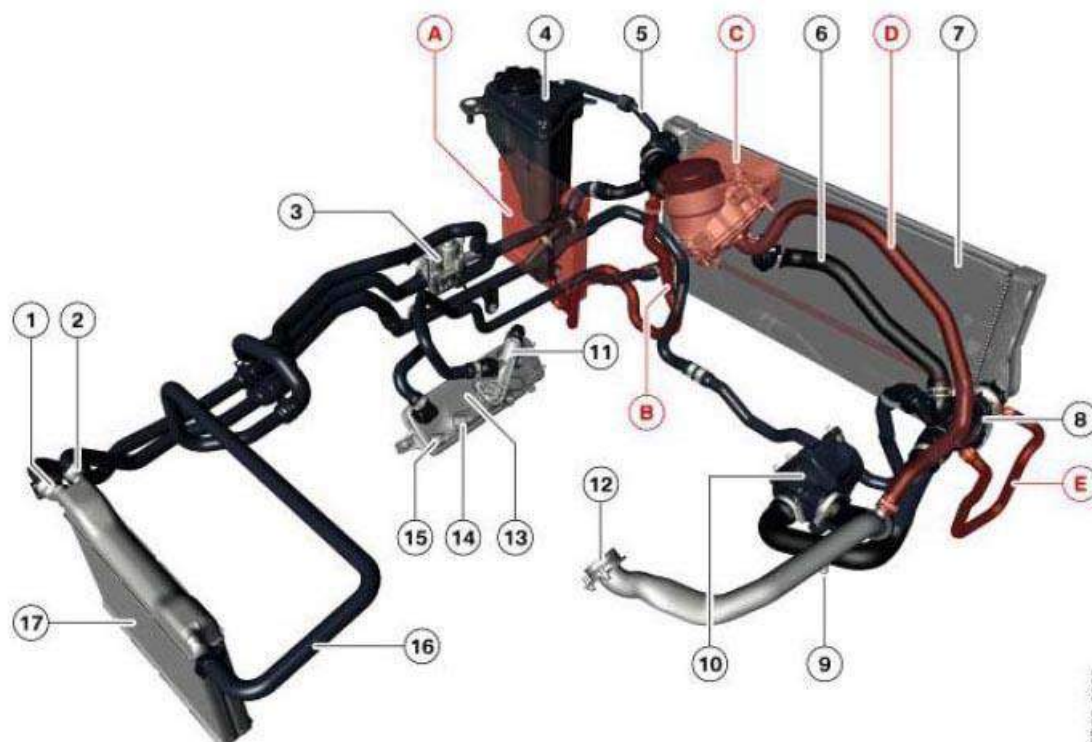


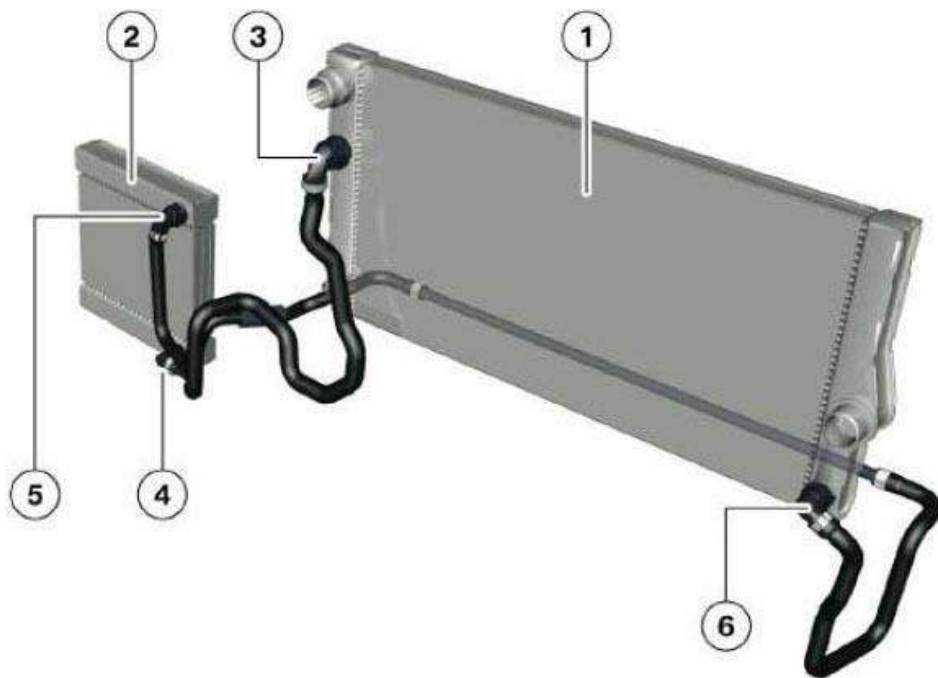
Fig. 55: Identifying Cooling System Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Auxiliary radiator
B	Coolant feed line to auxiliary radiator
C	Oil-to-coolant heat exchanger
D	Coolant feed line to oil-to-coolant heat exchanger
E	Coolant return line from auxiliary radiator
1	Zone 1 feed line, heating heat exchanger

2	Zone 2 feed line, heating heat exchanger
3	Coolant valve
4	Expansion tank
5	Equalization line
6	Radiator
7	Bypass line for small cooling circuit
8	Thermostat
9	Electric coolant pump
10	Exhaust turbocharger supply line
11	Thermostat for transmission oil cooling
12	Coolant feed line to engine block
14	Transmission oil-to-coolant heat exchanger
15	Connection, transmission oil line
16	Connection, transmission oil line
17	Return, heating heat exchanger

The following graphic shows the connection of the auxiliary radiator to the cooling system. The auxiliary radiator is connected to the radiator by means of parallel coolant lines, thus increasing the cooling surface area. This system is combined with an oil-to-coolant heat exchanger mounted on the oil filter housing. (See in the previous graphic.)



T008-2179

Fig. 56: Identifying Auxiliary Radiator Components - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

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Index	Explanation
1	Radiator
2	Auxiliary Radiator
3	Feed connection to the auxiliary radiator
4	Feed connection at the auxiliary radiator
5	Return connection to the auxiliary radiator
6	Return connection from the auxiliary radiator

NOTE: If a separate oil to air cooler is not installed, an auxiliary radiator in conjunction with an oil to coolant heat exchanger is used to cool the engine oil.

Oil Cooler



Fig. 57: Identifying Engine Oil Cooling Components (Hot Climate) - N55
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Oil filter module
2	Thermostat

3	Oil cooler lines
4	Engine oil to air heat exchanger (oil cooler)

NOTE: Most current US vehicles use a separate engine oil to air heat exchanger to cool the engine oil (hot climate version).

Coolant Passages

The coolant passages in the cylinder head are also used for indirect cooling of the fuel injectors. The following graphic clearly shows that the coolant flows over the valves and the fuel injectors, thus reducing the heat transfer to the components to a minimum.

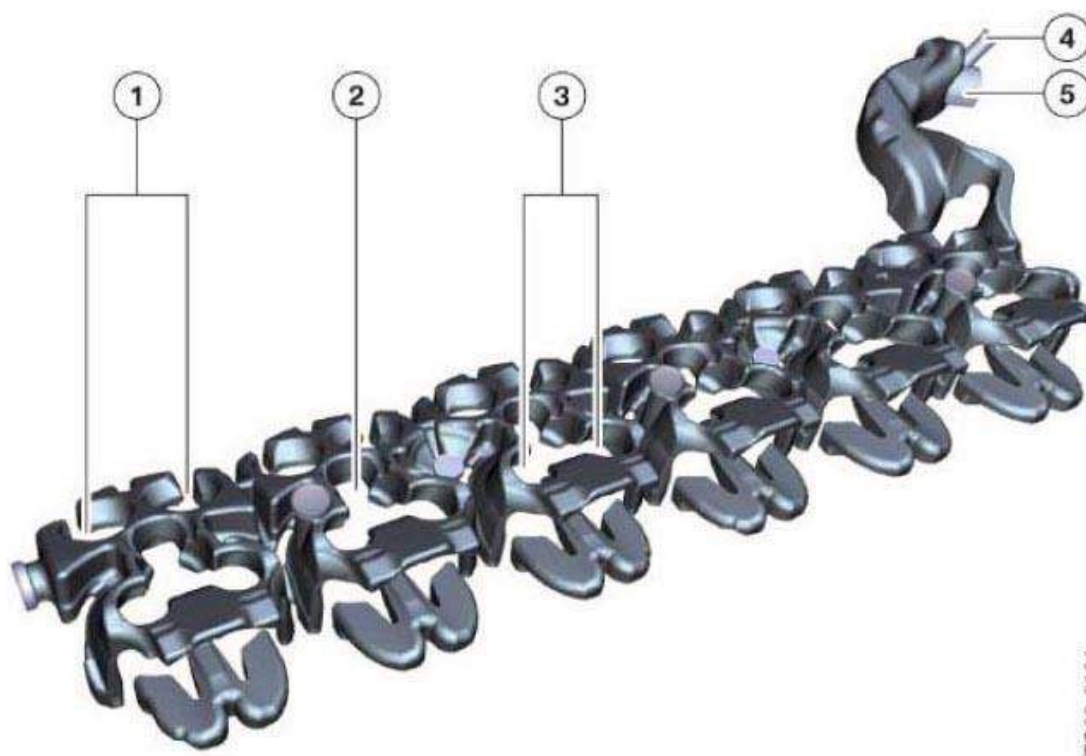


Fig. 58: Casting Of Coolant Passages In Cylinder Head - N55
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Channel, intake valves
2	Channel, fuel injectors
3	Channel, exhaust valves
4	Connection, coolant hose to thermostat (small cooling circuit)
5	Connection, coolant hose to radiator (large cooling circuit)

The cast iron cylinder liners are cast into the aluminum die-casting. The deck area (webs) between the cylinders have grooved coolant passages. Coolant can flow along these grooves from one side of the block to the other, thus cooling the deck area between the cylinders.

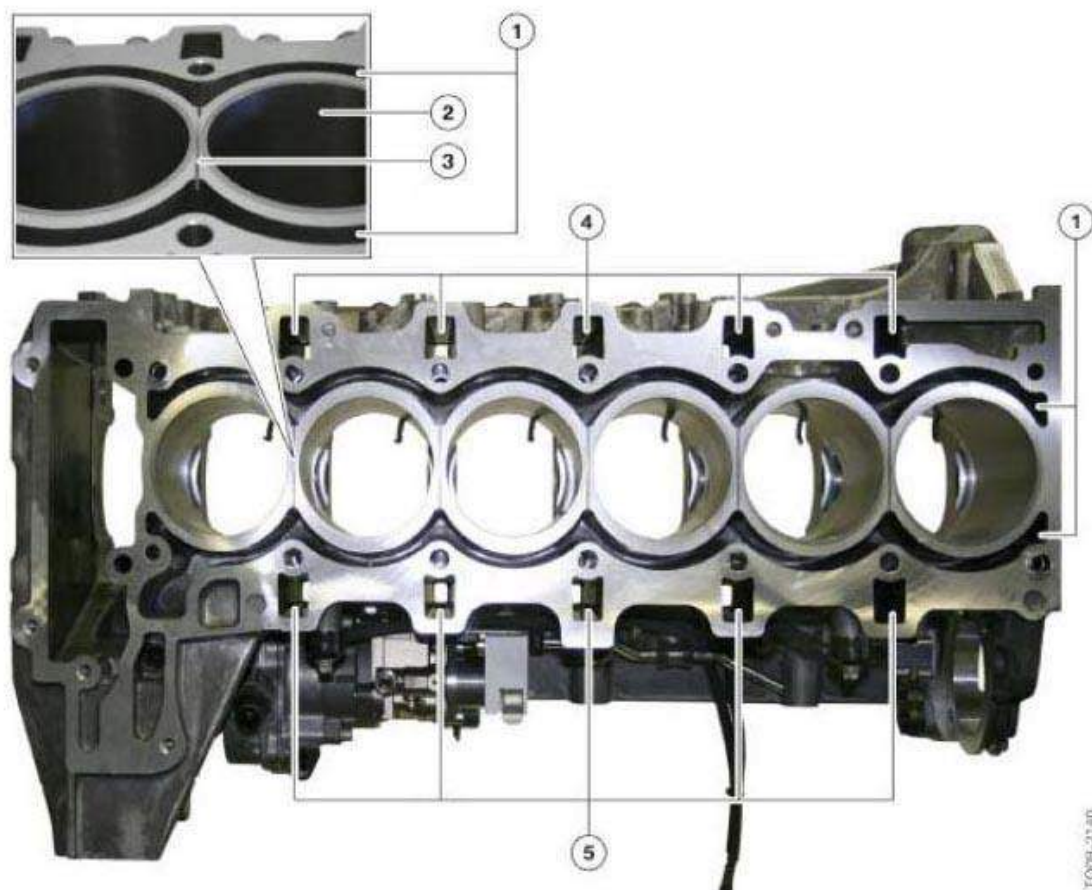


Fig. 59: Identifying Coolant Passages And Web Cooling Of Engine Block -N55
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Cooling duct
2	Cylinder liner
3	Grooved coolant passage
4	Oil return ducts, exhaust side
5	Oil return ducts, intake side

ENGINE ELECTRICAL SYSTEM

Connection to vehicle electrical system

For the first time, an engine-mounted Digital Motor Electronics (DME) module is used. The DME is bolted to

the intake manifold and is cooled by the intake air.

The engine mounted DME has the following advantages:

- Engine wiring harness is divided into six individual modules
- All electrical components on the engine are supplied directly via the DME
- The E-box is no longer need
- 211 pins are available
- The plug-in connectors are water-tight

ENGINE WIRING HARNESS ROUTING (N55)

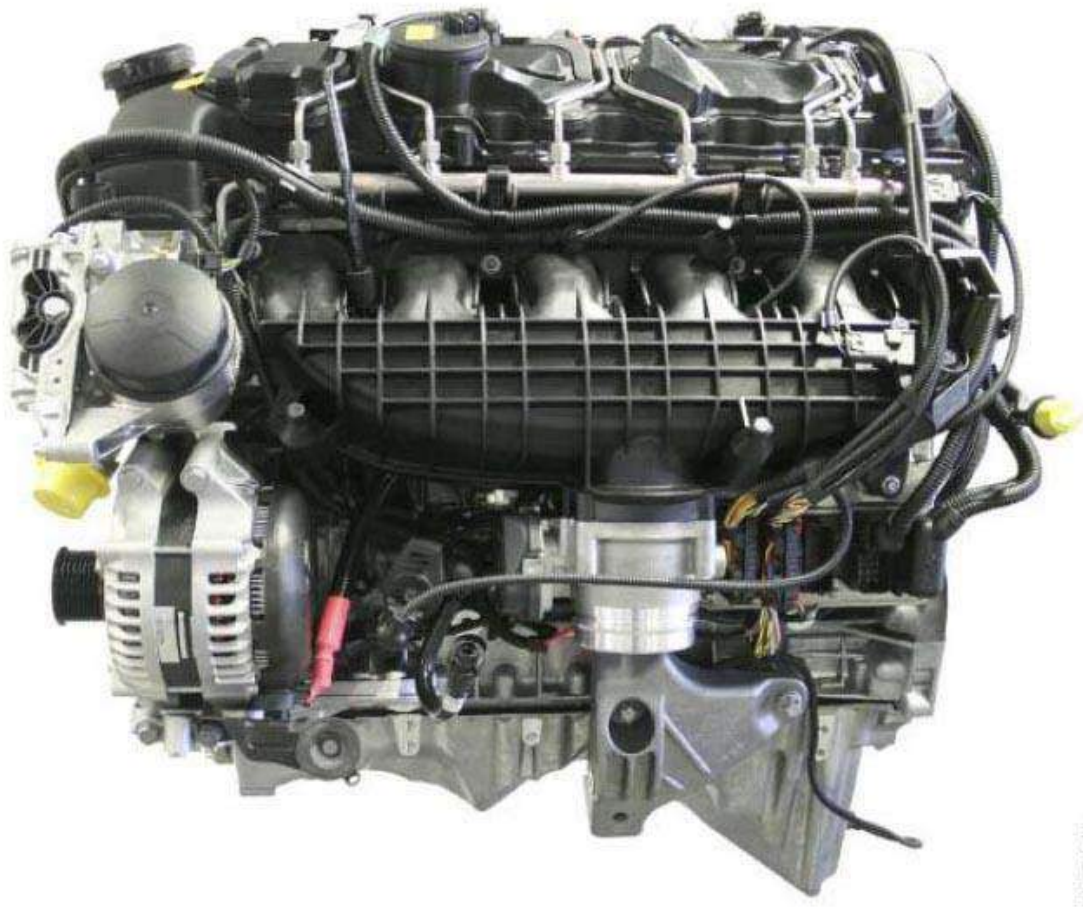


Fig. 60: Identifying Wiring Harness Routing
Courtesy of BMW OF NORTH AMERICA, INC.

ELETRICAL CIRCUIT DIAGRAMS

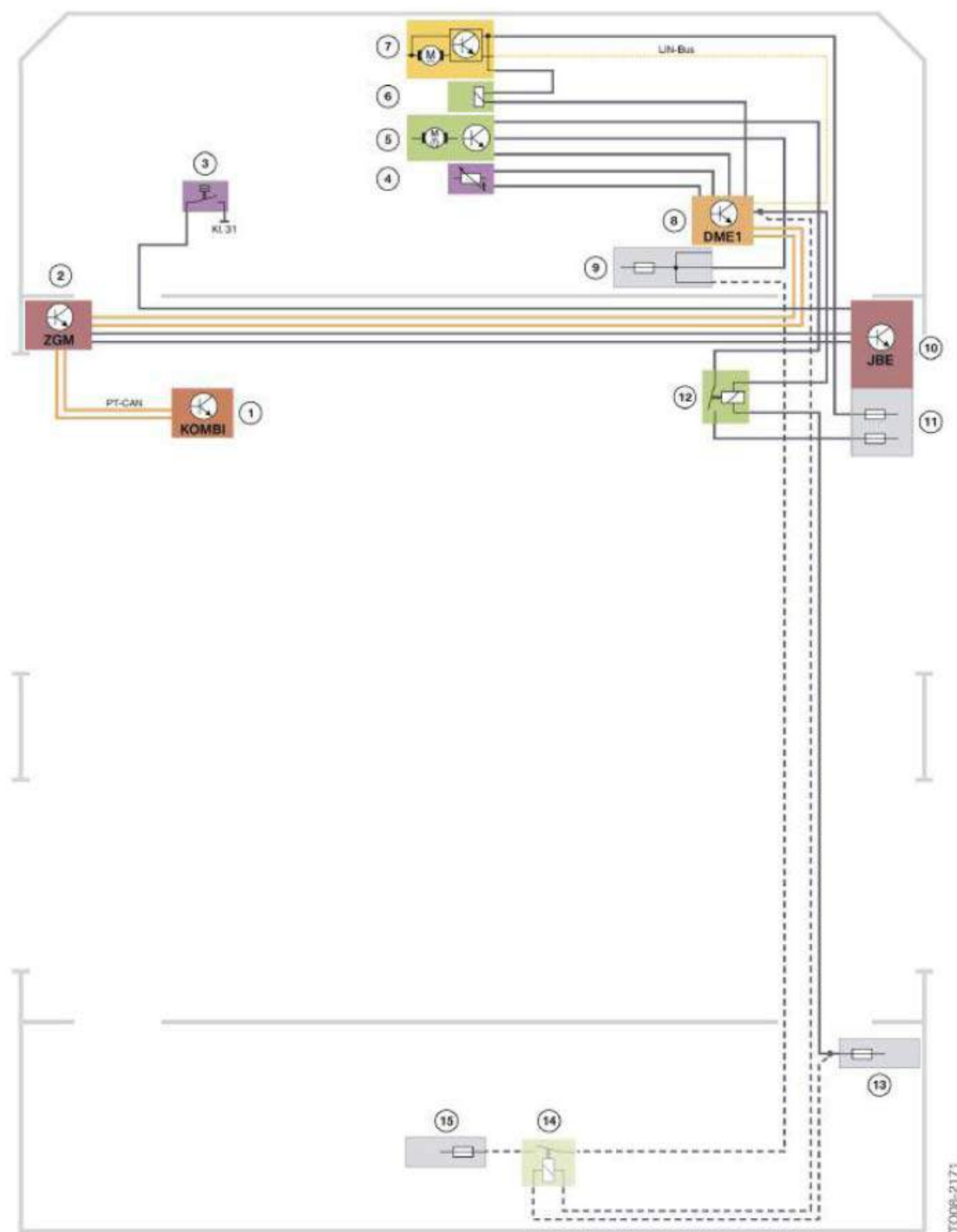
Digital Motor Electronics ECM Circuit Diagram - Connection To Vehicle Electrical System Circuit Diagram (N55)

2011 BMW 535xi

ENGINE N55 - Service Information

2	Electric air flap control
3	Mechanical air flap control
4	Electric fan
5	Starter
6	A/C compressor
7	Front power distribution box
8	Junction box electronics
9	Junction box
10	Integrated Chassis Management
11	Fuel tank leak diagnostic module
12	Electronic fuel pump controller
14	Rear power distribution box
15	Intelligent battery sensor
16	Battery power distribution box
17	Exhaust flap changeover valve
18	Diagnosis socket (engine speed signal)
19	Accelerator pedal module
20	Instrument cluster
21	Car Access System
22	Central Gateway Module

Engine Cooling Circuit Diagram (N55)



INDEX EXPLANATION CHART

Index	Explanation
1	Instrument cluster

2	Central Gateway Module
3	Coolant level switch
4	Coolant temperature sensor
5	Electric fan
6	Mechanical air flap control
7	Electric air flap control
8	Digital Motor Electronics
9	Front power distribution box
10	Junction box electronics
11	Junction box
12	Electric fan relay
14	Rear power distribution box
15	Electric fan relay (only for 850 Watt and 1000 Watt electric fan)

DIGITAL MOTOR ELECTRONICS - DME/ECM

The N55 engine is equipped with the Bosch engine management MEVD17.2:

- The MEVD17.2 is integrated in the intake system and is cooled by the intake air.
- The MEVD17.2 is FlexRay-compatible and directly supplies voltage to the sensors and actuators.

The top side of the DME housing also serves as the bottom section of the intake manifold. The housing is contoured in the area of the intake manifold to ensure optimum air flow. An O ring type seal is installed between the DME housing and the intake. The plug connections between the wiring harness and DME are water-tight.

Digital Motor Electronics ECM Connector Identification (MEVD17.2 - N55)

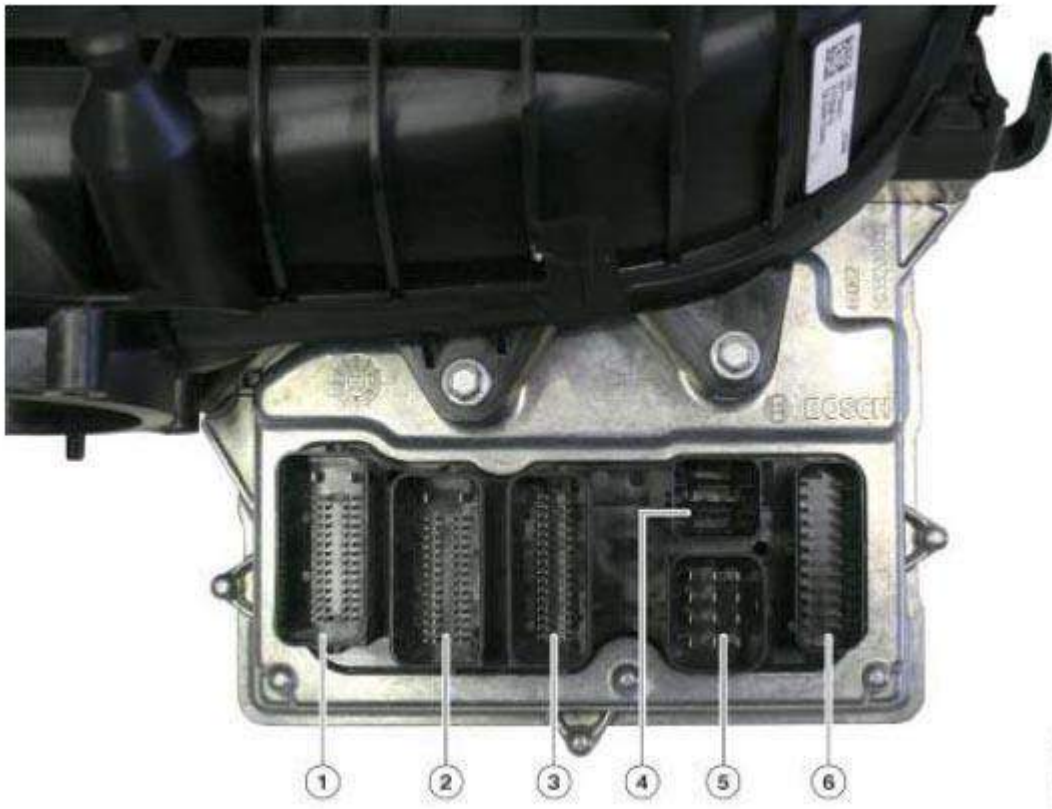


Fig. 63: Identifying Engine Management Connectors
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Engine wiring harness, sensor 1 (Module 100)
2	Engine wiring harness, sensor 2 (Module 200)
3	Connection, vehicle wiring harness (Module 300)
4	Engine wiring harness, Valvetronic (Module 400)
5	Connection, voltage supply (Module 500)
6	Engine wiring harness, injection and ignition (Module 600)

Digital Motor Electronics ECM Circuit Diagram (N55, MEVD17.2)

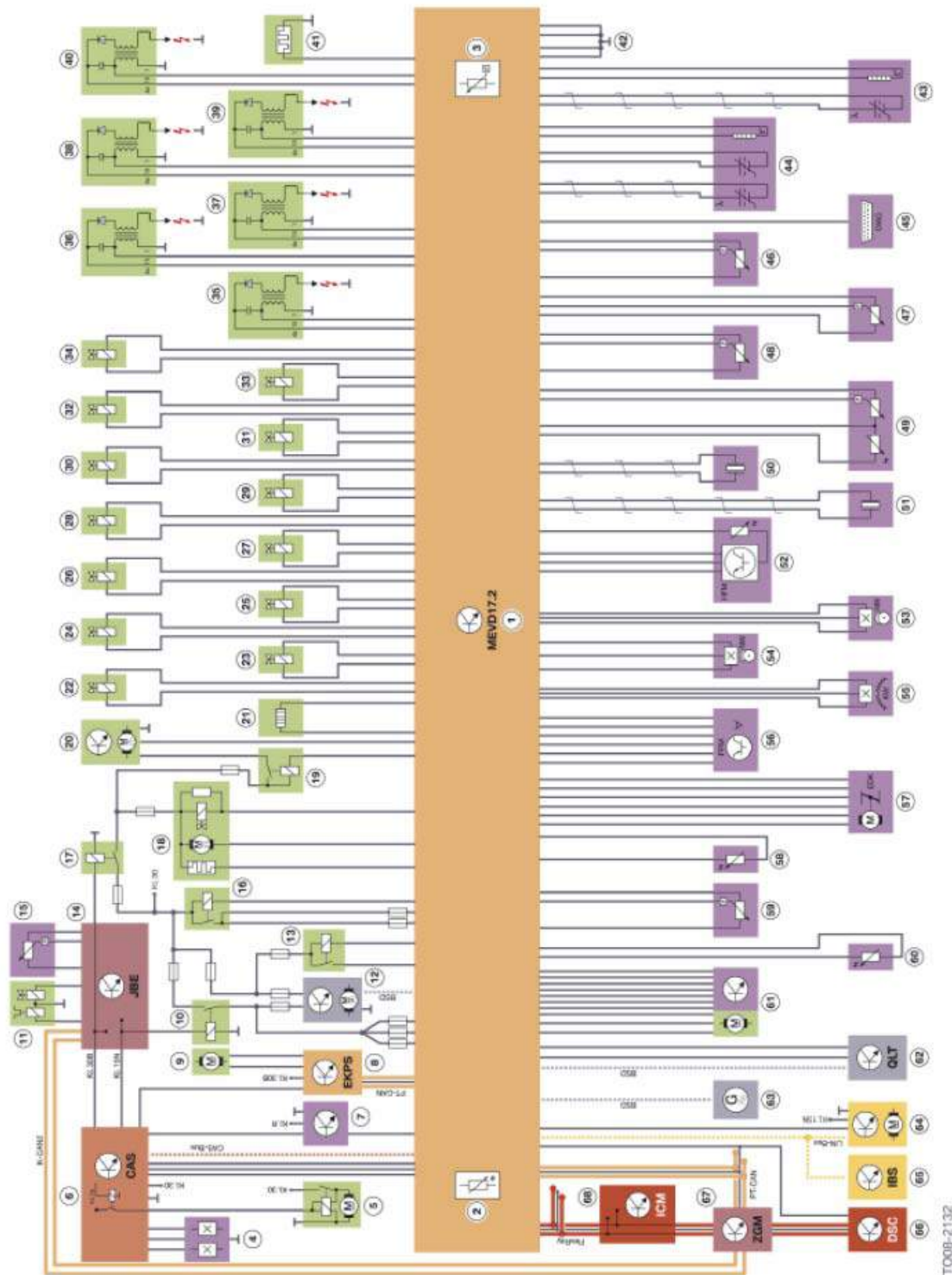


Fig. 64: Identifying Digital Motor Electronics Circuit Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
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2011 BMW 535xi

ENGINE N55 - Service Information

1	Engine electronics Valvetronic, direct injection 17.2 MEVD17.2
2	Ambient pressure sensor
3	Temperature sensor
4	Brake light switch
5	Starter
6	Car Access System (CAS)
7	Clutch module
8	Electronic fuel pump control (EKPS)
9	Electric fuel pump
10	Terminal 15N relay
11	A/C compressor
12	Coolant pump
13	Valvetronic relay
14	Junction Box Electronics (JBE)
15	Refrigerant pressure sensor
16	Relay, ignition and injection
17	Terminal 30B relay
18	Fuel tank leak diagnosis module (DMTL)
19	Electric fan relay
20	Electric fan
21	Characteristic map thermostat
22	Diverter valve
23	Fuel tank vent valve
24	VANOS solenoid valve, intake camshaft
25	VANOS solenoid valve, exhaust camshaft
26	Oil pressure control valve
27	Electropneumatic pressure converter (EPDW) for wastegate valve
28	Quantity control valve
29-34	Fuel injectors
35-40	Ignition coils
41	Engine breather heater
42	Ground connections
43	Oxygen sensor after catalytic converter
44	Oxygen sensor before catalytic converter
45	Diagnostic socket
46	Low-pressure fuel sensor
47	Intake manifold pressure sensor after throttle valve
48	Fuel rail pressure sensor
49	Charge air temperature and pressure sensor
50	Knock sensor, cylinders 1 - 3
51	Knock sensor, cylinders 4 - 6

	Hot-film air mass meter (HFM)
53	Intake camshaft sensor
54	Exhaust camshaft sensor
55	Crankshaft sensor
56	Accelerator Pedal Module (FPM)
57	Throttle valve (MDK)
58	Coolant temperature sensor at engine outlet
59	Oil pressure sensor
60	Oil temperature sensor
61	Valvetronic servomotor
62	Oil condition sensor
63	Alternator
64	Active cooling air flap control
65	Intelligent battery sensor (IBS)
66	Dynamic stability control (DSC)
67	Central Gateway Module (ZGM)
68	Integrated Chassis Management (ICM)

Functions

Fuel supply system

The fuel pressure sensor sends a voltage signal, corresponding to the system pressure applied between the fuel pump and the high pressure pump, to the engine control unit (DME/ECM). The system pressure (fuel pressure) is determined with the fuel pressure sensor upstream of the high pressure pump. The target pressure is constantly compared to the actual pressure in the DME.

If the target pressure deviates from the actual pressure, the engine control unit increases or decreases the voltage for the electric fuel pump. This voltage is sent in the form of a message via the PT-CAN to the EKP control unit.

The electric fuel pump (EKP) control unit converts the message into an output voltage for the electric fuel pump, thus regulating the required delivery pressure for the engine (or high pressure pump). The electric fuel pump is pilot-controlled in the event of signal failure (fuel pressure sensor). Should the CAN bus fail the EKP control unit operates the electric fuel pump with the applied system voltage. The fuel flows via the high pressure line to the fuel rail. The fuel is buffered in the fuel rail and distributed to the fuel injectors.

Fuel quantity control

The rail pressure sensor measures the current fuel pressure in the rail. The excess fuel is returned to the inlet of the high pressure pump when the quantity control valve in the high pressure pump opens. Vehicle operation is restricted in the event of the high pressure pump failing.

The quantity control valve controls the fuel pressure in the rail. The engine management actuates the quantity control valve with a pulse width-modulated signal. Depending on the pulse width, a variable throttle cross

section is released, thus providing the quantity of fuel required for the current load status of the engine. It is also possible to reduce the pressure in the rail.

Boost pressure control

The engine management controls the boost pressure with the wastegate valve at the turbocharger. An electropneumatic pressure converter (vacuum solenoid) receives the signals from the engine management and supplies vacuum to open the wastegate valve when the specified maximum boost pressure is reached.

A diverter valve is installed on the compressor housing of the turbocharger. It connects the pressure side to the inlet side of the induction system and is controlled directly by the engine management. The diverter valve eliminates undesirable peaks in the boost pressure that can occur when the throttle valve is quickly closed. Therefore it has a decisive influence on the engine acoustics while protecting the turbocharger and its related components.

A pressure wave is built up from the throttle valve to the turbocharger compressor wheel when the throttle valve is closed. This pressure wave acts against the throttle plate and the compressor blades pressing them against the bearings. The diverter valve reduces this pressure wave and thus the load on these components by "diverting" air pressure from the pressure side to the suction side of the compressor housing. This also maintains the turbocharger spooled (up to speed) for the next acceleration and reduces turbo lag.

Engine cooling

The engine cooling system utilizes an electric coolant pump. The heat management determines the current cooling requirement and controls the cooling system accordingly. Under certain circumstances, the coolant pump can be completely switched off, e.g. to rapidly heat up the coolant during the warm-up phase. The coolant pump continues to operate when the hot engine is shut down. The coolant capacity can therefore be varied regardless of the engine speed. In addition to the characteristic map thermostat, the heat management makes it possible to use various characteristic maps for controlling the coolant pump. In this way the engine control unit can adapt the engine temperature to the driving conditions.

The engine control unit regulates the following temperature ranges:

- 108°C/226°F = Economy mode
- 104°C/219°F = Normal mode
- 95°C/203°F = High mode
- 90°C/194°F = High mode and control with characteristic map thermostat

The engine management sets a higher temperature (108°C) when, based on vehicle operation, the engine control unit detects "Economy" mode. The engine is operated with relatively low fuel requirements in this temperature range. The internal engine friction is reduced at higher temperatures. The increase in temperature therefore results in low fuel consumption in the low load range. The driver wishes to utilize the optimum power developed by the engine in "High and control with characteristic map thermostat" mode. For this purpose, the temperature in the cylinder head is reduced to 90°C. This temperature reduction promotes improved volumetric efficiency, thus resulting in an increased engine torque. Adapted to the relevant driving situation, the engine control unit can now regulate a defined operating range. In this way it is possible to influence the fuel consumption and power output through the cooling system.

System Protection

If the coolant or the engine oil overheat during operation, certain vehicle functions are influenced to the effect that more energy is available to the engine cooling system.

These measures are divided over two operating modes:

- Component protection
 - Coolant temperature between 117°C/242°F and 124°C/255°F
 - Engine oil temperature between 150°C/300°F and 157°C/314°F
 - Result: The output of the air conditioning system (up to 100%) and of the engine is reduced
- Emergency
 - Coolant temperature between 125°C/257°F and 129°C/264°F
 - Engine oil temperature between 158°C/316°F and 163°C/325°F
 - Result: The power output of the engine is reduced (up to 90%)

Crankshaft Sensor

The function of the new crankshaft sensor is identical to that of the crankshaft sensors used for the automatic engine start-stop function (MSA). The engine reversal detection is required for the MSA function. (MSA is not currently offered in the US.)

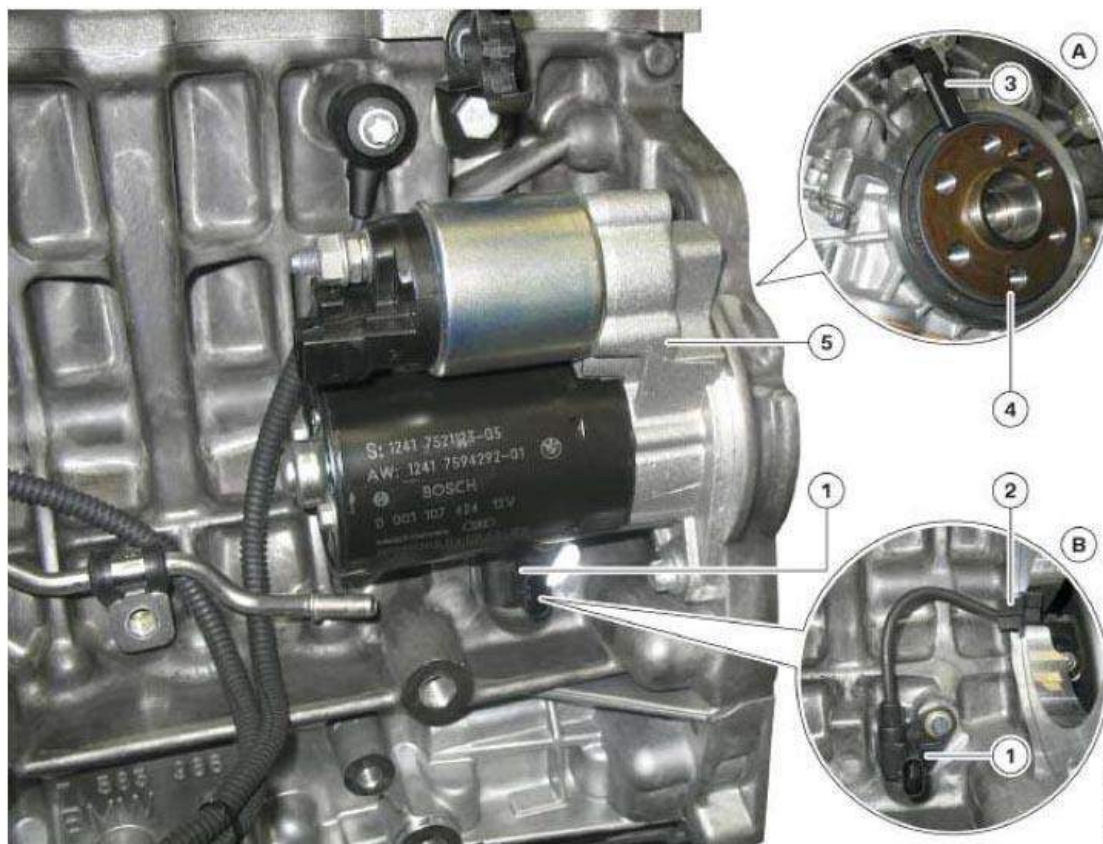


Fig. 65: Crankshaft Sensor Location - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Direction of view towards crankshaft
B	Same view without starter
1	Connector
2	Dust seal
3	Sensor
4	Multi-pole trigger wheel



Fig. 66: Identifying Crankshaft Sensor With Multipole Sensor Wheel - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Connector
2	Dust seal
3	Sensor

Ignition Coil

New ignition coils have been developed for the N55 engine. The ignition coils have improved electromagnetic compatibility and are sturdier. The insulation has been reinforced with silicone and a metal collar shielding compared to the coils used on previous engines. See the **SERVICE INFORMATION** section of this training material for more details.

CAUTION: Always remove the ignition coils before opening the fuel system. Gasoline may damage the silicone insulation on the coils which may lead to arcing and subsequent engine misfiring.

Oil Pressure Sensor

The new oil pressure sensor can now determine the absolute pressure.

The sensor delivers a more accurate pressure reading which is required for the electronic volume control oil pump function.

The sensor design is identical to that of the (high) fuel pressure sensor. The DME supplies a voltage of 5 Volt to the oil pressure sensor.



Fig. 67: Identifying Oil Pressure Sensor - N55
Courtesy of BMW OF NORTH AMERICA, INC.

Oxygen Sensors

A new connector is used for the oxygen sensors. The new connector system provides greatly improved contacting properties and eliminates "background noise".



Fig. 68: Identifying Engine, Catalytic Converter Components - N55
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

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Index	Explanation
1	Oxygen sensor upstream of catalytic converter
2	Connection at exhaust turbocharger
3	Ceramic monolith 1
4	Catalytic converter
5	Ceramic monolith 2
6	Oxygen sensor after catalytic converter

Oxygen sensor before catalytic converter

The Bosch oxygen sensor LSU ADV is used as the control sensor before the catalytic converter. The abbreviation LSU stands for "Lambdasonde Universal" and ADV for "Advanced". The function is similar to that of the LSU 4.9 oxygen sensor and is therefore described in detail in the E71 X6 training material under "N63 engine" available in TIS and ICP.

The oxygen sensor before catalytic converter (LSU ADV) offers the following advantages:

- High signal stability specially during turbocharged operation due to low dynamic pressure dependence.
- Increased durability due to reduced pump voltage.
- Increased accuracy (by a factor of 1.7 compared to LSU 4.9).
- Ready for operation in < 5 seconds.
- Greater temperature compatibility.
- Improved connector with more effective contacting properties.

The LSU ADV has an extended measuring range, making it possible to measure precisely from lambda 0.65. The new oxygen sensor is ready for operation faster so that exact measured values are available within 5 seconds of start up.

The higher measuring dynamics of the sensor makes it possible to more effectively determine and control the fuel-air ratio separately for each cylinder. This results in a homogeneous exhaust flow that reduces emissions while also having a favorable effect on long-term emission characteristics.

Oxygen sensor after catalytic converter

The oxygen sensor after catalytic converter is also known as the monitoring sensor. The familiar Bosch LSF 4.2 monitoring sensor is used.

Hot-film airmass meter

The Siemens SIMAF GT2 hot-film air mass meter is used. This sensor is equipped with planar metal resistors on glass. Based on the tried and tested sensor technology used in the SIMAF GT1 for more than 15 years, the SIMAF GT2 represents a further-development and optimization with higher vibration resistance, improved accuracy (at all operating temperatures), and lower sensitivity to air pulsations and water.



Fig. 69: Identifying Hot-Film Airmass Meter
Courtesy of BMW OF NORTH AMERICA, INC.

High Pressure Fuel Injector Valve

The HDEV5.2 solenoid type injector valves used on the N55 engine are a new development.

1. **Booster phase:**

Opening of the HDEV5.2 is initiated in the booster phase by a high booster voltage from the DME. The booster phase ends on reaching approximately 10 amps. The high current is achieved by a voltage of up to approximately 65 Volt.

2. **Energizing phase:**

In the energizing phase, the HDEV5.2 is completely opened by controlling the current to approximately 6.2 amps. At the end of the energizing phase, the current is reduced to the holding current level of approximately 2.5 amps.

3. **Hold phase:**

The energized HDEV5.2 is kept open by controlling the current at approximately 2.5 amps in the hold phase.

4. **Switch off phase:**

The current is switched off at the end of the injection time (in the switch off phase). At least 2 milliseconds elapse between two injection cycles.

Function

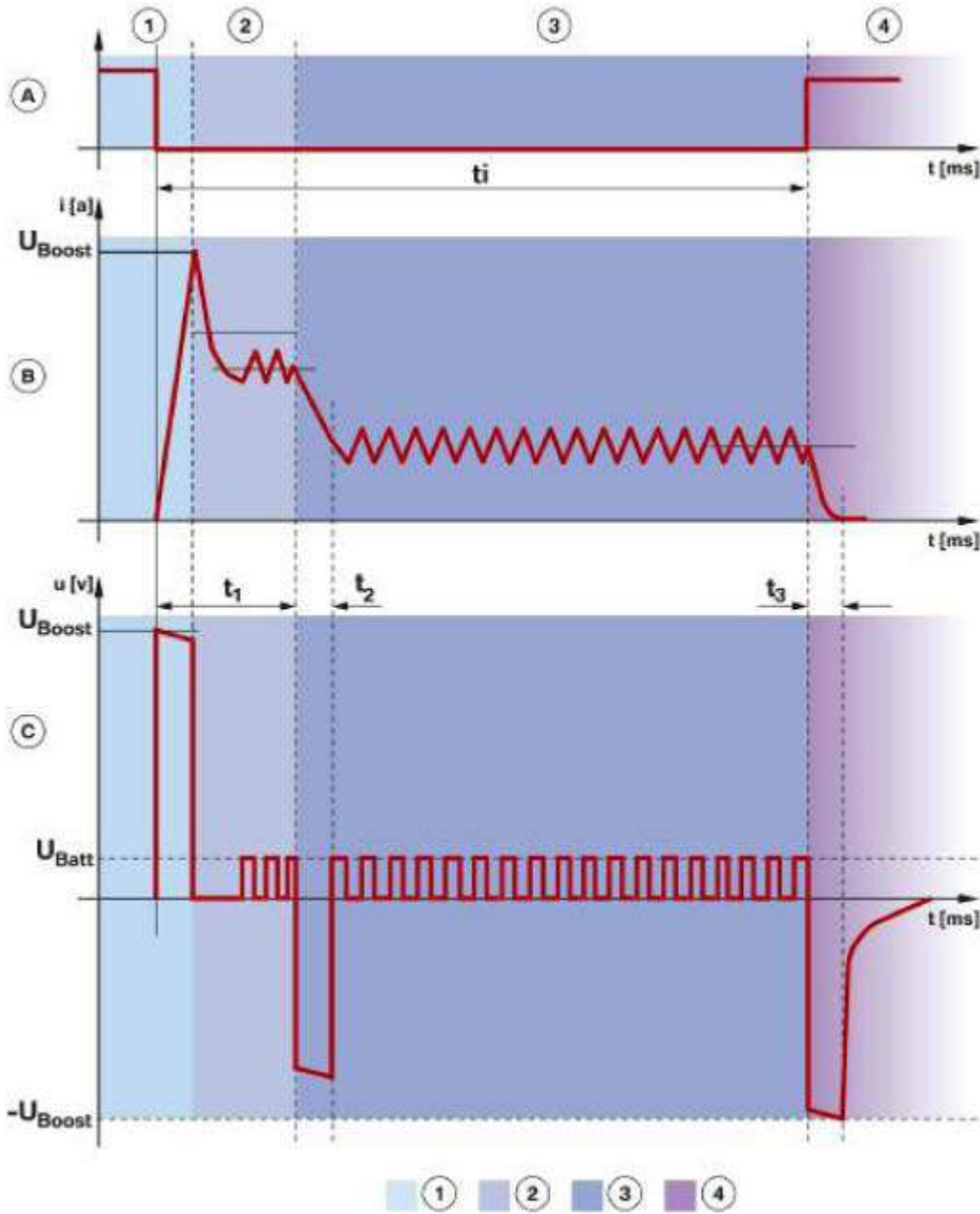


Fig. 70: Actuation Phases Of HDEV5.2 - N55
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	DME actuation signal
B	Current flow HDEV5.2
C	Voltage at HDEV5.2

1	Booster phase
2	Energizing phase
3	Hold phase
4	Switch off phase

SERVICE INFORMATION

CYLINDER HEAD

The combination of exhaust turbocharger, Valvetronic, and direct fuel injection is referred to as Turbo-Valvetronic-Direct-Injection (TVDI).

CYLINDER HEAD COVER

NOTE: If a customer complains about high oil consumption and oil is discovered in the turbocharger, it should not be immediately assumed that the turbocharger is defective.

If the oil is present in the fresh air pipe after the introduction of the blow-by gasses then the entire engine should be checked for leaks. Defective gaskets or crankshaft seals may be the cause of excessively high blow-by gas output.

FUEL INJECTORS

In order to remove the N55 fuel injectors from the cylinder head, special tool #13 0 270 must be utilized. Failure to use the special tool will result in damage to the injectors.

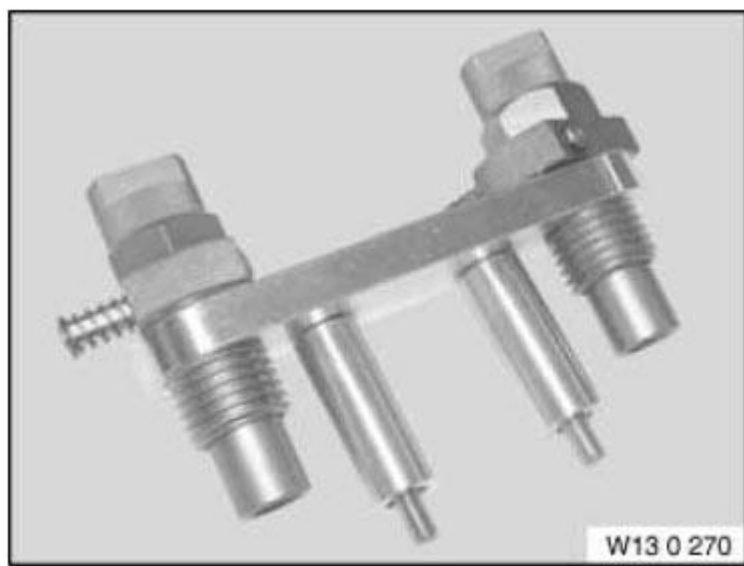


Fig. 71: Identifying Fuel Injectors

Courtesy of BMW OF NORTH AMERICA, INC.

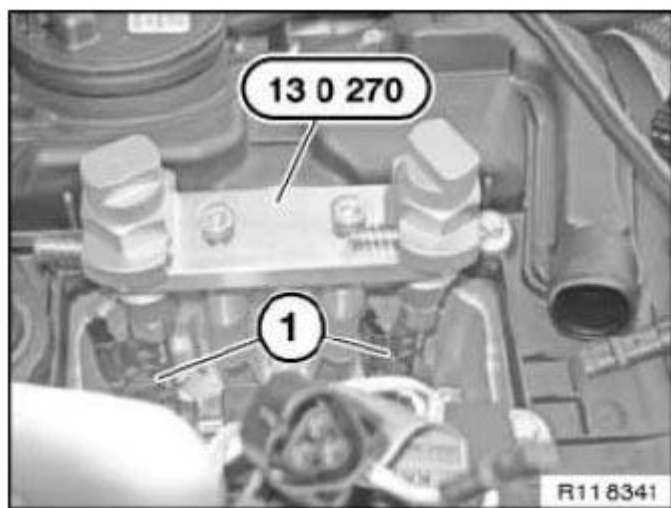


Fig. 72: Removing N55 Fuel Injectors From Cylinder Head Using Special Tool (13 0 270)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Do not open the high pressure fuel injection system if the coolant temperature is above 40°C. The residual pressure in the high pressure fuel system could cause bodily injury.

NOTE: It is essential to follow the repair instructions and observe the utmost cleanliness when working on the high pressure fuel system. Even minute soiling or damage at the connections of the high pressure lines and cause leaks.

There is a new tool # 13 0 280 that must be used when replacing the PTFE seals on the tips of the solenoid valve injectors. As with piezoelectric injectors these seals must be replaced if and when the injectors are being re-installed.

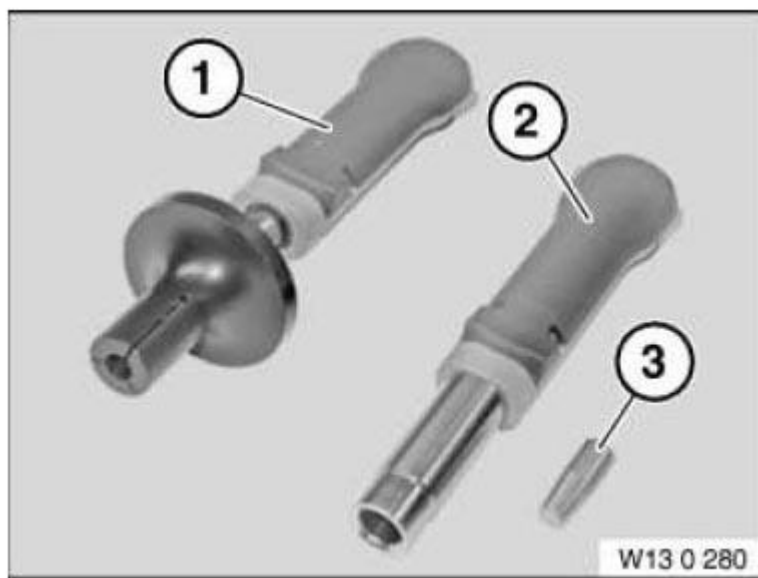


Fig. 73: Identifying Solenoid Valve Injectors
Courtesy of BMW OF NORTH AMERICA, INC.

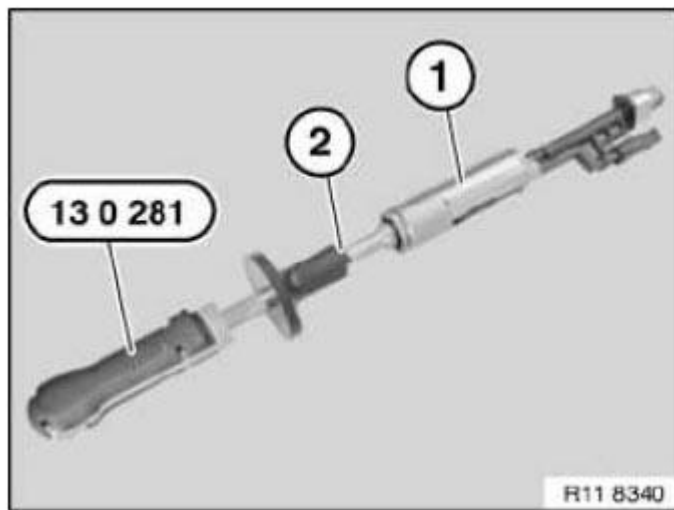


Fig. 74: Identifying Solenoid Valve Injectors And Special Tool (13 0 281)
Courtesy of BMW OF NORTH AMERICA, INC.

IGNITION COILS

The ignition coils of the N55 have been redesigned for better rigidity and durability. Particular care must be taken when working on the fuel system to ensure that the ignition coils are not wet with fuel. The resistance of the silicone material is greatly reduced by contact with fuel. This could compromise the coils insulation and result in arcing at the top of the spark plug causing a misfire.

The ignition coils must be removed before working on the fuel system.

- When installing new solenoid valve fuel injectors utmost cleanliness must be observed.
- After removing the ignition coils use a rag to prevent fuel from entering the spark plug well.
- Ignition coils that have been saturated with fuel must be replaced.

GENERAL INFORMATION

Engine Overhaul Procedures

* PLEASE READ THIS FIRST *

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Always refer to appropriate engine overhaul article, if available, in the **ENGINES** section for complete overhaul procedures and specifications for the vehicle being repaired.

DESCRIPTION

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ENGINE IDENTIFICATION

Engine may be identified from Vehicle Identification Number (VIN) stamped on a metal tab. Metal tab may be located in different locations depending on manufacturer. Engine identification number or serial number is located on cylinder block. Location varies with each manufacturer.

INSPECTION PROCEDURES

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Engine components must be inspected to meet manufacturer's specifications and tolerances during overhaul. Proper dimensions and tolerances must be met to obtain proper performance and maximum engine life.

Micrometers, depth gauges and dial indicator are used for checking tolerances during engine overhaul. Magnaflux, Magnaglo, dye-check, ultrasonic and x-ray inspection procedures are used for parts inspection.

MAGNETIC PARTICLE INSPECTION

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Magnaflux & Magnaglo

Magnaflux is an inspection technique used to locate material flaws and stress cracks. Component is subjected to a strong magnetic field. Entire component or a localized area can be magnetized. Component is coated with either a wet or dry material that contains fine magnetic particles.

Cracks which are outlined by the particles cause an interruption of magnetic field. Dry powder method of Magnaflux can be used in normal lighting and crack appears as a bright line.

Fluorescent liquid is used along with a Black light in the Magnaglo Magnaflux system. Darkened room is required for this procedure. The crack will appear as a glowing line. Complete demagnetizing of component upon completion is required on both procedures. Magnetic particle inspection applies to ferrous materials only.

PENETRANT INSPECTION

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Zyglo

The Zyglo process coats material with a fluorescent dye penetrant. Component is often warmed to expand cracks that will be penetrated by the dye. Using darkened room and Black light, component is inspected for cracks. Crack will glow brightly.

Developing solution is often used to enhance results. Parts made of any material, such as aluminum cylinder heads or plastics, may be tested using this process.

Dye Check

Penetrating dye is sprayed on the previously cleaned component. Dye is left on component for 5-45 minutes, depending upon material density. Component is then wiped clean and sprayed with a developing solution. Surface cracks will show up as a bright line.

ULTRASONIC INSPECTION

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If an expensive part is suspected of internal cracking, ultrasonic testing is used. Sound waves are used for component inspection.

X-RAY INSPECTION

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This form of inspection is used on highly stressed components. X-ray inspection may be used to detect internal and external flaws in any material.

PRESSURE TESTING

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Cylinder heads can be tested for cracks using a pressure tester. Pressure testing is performed by plugging all but one of the holes of cylinder head and injecting air or water into the open passage.

Leaks are indicated by the appearance of wet or damp areas when using water. When air is used, it is necessary to spray the head surface with a soap solution. Bubbles will indicate a leak. Cylinder head may also be submerged in water heated to specified temperature to check for cracks created during heat expansion.

CLEANING PROCEDURES

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GENERAL

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All components of an engine do not have the same cleaning requirements. Physical methods include bead blasting and manual removal. Chemical methods include solvent blast, solvent tank, hot tank, cold tank and steam cleaning of components.

BEAD BLASTING

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Manual removal of deposits may be required prior to bead blasting, followed by some other cleaning method. Carbon, paint and rust may be removed using bead blasting method. Components must be free of oil and grease prior to bead blasting. Beads will stick to grease or oil soaked areas causing area not to be cleaned.

Use air pressure to remove all trapped residual beads from component after cleaning. After cleaning internal engine parts made of aluminum, wash thoroughly with hot soapy water. Component must be thoroughly cleaned as glass beads will enter engine oil resulting in bearing damage.

CHEMICAL CLEANING

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Solvent tank is used for cleaning oily residue from components. Solvent blasting sprays solvent through a siphon gun using compressed air.

The hot tank, using heated caustic solvents, is used for cleaning ferrous materials only. DO NOT clean aluminum parts such as cylinder heads, bearings or other soft metals using the hot tank. After cleaning, flush parts with hot water.

A non-ferrous part will be ruined and caustic solution will be diluted if placed in the hot tank. Always use eye protection and gloves when using the hot tank.

Use of a cold tank is for cleaning aluminum cylinder heads, carburetors and other soft metals. A less caustic and unheated solution is used. Parts may be left in the tank for several hours without damage. After cleaning, flush parts with hot water.

Steam cleaning, with boiling hot water sprayed at high pressure, is recommended as the final cleaning process when using either hot or cold tank cleaning.

COMPONENT CLEANING

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SHEET METAL PARTS

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Examples of sheet metal parts are rocker covers, front and side covers, oil pan and bellhousing dust cover. Glass bead blasting or hot tank may be used for cleaning.

Ensure all mating surfaces are flat. Deformed surfaces should be straightened. Check all sheet metal parts for cracks and dents.

INTAKE & EXHAUST MANIFOLDS

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Using solvent cleaning or bead blasting, clean manifolds for inspection. If intake manifold has an exhaust crossover, all carbon deposits must be removed. Inspect manifolds for cracks, burned or eroded areas, corrosion and damage to fasteners.

Exhaust heat and products of combustion cause threads of fasteners to corrode. Replace studs and bolts as necessary. On "V" type intake manifolds, sheet metal oil shield must be removed for proper cleaning and inspection. Ensure all manifold parting surfaces are flat and free of burrs.

CYLINDER HEAD REPLACEMENT

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REMOVAL

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Remove intake and exhaust manifolds and valve cover. Cylinder head and camshaft carrier bolts (if equipped) should be removed only when engine is cold. On many aluminum cylinder heads, removal while hot will cause cylinder head warpage. Mark rocker arm or overhead cam components for location.

Remove rocker arm components or overhead cam components. Components must be installed in original location. Individual design rocker arms may utilize shafts, ball-type pedestal mounts or no rocker arms. For all design types, wire components together and identify according to corresponding valve. Remove cylinder head bolts. Note length and location. Some applications require cylinder head bolts be removed in proper sequence to prevent cylinder head damage. See **Fig. 1**. Remove cylinder head.

INSTALLATION

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Ensure all surfaces and head bolts are clean. Check that head bolt holes of cylinder block are clean and dry to

prevent block damage when bolts are tightened. Clean threads with tap to ensure accurate bolt torque.

Install head gasket on cylinder block. Some manufacturers may recommend sealant be applied to head gasket prior to installation. Note that all holes are aligned. Some gasket applications may be marked so that certain area faces upward. Install cylinder head using care not to damage head gasket. Ensure cylinder head is fully seated on cylinder block.

Some applications require head bolts be coated with sealant prior to installation. This is done if head bolts are exposed to coolant passages. Some applications require head bolts be coated with light coat of engine oil.

Install head bolts. Head bolts should be tightened in proper steps and sequence to specification. See **Fig. 1**. Install remaining components. Tighten all bolts to specification. Adjust valves if required. See VALVE ADJUSTMENT.

NOTE: Some manufacturers require that head bolts be retightened after specified amount of operation. This must be done to prevent head gasket failure.

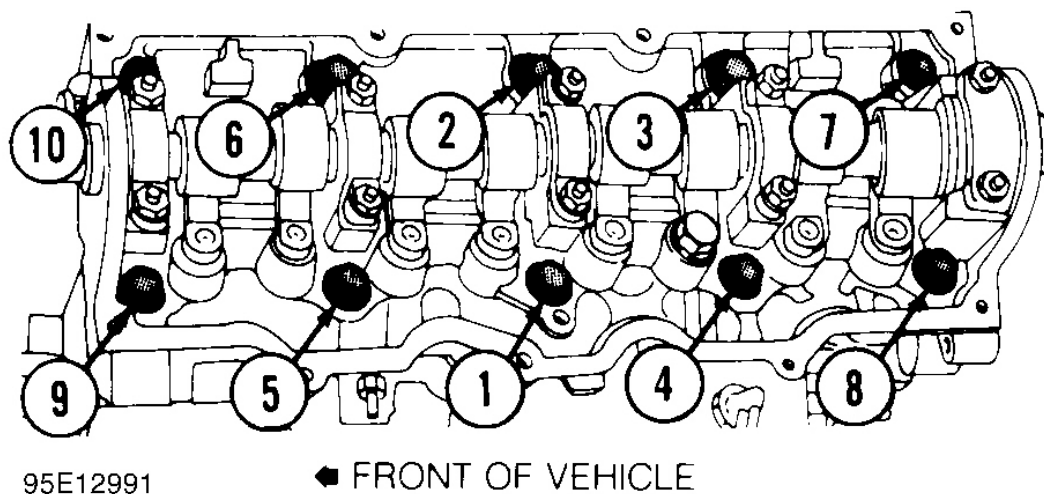


Fig. 1: Typical Cylinder Head Tightening or Loosening Sequence

VALVE ADJUSTMENT

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being repaired.

Engine specifications will indicate valve train clearance and temperature at which adjustment is to be made on most models. In most cases, adjustment will be made with a cold engine. In some cases, both a cold and a hot clearance will be given for maintenance convenience.

On some models, adjustment is not required. Rocker arms are tightened to specification and valve lash is automatically set. On some models with push rod actuated valve train, adjustment is made at push rod end of rocker arm while other models do not require adjustment.

Clearance will be checked between tip of rocker arm and tip of valve stem in proper sequence using a feeler gauge. Adjustment is made by rotating adjusting screw until proper clearance is obtained. Lock nut is then tightened. Engine will be rotated to obtain all valve adjustments to manufacturer's specifications.

Some models require hydraulic lifter to be bled down and clearance measured. Push rods of different length can be used to obtain proper clearance. Clearance will be checked between tip of rocker arm and tip of valve stem in proper sequence using a feeler gauge.

Overhead cam engines designed without rocker arms actuate valves directly on a cam follower. A hardened, removable disc is installed between the cam lobe and lifter. Clearance will be checked between cam heel and adjusting disc in proper sequence using a feeler gauge. Engine will be rotated to obtain all valve adjustments.

On overhead cam engines designed with rocker arms, adjustment is made at valve end of rocker arm. Ensure valve to be adjusted is riding on heel of cam on all engines. Clearance will be checked between tip of rocker arm and tip of valve stem in proper sequence using a feeler gauge. Adjustment is made by rotating adjusting screw until proper clearance is obtained. Lock nut is then tightened. Engine will be rotated to obtain all valve adjustments to manufacturer's specifications.

CYLINDER HEAD OVERHAUL

*** PLEASE READ THIS FIRST ***

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CYLINDER HEAD DISASSEMBLY

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Always refer to appropriate engine overhaul article, if available, in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

Mark valves for location. Using valve spring compressor, compress valve springs. Remove valve locks. Carefully release spring compressor. Remove retainer or rotator, valve spring, spring seat and valve. See **Fig. 2**.

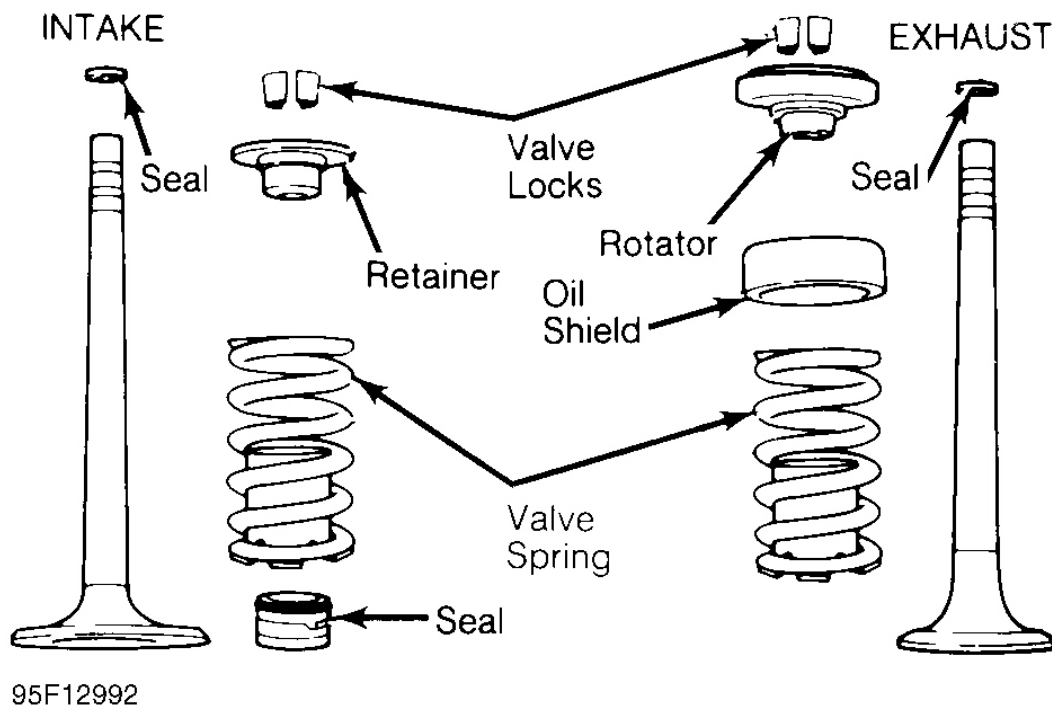


Fig. 2: Exploded View of Valve Assemblies

CYLINDER HEAD CLEANING & INSPECTION

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Clean cylinder head and valve components using approved cleaning methods. Inspect cylinder head for cracks, damage or warped gasket surface. Place straightedge across gasket surface. Determine clearance at center of straightedge. Measure across both diagonals, longitudinal center line and across cylinder head at several points. See **Fig. 3**.

On cast iron cylinder heads, if warpage exceeds .003" (.08 mm) in a 6" span, or .006" (.15 mm) over total length, cylinder head must be resurfaced. On most aluminum cylinder heads, if warpage exceeds .002" (.05 mm) in any area, cylinder head must be resurfaced. Warpage specification may vary by manufacturer. If warpage exceeds specification on some cylinder heads, cylinder head must be replaced.

Cylinder head thickness should be measured to determine amount of material which can be removed before replacement is required. Cylinder head thickness must not be less than the manufacturer's specification.

If cylinder head required resurfacing, it may not align properly with intake manifold. On "V" type engines, misalignment is corrected by machining intake manifold surface that contacts cylinder head. Cylinder head may be machined on surface that contacts intake manifold. Using oil stone, remove burrs or scratches from all sealing surfaces.

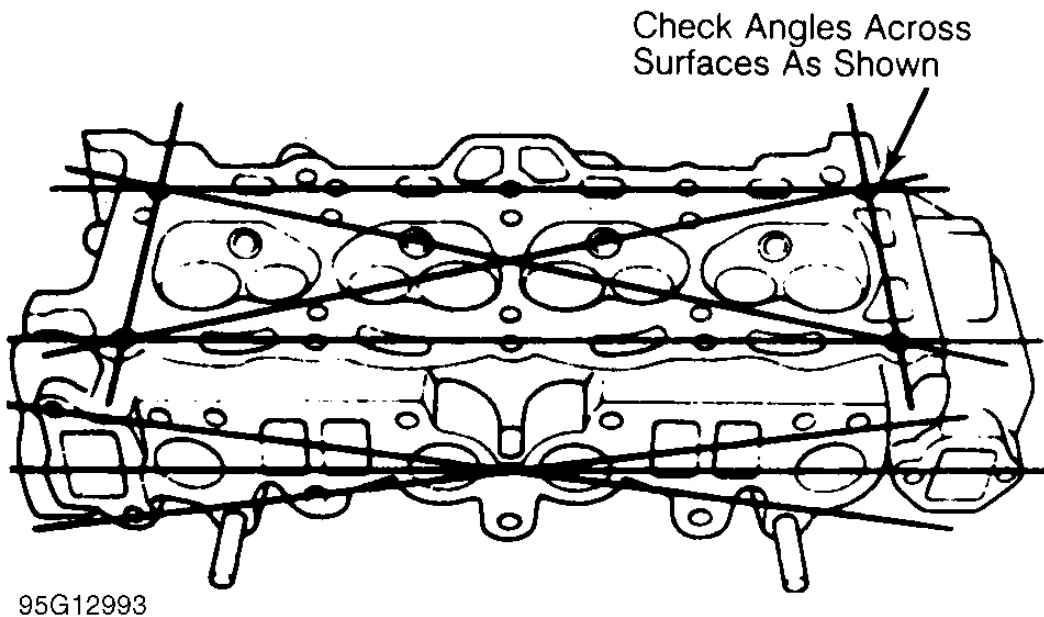


Fig. 3: Checking Cylinder Head for Warpage

VALVE SPRINGS

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Inspect valve springs for corroded or pitted valve spring surfaces which may lead to breakage. Polished spring ends caused by a rotating spring indicate that spring surge has occurred. Replace springs showing evidence of these conditions.

Inspect valve springs for squareness using a 90-degree straightedge. See **Fig. 4**. Replace valve spring if out-of-square exceeds manufacturer's specification.

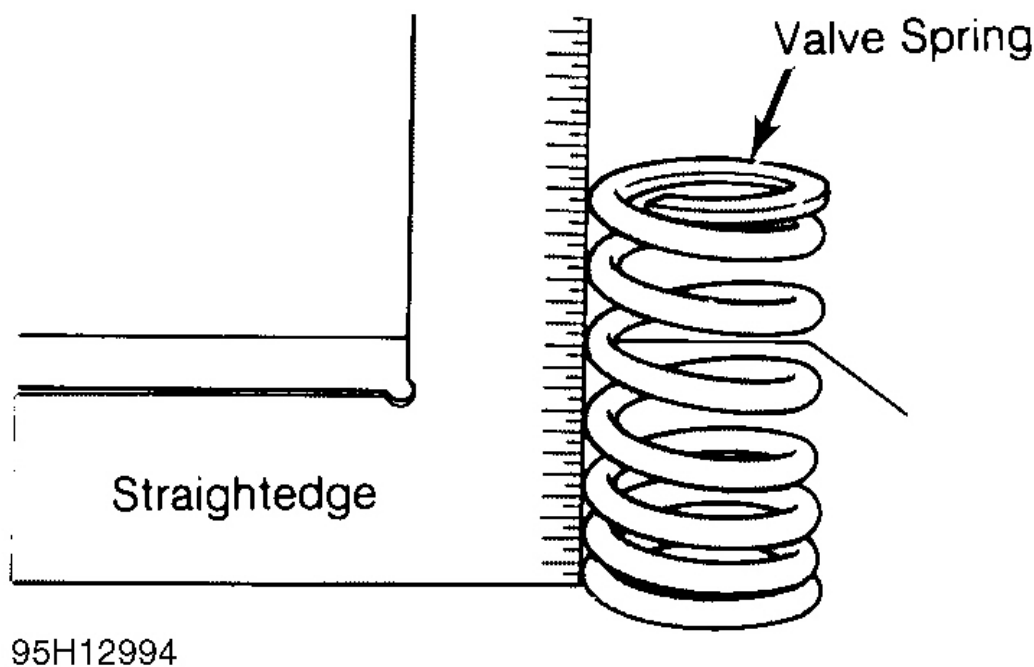


Fig. 4: Checking Valve Spring Squareness

Using vernier caliper, measure free length of all valve springs. Replace springs if not within specification. Using valve spring tester, test valve spring pressure at installed and compressed heights. See **Fig. 5**.

Usually compressed height is installed height minus valve lift. Replace valve spring if not within specification. It is recommended to replace all valve springs when overhauling cylinder head. Valve springs may need to be installed with color coded end or small coils at specified area according to manufacturer.

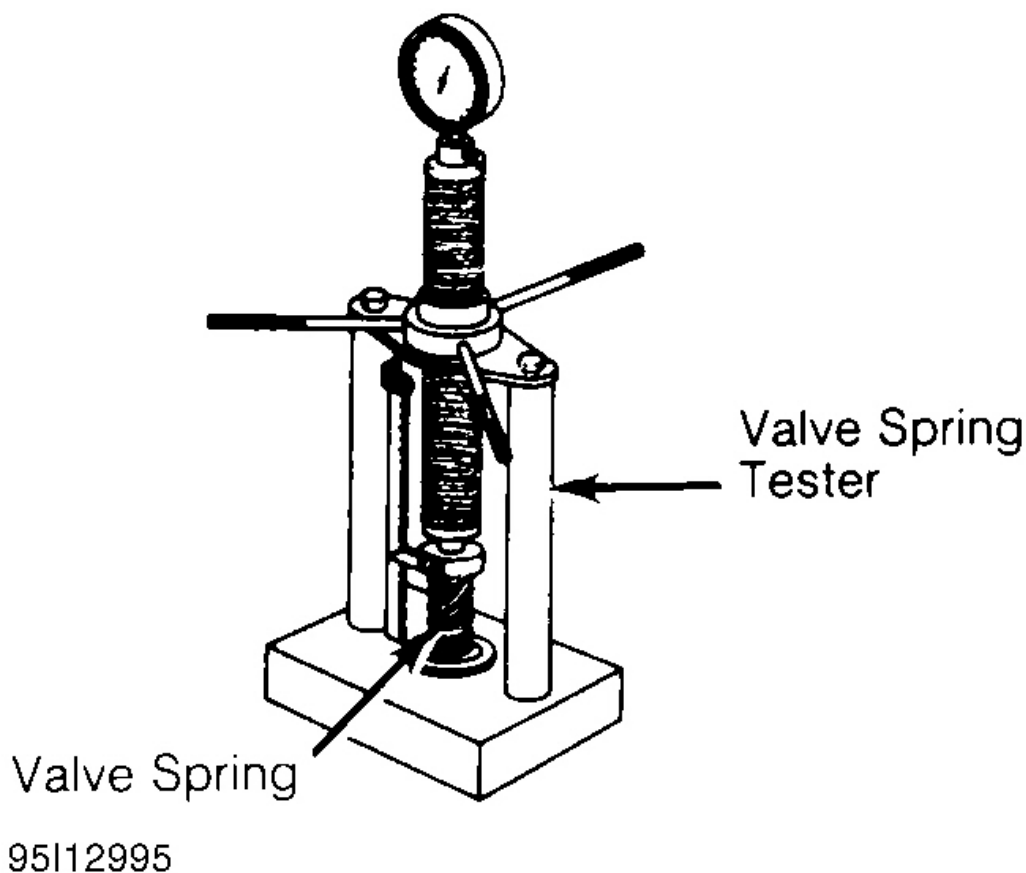


Fig. 5: Checking Valve Spring Pressure

VALVE GUIDE

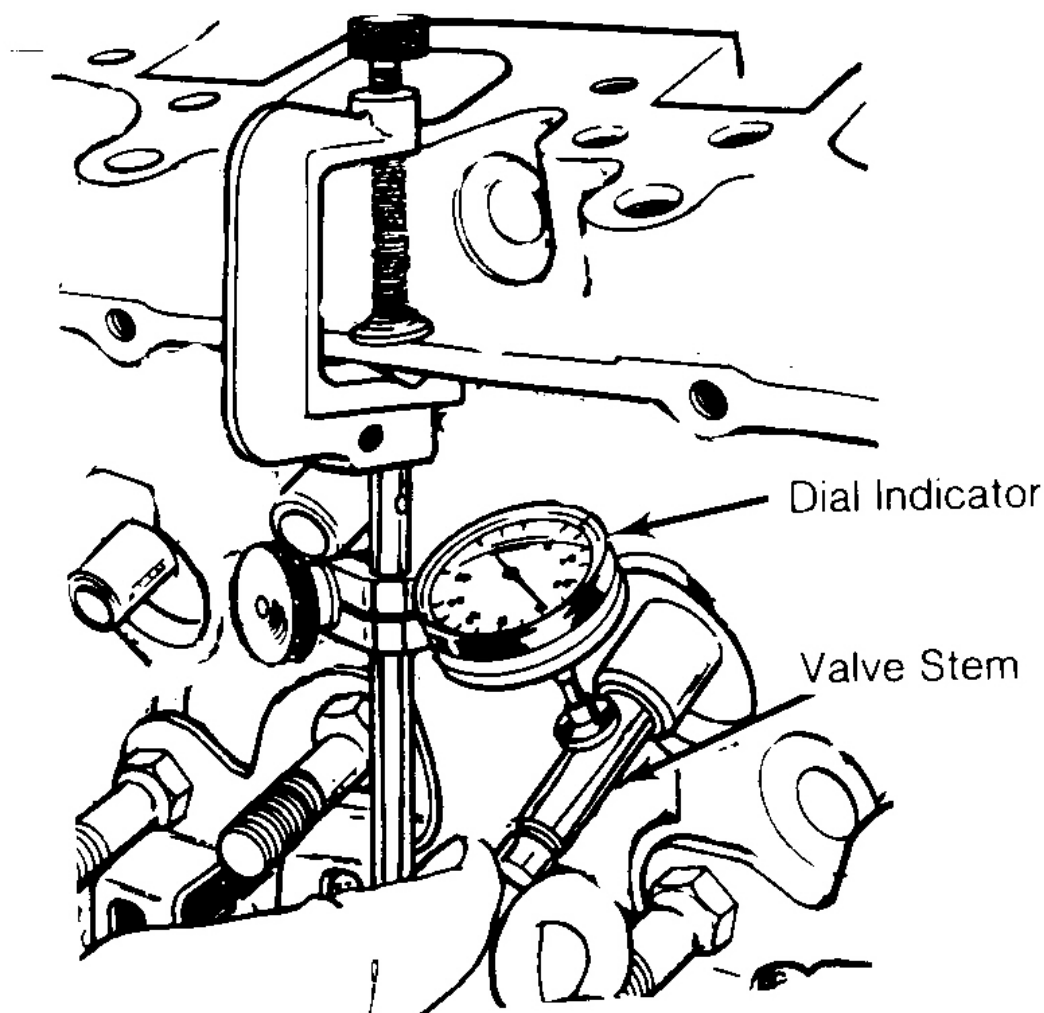
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Measuring Valve Guide Clearance

Check valve stem-to-guide clearance. Ensure valve stem diameter is within specification. Install valve in valve

guide. Install dial indicator assembly on cylinder head with tip resting against valve stem just above valve guide. See **Fig. 6**.



95J12996

Fig. 6: Measuring Valve Stem-to-Guide Clearance

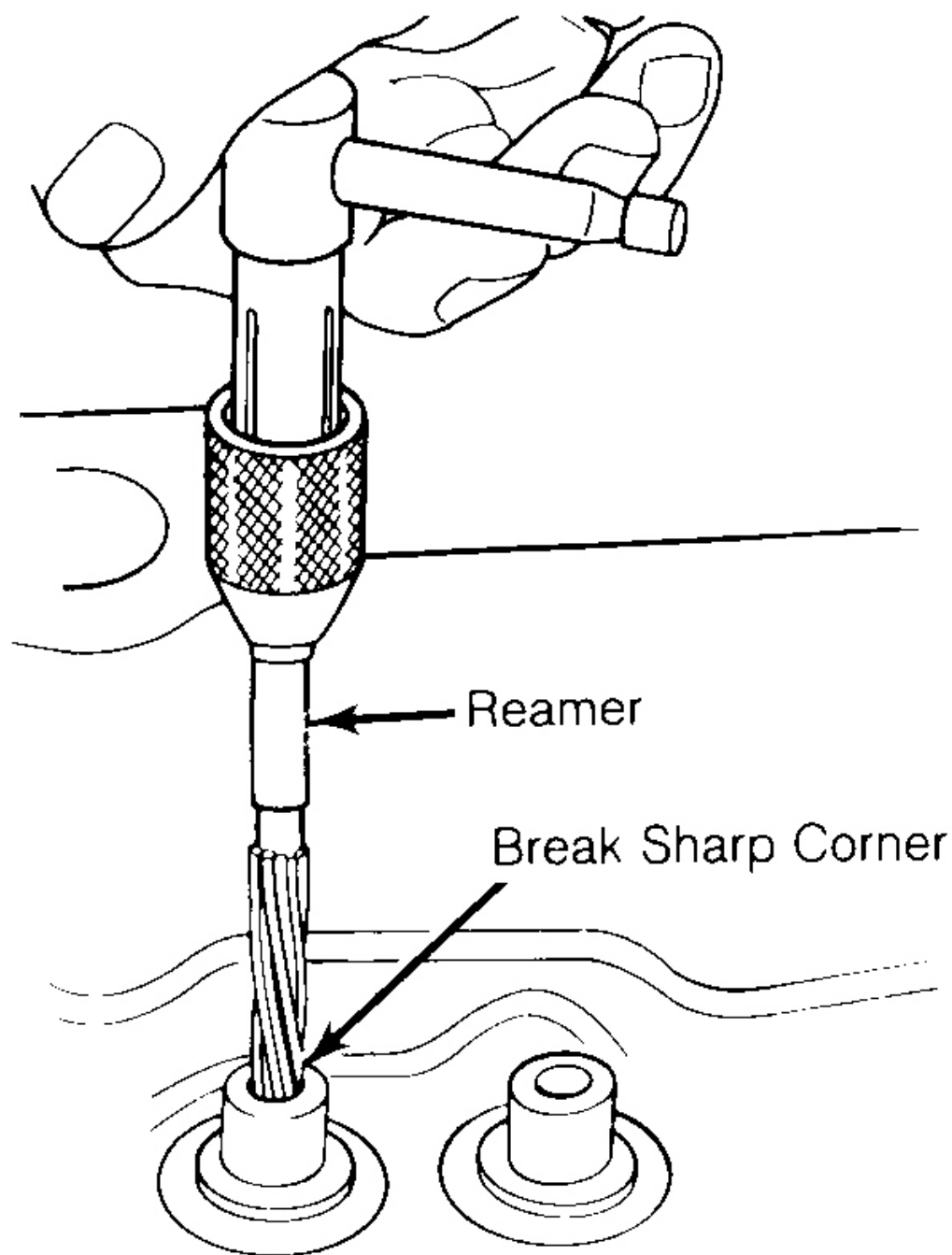
Lower valve approximately 1/16" below valve seat. Push valve stem against valve guide as far as possible. Adjust dial indicator to zero. Push valve stem in opposite direction and note reading. Clearance must be within specification.

If valve guide clearance exceeds specification, valves with oversize stems may be used and valve guides are reamed to larger size or valve guide must be replaced. On some applications, a false guide is installed, then reamed to proper specification. Valve guide reamer set is used to ream valve guide to obtain proper clearance

for new valve.

Reaming Valve Guide

Select proper reamer for size of valve stem. Reamer must be of proper length to provide clean cut through entire length of valve guide. Install reamer in valve guide and rotate to cut valve guide. See **Fig. 7**.



95A12997

Fig. 7: Reaming Valve Guides

Replacing Valve Guide

Replace valve guide if clearance exceeds specification. Valve guides are either pressed, hammered or shrunk in place, depending upon cylinder head design and type of metal used.

Remove valve guide from cylinder head by pressing or tapping on a stepped drift. See **Fig. 8**. Once valve guide is installed, distance from cylinder head to top of valve guide must be checked. This distance must be within specification.

Aluminum heads are often heated before installing valve guide. Valve guide is sometimes cooled in dry ice prior to installation. Combination of a heated cylinder head and cooled valve guide ensures a tight guide fit upon assembly. The new guide must be reamed to specification.

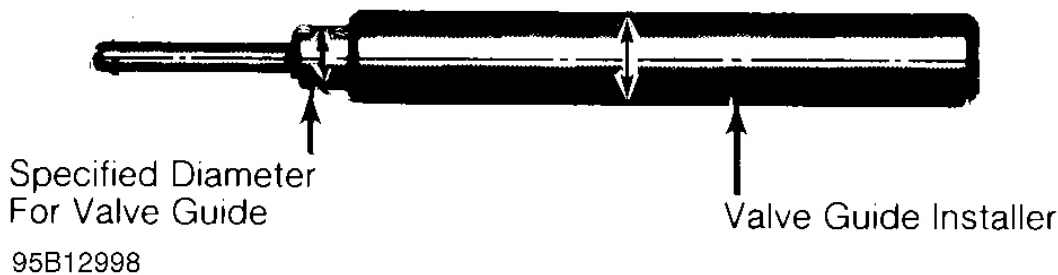


Fig. 8: Typical Valve Guide Remover & Installer

VALVES & VALVE SEATS

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Valve Grinding

Valve stem O.D. should be measured in several areas to indicate amount of wear. Replace valve if not within specification. Valve margin area should be measured to ensure that valve can be ground. See **Fig. 9**.

If valve margin is less than specification, the valves will be burned. Valve must be replaced. Due to minimum margin dimensions during manufacture, some new type valves cannot be reground. Some manufacturers use stellite coated valves that must NOT be machined. Valves can only be lapped into valve seat.

CAUTION: Some valves are sodium filled. Extreme care must be used when disposing of damaged or worn sodium-filled valves.

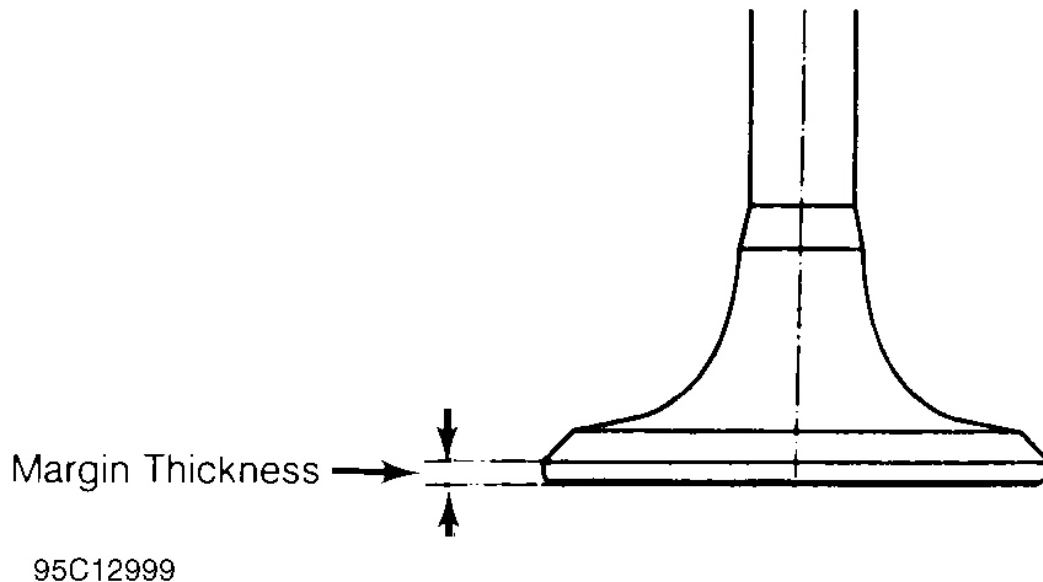


Fig. 9: Measuring Valve Head Margin

Resurface valve to proper angle specification using valve grinding machine. Follow manufacturer's instructions for valve grinding machine. Specifications may indicate a different valve face angle than seat angle. Measure valve margin after grinding. Replace valve if not within specification. Valve stem tip can be refinished using valve grinding machine.

Valve Lapping

During valve lapping of recently designed valves, be sure to follow manufacturer's recommendations. Surface hardening and materials used with some valves do not permit lapping. Lapping process will remove excessive amounts of the hardened surface.

Valve lapping is done to ensure adequate sealing between valve face and seat. Use either a hand drill or lapping stick with suction cup attached.

Moisten and attach suction cup to valve. Lubricate valve stem and guide. Apply a thin coat of fine valve grinding compound between valve and seat. Rotate lapping tool between the palms or with hand drill.

Lift valve upward off the seat and change position often. This is done to prevent grooving of valve seat. Lap valve until a smooth polished seat is obtained. Thoroughly clean grinding compound from components. Valve-to-valve seat concentricity should be checked. See **VALVE SEAT CONCENTRICITY**.

CAUTION: Valve guides must be in good condition and free of carbon deposits prior to valve seat grinding. Some engines contain an induction hardened valve seat. Excessive material removal will damage valve seats.

Valve Seat Grinding

Select coarse stone of correct size and angle for seat to be ground. Ensure stone is true and has a smooth surface. Select correct size pilot for valve guide dimension. Install pilot in valve guide. Lightly lubricate pilot shaft. Install stone on pilot. Move stone off and on the seat approximately 2 times per second during grinding operation.

Select a fine stone to finish grinding operation. Various angle grinding stones are used to center and narrow the valve seat as required. See **Fig. 10**.

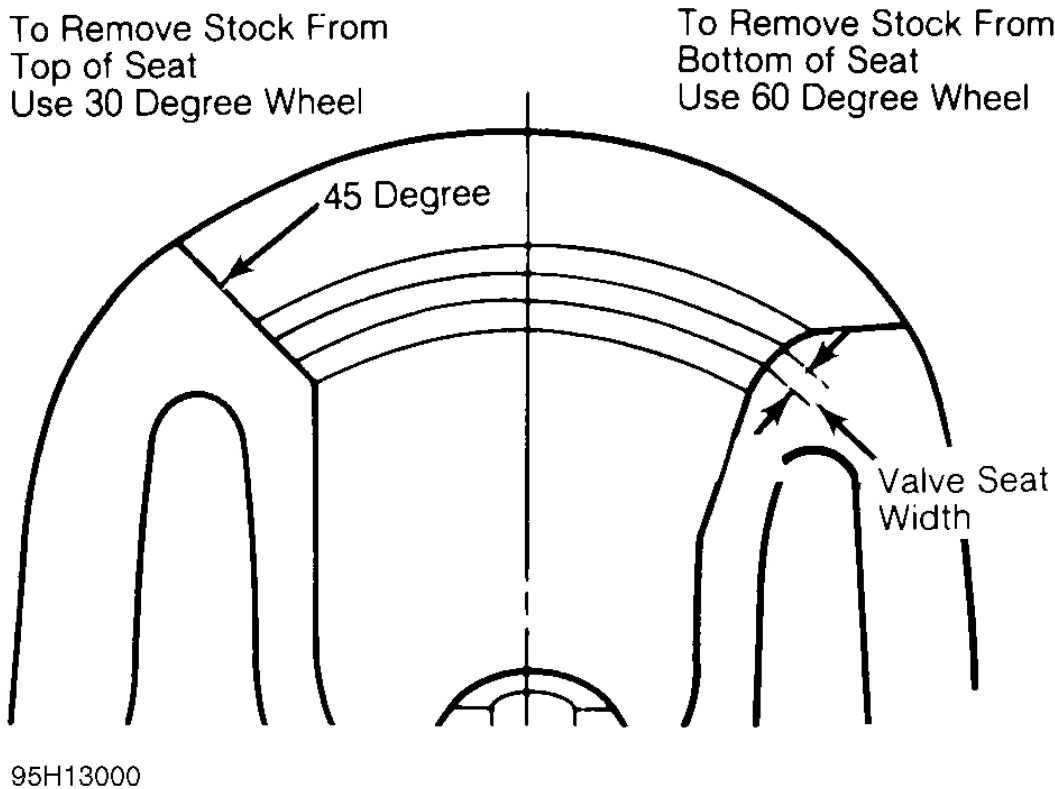


Fig. 10: Adjusting Valve Seat Width

Valve Seat Replacement

Replacement of valve seat inserts is done by cutting out the old insert and machining an oversize insert bore. Replacement oversize insert is usually cooled and the cylinder head is sometimes warmed. Valve seat is pressed

into the head. This operation requires specialized machine shop equipment.

Valve Seat Concentricity

Using dial gauge, install gauge pilot in valve guide. Position gauge arm on the valve seat. Adjust dial indicator to zero. Rotate arm 360 degrees and note reading. Runout should not exceed specification.

To check valve-to-valve seat concentricity, coat valve face lightly with Prussian Blue dye. Install valve and rotate it on valve seat. If pattern is even and entire seat is coated at valve contact point, valve is concentric with the valve seat.

CYLINDER HEAD REASSEMBLY

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Valve Stem Installed Height

Valve stem installed height must be checked when new valves are installed or when valves or valve seats have been ground. Install valve in valve guide. Measure distance from tip of valve stem to spring seat. See **Fig. 11**. Distance must be within specification to allow sufficient clearance for valve operation.

Remove valve and grind valve stem tip if height exceeds specification. Valve tips are surface hardened. DO NOT remove more than .010" (.25 mm) from tip. Chamfer sharp edge of reground valve tip. Recheck valve stem installed height.

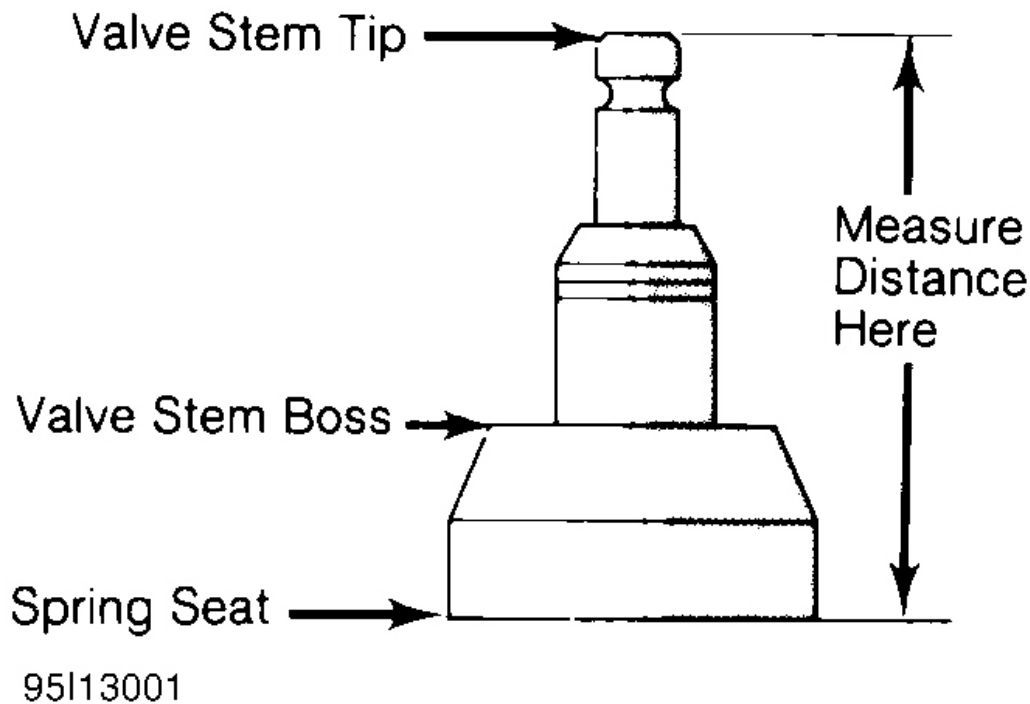


Fig. 11: Measuring Valve Stem Installed Height

VALVE STEM OIL SEALS

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Valve stem oil seals must be installed on valve stem. See **Fig. 2**. Seals are needed due to pressure differential at the ends of valve guides. Atmospheric pressure above intake guide, combined with manifold vacuum below guide, causes oil to be drawn into the cylinder.

Exhaust guides also have pressure differential created by exhaust gas flowing past the guide, creating a low pressure area. This low pressure area draws oil into the exhaust system.

Some manufacturers require that special color code or specified height valve stem oil seal be installed in

designated area.

Replacement (On-Vehicle)

Mark rocker arm or overhead cam components for location. Remove rocker arm components or overhead cam components. Components must be installed in original location. Remove spark plugs. Valve stem oil seals may be replaced by holding valves against seats using air pressure.

Air pressure must be installed in cylinder using an adapter for spark plug hole. An adapter can be constructed by welding air hose connection to spark plug body with porcelain removed.

Rotate engine until piston is at top of stroke. Install adapter in spark plug hole. Apply a minimum of 140 psi (9.8 kg/cm²) line pressure to adapter. Air pressure should hold valve closed. If air pressure does not hold valve closed, check for damaged or bent valve. Cylinder head must be removed for service.

Using valve spring compressor, compress valve springs. Remove valve locks. Carefully release spring compressor. Remove retainer or rotator and valve spring. Remove valve stem oil seal.

If oversize valves have been installed, oversize oil seals must be used. Coat valve stem with engine oil. Install protective sleeve over end of valve stem. Install new oil seal over valve stem and seat on valve guide. Remove protective sleeve. Install spring seat, valve spring and retainer or rotator. Compress spring and install valve locks. Remove spring compressor. Ensure valve locks are fully seated.

Install rocker arms or overhead cam components. Tighten all bolts to specification. Adjust valves if required. Remove adapter. Install spark plugs, valve cover and gasket.

VALVE SPRING INSTALLED HEIGHT

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Valve spring installed height should be checked during reassembly. Measure height from lower edge of valve spring to the upper edge. DO NOT include valve spring seat or retainer. Distance must be within specification. If valves and/or seats have been ground, a valve spring shim may be required to correct spring height. See **Fig. 12**.

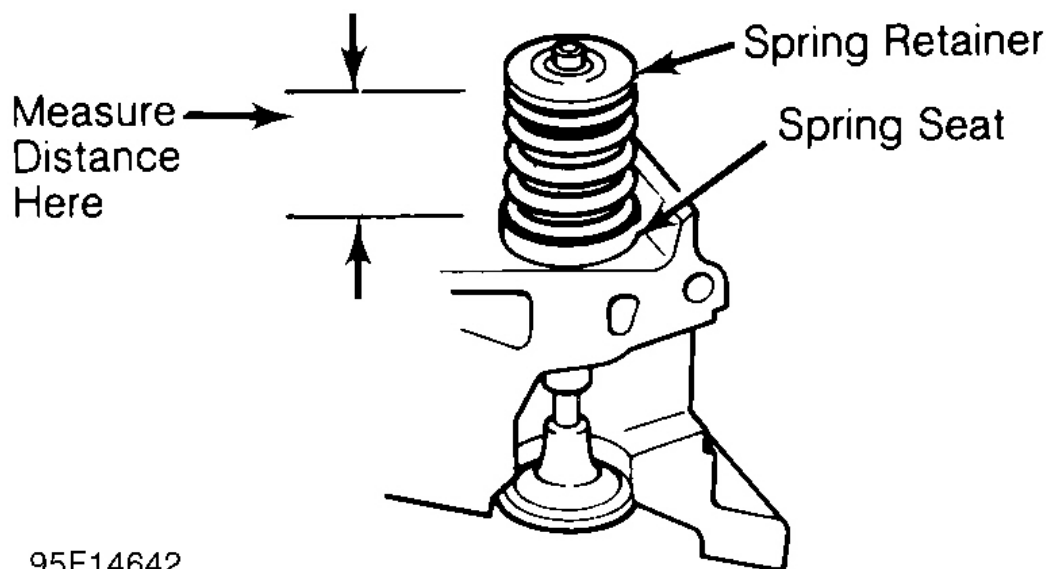


Fig. 12: Measuring Valve Spring Installed Height

ROCKER ARMS & ASSEMBLIES

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Rocker Studs

Rocker studs are either threaded or pressed in place. Threaded studs are removed by locking 2 nuts on the stud. Unscrew the stud by turning the jam nut. Coat new stud threads with Loctite and install. Tighten to specification.

Pressed-in stud can be removed using a stud puller. Ream stud bore to proper specification and press in a new oversize stud. Pressed-in studs are often replaced by cutting threads in the stud bore to accept a threaded stud.

Rocker Arms & Shafts

Mark rocker arms for location. Remove rocker arm retaining bolts. Remove rocker arms. Inspect rocker arms,

shafts, bushings and pivot balls (if equipped) for excessive wear. Inspect rocker arms for wear in valve stem contact area. Measure rocker arm bushing I.D. Replace bushings if excessively worn.

The rocker arm valve stem contact point may be reground, using special fixture for valve grinding machine. Remove minimum amount of material as possible. Ensure all oil passages are clear. Install rocker arm components in original location. Ensure rocker arm is properly seated in push rod. Tighten bolts to specification. Adjust valves if required. See **VALVE ADJUSTMENT**.

PUSH RODS

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Remove rocker arms. Mark push rods for location. Remove push rods. Push rods can be steel or aluminum, solid or hollow. Hollow push rods must be internally cleaned to ensure oil passage to rocker arms is cleaned. Check push rods for damage, such as loose ends on steel tipped aluminum types.

Check push rod for straightness. Roll push rod on a flat surface. Using feeler gauge, check clearance at center. Replace push rod if bent. The push rod can also be supported at each end and rotated. A dial indicator is used to detect a bent area in the push rod.

Lubricate ends of push rod and install push rod in original location. Ensure push rod is properly seated in lifter. Install rocker arm. Tighten bolts to specification. Adjust valves if required. See **VALVE ADJUSTMENT**.

LIFTERS

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Hydraulic Lifters

Before replacing a hydraulic lifter for noisy operation, ensure noise is not caused by worn rocker arms or valve tips. Also ensure sufficient oil pressure exists. Hydraulic lifters must be installed in original location. Remove rocker arm assembly and push rod. Mark components for location. Some applications require intake manifold,

cylinder head or lifter cover removal. Remove lifter retainer plate (if used). To remove lifters, use a hydraulic lifter remover or magnet. Different type lifters are used. See **Fig. 13**.

On sticking lifters, disassemble and clean lifter. DO NOT mix lifter components or positions. Parts are select-fitted and are not interchangeable. Inspect all components for wear. Note amount of wear in lifter body-to-camshaft contact area. Surface must have smooth and convex contact face. If wear is apparent, carefully inspect cam lobe.

Inspect push rod contact area and lifter body for scoring or signs of wear. If body is scored, inspect lifter bore for damage and lack of lubrication. On roller type lifters, inspect roller for flaking, pitting, loss of needle bearings and roughness during rotation.

Measure lifter body O.D. in several areas. Measure lifter bore I.D. Ensure components or oil clearance is within specification. Some models offer oversize lifters. Replace lifter if damaged.

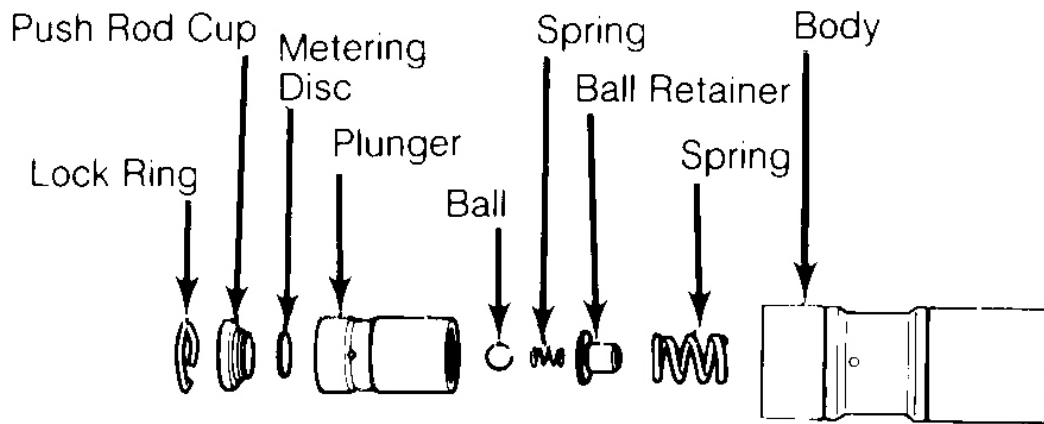
If lifter check valve is not operating, obstructions may be preventing it from closing or valve spring may be broken. Clean or replace components as necessary.

Check plunger operation. Plunger should drop to bottom of the body by its own weight when assembled dry. If plunger is not free, soak lifter in solvent to dissolve deposits.

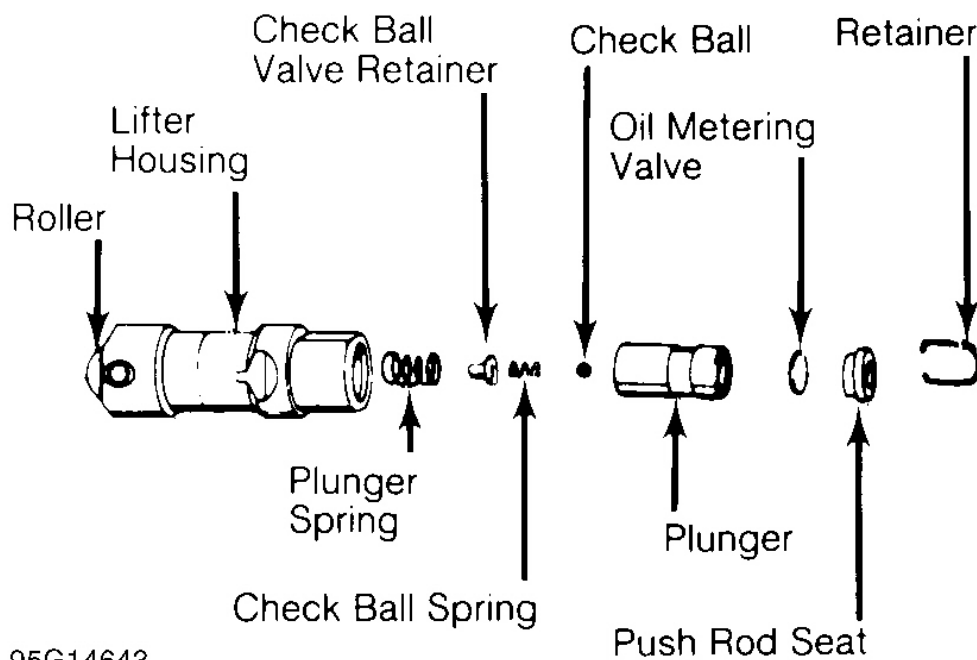
Lifter leak-down test can be performed on lifter. Lifter must be filled with special test oil. New lifters contain special test oil. Using lifter leak-down tester, perform leak-down test following manufacturer's instructions. If leak-down time is not within specifications, replace lifter assembly.

Lifters should be soaked in clean engine oil several hours prior to installation. Coat lifter base, roller (if equipped) and lifter body with ample amount of Molykote or camshaft lubricant. See **Fig. 13**. Install lifter in original location. Install remaining components. Valve lash adjustment is not required on most hydraulic lifters. Preload of hydraulic lifter is automatic. Some models may require adjustment.

NOTE: Some manufacturers require that a crankcase conditioner be added to engine oil and engine operated for specified amount of time to aid in lifter break-in procedure if new lifters or camshaft are installed.



FLAT LIFTER



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ROLLER LIFTER

Fig. 13: Typical Hydraulic Valve Lifter Assemblies**Mechanical Lifters**

Lifter assemblies must be installed in original locations. Remove rocker arm assembly and push rod. Mark components for location. Some applications require intake manifold or lifter cover removal. Remove lifter retainer plate (if used). To remove lifters, use lifter remover or magnet.

Inspect push rod contact area and lifter body for scoring or signs of wear. If body is scored, inspect lifter bore for damage and lack of lubrication. Note amount of wear in lifter body-to-camshaft contact area. Surface must have smooth and convex contact face. If wear is apparent, carefully inspect cam lobe.

Coat lifter base, roller (if equipped) and lifter body with ample amount of Molykote or camshaft lubricant. Install lifter in original location. Install remaining components. Tighten bolts to specification. Adjust valves. See [VALVE ADJUSTMENT](#).

PISTONS, CONNECTING RODS & BEARINGS

*** PLEASE READ THIS FIRST ***

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RIDGE REMOVAL

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Ridge in cylinder wall must be removed prior to piston removal. Failure to remove ridge prior to removing pistons will cause piston damage in piston ring lands or grooves.

With piston at bottom dead center, place rag in bore to trap metal chips. Install ridge reamer in cylinder bore. Adjust ridge reamer using manufacturer's instructions. Remove ridge using ridge reamer. DO NOT remove an excessive amount of material. Ensure ridge is completely removed.

PISTON & CONNECTING ROD REMOVAL

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Note top of piston. Some pistons may contain a notch, arrow or be marked FRONT. Piston must be installed in proper direction to prevent damage with valve operation.

Check that connecting rod and cap are numbered for cylinder location and which side of cylinder block the number faces. Proper cap and connecting rod must be installed together. Connecting rod cap must be installed on connecting rod in proper direction to ensure bearing lock procedure. Mark connecting rod and cap if necessary. Pistons must be installed in original location.

Remove cap retaining nuts or bolts. Remove bearing cap. Install tubing protectors on connecting rod bolts. This protects cylinder walls from scoring during removal. Ensure proper removal of ridge. Push piston and connecting rod from cylinder. Connecting rod boss can be tapped with a wooden dowel or hammer handle to aid in removal.

PISTON & CONNECTING ROD

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Disassembly

Using ring expander, remove piston rings. Remove piston pin retaining rings (if equipped). Note direction of piston installation on connecting rod. On pressed type piston pins, special fixtures and procedures according to manufacturer must be used to remove piston pins. Follow manufacturer's recommendations to avoid piston distortion or breakage.

Cleaning

Remove all carbon and varnish from piston. Pistons and connecting rods may be cleaned in cold type chemical tank. Using ring groove cleaner, clean all deposits from ring grooves. Ensure all deposits are cleaned from ring grooves to prevent ring breakage or sticking. DO NOT attempt to clean pistons with wire brush.

Inspection

Inspect pistons for nicks, scoring, cracks or damage in ring areas. Connecting rod should be checked for cracks using Magnaflux procedure. Piston diameter must be measured in manufacturer's specified area.

Using telescopic gauge and micrometer, measure piston pin bore of piston in 2 areas, 90 degrees apart. This is

done to check diameter and out-of-round.

Install proper bearing cap on connecting rod. Ensure bearing cap is installed in proper location. Tighten bolts or nuts to specification. Using inside micrometer, measure inside diameter in 2 areas, 90 degrees apart.

Connecting rod I.D. and out-of-round must be within specification. Measure piston pin bore I.D. and piston pin O.D. All components must be within specification. Subtract piston pin diameter from piston pin bore in piston and connecting rod to determine proper fit.

Connecting rod length must be measured from center of crankshaft journal inside diameter to center of piston pin bushing using proper caliper. Connecting rods must be the same length. Connecting rods should be checked on an alignment fixture for bent or twisted condition. Replace all components which are damaged or not within specification.

PISTON & CYLINDER BORE FIT

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Ensure cylinder is checked for taper, out-of-round and properly honed prior to checking piston and cylinder bore fit. See **CYLINDER BLOCK**. Using dial bore gauge, measure cylinder bore.

Measure piston skirt diameter at 90 degree angle to piston pin at specified area by manufacturer. Subtract piston diameter from cylinder bore diameter to determine piston-to-cylinder clearance. Clearance must be within specification. Mark piston for proper cylinder location.

ASSEMBLING PISTON & CONNECTING ROD

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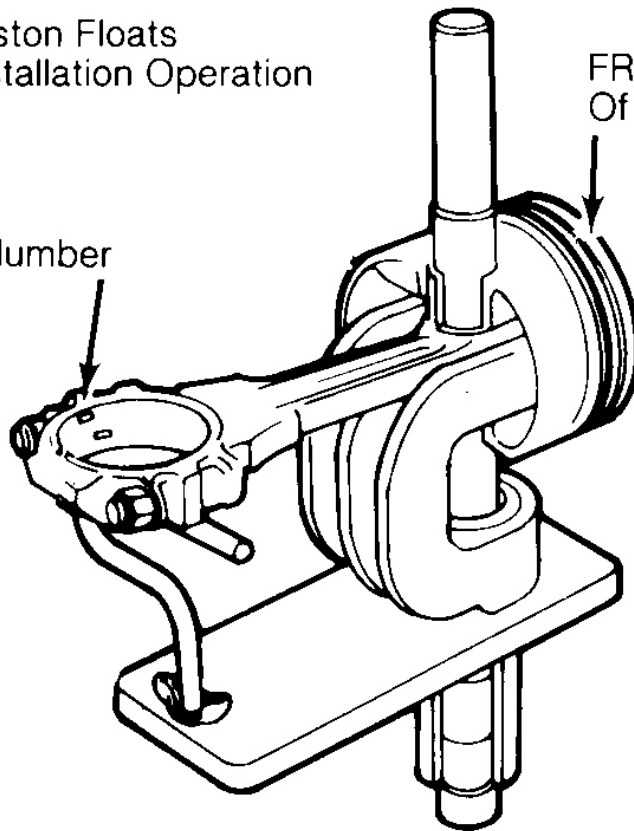
Install piston on connecting rod for corresponding cylinder. Ensure reference marking on top of piston corresponds with connecting rod and cap number. See **Fig. 14**.

Lubricate piston pin and install in connecting rod. Ensure piston pin retainers are fully seated (if equipped). On pressed type piston pins, follow manufacturer's recommended procedure to avoid distortion or breakage.

Ensure Piston Floats
During Installation Operation

Cylinder Number

FRONT Indicator
Of Piston



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Fig. 14: Installing Typical Piston Pin

CHECKING PISTON RING CLEARANCES

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Piston rings must be checked for side clearance and end gap. To check end gap, install piston ring in cylinder in which it is to be installed. Using an inverted piston, push ring to bottom of cylinder in smallest cylinder diameter.

Using feeler gauge, check ring end gap. See **Fig. 15**. Piston ring end gap must be within specification. Ring breakage will occur if insufficient ring end gap exists.

Some manufacturers permit correcting insufficient ring end gap by using a fine file while other manufacturers recommend using another ring set. Mark rings for proper cylinder installation after checking end gap.

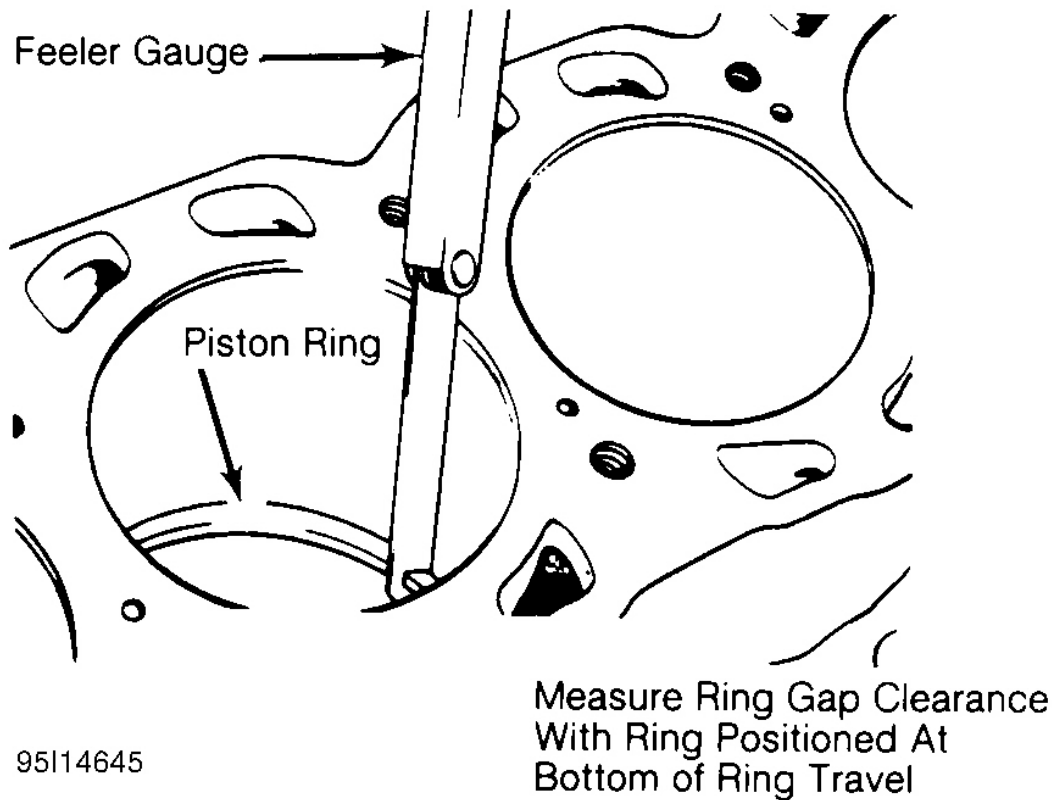


Fig. 15: Checking Piston Ring End Gap

For checking side clearance, install rings on piston. Using feeler gauge, measure clearance between piston ring and piston ring land. Check side clearance in several areas around piston. Side clearance must be within specification.

If side clearance is excessive, piston ring grooves can be machined to accept oversize piston rings (if available). Normal practice is to replace piston.

PISTON & CONNECTING ROD INSTALLATION

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Cylinders must be honed prior to piston installation. See **CYLINDER HONING** under CYLINDER BLOCK.

Install upper connecting rod bearings. Lubricate upper bearings with engine oil. Install lower bearings in rod caps. Ensure bearing tabs are properly seated. Position piston ring gaps according to manufacturer's recommendations. See **Fig. 16**. Lubricate pistons, rings and cylinder walls.

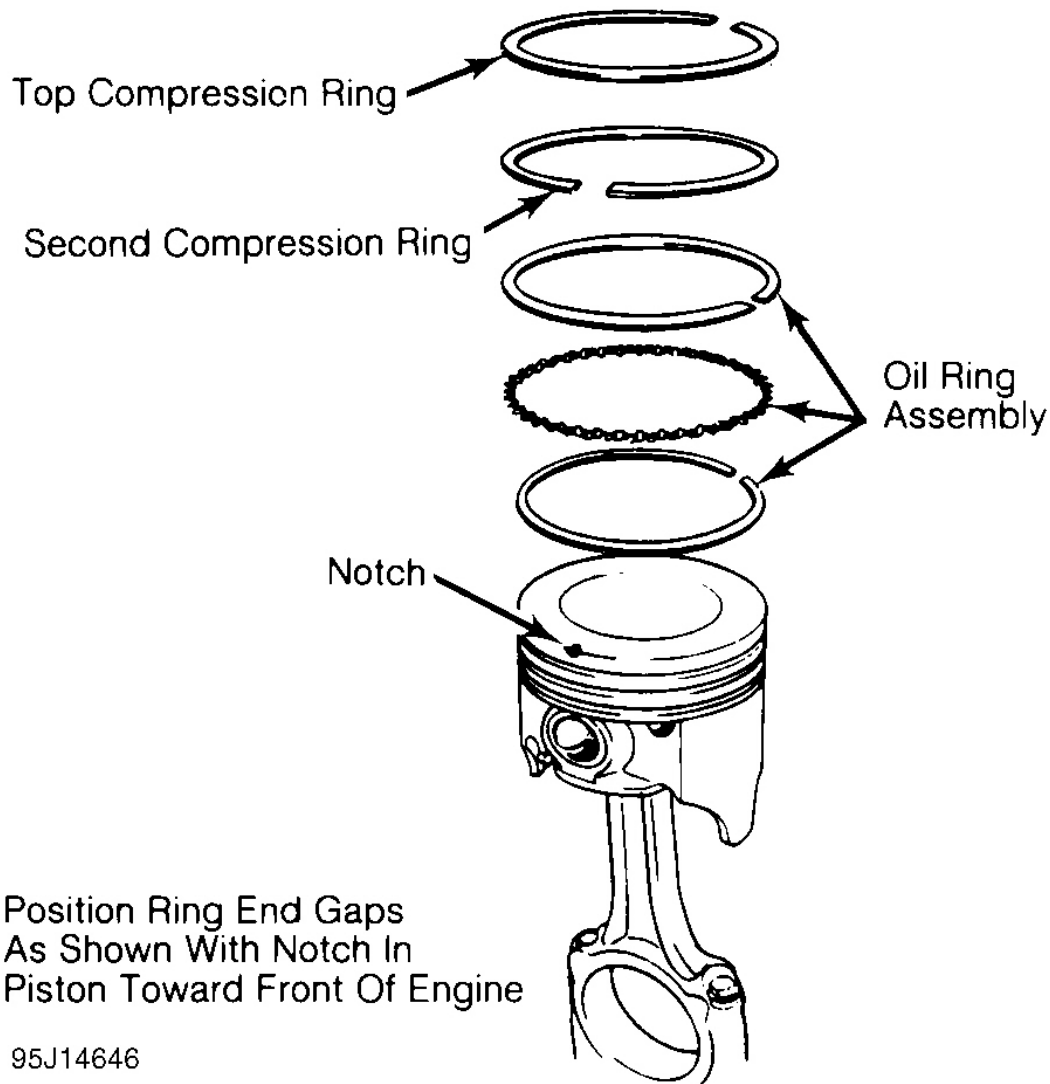
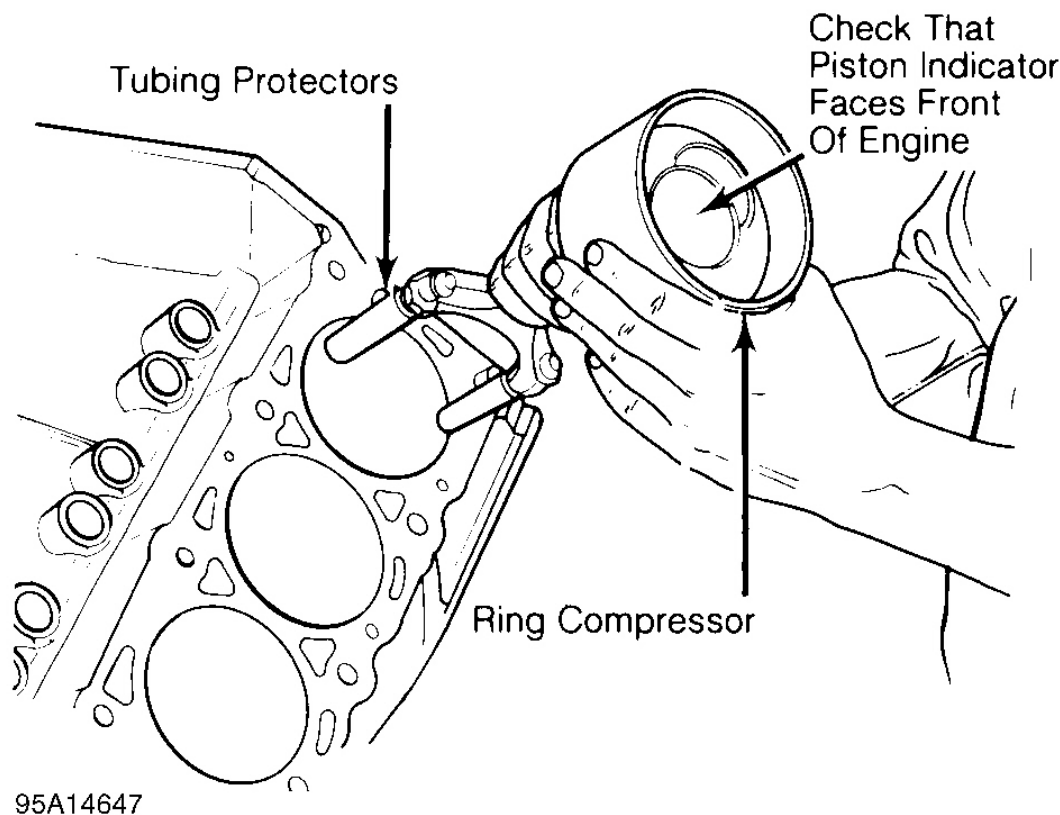


Fig. 16: Positioning Typical Piston Ring End Gap

Install ring compressor. Use care not to rotate piston rings. Compress rings with ring compressor. Install plastic tubing protectors over connecting rod bolts. Install piston and connecting rod assembly. Ensure piston notch, arrow or FRONT mark is toward front of engine. See **Fig. 17**.



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Fig. 17: Installing Piston & Connecting Rod Assembly

Carefully tap piston into cylinder until rod bearing is seated on crankshaft journal. Remove protectors. Install rod cap and bearing. Lightly tighten connecting rod bolts. Repeat procedure for remaining cylinders. Check bearing clearance. See **MAIN & CONNECTING ROD BEARING CLEARANCE**.

Once clearance is checked, lubricate journals and bearings. Install bearing caps. Ensure marks are aligned on connecting rod and cap. Tighten rod nuts or bolts to specification. Ensure rod moves freely on crankshaft. Check connecting rod side clearance. See **CONNECTING ROD SIDE CLEARANCE**.

CONNECTING ROD SIDE CLEARANCE

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Position connecting rod toward one side of crankshaft as far as possible. Using feeler gauge, measure clearance between side of connecting rod and crankshaft. See **Fig. 18**. Clearance must be within specification.

Check for improper bearing installation, wrong bearing cap or insufficient bearing clearance if side clearance is insufficient. Connecting rod may require machining to obtain proper clearance. Excessive clearance usually indicates excessive wear at crankshaft. Crankshaft must be repaired or replaced.

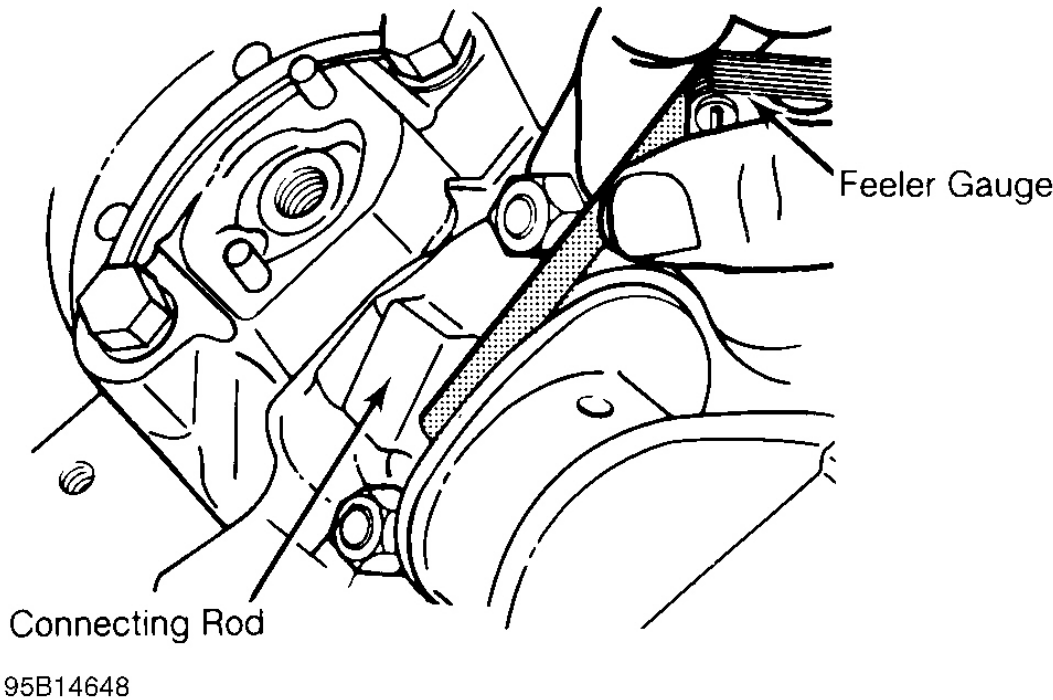


Fig. 18: Measuring Connecting Rod Side Clearance

MAIN & CONNECTING ROD BEARING CLEARANCE

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Plastigage Method

Plastigage method may be used to determine bearing clearance. Plastigage can be used with an engine in service

or during reassembly. Plastigage material is oil soluble.

Ensure journals and bearings are free of oil or solvent. Oil or solvent will dissolve material and false reading will be obtained. Install small piece of Plastigage along full length of bearing journal. Install bearing cap in original location. Tighten bolts to specification.

CAUTION: DO NOT rotate crankshaft while Plastigage is installed. Bearing clearance will not be obtained if crankshaft is rotated.

Remove bearing cap. Compare Plastigage width with scale on Plastigage container to determine bearing clearance. See **Fig. 19**. Rotate crankshaft 90 degrees. Repeat procedure. This is done to check journal eccentricity. This procedure can be used to check oil clearance on both connecting rod and main bearings.

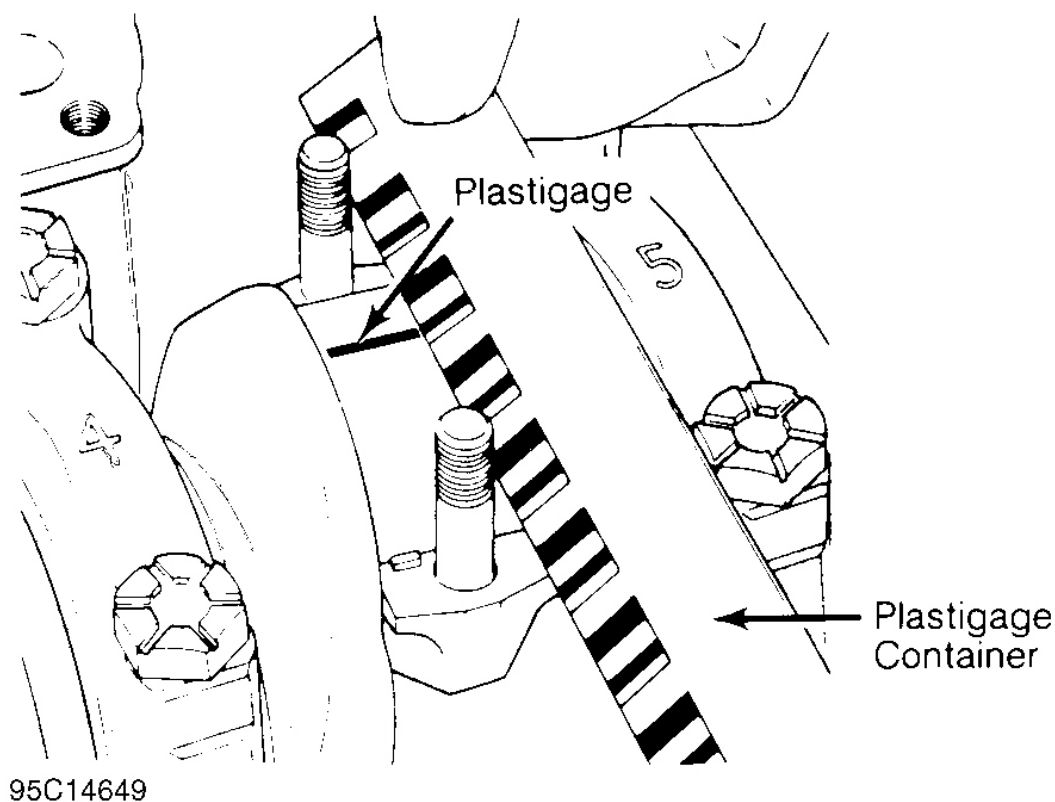


Fig. 19: Measuring Bearing Clearance

Micrometer & Telescopic Gauge Method

A micrometer is used to determine journal diameter, taper and out-of-round dimensions of the crankshaft. See **CLEANING & INSPECTION** under CRANKSHAFT & MAIN BEARINGS in this article.

With crankshaft removed, install bearings and caps in original location on cylinder block. Tighten bolts to specification. On connecting rods, install bearings and caps on connecting rods. Install proper connecting rod cap on corresponding rod. Ensure bearing cap is installed in original location. Tighten bolts to specification.

Using a telescopic gauge and micrometer or inside micrometer, measure inside diameter of connecting rod and main bearings bores. Subtract each crankshaft journal diameter from the corresponding inside bearing bore diameter. This is the bearing clearance.

CRANKSHAFT & MAIN BEARINGS

*** PLEASE READ THIS FIRST ***

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REMOVAL

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Ensure all main bearing caps are marked for location on cylinder block. Some main bearing caps have an arrow stamped on them. The arrow must face timing belt or timing chain end of engine. Remove main bearing cap bolts. Remove main bearing caps. Carefully remove crankshaft. Use care not to bind crankshaft in cylinder block during removal.

CLEANING & INSPECTION

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being repaired.

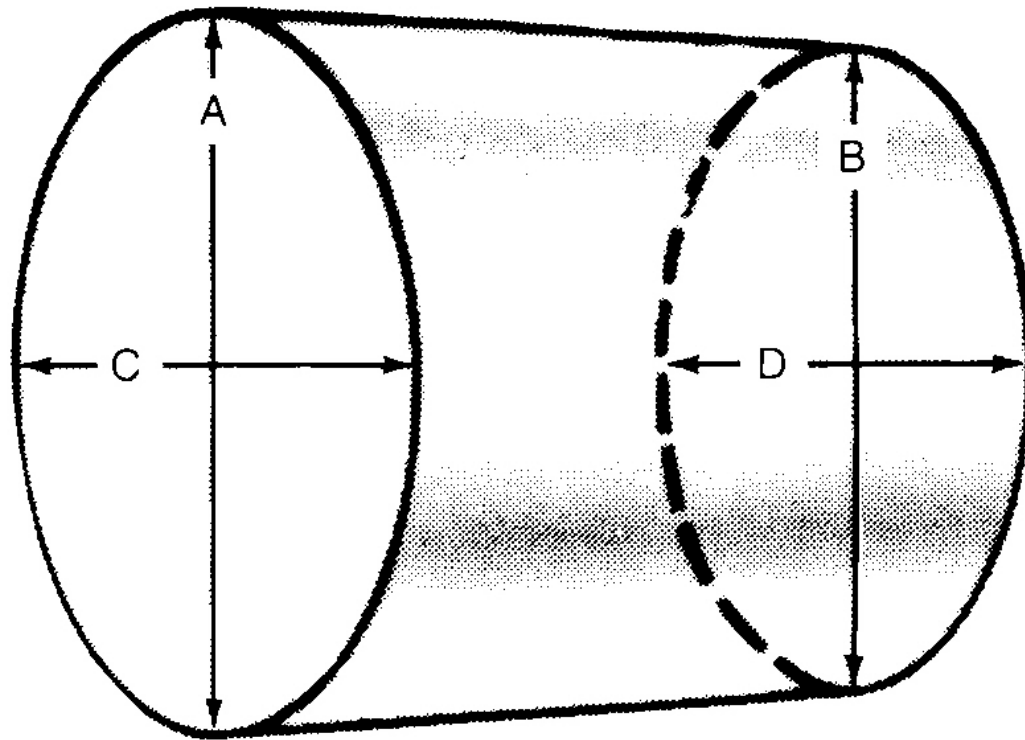
Thoroughly clean crankshaft using solvent. Dry with compressed air. Ensure all oil passages are clear and free of sludge, rust, dirt and metal chips.

Inspect crankshaft for scoring and nicks. Inspect crankshaft for cracks using Magnaflux procedure. Inspect rear seal area for grooving or damage. Inspect bolt hole threads for damage. If pilot bearing or bushing is used, check pilot bearing or bushing fit in crankshaft. Inspect crankshaft gear for damaged or cracked teeth. Replace gear if damaged. Ensure oil passage plugs are tight (if equipped).

Using micrometer, measure all journals in 4 areas to determine journal taper, out-of-round and undersize. See **Fig. 20**. Some crankshafts can be reground to the next largest undersize, depending on the amount of wear or damage. Crankshafts with rolled fillet cannot be reground and must be replaced.

- A - B = Vertical Taper
- C - D = Horizontal Taper
- A - C & B - D = Out-Of-Round

Check For Out-Of-Round At Each End Of Journal



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Fig. 20: Measuring Crankshaft Journals

Crankshaft journal runout should be checked. Install crankshaft in "V" blocks or bench center. Position dial indicator with tip resting on the main bearing journal area. See **Fig. 21**. Rotate crankshaft and note reading. Journal runout must not exceed specification. Repeat procedure on all main bearing journals. Crankshaft must be replaced if runout exceeds specification.

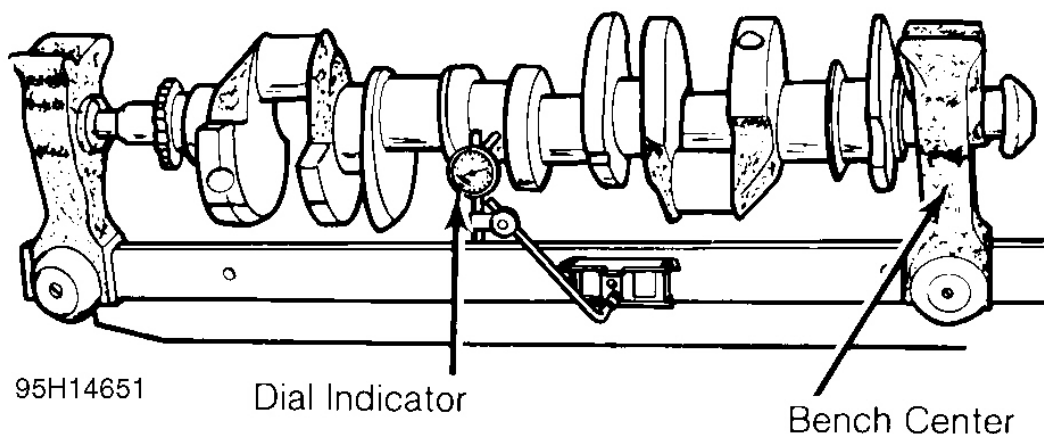


Fig. 21: Measuring Crankshaft Main Bearing Journal Runout

INSTALLATION

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Install upper main bearing in cylinder block. Ensure lock tab is properly located in cylinder block. Install bearings in main bearing caps. Ensure all oil passages are aligned. Install rear seal (if removed).

Ensure crankshaft journals are clean. Lubricate upper main bearings with clean engine oil. Carefully install crankshaft. Check each main bearing clearance using Plastigage method. See **MAIN & CONNECTING ROD BEARING CLEARANCE**.

Once clearance is checked, lubricate lower main bearing and journals. Install main bearing caps in original location. Install rear seal in rear main bearing cap (if removed). Some rear main bearing caps require sealant to be applied in corners to prevent oil leakage.

Install and tighten all bolts except thrust bearing cap to specification. Tighten thrust bearing cap bolts finger tight only. Some models require that thrust bearing be aligned. On most applications, crankshaft must be moved rearward then forward. Procedure may vary with manufacturer. Thrust bearing cap is then tightened to specification. Ensure crankshaft rotates freely. Crankshaft end play should be checked. See **CRANKSHAFT END PLAY**.

CRANKSHAFT END PLAY

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Dial Indicator Method

Crankshaft end play can be checked using dial indicator. Mount dial indicator on rear of cylinder block. Position dial indicator tip against rear of crankshaft. Ensure tip is resting against flat surface.

Pry crankshaft rearward. Adjust dial indicator to zero. Pry crankshaft forward and note reading. Crankshaft end play must be within specification. If end play is not within specification, check for faulty thrust bearing installation or worn crankshaft. Some applications offer oversize thrust bearings.

Feeler Gauge Method

Crankshaft end play can be checked using feeler gauge. Pry crankshaft rearward. Pry crankshaft forward. Using feeler gauge, measure clearance between crankshaft and thrust bearing surface. See **Fig. 22**.

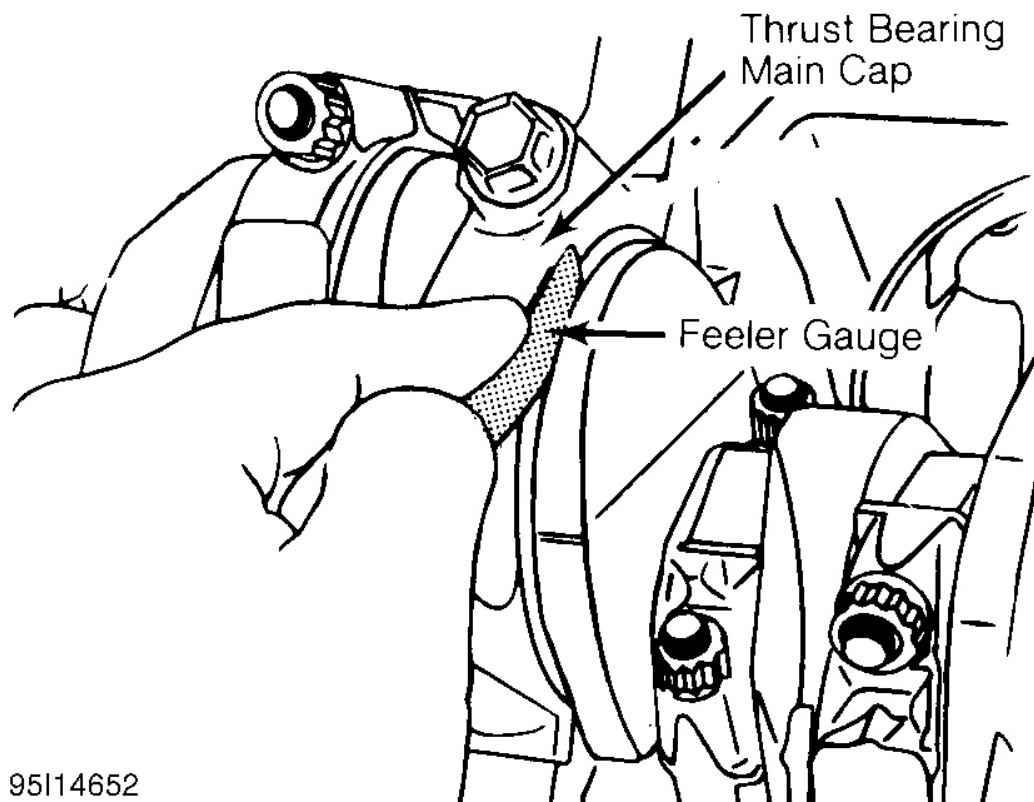


Fig. 22: Checking Crankshaft End Play

Crankshaft end play must be within specification. If end play is not within specification, check for faulty thrust bearing installation or worn crankshaft. Some applications offer oversize thrust bearings.

CYLINDER BLOCK

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Block Cleaning

Only cast cylinder blocks should be hot tank cleaned. Aluminum cylinder blocks should be cleaned using cold

tank method. Cylinder block is cleaned in order to remove carbon deposits, gasket residue and water jacket scale. Remove oil gallery plugs, freeze plugs and cam bearings before cleaning block.

Block Inspection

Visually inspect the block. Check suspected areas for cracks using the Dye Penetrant inspection method. Block may be checked for cracks using the Magnaflux method.

Cracks are most commonly found at the bottom of cylinders, main bearing saddles, near expansion plugs and between cylinders and water jackets. Inspect lifter bores for damage. Inspect all head bolt holes for damaged threads. Threads should be cleaned using tap to ensure proper head bolt torque. Consult machine shop concerning possible welding and machining (if required).

Cylinder Bore Inspection

Inspect bore for scoring or roughness. Cylinder bore is dimensionally checked for out-of-round and taper using dial bore gauge. For determining out-of-round, measure cylinder parallel and perpendicular to the block center line. Difference in the 2 readings is the bore out-of-round. Cylinder bore must be checked at top, middle and bottom of piston travel area.

Bore taper is obtained by measuring bore at the top and bottom. If wear has exceeded allowable limits, block must be honed or bored to next available oversize piston dimension.

Cylinder Honing

Cylinder must be properly honed to allow new piston rings to properly seat. Cross-hatching at correct angle and depth is critical to lubrication of cylinder walls and pistons.

A flexible drive hone and power drill are commonly used. Drive hone must be lubricated during operation. Mix equal parts of kerosene and SAE 20W engine oil for lubrication.

Apply lubrication to cylinder wall. Operate cylinder hone from top to bottom of cylinder using even strokes to produce 45 degree cross-hatch pattern on the cylinder wall. DO NOT allow cylinder hone to extend below cylinder during operation.

Recheck bore dimension after final honing. Wash cylinder wall with hot soapy water to remove abrasive particles. Blow dry with compressed air. Coat cleaned cylinder walls with lubricating oil.

Deck Warpage

Check deck for damage or warped gasket surface. Place a straightedge across gasket surface of the deck. Using feeler gauge, measure clearance at center of straightedge. Measure across width and length of cylinder block at several points.

If warpage exceeds specifications, deck must be resurfaced. If warpage exceeds manufacturer's maximum tolerance for material removal, replace block.

NOTE: Some manufacturers recommend that a total amount of material (cylinder head and cylinder block) can only be removed before components must be replaced.

Deck Height

Distance from crankshaft center line to block deck is called the deck height. Measure and record front and rear main journals of crankshaft. To compute this distance, install crankshaft and retain with center main bearing and cap only. Measure distance from crankshaft journal to block deck, parallel to cylinder center line.

Add one half of main bearing journal diameter to distance from crankshaft journal to block deck. This dimension should be checked at front and rear of cylinder block. Both readings should be the same.

If difference exceeds specification, cylinder block must be repaired or replaced. Deck height and warpage should be corrected at the same time.

Main Bearing Bore & Alignment

For checking main bearing bore, remove all bearings from cylinder block and main bearing caps. Install main bearing caps in original location. Tighten bolts to specification. Using inside micrometer, measure main bearing bore in 2 areas 90 degrees apart. Determine bore size and out-of-round. If diameter is not within specification, block must be align-bored.

For checking alignment, place a straightedge along center line of main bearing saddles. Check for clearance between straightedge and main bearing saddles. Block must be align-bored if clearance exists.

Expansion Plug Removal

Drill hole in center of expansion plug. Remove with screwdriver or punch. Use care not to damage sealing surface.

Expansion Plug Installation

Ensure sealing surface is free of burrs. Coat expansion plug with sealer. Using wooden dowel or pipe of slightly smaller diameter, install expansion plug. Ensure expansion plug is evenly located.

Oil Gallery Plug Removal

Remove threaded oil gallery plugs using appropriate wrench. Soft press-in plugs are removed by drilling into plug and installing a sheet metal screw. Remove plug with slide hammer or pliers.

Oil Gallery Plug Installation

Ensure threads or sealing surface is clean. Coat threaded oil gallery plugs with sealer and install. Replacement soft press-in plugs are installed with a hammer and drift.

CAMSHAFT

*** PLEASE READ THIS FIRST ***

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CLEANING & INSPECTION

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Clean camshaft with solvent. Ensure all oil passages are clear. Inspect cam lobes and bearing journals for pitting, flaking or scoring. Using micrometer, measure bearing journal O.D.

Support camshaft at each end with "V" blocks. Position dial indicator with tip resting on center bearing journal. Rotate camshaft and note camshaft runout reading. If reading exceeds specification, replace camshaft.

Check cam lobe lift by measuring base circle of camshaft using micrometer. Measure again at 90-degree angle to tip of cam lobe. Cam lift can be determined by subtracting base circle diameter from tip of cam lobe measurement.

Different lift dimensions are given for intake and exhaust cam lobes. Reading must be within specification. Replace camshaft if cam lobes or bearing journals are not within specification.

Inspect camshaft gear for chipped, eroded or damaged teeth. Replace gear if damaged. On camshafts using thrust plate, measure distance between thrust plate and camshaft shoulder. Replace thrust plate if not within specification.

CAMSHAFT BEARINGS

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Removal & Installation

Remove camshaft rear plug. Camshaft bearing remover is assembled with shoulder resting against bearing to be removed according to manufacturer's instructions. Tighten puller nut until bearing is removed. Remove remaining bearings, leaving front and rear bearings until last. These bearings act as a guide for camshaft bearing remover.

To install new bearings, puller is rearranged to pull bearings toward the center of block. Ensure all lubrication passages of bearing are aligned with cylinder block. Coat new camshaft rear plug with sealant. Install camshaft rear plug. Ensure plug is even in cylinder block.

CAMSHAFT INSTALLATION

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Lubricate bearing surfaces and cam lobes with ample amount of Molykote or camshaft lubricant. Carefully install camshaft. Use care not to damage bearing journals during installation. Install thrust plate retaining bolts (if equipped). Tighten bolts to specification. On overhead camshafts, install bearing caps in original location. Tighten bolts to specification. On all applications, check camshaft end play.

CAMSHAFT END PLAY

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Using dial indicator, check camshaft end play. Position dial indicator on front of engine block or cylinder head. Position indicator tip against camshaft. Push camshaft toward rear of cylinder head or engine and adjust indicator to zero.

Move camshaft forward and note reading. Camshaft end play must be within specification. End play may be adjusted by relocating gear, shimming thrust plate or replacing thrust plate depending on each manufacturer.

TIMING CHAINS & BELTS

*** PLEASE READ THIS FIRST ***

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TIMING CHAINS

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Timing chains will stretch during operation. Limits are placed upon amount of stretch before replacement is required. Timing chain stretch will alter ignition timing and valve timing.

To check timing chain stretch, rotate crankshaft to eliminate slack from one side of timing chain. Mark reference point on cylinder block. Rotate crankshaft in opposite direction to eliminate slack from remaining side of timing chain. Force other side of chain outward and measure distance between reference point and timing chain. See **Fig. 23**. Replace timing chain and gears if not within specification.

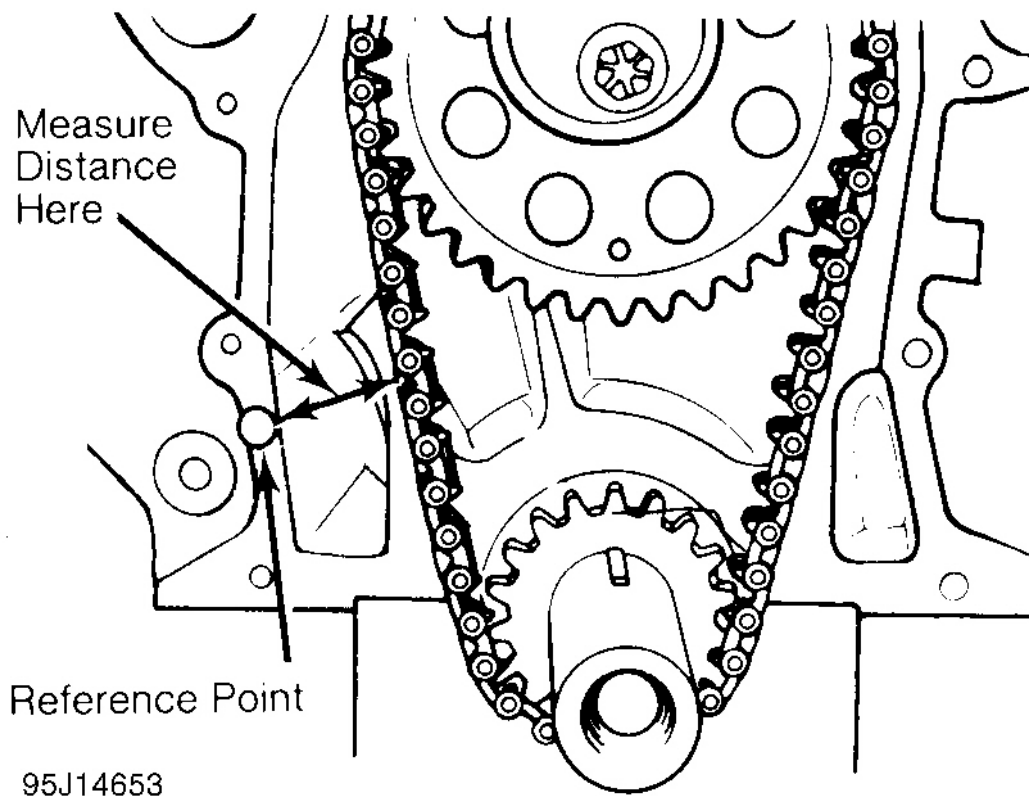


Fig. 23: Measuring Timing Chain Stretch

Timing chains must be installed so timing marks on camshaft gear and crankshaft gear are aligned according to manufacturer. See **Fig. 24**.

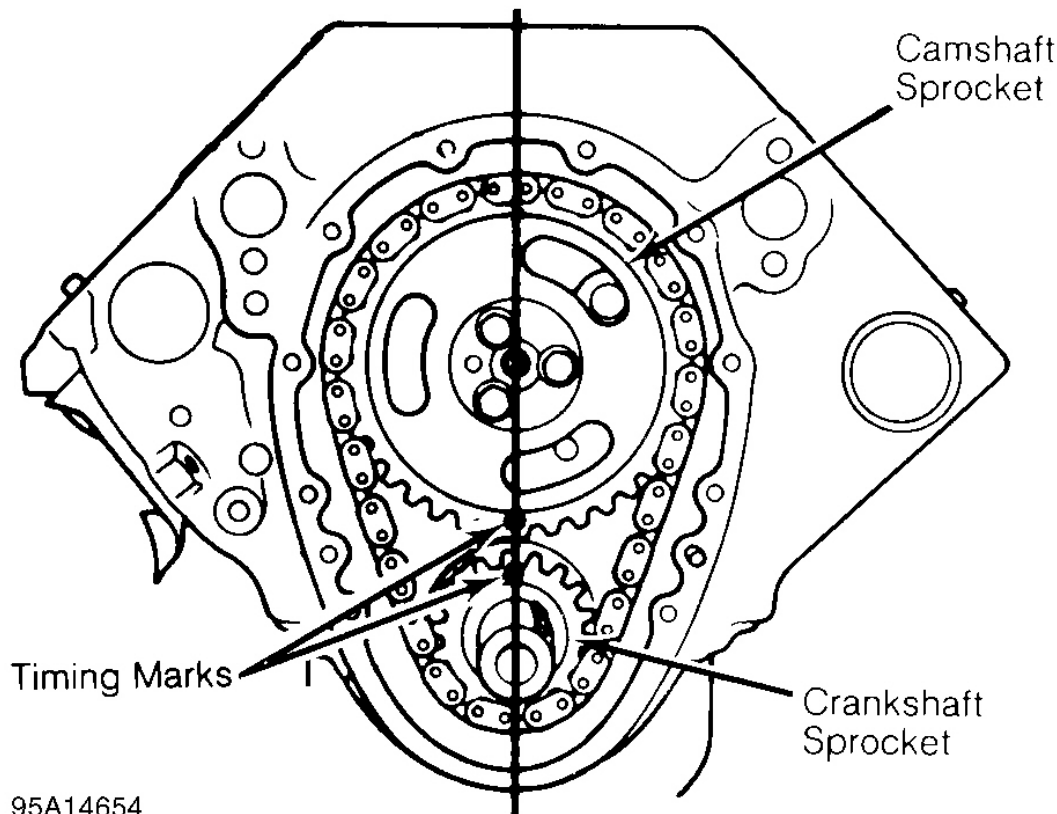


Fig. 24: Typical Gear Timing Mark Alignment

TIMING BELTS

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Always refer to appropriate engine overhaul article, if available, in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

Cogged tooth belts are commonly used on overhead cam engines. Inspect belt teeth for rounded corners or cracking. Replace belt if it is cracked, damaged, missing teeth or oil soaked.

Used timing belt must be installed in original direction of rotation. Inspect all sprocket teeth for wear. Replace all worn sprockets. Sprockets are marked for timing purposes. Engine is positioned so that crankshaft sprocket mark will be upward. Camshaft sprocket is aligned with reference mark on cylinder head or timing belt cover

and then timing belt can be installed. See **Fig. 25**.

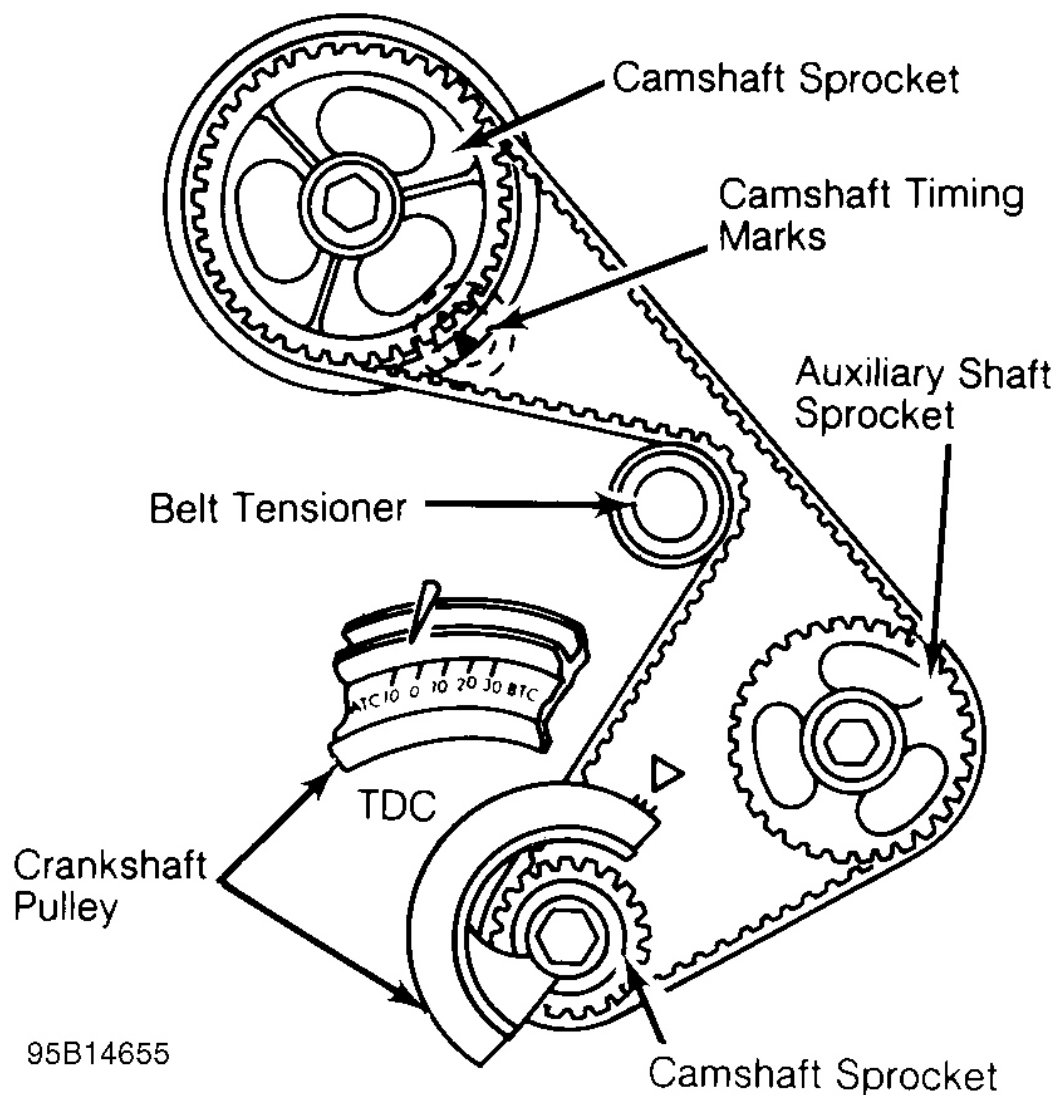


Fig. 25: Typical Camshaft Belt Sprocket Alignment

TENSION ADJUSTMENT

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If guide rails are used with spring loaded tensioners, ensure at least half of original rail thickness remains. Spring loaded tensioner should be inspected for damage.

Ensure all timing marks are aligned. Adjust belt tension using manufacturer's recommendations. Belt tension may require checking using tension gauge. See **Fig. 26**.

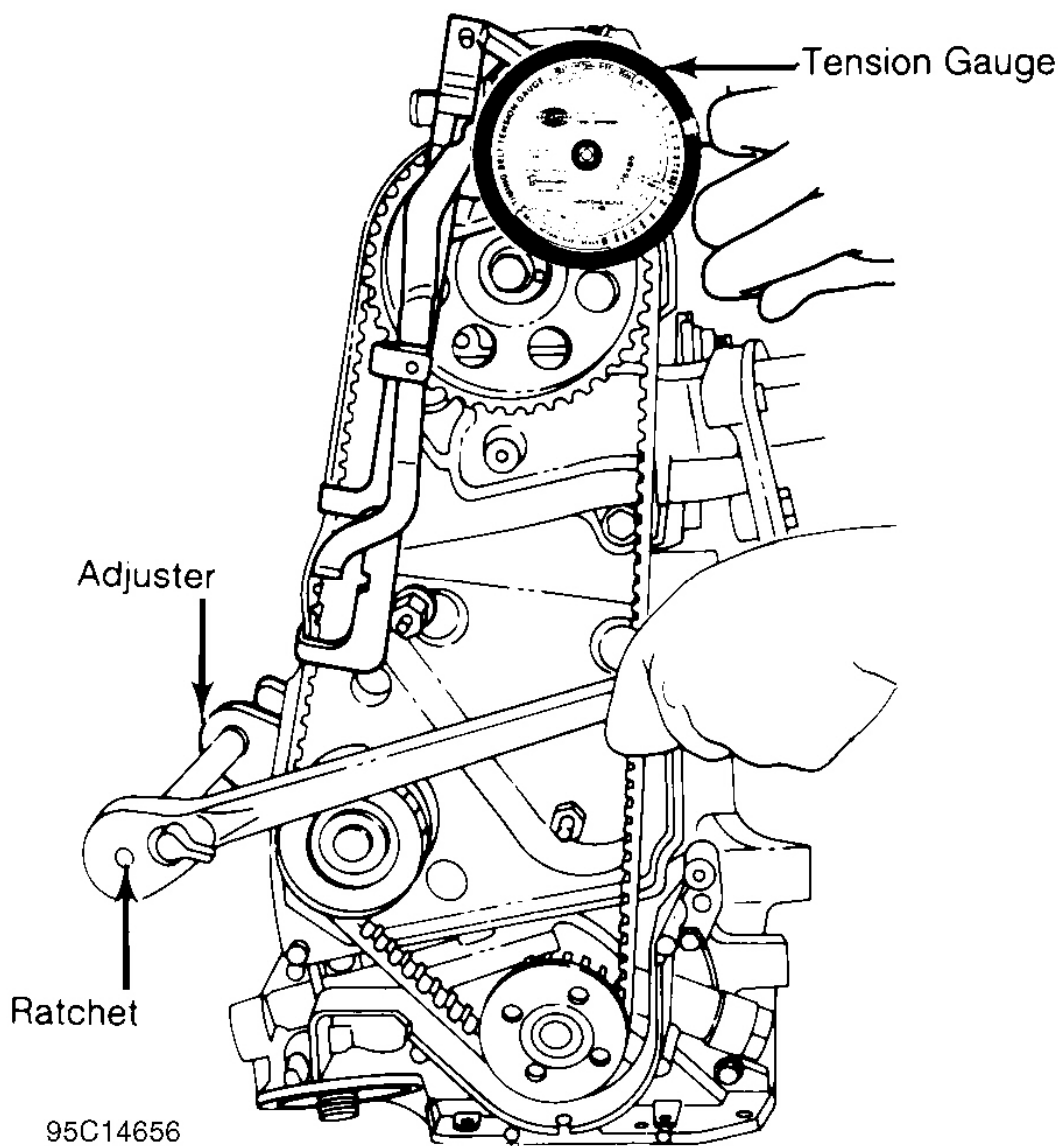


Fig. 26: Adjusting Typical Timing Belt Tension**TIMING GEARS**

*** PLEASE READ THIS FIRST ***

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TIMING GEAR BACKLASH & RUNOUT

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Always refer to appropriate engine overhaul article, if available, in the **ENGINES** section for complete overhaul procedures and specifications for the vehicle being repaired.

On engines where camshaft gear operates directly on crankshaft gear, gear backlash and runout must be checked. To check backlash, install dial indicator with tip resting on tooth of camshaft gear. Rotate camshaft gear as far as possible. Adjust indicator to zero. Rotate camshaft gear in opposite direction as far as possible and note reading.

To determine timing gear runout, mount dial indicator with tip resting on face edge of camshaft gear. Adjust indicator to zero. Rotate camshaft gear 360 degrees and note reading. If backlash or runout exceeds specification, replace camshaft and/or crankshaft gear.

REAR MAIN OIL SEAL INSTALLATION

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Always refer to appropriate engine overhaul article, if available, in the **ENGINES** section for complete overhaul procedures and specifications for the vehicle being repaired.

One-Piece Type Seal

For one-piece type oil seal installation, coat block contact surface of seal with sealer if seal is not factory coated. Ensure seal surface is free of burrs. Lubricate seal lip with engine oil and press seal into place using proper oil seal installer. See **Fig. 27**.

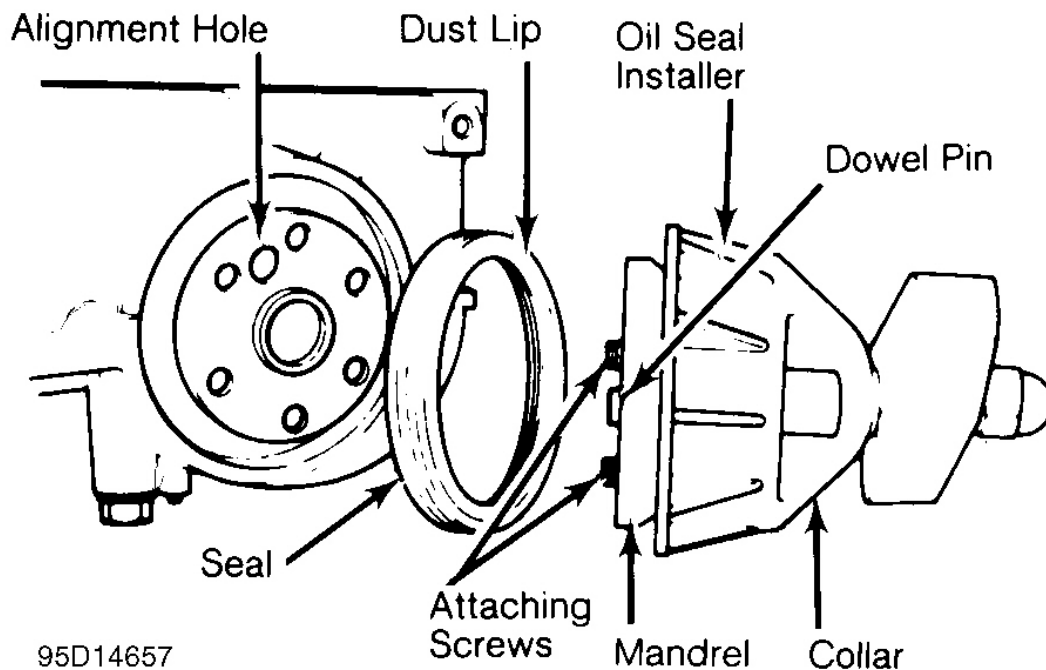


Fig. 27: Installing Typical One-Piece Oil Seal

Rope Type Seal

For rope type rear main oil seal installation, press seal lightly into seat area. Using seal installer, fully seat seal in bearing cap or cylinder block.

Trim seal ends even with cylinder block parting surface. Some applications require sealer to be applied on main bearing cap before installing. See **Fig. 28**.

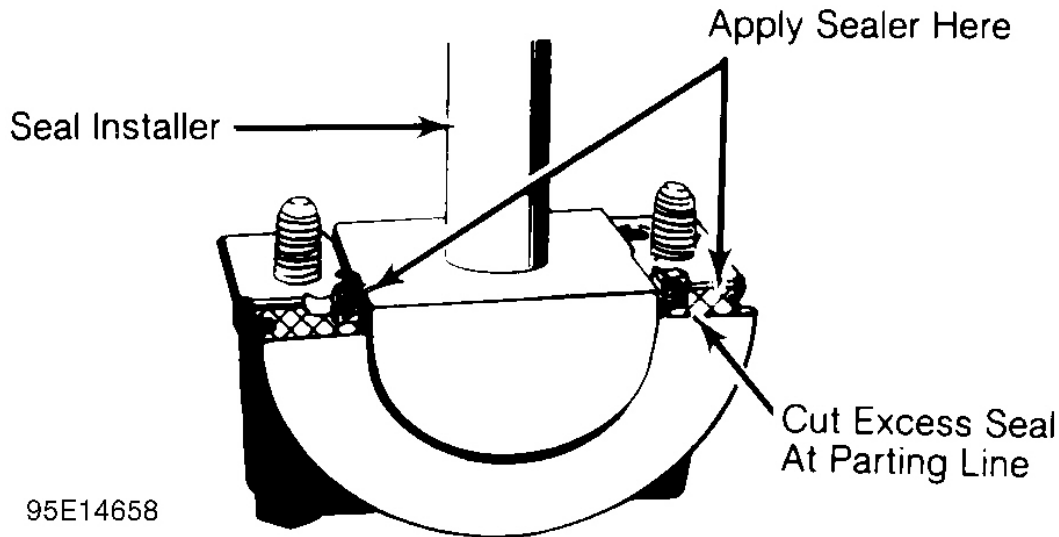


Fig. 28: Installing Typical Rope Seal

Split-Rubber Type Seal

Follow manufacturer's procedures when installing split-rubber type rear main oil seals. Installation procedures vary with manufacturer and engine type. See **Fig. 29**.

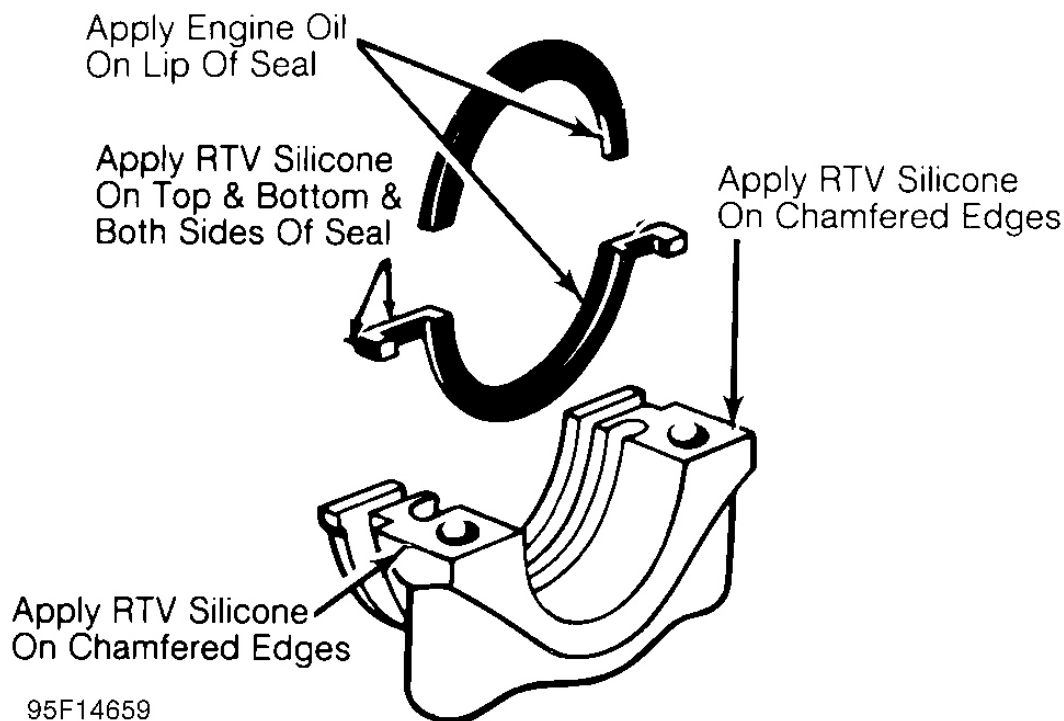


Fig. 29: Installing Typical Split-Rubber Seal

OIL PUMP

*** PLEASE READ THIS FIRST ***

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ROTOR TYPE

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Mark oil pump rotor locations before removing. See **Fig. 30**. Remove outer rotor and measure thickness and diameter. Measure inner rotor thickness. Inspect shaft for scoring or wear. Inspect rotors for pitting or damage. Inspect cover for grooving or wear. Replace worn or damaged components.

Measure outer rotor-to-body clearance. Replace pump assembly if clearance exceeds specification. Measure clearance between rotors. See **Fig. 31**. Replace shaft and both rotors if clearance exceeds specification.

Install rotors in pump body. Position straightedge across pump body. Using feeler gauge, measure clearance between rotors and straightedge. Pump cover wear is measured using a straightedge and feeler gauge. Replace pump if clearance exceeds specification.

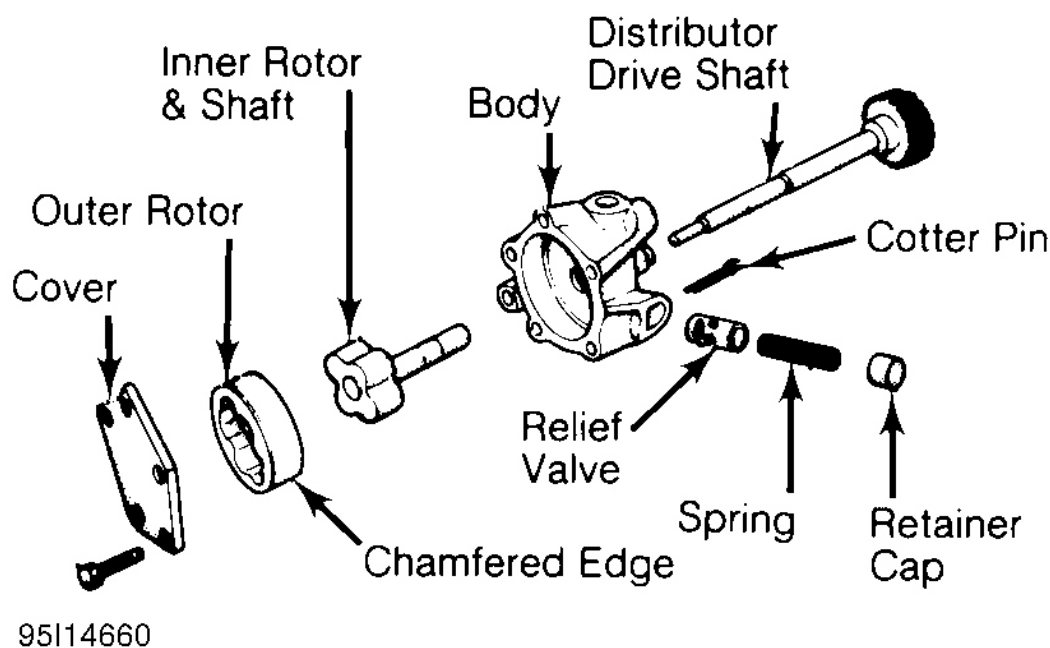


Fig. 30: Typical Rotor Type Oil Pump

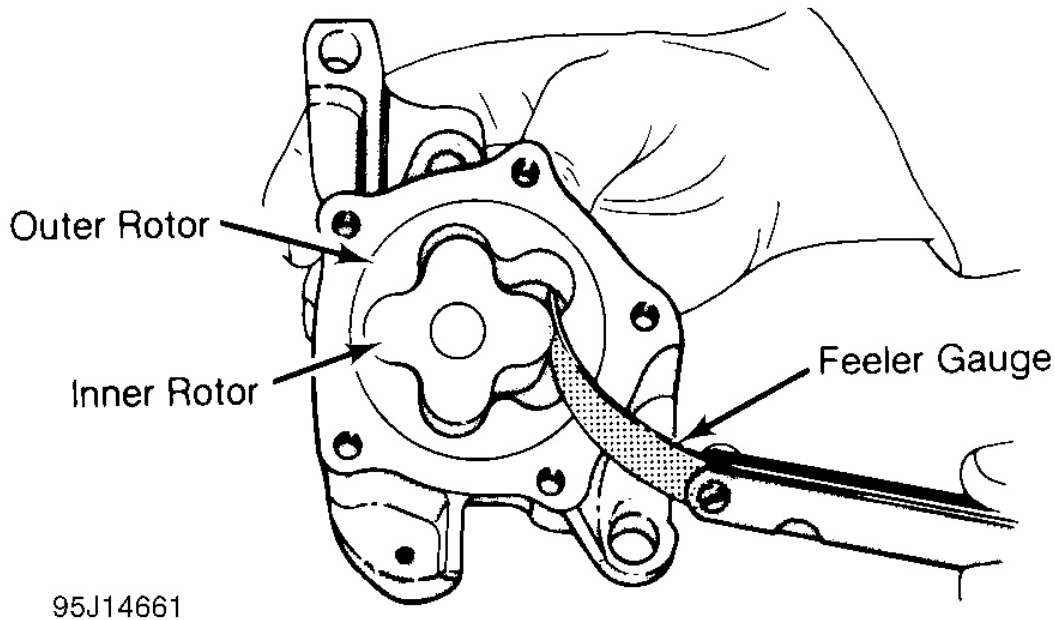


Fig. 31: Measuring Rotor Clearance

GEAR TYPE

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Mark oil pump gear location before removing. See **Fig. 32**. Remove gears from pump body. Inspect gears for pitting or damage. Inspect cover for grooving or wear. Measure gear diameter and length. Measure gear housing cavity depth and diameter. See **Fig. 33**. Replace worn or damaged components.

Pump cover wear is measured using a straightedge and feeler gauge. Replace pump or components if warpage or wear exceeds specification, or mating surface of pump cover is scratched or grooved.

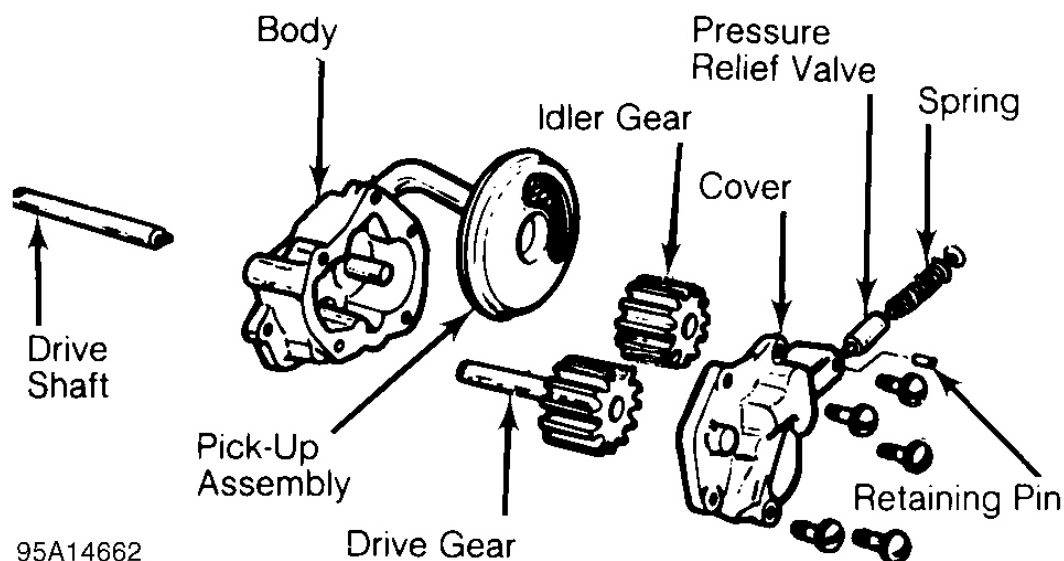
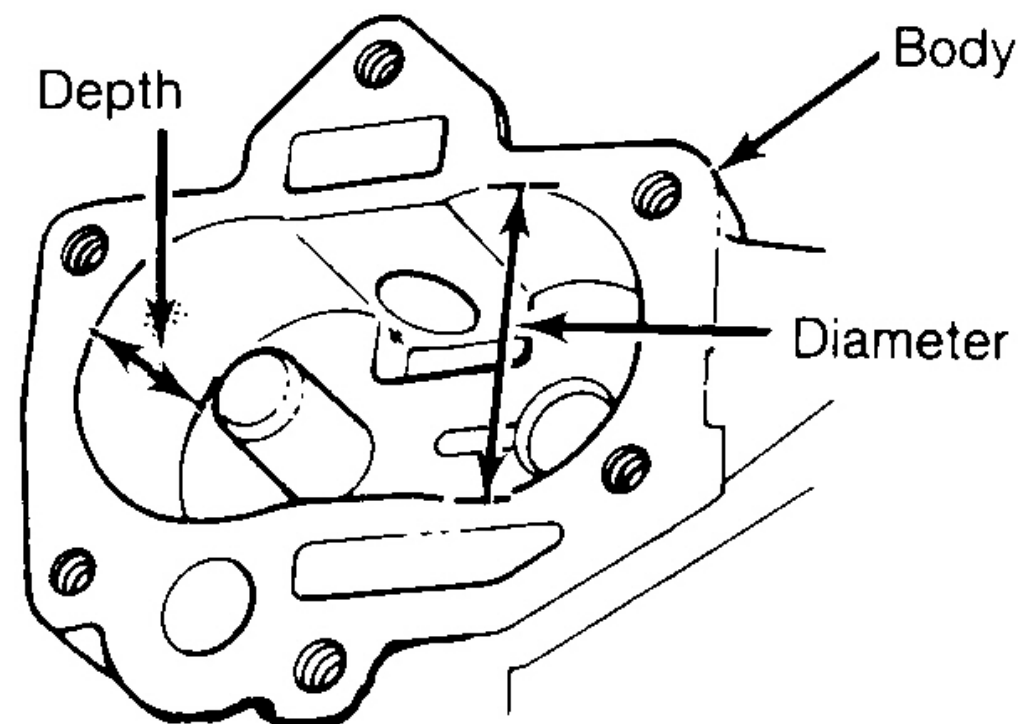


Fig. 32: Typical Gear Type Oil Pump



95B14663

Fig. 33: Measuring Oil Pump Gear Cavity

BREAK-IN PROCEDURE

*** PLEASE READ THIS FIRST ***

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ENGINE PRE-OILING

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Pre-oil engine prior to operation to prevent engine damage. Lightly oiled oil pump will cavitate unless oil pump cavities are filled with engine oil or petroleum jelly.

Engine pre-oiling can be done using pressure oiler (if available). Connect pressure oiler to cylinder block oil passage such as oil pressure sending unit. Operate pressure oiler long enough to ensure correct amount of oil has filled crankcase. Check oil level while pre-oiling.

If pressure oiler is not available, disconnect ignition system. Remove oil pressure sending unit and replace with oil pressure test gauge. Using starter motor, rotate engine starter until gauge shows normal oil pressure for several seconds. DO NOT crank engine for more than 30 seconds to avoid starter motor damage. Ensure oil pressure has reached the most distant point from the oil pump.

NOTE: If new lifters or camshaft are installed, some manufacturers require that a crankcase conditioner be added to engine oil. The engine should be operated for specified amount of time to aid in lifter break-in procedure.

INITIAL START-UP

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Always refer to appropriate engine overhaul article, if available, in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

Start engine and operate engine at low speed while checking for coolant, fuel and oil leaks. Stop engine. Recheck coolant and oil level. Adjust if necessary.

CAMSHAFT

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Break-in procedure is required when new or reground camshaft has been installed. Operate and maintain engine speed between 1500-2500 RPM for approximately 30 minutes. Procedure may vary due to manufacturer's recommendations.

PISTON RINGS

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Piston rings require a break-in procedure to ensure seating of rings to cylinder walls. Serious damage may occur to rings if correct procedures are not followed.

Extremely high piston ring temperatures are obtained during break-in process. If rings are exposed to excessively high RPM or high cylinder pressures, ring damage can occur. Follow piston ring manufacturer's recommended break-in procedure.

FINAL ADJUSTMENTS

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Always refer to appropriate engine overhaul article, if available, in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

Check or adjust ignition timing and dwell (if applicable). Adjust valves (if necessary). Adjust idle speed and mixture. Retighten cylinder heads (if required). If cylinder head or block is aluminum, retighten bolts when engine is cold. Follow the engine manufacturer's recommended break-in procedure and maintenance schedule for new engines.

NOTE: Some manufacturers require that head bolts be retightened after specified amount of operation. This must be done to prevent head gasket failure.

ENGINE

Engine - Repair

1100 ENGINE, GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

ENGINE IDENTIFICATION

Punch engine numbers at marked surface with number punch.

Magnesium crankcase with sticker

M47/M47TU/M47T2

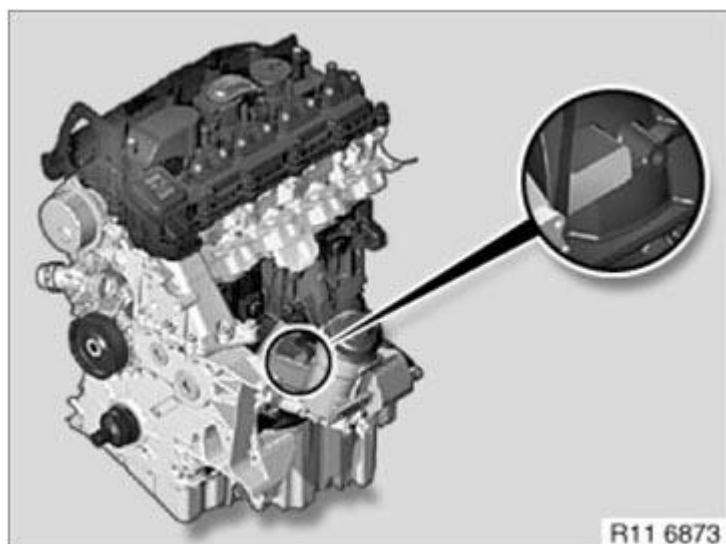


Fig. 1: Identifying Engine Identification Numbers Location (M47/M47TU/M47T2)
Courtesy of BMW OF NORTH AMERICA, INC.

M57/M57TU/M57T2

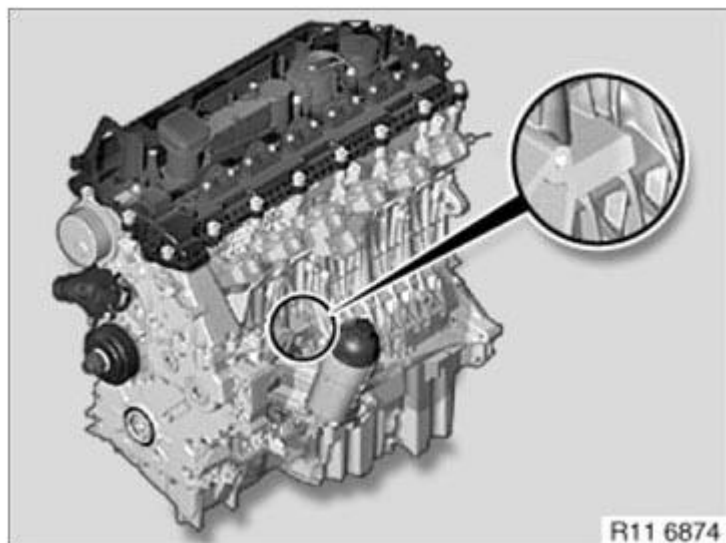


Fig. 2: Identifying Engine Identification Numbers Location - M57/M57TU/M57T2
Courtesy of BMW OF NORTH AMERICA, INC.

M67/M67TU

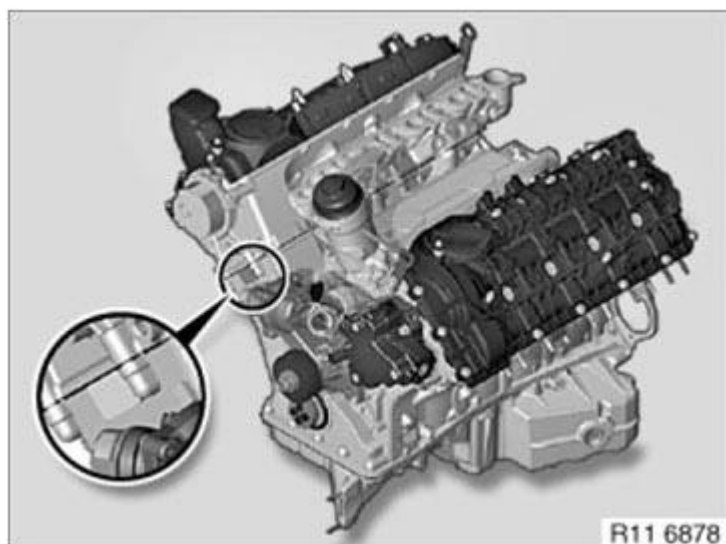


Fig. 3: Identifying Engine Identification Numbers Location - M67/M67TU
Courtesy of BMW OF NORTH AMERICA, INC.

N47/N47S/N47C/N57 N57S

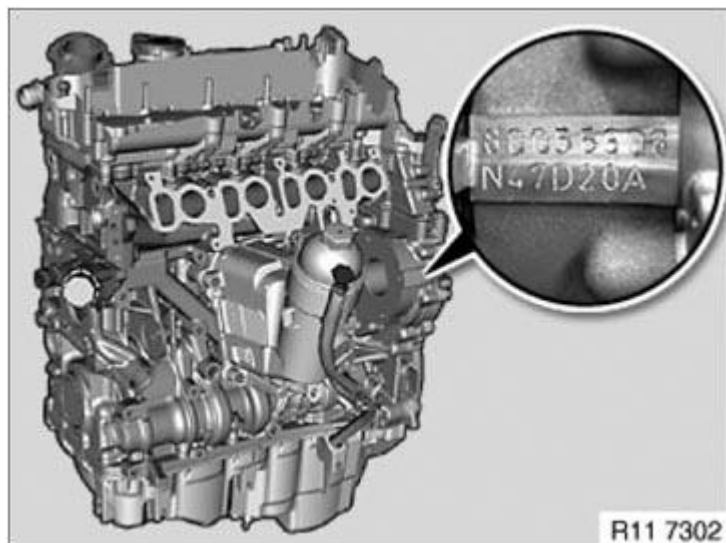


Fig. 4: Identifying Engine Identification Numbers Location - N47/N47S/N47C/N57 N57S
Courtesy of BMW OF NORTH AMERICA, INC.

M52/M52TU

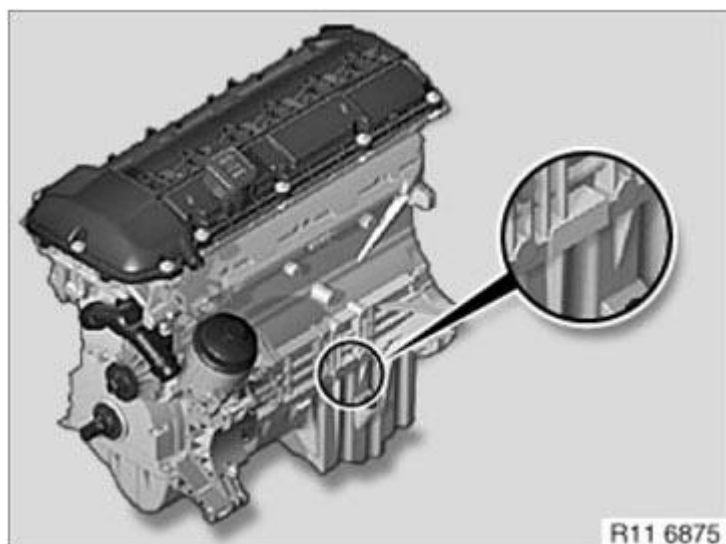


Fig. 5: Identifying Engine Identification Numbers Location (M52 / M52TU)
Courtesy of BMW OF NORTH AMERICA, INC.

M54

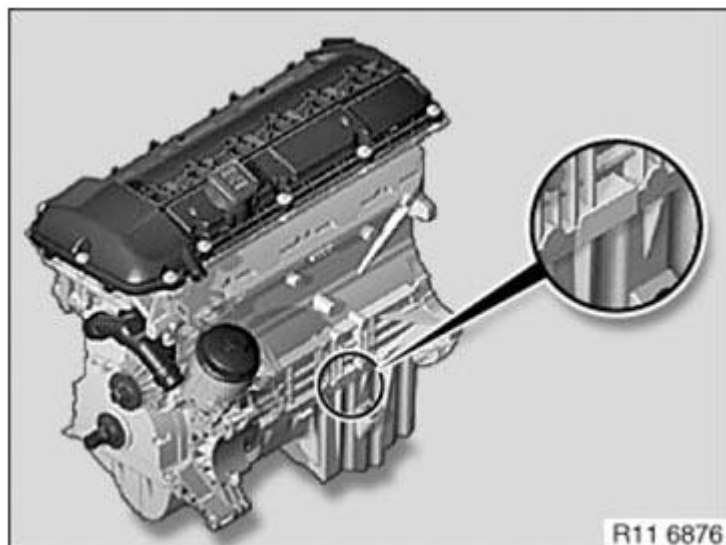


Fig. 6: Identifying Engine Identification Numbers Location (M54)
Courtesy of BMW OF NORTH AMERICA, INC.

M56

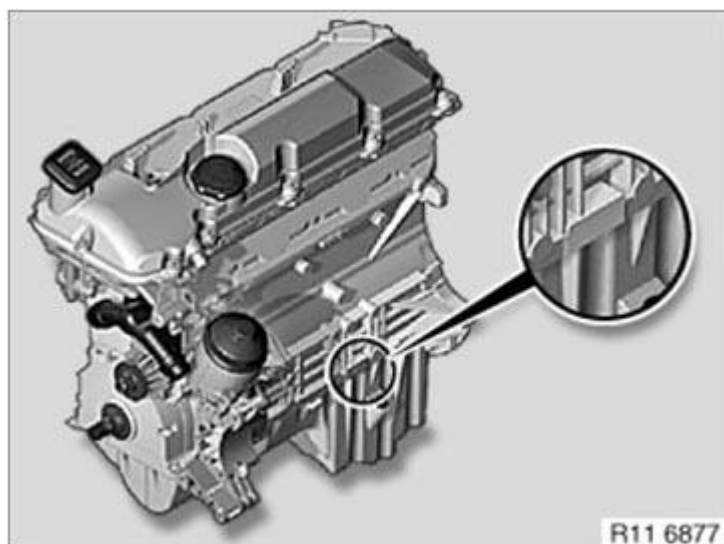


Fig. 7: Identifying Engine Identification Numbers Location - M56
Courtesy of BMW OF NORTH AMERICA, INC.

N40/N45/N45T/N43

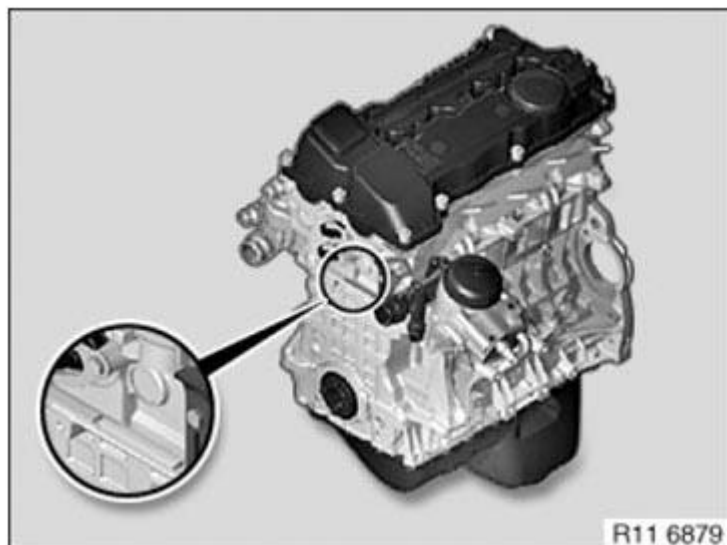


Fig. 8: Identifying Engine Identification Numbers Location - N40/N45/N45T/N43
Courtesy of BMW OF NORTH AMERICA, INC.

N42/N46/N46T

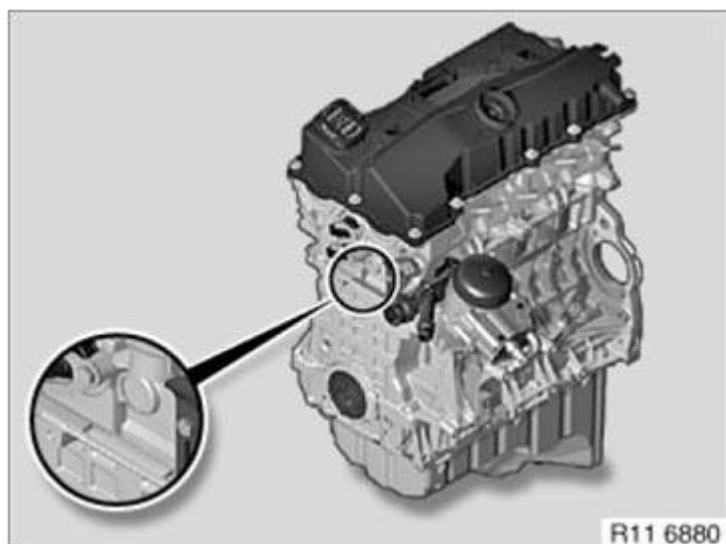


Fig. 9: Identifying Engine Identification Numbers Location - N42/N46/N46T
Courtesy of BMW OF NORTH AMERICA, INC.

N51/N52/N52K/N52T/N53/N54/N55

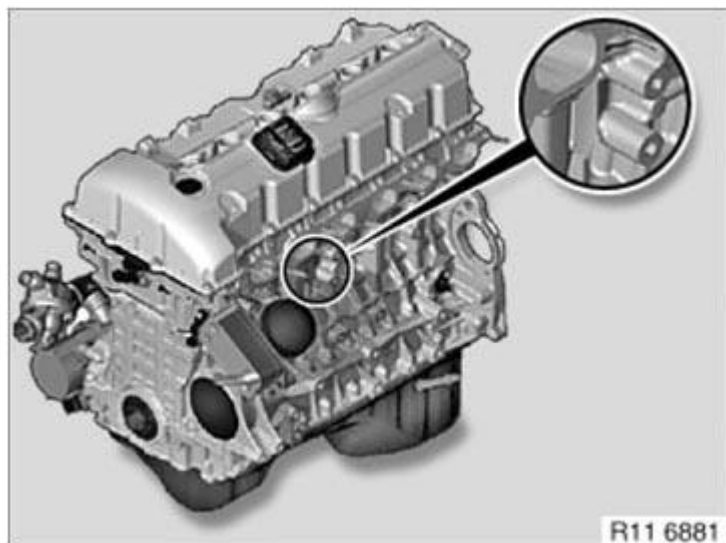


Fig. 10: Identifying Engine Identification Numbers Location - N51/N52/N52K/N52T/N53/N54/N55
Courtesy of BMW OF NORTH AMERICA, INC.

N62/N62TU

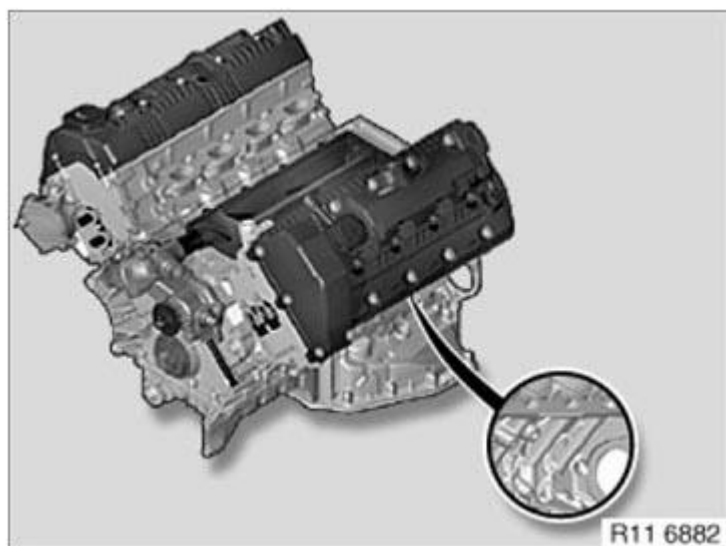


Fig. 11: Identifying Engine Identification Numbers Location - N62/N62TU
Courtesy of BMW OF NORTH AMERICA, INC.

N73

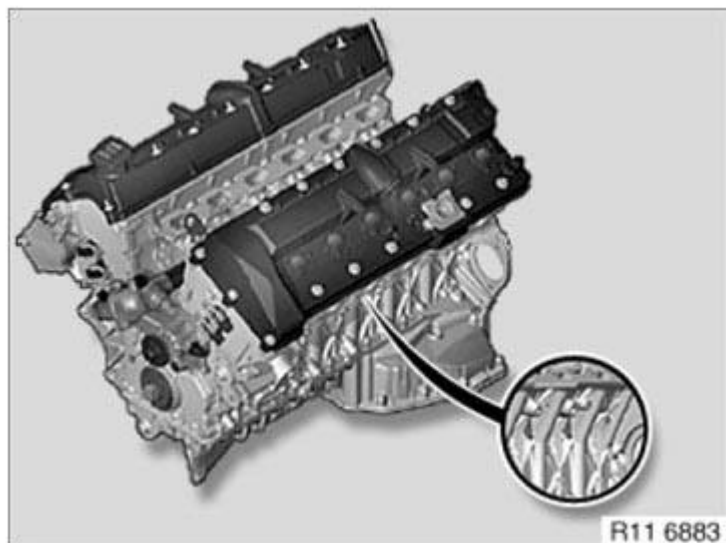


Fig. 12: Identifying Engine Identification Numbers Location - N73
Courtesy of BMW OF NORTH AMERICA, INC.

S54

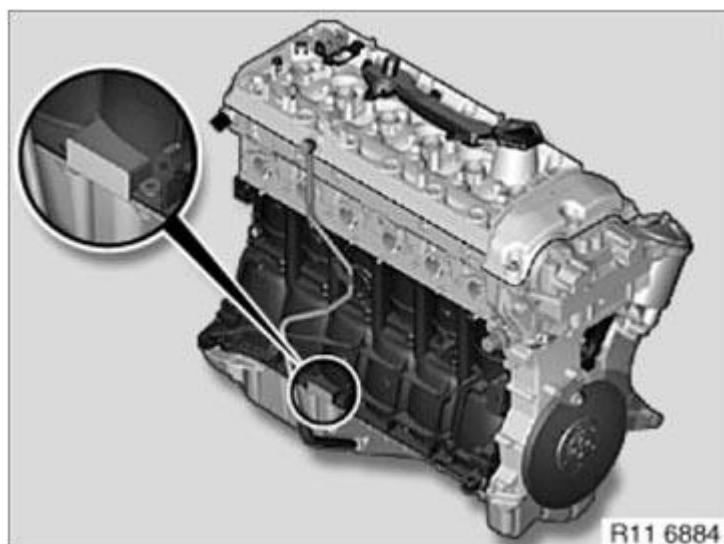


Fig. 13: Identifying Engine Identification Numbers Location - S54
Courtesy of BMW OF NORTH AMERICA, INC.

S85/S65

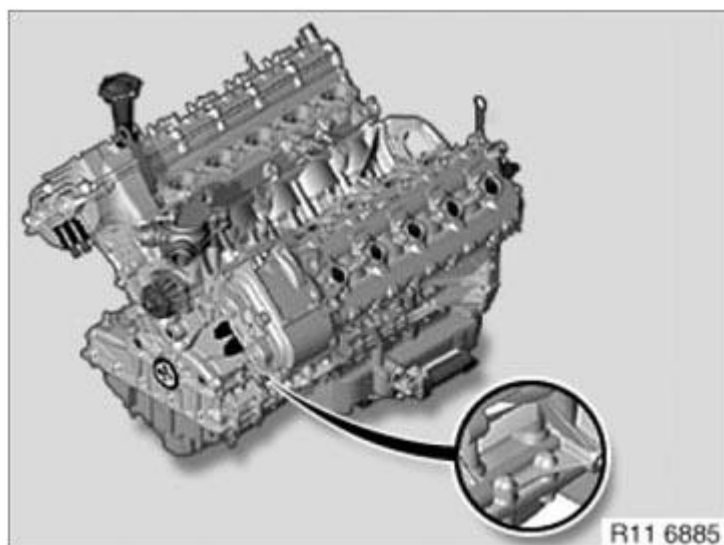


Fig. 14: Identifying Engine Identification Numbers Location - S85/S65
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

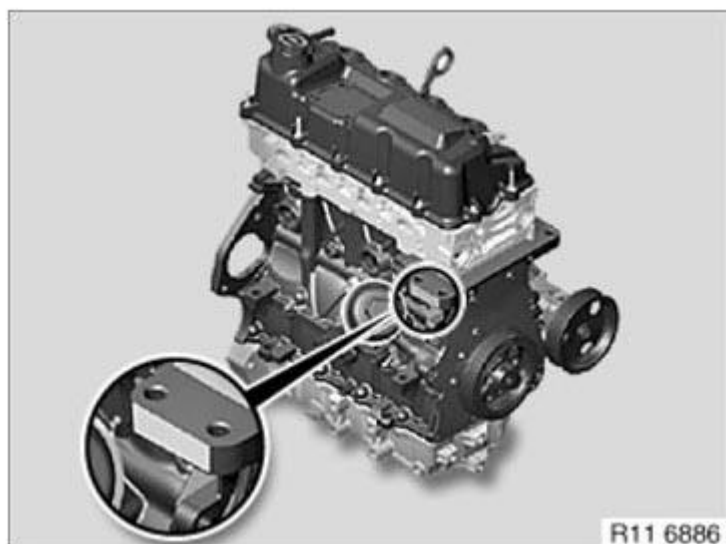


Fig. 15: Identifying Engine Identification Numbers Location - W10/W11
Courtesy of BMW OF NORTH AMERICA, INC.

N12/N14/N16/N18

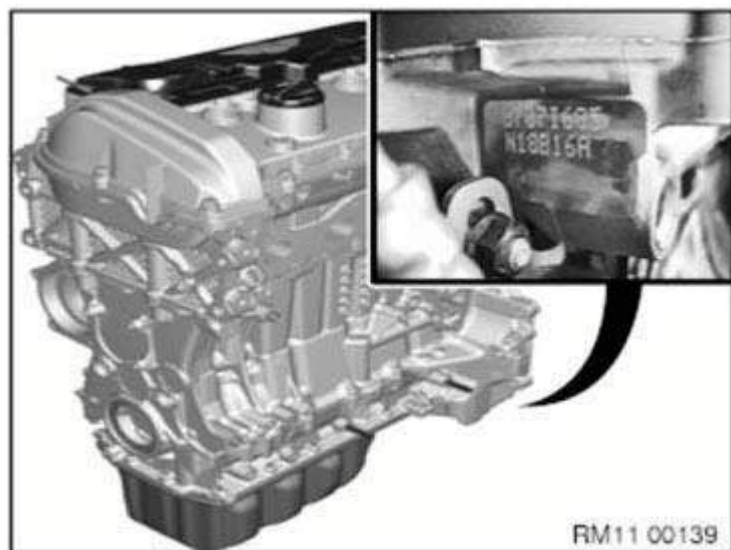


Fig. 16: Identifying Engine Identification Numbers Location - N12/N14/N16/N18
Courtesy of BMW OF NORTH AMERICA, INC.

W17

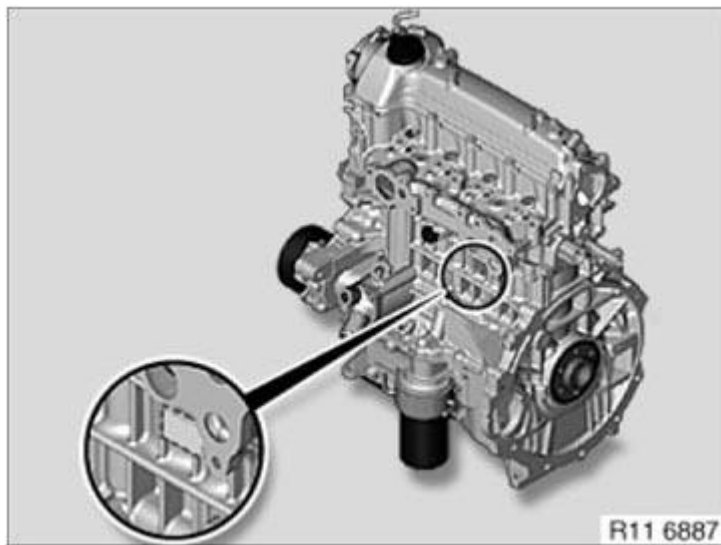


Fig. 17: Identifying Engine Identification Numbers Location - W17
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1100... OVERVIEW OF CONSUMABLE (ELECTRONIC PARTS CATALOGUE)

1.0 Sealing compound for injection

SEALING COMPOUND FOR INJECTION

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	N40, N42, N45, N46, N43, N45N, N46N	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 128367 sealing compound
1.2	N40, N42, N45, N46, N43, N45N, N46N	Loctite 128357 liquid gasket	83 19 7 536 051	Sealing between crankcase upper and lower halves
1.3	N51, N52, N53, N54, N52N, N55	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.4	N51, N52, N53, N54, N52N, N55	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.5	S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.6	S65, S85	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and

lower halves

2.0 Sealing compound for application**SEALING COMPOUND FOR APPLICATION**

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
2.1	M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N40, N42, N45, N45N, N46, N46N, N43, N47, N47top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57S N62, N62TU, N63, N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85 N12, N14, N16, N18	Drei Bond 1209 liquid gasket	07 58 9 062 376	For sealing separation points on crankcase
2.2	N12, N14, N16, N18 W16, N47top, N47D1, N47C1 N57D1,	Loctite 5970 liquid gasket	83 19 0 404 517 83 19 0 404 517	Sealing between crankcase upper and lower sections. Sealing of gear case cover, oil sump, coolant pump, component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid gasket	07 58 9 067 732	Sealing between cover sleeve and crankcase

3.0 Cleaning agent**CLEANING AGENT REFERENCE CHART**

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
3.1	N45, N46, N45T, N46T, N43, N51, N52, N52Kp,	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine

N52TU, N53, N55, N63, N63S, N63Hybrid, N74			
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4.0 Lubricant for application

LUBRICANT FOR APPLICATION

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
4.1	N20, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N73	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High temperature paste	83 19 2 152 323	For greasing the threads on the exhaust turbocharger.
4.3	N12, N14, N16, N18 N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63, N73, N73H, N74. S65, S85.	High temperature paste (NEVER-SEEZ compound)	83 23 0 140 233	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T N47D1 N57 N57D1	Copper paste	81 22 9 400 794	For greasing the double hex head bolt on the exhaust turbocharger.

5.0 Lubricants to loosen locked screw connections

LUBRICANTS TO LOOSEN LOCKED SCREW CONNECTIONS

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
5.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, W16, W17,	Brunox lubricating grease	83 23 0 445 529	For releasing the glow elements

1100 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N63)

Remove acoustic cover (1) in following steps:

- Raise
- Remove in direction of travel

Installation:

Insert acoustic cover (1) into existing rubber guides.

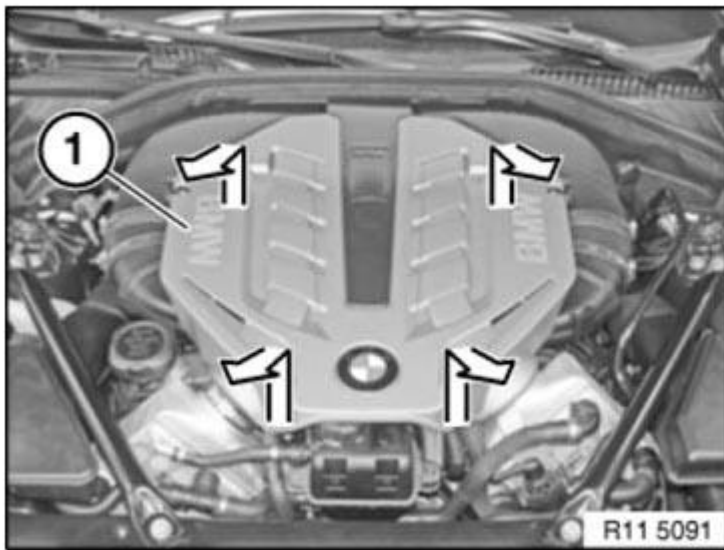


Fig. 18: Identifying Acoustic Cover
Courtesy of BMW OF NORTH AMERICA, INC.

1100050 REMOVING AND INSTALLING/REPLACING ENGINE (N63)

Necessary preliminary work

- Move ENGINE COMPARTMENT LID into service position
- Drain COOLANT
- Disconnect battery positive lead from terminal
- Drain off AIR CONDITIONING SYSTEM
- Remove right SUSPENSION CROSS-BRACE .
- Remove RADIATOR
- Remove both INTAKE SILENCER HOUSINGS
- Disconnect coolant hoses from engine
- Disconnect coolant hoses from charge air cooler
- Disconnect line from tank vent valve

- Detach power steering pump from holder. See **POWER STEERING PUMP FOR HYDRAULIC STEERING GEAR WITH DYNAMIC DRIVE (N63)** or **POWER STEERING PUMP FOR POWER STEERING GEAR WITH ACTIVE FRONT STEERING (N63)** .
- Remove **UNIVERSAL JOINT**
- Remove **GEARBOX**

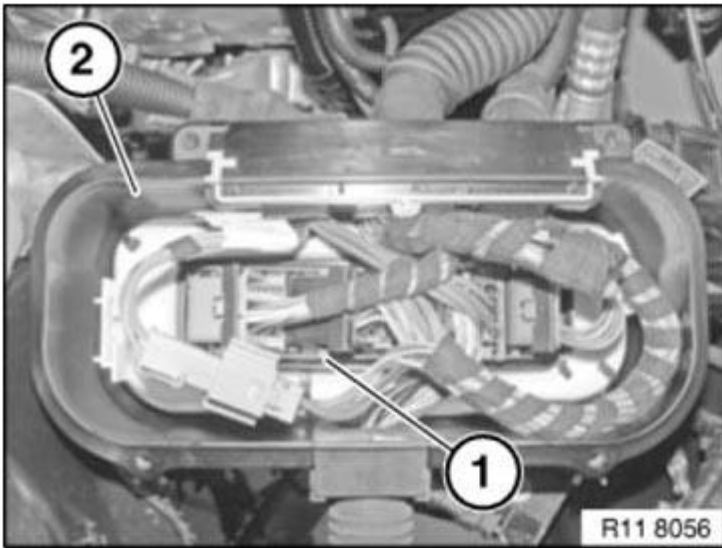


Fig. 19: Identifying Wiring Harness And Electronics Box
Courtesy of BMW OF NORTH AMERICA, INC.

Release wiring harness (1) from electronics box (2) and secure on engine against falling off.

Release wiring harness from supplementary electronics box (1) and secure on engine against falling off.

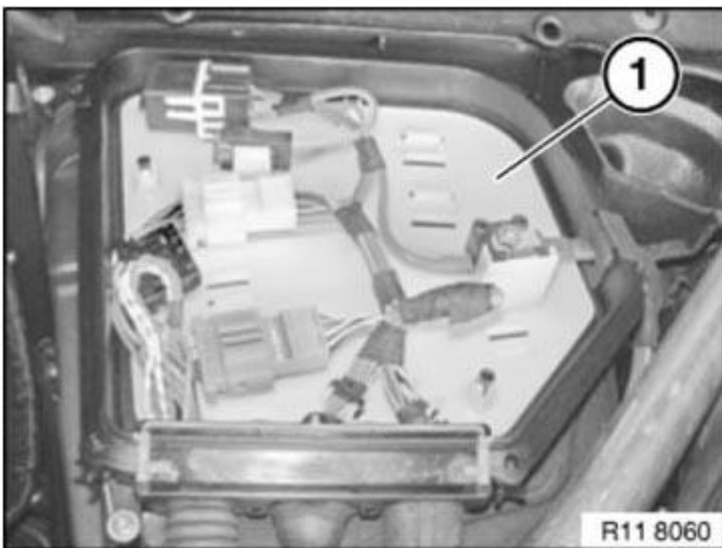


Fig. 20: Identifying Supplementary Electronics Box
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Remove battery earth lead (2).

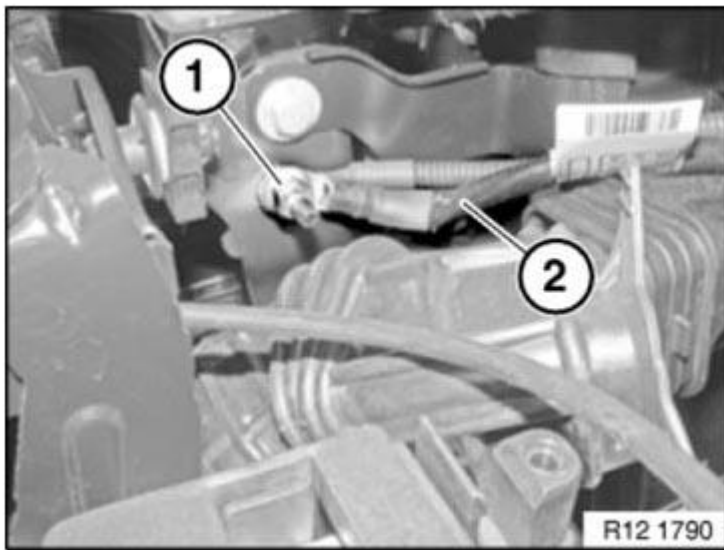


Fig. 21: Identifying Slacken Nut And Battery Earth Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach vacuum line (1) from vacuum pump.

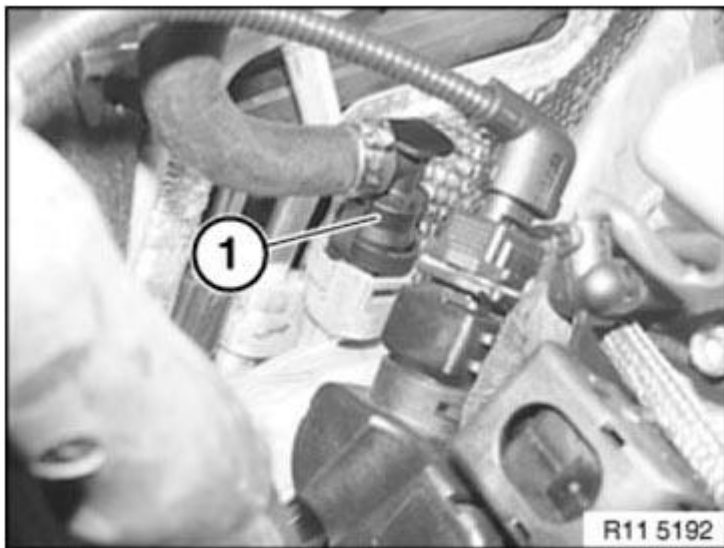


Fig. 22: Identifying Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove air conditioning line (2).

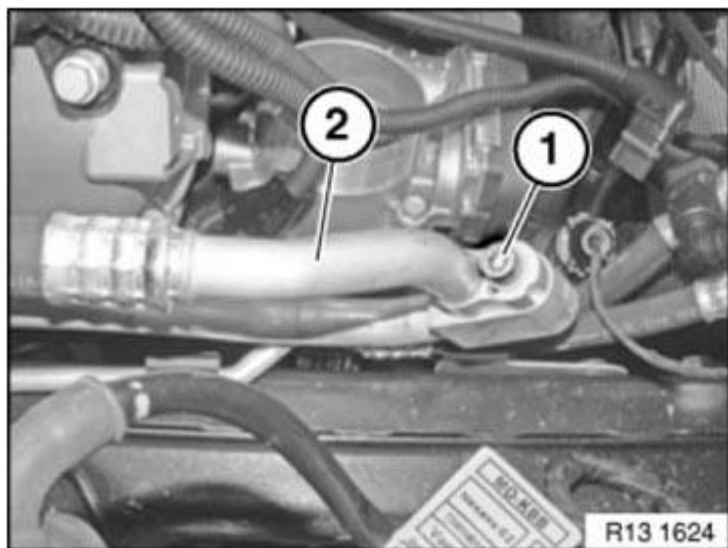


Fig. 23: Identifying Screw And Air Conditioning Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release and disconnect coolant hoses (1).

Illustration shows N57

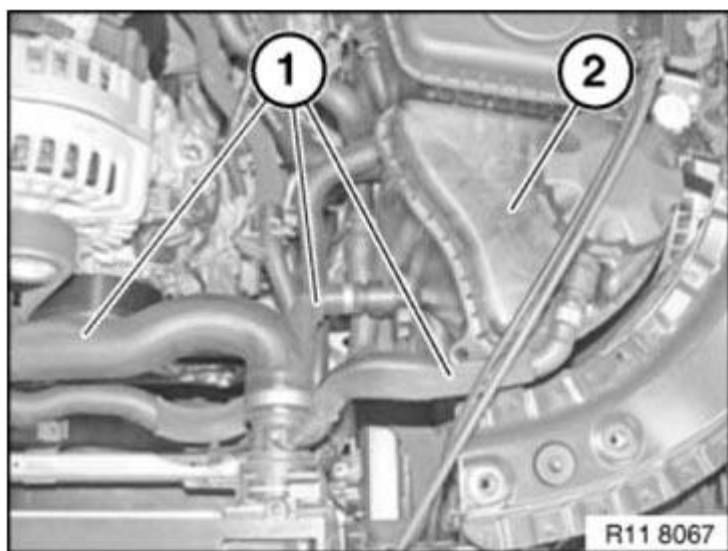


Fig. 24: Identifying Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Release screw (2).

Press off oil line from oil reservoir to intake pipe section with special tool to prevent oil from escaping.

Installation note:

Replace hose clamp.

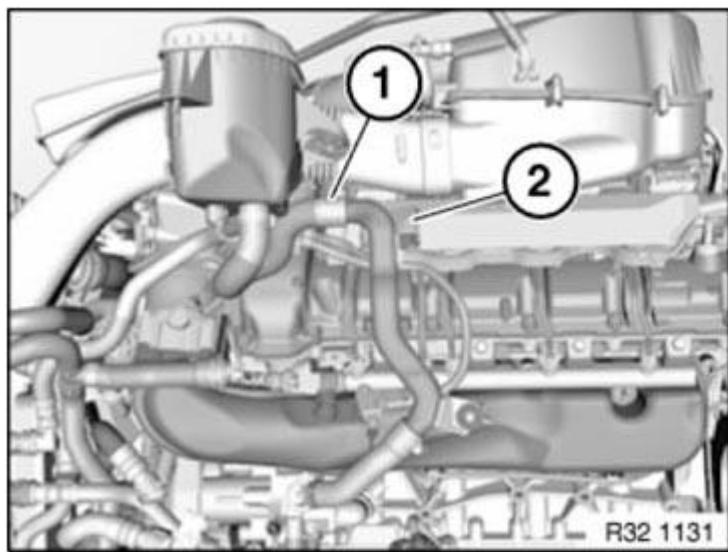


Fig. 25: Identifying Oil Reservoir Hose Clip And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove intake pipe section (1) in direction of arrow from holder (2).

Remove intake pipe in upward direction.

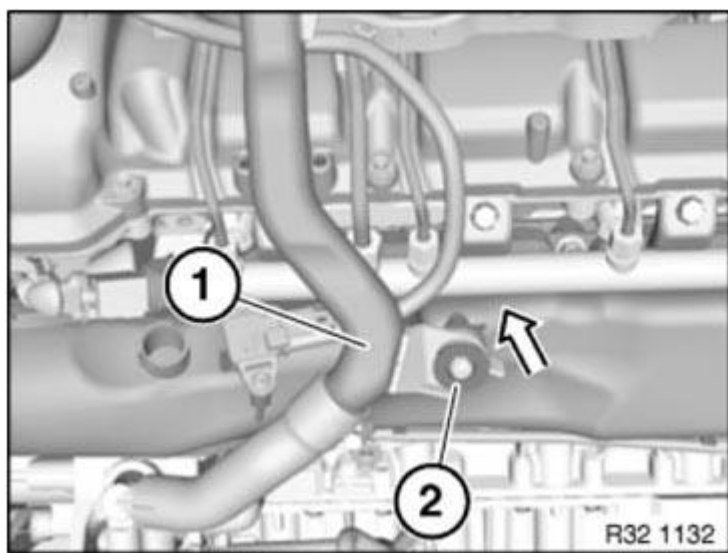


Fig. 26: Removing Intake Pipe Section In Direction Of Arrow From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Detach coolant hose from water valve.

Release hose clamp and detach coolant hose (2).

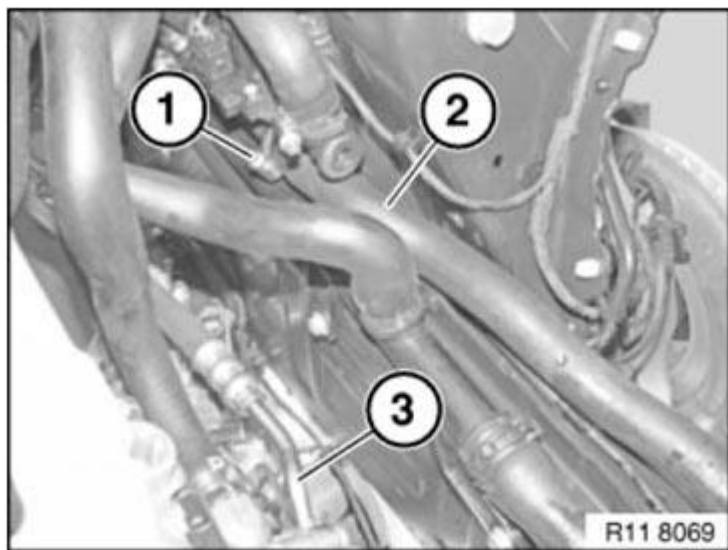


Fig. 27: Identifying Hose Clip And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect fuel delivery line (1), seal off with special tool 13 5 160.

Seal off fuel delivery line (2) with special tool 13 5 162.

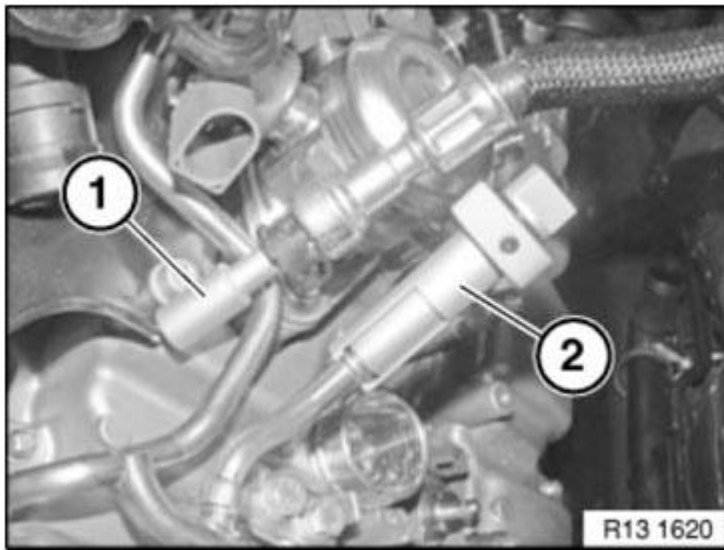


Fig. 28: Identifying Fuel Delivery Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1). Tightening torque **17 22 4AZ** .

Detach oil lines from oil filter housing.

Catch and dispose of emerging oil.

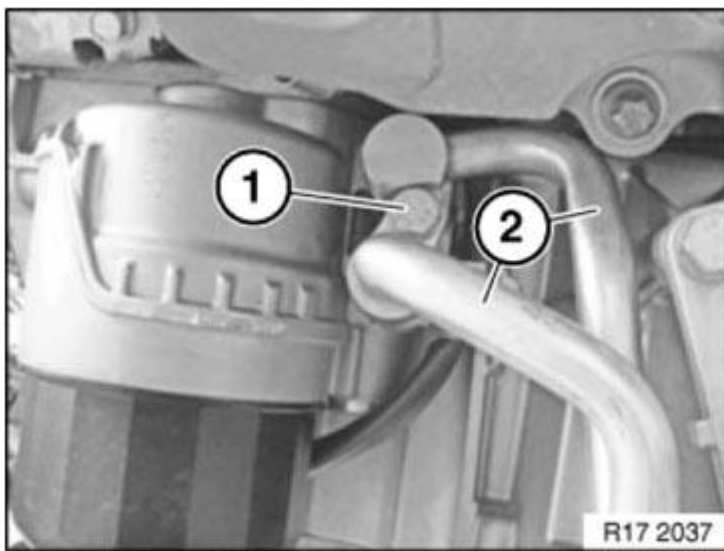


Fig. 29: Identifying Oil Pipes Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on **ENGINE MOUNT** on left and right.

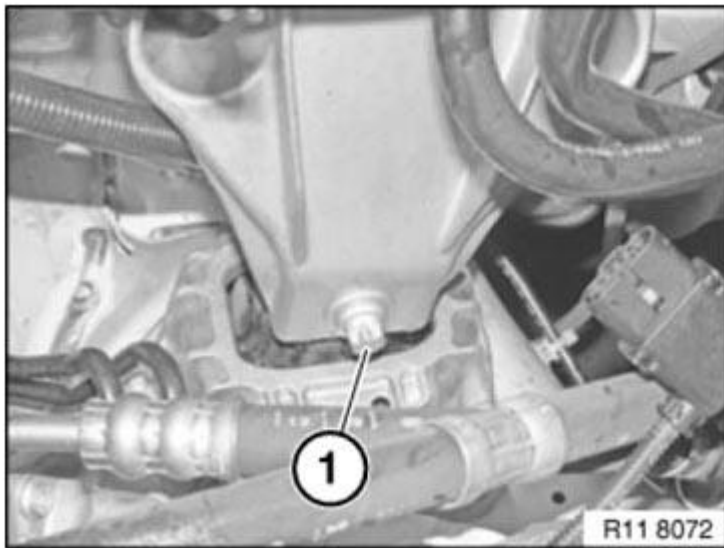


Fig. 30: Identifying Screws On Engine Mount On Left And Right
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before lifting the engine, the lifting lugs must be checked for damage (cracks) and to ensure they are seated securely.

Suspend special tool from lifting eyes (1) at front and rear.

11 0 020 Lift out engine with special tool.

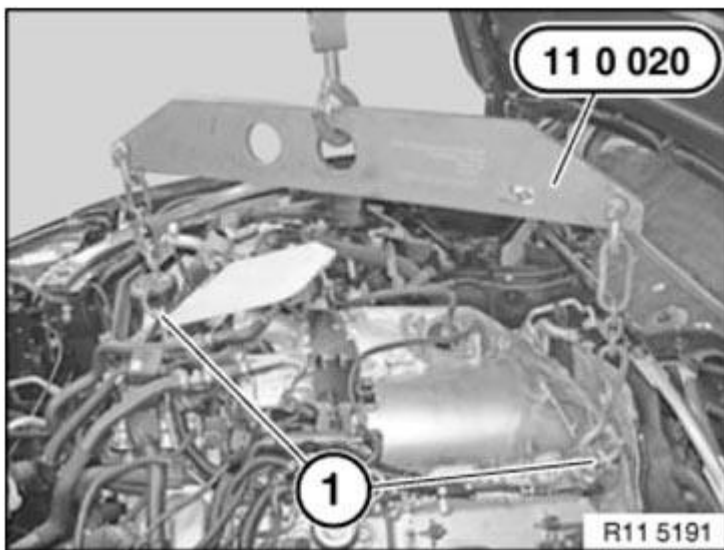


Fig. 31: Lifting Out Engine With Special Tool (11 0 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Mount engine on assembly stand.

Assemble engine.

Top up **COOLANT** and vent cooling system.

Check **COOLING SYSTEM** for leaks.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

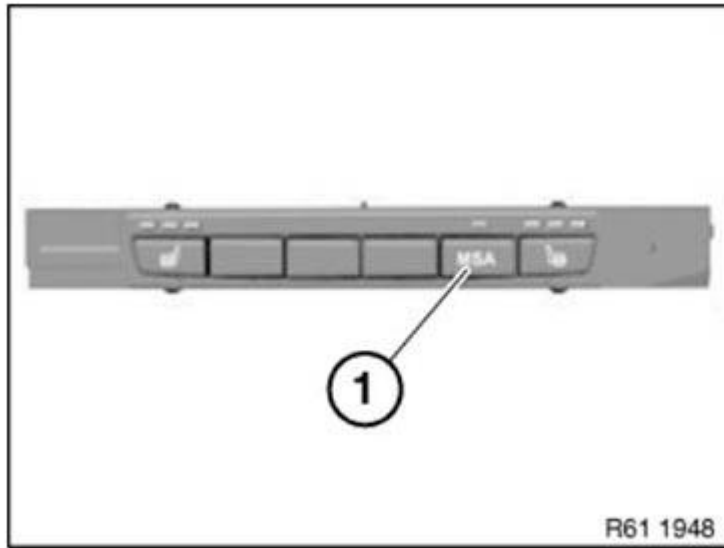


Fig. 32: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 - A = 10 mm
 - Basic setting (engine hood/bonnet open)
 - B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

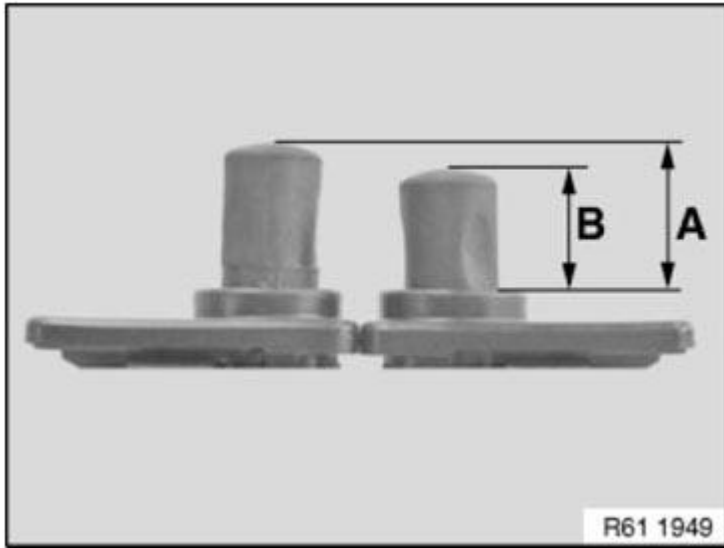


Fig. 33: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
 Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: **DANGER OF POISONING** if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

1100670 SECURING ENGINE IN INSTALLATION POSITION (N63)

Notes

WARNING: Danger of injury!

Observe following instructions relating to special tool:

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. Keep special tools dry, clean and free of grease.

IMPORTANT: Before lifting the engine, check the lifting lugs for damage (cracks) and to ensure they are seated securely.

NOTE: Numbering system for special tools has been re-encoded.

IMPORTANT: Special tool 00 6 000 must not be fitted when transverse member (1) is installed!

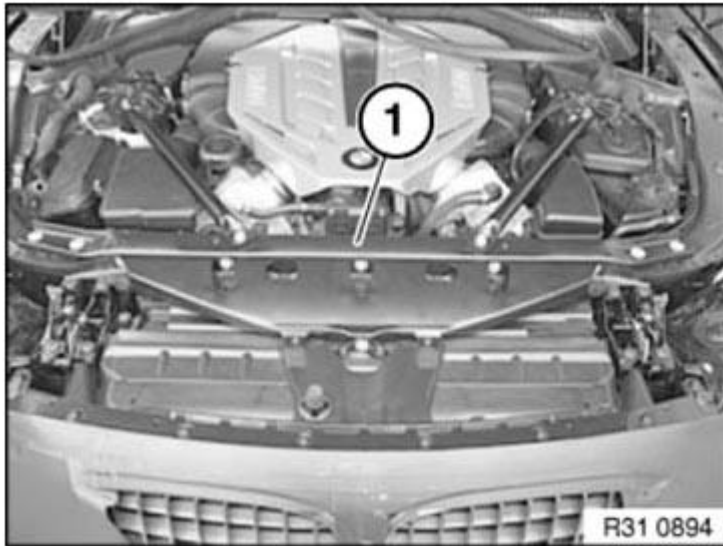


Fig. 34: Identifying Transverse Member
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work

- Secure **engine compartment lid** in service position. See **5100... SERVICE POSITION OF ENGINE COMPARTMENT LID** or **5100... ENGINE COMPARTMENT LID SERVICE POSITION (ACTIVE)**.
- Remove **PANEL** for engine compartment lid at side

- Remove left **INTAKE SILENCER HOUSING**
- Remove **UNDERBODY PROTECTION** at front and rear

Assemble transverse member 00 6 000 with special tools 00 6 002 00 6 004, 00 6 010, **00 6 050**.

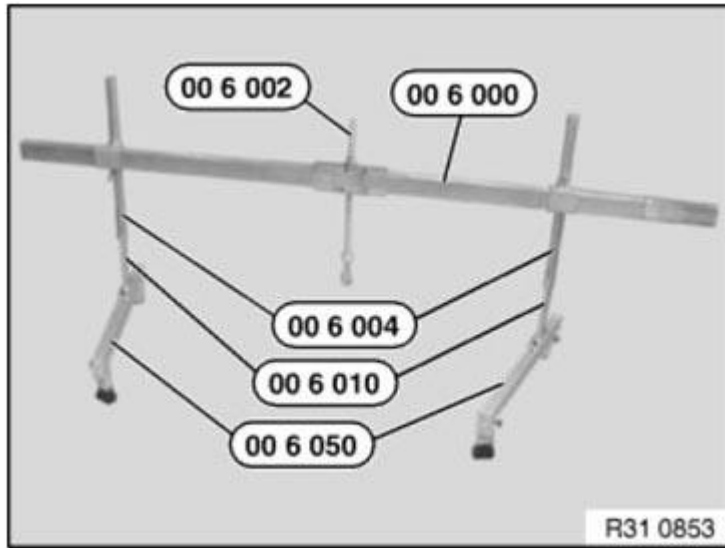


Fig. 35: Identifying Special Tools (00 6 002 00 6 004, 00 6 010)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Contact points (1) for special tool **00 6 050** are pictured.

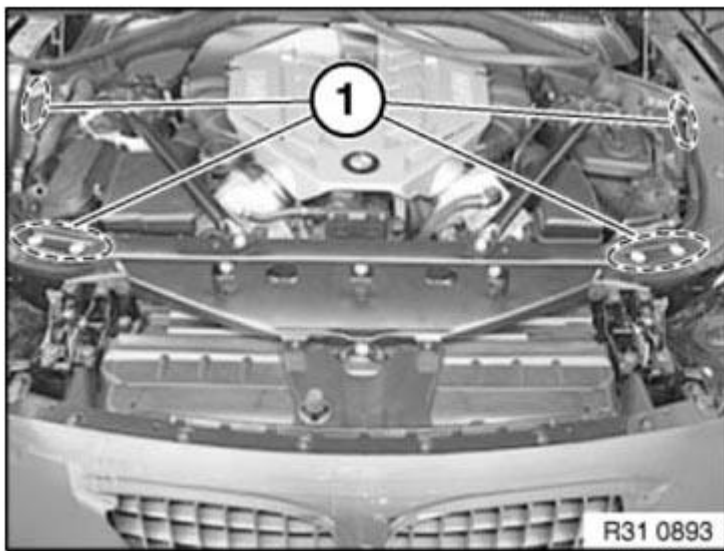


Fig. 36: Identifying Contact Points Of Special Tool 00 6 050
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Position transverse member 00 6 000 with a 2nd person helping on contact points (1).

Secure special tool **11 0 000** to spindle 00 6 002.

Attach suitable chains to special tool **11 0 000** and suspend from both engine suspension lugs.

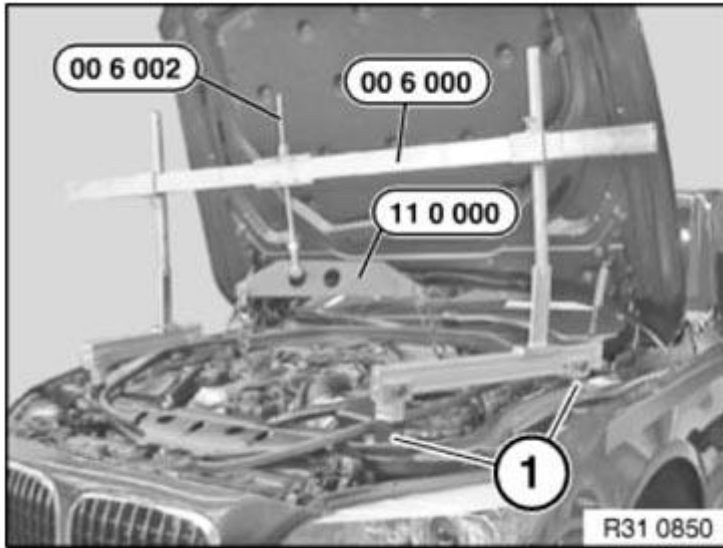


Fig. 37: Identifying Transverse Member 00 6 000 And Contact Points

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction. Always make sure there is sufficient clearance between the engine (or its add-on parts) and the body.

WARNING: Danger of injury!

Tighten down all screws and nuts on transverse member 00 6 000.

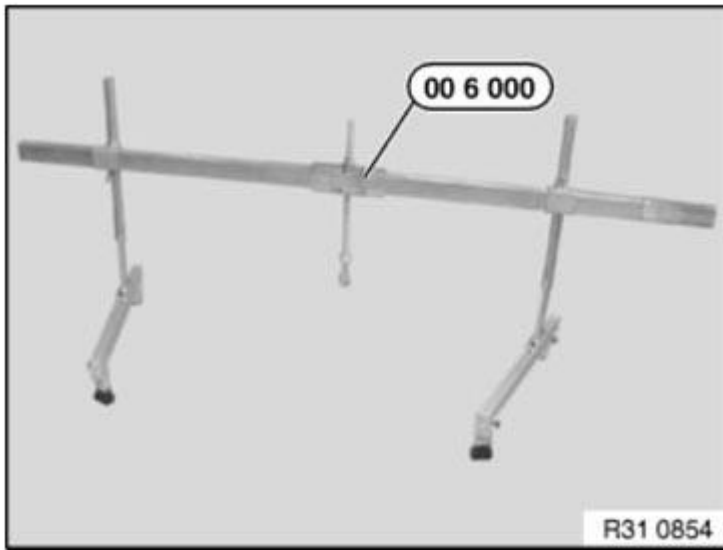


Fig. 38: Identifying Transverse Member 00 6 000
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **22 11 1AZ** .

NOTE: (Four-wheel drive only)
Remove vibration absorber on left front axle support.

Raise engine approx. 10 mm with crossmember.

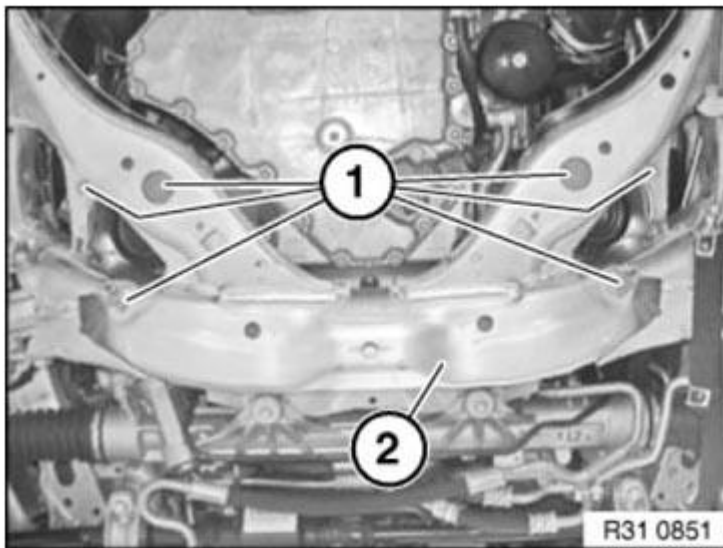


Fig. 39: Identifying Screws And Vibration Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

1100... SERVICE - ENGINE OIL (N63)**WARNING: Risk of scalding!**

Carry out work on the vehicle only when wearing oil- and heat-resistant protective gloves incl. forearm protection, face guard and protective apron.

IMPORTANT: Carry out the engine oil service only when the engine is at operating temperature.

Observe the exact engine oil filling capacity.

Overfilling the engine with engine oil will result in engine damage.

Checking and drip-off times (at least 10 minutes) must be observed.

Recycling:

Catch and dispose of drained engine oil in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Release screw plug (1) on oil filter cap.

Remove screw plug (2) from oil sump and drain engine oil.

Graphic E71.

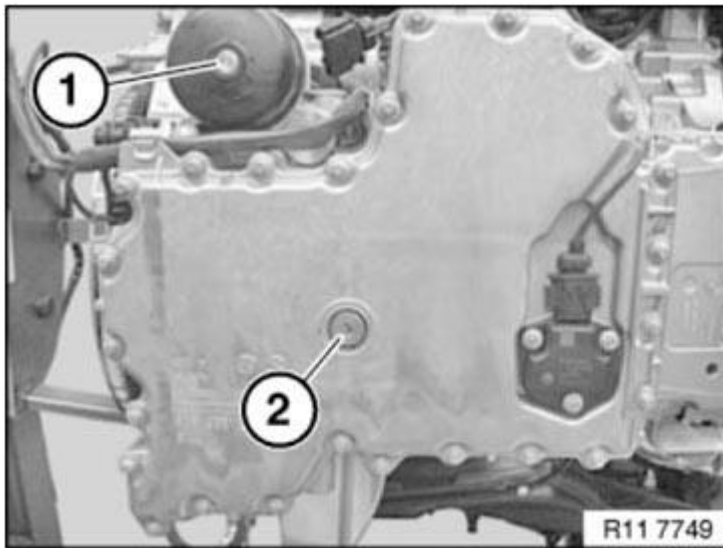


Fig. 40: Identifying Screw Plug Of Oil Filter Cap And Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil filter cover (1) with special tool **11 9 240** .

Graphic E71.

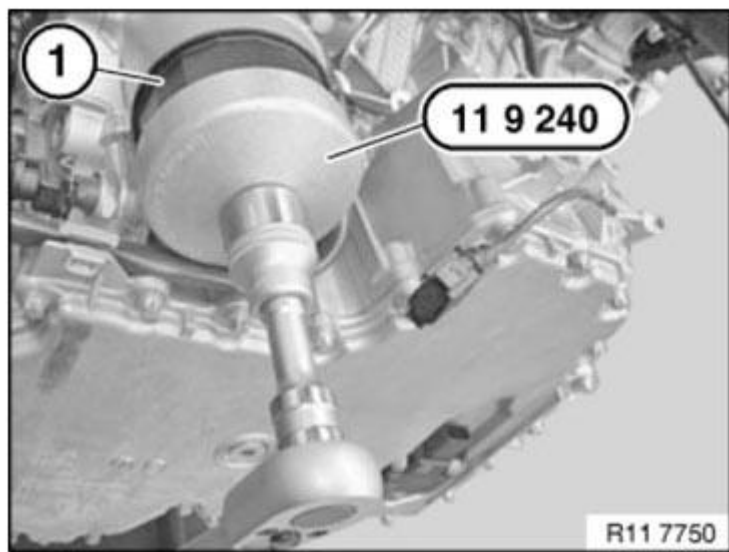


Fig. 41: Removing Oil Filter Cover With Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace oil filter element (3) and sealing rings (1 and 2)

Moisten sealing ring (2) with engine oil.

Insert oil filter element (3) into oil filter cover.

Installation note:

Oil filter element (3) must snap audibly into place.

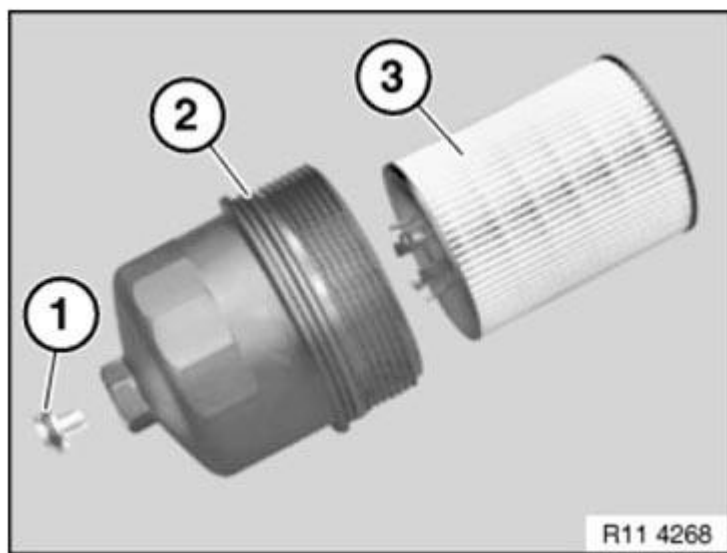


Fig. 42: Identifying Sealing Ring And Oil Filter Element
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Presentation: without underbody protection and reinforcement plate.**

Graphic E71.

Installation note:

Replace sealing rings.

Insert screw plug (2) for oil sump and tighten down.

Tightening torque **11 13 1AZ** .

Insert screw plug (1) for oil filter cap and tighten down.

Tightening torque **11 42 2AZ** .

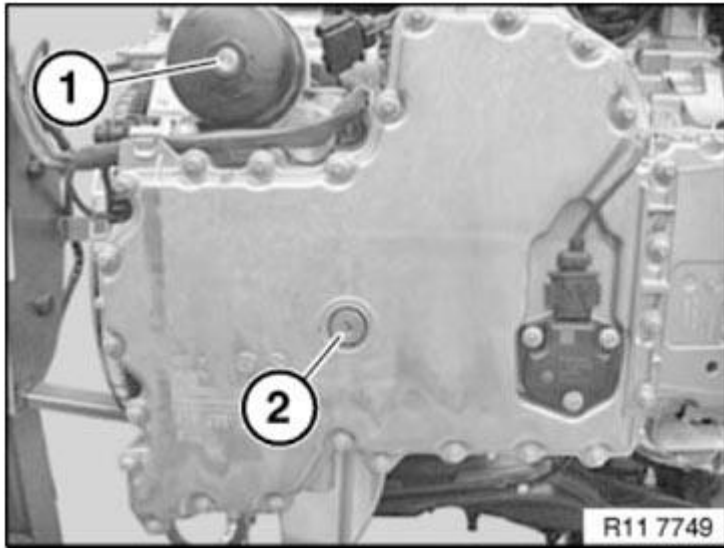


Fig. 43: Identifying Screw Plug Of Oil Filter Cap And Oil Sump
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Pour in ENGINE OIL .**
 Start engine and run at idle until oil pressure indicator light goes out.
 Switch off engine
 Check oil filter cap and screw plugs (1 and 2) for oil filter cap and oil sump for
 leaks.
 Assemble engine.

Checking engine oil level:

- Park vehicle on a horizontal surface
- Allow engine to run at operating temperature for three minutes with increased engine speed (approx. 1100 RPM)
- Read off engine oil level in instrument panel or on Control Display
- Top up engine oil if necessary

1112 CYLINDER HEAD WITH COVER

1112729 CHECKING CYLINDER HEAD FOR WATERTIGHTNESS (N63)

Necessary preliminary work

- Remove LEFT CYLINDER HEAD.
- Remove RIGHT CYLINDER HEAD.
- Remove ALL VALVES.

NOTE: Set of special tools 11 8 080 can be used for cylinder bank 1 to 4 and cylinder bank 5 to 8.

Position special tool 11 8 081 on cylinder head.

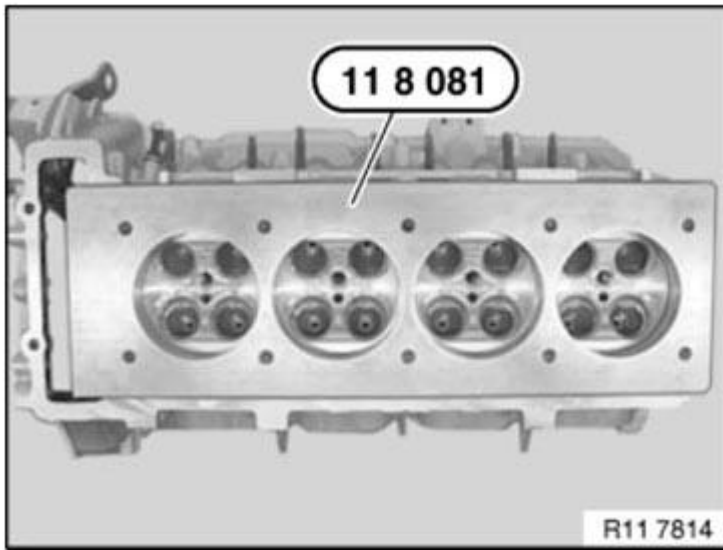


Fig. 44: Positioning Special Tool 11 8 081 On Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 8 083 and tighten in sequence (1 to 10) in several steps.

Tightening torque: **25 Nm**

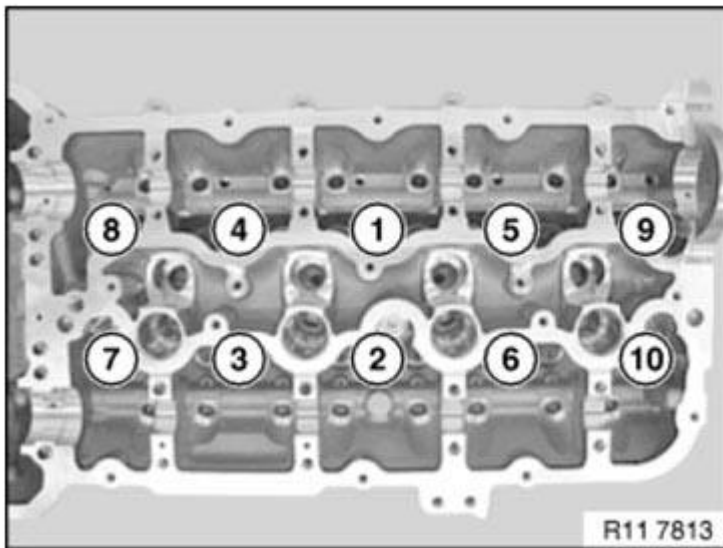


Fig. 45: Identifying Special Tool 11 8 083 Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Remove vent screw (1).

Tightening torque: **11 12 8AZ** .

Installation note:

Replace sealing ring.

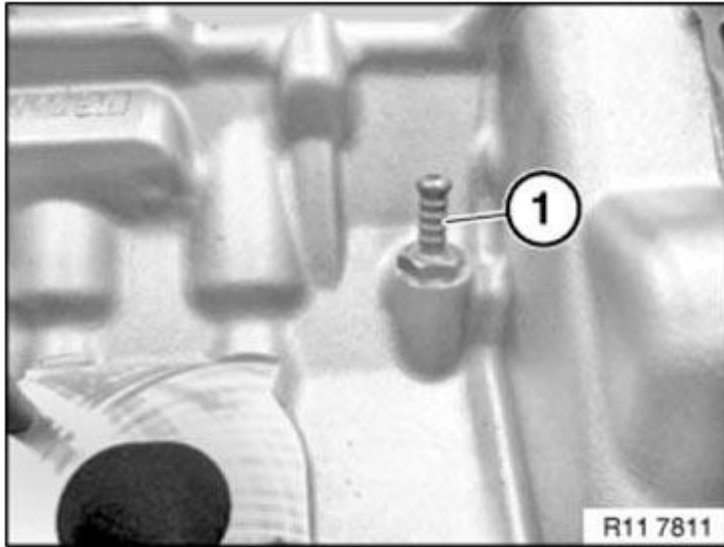


Fig. 46: Identifying Vent Screw

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Max: 0.8 Nm.

Screw in special tool 11 8 082 with suitable tool and special tool **00 9 250** to 0.8 Nm.

Connect compressed air hose with pressure gauge.

Immerse cylinder head in a water bath. Inspection pressure 4.0 bar.

Check cylinder head for escaping air (cracks).

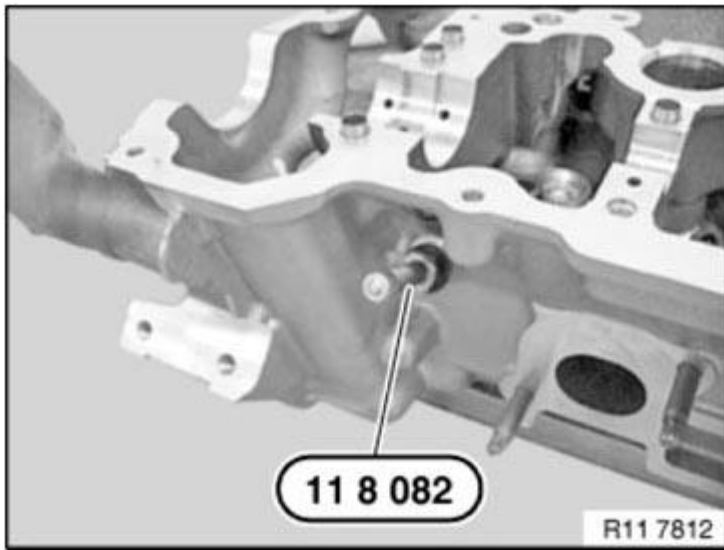


Fig. 47: Identifying Special Tool 11 8 082 Location
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If necessary, add cleaning agent to water bath.
Assemble engine.

1112719 GRINDING CYLINDER HEAD SEALING SURFACE (N63)

Necessary preliminary work

- Remove cylinder head. See LEFT CYLINDER HEAD and RIGHT CYLINDER HEAD.

Cylinder head disassembled

Check evenness of cylinder head lower face with a standard straightedge (1).

NOTE: Maximum deviation from flatness: longitudinal 0.10 mm.

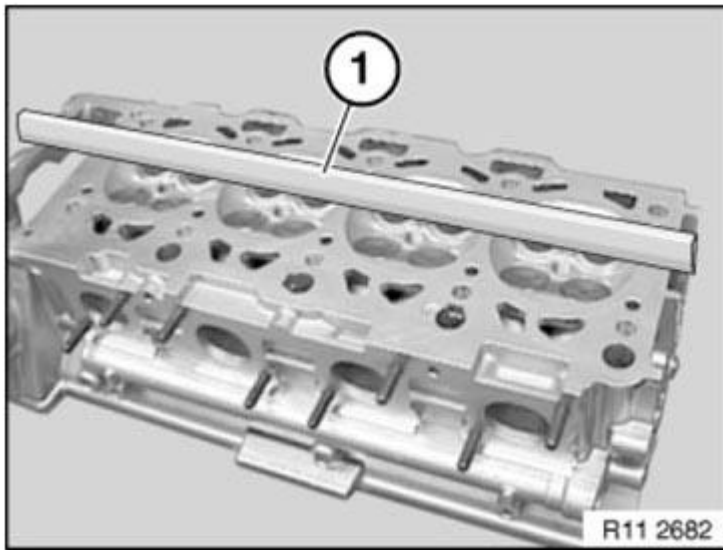


Fig. 48: Checking Evenness Of Cylinder Head Lower Face With Standard Straightedge - Longitudinal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Maximum deviation from flatness: transversal 0.05 mm.

Machining limit: See CYLINDER HEAD WITH VALVE SEAT COVER or CYLINDER HEAD WITH COVER

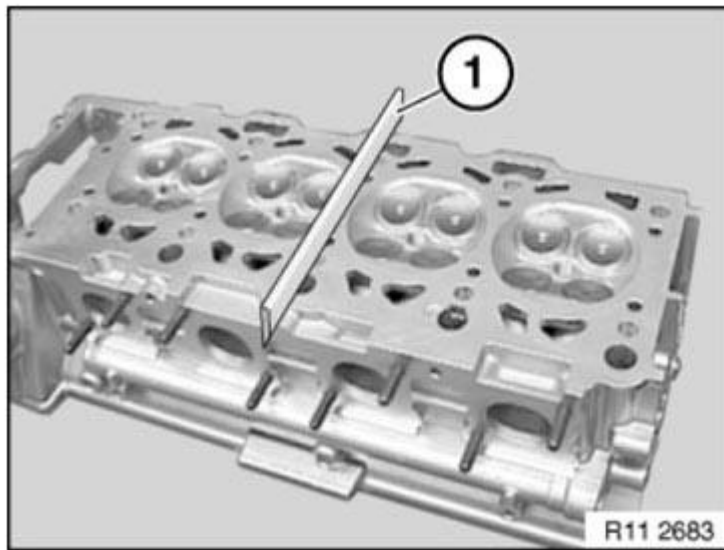


Fig. 49: Checking Evenness Of Cylinder Head Lower Face With Standard Straightedge - Transversal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A cylinder head gasket (+REP) 0.3 mm thicker than usual can be obtained for machined (resurfaced) cylinder heads.

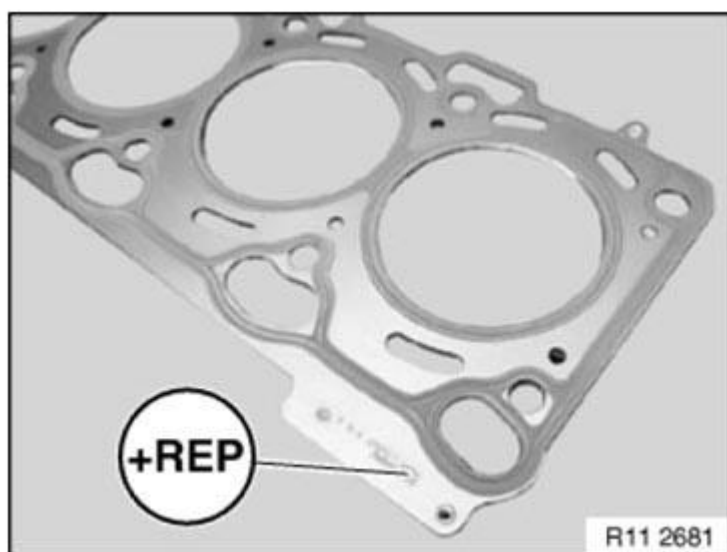


Fig. 50: Identifying Cylinder Head Gasket (+REP)
Courtesy of BMW OF NORTH AMERICA, INC.

1112105 REMOVING AND INSTALLING LEFT CYLINDER HEAD (N63)

Necessary preliminary work

- Check **TIMING**
- Remove left **INLET AND EXHAUST ADJUSTMENT UNIT**

Release screw (1).

NOTE: Guide rail is loose from cylinder head.

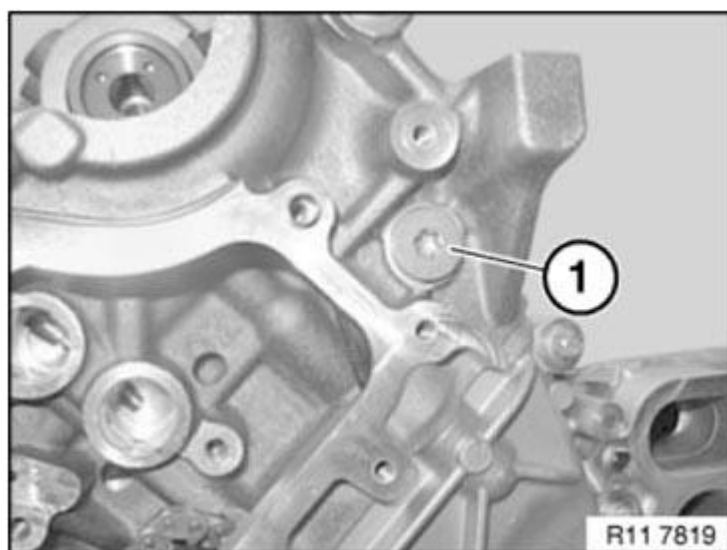
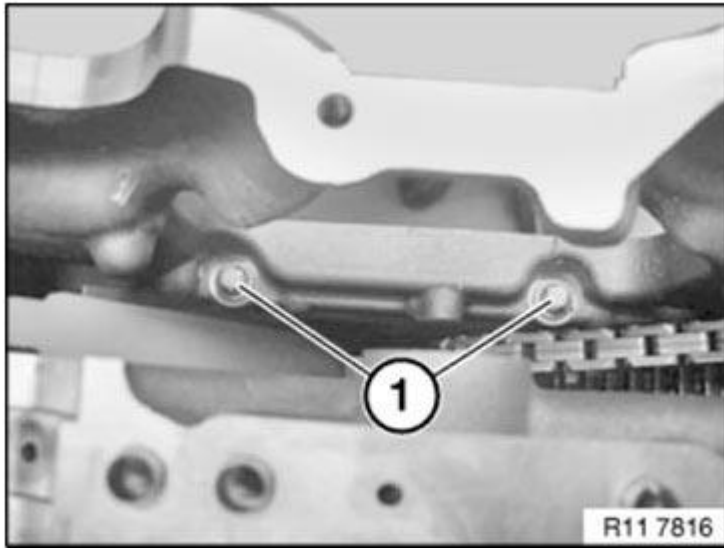


Fig. 51: Identifying Screw Of Guide Rail

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) at front from cylinder head.

**Fig. 52: Identifying Bolt On Front Cylinder Head**

Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts in sequence (10 to 1).

Remove all cylinder head bolts with washers.

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

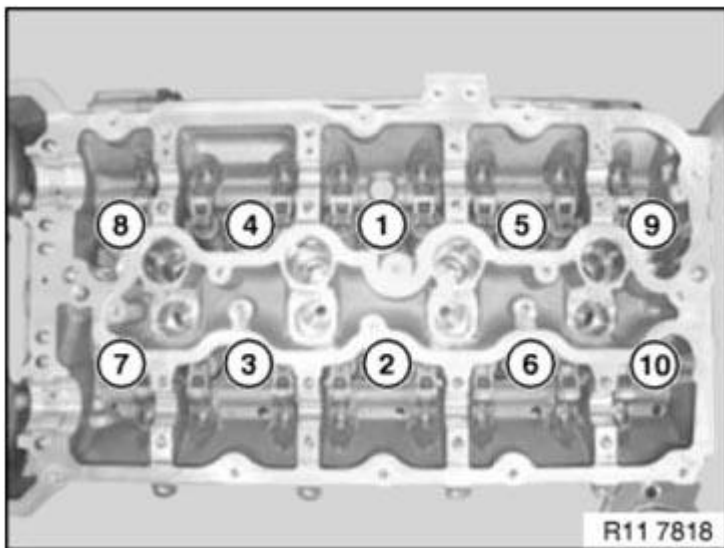


Fig. 53: Identifying Cylinder Head Bolts Releasing Sequence

Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing faces of cylinder head and engine block; if necessary, remove gasket debris compound with special tool **11 4 470** . Make sure no gasket remnants drop into oil and cooling channels.

IMPORTANT: Risk of cracking!

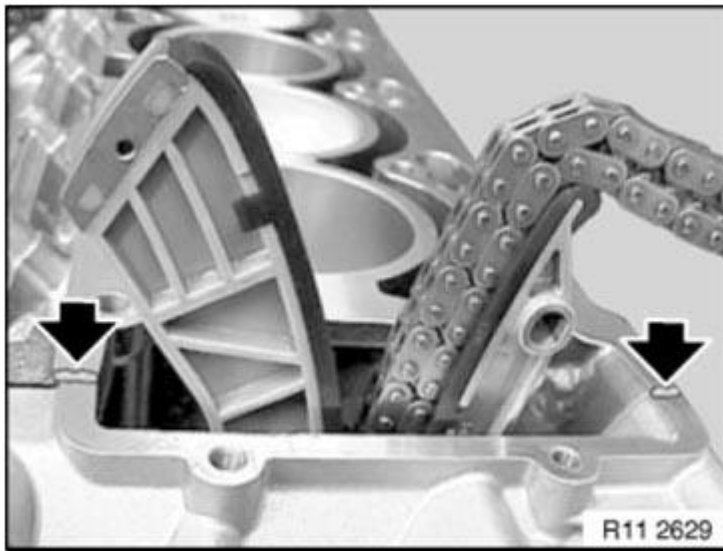
Threaded bores in engine block must be free of dirt and oil

Check **CYLINDER HEAD** for leaks.

Check **CYLINDER HEAD SEALING FACE** for surface evenness.

Coat joint between engine block and timing case cover with Drei Bond 1209 (refer to BMW Parts Service).

NOTE: **Graphic shows an N62 engine by way of example.**

**Fig. 54: Locating Drei Bond 1209 At Joint Between Engine Block And Timing Case Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

Check fitting sleeves (1) for damage and correct installation position.

Installation note:

Renew cylinder head gasket (2)

Fit new cylinder head gasket (2).

NOTE: **Graphic corresponds to cylinders 1-4.**

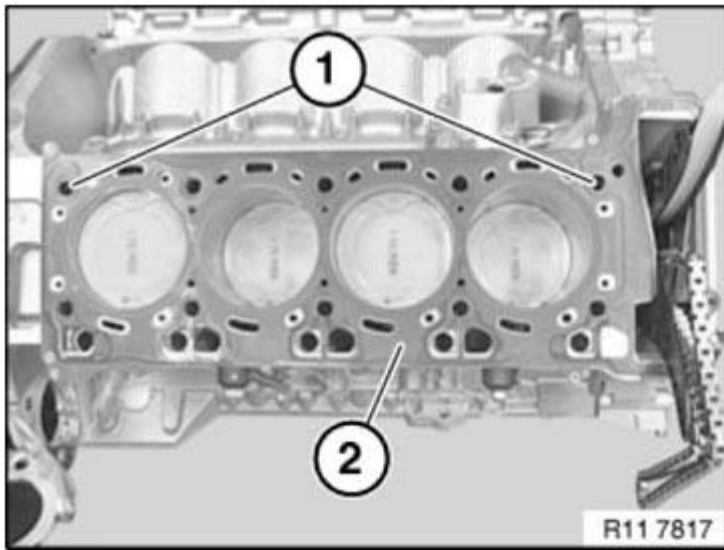


Fig. 55: Identifying Fitting Sleeves And Cylinder Head Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Put the cylinder head on.

Do not wash off bolt coating.

Installation note:

Fit new cylinder head bolts

Insert new cylinder head bolts and initially tighten so that they are free of play.

Tighten down cylinder head bolts in sequence 1 - 10.

Tightening torque **11 12 1AZ** .

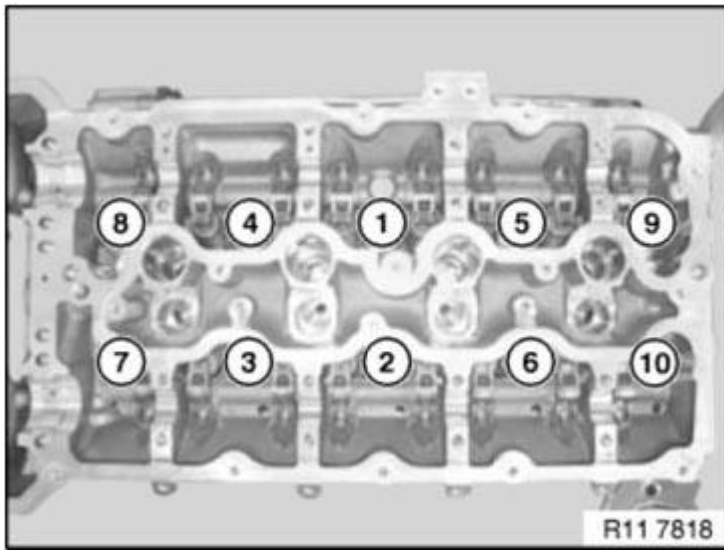


Fig. 56: Identifying Cylinder Head Bolts Tightening Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down bolts (1) between cylinder head and timing case cover.

Tightening torque **11 12 2AZ** .

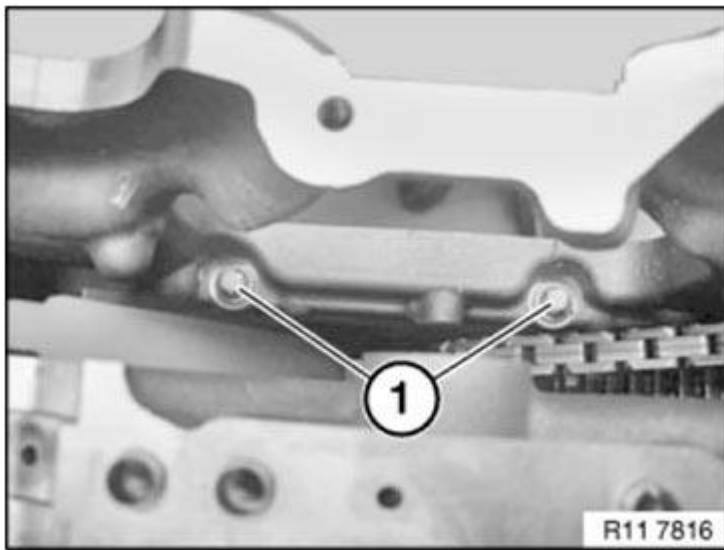


Fig. 57: Identifying Bolts Between Cylinder Head And Timing Case Cover
 Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (1) of guide rail and tighten down.

Tightening torque **11 31 3AZ** .

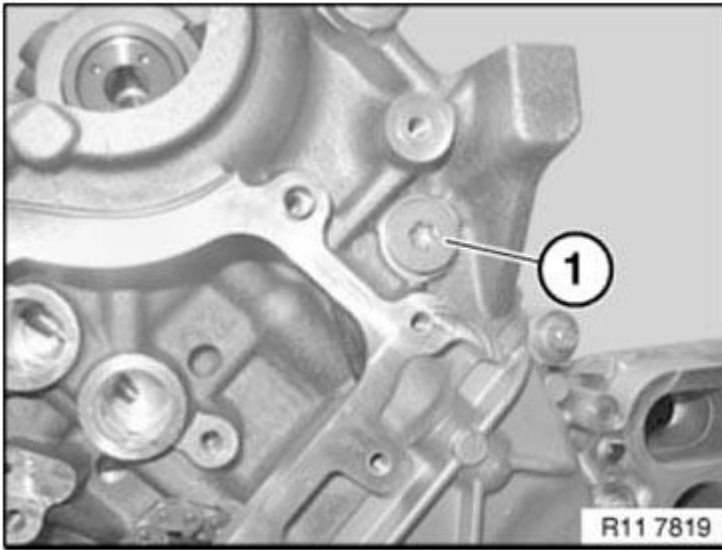


Fig. 58: Identifying Screw Of Guide Rail

Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, install **camshafts** . See **1131036 REMOVING AND INSTALLING/REPLACING LEFT EXHAUST CAMSHAFT (N63)** and **1131032 REMOVING AND INSTALLING/REPLACING LEFT INLET CAMSHAFT (N63)**.

Install left **INLET AND EXHAUST ADJUSTMENT UNITS** .

Assemble engine.

1112106 REMOVING AND INSTALLING RIGHT CYLINDER HEAD (N63)

Necessary preliminary work

- Check **TIMING** .
- Remove **INLET AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE** .

Release screw (1).

NOTE: **Guide rail is loose from cylinder head.**

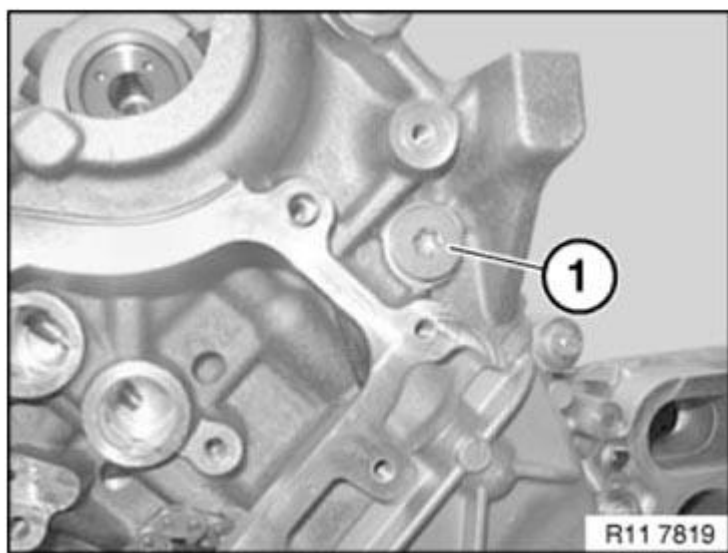


Fig. 59: Identifying Screw Of Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) at front from cylinder head.

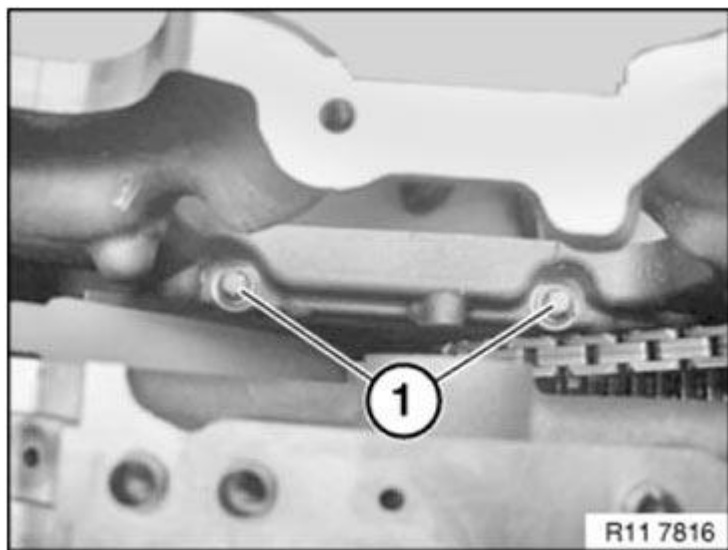


Fig. 60: Identifying Bolts At Front From Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts in sequence (10 to 1).

Remove all cylinder head bolts with washers.

NOTE: Shown without camshafts for purposes of clarity.

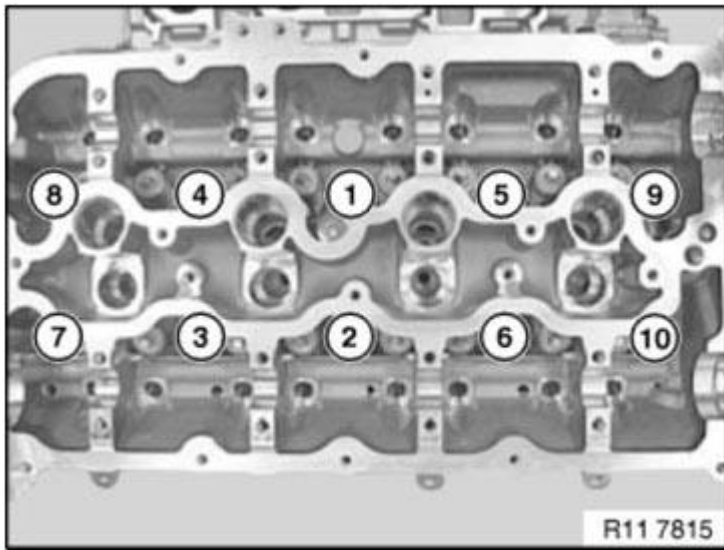


Fig. 61: Identifying Cylinder Head Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing faces of cylinder head and engine block; if necessary, remove gasket debris compound with special tool **11 4 470** . Make sure no gasket debris drops into the oil and coolant ducts.

Threaded bores in engine block must be free of dirt and oil (**risk of cracking**).

Check **CYLINDER HEAD FOR LEAKS** .

Check **CYLINDER HEAD SEALING FACE** for surface evenness.

Coat joint between engine block and timing case cover with Drei Bond 1209 (refer to BMW Parts Service).

NOTE: **Illustrations show N62.**

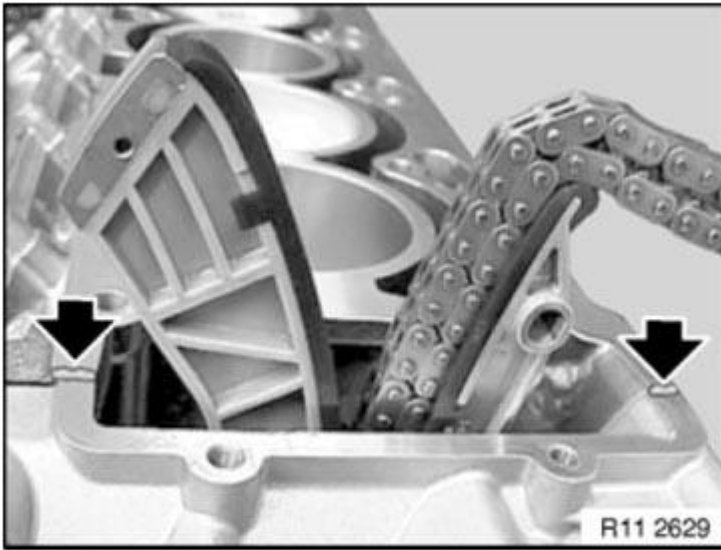


Fig. 62: Locating Drei Bond 1209 At Joint Between Engine Block And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Check fitting sleeves (1) for damage and correct installation position.

Fit new cylinder head gasket (2).

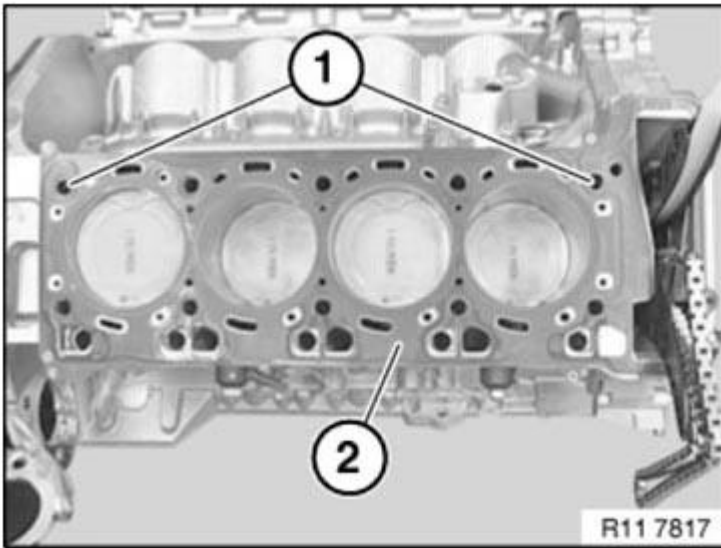


Fig. 63: Identifying Fitting Sleeves And Cylinder Head Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Put the cylinder head on.

Do not wash off bolt coating.

Insert new cylinder head bolts and initially tighten so that they are free of play.

Tighten down the cylinder-head bolts in order 1... 10.

Tightening torque: **11 12 1AZ** .

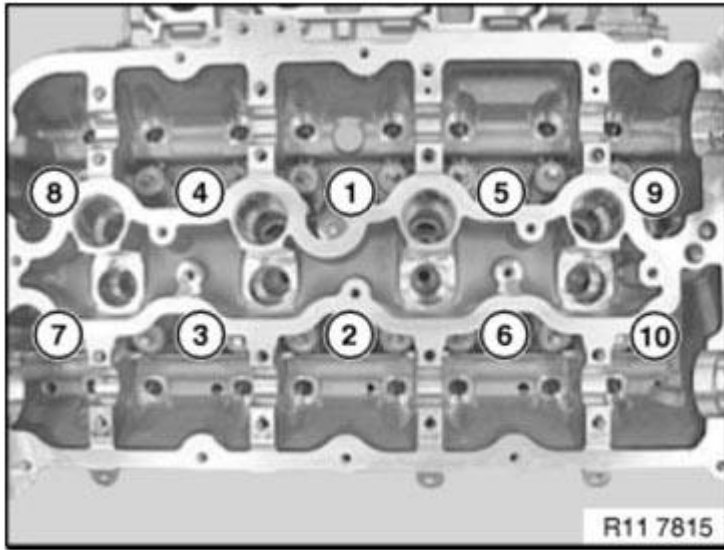


Fig. 64: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down bolts (1) between cylinder head and timing case cover.

Tightening torque: **11 12 2AZ** .

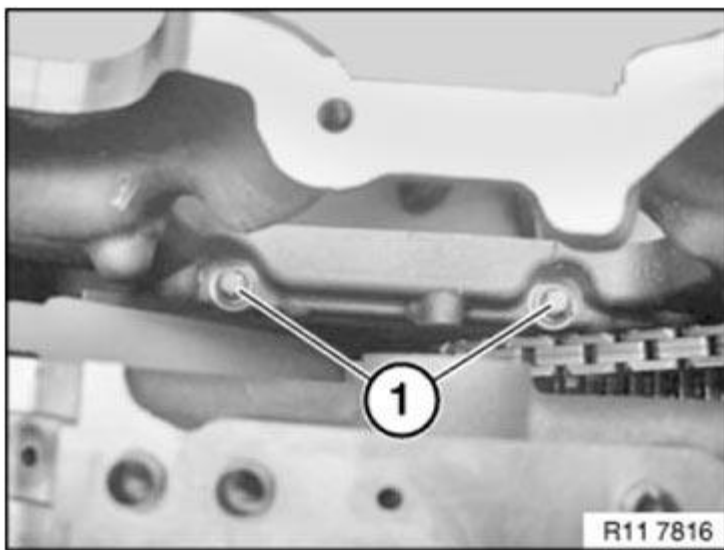


Fig. 65: Identifying Bolts Between Cylinder Head And Timing Case Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (1) of guide rail and tighten down.

Tightening torque: **11 31 3AZ** .

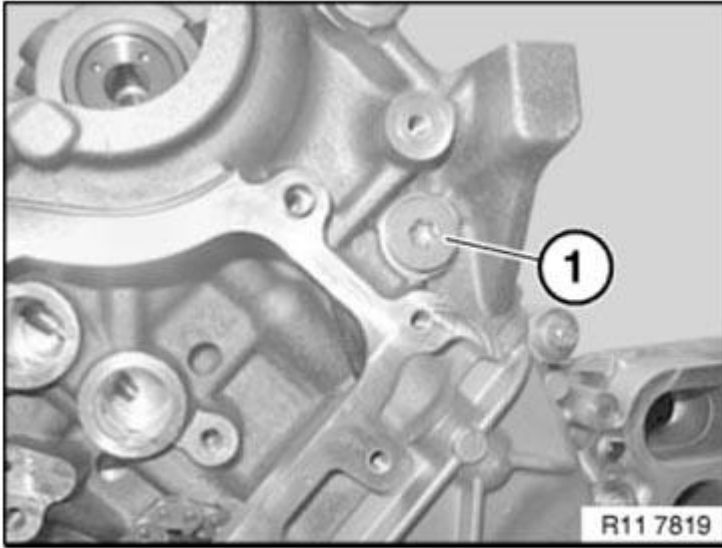


Fig. 66: Identifying Screw Of Guide Rail

Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, install camshafts . See **1131034 REMOVING AND INSTALLING/REPLACING RIGHT INLET CAMSHAFT (N63)** and **1131038 REMOVING AND INSTALLING/RENEWING RIGHT EXHAUST CAMSHAFT (N63)**.

Install **INLET AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE** .

Assemble engine.

1112005 REMOVING AND INSTALLING/SEALING LEFT CYLINDER HEAD COVER (N63)

Necessary preliminary work

- Remove **ACOUSTIC COVER**
- Disconnect **NEGATIVE BATTERY TERMINAL**
- Remove left **CHARGE AIR COOLER**
- Remove **INTAKE FILTER HOUSING**
- Remove **EXPANSION TANK** .
- Remove coolant pipe from cylinder head cover (E71 only)
- Remove coolant valve for heater feed line
- Disconnect **FUEL FEED LINE**

- Detach wiring harness for injectors and lay to one side
- Remove **IGNITION COILS** , cylinders 5-8
- Remove **INJECTORS** , cylinders 5-8
- Remove **HIGH-PRESSURE PUMP**

Release bolts in sequence (17 to 1).

Remove cylinder head cover.

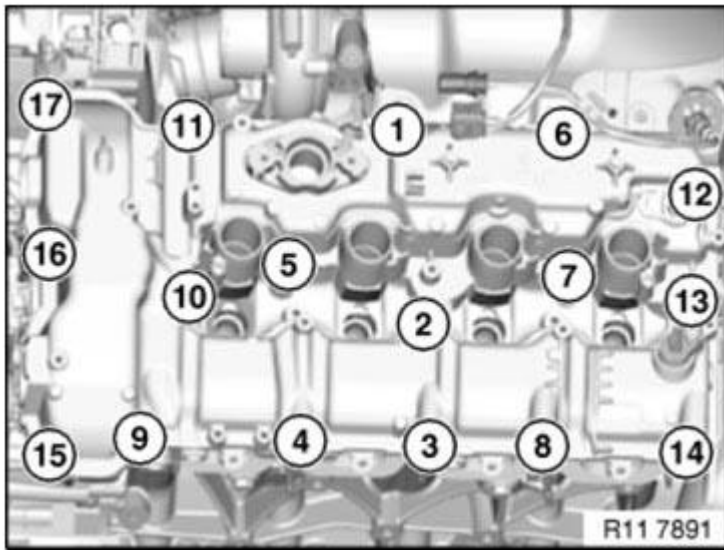


Fig. 67: Identifying Cylinder Head Cover Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing surface (1) with special tool **11 4 470** .

Installation note:

Replace gasket (2)

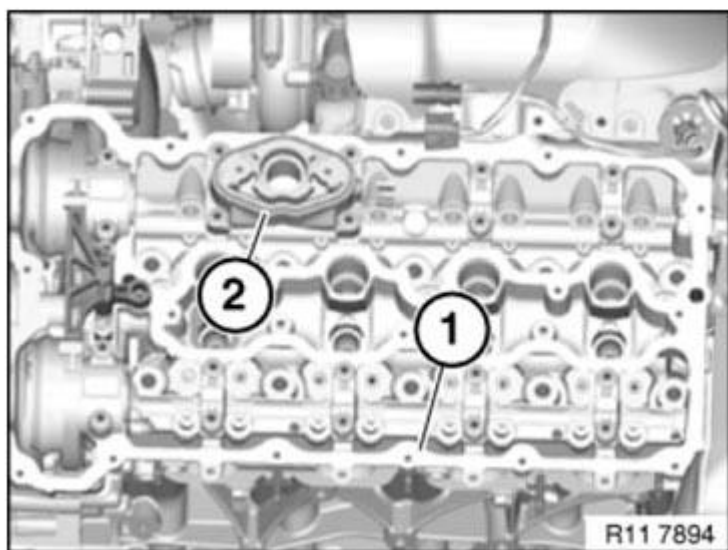


Fig. 68: Identifying Sealing Surface And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Renew profile seal of cylinder head cover

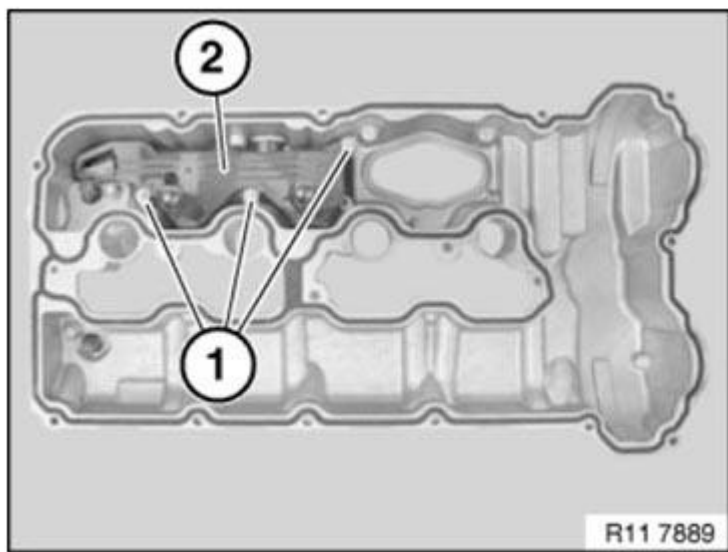


Fig. 69: Identifying Profile Seal Of Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

It is important to join screw (1) for exact positioning of the camshaft sensors.

Fit cylinder head cover.

Position screw (1).

Release screw (1) by 90°.

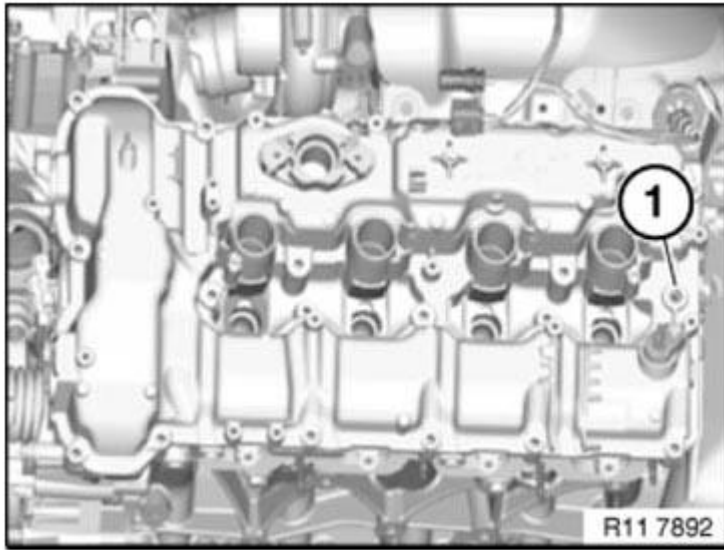


Fig. 70: Identifying Screw Of Camshaft Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Secure cylinder head cover in sequence (1 to 17) in two work steps.

Tightening torque **11 12 3AZ** .

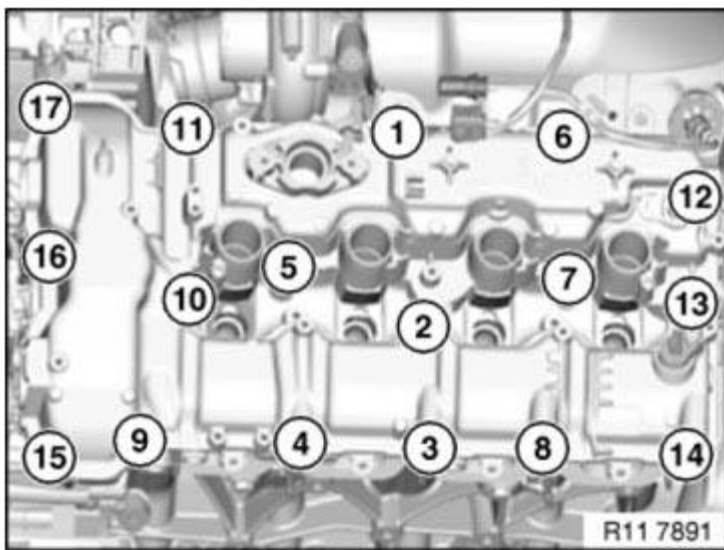


Fig. 71: Identifying Cylinder Head Cover Bolts Releasing Sequence

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1112006 REMOVING AND INSTALLING/SEALING RIGHT CYLINDER HEAD COVER (N63)

Necessary preliminary work

- Remove ACOUSTIC COVER
- Disconnect NEGATIVE BATTERY TERMINAL
- Release battery positive terminal
- Remove right INTERCOOLER
- Remove INTAKE FILTER HOUSING
- Disconnect FUEL FEED LINE
- Detach wiring harness for injectors and lay to one side
- Remove IGNITION COILS , cylinders 1-4
- Remove INJECTORS , cylinders 1-4
- Remove HIGH-PRESSURE PUMP

Release screws (1).

Tightening torque 11 12 9AZ .

Remove oil filler neck (2).

Installation note:

Replace sealing ring

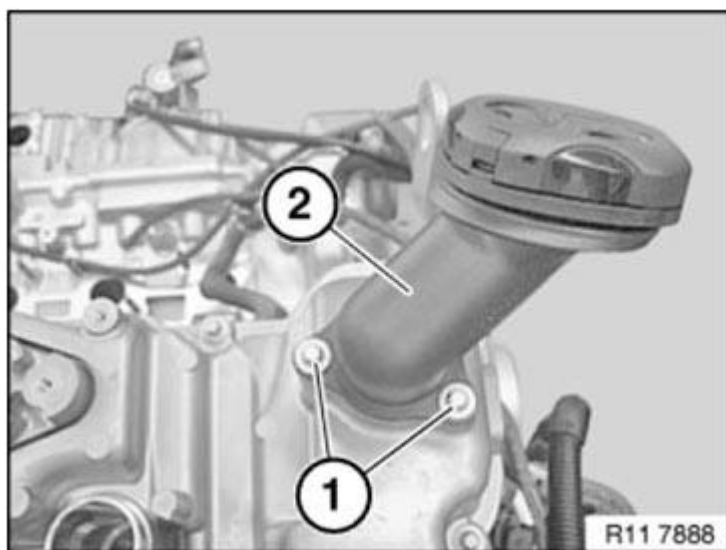


Fig. 72: Identifying Oil Filler Neck And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts in sequence (17 to 1).

Remove cylinder head cover.

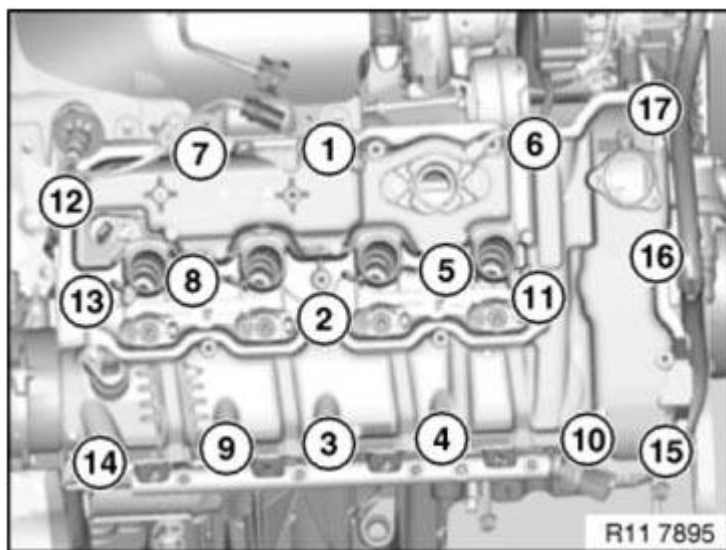


Fig. 73: Identifying Cylinder Head Cover Bolts Releasing Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing surface (1) with special tool 11 4 470 .

Installation note:

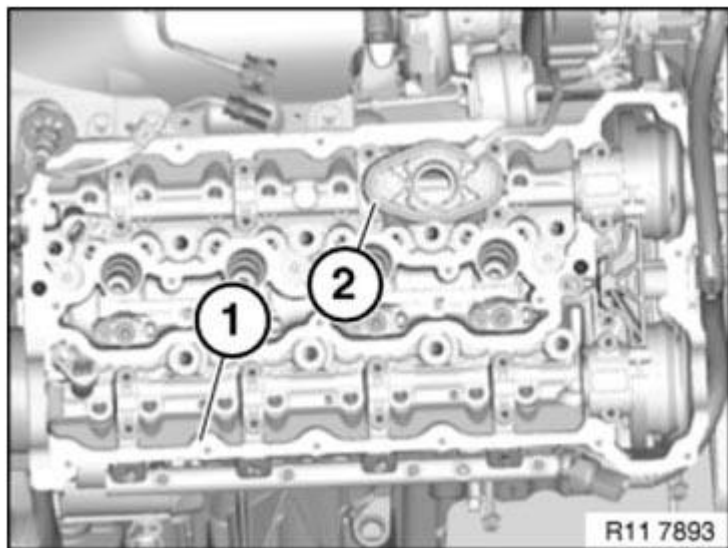
Replace gasket (2)

Fig. 74: Identifying Sealing Surface And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Renew profile seal of cylinder head cover

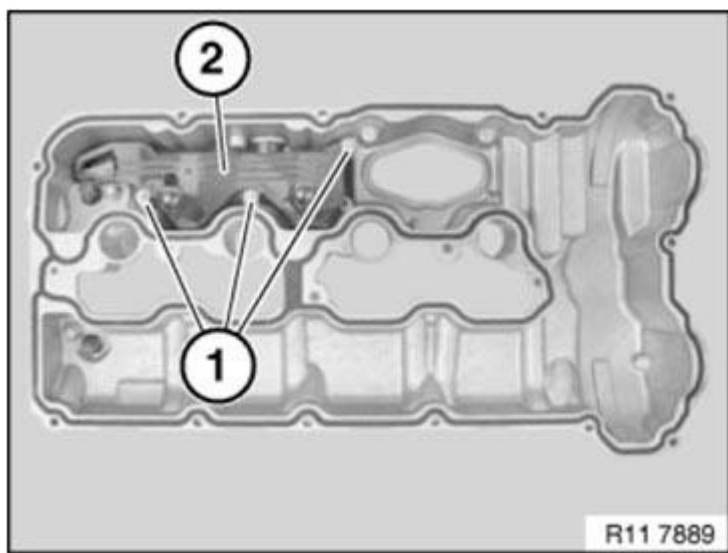


Fig. 75: Identifying Profile Seal Of Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

It is important to join screw (1) for exact positioning of the camshaft sensors.

Fit cylinder head cover.

Position screw (1).

Release screw (1) by 90°.

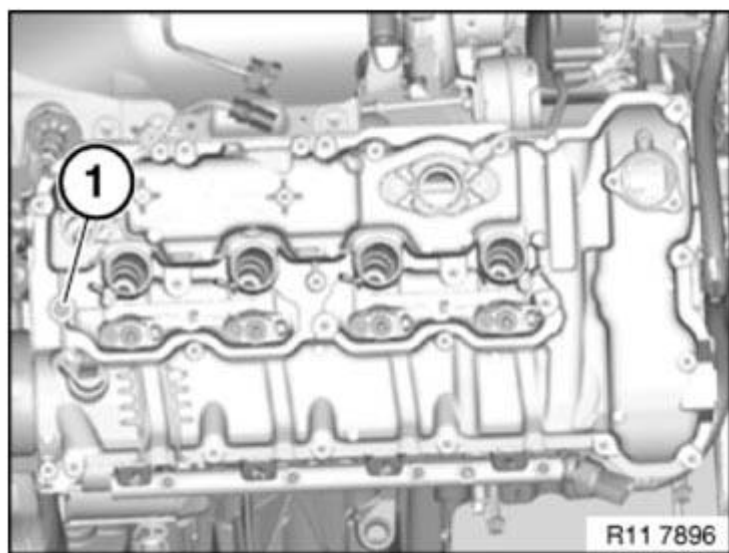


Fig. 76: Identifying Screw Of Camshaft Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Secure cylinder head cover in sequence (1 to 17) in two work steps.

Tightening torque **11 12 3AZ** .

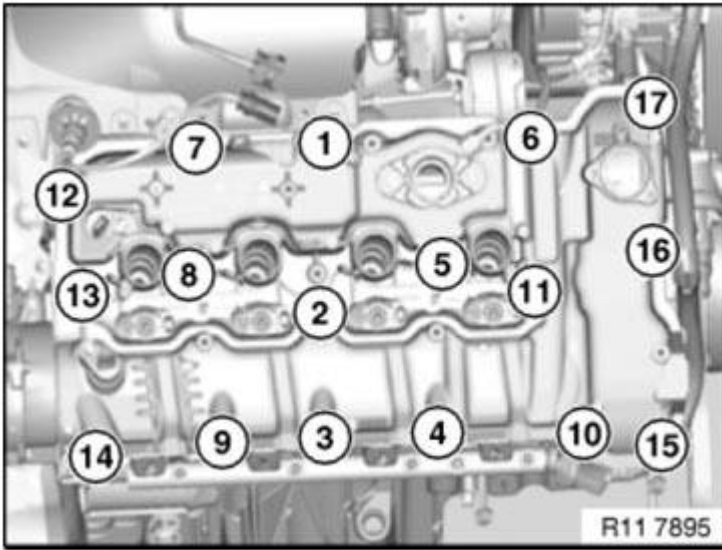


Fig. 77: Identifying Cylinder Head Cover Bolts Releasing Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1112112 REPLACING BOTH CYLINDER HEAD GASKETS (N63)

Necessary preliminary work

- Remove **LEFT CYLINDER HEAD**
- Remove **RIGHT CYLINDER HEAD**

INSTALLATION NOTE:

The cylinder head gasket (2) for cylinders 1-4 and cylinders 5-8 are identical.

There is no marking (TOP).

Cylinder head gasket (2) must depending on its styling be correctly positioned on the timing chain case.

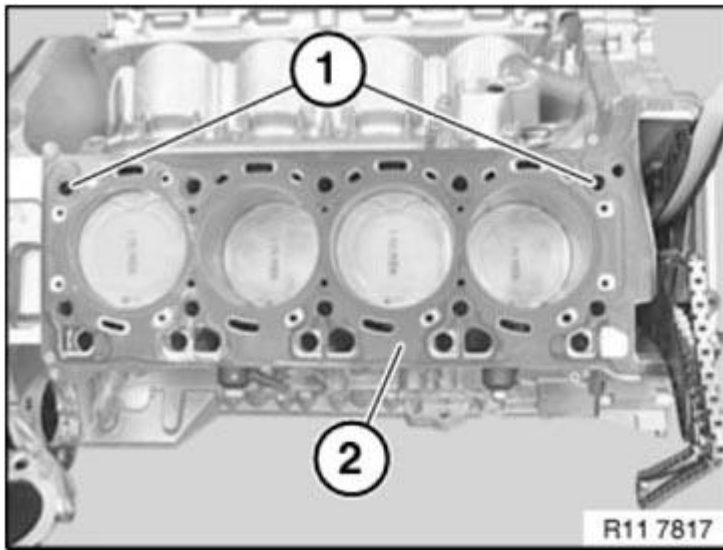


Fig. 78: Identifying Fitting Sleeves And Cylinder Head Gasket
 Courtesy of BMW OF NORTH AMERICA, INC.

Repair gasket (+REP) is 0.3 mm thicker.

Check **cylinder head** for surface evenness. See **1112719 GRINDING CYLINDER HEAD SEALING SURFACE (N63)**.

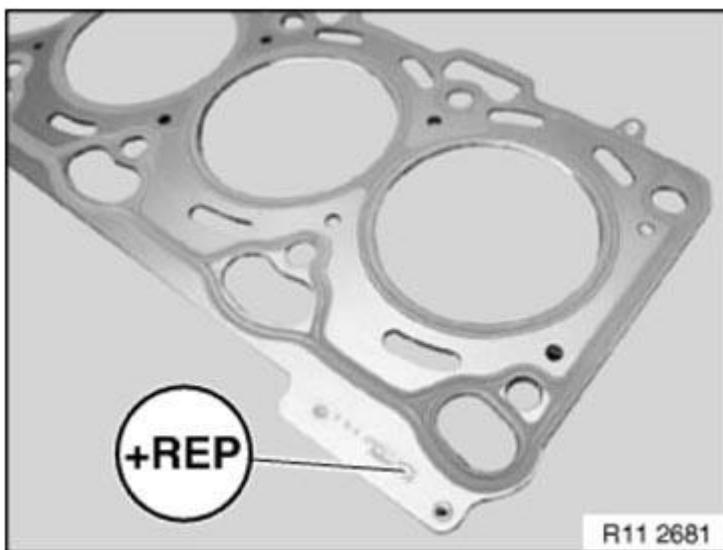


Fig. 79: Identifying Cylinder Head Gasket (+REP)
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1113 OIL SUMP

1113020 REMOVING AND INSTALLING/REPLACING LOWER OIL SUMP SECTION (N63)**Necessary preliminary work**

- Remove underbody protection at front and rear. See **FRONT UNDERBODY PROTECTION** and **REAR UNDERBODY PROTECTION**.
- Release oil drain plug and drain engine oil. See **SERVICE - ENGINE OIL**.

Unlock plug connection (1) on oil level sensor and disconnect.

Release screws (2) along line.

Tightening torque **11 13 3AZ**.

Remove lower oil sump section (3).

Installation note:

Clean sealing surfaces.

Replace gasket.

Replace screws.

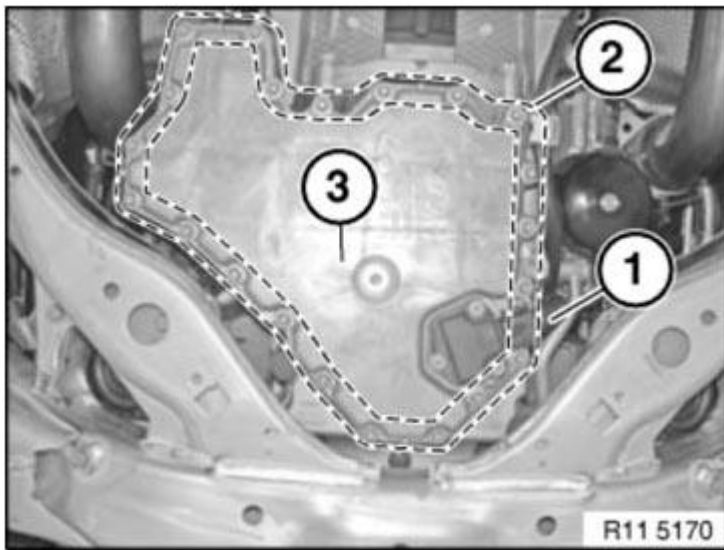


Fig. 80: Identifying Plug Connection On Oil Level Sensor And Lower Oil Sump Section
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing lower oil sump section:

Convert oil level sensor.

Replace sealing ring.

NOTE:

Procedure with four-wheel drive

Unlock plug connection (1) on oil level sensor and disconnect.

Release screws (2) along line.

Tightening torque **11 13 3AZ** .

Remove lower oil sump section (3).

Installation note:

Clean sealing surfaces.

Replace gasket.

Replace screws.

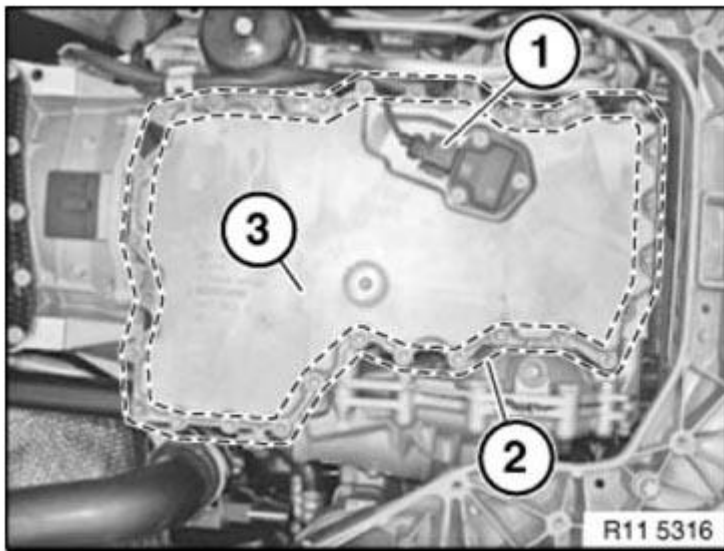


Fig. 81: Identifying Plug Connection On Oil Level Sensor And Lower Oil Sump Section
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing lower oil sump section:

Convert oil level sensor.

Replace sealing ring.

1113010 REMOVING AND INSTALLING/REPLACING UPPER OIL SUMP SECTION (N63)**Necessary preliminary work**

- Drain **ENGINE OIL** .
- Secure engine in **INSTALLATION POSITION** .
- Lower **FRONT AXLE** .
- Remove **LOWER OIL SUMP SECTION** .
- Unclip wiring harness on oil sump.

Remove oil filter cover with oil filter (1) with special tool **11 9 240** .

Tightening torque: **11 42 1AZ** .

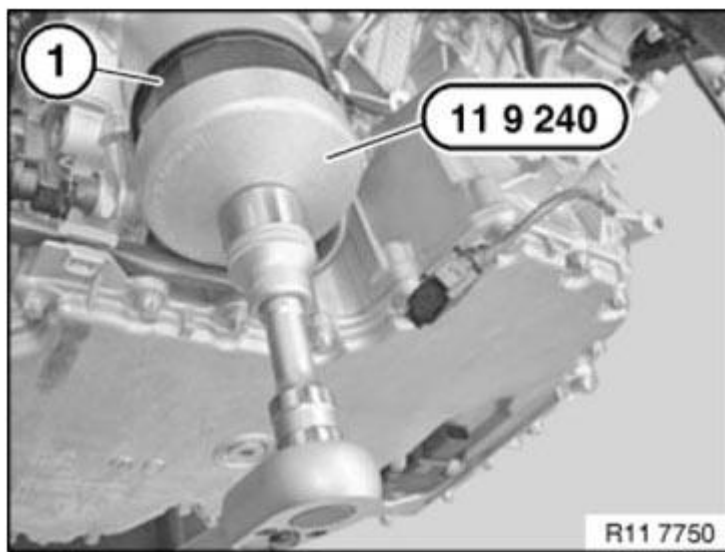


Fig. 82: Removing Oil Filter Cover With Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1). Remove oil pipes (2) from oil filter housing.

Release holders of supply/return lines on oil sump

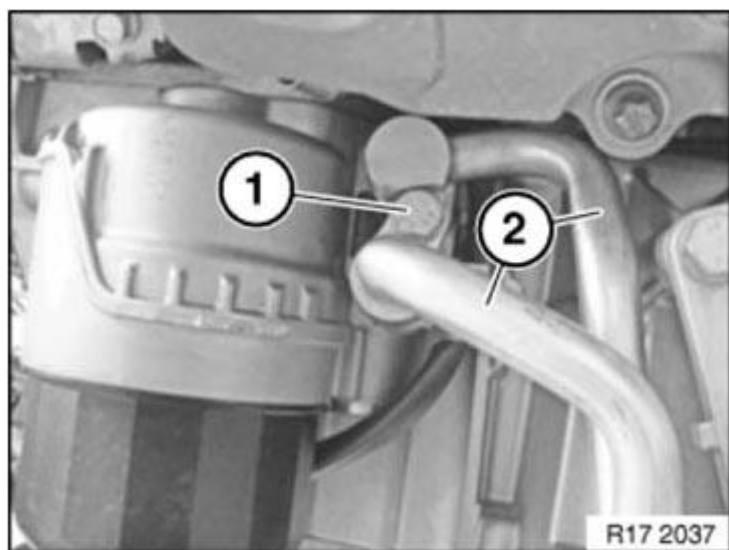


Fig. 83: Identifying Oil Pipes Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque: **11 41 1AZ** .

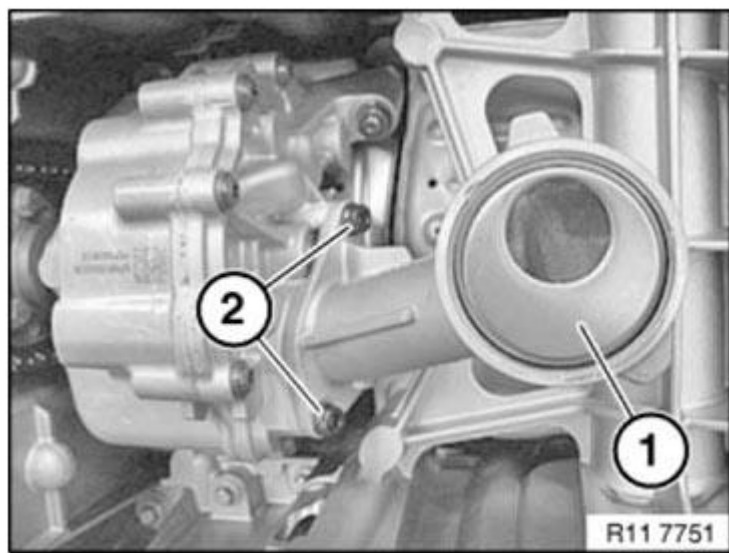


Fig. 84: Identifying Intake Pipe And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

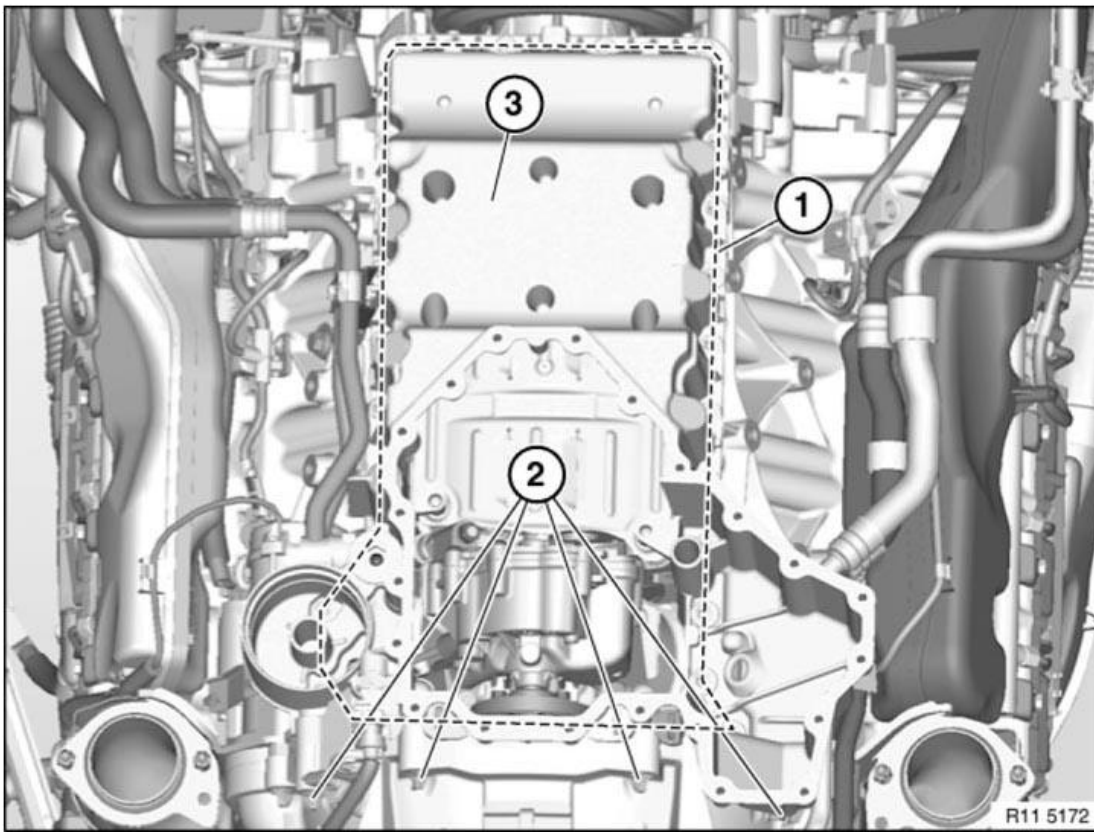


Fig. 85: Identifying Transmission End Screws And Upper Oil Sump Section
 Courtesy of BMW OF NORTH AMERICA, INC.

Release screws in area of line (1).

Tightening torque **11 13 2AZ** .

Release screws (2) on transmission end **24 00 1AZ** .

Remove upper oil sump section (3).

Installation note:

Free sealing surfaces of seal debris and clean.

Replace gasket.

Modify oil pressure switch if replacing oil sump.

Assemble engine.

1114 HOUSING COVER

1114110 REMOVING AND INSTALLING LOWER TIMING CASE COVER (N63)**Necessary preliminary work**

- Remove **ENGINE**
- Remove both cylinder head covers. See **LEFT CYLINDER HEAD COVER** and **RIGHT CYLINDER HEAD COVER**
- Remove **LOWER OIL SUMP SECTION**
- Remove **UPPER OIL SUMP SECTION**
- Remove alternator **BELT TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove **COOLANT PUMP**
- Remove **ALTERNATOR**
- Remove **A/C COMPRESSOR**
- Remove hub for **VIBRATION DAMPER**

Release screws along lines (1).

Remove timing case cover (2) towards front.

Clean sealing surfaces with special tool **11 4 470** .

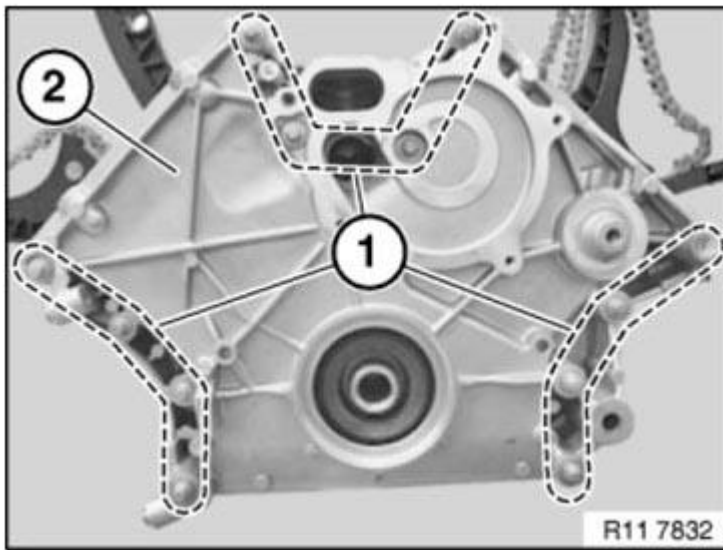


Fig. 86: Identifying Screws Along Lines And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check jump guard for damage.

Release screw (1).

Tightening torque **11 14 1AZ** .

Remove jump guard (2).

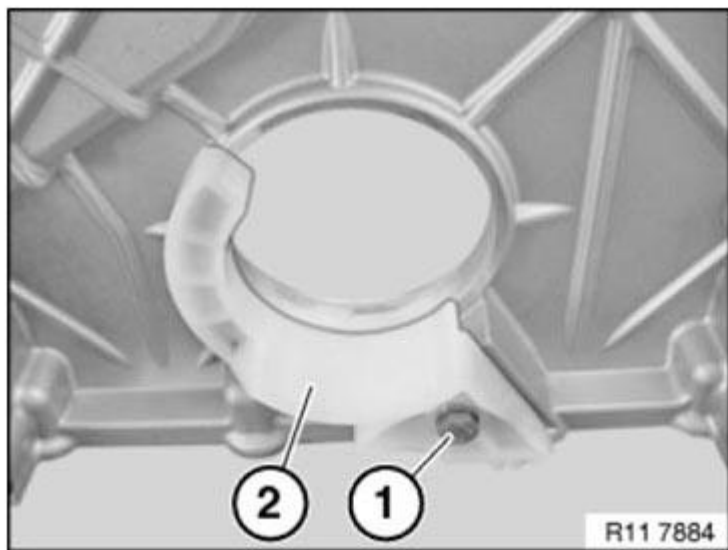


Fig. 87: Identifying Jump Guard And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing surfaces with special tool **11 4 470** .

Installation note:

Preposition all bolts in timing case cover.

Replace beaded metal gaskets (1, 2 and 3)

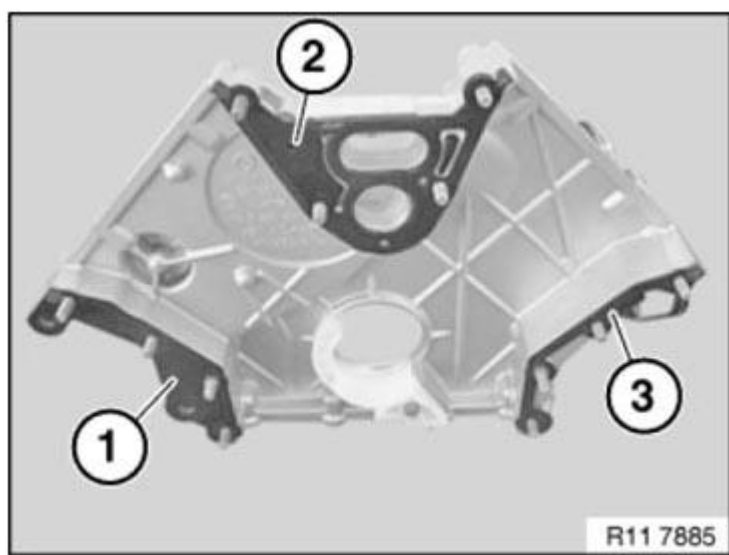


Fig. 88: Identifying Beaded Metal Gaskets
Courtesy of BMW OF NORTH AMERICA, INC.

Fit timing case cover (2).

Initially tighten all bolts to approx. 5 Nm.

Fully tighten all bolts in alternate sequence.

Tightening torque **11 14 2AZ** .

Installation note:

Wait for PU material to emerge at sealing joints.

Carefully wipe off protruding PU material.

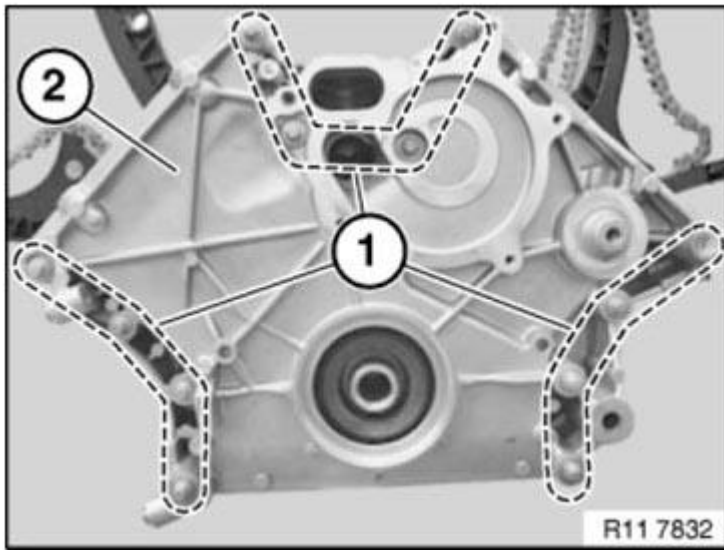


Fig. 89: Identifying Screws Along Lines And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **RADIAL SHAFT SEAL** in gear case cover at bottom.

Assemble engine.

1114080 REMOVING AND INSTALLING TIMING CASE COVER, TOP LEFT (N63)

Timing case cover, cylinders 5-8

Necessary preliminary work

- Remove both **SOLENOID VALVES** on left side

Release screws (1).

Tightening torque **11 14 3AZ** .

Remove timing case cover (2).

Installation note:

Replace gasket

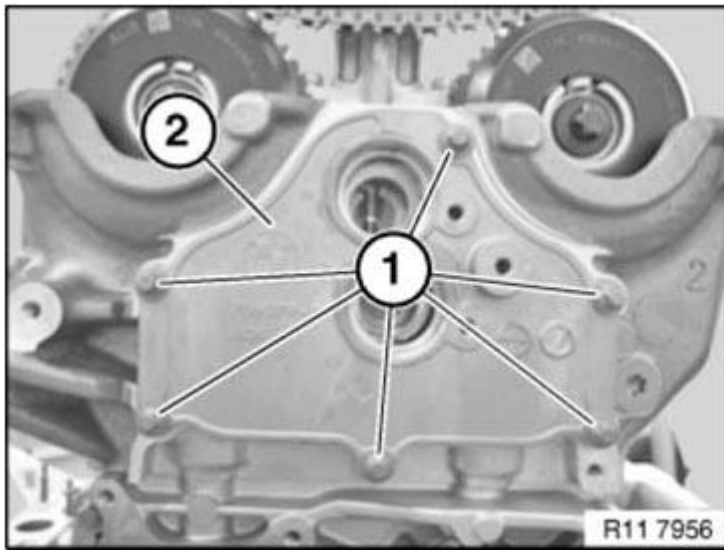


Fig. 90: Identifying Timing Case Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1114085 REMOVING AND INSTALLING TIMING CASE COVER, TOP RIGHT (N63)

Gear case cover, cylinders 1-4

Necessary preliminary work

- Remove both **SOLENOID VALVES** on right side

Release screws (1).

Tightening torque **11 14 3AZ** .

Remove timing case cover (2).

Installation note:

Replace gasket

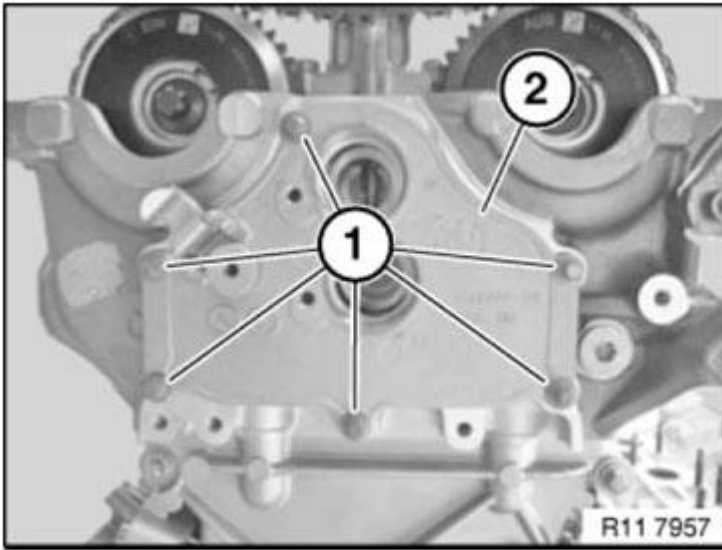


Fig. 91: Identifying Timing Case Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1114250 REMOVING AND INSTALLING/SEALING REAR COOLANT END COVER (N63)

Notes

WARNING: Risk of scalding!
Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Remove **FLYWHEEL**
- Drain **COOLANT**

Release all screws in area (1).

Tightening torque **11 14 5AZ** .

Remove end cover.

NOTE: Clean sealing surfaces with special tool 11 4 470 .

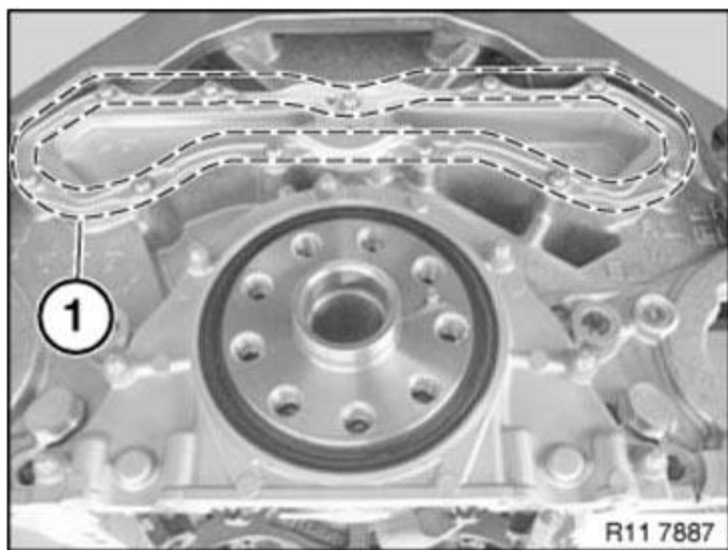


Fig. 92: Identifying End Cover Screws Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace profile seal (1)

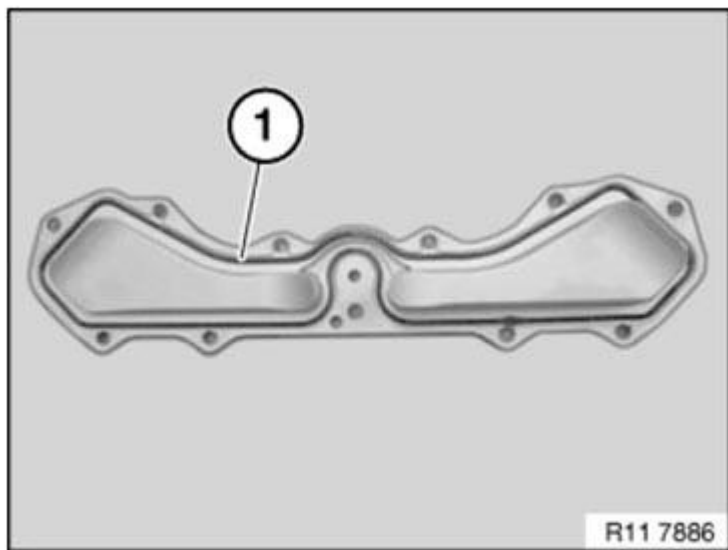


Fig. 93: Identifying Profile Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1114151 REPLACING CRANKSHAFT RADIAL SEAL ON TRANSMISSION SIDE (N63)

IMPORTANT: The radial crankshaft seal can only be replaced completely with the end cover. The radial crankshaft seal is an integral part of the end cover and can not be replaced individually.

Necessary preliminary work

- Drain off engine oil. See **SERVICE - ENGINE OIL**
- Remove **FLYWHEEL**

Release screws (1).

Unfasten screws (2).

Carefully remove end cover with radial crankshaft seal.

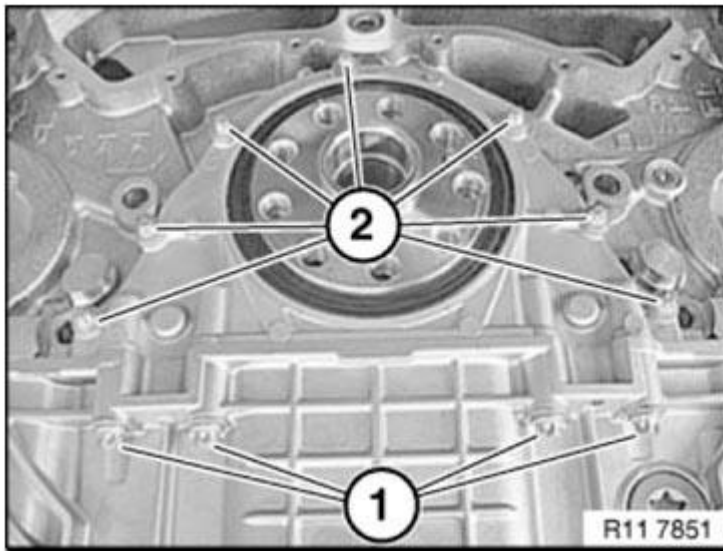


Fig. 94: Identifying Radial Crankshaft Seal End Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support bush (2) is included in delivery specification.
If the radial crankshaft seal (1) is stored for more than six months without the support bush (2), its operational reliability will no longer be guaranteed.
Radial crankshaft seal (1) must not be reused in this eventuality!
Support bush (2) remains in the radial crankshaft seal (1) and is used as a slip bush during described installation described below.

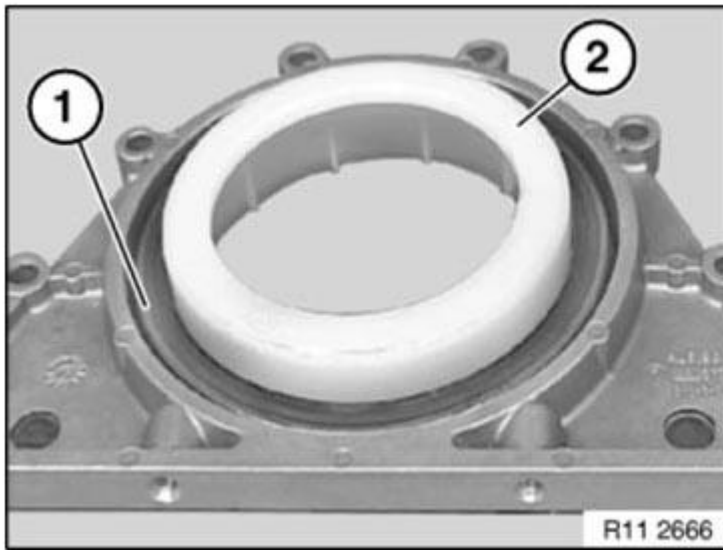


Fig. 95: Identifying Support Bush And Radial Crankshaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The sealing lip of the radial crankshaft seal (1) is highly sensitive and must not be kinked.
Do not touch the sealing lip with your fingers.

IMPORTANT: Special tool 11 2 390 must not be used.

When the radial crankshaft seal is installed, only the support bush included in the delivery specification may be used as a slip bush.

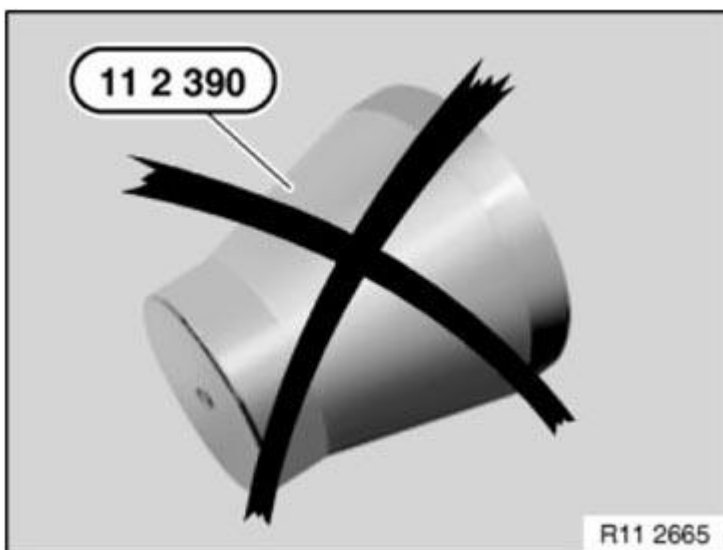


Fig. 96: Precaution - Special Tool 11 2 390 Must Not Be Used

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check fitting sleeves (1) for damage and correct installation position.

Clean sealing surface (2) so that it is free from oil and grease.

Coat contact points on joint along oil sump (see arrows) with Drei Bond 1209.

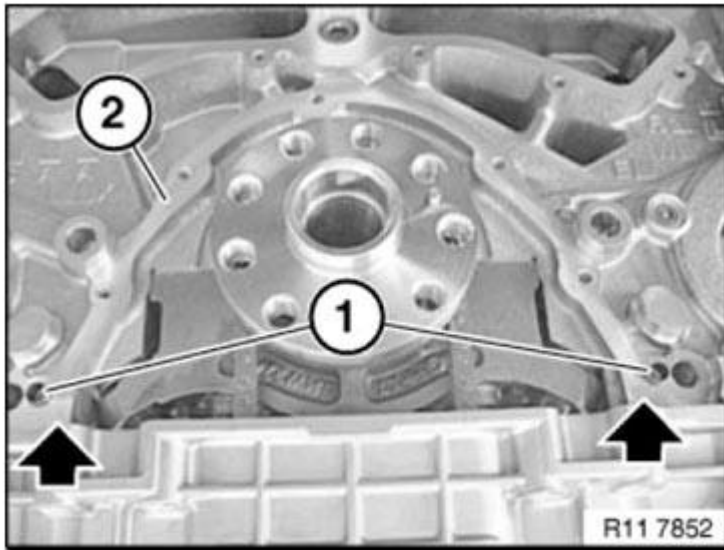


Fig. 97: Identifying Fitting Sleeves And Sealing Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Lightly oil running surface of crankshaft.

Fit end cover (1) with support bush (2) on crankshaft and push on carefully.

NOTE: Illustration shows (N62TU).

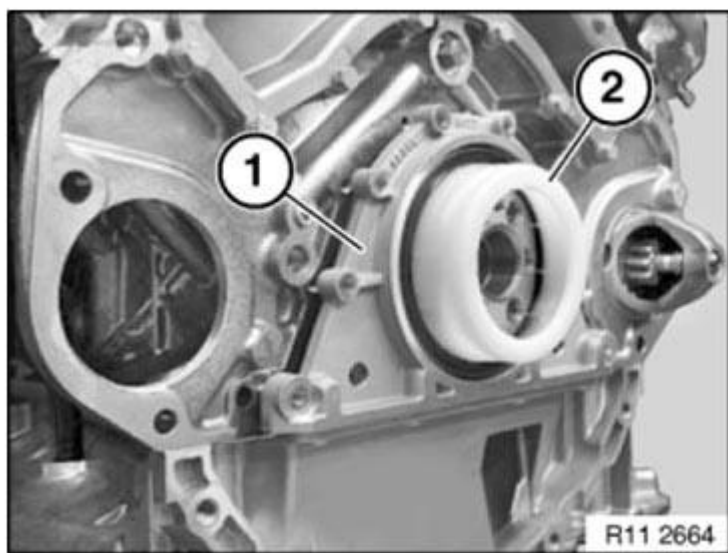


Fig. 98: Identifying End Cover And Support Bush
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (2) and initially tighten without play.

Insert screws (1) and initially tighten without play.

Tighten down bolts (2) from inside outwards.

Tighten down screws (1) from inside outwards.

Tightening torque **11 14 4AZ** .

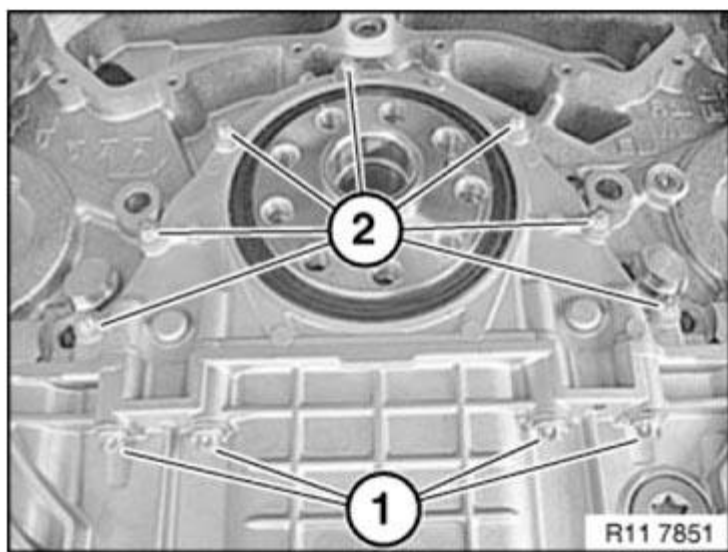


Fig. 99: Identifying Radial Crankshaft Seal End Cover Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1114141 REPLACING RADIAL SHAFT SEAL IN LOWER TIMING CASE COVER (N63)

Necessary preliminary work

- Removing **VIBRATION DAMPER**

Position all levers (2) horizontally to pull off radial shaft seal (1).

Turn back spindle of special tool **11 9 410** until all levers (2) can be positioned on sealing lip.

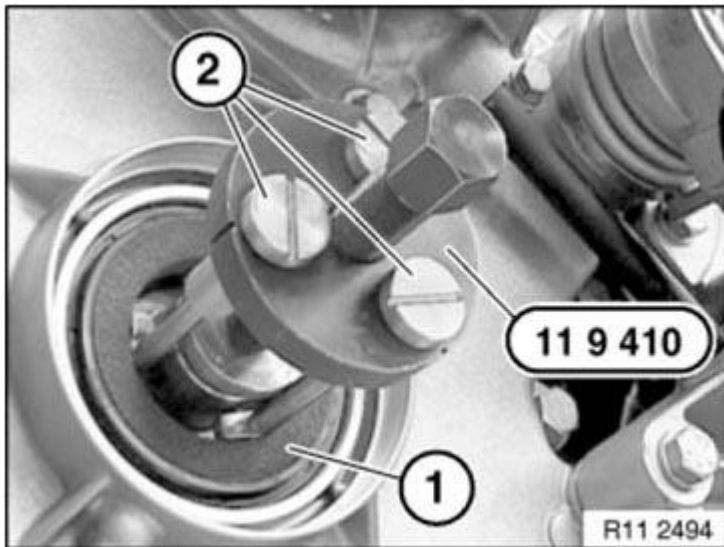


Fig. 100: Positioning All Levers Horizontally To Pull Off Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Turn all levers (2) so that they grip behind radial shaft seal (1).

Turn spindle (3) on special tool **11 9 410** to remove radial shaft seal (1).

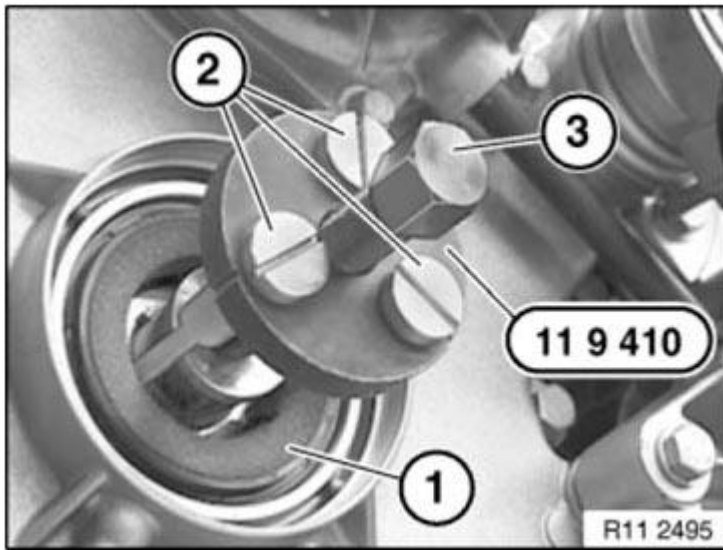


Fig. 101: Turning Spindle On Special Tool 11 9 410 To Remove Radial Shaft Seal
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Radial shaft seal (1) may only be supported with "support sleeve" (2).

If the radial shaft seal (1) is stored for more than six months without the support sleeve (2), its operational reliability will no longer be guaranteed.

Radial shaft seal (1) must not be reused in this case!

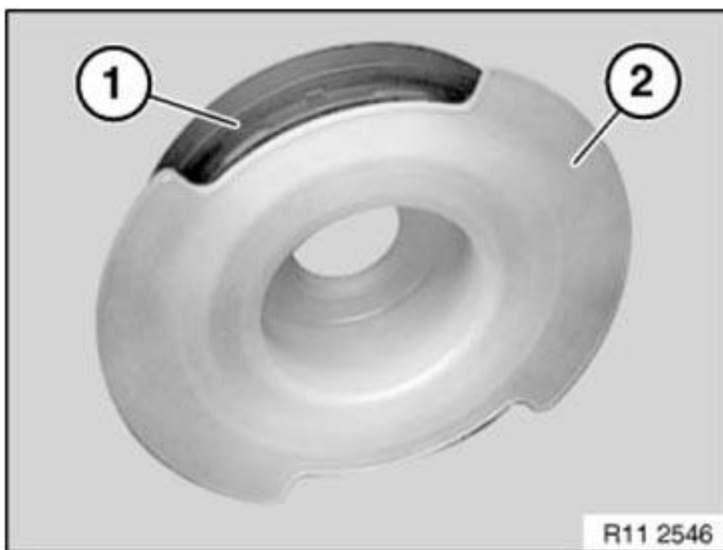


Fig. 102: Identifying Radial Shaft Seal And Support Sleeve
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The sealing lip of the radial shaft seal (1) is highly sensitive and must not be

**kinked under any circumstances.
Do not touch the sealing lip with your fingers.**

Remove support sleeve (2) from radial shaft seal (1).

Fit radial shaft seal (1) on lower gear case cover.

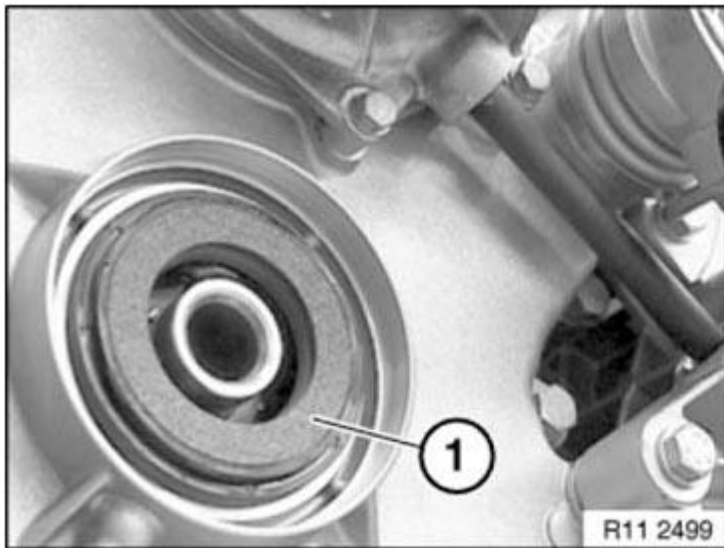


Fig. 103: Identifying Radial Shaft Seal On Lower Gear Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Using special tool **11 9 420** and central bolt (3), screw radial shaft seal into lower gear case cover until flush.

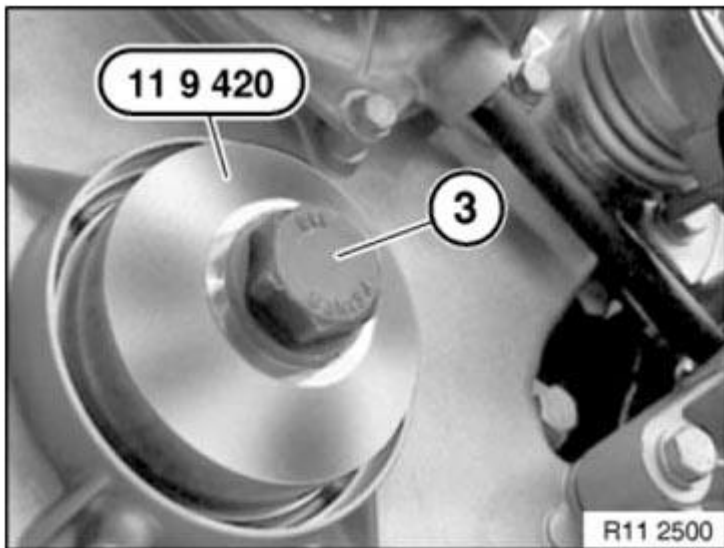


Fig. 104: Identifying Special Tool And Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1121 CRANKSHAFT WITH BEARING

1121531 REPLACING ALL CRANKSHAFT MAIN BEARING SHELLS (N63) WITHOUT HYBRID DRIVE

Notes

IMPORTANT: Risk of injury from sharp edge of housing.

IMPORTANT: If a crankcase or a crankshaft is replaced, old and new identifications can be used.

A mixed installation is permissible.

Example:

An old crankcase with an old crankcase designation and a new crankshaft with a new crankshaft designation.

An old crankshaft with an older crankshaft designation and a new crankcase with a new crankcase designation.

Or a new crankcase with a new crankshaft with new identifications.

Necessary preliminary work

- Remove CRANKSHAFT

NOTE: The main bearing caps 1 to 5 are marked with numbers.

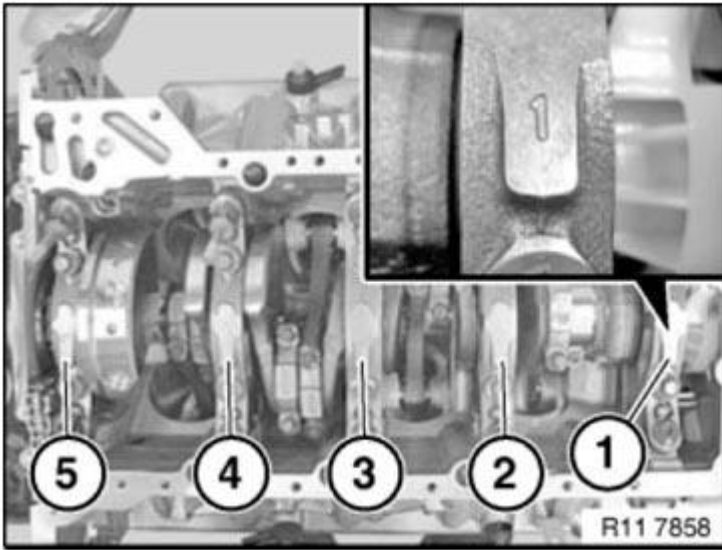


Fig. 105: Identifying Main Bearing Caps Marked Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

Observe crankshaft construction stage:

S: Series

B: Repair stage 1

C: Repair stage 2

The letters denote the bearing shell classification for the relevant bearing position from 1 to 5 (main bearing cap).

The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color assignment on crankshaft 1 to 5

Y= yellow

G= green

V= violet

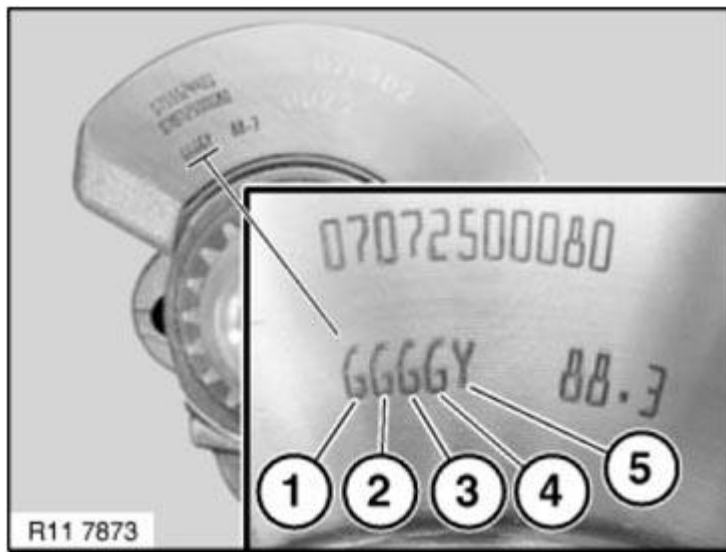


Fig. 106: Identifying Color Assignment On Crankshaft 1 To 5
Courtesy of BMW OF NORTH AMERICA, INC.

The letters denote the bearing shell classification for the relevant bearing position from 1 to 5 in the crankcase and is located on the transmission side in the Vee. The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color assignment in crankcase 1 to 5.

Y= yellow

G= green

V= violet

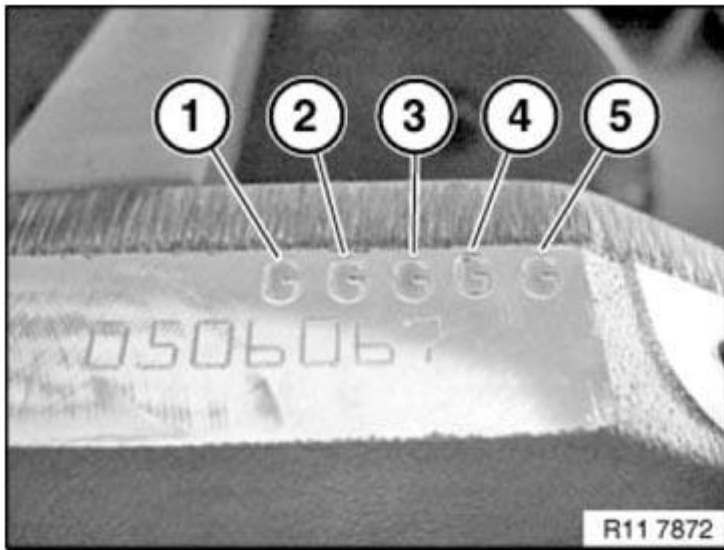


Fig. 107: Identifying Color Assignment In Crankcase 1 To 5
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New bearing shell classification.

The letters denote the bearing shell classification for the relevant bearing position from 1 to 5 (main bearing cap).

The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color assignment on crankshaft 1 to 5

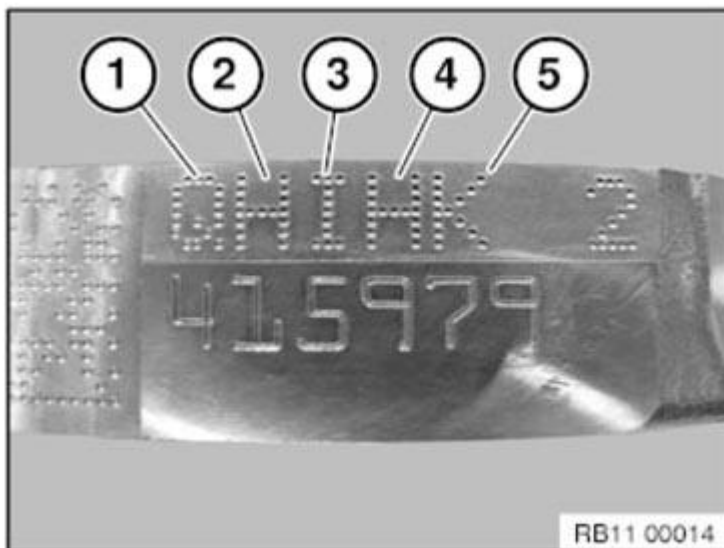


Fig. 108: Identifying Color Assignment On Crankshaft 1 To 5
 Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Changed bearing classification:
Bearing position 1, 2, 3, 4 and 5**

BEARING SHELL CLASSIFICATION LETTER WITH CODE

Code letter	Color code
New (A to H)	Yellow
Old Y	Yellow
New (I to R)	Green
Old G	Green
New (S is Z) Old V	Violet

TOLERANCE CLASSES AND BEARING SHELL COVERS COLOR CODE REFERENCE CHART

	Tolerance classes	Bearing shell covers
Crankcase	A B C D E G H	Yellow Yellow
Crankcase	I C M N P q R	Green Green
Crankcase	S T U W X Z	Violet

Installation note:

Install main bearing shells (1) with lubrication groove in crankcase.

Install main bearing shells (2) without lubrication groove in the main bearing caps.

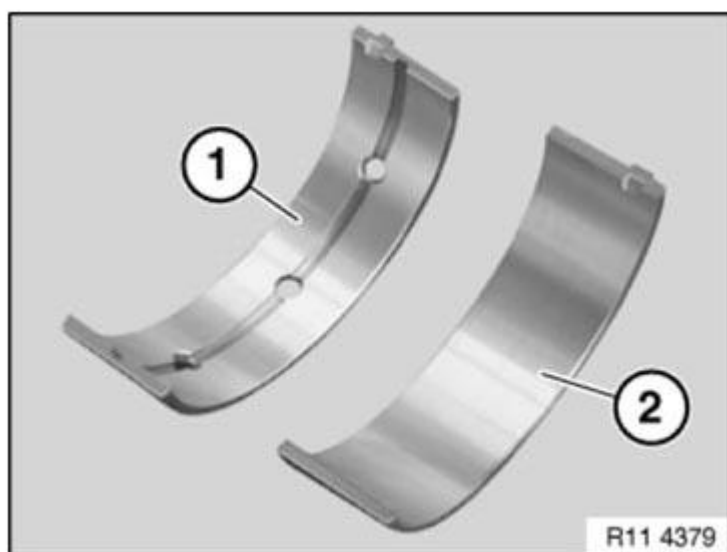


Fig. 109: Identifying Main Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Main bearing cap number 3 can be identified by the surfaces (1) for the thrust washers of the thrust bearing.

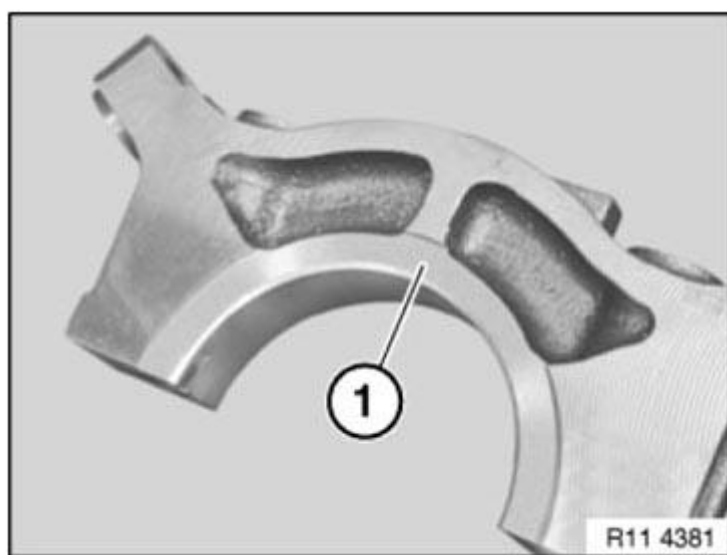


Fig. 110: Identifying Main Bearing Cap Thrust Washers Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back thread support bushing into main bearing cap.

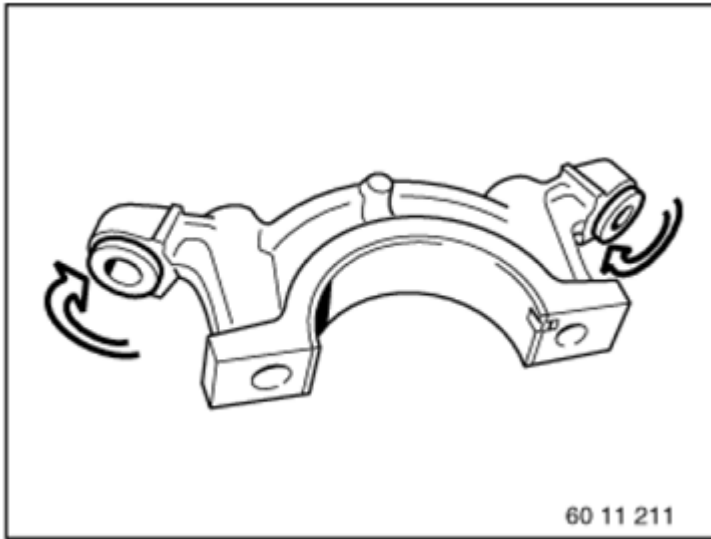


Fig. 111: Turning Back Thread Support Bushing Into Main Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Checking main bearing clearance

To check crankshaft bearing play, use the existing main bearing bolts.

IMPORTANT: Risk of cracking!
No oil is permitted in the blind holes.

Do not twist crankshaft.

Place special tool **00 2 590**

(Plastigage model PG 1) onto the oil-free crankshaft (see arrow).

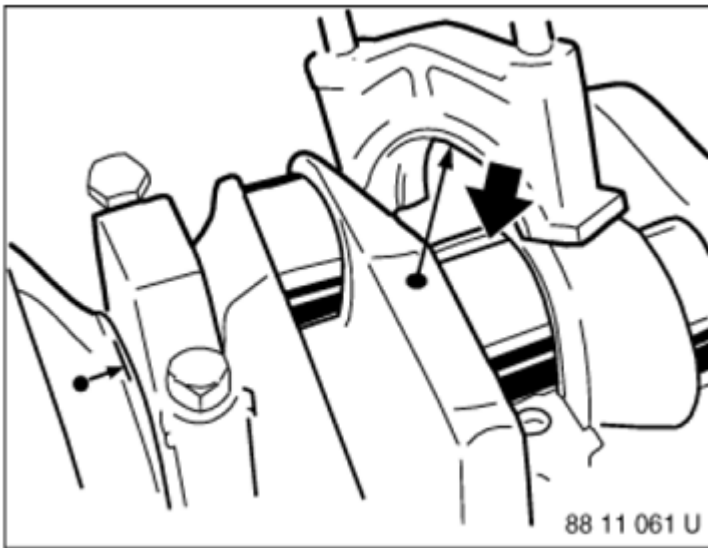


Fig. 112: Identifying Main Bearing Clearance On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down all collar bolts (M11) of main bearing caps in sequence 1 to 5 to jointing torque.

Tightening torque **11 11 1AZ** .

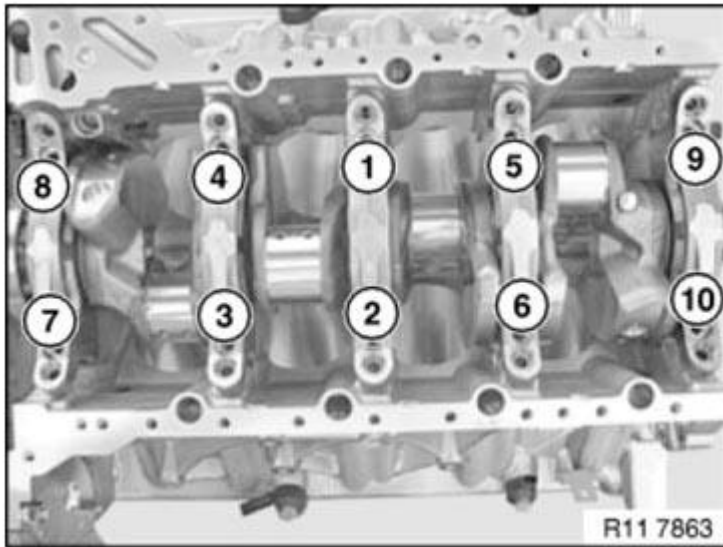


Fig. 113: Identifying Main Bearing Caps Collar Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down all collar bolts (M11) of main bearing caps with special tool **00 9 120** with angle of rotation.

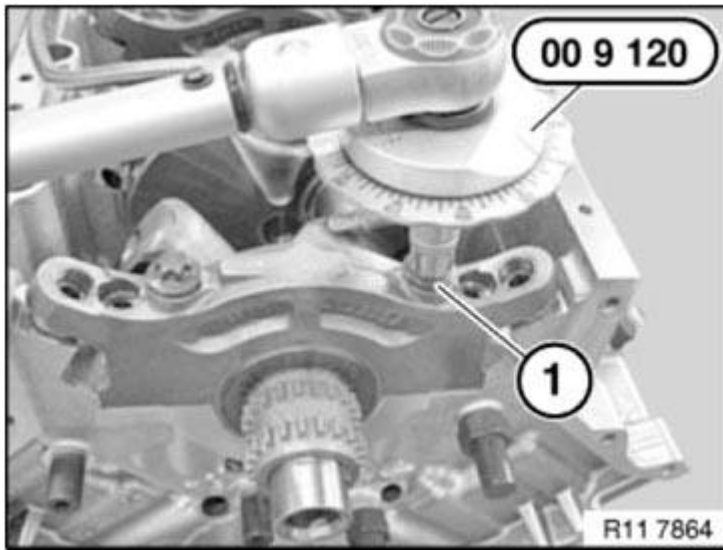


Fig. 114: Tightening Collar Bolts (M11) Of Main Bearing Caps With Special Tool 00 9 120 With Angle Of Rotation

Courtesy of BMW OF NORTH AMERICA, INC.

Remove main bearing cap.

Read off main bearing clearance at width of flattened plastic thread with assistance of measurement scale.

Main bearing clearance: See CRANKSHAFT AND BEARINGS or CRANKSHAFT AND BEARINGS.

- Remove plastic thread
- Apply a coat of oil to new bearing shells and crankshaft



Fig. 115: Measuring Main Bearing Clearance

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Always replace main bearing bolts in main bearing caps with new bolts.
Do not wash off bolt coating.

IMPORTANT: Risk of cracking!
No oil is permitted in the blind holes.

Install **CRANKSHAFT** .

Carefully strike back and front of crankshaft with a plastic hammer to center guide bearing (do not damage crankshaft).

Secure special tool 11 6 252 with magnetic foot on crankcase.

Position special tool 11 6 251.

Tightening specifications for main bearing:

Check **SIDE CLEARANCE** .

Check guide bearing shell, crankshaft and crankcase if necessary.

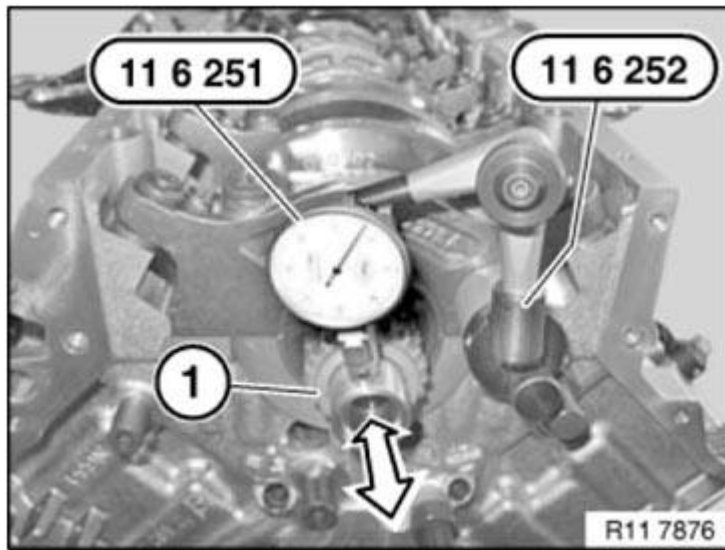


Fig. 116: Checking Side Clearance
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1121500 REPLACING CRANKSHAFT (N63)

Notes

IMPORTANT: Weight of crankshaft is approx. 20 kg.
Risk of injury from sharp edge of housing.

Necessary preliminary work

- Remove ENGINE
- Mount engine on assembly stand
- Remove cylinder head. See LEFT CYLINDER HEAD and RIGHT CYLINDER HEAD.
- Remove HUB FOR VIBRATION DAMPER
- Removing LOWER TIMING CASE COVER
- **Removing oil pan** See 1113020 REMOVING AND INSTALLING/REPLACING LOWER OIL SUMP SECTION (N63) and 1113010 REMOVING AND INSTALLING/REPLACING UPPER OIL SUMP SECTION (N63)
- Remove OIL PUMP
- Removing PISTON
- Remove FLYWHEEL
- Remove radial shaft seals. See RADIAL SHAFT SEAL IN LOWER TIMING CASE COVER and CRANKSHAFT RADIAL SEAL ON TRANSMISSION SIDE
- Remove TIMING CHAINS

Installation note:

Layout of main bearing caps.

All numbers must be read from the cylinder bank (5 to 8) (see arrows).

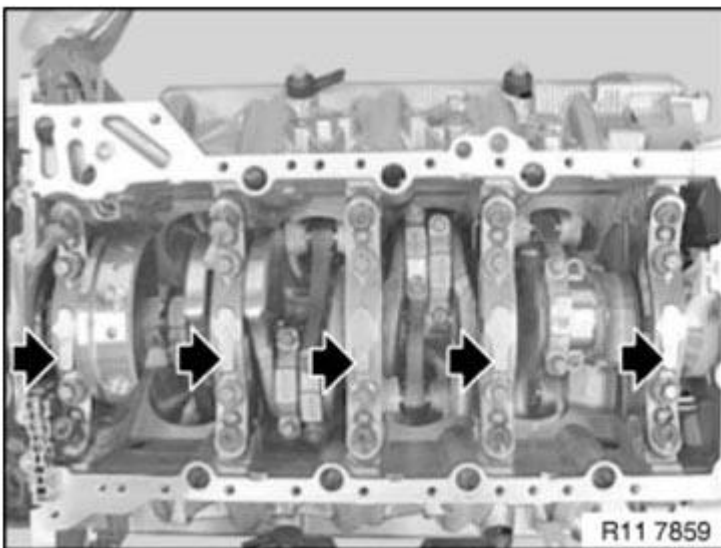


Fig. 117: Locating Main Bearing Caps Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

Main bearing caps (1 to 5) opposite the output end on the timing chain drive.

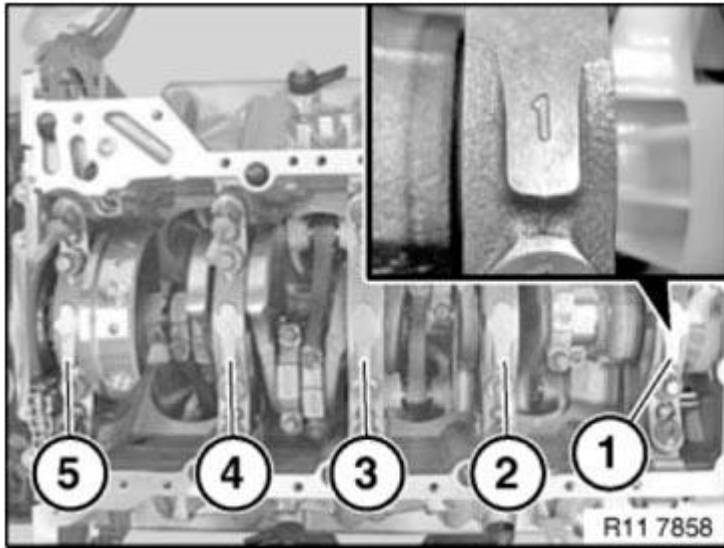


Fig. 118: Identifying Main Bearing Caps Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil pump spacer bolts (1) with special tool **13 5 020**.

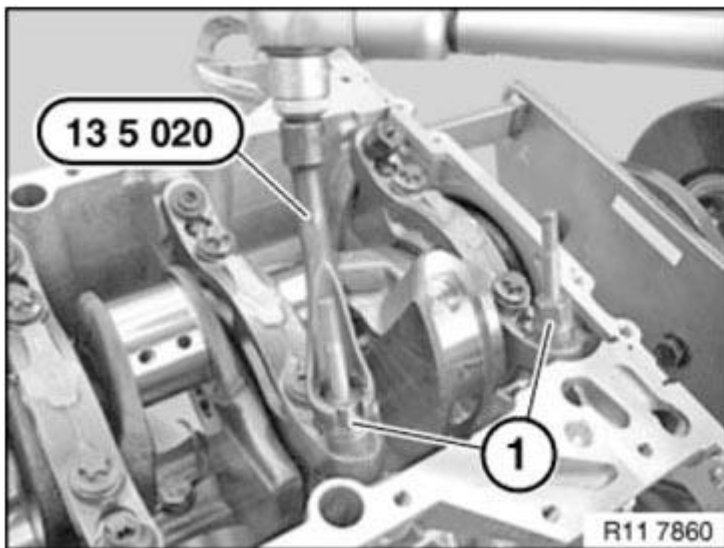


Fig. 119: Removing Oil Pump Spacer Bolts With Special Tool 13 5 020
Courtesy of BMW OF NORTH AMERICA, INC.

Release main bearing taper screw connection (1).

Release oil pump spacer pins (2).

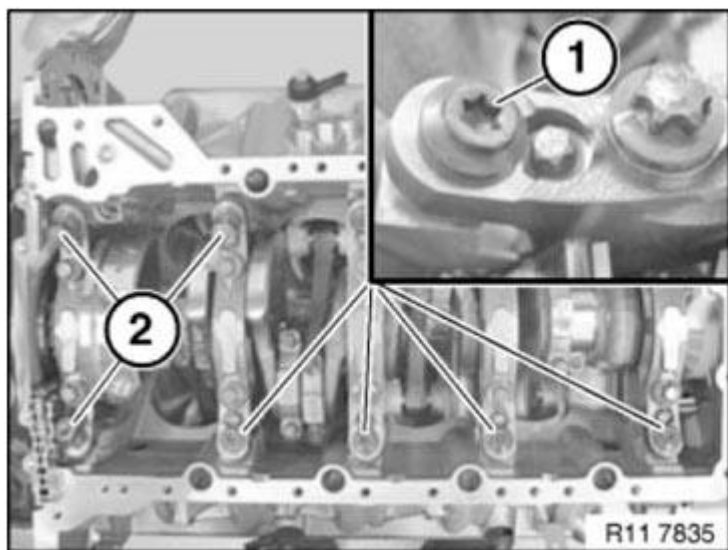


Fig. 120: Identifying Main Bearing Taper Screw Connection And Oil Pump Spacer Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Release all threaded support sleeves (1).

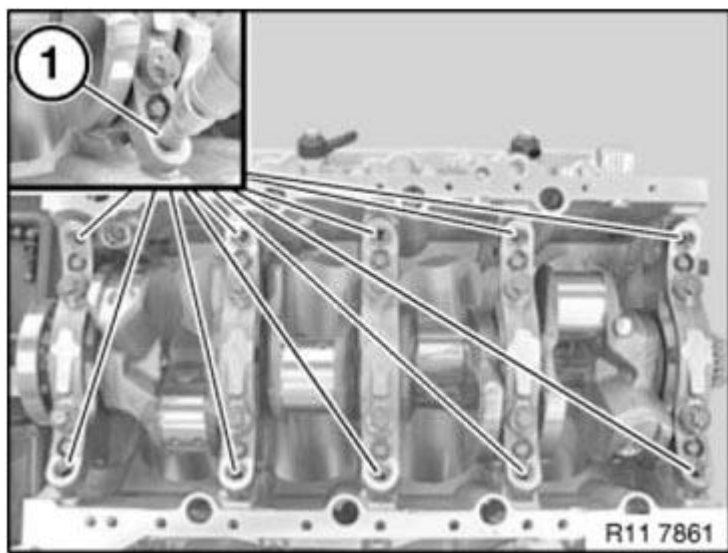


Fig. 121: Removing Threaded Support Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Release collar bolts (M8) in sequence 10 to 1.

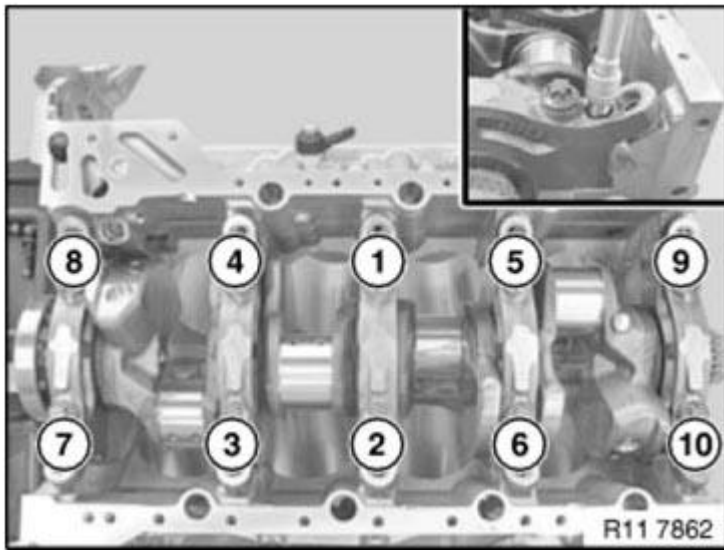


Fig. 122: Identifying Collar Bolts (M8) Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release collar bolts (M11) in sequence 10 to 1.

Remove main bearing caps 1 to 5.

IMPORTANT: Remove crankshaft with a 2nd person, weight approx. 25 kg.

Lift out crankshaft and set down safely (secure against turning).

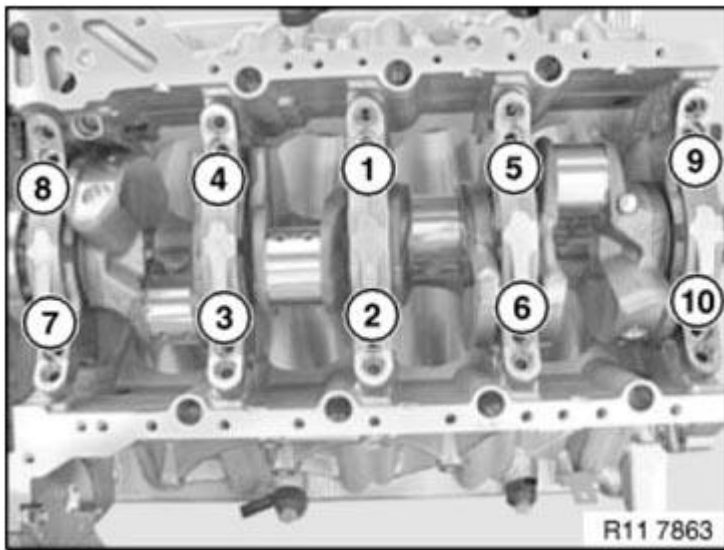


Fig. 123: Identifying Collar Bolts (M11) Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw for oil nozzle (1).

Tightening torque: **11 11 8 AZ** .

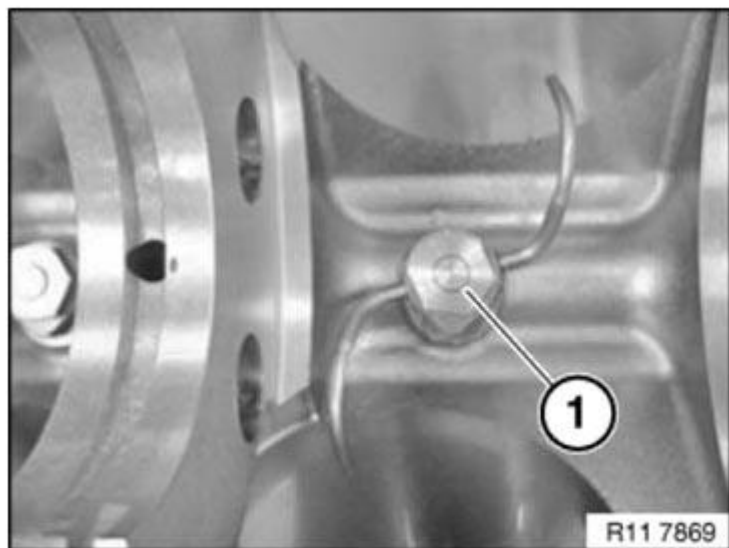


Fig. 124: Identifying Oil Nozzle

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check oil nozzle (1) for clear passage with compressed air.

Observe fastening on oil nozzle.

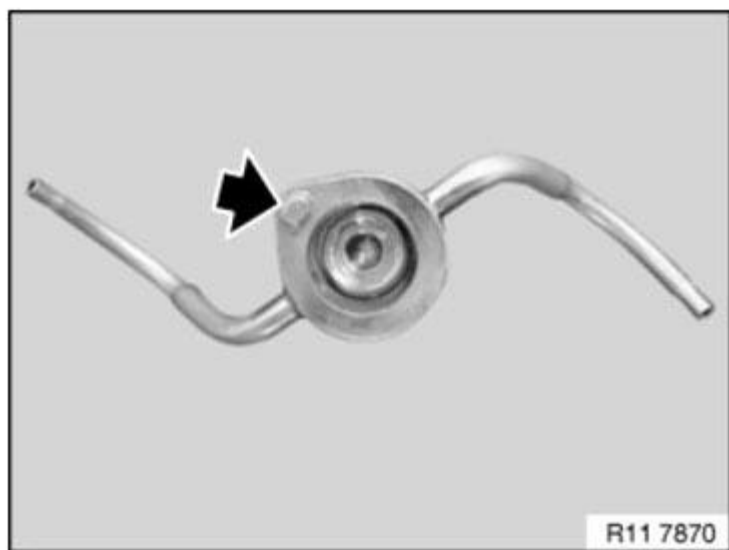


Fig. 125: Locating Fastening On Oil Nozzle

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Observe fastening in crankcase.

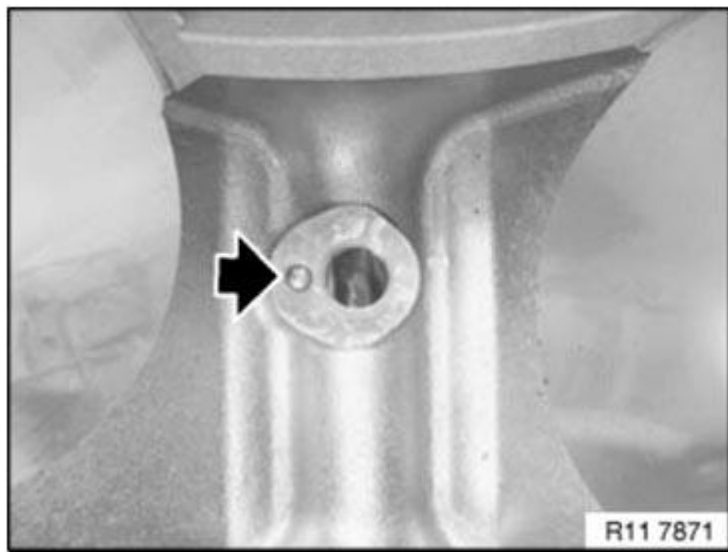


Fig. 126: Locating Fastening In Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **CRANKSHAFT MAIN BEARING SHELLS** .

Installation note:

Observe arrangement of main bearing caps.

All numbers must be read from the cylinder bank (5 to 8) (see arrows).

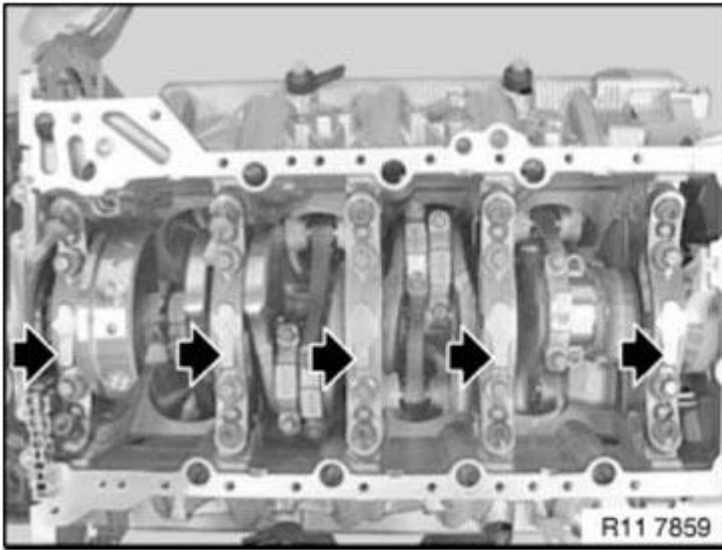


Fig. 127: Locating Main Bearing Caps Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

Main bearing caps (1) is opposite the output end on the timing chain drive.

Turn back all threaded support sleeves hand-tight.

Installation note:

Coat all bearing positions with engine oil.

IMPORTANT: Install crankshaft with a 2nd person, weight approx. 25 kg.

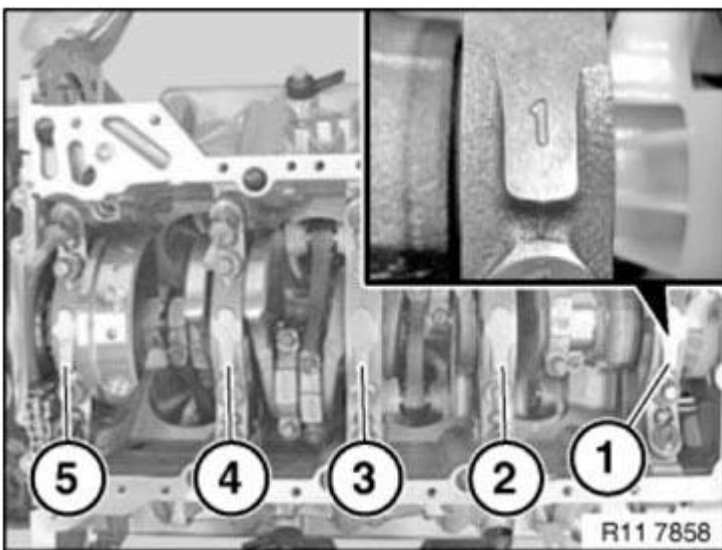


Fig. 128: Identifying Main Bearing Caps Numbers

Courtesy of BMW OF NORTH AMERICA, INC.

Install crankshaft.

Fit bearing caps (1 to 5).

Set down bearing caps positioned from 1 to 5.

Insert all collar bolts (M11) hand-tight.

Secure collar bolts (M11) in sequence (1 to 10).

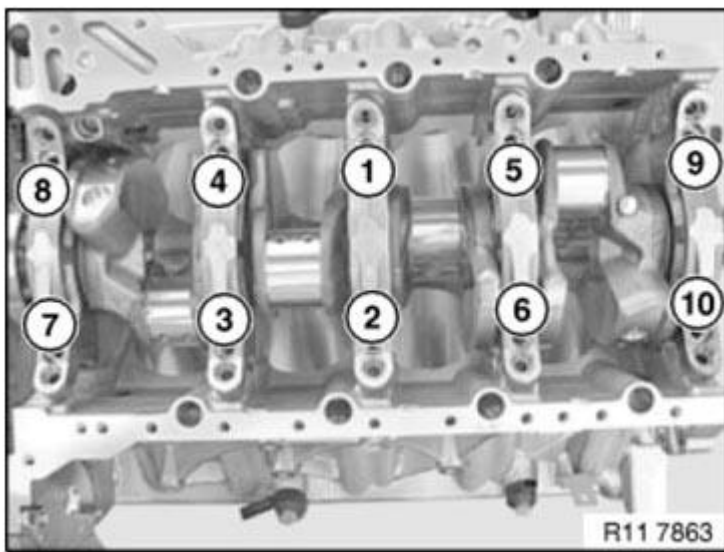


Fig. 129: Identifying Collar Bolts (M11) Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

For a better overview of the screw connection quality, mark the head of all collar bolts after joining with a line (1) using an oil-proof marker pen.

Check angle tightening.

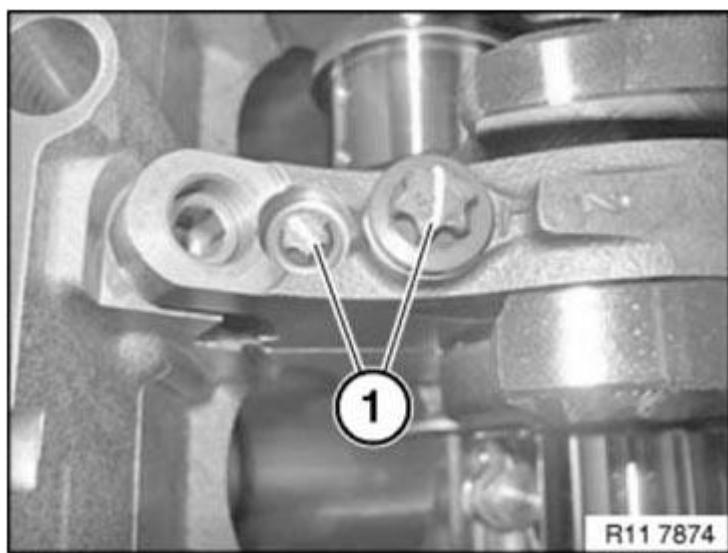


Fig. 130: Identifying Collar Bolts Head Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Secure collar bolt (1) with special tool 00 9 120 .

Tightening torque: 11 11 1AZ .

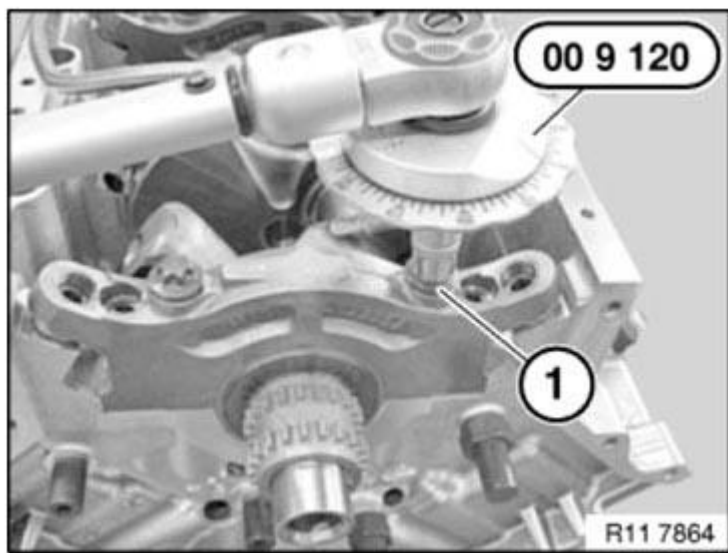


Fig. 131: Securing Collar Bolt With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all collar bolts (M8) hand-tight.

Secure collar bolts (M8) in sequence (1 to 10).

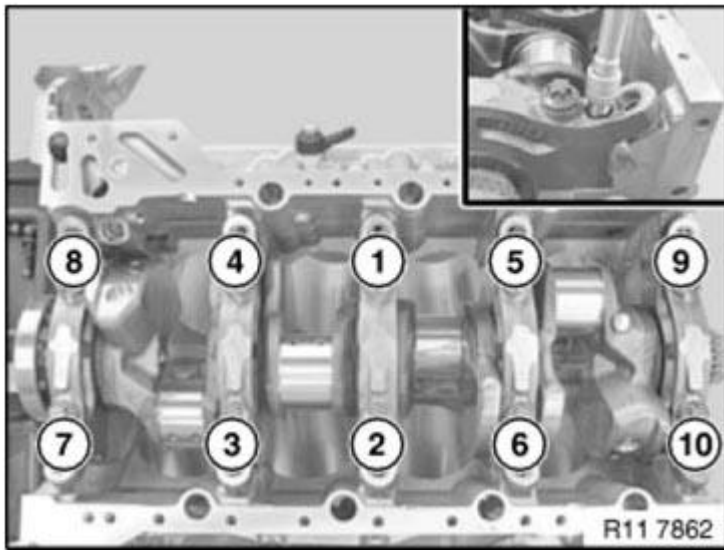


Fig. 132: Identifying Collar Bolts (M8) Tightening Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

For a better overview of the screw connection quality, mark the head of all collar bolts after joining with a line (1) using an oil-proof marker pen.

Check angle tightening.

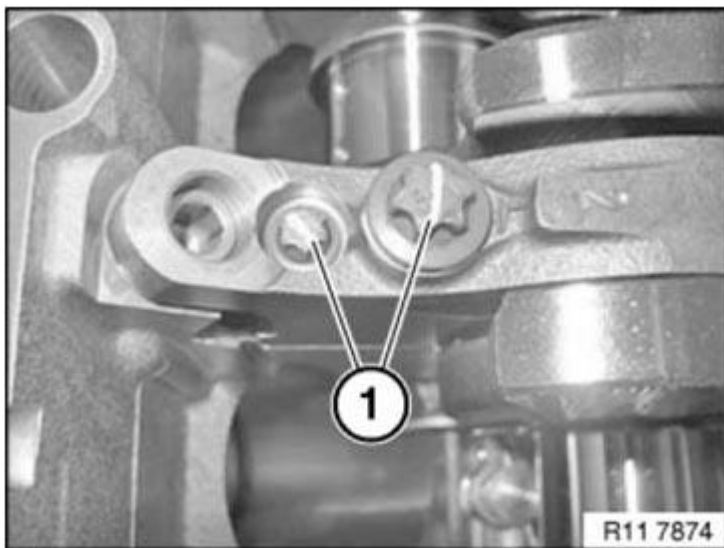


Fig. 133: Identifying Collar Bolts Head Mark
 Courtesy of BMW OF NORTH AMERICA, INC.

Secure collar bolt (1) with special tool 00 9 120 .

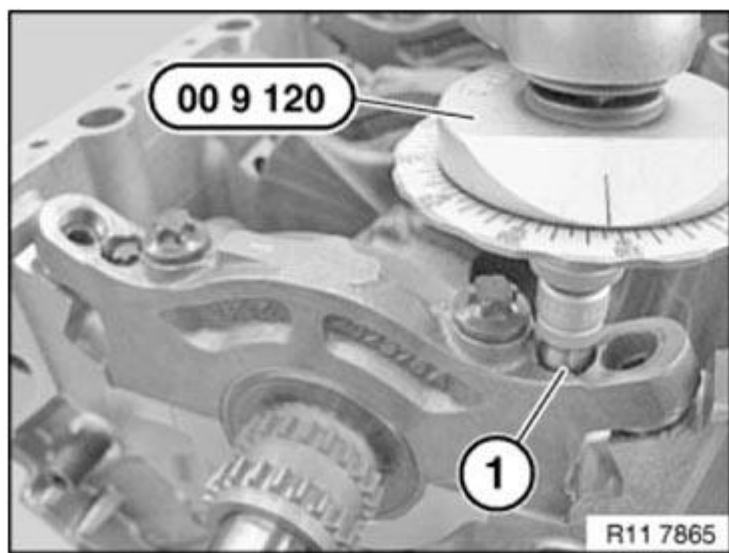


Fig. 134: Securing Collar Bolt With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure all threaded support sleeves (1) with special tool 11 4 350.

Tightening torque: **11 11 3 AZ** .

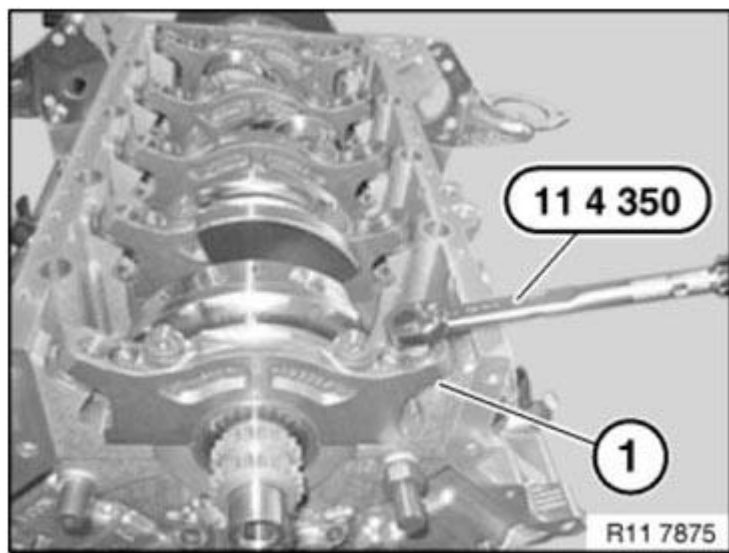


Fig. 135: Securing All Threaded Support Sleeves With Special Tool 11 4 350
Courtesy of BMW OF NORTH AMERICA, INC.

Secure main bearing taper screw connection (1).

Tightening torque: **11 11 4 AZ** .

Secure oil pump spacer pins (2).

Tightening torque: **11 11 5 AZ** .

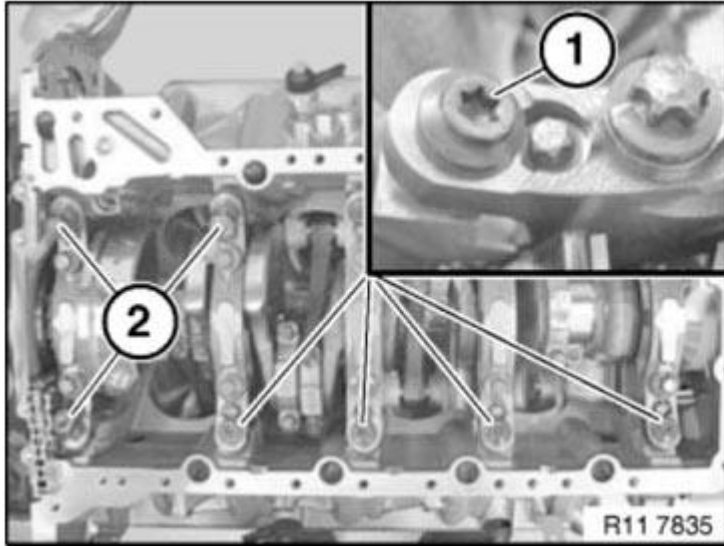


Fig. 136: Identifying Main Bearing Taper Screw Connection And Oil Pump Spacer Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Check crankshaft **COEFFICIENT OF FRICTION** .

Determine crankshaft **breakaway torque** with special tool **00 2 010** .

Rotate crankshaft at central bolt using special tool **00 2 010** .

If the breakaway torque is too high, it will be necessary to correct the **bearing clearance** . See **CRANKSHAFT AND BEARINGS** .

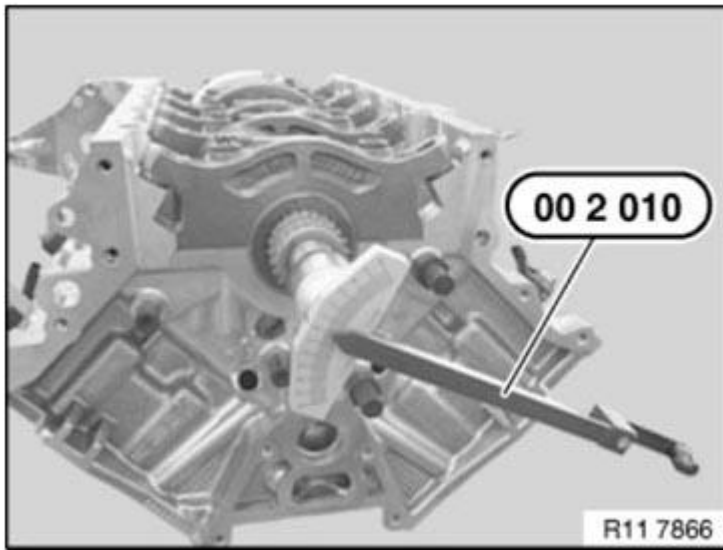


Fig. 137: Checking Crankshaft Breakaway Torque With Special Tool 00 2 010
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 6 252 to crankcase with magnetic base.

Slide crankshaft in direction of arrow forwards as far as it will go.

Set special tool 11 6 251 to zero.

Slide crankshaft (1) in direction of arrow towards rear and determine value.

Check **axial play** . See **ENGINE - TECHNICAL DATA -- 750LI** .

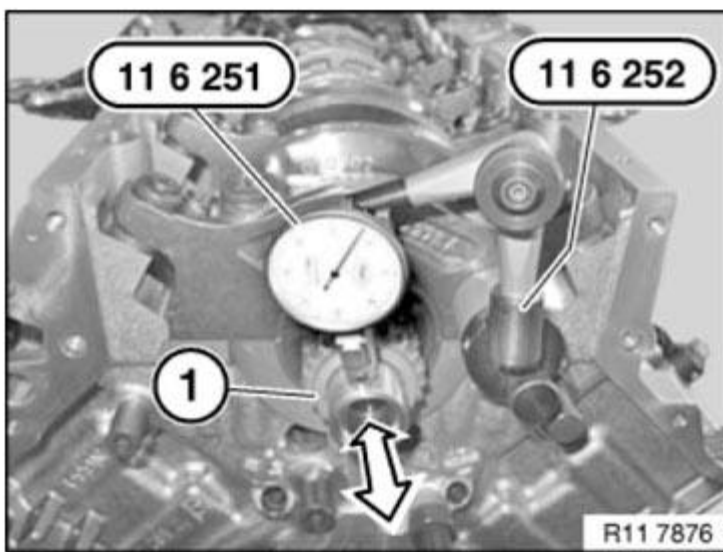


Fig. 138: Checking Axial Play

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1122 FLYWHEEL

1122000 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N63)

Necessary preliminary tasks

- Remove AUTOMATIC TRANSMISSION
- Remove manual transmission
- Remove clutch

Secure flywheel (1) with special tool 11 9 260 .

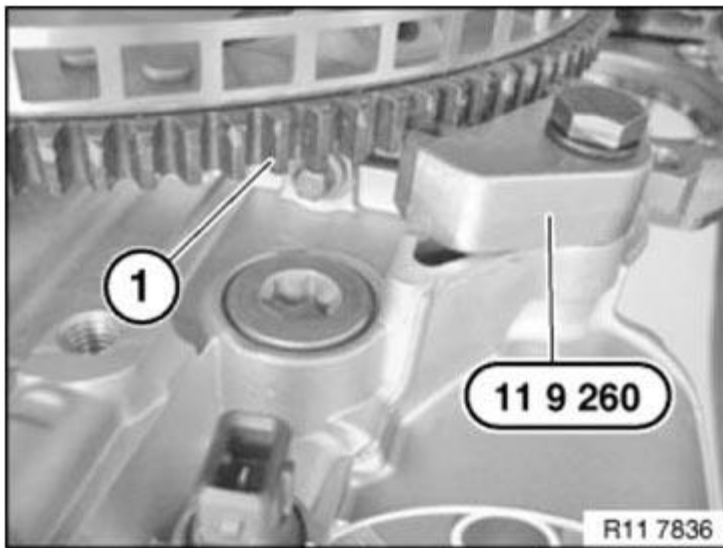


Fig. 139: Securing Flywheel With Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Release flywheel screws in area (1).

Remove flywheel (2).

Installation:

Clean threads on flywheel screws in crankshaft.

Flywheel (2) is secured with an alignment pin.

Fit flywheel (2).

Fit new flywheel screws

Tightening torque **11 22 1AZ** .

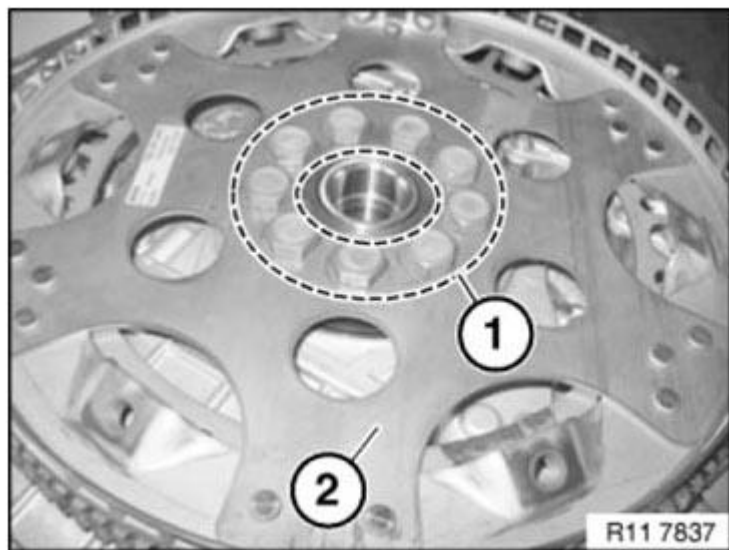


Fig. 140: Identifying Flywheel Screws

Courtesy of BMW OF NORTH AMERICA, INC.

1122510 REMOVING AND INSTALLING/REPLACING FLYWHEEL (TRANSMISSION REMOVED - N63)

Notes

Secure flywheel (1) with special tool **11 9 260** .

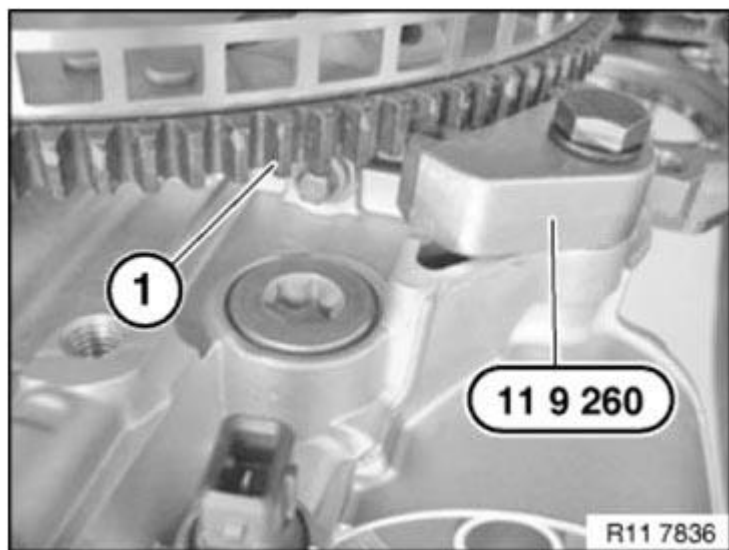


Fig. 141: Securing Flywheel With Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Release flywheel screws in area (1).

Remove flywheel (2).

Installation:

Clean threads on flywheel screws in crankshaft.

Flywheel (2) is secured with an alignment pin.

Fit flywheel (2).

Fit new flywheel screws

Tightening torque **11 22 1AZ** .

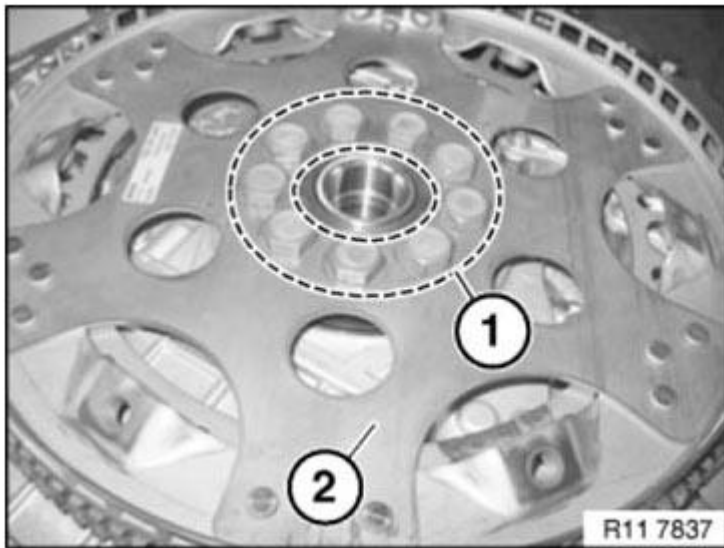


Fig. 142: Identifying Flywheel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

1122513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL (N63)

Notes

NOTE: **FLYWHEEL** removed!

Using hydraulic press (1) and special tool 21 2 051, press roller bearing out of dual-mass flywheel downwards on engine side.

IMPORTANT: Risk of damage:
Roller bearing must not be driven out.

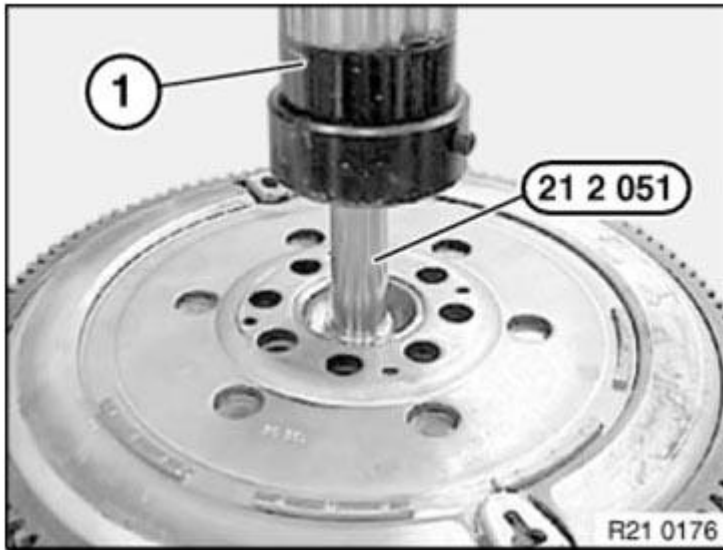


Fig. 143: Pressing Roller Bearing Out Of Dual-Mass Flywheel Downwards On Engine Side
Courtesy of BMW OF NORTH AMERICA, INC.

Push roller bearing (2) onto special tool 21 2 052.

Using hydraulic press (1), press roller bearing into dual-mass flywheel as far as it will go on clutch side.

IMPORTANT: Risk of damage:
Observe press-in instruction:

- Roller bearing must not be driven in.
- Roller bearing mounting force/travel monitored:

Min. 2000 N 1 mm before end of pressing in.

Max. 15, 000 N during entire press-in procedure.

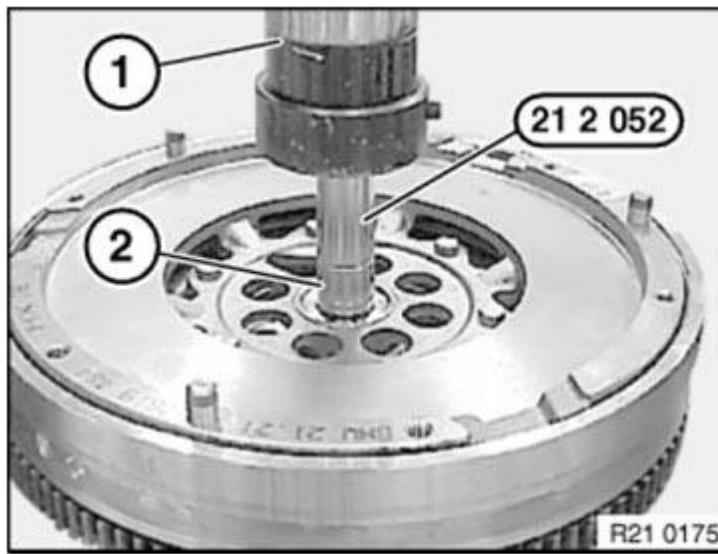


Fig. 144: Pressing Roller Bearing Into Dual-Mass Flywheel
Courtesy of BMW OF NORTH AMERICA, INC.

1123 VIBRATION DAMPER

1123010 REMOVING AND INSTALLING/RENEWING VIBRATION DAMPER (N63)

Necessary preliminary work

- Remove **FAN COWL**
- Remove A/C compressor **DRIVE BELT**
- Remove alternator **DRIVE BELT**
- Remove belt pulley for A/C system

Release screw (1).

Tightening torque **11 28 1AZ** .

Remove belt tensioner with idler pulley (2).

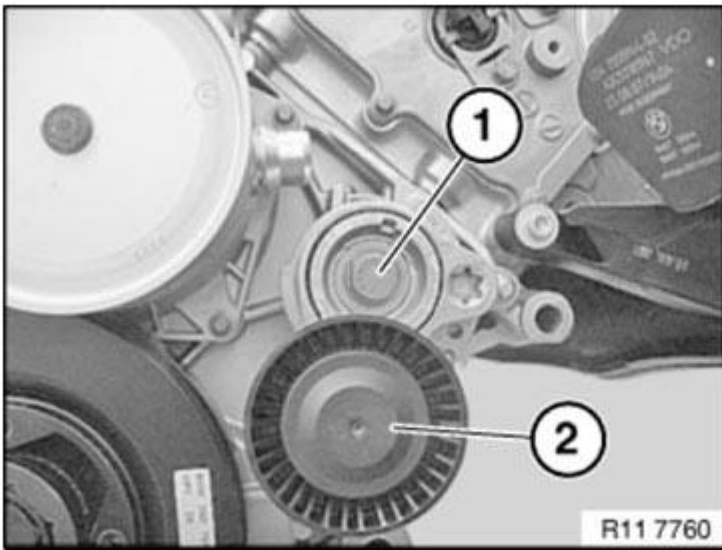


Fig. 145: Identifying Screw And Idler Pulley
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 8 090** with three screws (1) to vibration damper.

Secure special tool **11 8 090** with belt tensioner bolt (2) to timing case cover.

Tightening torque **11 28 1AZ**.

NOTE: A 3/4 inch tool is needed to release the central bolt.

Release central bolt on vibration damper.

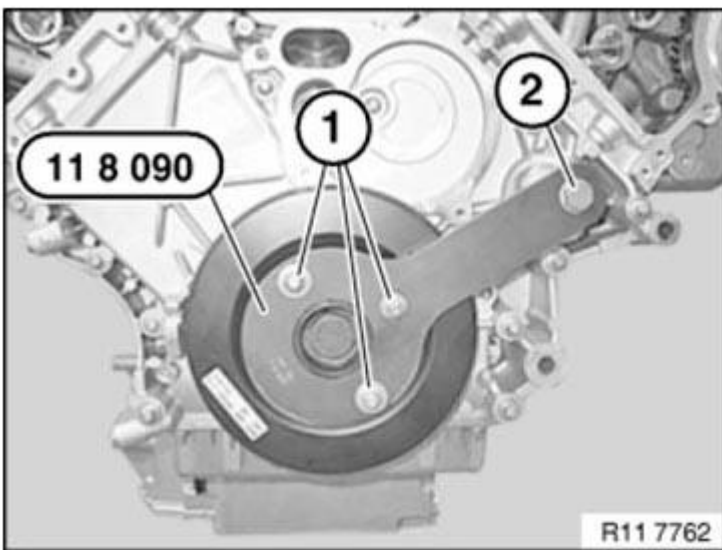


Fig. 146: Securing Special Tool 11 8 090 With Belt Tensioner Bolt To Timing Case Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt with special tool 00 9 140 or 11 3 460 .

Position special tool 11 3 460 on special tool 11 8 090 .

Adjust special tool 11 9 453 on special tool 11 9 454 using clamping screw to 0° on scale.

Tightening torque 11 23 1AZ .

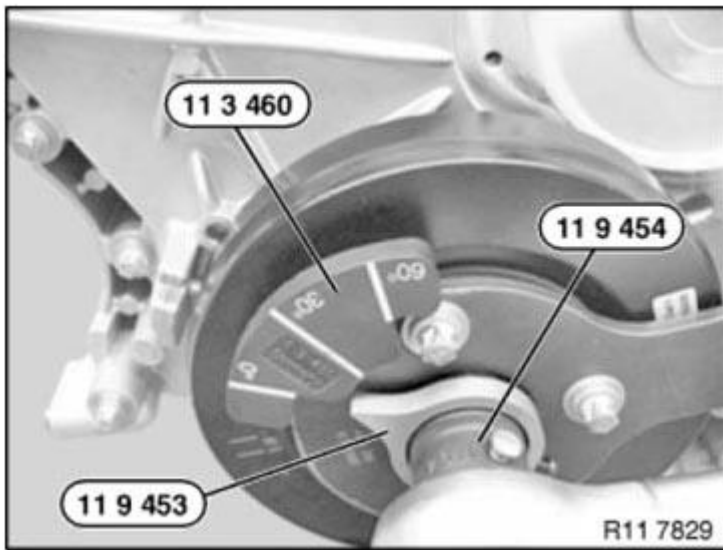


Fig. 147: Adjusting Special Tool 11 9 453 On Special Tool 11 9 454 Using Clamping Screw To 0° On Scale
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1124 CONNECTING ROD WITH BEARING

1124571 REPLACING ALL CONNECTING ROD BEARINGS (N63)

Notes

IMPORTANT: Note grinding stages on crankshaft . See CRANKSHAFT AND BEARINGS .

Necessary preliminary work

- Removing all PISTONS

Install new connecting rod bearing shells.

Install one blue bearing shell (1) and one red bearing shell (2) in each connecting rod.

Install **PISTON** .

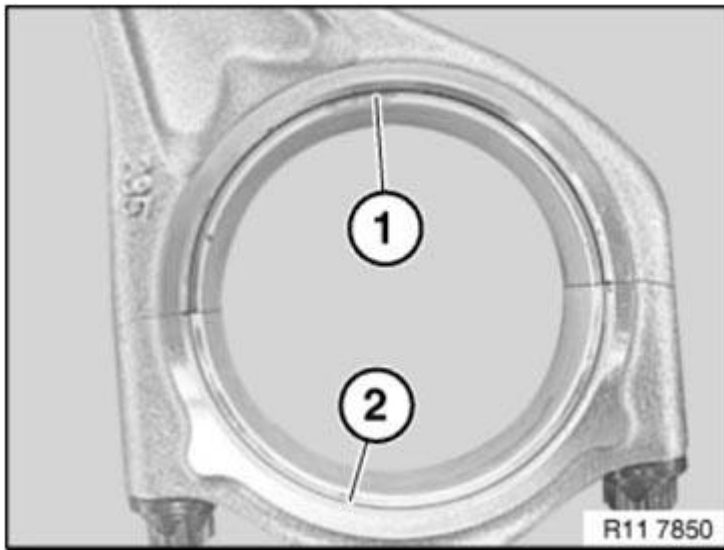


Fig. 148: Identifying Blue Bearing Shell And Red Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The bearing shells on the connecting rod are coded.

Connecting rod bearing cap (1): the red bearing shell is fitted and the fastening notches are on the left and right sides of the bearing shell (see arrows).

Connecting rod (2): the blue bearing shell is fitted and the fastening notches are one side of the bearing shell (see arrows).

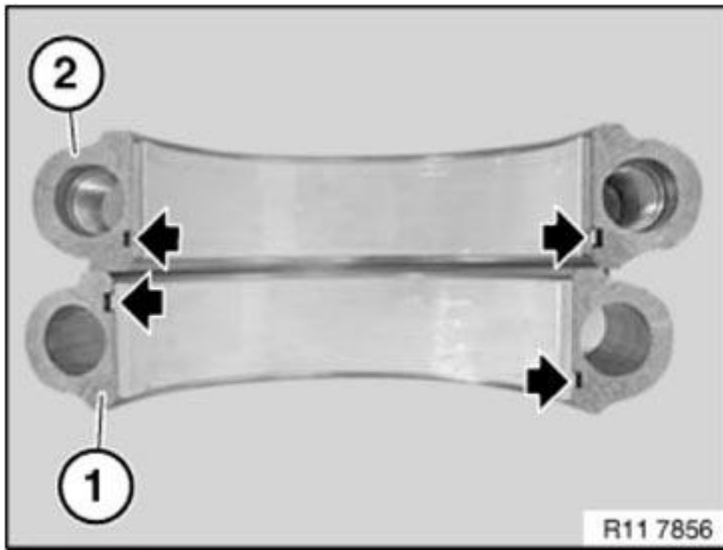


Fig. 149: Locating Red Bearing Shell Fastening Notches And Blue Bearing Shell Fastening Notches
Courtesy of BMW OF NORTH AMERICA, INC.

Check connecting-rod bearing play

Piston in BDC position.

Fit special tool **00 2 590** (Plastigage type PG 1) to oil-free crankshaft.

Fit bearing caps so that matching numbers match up.

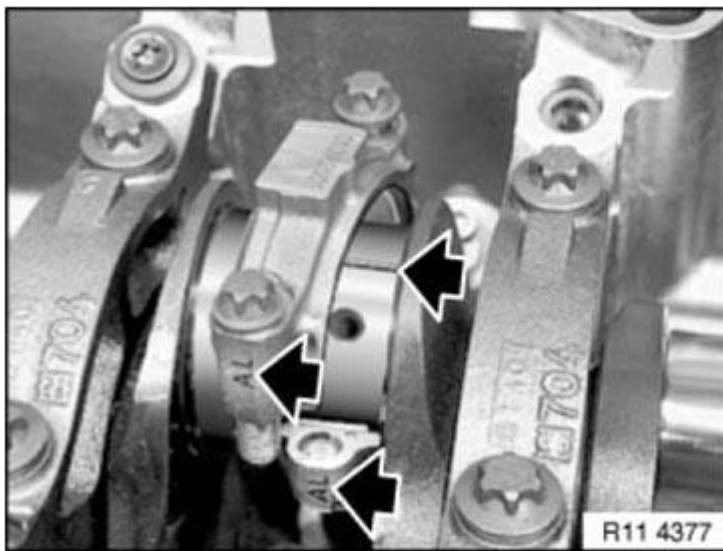


Fig. 150: Locating Special Tool 00 2 590
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort connecting rods or crankshaft.

Use connecting rod bolts to check connecting-rod bearing play.

Connecting rod bolts with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

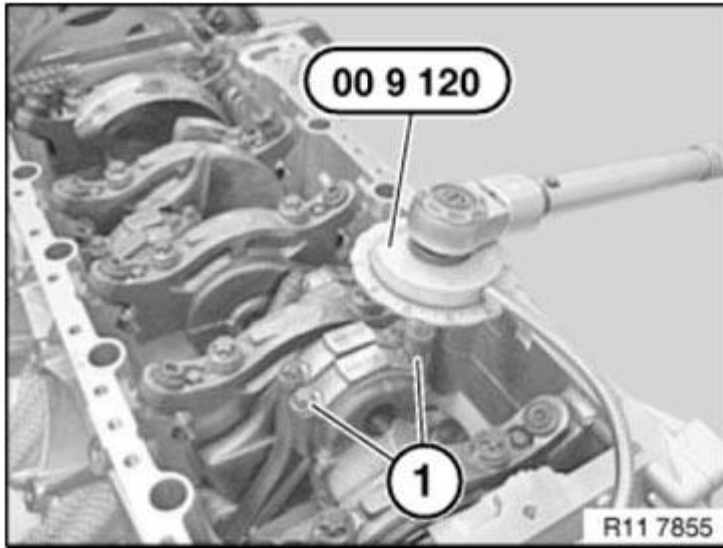


Fig. 151: Checking Connecting-Rod Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing cap and read off bearing play at width of flattened plastic thread with assistance of measuring scale.

CONNECTING-ROD BEARING PLAY .

- Remove plastic thread.
- Lubricate crankshaft and bearing shells.
- Install new connecting rod bolts.

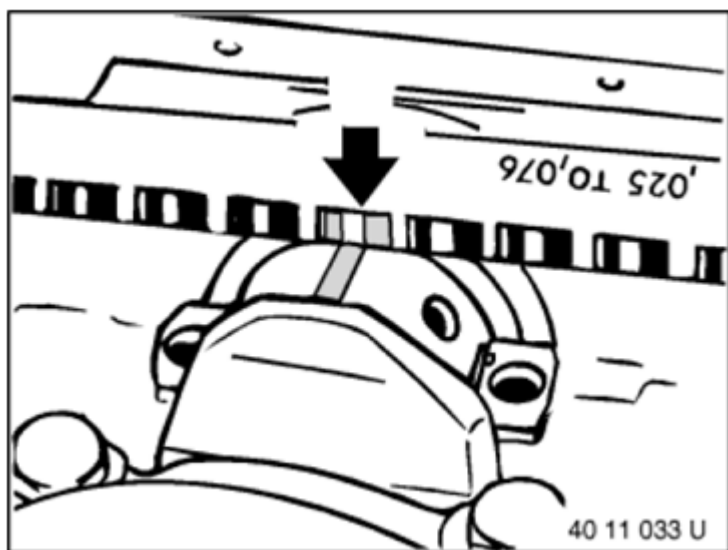


Fig. 152: Checking Connecting-Rod Bearing Play
 Courtesy of BMW OF NORTH AMERICA, INC.

Secure connecting rod bolts with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

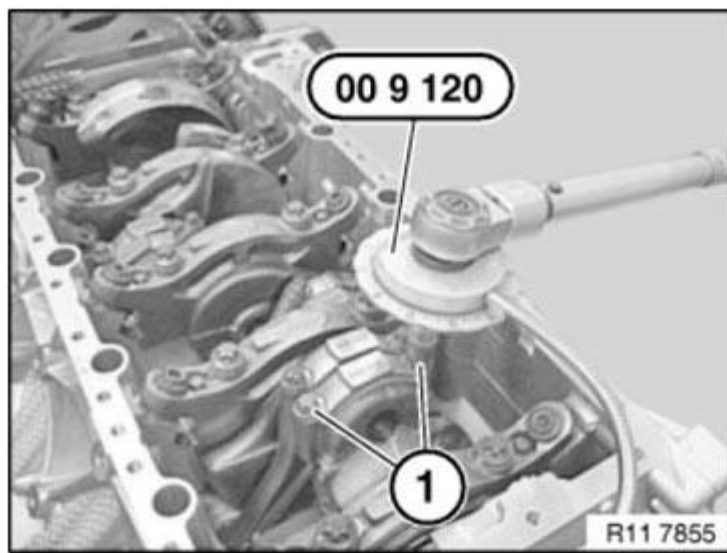


Fig. 153: Securing Connecting Rod Bolts With Special Tool 00 9 120
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1125 PISTON WITH RINGS AND PIN

1125530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N63) UP TO 3/2011**Notes**

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons and connecting rods are reused, they must be reinstalled in the same places.

Piston and piston pin are matched to each other and can only be replaced as a pair.

Conrod and conrod bearing cap are cracked.

Identification is effected by means of identical pairing letters on the connecting rod big end.

Mixing up the components will result in engine damage.

Conrod bearings must always be replaced.

Necessary preliminary tasks

- Remove **ENGINE**
- Install engine on assembly stand
- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Removing oil pan. See **LOWER OIL SUMP SECTION** and **UPPER OIL SUMP SECTION**
- Remove **OIL PUMP**

Unscrew connecting rod bearing cap.

NOTE: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters.

The stamped dates are always arranged in opposite directions.

Set down conrod bearing caps in order.

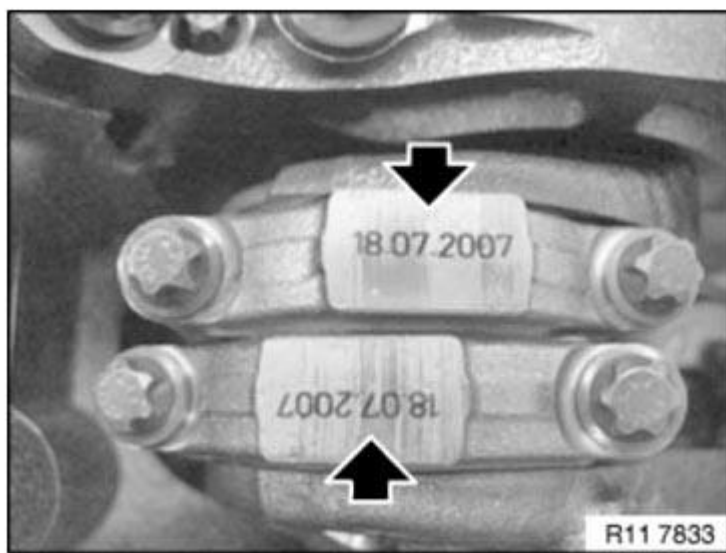


Fig. 154: Locating Connecting Rod Bearing Caps Stamped Dates
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To install and remove the conrods, it is essential for the crankshaft to be exactly in alignment with the cylinder bore (see dashed line).

Position crankshaft at central bolt.

Insert special tool 11 8 152 into conrod.

Screw special tool **11 5 440** into conrod with bolt (1).

Remove conrod with piston from cylinder head side.

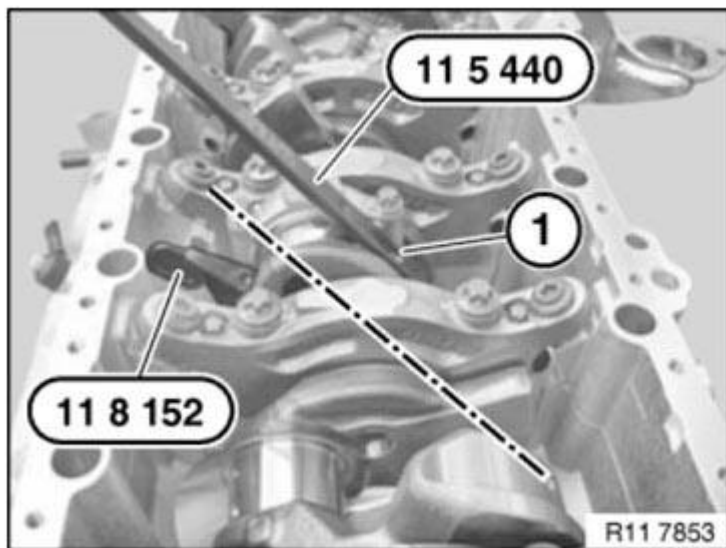


Fig. 155: Removing Conrod With Piston From Cylinder Head Side

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Piston and piston bolts are paired and must not be fitted individually.

Lift out retaining ring and press out piston pin.

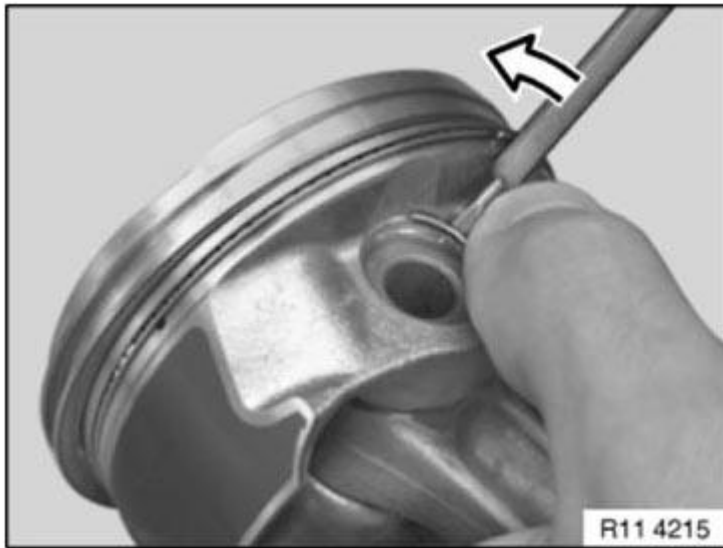


Fig. 156: Removing Retaining Ring From Piston

Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

NOTE: The conrods can also be replaced individually.
The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.

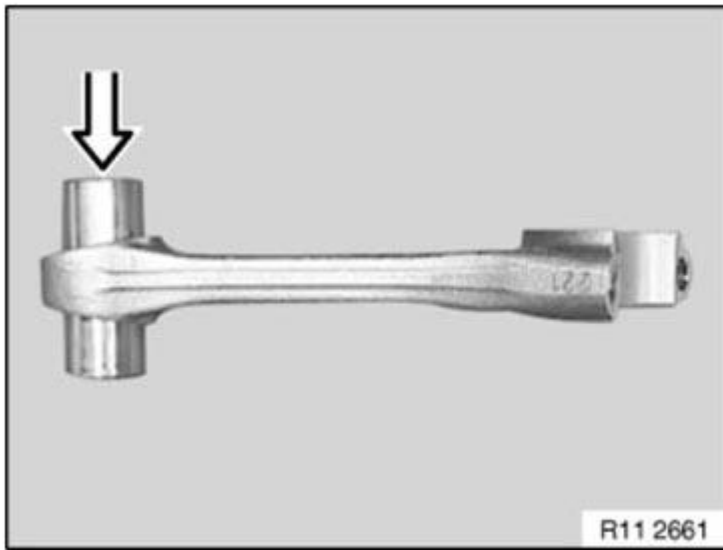


Fig. 157: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Prior to installation, measure piston installation clearance: Measure piston diameter with micrometer at measuring point A from lower edge of piston and offset by 90° to piston pin axis.

Refer to **MEASURING POINT A** .

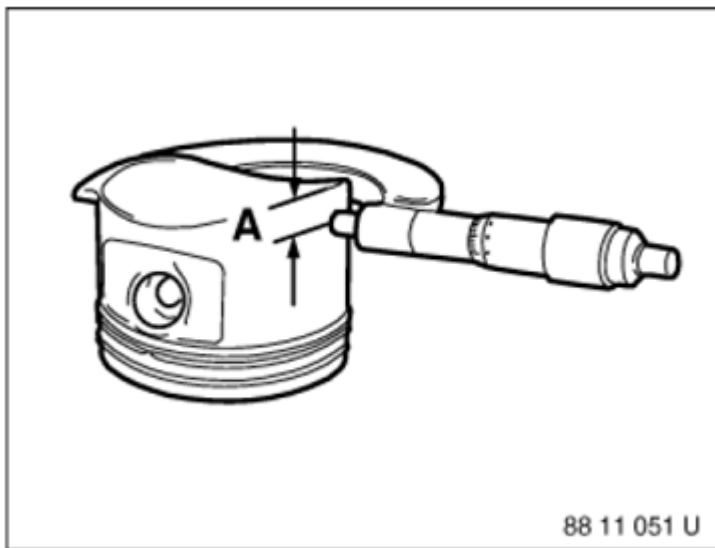


Fig. 158: Measuring Piston Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Refer to:

- **DIAMETER OF CYLINDER BORE**
- **PISTON INSTALLATION CLEARANCE**
- **TOTAL PERMISSIBLE WEAR CLEARANCE**

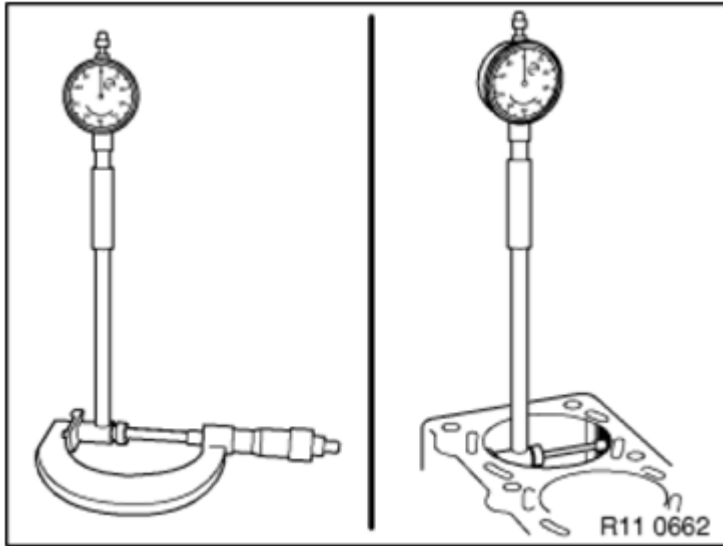


Fig. 159: Checking Diameter Of Cylinder Bore
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The conrods of cylinder banks 1 to 4 and 5 to 8 are mounted to the pistons differently.

NOTE: The pistons and conrods of cylinders 1 to 8 are identical.

Arrow on piston crown (cyl. 1 to 4) points upwards, bolt connection on conrod points at an angle to right.

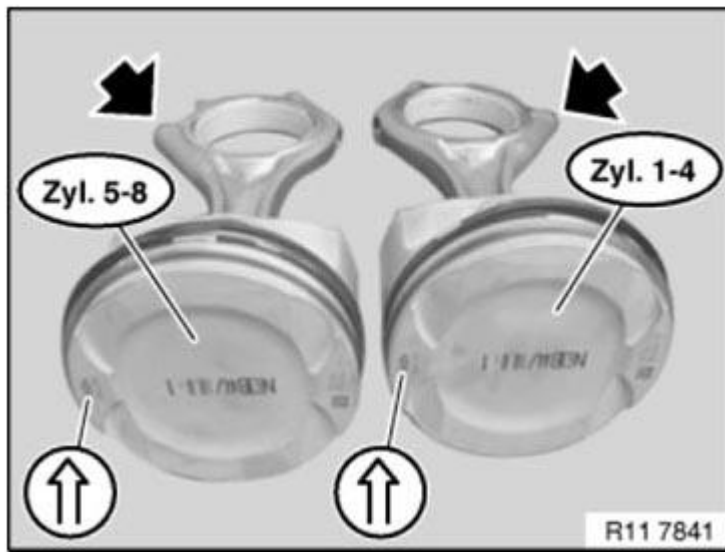


Fig. 160: Identifying Arrow On Piston Crown
Courtesy of BMW OF NORTH AMERICA, INC.

Arrow on piston crown (cyl. 5 to 8) points upwards, bolt connection on conrod points at an angle to left.

NOTE: For purposes of clarity, pistons are shown removed.

The conrods are correctly mounted on the piston when the bolt connections on the conrods are parallel to each other (see arrow).

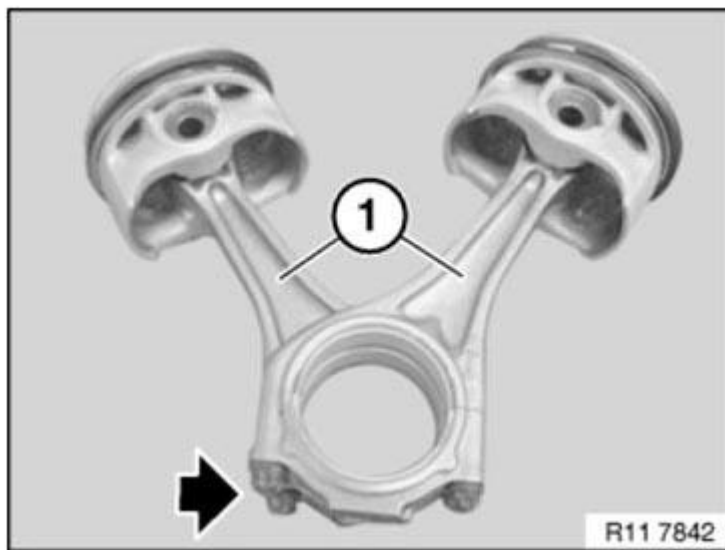


Fig. 161: Identifying Bolt Connections On Conrods Are Parallel To Each Other
Courtesy of BMW OF NORTH AMERICA, INC.

Install retaining ring.



Fig. 162: Installing Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Piston circlip (1) is correctly installed when the opening points upwards.

See illustration.

It must still be possible for the piston pin to moved easily.

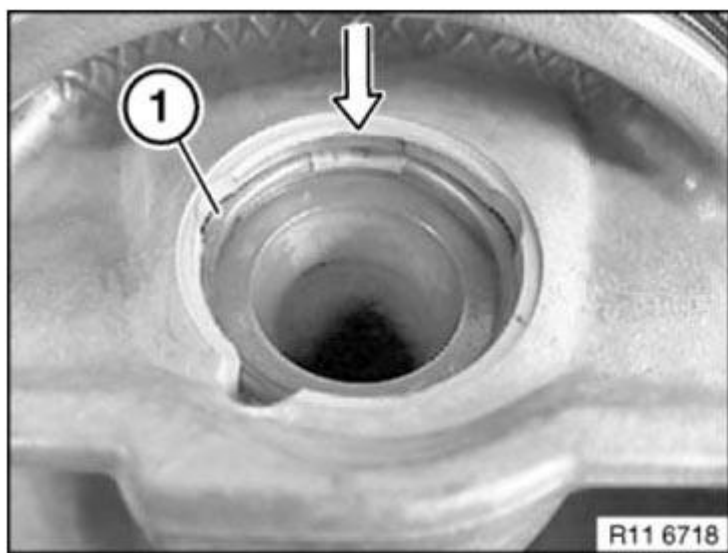


Fig. 163: Locating Piston Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tools 11 8 151 and 11 8 152 into conrod.

INSTALL CONNECTING ROD BEARING .

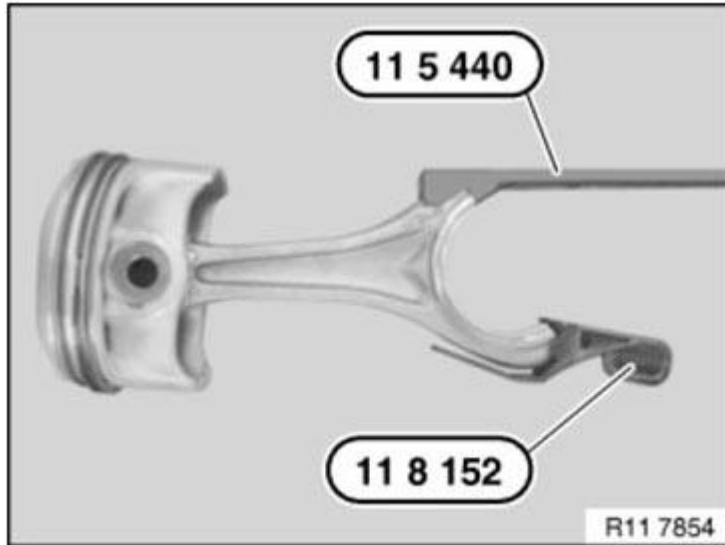


Fig. 164: Inserting Special Tools 11 8 151 And 11 8 152 Into Conrod
 Courtesy of BMW OF NORTH AMERICA, INC.

Lightly coat pistons and piston rings with oil.

Offset the contact points of the piston rings by approx. 120° to each other but do not position above the piston pin boss.

NOTE: Illustration shows S85.

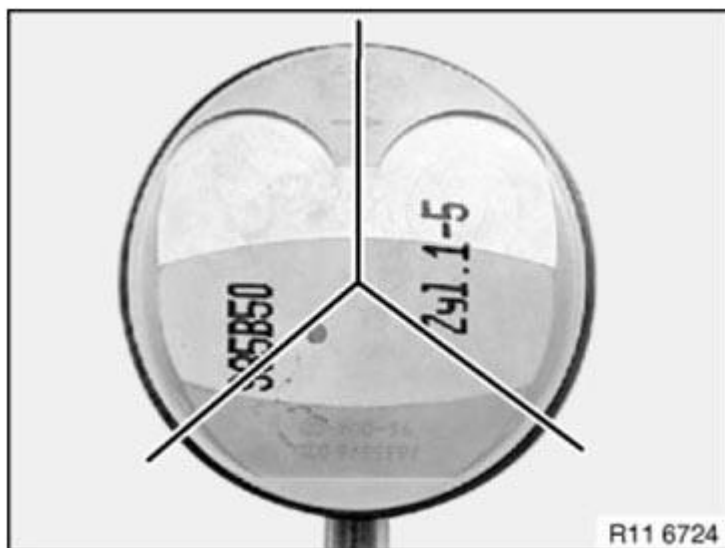


Fig. 165: Identifying Piston Rings Offset Contact Points
Courtesy of BMW OF NORTH AMERICA, INC.

Keep piston rods compressed with special tool **11 7 280**.

Install piston so that arrow points to camshaft drive.

IMPORTANT: Danger of piston ring failure.

Press in piston only with finger force (do not knock in!).

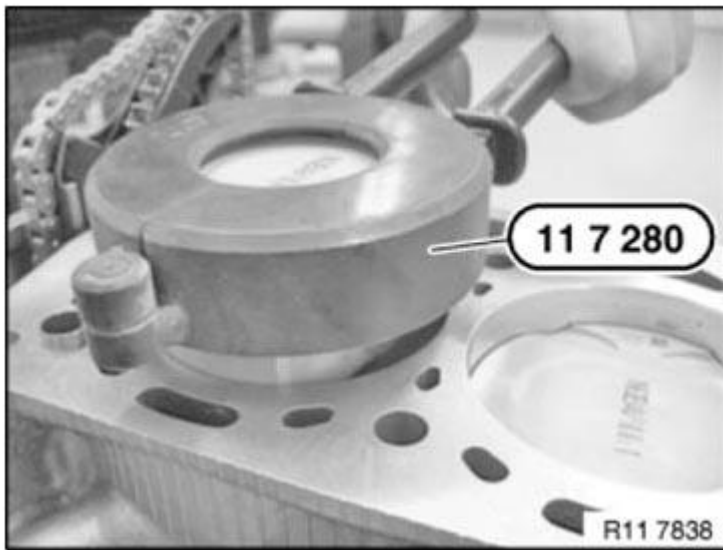


Fig. 166: Compressing Piston Rods With Special Tool 11 7 280
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of piston ring failure.

Press in piston (1) only with finger force (do not knock in!).

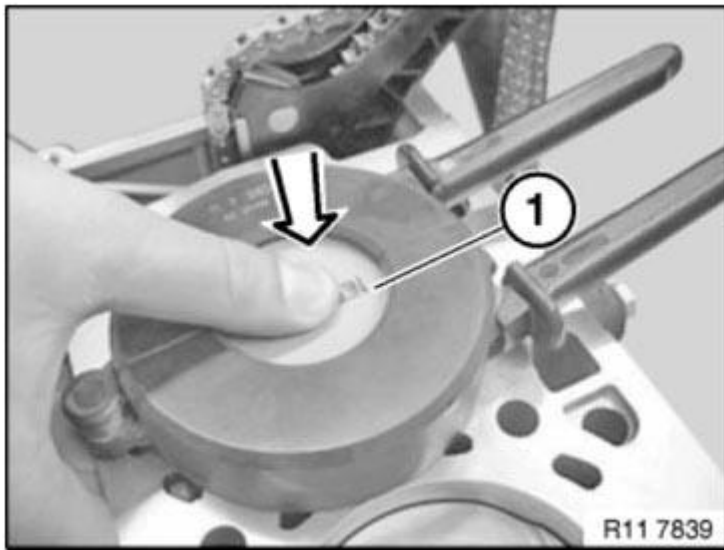


Fig. 167: Pressing In Piston Only With Finger Force
Courtesy of BMW OF NORTH AMERICA, INC.

The direction arrow on the piston crown must point to the camshaft drive (direction of travel towards front).

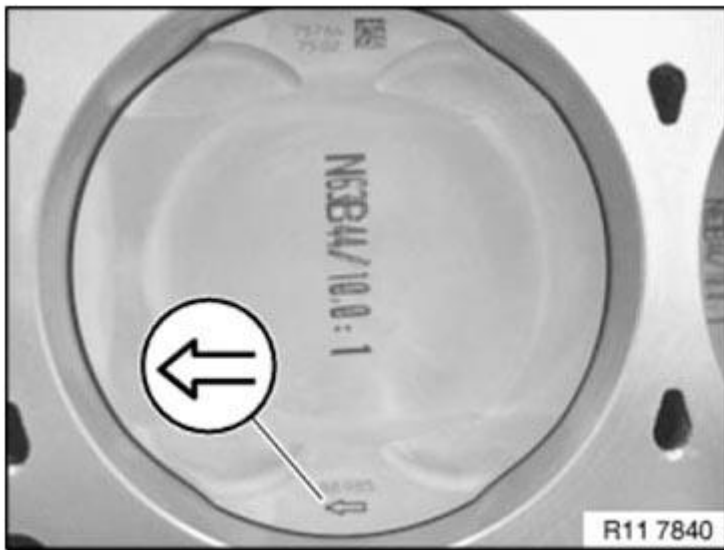


Fig. 168: Identifying Arrow Direction On Piston Crown Must Point To Camshaft Drive (Direction Of Travel Towards Front)

Courtesy of BMW OF NORTH AMERICA, INC.

Attach crankshaft journal to connecting rod.

Remove special tools **11 5 440** and 11 8 152.

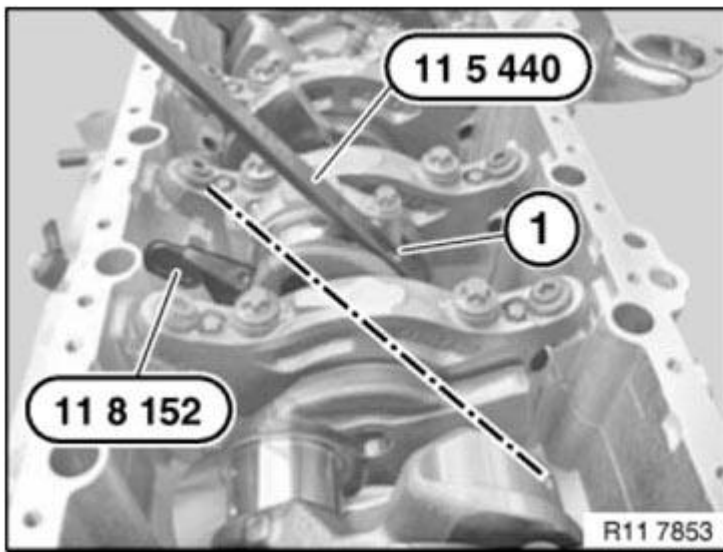


Fig. 169: Attaching Crankshaft Journal To Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, the pairing letters (1) are shown on the removed conrod.

IMPORTANT: Conrods and conrod bearing caps are denoted with the same pairing letters (1), do not mix them up.
Fit bearing cap so that pairing letters match up.

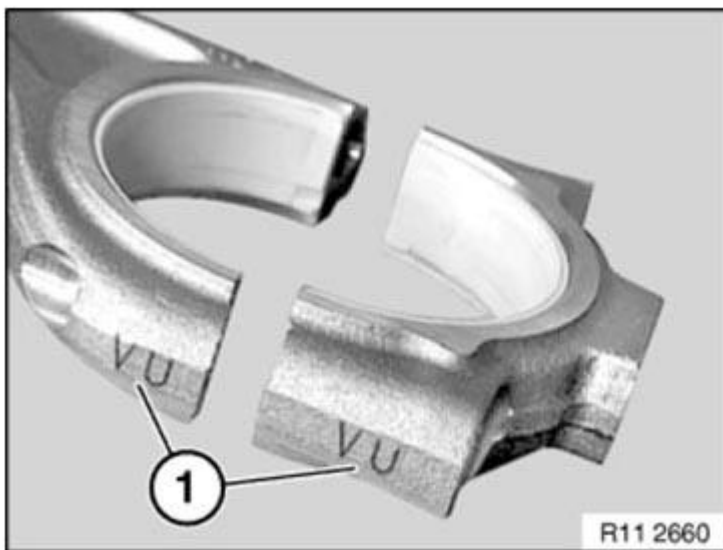


Fig. 170: Identifying Conrods And Conrod Bearing Caps Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply light coat of oil to connecting-rod bearing shells.

Fit bearing cap so that pairing letters match up.

Install new conrod bolts.

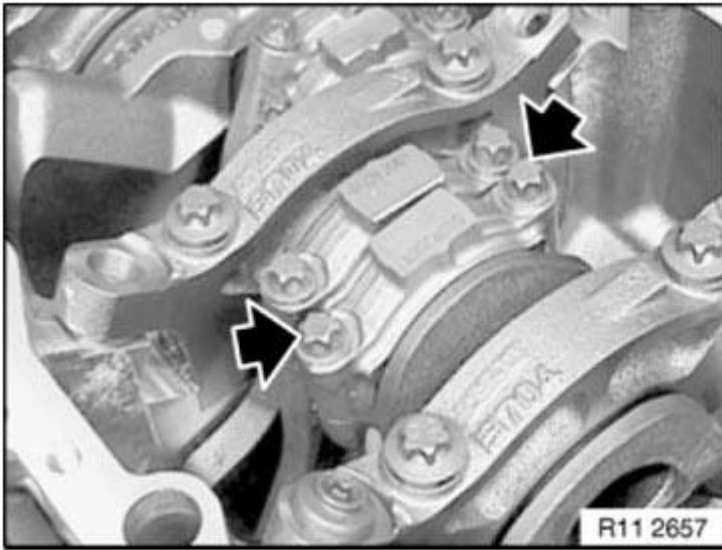


Fig. 171: Locating Conrod Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down connecting rod bolts (1) with special tool 00 9 120 .

Tightening torque 11 24 1 AZ .

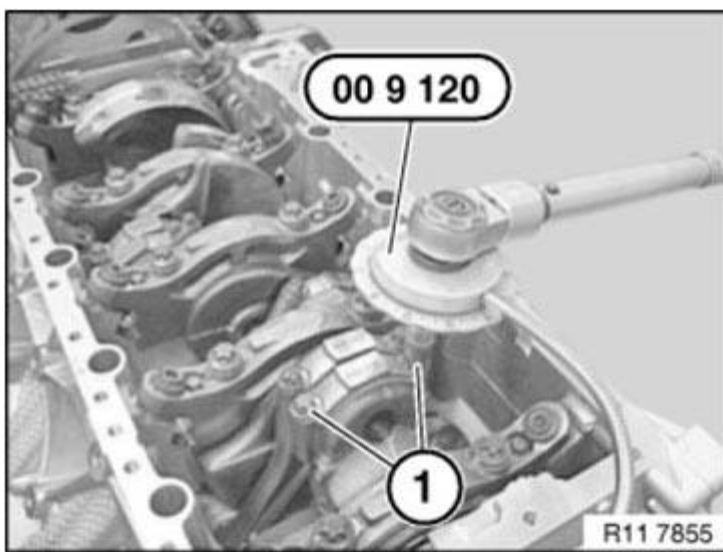


Fig. 172: Tightening Down Connecting Rod Bolts With Special Tool 00 9 120

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N63) FROM 3/2011

Notes

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons and connecting rods are reused, they must be reinstalled in the same places.

Piston and piston pin are matched to each other and can only be replaced as a pair.

Conrod and conrod bearing cap are cracked.

Identification is effected by means of identical pairing letters on the connecting rod big end.

Mixing up the components will result in engine damage.

Conrod bearings must always be replaced.

Necessary preliminary tasks

- Fully remove front axle together with engine.
- Remove **ENGINE** from front axle.
- Install engine on assembly stand.
- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Removing oil sump. See **LOWER OIL SUMP SECTION** and **UPPER OIL SUMP SECTION**.
- Remove **OIL PUMP**.

To release the connecting rod bolts (1), the crankshaft (2) must be moved to a suitable position.

Release connecting rod bolts (1).

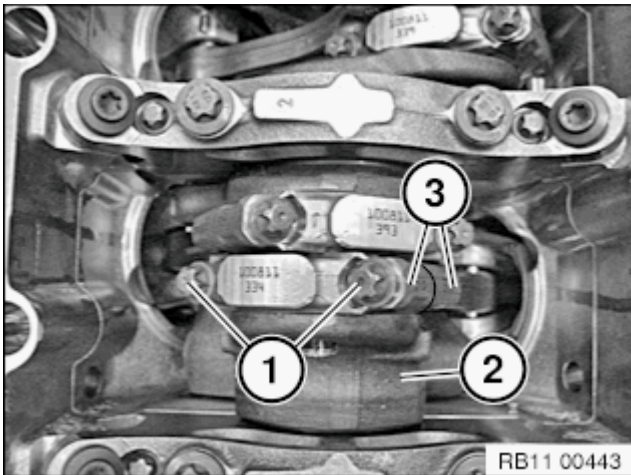


Fig. 173: Identifying Connecting Rod Bolts And Crankshaft

Screw the special tool 2 249 164 (assembly tool) into the connecting rod.

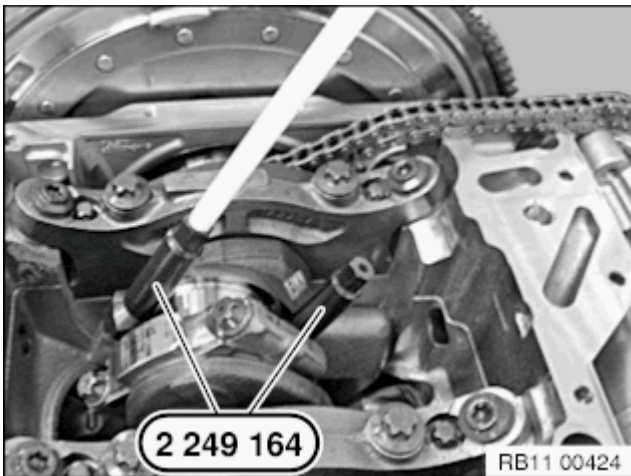


Fig. 174: Identifying Special Tool 2 249 164 Secured To Connecting Rod

NOTE: For installation and dismantling of the connecting rods, it is essential for the crankshaft to be exactly in alignment with the cylinder bore.

Position crankshaft at central bolt.

Insert special tool 11 8 152 into conrod.

Press out the connecting rod and piston with special tool 22 49 164 towards the cylinder head side.

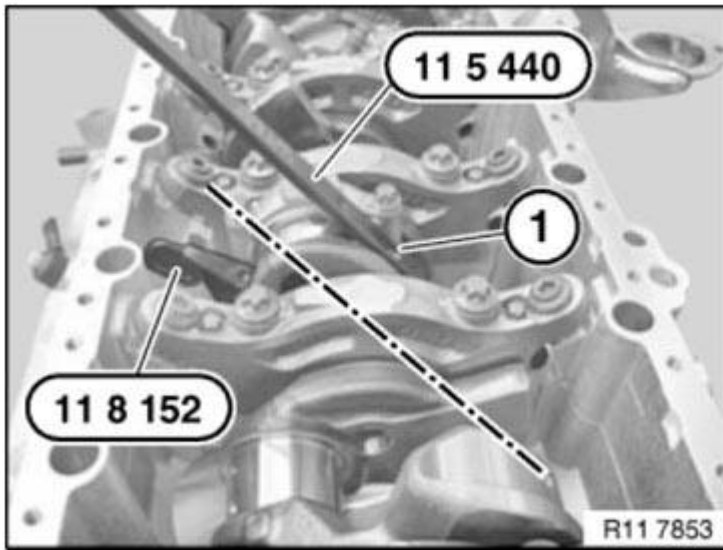


Fig. 175: Removing Conrod With Piston From Cylinder Head Side
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pistons and gudgeon pins are paired and must not be fitted individually.

Lift out circlip and press out piston pin.



Fig. 176: Removing Retaining Ring From Piston
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

NOTE: The connecting rod can also be replaced individually.

The gudgeon pin must be able to be pressed through the bush by hand with little force and must not display any significant play.

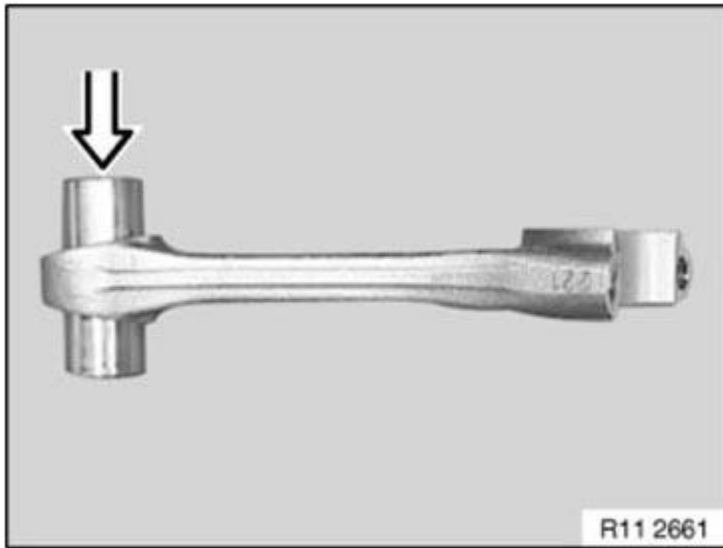


Fig. 177: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Prior to installation, measure piston installation clearance: Measure piston diameter with micrometer at measuring point A from lower edge of piston and offset at 90° to the axis of the gudgeon pin.

Refer to **MEASURING POINT A** .

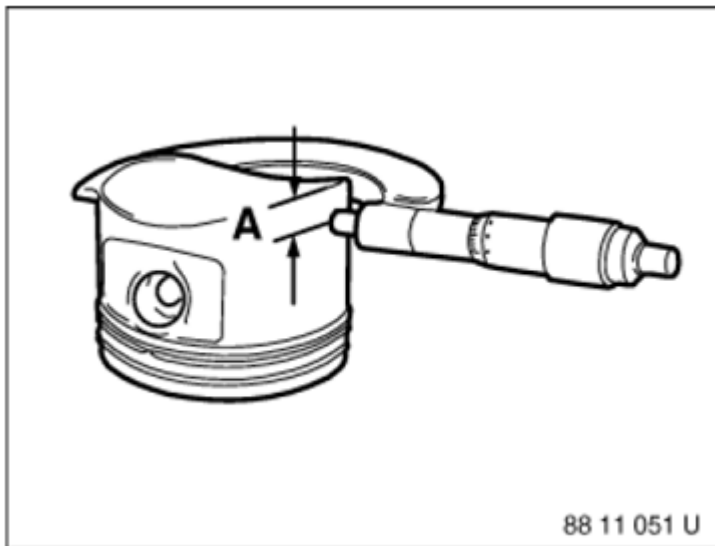


Fig. 178: Measuring Piston Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Refer to:

- **DIAMETER OF CYLINDER BORE**
- **PISTON INSTALLATION CLEARANCE**
- **TOTAL PERMISSIBLE WEAR CLEARANCE**

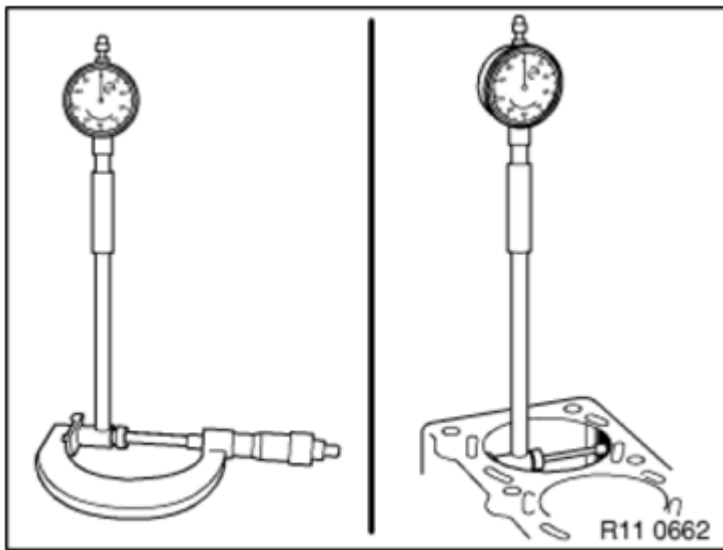


Fig. 179: Checking Diameter Of Cylinder Bore
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Piston circlip (1) is correctly installed when the opening points upwards.

See illustration.

It must still be possible for the gudgeon pin to be moved easily.

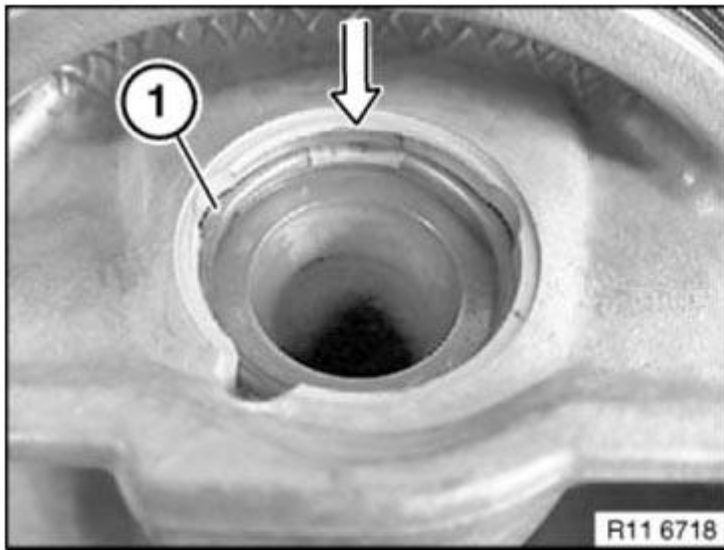


Fig. 180: Locating Piston Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Insert the special tools 22 49 164 (assembly tool) into the connecting rod.

Install **CONNECTING ROD BEARING**.

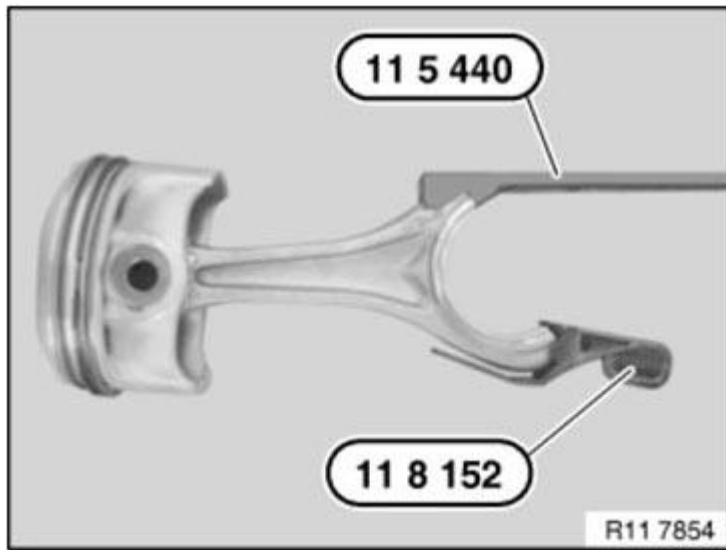


Fig. 181: Inserting Special Tools 11 8 151 And 11 8 152 Into Conrod
Courtesy of BMW OF NORTH AMERICA, INC.

Lightly coat pistons and piston rings with oil.

Offset the contact points of the piston rings by approx. 120° to each other but do not position above the piston pin boss.

NOTE: Illustration shows S85.

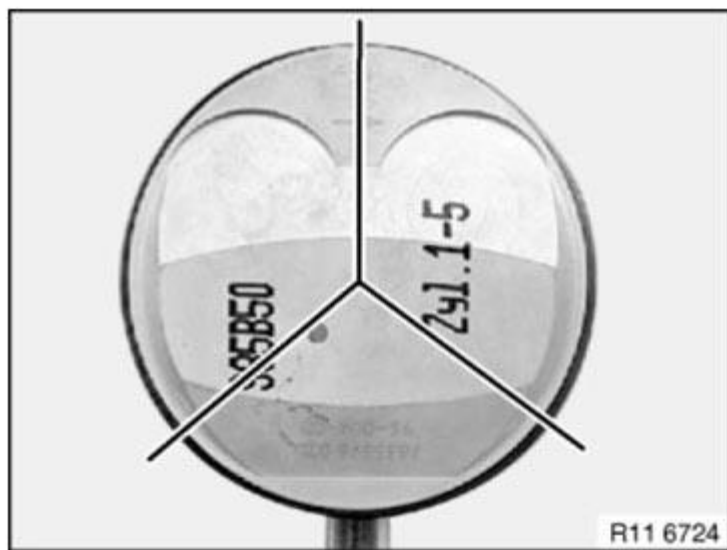


Fig. 182: Identifying Piston Rings Offset Contact Points
Courtesy of BMW OF NORTH AMERICA, INC.

Keep piston rods compressed with special tool **11 7 280**.

Install piston so that arrow points to camshaft drive.

IMPORTANT: Risk of piston ring breakage.

Press in piston only with finger force (do not knock in!).

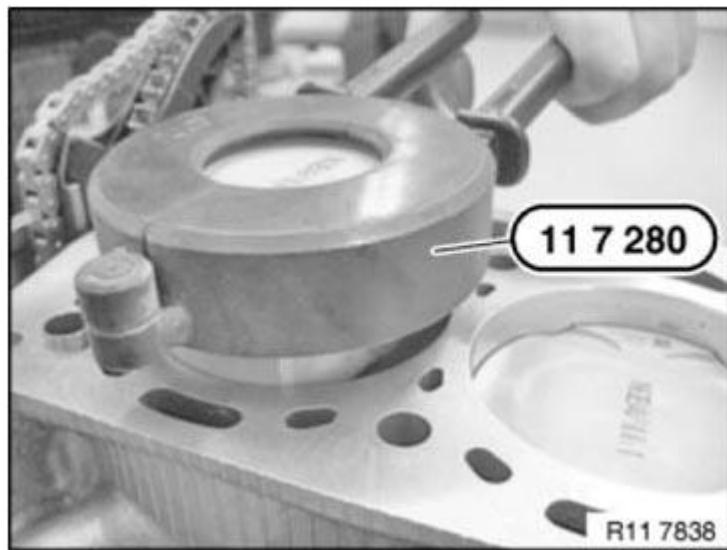
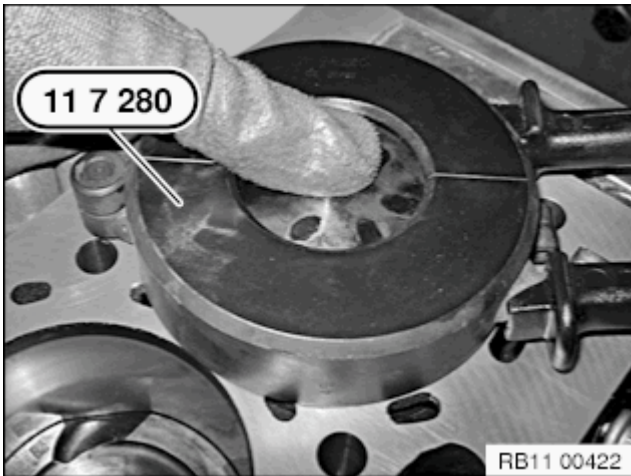


Fig. 183: Compressing Piston Rods With Special Tool 11 7 280

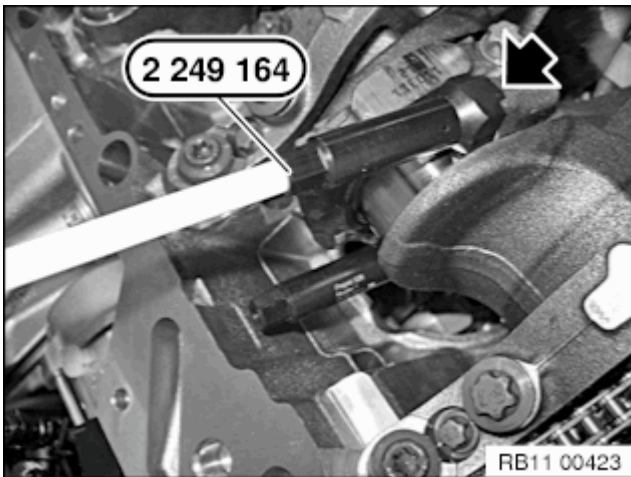
Courtesy of BMW OF NORTH AMERICA, INC.

The direction arrow on the piston crown must point to the camshaft drive (direction of travel towards front).

**Fig. 184: Identifying Piston Crown Direction**

Connect the crankshaft journal to connecting rod.

Remove special tools 22 49 164.

**Fig. 185: Connecting Crankshaft Journal And Connecting Rod And Removing Special Tools 22 49 164**

NOTE: For purposes of clarity, the pairing letters (1) are shown on the removed connecting rod.

IMPORTANT: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters (1), do not mix them up.
Fit bearing cap so that pairing letters match up.

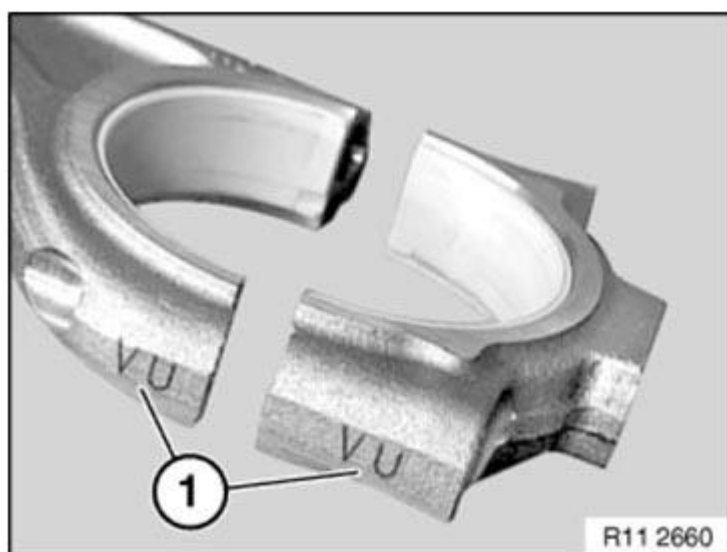


Fig. 186: Identifying Conrods And Conrod Bearing Caps Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply light coat of oil to connecting rod bearing shells.

Fit bearing cap so that pairing letters match up.

Install new connecting rod bolts.

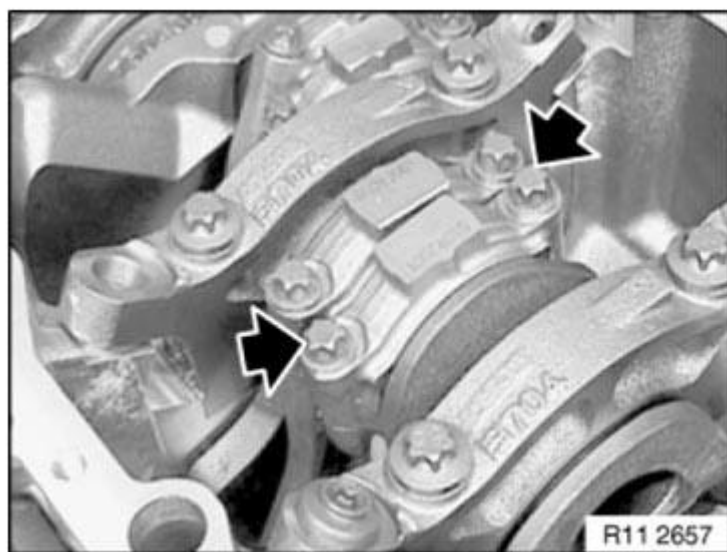


Fig. 187: Locating Conrod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down connecting rod bolts (1) with special tool 00 9 120 .

Tightening torque **11 24 1 AZ** .

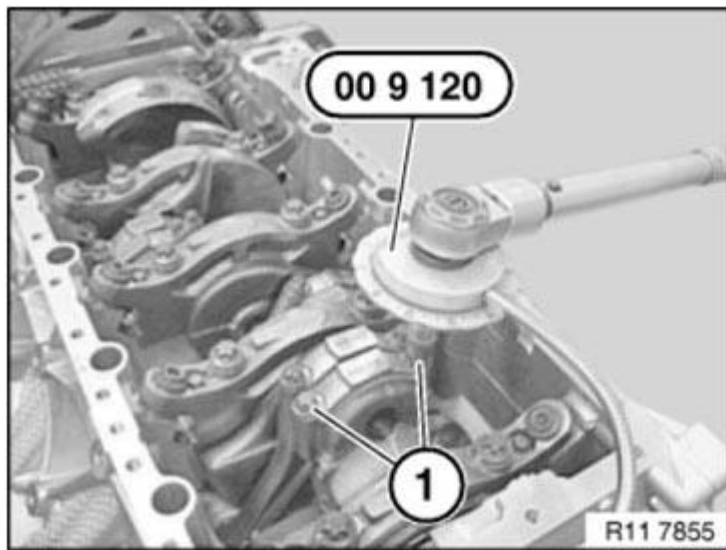


Fig. 188: Tightening Down Connecting Rod Bolts With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

1128 V-RIBBED BELT W.TENS./DEFLECT

1128050 REPLACING A/C COMPRESSOR DRIVE BELT WITH BELT TENSIONER (N63)

IMPORTANT: Risk of damage!

Release screws (1) on vibration absorber only if removal position is adjusted.

If contaminated with hydraulic fluid:

Replace drive belt.

Crank engine at central bolt in direction of engine rotation.

Installation note:

If the drive belt is to be reused, mark direction of travel and reinstall drive belt in same direction of rotation.

Necessary preliminary work

- Remove **DRIVE BELT** for alternator.

NOTE:

Observe direction of engine rotation

Crank engine at central bolt until marking (see arrow) is reached on vibration absorber.

Release screws (1).

Tightening torque **11 28 2AZ** .

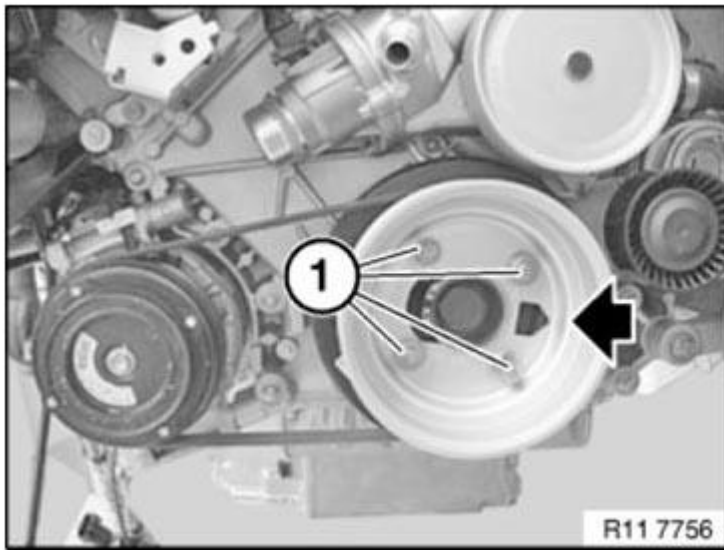


Fig. 189: Identifying Crank Pulley Screws And Marking
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Belt pulley is pretensioned.
Belt pulley tension is relieved abruptly during the cranking process!

NOTE: Crank engine at central bolt until marking (see arrow) is reached on vibration absorber.
Remove elasto-belt.

Observe direction of engine rotation

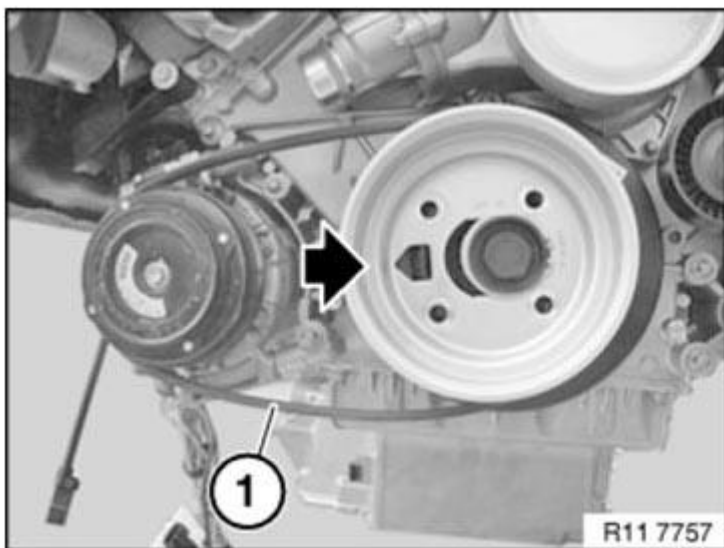


Fig. 190: Identifying Marking Reached On Vibration Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1128010 REPLACING DRIVE BELT FOR ALTERNATOR (N63)

Notes

**IMPORTANT: If contaminated with hydraulic fluid:
Replace drive belt.**

Installation note:

If the drive belt is to be reused, mark direction of travel and reinstall drive belt in same direction of rotation.

Necessary preliminary work

- Remove **FAN COWL** .
- Release **EXPANSION TANK** for charge air cooler from mounting and press forwards.

Coolant hoses do not need to be released!

IMPORTANT: Belt tensioner is under high initial spring preload.

Slowly and carefully pre-tension belt tensioner (1) in direction of arrow up to stop.

Secure special tool 11 3 340 in dowel hole (2).

Belt tensioner in installation position.

Remove drive belt.

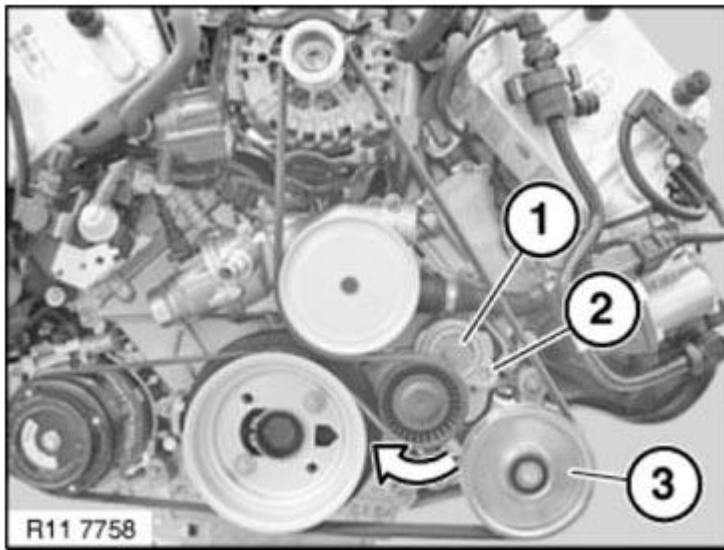


Fig. 191: Identifying Belt Tensioner Tensioning Direction
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: On vehicles which do not have a power steering pump, a deflecting element (3) is fitted in place of the power steering pump.

IMPORTANT: Belt tensioner is under high initial spring preload.

Put on the drive belt.

Remove special tool 11 3 340 from dowel hole (2).

Slowly relieve tension on belt tensioner (1).

Installation note:

Make sure drive belt is in correct installation position.

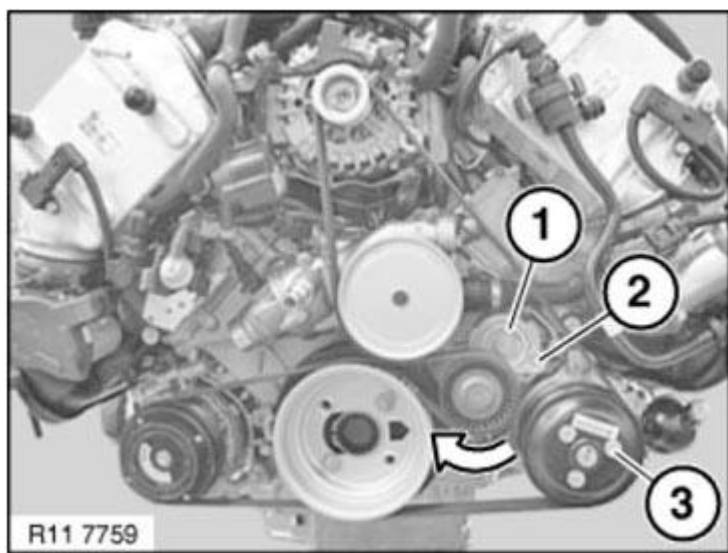


Fig. 192: Identifying Belt Tensioner Tensioning Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1128020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N63)

Necessary preliminary work

- Remove alternator **DRIVE BELT**

If necessary, remove special tool **11 0 390** .

Release screw (1).

Tightening torque **11 28 1AZ** .

Remove belt tensioner with idler pulley (2).

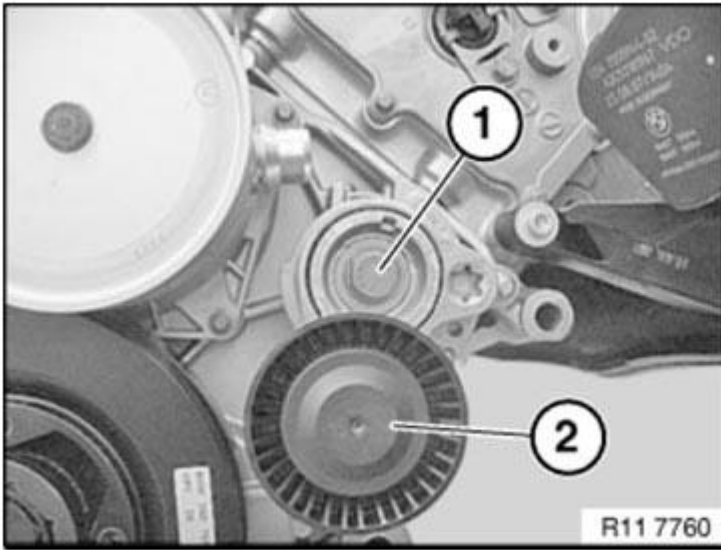


Fig. 193: Identifying Screw And Idler Pulley
 Courtesy of BMW OF NORTH AMERICA, INC.

1131 CAMSHAFT

1131573 ADJUSTING CAMSHAFT TIMING ON LEFT SIDE (N63)

Notes

IMPORTANT: Release central bolts on adjuster only with special tool 11 9 890 .
 Risk of damage to timing drive.
 If special tool 11 9 890 can not be fitted, it is necessary when releasing the
 central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 5 to 8)

Necessary preliminary work

- Remove LEFT GEAR CASE COVER
- CHECK CAMSHAFT TIMING ON LEFT SIDE

Get set of special tools 11 9 890 ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.
 Special tool 11 9 892 Press-down bar.
 Special tool 11 9 893 Gap gauge for intake and exhaust camshafts.
 Special tool 11 9 894 spacer.

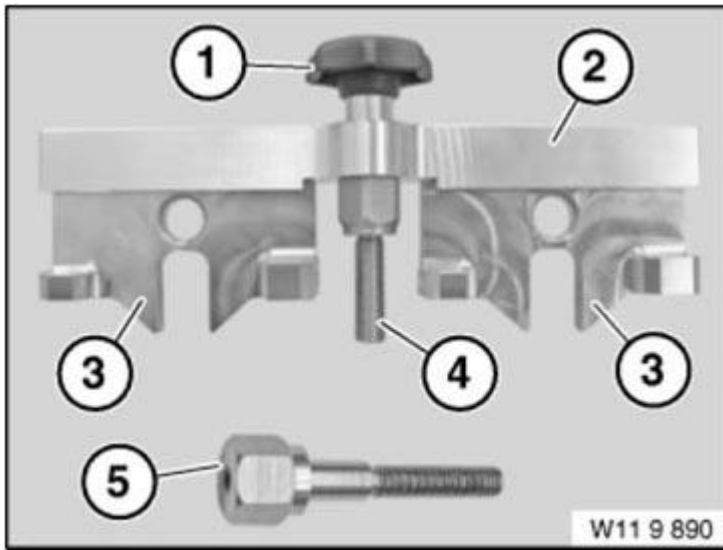


Fig. 194: Identifying Set Of Special Tools 11 9 890
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

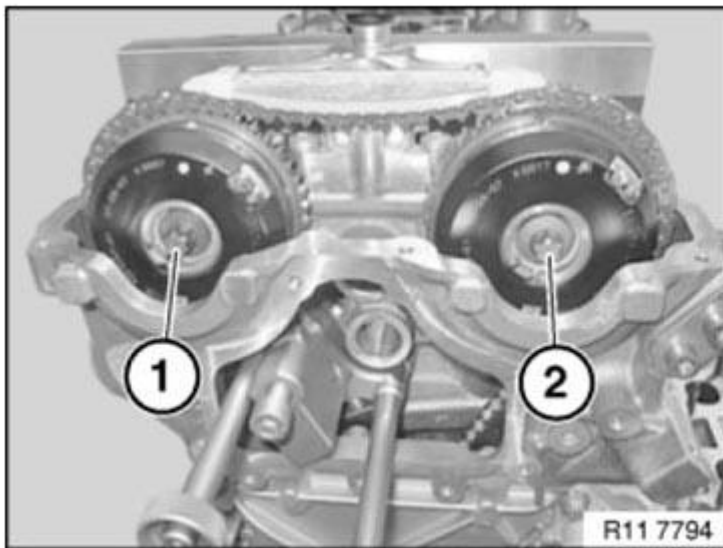


Fig. 195: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow).
If no grease can be seen on the bolt head of central bolt (1), the ADJUSTER must be replaced for safety reasons.

Installation note:

Coat contact surface of new central bolt (1) with copper paste.

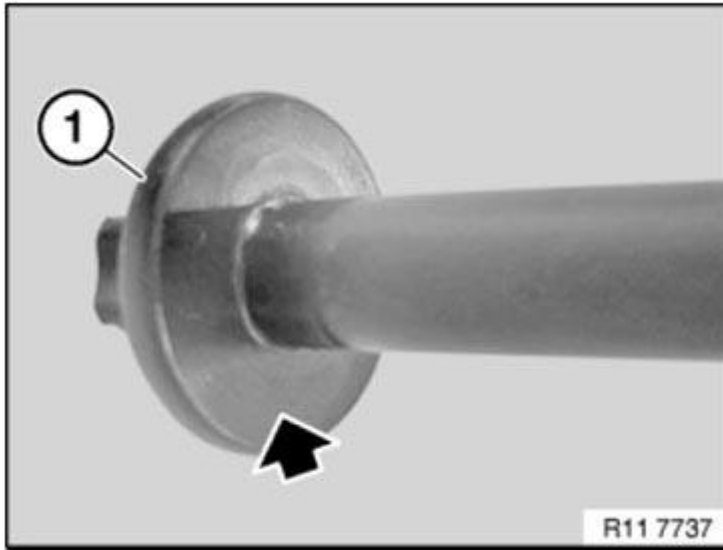


Fig. 196: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on intake camshaft and exhaust camshaft.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

Screw special tool 11 9 894 into cylinder head.

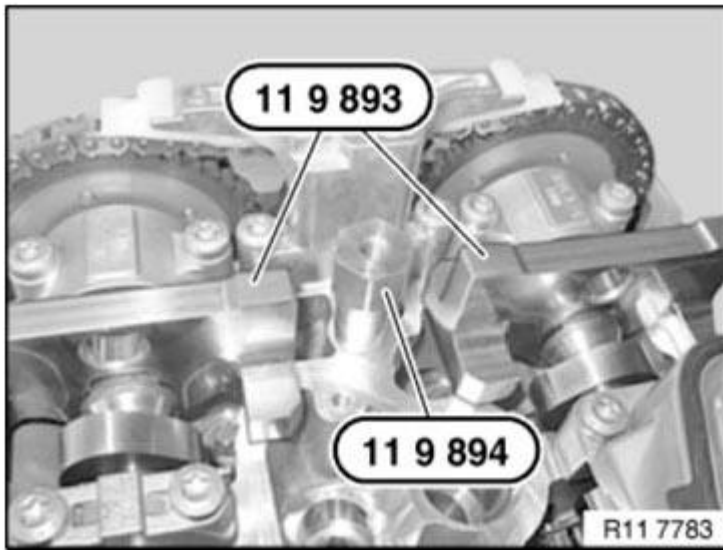


Fig. 197: Positioning Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
 Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools 11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

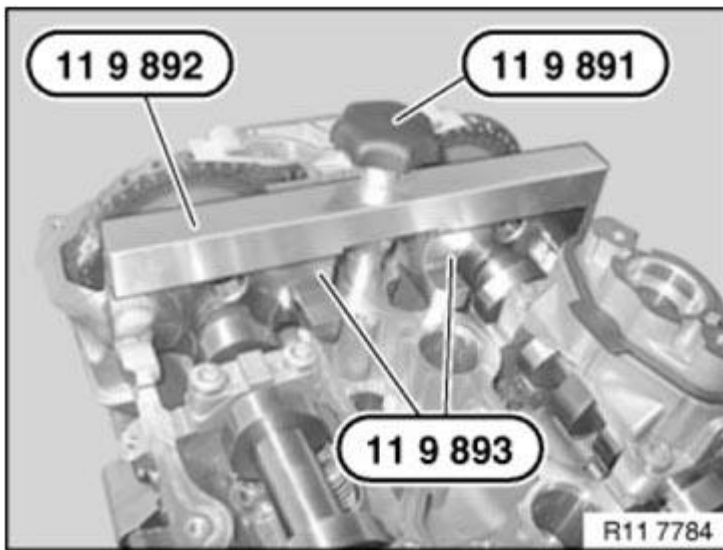


Fig. 198: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
 Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake camshaft adjuster with special tool 00 9 120.

Secure central bolt (2) of exhaust camshaft adjuster with special tool **00 9 120** .

Tightening torque: **11 36 1AZ** .

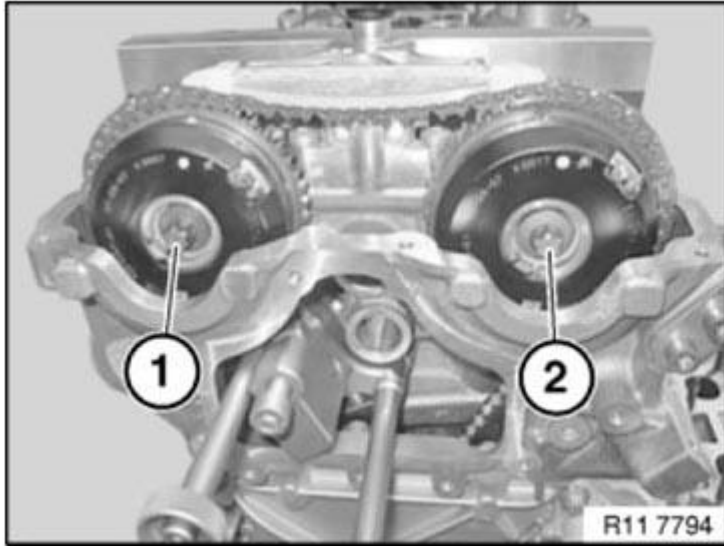


Fig. 199: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **150° before cylinder no. 1 firing TDC position**.

Secure vibration damper with special tool **11 9 190** at **150° before cylinder no. 1 firing TDC position 1**.

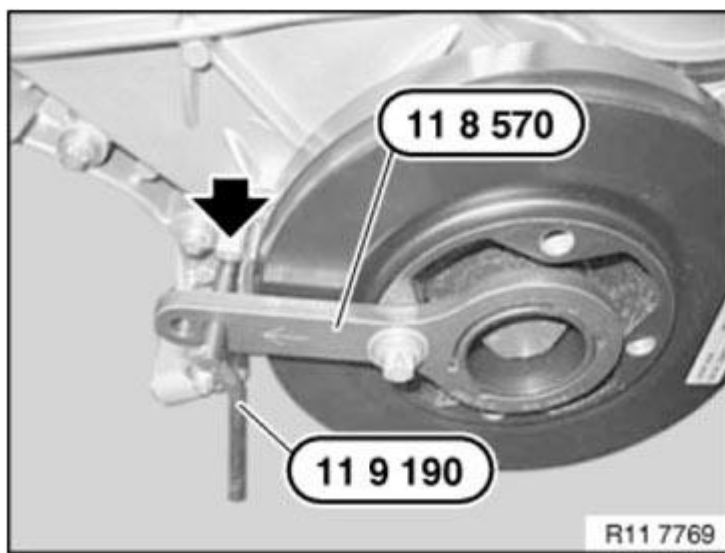


Fig. 200: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

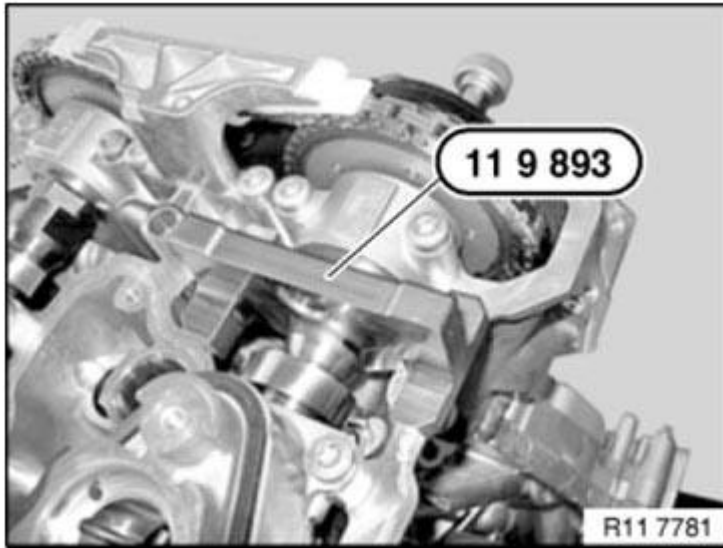


Fig. 201: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

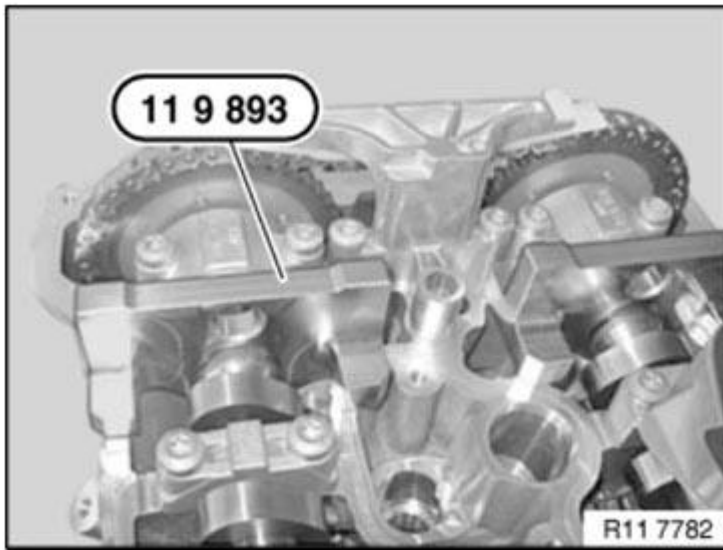


Fig. 202: Identifying Special Tool 11 9 893 On Intake Camshaft
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131574 ADJUSTING CAMSHAFT TIMING ON RIGHT SIDE (N63)

Notes

IMPORTANT: Release central bolts on adjuster only with special tool 11 9 890 .
 Risk of damage to timing drive.
 If special tool 11 9 890 can not be fitted, it is necessary when releasing the
 central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 1 to 4)

Necessary preliminary work

- Remove RIGHT-HAND GEAR CASE COVER
- CHECK CAMSHAFT TIMING ON RIGHT SIDE .

Get set of special tools 11 9 890 ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.
 Special tool 11 9 892 Press-down bar.
 Special tool 11 9 893 Gap gauge for intake and exhaust camshafts.
 Special tool 11 9 894 spacer.

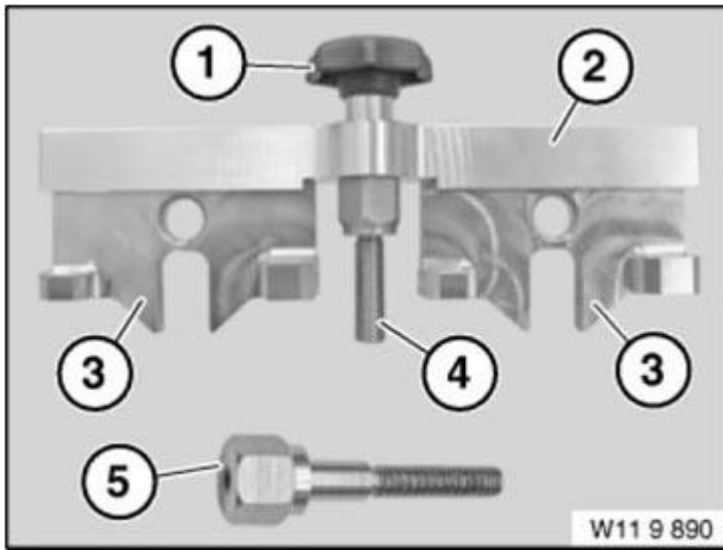


Fig. 203: Identifying Set Of Special Tools 11 9 890
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

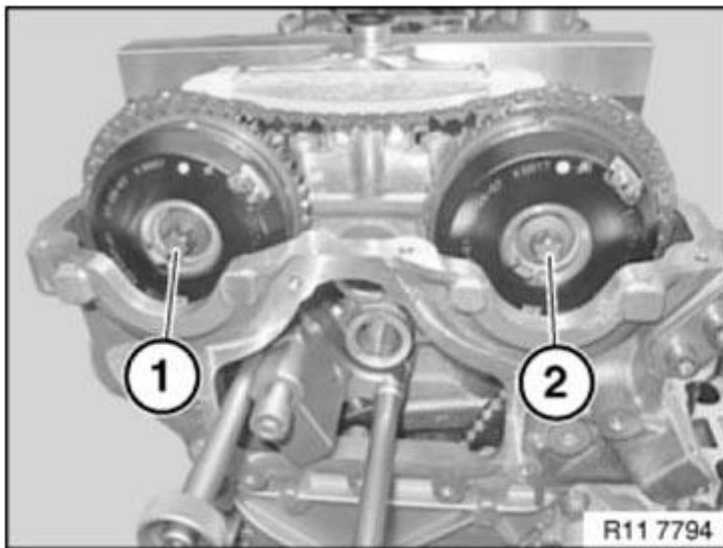


Fig. 204: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow).
If no grease can be seen on the bolt head of central bolt (1), the ADJUSTER must be replaced for safety reasons.

Installation note:

Coat contact surface of new central bolt (1) with copper paste.

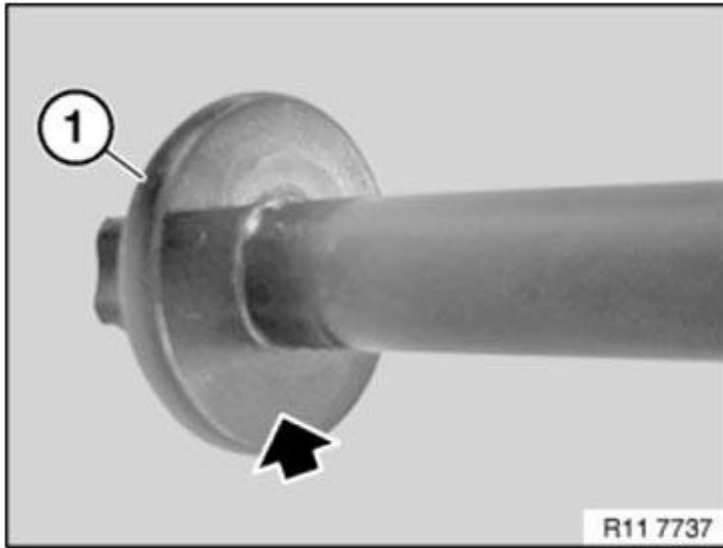


Fig. 205: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on intake camshaft and exhaust camshaft.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

Screw special tool 11 9 894 into cylinder head.

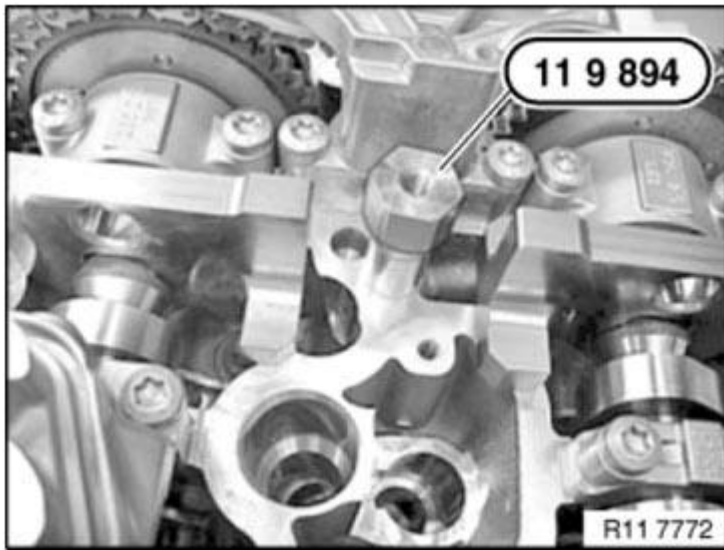


Fig. 206: Identifying Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools 11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

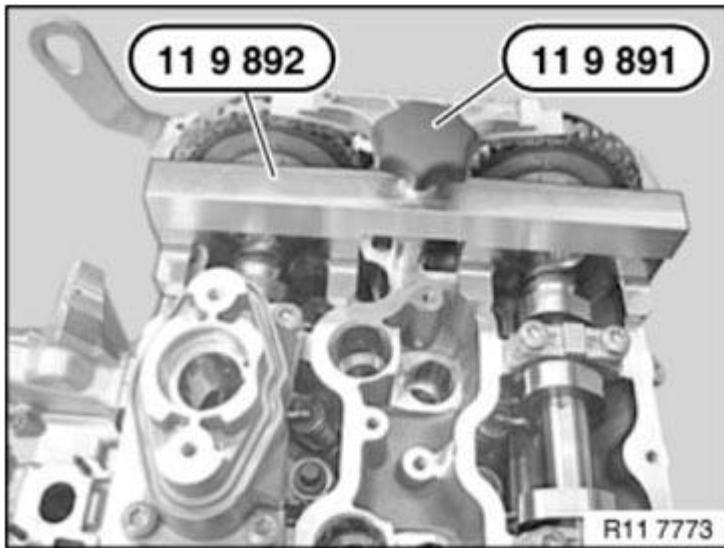


Fig. 207: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake camshaft adjuster with special tool 00 9 120.

Secure central bolt (2) of exhaust camshaft adjuster with special tool **00 9 120** .

Tightening torque: **11 36 1AZ** .

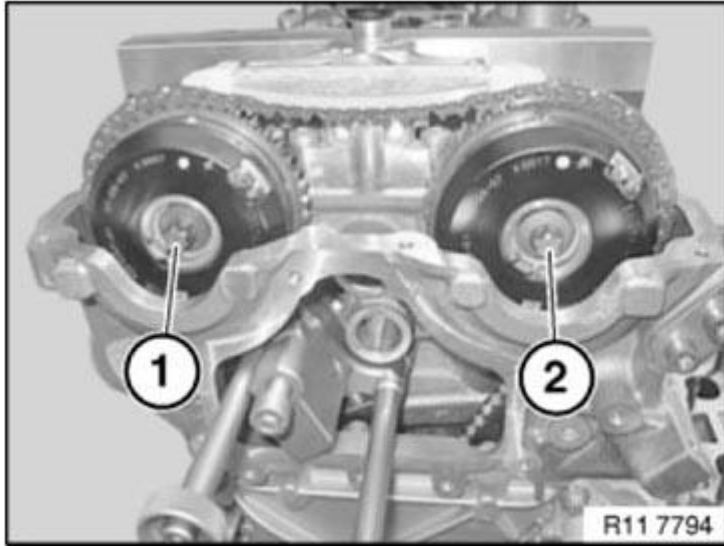


Fig. 208: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **150° before cylinder no. 1 firing TDC position**.

Secure vibration damper with special tool **11 9 190** at **150° before cylinder no. 1 firing TDC position 1**.

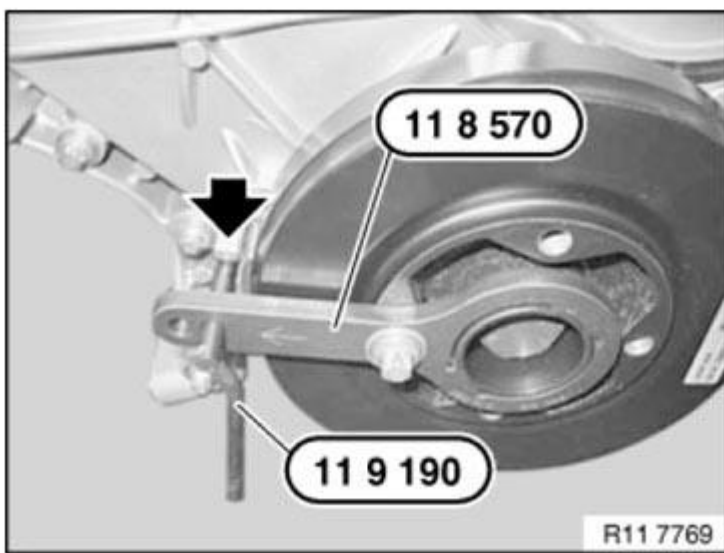


Fig. 209: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

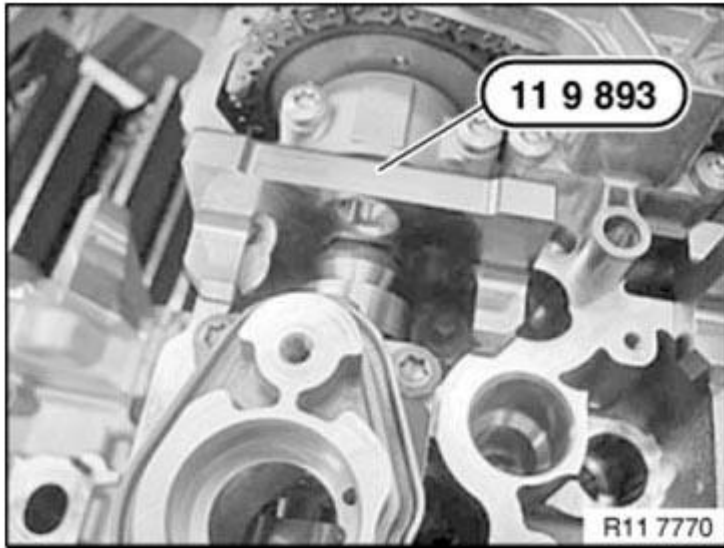


Fig. 210: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

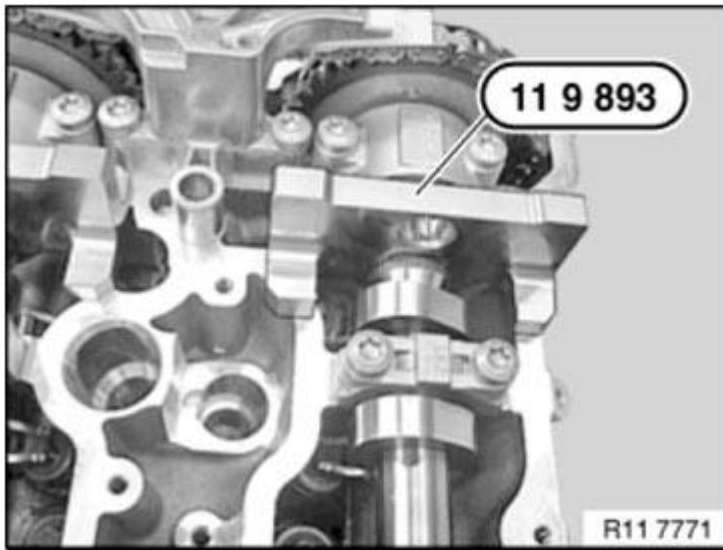


Fig. 211: Identifying Special Tool 11 9 893 On Intake Camshaft
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N63)

Notes

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
 The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 5-8:

Necessary preliminary work

- Remove left CYLINDER HEAD COVER
- Remove FAN COWL with electric fan
- Remove BELT PULLEY for air conditioning system
- Remove left CHAIN TENSIONER

Mount special tool 11 9 900 at position of chain tensioner.

Preload hexagon socket screw with special tool 00 9 250 to 0.6 Nm.

NOTE: Graphic corresponds to cylinders 1-4.

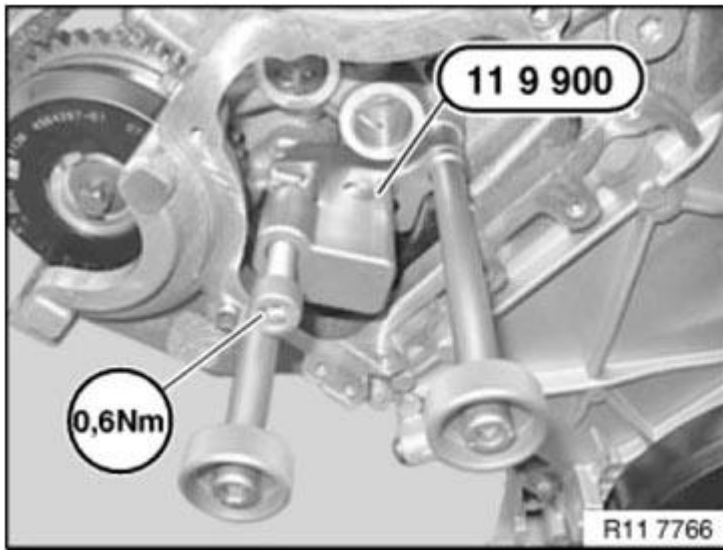


Fig. 212: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Marking (MP = Mounting Position) is important for installing special tool 11 8 570 .

MP = 150° before cylinder no. 1 firing TDC position

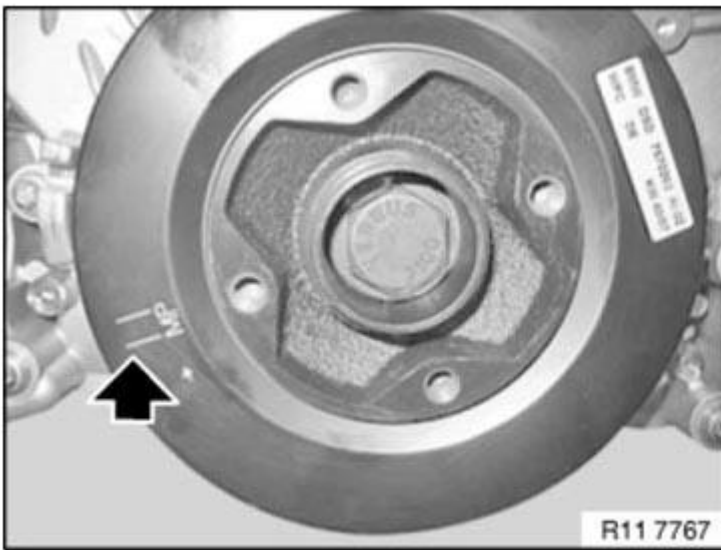


Fig. 213: Identifying Mounting Position Of Special Tool 11 8 570
 Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 8 570 with dihedron on vibration damper in such a way that it can be secured with bolt (1) at the MP marking.

NOTE: Setting groove on crankcase, see arrow.

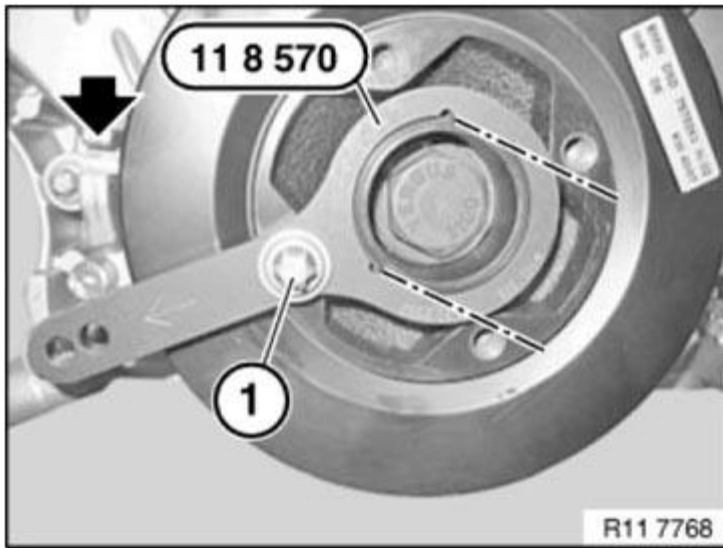


Fig. 214: Positioning Special Tool 11 8 570 With Dihedron On Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt.

Secure vibration damper with special tools 11 8 570 and 11 9 190 at 150° before cylinder no. 1 firing TDC position.

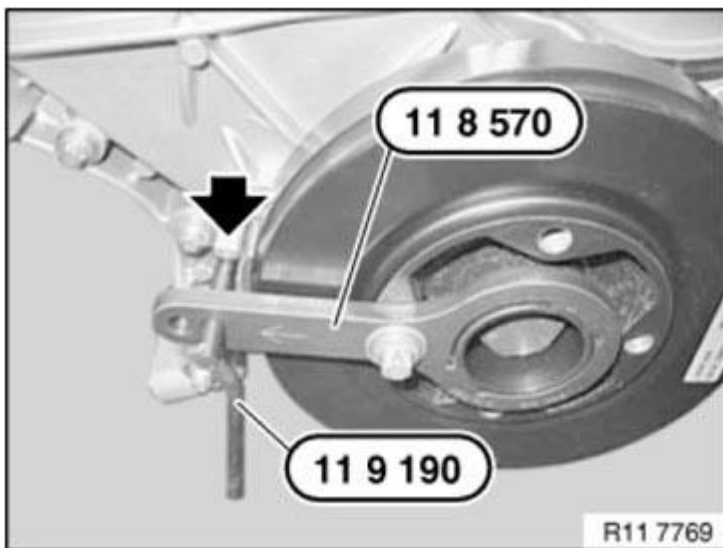


Fig. 215: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder no. 1 at 150° before firing TDC position, cams on exhaust camshaft (A) at cylinder no. 5 point at

an angle to the left.

Cams on inlet camshaft (E) point at an angle downwards.

NOTE: For purposes of clarity, the graphic shows the inlet and exhaust adjustment units removed.

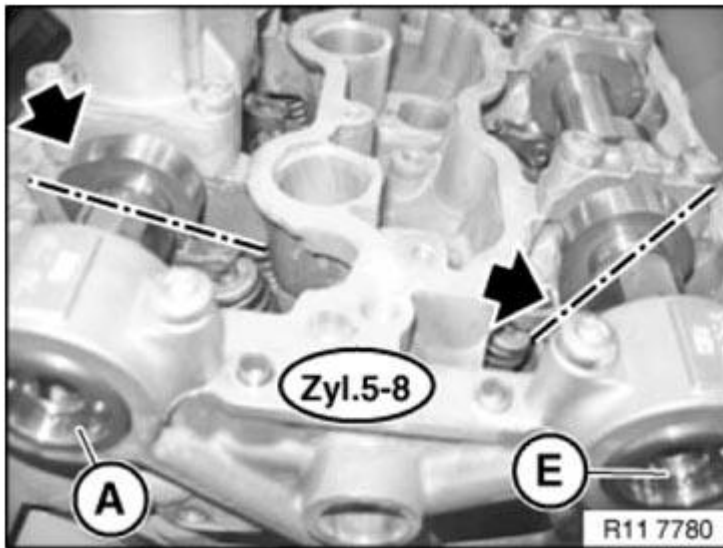


Fig. 216: Identifying Cams On Inlet Camshaft Point At An Angle Downwards
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the inlet and exhaust adjustment units are normally locked in their initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster. In order to avoid incorrect timing adjustment, it is essential to check the locking of the camshaft adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of intake and exhaust camshaft adjusters in initial setting:

Gripping hexagon head (2) of camshafts with a fork wrench (1), carefully try to rotate camshafts against direction of rotation.

The intake and exhaust camshaft adjusters are locked in the initial setting when the camshafts are non-positively connected to the adjusters.

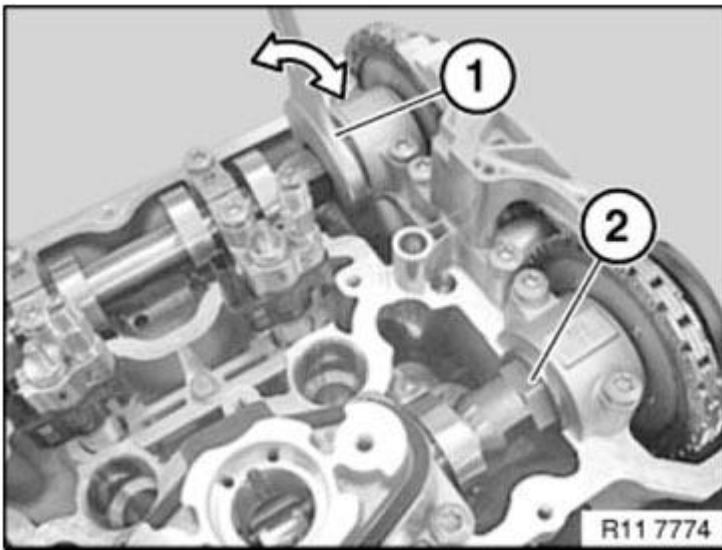


Fig. 217: Gripping Hexagon Head Of Camshafts With Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the intake or exhaust camshaft adjusters of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

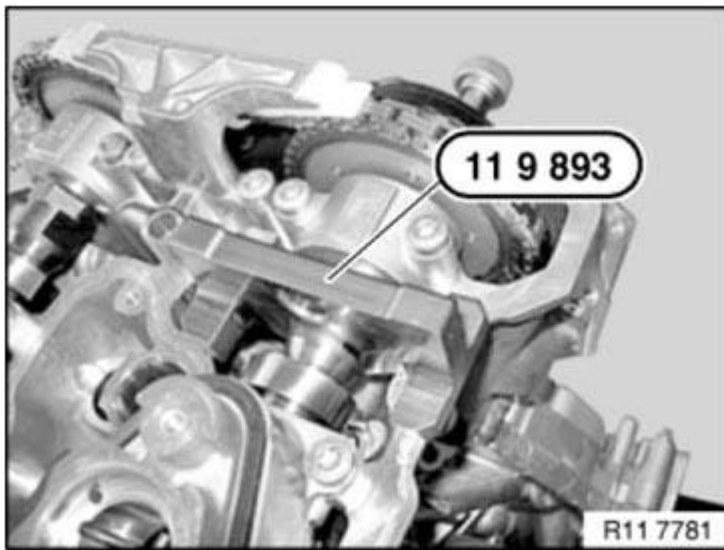


Fig. 218: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

If necessary, adjust camshaft TIMING on left side.

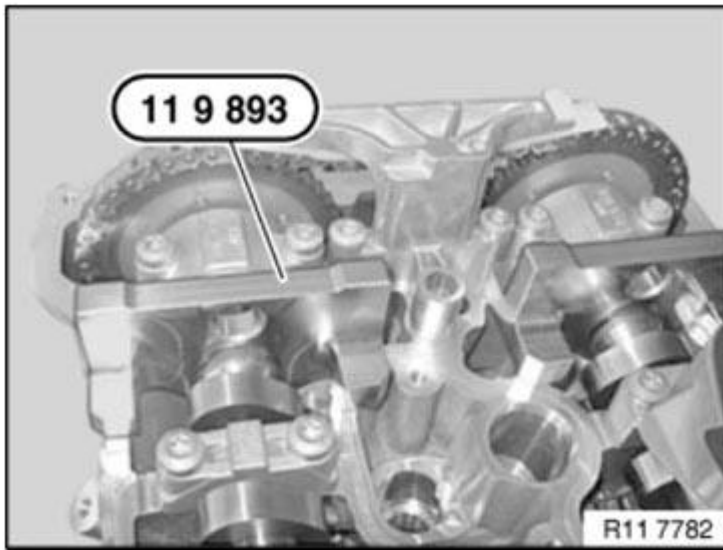


Fig. 219: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N63)

Notes

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 1-4:

Necessary preliminary work

- Remove right CYLINDER HEAD COVER
- Remove FAN COWL with electric fan
- Remove BELT PULLEY for air conditioning system
- Remove right CHAIN TENSIONER

Mount special tool **11 9 900** at position of chain tensioner.

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm**.

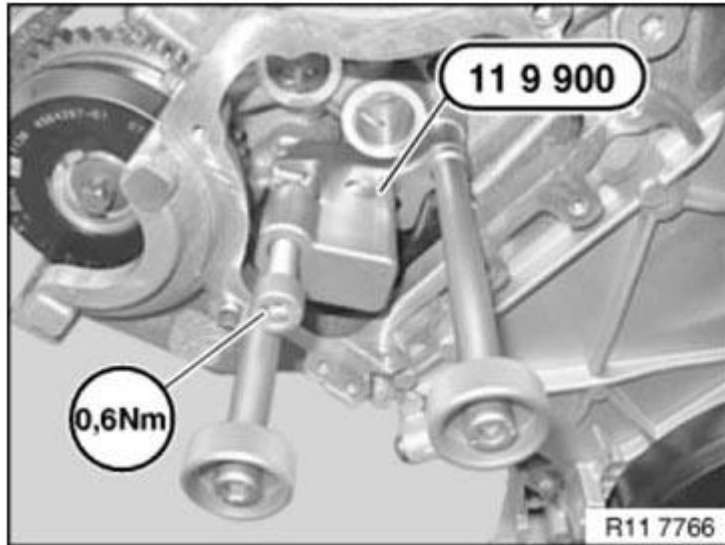


Fig. 220: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Marking (MP = Mounting Position) is important for installing special tool **11 8 570**.

MP = 150° before cylinder no. 1 firing TDC position

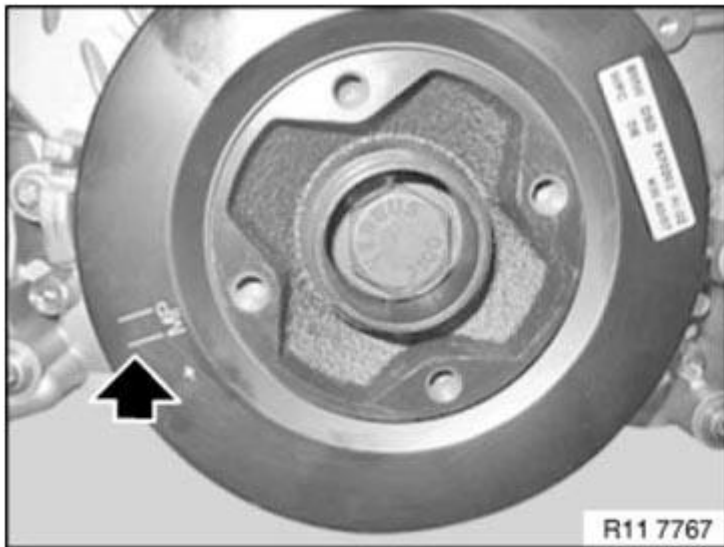


Fig. 221: Identifying Mounting Position Of Special Tool 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with dihedral on vibration damper in such a way that it can be secured with bolt (1) at the MP marking.

NOTE: Setting groove on crankcase, see arrow.

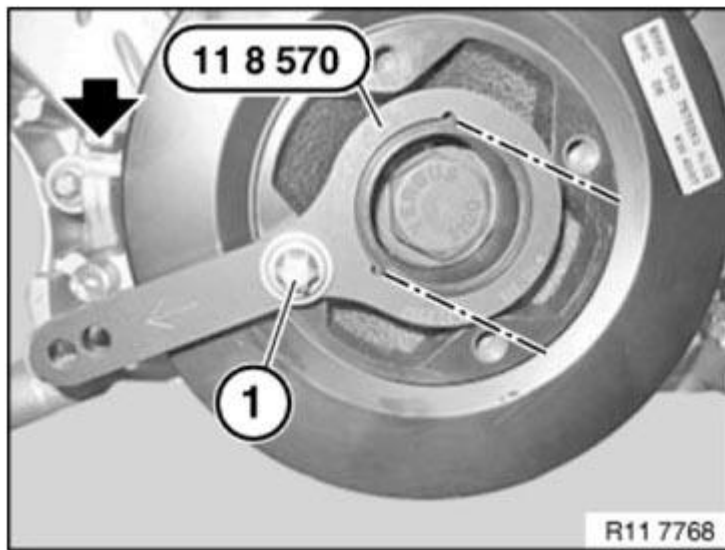


Fig. 222: Positioning Special Tool 11 8 570 With Dihedron On Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt.

Secure vibration damper with special tools **11 8 570** and **11 9 190** at 150° before cylinder no. 1 firing TDC position.

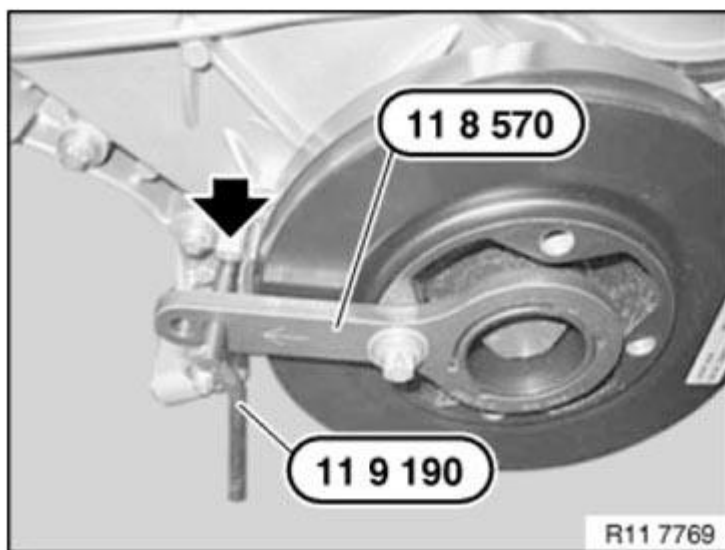


Fig. 223: Securing Vibration Damper With Special Tool 11 9 190

Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder no. 1 at 150° before firing TDC position, cams on exhaust camshaft (A) at cylinder no. 1 point at an angle upwards.

Cams on inlet camshaft (E) point at an angle downwards.

NOTE: For purposes of clarity, the graphic shows the inlet and exhaust adjustment units removed.

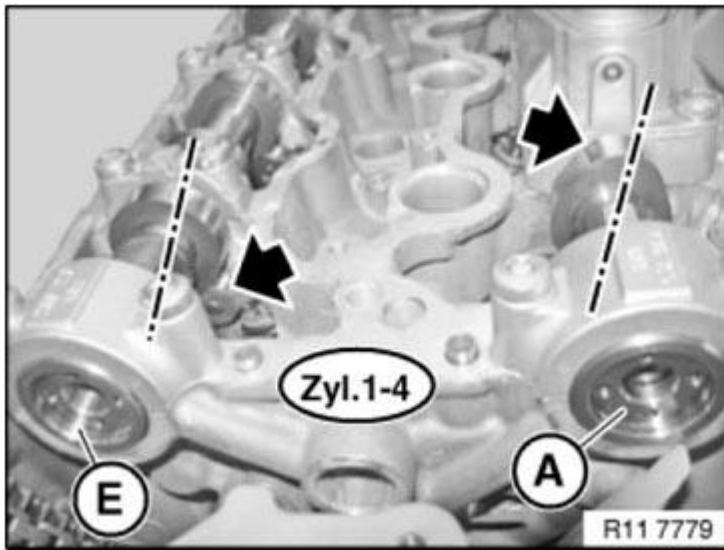


Fig. 224: Identifying Cams On Inlet Camshaft Point At An Angle Downwards
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the intake and exhaust camshaft adjusters are normally locked in their initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster. In order to avoid incorrect timing adjustment, it is essential to check the locking of the camshaft adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of intake and exhaust camshaft adjusters in initial setting:

Gripping hexagon head (2) of camshafts with an open-end spanner (1), carefully try to rotate camshafts against direction of rotation.

The intake and exhaust camshaft adjusters are locked in the initial setting when the camshafts are non-positively connected to the adjusters.

NOTE: Graphic corresponds to cylinders 5-8.

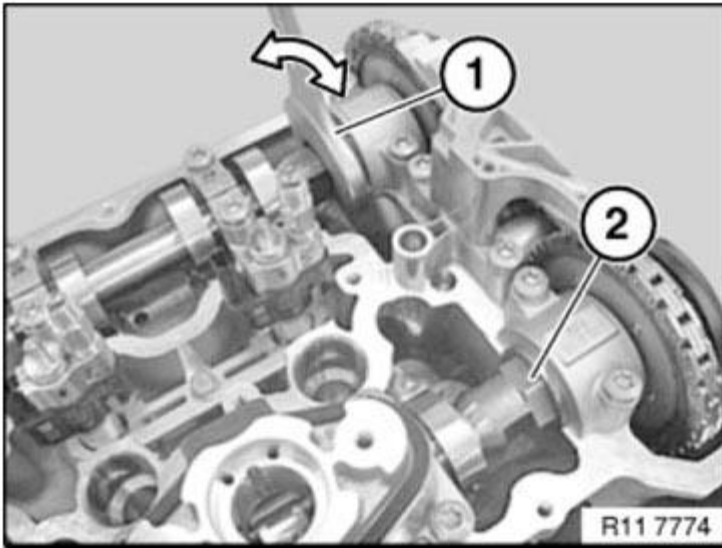


Fig. 225: Gripping Hexagon Head Of Camshafts With Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the intake or exhaust camshaft adjusters of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

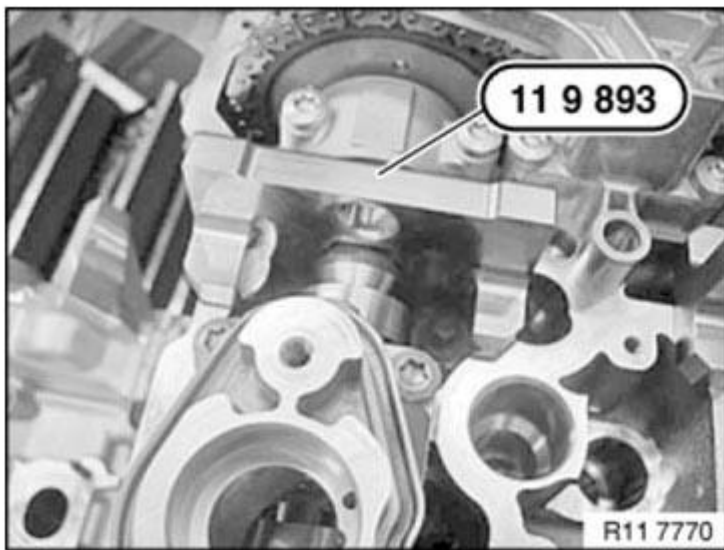


Fig. 226: Identifying Special Tool 11 9 893 On Exhaust Camshaft
 Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

If necessary, adjust camshaft **TIMING** on right side.

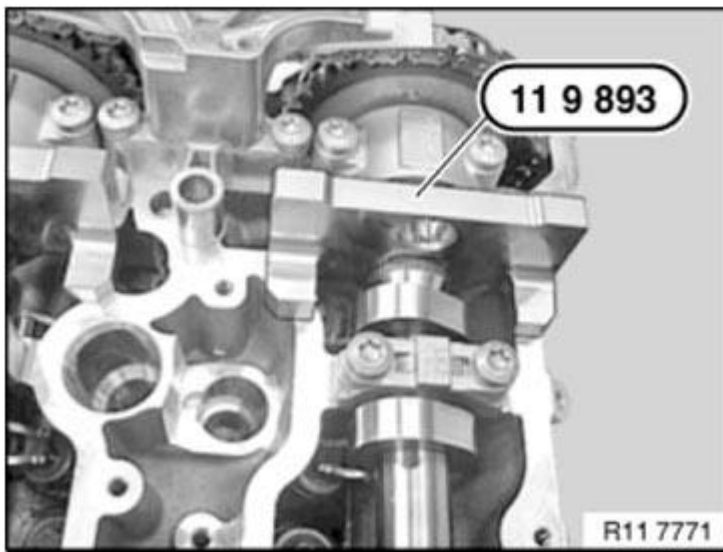


Fig. 227: Identifying Special Tool 11 9 893 On Intake Camshaft
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131038 REMOVING AND INSTALLING/RENEWING RIGHT EXHAUST CAMSHAFT (N63)

Notes

Cylinders 1-4:

IMPORTANT: Risk of damage!

The exhaust camshaft must first be rotated in such a way that the camshaft is free from tension when the bearing caps are released.

Necessary preliminary work

- Remove right **HIGH-PRESSURE PUMP**

- Remove right **CYLINDER HEAD COVER**
- Remove right **EXHAUST CAMSHAFT ADJUSTER**

IMPORTANT: No cam on the exhaust camshaft is permitted to press directly onto a roller cam follower.
With cylinder no. 1 at 150° before TDC firing position there is no piston in the TDC position.

Rotate exhaust camshaft (2) at dihedron with a fork wrench into a suitable position.

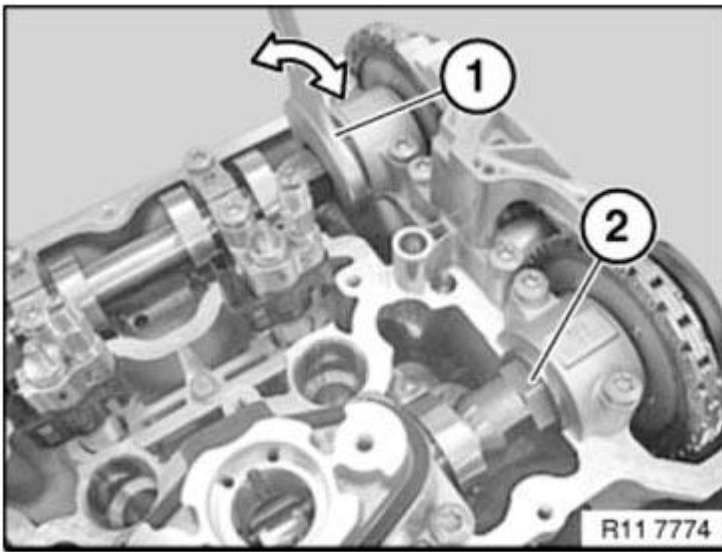


Fig. 228: Rotating Exhaust Camshaft At Dihedron With Fork Wrench Into Suitable Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The intake camshaft of cylinder bank 5-8 is marked "E 5-8".

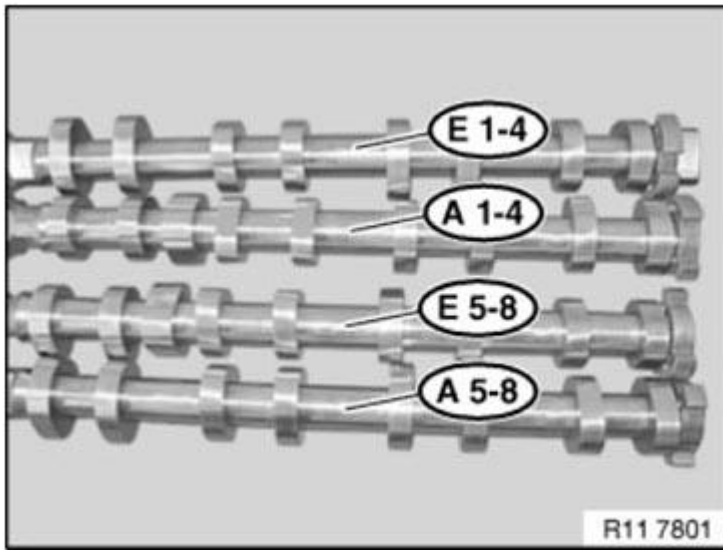


Fig. 229: Identifying Camshaft Of Cylinder Bank Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (10 to 1) in 1/2 turns.

Set all bearing caps down in special tool **11 4 480** in a neat and orderly fashion.

Remove roller tappet from bearing caps (2 and 3) of high pressure pump and lay down in special tool **11 4 480**.

Remove left exhaust camshaft and lay down in special tool **11 4 480**.

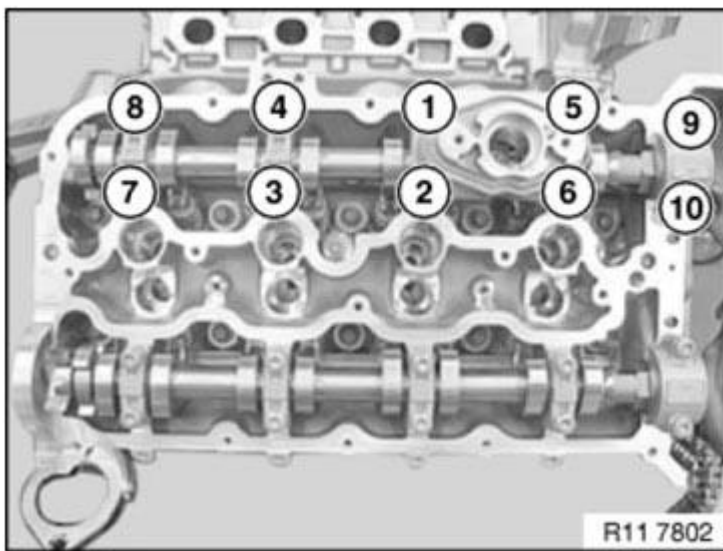


Fig. 230: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) of can slip slightly when inlet camshaft is fitted.
Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

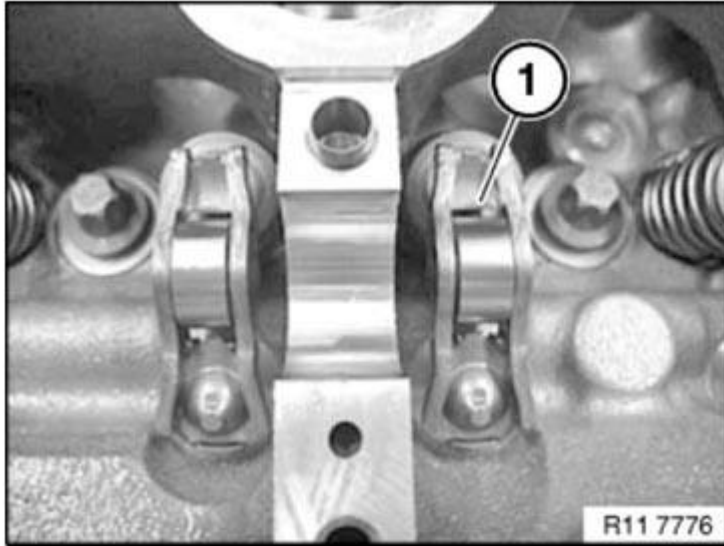


Fig. 231: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

If necessary, replace plain compression rings (1).

Press compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull compression ring (1) apart and remove towards front.

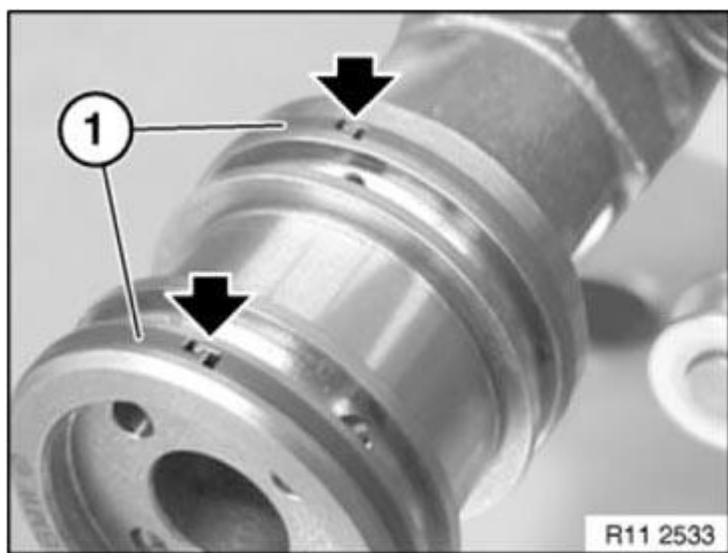


Fig. 232: Locating Compression Ring End
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

Make sure compression rings (1) are engaged at ends.

Coat all bearing positions with engine oil.

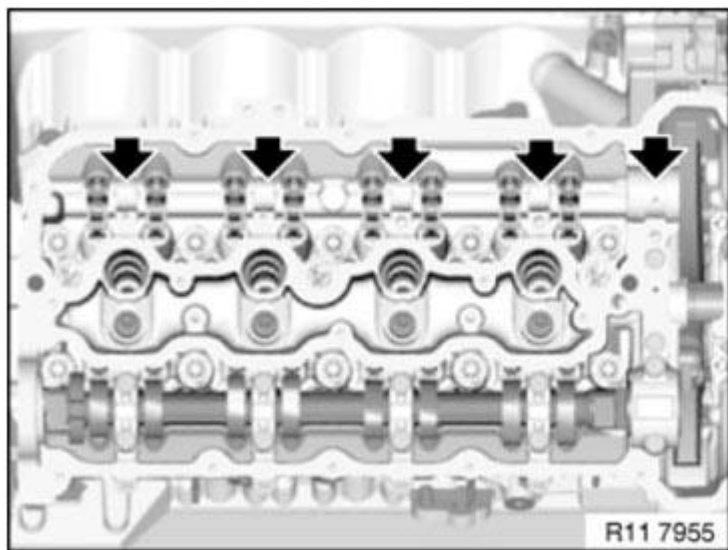


Fig. 233: Locating Bearing Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Install exhaust camshaft (1).

Turn exhaust camshaft (1) until cams point to side at cylinder no. 1 as shown in graphic.

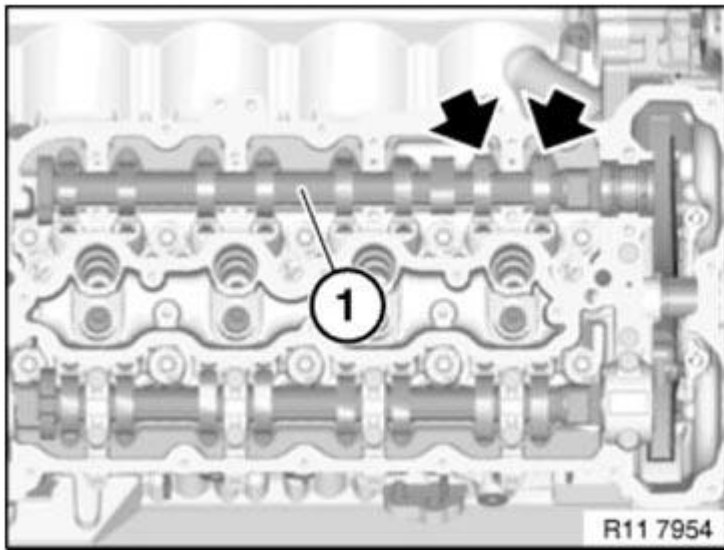


Fig. 234: Identifying Exhaust Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Bearing caps of cylinders 1-4 and cylinders 5-8 must not be interchanged. All bearing caps are coded and can only be installed in one position.

All bearing caps are marked with letters and numbers:

L= Cylinder bank 1-4.

R= Cylinder bank 5-8.

E= Intake side

A= Exhaust side

1= Marking, bearing point, from 1 to 5

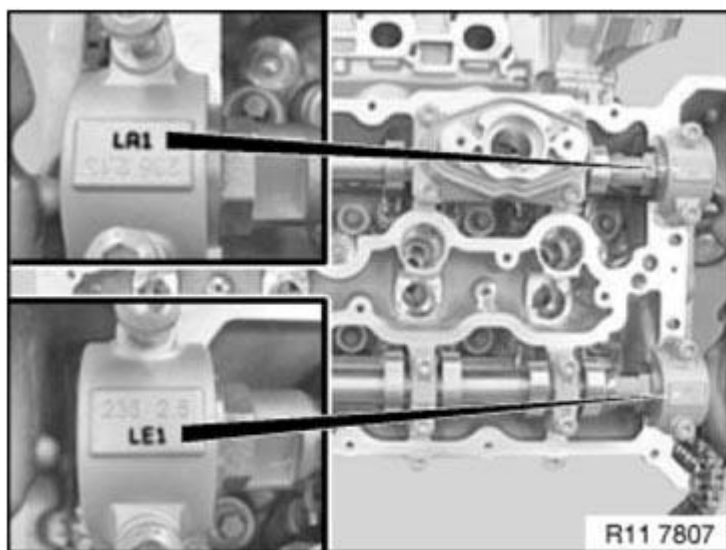


Fig. 235: Identifying Bearing Caps Marks
 Courtesy of BMW OF NORTH AMERICA, INC.

Insert all bolts.

Tighten down bolts in sequence (1 to 10) in 1/2 turns.

Tightening torque **11 31 6AZ** .

Tightening torque **11 31 7AZ** .

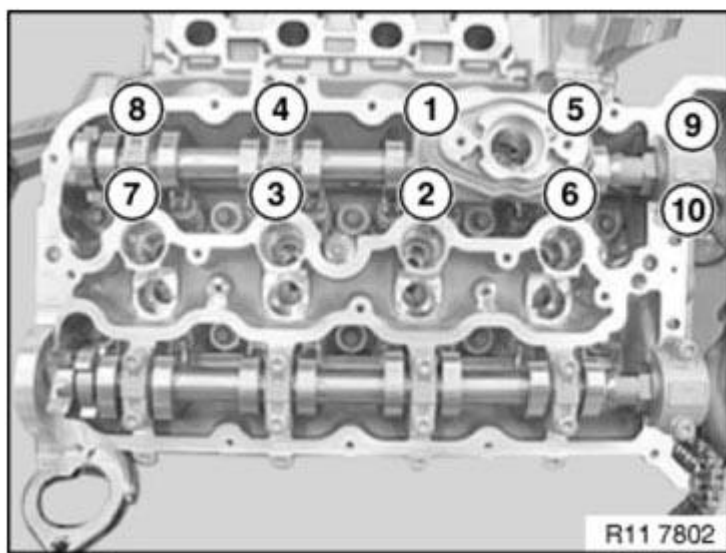


Fig. 236: Identifying Camshaft Bearings Bolts Tightening Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Install right **INLET AND EXHAUST CAMSHAFT ADJUSTERS** .

Adjust **VALVE TIMING** .

Assemble engine.

1133054 REMOVING AND INSTALLING/RENEWING ROCKER ARMS ON RIGHT SIDE (N63)

Necessary preliminary work

(cylinder bank 1 to 4)

- Remove **INLET AND EXHAUST ADJUSTMENT UNIT** on right side.
- Remove right **INLET CAMSHAFT** .
- Remove right **EXHAUST CAMSHAFT** .

**IMPORTANT: Used rocker arms (1) may only be reused in the same position.
Tolerance classes are not required.**

Remove rocker arm (1) and set down in neat order in special tool **11 4 480** .

Install rocker arm (1).

Align all rocker arms (1) straight.

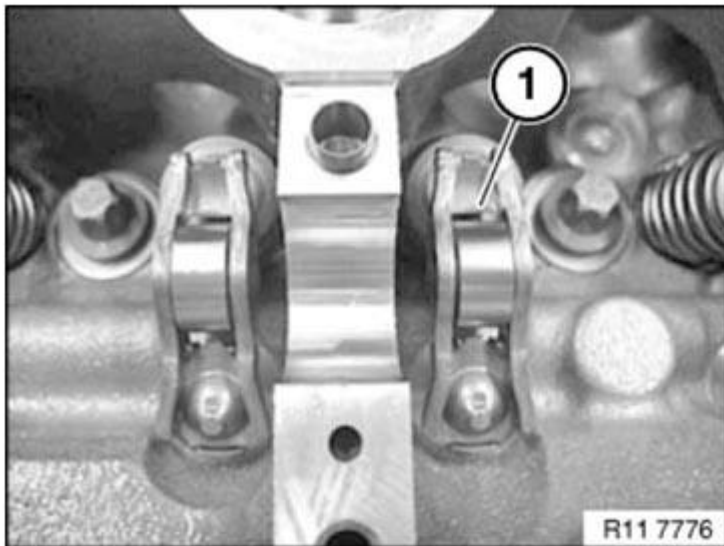


Fig. 237: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1133052 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS ON LEFT SIDE (N63)

Necessary preliminary work

(cylinder bank 5 to 8)

- Remove LEFT INLET CAMSHAFT .
- Remove left EXHAUST CAMSHAFT .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.
Tolerance classes are not required.

Remove rocker arm (1) and set down in neat order in special tool 11 4 480 .

Install rocker arm (1).

Align all rocker arms (1) straight.

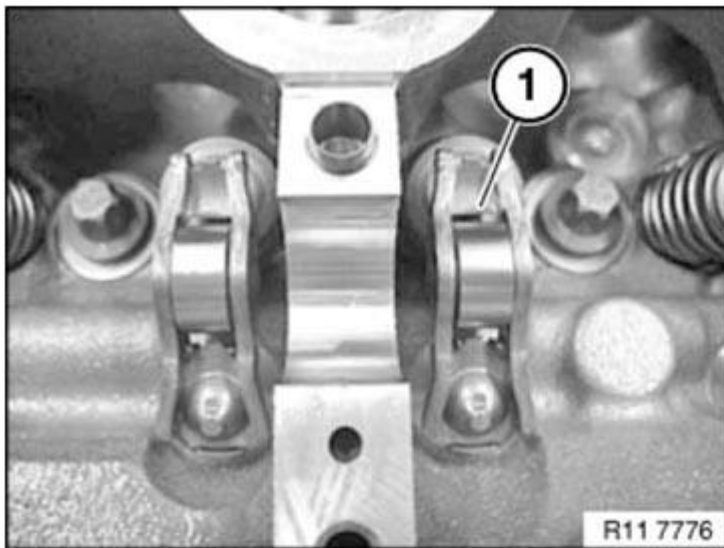


Fig. 238: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1131036 REMOVING AND INSTALLING/REPLACING LEFT EXHAUST CAMSHAFT (N63)

Necessary preliminary work

(cylinder bank 5 to 8)

IMPORTANT: The exhaust camshaft must first be rotated in such a way that the camshaft is

free from tension when the bearing caps are released risk of damage.

- Remove **LEFT CYLINDER HEAD COVER** .
- Check **TIMING** .
- Remove **LEFT INLET ADJUSTMENT UNIT** .

IMPORTANT: No cam on the exhaust camshaft is permitted to press directly onto a roller cam follower.
With cylinder no. 1 at 150° before firing TDC there is no piston in the TDC position.

Rotate exhaust camshaft (2) at dihedron with a fork wrench into a suitable position.

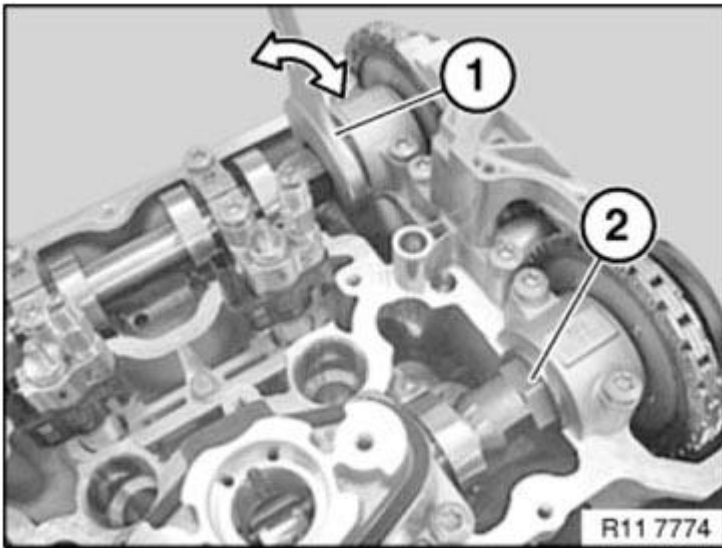


Fig. 239: Rotating Exhaust Camshaft At Dihedron With Fork Wrench Into Suitable Position
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (10 to 1) in 1/2 turns.

Set down all bearing caps in a tidy and orderly fashion on special tool **11 4 480** .

Remove roller tappet from bearing cap (2 and 3) of high pressure pump and set down on special tool **11 4 480** .

Remove left exhaust camshaft and set down on special tool **11 4 480** .

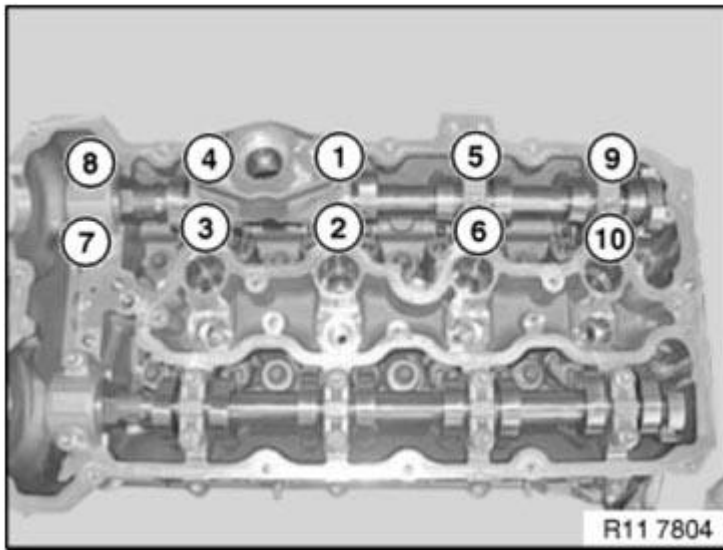


Fig. 240: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after exhaust camshaft has been removed.
Do "not" remove rocker arms (1) on exhaust side.

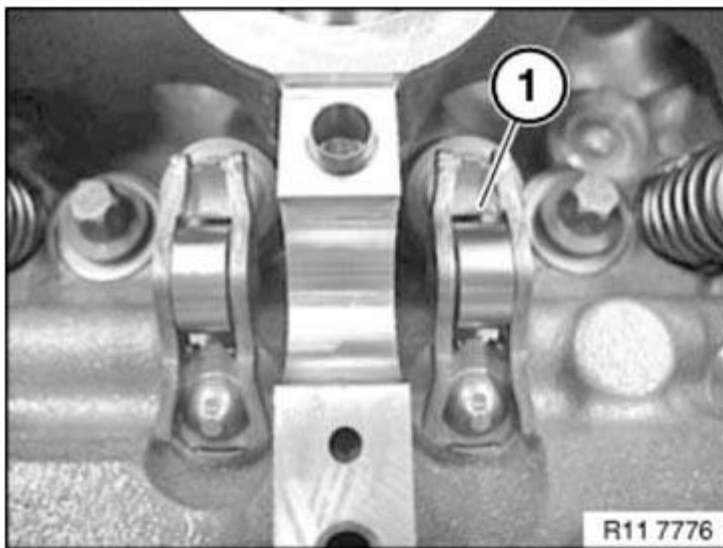


Fig. 241: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

If necessary, replace plain compression rings (1).

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

Carefully pull compression ring (1) apart and remove towards front.

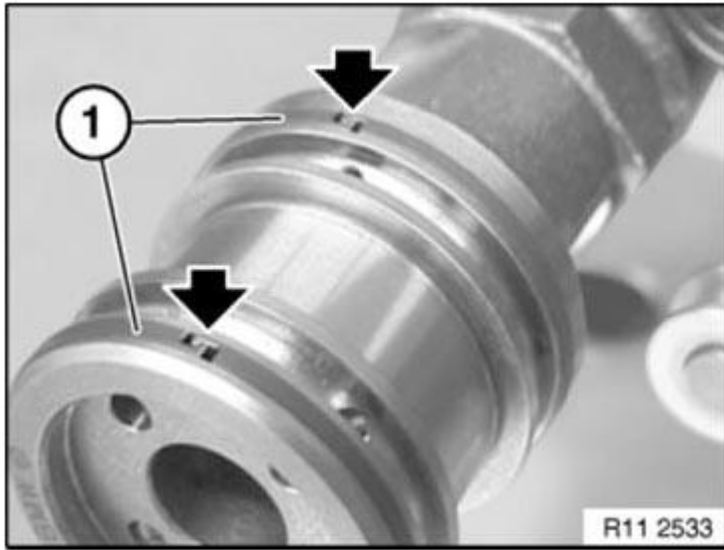


Fig. 242: Locating Compression Ring End
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

Make sure compression rings (1) are engaged at ends.

NOTE: Exhaust camshaft of cylinder bank 5 to 8 is marked with "A 5-8".

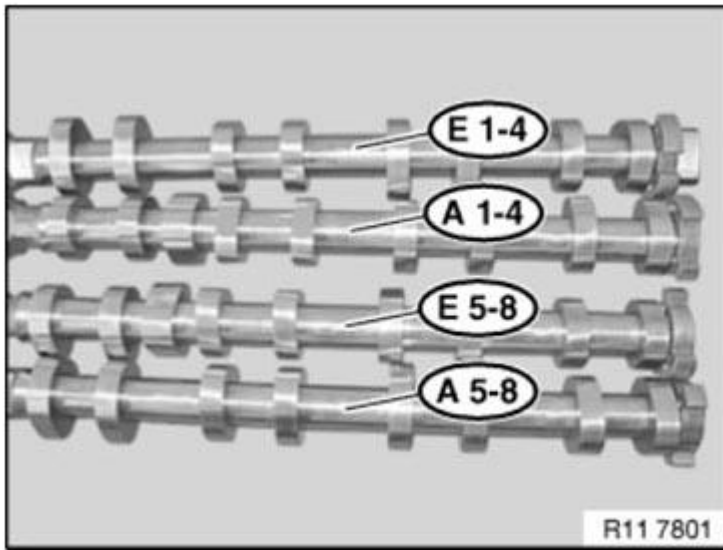


Fig. 243: Identifying Camshaft Of Cylinder Bank Mark
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when exhaust camshaft is fitted.
Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

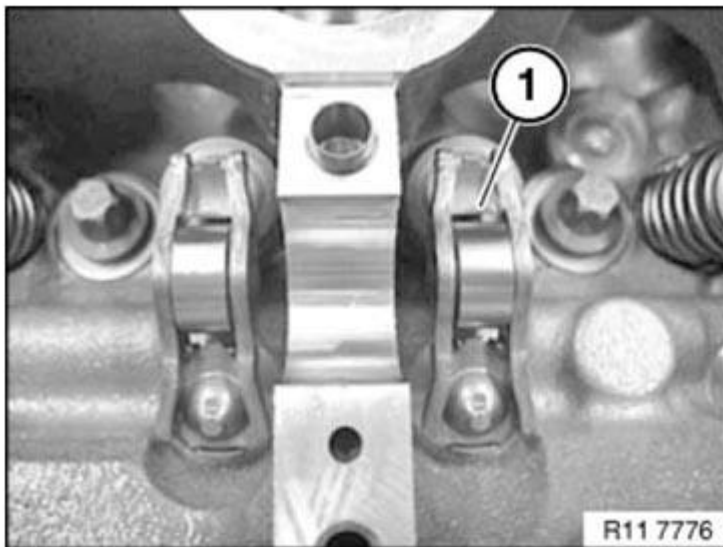


Fig. 244: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil.

Install exhaust camshaft (1).

Insert exhaust camshaft (1) so that cams point to side at cylinder 5 as shown in picture.

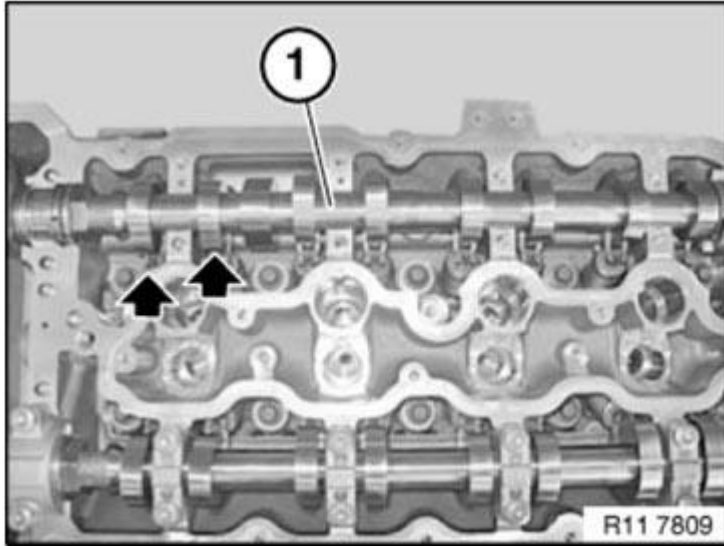


Fig. 245: Identifying Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 4 and 5 to 8.
All bearing caps are coded and can only be installed in one position.

All bearing caps are marked:

L= Cylinders 1 - 4.

R= Cylinders 5 - 8.

E= Intake side

A= Exhaust side

1= designation from 1 to 5

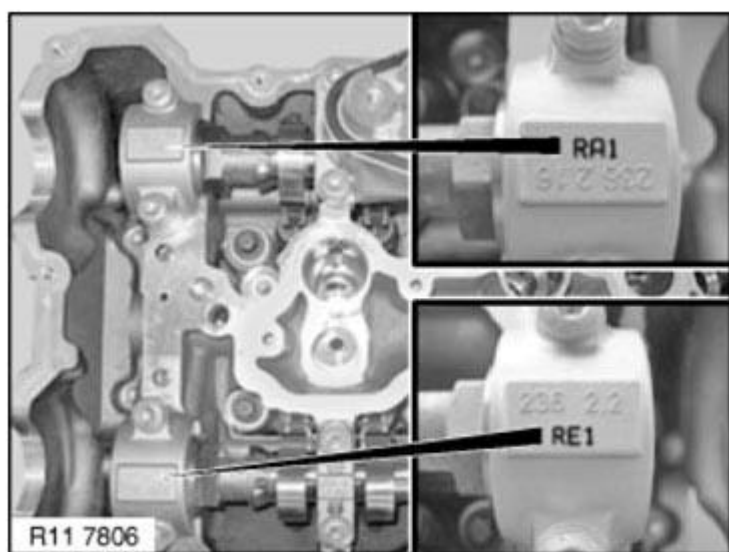


Fig. 246: Identifying Bearing Caps Mark
 Courtesy of BMW OF NORTH AMERICA, INC.

Insert all bolts.

Tighten down bolts in sequence (1 to 10) in 1/2 turns.

Tightening torque: **11 31 6AZ** .

Tightening torque: **11 31 7AZ** .

Insert tappets for high-pressure pump.

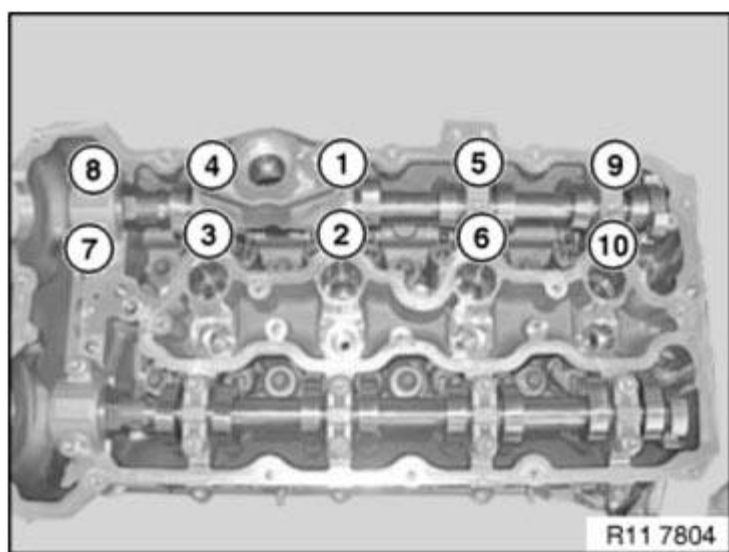


Fig. 247: Identifying Camshaft Bearings Bolts Tightening Sequence

Courtesy of BMW OF NORTH AMERICA, INC.

Install **INLET ADJUSTMENT UNITS** .

Adjust **VALVE TIMING** .

Assemble engine.

1131032 REMOVING AND INSTALLING/REPLACING LEFT INLET CAMSHAFT (N63)

Necessary preliminary work

(cylinder bank 5 to 8)

IMPORTANT: The intake camshaft must first be rotated in such a way that the camshaft is free from tension when the bearing caps are released (risk of damage).

- Remove **LEFT CYLINDER HEAD COVER** .
- Check **TIMING** .
- Remove **LEFT INLET ADJUSTMENT UNIT** .

IMPORTANT: No cam on the inlet camshaft is permitted to press directly onto a roller cam follower.
With cylinder no. 1 at 150° before firing TDC there is no piston in the TDC position.

Rotate left inlet camshaft at dihedron with a fork wrench (1) into a suitable position.

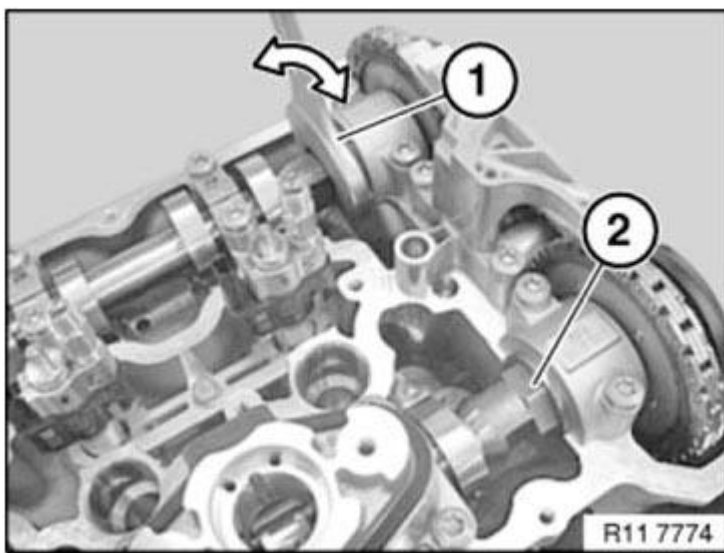


Fig. 248: Rotating Left Inlet Camshaft At Dihedron With Fork Wrench

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (10 to 1) in 1/2 turns.

Set down all bearing caps in a tidy and orderly fashion on special tool **11 4 480** .

Intake camshaft

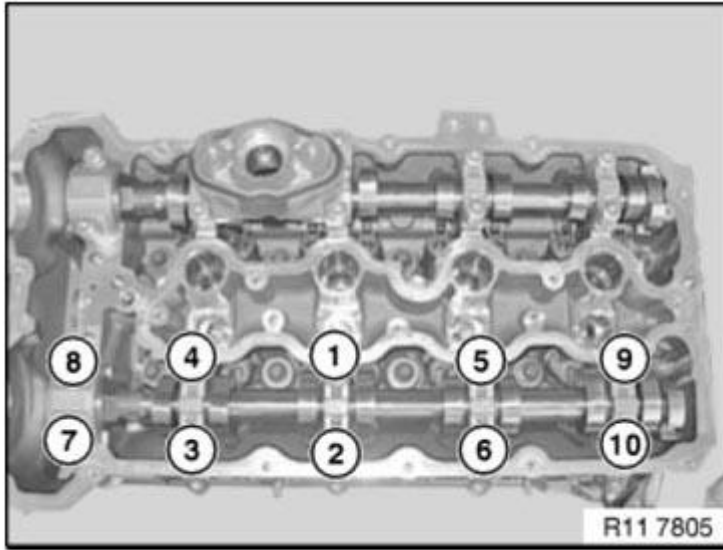


Fig. 249: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after inlet camshaft has been removed.
Do "not" remove rocker arm (1) on intake side.

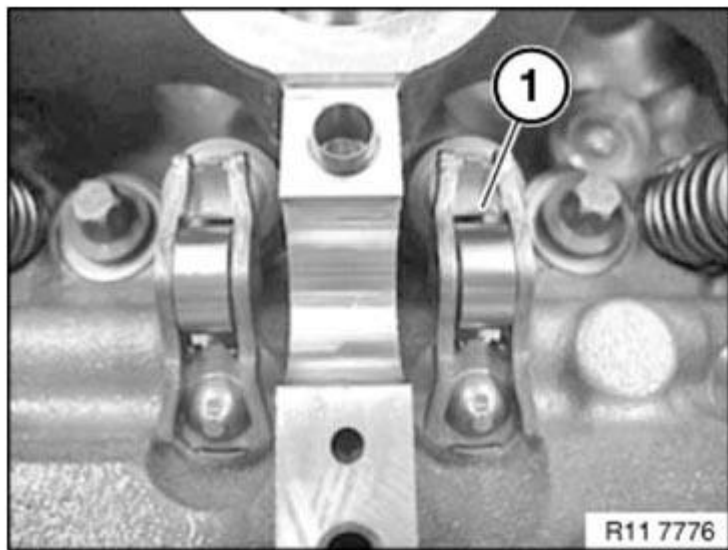


Fig. 250: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

If necessary, replace plain compression rings (1).

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

Carefully pull compression ring (1) apart and remove towards front.

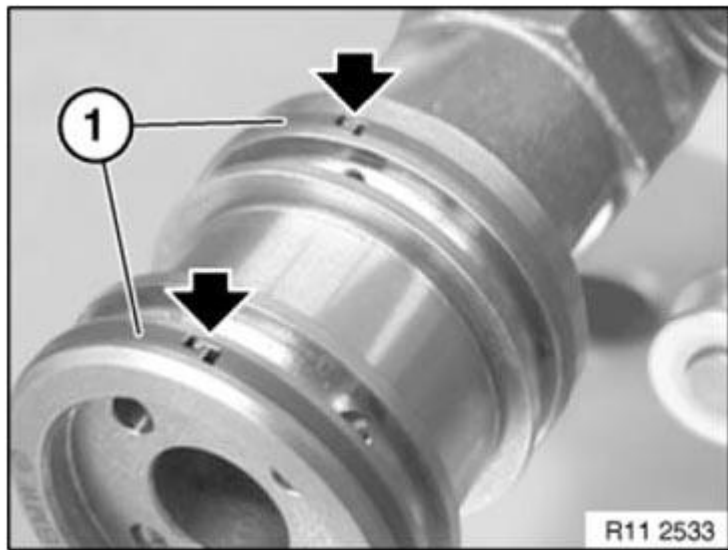


Fig. 251: Locating Compression Ring End

Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

Make sure compression rings (1) are engaged at ends.

NOTE: The intake camshaft of cylinder bank 5 to 8 is marked with "E 5-8".

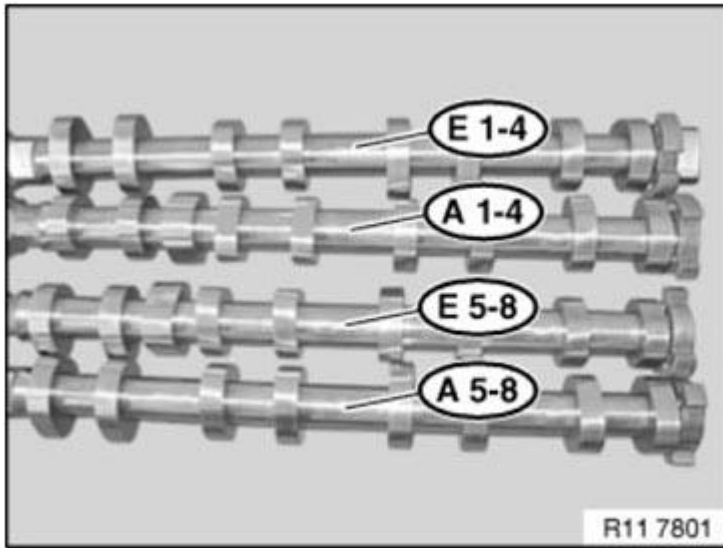


Fig. 252: Identifying Camshaft Of Cylinder Bank Mark
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when inlet camshaft is fitted.
Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

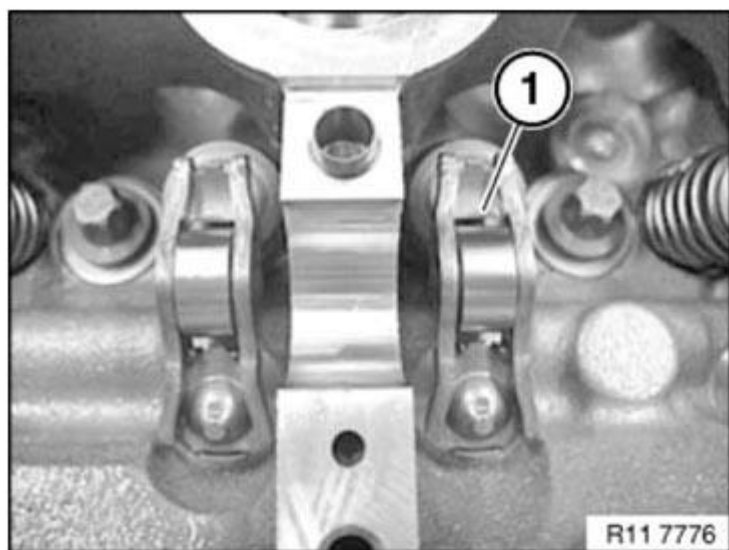


Fig. 253: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil.

Insert intake camshaft.

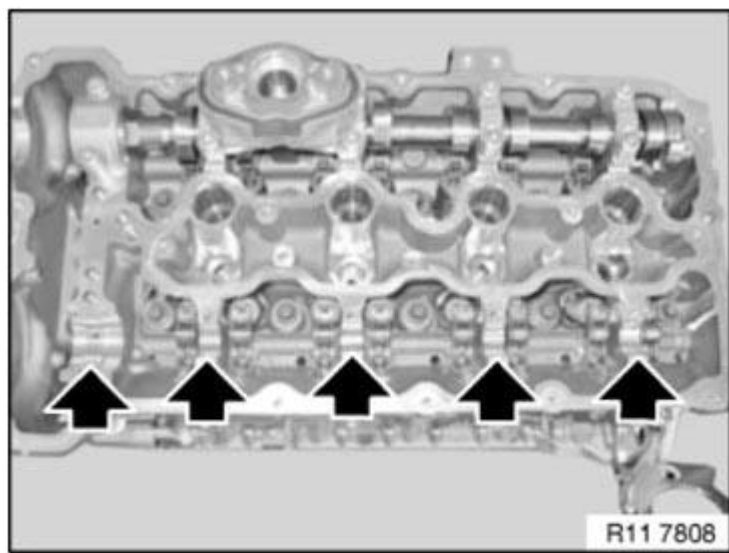


Fig. 254: Locating Bearing Positions

Courtesy of BMW OF NORTH AMERICA, INC.

Insert inlet camshaft (1) so that cams point to side at cylinder 5 as shown in picture.

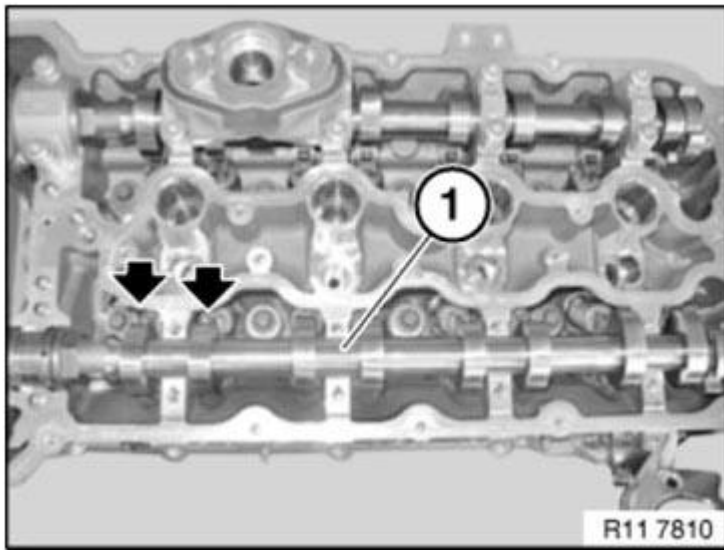


Fig. 255: Positioning Inlet Camshaft So That Cams Point To Side At Cylinder 5
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 4 and 5 to 8.

All bearing caps are coded and can only be installed in one position.

All bearing caps are marked:

L= Cylinders 1 - 4.

R= Cylinders 5 - 8.

E= Intake side

A= Exhaust side

1= designation from 1 to 5

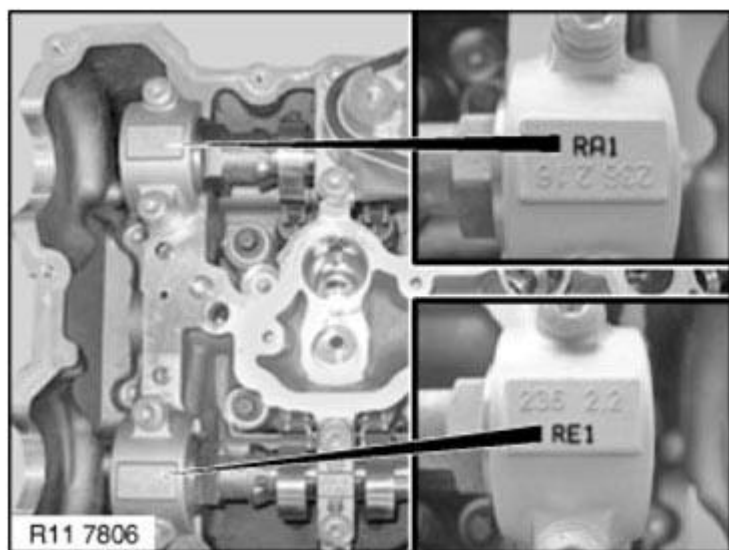


Fig. 256: Identifying Bearing Caps Mark
 Courtesy of BMW OF NORTH AMERICA, INC.

Insert all bolts.

Tighten down bolts in sequence (1 to 10) in 1/2 turns.

Tightening torque: **11 31 6AZ** .

Tightening torque: **11 31 7AZ** .

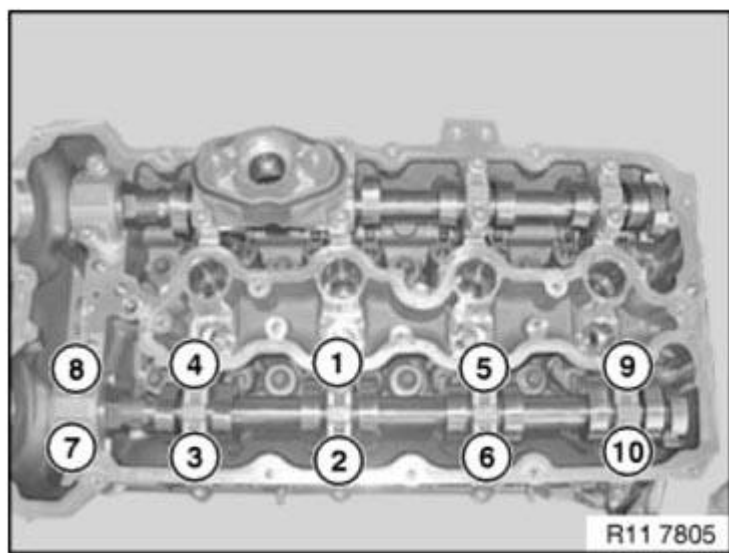


Fig. 257: Identifying Camshaft Bearings Bolts Tightening Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Install **INLET ADJUSTMENT UNITS** .

Adjust **VALVE TIMING** .

Assemble engine.

1131034 REMOVING AND INSTALLING/REPLACING RIGHT INLET CAMSHAFT (N63)

Necessary preliminary work

(cylinder bank 1 to 4)

IMPORTANT: The intake camshaft must first be rotated in such a way that the camshaft is free from tension when the bearing caps are released (risk of damage).

- Remove right **CYLINDER HEAD COVER** .
- Check **TIMING** .
- Remove **RIGHT INLET ADJUSTMENT UNIT** .

IMPORTANT: No cam on the inlet camshaft is permitted to press directly onto a roller cam follower.
With cylinder no. 1 at 150° before firing TDC there is no piston in the TDC position.

Rotate right inlet camshaft (2) at dihedron with a fork wrench (1) into a suitable position.

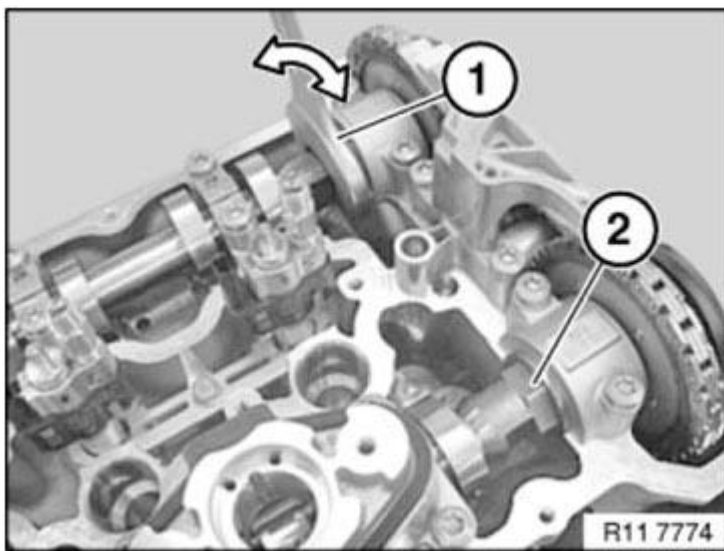


Fig. 258: Rotating Exhaust Camshaft At Dihedron With Fork Wrench Into Suitable Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration shows cyl. 5 to 8.

Release bolts of camshaft bearings in sequence (10 to 1) in 1/2 turns.

Set down all bearing caps in a tidy and orderly fashion on special tool **11 4 480** .

Intake camshaft

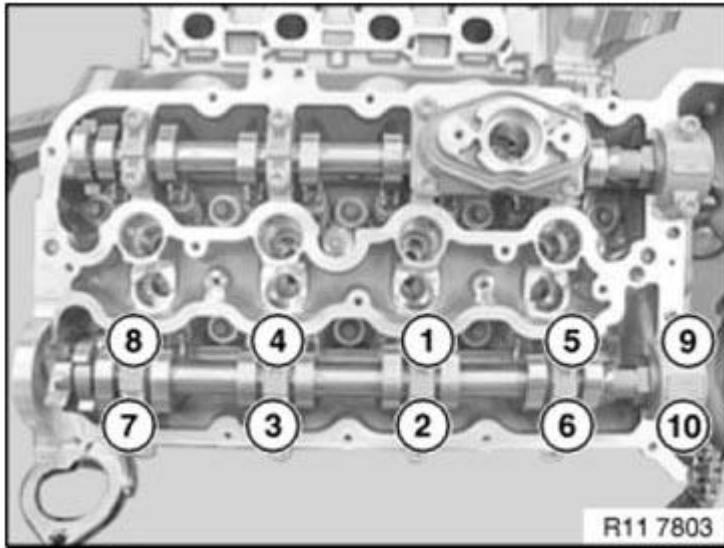


Fig. 259: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after inlet camshaft has been removed.
Do "not" remove rocker arm (1) on intake side.

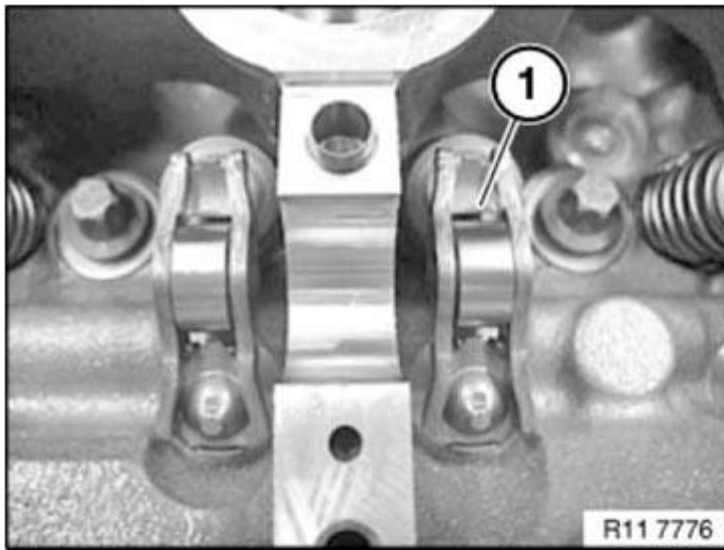


Fig. 260: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

If necessary, replace plain compression rings (1).

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

Carefully pull compression ring (1) apart and remove towards front.

Ends of compression rings (1) point upwards.

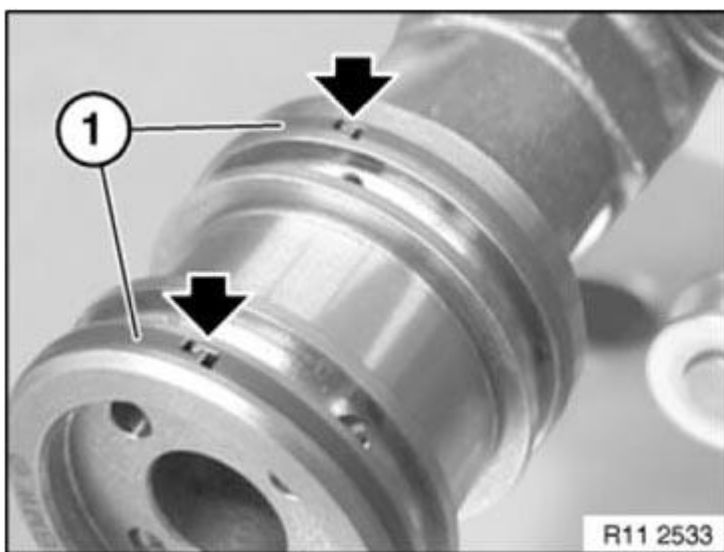


Fig. 261: Locating Compression Ring End

Courtesy of BMW OF NORTH AMERICA, INC.

Make sure compression rings (1) are engaged at ends.

NOTE: The intake camshaft of cylinder bank 5 to 8 is marked with "E 5-8".

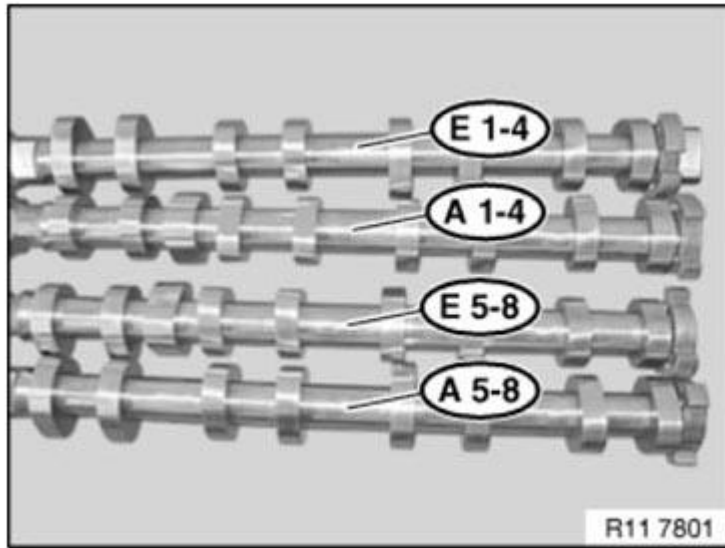


Fig. 262: Identifying Camshaft Of Cylinder Bank Mark
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when inlet camshaft is fitted.
Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

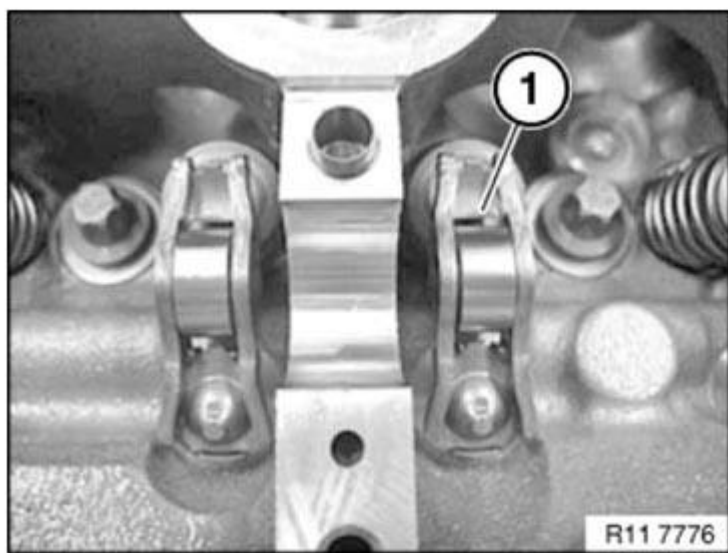


Fig. 263: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil.

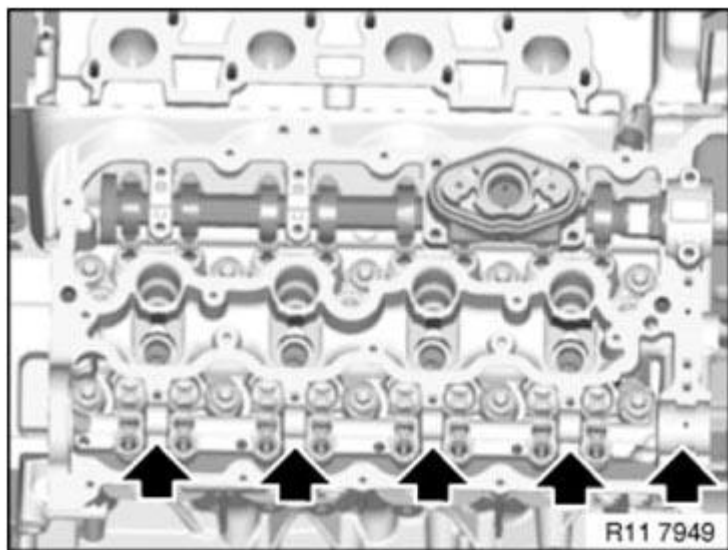


Fig. 264: Locating Bearing Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Insert intake camshaft.

Insert inlet camshaft (1) so that cams point to side at cylinder 1 as shown in picture.

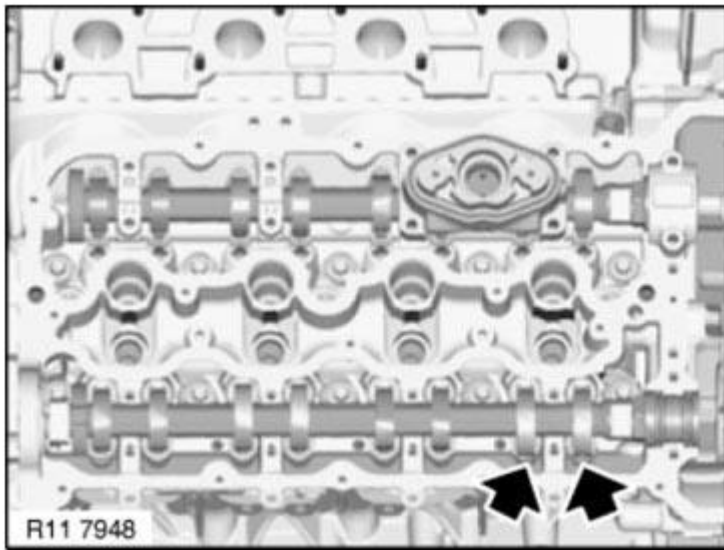


Fig. 265: Positioning Inlet Camshaft So That Cams Point To Side At Cylinder 1
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 4 and 5 to 8.
All bearing caps are coded and can only be installed in one position.

All bearing caps are marked with letters and numbers:

L= Cylinder bank 1-4.

R= Cylinder bank 5-8.

E= Intake side

A= Exhaust side

1= designation, bearing point, from 1 to 5

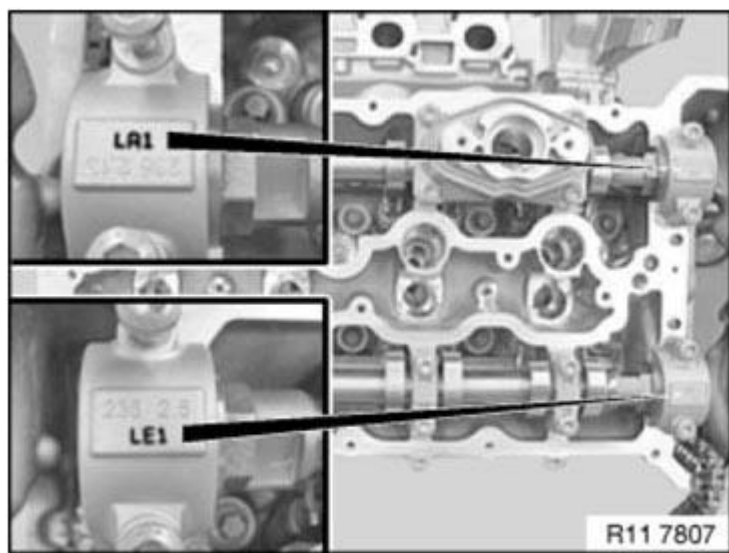


Fig. 266: Identifying Bearing Caps Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all bolts.

Tighten down bolts in sequence (1 to 10) in 1/2 turns.

Tightening torque: **11 31 6 AZ** .

Tightening torque: **11 31 7 AZ** .

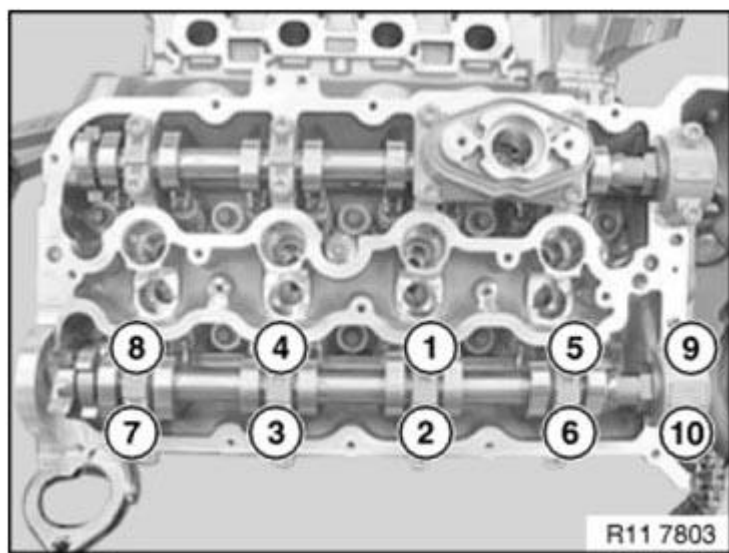


Fig. 267: Identifying Camshaft Bearings Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INLET ADJUSTMENT UNITS** .

Adjust **VALVE TIMING** .

Assemble engine.

1131094 REMOVING HYDRAULIC CHAIN TENSIONER FOR TIMING CHAINS ON LEFT SIDE (N63)

Notes

WARNING: Chain tensioner is pre-tensioned.
Release lock pin only in installed state.
Danger of injury!

IMPORTANT: Risk of damage!
The engine must not be cranked when the chain tensioner is removed.
The timing chain may jump.

Necessary preliminary work

- Remove **TIMING CASE COVER** at top left

Crank engine back at central bolt (1) against direction of engine rotation by approx. 90°.

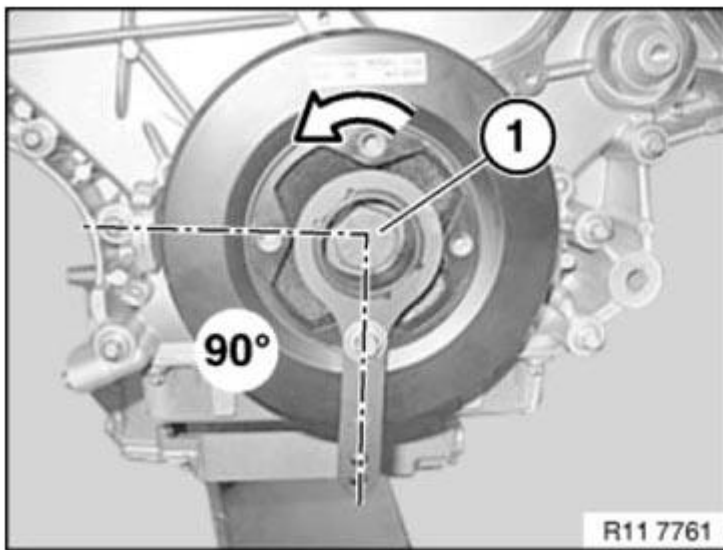


Fig. 268: Cranking Engine Back At Central Bolt Against Direction Of Engine Rotation By Approx. 90°
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The timing chain on the chain tensioner becomes the tight end on cranking back.

Do not crank engine without chain tensioner or special tool 11 9 900 .

Piston (1) of chain tensioner must be pressed in against oil pressure in housing (see arrow).

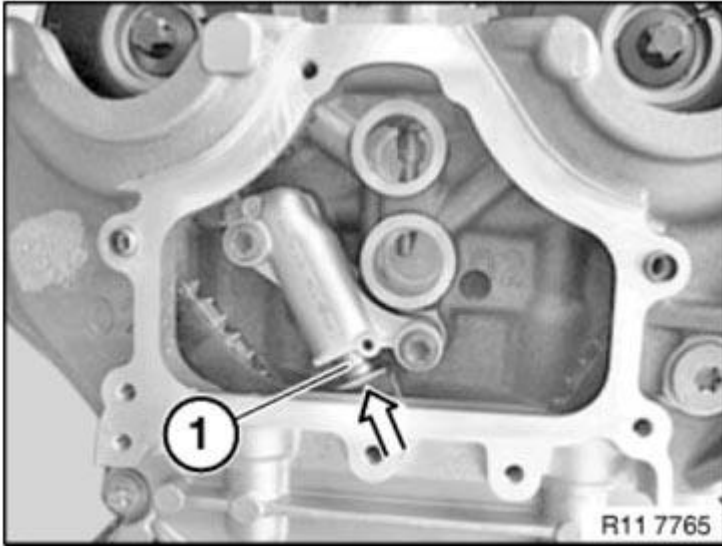


Fig. 269: Identifying Piston Of Chain Tensioner Pressed In Against Oil Pressure In Housing
Courtesy of BMW OF NORTH AMERICA, INC.

If the chain tensioner piston is retracted over its full length, a 3.5 mm drill bit or a suitable lock pin must be positioned.

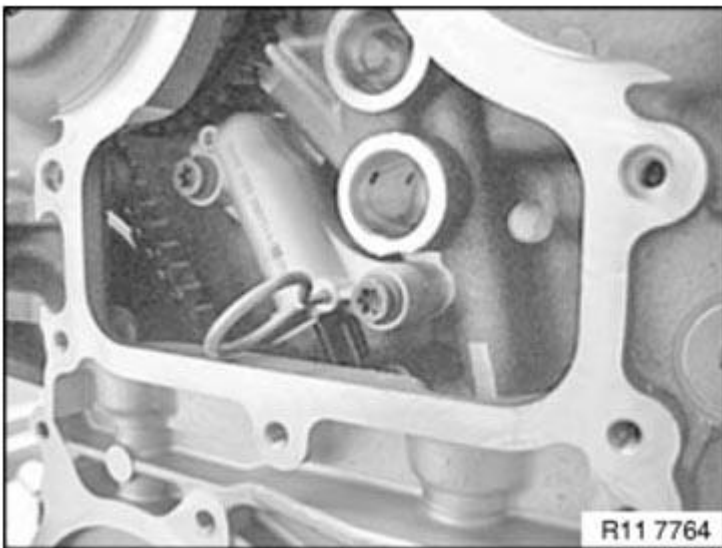


Fig. 270: Identifying Chain Tensioner Piston Retracted Over Its Full Length
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 31 5AZ** .

Remove chain tensioner (2).

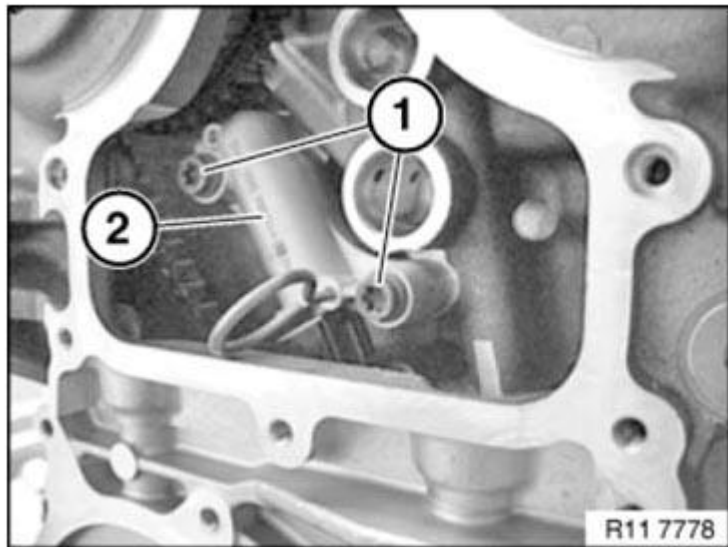


Fig. 271: Identifying Chain Tensioner And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of injury!
Chain tensioner is under high preload force.

Chain tensioner arrangement:

- Piston
- Expansion element
- Compression spring
- Housing

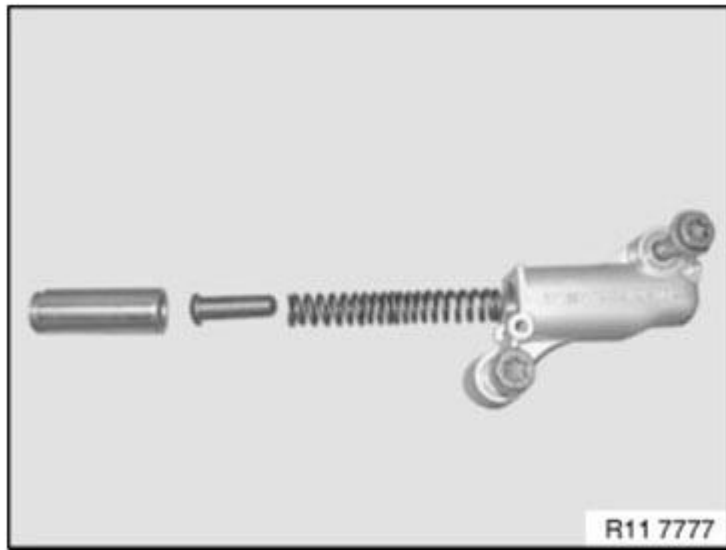


Fig. 272: Identifying Chain Tensioner Arrangement
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace all gaskets and sealing rings

Assemble engine.

1131095 REMOVING HYDRAULIC CHAIN TENSIONER FOR TIMING CHAINS ON RIGHT SIDE (N63)

Notes

WARNING: Chain tensioner is pre-tensioned.
Release lock pin only in installed state.
Danger of injury!

IMPORTANT: Risk of damage!
The engine must not be cranked when the chain tensioner is removed.
The timing chain may jump.

Necessary preliminary work

- Remove **TIMING CASE COVER** at top right

Crank engine back at central bolt (1) against direction of engine rotation by approx. 180°.

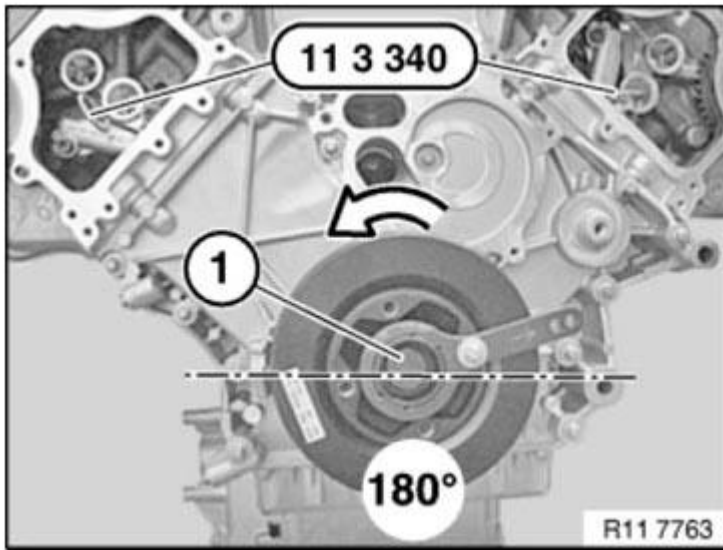


Fig. 273: Cranking Engine Back At Central Bolt Against Direction Of Engine Rotation By Approx. 180°
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The timing chain on the chain tensioner becomes the tight end on cranking back.

Do not crank engine without chain tensioner or special tool 11 9 900 .

Piston (1) of chain tensioner must be pressed in against oil pressure in housing (see arrow).

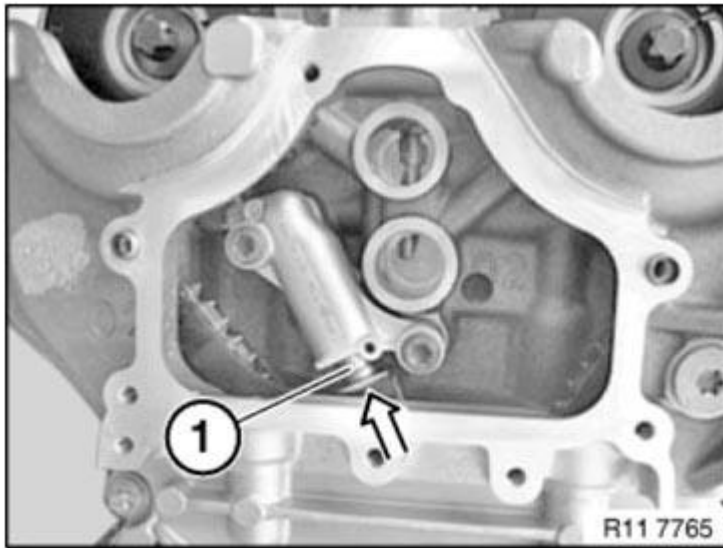


Fig. 274: Identifying Piston Of Chain Tensioner Pressed In Against Oil Pressure In Housing
 Courtesy of BMW OF NORTH AMERICA, INC.

If the chain tensioner piston is retracted over its full length, a 3.5 mm drill bit or a suitable lock pin must be positioned.

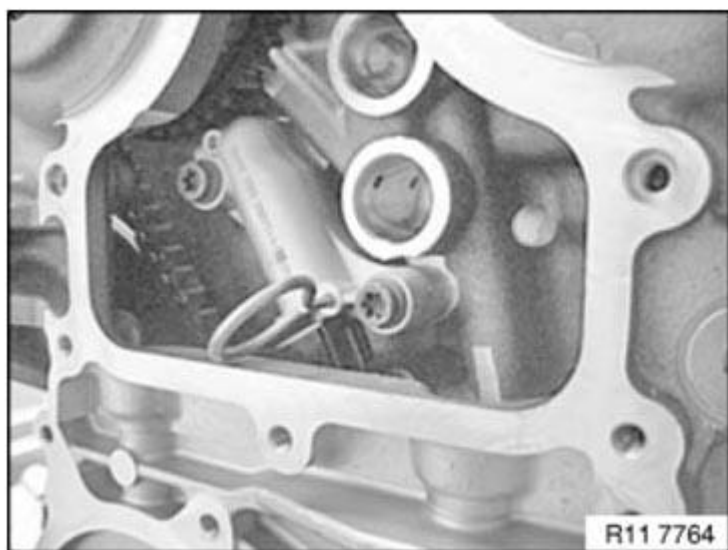


Fig. 275: Identifying Chain Tensioner Piston Retracted Over Its Full Length
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 31 5AZ** .

Remove chain tensioner (2).

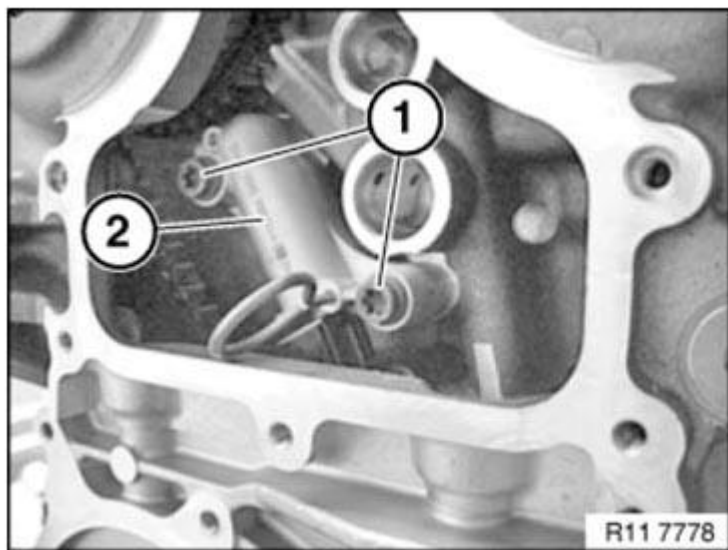


Fig. 276: Identifying Chain Tensioner And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of injury!
Chain tensioner is under high preload force.

Chain tensioner arrangement:

- Piston
- Expansion element
- Compression spring
- Housing

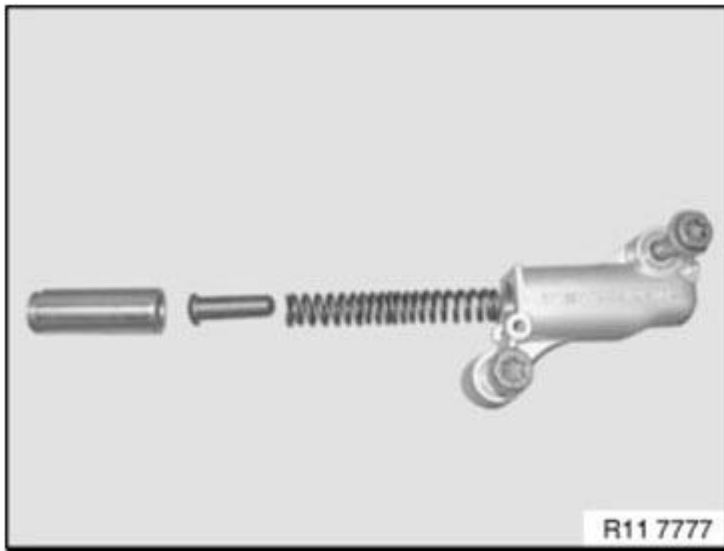


Fig. 277: Identifying Chain Tensioner Arrangement
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace all gaskets and sealing rings

Assemble engine.

1131052 REPLACING BOTH TIMING CHAINS (N63)

Notes

WARNING: Burning hazard! Wear gloves.

Necessary preliminary work

- Remove lower **TIMING CASE COVER**
- To facilitate removal and installation of timing chains, turn engine over with special tool **00 2 300**.

Timing drive, cylinders 1 to 4

Remove guide rail (5) from bearing bolt.

Remove timing chain (3) with tensioning rail (4) from bearing bolt.

Timing drive, cylinders 5 to 8

Remove guide rail (1) from bearing bolt.

Remove timing chain (2) with tensioning rail (6) from bearing bolt.

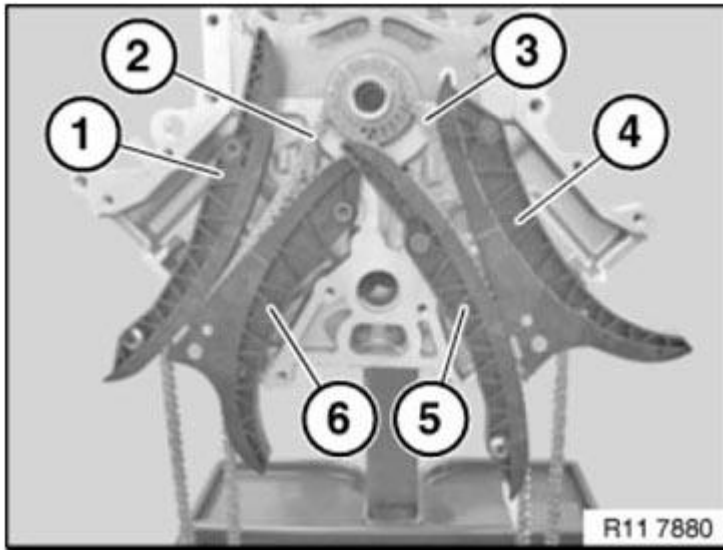


Fig. 278: Identifying Guide Rail, Timing Chain And Tensioning Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Timing drive, cylinders 1 to 4

Release bearing bolts (2) with a suitable tool.

Tightening torque: **11 31 1AZ** .

Timing drive, cylinders 5 to 8

Release bearing bolts (1).

Tightening torque: **11 31 2AZ** .

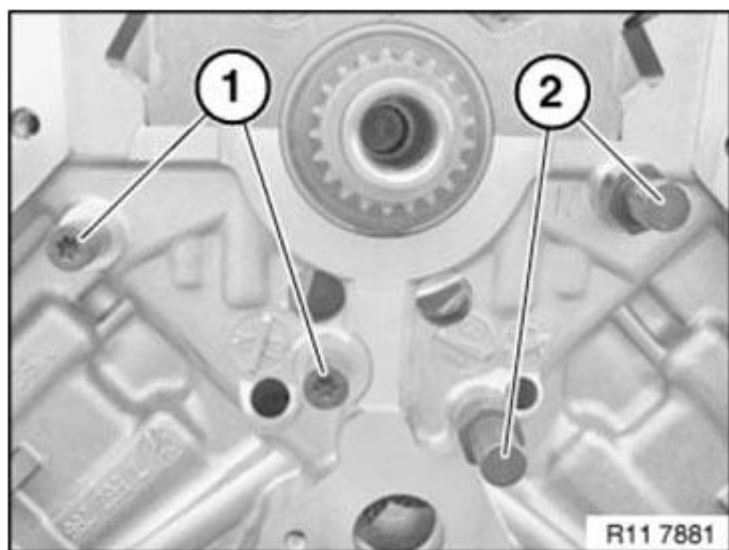


Fig. 279: Identifying Bearing Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tools 11 2 001 and 11 2 002 to the crankshaft.

Insert special tool 11 2 007 and remove sprocket wheel with special tool 11 2 003.

Installation note:

Check sprocket wheels for wear, replace if necessary.

Heat sprocket wheel to **60°C**.

WARNING: Burning hazard! Wear gloves.

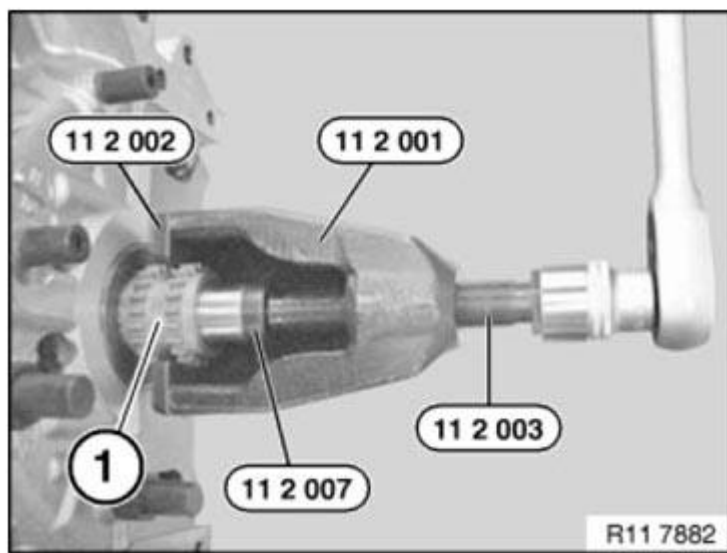


Fig. 280: Removing Sprocket Wheel With Special Tool 11 2 003
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure Woodruff key (1) is installed in correct position in crankshaft (2).

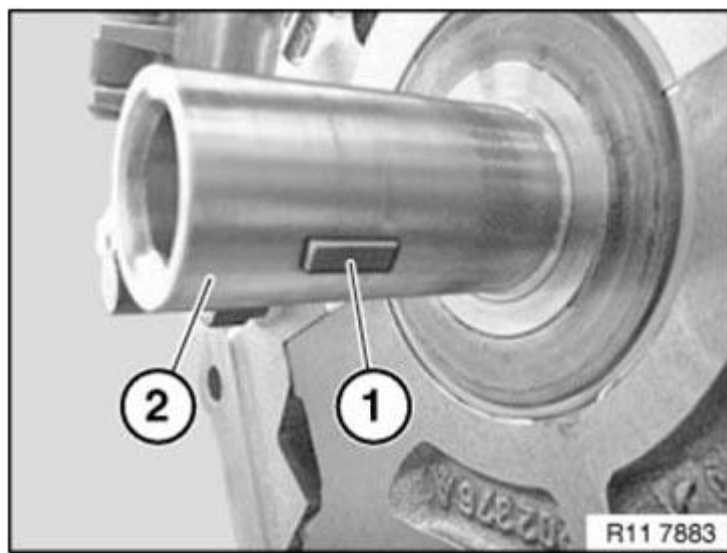


Fig. 281: Identifying Woodruff Key Installed In Correct Position In Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Maintain tension of timing chains when installing timing case cover.

Observe sparking protection on timing case cover.

Make sure timing chain (1) is correctly installed when placing it in guide rail (3).

Assemble engine.

1133 ROCKER ARM WITH BEARING MOUNT

1133054 REMOVING AND INSTALLING/RENEWING ROCKER ARMS ON RIGHT SIDE (N63)

Necessary preliminary work

(cylinder bank 1 to 4)

- Remove INLET AND EXHAUST ADJUSTMENT UNIT on right side.
- Remove right INLET CAMSHAFT .
- Remove right EXHAUST CAMSHAFT .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.
Tolerance classes are not required.

Remove rocker arm (1) and set down in neat order in special tool 11 4 480 .

Install rocker arm (1).

Align all rocker arms (1) straight.

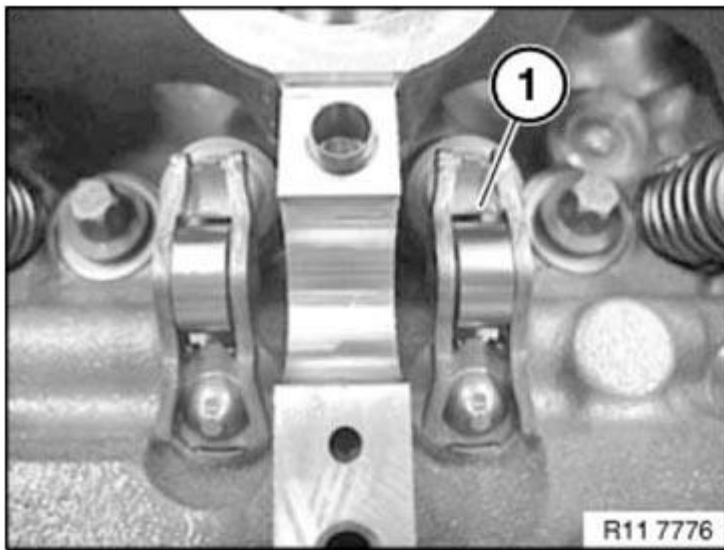


Fig. 282: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1133052 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS ON LEFT SIDE (N63)

Necessary preliminary work

(cylinder bank 5 to 8)

- Remove LEFT INLET CAMSHAFT .
- Remove left EXHAUST CAMSHAFT .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.
Tolerance classes are not required.

Remove rocker arm (1) and set down in neat order in special tool 11 4 480 .

Install rocker arm (1).

Align all rocker arms (1) straight.

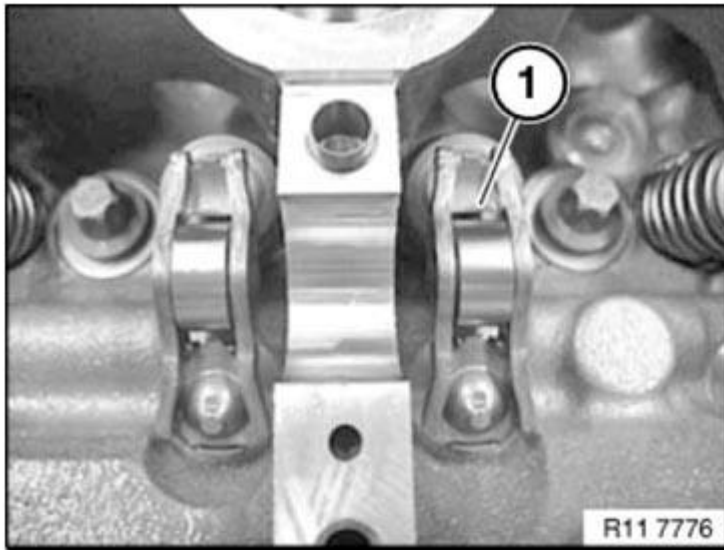


Fig. 283: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1134 VALVES WITH SPRINGS

1134552 REMOVING AND INSTALLING/REPLACING ALL VALVES (N63)

Necessary preliminary work

- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Remove camshafts. See **LEFT INLET CAMSHAFT**; **RIGHT INLET CAMSHAFT**; **LEFT EXHAUST CAMSHAFT**; and **RIGHT EXHAUST CAMSHAFT**.

Mount cylinder head (1) on special tool **11 9 000** .

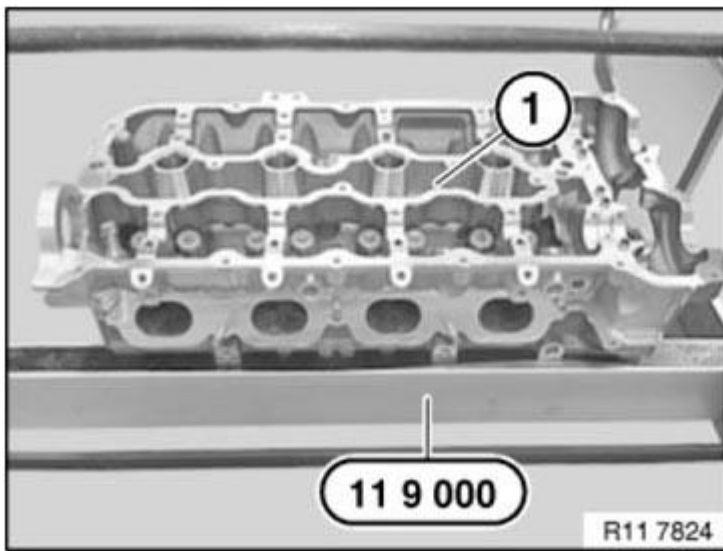


Fig. 284: Mounting Cylinder Head On Special Tool 11 9 000
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 9 008 on special tool 11 9 006.

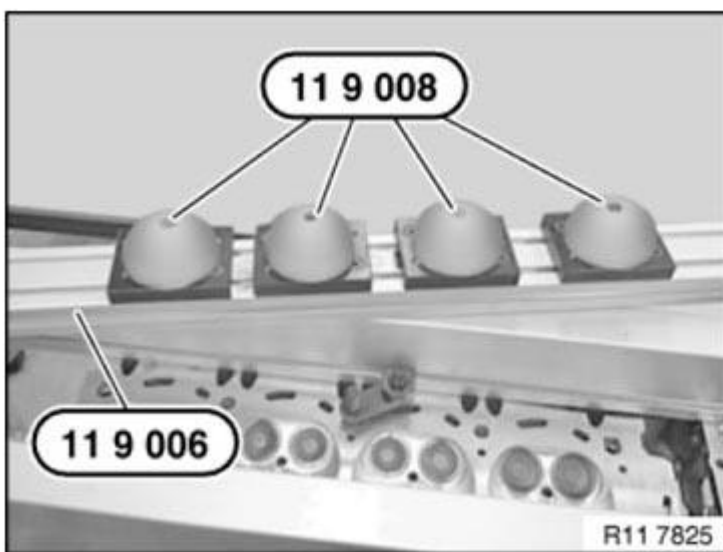


Fig. 285: Preparing Special Tool 11 9 008 On Special Tool 11 9 006

Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 006 with silicone cushion on cylinder head.

Slide locks (1) in direction of arrow and pretension with eccentric shaft.

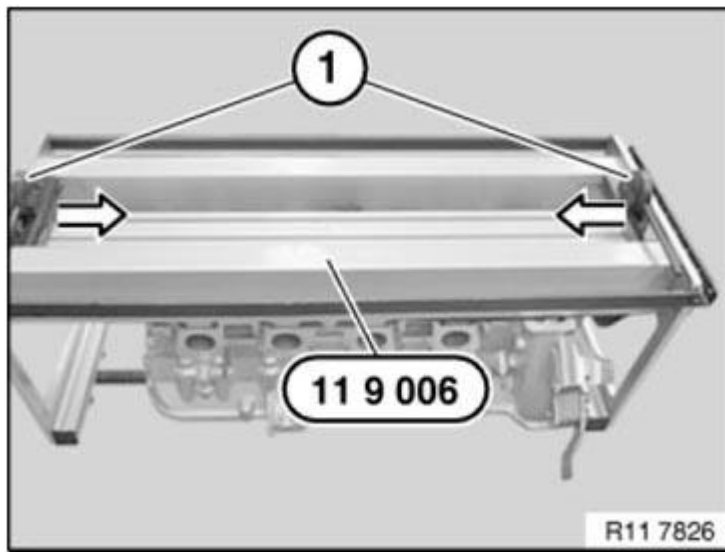


Fig. 286: Sliding Locks In Direction Of Arrow And Pretension With Eccentric Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring with special tool 11 8 840 .

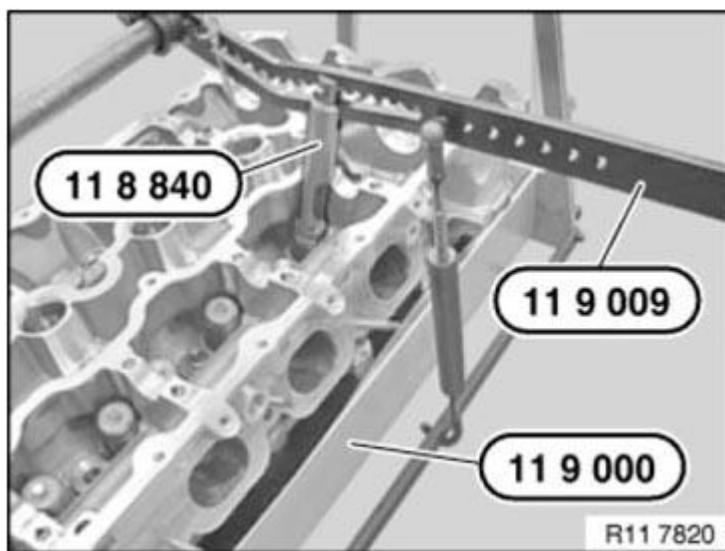


Fig. 287: Pressing Down Valve Spring With Special Tool 11 8 840
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters (1) with a magnet.

Place valve springs and valve keys on special tool 11 4 480 in an orderly manner.

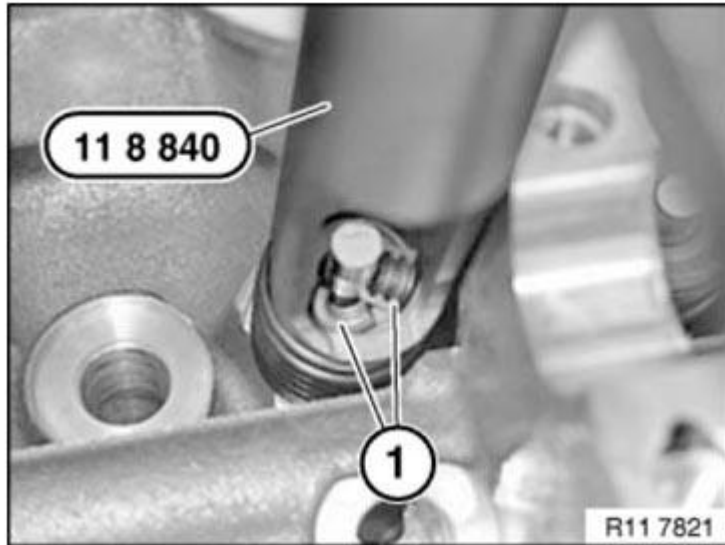


Fig. 288: Identifying Valve Cotters

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect assembly possible.

Incorrect assembly will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

Only the diameter is decisive for the correct installation of the valve springs.

Install valve spring so that larger diameter points to spring plate at bottom.

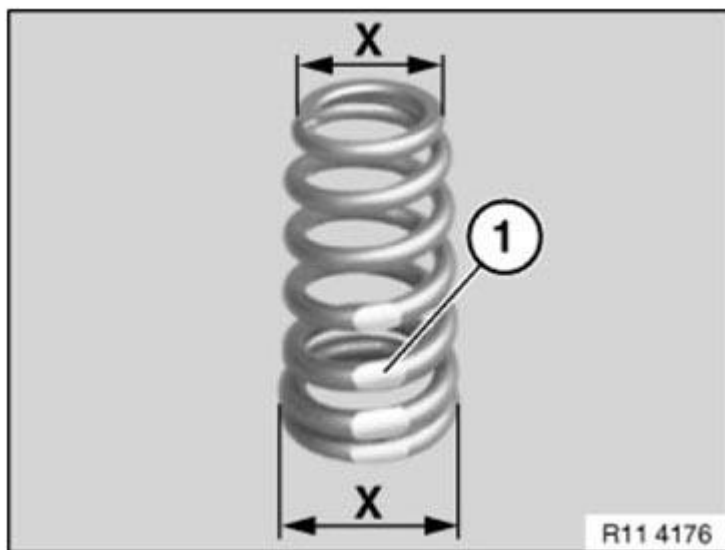


Fig. 289: Dimensions Of Valve Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

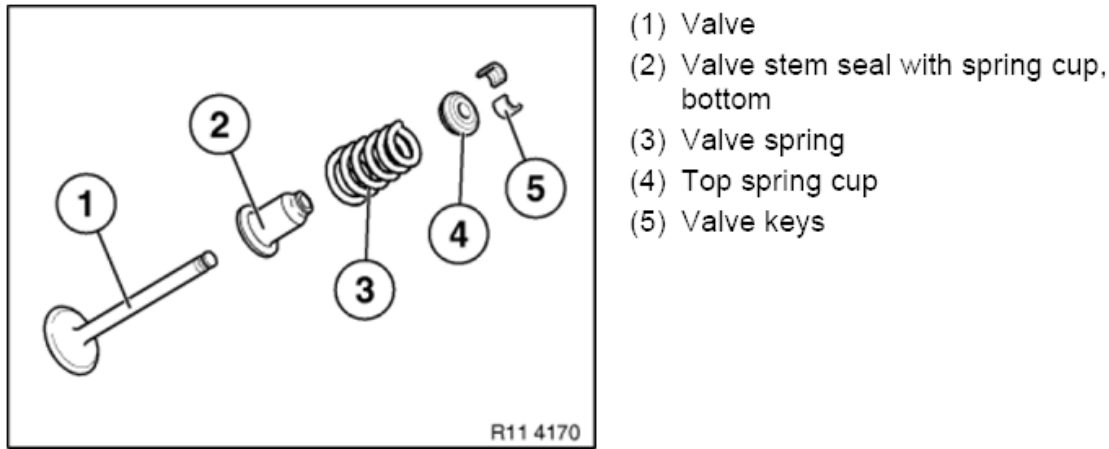


Fig. 290: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Release special tool 11 9 006 from cylinder head.

Remove all valves and place on special tool **11 4 480** in an orderly manner.

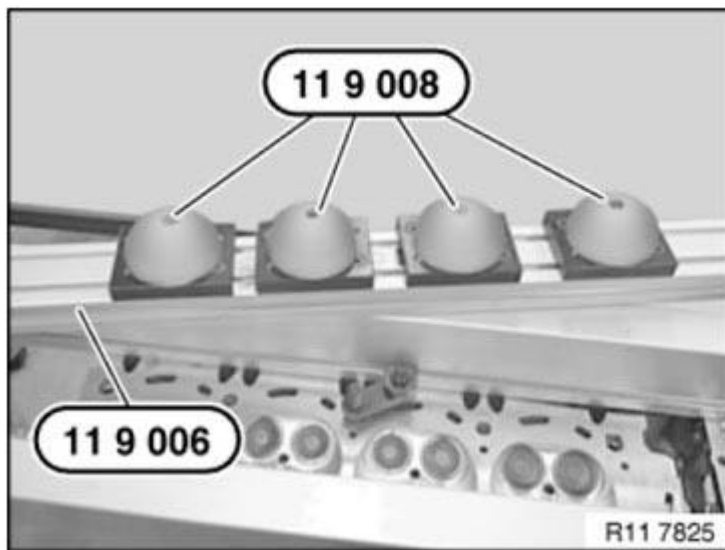


Fig. 291: Preparing Special Tool 11 9 008 On Special Tool 11 9 006
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1134715 REPLACING ALL VALVE SPRINGS (N63)

Necessary preliminary work

- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Remove camshafts. See **LEFT INLET CAMSHAFT**; **RIGHT INLET CAMSHAFT**; **LEFT EXHAUST CAMSHAFT**; and **RIGHT EXHAUST CAMSHAFT**.

Mount cylinder head (1) on special tool **11 9 000** .

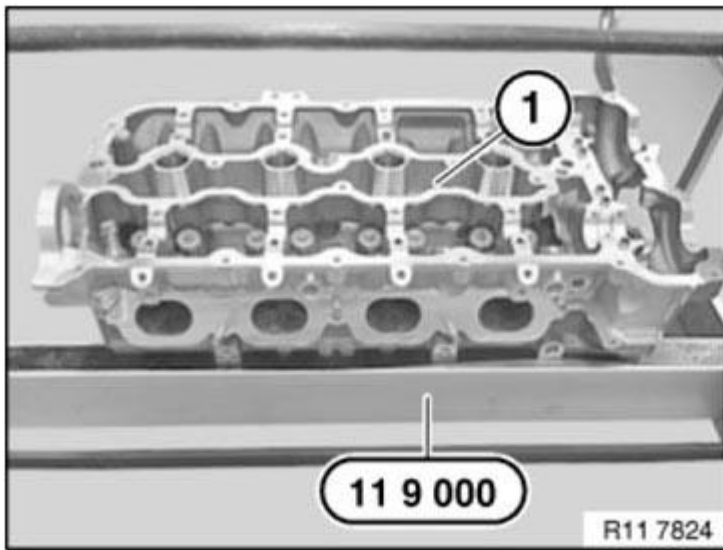


Fig. 292: Mounting Cylinder Head On Special Tool 11 9 000
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 9 008 on special tool 11 9 006.

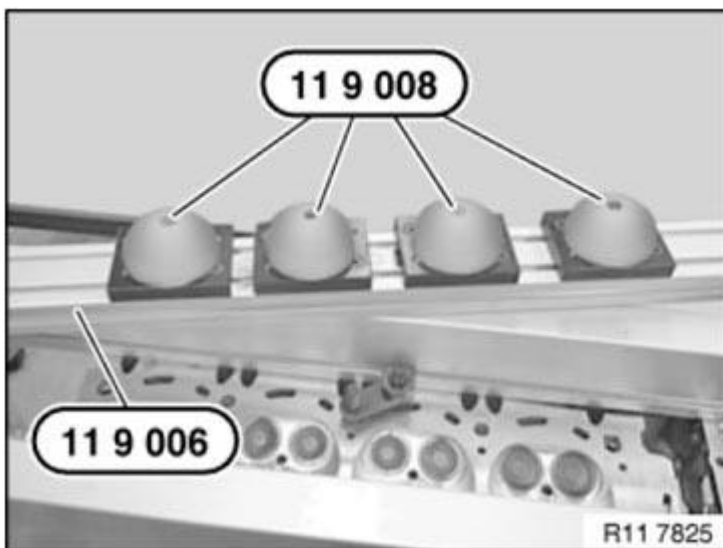


Fig. 293: Preparing Special Tool 11 9 008 On Special Tool 11 9 006
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 006 with silicone cushion on cylinder head.

Slide locks (1) in direction of arrow and pretension with eccentric shaft.

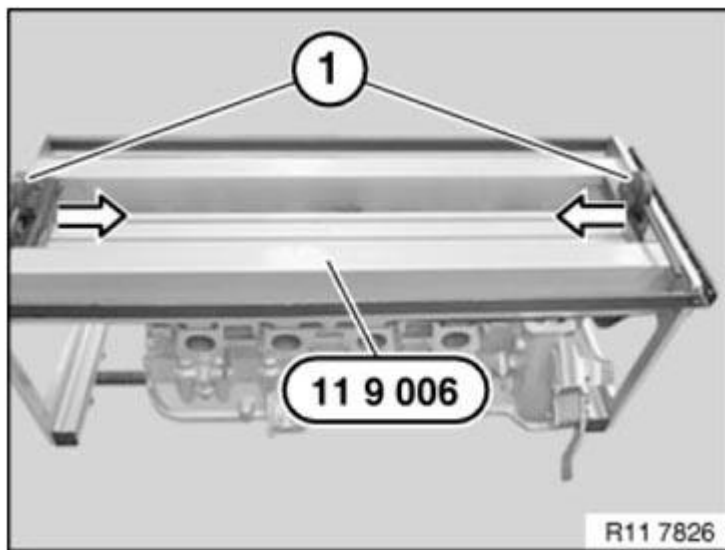


Fig. 294: Sliding Locks In Direction Of Arrow And Pretension With Eccentric Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring with special tool 11 8 840 .

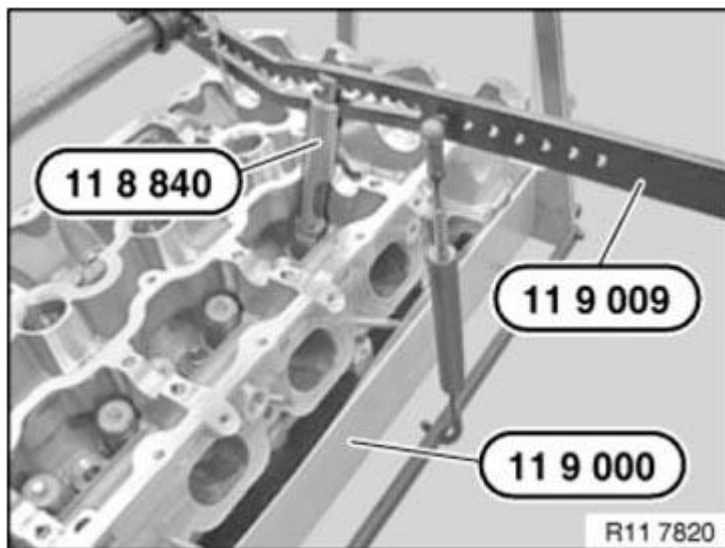


Fig. 295: Pressing Down Valve Spring With Special Tool 11 8 840
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters (1) with a magnet.

Place valve springs and valve keys on special tool 11 4 480 in an orderly manner.

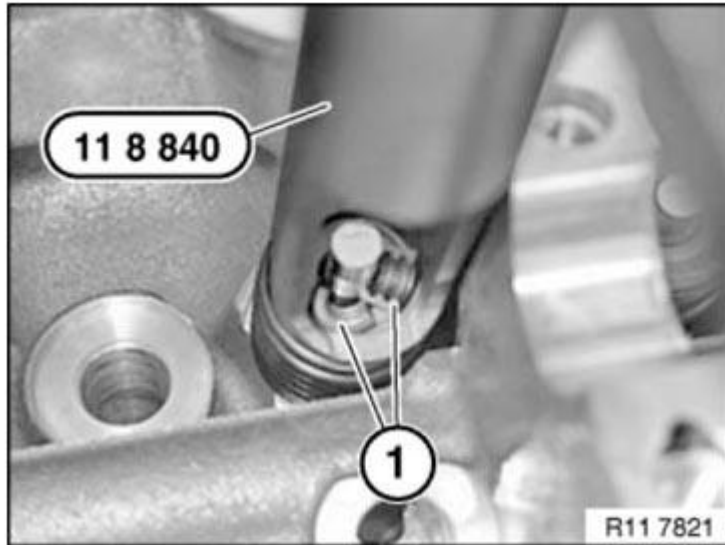


Fig. 296: Identifying Valve Cotters

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect assembly possible.

Incorrect assembly will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

Only the diameter is decisive for the correct installation of the valve springs.

Install valve spring so that larger diameter points to spring plate at bottom.

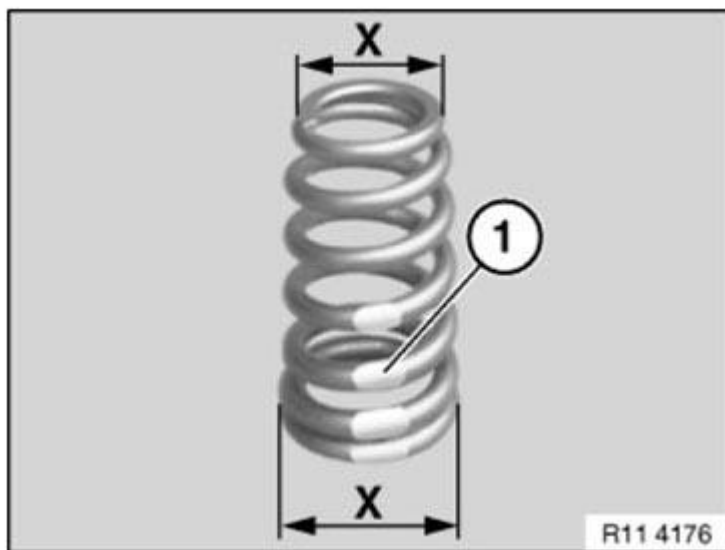


Fig. 297: Dimensions Of Valve Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

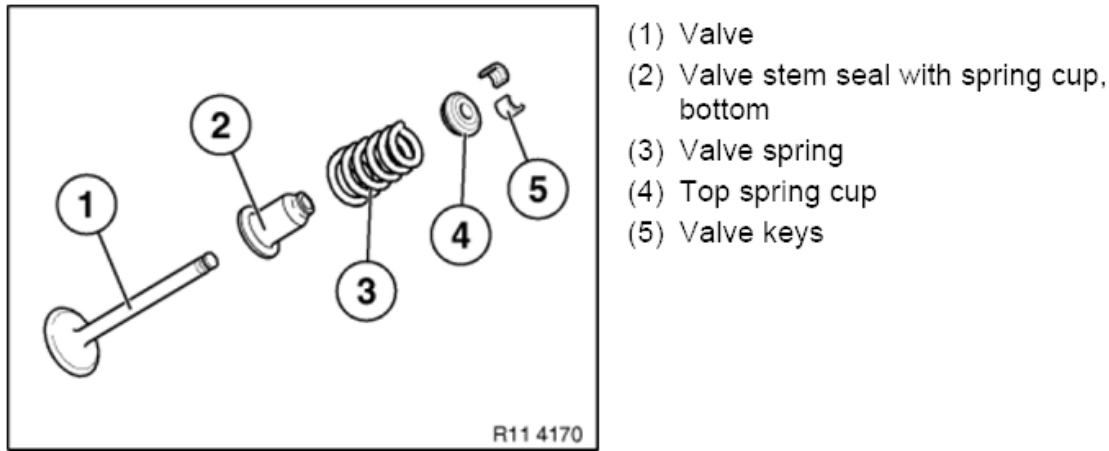


Fig. 298: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1134560 REPLACING ALL VALVE STEM SEALS (N63)

Notes

IMPORTANT: Risk of damage to sealing lip on valve stem seal.
Fit new valve stem seals only when all valves have been installed.

Necessary preliminary work

- Remove all VALVE SPRINGS .

Press special tool 11 6 370 onto the valve stem seal.

Withdraw valve stem seal by turning and simultaneously unscrewing special tool 11 6 370 .

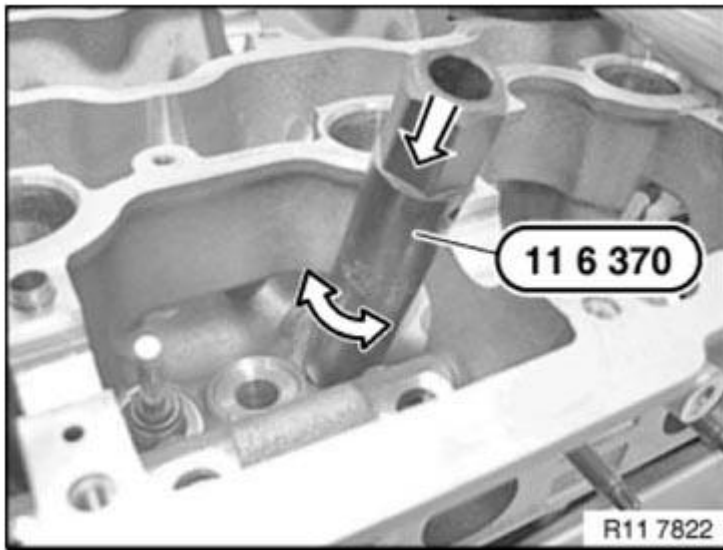


Fig. 299: Pressing Special Tool 11 6 370 Onto Valve Stem Seal
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Lubricate valve stem with oil and insert valve.

Installation sleeve **116380** is included in the delivery specification for the valve stem seals.

Fit special tool **116380**.

Coat new valve stem seal (1) with oil and install.

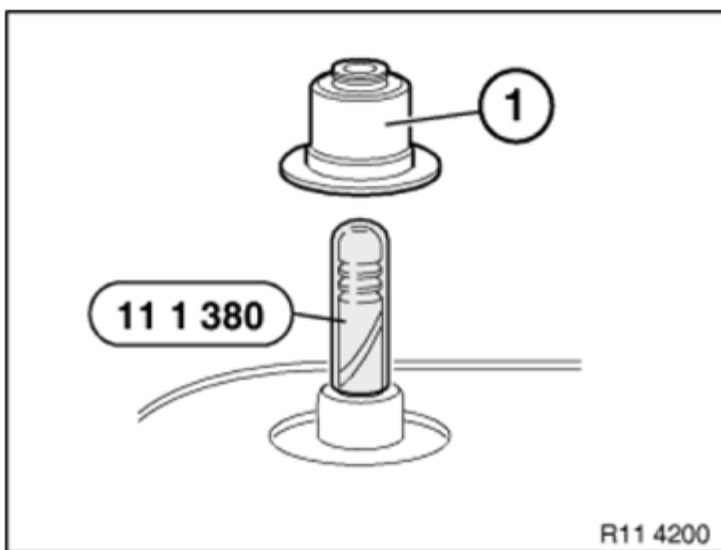


Fig. 300: Identifying Valve Stem Seal And Special Tool 11 6 380

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N63 engine, the special tool 11 6 380 must be remachined according to the sketch with a 6.2 mm drill bit dia. to a depth of A = approx. 45 mm.
This modification has already been taken into account for reordering.

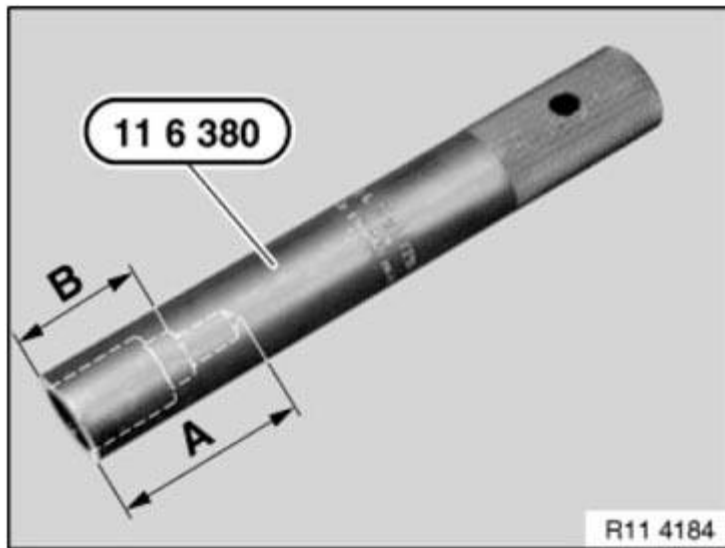


Fig. 301: Identifying Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

Manually press on valve stem seal as far as it will go with special tool 11 6 380.

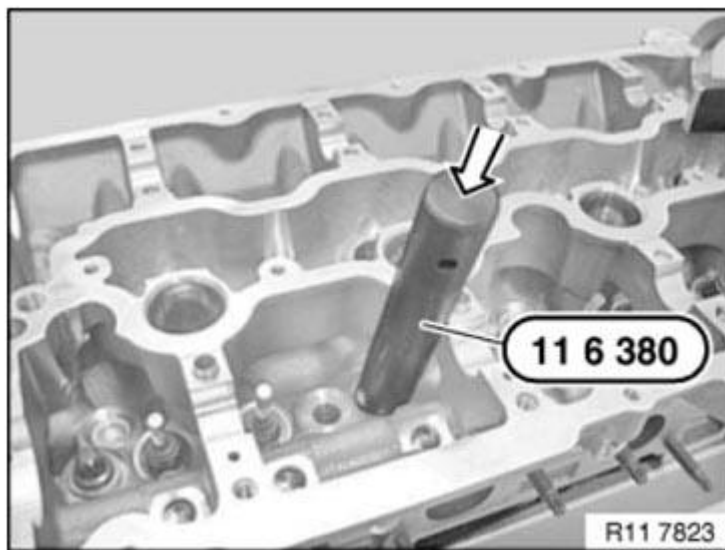


Fig. 302: Pressing On Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1136 VARIABLE CAMSHAFT TIMING

1131573 ADJUSTING CAMSHAFT TIMING ON LEFT SIDE (N63)

Notes

IMPORTANT: Release central bolts on adjuster only with special tool 11 9 890 .
Risk of damage to timing drive.
If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 5 to 8)

Necessary preliminary work

- Remove LEFT GEAR CASE COVER
- CHECK CAMSHAFT TIMING ON LEFT SIDE

Get set of special tools 11 9 890 ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.
Special tool 11 9 892 Press-down bar.
Special tool 11 9 893 Gap gauge for intake and exhaust camshafts.
Special tool 11 9 894 spacer.

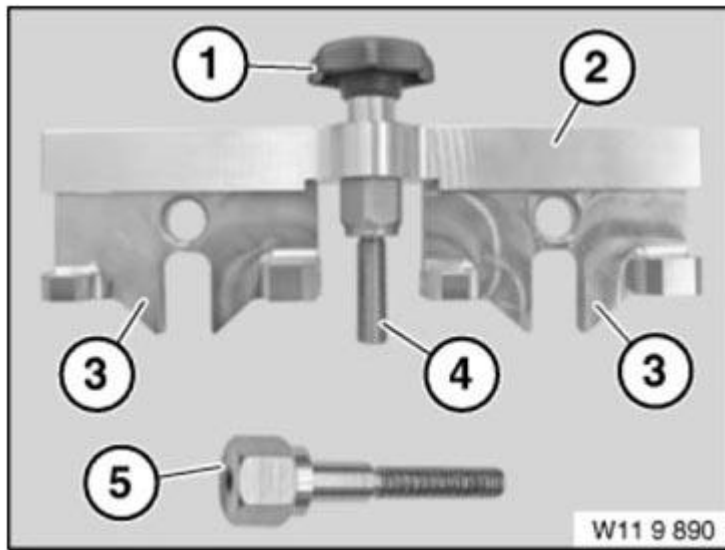


Fig. 303: Identifying Set Of Special Tools 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

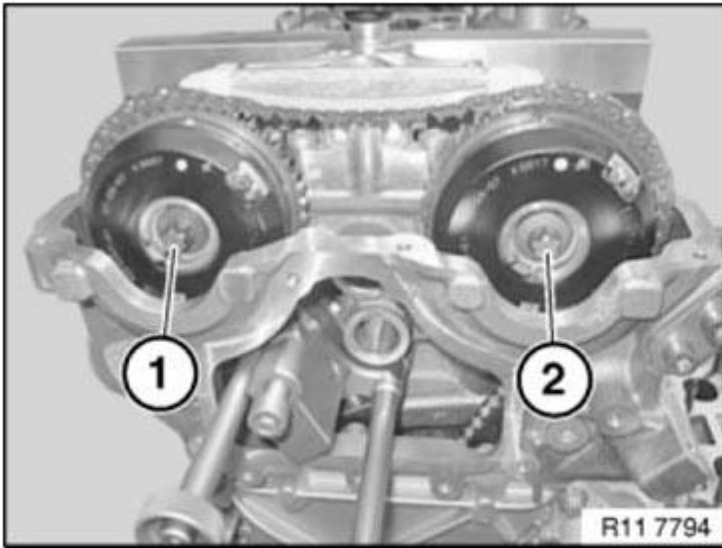


Fig. 304: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow).
If no grease can be seen on the bolt head of central bolt (1), the ADJUSTER must be replaced for safety reasons.

Installation note:

Coat contact surface of new central bolt (1) with copper paste.

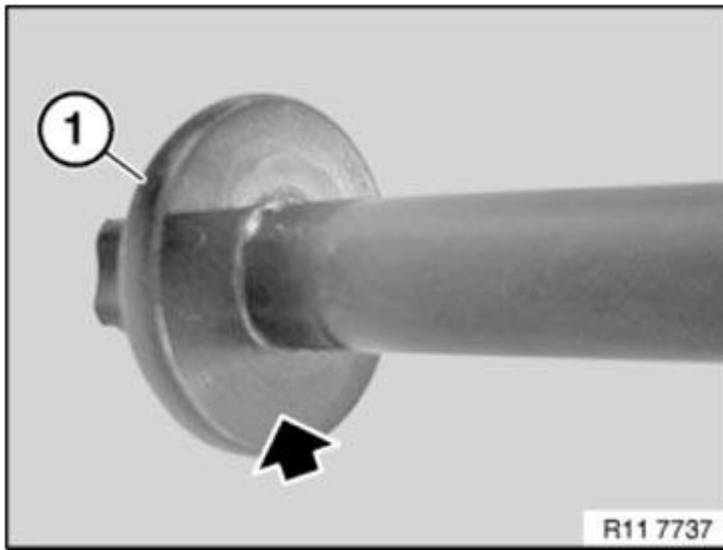


Fig. 305: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on intake camshaft and exhaust camshaft.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

Screw special tool 11 9 894 into cylinder head.

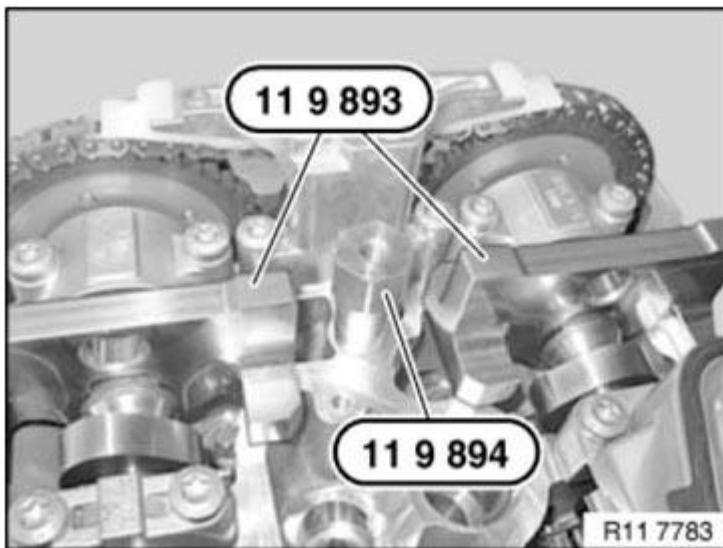


Fig. 306: Positioning Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools 11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

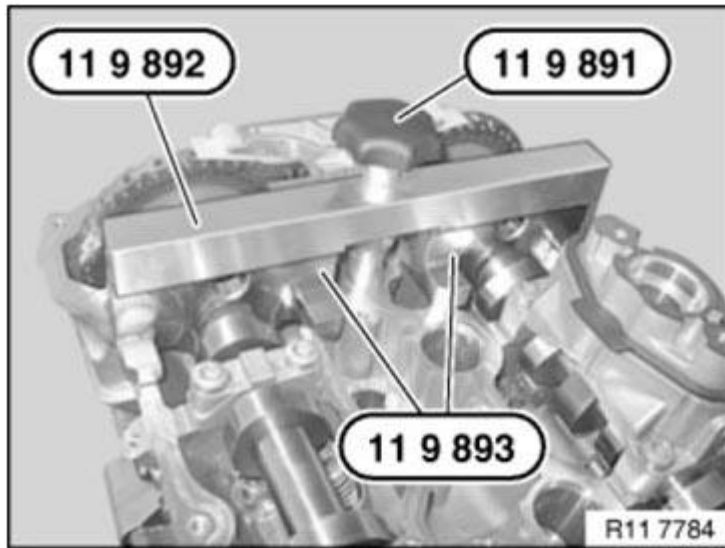


Fig. 307: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake camshaft adjuster with special tool 00 9 120 .

Secure central bolt (2) of exhaust camshaft adjuster with special tool 00 9 120 .

Tightening torque: 11 36 1AZ .

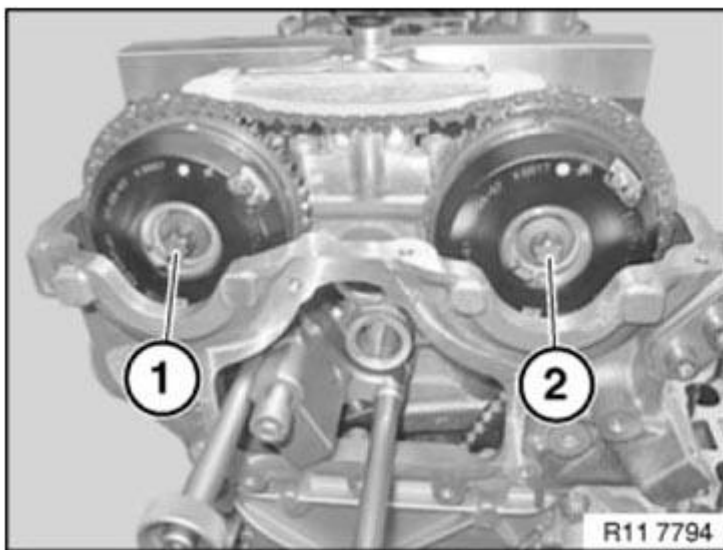


Fig. 308: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools 11 9 190 and 11 8 570 .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **150° before cylinder no. 1 firing TDC position.**

Secure vibration damper with special tool 11 9 190 at **150° before cylinder no. 1 firing TDC position 1.**

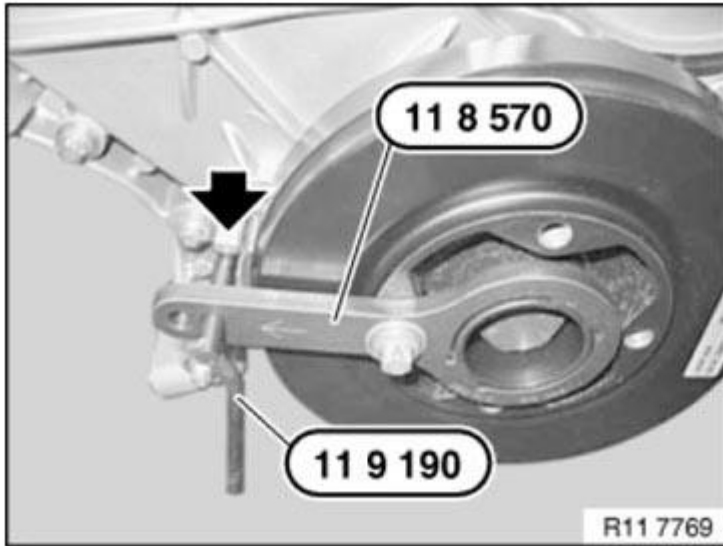


Fig. 309: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: **Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.**

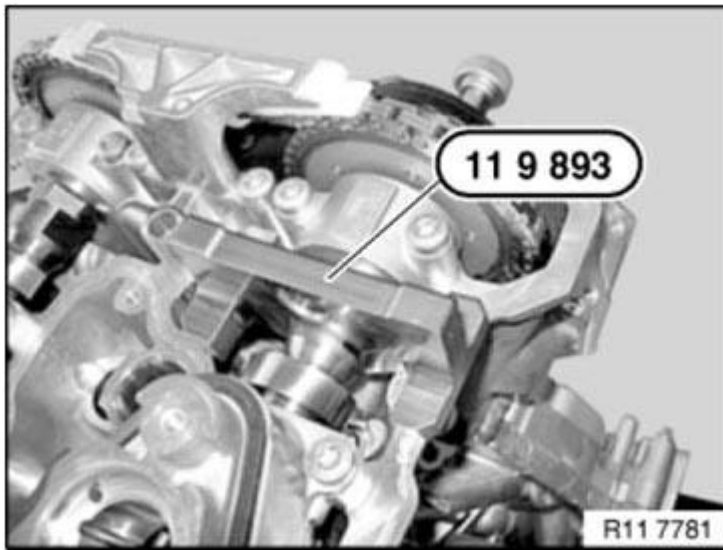


Fig. 310: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

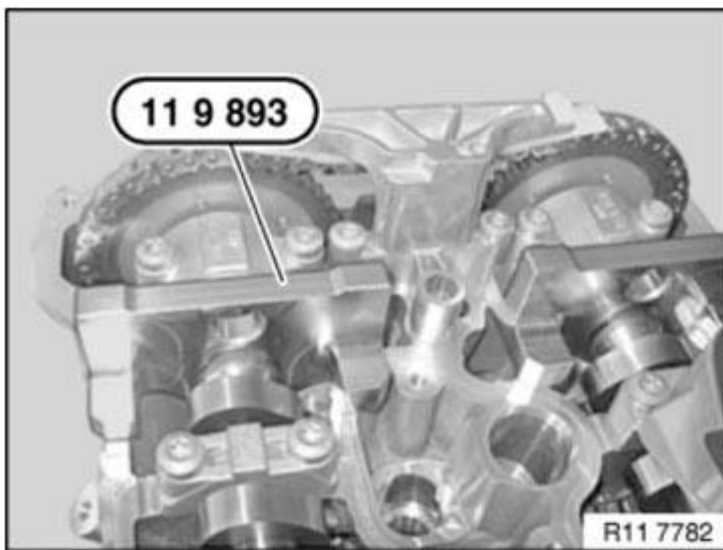


Fig. 311: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131574 ADJUSTING CAMSHAFT TIMING ON RIGHT SIDE (N63)**Notes**

IMPORTANT: Release central bolts on adjuster only with special tool 11 9 890 .

Risk of damage to timing drive.

If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 1 to 4)

Necessary preliminary work

- Remove RIGHT-HAND GEAR CASE COVER
- CHECK CAMSHAFT TIMING ON RIGHT SIDE .

Get set of special tools 11 9 890 ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.
 Special tool 11 9 892 Press-down bar.
 Special tool 11 9 893 Gap gauge for intake and exhaust camshafts.
 Special tool 11 9 894 spacer.

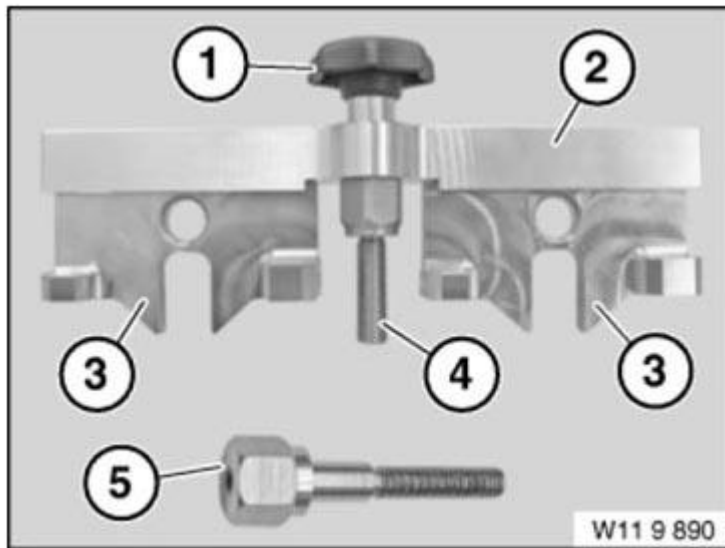


Fig. 312: Identifying Set Of Special Tools 11 9 890
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

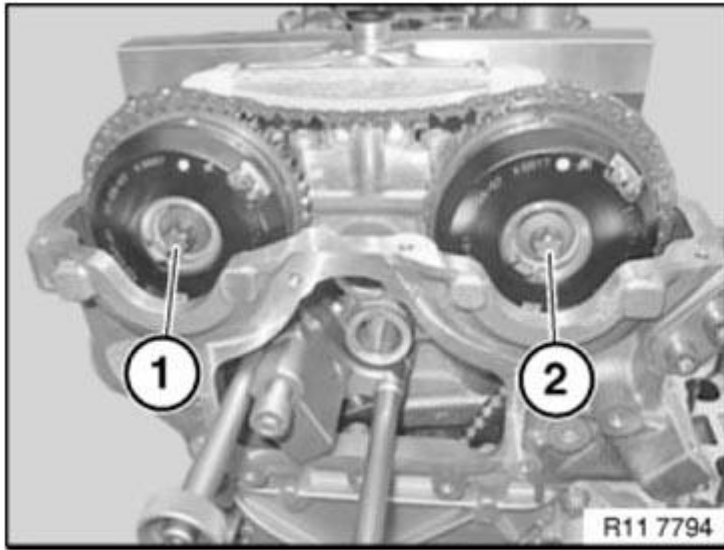


Fig. 313: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow).

If no grease can be seen on the bolt head of central bolt (1), the **ADJUSTER** must be replaced for safety reasons.

Installation note:

Coat contact surface of new central bolt (1) with copper paste.

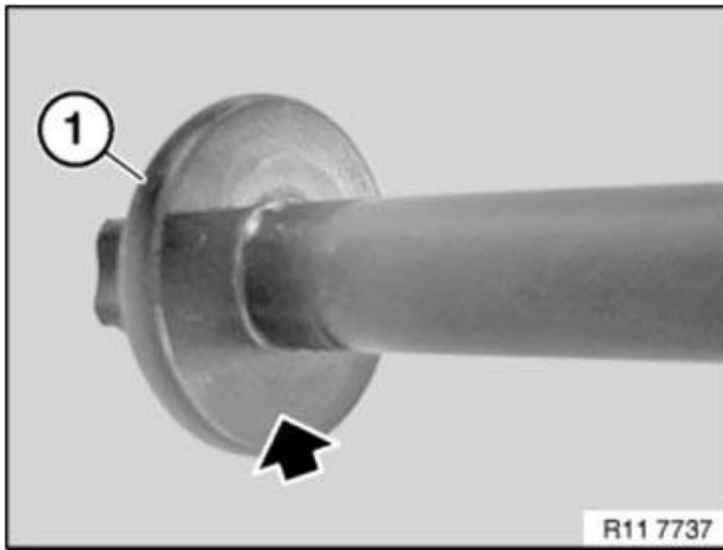


Fig. 314: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on intake camshaft and exhaust camshaft.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

Screw special tool 11 9 894 into cylinder head.

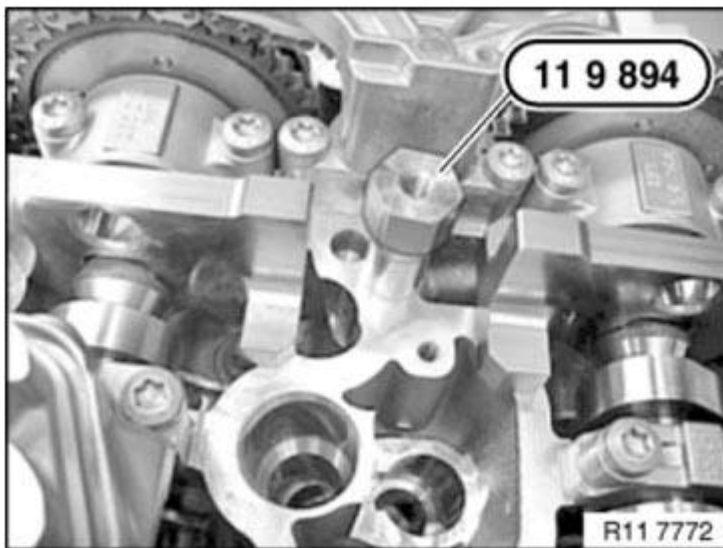


Fig. 315: Identifying Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools 11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

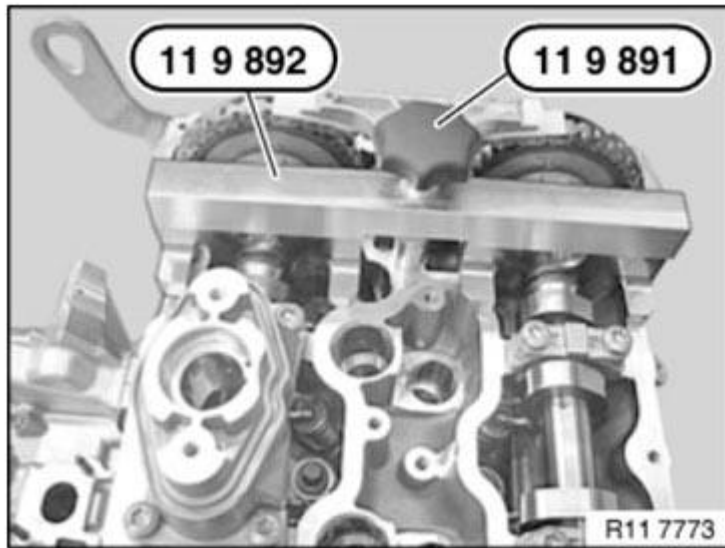


Fig. 316: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake camshaft adjuster with special tool 00 9 120 .

Secure central bolt (2) of exhaust camshaft adjuster with special tool 00 9 120 .

Tightening torque: 11 36 1AZ .

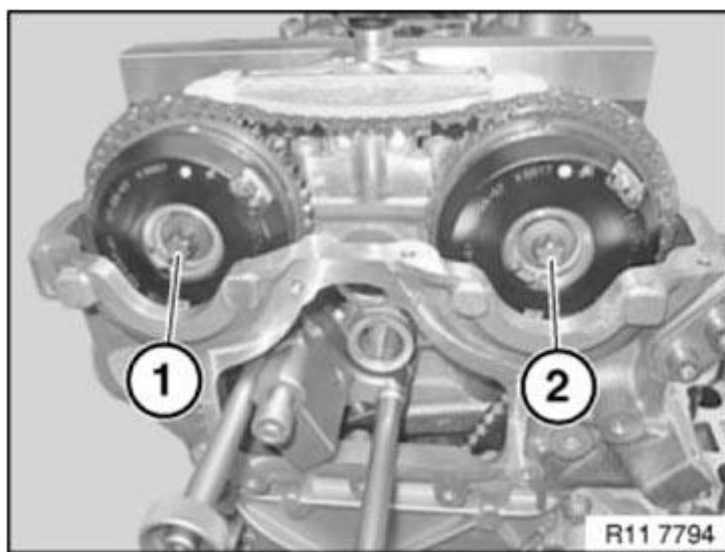


Fig. 317: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools 11 9 190 and 11 8 570 .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **150° before cylinder no. 1 firing TDC position.**

Secure vibration damper with special tool 11 9 190 at **150° before cylinder no. 1 firing TDC position 1.**

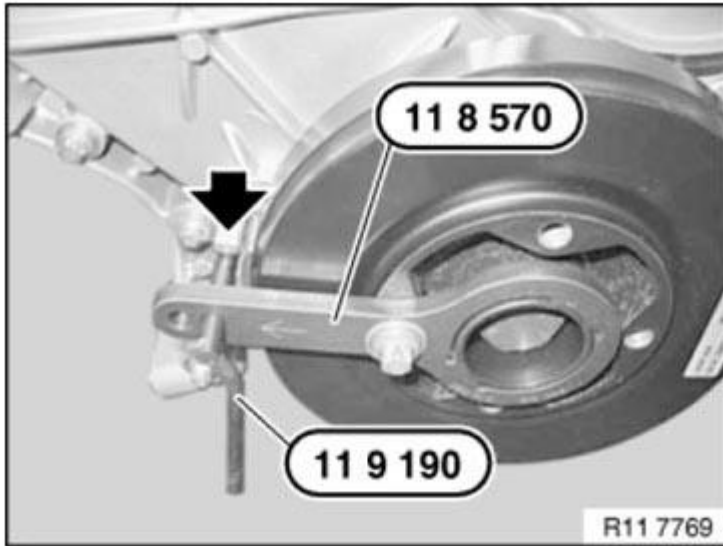


Fig. 318: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: **Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.**

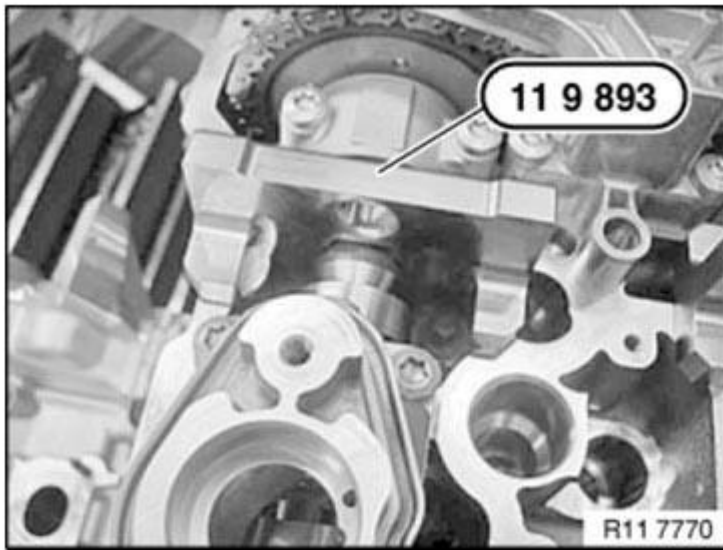


Fig. 319: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

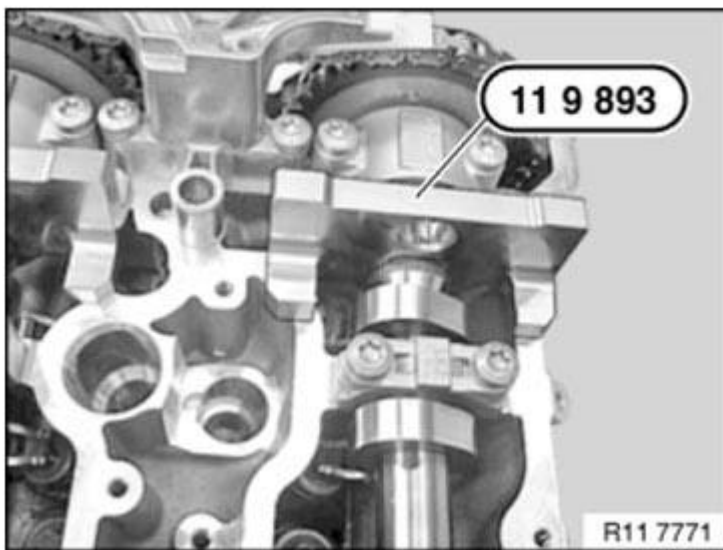


Fig. 320: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N63)**Notes**

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 5-8:**Necessary preliminary work**

- Remove left CYLINDER HEAD COVER
- Remove FAN COWL with electric fan
- Remove BELT PULLEY for air conditioning system
- Remove left CHAIN TENSIONER

Mount special tool 11 9 900 at position of chain tensioner.

Preload hexagon socket screw with special tool 00 9 250 to **0.6 Nm**.

NOTE: Graphic corresponds to cylinders 1-4.

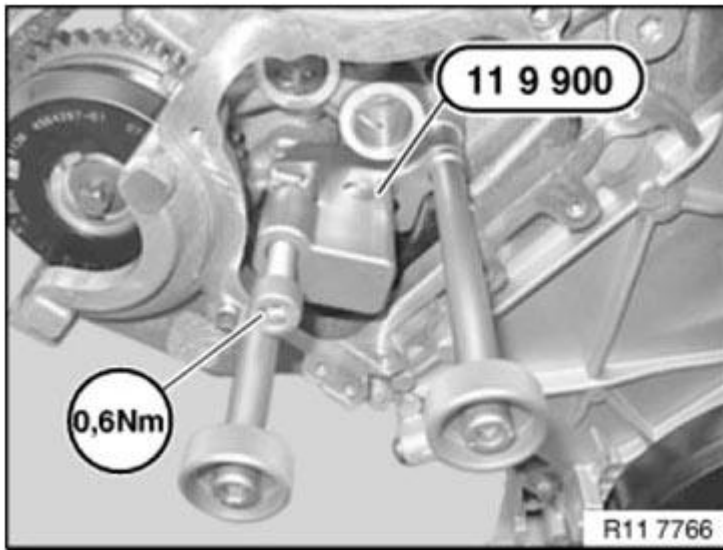


Fig. 321: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Marking (MP = Mounting Position) is important for installing special tool 11 8 570 .

MP = 150° before cylinder no. 1 firing TDC position

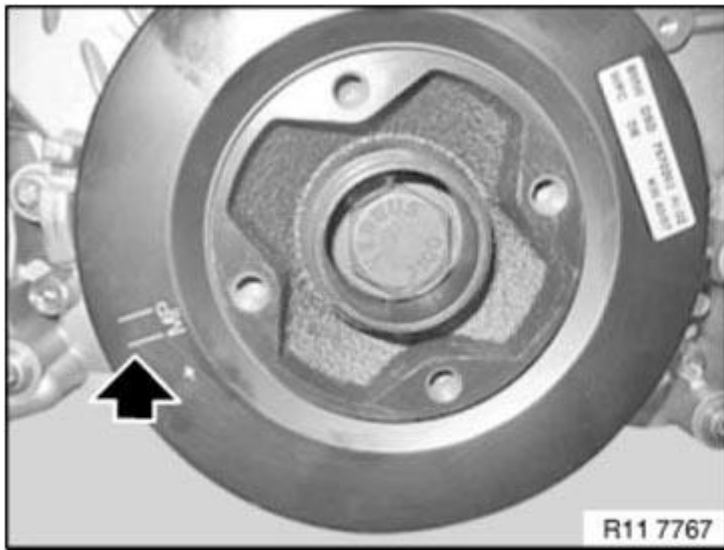


Fig. 322: Identifying Mounting Position Of Special Tool 11 8 570
 Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with dihedron on vibration damper in such a way that it can be secured with bolt (1) at the MP marking.

NOTE: **Setting groove on crankcase, see arrow.**

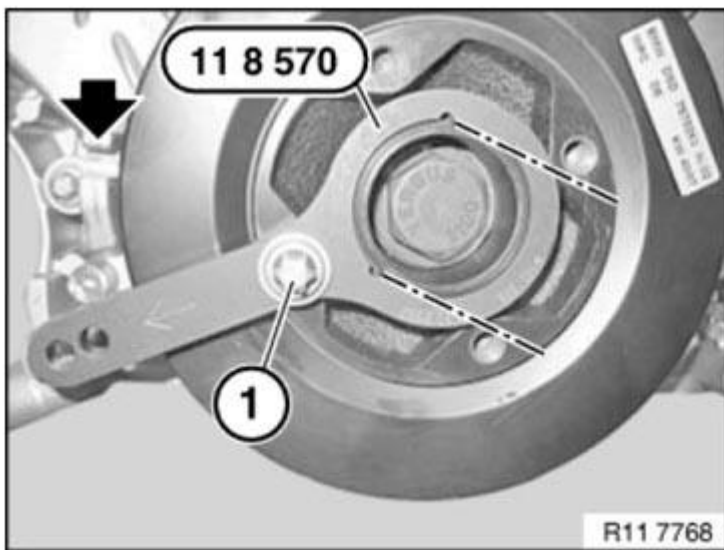


Fig. 323: Positioning Special Tool 11 8 570 With Dihedron On Vibration Damper
 Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt.

Secure vibration damper with special tools **11 8 570** and **11 9 190** at 150° before cylinder no. 1 firing TDC

position.

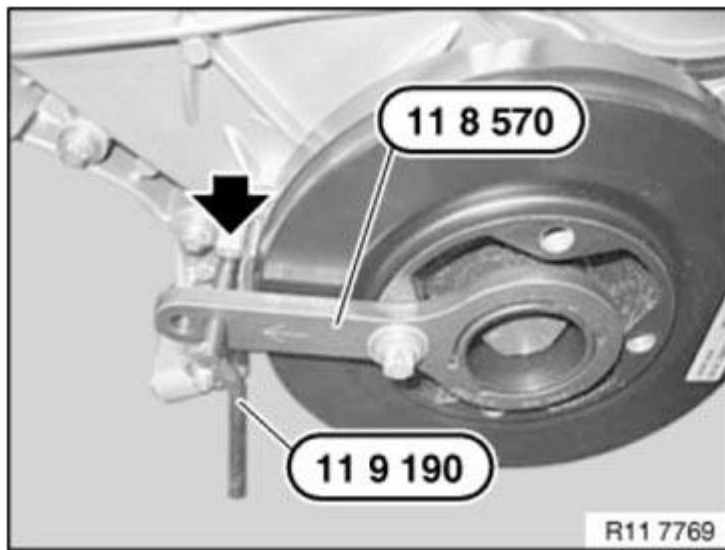


Fig. 324: Securing Vibration Damper With Special Tool 11 9 190
 Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder no. 1 at 150° before firing TDC position, cams on exhaust camshaft (A) at cylinder no. 5 point at an angle to the left.

Cams on inlet camshaft (E) point at an angle downwards.

NOTE: For purposes of clarity, the graphic shows the inlet and exhaust adjustment units removed.

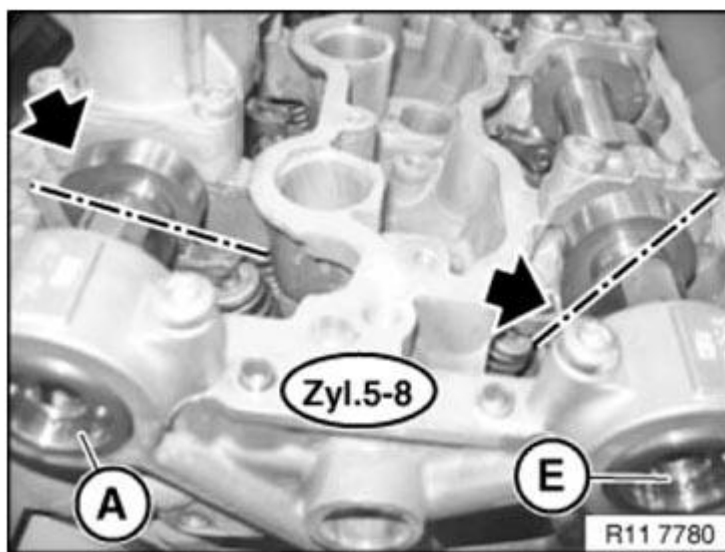


Fig. 325: Identifying Cams On Inlet Camshaft Point At An Angle Downwards

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the inlet and exhaust adjustment units are normally locked in their initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster. In order to avoid incorrect timing adjustment, it is essential to check the locking of the camshaft adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of intake and exhaust camshaft adjusters in initial setting:

Gripping hexagon head (2) of camshafts with a fork wrench (1), carefully try to rotate camshafts against direction of rotation.

The intake and exhaust camshaft adjusters are locked in the initial setting when the camshafts are non-positively connected to the adjusters.

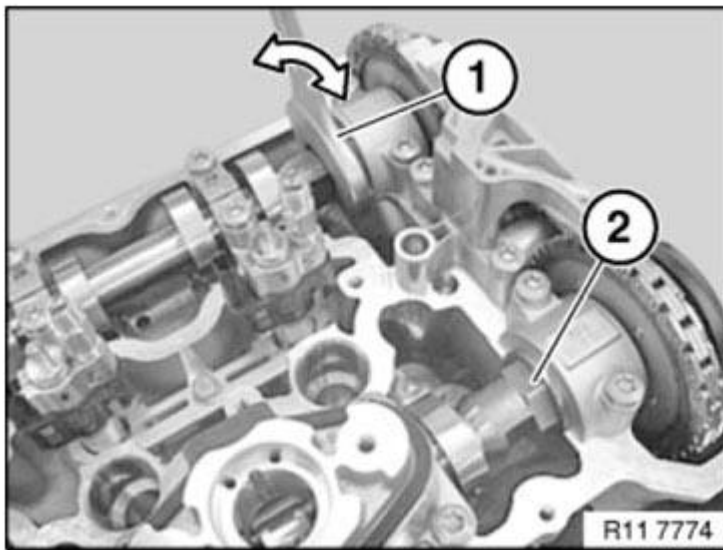


Fig. 326: Gripping Hexagon Head Of Camshafts With Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the intake or exhaust camshaft adjusters of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

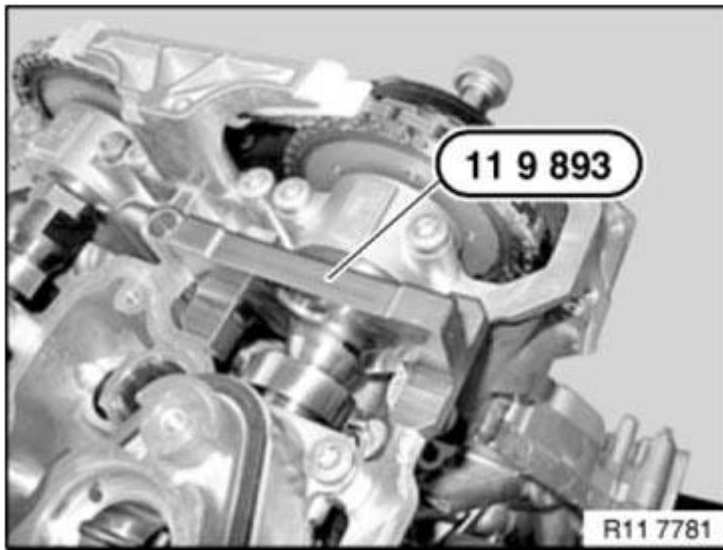


Fig. 327: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

If necessary, adjust camshaft **TIMING** on left side.

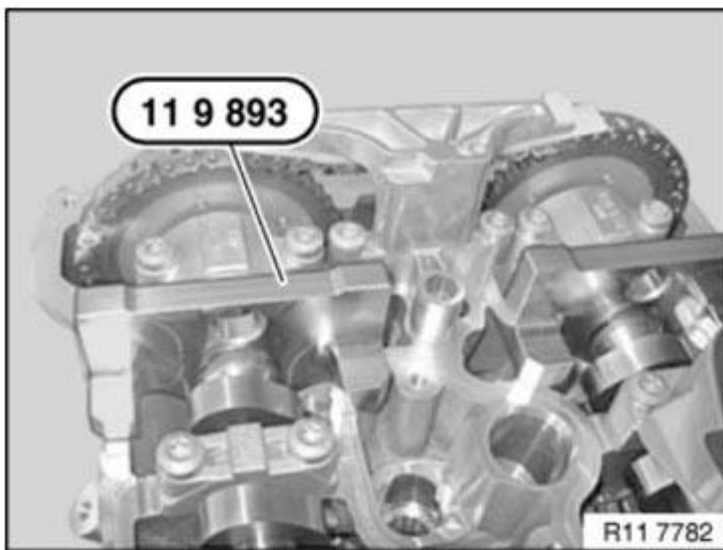


Fig. 328: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N63)

Notes

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 1-4:

Necessary preliminary work

- Remove right CYLINDER HEAD COVER
- Remove FAN COWL with electric fan
- Remove BELT PULLEY for air conditioning system
- Remove right CHAIN TENSIONER

Mount special tool 11 9 900 at position of chain tensioner.

Preload hexagon socket screw with special tool 00 9 250 to **0.6 Nm**.

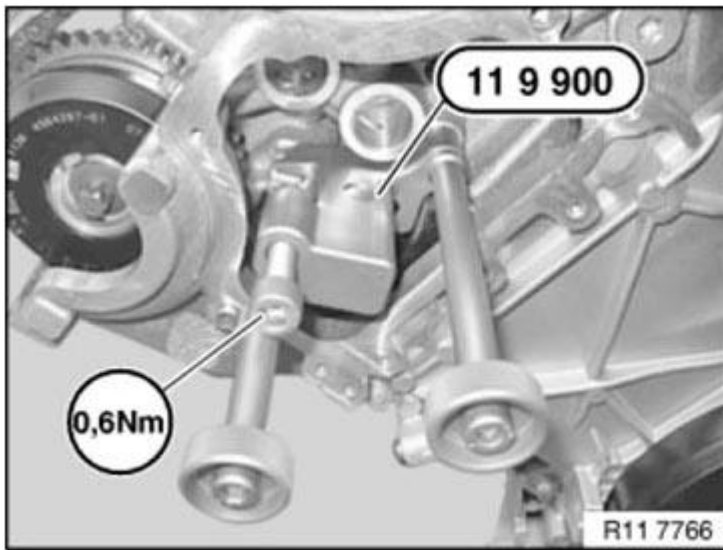


Fig. 329: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Marking (MP = Mounting Position) is important for installing special tool 11 8 570 .

MP = 150° before cylinder no. 1 firing TDC position

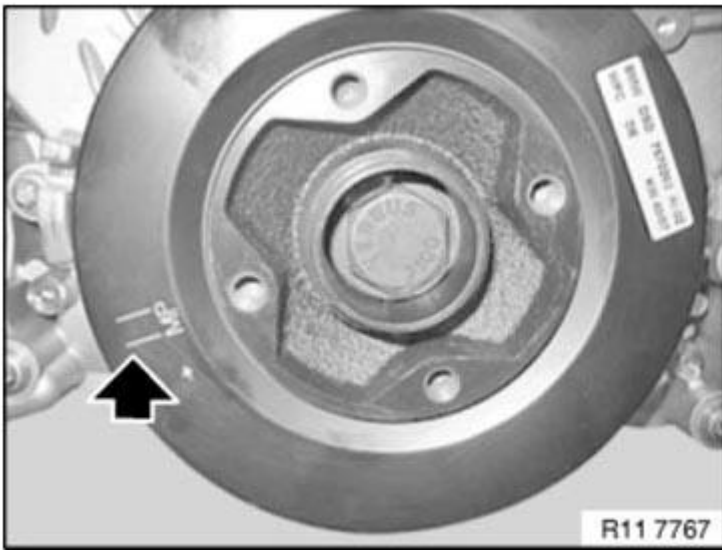


Fig. 330: Identifying Mounting Position Of Special Tool 11 8 570
 Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with dihedron on vibration damper in such a way that it can be secured with bolt (1) at the MP marking.

NOTE: Setting groove on crankcase, see arrow.

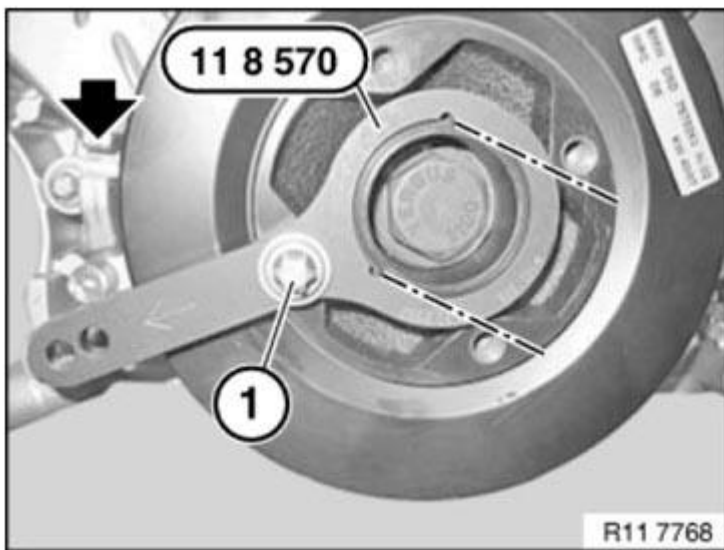


Fig. 331: Positioning Special Tool 11 8 570 With Dihedron On Vibration Damper
 Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt.

Secure vibration damper with special tools **11 8 570** and **11 9 190** at 150° before cylinder no. 1 firing TDC

position.

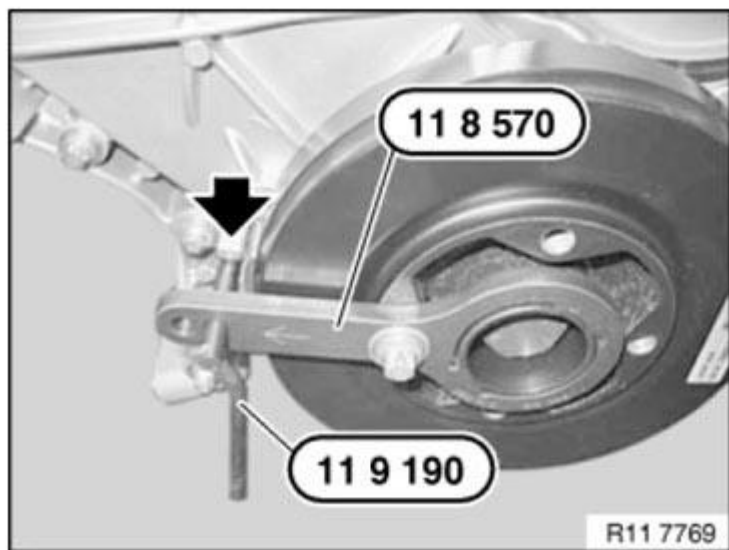


Fig. 332: Securing Vibration Damper With Special Tool 11 9 190
 Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder no. 1 at 150° before firing TDC position, cams on exhaust camshaft (A) at cylinder no. 1 point at an angle upwards.

Cams on inlet camshaft (E) point at an angle downwards.

NOTE: For purposes of clarity, the graphic shows the inlet and exhaust adjustment units removed.

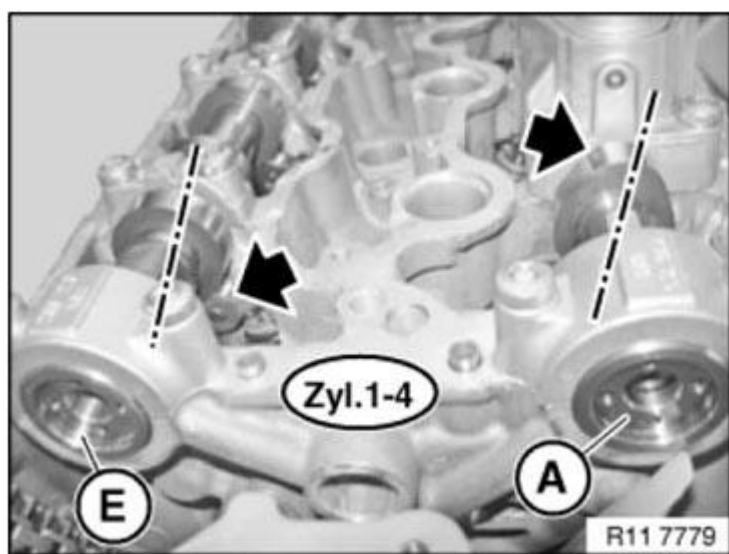


Fig. 333: Identifying Cams On Inlet Camshaft Point At An Angle Downwards

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the intake and exhaust camshaft adjusters are normally locked in their initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster. In order to avoid incorrect timing adjustment, it is essential to check the locking of the camshaft adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of intake and exhaust camshaft adjusters in initial setting:

Gripping hexagon head (2) of camshafts with an open-end spanner (1), carefully try to rotate camshafts against direction of rotation.

The intake and exhaust camshaft adjusters are locked in the initial setting when the camshafts are non-positively connected to the adjusters.

NOTE: Graphic corresponds to cylinders 5-8.

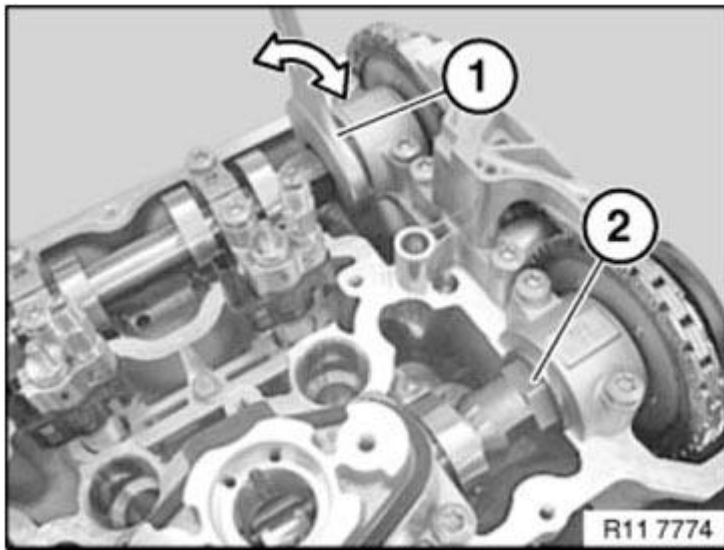


Fig. 334: Gripping Hexagon Head Of Camshafts With Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the intake or exhaust camshaft adjusters of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

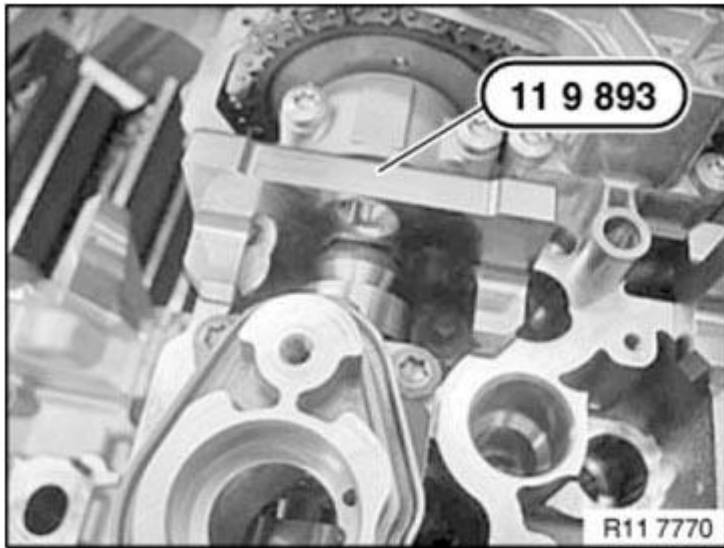


Fig. 335: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.
If necessary, adjust camshaft TIMING on right side.

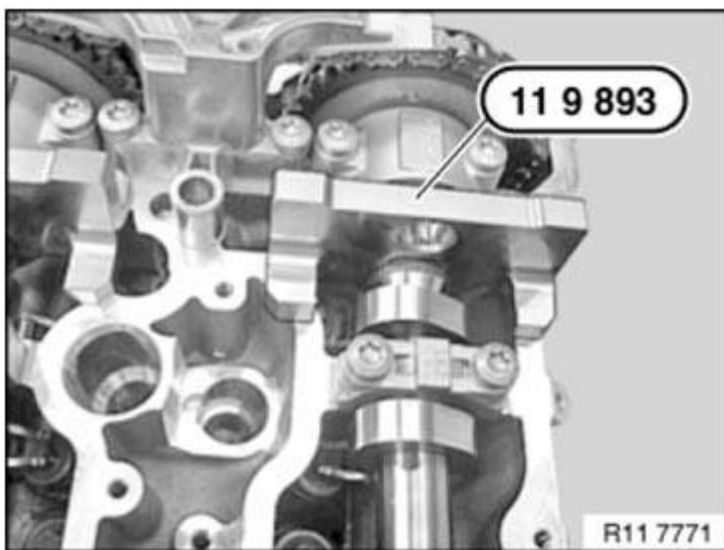


Fig. 336: Identifying Special Tool 11 9 893 On Intake Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1136720 REMOVING AND INSTALLING/RENEWING BOTH SOLENOID VALVES ON RIGHT SIDE (N63)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunctions if valves are contaminated:

- Irregular operation
- OBD incorrect entry
- Poor exhaust gas values
- Low engine performance

IMPORTANT: Risk of damage!

Do not clean solenoid valves with compressed air.

Solenoid valves, cylinders 1-4:

Necessary preliminary work

- Read out fault memory in DME control unit
- Switch off ignition
- Remove right **INTERCOOLER**
- Release holder for electropneumatic pressure converter (EPPC) and carefully press to one side

NOTE: **Solenoid valve (4) controls the inlet adjustment unit.**
 Solenoid valve (2) controls the exhaust adjustment unit.

Unlock plug connections of solenoid valves (2 and 4) and disconnect.

Installation note:

Plug connections must snap audibly into place!

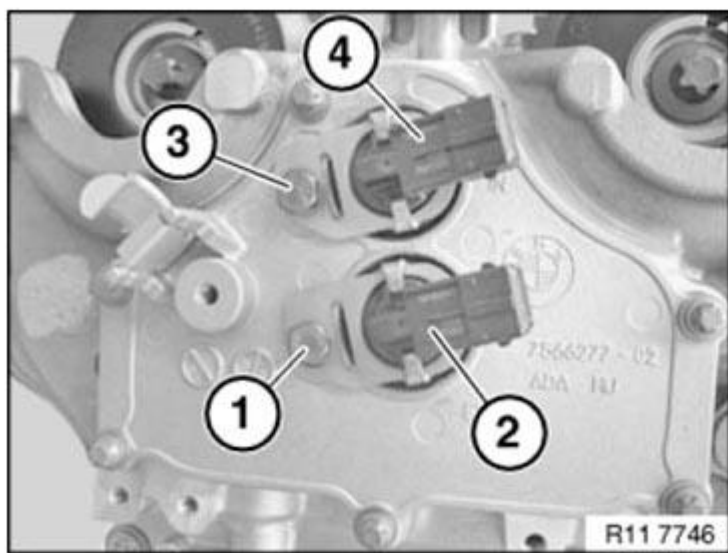


Fig. 337: Identifying Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque **11 36 3AZ** .

Pull out solenoid valves (2 and 4).

Installation note:

Replace O-rings (1 and 2) on solenoid valve

Installation note:

To install solenoid valves, coat both O - rings with engine oil.

If the solenoid valve is to be reused, the filter strainer (see arrow) must be cleaned.

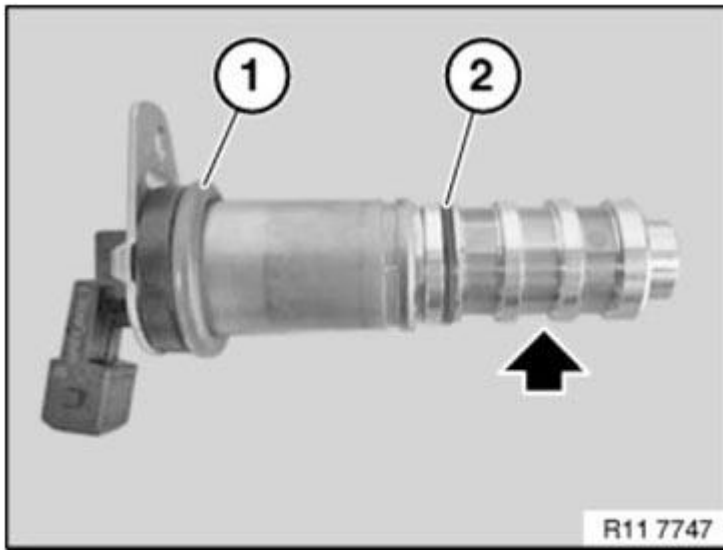


Fig. 338: Identifying O-Rings On Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If a filter element is clogged with dirt, the filter element (filter strainer) may be removed.

Release filter elements (1) at contact edges.

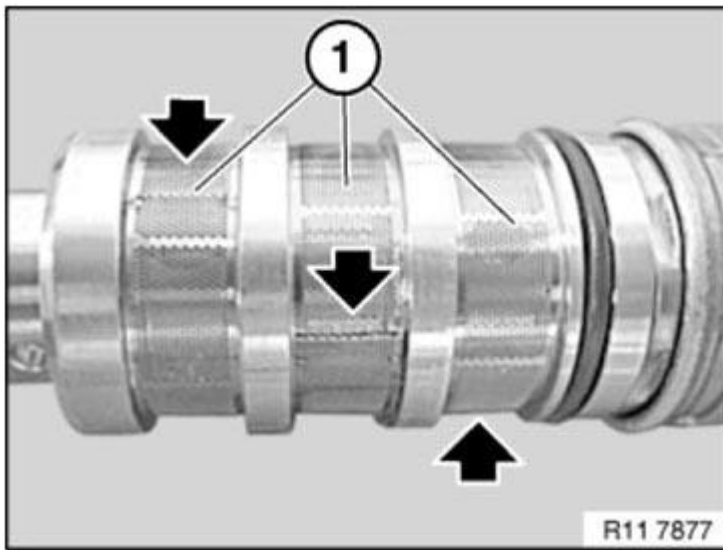


Fig. 339: Identifying Filter Elements At Contact Edges
Courtesy of BMW OF NORTH AMERICA, INC.

Bend open welding spots on filter element (1) with a screwdriver (2) in direction of arrow until welding spots are opened.

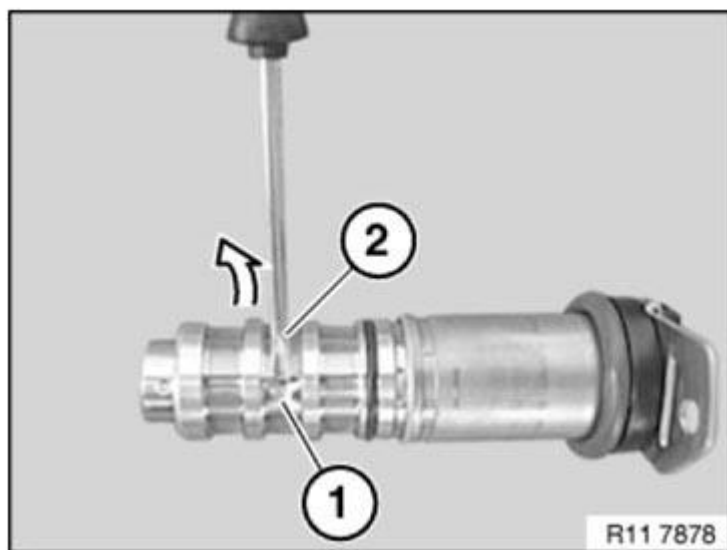


Fig. 340: Bending Open Welding Spots On Filter Element With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Avoid damaging, e.g. notches or scratches, the solenoid valve housing (see arrows).

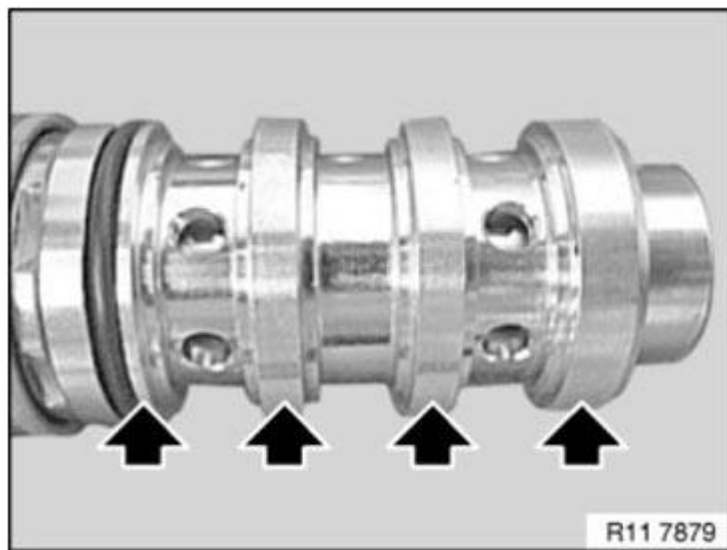


Fig. 341: Inspecting Notches Or Scratches For Solenoid Valve Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully insert solenoid valves (2 and 4) up to stop.

Ensure correct installation position.

Insert screws (1 and 3) and tighten down.

Tightening torque **11 36 3AZ** .

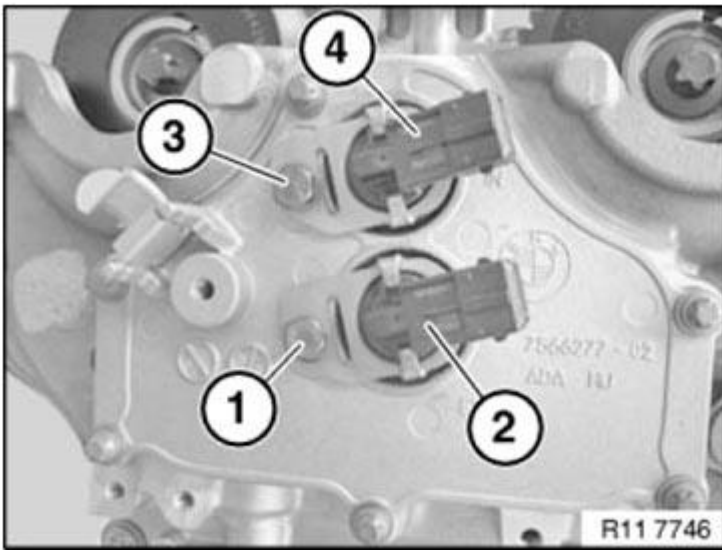


Fig. 342: Identifying Solenoid Valve

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

1136047 REMOVING AND INSTALLING/RENEWING INLET AND EXHAUST ADJUSTMENT UNITS ON LEFT SIDE (N63)

Notes

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position.
 The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster.
 Where central bolts are not greased at the bolt contact points up to engine number 20024295 , the camshaft adjuster must be renewed due to safety reasons.
 The central bolts is greased from engine number 20024296.

(cylinder bank 5 to 8)

Necessary preliminary work

- Read fault memory and make a documentary record
- Remove **LEFT CYLINDER HEAD COVER**
- Remove **LEFT TIMING CASE COVER**
- Check **timing** See **1131070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N63)** or **1131071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N63)**.

To release central bolts, use special tool **11 9 890** or grip at hexagon head of camshaft.

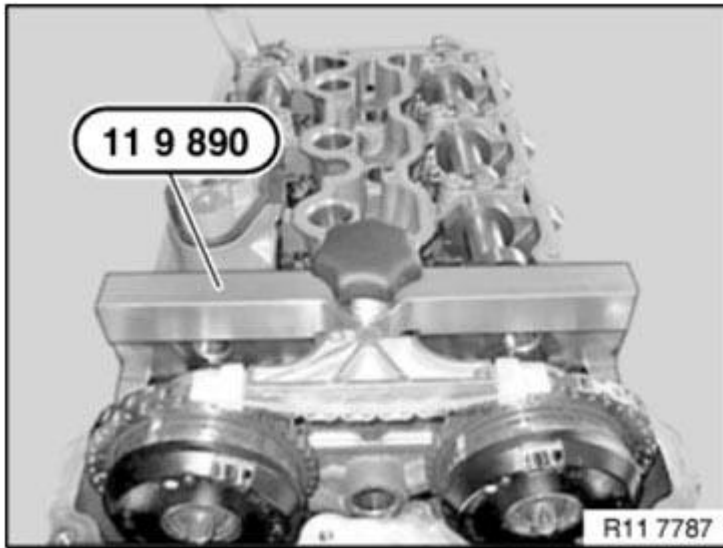


Fig. 343: Identifying Special Tool 11 9 890

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool **11 9 890** can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshafts.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

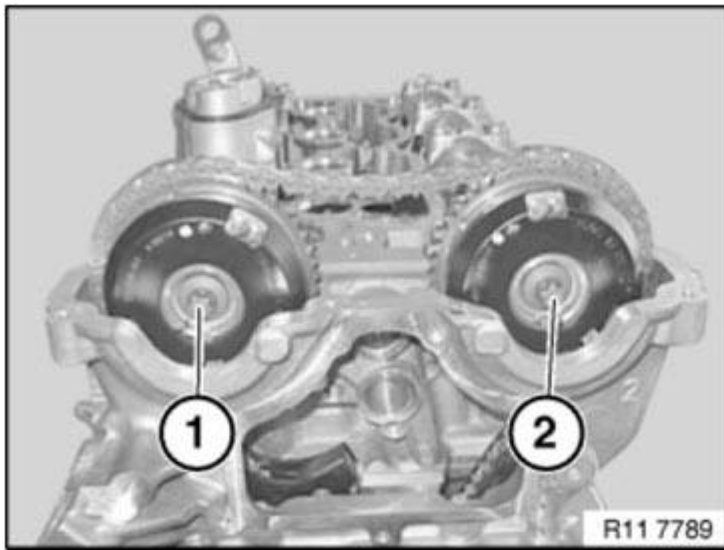


Fig. 344: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow).
If no grease can be seen on the bolt head of central bolt (1), the intake and exhaust camshaft adjuster must be renewed due to safety reasons.

Installation note:

Coat contact face of central bolt (1) with copper paste.

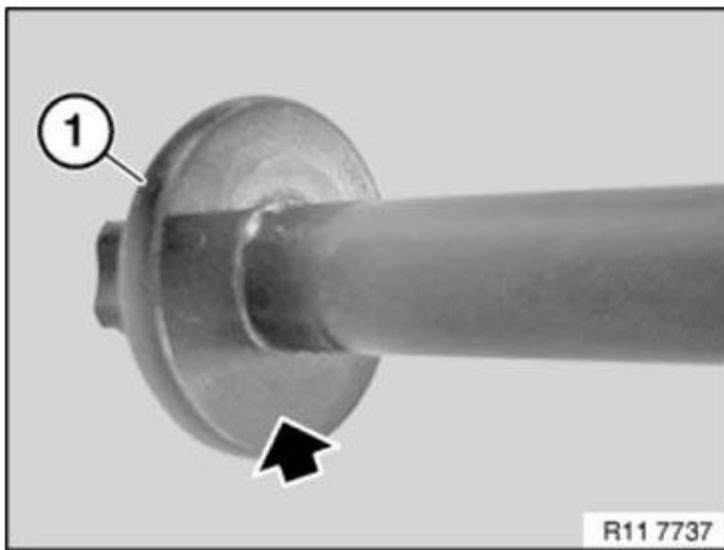


Fig. 345: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket screw.

Release special tool **11 9 900** at knurled screws and remove.

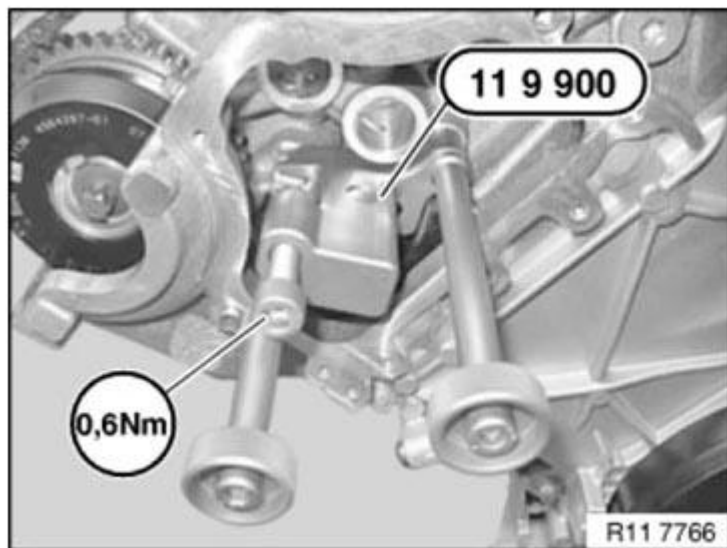


Fig. 346: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove upper tensioning rail (2).

NOTE: Shown without special tools for purposes of clarity.

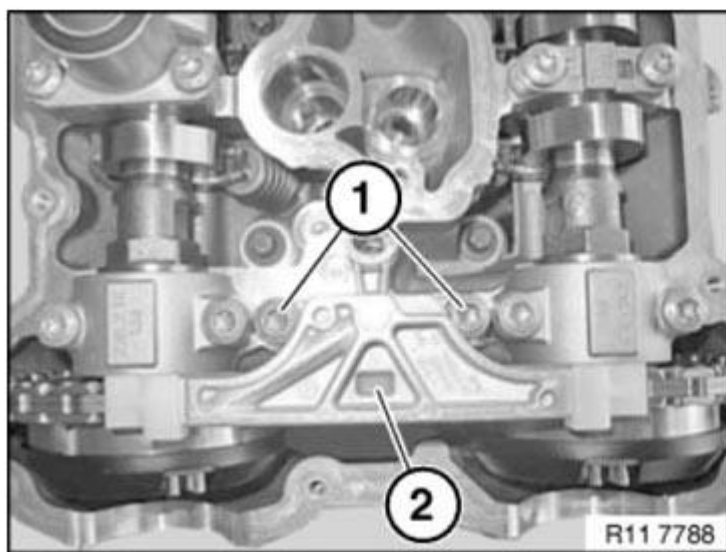


Fig. 347: Identifying Upper Tensioning Rail And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Remove central bolt (2) of inlet adjustment unit.

Installation note:

Replace central bolts after releasing.

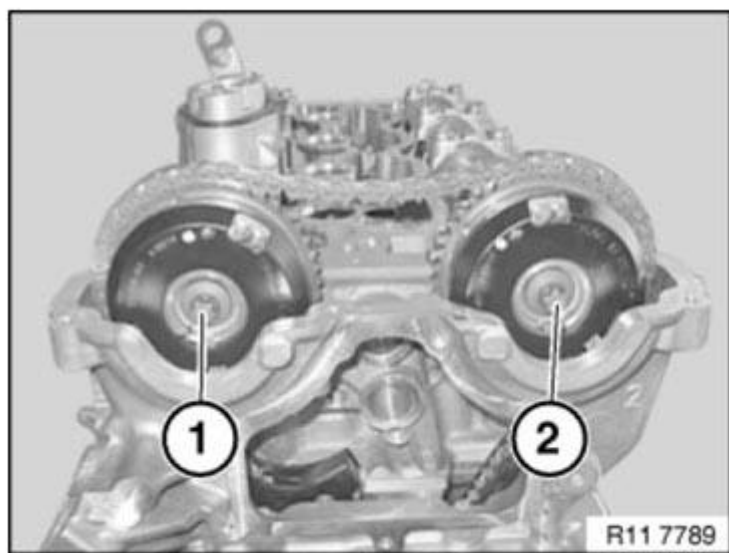


Fig. 348: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Detach inlet adjustment unit (1) in direction of arrow from inlet camshaft.

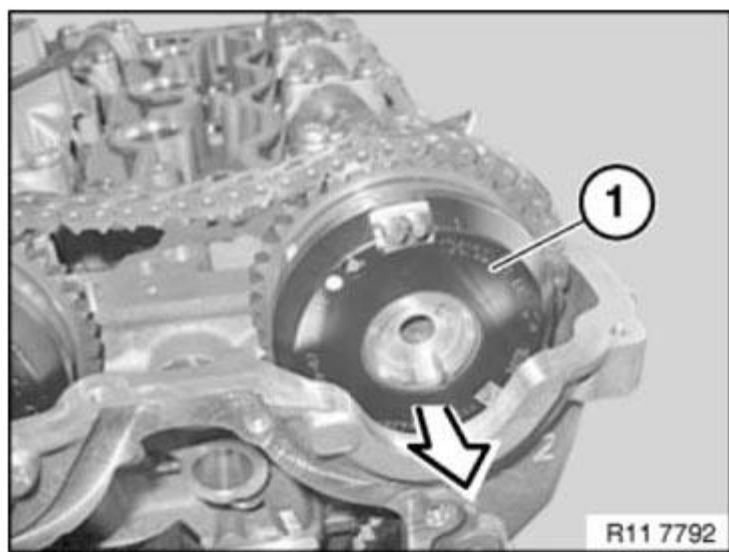


Fig. 349: Identifying Inlet Adjustment Unit

Courtesy of BMW OF NORTH AMERICA, INC.

Feed out inlet adjustment unit (2) from timing chain (1).

Lift out inlet adjustment unit (2).

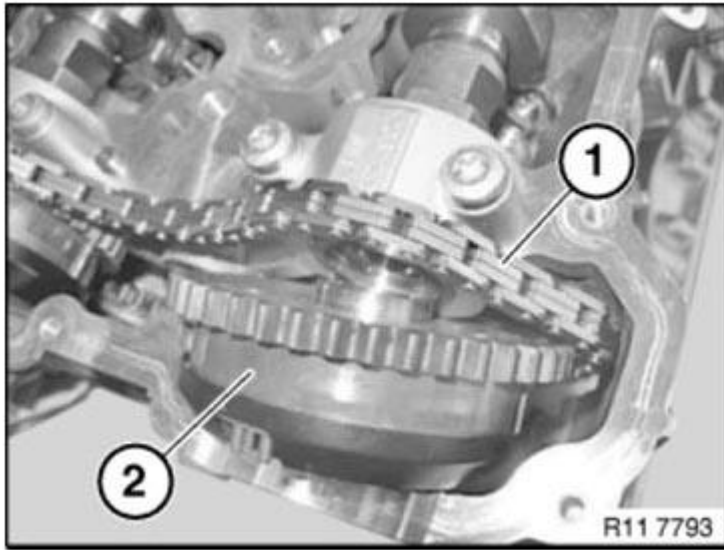


Fig. 350: Identifying Inlet Adjustment Unit And Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

Remove central bolt (1) of exhaust adjustment unit.

Installation note:

Replace central bolts after releasing.

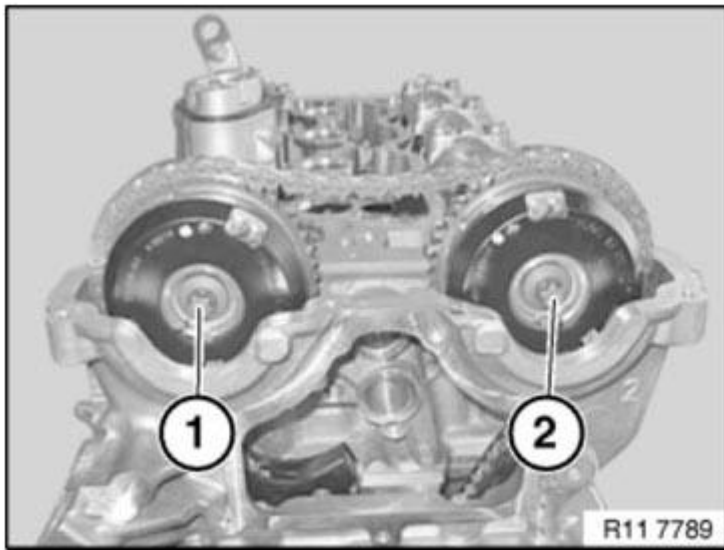


Fig. 351: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Detach exhaust adjustment unit (1) in direction of arrow from exhaust camshaft.

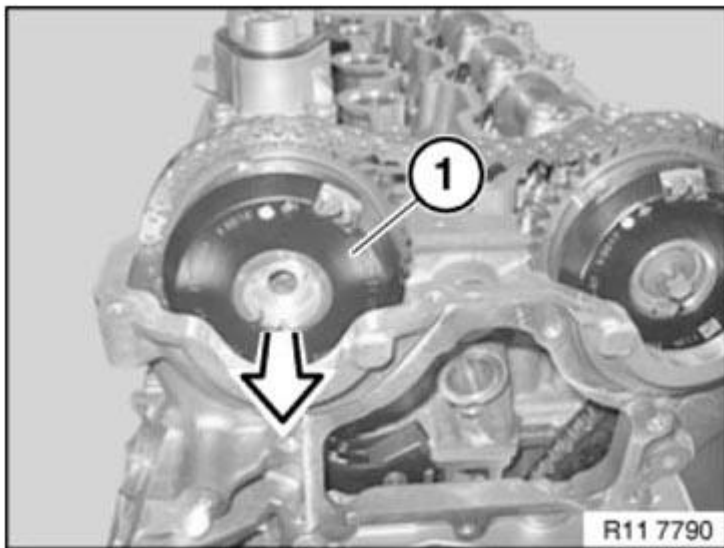


Fig. 352: Identifying Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out exhaust adjustment unit (2) from timing chain (1).

Lift out exhaust adjustment unit (2).

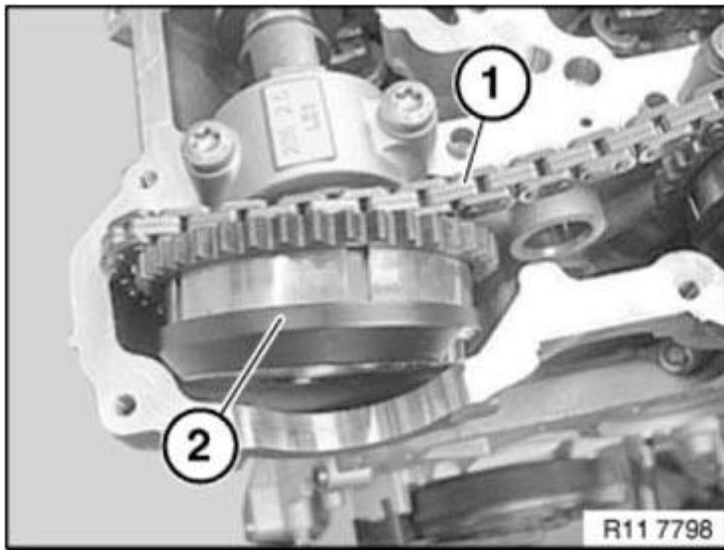


Fig. 353: Identifying Exhaust Adjustment Unit And Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

Intake and exhaust camshaft adjusters are different.

Mixing up the inlet and exhaust adjustment units will cause damage to the engine.

1. Intake camshaft adjuster (1) is marked **IN**
2. Exhaust camshaft adjuster (2) is marked **OUT**

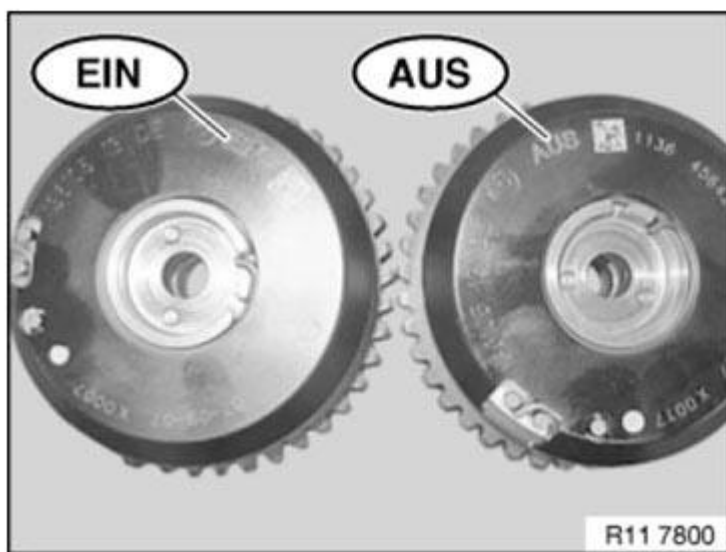


Fig. 354: Identifying Intake And Exhaust Camshaft Adjusters Mark

Installation note:

Coat contact face of central bolt (1) with copper paste.

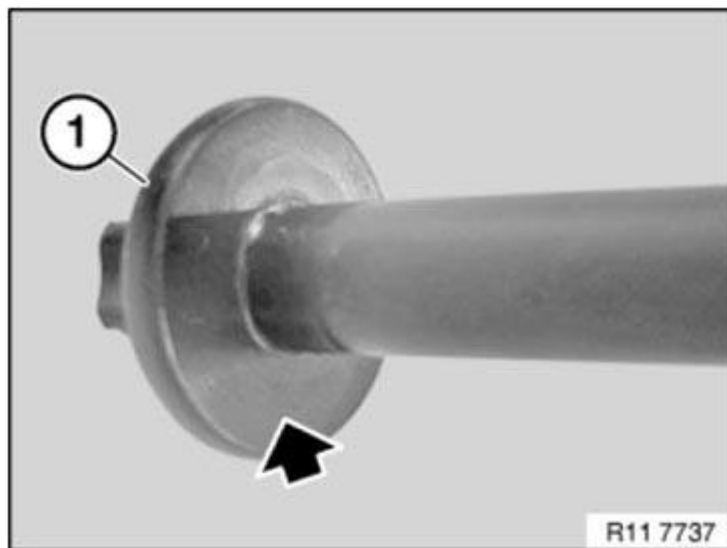


Fig. 355: Checking Head Of Central Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of adjustment units in relation to timing chain can be freely selected.

Feed adjuster into timing chain and position on camshafts.

Insert central bolts (1 and 2) on adjustment units without gaps.

Release central bolts (1 and 2) by **90°**.

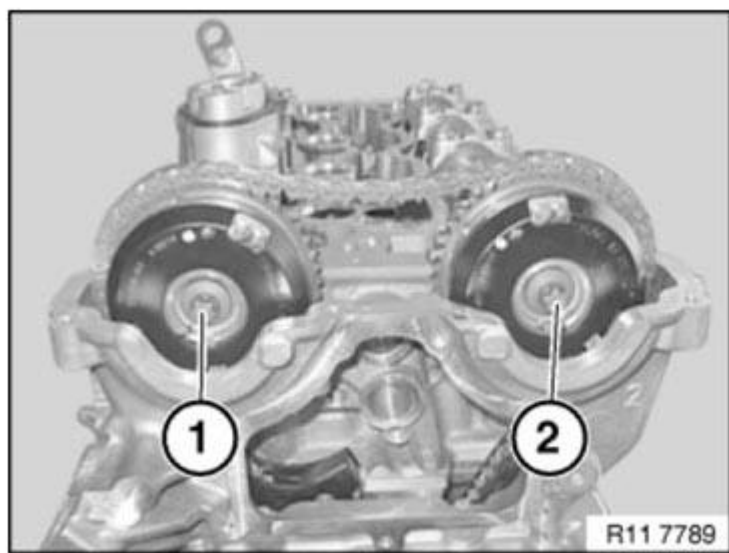


Fig. 356: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sliding rail (2) and secure with screws (1).

Tightening torque: **11 31 4AZ** .

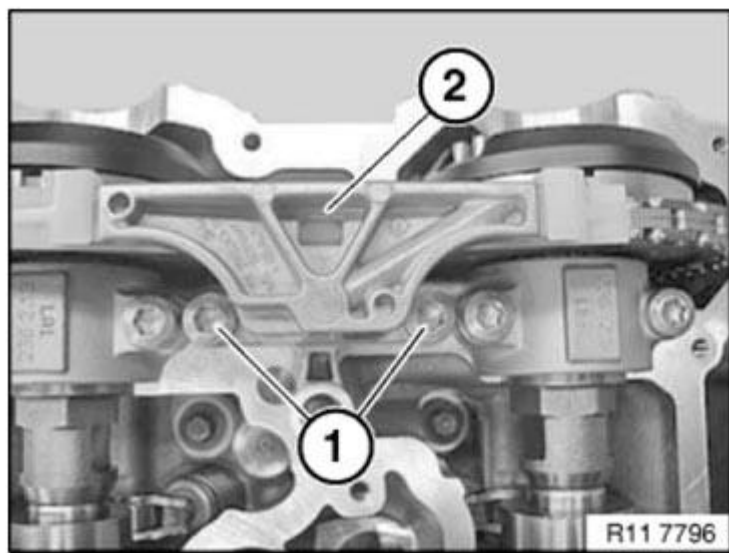


Fig. 357: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Get set of special tools **11 9 890** ready for securing camshafts.

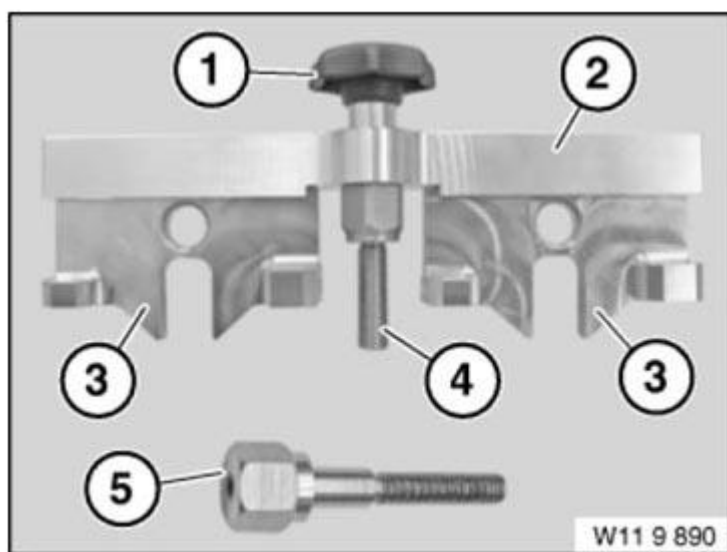


Fig. 358: Identifying Set Of Special Tools 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on exhaust camshaft.

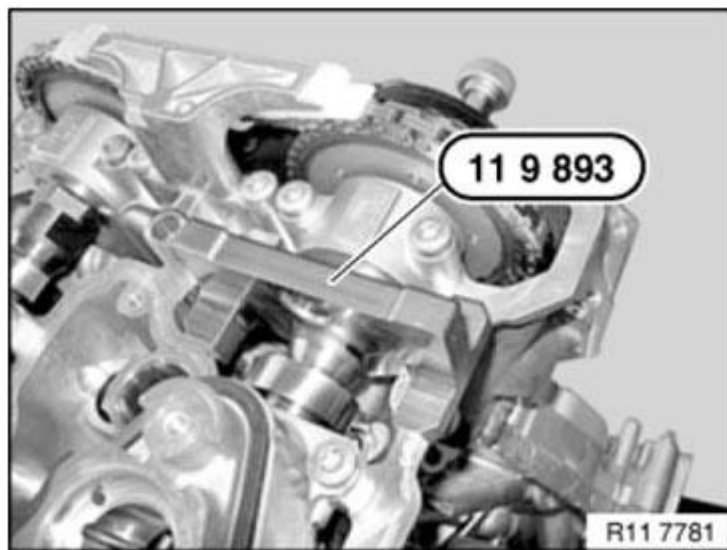


Fig. 359: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft.

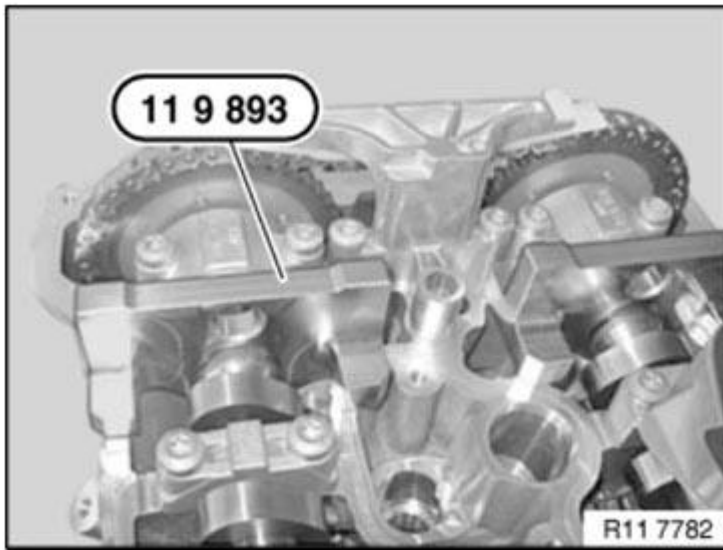


Fig. 360: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Align exhaust and intake camshafts so that special tools 11 9 893 lie on the cylinder head without any gap.

Screw special tool 11 9 894 into cylinder head.

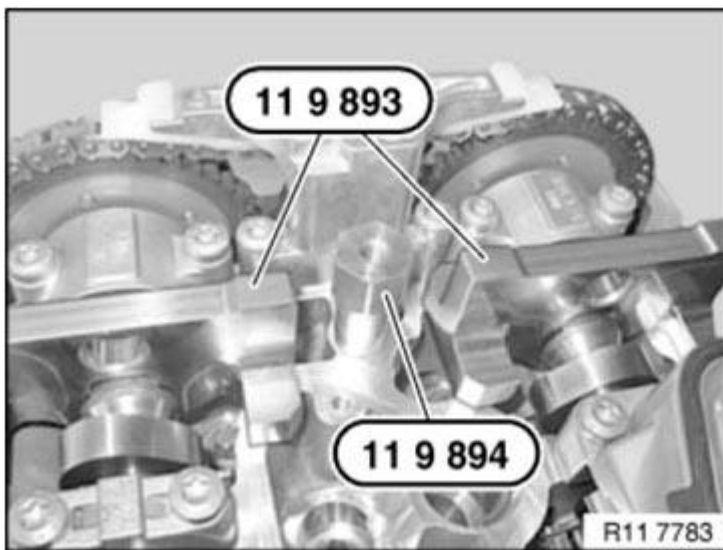


Fig. 361: Positioning Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 9 892 down with special tool 11 9 891.

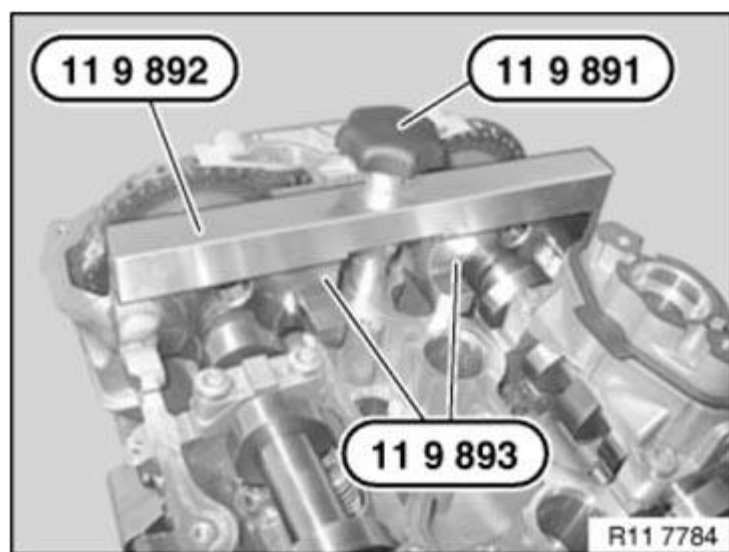


Fig. 362: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
 Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 9 900 .

Pretension timing chain with special tool 11 9 900 .

Preload hexagon socket screw with special tool 00 9 250 to 0.6 Nm.

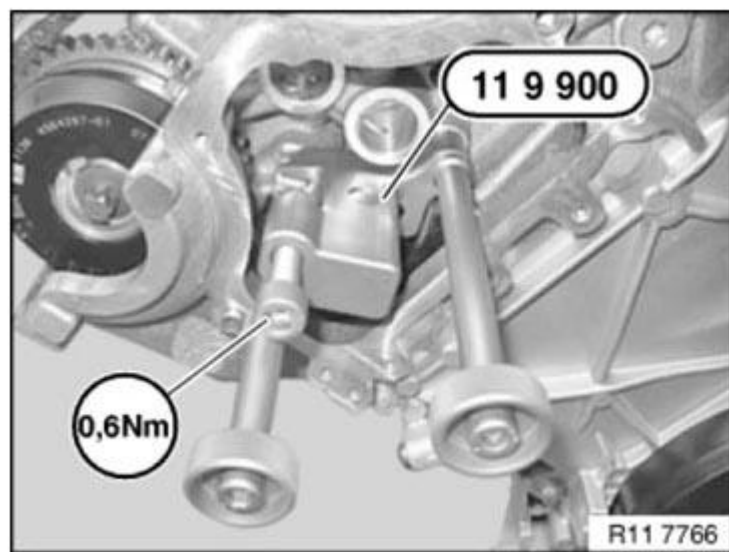


Fig. 363: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
 Courtesy of BMW OF NORTH AMERICA, INC.

Check special tools 11 9 190 for correct seating.

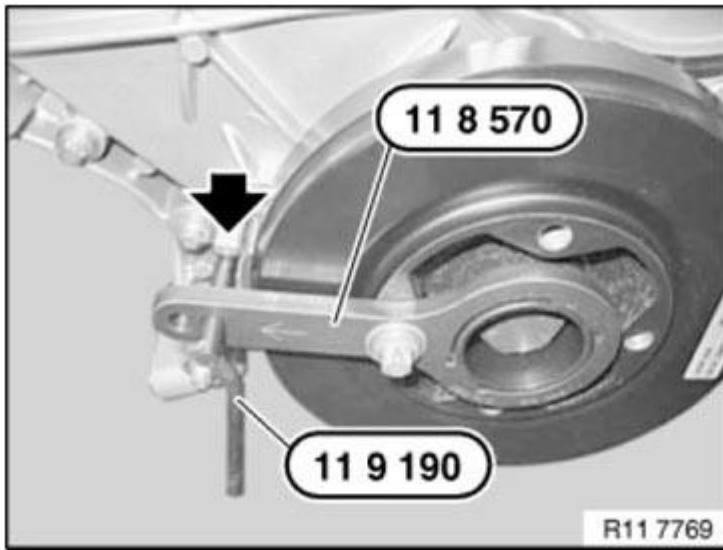


Fig. 364: Securing Vibration Damper With Special Tool 11 9 190
 Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down central screw (1 and 2) of the adjustment units with special tool 00 9 120 .

Tightening torque 11 36 1AZ .

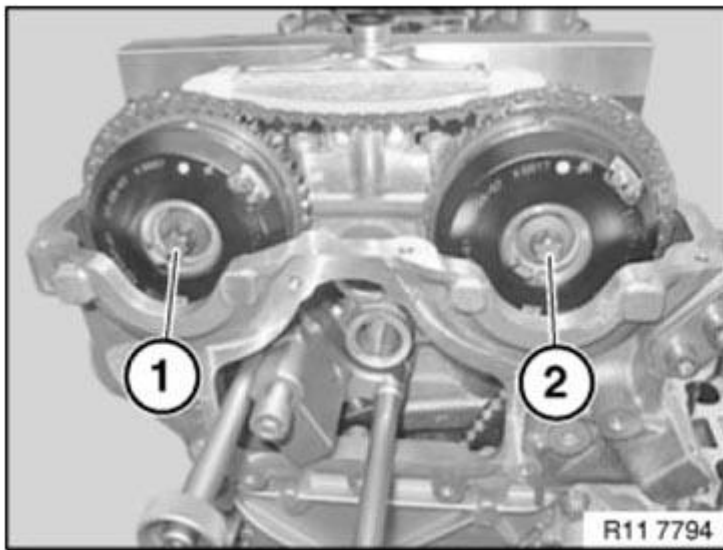


Fig. 365: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools 11 9 190 and 11 8 570 .

Crank engine at central bolt twice in direction of rotation until engine is in the **150° firing TDC position cylinder 1** again.

Mount special tool **11 8 570** on vibration damper with a bolt.

Secure special tool **11 9 190** in 150° firing TDC position cylinder 1.

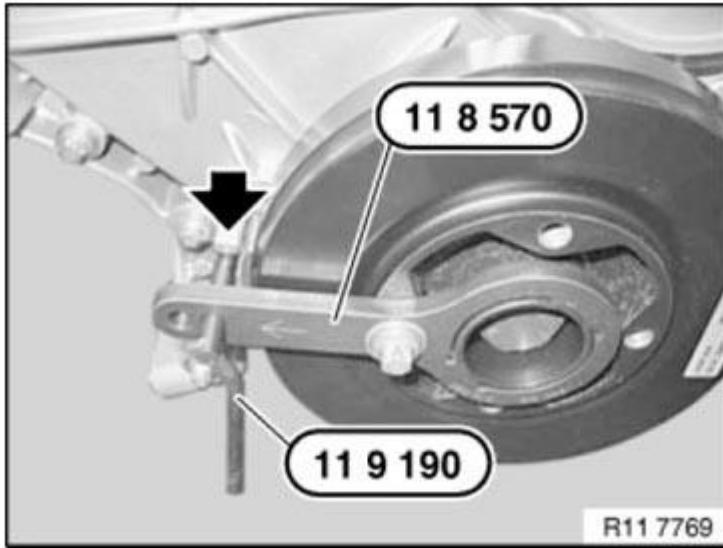


Fig. 366: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Check timing again. See **1131070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N63)**.

Remove all special tools.

1136715 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES ON LEFT SIDE (N63)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunctions if valves are contaminated:

- Irregular operation
- OBD incorrect entry
- Poor exhaust gas values
- Low engine performance

IMPORTANT: Risk of damage!

Do not clean solenoid valves with compressed air.

Solenoid valves, cylinders 5-8:

Necessary preliminary work

- Read out fault memory in DME control unit
- Switch off ignition
- Unlock hose on tank venting valve and disconnect
- Remove left **CHARGE AIR COOLER**
- Carefully press pipe to one side

NOTE: **Solenoid valve (2) controls the intake adjuster.**
 Solenoid valve (4) controls the exhaust adjustment unit.

Unlock plug connections of solenoid valves (2 and 4) and disconnect.

Installation note:

Plug connections must snap audibly into place!

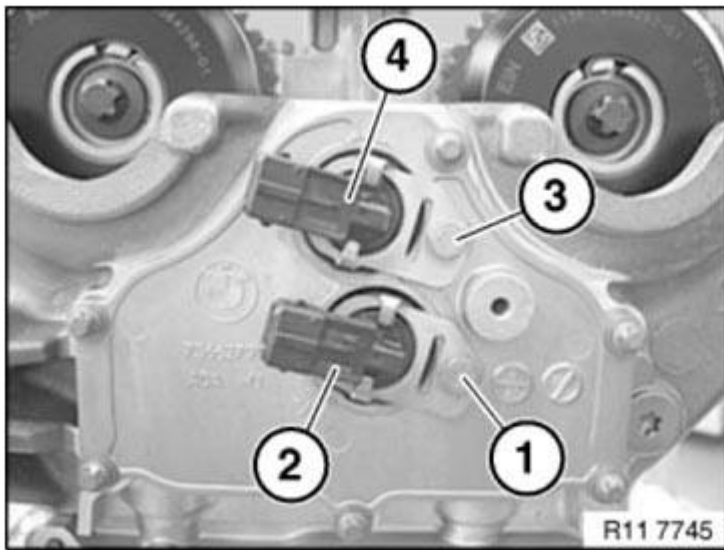


Fig. 367: Identifying Solenoid Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque **11 36 3AZ** .

Pull out solenoid valves (2 and 4).

Installation note:

Replace O-rings (1 and 2) on solenoid valve

Installation note:

To install solenoid valves, coat both O - rings with engine oil.

If the solenoid valve is to be reused, the filter strainer (see arrow) must be cleaned.

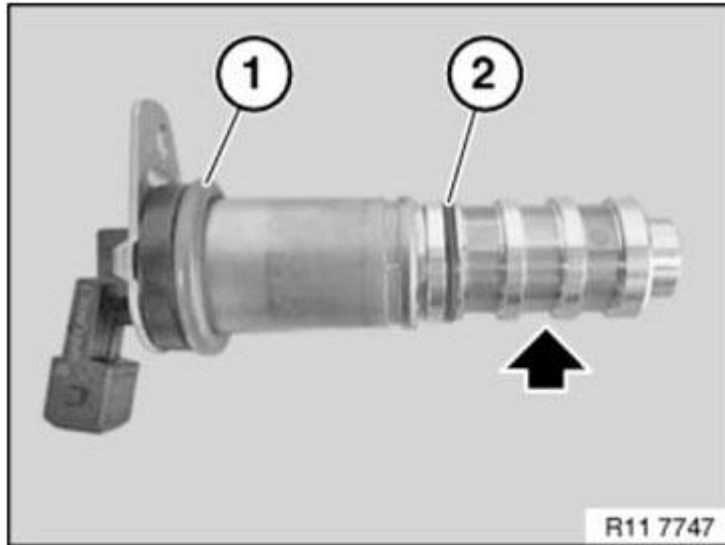


Fig. 368: Identifying O-Rings On Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If a filter element is clogged with dirt, the filter element (filter strainer) may be removed.

Release filter elements (1) at contact edges.

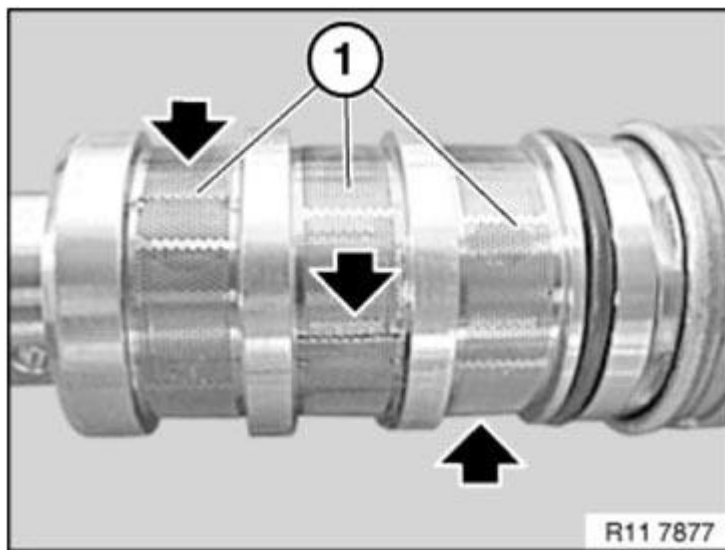


Fig. 369: Identifying Filter Elements At Contact Edges
Courtesy of BMW OF NORTH AMERICA, INC.

Bend open welding spots on filter element (1) with a screwdriver (2) in direction of arrow until welding spots are opened.

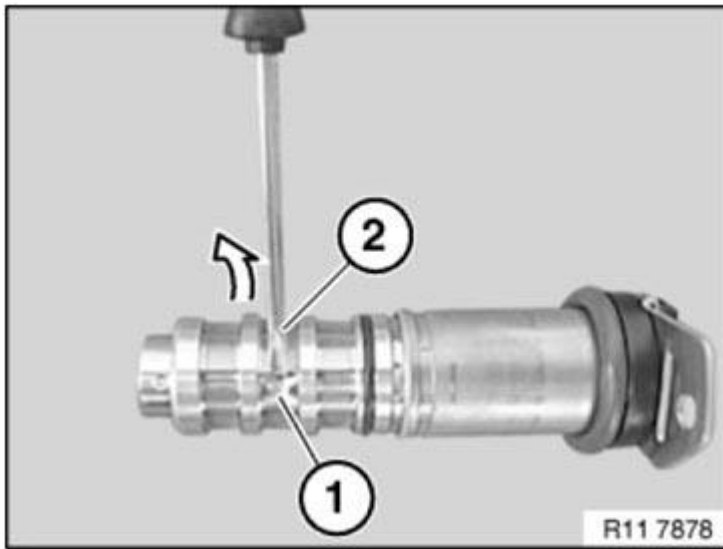


Fig. 370: Bending Open Welding Spots On Filter Element With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Avoid damaging, e.g. notches or scratches, the solenoid valve housing (see arrows).

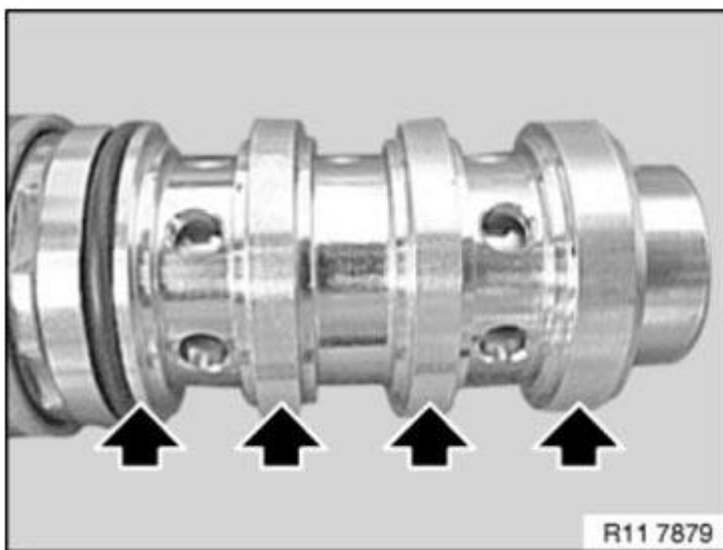


Fig. 371: Inspecting Notches Or Scratches For Solenoid Valve Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully insert solenoid valves (2 and 4) up to stop.

Ensure correct installation position.

Insert screws (1 and 3) and tighten down.

Tightening torque **11 36 3AZ** .

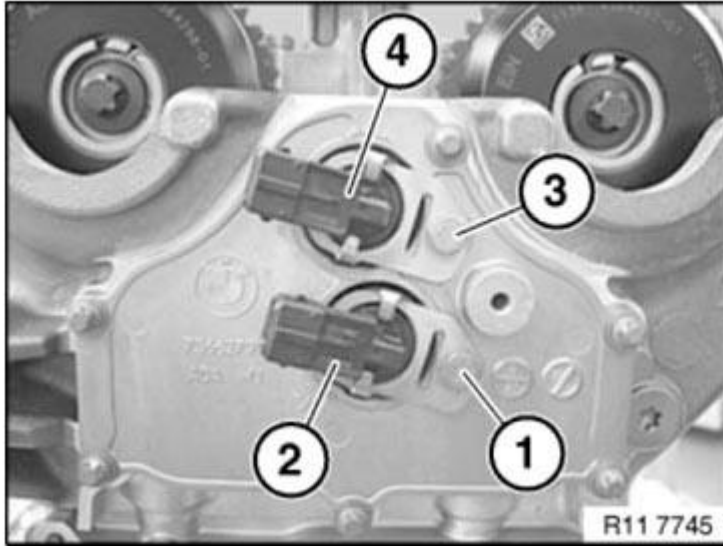


Fig. 372: Identifying Solenoid Valves

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

1136048 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS ON RIGHT SIDE (N63)

Notes

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster. Where central bolts are not greased at the bolt contact points up to engine number 20024295 , the adjustment gear must be replaced for safety reasons. The central bolts is greased from engine number 20024296.

(cylinder bank 1 to 4)

Necessary preliminary work

- Read fault memory and make a documentary record
- Remove **RIGHT CYLINDER HEAD COVER**
- Remove **RIGHT GEAR CASE COVER**
- Check **TIMING** .

To release central bolts, use special tool **11 9 890** or grip at hexagon head of camshaft.

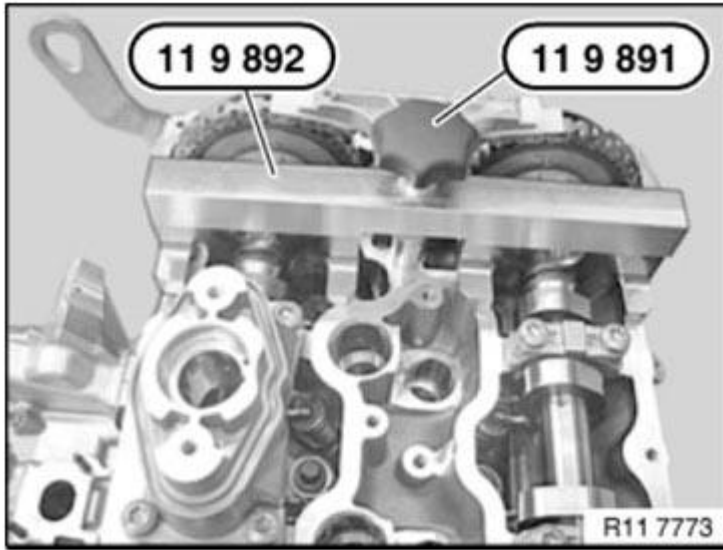


Fig. 373: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool **11 9 890** can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshafts.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

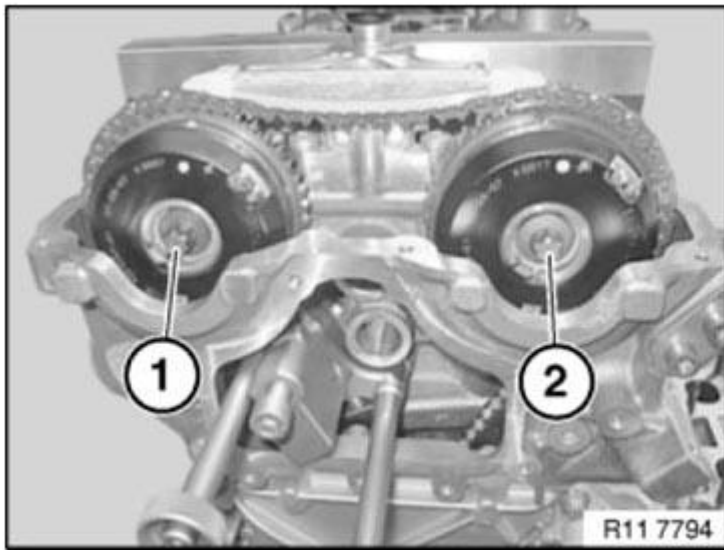


Fig. 374: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow).
If no grease can be seen on the bolt head of central bolt (1), the inlet and exhaust adjustment unit must be replaced for safety reasons.

Installation note:

Coat contact face of central bolt (1) with copper paste.

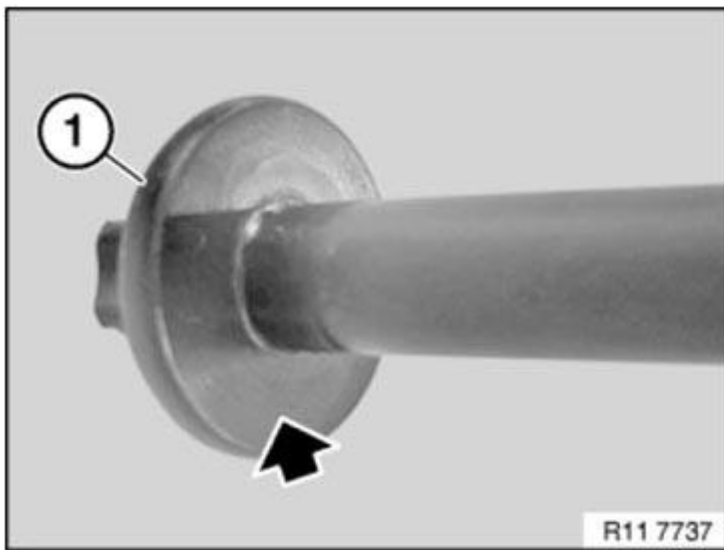


Fig. 375: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket screw.

Release special tool **11 9 900** at knurled screws and remove.

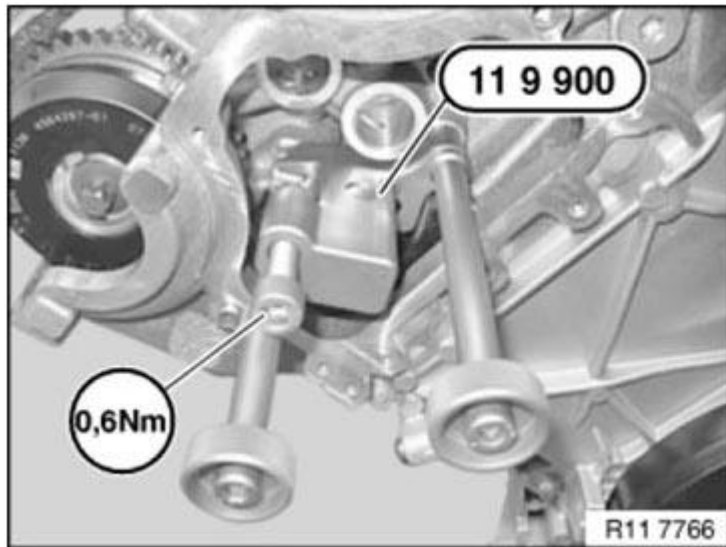


Fig. 376: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove upper tensioning rail (2).

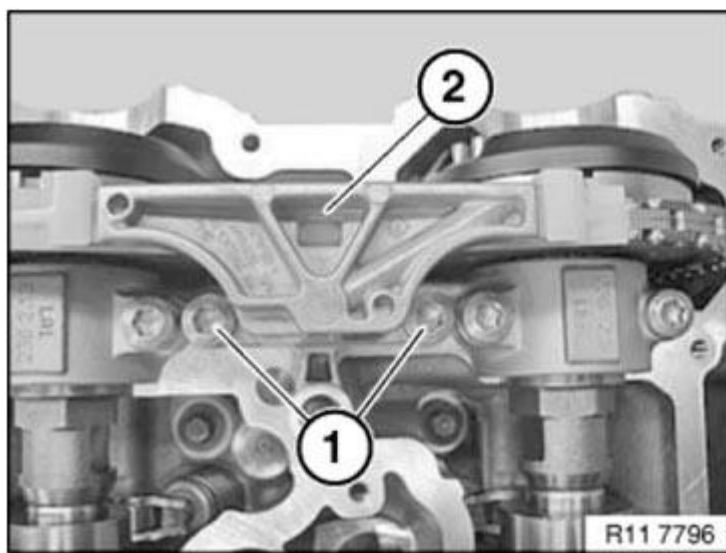


Fig. 377: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove central bolt (1) of exhaust adjustment unit.

Installation note:

Replace central bolts after releasing.

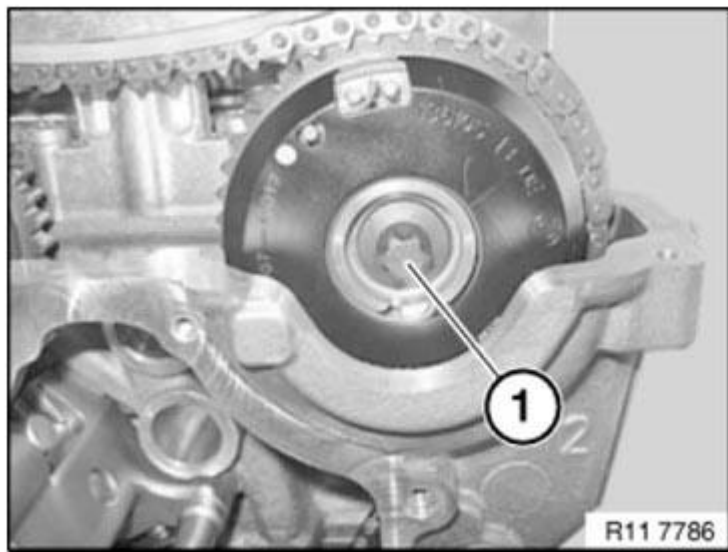


Fig. 378: Identifying Central Bolt Of Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Detach exhaust adjustment unit (1) in direction of arrow from exhaust camshaft.

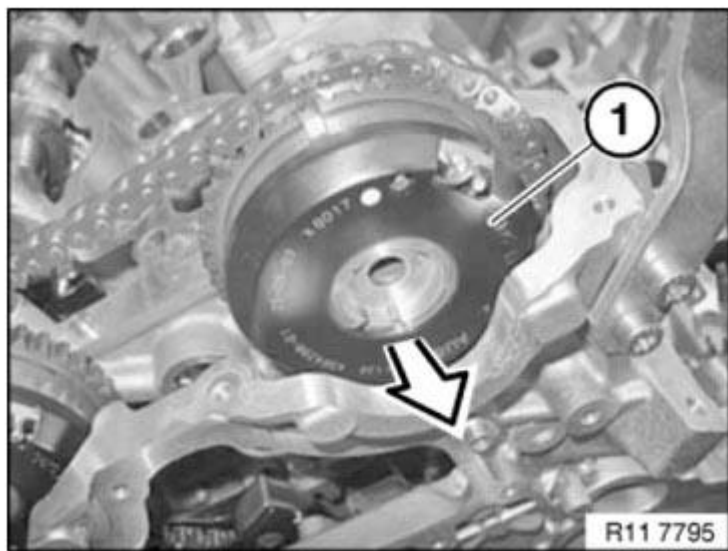


Fig. 379: Identifying Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out exhaust adjustment unit (2) from timing chain (1).

Lift out exhaust adjustment unit (2).

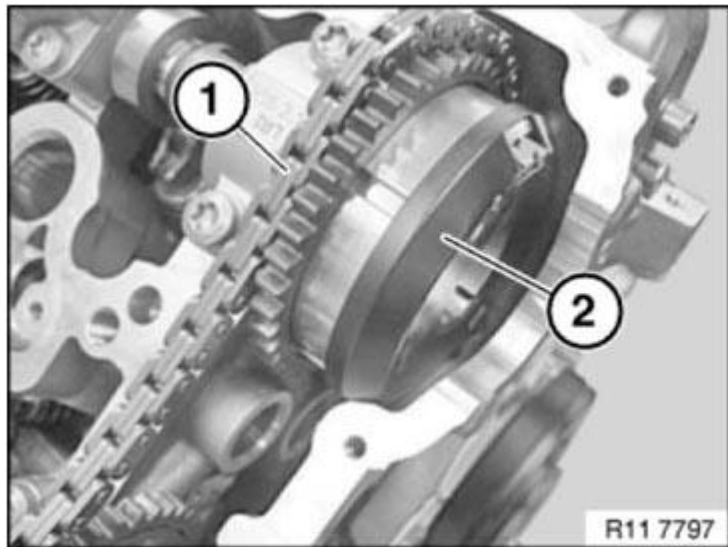


Fig. 380: Identifying Exhaust Adjustment Unit And Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

Remove central bolt (1) of inlet adjustment unit.

Installation note:

Replace central bolts after releasing.

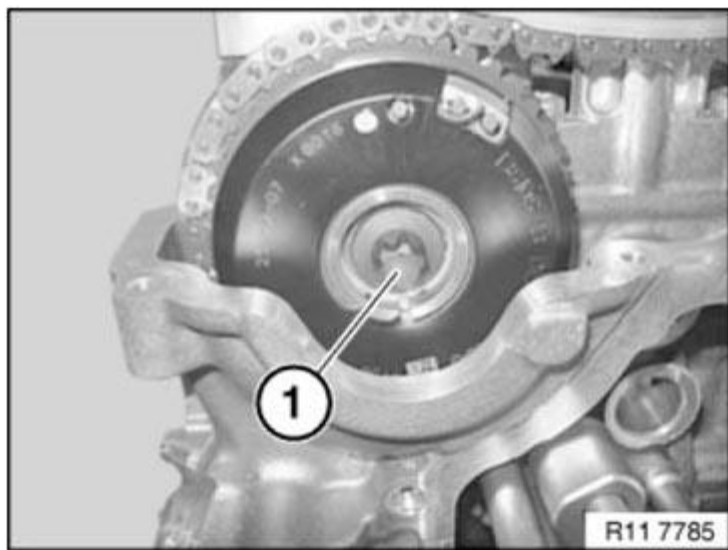


Fig. 381: Identifying Central Bolt Of Inlet Adjustment Unit

Courtesy of BMW OF NORTH AMERICA, INC.

Detach inlet adjustment unit (1) in direction of arrow from inlet camshaft.

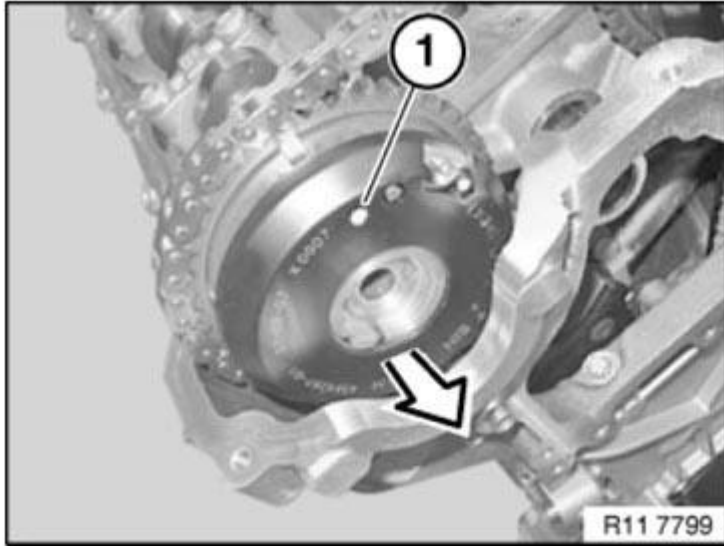


Fig. 382: Identifying Inlet Adjustment Unit

Courtesy of BMW OF NORTH AMERICA, INC.

Feed out inlet adjustment unit (2) from timing chain (1).

Lift out inlet adjustment unit (2).

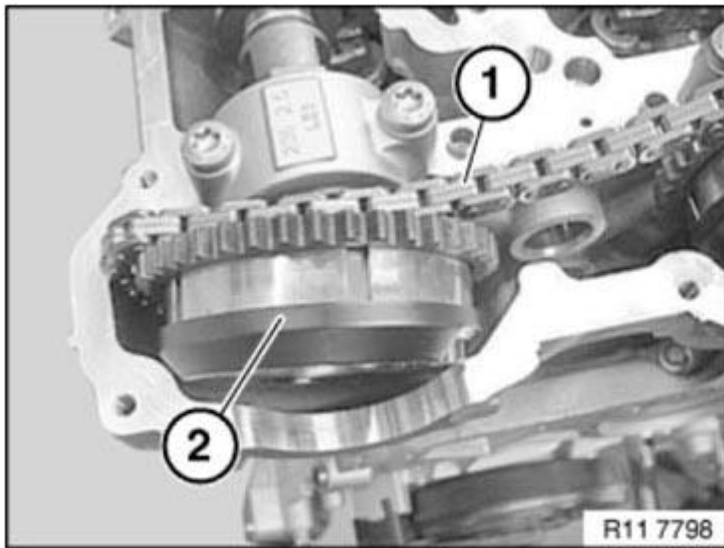


Fig. 383: Identifying Exhaust Adjustment Unit And Timing Chain

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

Intake and exhaust camshaft adjusters are different.

Mixing up the inlet and exhaust adjustment units will cause damage to the engine.

1. Intake camshaft adjuster (1) is marked **IN**
2. Exhaust camshaft adjuster (2) is marked **OUT**

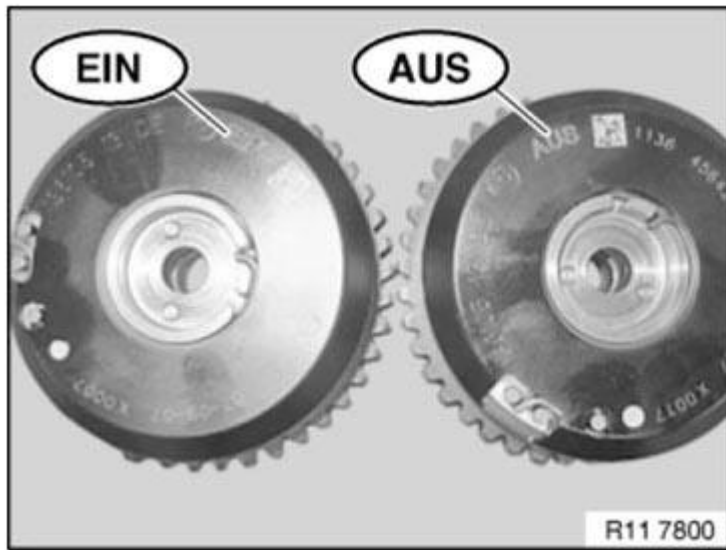


Fig. 384: Identifying Intake And Exhaust Camshaft Adjusters Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Coat contact face of central bolt (1) with copper paste.

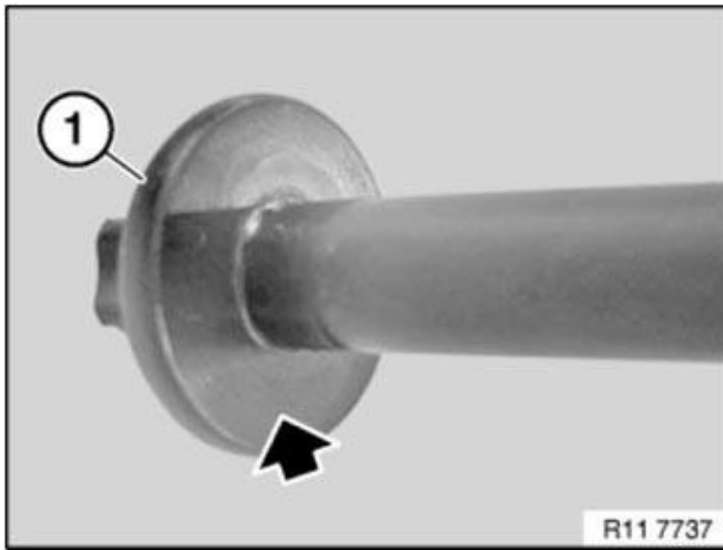


Fig. 385: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of adjustment units in relation to timing chain can be freely selected.

Feed adjuster into timing chain and position on camshafts.

Insert central bolts (1 and 2) on adjustment units without gaps.

Release central bolts (1 and 2) by 90°.

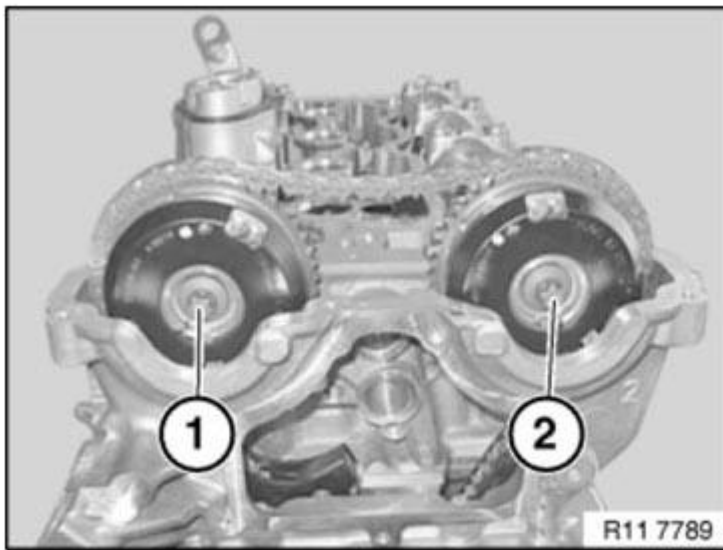


Fig. 386: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sliding rail (2) and secure with screws (1).

Tightening torque: **11 31 4AZ** .

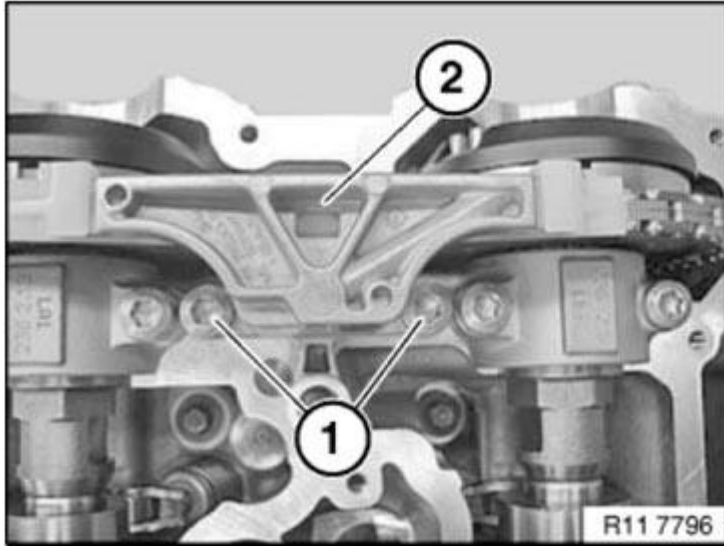


Fig. 387: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Get set of special tools **11 9 890** ready for securing camshafts.

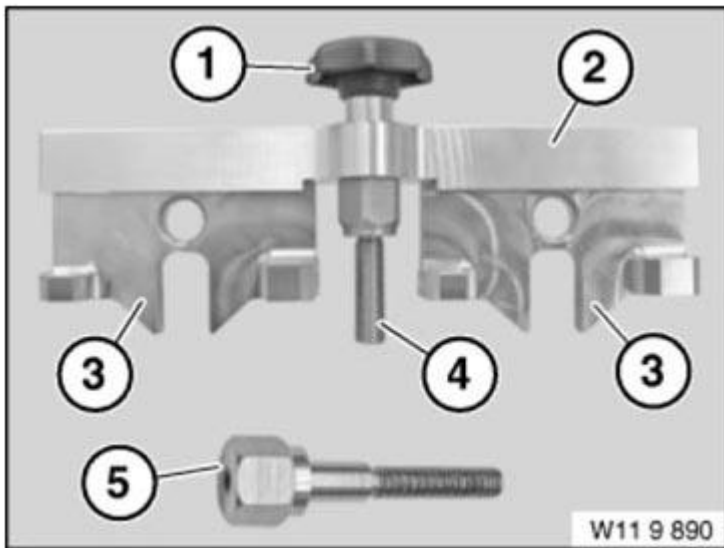


Fig. 388: Identifying Set Of Special Tools 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on exhaust camshaft.

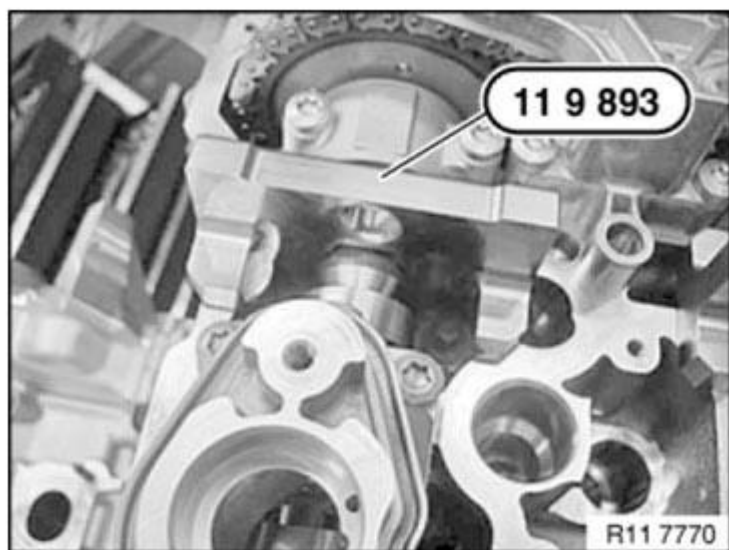


Fig. 389: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft.

Installation note:

Align exhaust and intake camshafts so that special tools 11 9 893 lie on the cylinder head without any gap.

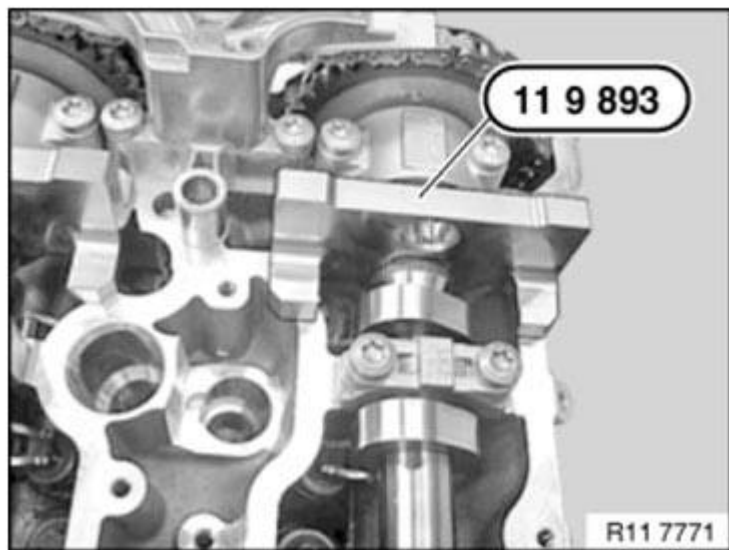


Fig. 390: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 894 into cylinder head.

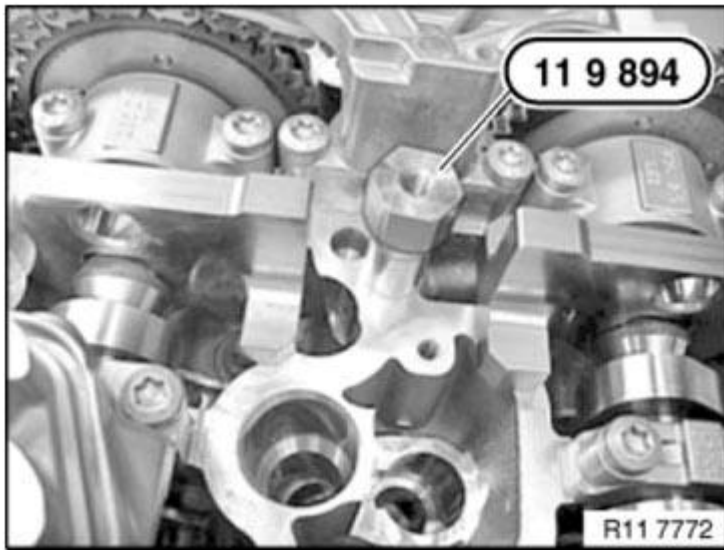


Fig. 391: Identifying Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 9 892 down with special tool 11 9 891.

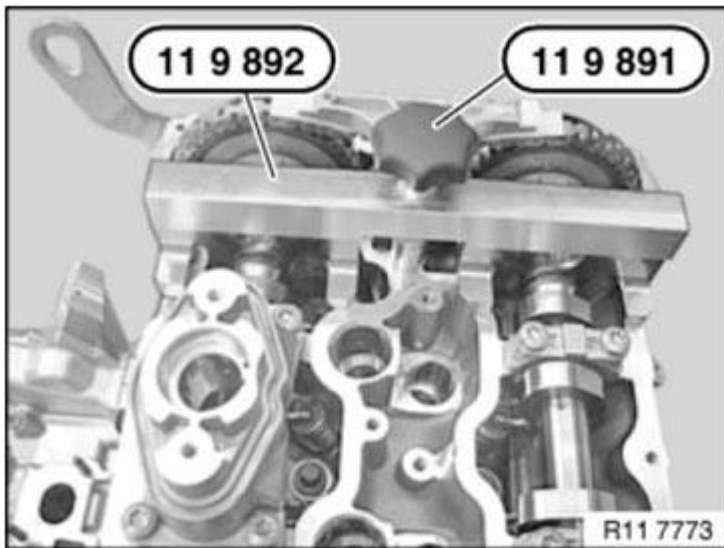


Fig. 392: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 9 900 .

Pretension timing chain with special tool 11 9 900 .

Preload hexagon socket screw with special tool 00 9 250 to 0.6 Nm.

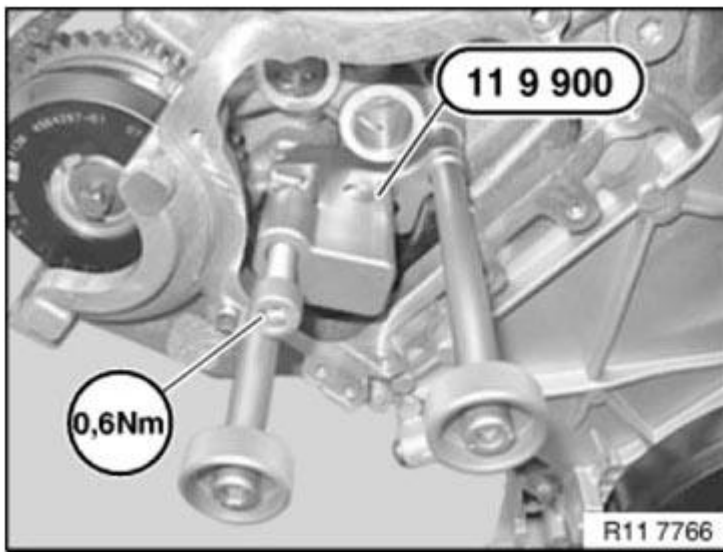


Fig. 393: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
 Courtesy of BMW OF NORTH AMERICA, INC.

Check special tools 11 9 190 for correct seating.

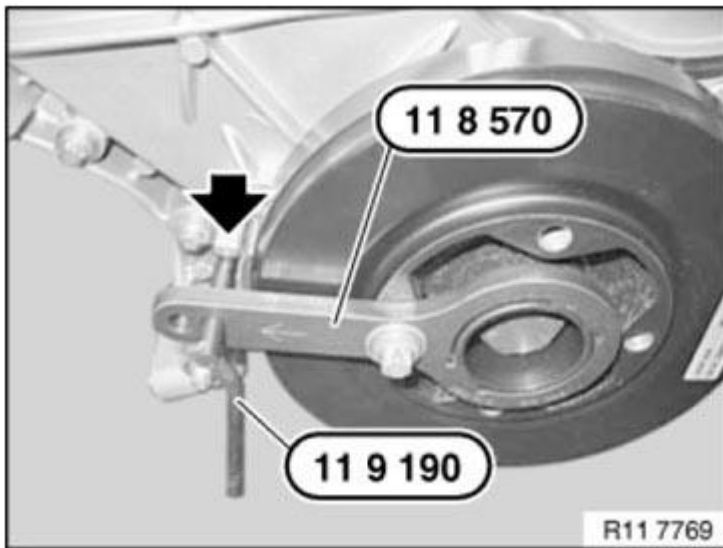


Fig. 394: Securing Vibration Damper With Special Tool 11 9 190
 Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down central screw (1 and 2) of the adjustment units with special tool 00 9 120 .

Tightening torque 11 36 1AZ .

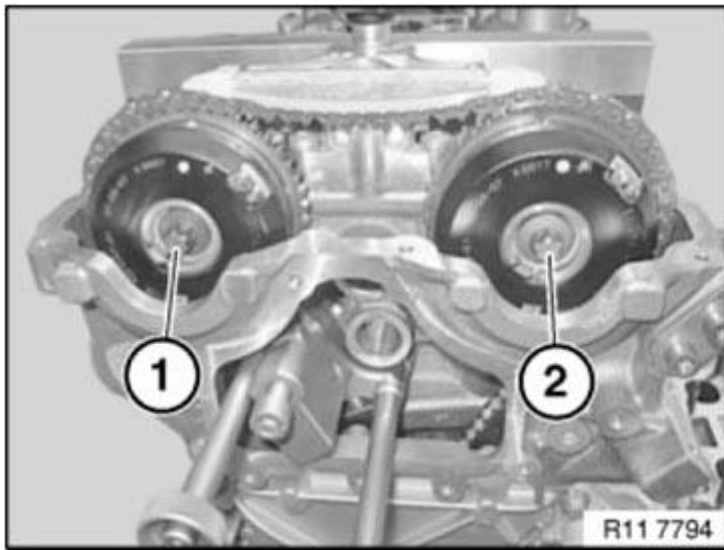


Fig. 395: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools 11 9 190 and 11 8 570 .

Crank engine at central bolt twice in direction of rotation until engine is in the **150° firing TDC position cylinder 1** again.

Mount special tool 11 8 570 on vibration damper with a bolt.

Secure special tool 11 9 190 at 150° before cylinder no. 1 firing TDC position.

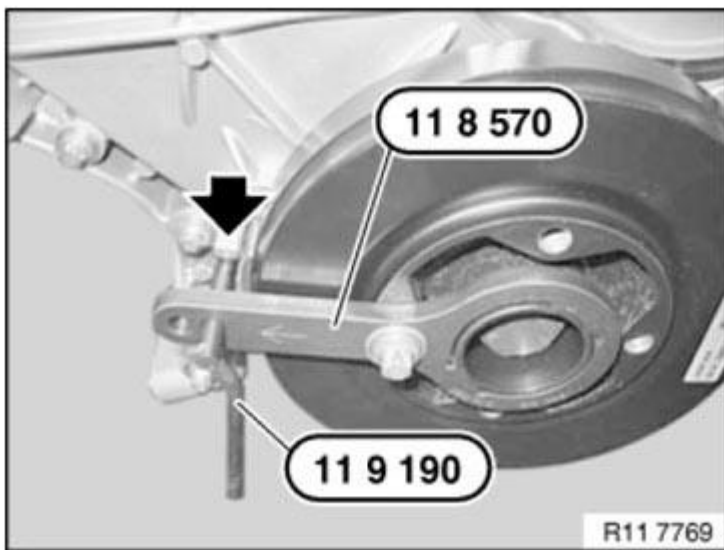


Fig. 396: Securing Vibration Damper With Special Tool 11 9 190
 Courtesy of BMW OF NORTH AMERICA, INC.

Check timing again. See **1131071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N63)**.

Remove all special tools.

1140 OIL SUPPLY

1140000 CHECKING ENGINE OIL PRESSURE

Notes

WARNING: Risk of scalding!

NOTE: To check the engine oil pressure, remove the oil pressure switch and install and connect the special tool.

NOTE: A small amount of engine oil emerges when the oil pressure switch is removed.

Have a cleaning cloth ready.

Necessary preliminary work

- Follow BMW diagnosis instruction
- Remove **OIL PRESSURE SWITCH**

Special tool **11 4 050** is equipped with a sealing ring (1).

IMPORTANT: Tightening torque of special tool **11 4 050** max. 20 Nm.

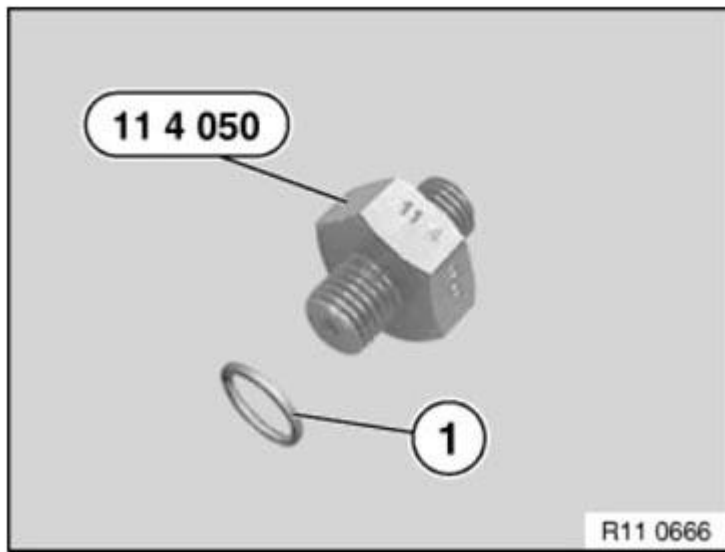


Fig. 397: Identifying Special Tool (11 4 050) And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool **11 4 050** into crankcase to max. 20 Nm.

Secure union nut (1) of special tool 13 3 063 to max. 15 Nm.

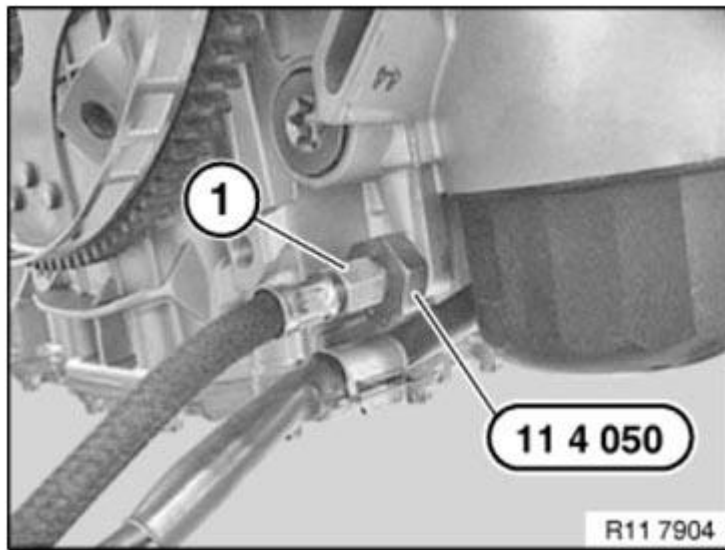


Fig. 398: Identifying Union Nut And Special Tool 11 4 050
Courtesy of BMW OF NORTH AMERICA, INC.

Checking engine oil pressure with DIS Tester

Screw special tool 13 6 054 with sealing ring (1) into special tool 13 6 051 and connect to DIS tester.

Checking engine oil pressure with pressure gauge

Connect special tool 13 3 063 with special tool 13 3 061 (pressure gauge).

Start engine and check engine oil pressure.

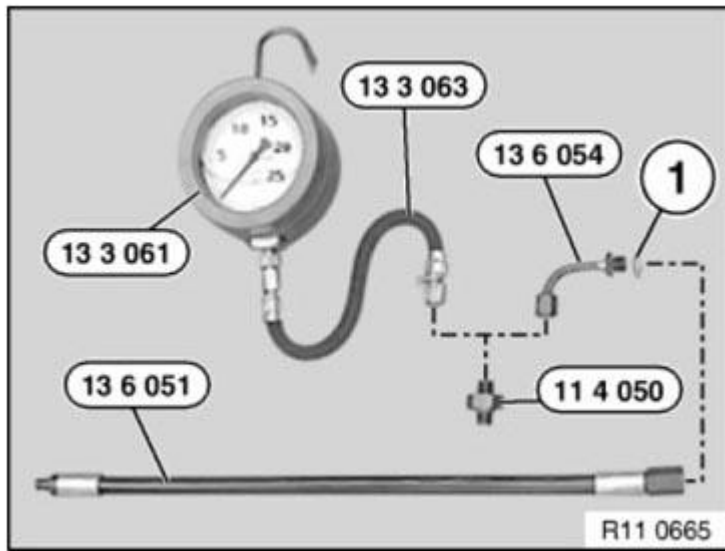
SPECIFIED VALUE .

Fig. 399: Checking Engine Oil Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

1141 OIL PUMP WITH FILTER AND DRIVE**1141000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N63)****Notes**

IMPORTANT: All adjusting procedures on the chain drive must be observed.
A timing chain which is tensioned too tautly can cause noises in the chain drive.
A timing chain that is too slack can cause the timing chain to jump.
Risk of damage in oil pump drive.

Necessary preliminary work

- **DRAIN ENGINE OIL** .
- **REMOVE UPPER OIL SUMP SECTION** .

Unscrew nuts (2).

Tightening torque: **11 41 1AZ** .

Remove intake pipe (1).

Installation note:

Replace O-ring.

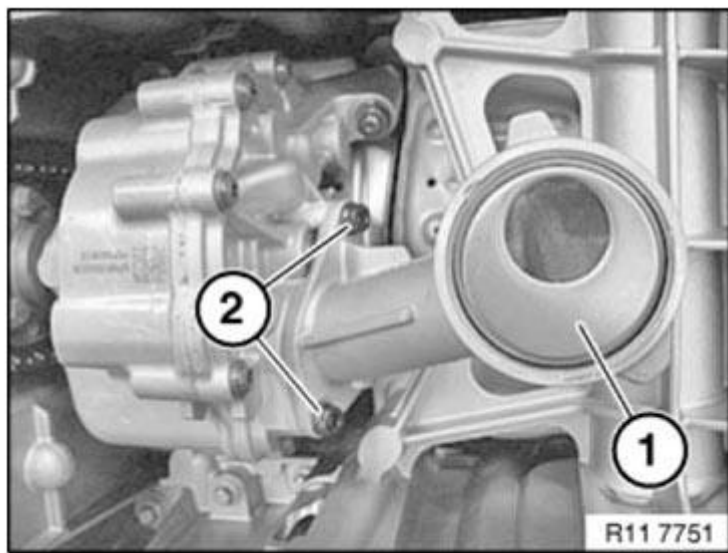


Fig. 400: Identifying Intake Pipe And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release all nuts (1) using special tool 11 7 201.

Tightening torque **11 41 5 AZ** .

Remove oil pump drive gear.

NOTE: **Illustration shows engine removed.**

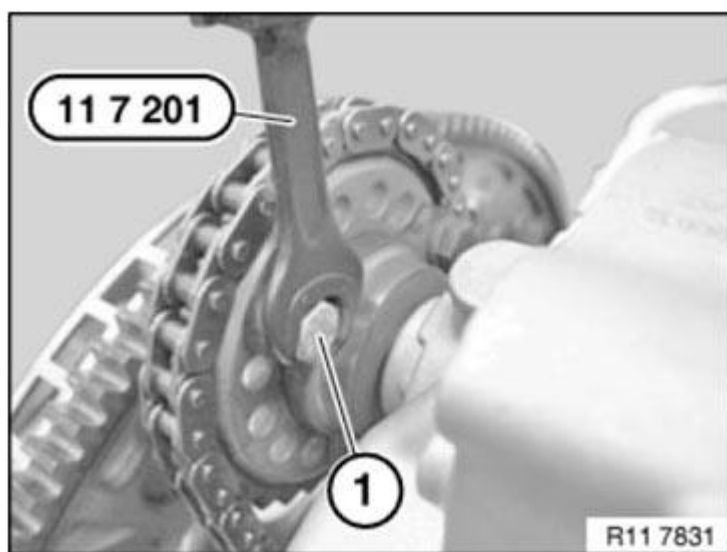


Fig. 401: Removing Nuts Using Special Tool 11 7 201
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Release screws, remove oil pump (1) with aid of a second person.

Installation note:

Replace screws.

Tightening torque **11 41 2AZ** .

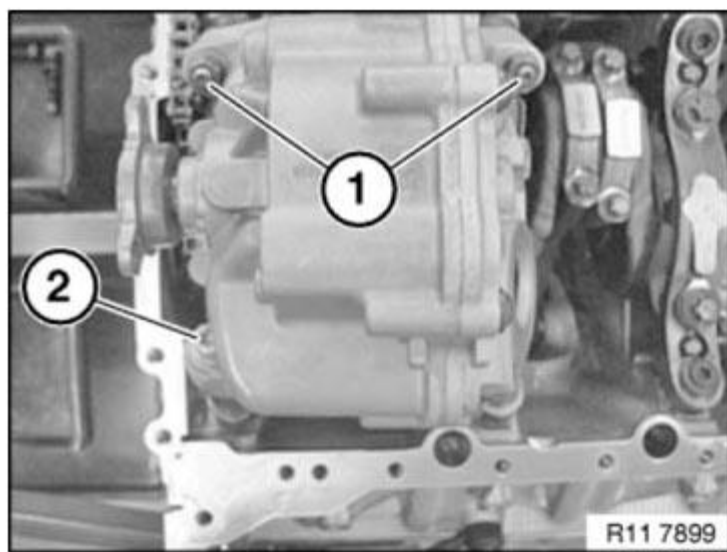


Fig. 402: Identifying Oil Pump And Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Detach oil lines (1) upwards in direction of arrow.

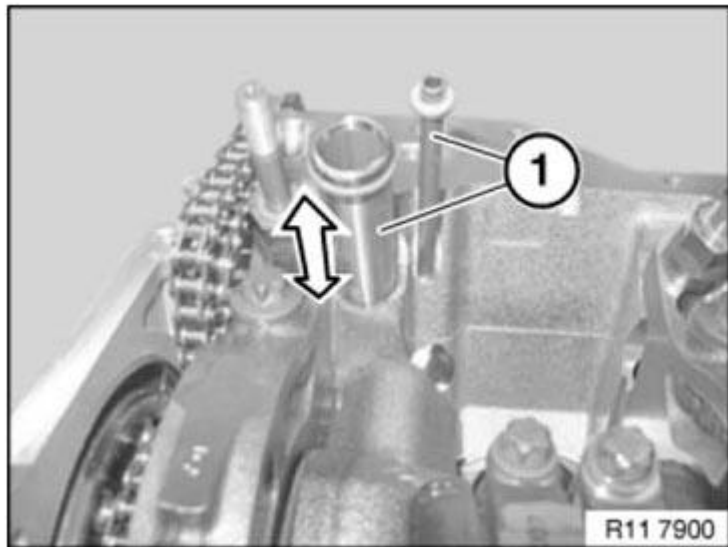


Fig. 403: Detaching Oil Lines Upwards In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings (1).

Apply light coat of oil to sealing ring (1).

Coat sealing ring (2) with suitable lubricant.

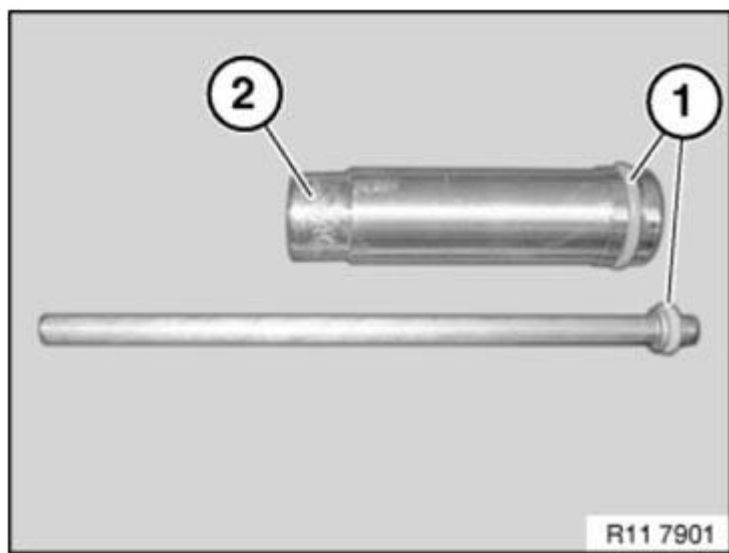


Fig. 404: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace O-ring (1) for oil feed line.

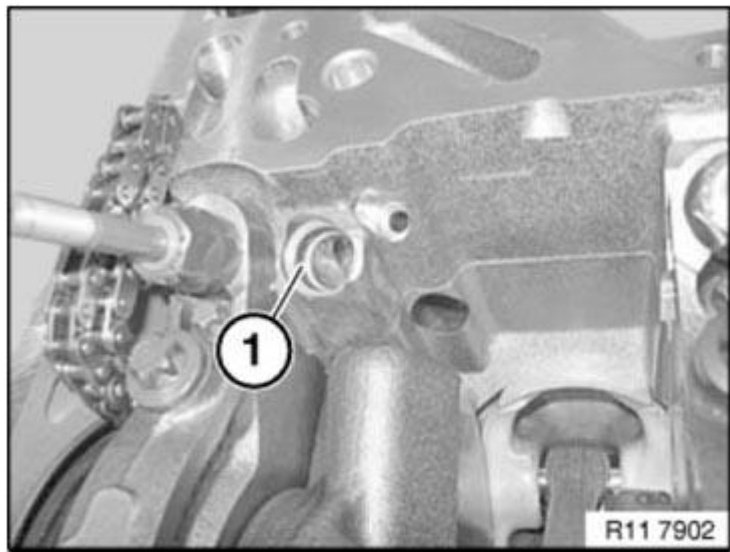


Fig. 405: Identifying O-Ring Of Oil Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Fit oil lines (1) in direction of arrow.

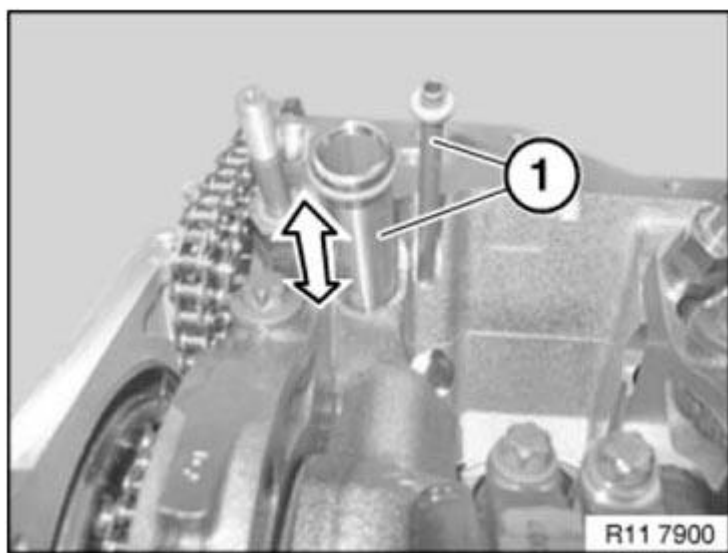


Fig. 406: Fitting Oil Lines In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If the oil pump is renewed, the oil deflector must be converted.

Release screws (1).

Tightening torque: **11 41 6 AZ** .

Modify oil deflector (2).

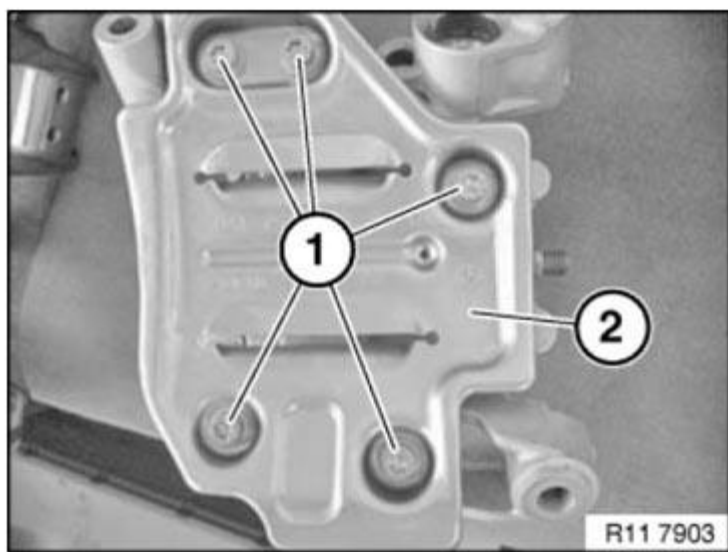


Fig. 407: Identifying Oil Deflector And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 8 920 on special tool 11 9 280 .

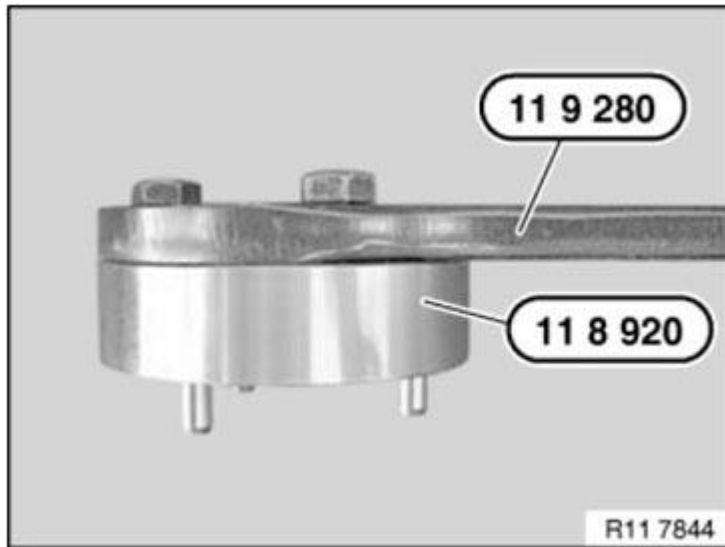


Fig. 408: Fitting Special Tool 11 8 920 On Special Tool 11 9 280
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Left-hand thread on oil pump screw connection.
Do not grip oil pump drive with a pair of pliers risk of damage.

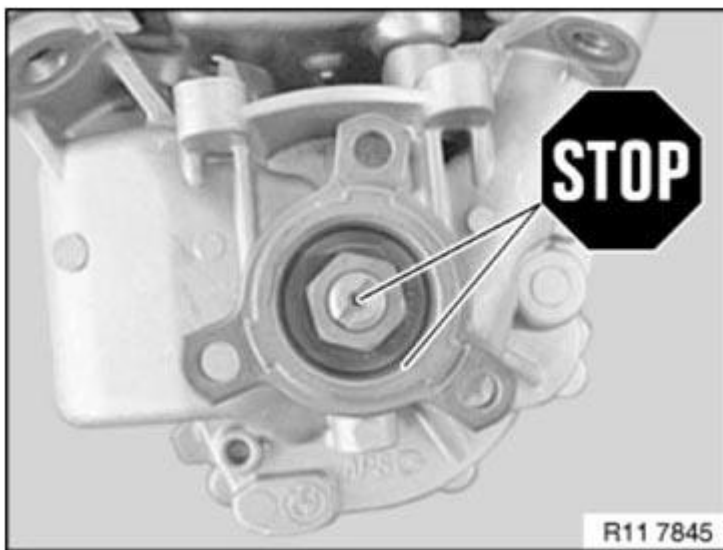


Fig. 409: [Caution - Do Not Grip Oil Pump Drive With Pair Of Pliers Risk Of Damage]
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Nut (1) has left-hand thread.

Position special tool **11 8 920** on sprocket.

Slacken nut (1).

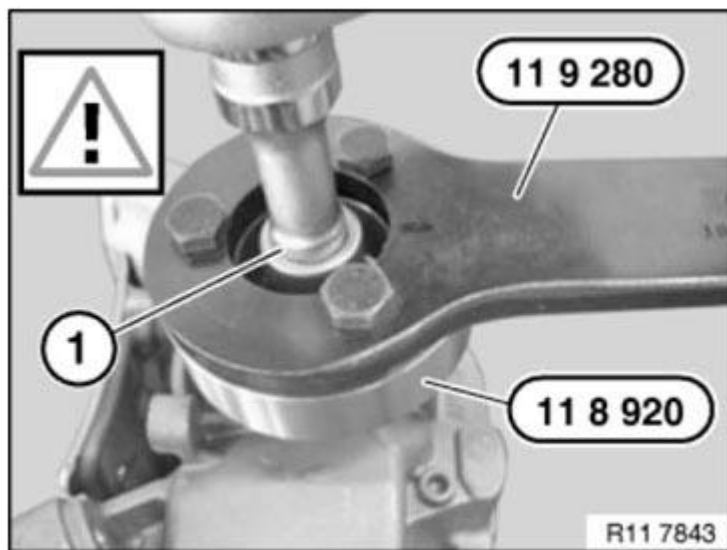


Fig. 410: Positioning Special Tool 11 8 920 On Sprocket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check mounting flats on pump shaft (1) for damage.

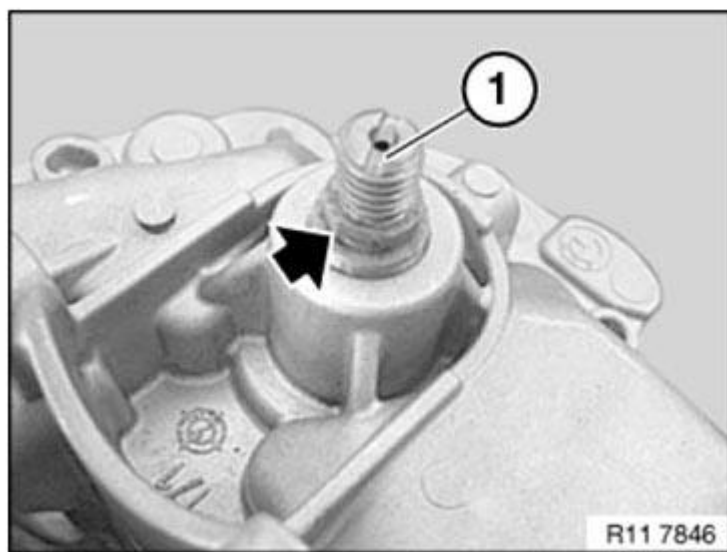


Fig. 411: Checking Mounting Flats On Pump Shaft For Damage

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Nut (1) has left-hand thread.

Grip pump with assistance of a second person.

Secure nut (1) with special tool 00 9 120 .

Tightening torque: 11 41 4

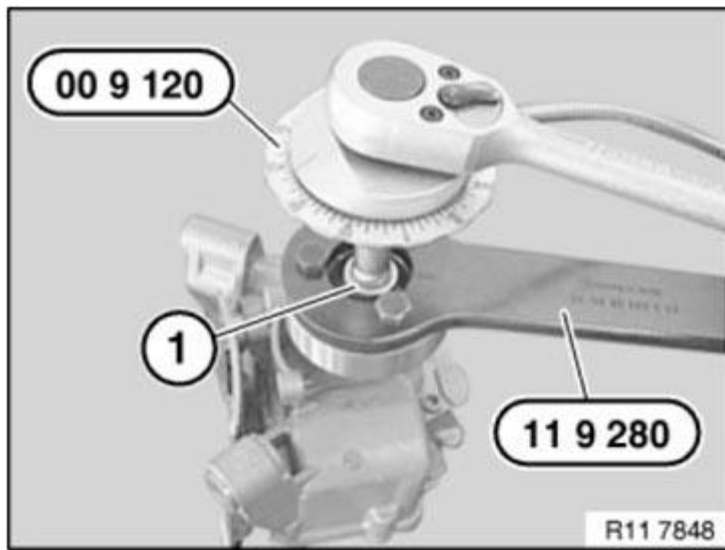


Fig. 412: Securing Nut With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure nuts (1).

Tightening torque 11 41 2 AZ .

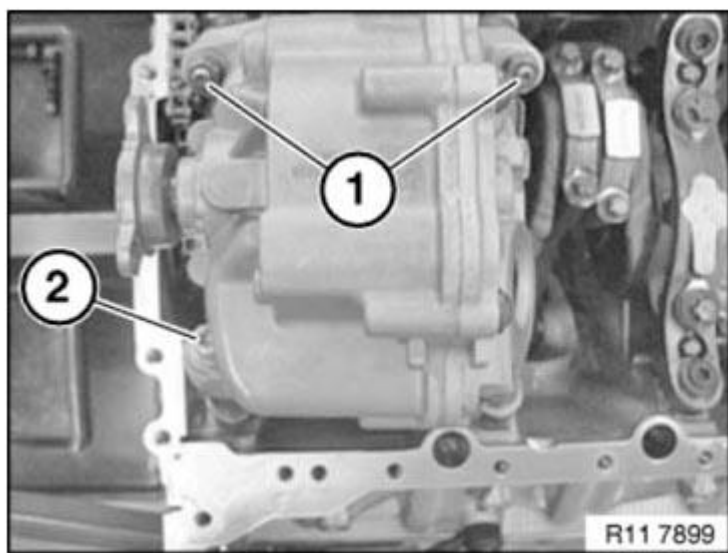


Fig. 413: Identifying Oil Pump And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Install oil pump drive gear.

Secure all nuts (1) with special tool 11 7 201.

Tightening torque **11 41 5 AZ** .

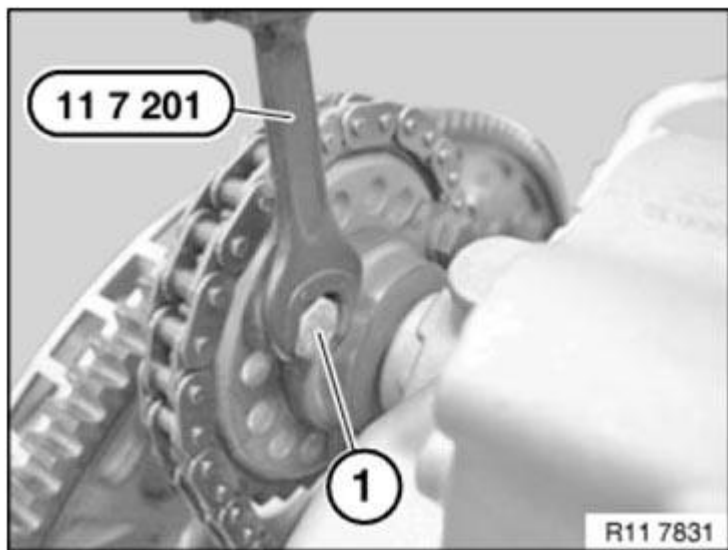


Fig. 414: Tightening Nuts Using Special Tool 11 7 201
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil pump timing chain

Pretension oil pump adjusting sleeve (1) with a hexagon socket wrench.

Adjustment value **10 mm +2**.

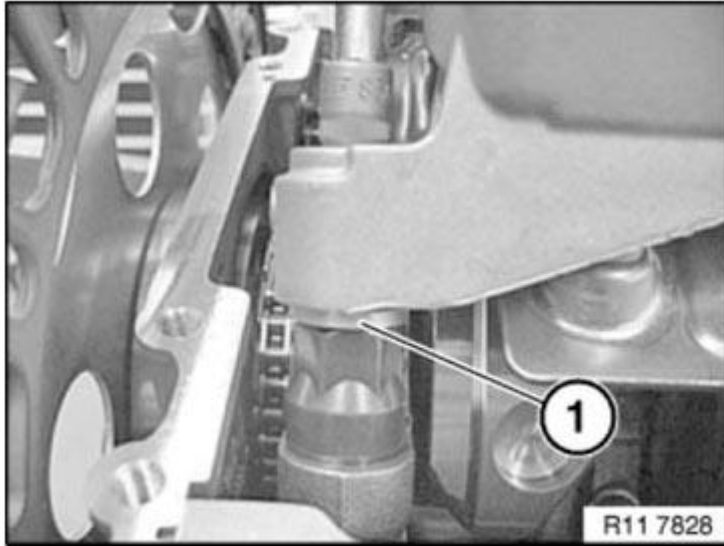


Fig. 415: Pretensioning Oil Pump Adjusting Sleeve With Hexagon Socket Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Minimally preload timing chain (1) with special tool 51 0 342.

Read off measured value A on special tool 51 0 342 and note down.

IMPORTANT: Do not use force to preload timing chain (1).

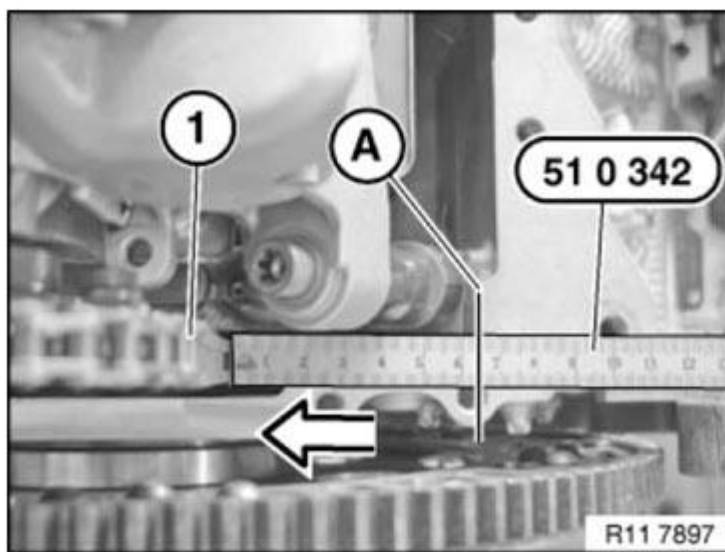


Fig. 416: Measuring Value A On Special Tool 51 0 342

Courtesy of BMW OF NORTH AMERICA, INC.

Using a screwdriver (1), preload timing chain to minimal extent in direction of arrow.

Read off measured value B on special tool 51 0 342 and note down.

IMPORTANT: Do not use force preload timing chain.

Measured value A minus measured value B results in the adjustment value.

Adjustment value **10 mm +2**.

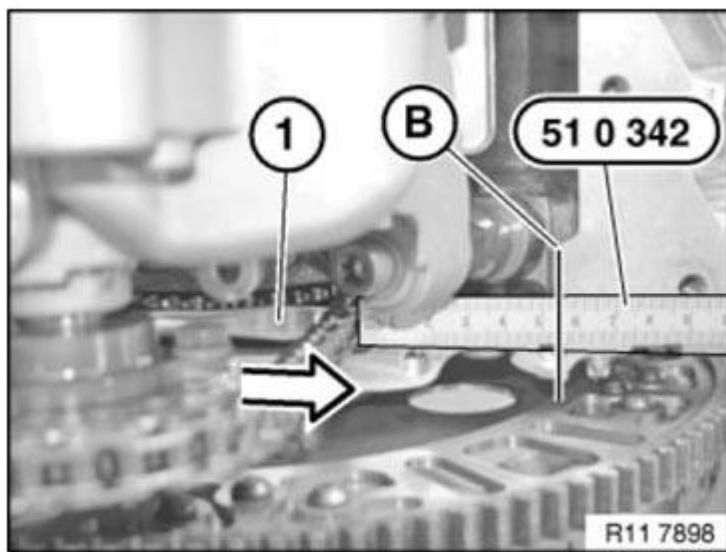


Fig. 417: Measuring Value B On Special Tool 51 0 342
Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure screw (2).

Tightening torque **11 41 2 AZ** .

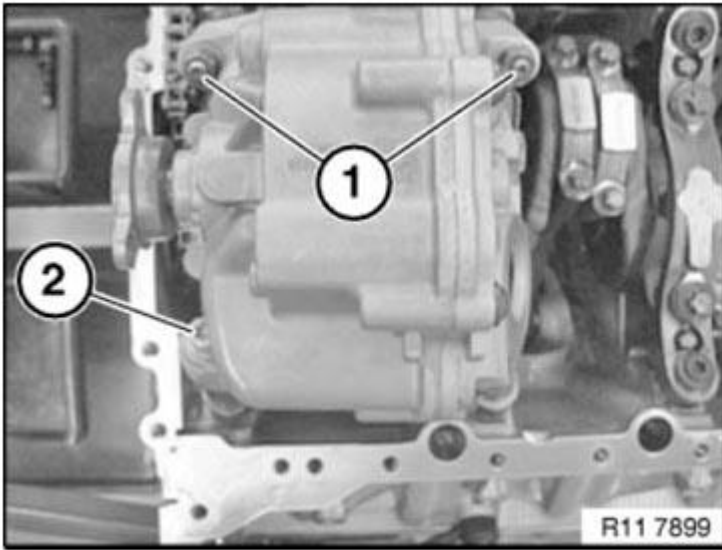


Fig. 418: Identifying Oil Pump And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 41 150 REMOVING AND INSTALLING/REPLACING ROLLER CHAIN FOR OIL PUMP DRIVE (N63)

Special tools required:

- 11 7 201
- 22 13 485

See **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

See **ENGINE AND GEARBOX SUSPENSION - SPECIAL TOOLS** .

Necessary preliminary tasks:

- Drain **engine oil**.
- Remove **flywheel**.
- Remove **bottom of oil sump**.

NOTE: **Support bush (2) is included in delivery specification.**

If the crankshaft seal (1) is stored for more than six months without the support sleeve (2), its operational reliability will no longer be guaranteed. **Crankshaft seal (1) must not be reused in this case!** Support bush (2) remains in the crankshaft seal (1) and is used as a slip bush during described installation described below.

IMPORTANT: The sealing lip of the crankshaft seal (1) is very sensitive and must not be kinked.

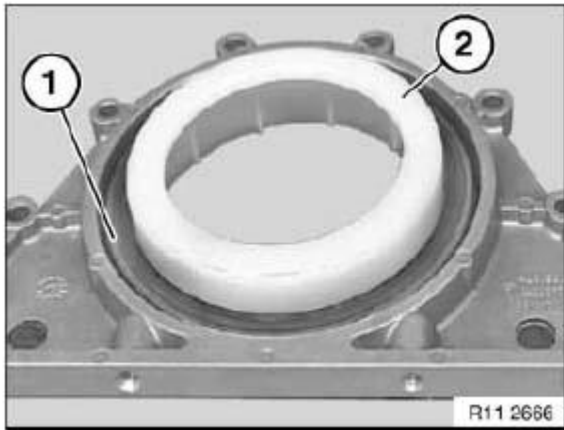


Fig. 419: Identifying Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (2). Tightening torque: 10 Nm. Remove intake pipe (1).

Installation note: Replace O-ring.

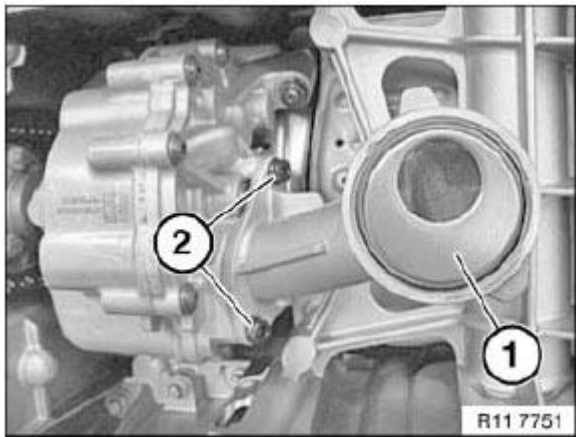


Fig. 420: Identifying Intake Pipe Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release all nuts (1) using special tool 11 7 201. Tightening torque: 10 Nm. Remove oil pump drive gear.

NOTE: Graphic shows engine removed

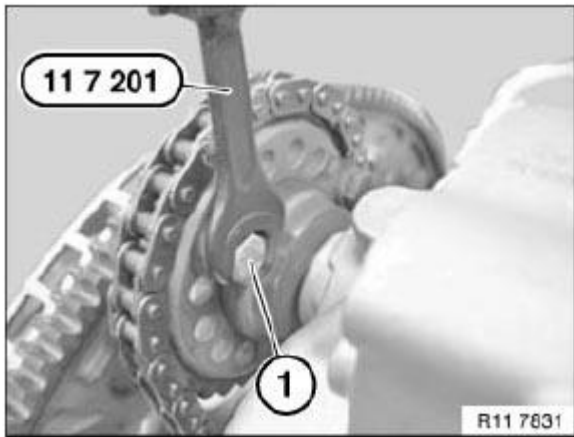


Fig. 421: Removing Oil Pump Sprocket Wheel Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1). Release screws, remove oil pump (1) with aid of a second person.

Installation note: Replace screws. Tightening torque: 24 Nm

NOTE: **Graphic without top oil sump**

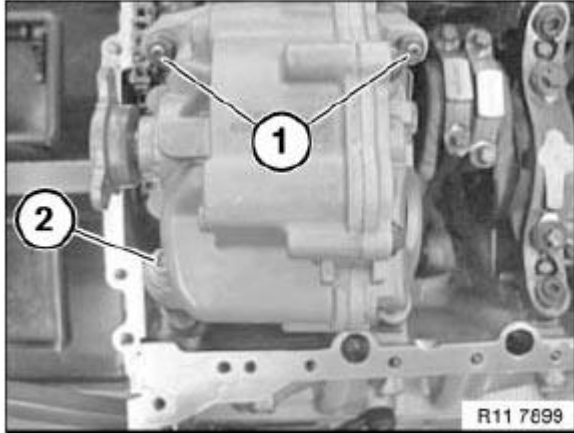


Fig. 422: Identifying Oil Pump With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off engine oil line (1) upwards in direction of arrow.

NOTE: **Graphic without top oil sump**

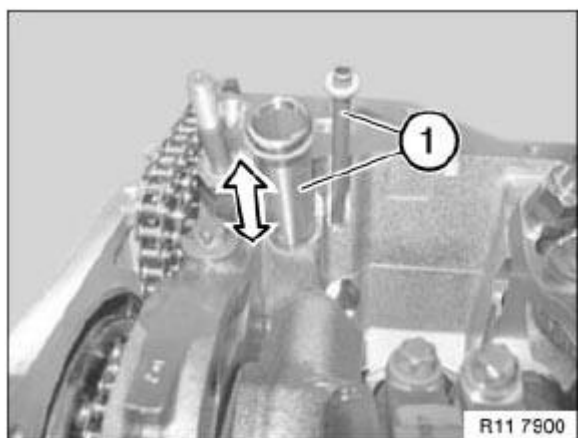


Fig. 423: Detaching Oil Lines

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Replace sealing rings (1). Lightly oil sealing ring 1 (1). Coat engine oil pipe (2) with suitable lubricant.

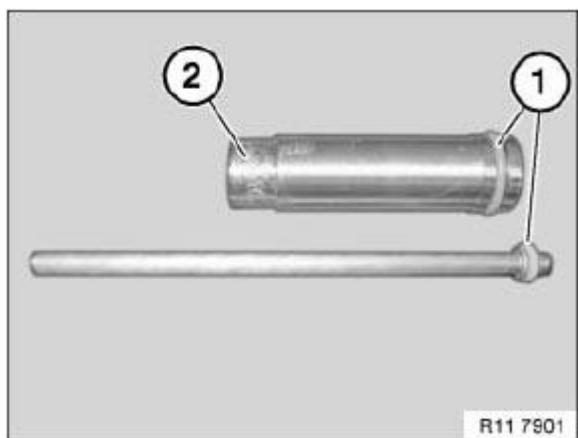


Fig. 424: Identifying Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Replace O-ring (1) for oil feed line.

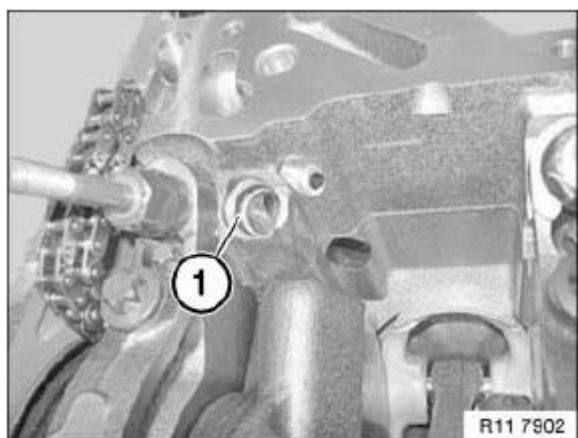


Fig. 425: Identifying O-Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Fit engine oil pipe (1) in direction of arrow.

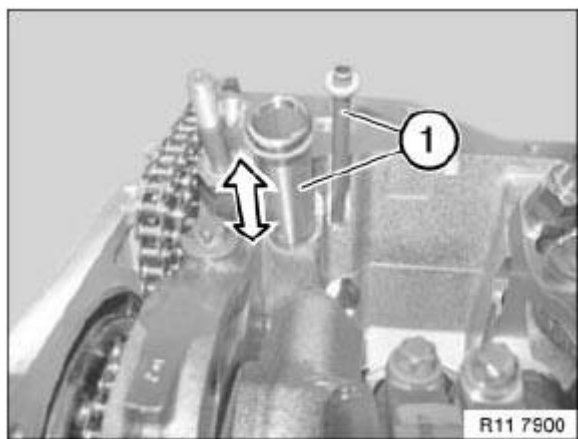


Fig. 426: Detaching Oil Lines

Courtesy of BMW OF NORTH AMERICA, INC.

Feed out roller chain (1) via the crankshaft (2).

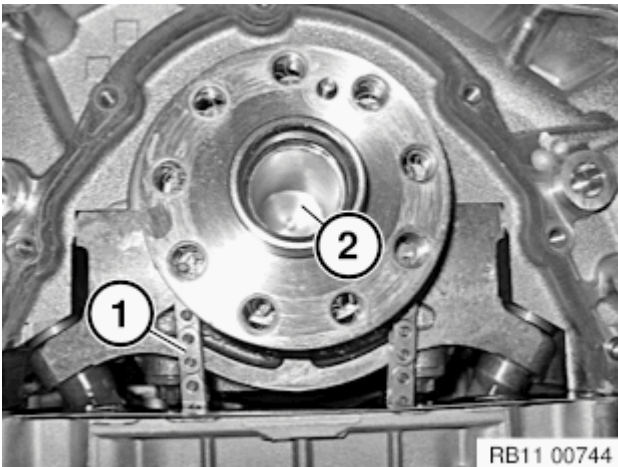


Fig. 427: Feeding Out Roller Chain

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Mount new roller chain (1). Install oil pump and adjust.

Procedure on installed engine:

Upper oil sump has been installed.

Position drag pointer (1) of special tool 2 213 485 on oil pump chain.

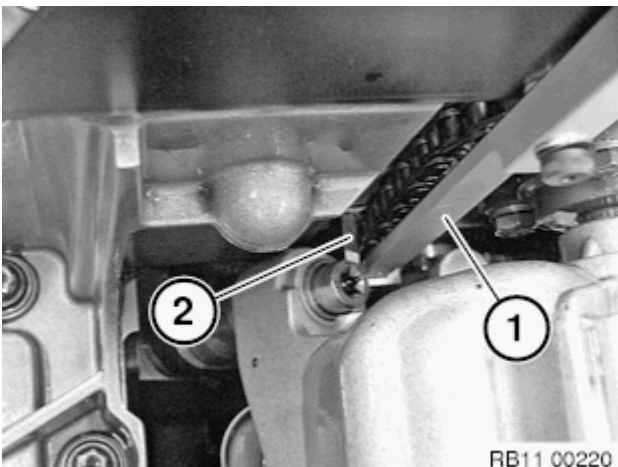


Fig. 428: Positioning Drag Pointer Of Special Tool (2 213 485)

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Attachment point (1) N63O0 / N63O1/S63O0. Attachment point (2) N74.

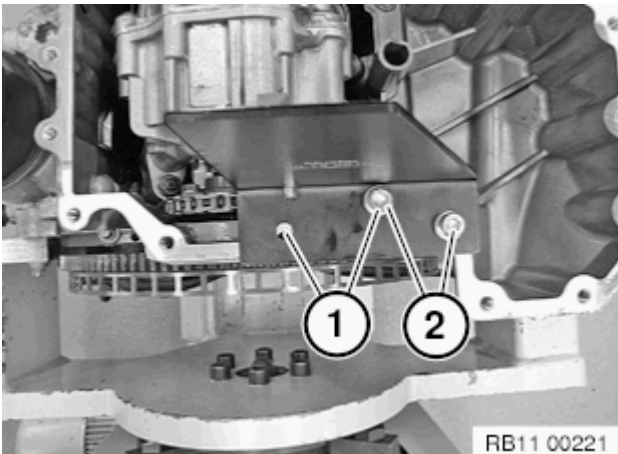


Fig. 429: Identifying Attachment Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not use force preload timing chain.

Push drag pointer (1) to the left and right until value has been determined. Adjustment value **10 mm +2** .

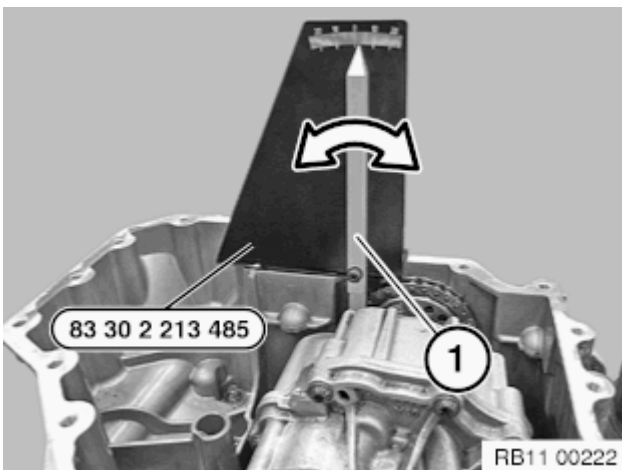


Fig. 430: Pushing Drag Pointer To Left
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil pump timing chain.

Pretension oil pump adjusting sleeve (1) with a hexagon socket wrench. Adjustment value **10 mm +2** .

NOTE: **Graphic without top oil sump**

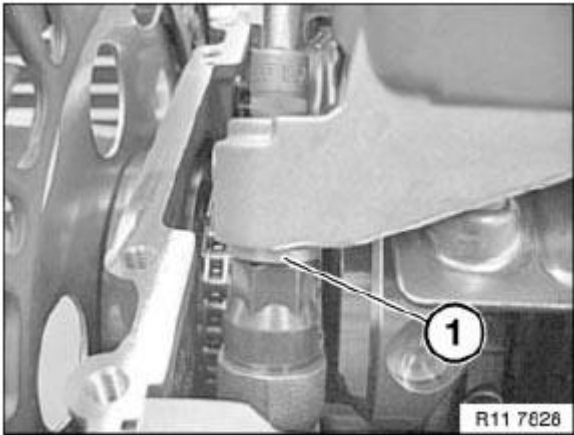


Fig. 431: Identifying Oil Pump Adjusting Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure screw (2). Tightening torque: 24 Nm

NOTE: **Graphic without top oil sump**

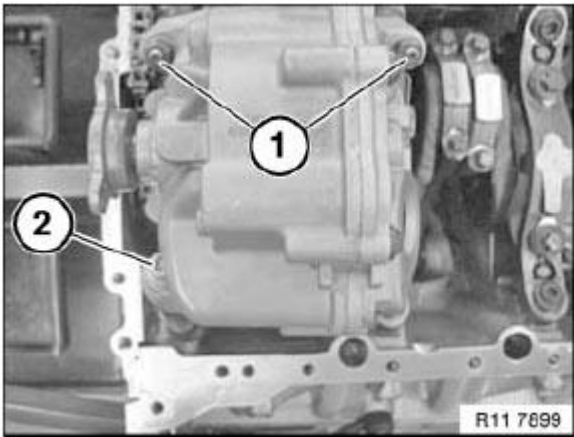


Fig. 432: Identifying Oil Pump With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Check fitting sleeves (1) for damage and correct installation position. Clean sealing surface (2) so that it is free from oil and grease. Coat contact edges on separating face along oil sump (see arrows) with Drei Bond 1209 2.1.

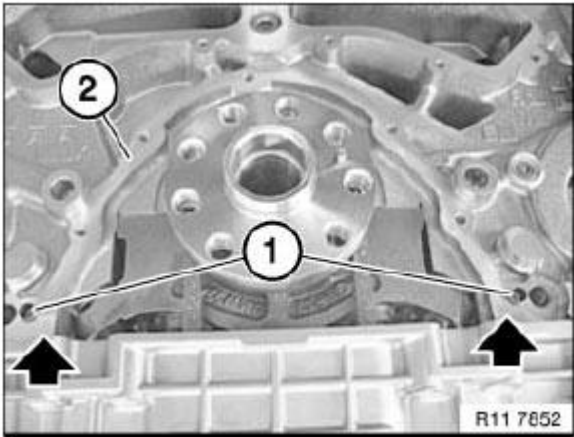


Fig. 433: Identifying dowel sleeves and sealing faces
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Lightly oil running surface of crankshaft.

Fit end cover (1) with support bush (2) on crankshaft and push on carefully.

NOTE: Graphic shows (N62TU).

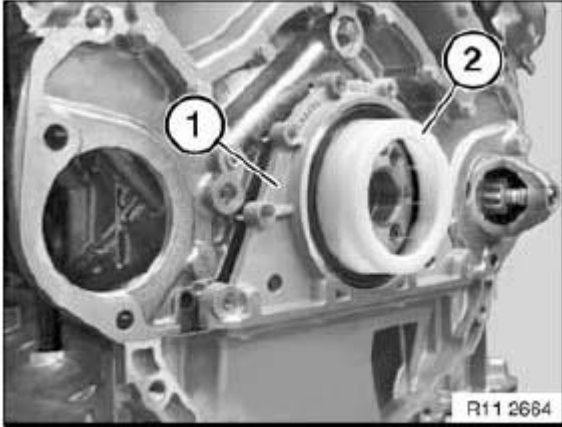


Fig. 434: Identifying Support Sleeve And Cover
 Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (2) and initially tighten without play. Insert screws (1) and initially tighten without play. Tighten down bolts (2) from inside outwards.

Tightening torque: 10 Nm

Tighten down screws (1) from inside outwards.

Tightening torque: 25 Nm.

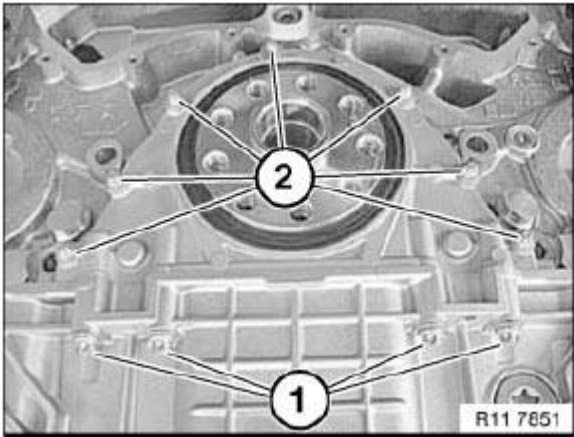


Fig. 435: Identifying Cover Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1142 OIL FILTER AND LINES

1142260 OIL RETURN COVER

IMPORTANT: Risk of fire.

In the event of oil leakage in the Vee, the leakage oil may be ignited on hot components.

Necessary preliminary work

- Remove both exhaust turbochargers. See **EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-4** and **EXHAUST TURBOCHARGER, LEFT, CYLINDERS 5-8**
- Remove **HEAT SHIELD** at bottom.

Release banjo bolt (1).

Tightening torque: **11 42 10AZ** .

Release screws (3).

Tightening torque: **11 65 6AZ** .

Place vacuum reservoir (4) to one side.

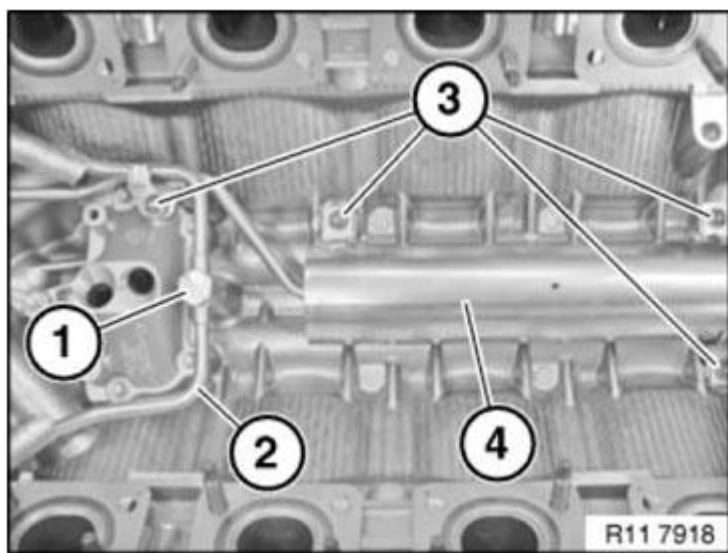


Fig. 436: Identifying Banjo Bolt, Screws And Vacuum Reservoir
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: **11 42 8AZ** .

Remove oil return cover (2).

Installation note:

Replace oil return cover.

Replace both O-rings.

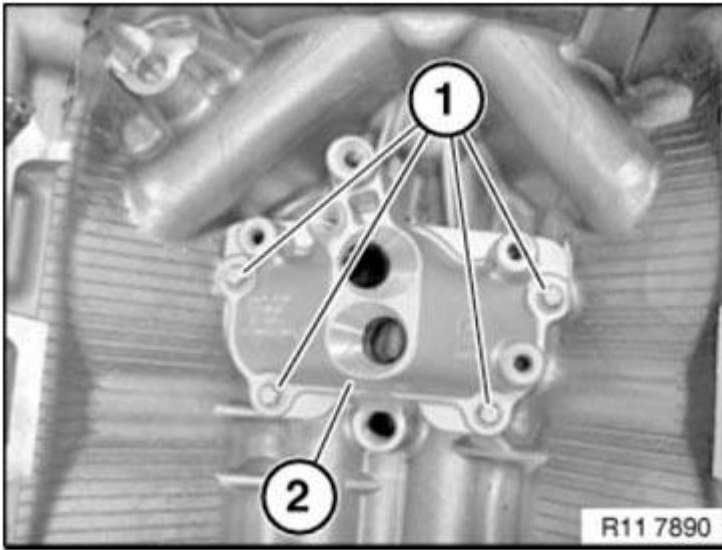


Fig. 437: Identifying Oil Return Cover And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1151 WATER PUMP WITH DRIVE

1151000 REMOVING AND INSTALLING/RENEWING COOLANT PUMP (N63)

WARNING: Risk of scalding!
 Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

IMPORTANT: If a coolant pump which has already been operated is reused, it must be filled immediately after being removed with coolant (mixture ratio 1:1/water: coolant).

Necessary preliminary work

- Drain **COOLANT**
- Remove intercooler **EXPANSION TANK**
- Remove alternator drive belt. See **REPLACING DRIVE BELT FOR ALTERNATOR**.

IMPORTANT: Risk of damage!

Coolant emerges when the coolant hoses are detached from the coolant thermostat and coolant pump.

Cover surrounding components and plug connections with suitable apparatus

NOTE: For purposes of clarity, the graphic shows the auxiliary water pump removed.

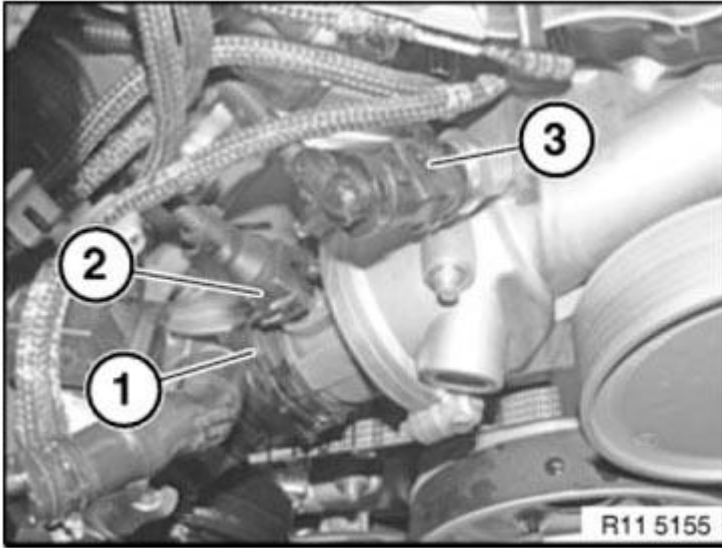


Fig. 438: Identifying Plug Connections

Courtesy of BMW OF NORTH AMERICA, INC.

Remove plug connections (2 and 3).

Installation note:

Plug connections (2 and 3) must snap audibly into place!

Unlock snap fastener on coolant hose (1).

Detach coolant hose (1) and lay to one side.

Release screw (4).

Tightening torque **11 51 3AZ** .

Detach pipe (3) and lay to one side.

Installation note:

Replace sealing ring

Unlock quick-release coupling on coolant hose (5).

Detach coolant hose (5) and lay to one side.

Unfasten screws (2).

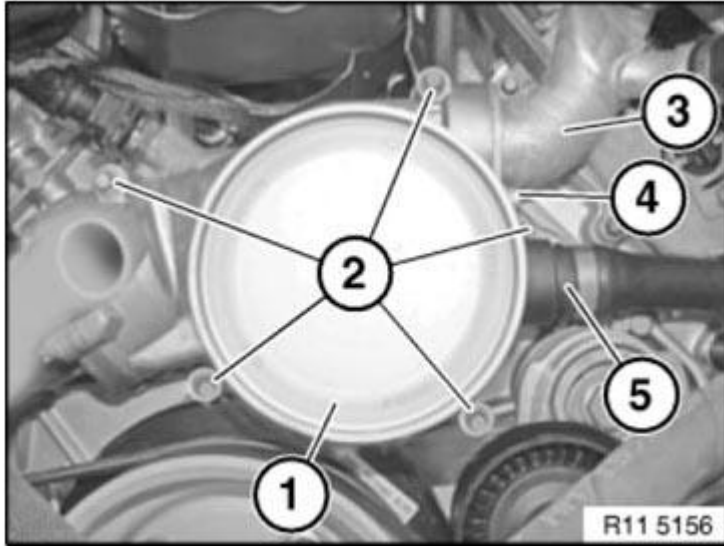


Fig. 439: Identifying Pipe, Screws And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 51 1AZ** .

Remove coolant pump (1) in upward direction with a tilting motion.

Installation note:

Replace gasket

If reusing the coolant pump:

If a coolant pump is reused, it must be mechanically rotated once (breakaway torque at pump impellers).

One coolant pump rotation will be sufficient.

If replacing the coolant pump:

Release screws on coolant thermostat.

Tightening torque **11 53 1AZ** .

Remove coolant thermostat.

Installation note:

Replace sealing ring

Assemble engine.

Top up COOLANT .

BLEEDING INSTRUCTIONS must be observed **without fail**.

1153 THERMOSTAT AND CONNECTIONS

1153000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N63)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Drain COOLANT .
- Remove COOLANT PUMP .
- Remove charge air cooler EXPANSION TANK .
- **REMOVE** fan cowl with electric fan.

IMPORTANT: Risk of damage!

Coolant emerges when the coolant hoses are detached from the coolant thermostat.

Cover surrounding components and plug connections with suitable apparatus

NOTE: For purposes of clarity, the graphic shows the auxiliary water pump removed.

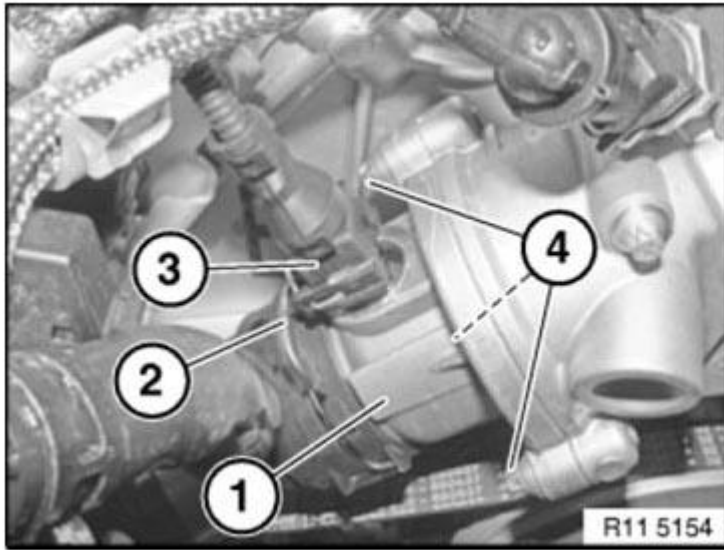


Fig. 440: Identifying Plug Connection, Coolant Hose And Coolant Thermostat
 Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (3).

Installation note:

Plug connection (3) must snap audibly into place!

Unlock snap fastener on coolant hose (2).

Detach coolant hose (2) and lay to one side.

NOTE: One of the screws is not shown and is located at the rear under the coolant thermostat (1).

Release screws (4).

Tightening torque **11 53 1AZ** .

Lift out coolant thermostat (1).

NOTE: The coolant thermostat is integrated in the housing cover. It can only be replaced as a complete unit!

Clean sealing surface.

Installation note:

Replace sealing ring (1)

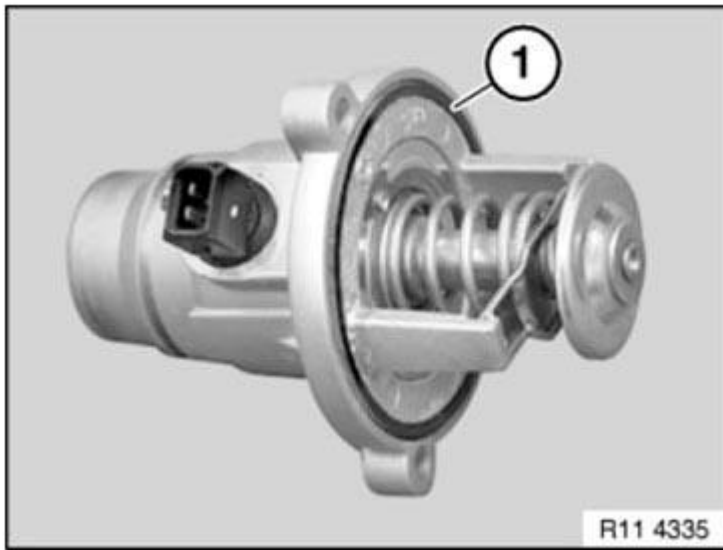


Fig. 441: Identifying Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up COOLANT .

BLEEDING INSTRUCTIONS must be observed **without fail**.

1153000 REMOVING AND INSTALLING/REPLACING SUPPLEMENTARY COOLANT PUMP FOR EXHAUST TURBOCHARGER (N63)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Remove charge air cooler EXPANSION TANK

Unclip coolant hose (1) from bracket (3) and lay in direction of arrow to one side.

Unfasten screws (2).

Tightening torque 11 51 4AZ .

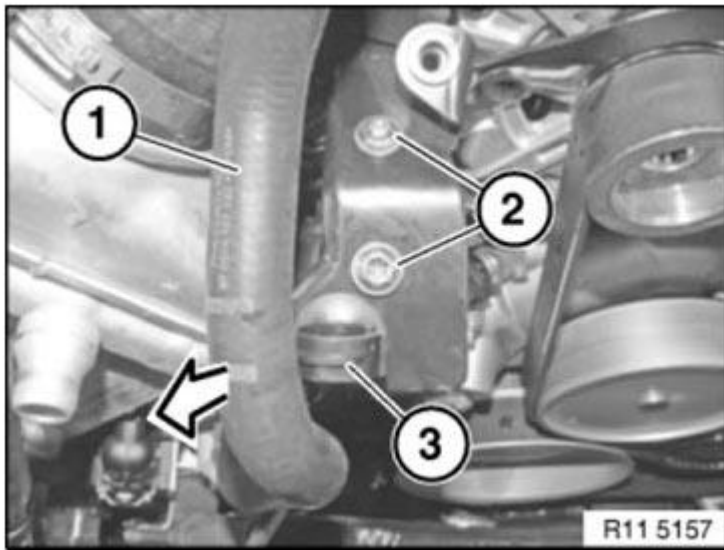


Fig. 442: Identifying Coolant Hose And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Coolant emerges when the coolant hoses are detached from the auxiliary water pump (3).

Cover surrounding components and plug connections with suitable apparatus

Release hose clamp (5) with a suitable tool.

Installation note:

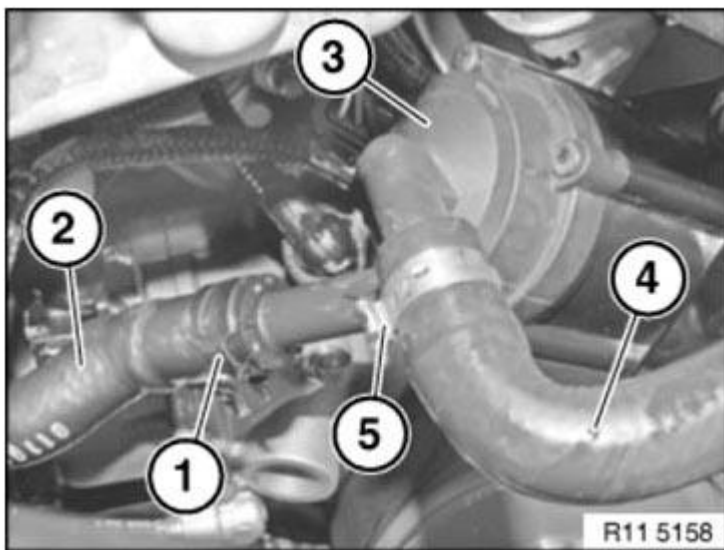


Fig. 443: Identifying Auxiliary Water Pump, Coolant Hose And Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Replace hose clamp (5)

Detach coolant hose (4) and lay to one side.

Release hose clamp (1) with a suitable tool.

Detach coolant hose (2) and lay to one side.

Disconnect plug connection (2).

Installation note:

Plug connection (2) must snap audibly into place!

Lift out auxiliary water pump (1).

Release holder (3) from auxiliary water pump (1).

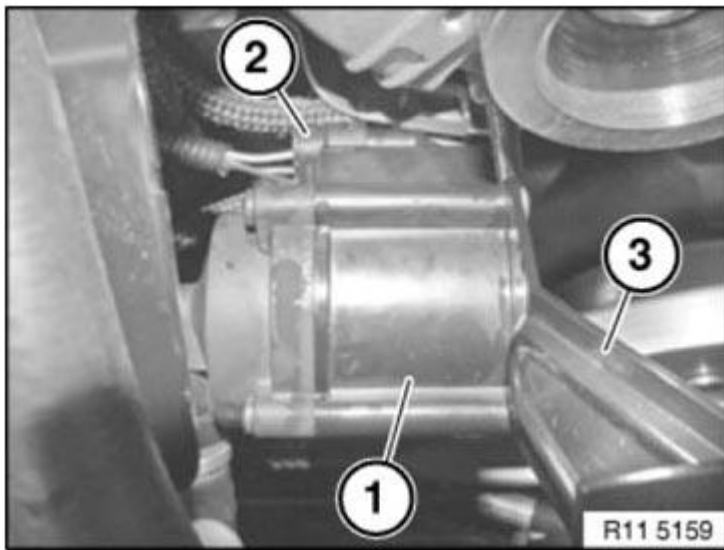


Fig. 444: Identifying Plug Connection, Holder And Auxiliary Water Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

VENTING INSTRUCTIONS must be observed **without fail**.

1161 INTAKE MANIFOLD

1161730 CHECK BMW DIAGNOSIS SYSTEM FOR EXCESS PRESSURE AND VACUUM (N63)

IMPORTANT: Excess pressure and vacuum lines are identified by the size of the connection fittings and color-coded red and blue and must not be mixed up with each other.

Build up pressure with Blue color.

Generate vacuum pressure with Red color.

Mixing up the functions will result in damage to the engine.

Necessary preliminary work

- Release upper section of intake air filter.
- Prepare BMW diagnosis system.
- Start diagnostic program.
 1. Power train
 2. Engine electronics
 3. Air supply
 4. Charging pressure control Oder Perception

Lack of power

Note on ordering:

- Workshop equipment.
- Workshop planning.
- Workshop equipment catalogue.
- Measuring and test equipment.
- No. 81 29 0 426 464

Pressure measurement

Prepare BMW diagnosis system on excess pressure diagnosis unit.

1. Screw in pressure sensor.
2. Overpressure connection (Blue).
3. Connect stimuli cables (3) to positive and negative.
4. Connect 12V battery cables (4) to vehicle battery positive and negative.

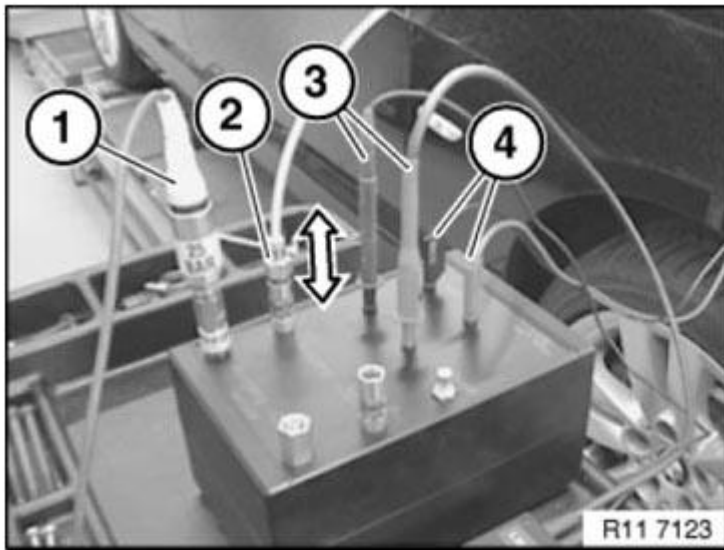


Fig. 445: Measuring Pressure

Courtesy of BMW OF NORTH AMERICA, INC.

Secure seal plug (1) with union nut (2) in intake port and seal.

NOTE: Twin-Turbo: both intake ports must be sealed.

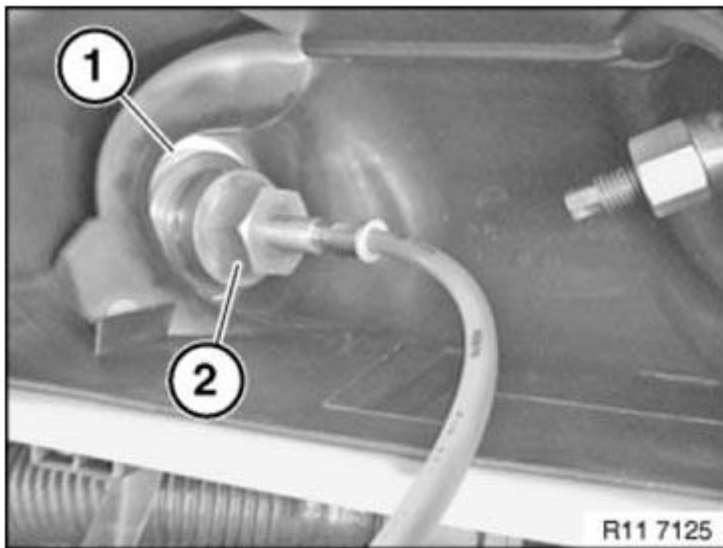


Fig. 446: Identifying Seal Plug And Union Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Insert Blue pneumatic hose (4) in pneumatic coupling (2) of sealing plug (1).

Seal plug (3) has no pneumatic coupling.

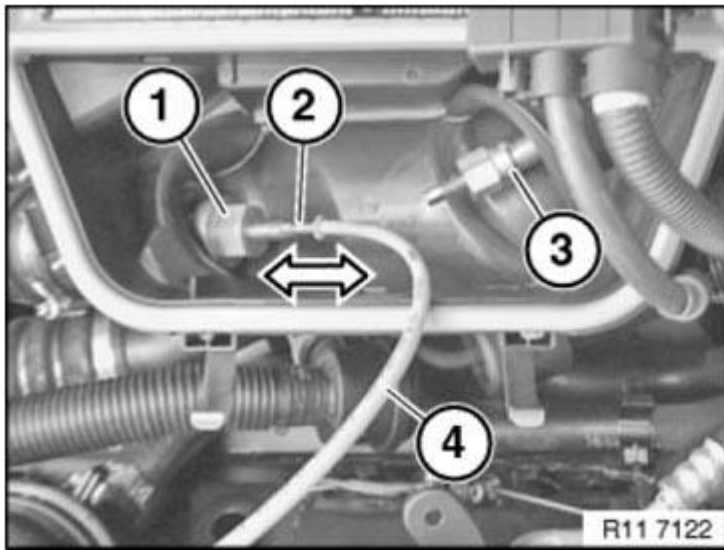


Fig. 447: Inserting Blue Pneumatic Hose In Pneumatic Coupling Of Sealing Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Vacuum pressure measurement

Prepare diagnosis tester on vacuum diagnosis unit.

1. Screw in pressure sensor.
2. Connect stimuli cables (2) to positive and negative.
3. Connect 12V battery cables (3) to vehicle battery positive and negative.
4. Controller for vacuum connection.
5. Vacuum connection (Red).

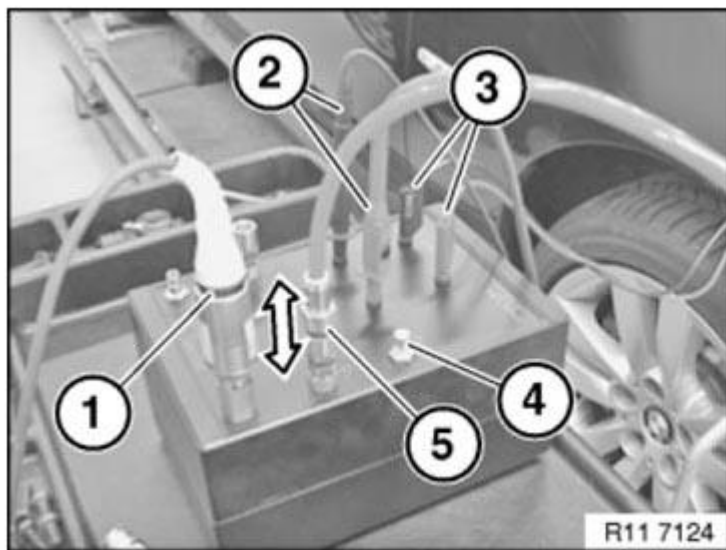


Fig. 448: Measuring Vacuum Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Calibration for vacuum pressure measurement

Seal shutoff tap (2) in direction of arrow.

Release lock nut on controller (1).

Carry out pressure adjustment in accordance with BMW diagnosis instruction.

Secure controller (1) hand-tight against turning.

Open shutoff tap (2) again.

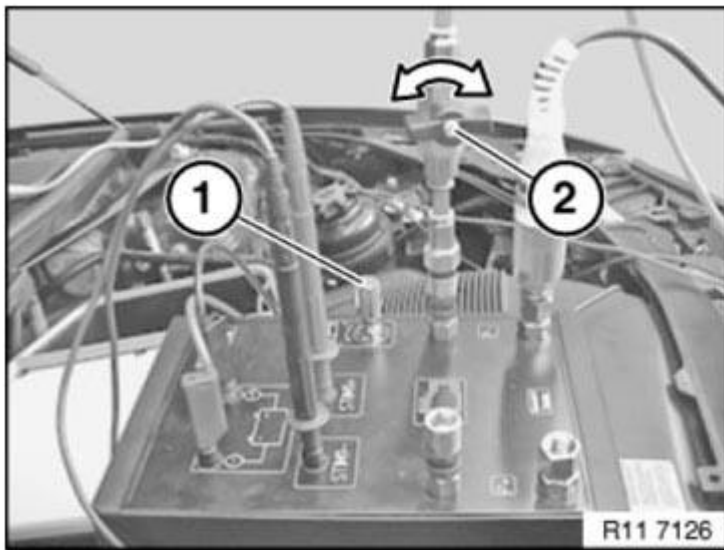


Fig. 449: Releasing Lock Nut On Controller
Courtesy of BMW OF NORTH AMERICA, INC.

Connections on EPPC

1. Connection (VAC) to vacuum reservoir.
2. Connection (OUT) with ring to exhaust turbocharger.

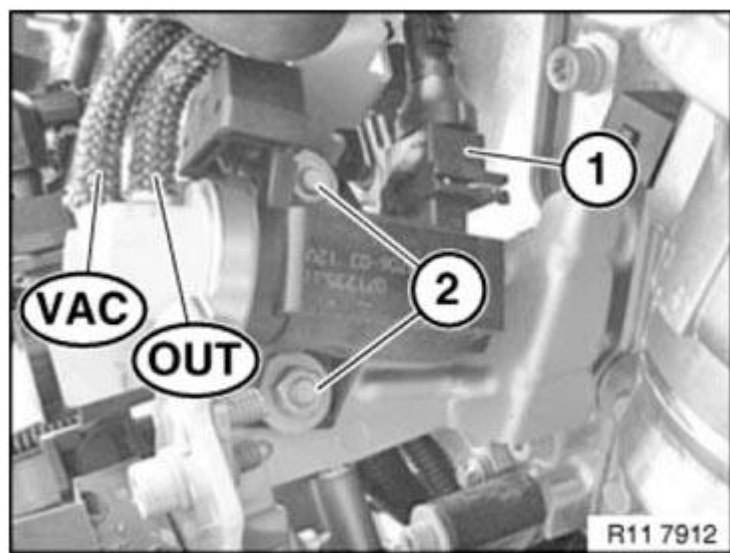


Fig. 450: Identifying Vacuum Reservoir Connection (VAC)
Courtesy of BMW OF NORTH AMERICA, INC.

Vacuum activation, cylinders 1-4

Detach red vacuum line from vacuum unit.

Prepare T-piece (5) with vacuum lines for measurement.

Connect red vacuum line (1) with vacuum unit (2) and quick-release coupling (3).

Open shutoff tap (4).

NOTE: **Observe diagnosis instructions.**

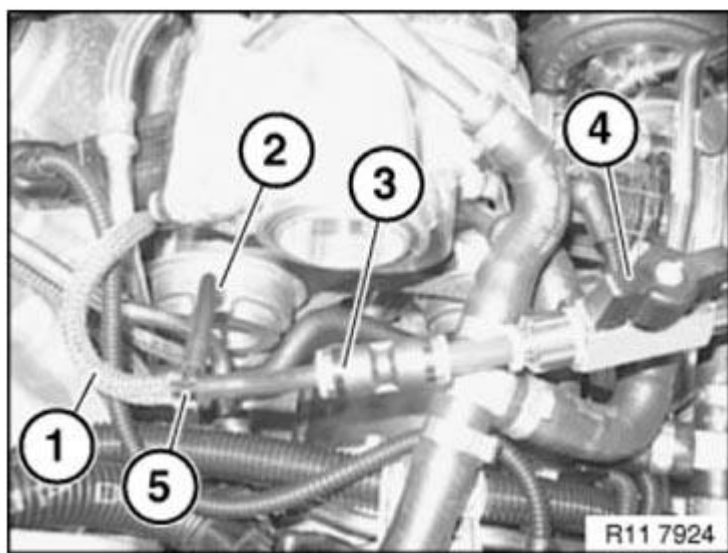


Fig. 451: Identifying Red Vacuum Line, Vacuum Unit And Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Vacuum activation, cylinders 5-8

Detach blue vacuum line from vacuum unit.

Prepare T-piece (5) with vacuum lines for measurement.

Connect blue vacuum line (1) with vacuum unit (2) and quick-release coupling (3).

Open shutoff tap (4).

NOTE: **Observe diagnosis instructions.**

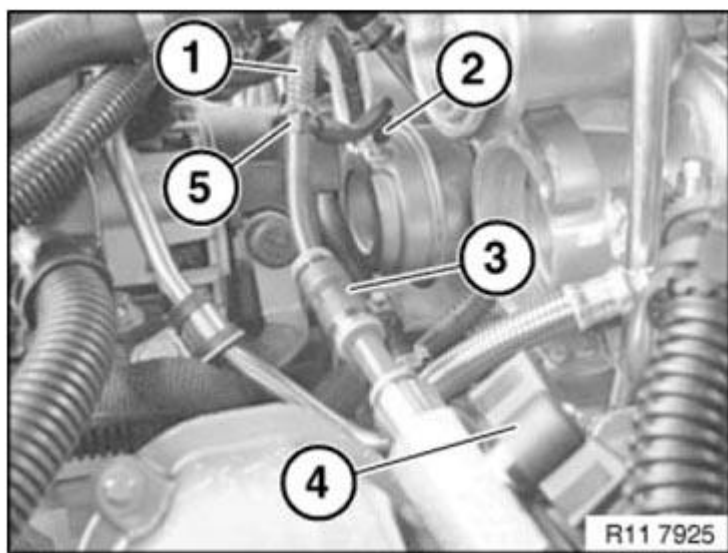


Fig. 452: Identifying Blue Vacuum Line, Vacuum Unit And Quick-Release Coupling
 Courtesy of BMW OF NORTH AMERICA, INC.

Exhaust turbocharger, cylinders 1-4

Initial position (1) of wastegate linkage depressurized.

Wastegate valve opened.

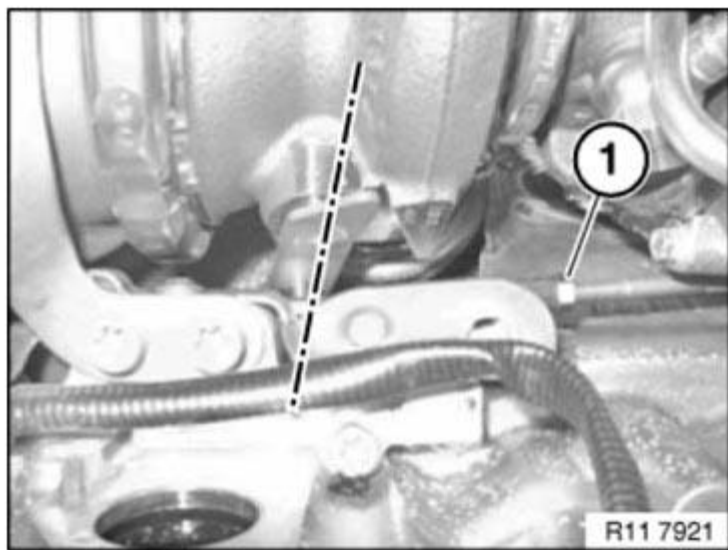


Fig. 453: Identifying Initial Position Of Wastegate Linkage Depressurized
 Courtesy of BMW OF NORTH AMERICA, INC.

Initial position (1) of wastegate linkage with vacuum pressure.

Wastegate valve closed.

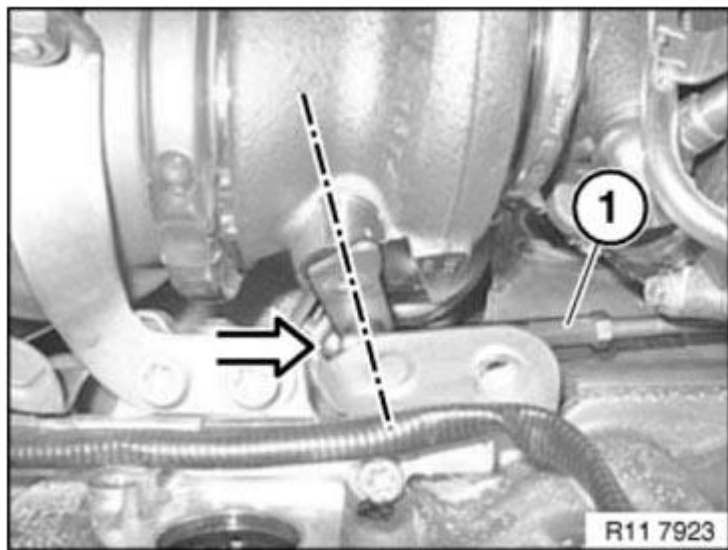


Fig. 454: Identifying Initial Position Of Wastegate Linkage With Vacuum Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Exhaust turbocharger, cylinders 5-8

Initial position (1) of wastegate linkage depressurized.

Wastegate valve opened.

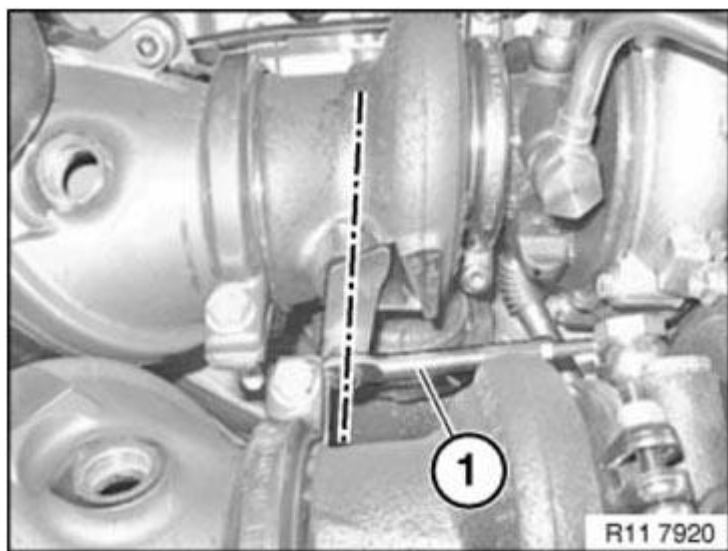


Fig. 455: Identifying Initial Position Of Wastegate Linkage Depressurized
Courtesy of BMW OF NORTH AMERICA, INC.

Initial position (1) of wastegate linkage with vacuum pressure.

Wastegate valve closed.

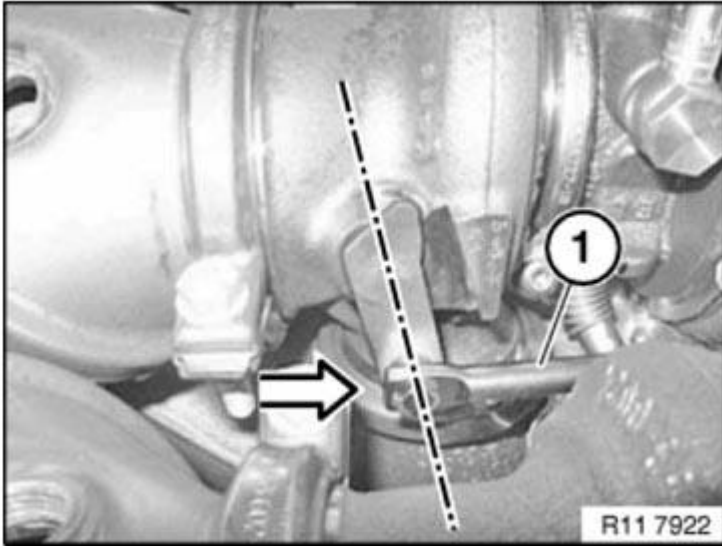


Fig. 456: Identifying Initial Position Of Wastegate Linkage With Vacuum Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Check wastegate valve with vacuum

Wastegate valves must be opened without vacuum.

The wastegate valves must close if a vacuum pressure is applied at the wastegate sockets (see BMW diagnosis system).

Check shaft on turbine wheel for rotatability.

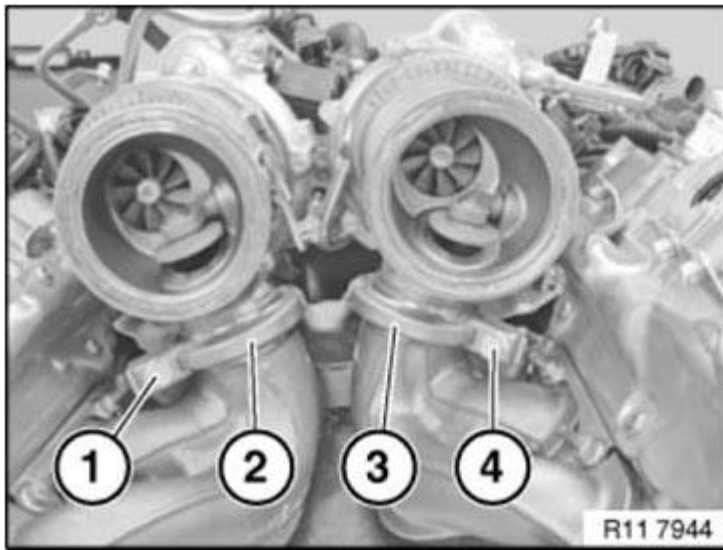


Fig. 457: Checking Wastegate Valve With Vacuum
 Courtesy of BMW OF NORTH AMERICA, INC.

Follow diagnosis instructions.

1161065 REMOVING AND INSTALLING/REPLACING LEFT INTAKE PLENUM (N63)

Necessary preliminary work

- Remove left **INJECTION PIPE** .
- Remove **THROTTLE VALVE**
- Release screws on intake plenum from above without fail before lowering front axle.
- Secure **ENGINE** in installation position.
- Lower front axle, releasing screws on engine mount first. See **LOWERING/RAISING FRONT AXLE SUPPORT (UNIVERSAL LIFTER)** .
- Release power steering pump, if installed, and set aside. See **POWER STEERING PUMP FOR HYDRAULIC STEERING GEAR WITH DYNAMIC DRIVE (N63)** or **POWER STEERING PUMP FOR POWER STEERING GEAR WITH ACTIVE FRONT STEERING (N63)** .
- Remove **UNIVERSAL JOINT** with corrugated tubing.

Detach engine ventilation hose (1).

Disconnect connector.

Unscrew nuts (2).

Tightening torque: **11 61 1 AZ** .

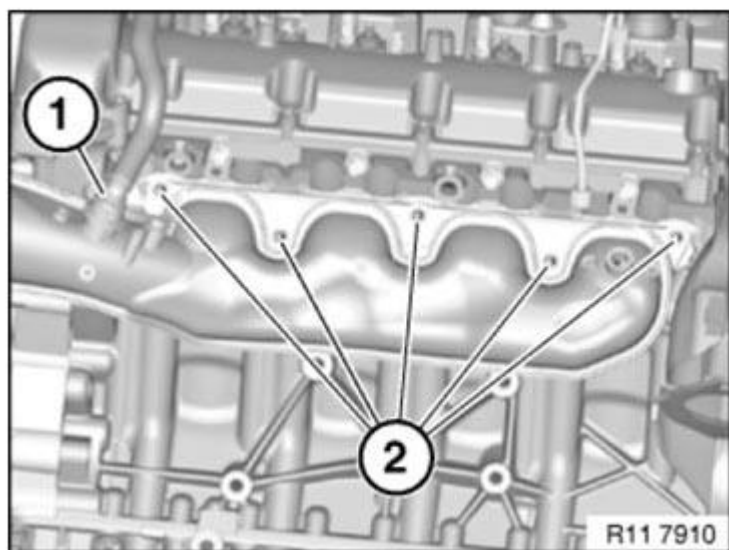


Fig. 458: Identifying Engine Ventilation Hose And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release **THROTTLE VALVE** (1).

Release holder screw (2) on intake plenum.

Tightening torque: **11 61 2AZ** .

Feed out intake plenum towards rear.

Installation note:

Replace all profile seals.

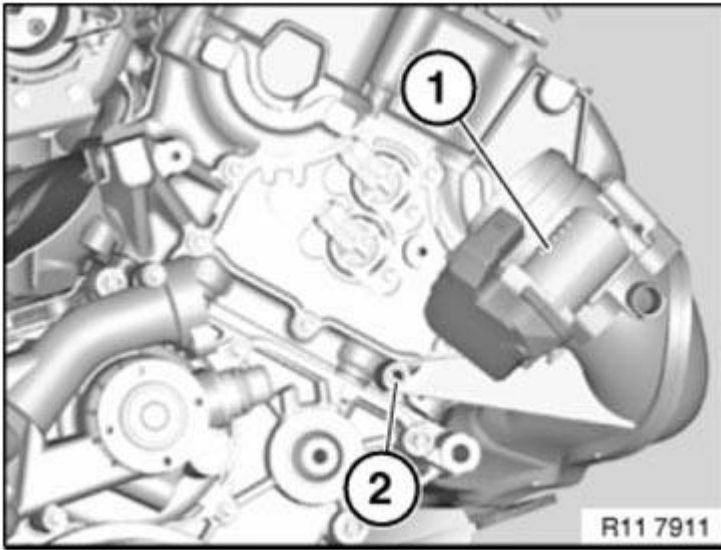


Fig. 459: Identifying Throttle Valve And Holder Screw On Intake Plenum
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle and

Check air intake system for leaks.

1161068 REMOVING AND INSTALLING/REPLACING RIGHT INTAKE PLENUM (N63)

Necessary preliminary work

- Remove right **INJECTION PIPE** .
- Remove **THROTTLE VALVE**
- Release screws on intake plenum from above without fail before lowering front axle.
- Secure **ENGINE** in installation position.
- Lower **FRONT AXLE** , releasing screws on engine mount first
- Release A/C compressor and place to one side. See **REMOVING AND INSTALLING/REPLACING HEATING AND AIR CONDITIONING SYSTEM COMPRESSOR (N63, WITH DYNAMIC DRIVE)** .

Detach engine ventilation hose (1).

Disconnect connector.

Unscrew nuts (2).

Tightening torque: **11 61 1 AZ** .

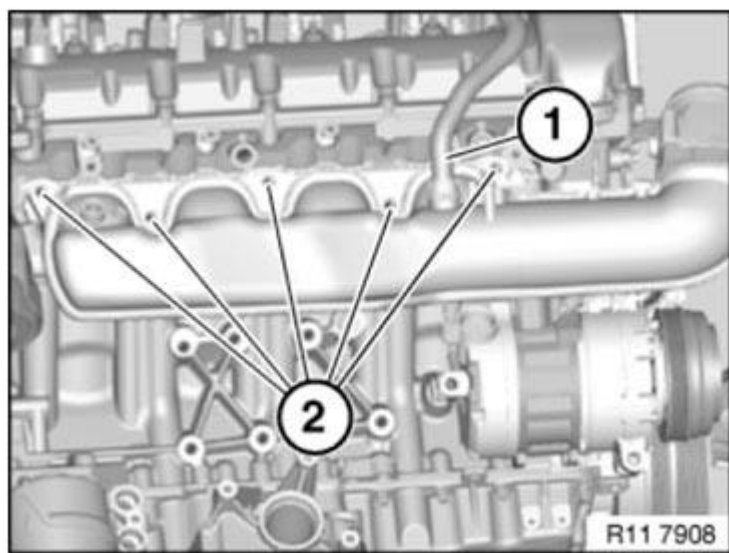


Fig. 460: Identifying Engine Ventilation Hose And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **THROTTLE VALVE** (2).

Release screw (1).

Tightening torque: **11 61 2 AZ** .

Feed out intake plenum towards rear.

Installation note:

Replace all profile seals.

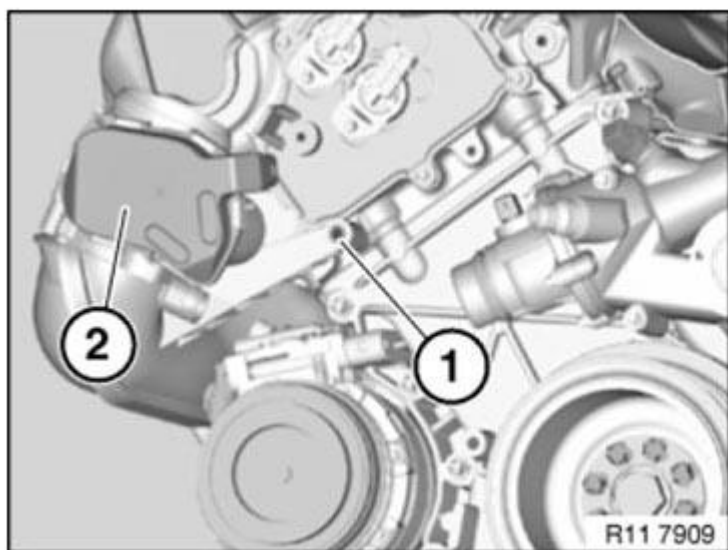


Fig. 461: Identifying Screw And Throttle Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle.

Check air intake system for leaks.

1165 SUPERCHARGER WITH CONTROL

1165 CONNECTION DIAGRAM, VACUUM ACTIVATION (N63)

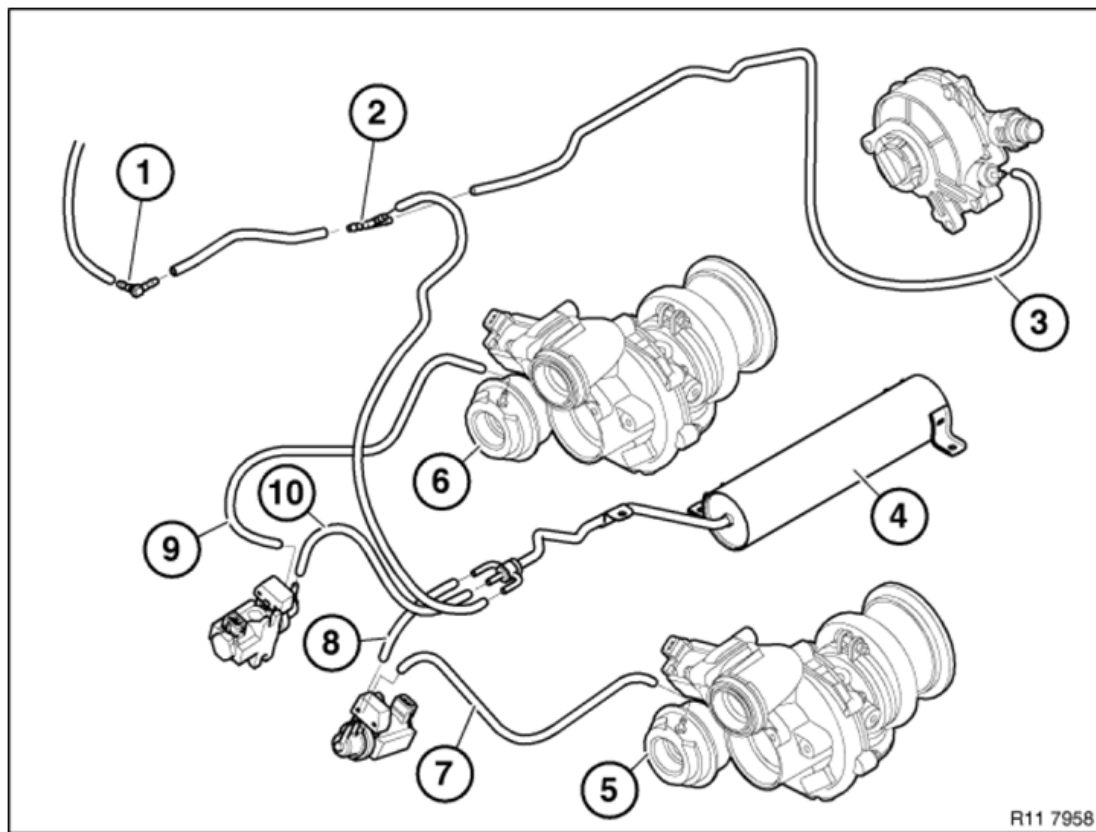


Fig. 462: Connection Diagram, Vacuum Activation (N63)

Courtesy of BMW OF NORTH AMERICA, INC.

1. Connection (1) Black to exhaust flaps.
2. Distribute element (2), vacuum pump/vacuum reservoir (4).
3. Vacuum line (3) black to vacuum pump.
4. Vacuum reservoir (4) with three connections.
5. Connection, vacuum unit (wastegate), bank 2, cylinders 5 to 8.
6. Connection, vacuum unit (wastegate), bank 1, cylinders 1 to 4.
7. Vacuum hose (7) black/blue to vacuum unit (5) connection to pressure converter (OUT) bank 2 cylinders 5 to 8.
8. Vacuum hose black to vacuum reservoir connection to pressure converter (VAC) bank 2 cylinders 5 to 8.
9. Vacuum hose (9) black/red to vacuum unit (6) to pressure convert (OUT) bank 1 cylinder 1 to 4.
10. Vacuum hose black to vacuum reservoir connection to pressure converter (VAC) bank 1 cylinders 1 to 4.

1165714 REMOVING AND INSTALLING/RENEWING ELECTRIC CHANGEOVER VALVE ON EXHAUST TURBOCHARGER, RIGHT (N63)

Necessary preliminary work

- Remove right **TURBOCHARGER** .

Release screws (1).

Remove electric changeover valve (2).

Installation note:

Replace O-ring.

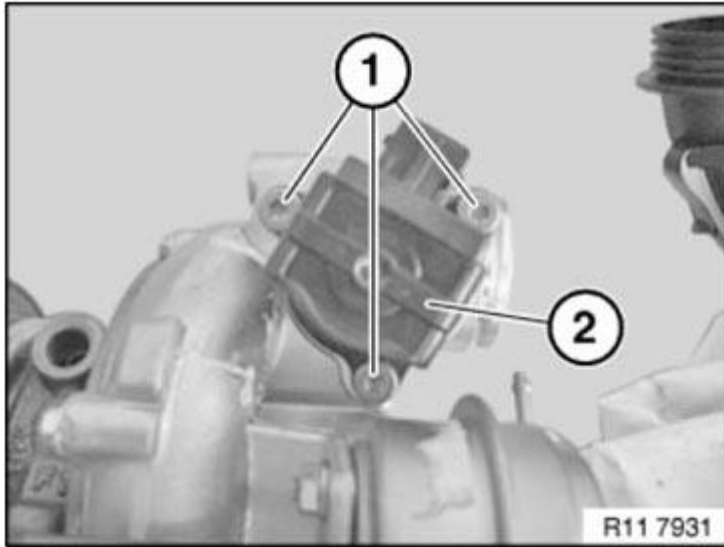


Fig. 463: Identifying Electric Changeover Valve And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Follow diagnosis instruction.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

1165185 REMOVING AND INSTALLING/RENEWING HEAT SHIELD AT BOTTOM (N63)

Necessary preliminary work

- Disconnect the **BATTERY CABLE FROM THE NEGATIVE TERMINAL** .
- Remove **FAN COWL** with electric fan.
- Remove the **ALTERNATOR** (not F04).
- Remove both exhaust turbochargers. See **EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-4**

and **EXHAUST TURBOCHARGER, LEFT, CYLINDERS 5-8.**

Remove both exhaust manifolds. See **LEFT EXHAUST MANIFOLD** and **RIGHT EXHAUST MANIFOLD**.

Release screws (1).

Tightening torque **11 65 3AZ**.

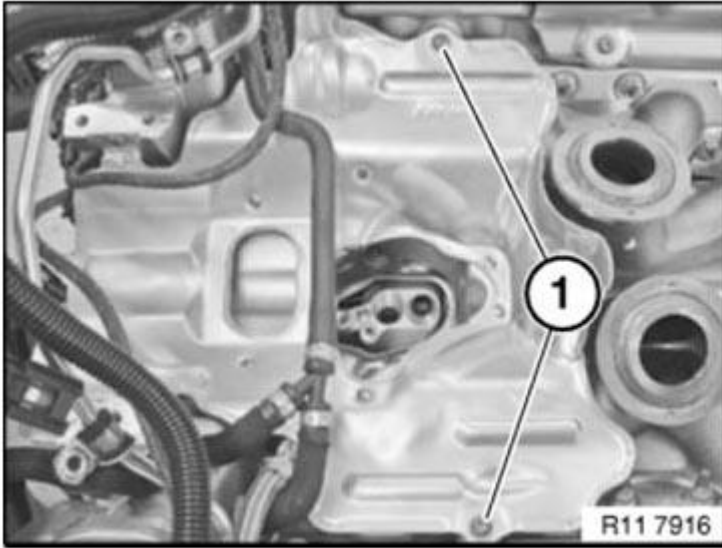


Fig. 464: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ**.

Remove heat shield (2) towards top.

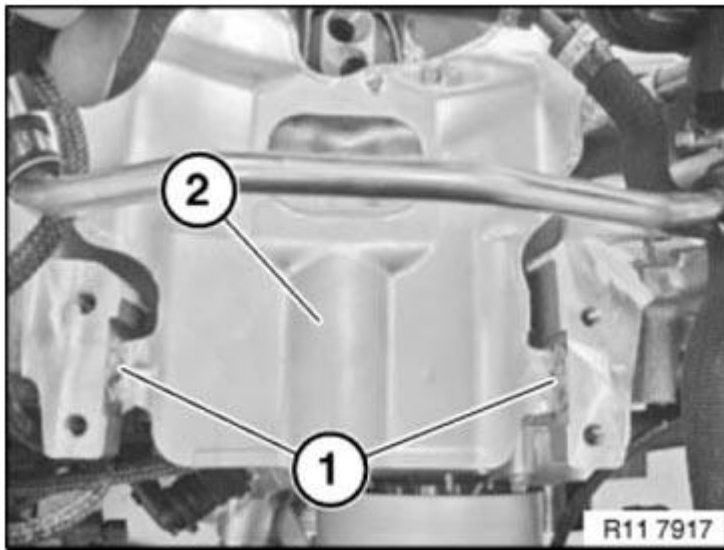


Fig. 465: Identifying Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

IMPORTANT: Risk of interchange on replacement of the heat shield.
Other shields are installed in the N63H and S63 engines.

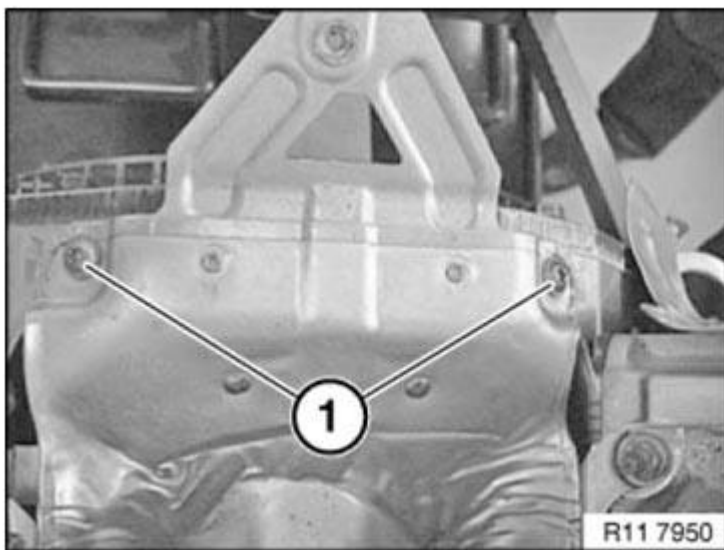


Fig. 466: Identifying Heat Shield Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release front screws on heat shield (1).

Tightening torque **11 65 3AZ** .

Remove heat shield (1) towards top.

IMPORTANT: Risk of interchange on replacement of the heat shield.
Other shields are installed in the N63H and S63 engines.

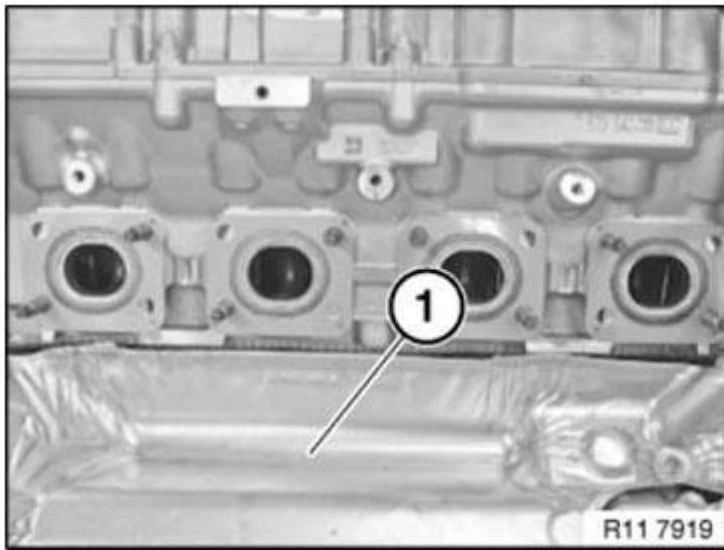


Fig. 467: Identifying Front Screws On Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1165180 REMOVING AND INSTALLING/RENEWING HEAT SHIELD AT TOP (N63)

Necessary preliminary work

- Remove both **INTAKE FILTER HOUSINGS** .
- Remove both control sensors. See **LEFT CONTROL SENSOR** and **RIGHT CONTROL SENSOR**.

Release screws (1).

Lift out holder.

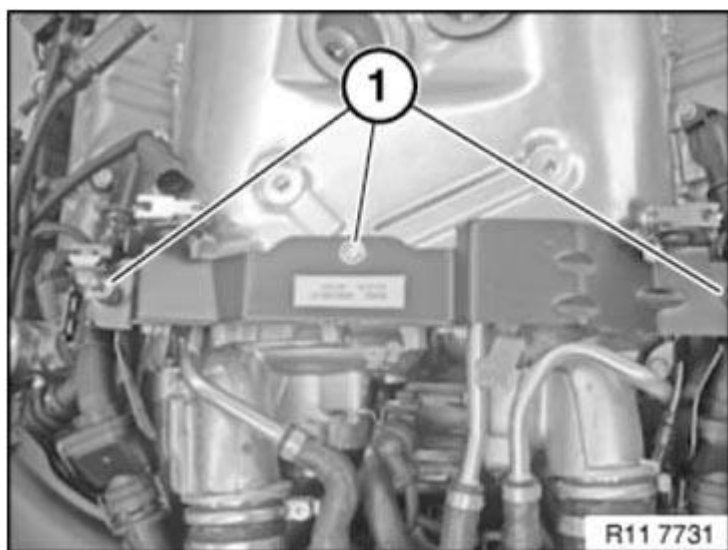


Fig. 468: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 65 3AZ** .

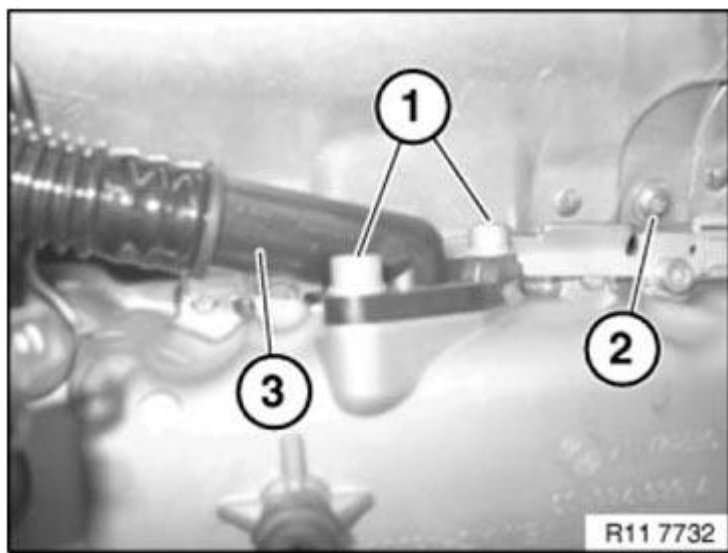


Fig. 469: Identifying Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 65 3AZ** .

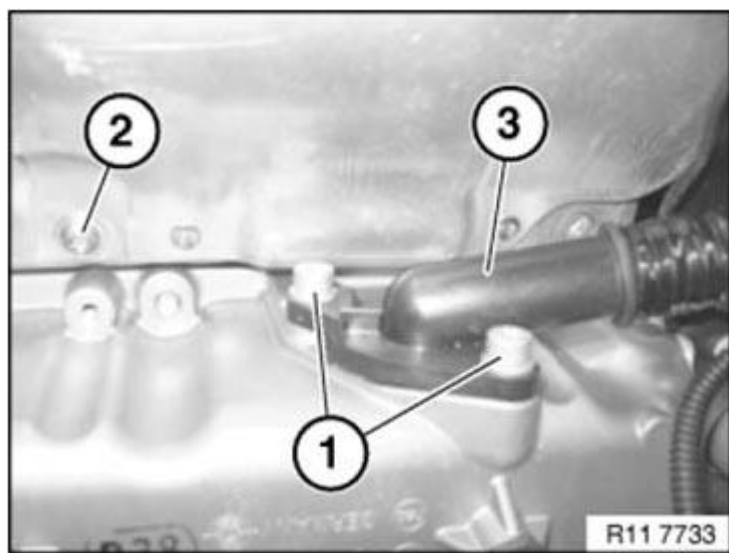


Fig. 470: Identifying Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release retaining clip (1).

Detach wire ring (2) and set down behind oxygen sensor.

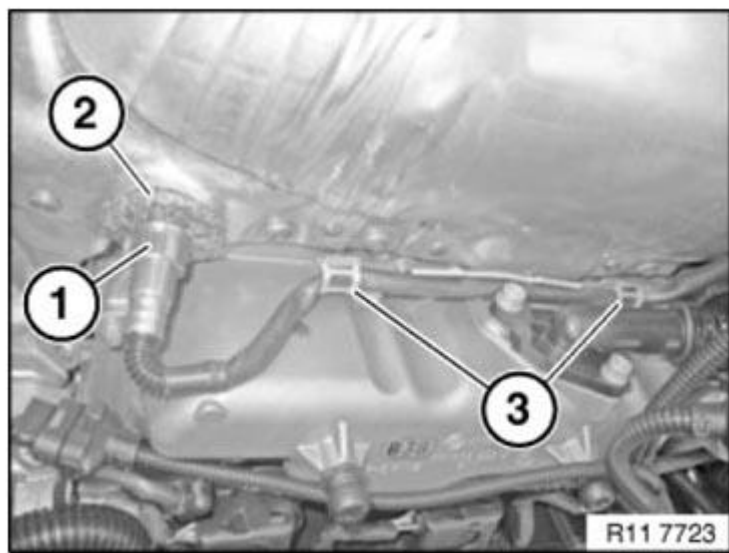


Fig. 471: Identifying Retaining Clip And Wire Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release retaining clip (1).

Detach wire ring (2) and set down behind oxygen sensor.

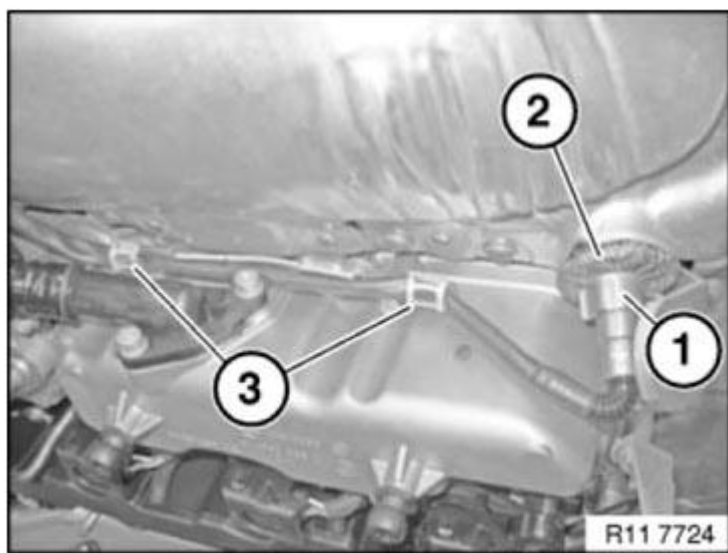


Fig. 472: Identifying Oxygen Sensor With Wire Ring And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

NOTE: For purposes of clarity, the graphic shows the oxygen sensor removed.

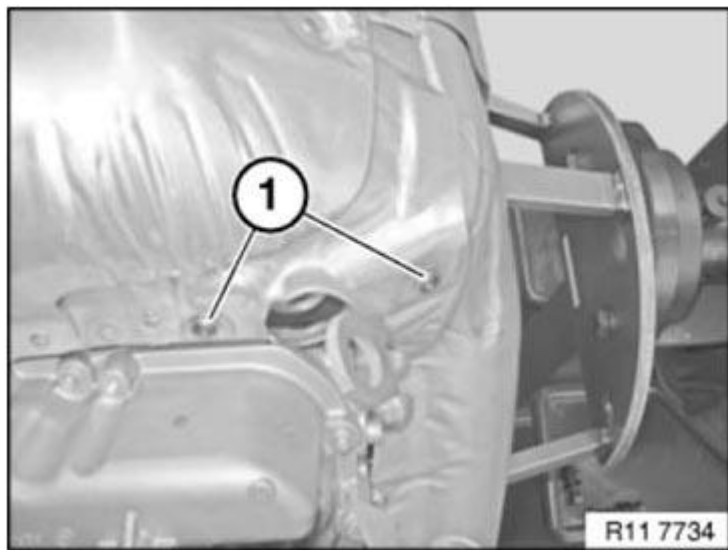


Fig. 473: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

Lift out heat shield.

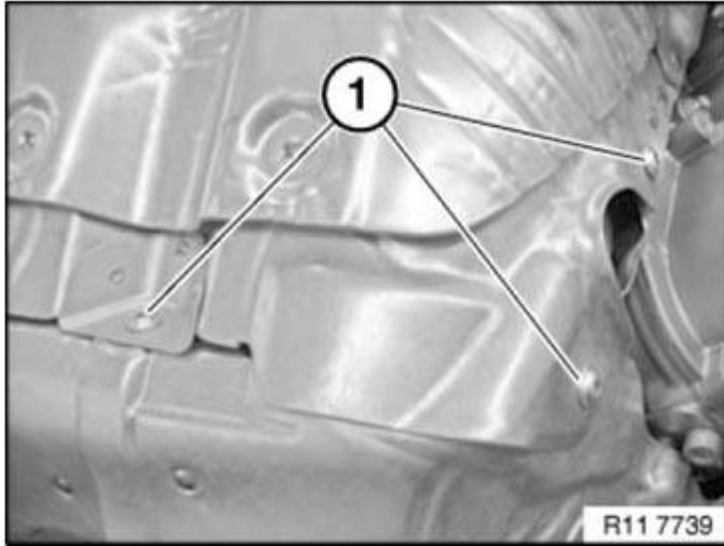


Fig. 474: Identifying Heat Shield Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1165712 REMOVING AND INSTALLING/REPLACING ELECTRIC CHANGEOVER VALVE ON EXHAUST TURBOCHARGER, LEFT (N63)

Necessary preliminary work

- Remove left **TURBOCHARGER** .

Release screws (1).

Remove electric changeover valve.

Installation note:

Replace O-ring.

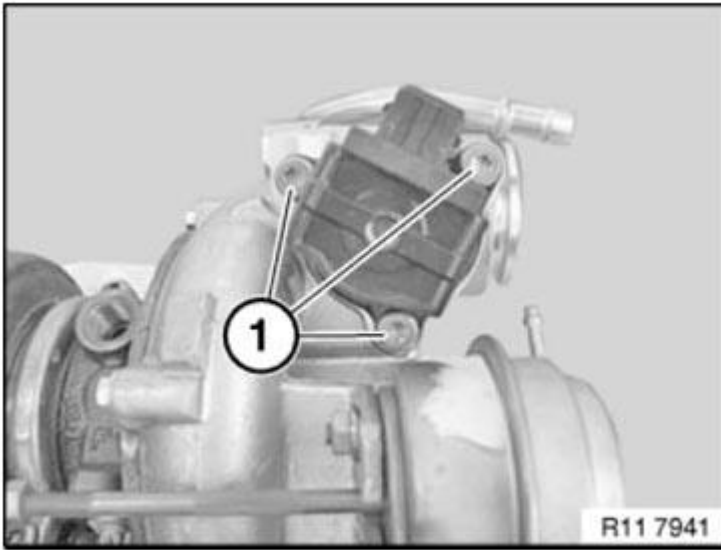


Fig. 475: Identifying Electric Changeover Valve Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Follow diagnosis instruction.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

1165030 REMOVING AND INSTALLING/REPLACING EXHAUST TURBOCHARGER, LEFT, CYLINDERS 5-8 (N63)

Notes

IMPORTANT: Risk of fire if oil lines are leaking.
Risk of mixing up vacuum hoses.

Necessary preliminary work

- Remove **CATALYTIC CONVERTER** , cylinders 5 - -8.

Disconnect plug connection (1) on electric changeover valve (2).

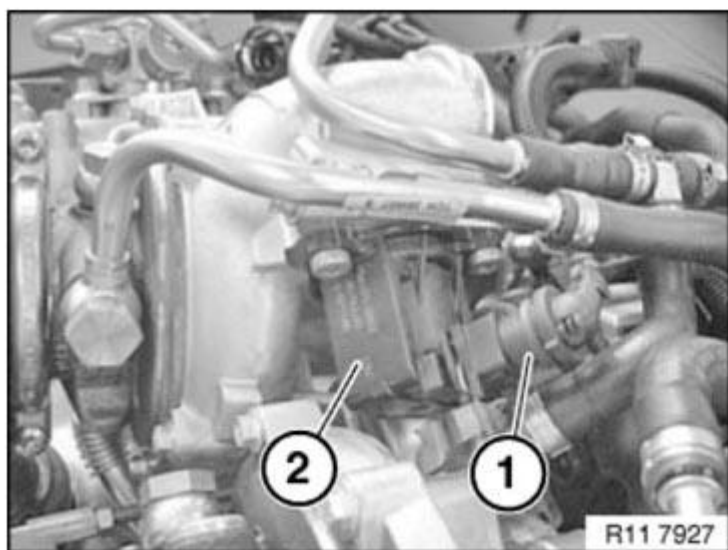


Fig. 476: Identifying Plug Connection On Electric Changeover Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 7AZ** .

Unfasten banjo bolt (2).

Tightening torque **11 42 4AZ** .

Lay oil line from turbocharger to side.

Installation note:

Replace all sealing rings

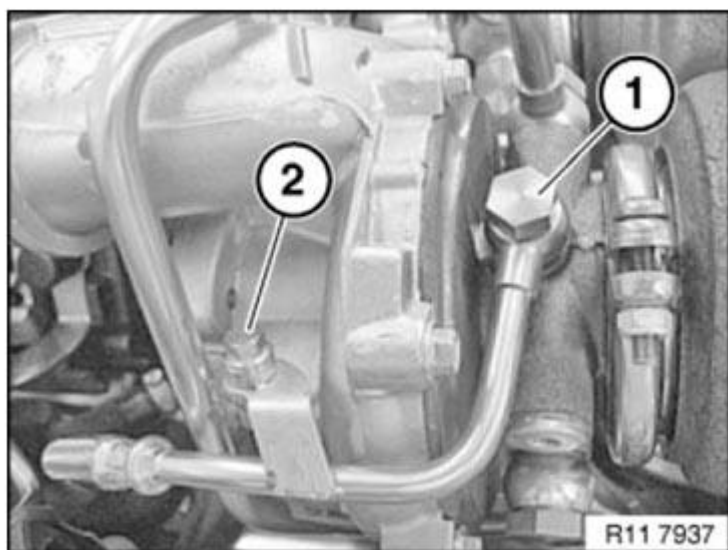


Fig. 477: Identifying Banjo Bolt With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 3AZ** .

Release banjo bolt (2).

Tightening torque **11 53 2AZ** .

Lay coolant return line to one side.

Installation note:

Replace all sealing rings

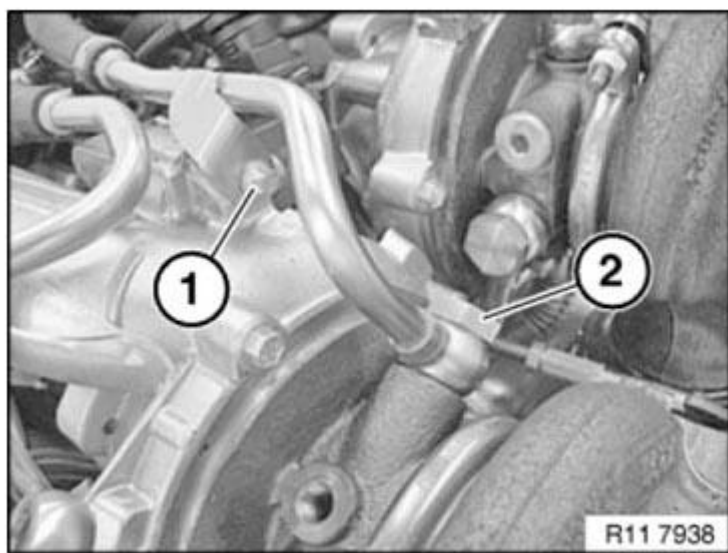


Fig. 478: Identifying Banjo Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Open hose clamp (1).

Detach coolant feed line (2).

Installation note:

Replace hose clamp (1)

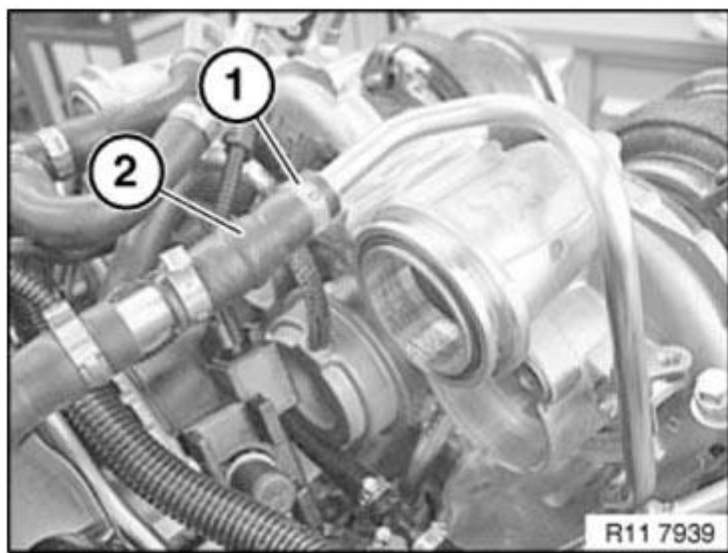


Fig. 479: Identifying Coolant Feed Line And Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (4) with a suitable tool.

NOTE: Oil return pipe (3) can only be removed with turbocharger.

Tightening torque 11 42 10AZ .

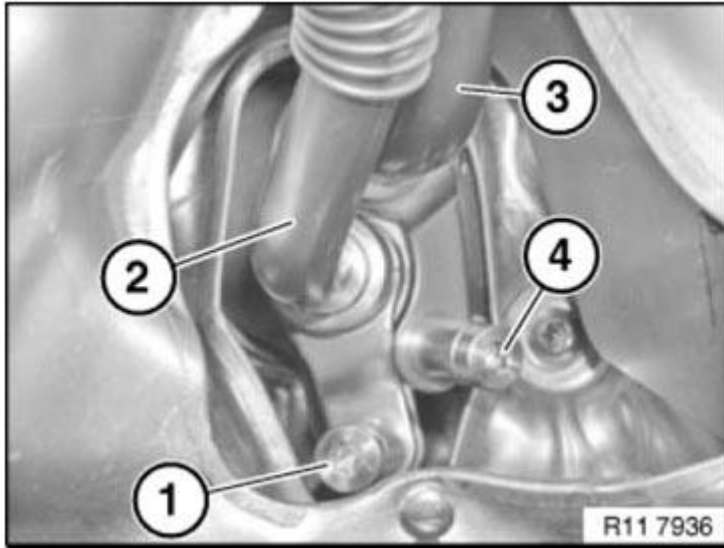


Fig. 480: Identifying Oil Return Pipe With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Open V-band clamp (2).

IMPORTANT: Do not mechanically deform oil return line.

Remove turbocharger with oil return line in upward direction.

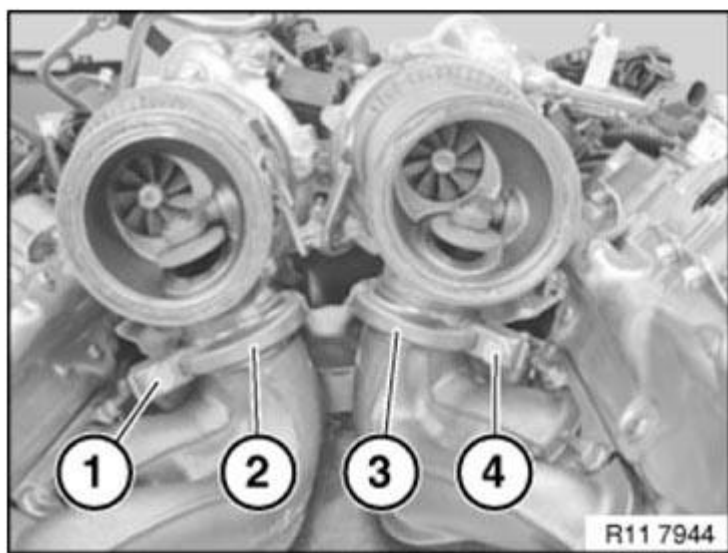


Fig. 481: Identifying V-Band Clamp With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, convert coolant feed line to new turbocharger.

Release banjo bolt (1).

Tightening torque **11 53 2AZ** .

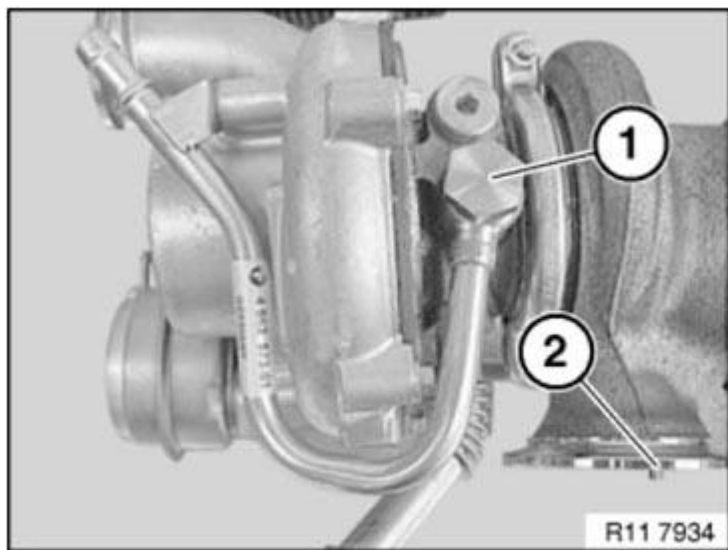


Fig. 482: Identifying Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 3AZ** .

Modify coolant feed line (2).

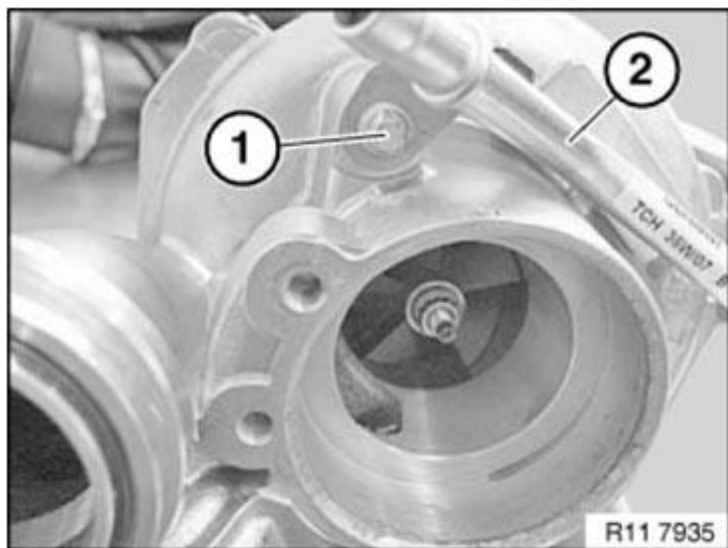


Fig. 483: Identifying Coolant Feed Line With Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 42 9AZ** .

Remove oil return pipe (2).

Installation note:

A new oil return pipe must always be fitted

Replace gasket.

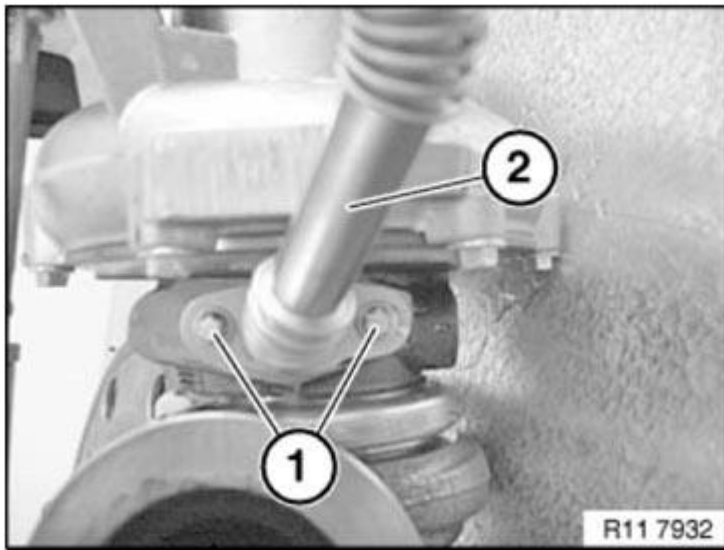


Fig. 484: Identifying Oil Return Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: A deformed oil return pipe can result in leaks.
Risk of fire if oil line is leaking.**

The thermal linear compensators (see arrows) on the oil return pipe (1) must not be mechanically deformed.

Installation note:

Moisten oil return pipe at end with engine oil.

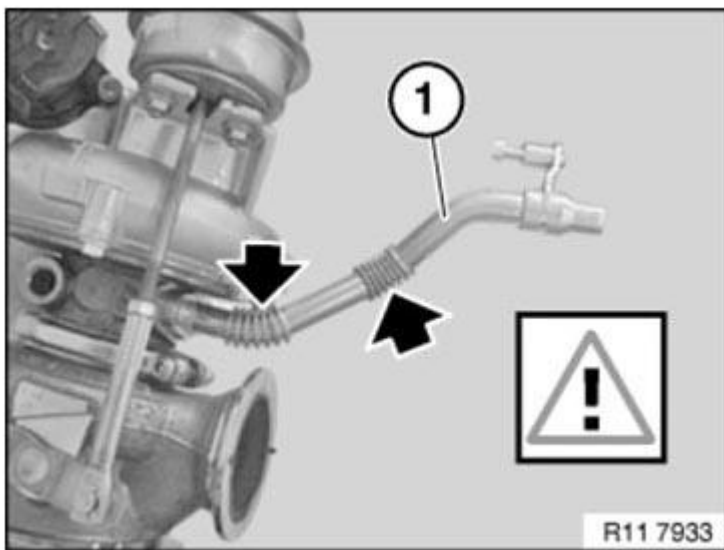


Fig. 485: Identifying Thermal Linear Compensators On Oil Return Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Illustration shows special tools.

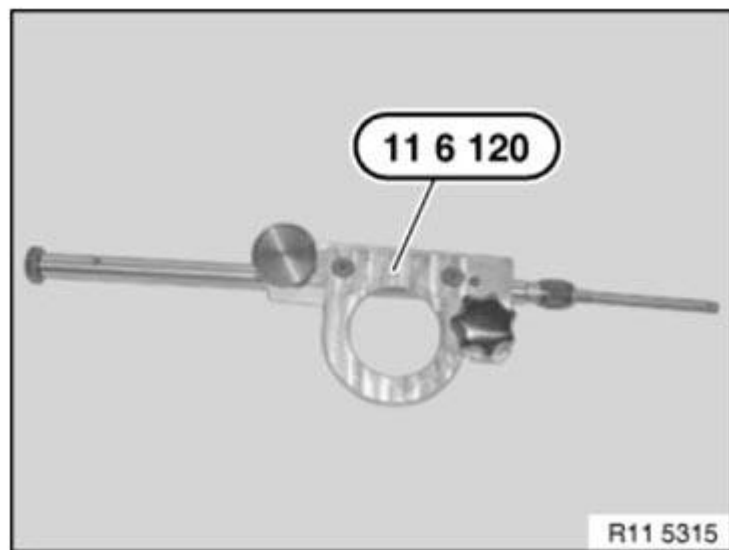


Fig. 486: Identifying Special Tool (11 6 120)

Courtesy of BMW OF NORTH AMERICA, INC.

To install the exhaust turbocharger, special tool 11 6 120, consisting of 11 6 121 and 11 6 123, can be used.

Place special tool (1) on turbocharger and secure with screw (2).

Slide in screw shaft (3) up to mounting bolt (4).

Secure screw shaft (3) with knurled screw (5).

NOTE: Oil return pipe must not be deformed.

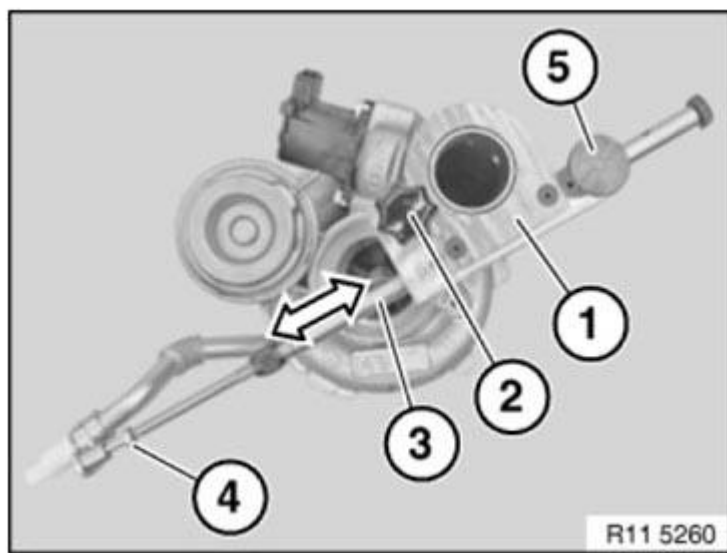


Fig. 487: Sliding Screw Shaft Up To Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release knurled screw (5).

Screw oil return pipe to screw shaft (3).

Tightening torque **11 42 10AZ** .

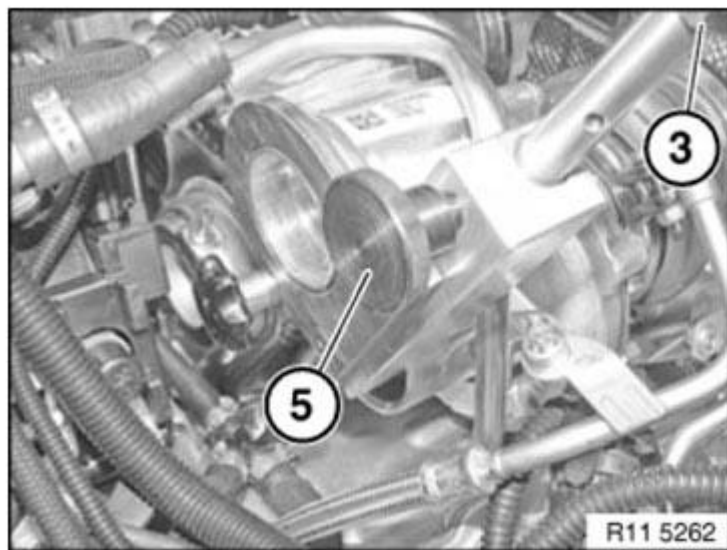


Fig. 488: Identifying Knurled Screw And Screw Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The O - rings can easily fall into the oil duct.

Installation note:

Replace O-rings on oil return cover (2)

NOTE: Illustration shows turbocharger removed.

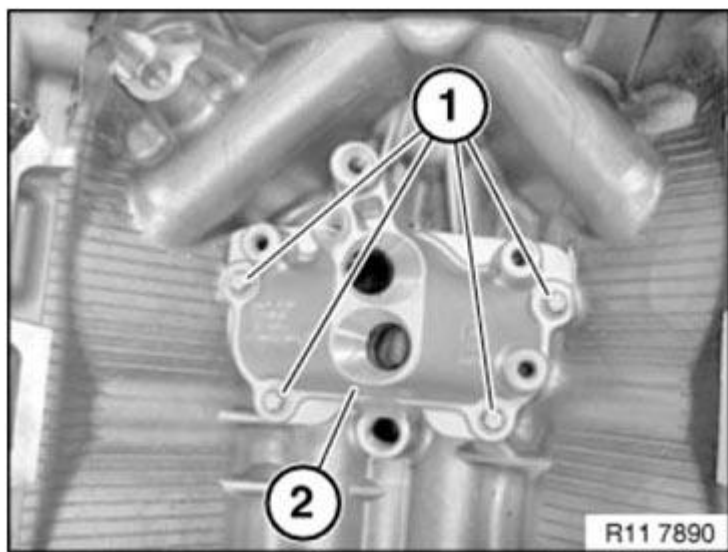


Fig. 489: Identifying Oil Return Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replace gasket (1) on exhaust manifold.

Installation note:

Check locating apparatus on exhaust manifold.

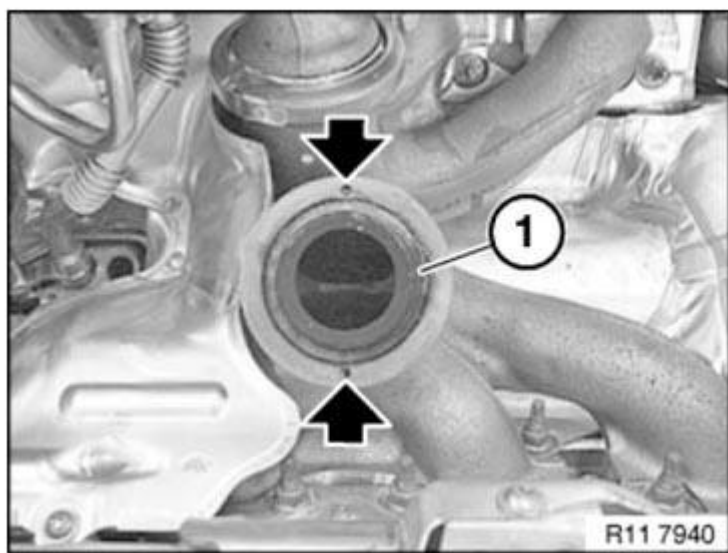


Fig. 490: Locating Apparatus On Exhaust Manifold
Courtesy of BMW OF NORTH AMERICA, INC.

Position turbocharger with oil return line on exhaust manifold.

Position V-band clamp (2).

Insert screw (1).

Tightening torque **11 65 1AZ** .

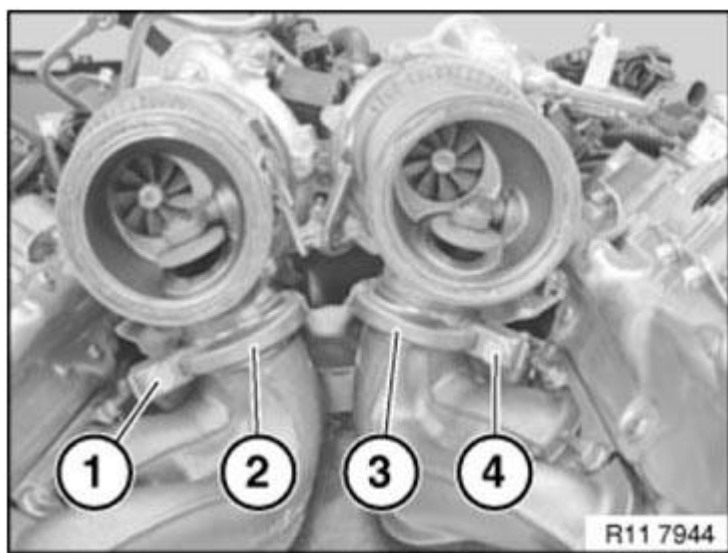


Fig. 491: Identifying V-Band Clamp With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The ends of the V - band clamp must rest parallel to each other.

Tightening torque **11 65 1AZ** .

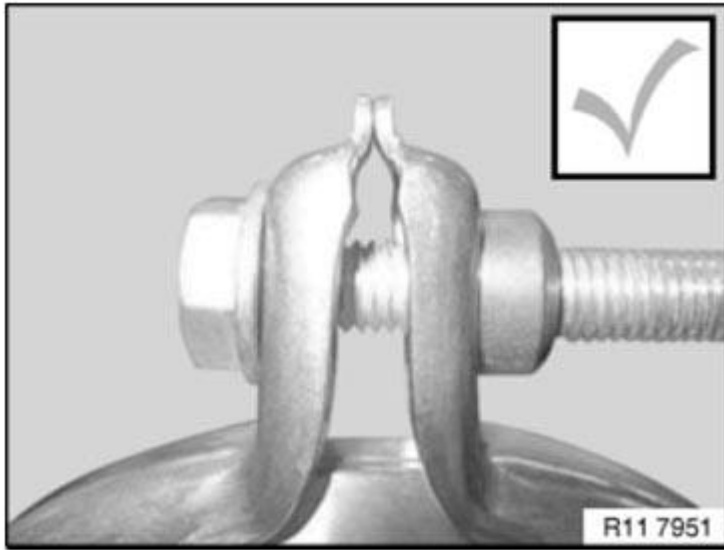


Fig. 492: Identifying V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Screw connection of V-band clamp is too loose:

If you can see a gap between the ends of the V-band clamps, release and then repeat the screw connection.

Tightening torque **11 65 1AZ** .

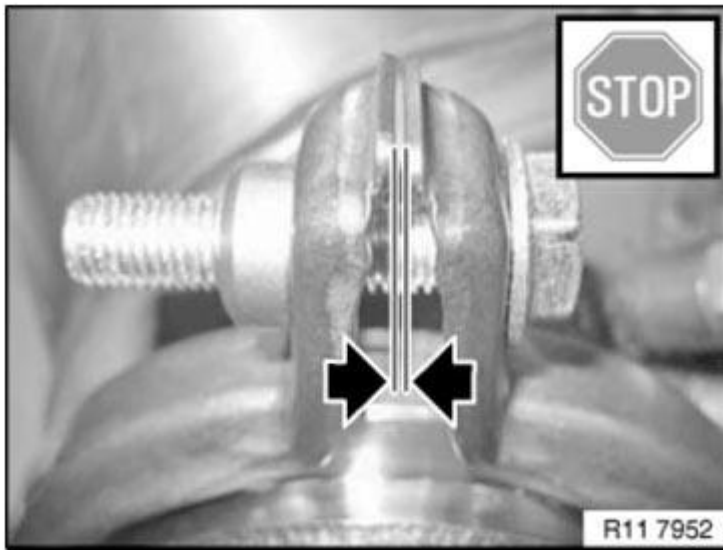


Fig. 493: Locating V-Band Clamp Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Screw connection of V-band clamp is too tight:

If the ends of the V-band clamp are positioned under each other, release and then repeat the screw connection.

Tightening torque **11 65 1AZ** .

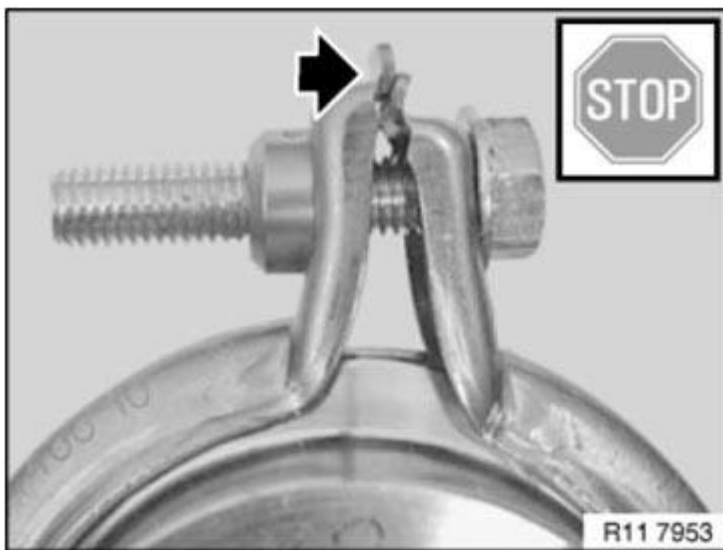


Fig. 494: Locating V-Band Clamps Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of mixing up vacuum hoses.

Vacuum hose (1) for cylinders 5-8

Old version: black/blue

New version: black/yellow

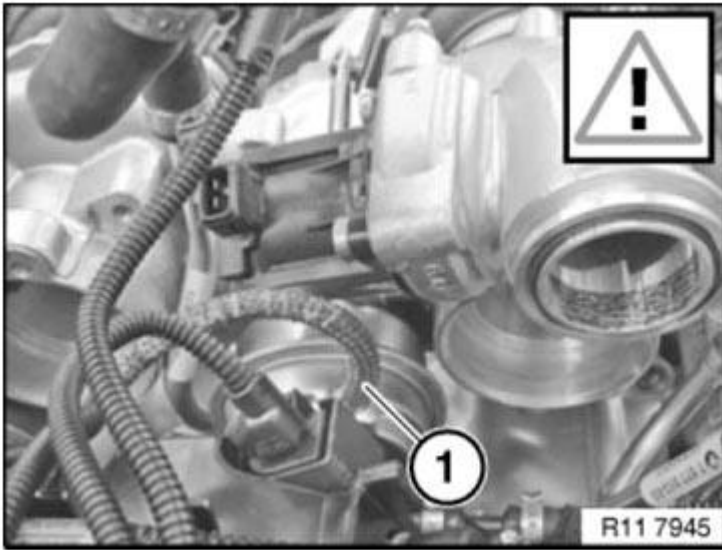


Fig. 495: Identifying Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check **VACUUM CONNECTIONS** .

Observe BMW diagnosis instructions.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

1165025 REMOVING AND INSTALLING/REPLACING EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-4 (N63)

Notes

**IMPORTANT: Risk of fire if oil lines are leaking.
Risk of mixing up vacuum hoses.**

Necessary preliminary work

- Remove **CATALYTIC CONVERTER** , cylinders 1-4

Disconnect plug connection (1) on electric changeover valve (2).

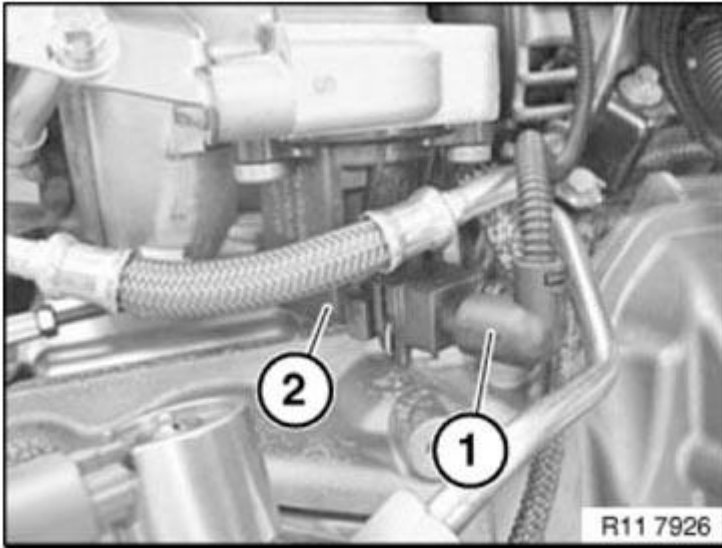


Fig. 496: Identifying Plug Connection On Electric Changeover Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 7AZ** .

Unfasten banjo bolt (2).

Tightening torque **11 42 4AZ** .

Lay oil line (3) from turbocharger to side.

Installation note:

Replace all sealing rings

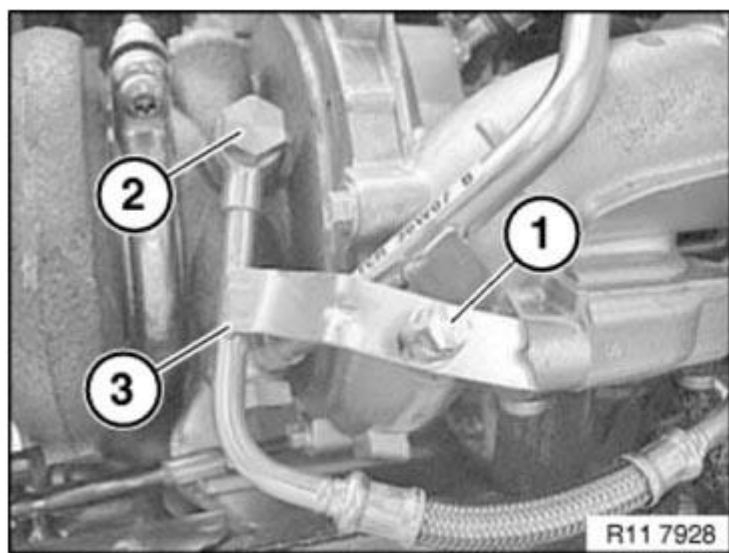


Fig. 497: Identifying Oil Line With Banjo Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 3AZ** .

Release banjo bolt (2).

Tightening torque **11 53 2AZ** .

Lay coolant return line (3) to one side.

Installation note:

Replace all sealing rings

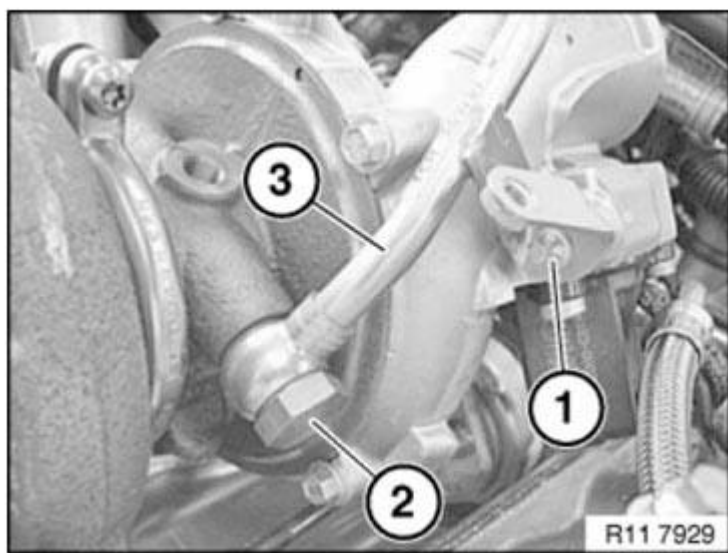


Fig. 498: Identifying Coolant Return Line With Banjo Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Open hose clamp (1).

Detach coolant feed line (2).

Installation note:

Replace hose clamp (1)

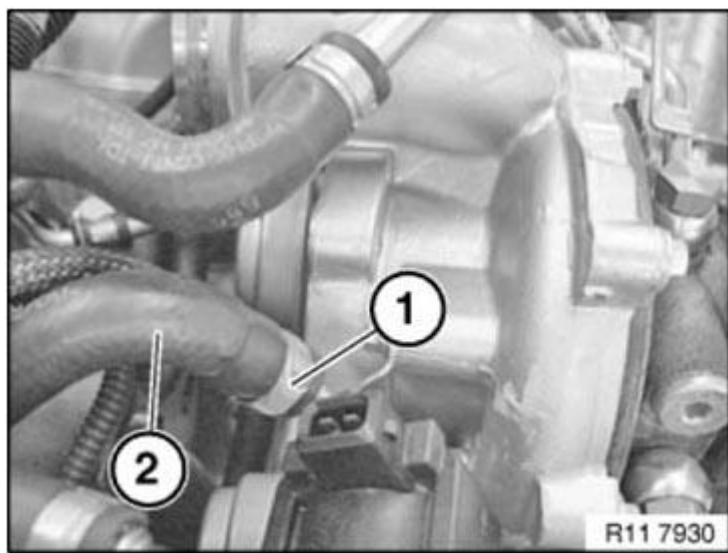


Fig. 499: Identifying Coolant Feed Line And Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) with a suitable tool.

NOTE: Oil return pipe (2) can only be removed with turbocharger.

Tightening torque 11 42 10AZ .

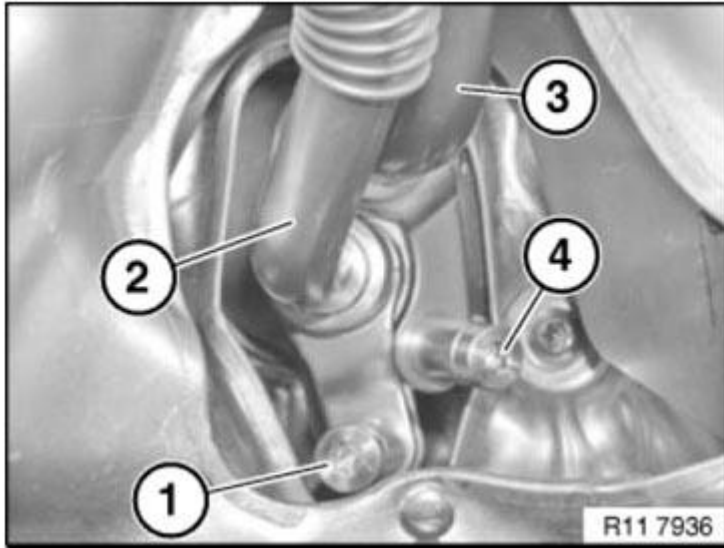


Fig. 500: Identifying Oil Return Pipe With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (4).

Open V-band clamp (3).

IMPORTANT: Do not mechanically deform oil return line.

Remove turbocharger with oil return line in upward direction.

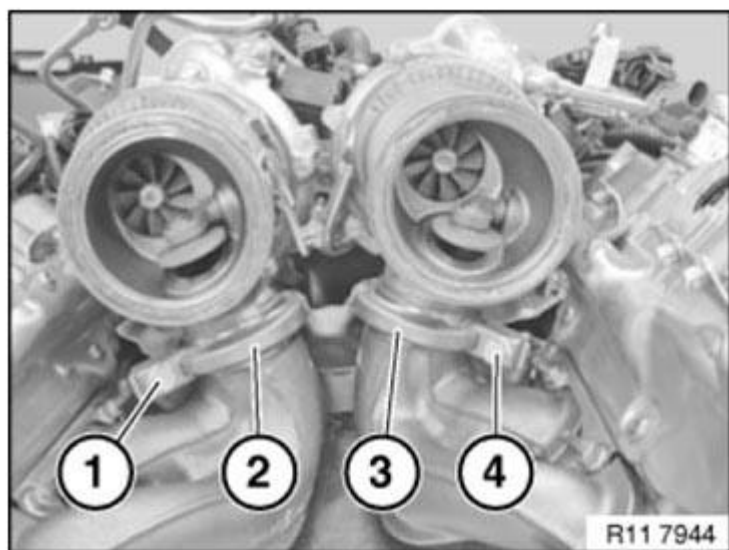


Fig. 501: Identifying V-Band Clamp With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, convert coolant feed line to new turbocharger.

Release banjo bolt (1).

Tightening torque **11 53 2AZ** .

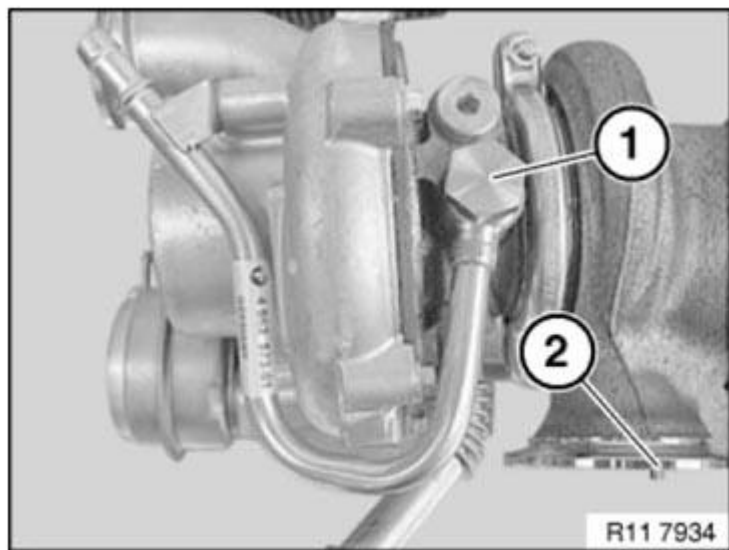


Fig. 502: Identifying Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 3AZ** .

Modify coolant feed line (2).

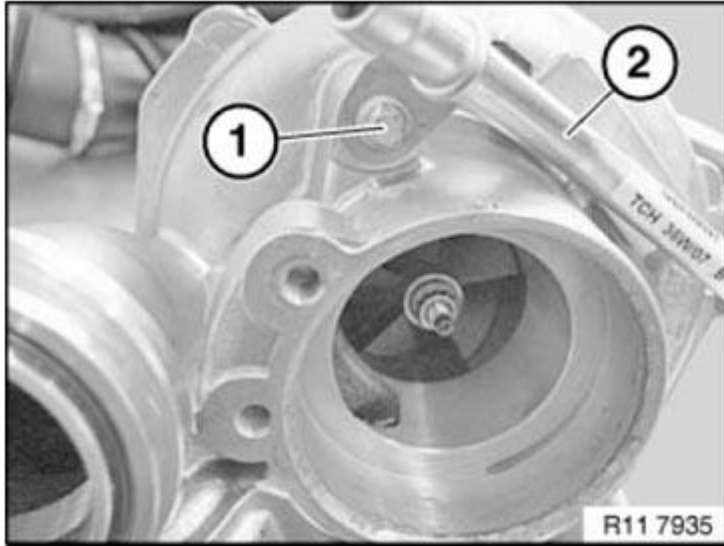


Fig. 503: Identifying Coolant Feed Line With Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 42 9AZ** .

Remove oil return pipe (2).

Installation note:

A new oil return pipe must always be fitted

Replace gasket.

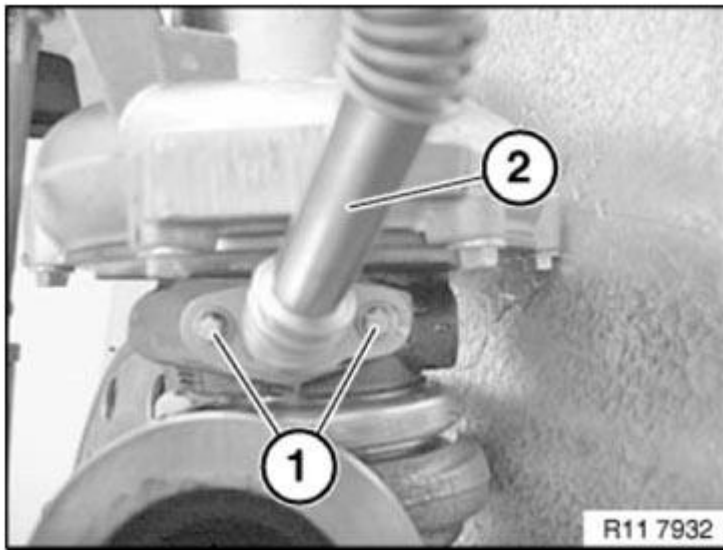


Fig. 504: Identifying Oil Return Pipe

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: A deformed oil return pipe can result in leaks.
Risk of fire if oil line is leaking.**

The thermal linear compensators (see arrows) on the oil return pipe (1) must not be mechanically deformed.

Installation note:

Moisten oil return pipe at end with engine oil.

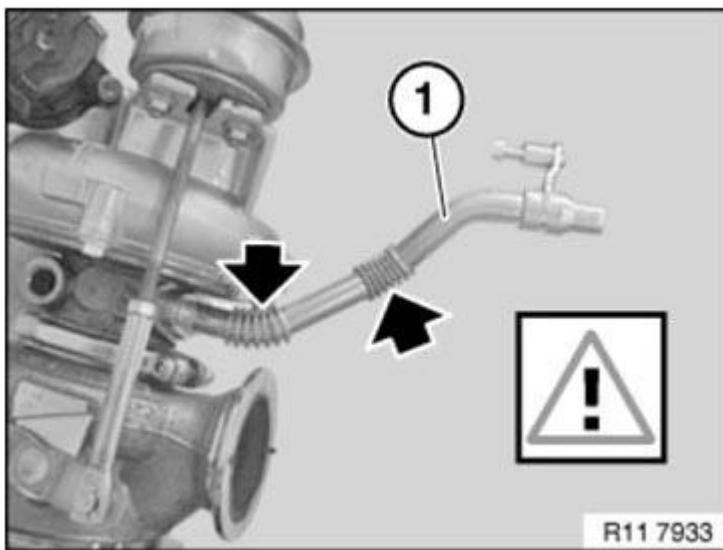


Fig. 505: Identifying Thermal Linear Compensators On Oil Return Pipe

Courtesy of BMW OF NORTH AMERICA, INC.

Illustration shows special tools.

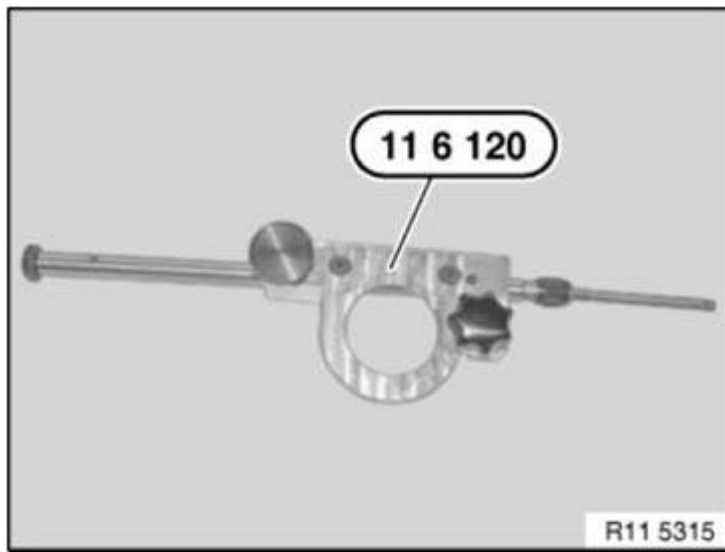


Fig. 506: Identifying Special Tool (11 6 120)

Courtesy of BMW OF NORTH AMERICA, INC.

To install the exhaust turbocharger, special tool 11 6 120, consisting of 11 6 122 and 11 6 123, can be used.

Place special tool (1) on turbocharger and secure with screw (2).

Slide in screw shaft (3) up to mounting bolt (4).

Secure screw shaft (3) with knurled screw (5).

NOTE: **Pipe must not be deformed.**

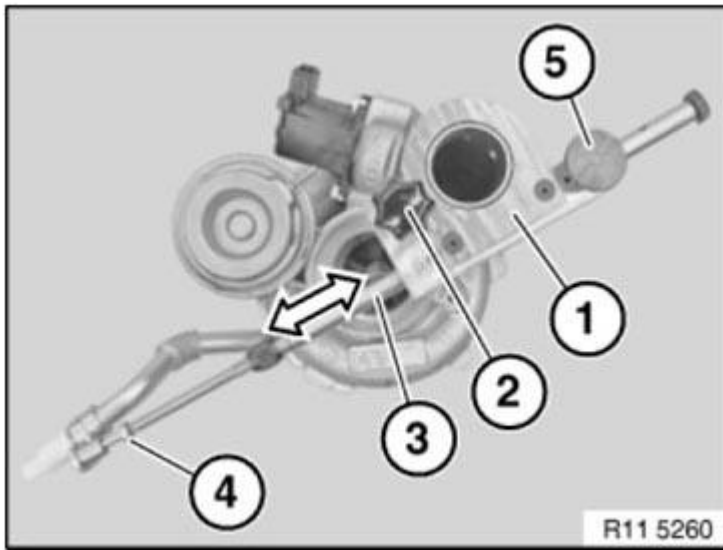


Fig. 507: Sliding Screw Shaft Up To Mounting Bolt
 Courtesy of BMW OF NORTH AMERICA, INC.

To screw the oil return pipe, it is necessary to release knurled screw (5) again.

Screw oil return pipe to screw shaft (3).

Tightening torque **11 42 10AZ** .

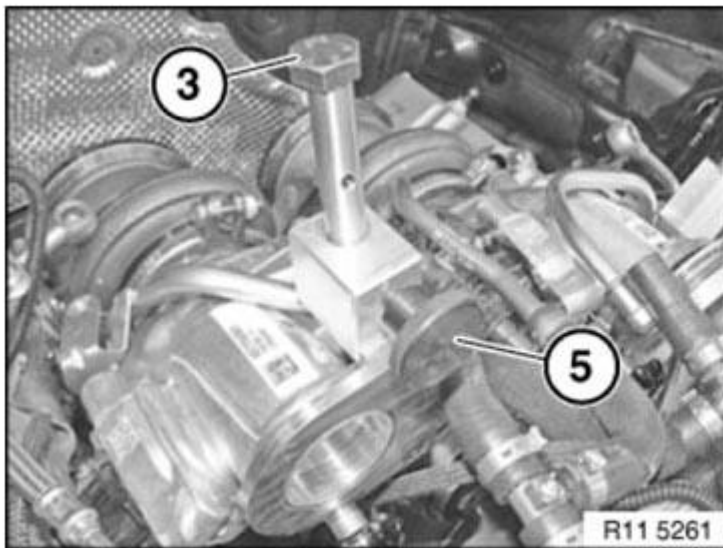


Fig. 508: Identifying Knurled Screw And Screw Shaft
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The O-rings can easily fall into the oil duct.

Installation note:

Replace O-rings on oil return cover (2)

NOTE: Illustration shows turbocharger removed.

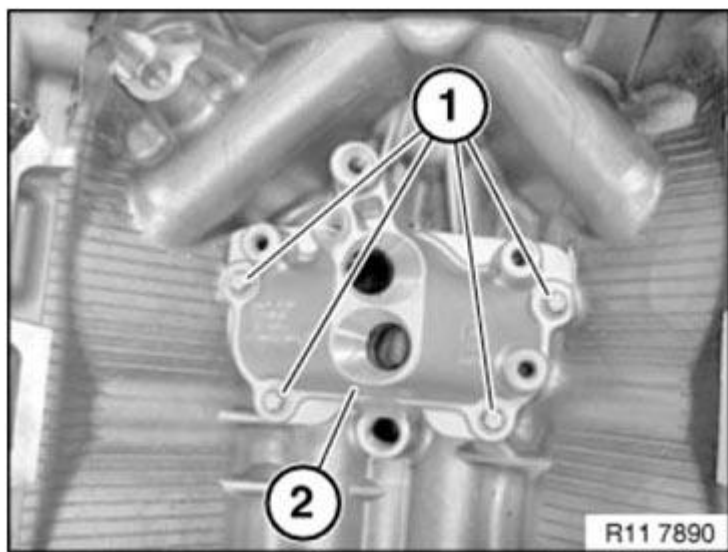


Fig. 509: Identifying Oil Return Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace gasket on exhaust manifold

Installation note:

Check locating apparatus on exhaust manifold.

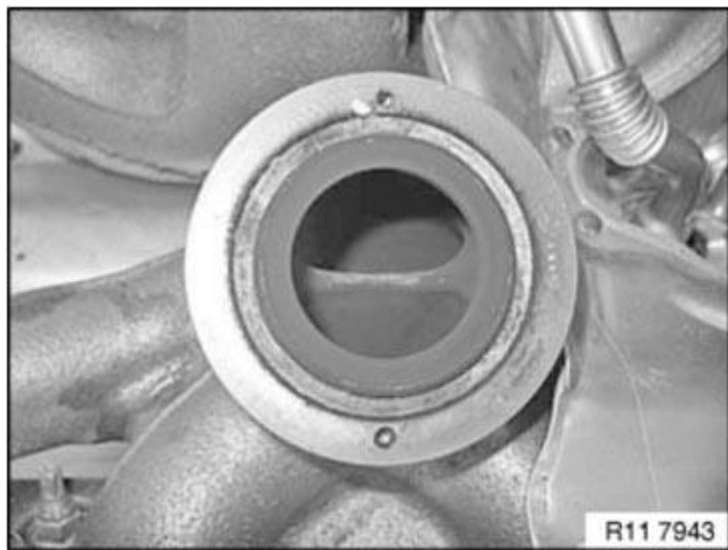


Fig. 510: Identifying Apparatus On Exhaust Manifold
Courtesy of BMW OF NORTH AMERICA, INC.

Position turbocharger with oil return line on exhaust manifold.

Position V-band clamp (3).

Insert bolt (4).

Tightening torque **11 65 1AZ** .

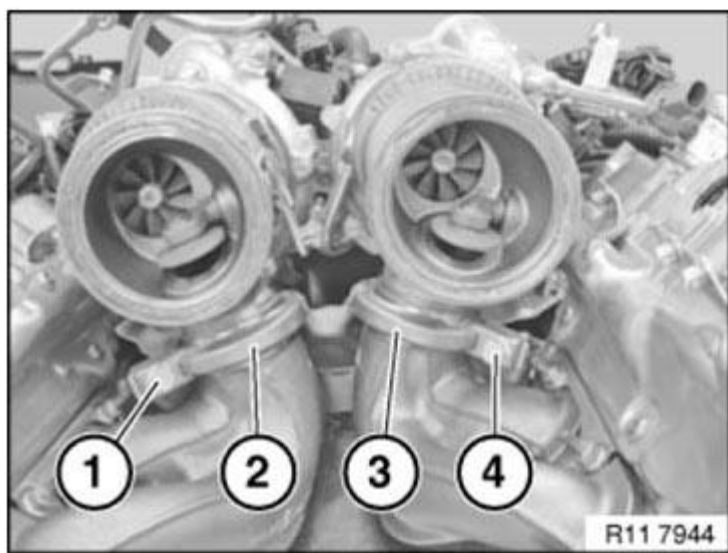


Fig. 511: Identifying V-Band Clamp With Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The ends of the V-band clamp must rest parallel to each other.

Tightening torque **11 65 1AZ** .

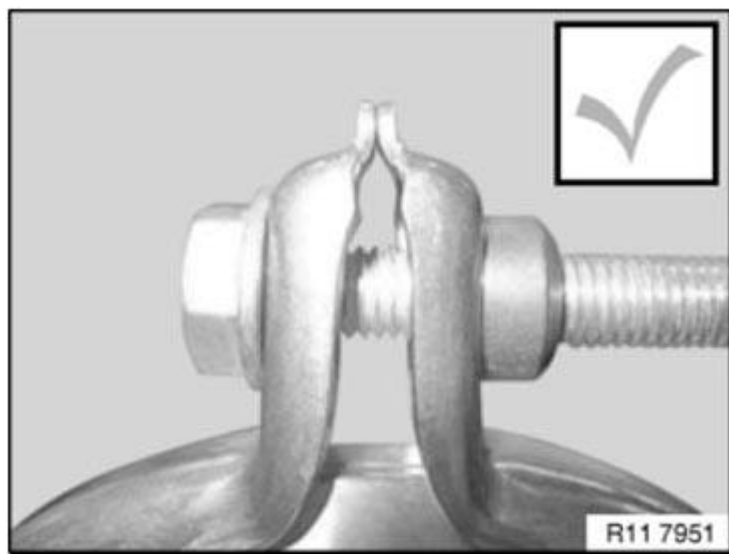


Fig. 512: Identifying V-Band Clamp Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Screw connection of V-band clamp is too loose:

If you can see a gap between the ends of the V-band clamps, release and then repeat the screw connection.

Tightening torque **11 65 1AZ** .

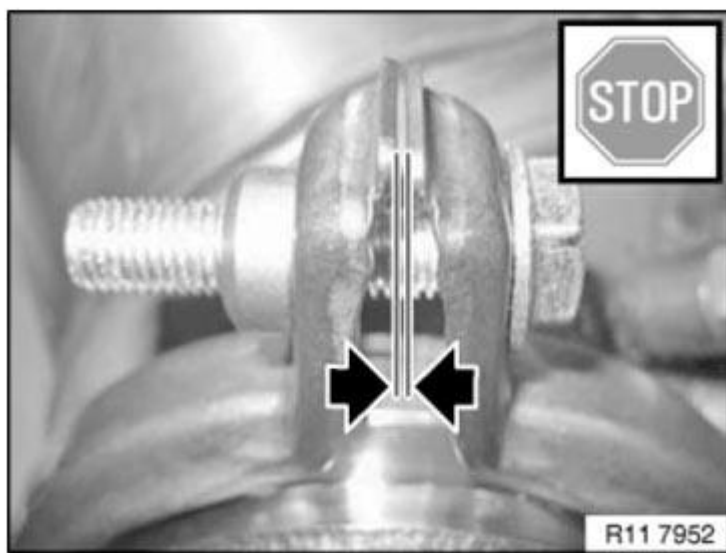


Fig. 513: Locating V-Band Clamp Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Screw connection of V-band clamp is too tight:

If the ends of the V-band clamp are positioned under each other, release and then repeat the screw connection.

Tightening torque **11 65 1AZ** .

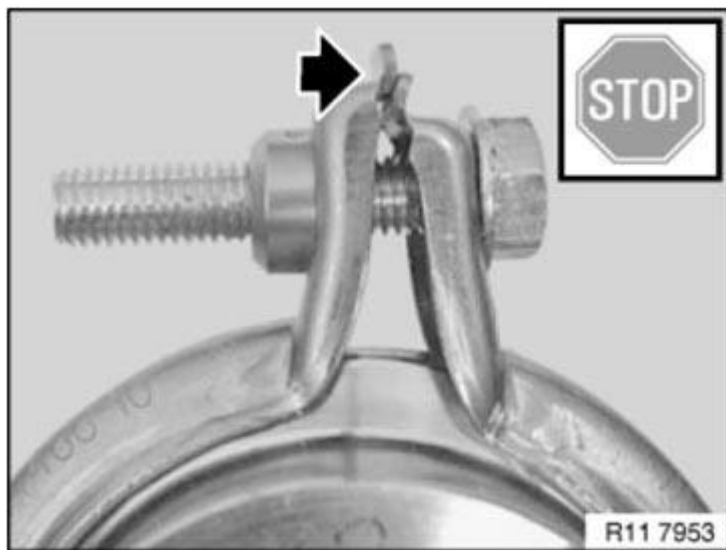


Fig. 514: Locating V-Band Clamp Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of mixing up vacuum hoses.

Vacuum hose (1) black/red for cylinders 1-4.

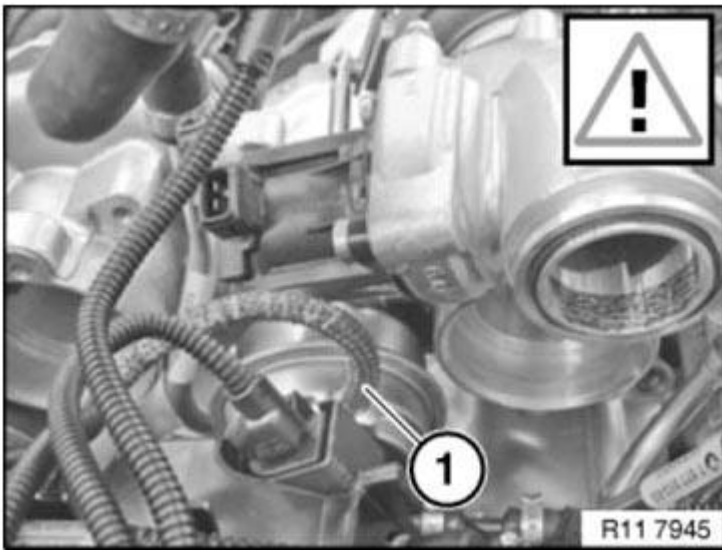


Fig. 515: Identifying Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check **VACUUM CONNECTIONS** .

Observe BMW diagnosis instructions.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

1161065 REMOVING AND INSTALLING/REPLACING LEFT INTAKE PLENUM (N63)

Necessary preliminary work

- Remove left **INJECTION PIPE** .
- Remove **THROTTLE VALVE**
- Release screws on intake plenum from above without fail before lowering front axle.
- Secure **ENGINE** in installation position.
- Lower front axle, releasing screws on engine mount first. See **LOWERING/RAISING FRONT AXLE SUPPORT (UNIVERSAL LIFTER)** .
- Release power steering pump, if installed, and set aside. See **POWER STEERING PUMP FOR**

HYDRAULIC STEERING GEAR WITH DYNAMIC DRIVE (N63) or POWER STEERING PUMP FOR POWER STEERING GEAR WITH ACTIVE FRONT STEERING (N63) .

UNIVERSAL JOINT with corrugated tubing.

Detach engine ventilation hose (1).

Disconnect connector.

Unscrew nuts (2).

Tightening torque: **11 61 1 AZ** .

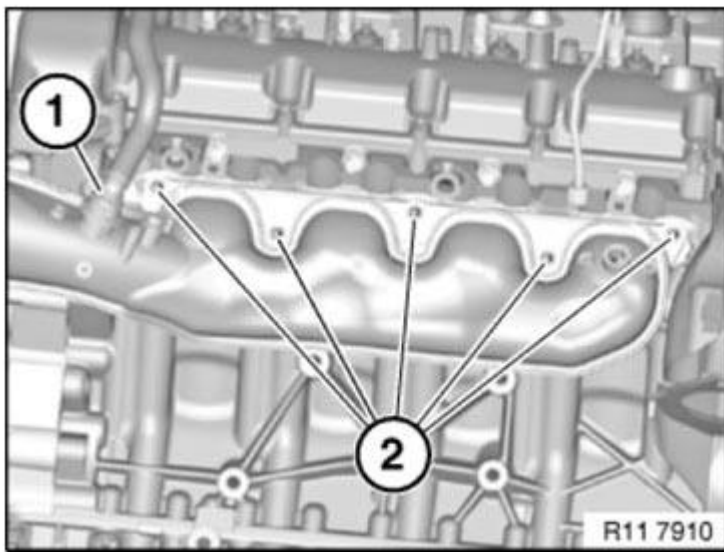


Fig. 516: Identifying Engine Ventilation Hose And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release **THROTTLE VALVE** (1).

Release holder screw (2) on intake plenum.

Tightening torque: **11 61 2AZ** .

Feed out intake plenum towards rear.

Installation note:

Replace all profile seals.

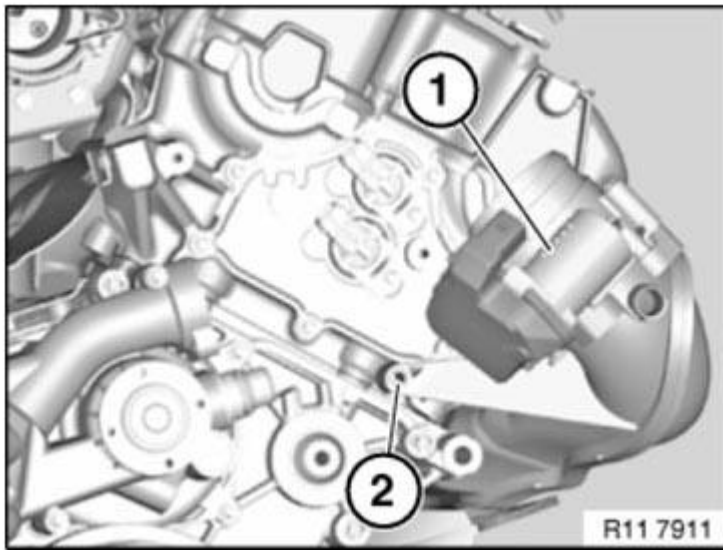


Fig. 517: Identifying Throttle Valve Assembly (N63) And Holder Screw On Intake Plenum
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle and

Check air intake system for leaks.

1165010 REMOVING AND INSTALLING/REPLACING PRESSURE ACCUMULATOR (N63)

Necessary preliminary work

- Remove both exhaust turbochargers. See **EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-4** and **EXHAUST TURBOCHARGER, LEFT, CYLINDERS 5-8**.
- Remove both exhaust manifolds. See **LEFT EXHAUST MANIFOLD** and **RIGHT EXHAUST MANIFOLD**.
- Remove **HEAT SHIELD** at bottom

Release banjo bolt (1).

Tightening torque **11 42 3AZ**.

Installation note:

Replace sealing ring

Release screw (3) on engine oil line.

Remove engine oil line (2).

Release screws (3) on vacuum reservoir (4).

Tightening torque **11 65 6AZ** .

Remove vacuum reservoir (4).

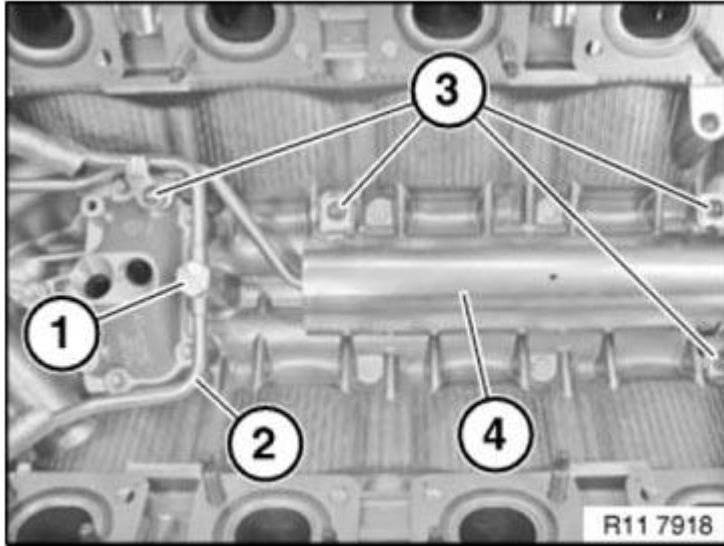


Fig. 518: Identifying Banjo Bolt, Screws And Vacuum Reservoir
Courtesy of BMW OF NORTH AMERICA, INC.

Check **VACUUM CONNECTIONS** for correct routing.

Check **VACUUM SYSTEM FOR LEAKS** .

Assemble engine.

1161068 REMOVING AND INSTALLING/REPLACING RIGHT INTAKE PLENUM (N63)

Necessary preliminary work

- Remove right **INJECTION PIPE** .
- Remove **THROTTLE VALVE**
- Release screws on intake plenum from above without fail before lowering front axle.
- Secure **ENGINE** in installation position.
- Lower **FRONT AXLE** , releasing screws on engine mount first
- Release A/C compressor and place to one side. See **REMOVING AND INSTALLING/REPLACING HEATING AND AIR CONDITIONING SYSTEM COMPRESSOR (N63, WITH DYNAMIC DRIVE)** .

Detach engine ventilation hose (1).

Disconnect connector.

Unscrew nuts (2).

Tightening torque: **11 61 1 AZ** .

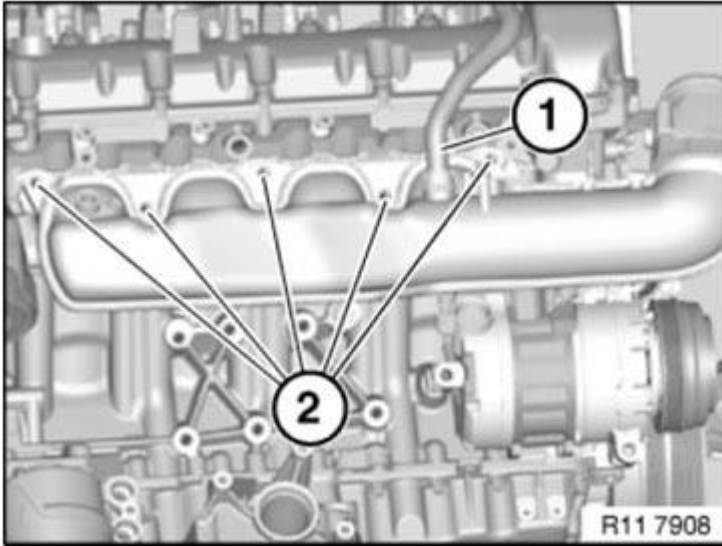


Fig. 519: Identifying Engine Ventilation Hose And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **THROTTLE VALVE** (2).

Release screw (1).

Tightening torque: **11 61 2 AZ** .

Feed out intake plenum towards rear.

Installation note:

Replace all profile seals.

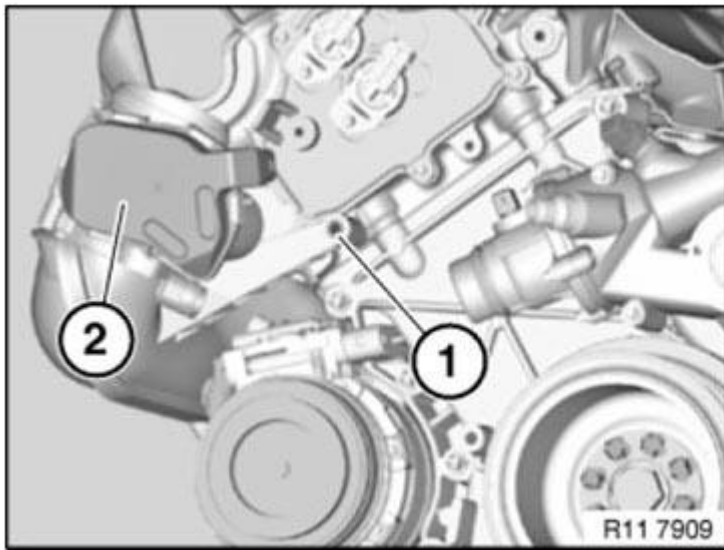


Fig. 520: Identifying Screw And Throttle Valve
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle.

Check air intake system for leaks.

1166 VACUUM PUMP

1166000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N63)

IMPORTANT: Installation note:

Due to the risk of damage to the engine gaskets/seals and the lack of brake boosting, make sure before starting the engine that all the vacuum lines are connected.

Vacuum pump is fitted on cylinder head 1 to 4 at rear on intake camshaft.

Necessary preliminary work

- Press brake pedal several times in order to reduce vacuum pressure in brake booster.
- Remove right **CATALYTIC CONVERTER** .
- Remove right heat shield.
- Detach vacuum line from vacuum pump.

Release screws (1).

Remove heat shield (2).

Remove vacuum hose.

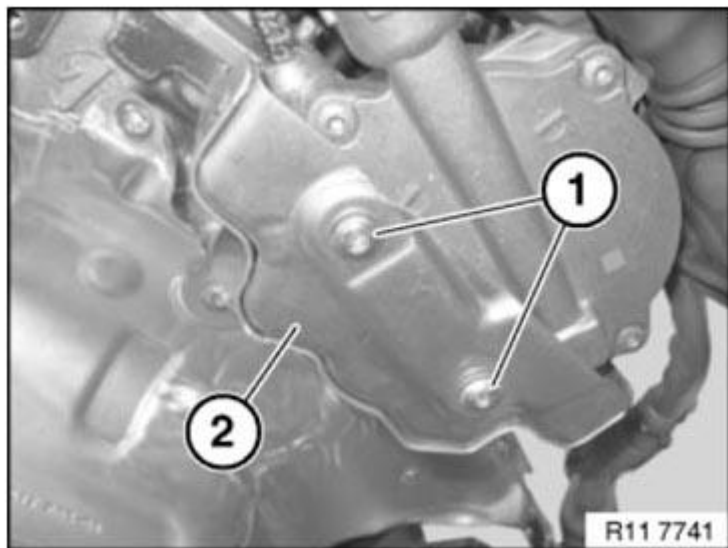


Fig. 521: Identifying Heat Shield With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

NOTE: Bolts (1) are secured against falling out.

Release screw (2).

Remove vacuum pump (3).

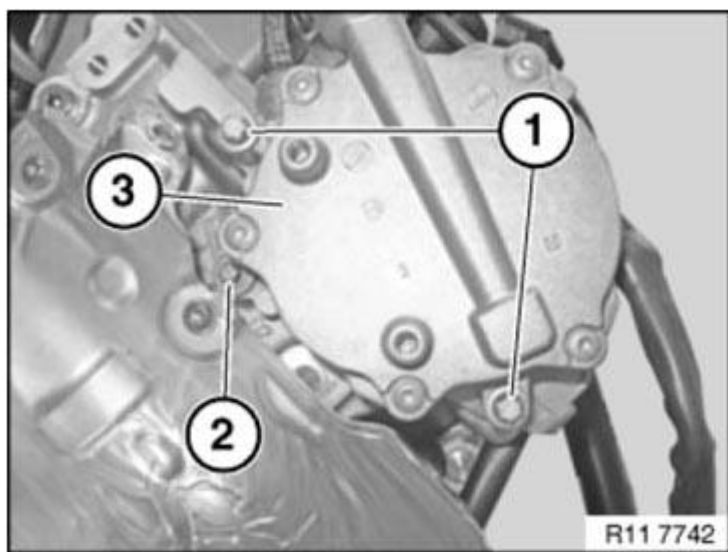


Fig. 522: Identifying Vacuum Pump With Mounting Bolts And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Drive (1) must be rotated into correct position prior to installation.

Installation note:

Replace sealing ring (2) and coat with grease to facilitate fitting.

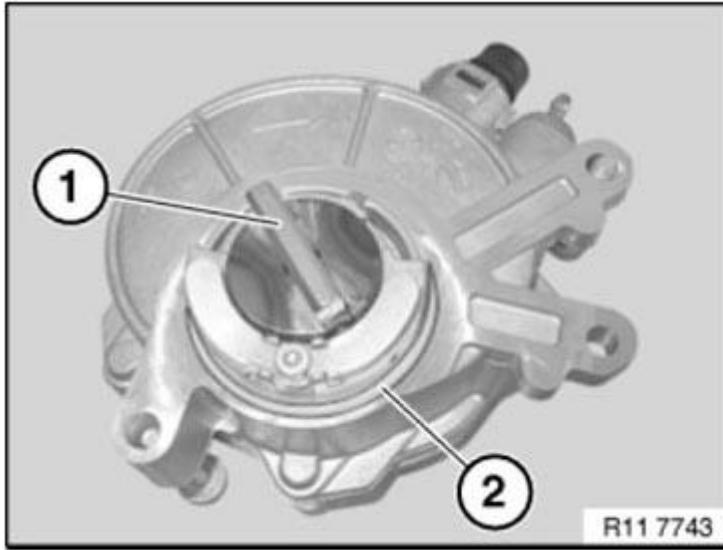


Fig. 523: Identifying Sealing Ring And Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Align vacuum pump drive to groove (1) of intake camshaft.

Vacuum pump can best be installed when groove (1) is vertically aligned.

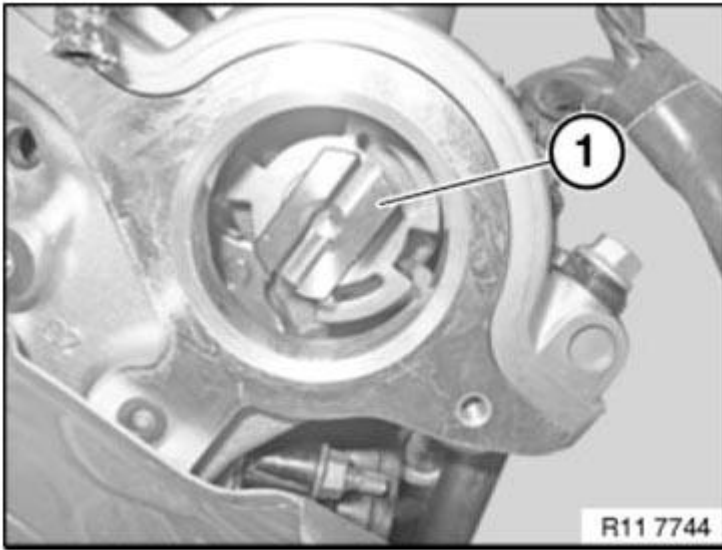


Fig. 524: Identifying Intake Camshaft Groove
 Courtesy of BMW OF NORTH AMERICA, INC.

Check function of DME.

Check vacuum pump for leaks and correct operation.

1174 EL.VALVE FOR EXH. GAS RECIRCULATION

1174509 REPLACING BOTH PRESSURE CONVERTERS FOR TURBOCHARGER (N63)

Necessary preliminary work

- Partially release charge air cooler EXPANSION TANK .
- Partially release AUXILIARY WATER PUMP for exhaust turbocharger (not F04).
- Disconnect plug connection at COOLANT THERMOSTAT .

Pressure converter, cylinders 1-4

Disconnect plug connection (1) on pressure converter.

Installation note:

Plug connection (1) must snap audibly into place!

Disconnect black vacuum hose at connection (VAC = vacuum reservoir).

Disconnect black/red vacuum hose at connection (OUT= turbocharger vacuum unit).

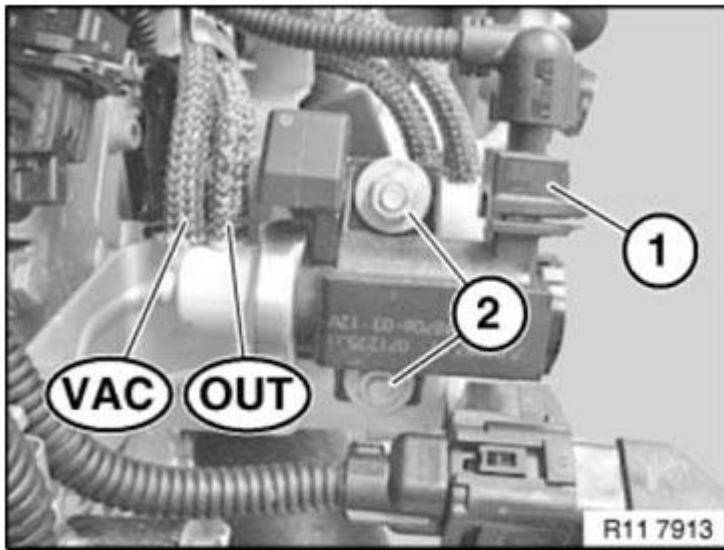


Fig. 525: Identifying Black/Red Vacuum Hose And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (2).

Tightening torque **11 65 8AZ** .

Remove pressure converter.

Pressure converter, cylinders 5-8

Disconnect plug connection (1) on pressure converter.

Installation note:

Plug connection (1) must snap audibly into place!

Disconnect black vacuum hose at connection (VAC = vacuum reservoir).

Disconnect black/blue vacuum hose at connection (OUT= turbocharger vacuum unit).

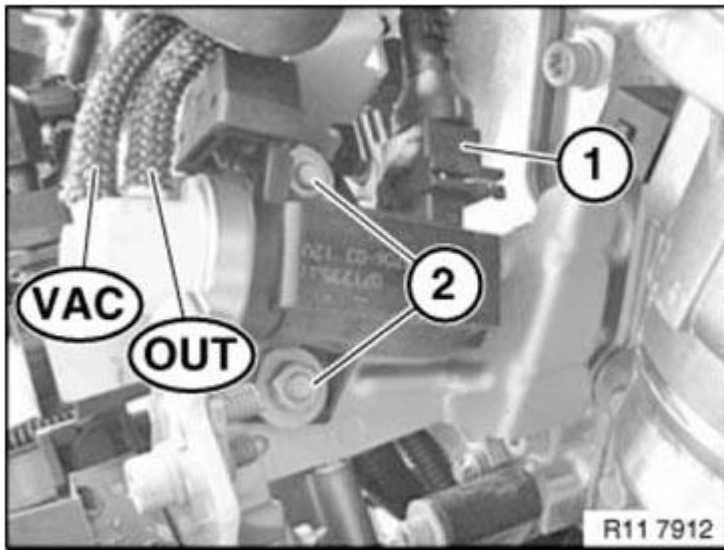


Fig. 526: Identifying Black/Blue Vacuum Hose Connection With Plug Connection
 Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (2).

Tightening torque **11 65 8AZ** .

Remove pressure converter.

Check activation via BMW diagnosis system.

1178 EMISSION CONTROL, OXYGEN SENSOR

1178530 REPLACING LEFT CONTROL SENSOR (N63)

Notes

WARNING: Risk of burning!
Only perform this work after engine has cooled down.

Necessary preliminary work

- Check function of DME control unit
- Switch off ignition
- Remove **AIR FILTER HOUSING**

Unlock plug connection and detach.

Unclip control sensor cable at retaining clips.

Release control sensor with special tool **11 7 020** .

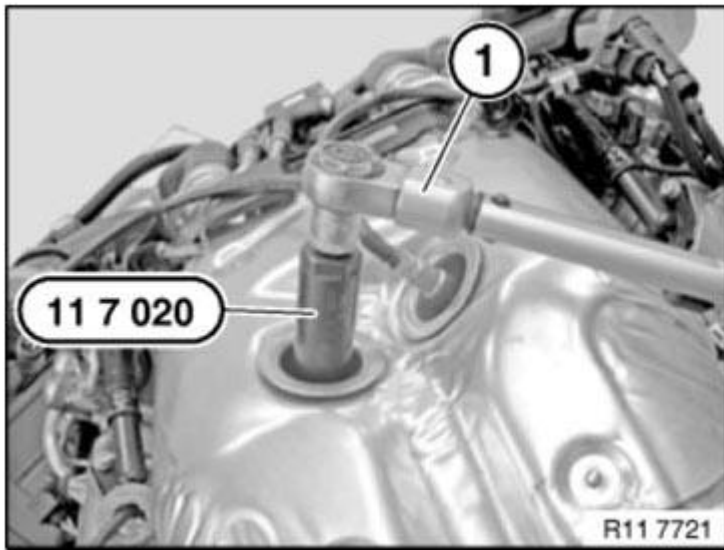


Fig. 527: Releasing Control Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure control sensor with special tool **11 7 020** and a torque wrench (1).

Tightening torque **11 78 1AZ** .

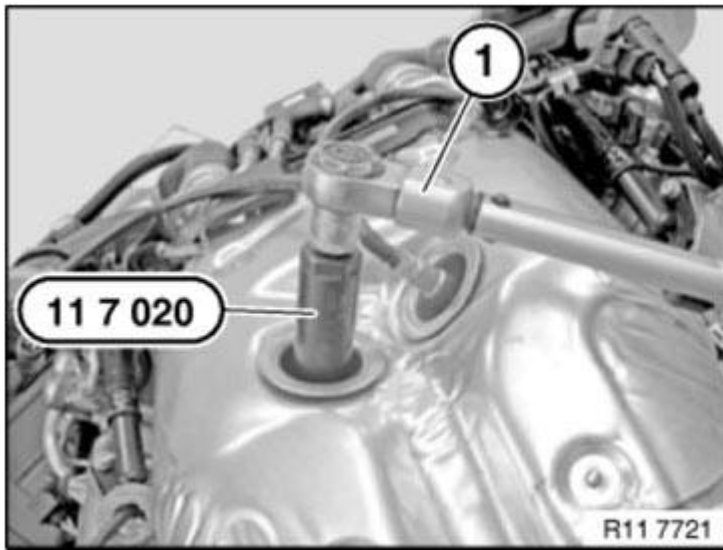


Fig. 528: Securing Control Sensor Using Special Tool 11 7 020 And Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check function of DME control unit.

Pay attention to cable routing of control sensor.

1178540 REPLACING LEFT MONITOR SENSOR (N63)

Notes

WARNING: Risk of burning!
Only perform this work after engine has cooled down.

Necessary preliminary work

- Check function of DME control unit
- Switch off ignition
- Remove **AIR FILTER HOUSING**

Release retaining clip (1).

Remove heat shield wire ring (2) over oxygen sensor.

Detach oxygen sensor cable from retaining clips (3).

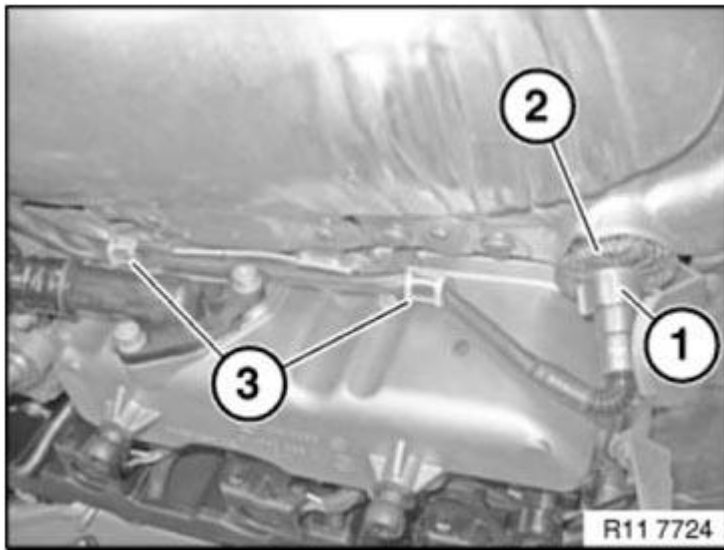


Fig. 529: Identifying Heat Shield Wire Ring And Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Release monitoring sensor (1) with special tool **11 7 020** .

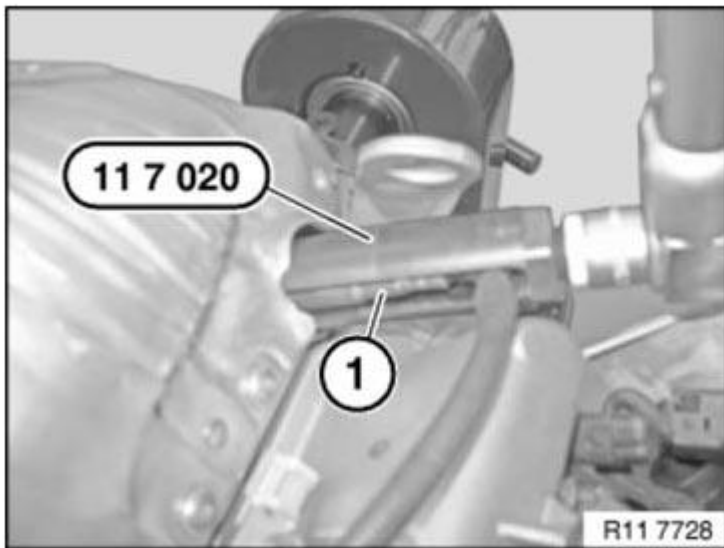


Fig. 530: Releasing Monitoring Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound

to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Fasten monitoring sensor (1) with special tool **11 7 020** .

Tightening torque **11 78 1AZ** .

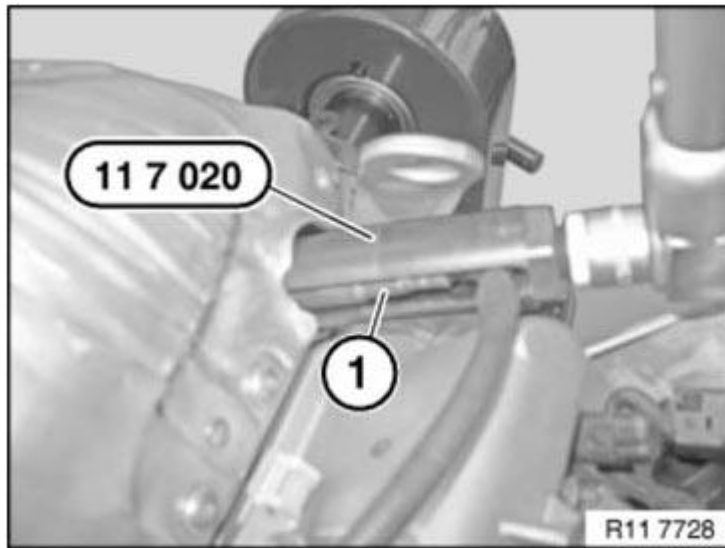


Fig. 531: Tightening Monitoring Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check function of DME control unit.

Pay attention to cable routing of monitor sensor.

1178533 REPLACING RIGHT CONTROL SENSOR (N63)

Notes

WARNING: Risk of burning!
Only perform this work after engine has cooled down.

Necessary preliminary work

- Check function of DME control unit
- Switch off ignition

Remove **AIR FILTER HOUSING**

Unlock plug connection and detach.

Unclip control sensor cable from holder.

Release control sensor with special tool **11 7 020** .

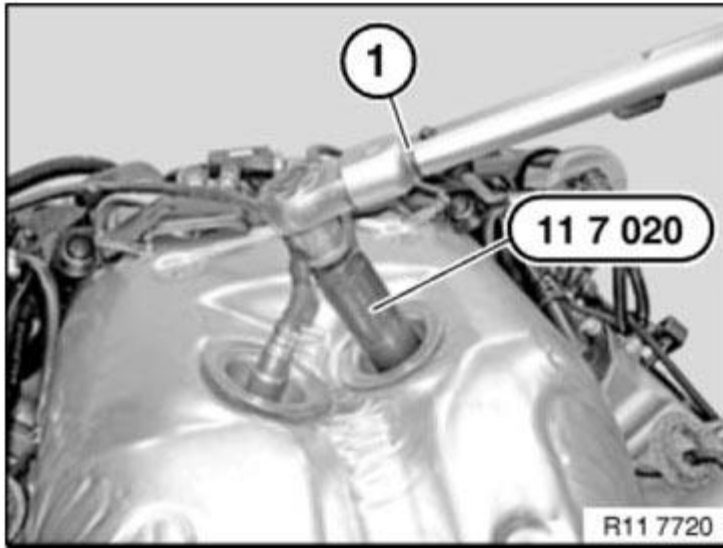


Fig. 532: Releasing Control Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure control sensor with special tool **11 7 020** and a torque wrench (1).

Tightening torque **11 78 1AZ** .

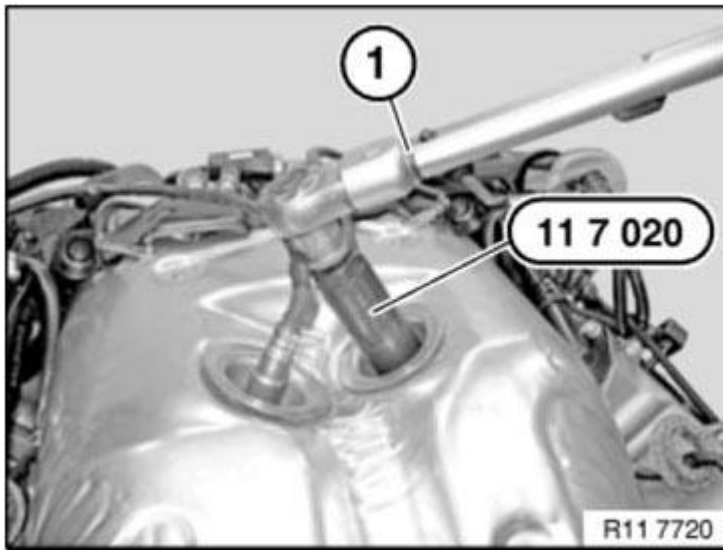


Fig. 533: Securing Control Sensor Using Special Tool 11 7 020 And Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check function of DME control unit.

Pay attention to cable routing of control sensor.

1178543 REPLACING RIGHT MONITOR SENSOR (N63)

Notes

WARNING: Risk of burning!
Only perform this work after engine has cooled down.

Necessary preliminary work

- Check function of DME control unit
- Switch off ignition
- Remove **AIR FILTER HOUSING**

Release retaining clip (1).

Remove heat shield (2) over oxygen sensor.

Detach oxygen sensor cable from retaining clips (3).

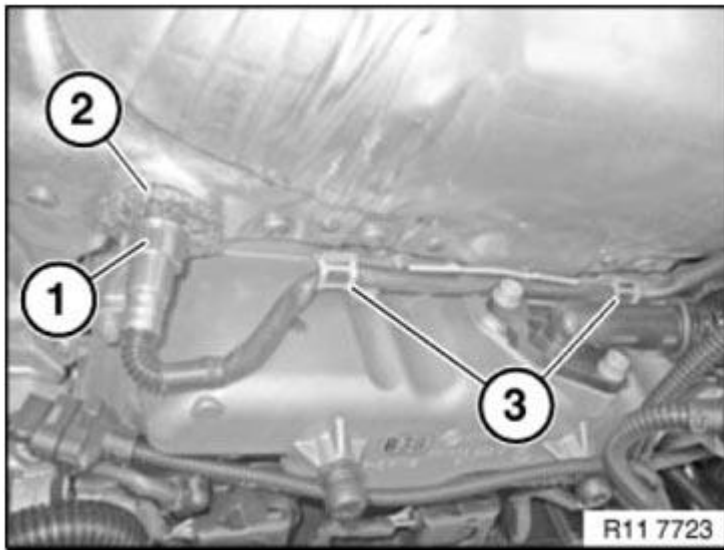


Fig. 534: Identifying Heat Shield And Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Release monitoring sensor (1) with special tool **11 7 020** .

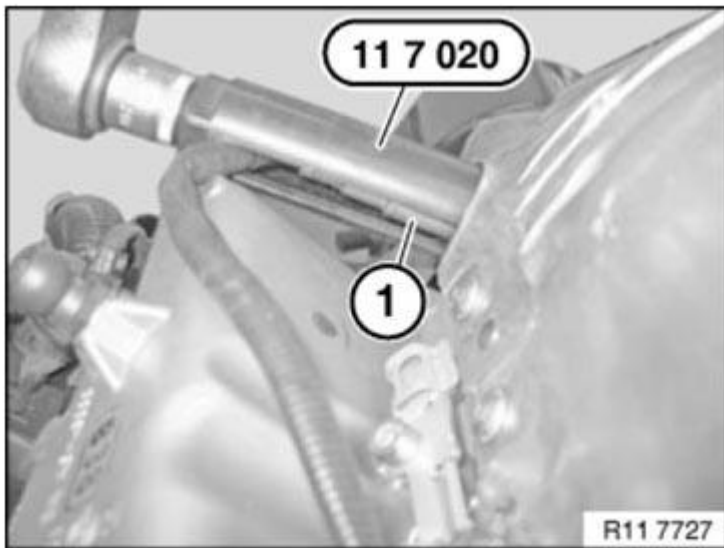


Fig. 535: Releasing Monitoring Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound

to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Fasten monitoring sensor (1) with special tool **11 7 020** .

Tightening torque **11 78 1AZ** .

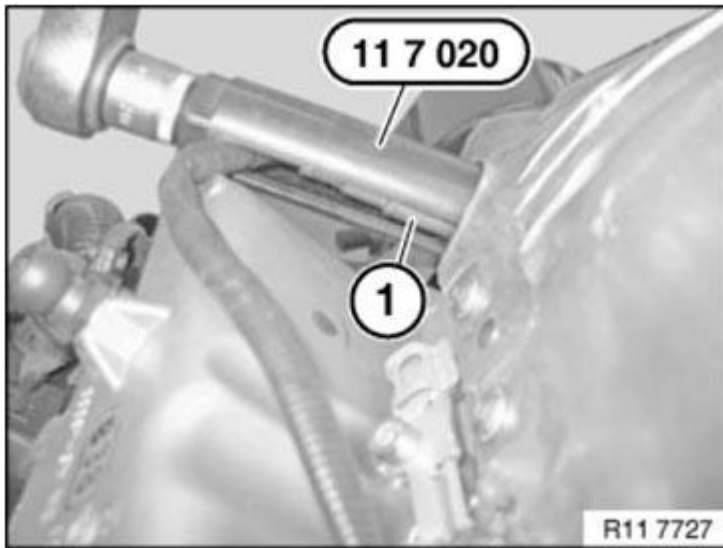


Fig. 536: Installing Monitoring Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check function of DME control unit.

Pay attention to cable routing of monitor sensor.

ACCESSORIES AND BODY, CAB

Entertainment and Communication - F10

INTRODUCTION

The information and communication system plays a highly important role in the F10. It builds on the very progressive technology from the F01. Thus the driver is offered a very wide range of infotainment systems from which to choose.

This information bulletin is intended to provide an overview of the systems being used.

1.1. F10 BUS DIAGRAM

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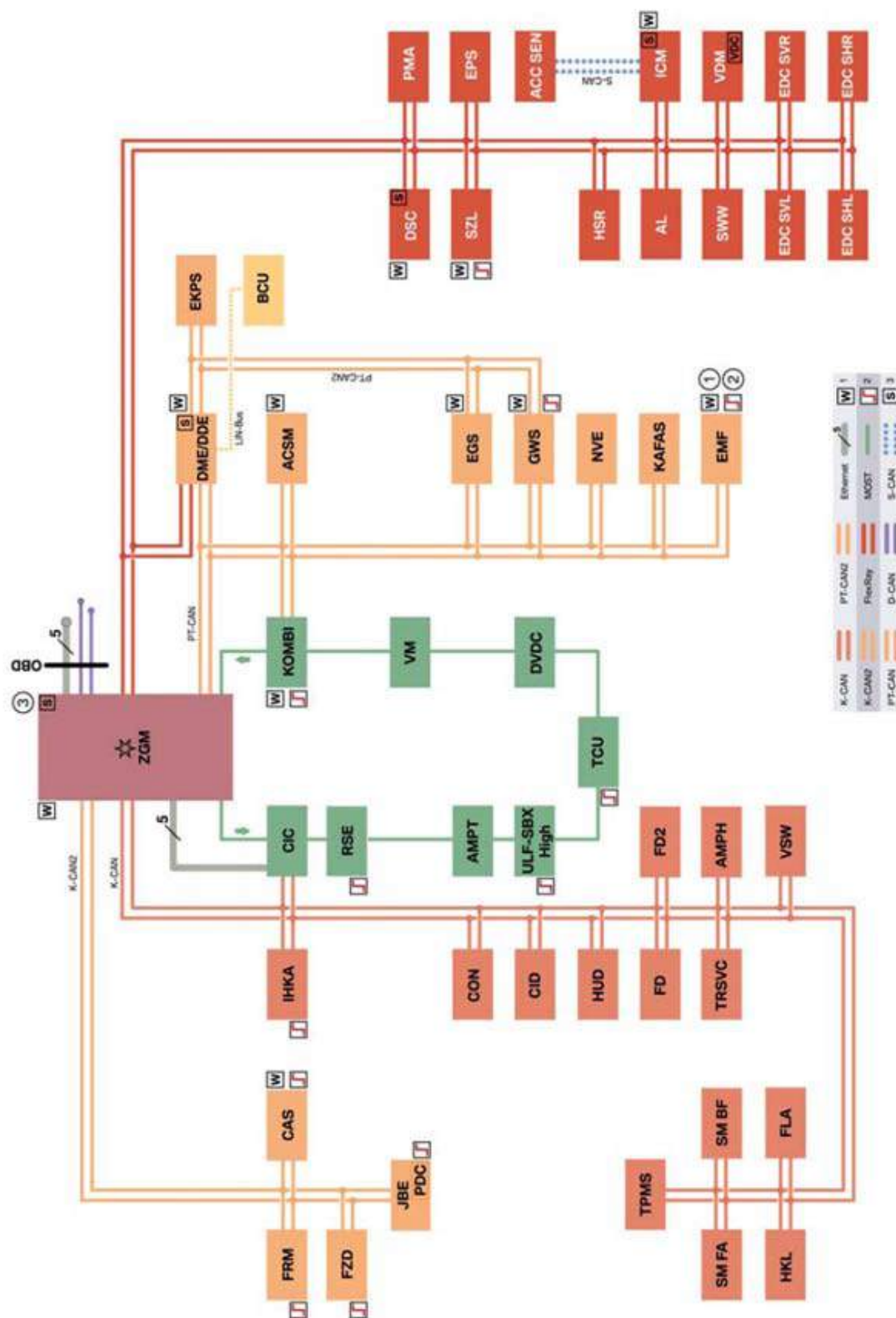


Fig. 1: Entertainment And Communication Bus Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION DIAGRAM

Index	Explanation
1	Wakeable control units
2	Control units authorized to wake up the vehicle
3	Startup node control units, for starting up and synchronizing the FlexRay bus system
ACC-SEN	Active Cruise Control Sensor
ACSM	Advanced Crash Safety Module
AL	Active steering
AMPH	Amplifier High (high fidelity amplifier)
AMPT	Amplifier Top (top high fidelity amplifier)
BSD	Bit-serial data interface
BCU	Battery Charge Unit (for auxiliary battery)
CAS	Car Access System
CIC	Car Information Computer
CIC	Basic Car Information Computer Basic
CID	Central Information Display
CON	Controller
D-CAN	Diagnosis on Controller Area Network
DDE	Digital Diesel Electronics (Not for US)
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
DVD	DVD changer
EDC	SHL Electronic Damper Control, rear left satellite unit
EDC	SHR Electronic Damper Control, rear right satellite unit
EDC	SVL Electronic Damper Control, front left satellite unit
EDC	SVR Electronic Damper Control, front right satellite unit
EGS	Electronic transmission control
EKPS	Electronic fuel pump control
EMF	Electromechanical parking brake
EPS	Electronic Power Steering
Ethernet	Cabled data network technology for local data networks
FD	Rear display
FD2	Rear display 2
FLA	High-beam assistant
FlexRay	Fast, preset and fault-tolerant bus system for use in automotive applications
FRM	Footwell module
FZD	Roof function center
GWS	Gear selector switch
HKL	Luggage compartment lid lift
HSR	Rear suspension slip angle control
HUD	Head-Up Display

ICM	Integrated Chassis Management
IHKA	Integrated automatic heating/air conditioning
JBE	Junction box electronics
KAFAS	Camera-based driver assistance system
K-Bus	Body bus
K-CAN.	Body controller area network
K-CAN2	Body controller area network 2 (500 kBit/s)
KOMBI	Instrument cluster
LIN-Bus	Local Interconnect Network bus
Local-CAN	Local Controller Area Network
MOST	Media Oriented System Transport
MOST port	Media Oriented System Transport port
NVE	Night Vision electronics
PDC	Park Distance Control
PMA	Parking Maneuvering Assistant Control Unit
PT-CAN	Powertrain CAN
PT-CAN2	Powertrain controller area network 2
OBD	Diagnosis socket
RSE	Rear seat entertainment system
SDARS	Satellite tuner
SMBF	Front passenger seat module
SMFA	Seat module, driver
SWW	Blind Spot Detection
SZL	Steering column switch cluster
TCU	Telematics Control Unit
TPMS	Tire Pressure Monitoring System
TR SVC	Control unit for reversing camera and side view
ULF-SBX	Universal interface box
VDM	Vertical Dynamics Management
VM	Video Module
VSW	Video switch
ZGM	Central Gateway Module

HEAD UNITS

2.1. CAR INFORMATION COMPUTER



Fig. 2: Identifying Car Information Computer (CIC)
Courtesy of BMW OF NORTH AMERICA, INC.

The CIC head unit was installed for the first time on BMW 1 Series and 3 Series vehicles with the navigation system (option 609). This further development of the Car Communication Computer CCC is now also being used in the F10.

By storing data on a 80 gigabyte hard disk, the new head unit provides many new functions and options.

The audio systems with CIC added a music collection function. Music files can be converted (ripped) or copied for the music collection on the hard disc. Fast access to these music files, stored on the CIC-dedicated hard disc, is ensured at all times. A selection of up to 3700 music files (12 gigabytes) is possible.

The tuners/decoders of the digital radio systems, (IBOC) digital tuner and satellite tuner (SDARS) are now integrated into the CIC.

A modified base plate adapter extends the connectivity of the music player (option 6NF). This makes it possible to connect to and play back music tracks in the mobile phone.

Simple menu navigation and playback of these music tracks can now be controlled via the iDrive.

2.1.1. Block diagram

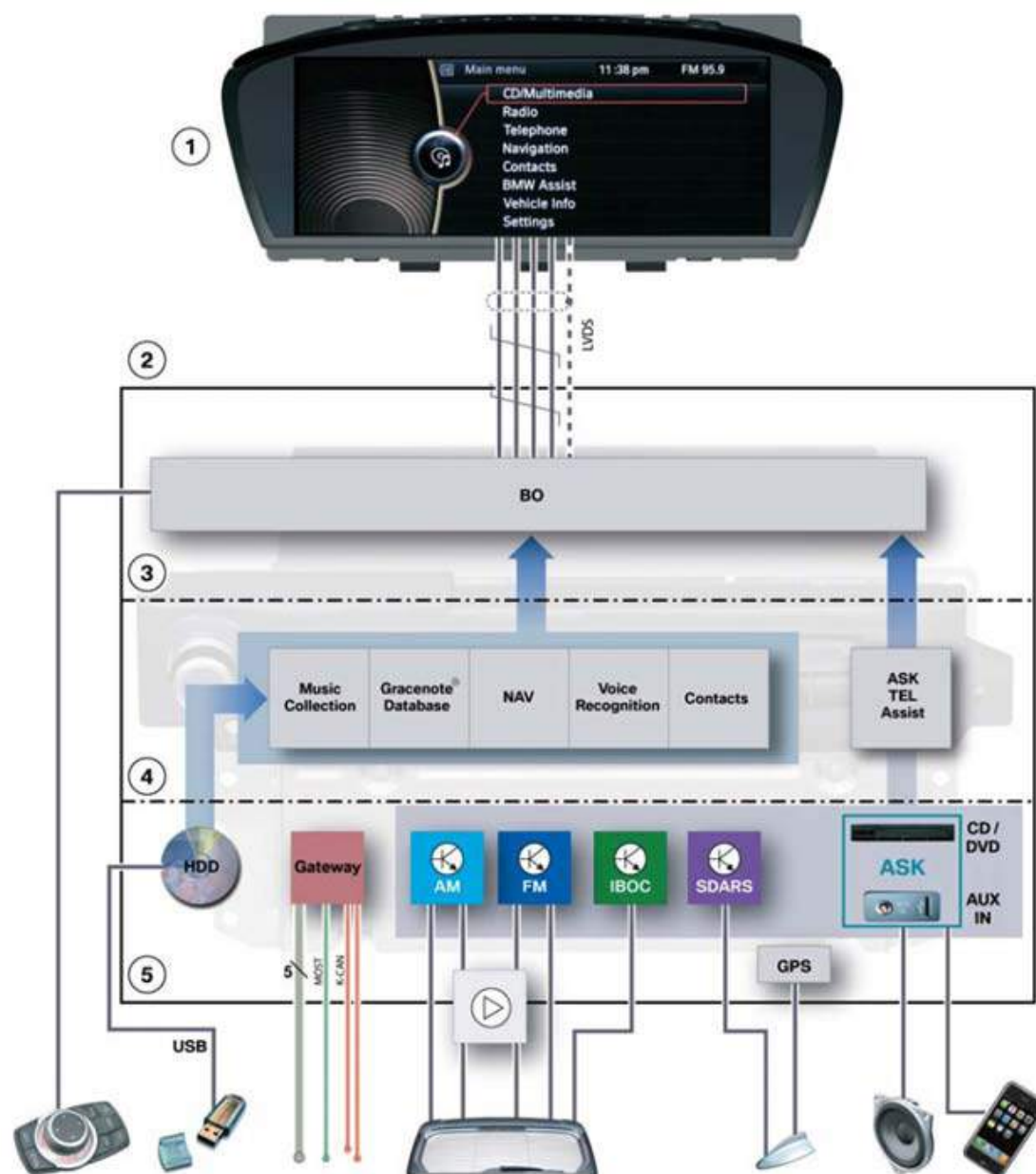


Fig. 3: Car Information Computer Block Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Central Information Display
2	Car Information Computer
3	User interface
4	Application software
5	Hardware and interfaces

2.1.2. System wiring diagram

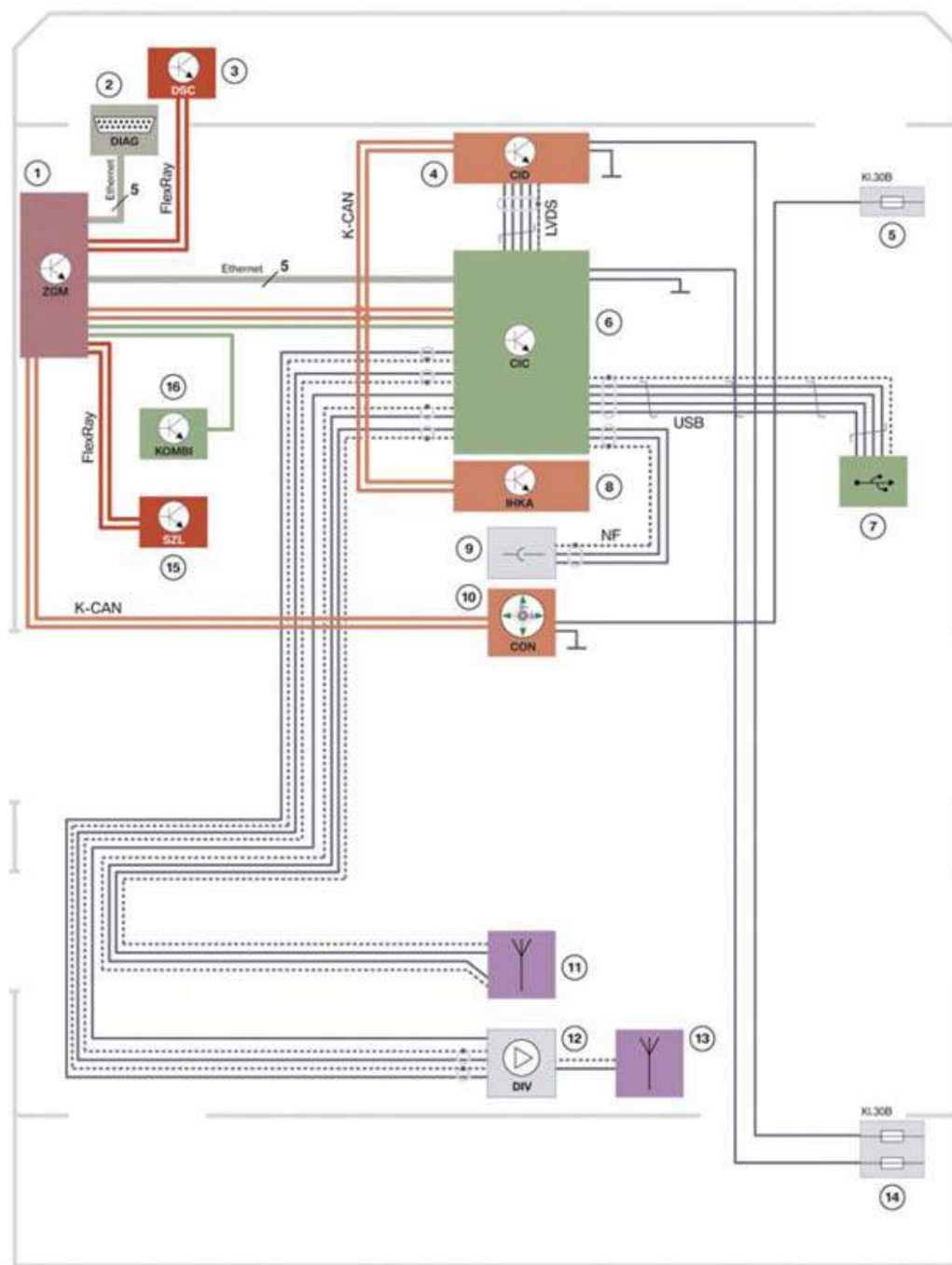


Fig. 4: CIC System Wiring Diagram

Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
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1	Central Gateway Module
2	Diagnosis interface
3	Dynamic Stability Control
4	Central Information Display
5	Front power distribution box
6	Car Information Computer
7	USB connection in glove box
8	Integrated automatic heating/air conditioning
9	Jack plug audio frequency input in the center console for playing back audio files
10	Controller
11	Roof-mounted antenna (GPS, SDARS)
12	antenna diversity module with integrated antenna amplifier
13	Rear window antenna (FM, AM)
14	Rear power distribution box
15	Steering column switch cluster
16	Instrument cluster

iDrive control screen comes in two versions: with a 7.0" diagonal 800 x 480-pixel resolution as standard equipment, or with the optional Navigation system, in a dazzling 10.2", 1280 x 480-pixel version with a wider range of features and functions as in the new BMW 7 Series.

All F10 come with the 7" CID combined with CIC Basic (without Navigation system) as standard equipment.

The system uses the same iDrive controller as the CIC with Navigation but includes less features like Music Collection or Voice Activation.



Fig. 5: Display CIC (With Navigation) And 10.2 Diagonal CID
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 6: Display CIC Basic (Non Navigation) And 7 Diagonal CID
 Courtesy of BMW OF NORTH AMERICA, INC.

F10 CIC Basic (non Navigation) and 7" diagonal CID.

CIC Basic comes standard equipped with HD Radio as the IBOC decoder is integrated into the CIC hardware.

SDARS (Satellite radio) however is available as an optional extra (option 655)

SPEAKER SYSTEMS

3.1. OVERVIEW



Fig. 7: Identifying Speakers
 Courtesy of BMW OF NORTH AMERICA, INC.

The speaker systems in the F10 are offered in two levels:

- HiFi system = HiFi loudspeaker system (standard equipment)
- Top HiFi system = HiFi system Professional (option 677).

The HiFi system standard equipment on all F10 models.

The HiFi system is equipped with an eight-channel amplifier with digital equalizer. However, only seven of the eight channels are used in the HiFi system.

The bass speakers are located under the front seats. They are coupled to the side sills to increase the resonance volume necessary for bass reproduction.

The head-units CIC and Champ 2 can be combined with any of the amplifier/speaker systems available.

The HiFi system and Top-HiFi systems feature separate speakers for the treble and mid-range frequencies.

Even though the diameters of the speakers in the HiFi and Top HiFi System Professional are the same, there are differences in the performance of the speakers. This is achieved by the use of different materials for the diaphragms, coils and magnets

The Top HiFi system supports playback of multichannel formats. Multichannel audio formats can be played back with the player in the CIC or with the 6x DVD changer.

The HiFi system has twelve speakers while the Top-HiFi system has 16 speakers each with different auxiliary amplifiers.

3.2. COMPONENTS

3.2.1. HiFi system

The following graphic shows the speakers and the amplifier of the HiFi system. The speakers are powered with 5 x 25 watts for the midrange speakers and tweeters and 2 x 40 watts for the bass speakers.

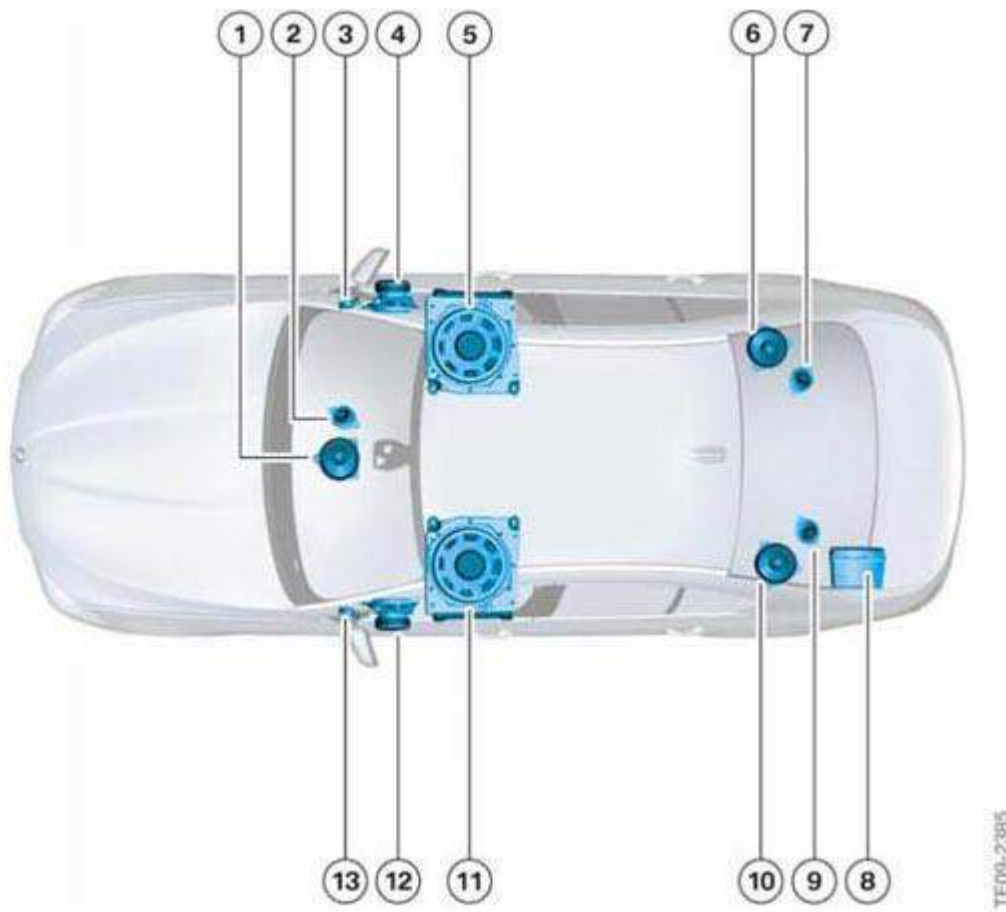


Fig. 8: Identifying HiFi System Components
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Tweeter, front center
2	Mid-range speaker, front center
3	Tweeter, front right door
4	Mid-range speaker, front right door
5	Woofers, under right front seat
6	Mid-range speaker, rear window shelf, right
7	Tweeter, rear window shelf, right
8	HiFi amplifier
9	Tweeter, rear window shelf, left
10	Mid-range speaker, rear window shelf, left
11	Woofers, under left front seat
12	Mid-range speaker, front left door
13	Tweeter, front left door

3.2.2. Top HiFi system

The following graphic shows the speakers and the amplifier of the HiFi System. The speakers are powered with 7 x 50 watts for the midrange speakers and tweeters and 2 x 125 watts for the bass speakers.

In the F10, the amplifier in the HiFi System is equipped with what is known as a load-logic separation. Here, the electronics of the amplifier are supplied and connected via a separate voltage line. The line is specially protected against short-term voltage dips and thus prevents failure of the electronics in the event of a short-term voltage dip.

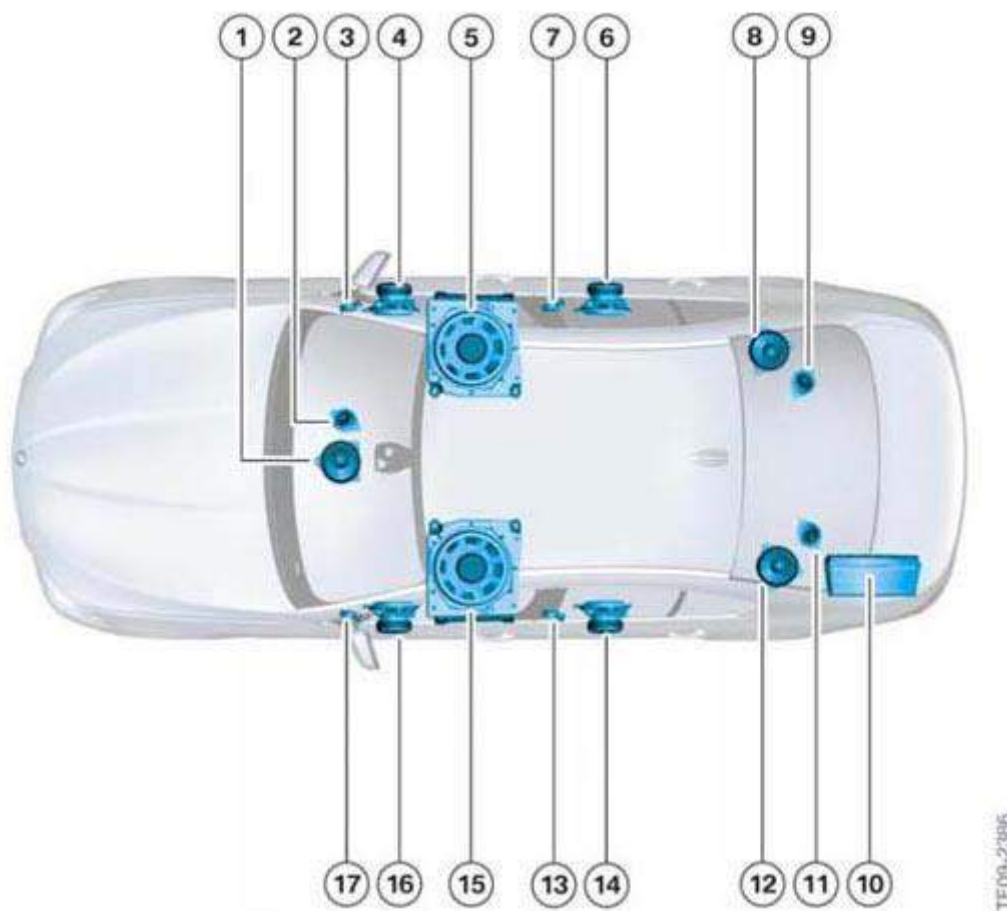


Fig. 9: Identifying Speakers And Amplifier Of HiFi System
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Tweeter, front center
2	Mid-range speaker, front center
3	Tweeter, front right door
4	Mid-range speaker, front right door
5	Woofer, under right front seat

6	Mid-range speaker, rear right door
7	Tweeter, rear right door
8	Mid-range speaker, rear window shelf, right
9	Tweeter, rear window shelf, right
10	Top-HiFi amplifier
11	Tweeter, rear window shelf, left
12	Mid-range speaker, rear window shelf, left
13	Tweeter, rear left door
14	Mid-range speaker, rear left door
15	Woofer, under left front seat
16	Mid-range speaker, front left door
17	Tweeter, front left-door

TELEPHONE SYSTEMS

4.1. OVERVIEW



Fig. 10: Identifying Telephone System
Courtesy of BMW OF NORTH AMERICA, INC.

The Telematic Control Unit (TCU) familiar from the E70 (option 639) is installed.

BMW ASSIST is standard equipment in combination with the TCU.

The pairing assistant has also been integrated into the F10 to assist the customer in pairing the mobile phone.

NOTE: The specified range of functions will only be achieved with Bluetooth-enabled mobile phones recommended by BMW. A list of currently recommended Bluetooth-enabled mobile phones is posted on the Aftersales Assistance Portal (ASAP) and at <http://www.bmw.com/bluetooth/>

4.2. GENERAL DESCRIPTION

The following control units act as the interface between the mobile phone and the vehicle:

- Telematic Control Unit (TCU)

The preconditions under which TCU or TCU and interface box together are installed are listed below:

COMPONENTS DESCRIPTION CHART

Optional extra	Installed control units
Complete basic fittings for mobile phone (option 639)	TCU
Complete basic fittings for mobile phone (option 639) + USB audio interface (optional 6FL)	TCU ULF-SBX High
Complete basic fittings for mobile phone (option 639)+ Smartphone Integration (option 6NF) + USB audio interface (option 6FL)	TCU ULF-SBX High (Base plate and cradle for Smartphone integration)

NOTE: The ULF-SBX High is only used for the USB Audio Interface (option 6FL), the TCU is used for all other telephone and BMW Assist functions.

REAR SEAT ENTERTAINMENT

5.1. OVERVIEW

It is possible to watch video from Digital Versatile Disc DVD on the Central Information Display CID in the F10. The picture in the CID is deactivated and replaced with an information text for safety reasons when the vehicle is in motion. If the car is fitted with a rear-seat entertainment system, rear-seat passengers can watch videos while the car is on the move.

The following optional extras are offered:

- DVD changer for 6 DVDs (option 696)
- Rear seat entertainment (optional extra 6FG)



Fig. 11: Identifying Rear Seat Entertainment System
Courtesy of BMW OF NORTH AMERICA, INC.

The systems can be used for other purposes besides watching films, for example viewing interactive media such as tour guides, databases, catalogues, and so on. In conjunction with the Top HiFi amplifier (rear-seat entertainment professional), multichannel audio formats are supported.

The video module of the F10 does not incorporate a video switch. This continues to be a separate component.

5.2. REAR SEAT ENTERTAINMENT (OPTIONAL EXTRA 6FG)

The F10 uses the rear seat entertainment system (option 6FG), which was introduced with the F01.

5.2.1. System wiring diagram

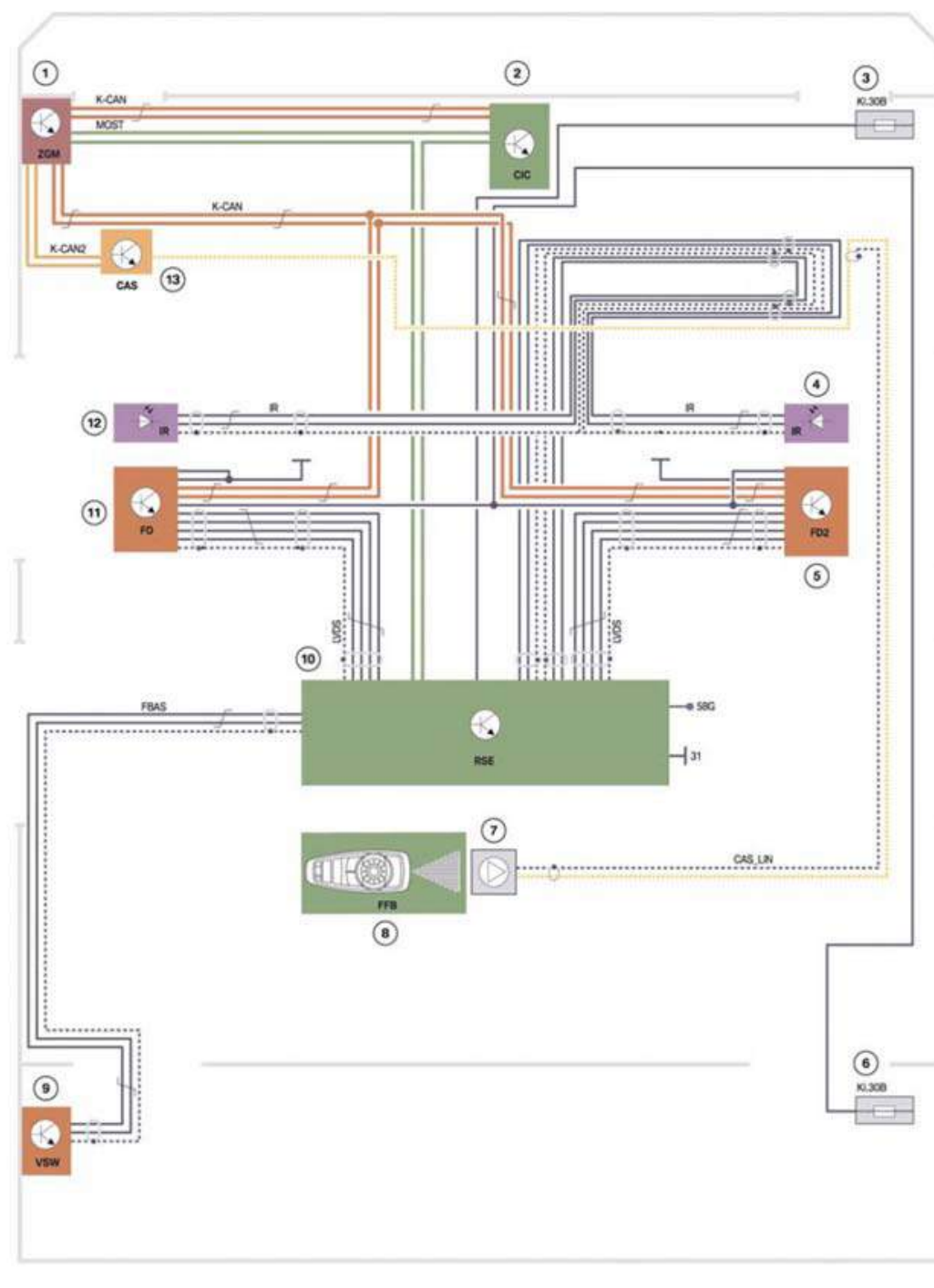


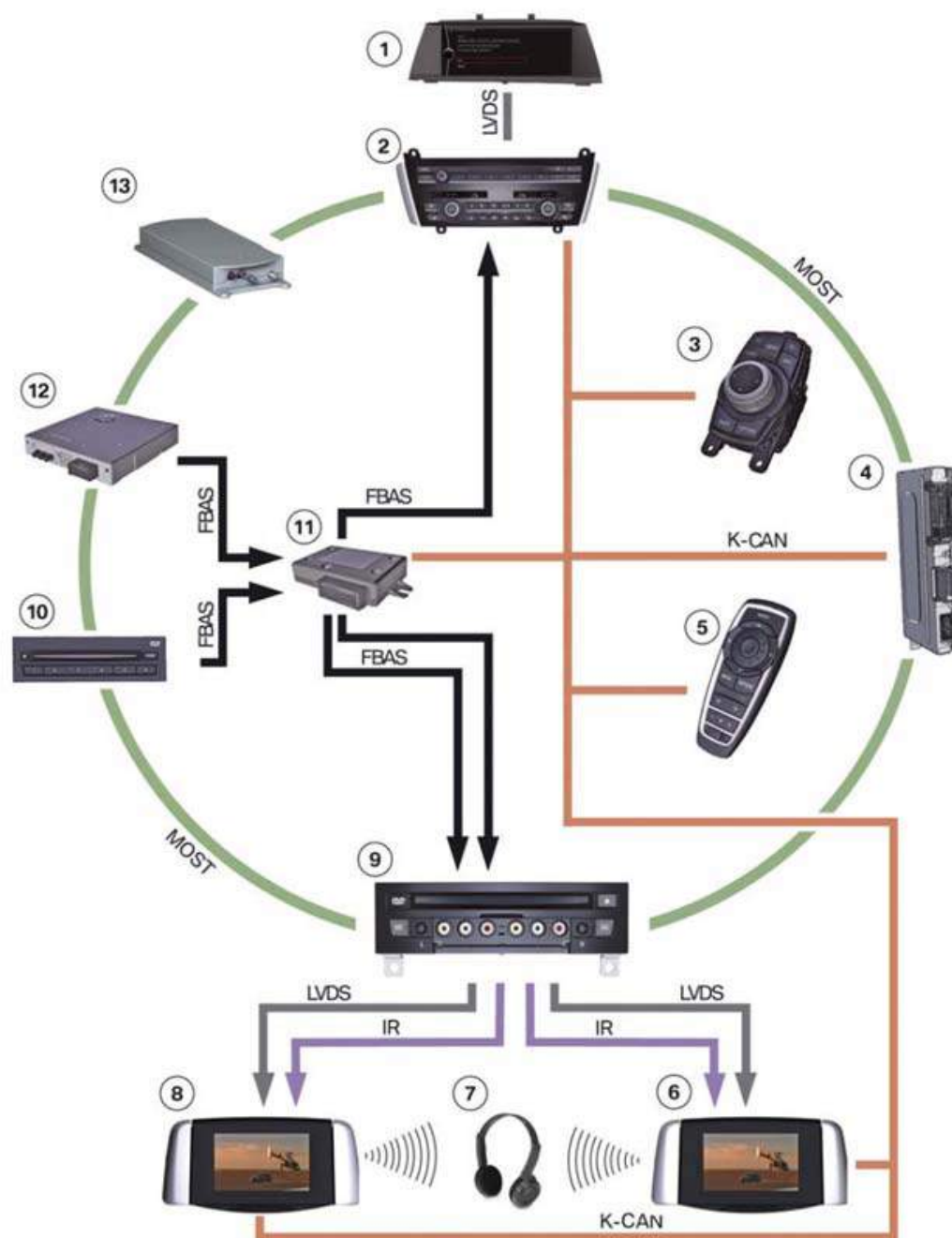
Fig. 12: Rear-Seat Entertainment Circuit Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Central Gateway Module

2	Car Information Computer or Car Information Computer Basic
3	Front distribution box
4	Infrared transmitter, right
5	Rear-seat display FD2
6	Rear power distribution box
7	antenna diversity module with antenna amplifier
8	Operation of the remote control system
9	Video switch
10	Rear Seat Entertainment RSE Mid
11	Rear-seat display FD
12	Infrared transmitter, left
13	Car Access System

5.2.2. Function diagram



COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Central Information Display, CID
2	Car Information Computer, CIC

3	Controller
4	Central Gateway Module, ZGM
5	Operation of the remote control system
6	Rear-seat display FD2 with infrared transmitter
7	Infrared headphones
8	Rear-seat display FD with infrared transmitter
9	Rear Seat Entertainment RSE-Mid
10	DVD changer for 6 DVDs, in glove box
11	Video switch VSW
12	Video module VM
13	Telematic Control Unit TCU

Sound output takes place either through the vehicle's speakers or via headphones. The volume of the speakers can be adjusted via the multifunction steering wheel, the head unit or with the radio remote control. The volume is controlled speed-dependent during playback through the speakers. The driving speed is registered by the wheel speed sensors.

The tone settings can be adjusted on the Car Information Computer or Car Information Computer Basic or using the radio remote control.

If the sound is output via the headphones, the volume can be adjusted either on the headphones (infrared headphones) or using the radio remote control (hard-wired headphones). The infrared headphones receive their signals from the infrared transmitter.

External devices can be connected via the two AV inputs directly to the RSE control unit or via the AUX-In connection or the USB audio interface (option 6FL) in the center console. The USB audio interface provides an additional jack and a USB connection for a type A USB connector.

Video cannot be transmitted to the rear seat entertainment system when a DVD is played back via the Car Information Computer. Similarly, video is not transmitted to the Car Information Computer when a DVD is played back in the rear seat entertainment control unit. Sound output, however, is possible in both cases. Picture and sound are transmitted to the CIC and the rear seat entertainment system during playback via the DVD changer. For safety reasons, no picture is shown in the Central Information Display while the vehicle is being driven. Sound output continues even when the car is not at a standstill.

An external device (e.g. game console) can be additionally connected via the AV inputs. The corresponding video signal is output on the display of the connected source. The selected DVD can still be viewed on the other display. Prerequisite: see Functions, Connection to external equipment via AV input.

The RSE MID control unit has a FBAS/CVBS (composite video baseband signal) input for the screen of the DVD changer or video module.

The video switch is installed corresponding to the equipment configuration.

5.2.3. Components, installation locations and functions

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Fig. 14: Identifying Rear Seat And Central Information Displays With Car Information Computer
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Rear-seat display FD
2	Central Information Display
3	Rear-seat display FD2
4	Car Information Computer or Car Information Computer Basic
5	Rear Seat Entertainment RSE-Mid
6	Operation of the remote control system

The rear seat entertainment system (option 6FG) offers the following equipment:

- Radio tuner with RDS
- Sound output via: infrared headphones, wired headphones and audio speakers of the vehicle
- AUX-In connection in center console (analog jack)
- Connection to external equipment via AV input, e.g. video camera, games console or portable playback equipment

- Operation via remote control.

Optional extras:

- DVD changer (option code 696)
- USB/audio interface in center console (option 6FL) for connecting media players (e.g. USB stick and Apple iPod)
- In Band On Channel (IBOC) HD Radio is standard equipment and Satellite Digital Audio Radio Services (SDARS) is available as an option (SA655)

5.2.4. Operation of the remote control system



Fig. 15: Identifying Radio Remote Control System Components
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Menu
2	Knurled wheel
3	Confirmation button
4	Option
5	Battery symbol
6	Selector slide, left/right
7	Volume
8	Track search/track skip
9	Wireless symbol
10	Back
11	Four-way directional-controller (four buttons)

The remote control features two LED for checking operation and battery voltage. Transmission of a wireless signal is acknowledged by the green send signal lighting. The radio remote control signals are only sent if the rear seat entertainment system is switched on.

If the battery voltage reaches a critical level, the red battery symbol will-light instead of the green send symbol each time a button is pressed. The battery in the radio remote control must be replaced to ensure continued operation.

The thumbwheel, the confirmation button and the four-way directional controller make up the iDrive controller functions. Turning the thumbwheel corresponds to turning the iDrive controller Sliding the iDrive controller to the left, right, forwards or back is replaced by pressing the corresponding button on the four-way directional controller. Pressing the iDrive controller corresponds to pressing the confirmation button.

The entire radio remote control changes over to the selected side by operating the selector slide.

The signals of the radio remote control are received by the antenna for radio remote control services in the rear window.

ANTENNA SYSTEMS

Depending on optional equipment, the F10 is equipped with different antenna systems:

ANTENNA SYSTEM LOCATION

Antenna	System	Location
FM/AM antenna	Radio	Rear window
SDARS antenna	Radio	Roof
Navigation antenna	Navigation system	Roof
Remote control service antenna	CAS (remote control services)	Rear window
Telephone antenna	Telephone.	Roof

Bluetooth antenna	Telephone.	Slide/tilt sunroof area
Emergency GSM antenna	Telematics services	Rear right interior

6.1. ANTENNA SYSTEMS

6.1.1. System wiring diagram

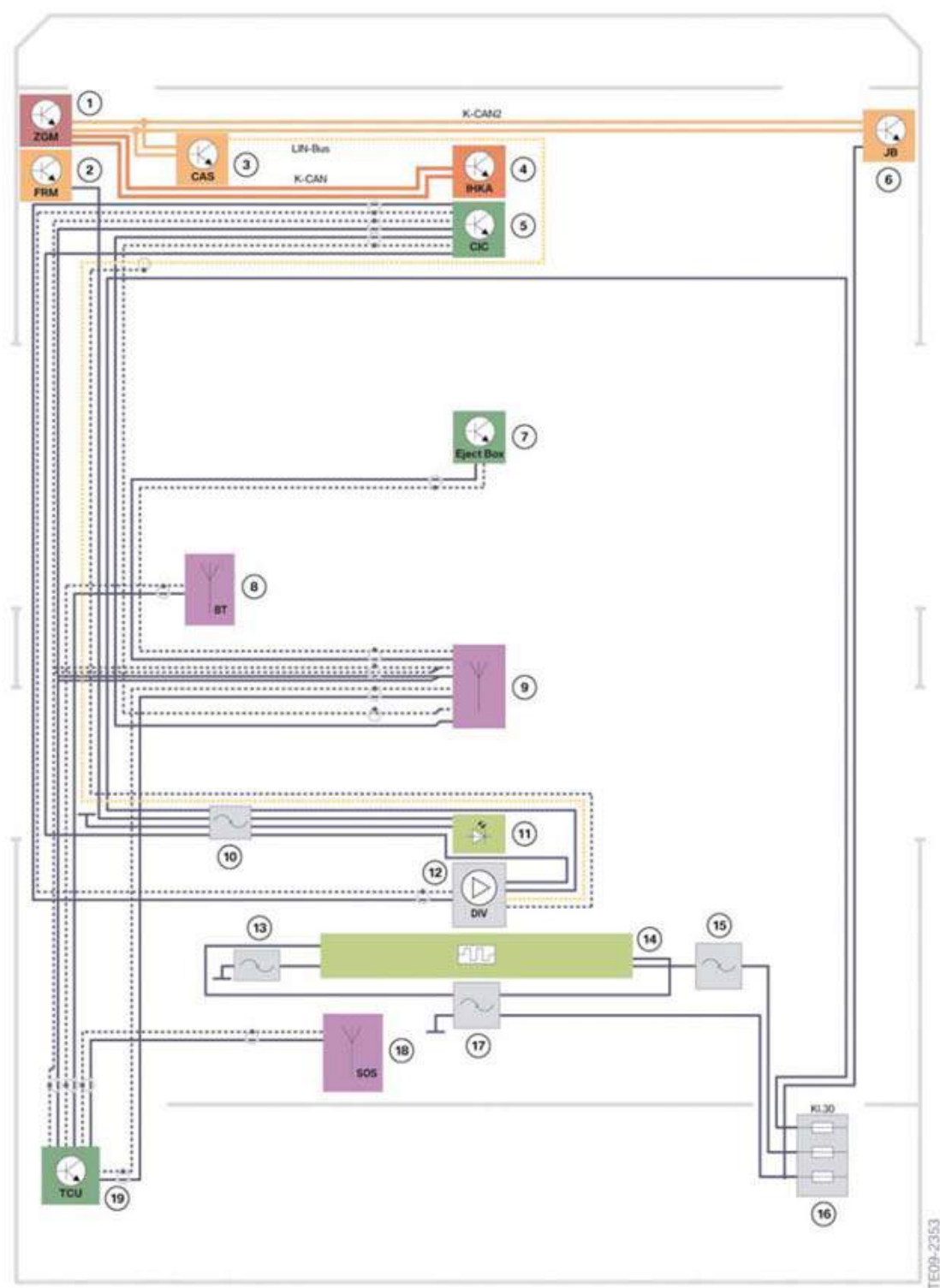


Fig. 16: Antenna System Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

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Index	Explanation
1	Central Gateway Module
2	Footwell module
3	Car Access System
4	Integrated automatic heating/air conditioning
5	Car Information Computer
6	Junction box electronics
7	Base plate of universal charging and hands-free facility
8	Bluetooth antenna
9	Roof-mounted antenna (telephone, SDARS and GPS)
10	Brake light interference suppression filter
11	Rear brake light
12	antenna diversity module with antenna amplifier
13	Rejector circuit, rear window_1
14	Rear window antennas (FM, AM, remote control services FBD)
15	Rejector circuit, rear window_2
16	Rear power distribution box
17	Rejector circuit, rear window defogger for AM range
18	Emergency call antenna (backup)
19	Telematics Control Unit

ENGINE

Exhaust System - Repair Instructions - 535xi

EXHAUST SYSTEM, COMPLETE

18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (N54)

Special tools required:

31 2 220

WARNING: Scalding hazard!

These tasks should only be carried out on an exhaust system that has cooled down.

IMPORTANT: Removal of the exhaust system must be carried out with the assistance of a second person.

Support exhaust system with jack and special tool 31 2 220 and secure against falling out.

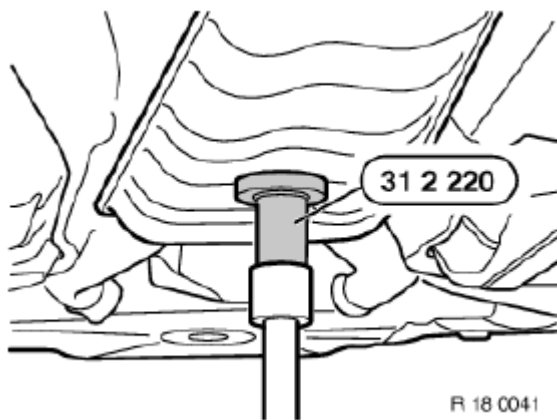


Fig. 1: Supporting Exhaust System With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Installation:

Replace self-locking nuts.

Replace seal.

Tightening torque **18 00 1AZ**

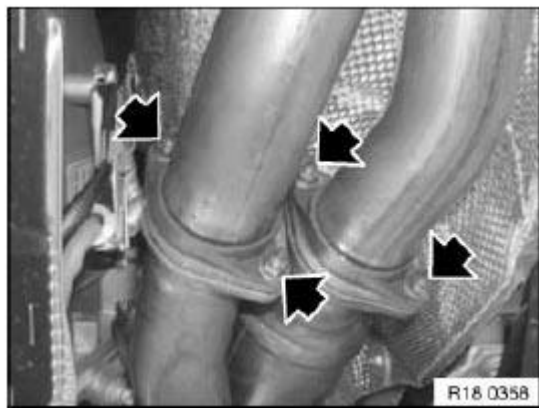


Fig. 2: Locating Self-Locking Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt and remove bracket (1).

Tightening torque **18 20 1AZ**

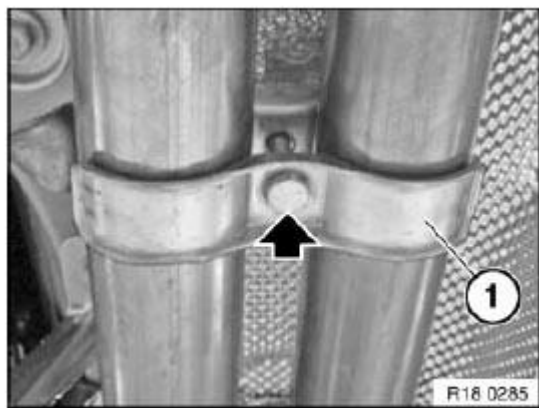


Fig. 3: Locating Bracket Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts along line and remove reinforcement plate (1).

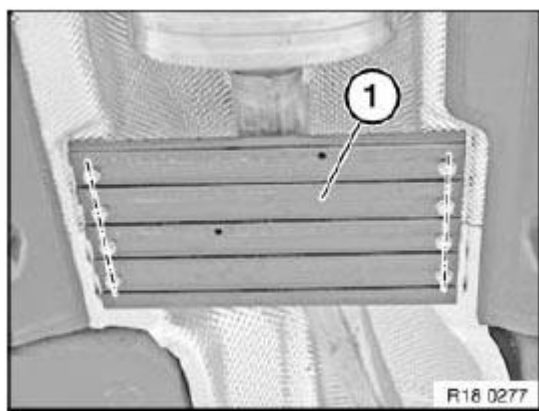


Fig. 4: Identifying Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Tightening torque, **18 00 4AZ**



Fig. 5: Locating Unfasten Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Tightening torque, **18 00 2AZ**

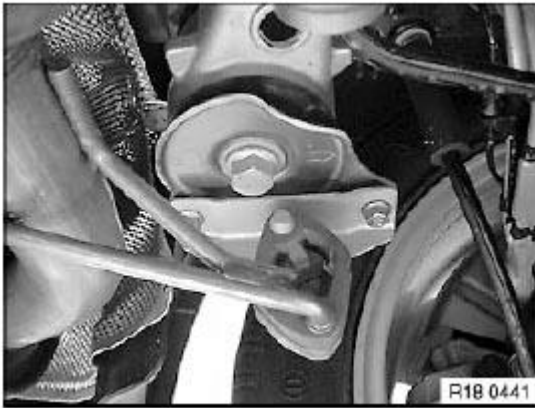


Fig. 6: Identifying Unscrew Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect pressure hose. Unscrew nuts.

Tightening torque, **18 00 6AZ**

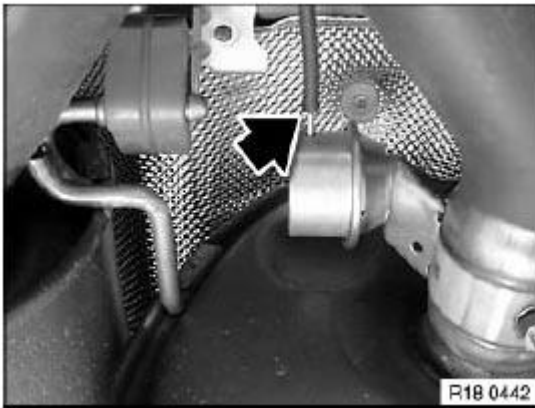


Fig. 7: Locating Pressure Hose

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check exhaust system for leaks.

18 12 045 REMOVING AND INSTALLING/REPLACING CENTER MUFFLER (N54)

Special tools required:

· 00 2 210

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove exhaust system .

NOTE: The cutting lines for the center muffler are designated by a notch in the pipe.

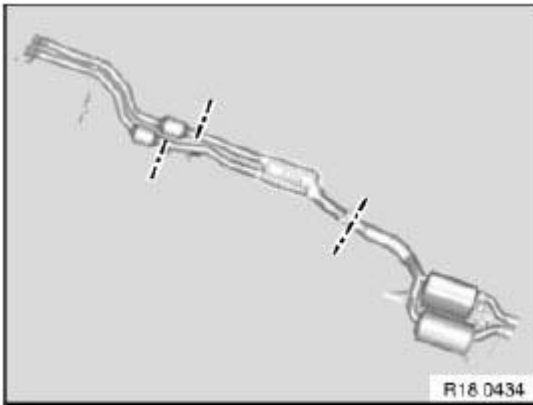


Fig. 8: Identifying Centre Muffler Lines Cutting Point
Courtesy of BMW OF NORTH AMERICA, INC.

Cut exhaust pipes with special tool 00 2 210 and with standard workshop equipment at marked points and deburr.

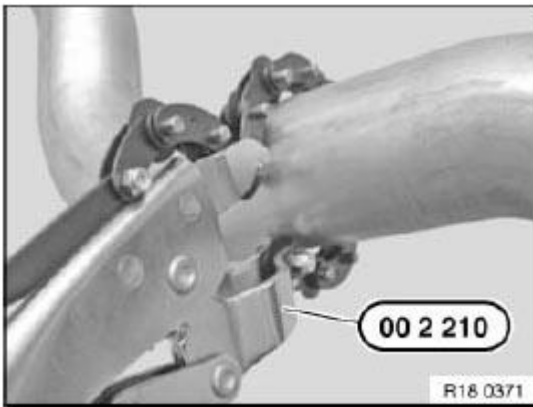


Fig. 9: Identifying Special Tool (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect center muffler to both exhaust pipes by means of clamps and align.

Align clamps and tighten down.

Tightening torque **18 00 5AZ.**

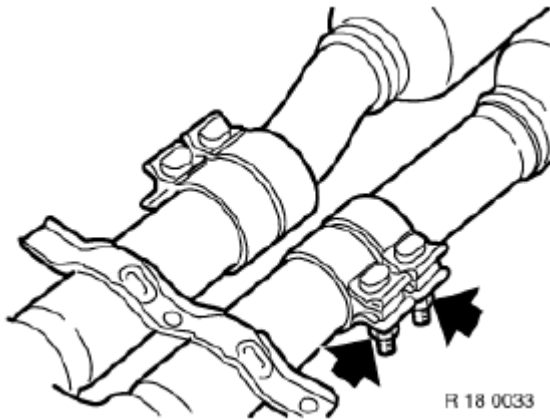


Fig. 10: Locating Exhaust Pipes Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect center muffler to rear muffler by means of clamp and align.

Align clamp and tighten down.

Tightening torque **18 00 5AZ.**



Fig. 11: Identifying Centre Muffler To Rear Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 12 030 REMOVING AND INSTALLING/REPLACING REAR MUFFLER (N54)

Special tools required:

- 00 2 210
- 31 2 220

WARNING: Scalding hazard!
Only perform these tasks after exhaust system has cooled down.

Support center muffler with special tool 31 2 220.

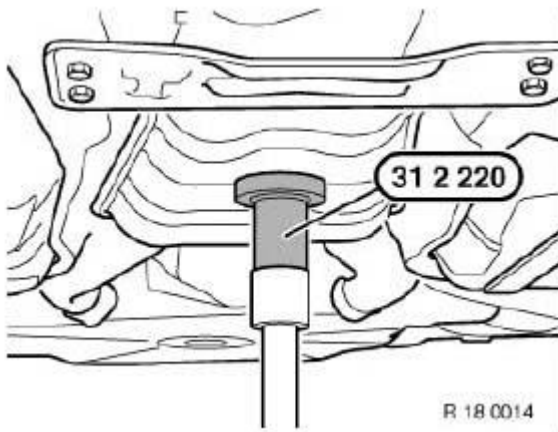


Fig. 12: Supporting Centre Muffler With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The cutting line for the rear muffler is designated by a notch in the pipe.

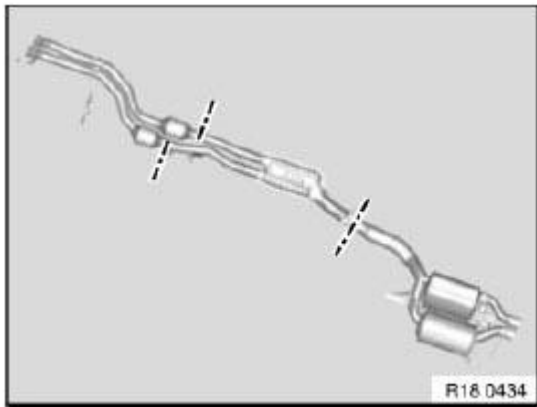


Fig. 13: Identifying Centre Muffler Lines Cutting Point
Courtesy of BMW OF NORTH AMERICA, INC.

Cut rear muffler with special tool 00 2 210 at marked point and deburr.

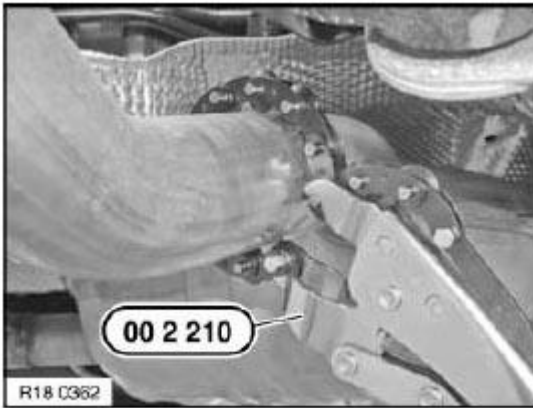


Fig. 14: Identifying Special Tool (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Detach hose from vacuum unit.

Unscrew mounting bolts.

Tightening torque **18 20 4AZ.**

Lower rear muffler and remove.

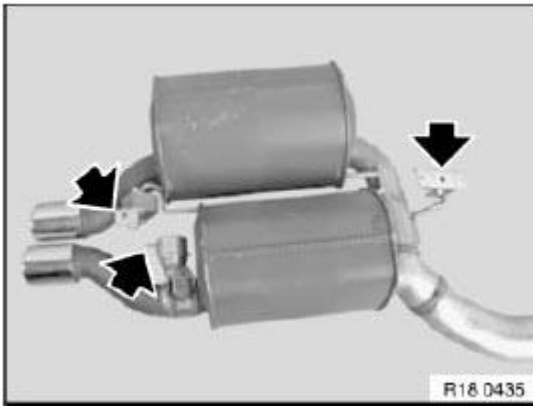


Fig. 15: Locating Lower Rear Muffler Unscrew Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect rear muffler to center muffler by means of clamping sleeves.

Align rear muffler to rear apron.

Align clamp and tighten down.

Tightening torque **18 00 5AZ.**



Fig. 16: Identifying Centre Muffler To Rear Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove exhaust system.
- Remove underbody protection . See **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** and **51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .
- Remove cable holder on side of transmission for control sensor/monitor sensor
- In all-wheel-drive vehicles: Remove **right bearing block** . See **31 53 040 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT BEARING BLOCK** .

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **control sensor**, cylinders 1 to 3 . See **78 EMISSION CONTROL, OXYGEN SENSOR** .

Remove **monitor sensor**, cylinders 1 to 3 . See **78 EMISSION CONTROL, OXYGEN SENSOR** .

Unscrew nuts.

Tightening torque **18 20 2AZ.**

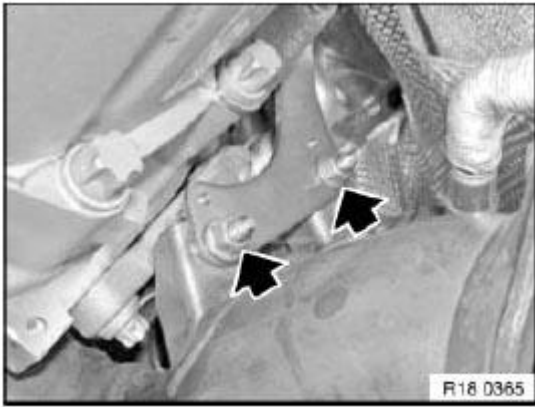


Fig. 17: Locating Exhaust Manifolds Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Remove holder (1).

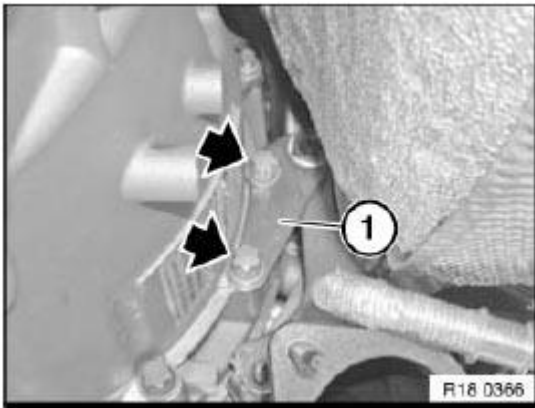


Fig. 18: Locating Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten clip. In so doing, secure catalytic converter (1) against falling out.

Remove catalytic converter (1).

Installation:

Clean sealing face and replace seal.

Tightening torque **18 00 3AZ.**

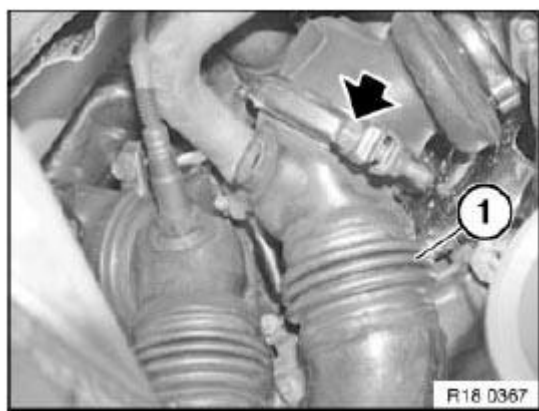


Fig. 19: Identifying Catalytic Converter

Courtesy of BMW OF NORTH AMERICA, INC.

18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

Remove catalytic converter, cylinders 1-3

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **control sensor**, cylinders 4 to 6 . See 78 EMISSION CONTROL, OXYGEN SENSOR .

Remove **monitor sensor**, cylinders 4 to 6 . See 78 EMISSION CONTROL, OXYGEN SENSOR .

Unfasten clip. In so doing, secure catalytic converter (1) against falling out.

Remove catalytic converter (1).

Installation:

Clean sealing face and replace seal.

Tightening torque 18 00 3AZ

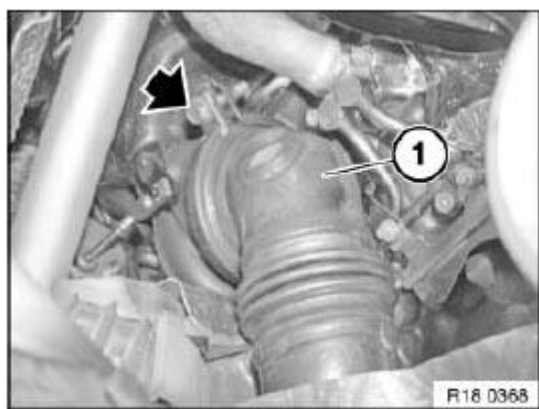


Fig. 20: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

18 32 082 REMOVING AND INSTALLING/REPLACING EXHAUST PIPE WITH CATALYTIC CONVERTER (N54)

Special tools required:

- 00 2 210

WARNING: Scalding hazard!
Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove exhaust system .

NOTE: The cutting lines for the exhaust pipes are designated by notches in the pipe.

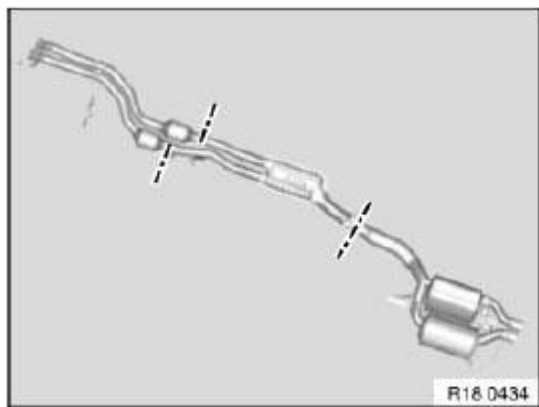


Fig. 21: Identifying Centre Muffler Lines Cutting Point
Courtesy of BMW OF NORTH AMERICA, INC.

Cut exhaust pipes at marked points with special tool 00 2 210 and deburr.

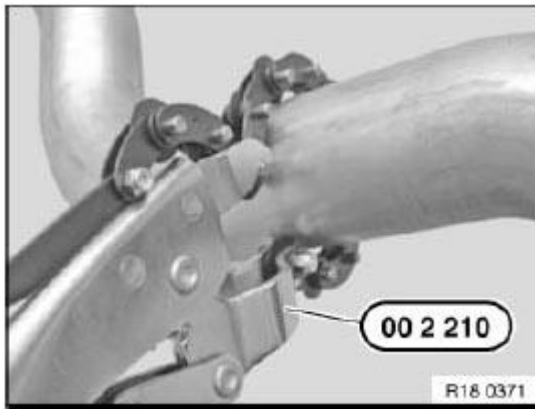


Fig. 22: Identifying Special Tool (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and replace during installation.

Installation:

Tightening torque, **18 00 1AZ.**

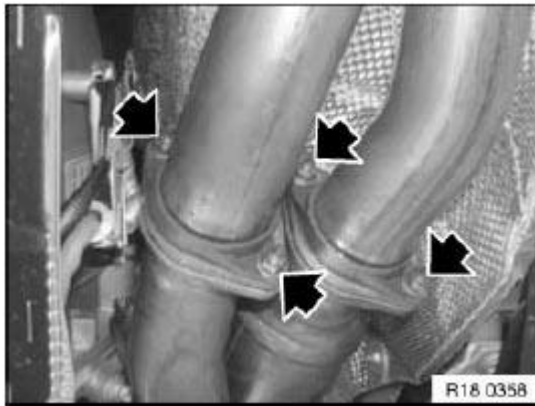


Fig. 23: Locating Self-Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect exhaust pipe to center muffler by means of clamp and align.

Align clamp and tighten down.

Tightening torque **18 00 5AZ.**

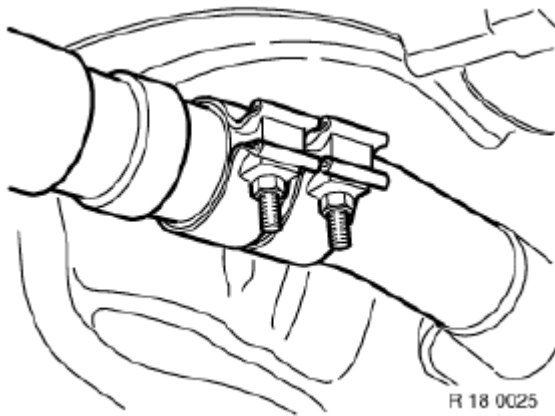


Fig. 24: Identifying Exhaust Pipe To Centre Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

MUFFLERS, DIESEL

18 10... REMOVING AND INSTALLING/REPLACING TRIM FOR EXHAUST PIPE

Release screw.

Detach trim (1).

Tightening torque **18 00 1AZ.**

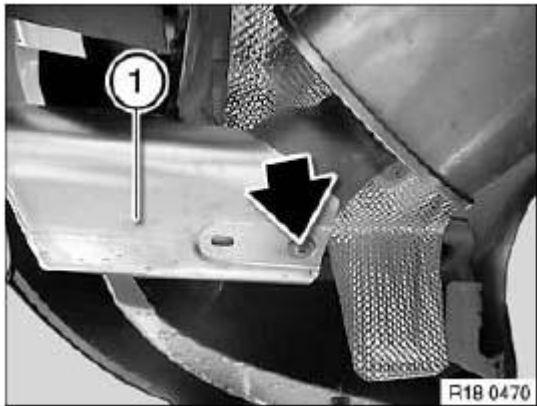


Fig. 25: Identifying Trim And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

18 12 030 REMOVING AND INSTALLING/REPLACING REAR MUFFLER (N54)

Special tools required:

- 00 2 210
- 31 2 220

WARNING: Scalding hazard!
Only perform these tasks after exhaust system has cooled down.

Support center muffler with special tool 31 2 220.

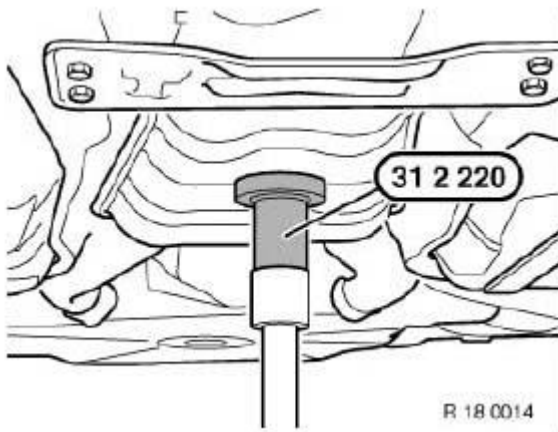


Fig. 26: Identifying Centre Muffler With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The cutting line for the rear muffler is designated by a notch in the pipe.

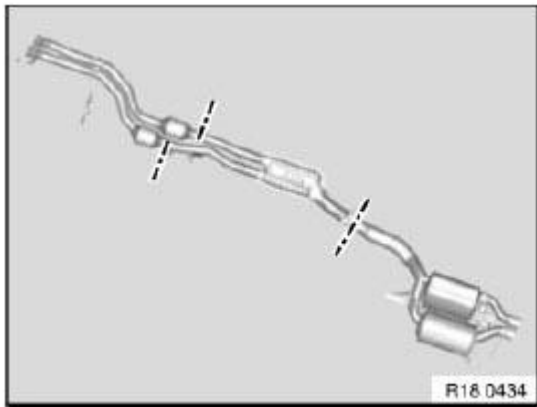


Fig. 27: Identifying Centre Muffler Lines Cutting Point
Courtesy of BMW OF NORTH AMERICA, INC.

Cut rear muffler with special tool 00 2 210 at marked point and deburr.

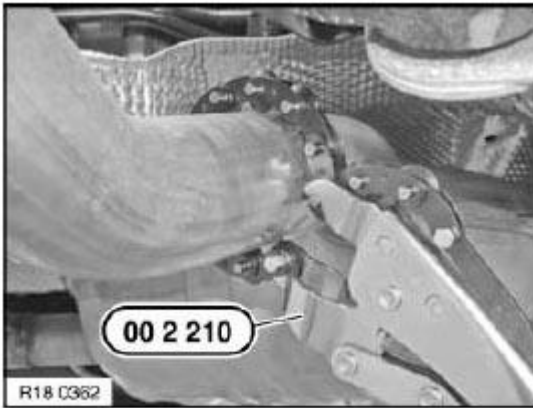


Fig. 28: Identifying Special Tool (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Detach hose from vacuum unit.

Unscrew mounting bolts.

Tightening torque **18 20 4AZ.**

Lower rear muffler and remove.

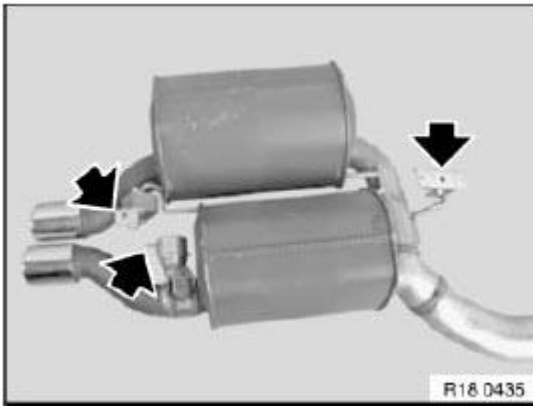


Fig. 29: Locating Lower Rear Muffler Unscrew Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect rear muffler to center muffler by means of clamping sleeves.

Align rear muffler to rear apron.

Align clamp and tighten down.

Tightening torque **18 00 5AZ.**



Fig. 30: Identifying Centre Muffler To Rear Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

MUFFLERS, PETROL

18 12 045 REMOVING AND INSTALLING/REPLACING CENTER MUFFLER (N54)

Special tools required:

- 00 2 210

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove **exhaust system** .

NOTE: The cutting lines for the center muffler are designated by a notch in the pipe.

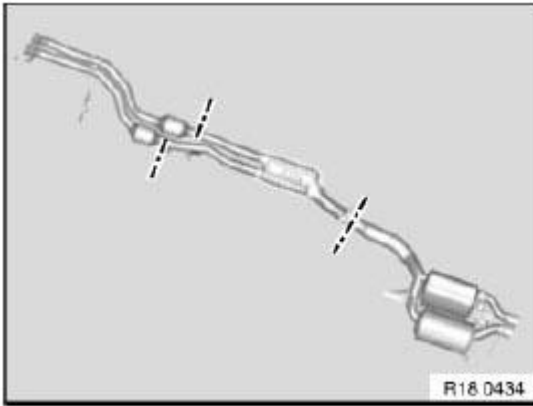


Fig. 31: Identifying Centre Muffler Lines Cutting Point
Courtesy of BMW OF NORTH AMERICA, INC.

Cut exhaust pipes with special tool 00 2 210 and with standard workshop equipment at marked points and deburr.

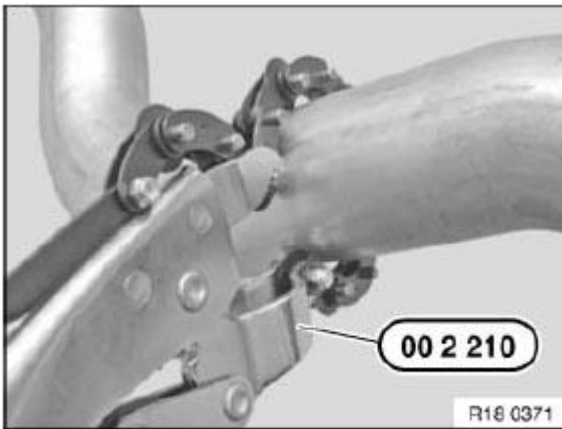


Fig. 32: Identifying Exhaust Pipes With Special Tool (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect center muffler to both exhaust pipes by means of clamps and align.

Align clamps and tighten down.

Tightening torque **18 00 5AZ.**

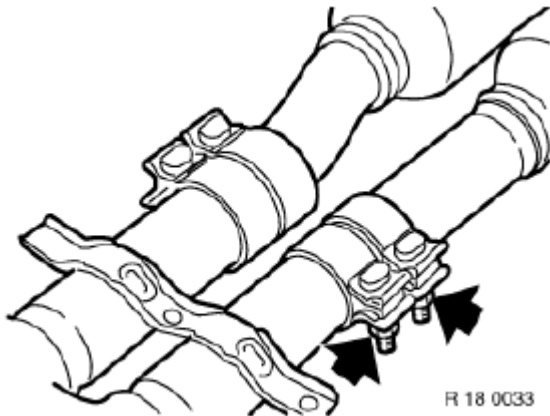


Fig. 33: Identifying Exhaust Pipes Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect center muffler to rear muffler by means of clamp and align.

Align clamp and tighten down.

Tightening torque **18 00 5AZ.**



Fig. 34: Identifying Centre Muffler To Rear Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 12 030 REMOVING AND INSTALLING/REPLACING REAR MUFFLER (N54)

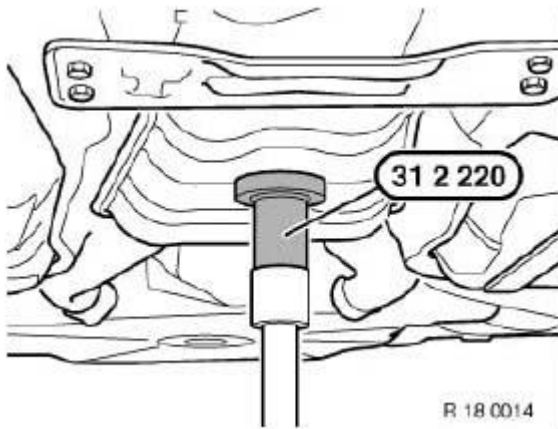
Special tools required:

· 00 2 210

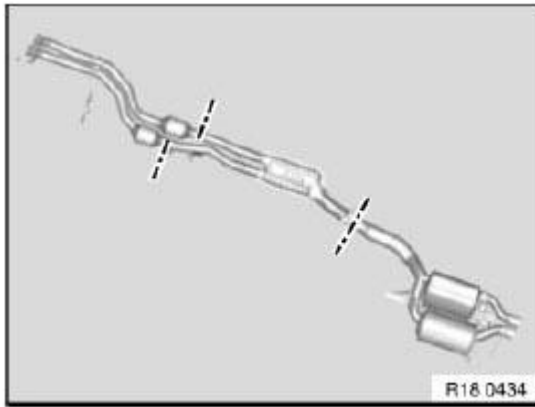
31 2 220

WARNING: Scalding hazard!**Only perform these tasks after exhaust system has cooled down.**

Support center muffler with special tool 31 2 220.

**Fig. 35: Identifying Centre Muffler With Special Tool (31 2 220)**

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The cutting line for the rear muffler is designated by a notch in the pipe.**Fig. 36: Identifying Centre Muffler Lines Cutting Point**

Courtesy of BMW OF NORTH AMERICA, INC.

Cut rear muffler with special tool 00 2 210 at marked point and deburr.

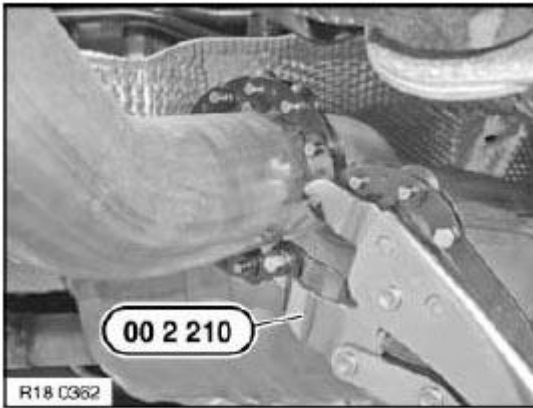


Fig. 37: Identifying Special Tool (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Detach hose from vacuum unit.

Unscrew mounting bolts.

Tightening torque **18 20 4AZ.**

Lower rear muffler and remove.

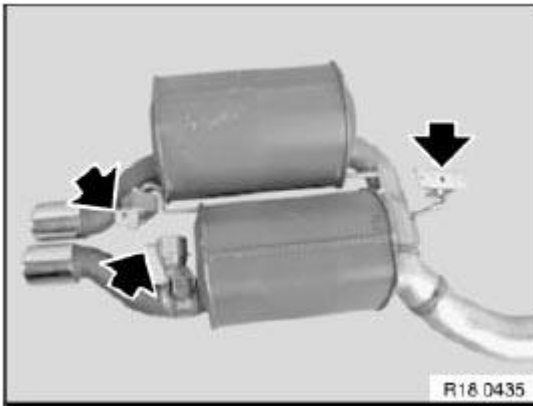


Fig. 38: Locating Lower Rear Muffler Unscrew Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect rear muffler to center muffler by means of clamping sleeves.

Align rear muffler to rear apron.

Align clamp and tighten down.

Tightening torque **18 00 5AZ.**



Fig. 39: Identifying Centre Muffler To Rear Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

EXHAUST PIPE WITH MOUNTING

18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove exhaust system .
- Remove underbody protection . See 51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION and 51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION .
- Remove cable holder on side of transmission for control sensor/monitor sensor
- In all-wheel-drive vehicles: Remove **right bearing block** . See 31 53 040 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT BEARING BLOCK .

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **control sensor**, cylinders 1 to 3 . See 78 EMISSION CONTROL, OXYGEN SENSOR .

Remove **monitor sensor**, cylinders 1 to 3 . See 78 EMISSION CONTROL, OXYGEN SENSOR .

Unscrew nuts.

Tightening torque **18 20 2AZ** .

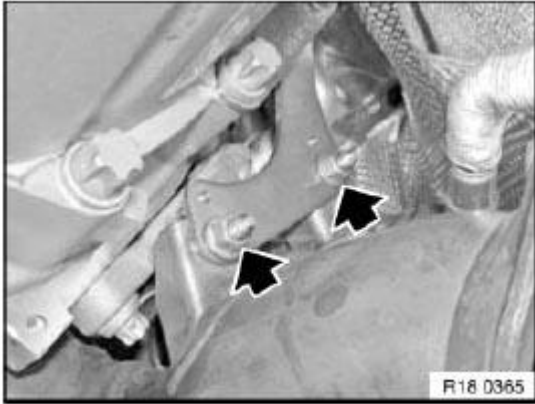


Fig. 40: Locating Exhaust Manifolds Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Remove holder (1).

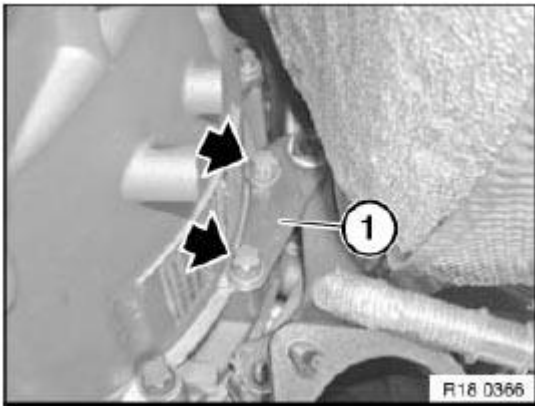


Fig. 41: Locating Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten clip. In so doing, secure catalytic converter (1) against falling out.

Remove catalytic converter (1).

Installation:

Clean sealing face and replace seal.

Tightening torque **18 00 3AZ.**

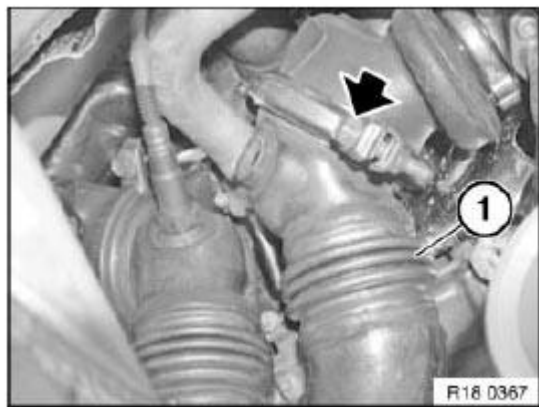


Fig. 42: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)

WARNING: Scalding hazard!
Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

· **Remove catalytic converter, cylinders 1-3**

NOTE: **The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.**

Remove **control sensor**, cylinders 4 to 6 . See **78 EMISSION CONTROL, OXYGEN SENSOR** .

Remove **monitor sensor**, cylinders 4 to 6 . See **78 EMISSION CONTROL, OXYGEN SENSOR** .

Unfasten clip. In so doing, secure catalytic converter (1) against falling out.

Remove catalytic converter (1).

Installation:

Clean sealing face and replace seal.

Tightening torque **18 00 3AZ.**

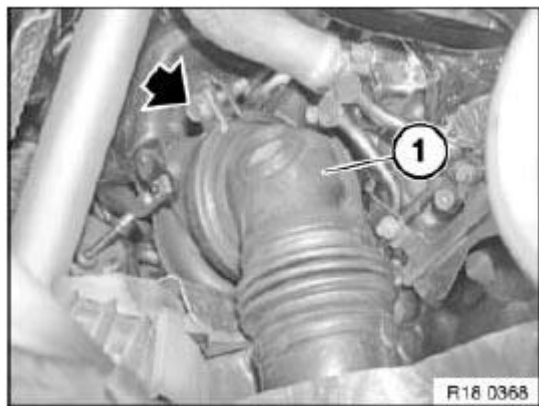


Fig. 43: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

18 32 082 REMOVING AND INSTALLING/REPLACING EXHAUST PIPE WITH CATALYTIC CONVERTER (N54)

Special tools required:

- 00 2 210

WARNING: Scalding hazard!
Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove exhaust system .

NOTE: The cutting lines for the exhaust pipes are designated by notches in the pipe.

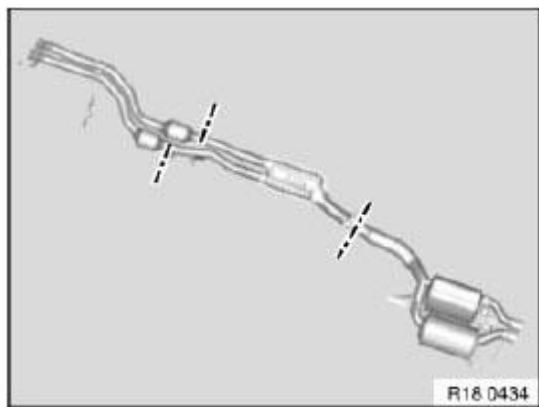


Fig. 44: Identifying Centre Muffler Lines Cutting Point
Courtesy of BMW OF NORTH AMERICA, INC.

Cut exhaust pipes at marked points with special tool 00 2 210 and deburr.

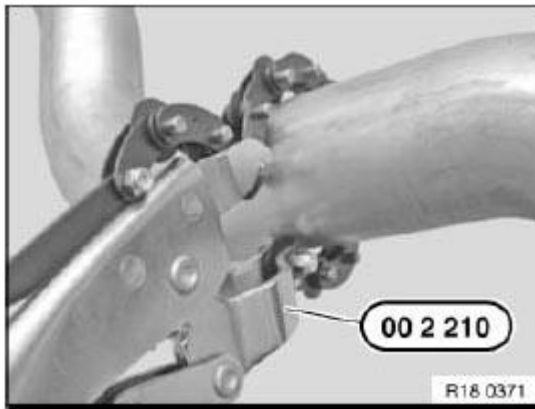


Fig. 45: Identifying Special Tool (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and replace during installation.

Installation:

Tightening torque, **18 00 1AZ.**

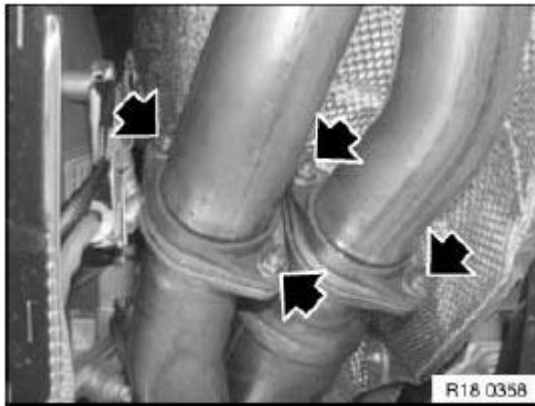


Fig. 46: Locating Self-Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect exhaust pipe to center muffler by means of clamp and align.

Align clamp and tighten down.

Tightening torque **18 00 5AZ.**

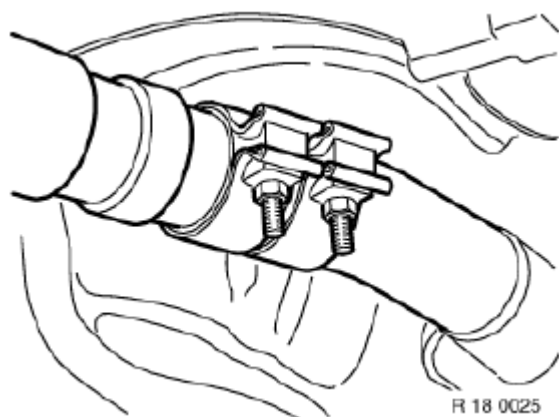


Fig. 47: Identifying Exhaust Pipe To Centre Muffler
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

EXHAUST CATALYTIC CONVERTER

18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove exhaust system .
- Remove underbody protection . See **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** and **51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .
- Remove cable holder on side of transmission for control sensor/monitor sensor
- In all-wheel-drive vehicles: Remove **right bearing block** . See **31 53 040 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT BEARING BLOCK** .

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **control sensor**, cylinders 1 to 3 . See **78 EMISSION CONTROL, OXYGEN SENSOR** .

Remove **monitor sensor**, cylinders 1 to 3 . See **78 EMISSION CONTROL, OXYGEN SENSOR** .

Unscrew nuts.

Tightening torque **18 20 2AZ.**

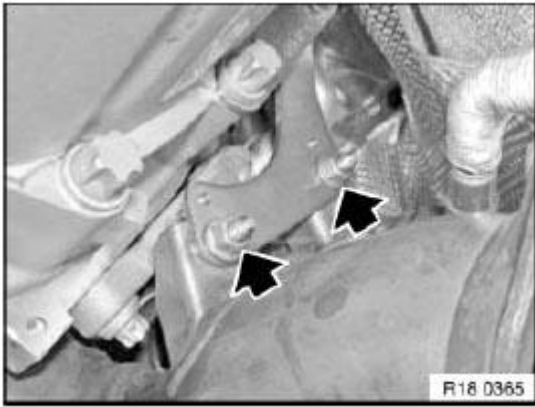


Fig. 48: Locating Exhaust Manifolds Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Remove holder (1).

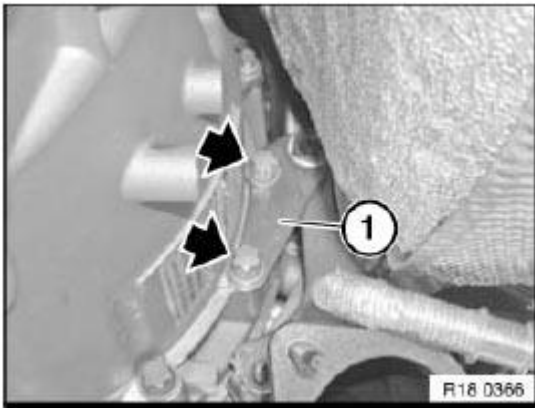


Fig. 49: Locating Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten clip. In so doing, secure catalytic converter (1) against falling out.

Remove catalytic converter (1).

Installation:

Clean sealing face and replace seal.

Tightening torque **18 00 3AZ.**

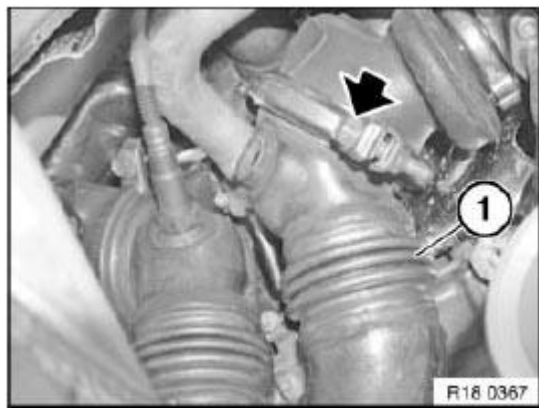


Fig. 50: Identifying Catalytic Converter

Courtesy of BMW OF NORTH AMERICA, INC.

18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove catalytic converter, cylinders 1-3

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

- Remove **control sensor**, cylinders 4 to 6 . See 78 EMISSION CONTROL, OXYGEN SENSOR .
- Remove **monitor sensor**, cylinders 4 to 6 . See 78 EMISSION CONTROL, OXYGEN SENSOR .

Unfasten clip. In so doing, secure catalytic converter (1) against falling out.

Remove catalytic converter (1).

Installation:

Clean sealing face and replace seal.

Tightening torque 18 00 3AZ.

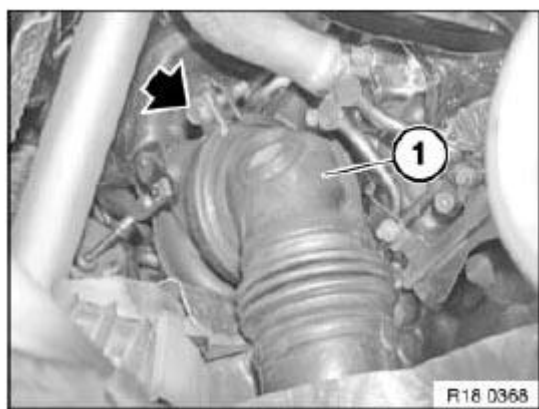


Fig. 51: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

18 32 082 REMOVING AND INSTALLING/REPLACING EXHAUST PIPE WITH CATALYTIC CONVERTER (N54)

Special tools required:

- 00 2 210

WARNING: Scalding hazard!
Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove exhaust system .

NOTE: The cutting lines for the exhaust pipes are designated by notches in the pipe.

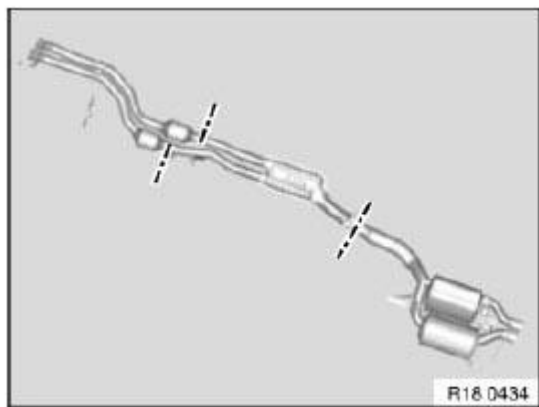


Fig. 52: Identifying Centre Muffler Lines Cutting Point
Courtesy of BMW OF NORTH AMERICA, INC.

Cut exhaust pipes at marked points with special tool 00 2 210 and deburr.

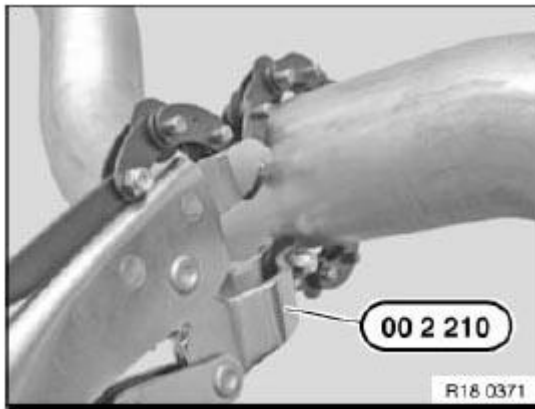


Fig. 53: Identifying Special Tool (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and replace during installation.

Installation:

Tightening torque, **18 00 1AZ.**

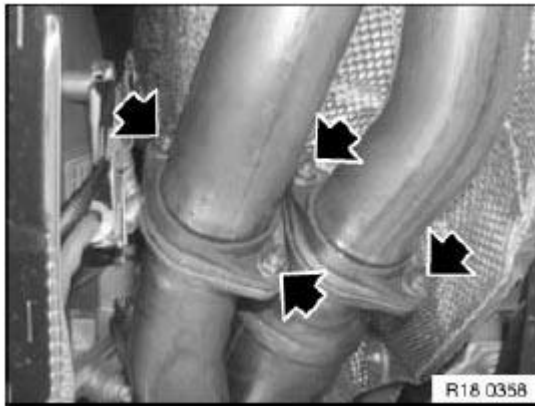


Fig. 54: Locating Self-Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect exhaust pipe to center muffler by means of clamp and align.

Align clamp and tighten down.

Tightening torque **18 00 5AZ.**

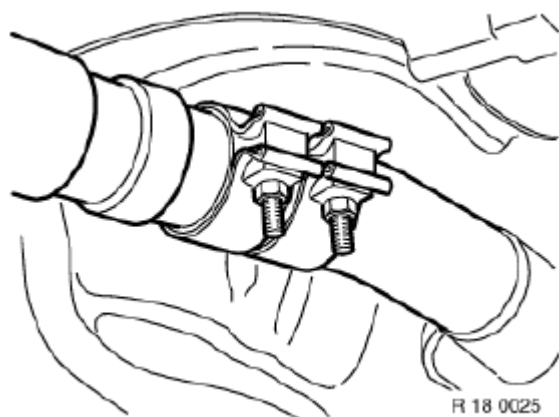


Fig. 55: Identifying Exhaust Pipe To Centre Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

SUSPENSION**Front Axle - Repair Instructions - AWD****00 GENERAL****00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN****Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN**Danger of injury!**

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

**WARNING: Danger of poisoning if oil is ingested/absorbed through the skin!
Risk of injury if oil comes into contact with eyes and skin!**

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00..... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.
2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

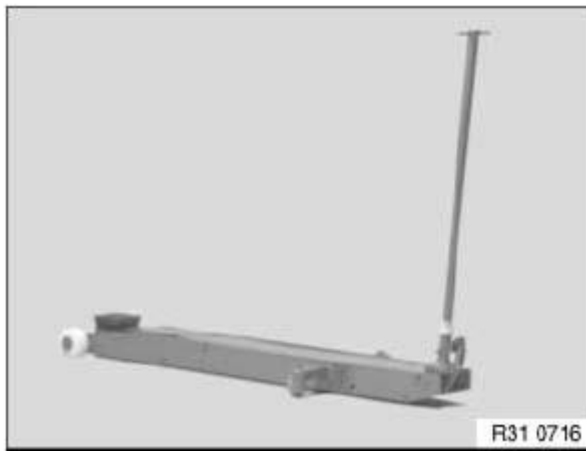


Fig. 1: Identifying Trolley Jack
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

1. Car jacking point
2. Side car jacking points
3. Rear differential

Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

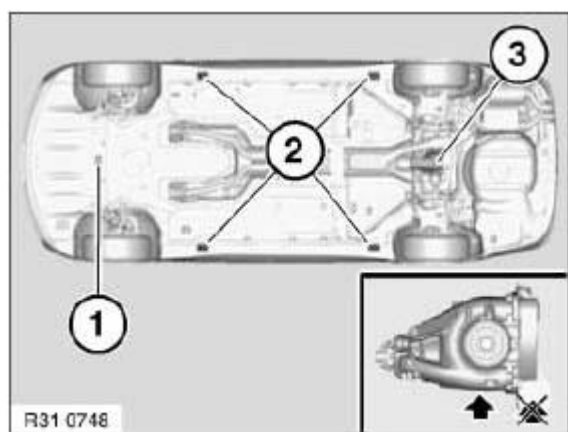
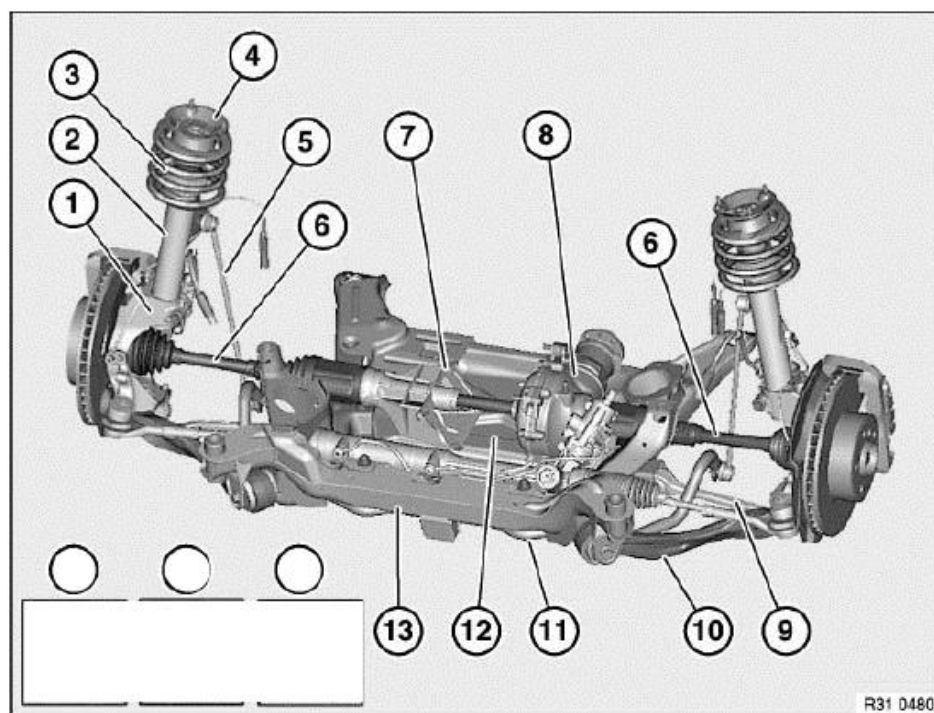


Fig. 2: Identifying Vehicle Jacking Point
Courtesy of BMW OF NORTH AMERICA, INC.

31.... OVERVIEW OF FRONT AXLE (AWD)



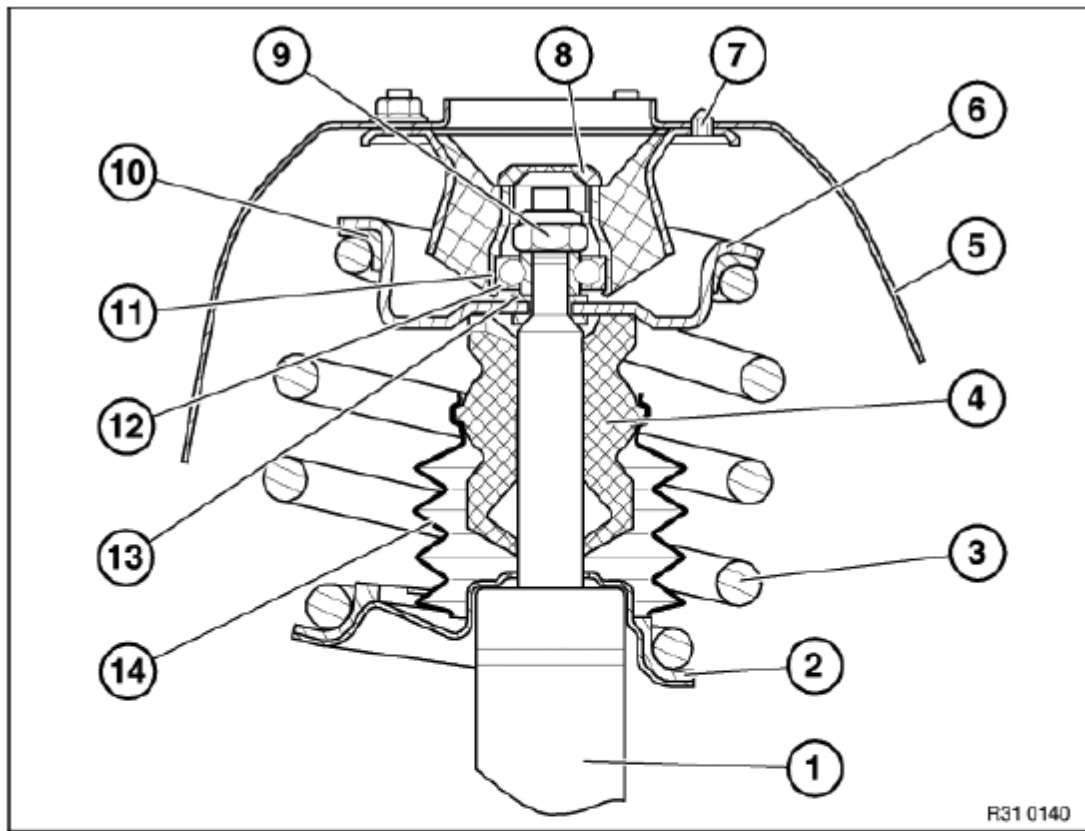
0 Safety precautions and general information

- | | |
|-------------------------------|------------------------|
| 1 Swivel bearing | 10 Tension strut |
| 2 Spring strut shock absorber | 11 Stabiliser |
| 3 Coil spring | 12 Reinforcement plate |
| 4 Thrust bearing | 13 Front axle support |
| 5 Stabilizer link | |
| 6 Output shaft | |
| 7 Bearing block | |
| 8 Front differential | |
| 9 Control arm | |

Fig. 3: Identifying Overview Of Front Axle (AWD)
 Courtesy of BMW OF NORTH AMERICA, INC.

0 Safety precautions and general information

31.... LAYOUT OF SPRING STRUT SHOCK ABSORBER



- | | |
|-------------------------------|-----------------------|
| 1 Spring strut shock absorber | 10 Upper spring pad |
| 2 Lower spring pad | 11 Thrust bearing |
| 3 Coil spring | 12 Dust sleeve |
| 4 Auxiliary spring | 13 Thrust washer/shim |
| 5 Wheel arch | 14 Rubber gaiter |
| 6 Upper spring plate | |
| 7 Centering pin | |
| 8 Grease cap | |
| 9 Nut | |

Fig. 4: Layout Of Spring Strut Shock Absorber
 Courtesy of BMW OF NORTH AMERICA, INC.

31 00... FRONT AXLE + STEERING (AWD): WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

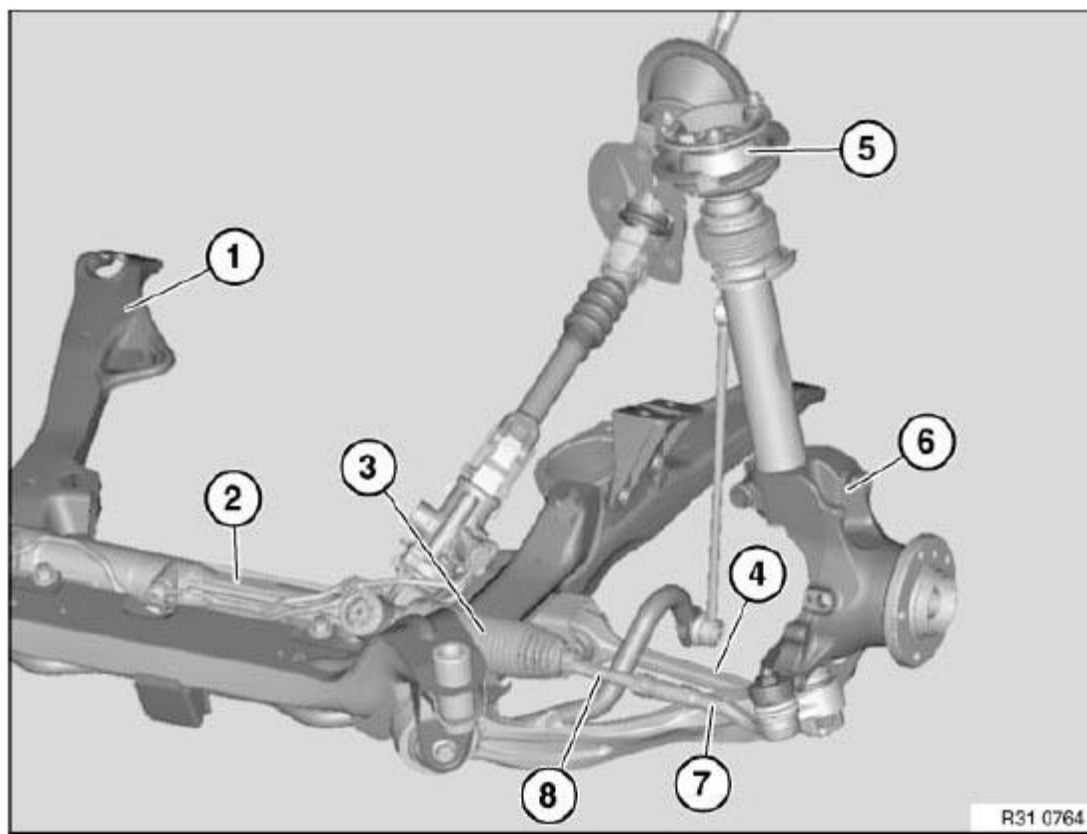


Fig. 5: Identifying Front Axle + Steering (AWD) Components
Courtesy of BMW OF NORTH AMERICA, INC.

A wheel/chassis alignment check must be carried out after the following work:

- Release of following screw/bolt connections:
 - Steering gear to front axle carrier
 - Control arm to front axle carrier
 - Support bearing to body (if centering pin is missing)
 - Tie rod end to tie rod
- Replacement of following parts:
 1. Front axle carrier
 2. Steering gear
 3. Gaiter (if the tie rod end has to be screwed off)
 4. Control arm
 5. Support bearing (if centering pin is missing)
 6. Swivel bearing
 7. Tie rod end
 8. Tie rod

31 00... INFORMATION ON REPLACING SHOCK ABSORBERS**Facts:**

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Consequence:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

Exception: On all M-models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

31 00... INSTRUCTIONS (CHASSIS COMPONENTS MADE OF ALUMINUM)

Due to the chemical and corrosion characteristics of aluminum, always comply with the following points when handling aluminum components:

- Do not bring into contact with battery acid!
- Do not clean with wire brushes made of brass or iron! Always use wire brushes with stainless steel bristles!
- Do not expose to flying sparks when grinding/separating! Cover components!
- Do not strike with steel welding splashes! Cover components!
- Do not expose to temperatures > 80 °C, even for brief periods! Temperatures in paint facilities do not have the same impact

31 00... INSTRUCTIONS (DAMAGE TO SUSPENSION)

Substandard road holding, typical noises, tires worn on one side, camber and toe-in values which deviate from nominal value and misshaped components are all indicators of damage to the suspension caused by road traffic accidents or similar impacts.

To repair vehicle correctly, depending on condition of vehicle, perform the following troubleshooting procedure:

You must also follow the rules and guidelines for accident-related repairs to the steering gear.

TROUBLESHOOTING CHART

CARMANUALSUSA		
Saturday, September 05, 2015 9:17:00 AM	Page 8	© 2011 Mitchell Repair Information Company, LLC.

Vehicle condition	Possible cause	Remedy
1. Camber inside/toe-in outside the nominal value, adjustment of track alignment possible	a. Screw connection not OK b. Tie rod or journal of tie rod end is deformed c. One or both tension struts is/are deformed d. Control arm deformed	a. Check screw connections: Tie rod end to swivel bearing Tie rod to power steering gear Power steering gear to front axle carrier b. Replace tie rod, tension strut and swivel bearing IMPORTANT: If the journal of the tie rod end is deformed, the power steering gear must also be replaced c. Replace tension strut and swivel bearing d. Replace control arm, tension strut and swivel bearing
2 Camber inside/toe-in outside the nominal value, adjustment of track alignment possible	Powerful forces acting on steering/front axle components	Replace tie rods Replace swivel bearing Replace power steering gear Replace tension strut Replace control arms
3 Camber/toe-in outside the nominal value, adjustment of track alignment not possible	Powerful forces acting on front axle with distortion of: a. Screw connections b. Front axle support c. See Pt. 1b) to d) d. Spring strut/piston rod	a. Check screw connections, replace the relevant part if necessary b. Replace front axle carrier c. See Pt. 1b) to d) d. Replace spring strut

31 00... NOTES ON REPAIRING THREADS

IMPORTANT: Install Heli-coil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads in engine carrier may be repaired with Heli-coil thread inserts. Comply with the procedure described in the example.



Fig. 6: Identifying Heli-coil Thread

Courtesy of BMW OF NORTH AMERICA, INC.

Procedure:

1. Create a clean core hole; if necessary, drill out screw remnants

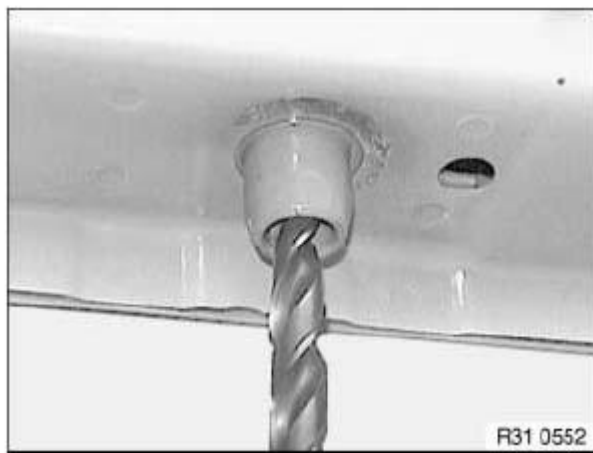


Fig. 7: Drilling Out Screw

Courtesy of BMW OF NORTH AMERICA, INC.

2. Create locating thread for Heli-coil thread insert



Fig. 8: Applying Thread For Heli-coil Thread
Courtesy of BMW OF NORTH AMERICA, INC.

3. Pick out Heli-coil thread insert in accordance with the table and screw into the locating thread until flush with the original thread

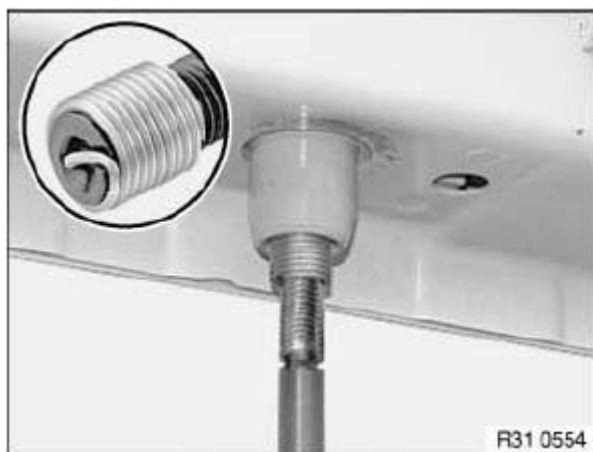


Fig. 9: Identifying Heli-coil Thread
Courtesy of BMW OF NORTH AMERICA, INC.

4. Break drive pin and remove

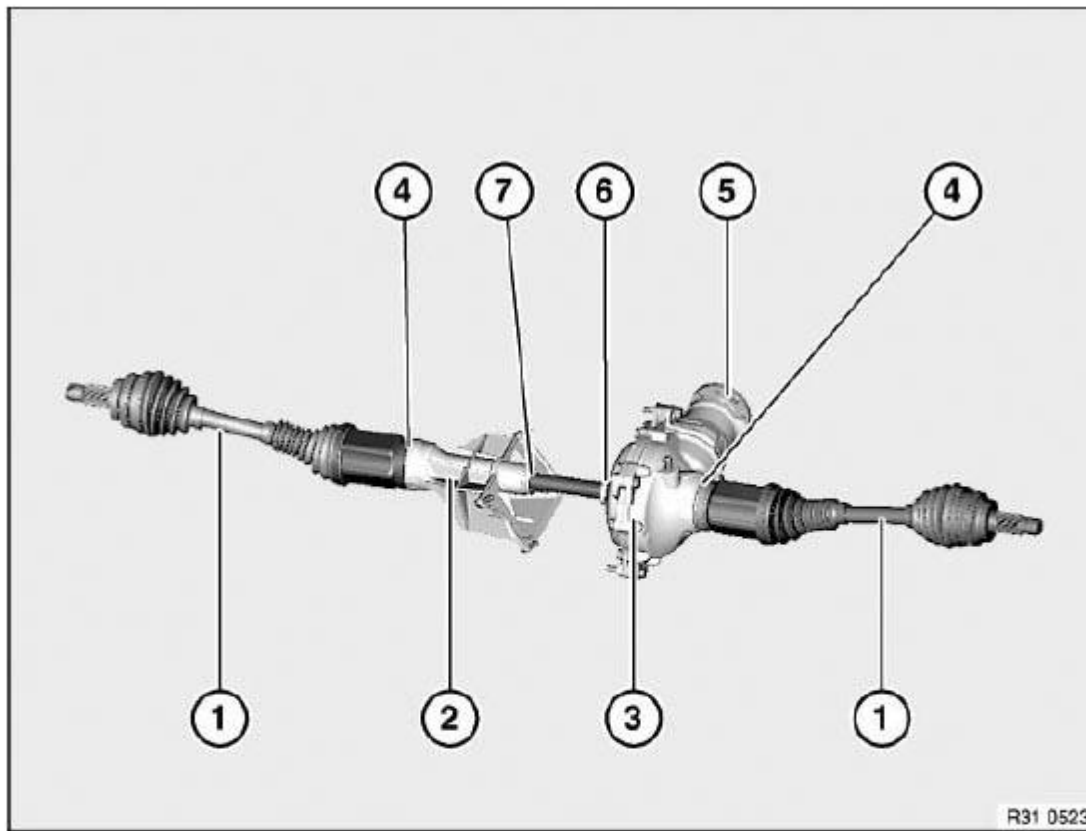


Fig. 10: Removing Drive Pin

Courtesy of BMW OF NORTH AMERICA, INC.

31 50... OVERVIEW OF FRONT DIFFERENTIAL/OUTPUT SHAFTS

cardiagn.com



- | | | | |
|---|---------------------------|---|-----------------------------|
| 1 | Output shaft / gaiters | 5 | Shaft seal (drive flange) |
| 2 | Bearing block | 6 | O-ring (front differential) |
| 3 | Front differential | 7 | O-ring (bearing block) |
| 4 | Shaft seal (output shaft) | | |

Fig. 11: Identifying Front Differential/Output Shafts Components
 Courtesy of BMW OF NORTH AMERICA, INC.

10 FRONT AXLE SUSPENSION

31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE (AWD)

IMPORTANT: Observe safety instructions for raising the vehicle
Driving without reinforcement plate is not permitted!

Necessary preliminary tasks:

- Remove underbody protective plate

Release screw (1).

Release screws (2) and remove reinforcement plate (3).

Installation:

Replace screws.

Tightening torque **31 10 9AZ** .

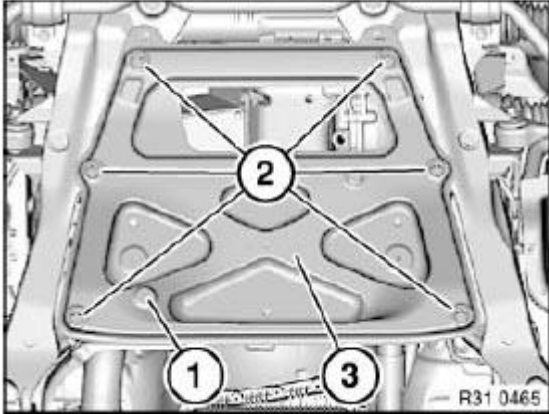


Fig. 12: Identifying Screws And Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION

All except M5:

Release screws (1 and 2) and pull out underbody protection (3) from under bumper trim.

Installation:

Ensure that seals are correctly seated.

Center underbody protection (3) and tighten down screws (1) and (2).

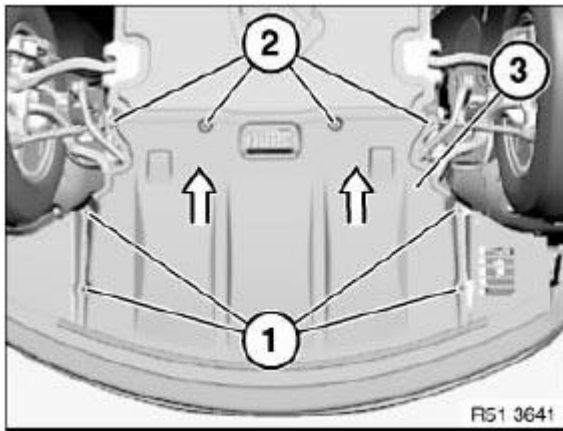


Fig. 13: Identifying Center Underbody Protection And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove catches (1) on cover (2).

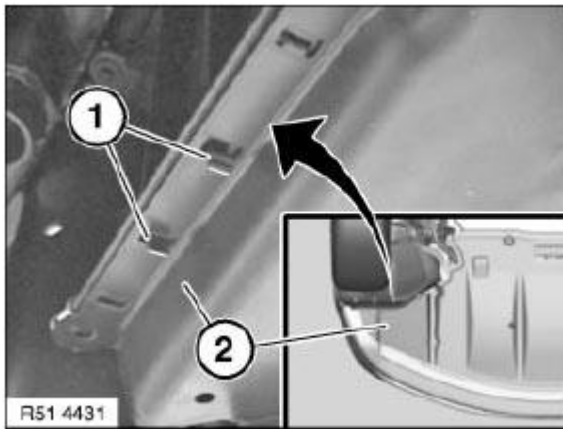


Fig. 14: Identifying Catches And Cover
 Courtesy of BMW OF NORTH AMERICA, INC.

Version with rough road package:

Release screws (1 and 2).

Feed out underbody protection (3) towards rear.

Installation:

Replace screws (1).

Tightening. Refer to **51 EXTERNAL GEARSHIFT COMPONENTS**.

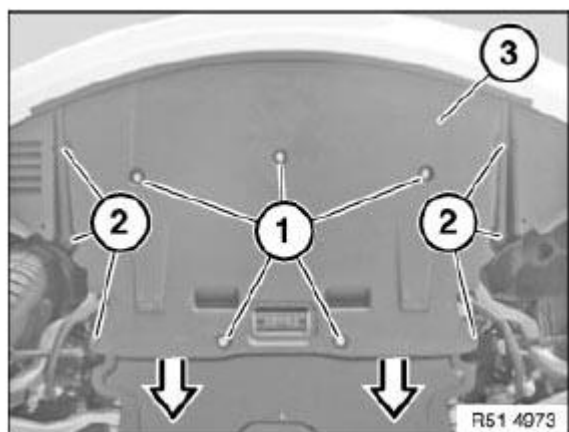


Fig. 15: Identifying Underbody Protection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

M5 only:

Release screws (1 and 2).

Release screws (3) at side from wheel arch trim.

Pull underbody protection (4) forward under bumper trim.

Installation:

Ensure that seals are correctly seated.

Center underside protection (4) and tighten down screws (1, 2 and 3).

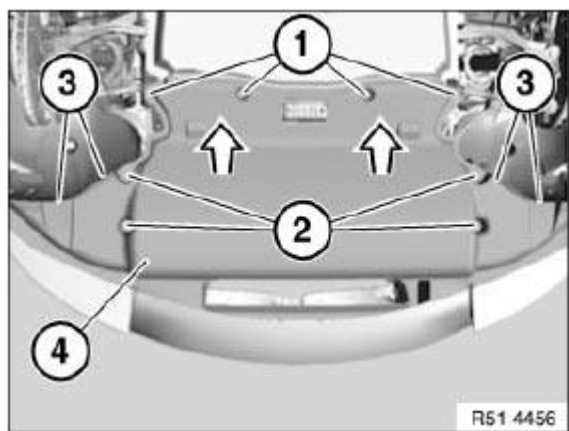


Fig. 16: Identifying Center Underside Protection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION

Necessary preliminary tasks:

- Remove front underbody protection

Not M5

Unfasten screws (1... 3).

Press heat shield (5) back.

Release screws (4) and remove underbody protection (6).

Installation:

Ensure correct seating.

Center underbody protection (6) and tighten down all screws.

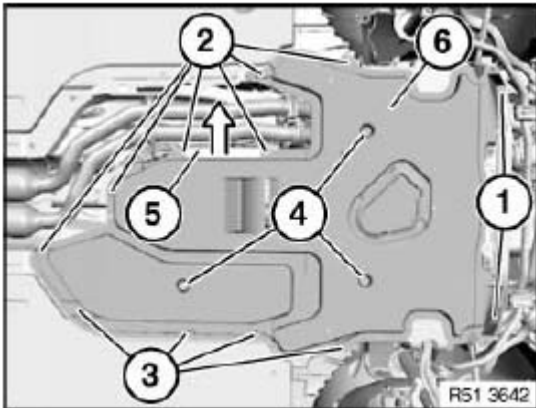


Fig. 17: Identifying Heat Shield, Center Underbody Protection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

M5 only

Unfasten screws (1 and 2).

Remove underbody protection (3).

Installation:

Ensure correct seating.

Center underbody protection (3) and tighten down all screws.

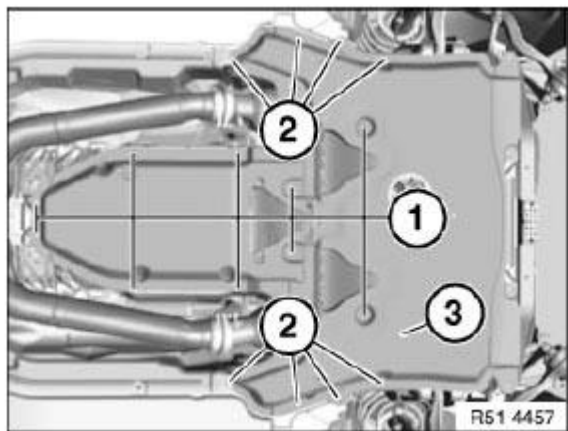


Fig. 18: Identifying Center Underbody Protection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

11 FRONT SUB-FRAME

31 11 001 REPLACING FRONT AXLE CARRIER (AWD)

WARNING: Danger to life!
Secure engine in installation position to prevent it from falling down.

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Seal off hydraulic lines with plugs.

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**
- Draw off and dispose off hydraulic fluid from fluid reservoir
- Secure engine in installation position
- Remove front wheels
- Remove **stabilizer**
- Remove **reinforcement plate**
- Remove steering gear cover on both sides
- Remove lower steering spindle from power steering gear. See **32 31 070 REMOVING AND INSTALLING / REPLACING STEERING SPINDLE LOWER SECTION (AWD)** .
- If necessary, disconnect plug connection from EH converter and remove line from front axle carrier.
- If necessary, remove ride-height sensor with line from front axle carrier. See **37 14 511 REPLACING FRONT RIDE-HEIGHT SENSOR** .
- If necessary, unclip vacuum line for engine mount from engine support arm and disconnect.
- Remove **tension strut** from front axle carrier.

- Remove **control arm** from front axle carrier.
- Remove tie rod end from swivel bearing. See **32 21 151 REPLACING LEFT OR RIGHT TIE ROD END (AWD)** .
- Lower **front axle carrier** until power steering gear rests on output shaft.
- Remove power steering gear. See **32 13 060 REMOVING AND INSTALLING/REPLACING POWER STEERING GEAR (AWD)** .

Remove heat shield(s).

Remove both engine mounts and if necessary remove with vacuum lines from front axle carrier. See **22 11 001 REPLACING LEFT ENGINE MOUNT (N52/N52K/N53)** or **22 11 001 REPLACING RIGHT ENGINE MOUNT (N52/N52K/N53)** .

Take front axle subframe down and set down on a suitable surface.

Installation:

Use previous front axle subframe as a template for modifying or replacing small parts.

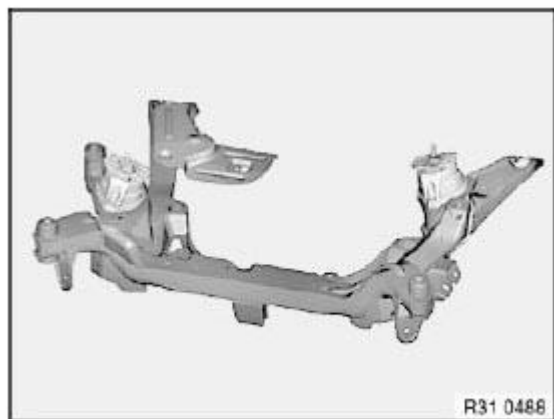


Fig. 19: Identifying Front Axle Subframe

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed hydraulic system. See **32 13 006 BLEEDING POWER STEERING UNIT** .
- Check pipe connections for leaks.
- Perform chassis alignment check.
- Carry out steering angle sensor adjustment.

31 11 506 LOWERING/RAISING FRONT AXLE CARRIER (AWD)

Special tools required:

- 00 2 040
- 31 4 060
- 31 4 070

WARNING: Danger to life!
Secure engine in installation position to prevent it from falling down.

IMPORTANT: Before installing the front axle carrier, make sure there is zinc foil (1) present on middle bolting point (2).
Replace damaged zinc foil (1).
Do not stick over zinc foil (1).

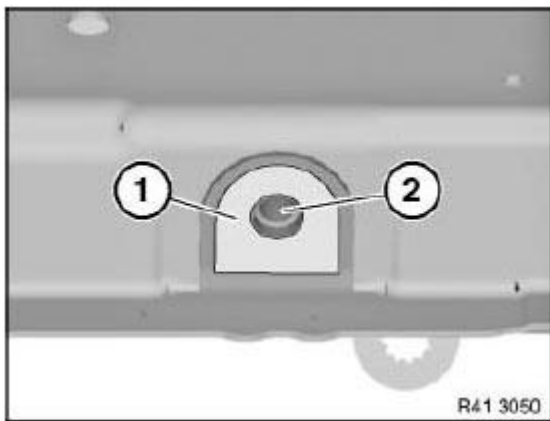


Fig. 20: Identifying Zinc Foil And Middle Bolting Point
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Secure engine in installation position
- Remove **reinforcement plate**
- Remove steering gear cover on both sides
- Remove lower steering spindle from power steering gear
- If necessary, disconnect plug connection from EH converter and remove line from front axle carrier
- If necessary, disconnect plug connection from ride-height sensor and remove line from front axle carrier
- If necessary, disconnect vacuum line of electrically operated valve from Y-distributor and expose

If necessary, position special tool 00 2 040 with a 2nd person helping on workshop jack.

Insert special tool 31 4 070 into corresponding receptacles 1 and 2 of special tool 00 2 040.

Insert special tool 31 4 060 with marking 1 into receptacle 4 of special tool 00 2 040.

Insert special tool 31 4 060 with marking 2 into receptacle 3 of special tool 00 2 040.

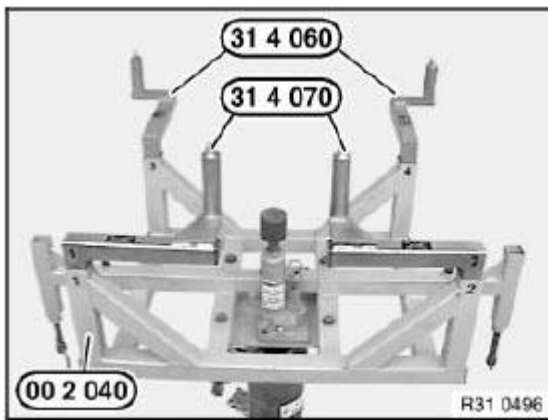


Fig. 21: Identifying Special Tool (31 4 060), (31 4 070) And (00 2 040)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!

Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Align special tool 00 2 040 to front axle carrier.

If necessary, lower special tool 33 3 274.

Support front axle carrier by raising special tool 00 2 040.

NOTE: Make sure when raising that special tools 31 4 070 and 31 4 060 are correctly inserted in the front or rear recesses on the front axle carrier.

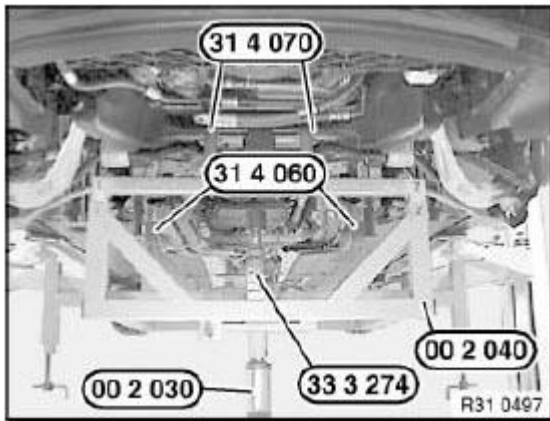


Fig. 22: Identifying Special Tool (31 4 070), (31 4 060) And (33 3 274)
 Courtesy of BMW OF NORTH AMERICA, INC.

M57T2:

NOTE: This bracket is only installed on the left side.

Release bolts (1).

Tightening torque **31 10 13AZ** .

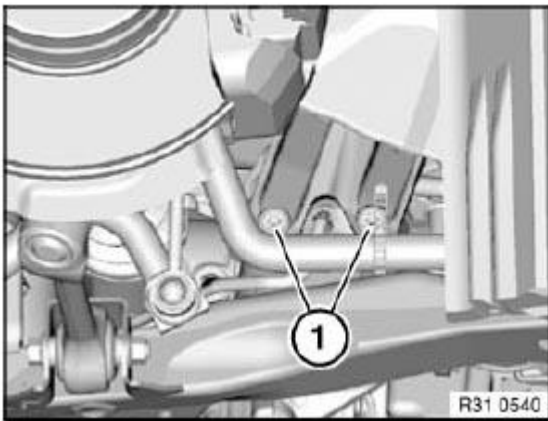


Fig. 23: Identifying Bracket Bolt
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to power steering hoses and lines when lowering and raising.
 Hoses/lines must not be kinked/tensioned/bent!
 When lowering and raising, make sure the cover for the relevant tension strut
 rubber mount is free to move.

Release screws (1, 2).

Installation:

Check threads for damage; if necessary, repair with Heli-coil thread inserts.

Tighten down screws (1) and then screws (2).

Tightening torque **31 10 1AZ** .

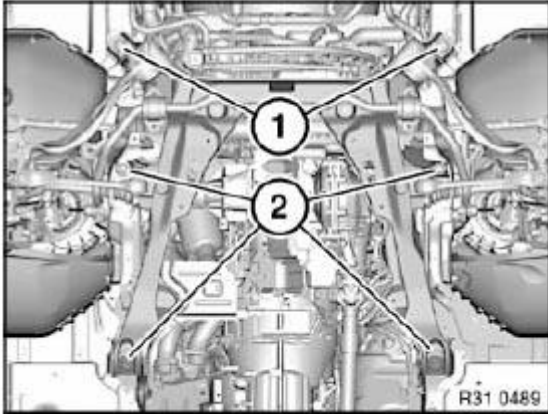


Fig. 24: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

The following operation must be carried out during lowering:

- N54 with automatic transmission: Release screws (1) and remove bracket (2) for transmission oil cooler lines from front axle carrier

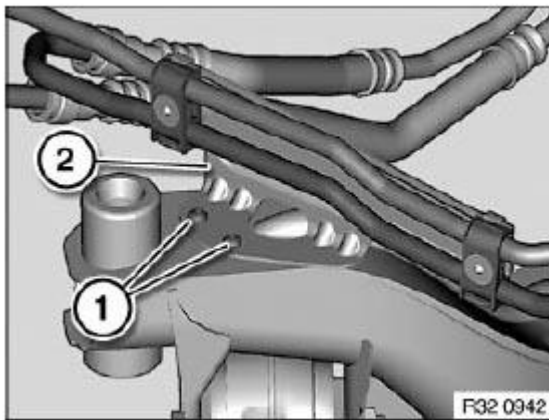


Fig. 25: Identifying Screws And Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

Lower front axle carrier until power steering gear rests on output shaft.

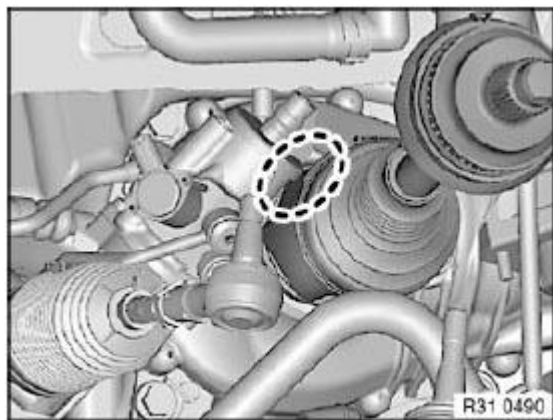


Fig. 26: Identifying Lower Front Axle Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Carry out steering angle sensor adjustment

12 STRUTS WITH RUBBER MOUNTS

31 12 000 REMOVING AND INSTALLING / REPLACING LEFT OR RIGHT CONTROL ARM (AWD)

Special tools required:

- 31 2 240
- 31 2 241
- 31 2 242
- 31 2 243
- 31 2 244
- 31 2 245
- 31 2 246

NOTE: If the control arm is detached from the front axle carrier, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

After installation:

- Perform chassis alignment check
- Carry out steering angle sensor adjustment

Necessary preliminary tasks:

- Remove front wheel

Release nut (1) and remove screw towards front.

Installation:

Replace self-locking nut.

Tightening torque **31 12 2AZ** .

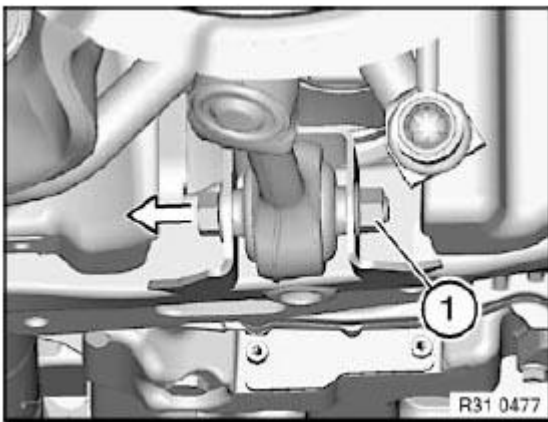


Fig. 27: Identifying Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) approx. 3-4 thread turns; if necessary, grip hexagon.

If necessary, replace special tool lower section 31 2 242 with lower section 31 2 246.

Press control arm off swivel bearing with special tool 31 2 240 (comprising 31 2 241, 31 2 243, 31 2 244, 31 2 245 and 31 2 246).

Unscrew nut (1) and remove control arm.

Installation:

Keep journal on ball head and bushing in swivel bearing clean and free from grease.

Replace self-locking nut.

Tightening torque **31 12 6AZ** .

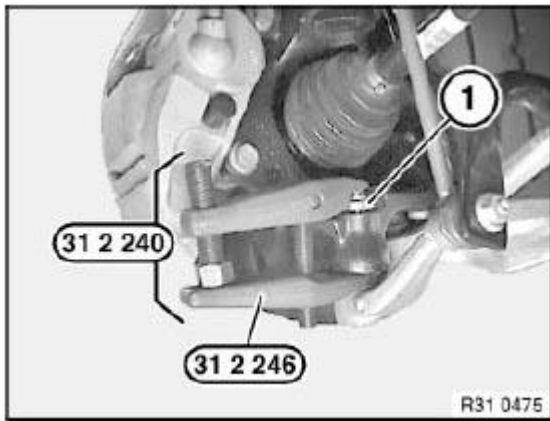


Fig. 28: Identifying Special Tool (31 2 240) And (31 2 246)
 Courtesy of BMW OF NORTH AMERICA, INC.

31 12 003 REMOVING AND INSTALLING / REPLACING TOP RIGHT WISHBONE

NOTE: Control arms with + or - marking (see illustration) are camber correction arms:

- Under dimension variant
- + Over dimension variant

These camber correction arms are used to correct the camber values by 30 minutes. To be used only if the tolerance values are exceeded or undershot! An unmarked control arm is a standard part.

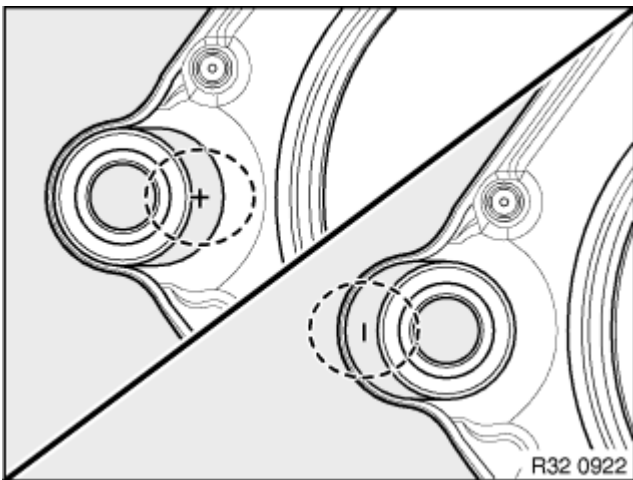


Fig. 29: Identifying Control Arms
 Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks: Remove control unit box

Important! The spring strut/lower wishbone screw connection does not have to be released!

Further procedure is identical to: **Removing and installing/replacing top left control arm.**

31 12 024 REPLACE WHEEL CONTROL JOINT IN WISHBONE (ALL-WHEEL DRIVE VEHICLE)

Necessary preliminary tasks: Remove front wheel

Release screws. If necessary, push wheel control joint off swivel bearing using a suitable tool.

Installation note: Recondition thread in swivel bearing. Keep recess for wheel control joint, bushing in trailing link and wheel control joint journal clean and free from grease. Replace microencapsulated screws.

Tightening torque, see **31 12 21AZ**

31 12 026 REMOVING AND INSTALLING / REPLACING GUIDE JOINT IN SWIVEL BEARING (4WD)

Special tools required:

- 33 4 200
- 33 4 205

Necessary preliminary tasks:

- Remove front wheel
- Remove **tension strut** from guide joint

Release screws (1).

If necessary, press guide joint (2) off swivel bearing with a suitable tool.

Installation:

Recondition thread in swivel bearing.

Keep recess for guide joint, bushing in tension strut and guide joint journal clean and free from grease.

Replace micro-encapsulated screws.

Tightening torque **31 12 21AZ** .

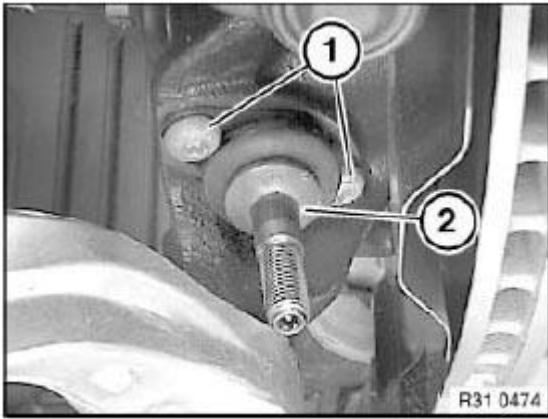


Fig. 30: Identifying Guide Joint And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Guide joint tightly seated in swivel bearing:

IMPORTANT: The guide joint must be replaced once it has been driven out with the special tools.

Secure special tool 33 4 205 to guide joint.

Drive guide joint out of swivel bearing with special tool 33 4 200.

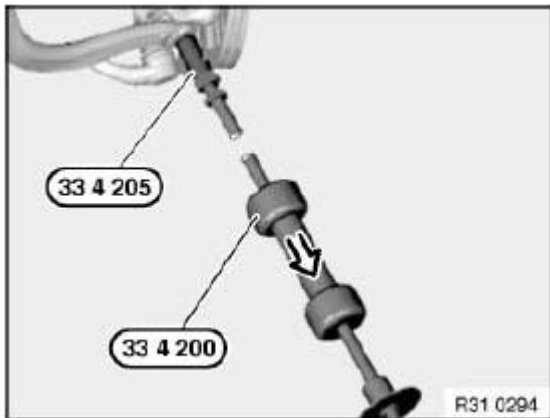


Fig. 31: Identifying Special Tool (33 4 205) And (33 4 200)
Courtesy of BMW OF NORTH AMERICA, INC.

31 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT (AWD)

Necessary preliminary tasks:

- Remove front wheel

Remove front assembly underside protection

Wheel suspension cover:

Remove clip (1).

Unscrew bolt (3).

Unclip wheel suspension cover (2) from front axle carrier (in vicinity of tension strut) and remove.

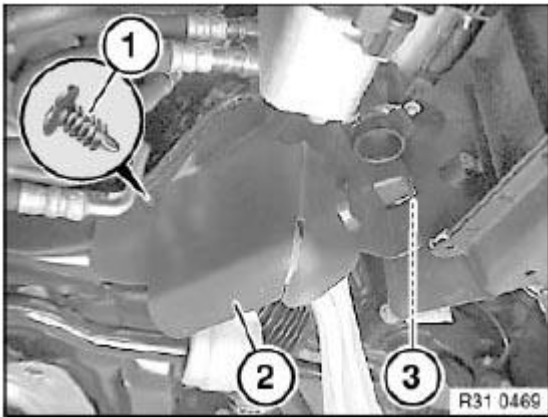


Fig. 32: Identifying Wheel Suspension Cover, Clip And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Right side only on version with xenon headlight:

Unscrew nut (1).

Tightening torque **37 14 7AZ** .

Remove jointed rod (2) from tension strut on right.

Installation:

Sensor lever (3) must point from ride-height sensor to right front wheel.

Replace self-locking nut.

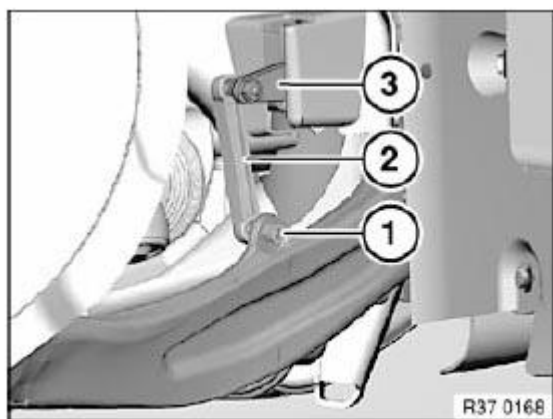


Fig. 33: Identifying Sensor Lever And Jointed Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1).

Installation:

Replace self-locking nut.

Tighten bolt connection in normal position.

Tightening torque **31 12 1AZ** .

Release nut (3); if necessary, grip at Torx socket.

Remove tension strut (2).

Installation:

Keep tension strut to guide joint connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque **31 12 20AZ** .

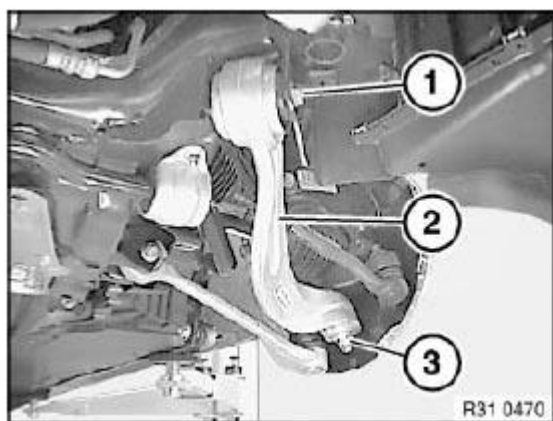


Fig. 34: Identifying Tension Strut And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

31 12 138 REPLACING RUBBER MOUNTS ON BOTH TENSION STRUTS (AWD)

Special tools required:

- 31 3 031
- 31 3 032

IMPORTANT: The rubber mounts on both tension struts must be replaced! Note that the rubber mounts may only be changed once.

Carry out check:

There must always be a minimum amount of play in the guide joint.

1. Check guide joint play

NOTE: For this purpose, apply light pressure to the tension strut (in the area of the guide joint) in the horizontal and vertical directions.

- Play is OK: Check bolt connection (see Point 2)
- Play is not OK: Replace rubber mount and guide joint

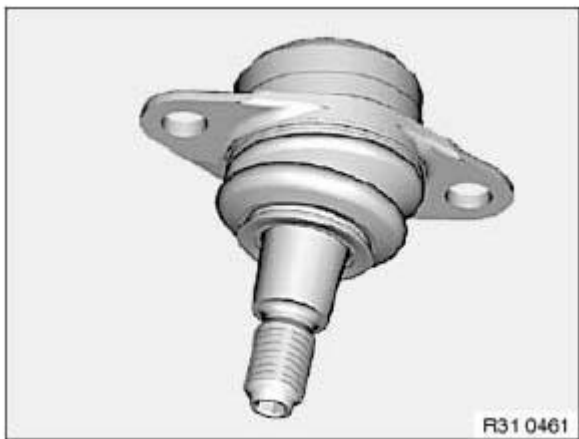


Fig. 35: Identifying Guide Joint

Courtesy of BMW OF NORTH AMERICA, INC.

2. Check bolt connection (tension strut to guide joint) by tightening to 60 % of tightening torque and listening for cracking sound.

Tightening torque **31 12 20AZ** .

- Torque wrench cracking sound: Replace rubber mount
- Bolt connection turns: Replace tension strut and guide joint

Replacing rubber mount:

Remove both tension struts.

IMPORTANT: If the tension struts already feature an identification mark with a center punch, it is necessary to replace both tension struts.

Mark tension struts with a punch mark in area (A).

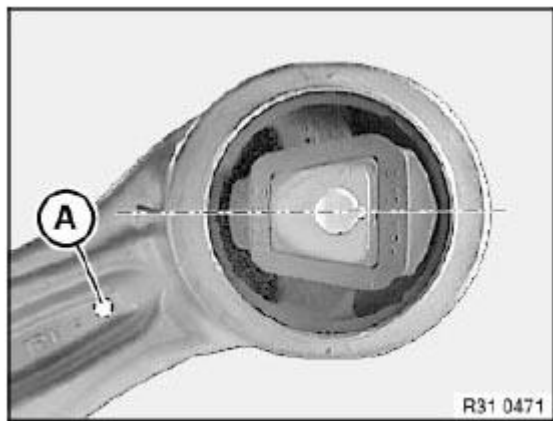
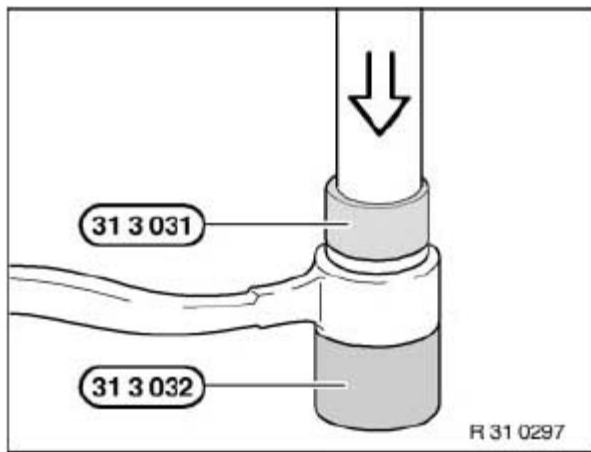


Fig. 36: Identifying Punch Mark On Tension Struts

Courtesy of BMW OF NORTH AMERICA, INC.

Using a press and special tools 31 3 031 and 31 3 032, press rubber mount out of tension strut.

NOTE: Special tool 31 3 031 must be exactly flush with rubber mount bushing.

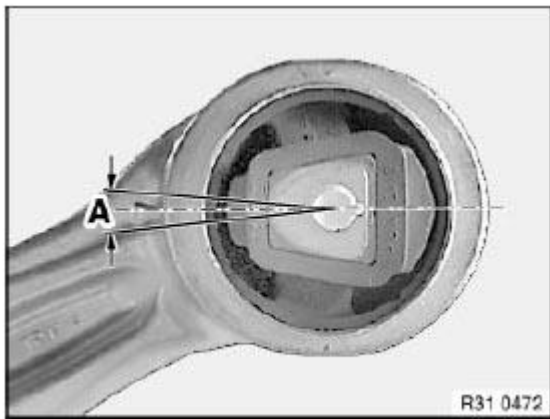
**Fig. 37: Identifying Special Tool (31 3 031) And (31 3 032)**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep rubber mount and bushing in tension strut clean and free from grease.

Align rubber mount by way of arrow to marking on tension strut and press in. The deviation (A) must not exceed $\pm 5^\circ$.

**Fig. 38: Identifying Tension Strut Bushing Clearance**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Protrusion (A) equally large.

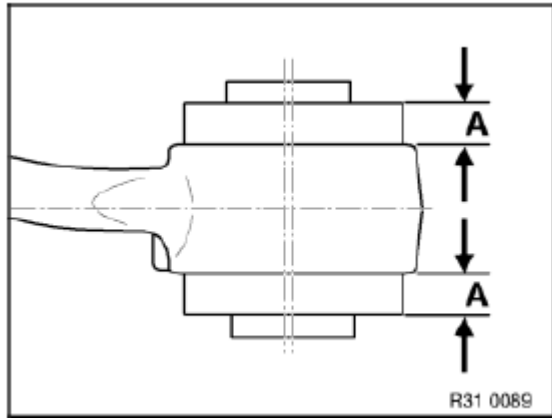


Fig. 39: Identifying Protrusion A

Courtesy of BMW OF NORTH AMERICA, INC.

21 WHEEL BEARINGS AND STUB AXLE

31 21 090 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SWIVEL BEARING (AWD)

Special tools required:

- 31 2 230

Remove front wheel.

Release collar nut; to do so, press brake pedal to floor.

Installation:

Replace collar nut, apply a light coating of oil to contact surface and tighten down.

Tightening torque **31 21 2AZ** .

Secure collar nut by peening on flat areas of output shaft.

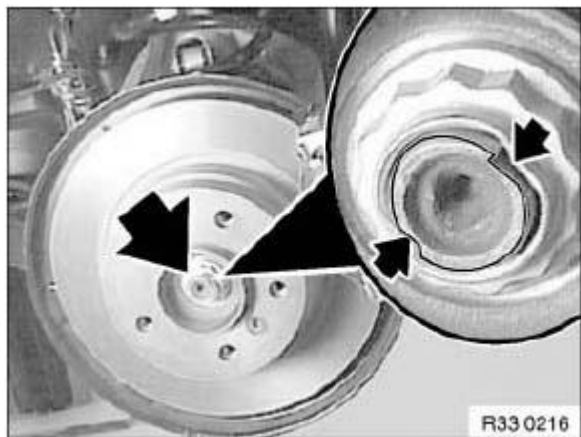


Fig. 40: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove brake disk.

Replacement only: Drive out drive flange.

Remove front pulse generator from swivel bearing and remove line from bracket.

Remove tie rod end from swivel bearing.

Remove tension strut from guide joint.

Remove control arm from swivel bearing.

Remove stabilizer link from spring strut and rotate swivel bearing to one side.

Press output shaft out of drive flange and tie up.

Support swivel bearing with workshop jack and a suitable mounting.

Release nut (1) and remove holder (2).

Pull out bolt (3) towards front.

Spread swivel bearing with special tool 31 2 230.

Lower workshop jack and remove swivel bearing.

Installation:

Keep press fit of swivel gearing and spring strut in lower area clean and free from oil and grease.

Spread swivel bearing with special tool 31 2 230, align by means of gap to positioning pins on back of spring strut and raise as far as it will go.

Replace self-locking nut.

Tightening torque. Refer to **31 31 3AZ** .

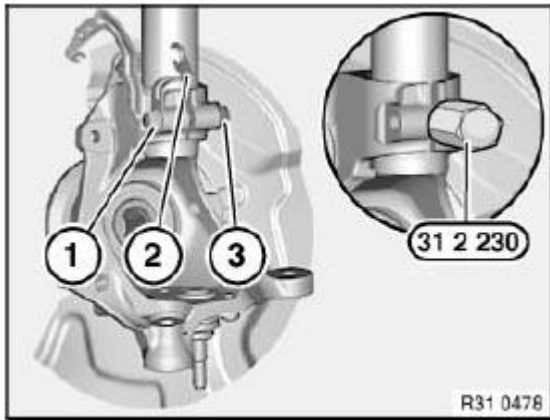


Fig. 41: Identifying Special Tool (31 2 230)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Modify guide joint.

Modify dust sleeve (1).

Modify brake guard plate (2).

Installation:

Install new wheel bearing.

Draw in drive flange.

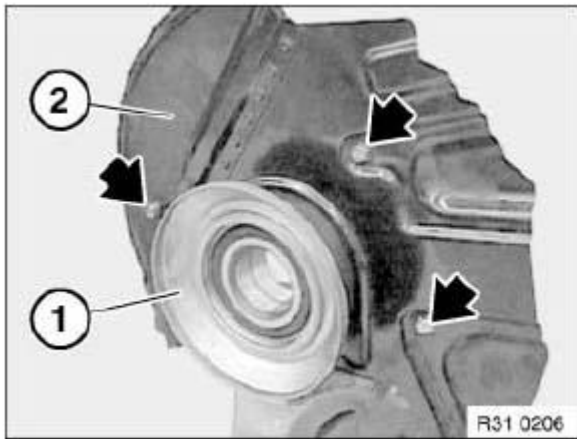


Fig. 42: Locating Brake Guard Plate And Dust Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Replacement only: Perform chassis alignment check

31 21 180 REPLACING BEARING FOR FRONT WHEEL (AWD)

Special tools required:

- 22 1 018
- 31 2 113
- 33 2 116
- 33 2 160
- 33 2 201
- 33 3 261
- 33 3 266
- 33 3 268
- 33 4 200
- 33 4 261
- 33 4 262

**IMPORTANT: Bearing cannot be dismantled.
Do not wash out bearing.**

Remove front wheel.

Release collar nut; to do so, press brake pedal to floor.

Remove front brake disk

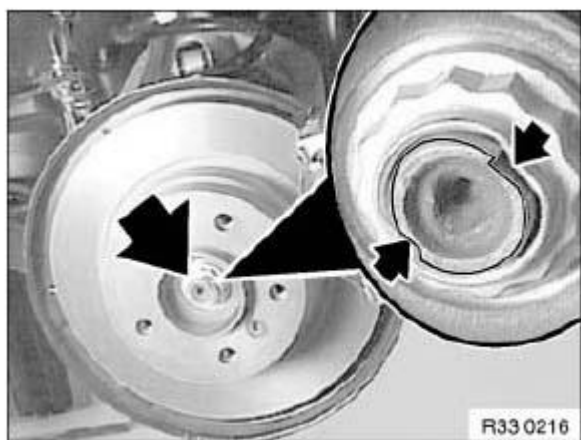


Fig. 43: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Force drive flange with special tools 33 2 116 / 33 2 201, 33 2 160, 33 4 200 and 5 wheel bolts out of wheel bearing.

NOTE: Rounded inside edge of special tool 33 2 160 must point to drive flange.
Detach wheel bearing inner race from drive flange.

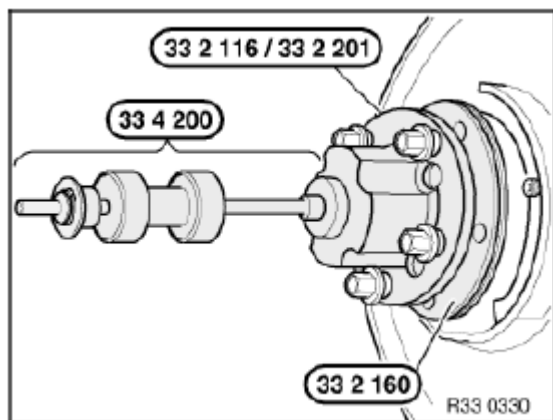


Fig. 44: Identifying Special Tool (33 2 116 / 33 2 201) And (33 4 200)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove swivel bearing and clamp with aluminum clamping jaws in vice.

IMPORTANT: The bearing was destroyed when the drive flange hub was removed and must not be reused!

Lift out retaining ring (1).

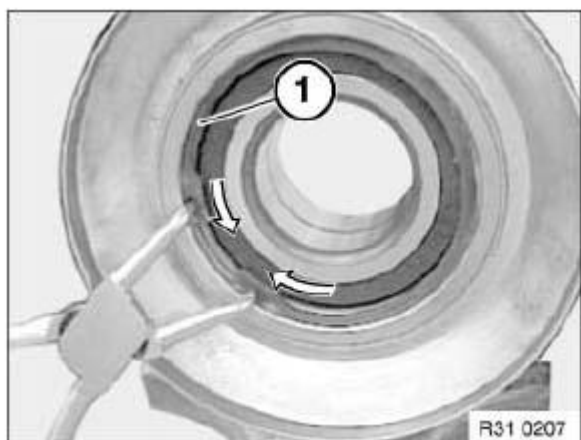


Fig. 45: Identifying Retaining Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Pull out bearing with special tools 31 2 113, 33 4 261, 33 3 266 and 33 3 261.

NOTE: The bearing can be forced out of the swivel bearing on a press.
Check dust sleeve, replace if necessary.

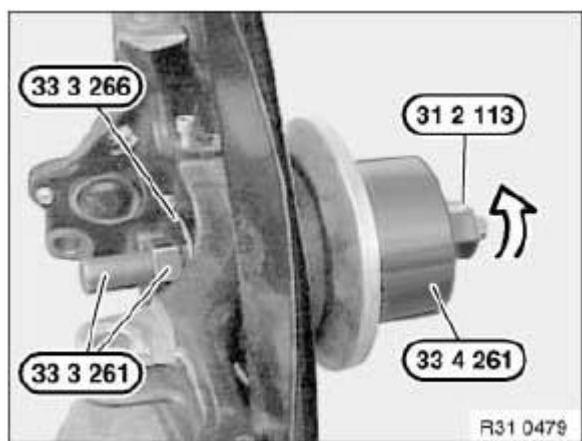


Fig. 46: Identifying Special Tool (31 2 113), (33 4 261) And (33 3 266)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Keep press-fit areas clean and free of oil and grease.
Coat bearing seat in swivel bearing over 50 % of its length with Loctite 638.
Wider chamfer of bearing must point to swivel bearing!

Clean press-fit area of new bearing.

Clean bearing seat in swivel bearing and coat over 50 % of its length with Loctite 638.

IMPORTANT: Wider chamfer (1) of bearing must point to swivel bearing!

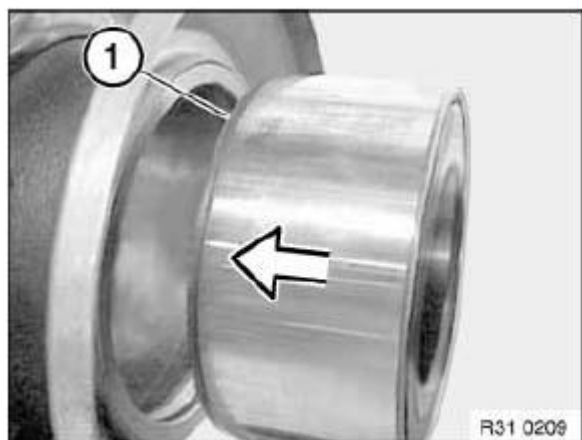


Fig. 47: Locating Wider Chamfer

Courtesy of BMW OF NORTH AMERICA, INC.

Align bearing by way of wider chamfer to swivel bearing and draw in with special tools 31 2 113, 22 1 018, 33 4 262 and 33 3 261.

NOTE: The bearing can be forced out of the swivel bearing on a press.

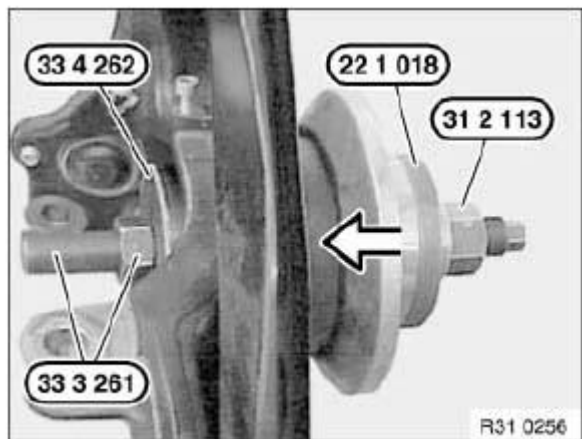


Fig. 48: Identifying Special Tool (31 2 113), (33 4 262) And (22 1 018)

Courtesy of BMW OF NORTH AMERICA, INC.

Install new circlip (1).

NOTE: Make sure circlip (1) is correctly seated.

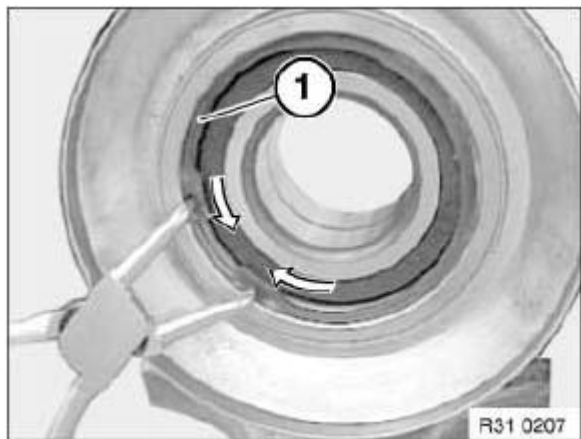


Fig. 49: Identifying Retaining Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Draw in drive flange (1) with special tools 31 2 113, 33 3 268, 33 3 266 and 33 3 261.

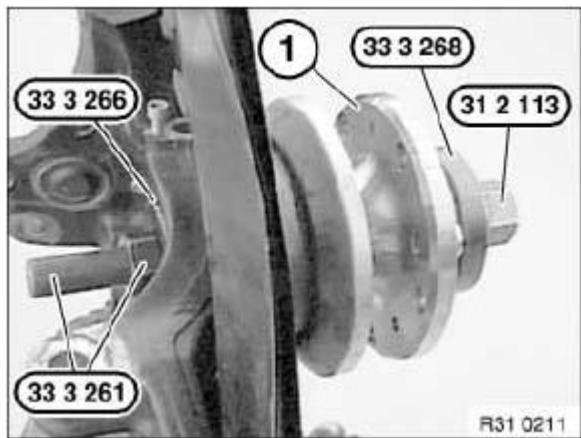


Fig. 50: Identifying Special Tool (31 2 113), (33 3 268) And (33 3 266)

Courtesy of BMW OF NORTH AMERICA, INC.

Install swivel bearing.

Draw output shaft into drive flange.

Install front brake disk.

Install front brake caliper.

Replace collar nut, apply a light coating of oil to contact surface and tighten down.

Tightening torque **31 21 2AZ**.

Secure collar nut by peening on flat areas of output shaft.

Install front wheel.

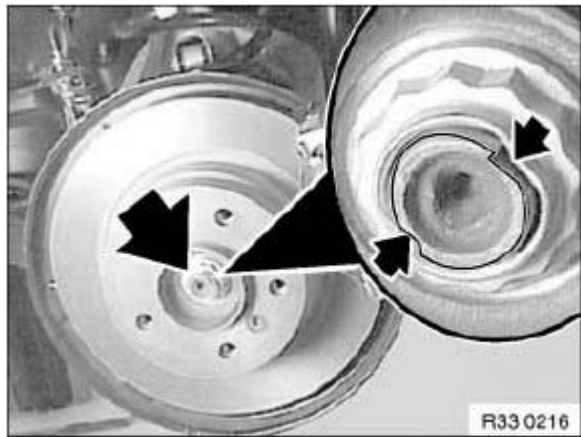
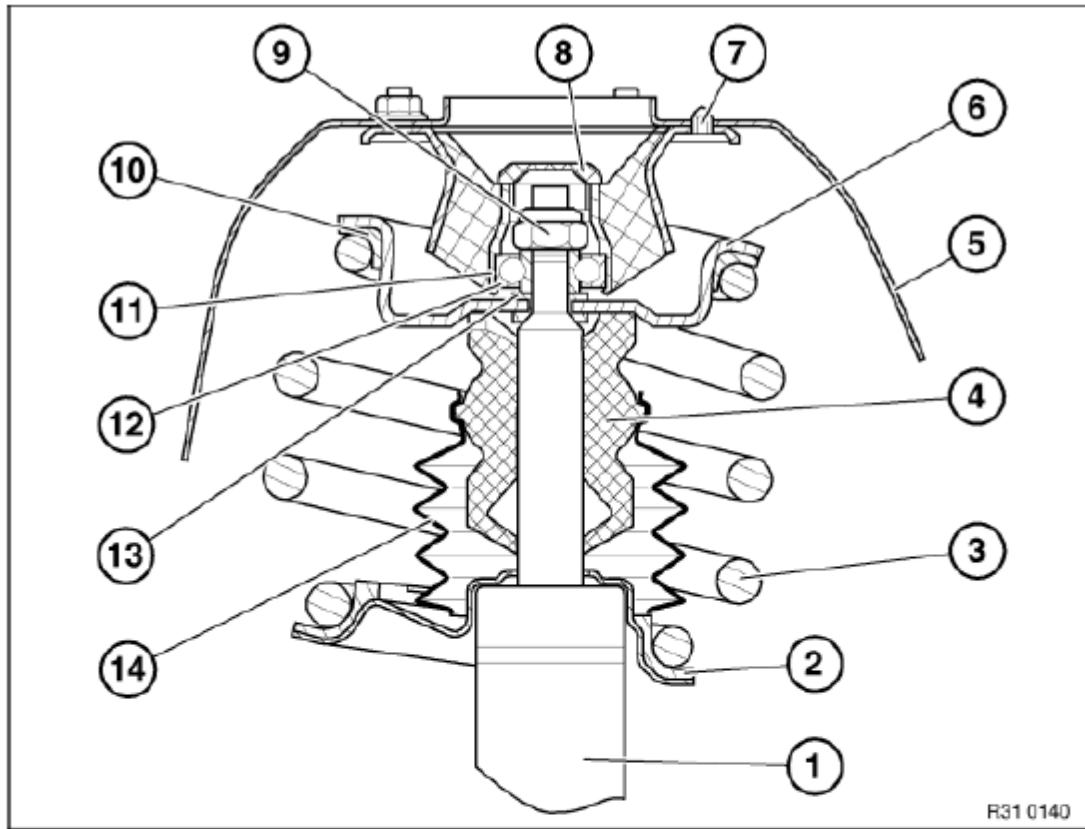


Fig. 51: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

31 SPRING STRUT

31.... LAYOUT OF SPRING STRUT SHOCK ABSORBER



- | | |
|-------------------------------|-----------------------|
| 1 Spring strut shock absorber | 10 Upper spring pad |
| 2 Lower spring pad | 11 Thrust bearing |
| 3 Coil spring | 12 Dust sleeve |
| 4 Auxiliary spring | 13 Thrust washer/shim |
| 5 Wheel arch | 14 Rubber gaiter |
| 6 Upper spring plate | |
| 7 Centering pin | |
| 8 Grease cap | |
| 9 Nut | |

Fig. 52: Layout Of Spring Strut Shock Absorber
 Courtesy of BMW OF NORTH AMERICA, INC.

31 00... INFORMATION ON REPLACING SHOCK ABSORBERS

Facts:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Consequence:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

Exception: On all M-models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

31 31 000 REMOVING AND INSTALLING COMPLETE FRONT LEFT OR RIGHT SPRING STRUT (AWD)

**IMPORTANT: If the centering pin is missing from the support bearing, the position of the studs to the wheel arch must be marked so that the original camber is approximately maintained.
Only one nut may ever be released for marking.**

Remove front wheel.

Release collar nut; to do so, press brake pedal to floor.

Installation:

Replace collar nut, apply a light coating of oil to contact surface and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Tightening torque **31 21 2AZ** .

Secure collar nut by peening on flat areas of output shaft.

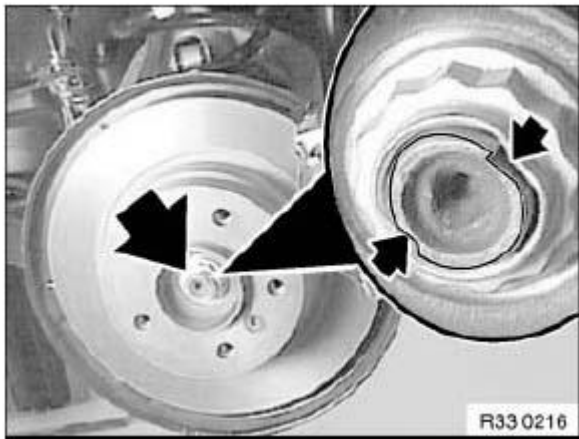


Fig. 53: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove brake disk.

Remove tie rod end from swivel bearing.

Remove tension strut from guide joint.

Remove control arm from swivel bearing.

Remove stabilizer link from spring strut.

Turn swivel bearing to one side.

Press output shaft out of drive flange and tie up.

Remove pulse generator from swivel bearing and remove line from bracket on spring strut.

Centering pin missing: Make position of studs in relation to wheel arch.

Secure spring strut against falling out.

Unscrew nuts.

Remove spring strut with swivel bearing downwards out of wheel arch.

Installation:

Clean contact surface in spring strut dome.

Replace faulty sealing washer for spring strut support bearing (corrosion protection).

Align spring strut using centering pin to bore in wheel arch or studs to wheel arch and push upwards.

Replace self-locking nuts.

Tightening torque **31 31 1AZ** .

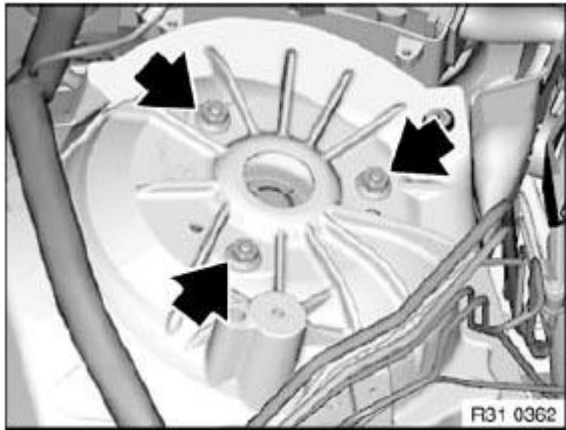


Fig. 54: Locating Spring Strut

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Carry out wheel alignment check if a spring strut with support bearing was or has been installed without centering pin.

31 31 031 REPLACING FRONT LEFT OR RIGHT SPRING STRUT (AWD)

Special tools required:

- 31 2 210
- 31 2 230
- 31 3 341
- 31 3 354
- 31 3 355
- 31 3 356

WARNING: Observe the following instructions to avoid any risk of injury by the coil springs.

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!

4. These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.
5. Keep special tools dry, clean and free of grease.
6. Impact screwdrivers may not be used!
7. Do not compress coil spring to full extent.
8. Observe manufacturer's instructions.

IMPORTANT: Replace auxiliary dampers in pairs only.

NOTE: The support ring on the auxiliary damper has been modified from plastic to steel.

NOTE: Read and comply with Information on replacing shock absorbers.

Necessary preliminary tasks:

- Remove front spring strut

Release nut (1) and remove holder (2).

Remove bolt (3) towards front.

Spread swivel bearing with special tool 31 2 230.

Pull spring strut out of swivel bearing.

Installation:

Keep press fit of swivel gearing and spring strut in lower area clean and free from oil and grease.

Spread swivel bearing with special tool 31 2 230, align by means of gap to positioning pins on back of spring strut and push together as far as it will go.

Replace self-locking nut.

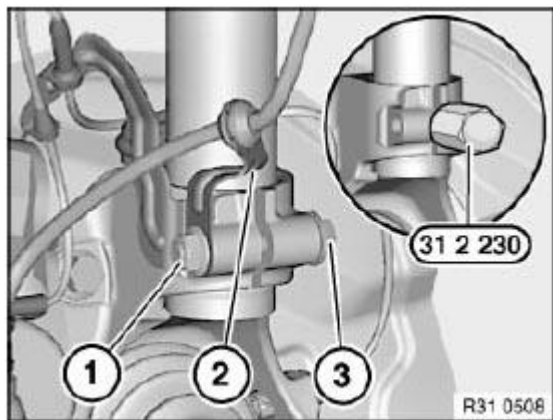


Fig. 55: Identifying Special Tool (31 2 230)
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **31 31 3AZ** .

Removing:

Clamp special tool 31 3 341 in vice.

Insert centering ring 31 3 356 in special tool 31 3 354.

Position special tools 31 3 355 and 31 3 354 with centering ring 31 3 356 from above on special tool 31 3 341 until locking pins (1) can be felt and heard to snap into place.

Check seating of special tools 31 3 355 and 31 3 354 with centering ring 31 3 356, correct if necessary.

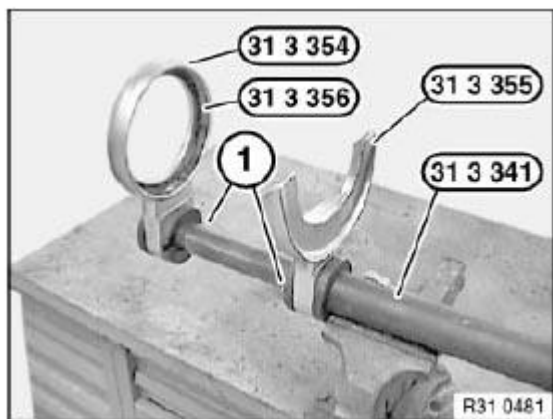


Fig. 56: Identifying Special Tool (31 3 354), (31 3 355) And (31 3 356)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: During tensioning, spring plate must rest correctly in special tool 31 3 354 with centering ring 31 3 356!

During tensioning, lower coil of coil spring must rest completely in recess of special tool 31 3 355!
Compress coil spring until stress on piston rod is relieved.

Clean coil spring to remove coarse dirt and take up with special tools 31 3 355 and 31 3 354 with centering ring 31 3 356.

Twist spring strut until end of coil spring (1) is flush with end of special tool 31 3 355.

Compress coil spring until stress on piston rod is relieved.

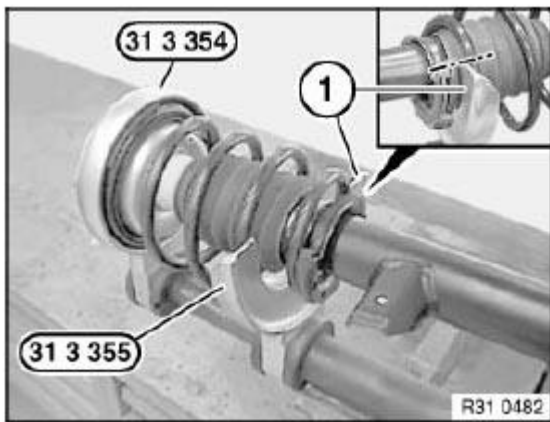


Fig. 57: Identifying Special Tool (31 3 355) And (31 3 354)
 Courtesy of BMW OF NORTH AMERICA, INC.

Take off cap.

Release nut with special tool 31 2 210 (grip piston rod in the process).

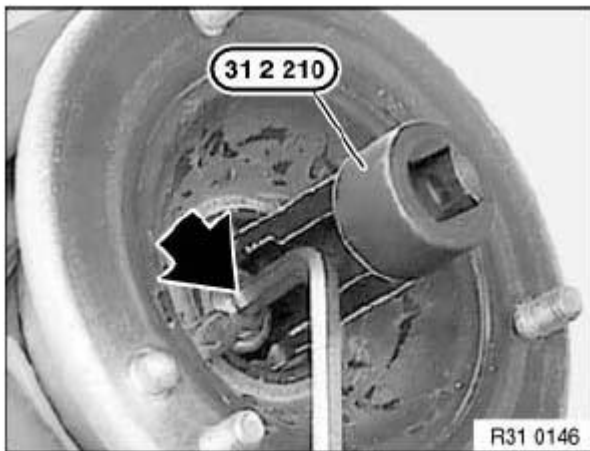


Fig. 58: Identifying Special Tool (31 2 210)
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove support bearing (1), dust sleeve and supporting ring (2).

Remove spring strut with auxiliary damper, gaiter and lower spring pad sideways from tensioned coil spring.

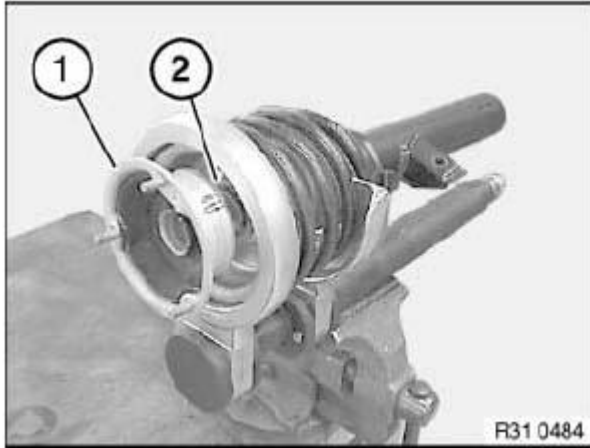


Fig. 59: Identifying Support Bearing And Supporting Ring
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, remove auxiliary damper (1) with gaiter (2) and spring pad (3) from shock absorber.

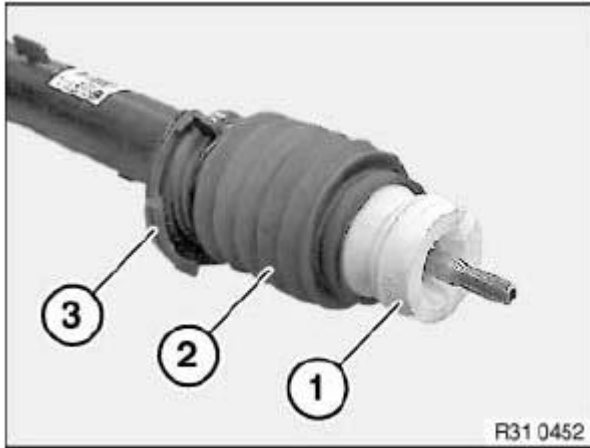


Fig. 60: Identifying Auxiliary Damper, Gaiter And Lower Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve tension on coil spring. Remove coil spring with spring plate from special tools 31 3 354, 31 3 356 and 31 3 355.



Fig. 61: Identifying Special Tool (31 3 354) And (31 3 355)

Installation: Check spring pad (1) for damage, replace if necessary. Attach spring plate (2) with spring pad (1) to coil spring.

NOTE: End of coil spring must be positively aligned to spring pad (1).

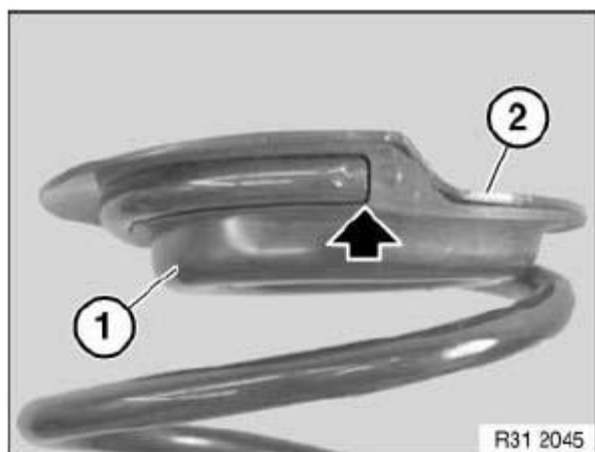


Fig. 62: Identifying Spring Plate And Upper Spring Pad

Hold coil spring and spring plate with special tools 31 3 355, 31 3 356 and 31 3 354. Twist coil spring until lower end of coil spring (1) is flush with end (2) of special tool 31 3 355.



Fig. 63: Identifying Special Tool (31 3 354) And (31 3 355)

WARNING: Do not compress coil spring to full extent. Special tool 31 3 354 and centering ring 31 3 356 must rest correctly on the upper spring plate! Bottom coil of coil spring must rest completely in recess of special tool 31 3 355!

Tension coil spring.



Fig. 64: Identifying Special Tool (31 3 354) And (31 3 355)

Check auxiliary damper (1), gaiter (2) and spring pad (3) for damage, replace if necessary.

NOTE: Make sure spring pad (3) is correctly seated on shock absorber.

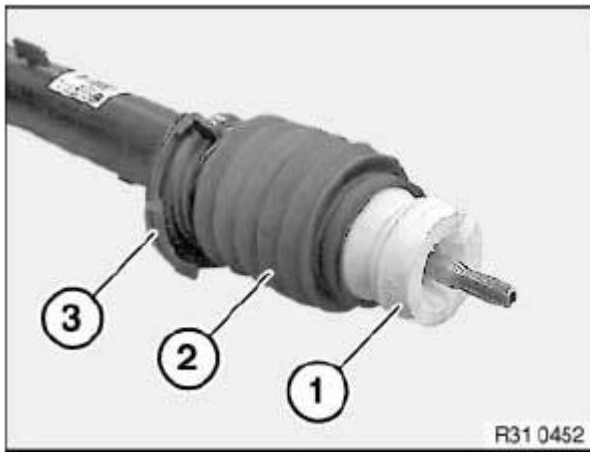


Fig. 65: Identifying Auxiliary Spring, Gaiter And Lower Spring Pad

Insert shock absorber in tensioned coil spring. Attach thrust washer (2) to piston rod. Check support bearing (1) for damage, replace if necessary. Attach dust sleeve and support bearing to piston rod.

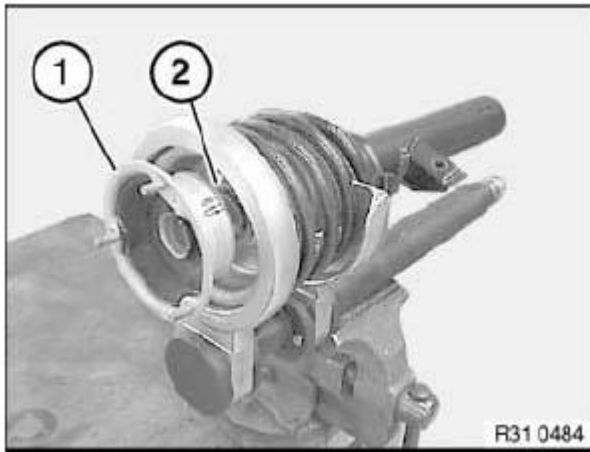


Fig. 66: Identifying Support Bearing And Supporting Ring

Replace nut and tighten down with special tool 31 2 210 (grip piston rod in the process). Tightening torque **31 31 2AZ**. Fit cover cap.

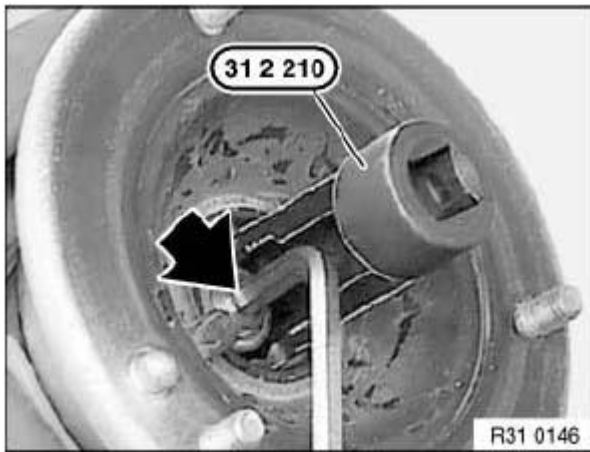


Fig. 67: Identifying Special Tool 31 2 210

IMPORTANT: Spring pad (1) must rest positively on spring plate (2)! Upper end of coil spring must rest on stop of spring pad (1)!

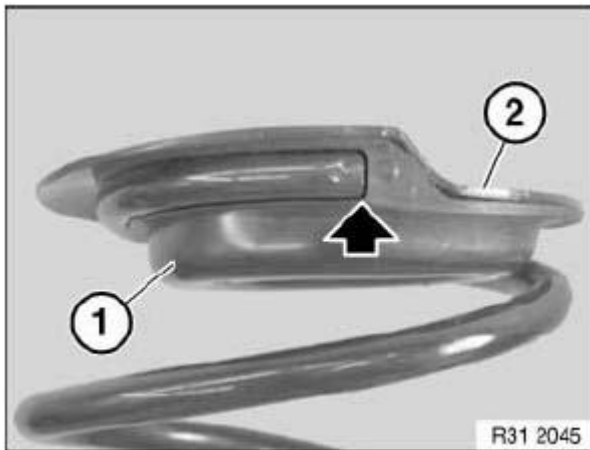


Fig. 68: Identifying Spring Plate And Upper Spring Pad

IMPORTANT: Lower end of coil spring (2) must rest on stop of spring pad (1)!

Relieve tension on coil spring. Check installation position of gaiter, correct fold if necessary.

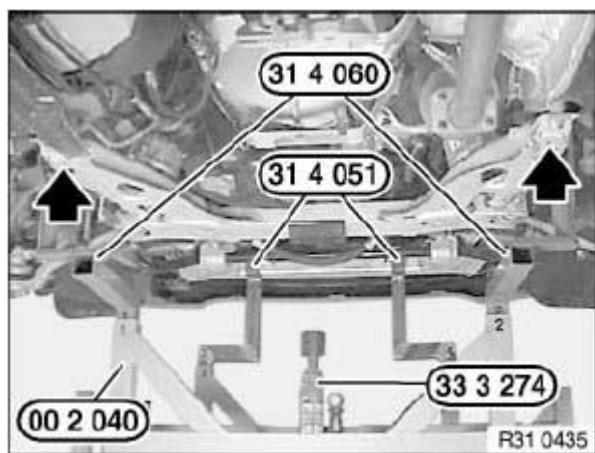


Fig. 69: Identifying Special Tools 31 4 051, 31 4 060, 33 3 274 And 00 2 040

After installation: Carry out wheel alignment check if a spring strut with support bearing was or has been installed without centering pin.

51 71 373 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON SPRING STRUT DOME

**IMPORTANT: Vehicles must not be driven without tension struts.
Driving without tension struts will result in bodywork damage.**

Necessary preliminary tasks:

- Remove lower microfilter housing section on left/right

If necessary, remove cover on spring strut dome on left/right:

- Release expander rivets (1).
- Remove cover (3),
- taking care not to damage retaining lug (2)

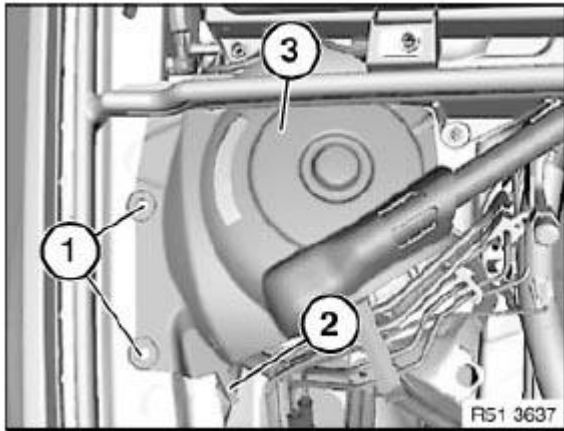


Fig. 70: Identifying Expander Rivets And Retaining Lug
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, remove tension strut panels:

- Release expander rivets on panel (2)
- Remove panel (2) in direction of arrow

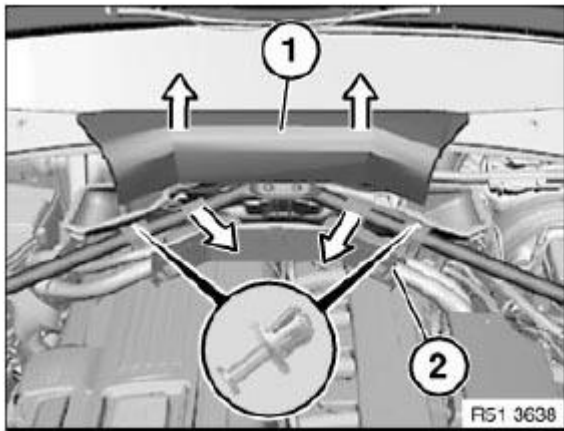


Fig. 71: Identifying Expander Rivets And Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Important - modified screw connection!

Screws must be replaced and - because of the modified surface coating - tightened to increased torque!

Release screws (1).

Remove tension strut (2).

Installation:

Replace screws.

Tightening torque **51 61 1AZ.**

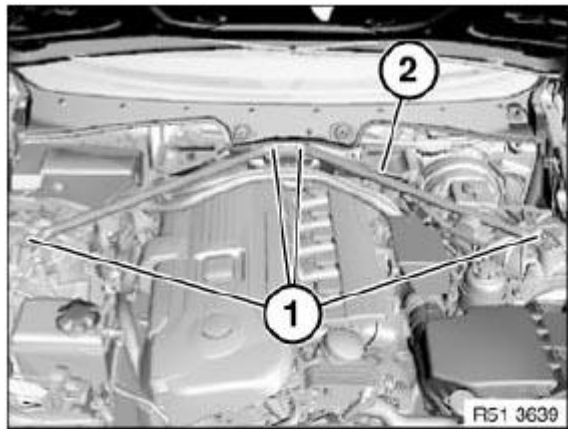


Fig. 72: Identifying Tension Strut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

33 SPRING WITH SUSPENSION

31 33... MEASURING RIDE-LEVEL HEIGHT OF VEHICLE

Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to lower edge of wheel arch (1).

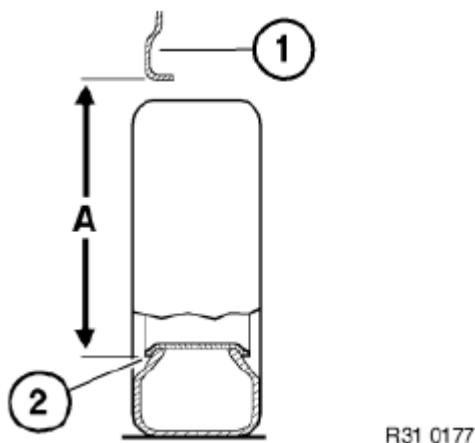


Fig. 73: Identifying Ride-Level Height Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

31 33 001 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SUPPORT BEARING (AWD)

Installation note:

- All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
- Retaining elements on chassis and suspension and steering parts must be replaced.

NOTE: Procedure is described in replacing front left or right spring strut.

Replacement: Vehicle with spacer ring:

NOTE: Spacer ring (A) is fitted in vehicles with "rough road package" version.

Unscrew nuts. Tightening torque **31 31 1AZ** . Remove spacer ring (A) from support bearing.

Installation note: Align spacer ring (A) using centering pin (1) to support bearing and place in position. Replace self-locking nuts.

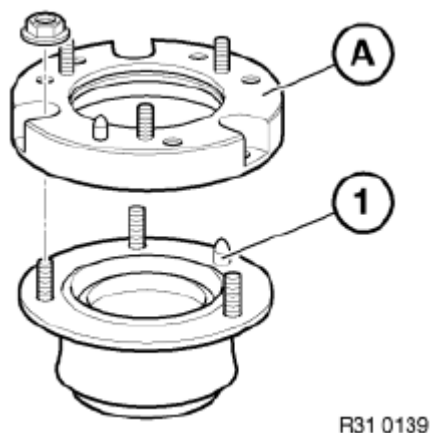


Fig. 74: Identifying Adapter And Centering Pin

If necessary, twist/drive out centering pin (1).

NOTE: If a support bearing (2) was fitted without centering pin (1), the centering pin (1) of the new support bearing (2) must be driven or twisted out.

After installation: If a support bearing is installed without a centering pin, perform a wheel alignment. If a support bearing is installed without a centering pin, perform a wheel alignment.

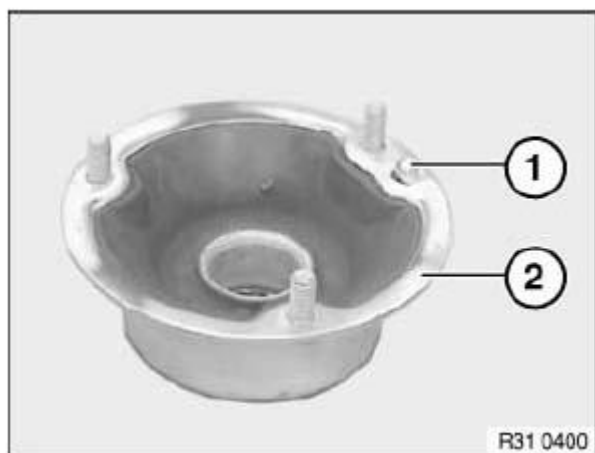


Fig. 75: Identifying Centering Pin And Support Bearing

31 33 095 MEASURING RIDE-LEVEL HEIGHT OF VEHICLE

Necessary preliminary tasks:

- Move vehicle into normal position

Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to lower edge of wheel arch (1).

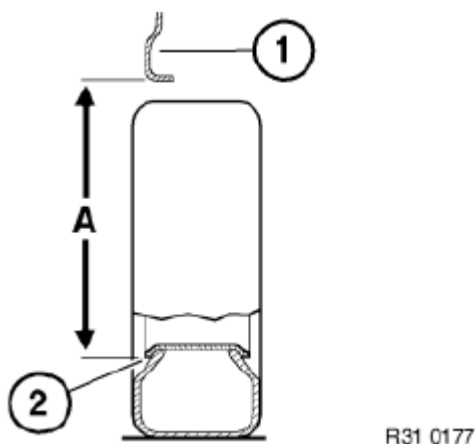


Fig. 76: Identifying Rim Flange Clearance

Courtesy of BMW OF NORTH AMERICA, INC.

31 33 100 REMOVING AND INSTALLING/REPLACING COIL SPRING FOR FRONT LEFT OR FRONT RIGHT SPRING STRUT

Installation note:

- All screws, nuts, bolts and hose clamps removed during the repair must be replaced.

2. Retaining elements on chassis and suspension and steering parts must be replaced.

IMPORTANT: Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!

NOTE: Procedure is described in replacing front left or right spring strut.

35 STABILIZER BAR

31 35 000 REMOVING AND INSTALLING/REPLACING FRONT STABILIZER (AWD)

Necessary preliminary tasks:

- Remove front assembly underside protection
- Remove **stabilizer link** on both sides from stabilizer.

Unscrew nuts (1).

Remove stabilizer (2).

Installation:

Check rubber mount on both sides, replace if necessary.

Replace self-locking nuts.

Tightening torque **31 35 1AZ** .

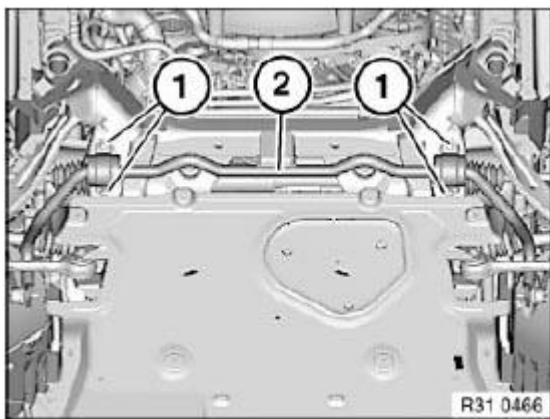


Fig. 77: Identifying Stabilizer And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

Remove rubber mount on both sides from stabilizer.

31 35 005 REMOVING AND INSTALLING/REPLACING PUSH ROD (STABILIZER LINK) FOR LEFT OR RIGHT STABILIZER (AWD)

IMPORTANT: Observe safety instructions on raising the vehicle.

NOTE: Stabilizer links may only be replaced in pairs.

Release nuts (1); if necessary, grip at Torx socket.

Remove stabilizer link (2).

Installation:

Replace self-locking nuts.

Tightening torque **31 35 11AZ**.

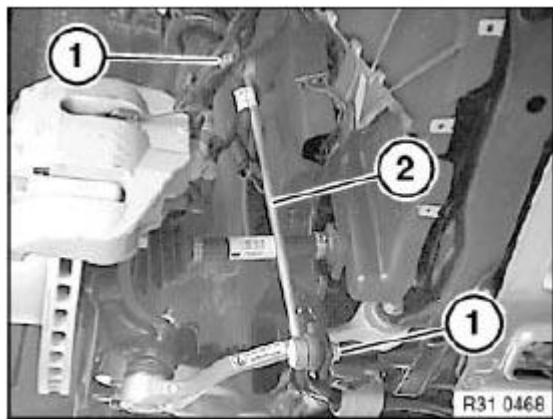


Fig. 78: Identifying Stabilizer Link And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Never tighten the anti-roll bar link with an impact wrench! Do not twist the joint of the anti-roll bar link while tightening the nut! Never twist the joint to hold against the screw connection!

The plastic bond (1) may never be broken as marked with arrows in area (2). If the plastic bond is broken, the anti-roll bar link must be replaced.

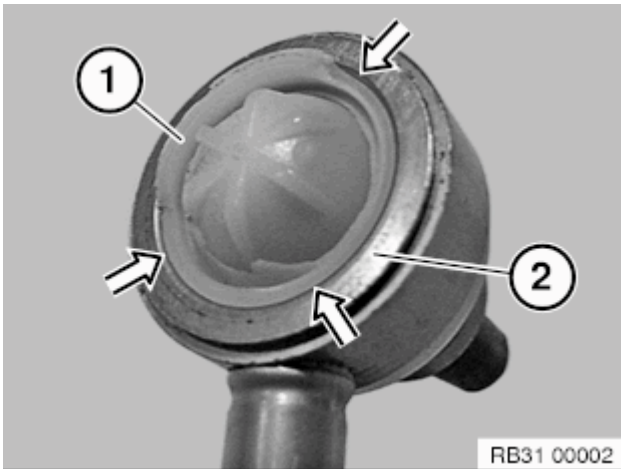


Fig. 79: Ensure Plastic Bond Is Not Broken

31 35 021 REPLACING BOTH RUBBER MOUNTS OF STABILIZER MOUNTING ON FRONT AXLE CARRIER (4WD)

Necessary preliminary tasks:

- Remove **stabilizer** from front axle carrier

Remove retaining bracket (1) and rubber mount (2) on both sides.

Installation:

Keep retaining bracket (1), rubber mount (2) and stabilizer clean and free from oil and grease.

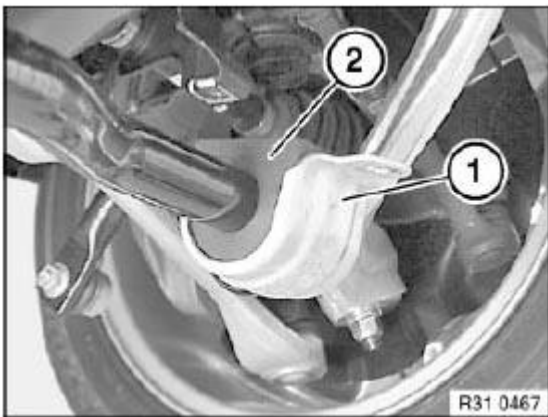
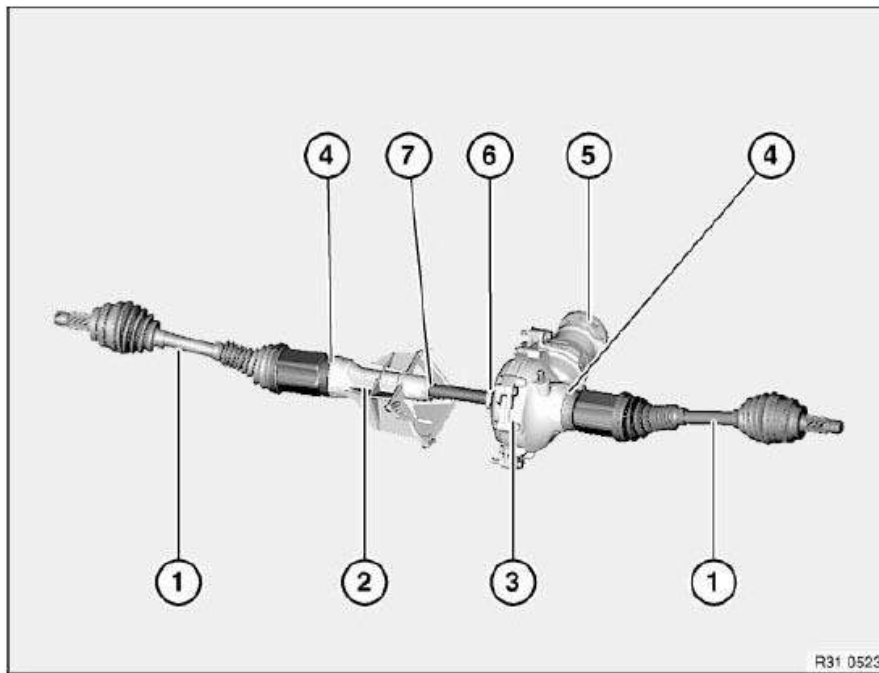


Fig. 80: Identifying Bracket And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

50 FRONT AXLE GEARBOX

31 50... OVERVIEW OF FRONT DIFFERENTIAL/OUTPUT SHAFTS



- | | | | |
|---|---------------------------|---|-----------------------------|
| 1 | Output shaft / gaiters | 5 | Shaft seal (drive flange) |
| 2 | Bearing block | 6 | O-ring (front differential) |
| 3 | Front differential | 7 | O-ring (bearing block) |
| 4 | Shaft seal (output shaft) | | |

Fig. 81: Identifying Front Differential/Output Shafts Components
 Courtesy of BMW OF NORTH AMERICA, INC.

Safety precautions & general information

31 50... CHANGING FRONT DIFFERENTIAL OIL

IMPORTANT: Use only the approved front differential oil in this front differential.
 Failure to comply with this requirement will result in serious damage to the differential!

NOTE: Only change oil when front differential is at normal operating temperature.

Necessary preliminary tasks:

- Remove **reinforcement plate**

Checking/correcting front differential oil level:

Undo oil filler plug (1).

Check front differential oil level.

If necessary, pour in front differential oil up to lower edge of opening for oil filler plug (1).

Installation:

Replace sealing ring.

Tightening torque **31 50 8AZ** .

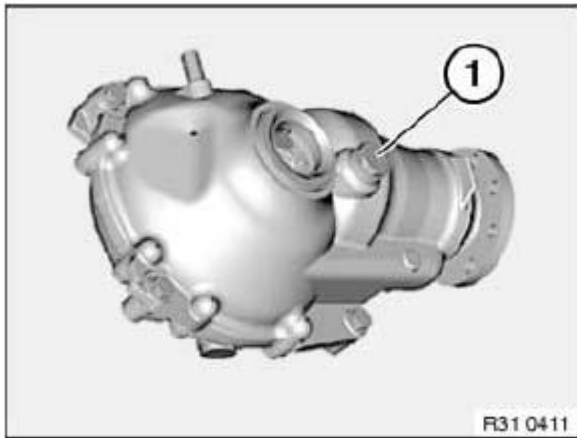


Fig. 82: Identifying Oil Filler Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Changing front differential oil:

Place oil collecting apparatus underneath.

Remove oil drain plug (1).

Drain front differential oil.

Replace sealing ring, screw in oil drain plug (1) and tighten down.

Tightening torque **31 50 8AZ** .

Undo oil filler plug (2).

Pour in front differential oil up to lower edge of opening for oil filler plug (2).

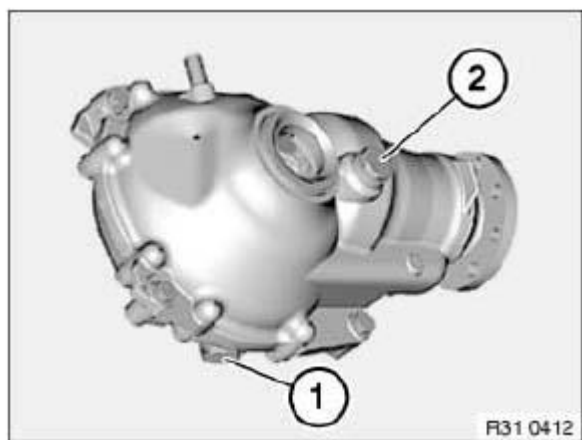


Fig. 83: Identifying Oil Filler Plug And Oil Drain Plug
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring.

Tightening torque **31 50 8AZ** .

31 50 001 REMOVING AND INSTALLING/REPLACING FRONT DIFFERENTIAL

WARNING: Danger to life!

Secure engine in installation position to prevent it from falling down.

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Seal off hydraulic lines with plugs.

Necessary preliminary tasks:

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Secure engine in installation position
- Disconnect pressure line from vane pump
- Disconnect return line from cooling coil
- Drain and dispose of front differential oil
- Remove **left output shaft**
- **Press right output shaft** approx. 6 to 7 cm out of front differential
- Remove propeller shaft from front differential
- Replacement only:
 - Replace front axle output flange on transfer box

NOTE: Replace the output flange to ensure a clean seal on the transfer case.

Lower front axle support

IMPORTANT: Grip front differential firmly while releasing last bolt in order to avoid damage caused by the differential falling.

Version with automatic transmission: If necessary, disconnect hydraulic lines from oil sump.

Release screws (1).

Tightening torque **31 50 7AZ**.

Detach front differential from oil sump and remove towards rear.

Installation:

Replace O-ring if necessary.

Coat O-ring with front differential oil.

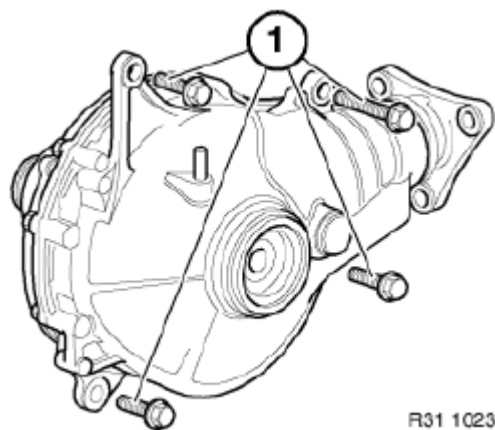


Fig. 84: Identifying Front Differential Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed hydraulic system
- Check pipe connections for leaks
- fill with front differential oil
- Check transfer case oil level, correct if necessary
- Carry out steering angle sensor adjustment

31 51 010 REPLACING RADIAL SEAL FOR DRIVE FLANGE OF FRONT DIFFERENTIAL**Special tools required:**

- 23 0 020
- 31 5 130
- 33 1 150

Necessary preliminary tasks:

- Remove **reinforcement plate**
- Remove front propeller shaft

Mark position of nut with respect to shaft with punch marks (arrow).

Lever out lockplate (1) with a suitable tool.

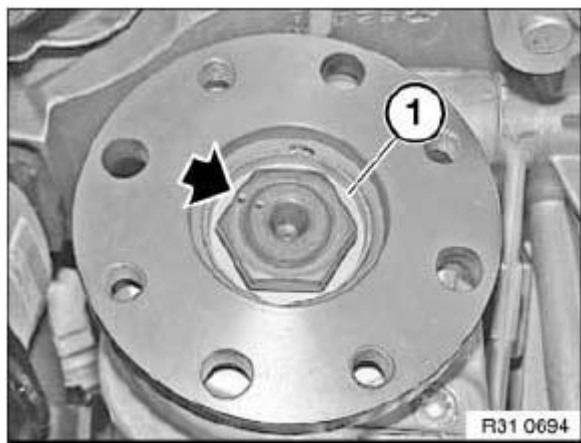


Fig. 85: Locating Lockplate

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Do not place special tool on threaded holes of drive flange.

Secure drive flange with special tool 23 0 020 against turning and release nut (1).

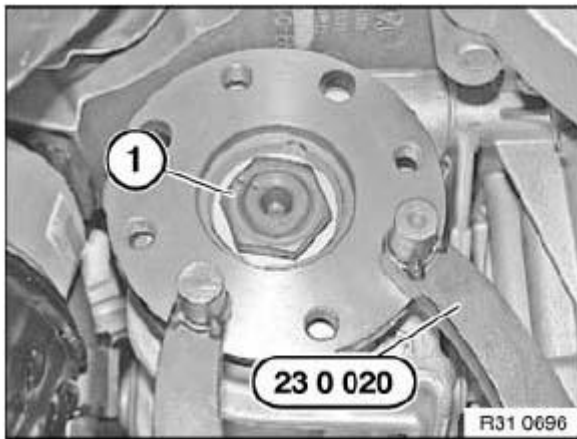


Fig. 86: Identifying Special Tool (23 0 020)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Mount special tool only with longer screws (M10x30) on drive flange.

Pull drive flange off drive shaft with special tool 33 1 150.

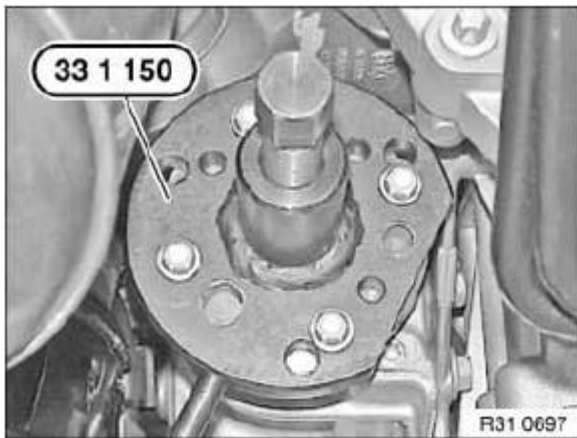


Fig. 87: Identifying Special Tool (33 1 150)

Courtesy of BMW OF NORTH AMERICA, INC.

Lever shaft seal (1) out of front differential with a suitable screwdriver (2).

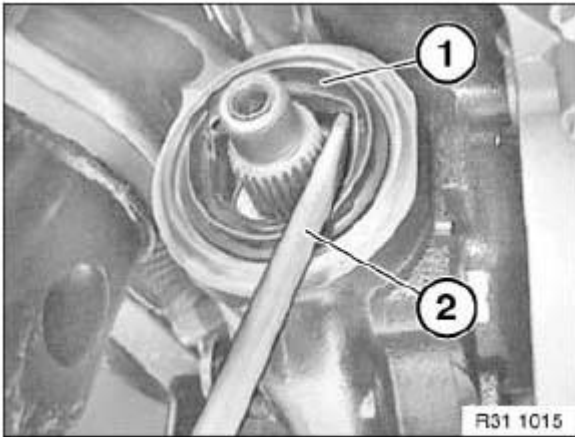


Fig. 88: Identifying Lever Shaft Seal And Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive in shaft seal with special tool 31 5 130 as far as it will go.

Coat sealing lips of new shaft seal (1) with front differential oil.

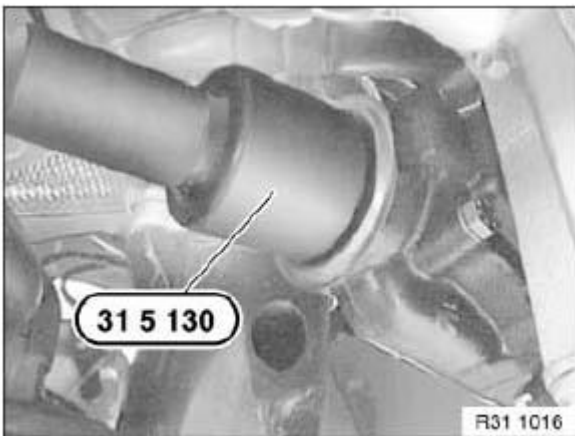


Fig. 89: Identifying Special Tool (31 5 130)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Do not tighten nut beyond punch marks. Otherwise the clamping sleeve will be damaged.

Clean drive flange and attach.

Tighten down nut until punch marks on nut and shaft are aligned.

Install new lockplate (1).

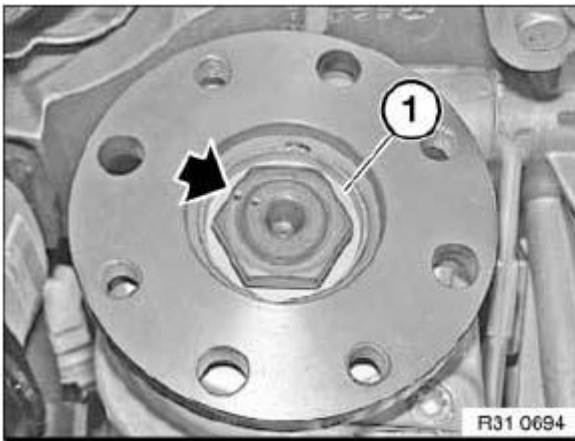


Fig. 90: Locating Lockplate

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check front differential oil level, correct if necessary

31 51 015 REPLACING SHAFT SEAL FOR LEFT OUTPUT SHAFT

Special tools required:

- 31 5 130

Necessary preliminary tasks:

- Remove **left output shaft**

Lever shaft seal (1) with a screwdriver (2) out of front differential (3).

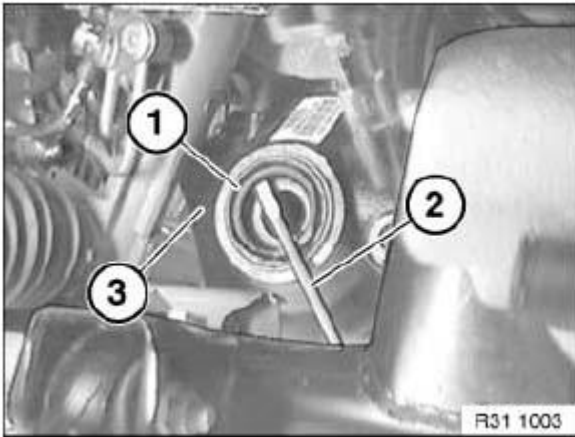


Fig. 91: Identifying Lever Shaft Seal And Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Protective sleeve (2) serves to protect the sealing lips of shaft seal (1) from being damaged when the output shaft is inserted into the front differential.



Fig. 92: Identifying Protective Sleeve And Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive in shaft seal with special tool 31 5 130 as far as it will go.

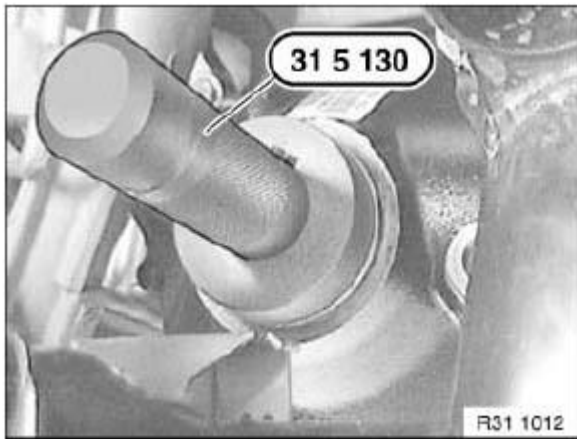


Fig. 93: Identifying Special Tool (31 5 130)

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check front differential oil level, correct if necessary

31 51 060 REPLACING O-RING FOR FRONT DIFFERENTIAL ON RIGHT

Necessary preliminary tasks:

- Remove **front differential**

Remove O-ring (1) with a suitable tool from front differential.

Installation:

Insert O-ring (1) in groove and coat with front differential oil.

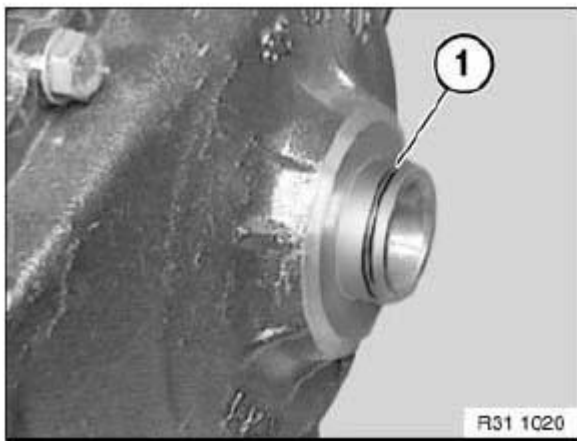


Fig. 94: Identifying O-Ring

Courtesy of BMW OF NORTH AMERICA, INC.

53 DIFFERENTIAL WITH BEARINGS

31 51 020 REPLACING SHAFT SEAL FOR RIGHT OUTPUT SHAFT

Special tools required:

- 31 5 130

Necessary preliminary tasks:

- Remove right output shaft

Lever shaft seal (1) with a screwdriver (2) out of bearing block (3).

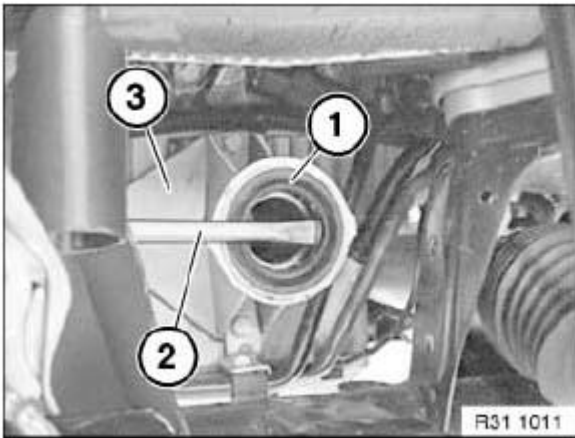


Fig. 95: Identifying Shaft Seal, Screwdriver And Bearing Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Protective sleeve (2) serves to protect the sealing lips of shaft seal (1) from being damaged when the output shaft is inserted into the bearing block.

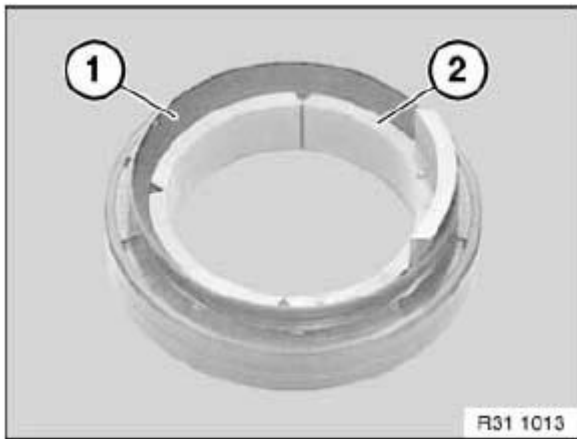


Fig. 96: Identifying Protective Sleeve And Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive in shaft seal with special tool 31 5 130 as far as it will go.

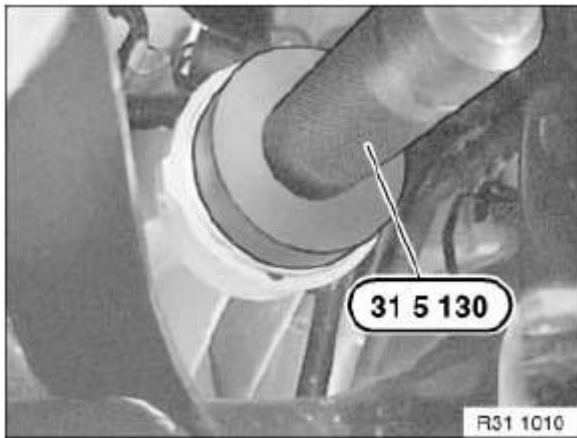


Fig. 97: Identifying Special Tool (31 5 130)
Courtesy of BMW OF NORTH AMERICA, INC.

31 51 065 REPLACING O-RING FOR BEARING BLOCK

Necessary preliminary tasks:

- Remove **bearing block**

Remove O-ring (1) with a suitable tool from bearing block (2).

Installation:

Insert O-ring (1) in groove and coat with front differential oil.

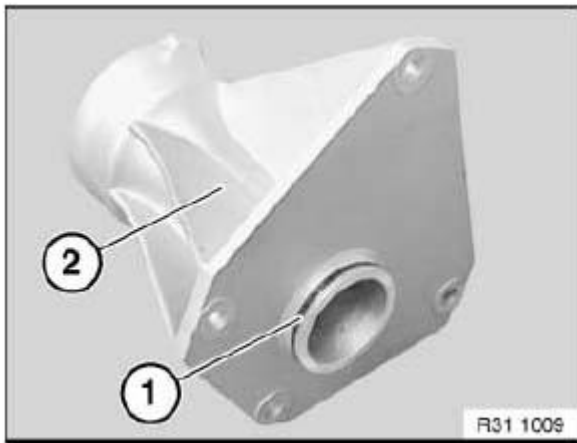


Fig. 98: Identifying O-Ring And Bearing Block
Courtesy of BMW OF NORTH AMERICA, INC.

31 53 040 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT BEARING BLOCK

Necessary preliminary tasks:

- Remove **right output shaft**

Release grounding strap on bearing block.

Unfasten screws.

Remove bearing block (1) from oil sump.

Installation:

Replace O-ring

Tightening torque **31 60 1AZ** .

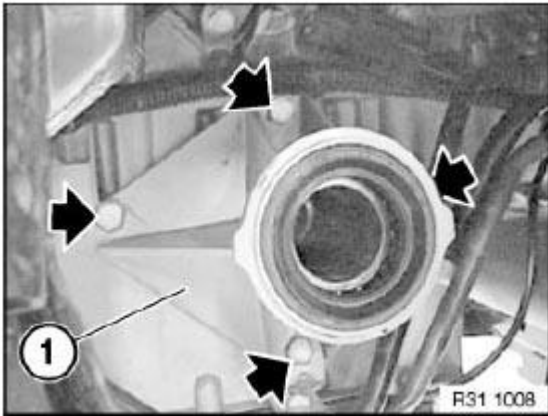


Fig. 99: Locating Bearing Block

Courtesy of BMW OF NORTH AMERICA, INC.

60 OUTPUT SHAFT

31 51 015 REPLACING SHAFT SEAL FOR LEFT OUTPUT SHAFT

Special tools required:

- 31 5 130

Necessary preliminary tasks:

- Remove left output shaft

Lever shaft seal (1) with a screwdriver (2) out of front differential (3).

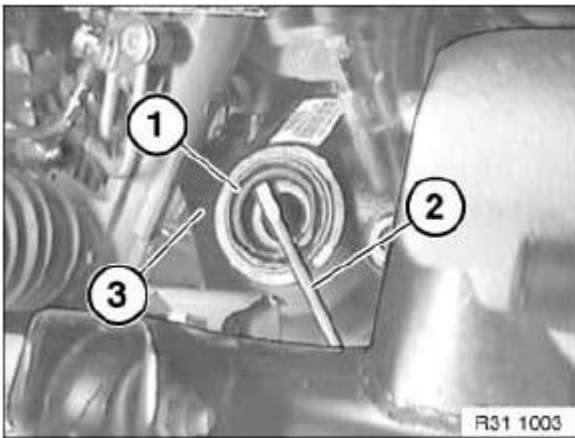


Fig. 100: Identifying Lever Shaft Seal And Screwdriver

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Protective sleeve (2) serves to protect the sealing lips of shaft seal (1) from being damaged when the output shaft is inserted into the front differential.

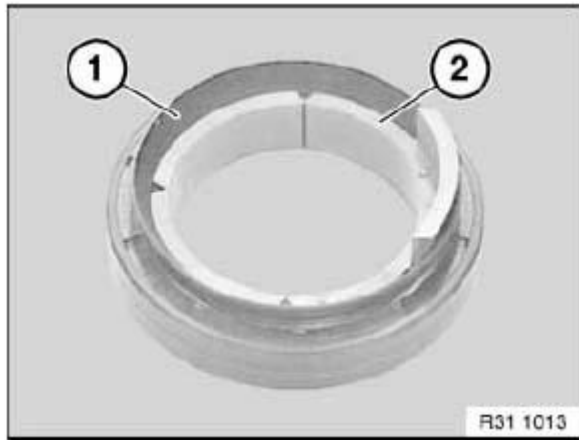


Fig. 101: Identifying Protective Sleeve And Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive in shaft seal with special tool 31 5 130 as far as it will go.

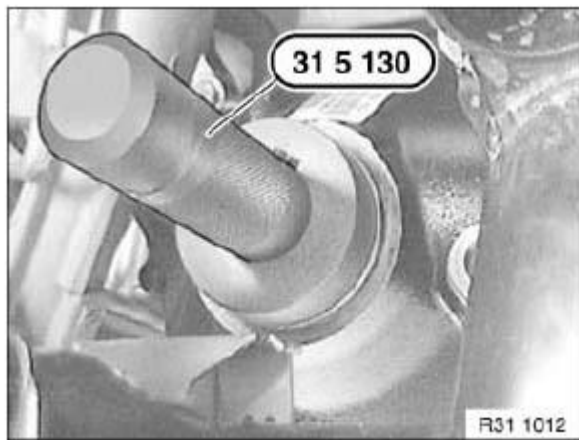


Fig. 102: Identifying Special Tool (31 5 130)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check front differential oil level, correct if necessary

31 51 020 REPLACING SHAFT SEAL FOR RIGHT OUTPUT SHAFT

Special tools required:

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31 5 130

Necessary preliminary tasks:

- Remove **right output shaft**

Lever shaft seal (1) with a screwdriver (2) out of bearing block (3).

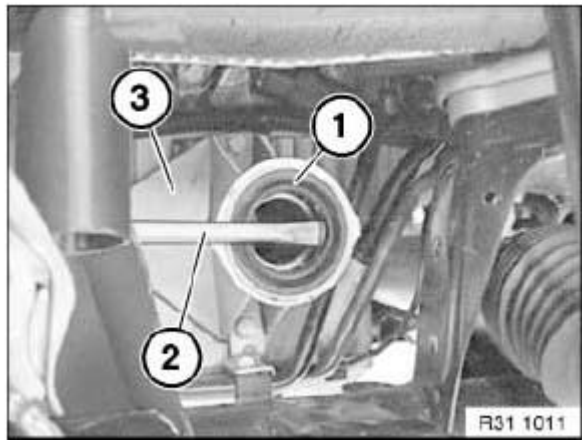


Fig. 103: Identifying Shaft Seal, Screwdriver And Bearing Block

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Protective sleeve (2) serves to protect the sealing lips of shaft seal (1) from being damaged when the output shaft is inserted into the bearing block.

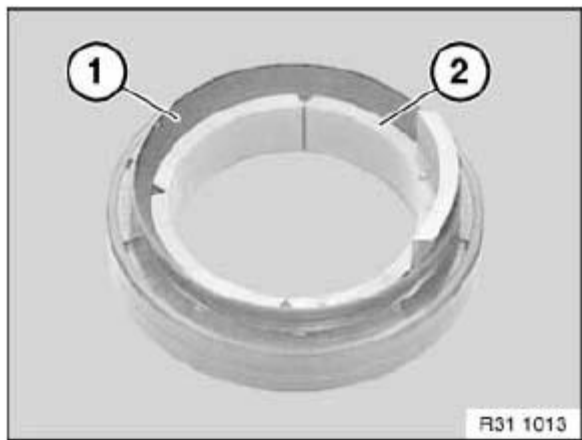


Fig. 104: Identifying Protective Sleeve And Shaft Seal

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive in shaft seal with special tool 31 5 130 as far as it will go.

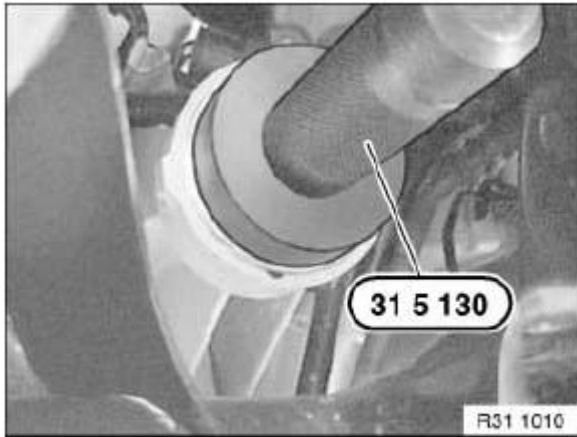


Fig. 105: Identifying Special Tool (31 5 130)

Courtesy of BMW OF NORTH AMERICA, INC.

31 60... NOTES ON REMOVING AND INSTALLING LOW PROFILE BAND CLAMPS

Special tools required:

- 31 5 200

IMPORTANT: During removal Low Profile band clamp (dotted line) is overstretched and must not be reused!



Fig. 106: Identifying Low Profile Band Clamp

Courtesy of BMW OF NORTH AMERICA, INC.

Removing:

Place special tool 31 5 200 on lugs (1, 2).

NOTE: Make sure that the movable piece (3) of the special tool is placed on lug (1).

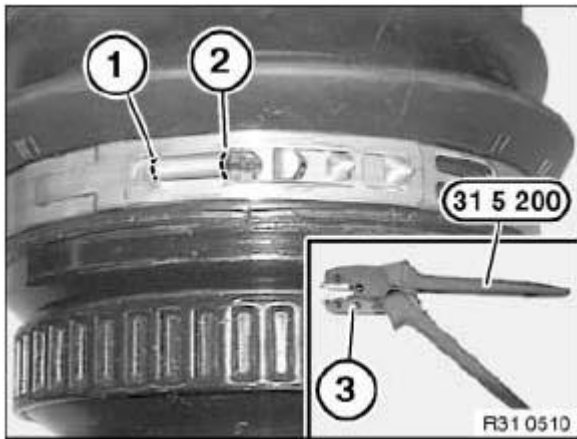


Fig. 107: Identifying Special Tool (31 5 200)

Courtesy of BMW OF NORTH AMERICA, INC.

Compress Low Profile band clamp with special tool 31 5 200 until end of band clamp (1) lifts up.

Relieve tension on special tool and remove Low Profile band clamp.

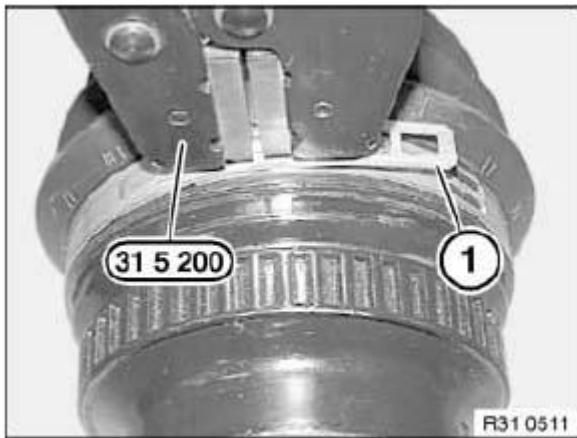


Fig. 108: Identifying Special Tool (31 5 200)

Courtesy of BMW OF NORTH AMERICA, INC.

Assembly:

Position Low Profile band clamp in installation position (A) on gaiter.

Place special tool 31 5 200 on lugs (1, 2).

NOTE: Make sure that the movable piece (3) of the special tool is placed on lug (1).

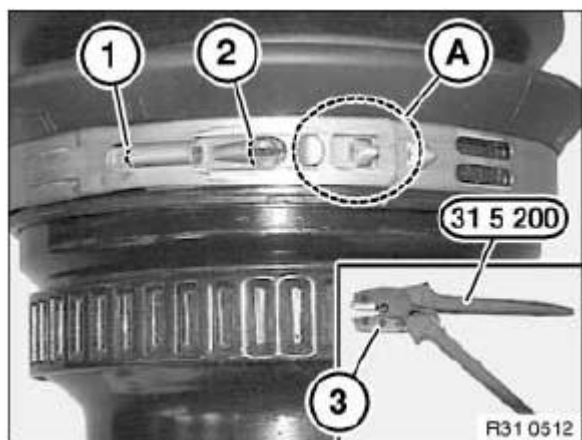


Fig. 109: Identifying Special Tool (31 5 200)

Courtesy of BMW OF NORTH AMERICA, INC.

Check and if necessary correct positions of gaiter and Low Profile band clamp.

Compress Low Profile band clamp with special tool 31 5 200 and press on end of band clamp (1).

Relieve tension on special tool and remove.

Check hook fastener (H); if necessary, repeat operation with new Low Profile band clamp.

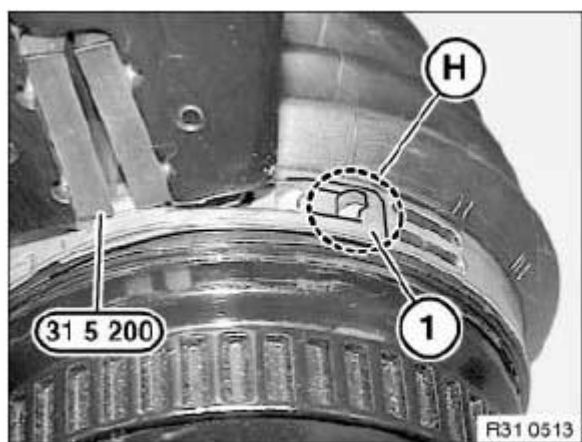


Fig. 110: Identifying Special Tool (31 5 200)

Courtesy of BMW OF NORTH AMERICA, INC.

31 60... PRESS RIGHT OUTPUT SHAFT APPROX. 6 TO 7 CM OUT OF FRONT DIFFERENTIAL

Special tools required:

31 5 110

Necessary preliminary tasks:

- Remove tie rod end from swivel bearing
- Remove **tension strut** from guide joint
- Remove **control arm from swivel bearing**

Press output shaft with special tool 31 5 110 out of front differential.

Insert spacer between bearing block and output shaft and secure with adhesive tape.

Installation:

Push output shaft over resistance of snap ring. Output shaft must snap audibly into place.

**IMPORTANT: High installation forces indicate that the spline teeth on the output shaft/rear differential side gear are damaged/deformed!
Check spline teeth, replaced damaged parts.**

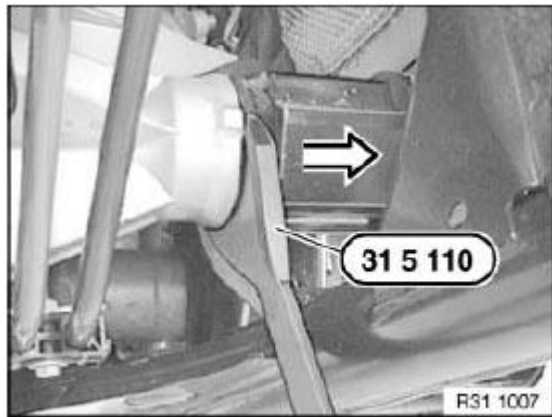


Fig. 111: Identifying Special Tool (31 5 110)

Courtesy of BMW OF NORTH AMERICA, INC.

31 60... PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE (WHEEL HUB) AND DRAWING IN

Special tools required:

- 33 2 111
- 33 2 115
- 33 2 116
- 33 2 117
- 33 2 118
- 33 2 160
- 33 2 201

- 33 2 202
- 33 2 203
- 33 2 205
- 33 2 207
- 33 2 208
- 33 5 070

WARNING: Risk of injury!

It is not permitted to use the impact screwdriver to press out and draw in the output shaft.

IMPORTANT: Risk of damage!

To avoid damaging the output shaft and adjoining parts, it is essential during the pressing-out process to repeatedly check and if necessary correct the position of the output shaft.

IMPORTANT: To avoid damaging the dust sleeve, use special tool 33 2 160 to press out and draw in the output shaft after removing the brake disk.

NOTE: Rounded inside edge of special tool 33 2 160 must point to drive flange.

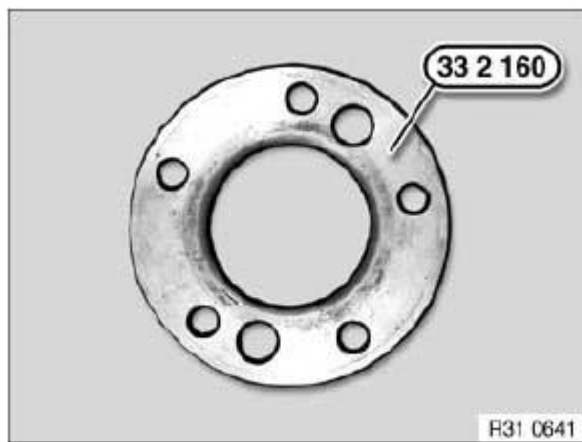


Fig. 112: Identifying Special Tool (33 2 160)

Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 200:

Screw on special tool 33 2 203, 33 2 207 and 33 2 201 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070.

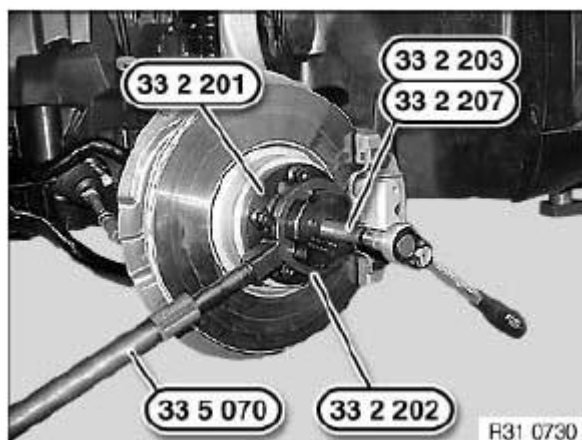


Fig. 113: Identifying Special Tool (33 2 203), (33 2 207) And (33 2 201)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 205 onto output shaft.

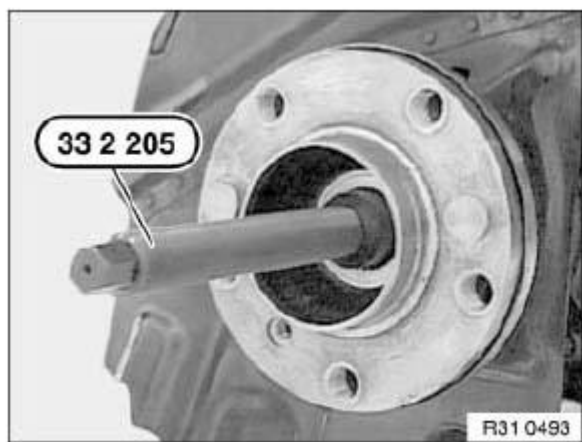


Fig. 114: Identifying Special Tool (33 2 205)
 Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 201 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 208 up to stop; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070.

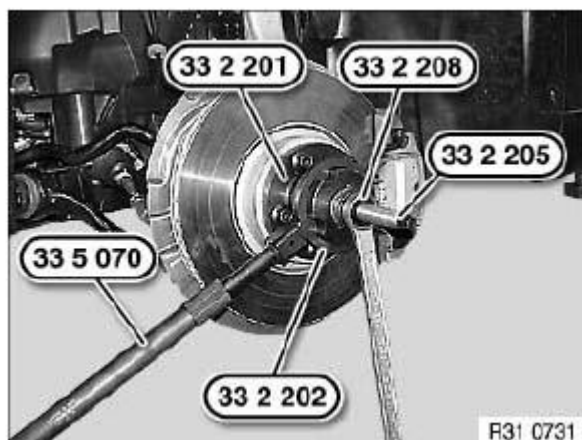


Fig. 115: Identifying Special Tool (33 2 203), (33 2 207) And (33 2 201)
 Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 100:

Screw on special tool 33 2 111, 33 2 117 and 33 2 116 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070.

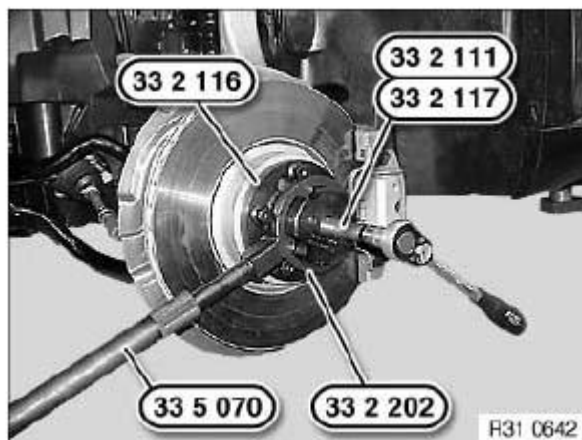


Fig. 116: Identifying Special Tool (33 2 203), (33 2 207) And (33 2 201)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 118 onto output shaft.

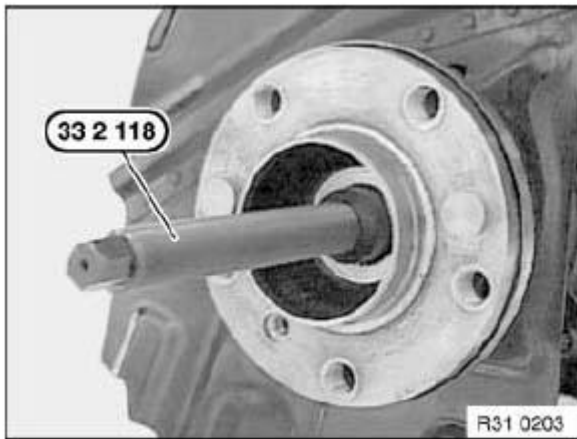


Fig. 117: Identifying Special Tool (33 2 118)

Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 116 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 115 up to stop; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070.

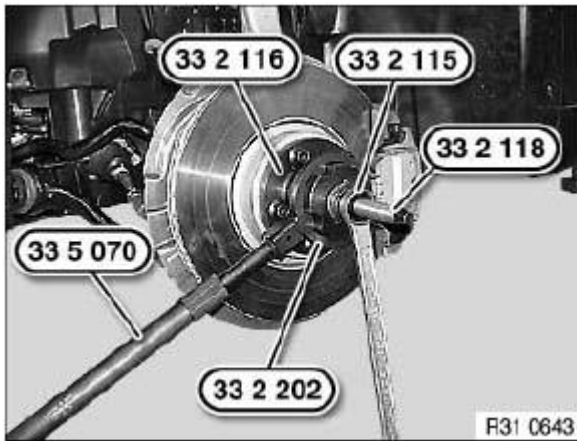


Fig. 118: Identifying Special Tool (33 2 116), (33 2 202) And (33 5 070)

Courtesy of BMW OF NORTH AMERICA, INC.

31 60 000 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT OUTPUT SHAFT

Special tools required:

- 31 5 110

IMPORTANT: Risk of damage!

Do not drive output shaft out of drive flange with an impact tool.

Remove front wheel.

Release collar nut; to do so, press brake pedal to floor.

Installation:

Replace collar nut, apply a light coating of oil to contact surface and tighten down.

Tightening torque **31 21 2AZ** .

Secure collar nut by peening on flat areas of output shaft.

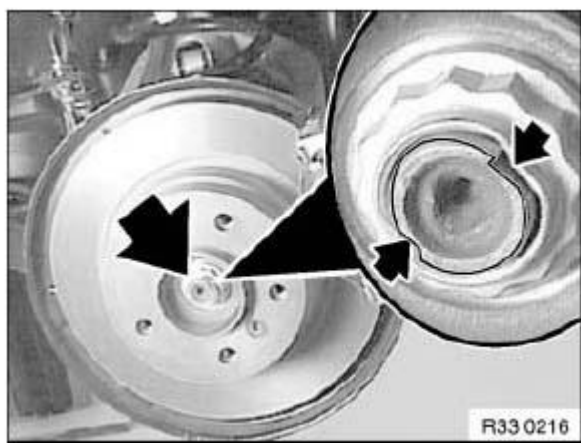


Fig. 119: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove **reinforcement plate**.

Remove steering gear cover at side.

Remove tie rod end from swivel bearing.

Remove **tension strut** from guide joint.

Remove **control arm from swivel bearing**.

Remove **stabilizer** link from spring strut.

Turn swivel bearing to one side.

Press **output shaft** out of drive flange and tie up.

Press output shaft with special tool 31 5 110 out of front differential/bearing block and remove.

Installation:

Replace shaft seal in front differential/bearing block and coat sealing lips with front differential oil.

Replace retaining ring and slide in output shaft over resistance of retaining ring. Output shaft must snap audibly into place.

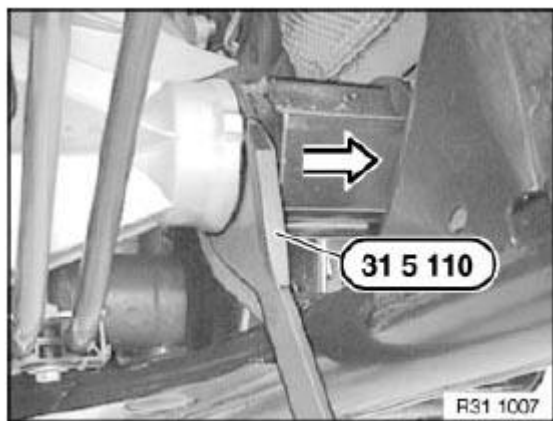


Fig. 120: Identifying Special Tool (31 5 110)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: High installation forces indicate that the spline teeth on the output shaft/rear differential side gear are damaged/deformed!
Check spline teeth, replaced damaged parts.

After installation:

- Check front differential oil level, correct if necessary

31 60 530 REPLACING AN OUTPUT SHAFT GAITER (ON TRANSMISSION SIDE) (OUTPUT SHAFT REMOVED)

NOTE: Procedure is described in both output shaft gaiters.

31 60 535 REPLACING BOTH GAITERS ON LEFT AND RIGHT OF OUTPUT SHAFT (OUTPUT SHAFT REMOVED)

Grip output shaft (1) in vice with aluminum clamping jaws.

NOTE: 2 = Joint, wheel side
3 = Joint, transmission side

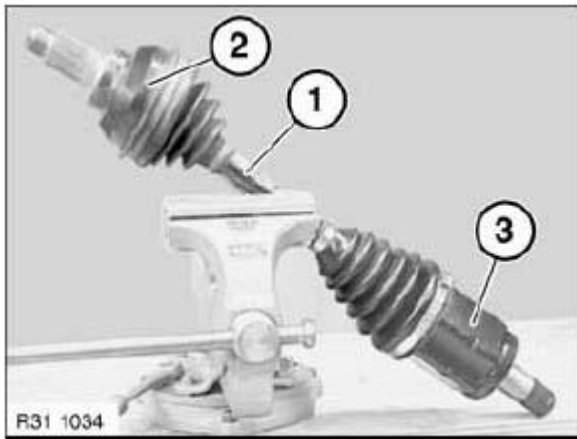


Fig. 121: Identifying Output Shaft And Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing gaiter of wheel-side joint:

Release **Low Profile band** clamp (1) and band clamp (2).

Pull back rubber gaiter (3).

Installation:

Feed gaiter (3) into groove of joint.

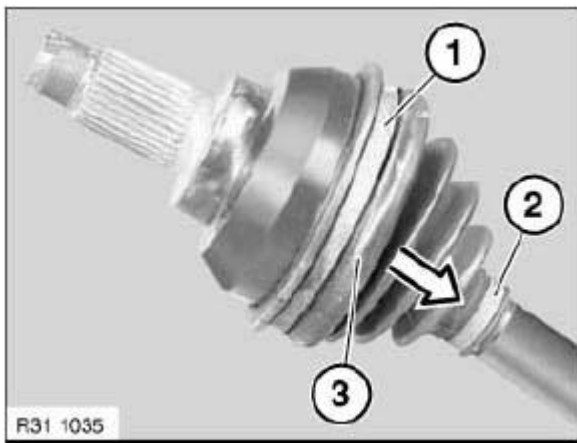


Fig. 122: Identifying Gaiter And Rubber Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Press off joint (1) via contact pressure of retaining ring on shaft (2).

Installation:

Push on joint until retaining ring can be heard to snap into place.

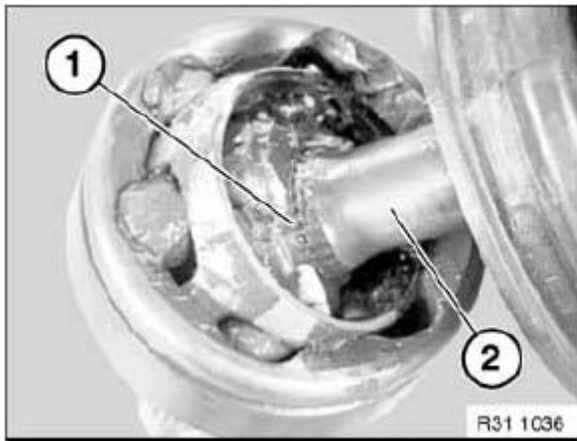


Fig. 123: Identifying Joint And Retaining Ring On Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out retaining ring (1).

Installation:

Replace retaining ring (1).

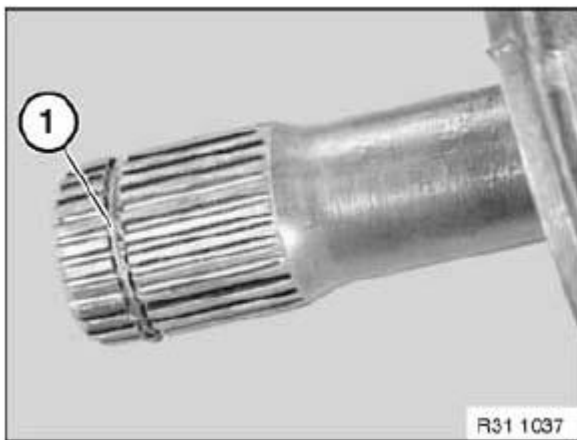


Fig. 124: Identifying Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off gaiter (1) over shaft (2).

Carefully clean all parts with a cloth.

NOTE: Regrease constant-velocity joint with the grease from the repair kit.

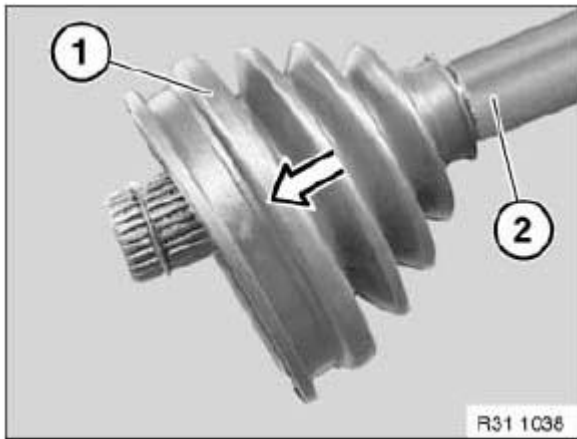


Fig. 125: Identifying Gaiter And Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing gaiter of transmission-side joint:

Release band clamps (1, 2).

Pull back rubber gaiter (3).

Detach tulip element (4).

Installation:

Feed gaiter (3) into groove of tulip element (4).

Align band clamp (1) so that hook fastener is as at flat end of tulip element (4).

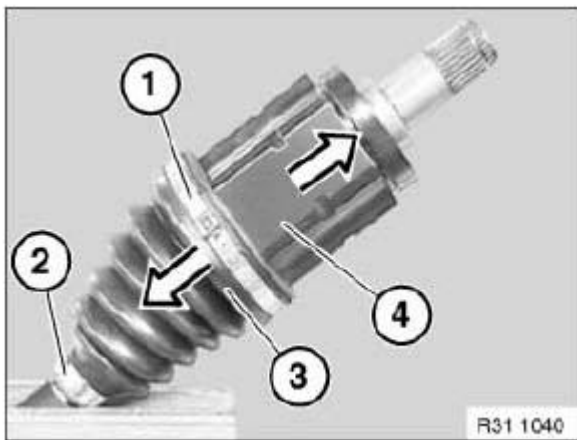


Fig. 126: Identifying Band Clamps, Rubber Gaiter And Element
Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining ring (1).

Installation:

Replace retaining ring (1).

Detach tripod element (2) from shaft (3).

Pull off gaiter over shaft (3).

Carefully clean all parts with a cloth.

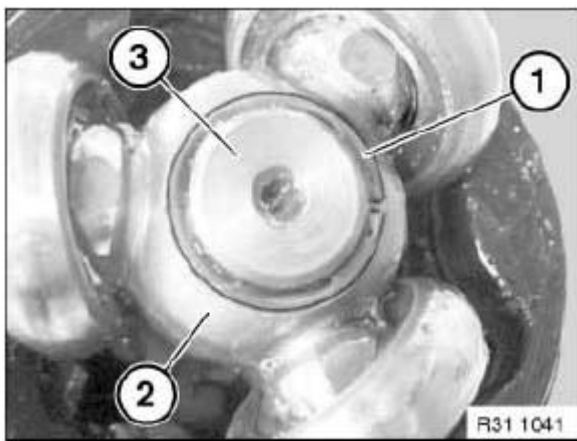


Fig. 127: Identifying Retaining Ring And Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Flat side (2) of tripod element (1) must point to retaining ring.

NOTE: Regrease constant-velocity joint (tripod element) with the grease from the repair kit.

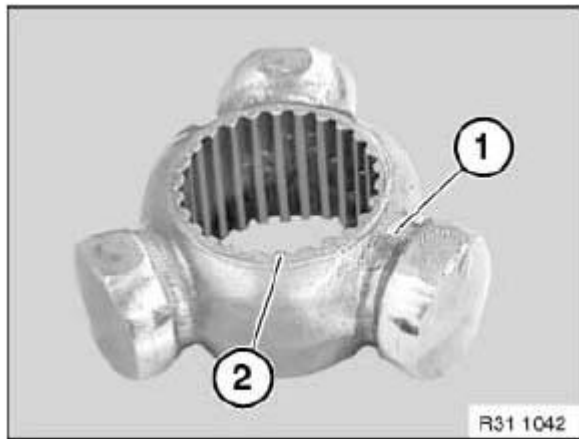


Fig. 128: Identifying Flat Side And Tripod Element
Courtesy of BMW OF NORTH AMERICA, INC.

90 TROUBLESHOOTING

31 90... TROUBLESHOOTING ON FRONT AXLE (AWD)

Follow troubleshooting for steering/shock absorbers.

TROUBLESHOOTING CHART

Fault	Cause	Remedy
Grinding noise (louder when negotiating bends)	Wheel bearings faulty	Replace wheel bearings
Vibration	Wheel imbalance	Balance wheels
	Radial/lateral rim runout	Check rims, replace if necessary
	Radial tire runout	Match or replace tires
Steering-wheel shake	Wheel imbalance	Balance wheels
	Radial/lateral rim runout	Check rims, replace if necessary
	Rubber mount of control arm faulty	Replace control arms
	Ball joint in control arm worn	Replace control arms
	Rubber mount of tension strut faulty	Replace rubber mounts on both tension struts
	Guide joint worn	Replace guide joint
Excessive steering wheel play/steering wheel inclination	Rubber mount of control arm faulty	Replace control arms
	Ball joint in control arm worn	Replace control arms
	Rubber mount of tension strut faulty	Replace rubber mounts on both tension struts
	Guide joint worn	Replace guide joint
Rattling noise	Bolts for reinforcement plate	Tighten down bolts (refer to

	loose	<u>REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE)</u>
	Bolts for front axle carrier to engine carrier loose	Replace bolts (refer to <u>LOWERING FRONT AXLE CARRIER)</u>
	Bolt for spring strut to swivel bearing loose	Replace bolt & nut (refer to <u>REMOVING AND INSTALLING FRONT SPRING STRUT)</u>
	Ball joint in control arm worn	Replace control arms
	Guide joint worn	Replace guide joint
	Rubber mounts for stabilizer bar bracket faulty	Replace both rubber mounts of stabilizer bar bracket
	Ball joints on stabilizer link(s) worn	Replace both stabilizer links
Excessive tire wear	Front or rear axle alignment incorrectly adjusted	Check suspension components for damage; if necessary, carry out chassis/wheel alignment check

31 90... TROUBLESHOOTING SHOCK ABSORBER

Read and comply with Information on replacing shock absorbers.

TROUBLESHOOTING CHART

Fault	Cause	Remedy
Shock absorber knocking (bottoming)	Rubber damper faulty	Visually inspect auxiliary spring for cracking, replace auxiliary spring
	Shock absorber leaking (oil/gas)	Replace shock absorber
Rattling noise	Shock absorber mounting loose	Tighten shock absorber
	Support bearing faulty/hardened	Replace support bearing
	Shock absorber leaking (oil/gas)	Replace shock absorber
Worn down areas (flattened areas) on tire profile	Shock absorber leaking (oil/gas)	Replace shock absorber
Long after-swinging of body after driving over rough road	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Building-up of body in case of successive uneven surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Wheels jumping even on normal road surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Whistling noises	Separating skin in vent holes of auxiliary spring	Remove separating skin

ENGINE**Fuel supply system - Repair Instructions****DRAWING OFF OF FUEL, SYSTEM CLEANING****16 00 GENERAL FUNCTION DESCRIPTION FOR FUEL SUPPLY SYSTEMS****Fuel supply systems, spark-ignition engines****Fuel system**

The electric fuel pump in the fuel tank generates the pressure in the fuel system which is set by the pressure regulator to a specific level.

Tank venting system

The tank venting system is an enclosed system which is vented via a carbon canister. The carbon is incorporated in the carbon canister as granulate. The large surface of the carbon stores the fuel vapors which occur in the fuel tank. The carbon canister must be regenerated on a regular basis so as to be able to continue storing fuel vapors. Regeneration is performed by way of purging with fresh air via the intake manifold. This process is controlled by the engine control unit.

16 00 005 DRAINING AND FILLING FUEL TANK**Special tools required:**

- 13 5 460
- 16 1 080

IMPORTANT: Observe country-specific safety regulations.

Ensure adequate ventilation in the place of work!

Connect the exhaust and extraction systems to the exhaust tailpipe.

The electric fuel pump must not operate without fuel! After completing repairs but before starting the engine for the first time, fill the fuel tank with min. 5 l fuel through the fuel filler pipe.

Do not damage non-return flap when pulling out extraction hose.

Drawing off fuel:

Start engine and allow to run.

IMPORTANT: Once fuel has been drawn off through the fuel filler pipe, there are still residual amounts in the fuel tank, in the fuel filter and in the fuel pump surge chamber.

NOTE: **The electric fuel pump runs.**

In this way, the fuel is repumped through the suction jet pump and the tank expansion line from the left to the right side of the fuel tank.

Fuel can be drawn out of the left and right sides of the tank through the filler neck, leaving only a small residual amount.

This residual amount in the fuel tank is drawn off after removal of the sensors for the fuel gauge (right/left).

Insert special tool **16 1 080** into filler neck.

Special tool **16 1 080** has two different diameters for gasoline and diesel vehicles!

Slide extraction hose of extractor unit through special tool **16 1 080** into the fuel filler pipe, turning in the process if necessary.

Draw off fuel as much as possible with extractor unit .

Follow drawing off of fuel on fuel gauge in instrument cluster.

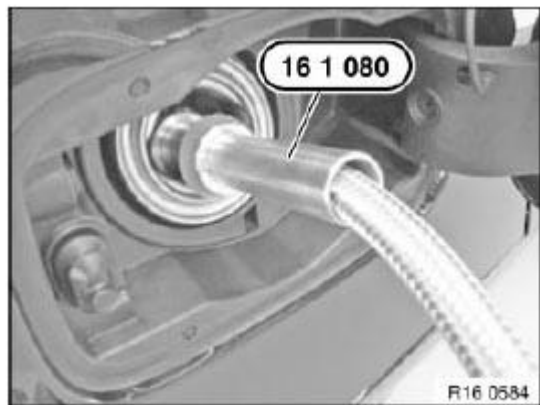


Fig. 1: Inserting Special Tool 16 1 080 Into Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

Draining fuel filter and surge chamber:

Connect special tool **13 5 460** to connection of fuel filter (1).

Connect special tool to extractor unit.

Draw off remaining fuel from filter and surge chamber.

NOTE: **A small amount of fuel still remains in the fuel tank.**

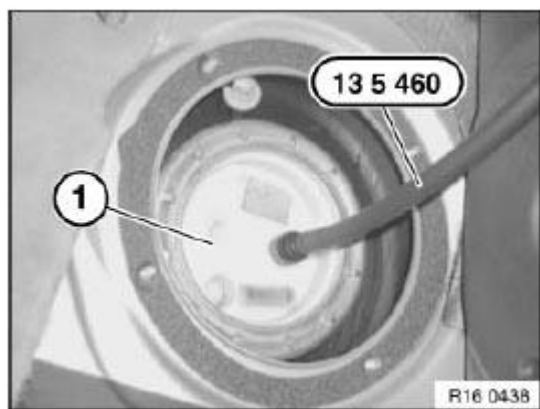


Fig. 2: Identifying Fuel Filter With Special Tool 13 5 460

Courtesy of BMW OF NORTH AMERICA, INC.

Drawing off residual fuel amount from fuel tank:

Drawing off residual fuel amount is not included in the time value of this operation.

IMPORTANT: Ensure car interior is adequately ventilated.

Catch dripping fuel in a suitable container.

Fuel gauge must roughly indicate zero before the left tank opening is opened.

If the suction jet pump is faulty, the fuel level in the left tank half may be above the service opening!

Large quantities of fuel may emerge on opening!

In this event, keep left tank half closed and feed extraction hose through right service opening to left tank half.

REMOVE FUEL GAUGE SENSOR (RIGHT).

REMOVE FUEL GAUGE SENSOR (LEFT).

Draw off residual fuel quantity through installation openings.

Fuel filling:

Insert special tool **16 1 080** into filler neck.

Special tool **16 1 080** has two different diameters for gasoline and diesel vehicles!

Slide extraction hose of extractor unit approx. 40 cm into fuel filler pipe.

Fill fuel from suction extractor unit.

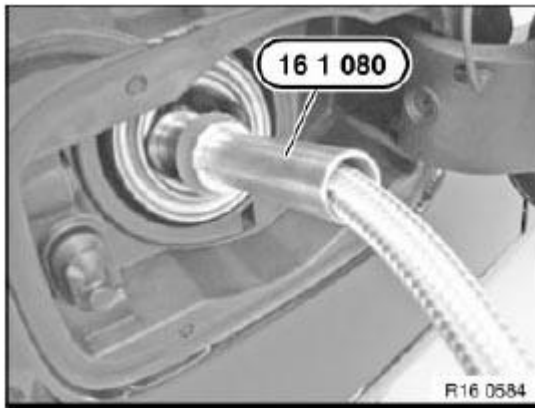


Fig. 3: Inserting Special Tool 16 1 080 Into Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

Drawing off after fault in suction jet pump:

Draw off right half of tank completely through fuel filler pipe.

Drain surge chamber and fuel filter.

REMOVE SENSOR FOR FUEL GAUGE (LEFT).

Insert extraction hose through sensor opening in tank, fuel (also residual quantity) can be drawn off.

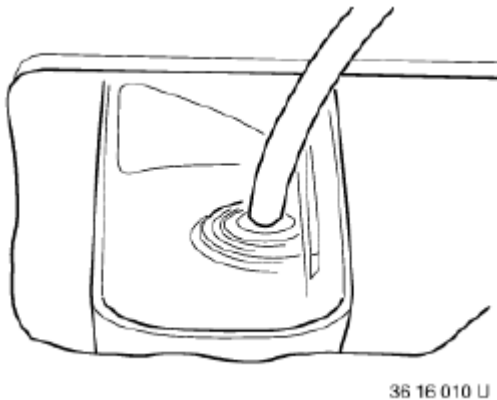


Fig. 4: Identifying Fuel Filler Pipe In Tank
Courtesy of BMW OF NORTH AMERICA, INC.

16 00 100 CHECKING FUEL TANK AND TANK VENTILATION SYSTEM FOR LEAKS

Special tools required:

- **13 3 010**
- **16 1 170**

· 16 1 171

· 16 1 174

NOTE: The following procedure is only applicable to vehicles without the tank leak diagnosis module.
Check tank venting system if a leak is suspected.

Comply with the following conditions in order to obtain plausible test results:

- Content of fuel tank:
 1. Maximum 90 %
 2. Minimum 13 % (reserve telltale must not light up).
- Park the car in the workshop at least 2 hours before the test so that the fuel temperature is approximately that of the workshop temperature (ideal fuel temperature approx. 10...20 °C).
- Never refuel the vehicle directly prior to the leak test due to the strong emission of gas by the fresh fuel.

Remove **REAR RIGHT WHEEL ARCH TRIM** .

Remove evaporation strainer from carbon canister.

S85:

Unlock quick-release fastener and detach line with evaporation strainer.

IMPORTANT: Risk of breakage!

Carefully remove evaporation strainer with a screwdriver from carbon canister.

Using special tool **16 1 070**, seal opening for evaporation strainer on carbon canister.

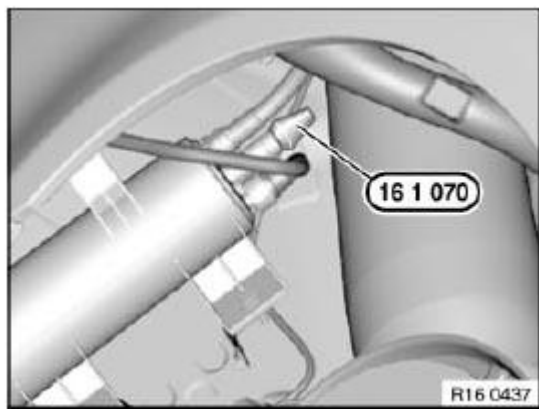


Fig. 5: Identifying Special Tool 16 1 070
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fuel filler cap and connect special tool **16 1 174** to fuel filler neck.

Clamp special tool **16 1 174** on fuel filler neck with adjusting wheel (1).

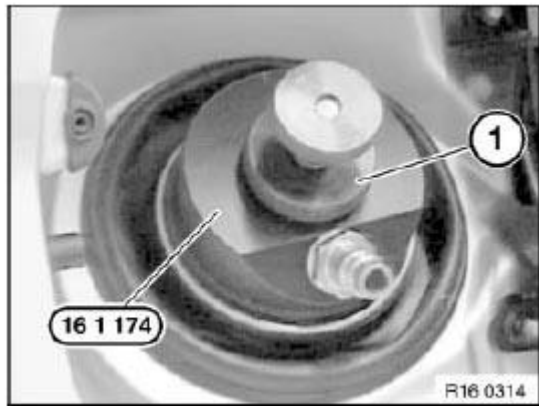


Fig. 6: Identifying Adjusting Wheel With Special Tool 16 1 174

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set pressure regulator on special tool 16 1 171 fully in "-" direction.

Connect special tool **16 1 171** using compressed air line (1) to garage compressed air system (8...10 bar).

Connect pressure sensor (2) from Diagnosis and Information System with a measuring range of 0...3.5 bar.

IMPORTANT: Do not connect fast-release coupling (3) of special tool 16 1 171 yet.

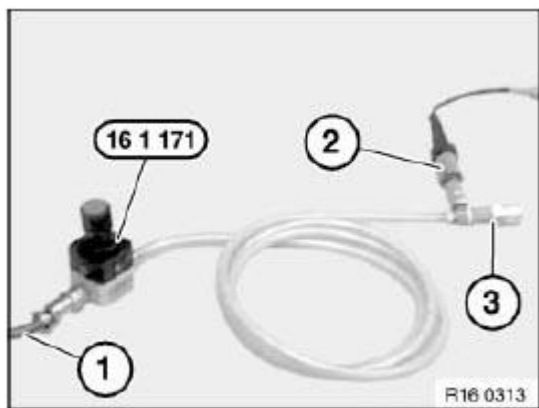


Fig. 7: Identifying Air Line, Pressure Sensor And Fast-Release Coupling With Special Tool 16 1 171

Courtesy of BMW OF NORTH AMERICA, INC.

Select "Measurement" function on Diagnosis and Information System (DIS).

Set measuring range according to pressure sensor to 0...3.5 bar.

Using pressure regulator on special tool **16 1 171**, increase pressure by 0.050 bar.

Connect special tool **16 1 174** to fast-release coupling of special tool **16 1 171**.

Using pressure regulator on special tool **16 1 171**, reset gauge pressure in fuel tank to 0.050 bar.

IMPORTANT: Do not under any circumstances increase pressure by more than 0.100 bar as this would result in damage to the fuel tank and venting system.

Using special tool **13 3 010**, disconnect delivery line from special tool **16 1 171** to fuel filler neck.

Allow a rest period of approx. 20 secs.

Read off and note down starting pressure value. Wait approx. 60 secs.

Read off final pressure value and compare with starting pressure value.

Measurement evaluation:

EVALUATION MEASUREMENT

Pressure drop between 0.008 and 0.010 bar.	Measure again.
Pressure drop in 60 secs. greater than 0.010 bar.	System leaking beyond permitted levels. Carry out LEAK TEST .

16 00 102 CHECKING FUEL TANK AND TANK VENTING SYSTEM FOR LEAKS WITH TANK LEAKAGE DIAGNOSIS MODULE (DM-TL)

NOTE: An OBD fault is indicated by the "Check Engine" indicator lamp in the instrument cluster lighting up. This may indicate a leak in the tank venting system. Information on this is provided by the fault memory of the DME control unit.

- Read out fault memory of DME control unit and carry out a diagnosis in accordance with faults stored.
- A leak test with the DM-TL module is then carried out if:
 - The components of the DM-TL module are O.K.
 - A fault is stored in the DME fault memory (tank leak detected).

Adhere to following conditions in order to carry out a correct leak test:

- Content of fuel tank < 90 %
- Reserve indicator lamp "off"
- Leave car in workshop for at least 2 hours so that fuel temperature comes into line with workshop temperature (ideal fuel temperature approx. 10...20 °C).

- Do not under any circumstances fill up car with fresh fuel (strong exhalation of fresh fuel).
- Check that fuel tank cap is correctly seated.

WARNING: During the leak test, under no circumstances apply external pressurization through the fuel filler neck as this may cause incorrect readings.

Clear DME fault memory.

In the Diagnosis and Information System (DIS), go to the "Function and component selection" page.

Work through tank leakage diagnosis module. Leakage test is carried out.

If fault is recorded again in DME fault memory (tank leak detected), carry out **LEAK TEST**.

16 00 510 CONDUCTING LEAK TEST ON FUEL TANK AND TANK VENTILATION SYSTEM

NOTE: The following procedure is only applicable to vehicles with the tank leak diagnosis module (DM-TL).
Select "Tank leak diagnosis module (DM-TL)" on Diagnosis and Information System (DIS).

- The leak diagnosis pump pressurizes the fuel tank and tank venting system for 30 secs.
- If pressure is required for more than 30 secs., reactivate the "Activate" button after 30 secs. in each case.

For vehicles without tank leak diagnosis module:

Pressurize **FUEL TANK AND TANK VENTING SYSTEM**.

When leak-testing with a leak detector: follow manufacturer's operating instructions.

IMPORTANT: On vehicles with tank leak diagnosis modules (DM-TL), do not work with external pressurization as the tank venting system will leak under this condition.
On account of emerging fuel vapors, carry out all operations in well ventilated rooms. Or use a suitable extractor system.
Observe country-specific accident prevention and occupational safety regulations.

The leak test can be carried out with a leak detector.

Possible causes may be:

- Fuel tank cap leaking (**CHECK FUEL CAP PRESSURE RELIEF VALVE**)
- Tank venting lines leaking (fuel tank carbon canister - tank venting valve)

- Tank venting valve leaking (engine compartment)
- Fuel level sensor flange on tank leaking



R16 0131

Fig. 8: Identifying Leak Detector

Courtesy of BMW OF NORTH AMERICA, INC.

FUEL TANK WITH MOUNTING

16 11 030 REMOVING AND INSTALLING FUEL TANK

IMPORTANT: After installation of fuel tank/prior to first engine start-up:

Check electrical resistance between earthing/grounding cable (fuel filler pipe) and wheel hub.

Measured value approx. 0.6 ohms

Fill fuel tank with min. 5 l fuel.

Necessary preliminary tasks:

- **DRAW OFF FUEL FROM FUEL TANK**
- Remove **REAR RIGHT WHEEL ARCH TRIM**
- **REMOVE COMPLETE PROPELLER SHAFT**
- Remove **HANDBRAKE BOWDEN CABLES** from wheel carrier and unclip from fuel tank
- Remove right **TENSION STRUT FOR REAR AXLE**

Unfasten nut.

Installation:

Tightening torque **16 12 11AZ** .

Seal nut with underseal again.

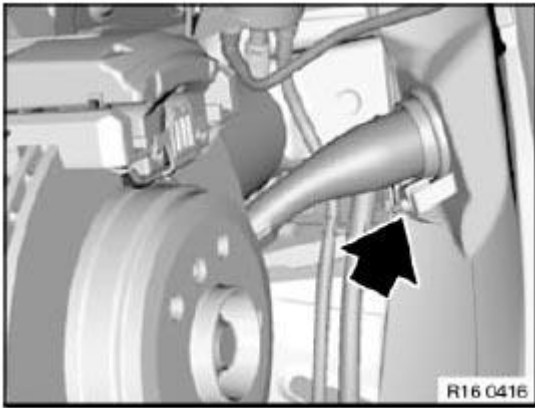


Fig. 9: Locating Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Disconnect filler vent line (4) from fuel filler pipe.

Vehicles with gasoline engines:

Disconnect service vent line (2) from carbon canister.

Unclip both lines and remove retaining clip (3).

Installation:

Replace hose clamp (1).

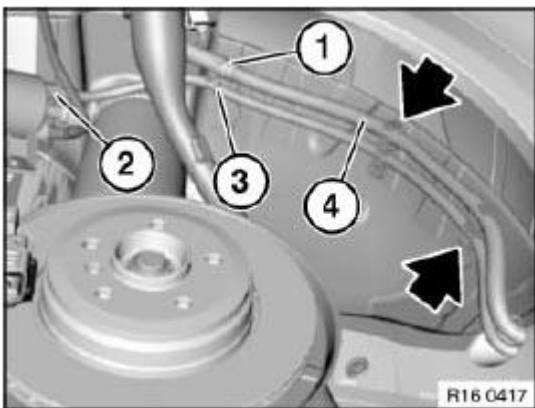


Fig. 10: Identifying Hose Clip, Retaining Clip, Filler And Service Vent Line

Courtesy of BMW OF NORTH AMERICA, INC.

Vehicles with gasoline engines:

Unlock and disconnect plug connections (1) of feed line.

If necessary, disconnect line (2) for independent heating.

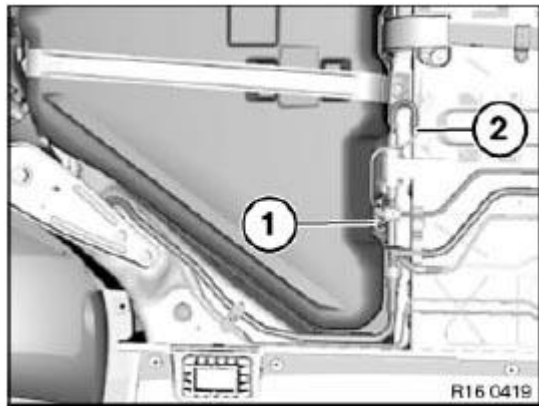


Fig. 11: Identifying Plug Connections And Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw.

Tightening torque, **16 11 1AZ** .

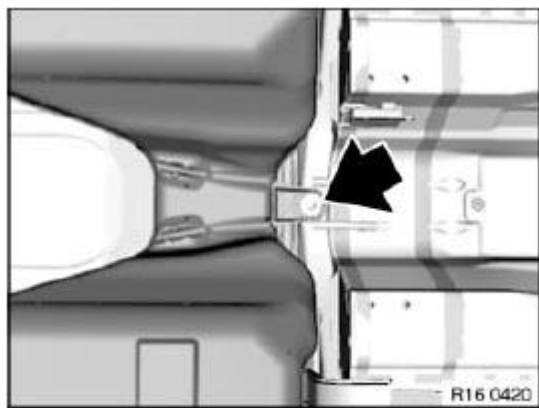


Fig. 12: Locating Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Heavily support the fuel tank.



Fig. 13: Supporting Fuel Tank

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws for tightening straps on left and right and remove tightening straps.

Tightening torque, **16 11 1AZ** .

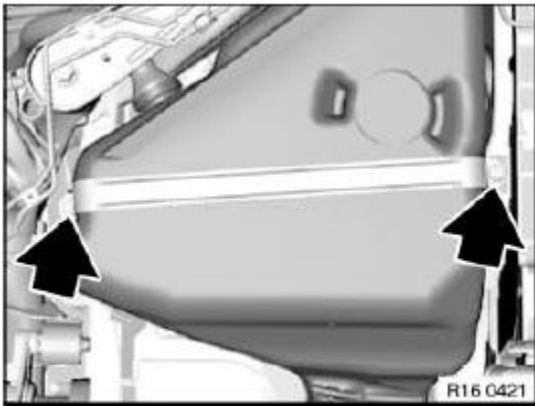


Fig. 14: Locating Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Note rubber mount with spacer bush.

Wide collar on spacer bush points to screw head.

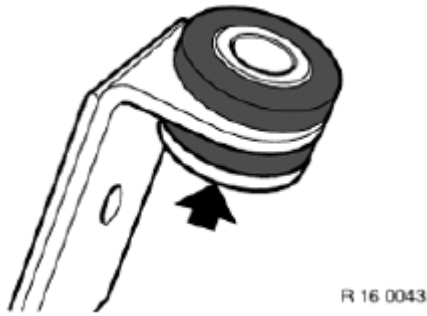


Fig. 15: Locating Spacer Bush

Courtesy of BMW OF NORTH AMERICA, INC.

Lower tank until plug (1) on top side of right tank half is accessible.

Unlock plug (1) and detach from delivery unit.

NOTE: Get a second person to feed out vent lines to wheel arch while removing tank towards bottom.

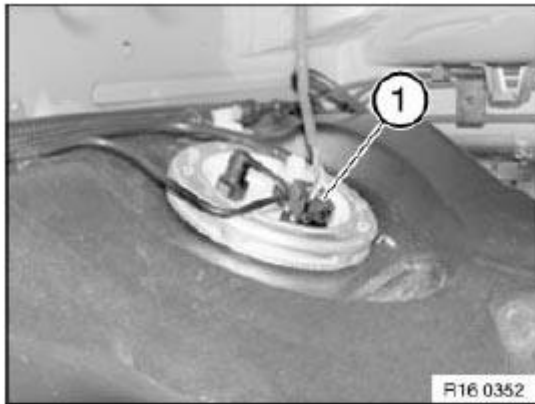


Fig. 16: Identifying Tank Until Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Feed vent lines (1) and (2) through body.

Do not kink lines.

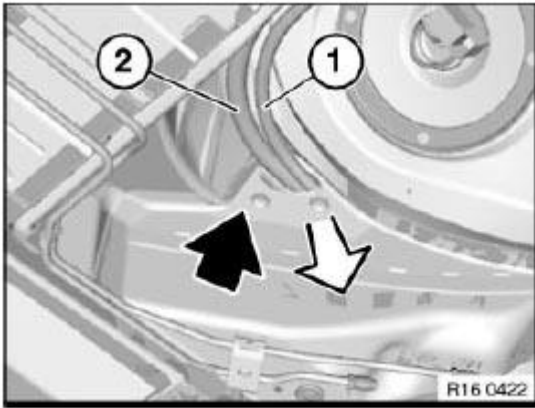


Fig. 17: Feeding Vent Lines

Courtesy of BMW OF NORTH AMERICA, INC.

16 11 130 CHECKING TANK CAP PRESSURE RELIEF VALVE

Special tools required:

- 13 3 010
- 16 1 171
- 16 1 172
- 16 1 173

Necessary preliminary tasks:

- Remove tank cap

Turn pressure regulator on special tool **16 1 171** counterclockwise up to stop.

Connect special tool **16 1 171** via compressed air line (1) to workshop/garage compressed air system (8...10 bar).

Connect pressure sensor (2) of Diagnosis and Information System with a measuring range of 0...25 bar.

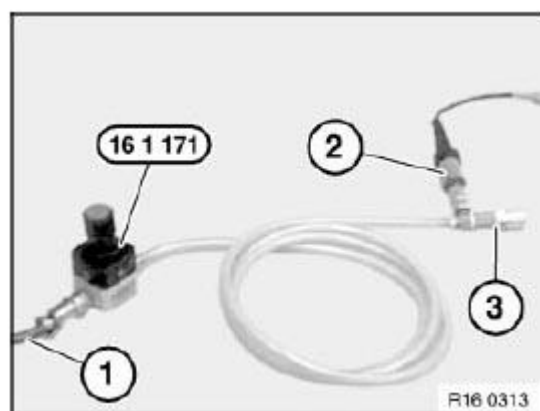


Fig. 18: Identifying Air Line, Pressure Sensor And Fast-Release Coupling With Special Tool 16 1 171
 Courtesy of BMW OF NORTH AMERICA, INC.

Select special tool **16 1 172** or **16 1 173** matching vehicle's filler cap and attach to quick release coupling of special tool **16 1 171**.

Install tank cap on selected special tool.



Fig. 19: Identifying Special Tool 16 1 172 And 16 1 173
 Courtesy of BMW OF NORTH AMERICA, INC.

Check testing equipment for leaks!

Select "Measurement" function on Diagnosis and Information System (DIS).

Increase pressure by 0.2 bar with pressure regulator on special tool **16 1 171**.

Using special tool **13 3 010**, disconnect supply line (1) from special tool **16 1 171** to fuel filler neck.

Allow a rest period of approx. 20 secs.

Read off and note down starting pressure.

Wait approx. 120 secs.

Read off final pressure value and compare with starting pressure value.

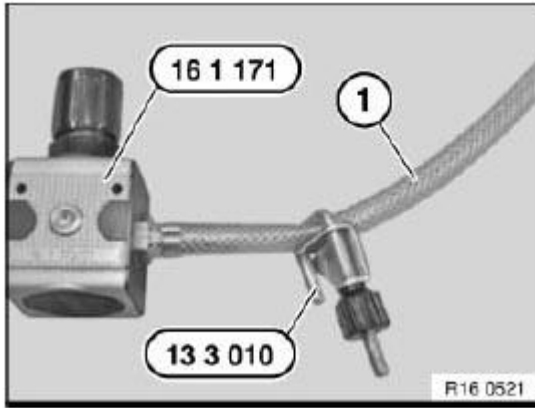


Fig. 20: Identifying Supply Line With Special Tool 13 3 010 And 16 1 171
Courtesy of BMW OF NORTH AMERICA, INC.

Measurement evaluation:

- Pressure drop up to 0.01 bar:
System OK
- Pressure drop over 0.02 bar:
System leaking beyond permitted levels

If system is leaking, check connection points for leaks.

Check tank cap pressure relief valve.

Follow same test procedure as for "Checking testing equipment for leaks".

Increase pressure by 0.3 bar with pressure regulator on special tool **16 1 171** .

Measurement evaluation:

- Pressure drop up to 0.01 bar:
Tank cap pressure relief valve OK
- Pressure drop over 0.02 bar:
Tank cap is leaking and must be replaced

FUEL TRANSFER, SENSOR FOR GAUGE

16 12... CHECKING REPUMPING FUNCTION OF SUCTION-JET PUMP WITH BMW DIAGNOSIS SYSTEM

IMPORTANT: Ensure adequate ventilation in the place of work!

Ensure absolute cleanliness when working on the open fuel tank.

Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Catch escaping fuel in a suitable container.

Necessary preliminary tasks:

- Fill level must be < or = 28 l
 - If necessary, **DRAW OFF FUEL FROM FUEL TANK**
- Pour two to three liters of fuel into the left tank chamber via the flange opening
- Connect diagnosis system
 - Path:
 - Brief test KOMBI Instrument cluster
 - Diagnosis control unit functions
 - Diagnosis requests
 - Tank sensor 1, tank sensor 2

NOTE: **Tank sensor 1 = right tank sensor**
 Tank sensor 2 = left tank sensor

Start engine.

Compare display for left and right tank chambers.

Repumping function OK

If fill level of tank sensor 2 (left chamber) is falling (approx. one liter per minute).

Repumping function not OK

If fill level of tank sensor 2 (left chamber) is stable or rising.

16 12 000 REMOVING AND INSTALLING/REPLACING FUEL GAUGE SENSOR (COMPLETE RIGHT SENSOR UNIT)

Special tools required:

- **16 1 020**

IMPORTANT: Ensure adequate ventilation in the place of work!
Ensure absolute cleanliness when working on the open fuel tank.
Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks:

- **DRAW OFF FUEL COMPLETELY FROM FUEL TANK**
- **REMOVE REAR SEAT**
- Remove **LEFT SENSOR UNIT**

Fold carpet (1) forwards.

Detach insulating mat (2) above left and right sensor units at perforation and fold back towards rear. Pop out rubber plugs here.

Fold back rubber mat (2).

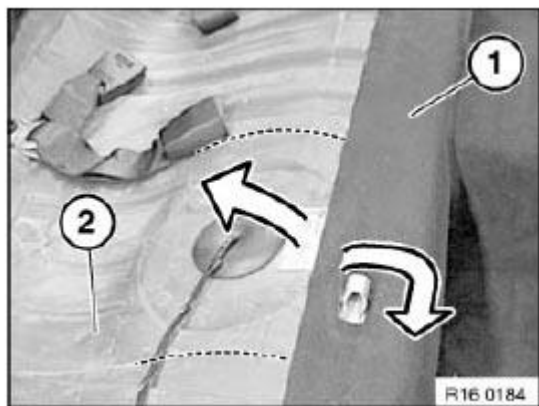


Fig. 21: Detaching Insulating Mat
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not damage gasket.

Release nuts (1) on left and right.

Fold metal cover of left and right sensor units upwards.

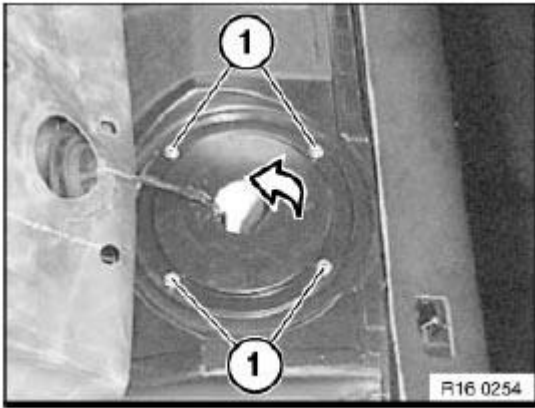


Fig. 22: Identifying Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fuel line is pressurized.
Catch escaping fuel in a suitable container.

If necessary, unlock and disconnect plug connection (1) of right sensor unit.

If necessary, release and disconnect hose (2) for independent heating (E60 only).

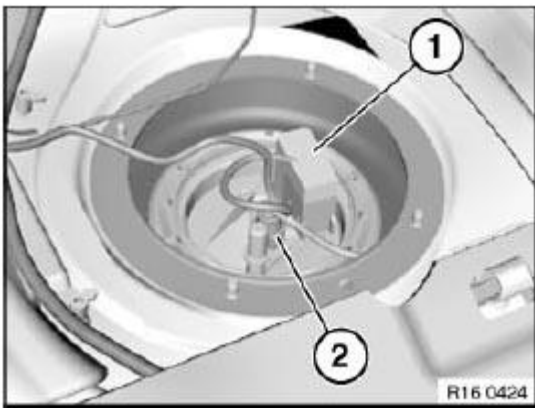


Fig. 23: Identifying Plug Connection And Hose

Courtesy of BMW OF NORTH AMERICA, INC.

Release rotary catch of left and right sensor units with special tool **16 1 020** .

Installation:

Replace rubber seal on left and right.

Tightening torque **16 14 2AZ** .

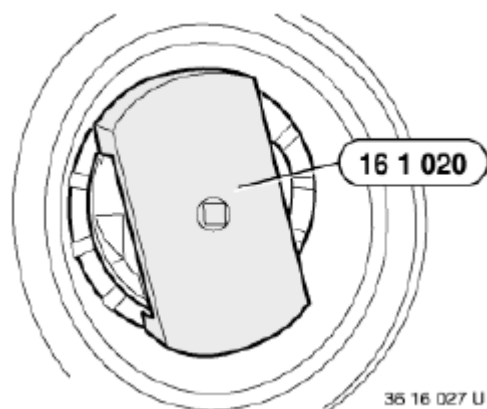


Fig. 24: Identifying Special Tool 16 1 020

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of breakage!

Carefully raise connecting cover. In so doing, do not pull excessively on connecting piece of fuel feed.

Installation:

When installing connecting cover, make sure that lug (1) in opening (2) engages fuel tank.

During torque tightening, notch (3) on screw cap can be clearly heard and felt to engage toothed segment (4) on fuel tank.

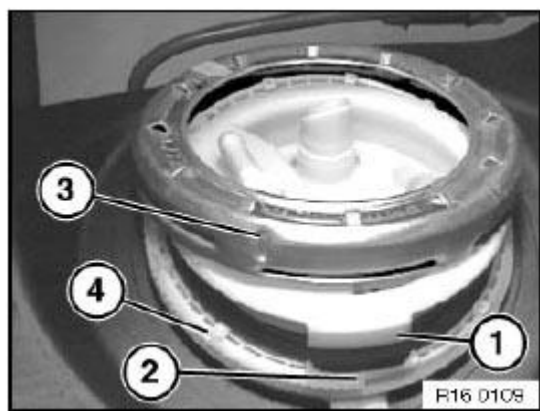


Fig. 25: Identifying Lug, Notch And Toothed Segment

Courtesy of BMW OF NORTH AMERICA, INC.

Secure a cable to hose pack through left service opening in tank.

The cable facilitates reinstallation of the hose pack.

Carefully remove right sensor unit from fuel tank.

IMPORTANT: Surge chamber is filled with fuel.
Drain surge chamber through upper opening (1). Catch fuel in a suitable container.

Feed hose pack out of fuel tank.

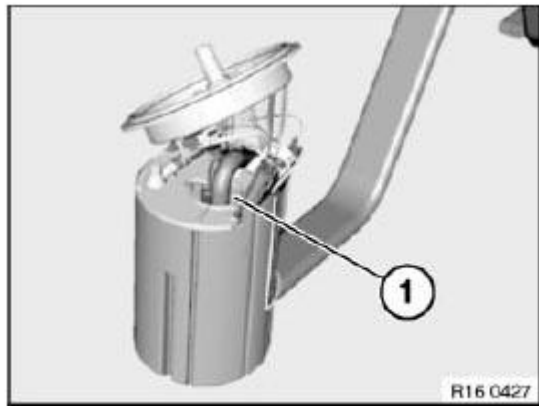


Fig. 26: Identifying Surge Chamber
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The new sensor unit is supplied with a plastic cover over the hose pack.

Secure the cable pulled through the tank during removal to the eyelet on the plastic cover.

Carefully feed hose pack through fuel tank using cable.

IMPORTANT: The lines on the connection are turned to the sensor unit as the hose pack is fed in.
Turn sensor unit in the same direction of rotation and align.
It is absolutely essential to avoid kinking the hoses.

Remove the plastic cover after feeding in the hose pack.

Replacing fuel level sensor:

Unlock and disconnect plug (2).

Release catches (1) and pull fuel level sensor out of unit.

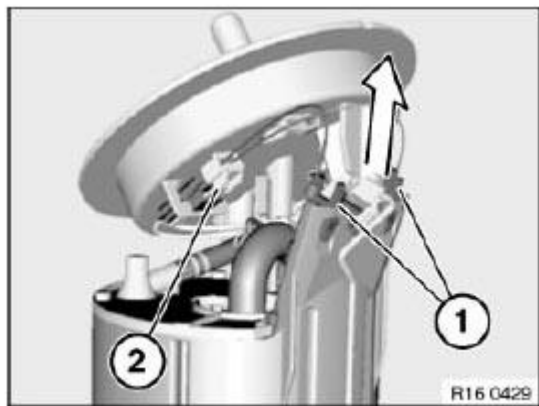


Fig. 27: Disconnecting Plug

Courtesy of BMW OF NORTH AMERICA, INC.

16 12 001 REMOVING AND INSTALLING/REPLACING FUEL GAUGE SENSOR (COMPLETE LEFT SENSOR UNIT)

Special tools required:

- **16 1 020**

IMPORTANT: Ensure adequate ventilation in the place of work!

Ensure absolute cleanliness when working on the open fuel tank.

Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks:

- **DRAW OFF FUEL FROM FUEL TANK**
- Remove **REAR SEAT BENCH**

After completing work:

- **CHECK REPUMPING FUNCTION OF SUCTION-JET PUMP**

Fold carpet (1) forwards.

Detach insulating mat (2) at perforation and fold back towards rear, pop out rubber plugs here.

Fold back rubber mat.

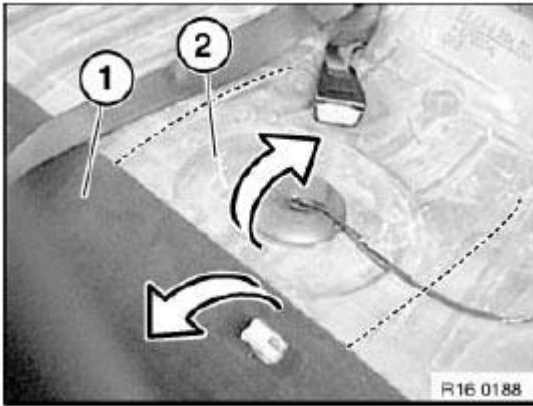


Fig. 28: Detaching Insulating Mat

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not damage gasket.

Release nuts (1) and fold back metal cover.

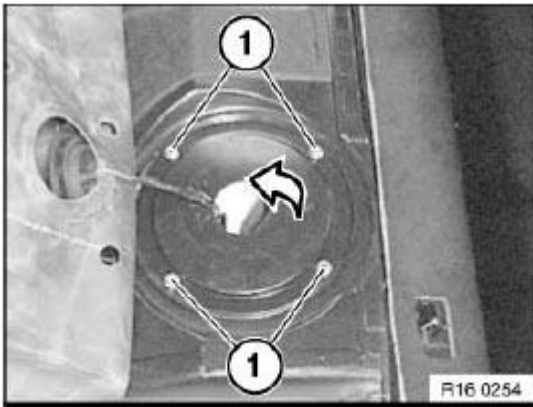


Fig. 29: Identifying Metal Cover Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fuel line is pressurized.
Catch escaping fuel in a suitable container.

Disconnect plug connection.

Release and disconnect feed line (1).

M57TU:

Release and disconnect feed and return lines.

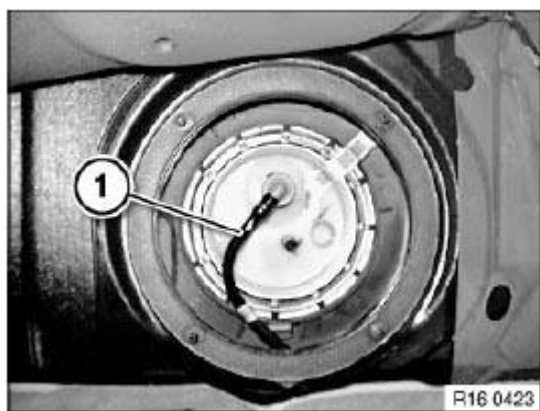


Fig. 30: Identifying Feed Line

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fuel gauge must roughly indicate zero before the left tank opening is opened.
 If the suction jet pump is faulty, the fuel level in the left tank half may be above the service opening!
 Large quantities of fuel may emerge on opening!
 In this event, keep left tank half closed and feed extraction hose through right service opening to left tank half.

Release screw cap with special tool **16 1 020** .

Installation:

Replace rubber gasket.

Tightening torque **16 14 2AZ** .

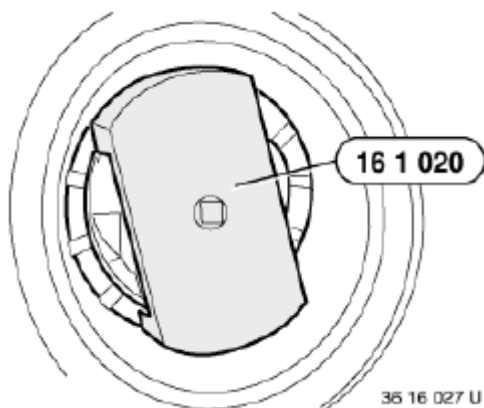


Fig. 31: Identifying Special Tool 16 1 020

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of breakage!

Carefully raise fuel level sensor until sensor flange projects out of tank opening. In so doing, do not pull excessively on connecting piece of fuel return.

Installation:

When installing fuel level sensor, make sure that lug (1) engages opening (2) in fuel tank.

During torque tightening, notch (3) on screw cap can be clearly heard and felt to engage toothed segment (4) on fuel tank.

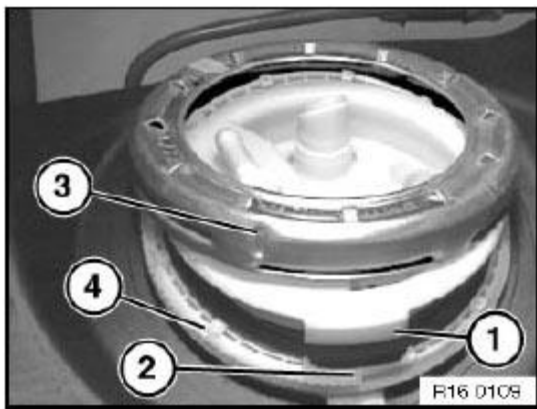


Fig. 32: Identifying Lug, Notch And Toothed Segment
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove left sensor unit from tank.

Disconnect line (1) to fuel filter and seal off at fuel filter.

Disconnect suction jet pump from fuel filter.

To do so, press catch (2) downwards and detach suction jet pump.

IMPORTANT: Look out of escaping fuel.

Catch fuel in a suitable container.

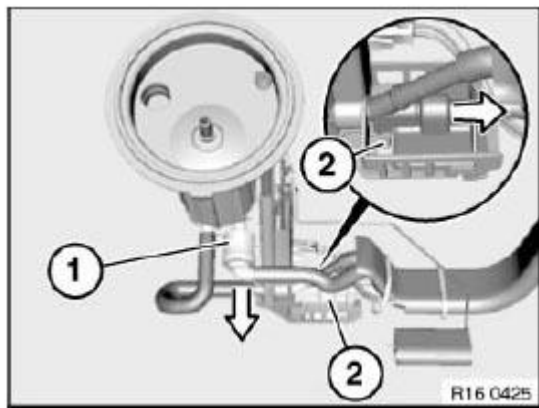


Fig. 33: Disconnecting Line Of Fuel Filter
Courtesy of BMW OF NORTH AMERICA, INC.

E60/M57TU only:

Carefully remove left sensor unit from tank.

Unlock line (1).

Pull suction jet pump out of holder.

To do so, press catch (2) downwards and detach suction jet pump (2).

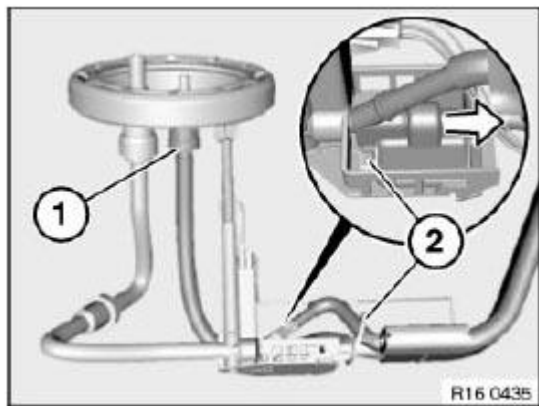


Fig. 34: Pressing Catch
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug (1) of hose pack.

NOTE: Release plug by pressing lock and disconnect.

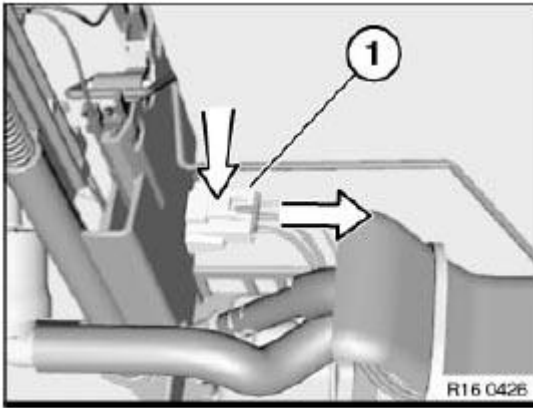


Fig. 35: Disconnecting Plug Of Hose Pack
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing fuel level sensor:

Unlock plug (2) and press out in direction of arrow.

Release catches (1) and pull fuel level sensor out of unit.

Disconnect cable from pressure regulator and feed out of cable gland.

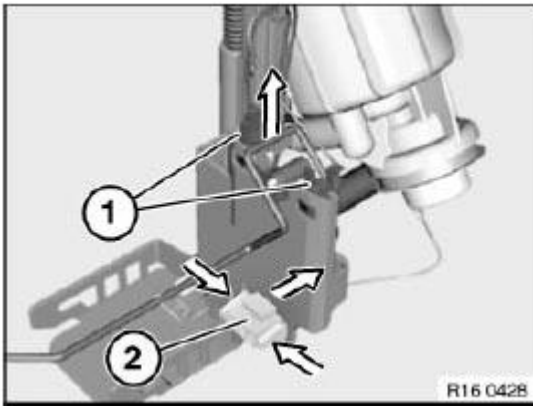


Fig. 36: Unlocking Plug
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 010 REMOVING AND INSTALLING/REPLACING CARBON CANISTER

Necessary preliminary tasks:

- Remove **REAR RIGHT WHEEL ARCH TRIM**.

Detach lines (1 and 2) from carbon canister (3).

Unfasten screws.

Installation:

Tightening torque **16 13 2AZ** .

Remove carbon canister (3).

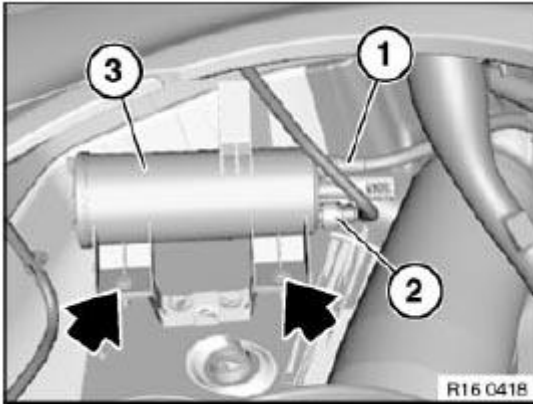


Fig. 37: Identifying Lines And Carbon Canister With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 010 REMOVING AND INSTALLING/REPLACING CARBON CANISTER WITH DM-TL

DM-TL = diagnosis module-tank leakage

Necessary preliminary tasks:

- **REMOVE REAR RIGHT WHEEL.**
- Remove **REAR RIGHT WHEEL ARCH TRIM** .

Unlock and detach lines (1) to (3).

1. Scavenging air line
2. Vent line to fuel tank
3. Evaporation line

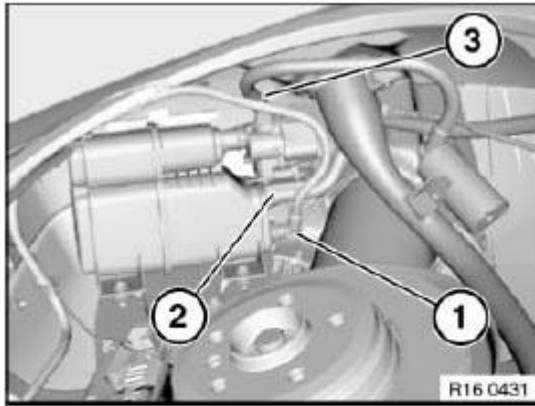


Fig. 38: Identifying Scavenging Air Line, Vent Line To Fuel Tank And Evaporation Line
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug (1).

Release screws and remove carbon canister with DM-TL towards bottom.

Tightening torque **16 13 2AZ** .

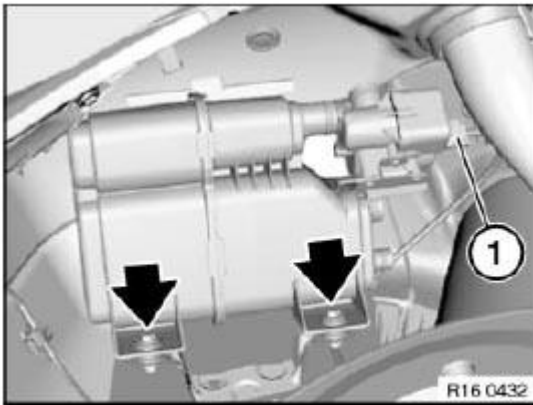


Fig. 39: Identifying Plug With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

FUEL PUMP

16 14 021 REMOVING AND INSTALLING/REPLACING FUEL FILTER (IN TANK)

Special tools required:

16 1 020

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when working on the open fuel tank.

Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Before starting the engine for the first time:

- **Fill fuel tank with at least 5 liters of fuel.**

Necessary preliminary tasks:

- **DRAW OFF FUEL FROM FUEL TANK**
- Remove **REAR SEAT BENCH**

After completing work:

- **CHECK REPUMPING FUNCTION OF SUCTION-JET PUMP**

Fold carpet (1) forwards.

Detach insulating mat (2) at perforation and fold back towards rear, pop out rubber plugs here.

Fold back rubber mat.

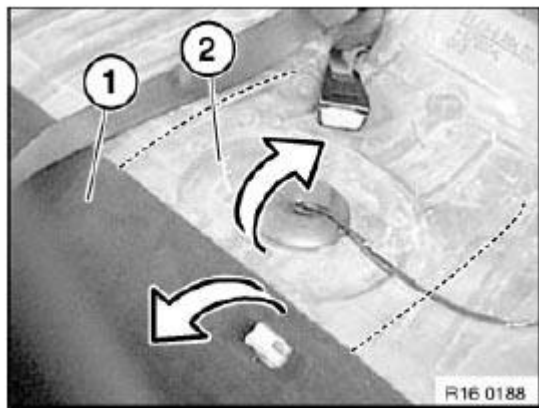


Fig. 40: Detaching Insulating Mat

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not damage gasket.

Release nuts (1) and fold back metal cover.

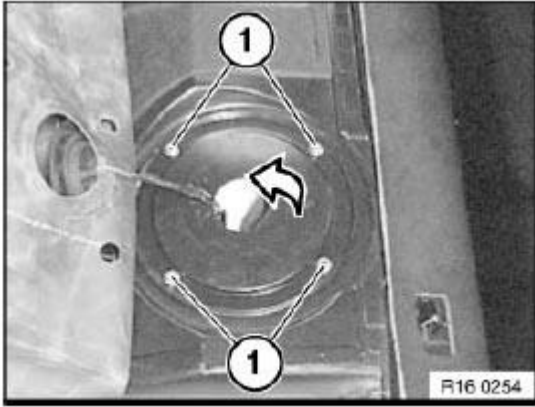


Fig. 41: Identifying Metal Cover Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fuel line is pressurized.
Catch escaping fuel in a suitable container.

Disconnect plug connection.

Release and disconnect feed line (1).

M57TU:

Release and disconnect feed and return lines.

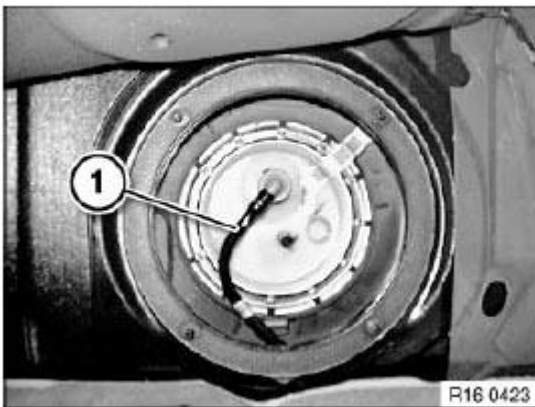


Fig. 42: Identifying Feed Line

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fuel gauge must roughly indicate zero before the left tank opening is opened.
If the suction jet pump is faulty, the fuel level in the left tank half may be above the service opening!
Large quantities of fuel may emerge on opening!
In this event, keep left tank half closed and feed extraction hose through right service opening to left tank half.

Release screw cap with special tool **16 1 020** .

Installation:

Tightening torque **16 14 2AZ** .

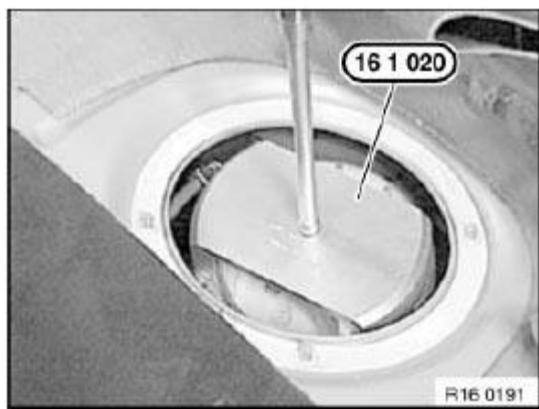


Fig. 43: Identifying Special Tool 16 1 020

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of breakage!

Carefully raise fuel level sensor until sensor flange projects out of tank opening. In so doing, do not pull excessively on connecting piece of fuel return.

Installation:

Replace rubber gasket.

When installing fuel level sensor, make sure that lug (1) engages opening (2) in fuel tank.

Fit screw cap without using a tool and tighten hand-tight.

Then tighten screw cap with special tool **16 1 020** until notch (3) points to marking (4).

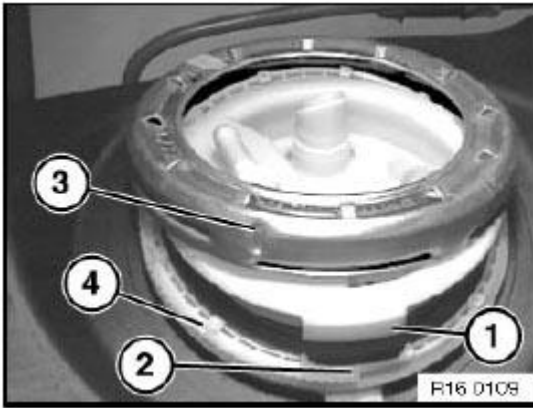


Fig. 44: Identifying Lug, Notch And Toothed Segment
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Look out of escaping fuel.
Catch fuel in a suitable container.

Carefully remove left sensor unit from tank.

Disconnect line (1) to fuel filter.

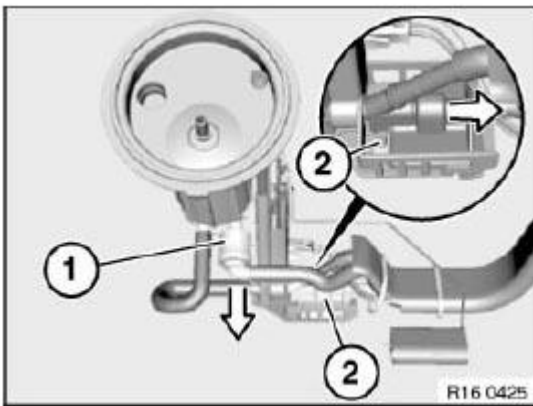


Fig. 45: Disconnecting Line Of Fuel Filter
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect line (1) to fuel filter and seal off at fuel filter.

Disconnect suction jet pump from fuel filter.

To do so, press catch (2) downwards and detach suction jet pump.

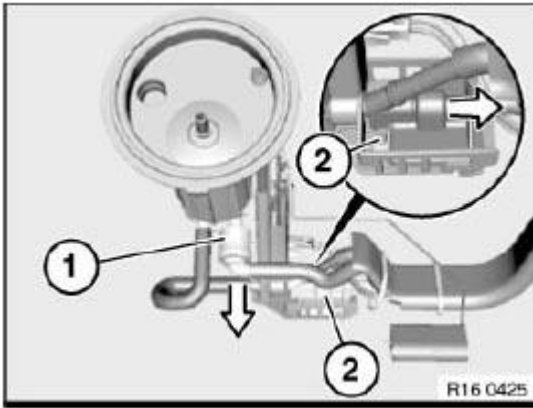


Fig. 46: Disconnecting Line Of Fuel Filter
Courtesy of BMW OF NORTH AMERICA, INC.

E60/M57TU only:

Carefully remove left sensor unit from tank.

Unlock line (1).

Pull suction jet pump out of holder.

To do so, press catch (2) downwards and detach suction jet pump (2).

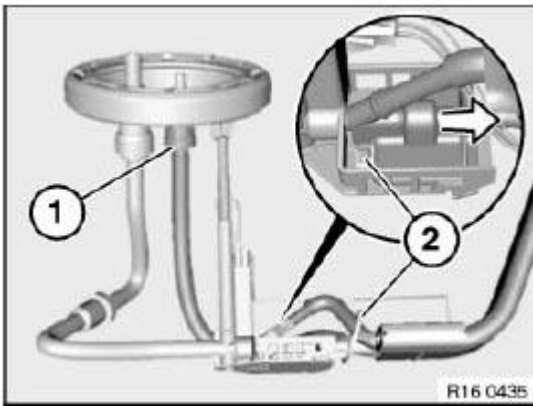


Fig. 47: Pressing Catch
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug (1) of hose pack.

NOTE: Release plug by pressing lock and disconnect.

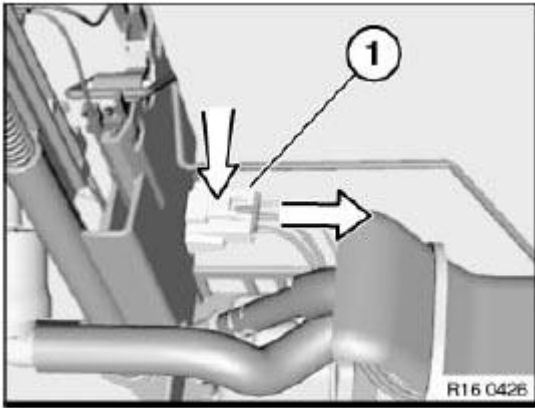


Fig. 48: Disconnecting Plug Of Hose Pack

Courtesy of BMW OF NORTH AMERICA, INC.

Replacing fuel level sensor:

Unlock plug (2) and press out in direction of arrow.

Release catches (1) and pull fuel level sensor out of unit.

Disconnect cable from pressure regulator and feed out of cable gland.

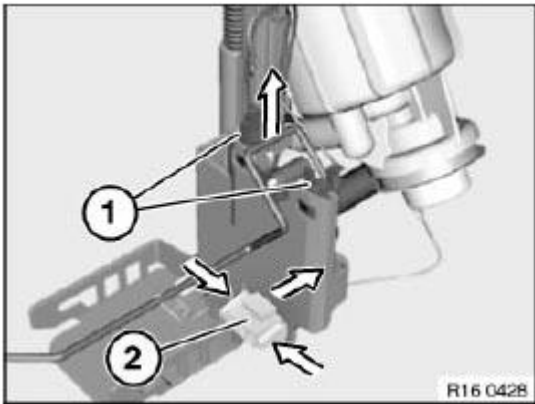









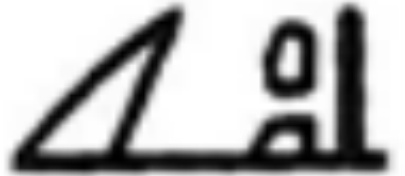






Fig. 49: Disconnecting Plug Of Hose Pack






Courtesy of BMW OF NORTH AMERICA, INC.

FUSE SYMBOLS

Fuse Assignment Symbol Definitions

System		Symbols (Including Variations)	
Accessories			
Alarm System			
Camera System/ (Rear View/Side View)			
CD/Radio			
CD Changer			

Cigarette Lighter/ Accessory Socket		
Convertible Top (Down)		
Convertible Top (Up)		
Display (On-Board Monitor)		
Horn		
Instrument Cluster		
Door Module		

		
Locking System		
Memory (Seat, Mirror, Steering Wheel)		
Mirror (Side)		

Navigation System








Roller Sun Blind








Seat (Adjust)

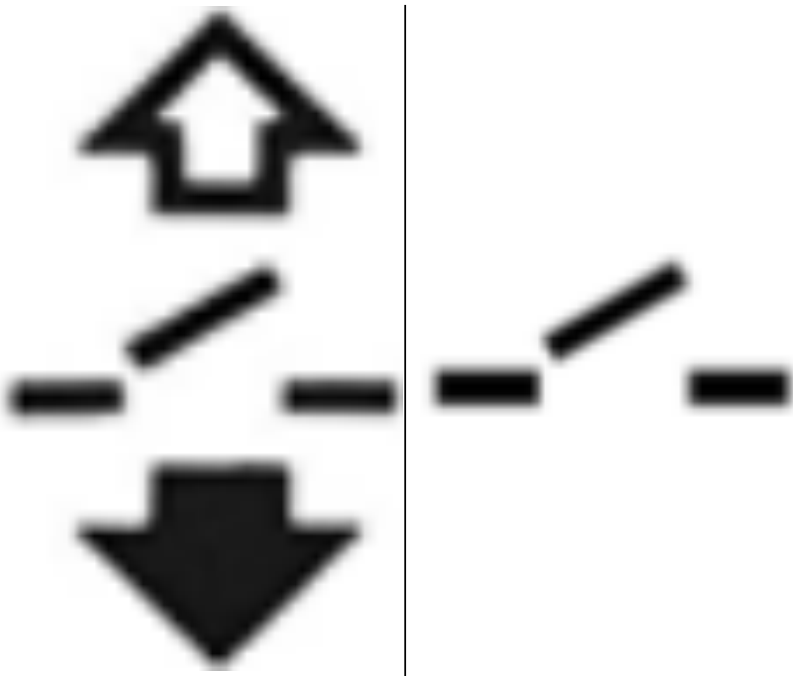
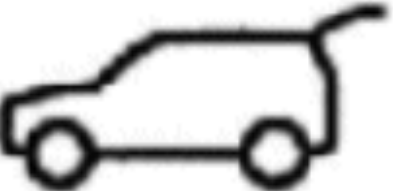

Seat (Passenger Adjust)/
Gentleman Function

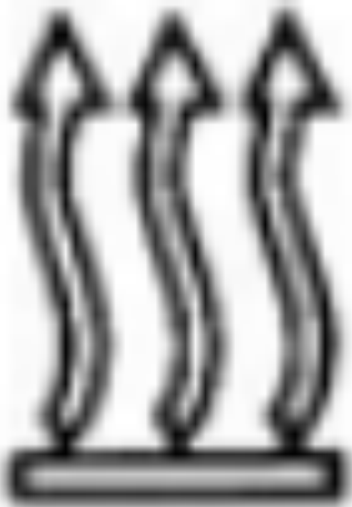
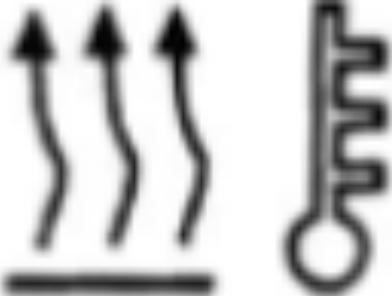

Seat (Heated)

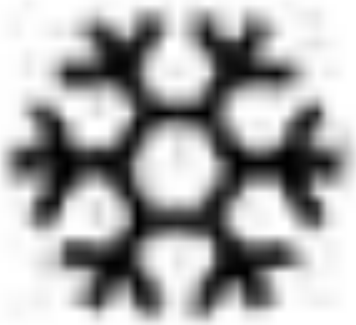



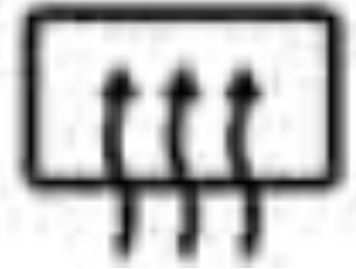
		
Seat (Active)		
Steering Wheel (Adjust)		
Steering Wheel (Heated)		



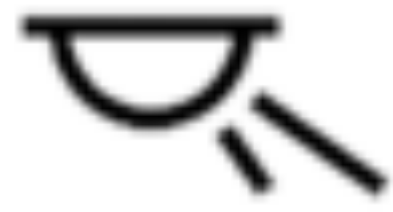
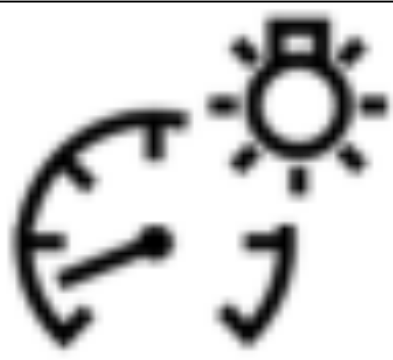

		
Telephone		
Window (Up/Down)		






cardiagn.com





Sunroof (Powered)		
Rear Hatch/Trunk		
Trailer/Tow		
A/C & Heating		
Heater (Heated seats on older models)		

		
Heater (Auxillary/Independent)		
Heater (Fuel Burning)		
A/C Cooling		

		
A/C-Heater Blower		
Window Defroster		
Window Defroster (Rear)/ Heated Rear Window		
Lighting (Interior/Exterior)		

Lighting System		
Lighting (Interior)		
Lighting (Reading)		
Lighting (Instrument)		
Exterior Lights (Adaptive Headlight on Some Models)		

Headlight (High Beam)		
Headlight (Low Beam)		
Headlight (Automatic Control)		
Headlight (Cleaning System)		
Headlight (Cleaning System)/ Wiper (Rear) ⁽²⁾		





Fog Light		
Parking Lights or Daytime Running Lights		
Parking Lights (Roadside)		
Engine, Transmission, & Diagnostic		
Engine Management		

Engine Fan



Fuel Pump



Hybrid Interface Module	HIM (Hybrid Interface Modul)	
Ignition System (Electronic)	START STOP	
Data Link Connector (DLC)/ Diagnostic Socket	OBD	
Transmission		
Steering & Suspension		
Steering System/ Active Steering		

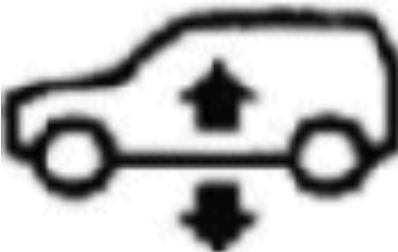
Suspension System (Electronic)



Electronic Damper Control






EDC







Suspension System (Self-Leveling)

**Safety & Vehicle Control**

ABS



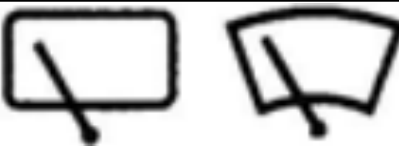
DSC		
Active Roll Stabilization		
Active Cruise Control/ Cruise Control		
Park Distance Control (PDC)		

		
Park Distance Control (PDC)/ Remote Garage Door Opener ⁽²⁾		
Parking Brake		
Restraint System (Belts/Air Bag)		

Tire Pressure Monitor (TPMS)

**Wiper/Washer**

Wiper System



Wiper (Front)





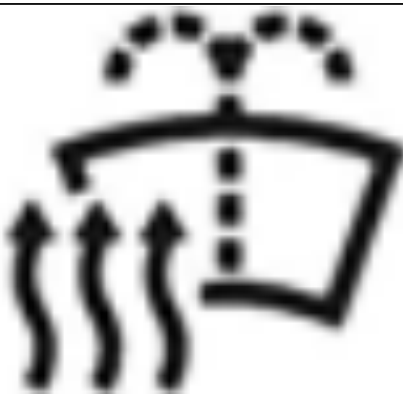



Wiper (Rear)



Wiper (Rain Sensor)



Washer System		
Washer (Rear Window)		
Washer (Heated Jets)		
Misc.		
(1)		
(1) Definition has not been determined.		
(2) While the definition of the individual symbols in this combined set is known, the meaning behind the combination has not been determined.		

ACCESSORIES AND EQUIPMENT**General electrical system - Repair Instructions****TROUBLESHOOTING****12 00... INSTRUCTIONS FOR WELDING WORK (OVERLOAD PROTECTION OF CONTROL UNITS)**

Follow instructions for body repairs.

When performing welding work on installed control units, to avoid any defects in the electronic control units, observe the following steps:

- **OBSERVE INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .**
- Detach terminal of battery negative lead from car battery and second battery if fitted. Cover negative terminal posts.
- If welding is to be performed near the battery/batteries, first remove battery/batteries from vehicle (flying sparks - combustion of explosive gas).
- Fit return clamp on welding unit as close as possible to welding point (maximum distance approx. 1 m).
- Never connect return clamp to ground pin on body which has ground wires attached!

61 00. VERSION WITH AFS: SETTING STEERING ANGLE (AFTER RECONNECTING VEHICLE BATTERY)

NOTE: **Version with AFS:**

After RECONNECTING the vehicle battery, carry out the following procedure for setting the steering angle:

- **Start engine.**
- **Turn steering wheel left to full lock.**
- **Turn steering wheel right to full lock.**
- **Turn steering wheel to central position.**
- **Turn off engine.**
- **Turn on ignition (terminal 15), AFS telltale and Check Control message go out.**

NOTE: **Entry in the fault memory remains unaffected by this procedure, therefore if necessary**

- Connect diagnosis system
- Clear fault memory

61 00... BATTERY

NOTE: Important notes and instructions for handling batteries can be found in:

- **DISCONNECTING BATTERY**
- **BATTERY CHARGING**
- **WELDING WORK**
- **EXTERNAL JUMP-STARTING AID**

Battery care and maintenance

In low-maintenance batteries, check the acid level at least once a year. If necessary, top up with distilled water up to the top marking.

The increasing number of electronic control units in the car reduces the self-discharging time of the battery (even in standby mode). To maintain the battery service life and to avoid exhaustive discharging, recharge laid-up vehicles every 6 weeks at the latest. The time for self-discharging depends on vehicle type and equipment specification.

Battery test

The battery acid density can be used to measure the charge state. However this test produces uncertainty caused by a design related range of variation. The acid density e.g. for a charged battery is 1.28 kg/l (in the tropical version the acid density is 1.23 kg/l).

Another interference factor is the acid lamination immediately after filling with distilled water.

Battery wear with partially sulfated and/or heavily contaminated plates will also lead to incorrect acid density test results.

61 00... DIAGNOSIS FOR CONDITION BASED SERVICE

NOTE: *Red symbol for pre-delivery check*

The vehicle is coded at the end of the assembly line so that the red symbol for the pre-delivery check is shown in the Next Service display (same symbol as vehicle check).

The symbol is a reminder to the Service staff that the predelivery check has not yet been carried out on this car.

NOTE: *Do not carry out a reset.*

Do not confuse this function with the "Vehicle check" maintenance scope.

Do not carry out a reset via the instrument cluster.

When carrying out the pre-delivery check with the "Transport Mode/Pre-delivery check" service function:

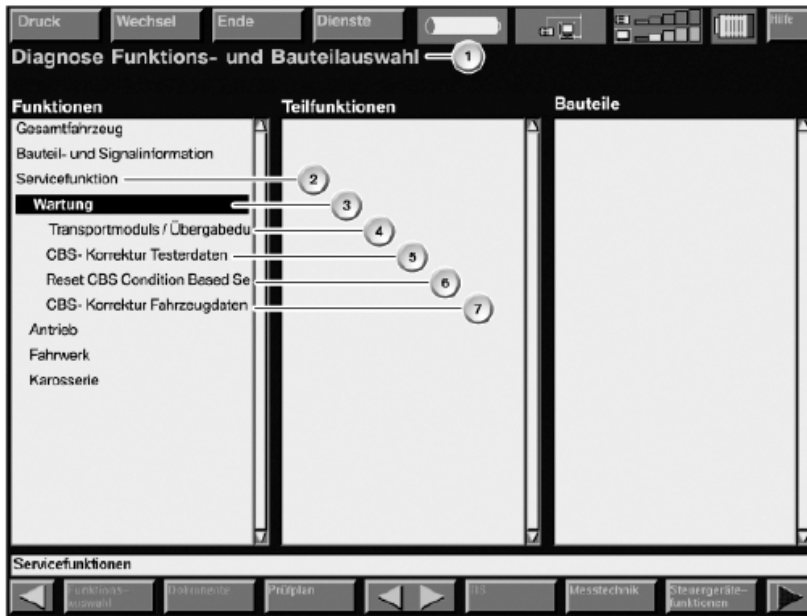
The symbol is automatically removed from the display after the service function has been executed.



T6004065

Fig. 1: Pre-Delivery Check Display

Courtesy of BMW OF NORTH AMERICA, INC.



T0004064

Key	Explanation	Key	Explanation
1	Function and component selection	2	Service functions
3	Maintenance	4	Transport Mode/Pre-delivery check
5	CBS Correction Tester Data	6	Reset CBS Condition Based Service
7	CBS Correction Vehicle Data		

Fig. 2: Display Diagnosis Functions

Courtesy of BMW OF NORTH AMERICA, INC.

4 service functions are available in the BMW diagnosis system for maintenance:

- Transport Mode/Pre-delivery check

- CBS Correction Tester Data
- Reset CBS
- CBS Correction Vehicle Data

Service function: Transport Mode/Pre-delivery check

To be able to hand over a vehicle to the customer in proper working order, it is essential to execute the "Transport Mode/Predelivery check" service function.

The following items are worked through during the pre-delivery check:

- Deactivation of transport mode.
- An adaptation process must be activated in order to determine the vehicle-specific mileage/kilometrage per week. Transport and immobilization periods before the vehicle is delivered to the customer therefore have no effect on the customer-specific weekly mileage/kilometrage.

The weekly mileage/kilometrage is used to control escalation from "green" to "yellow" (approx. 4 weeks before "red") for maintenance scopes with remaining distances. The averaged mileage/kilometrage of the last 6 weeks is taken into account here.

- Coding or blanking out of the legally prescribed intervals for the statutory vehicle inspection and statutory exhaust emissions test.
- Input of the target dates for the statutory vehicle inspection and the statutory exhaust emissions test (automatic or manual).

Automatic: By input of the date of first registration and of the time interval

Manual: By direct input of the target date

- Entry of local, service-related phone numbers, depending on vehicle equipment specification .

The country-specific phone numbers are displayed in the BMW diagnosis system as a reference text. The phone numbers can simply be read off during the input prompt.

- Reference to initialization of TeleService, depending on vehicle equipment specification.
- Checking and if necessary setting of the on-board date for the vehicle.
- Entry of the date for first registration of the vehicle.
- Now clear the fault memory.

NOTE: *Reducing input expenditure.*

Standardized data are stored in the BMW diagnosis system (for repeated use) in the interests of minimizing the time spent on making inputs in the garage/workshop. The standardized data can be changed with the "CBS

Correction Tester Data" service function.**Service function: CBS Correction Tester Data**

Data are automatically stored in the vehicle with the "Pre-delivery check" service function.

The standardized data can be changed with the "CBS Correction Tester Data" service function.

The following standardized data can be changed:

- Phone numbers:
 - BMW Group Mobile Service
 - BMW Hotline
 - Customer's home dealer

The country-specific phone numbers are contained as reference texts in the BMW diagnosis system (read off during the input prompt). The phone numbers must be input with the international dialling code.

- Legally prescribed vehicle inspection (country-specific):
 - Coding or blanking out
 - Interval for calculating the target date

The target date is calculated on the basis of the date of first registration.

- Legally prescribed exhaust emissions test (country-specific):
 - Coding or blanking out
 - Interval for calculating the target date

The target date is calculated on the basis of the date of first registration.

NOTE: ***Automatic function after installation of the BMW diagnosis system.***

The standardized data are automatically established when the pre-delivery check is carried out for the first time. It is therefore not necessary to input the data separately.

Service function: Reset CBS Condition Based Service

A maintenance scope can be reset with the "Reset CBS Condition Based Service" service function. Even when availability is over 80 %.

The benefit of reset via the BMW diagnosis system is that the on-board date is corrected automatically.

The individual maintenance scopes are displayed in the BMW diagnosis system with service counter and

availability.

- The service counter is reset by one counter on resetting. All service counters are set to "1" on new vehicles.

The service counters are used in the Service Acceptance/Reception Module (SAM) on a scope-specific basis for controlling additional work.

- Availability is set to 100 % on resetting. Availability in % is the wear value of the maintenance scope.

The greater the availability, the longer it is to the next maintenance scope.

0 % means that the maintenance measure must be carried out.

Service function: CBS Correction Vehicle Data

IMPORTANT: The data are overwritten.

Once this service function has been executed, it is no longer possible to reconstruct the previous status.

The "CBS Correction Vehicle Data" service function is available if a reset has been carried out **erroneously**. In this way, the availability of a maintenance scope can be corrected to a realistic value.

A data or a mileage/kilometer reading is entered for correction. These data are converted internally into an availability in %. In so doing, the BMW diagnosis system only accepts a smaller value as the current reading in the control unit. In addition, the service counter of the scope is automatically reduced by one counter.

The inputs are used in the Service Booklet to determine the realistic availability. A realistic availability can be reconstructed on a scope-specific basis by means of the last maintenance measure (with mileage/km reading and date).

This does not include correcting the availability for brake pads. The brake pad residual thickness must be measured and input (in millimeters).

NOTE: ***Reference for distance- and time-dependent maintenance scopes***
For a correction, the availability is referred to the distance- and time-dependent calculation.

61 00... PROGRAM / ENCODE THE CONTROL UNIT(S)

- In order to avoid incorrect programming procedures and fault messages, it is essential when working with the ISTA/P programming system always to use the version.
- Battery voltage must not drop below 13.0 V during programming.

Connect battery charger prior to programming. *Sourcing reference BMW Workshop Equipment

Catalogue

IMPORTANT: Prior to programming / encoding hybrid and electric vehicles disconnect the high-voltage system!

programming routine via ISTA/P:

- Connect the battery charger to the vehicle.
- Connect the programming system with the vehicle.
- Determine the action plan.
- Accept action plan with the control units to be programmed/encoded and enabled, if necessary or work through.
- Observe the reworking list!
- If applicable, connect the workshop system to the vehicle depending on the rework list, run the brief test and delete the fault memory.

NOTE: A switch to the workshop system may not necessarily be required with the integration of the service functions and the "Delete fault memory" function in ISTA/P. Check the rework list accordingly!

- Compliance with the information about programming in workshop systems and the corresponding notes in the user documentation is required.

61 00... NOTES ON HANDLING OPTICAL FIBERS

CAUTION: To avoid damage when handling optical fibers, comply with the following points:

- The minimum permitted bending radius is 25 mm
- Do not subject optical fibers to compressive and tensile load
- Protect optical fibers against the effects of heat $> \text{ or } = 85^{\circ}\text{C}$ (e.g. during welding work, drying work with infrared heater or hot air blower)
- Optical fibers are permitted to show only one junction point (bridge), replace optical fibers if necessary

NOTE: The optical fibers are colored differently as follows:

- Green= MOST (Media Oriented Systems Transport) optical fibers
- Yellow = ISIS (Intelligent Safety and Integration System) optical fibers
- Orange = repair optical fibers

Follow instructions for **PROCESSING CABLES AND OPTICAL FIBERS**.

61 00... NOTES ON HANDLING WIRING HARNESSES AND CABLES**In general:**

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use muckets if necessary
- Secure additionally laid cables/leads with cable ties

In addition:

Shielded lines

Joins in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded RTK031 coaxial lines may only be repaired with special crimping tools.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:

NOTE: **Fibre-optic cables are colored differently as follows:**

- Green = **MOST** (**M**edia **O**riented **S**ystems **T**ransport) optical fibres
- Yellow = **ISIS** (**I**ntelligent **S**afety **I**ntegration **S**ystem) optical fibres
- Orange = repair fibre-optic cables

IMPORTANT:

- **Optical fibres are permitted to show only one junction point (bridge).
Replace optical fibres if necessary**
- **Smallest permissible bending radius is 25 mm**

Avoid effects of heat > or = 85 °

TREATING CABLES AND FIBRE-OPTIC CABLES

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK TUBING**.

NOTE:

FlexRay lines may only reveal one separation point (bride); renew complete line if necessary

The cable is a twisted cable. If possible, maintain twisted cable after repair

Airbag cables:

REPAIRING AIRBAG CABLES

Ribbon cables:

REPAIRING RIBBON CABLES

61 00... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations:

Safety regulations for HANDLING COMPONENTS OF AIRBAG SYSTEM .

INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

Procedure for cable repair

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of them being mixed up! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in

control unit plug, assignment of repair cables is relevant. Lay repair cable in car parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the connectors and shrink-fit hoses in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colors. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

CUTTING OFF AND INSULATING CABLES.

REPAIRING A PLUG CONNECTION USING CONNECTORS.

INSTALLING AND REMOVING CONTACTS.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables. Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

CUTTING OFF AND INSULATING CABLES.

REPAIRING A PLUG CONNECTION USING CONNECTORS.

INSTALLING AND REMOVING CONTACTS.

61 00... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY

Battery acid is highly corrosive:

Do not allow any battery acid to come into contact with the eyes, the skin or clothing. Therefore wear protective clothing, gloves and goggles.

Do not tilt the battery, acid may emerge from the vent opening.

In event of contact with acid:

If acid is splashed into the eyes, rinse them immediately for several minutes with clear water. You must then

consult a doctor without delay.

If acid is splashed onto the skin or clothing, neutralize it immediately with a soapy solution and rinse with lots of water.

Seek medical attention immediately if battery acid is accidentally swallowed.

Explosion hazard:

Strictly no flames, sparks, naked light or smoking!

A highly explosive mixture of electrolytic gas is created when batteries are charged. The rooms where charging is carried out must therefore always be well ventilated.

Avoid the formation of sparks when handling cables, wiring and electrical devices.

Turn the ignition lock to the 0 position before disconnecting or connecting the battery.

Do not place tools or any similar object on the battery (danger of short-circuiting and explosion!).

AUXILIARY CABLE

61 12... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: *Do not connect continuous trickle charger to the cigarette lighter.*
The cigarette lighter is powered by the rear distribution box via a relay. This relay drops out after terminal 15 OFF. This means that a continuous trickle charger connected to the cigarette lighter is disconnected from the battery. Charge the battery via the jump-start connection points. Only then can the power supply be registered by the vehicle.

WARNING: Danger of destruction in event of mechanical strain

- Do not introduce any additional connections at the battery negative terminal.
- Do not modify the grounding cable.

The grounding cable also serves to dissipate heat.

- Do not establish any connection between the IBS and the sensor screw.
- Do not use force when disconnecting the pole shoe from the battery terminal:
 - Do not pull on the grounding cable.
 - Do not place any tools under the IBS to lever off the pole shoe.

- Do not use IBS connections as levers.
- Use a torque wrench and set tightening torque in accordance with repair instructions.
- Do not release or tighten down sensor screw (screw with Torx head).
- Avoid contact between IBS and ground.

WARNING: Danger of destruction to IBS and cables when battery is replaced

- The IBS and the cables can be destroyed by mechanical strain when the battery is replaced. Therefore avoid mechanical strain.
- The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).
- Use the battery size (capacity) installed as standard when replacing the battery.
- Register battery change via Service Function (Progman or DIS).
- Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.
- Always proceed in accordance with the repair instructions.

NOTE: *Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.*

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- For this reason, only replace the IBS when a corresponding fault is entered in the DME or DDE.

61 12 002 REPLACING POSITIVE BATTERY CABLE (FROM BATTERY TO LUGGAGE COMPARTMENT CONNECTOR)

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary tasks:

- Remove LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM
- Remove RIGHT LUGGAGE COMPARTMENT WHEEL ARCH TRIM
- Disconnect battery negative lead

Security version:

- Remove protective cover from distribution box/battery positive terminal (luggage compartment)

Lever out clips (1).

Release plastic nuts (2).

Remove underlay for luggage compartment floor panel (3).

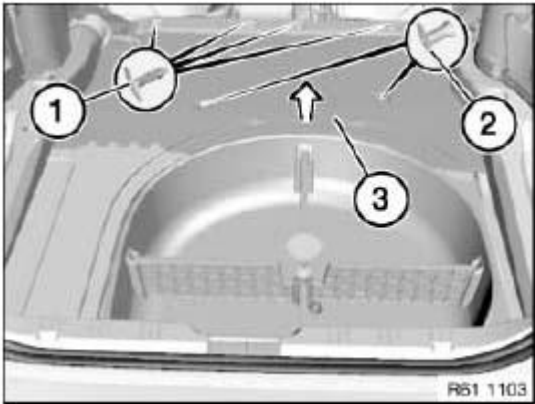


Fig. 3: Identifying Luggage Compartment Floor Panel And Plastic Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect plug connection (3) of IBS cable.

Unlock cable lug mounting and fold back.

Unscrew nut (2).

Tightening torque **61 21 4AZ** .

Remove positive battery cable.

Unscrew nut (5).

Tightening torque **61 21 1AZ** .

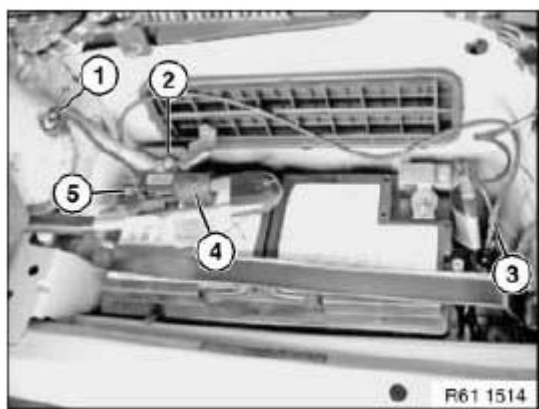


Fig. 4: Identifying IBS Cable Plug Connection And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not under any circumstances pull/lever safety battery terminal (4) off by force.

Pull safety battery terminal (4) upwards and remove.

Open cable lug mounting (1).

Release screw (2).

Tightening torque **61 12 3AZ** .

Unclip and remove positive battery cable (3).

WARNING: Risk of short circuits!

During installation, make sure that

- Cable lug mounting (1) is correctly seated on positive battery cable (3)
- Screw is properly connected.

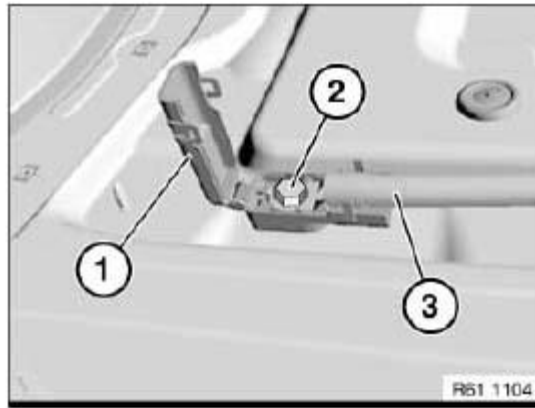


Fig. 5: Identifying Cable Lug Mounting, Screw And Battery Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip positive battery cable (1) from cable guides (2) and remove.

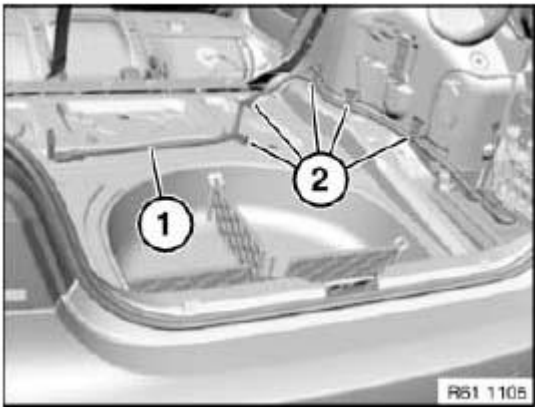


Fig. 6: Identifying Positive Battery Cable And Cable Guides
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 013 REPLACING BATTERY NEGATIVE LEAD

WARNING: Observe **SAFETY INSTRUCTIONS** for handling vehicle battery.
Read and comply with notes and instructions on **INTELLIGENT BATTERY SENSOR**.

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT TRIM ON SIDE PANEL ON RIGHT**

Security version:

- Remove luggage compartment equipment carrier

Slacken nut (1) on negative battery terminal.

Tightening torque **61 21 1AZ** .

IMPORTANT: Do not under any circumstances use force to pull off pole shoe.
Do not under any circumstances release socket-head cap screw of IBS.

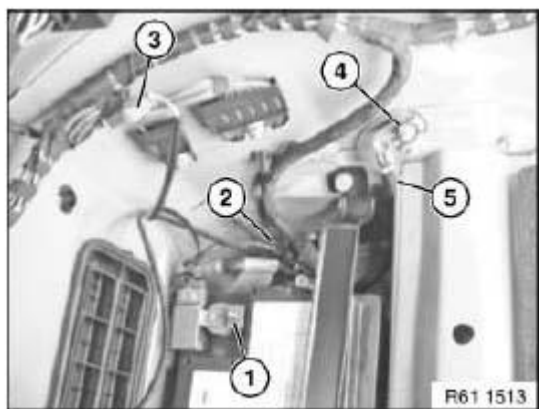


Fig. 7: Identifying Plug Connection, Battery Negative Lead And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Detach negative battery lead with intelligent battery sensor (IBS) in upward direction.

Disconnect plug connection (2).

Disconnect plug connection (3).

Release nut (4) and battery negative lead (5).

Tightening torque **61 21 2AZ** .

61 12 065 REPLACING WIRING HARNESS FOR FRONT BUMPER

IMPORTANT: Read and comply with notes on HANDLING WIRING HARNESSES AND CABLES.

Necessary preliminary tasks:

- Remove FRONT BUMPER TRIM .

NOTE: Operation is shown by way of example on the E63 (build date up to 09/2007).
There may be differences in detail in the case of other vehicle models.

Disconnect plug connections (1) on four ultrasonic transducers.

Unclip wiring harness (2) from bumper trim.

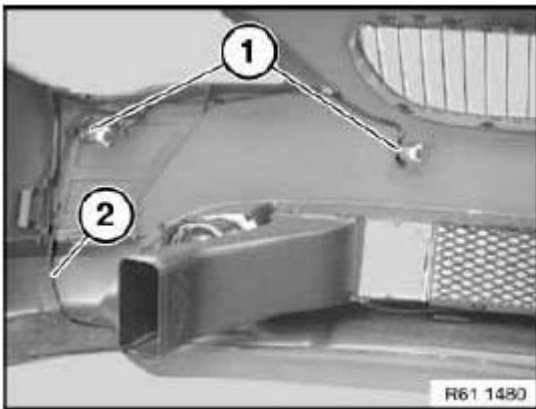


Fig. 8: Identifying Plug Connections And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Turn plug (1) in direction of arrow and feed out of bumper trim.

Remove wiring harness (2).

Installation:

Make sure wiring harness (2) is laid correctly.



Fig. 9: Identifying Wiring Harness And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 067 REPLACING WIRING HARNESS FOR REAR BUMPER

Operation is described in:

Replacing **REAR BUMPER TRIM** .

61 12 200 REPLACING WIRING HARNESS IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks:

- Close front side window completely.
- Remove **FRONT DOOR TRIM PANEL** .

IMPORTANT: Follow instructions for **HANDLING OPTICAL FIBRES**.

Unlock plug connections (1) and disconnect.

Release door wiring harness (2) at point (3).

Unclip door wiring harness (2) at points (4).

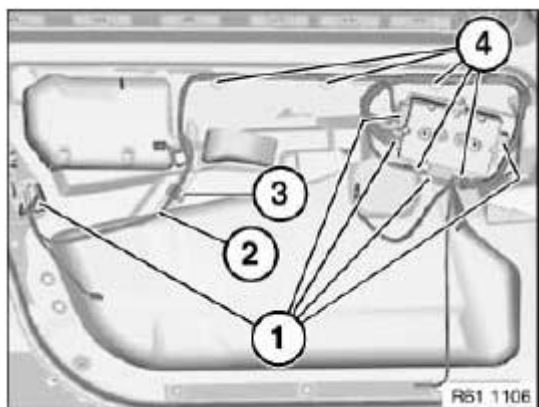


Fig. 10: Identifying Door Wiring Harness And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Detach **SOUNDPROOFING** on front door in working area.

Unfasten plug connection (1) and disconnect.

Cut through cable ties (2).

Disconnect door wiring harness (3) at retainer (4).

Unclip door wiring harness (3) in area of front window guide.

Installation:

Make sure door wiring harness (3) is correctly laid.

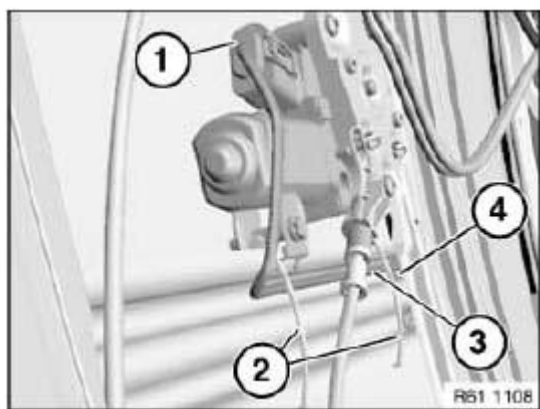


Fig. 11: Identifying Door Wiring Harness And Plug Connection
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Front side panel shown removed for purposes of clarity.

Release screw (1), fold door wiring harness plug on A-pillar (2) downwards slightly and remove.

Unlock plug connection behind and disconnect.

Pull rubber grommet (3) in direction of arrow out of front door (4).

Feed out door wiring harness towards front to A-pillar and remove.

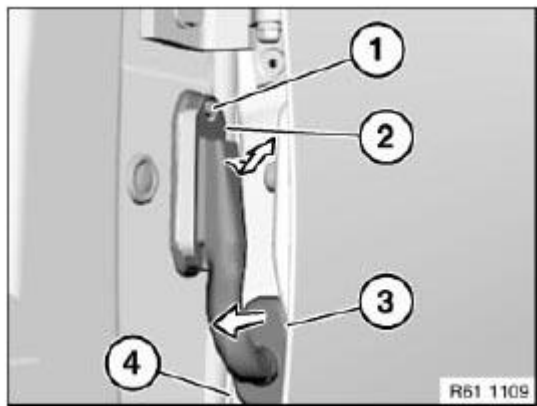


Fig. 12: Identifying Door Wiring Harness Plug On A-Pillar, Rubber Grommet And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

61 12 200 REPLACING WIRING HARNESS IN LEFT OR RIGHT FRONT DOOR (LONG VERSION)

Necessary preliminary tasks:

- Close front side window completely

- Disconnect battery negative lead
- Remove **FRONT DOOR TRIM PANEL**
- Remove **SOUND INSULATION IN FRONT DOOR**

Release cable (1) from door wiring harness (2).

Disconnect plug connection (3).

Release door wiring harness (2) at point (4).

Installation:

Make sure door wiring harness (2) is correctly laid.

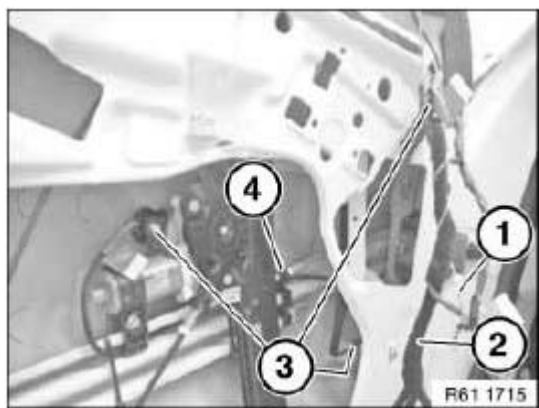


Fig. 13: Identifying Door Wiring Harness And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Front side panel shown removed for purposes of clarity.

Release screw (1), fold door wiring harness plug on A-pillar (2) downwards slightly and remove.

Unlock plug connection behind and disconnect.

Pull rubber grommet (3) in direction of arrow out of front door (4).

Feed out door wiring harness towards front to A-pillar and remove.

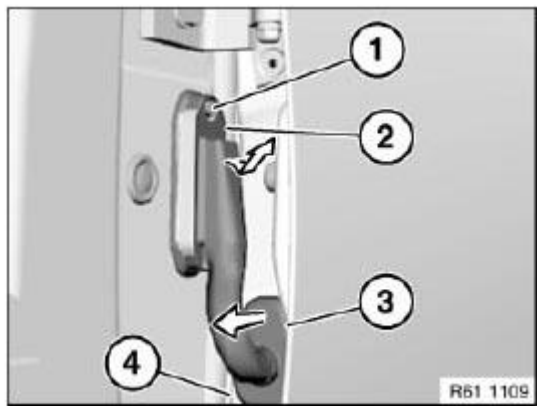


Fig. 14: Identifying Door Wiring Harness Plug On A-Pillar, Rubber Grommet And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 210 REPLACING WIRING HARNESS IN LEFT OR RIGHT REAR DOOR

Necessary preliminary tasks:

- Close rear side window completely.
- Remove **REAR DOOR TRIM PANEL**.

IMPORTANT: Follow instructions for **HANDLING OPTICAL FIBERS**.

Unfasten plug connection (1) and disconnect.

Release door wiring harness (2) at point (3).

Unclip door wiring harness (2) at points (4).

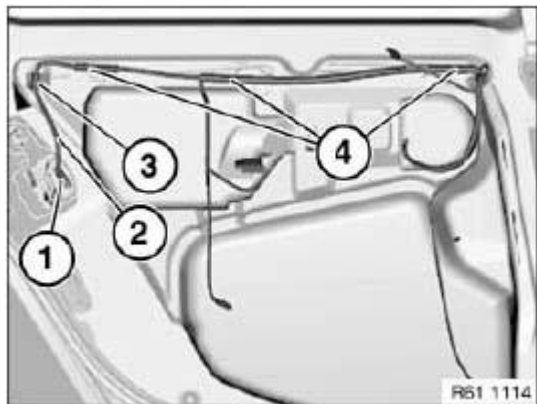


Fig. 15: Identifying Plug Connection And Door Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Detach **SOUNDPROOFING** on rear door in working area.

Unfasten plug connection (1) and disconnect.

Disconnect door wiring harness (2) at retainer (3).

Unclip door wiring harness (2) at points (4).

Installation:

Make sure door wiring harness (2) is correctly laid.

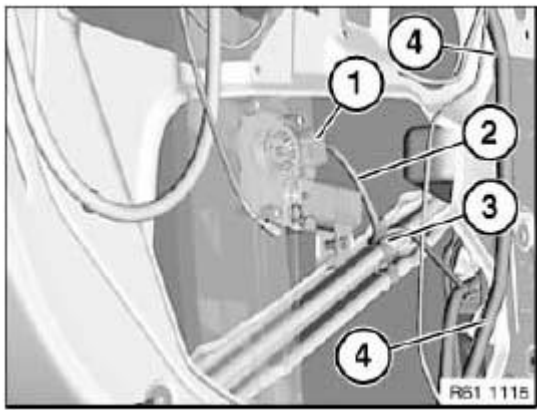


Fig. 16: Identifying Plug Connection And Door Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For clearer illustration, shown with front door removed.

Release screw (1), fold door wiring harness plug on B-pillar (2) downwards slightly and remove.

Unlock plug connection behind and disconnect.

Pull rubber grommet (3) in direction of arrow out of rear door (4).

Feed out door wiring harness towards front to B-pillar and remove.

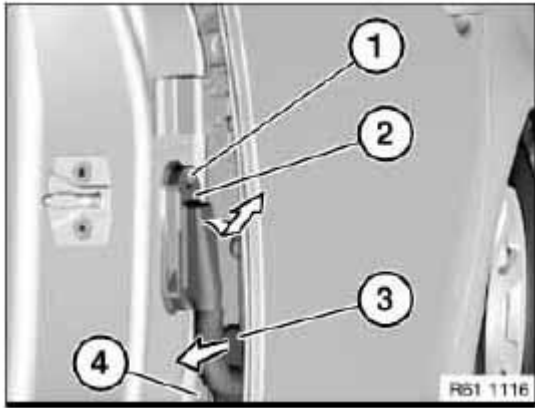


Fig. 17: Identifying Door Wiring Harness Plug On B-Pillar, Rubber Grommet And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 210 REPLACING WIRING HARNESS IN LEFT OR RIGHT REAR DOOR (LONG VERSION)

Necessary preliminary tasks:

- Close rear side window completely
- Disconnect battery negative lead
- Remove **REAR DOOR TRIM PANEL**
- Remove **SOUND INSULATION IN REAR DOOR**

Disconnect plug connection (1).

Disconnect door wiring harness (2) at retainer (3).

Installation:

Make sure door wiring harness (2) is correctly laid.

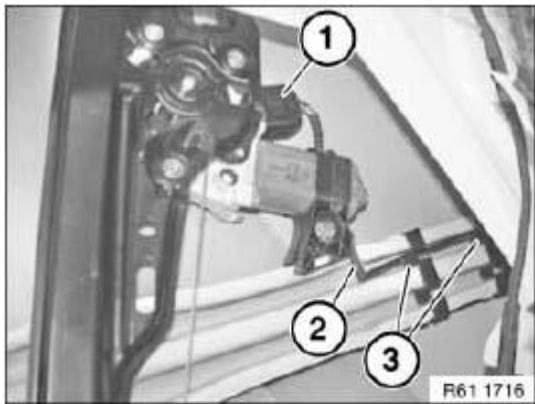


Fig. 18: Identifying Door Wiring Harness And Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For clearer illustration, shown with front door removed.

Release screw (1), fold door wiring harness plug on B-pillar (2) downwards slightly and remove.

Unlock plug connection behind and disconnect.

Pull rubber grommet (3) in direction of arrow out of rear door (4).

Feed out door wiring harness towards front to B-pillar and remove.

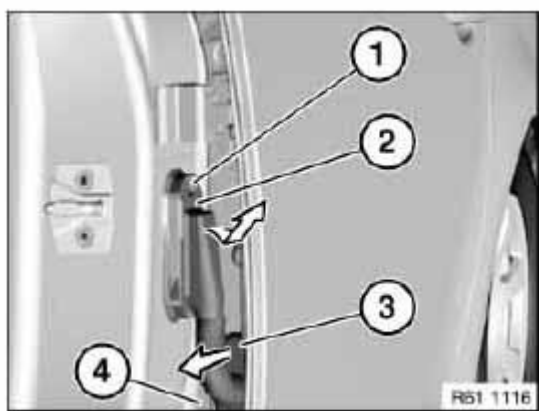


Fig. 19: Identifying Door Wiring Harness Plug On B-Pillar, Rubber Grommet And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 265 REPLACING WIRING HARNESS ON LEFT OR RIGHT FRONT SEAT

Operation is described in:

Replacing WIRING HARNESS ON LEFT OR RIGHT FRONT SEAT (COMFORT).

61 12 270 REPLACING WIRING HARNESS ON LEFT OR RIGHT FRONT SEAT (COMFORT SEAT)

Necessary preliminary tasks:

- Remove FRONT HEAD RESTRAINT .
- Remove OUTER COVER on front seat.
- Remove FRONT SEAT
- Remove INNER COVER ON FRONT SEAT
- Remove REAR PANEL on front seat backrest.

Disconnect all plug connections (1).

Release cable tie (2).

Removing wiring harness.

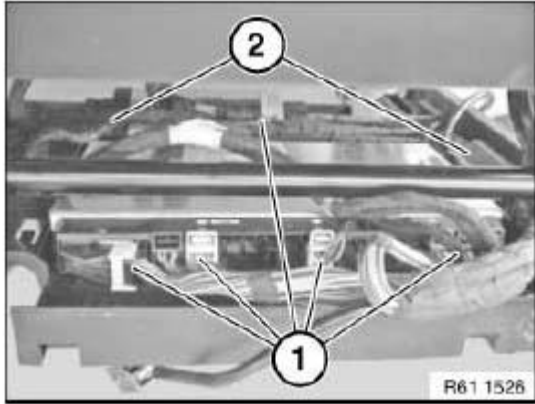


Fig. 20: Identifying Plug Connections And Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook seat fabric at retaining points (1).

Lever out clip (2).

Fold back seat fabric.

Unhook backrest fabric at retaining points (3).

Fold back backrest fabric.

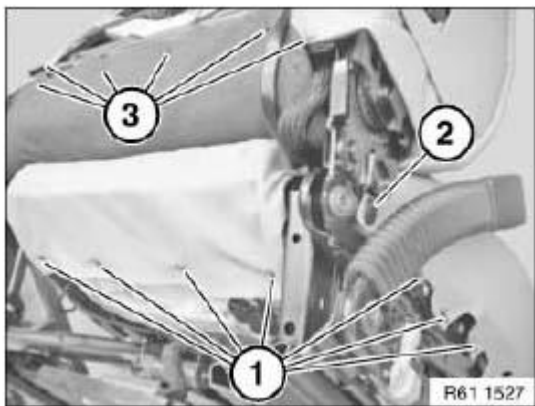


Fig. 21: Identifying Retaining Points
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect all plug connections (1).

Release cable tie (2).

Removing wiring harness.

Installation:

Make sure wiring harness is correctly laid.

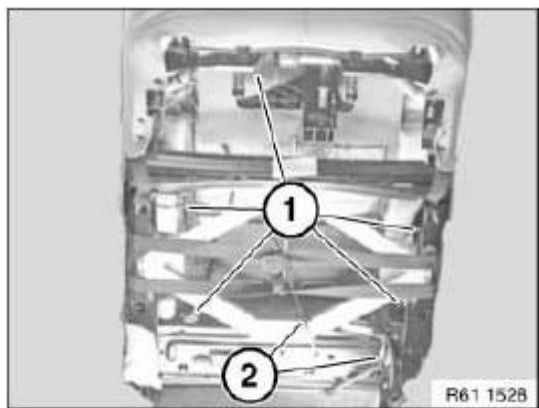


Fig. 22: Identifying Plug Connections And Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

CONNECTORS, TERMINALS, FUSE BOX

61 13... MAIN RELAY CONNECTOR FOR DME

Unlock locking flap (1) of corresponding cable.

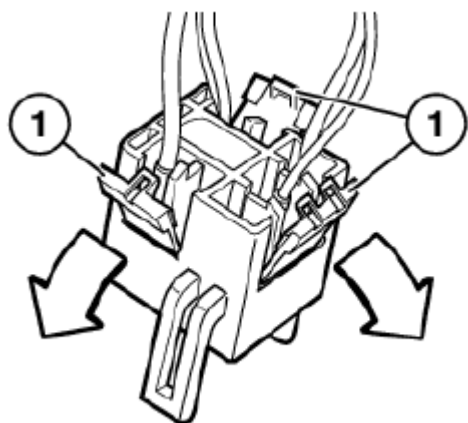


Fig. 23: Unlocking Locking Flap
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 1 136** or **61 1 137** (ejector), press back arrester hook (2) of appropriate contact and pull out

cable.

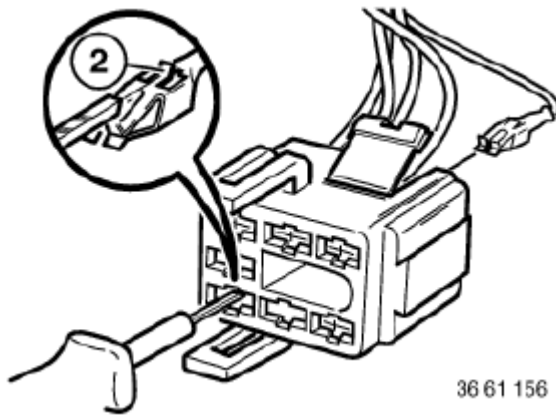


Fig. 24: Pressing Back Arrester Hook

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... REMOVING AND INSTALLING/REPLACING FIBRE-OPTIC CABLE CONNECTOR

IMPORTANT: Comply with notes and instructions on handling FIBRE-OPTIC CABLES.

Necessary preliminary tasks:

E60:

- Remove LUGGAGE COMPARTMENT TRIM ON LEFT SIDE PANEL

E61:

- Remove luggage compartment wheel arch trim on left.

Insert a small screwdriver into openings (1).

Expand catches of cover (2) and remove cover (2) in direction of arrow.

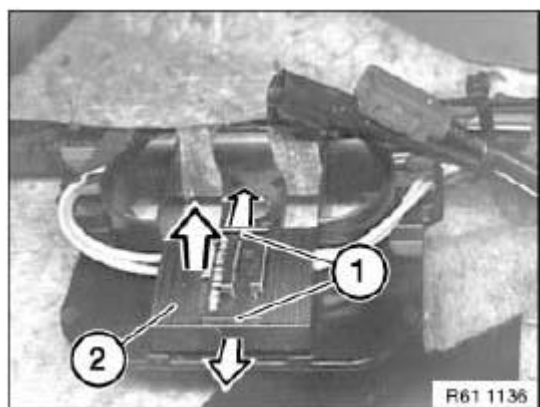


Fig. 25: Expanding Catches Of Cover

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Fibre-optic cables with locks at top can be removed directly.
Before the fibre-optic cables with locks at the bottom are removed, the fibre-optic cable connector (4) must be removed from the holder (3).

Removing a fibre-optic cable:

Lift lock (1) carefully and feed fibre-optic cable (2) out of connector (4).

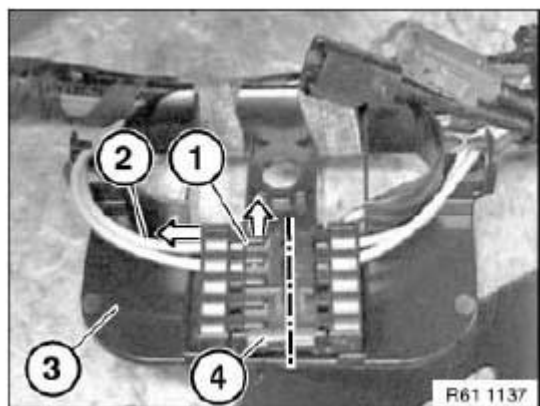


Fig. 26: Identifying Feed Fibre-Optic Cable And Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure fibre-optic cable (2) is correctly engaged in fibre-optic cable connector (4).

Removing connector (2) from holder (3):

Release lock in bore (1) by pressing and remove fibre-optic cable connector (2) in direction of arrow from holder (3).

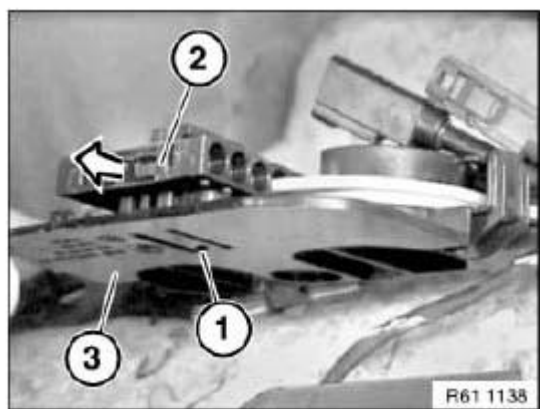


Fig. 27: Removing Fibre-Optic Cable Connector
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SOCKET OF TAB CONNECTOR HOUSINGS

Unlock hook (1) with special tool **61 1 360** and slide plug housing downwards out of base.

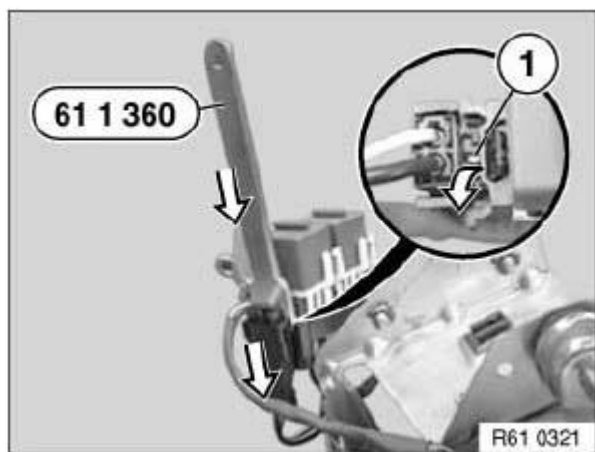


Fig. 28: Unlocking Hook Using Special Tool (61 1 360)
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

Special tools required:

- **61 0 300**
- **61 9 040**

IMPORTANT:

1. Identify cause of damage (e.g. sharp-edged body parts, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).
2. Read out fault memory

3. Eliminate cause of damage.
4. Disconnect battery negative terminal
5. Make sure that no safety-related system according to connection scheme (e.g. anti-lock braking system, active rear-axle kinematics, airbags, etc.) are influenced.

Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Service)

6. Carry out function test and read out fault memories again
7. Eliminate new faults if applicable and clear fault memories

NOTE: The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

Special tools:

- special tool 61 9 040

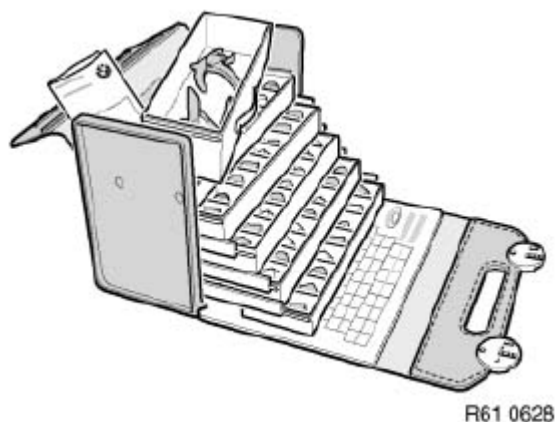
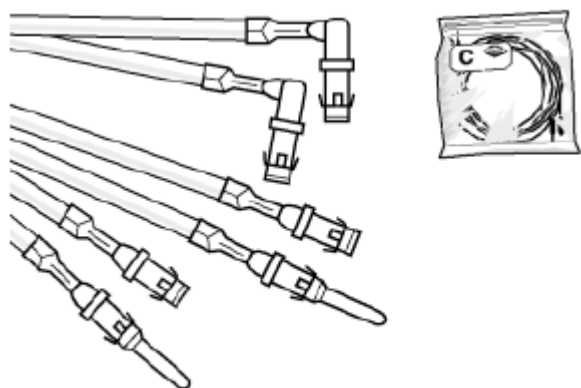


Fig. 29: Identifying Special Tool Kit (61 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular plug system D 2.5.

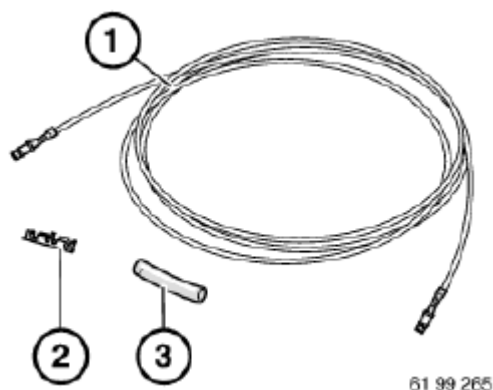


R61 99 257

Fig. 30: Identifying Special Tool (61 9 040)
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts:

1. Prepackaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section
3. Shrink-fit hose



61 99 265

Fig. 31: Identifying Shrink-Fit Hose, Crimp Connector And Prepackaged End Of Cable
 Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using relevant special tool contained in special tool kit **61 0 300** .

Refer to repair instructions:

OPENING PLUG HOUSINGS AND REMOVING CONTACTS OF DIFFERENT PLUG SYSTEMS

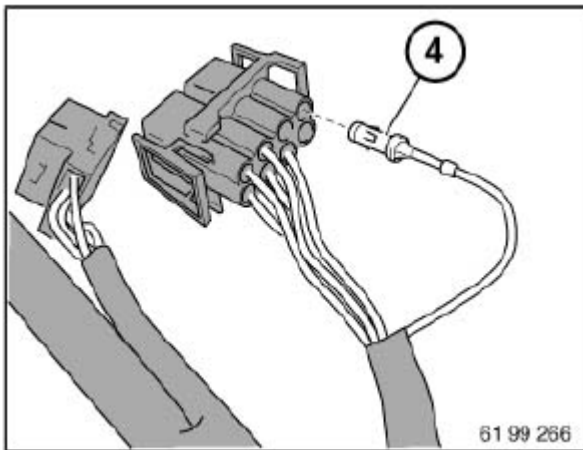


Fig. 32: Identifying Damaged Contact

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- Check maximum length of repair cable
- If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.

Observe following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

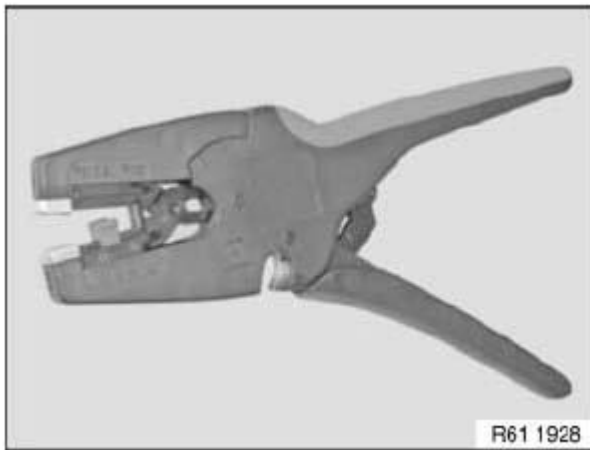


Fig. 33: Identifying Pliers

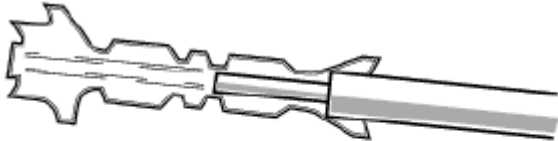
Courtesy of BMW OF NORTH AMERICA, INC.

Refer also to repair instruction:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

Crimp butt connector on preassembled wire end.

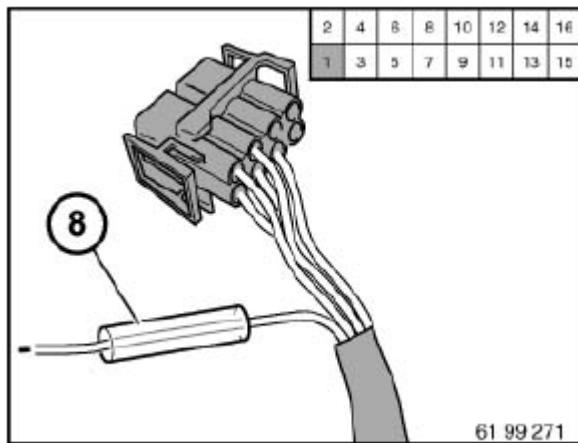
Refer to repair instructions:

CRIMPING ON STOP PARTS

61 99 270

Fig. 34: Identifying Crimp Butt Connector
 Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.



61 99 271

Fig. 35: Identifying Shrink-Fit Hose Onto Free Wire End
 Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.

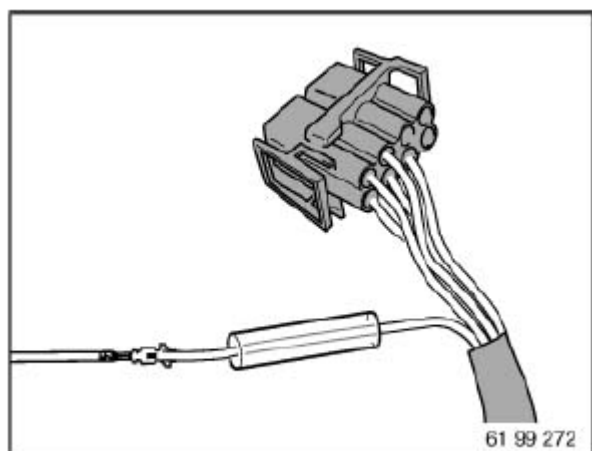


Fig. 36: Identifying Crimp Unused Wire End To Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

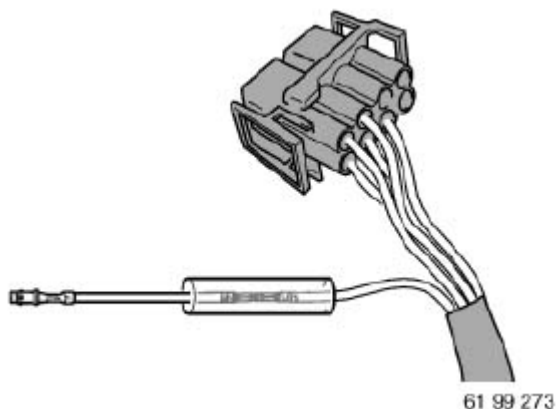


Fig. 37: Identifying Shrink-On Sleeve Over Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

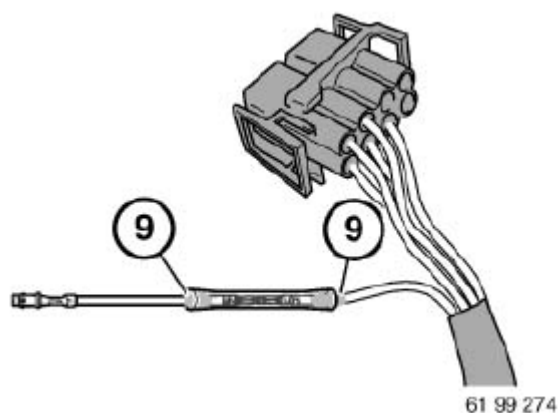


Fig. 38: Shrinking Sleeve On Both Sides With Hot Air Blower
 Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CRIMPING MICRO POWER QUADLOCK CONTACTS (MPQ)

Special tools required:

61 4 320

To crimp MPQ contacts, use pliers **61 4 321** (1) in conjunction with crimping head **61 4 325** (2) from crimping set **61 4 320**.

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

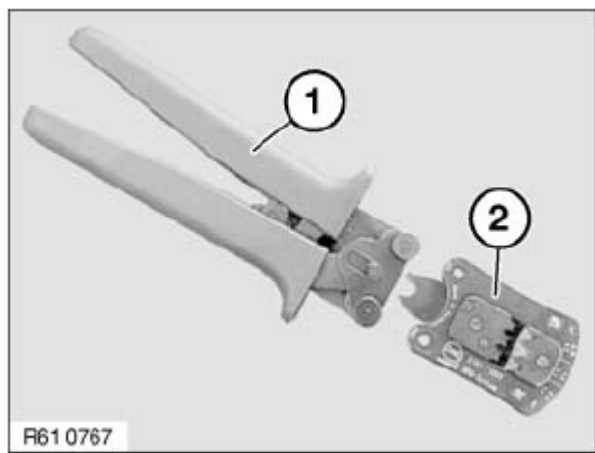


Fig. 39: Identifying Pliers (61 4 321) And Crimping Head (61 4 325)
 Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (1).

NOTE: Place contact (2) with utmost care in designated nest (observe cable cross-section) in crimping head (3). Make sure it is exactly positioned.

Place MPQ contact (2) in crimping head (3).

Close pliers (1) one notch.

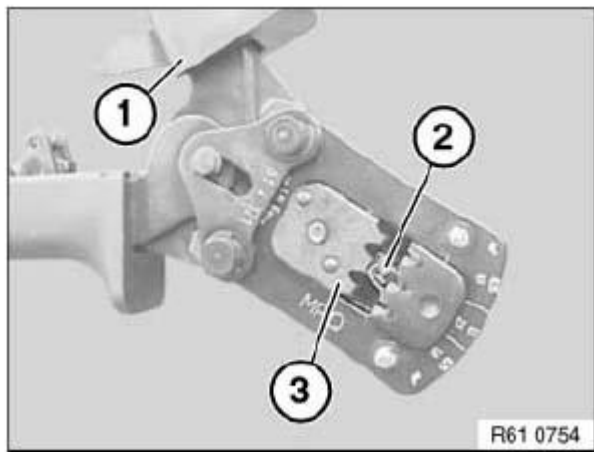


Fig. 40: Identifying Pliers, Crimping Head And MPQ Contact
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION from cables.

Insert stripped cable (2).

Close pliers (1) fully.

Open pliers (1) and remove cable (2).

NOTE: CHECK CONTACT FOR CORRECT CRIMPING.

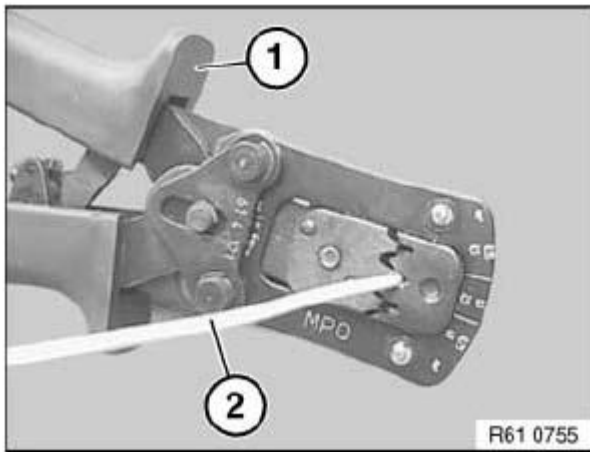


Fig. 41: Inserting Stripped Cable

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CRIMPING MICRO QUADLOCK SYSTEM CONTACTS (MQS)

Special tools required:

61 4 320

To crimp MQS contacts, use pliers **61 4 321** (1) in conjunction with crimping head **61 4 324** (2) from crimping set **61 4 320**.

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

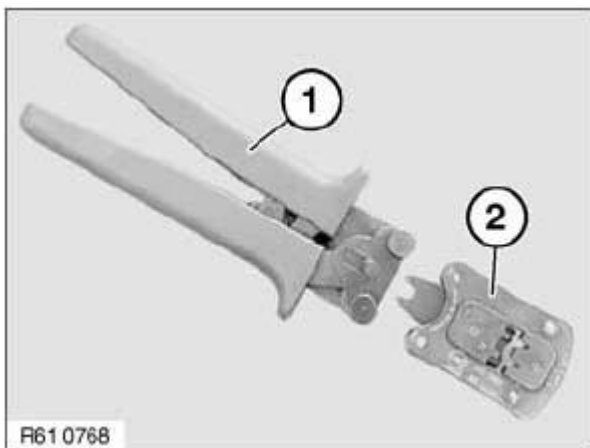


Fig. 42: Identifying Pliers (61 4 321) And Crimping Head (61 4 324)

Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (1).

Fold up contact carrier (2).

Insert MQS contact (3) in contact carrier (2).

Fold back contact carrier (2).

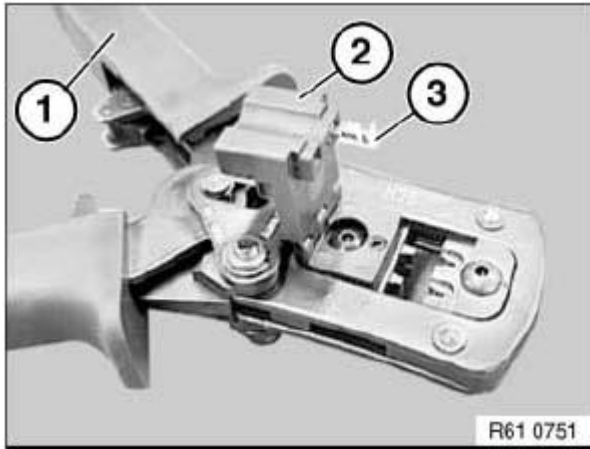


Fig. 43: Identifying Pliers, Contact Carrier And MQS Contact
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION from cables.

Close pliers (1) one notch.

Insert stripped cable (2).

Close pliers (1) fully.

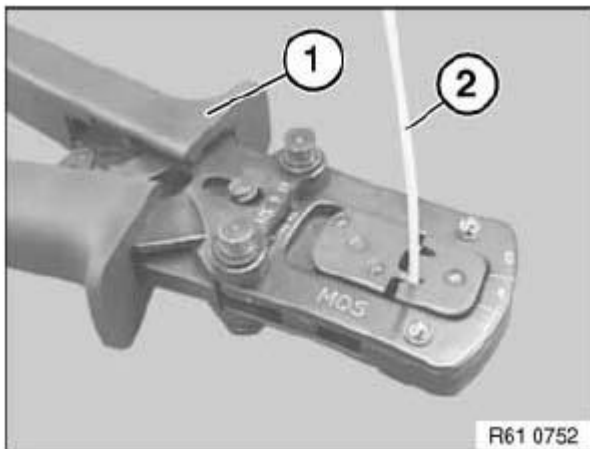


Fig. 44: Inserting Stripped Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (1).

Open contact carrier (2) gently and carefully remove MQS contact.

NOTE: **CHECK CONTACT FOR CORRECT CRIMPING.**

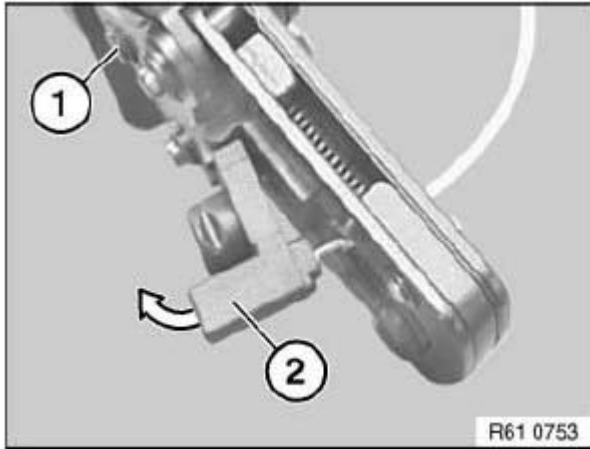


Fig. 45: Opening Contact Carrier

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CRIMPING ANNULAR CONTACTS

Special tools required:

· **61 4 320**

Crimping annular contacts:

Special tool **61 4 320**

61 13... CRIMPING OPTICAL FIBRES

Special tools required:

· **61 4 320**

To crimp optical fibres, use pliers **61 4 321** (1) in conjunction with crimping head **61 4 323** (2) from crimping set **61 4 320**.

NOTE: **Pliers (1) open automatically as far as they will go when handles are pressed together.**

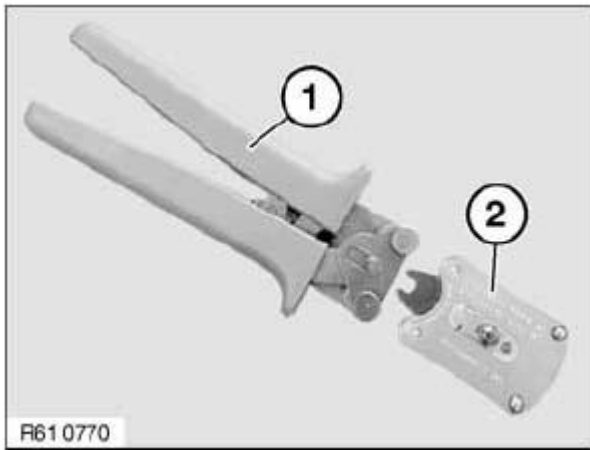


Fig. 46: Identifying Pliers (61 4 321) And Crimping Head (61 4 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).

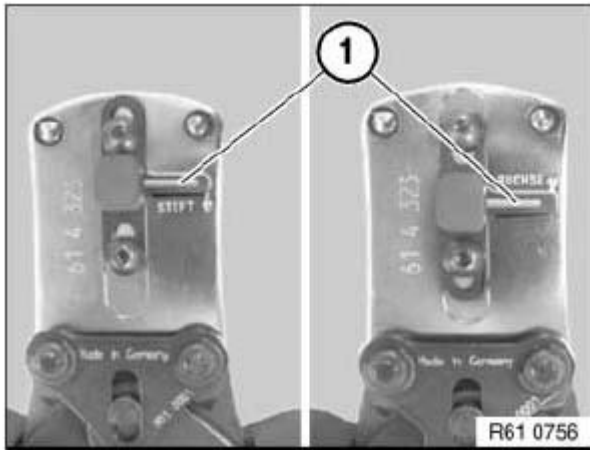


Fig. 47: Identifying Stop Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).

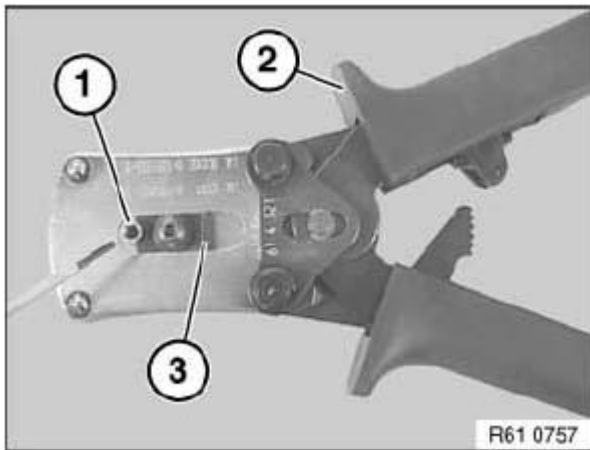


Fig. 48: Identifying Pliers And Locking Lever
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION FROM OPTICAL FIBRES.

Insert stripped optical fibre (1) as far as it will go into pin contact or jack (2).

Close pliers (3) fully.

Open pliers (3) and locking lever (4).

Remove optical fibre (1).

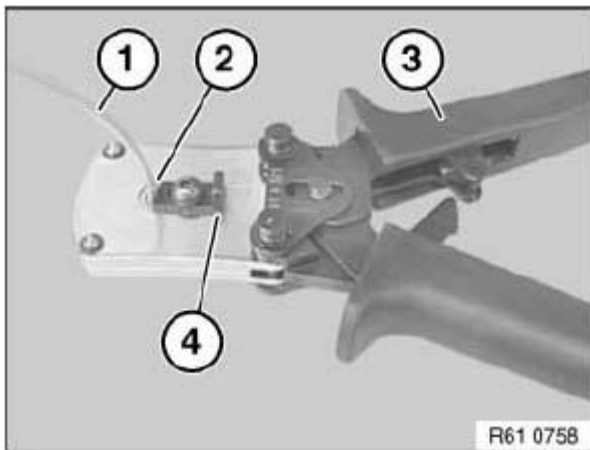


Fig. 49: Inserting Stripped Optical Fibre
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure optical fibre is correctly seated in jack.

Right (A)

End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

End of optical fibre (1) is not flush with tip of pin contact (2).

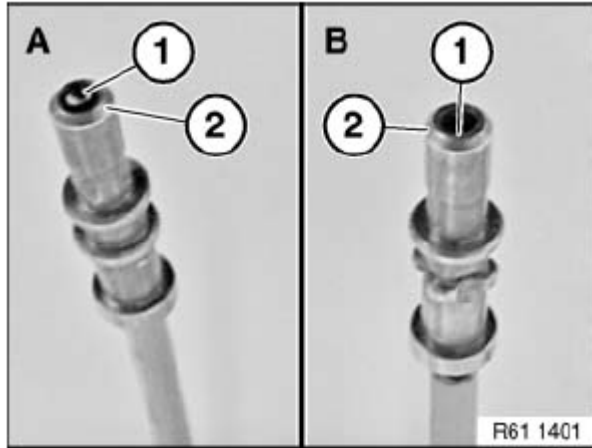


Fig. 50: Identifying Optical Fibre And Tip Of Pin Contact
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CRIMPING STOP PARTS

Special tools required:

- 12 1 080
- 12 1 081
- 12 1 083

Spare parts for in-car electronics (housing and contacts):

Refer to Service Information:

SI 2 04 07 341

1. Crimping butt connectors and contact sleeves for fan connectors up to 2.5 mm²

Refer to Service Information:

SI 2 04 06 293

2. Crimping butt connectors and contact sleeves for fan connectors from 2.5 mm²>

Refer to Service Information:**SI 2 02 05 194****SI 2 07 05 233****3. Crimping contact sleeves for fan connectors 4 mm² and ignition cable contacts**

Special tool kit **12 1 080** is used to fit ignition cable contacts and to crimp 4 mm² contact sleeves for fan connectors.

- **12 1 081** (hand crimping tool)
- **12 1 083** (matrix)

Refer to repair instructions:

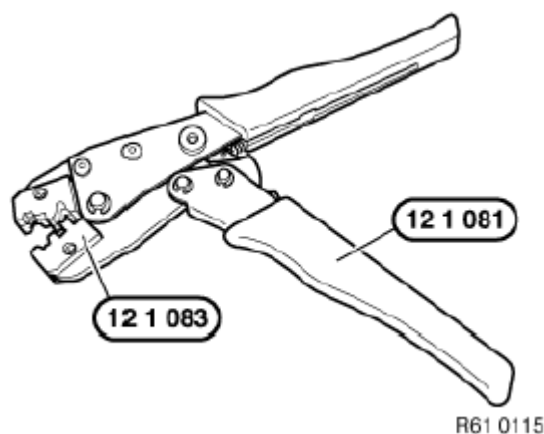
SPECIAL TOOLS FOR WIRING HARNESS REPAIRS

Fig. 51: Identifying Hand Crimping Tool (12 1 081)

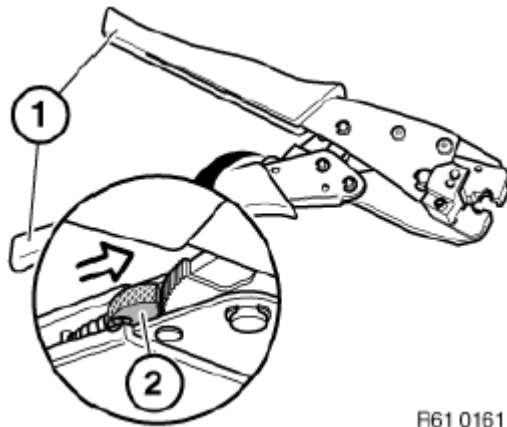
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock special tool **12 1 081**:

Squeeze grips (1) lightly and push unlocking lever (2) in direction of arrow.

Or:

Compress handles as far as they will go, tool unlocks automatically.

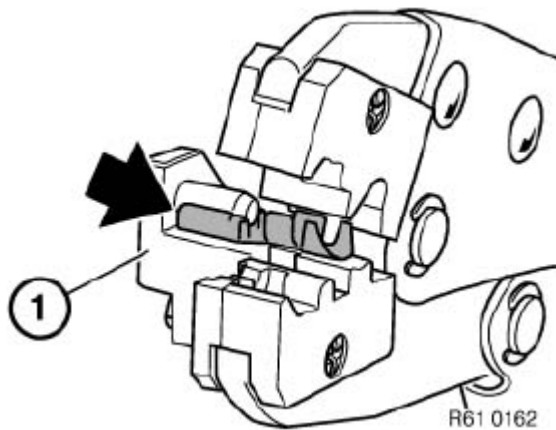


R61 0161

Fig. 52: Pushing Unlocking Lever

Courtesy of BMW OF NORTH AMERICA, INC.

Insert contact sleeve 4 mm² in nest with lock (1) as far as it will go.

**Fig. 53: Inserting Contact Sleeve**

Courtesy of BMW OF NORTH AMERICA, INC.

Preload contact by squeezing matrix in crimping tool. Grip contact (1) firmly only, do not crimp.

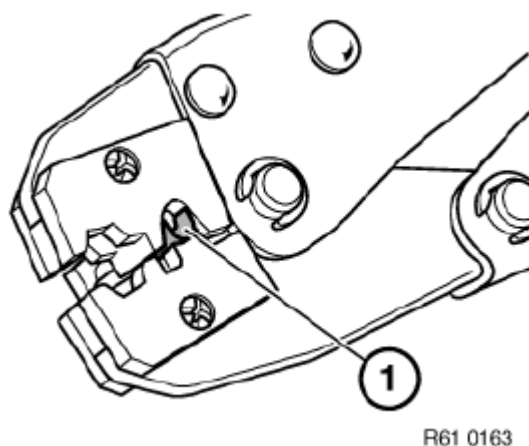


Fig. 54: Identifying Grip Contact

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION FROM CABLES.

Insert stripped end of wire (7) in the contact. Ensure insulation and stripped wire end are correctly laid in contact.

Compress crimping tool as far as it will go.

Crimping tool unlocks automatically.

Take contact out of crimping tool.

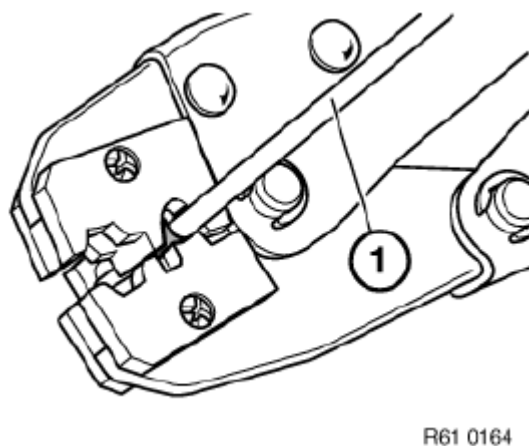


Fig. 55: Identifying Wire

Courtesy of BMW OF NORTH AMERICA, INC.

4. Checking crimping

Check insulation crimp (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

NOTE: Illustration shows butt connectors and contact sleeves for fan connectors knocked on one side. The crimping procedure is identical here.

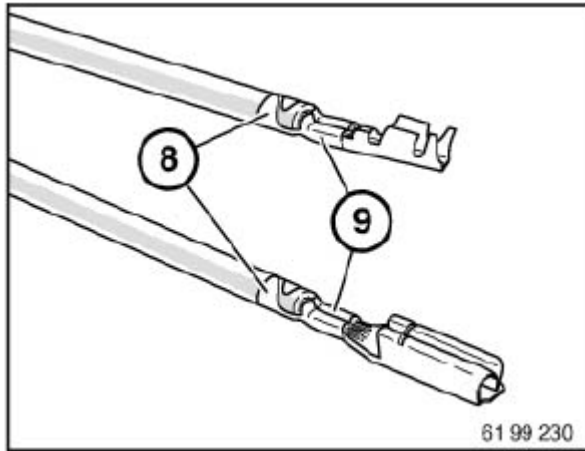
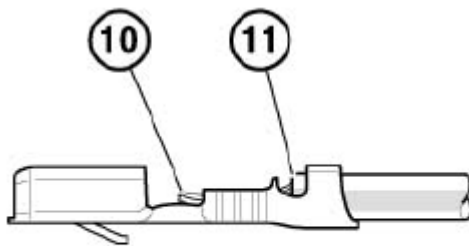


Fig. 56: Identifying Insulation Crimp And Wire Crimp
Courtesy of BMW OF NORTH AMERICA, INC.

Correct crimping:

Visible conductor end (10).

Visible insulation end (11).



61 99 231

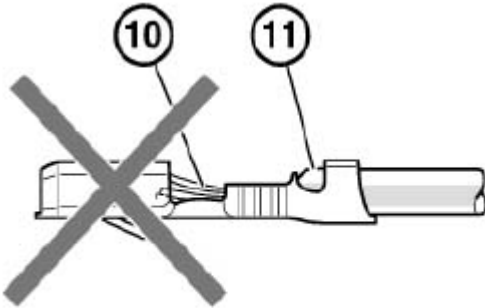
Fig. 57: Identifying Correct Crimping
Courtesy of BMW OF NORTH AMERICA, INC.

Incorrect crimping:

Conductor end (10) inserted too far.

Insulation end (11) in wire crimp.

If necessary, repeat crimping with a new contact.



61 99 232

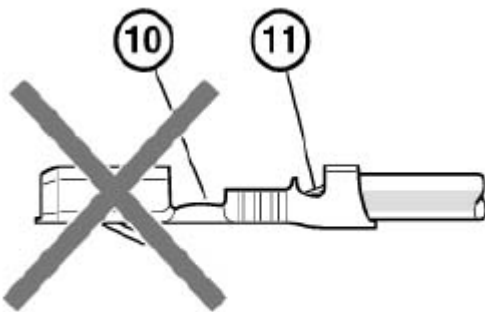
Fig. 58: Identifying Incorrect Crimping
Courtesy of BMW OF NORTH AMERICA, INC.

Incorrect crimping:

Conductor end (10) not visible.

Insulation end (11) not visible.

If necessary, repeat crimping with a new contact.



61 99 233

Fig. 59: Identifying Incorrect Crimping
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH

Special tools required:

61 4 320

To cut off, strip insulation and cut optical fibres to length, use pliers **61 4 321** (1) in conjunction with crimping head **61 4 322** (2) from crimping set **61 4 320**.

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

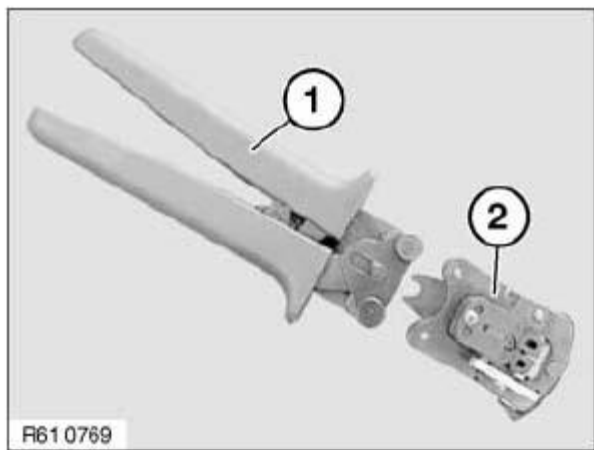


Fig. 60: Identifying Pliers (61 4 321) And Crimping Head (61 4 322)
Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre

Open pliers (1).

Place optical fibre (2) in cutting device (3).

Close pliers (1) and remove optical fibre (2).

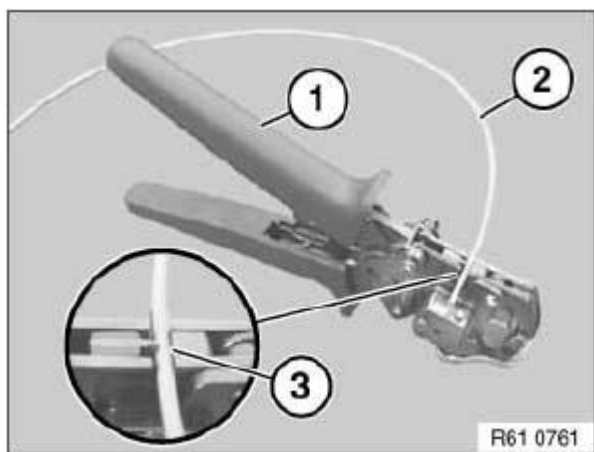


Fig. 61: Placing Optical Fibre In Cutting Device
Courtesy of BMW OF NORTH AMERICA, INC.

Stripping insulation from optical fibre

Open pliers (1).

Open lever (2) in direction of arrow.

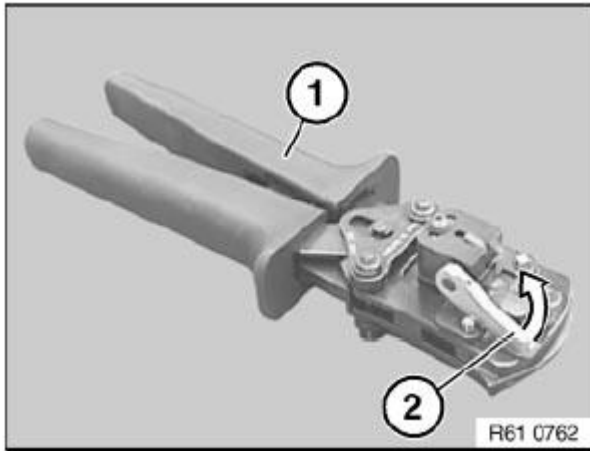


Fig. 62: Opening Lever

Courtesy of BMW OF NORTH AMERICA, INC.

Slide optical fibre (1) into stripping device (2) until flush at point (3).

Close pliers (4) fully.

Close clamping lever (5) in direction of arrow.

Open pliers (4) by one tooth notch.

Open clamping lever (5) against direction of arrow again and remove optical fibre (1).

NOTE: A stripping replacement blade set is available under number 61 4 327 .

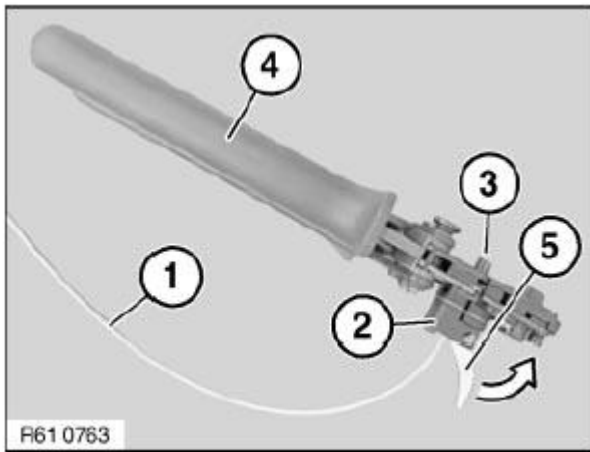


Fig. 63: Opening Clamping Lever

Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre to length

IMPORTANT: The cutting blade must be replaced prior to each cutting of the optical fibre.

Pull pin (1) in direction of arrow.

Fold up blade retaining link (2) in direction of arrow.

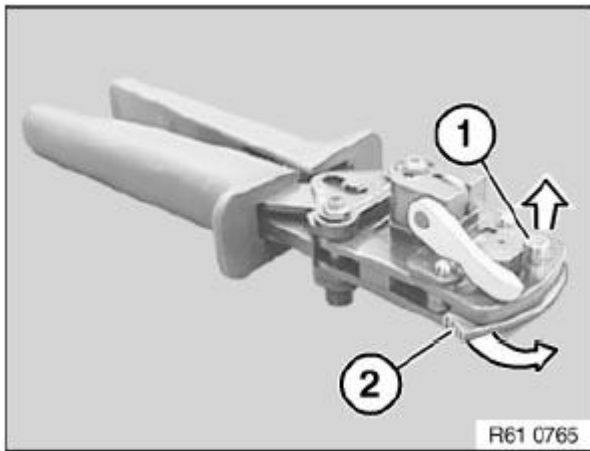


Fig. 64: Identifying Pin And Blade Retaining Link

Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury when changing the blade.

Remove blade (1) and replace.

Installation:

Make sure blade (1) is correctly seated on locating points (2).

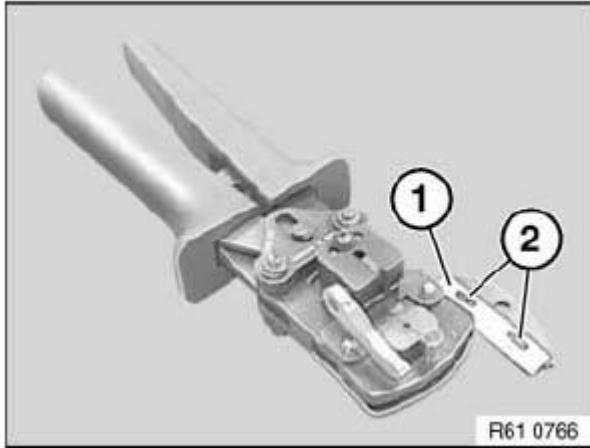


Fig. 65: Identifying Blade Is Correctly Seated On Locating Points
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (3).

Slide optical fibre (1) into cutting device (2) until insulation of optical fibre (1) butts against clamping device.

Close pliers (3) fully and keep closed.

Remove optical fibre (1).

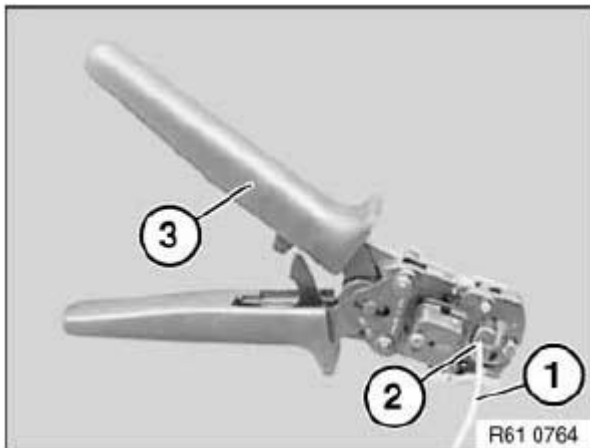


Fig. 66: Identifying Optical Fibre, Cutting Device And Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

For cutting cables to length and stripping insulation: refer to **CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH.**

Stripped length:

STRIPPED LENGTH REFERENCE

Wire cross-section (mm ²)	Stripped length (mm)
0.35... 0.50	4.0
0.75... 1.00	4.5
1.00... 2.50	5.0

61 13... IN-LINE PLUGS, 2-PIN, SYSTEM JPT ELA

Press lock (1) in direction of arrow and slide connector forward.

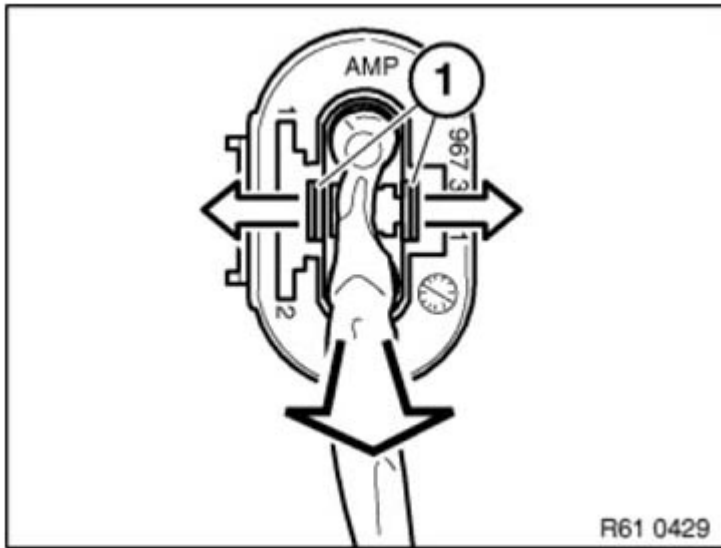
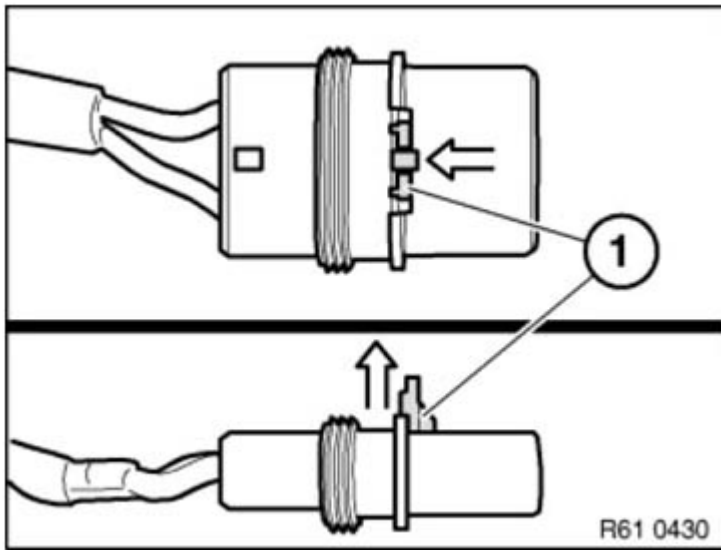


Fig. 67: Sliding Connector

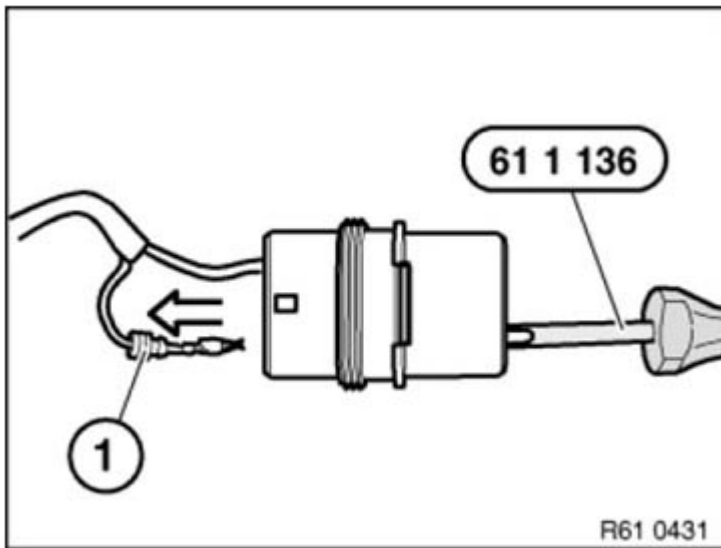
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock (1) downward and slide out to one side.

**Fig. 68: Sliding Lock**

Courtesy of BMW OF NORTH AMERICA, INC.

With special tool 61 0 316 (61 1 136), unlock contact and pull out cable (1) with contact towards rear.

**Fig. 69: Pulling Out Cable With Contact Using Special Tool (61 1 136)**

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE PLUGS, 24-PIN, HYBRID SYSTEM MQS/MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the plug housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)

MPQ, width 5.2 mm (Micro Power Quadlock)

Socket housing:

Press locks (1) on cap (2) upwards on both sides.

Detach cap from contact carrier (3).

NOTE: Detaching the cap releases the secondary locks of the socket contacts.

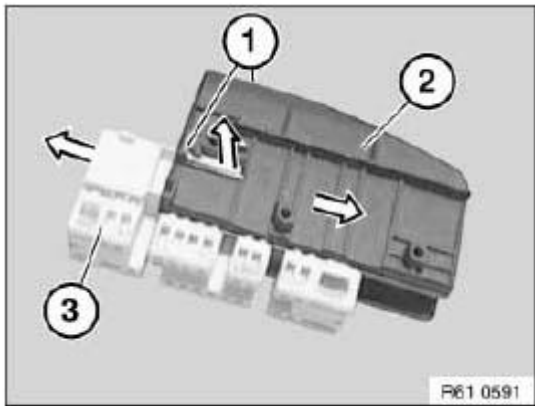


Fig. 70: Pressing Locks On Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).

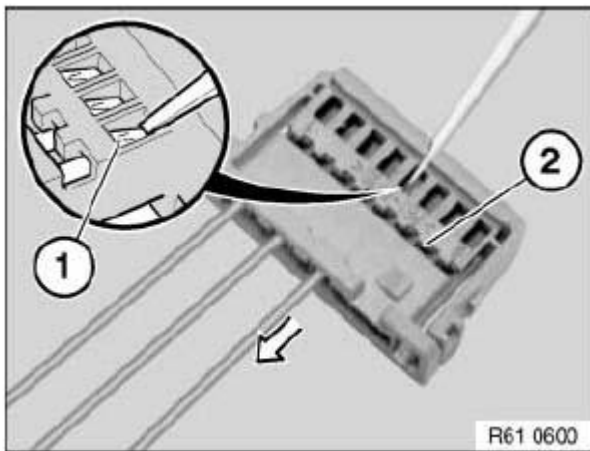


Fig. 71: Identifying Retaining Hook And Secondary Lock

Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

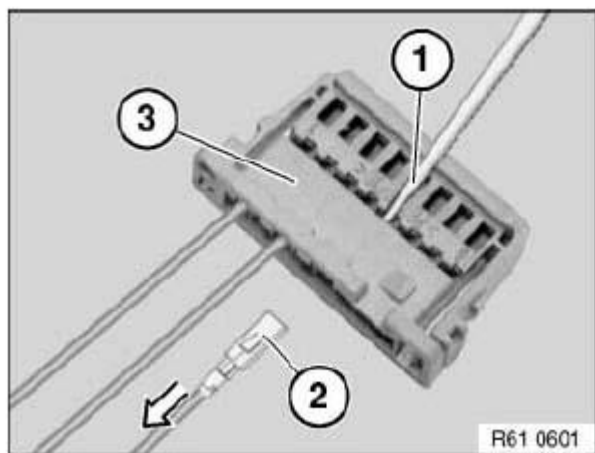


Fig. 72: Pulling Cable With Socket Contact
Courtesy of BMW OF NORTH AMERICA, INC.

Pin housing:

Press locks (1) on cap (2) upwards on both sides.

Detach cap from housing carrier (3).

NOTE: Detaching the cap releases the secondary locks of the pin contacts in the contact carriers.

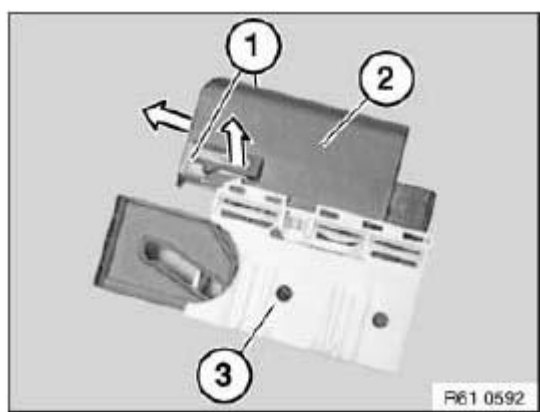


Fig. 73: Pressing Locks On Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Pull contact carrier (1) out of housing carrier (2).

The pin contacts are pulled out of a contact carrier as described under "Socket housing".

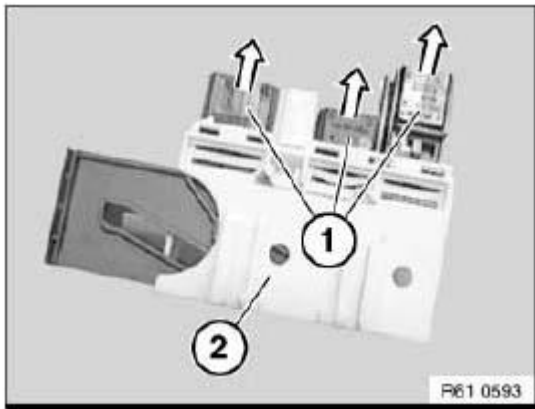


Fig. 74: Pulling Contact Carrier Out Of Housing Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE PLUGS, 30-PIN, HYBRID SYSTEM MQS/MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the plug housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Socket housing:

Raise lock (1) on housing (2).

Push contact carrier (3) from rear out of housing (2).

NOTE: Pushing out the contact carrier releases the secondary locks of the socket contacts.

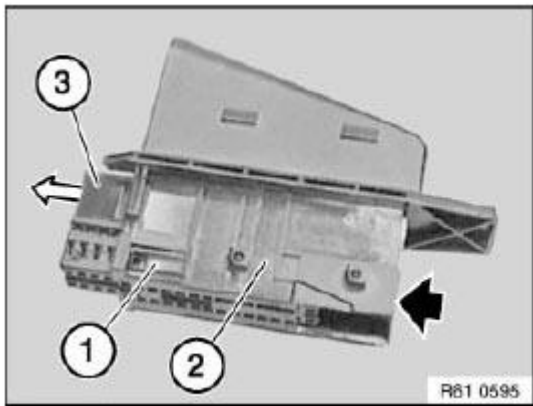


Fig. 75: Pushing Contact Carrier

Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).

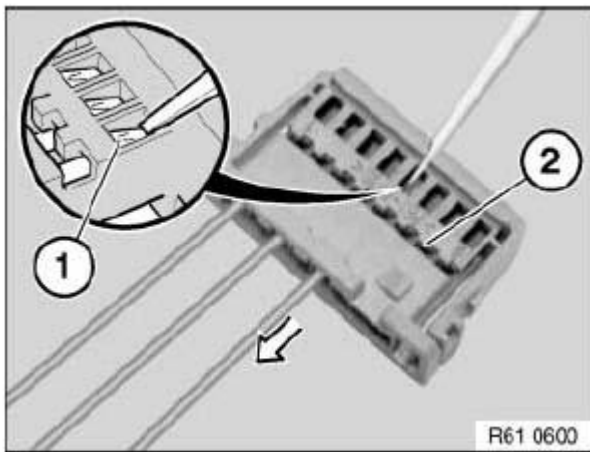


Fig. 76: Identifying Retaining Hook And Secondary Lock

Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

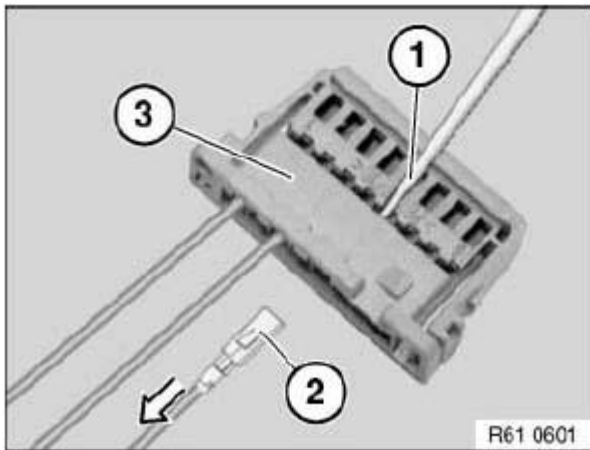


Fig. 77: Pulling Cable With Socket Contact
Courtesy of BMW OF NORTH AMERICA, INC.

Pin housing:

Contacts 1... 13 and 19... 27:

Raise locking slide (1) on both sides (2) of housing and detach.

NOTE: Detaching the locking slide releases the secondary locks of the pin contacts.

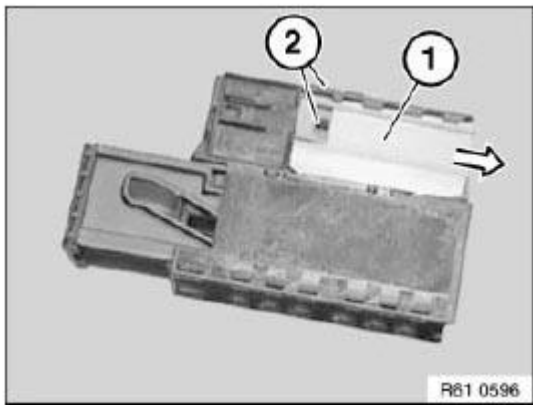


Fig. 78: Raising Locking Slide On Both Sides Of Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Contacts 14... 18 and 28... 30:

Pull slide (1) outwards completely.

Raise lock (2) on housing.

Pull contact carrier (3) out of housing.

NOTE: Pulling out the contact carrier releases the secondary locks of the pin contacts.

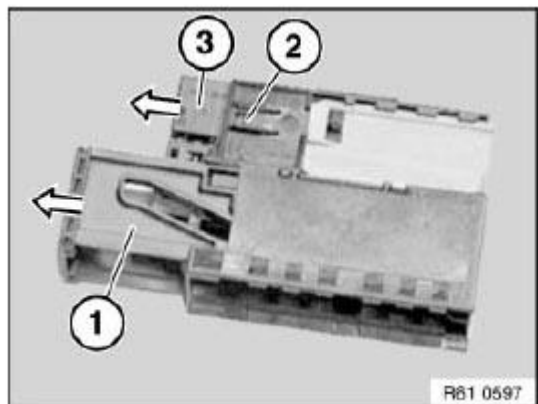


Fig. 79: Pulling Contact Carrier Out Of Housing
Courtesy of BMW OF NORTH AMERICA, INC.

The pin contacts are pulled out of a contact carrier as described under "Socket housing".

61 13... IN-LINE PLUGS, 6- TO 50-PIN, SYSTEM ELO

Unlock lock.

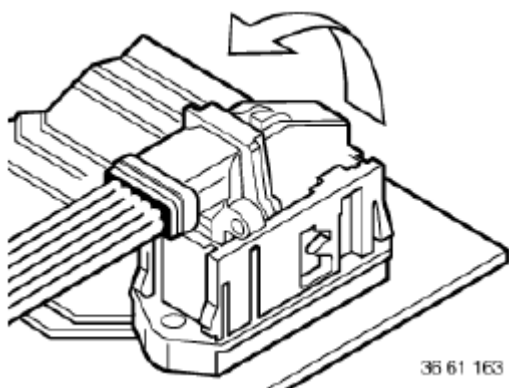
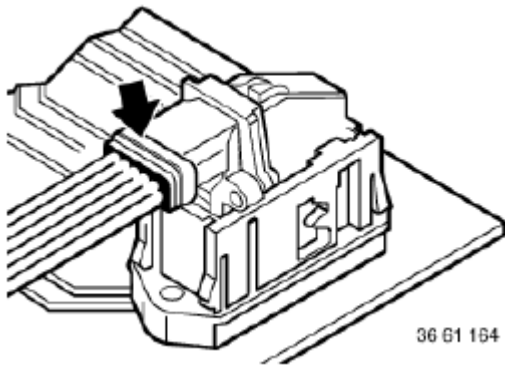


Fig. 80: Unlocking Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten cable clip.

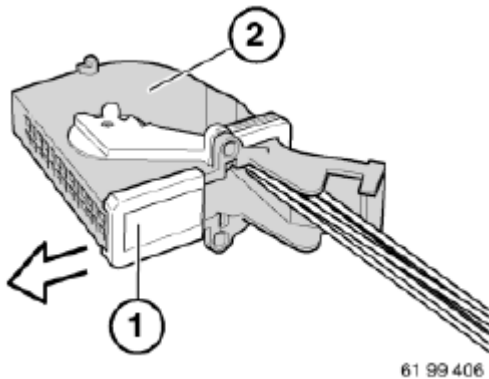
Installation:

Cable clip must be reinstalled.

**Fig. 81: Locating Cable Clip**

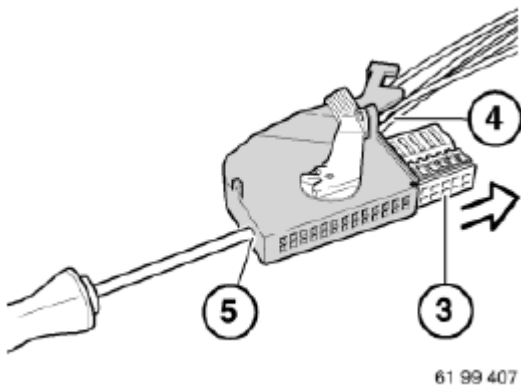
Courtesy of BMW OF NORTH AMERICA, INC.

Detach catch (1) from plug housing (2).

**Fig. 82: Detaching Catch From Plug Housing**

Courtesy of BMW OF NORTH AMERICA, INC.

Press out contact carrier (3) with wiring harness (4) through opening (5).

**Fig. 83: Pressing Out Contact Carrier With Wiring Harness**

Courtesy of BMW OF NORTH AMERICA, INC.

Hold down arrester hook (6) of defective contact and pull cable and contact up to secondary lock (8).

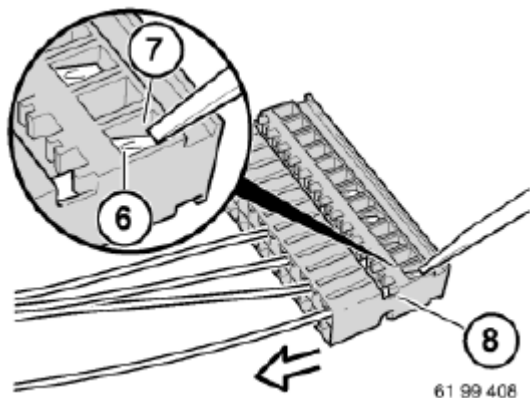


Fig. 84: Identifying Arrester Hook And Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down arrester hook once again in secondary lock (8) and pull cable and contact completely out of contact carrier.

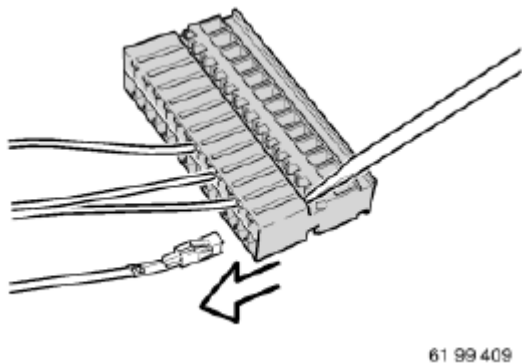
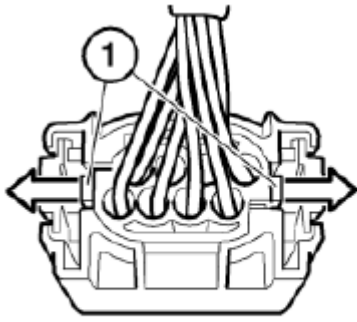


Fig. 85: Removing Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE PLUGS, 6-, 8-PIN, SYSTEM MQS

Press lock (1) in direction of arrow and slide plug forward.

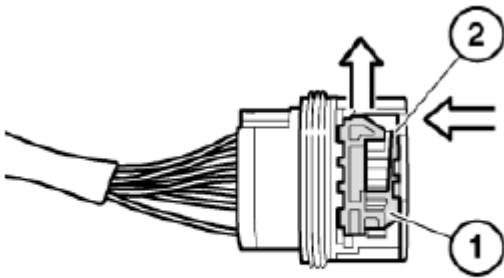


F61 0415

Fig. 86: Pressing Lock

Courtesy of BMW OF NORTH AMERICA, INC.

Press locking hook (2) downward and slide lock (1) out.

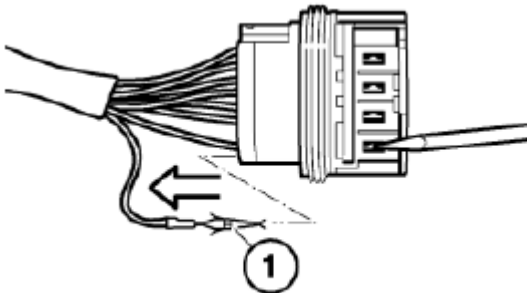


F61 0416

Fig. 87: Pressing Locking Hook

Courtesy of BMW OF NORTH AMERICA, INC.

Press down arrester hook (1) with screwdriver and pull out cable with contact towards rear.



F61 0417

Fig. 88: Pressing Down Arrester Hook

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... INLINE PLUGS, 8-, 12-PIN, SYSTEM D2.5

Move upper section of connector (1) and lower section of connector (2) against each other in direction of arrow.

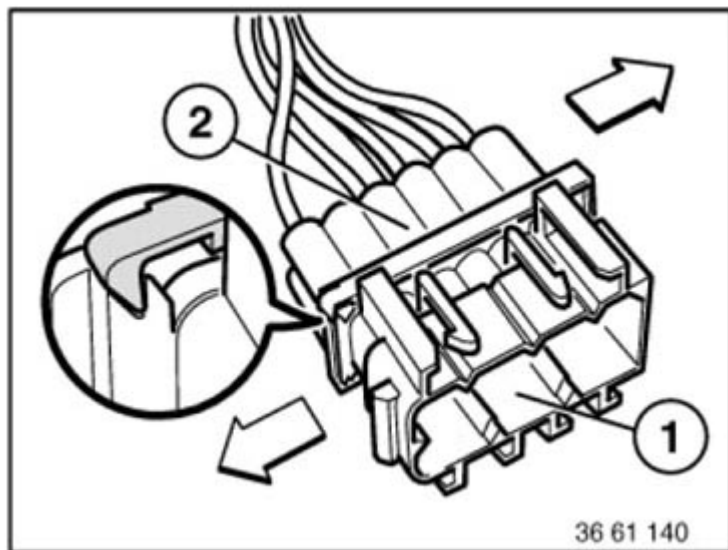


Fig. 89: Moving Upper And Lower Section Of Connector In Opposite Direction
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool 61 0 303 press back retaining hook(3) of corresponding contact and pull out cable with contact.

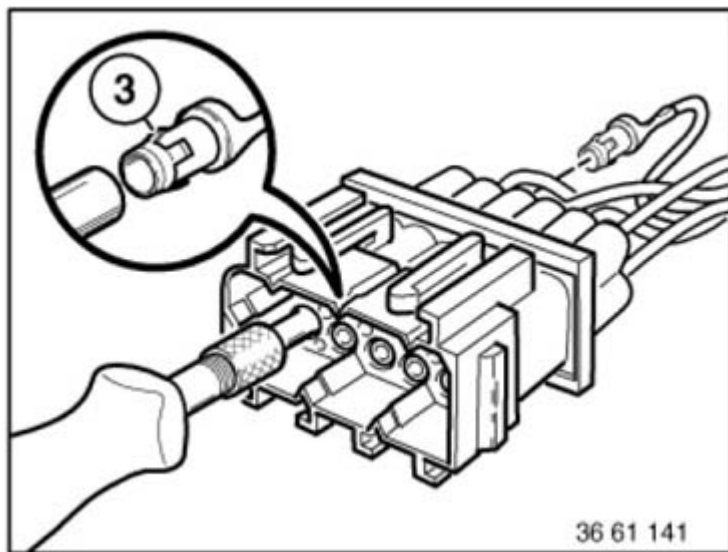


Fig. 90: Pressing Retaining Hook Of Corresponding Contact Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... INSTALLING FAN CONNECTOR FOR RETROFITTING/REPAIRS

Special tools required:

CARMANUALSUSA

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· 61 9 040

· 61 9 041

· 61 9 042

NOTE: The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.
The case can no longer be ordered.

Special tools:

· special tool **61 9 040**

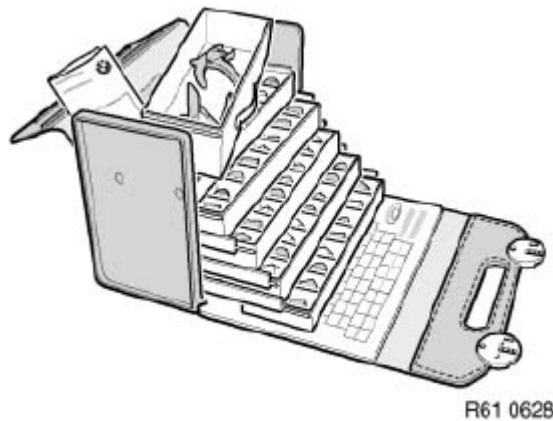


Fig. 91: Identifying Special Tool Kit (61 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Choose contact sleeve (up to 4 mm²) in accordance with wire cross-section.

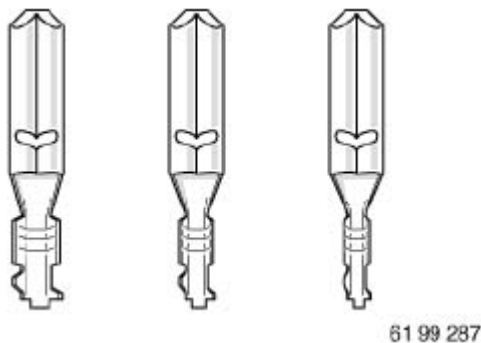


Fig. 92: Identifying Contact Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Alternatively:

Choose contact sleeves (up to 2.5 mm²) for fan connectors.

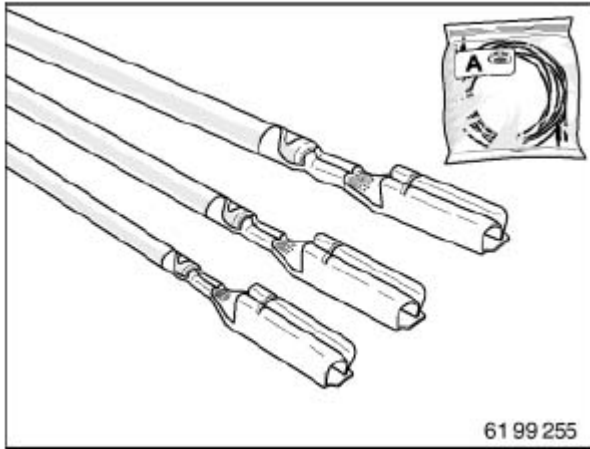


Fig. 93: Identifying Contact Sleeves For Fan Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through wire loop in wiring harness at established point.

Strip insulation from both wire ends.

Refer to repair instructions:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

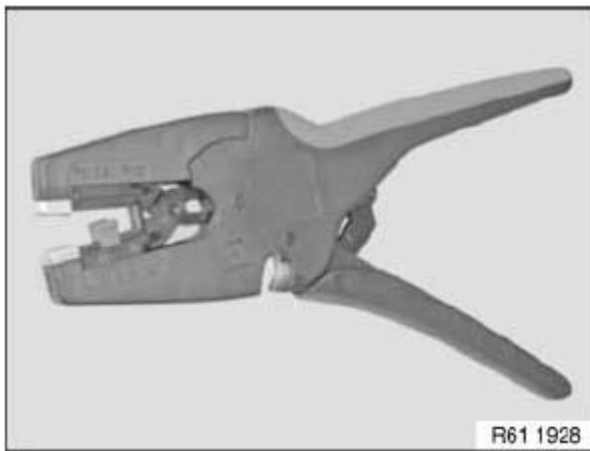


Fig. 94: Identifying Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp contact sleeves on both wire ends.

Refer to repair instructions:

CRIMPING ON STOP PARTS

NOTE: If using repair kit for contact sleeves, refer to repair instruction:
BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION.

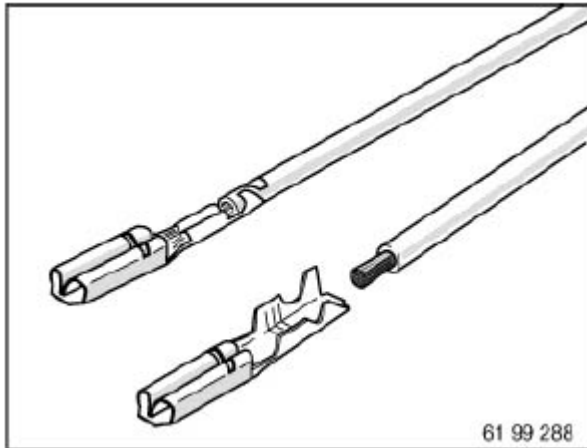


Fig. 95: Identifying Crimp Contact Sleeves On Both Wire Ends
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp connecting cable for retrofitting likewise with contact sleeve.

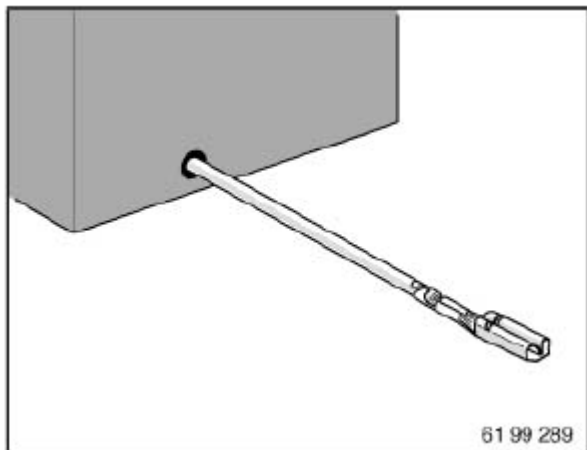
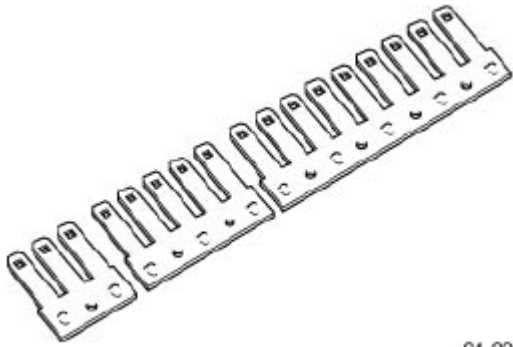


Fig. 96: Crimping Connecting Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Cut required number of poles to length for fan connectors.



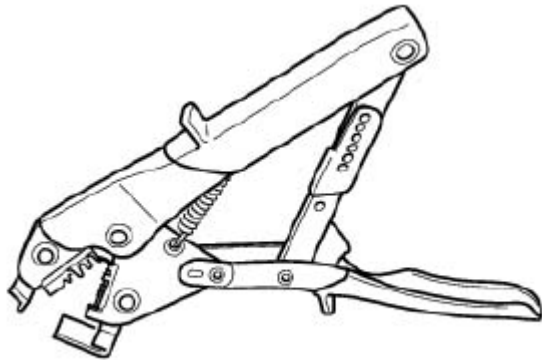
61 99 291

Fig. 97: Identifying Fan Connectors Poles
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool **61 9 041** (hand crimping tool) in conjunction with **61 9 042** (matrix) are used for pushing contact sleeves onto fan connectors.

Refer to repair instructions:

SPECIAL TOOLS FOR WIRING HARNESS REPAIRS.



61 99 217

Fig. 98: Identifying Hand Crimping Tool (61 9 041)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock special tool **61 9 041**:

Squeeze grips (1) lightly and push unlocking lever (2) in direction of arrow.

Or:

Compress handles as far as they will go, tool unlocks automatically.

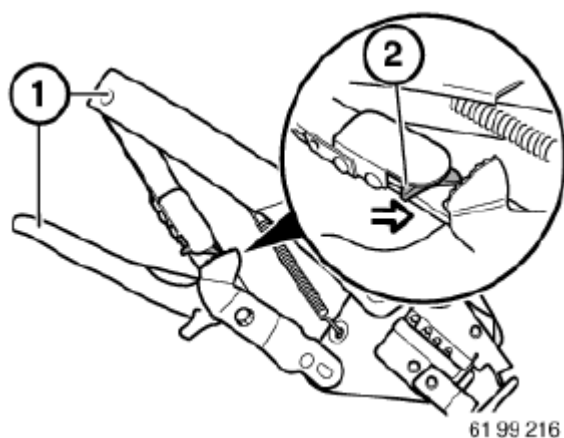


Fig. 99: Pushing Unlocking Lever

Courtesy of BMW OF NORTH AMERICA, INC.

Insert prepared fan connector (3) in special tool 61 9 041 / 61 9 042 .

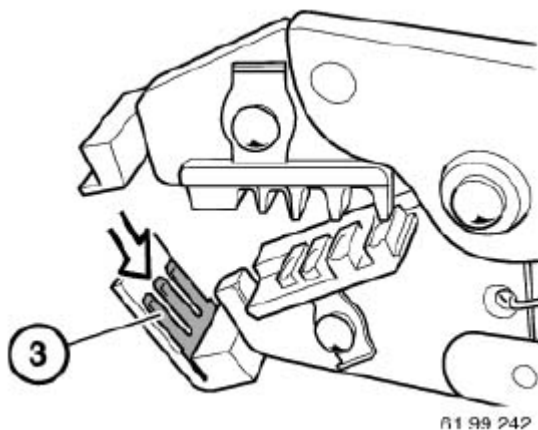


Fig. 100: Inserting Prepared Fan Connector In Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Attach wire with contact sleeve to fan connector.

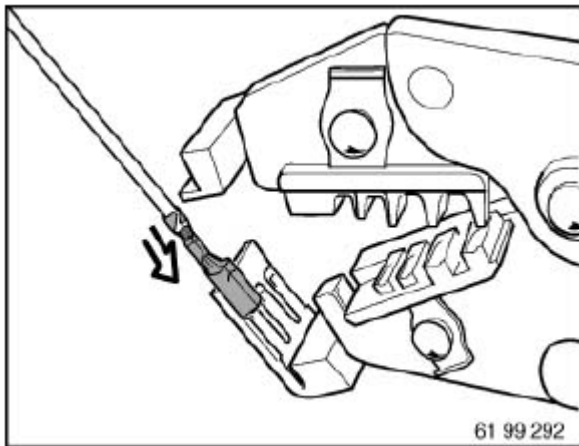


Fig. 101: Attaching Wire With Contact Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Press crimping tool together and slide contact sleeve firmly home.

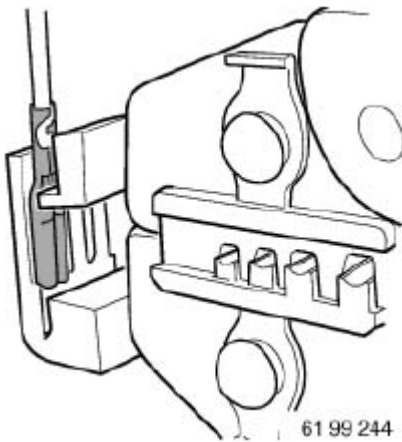
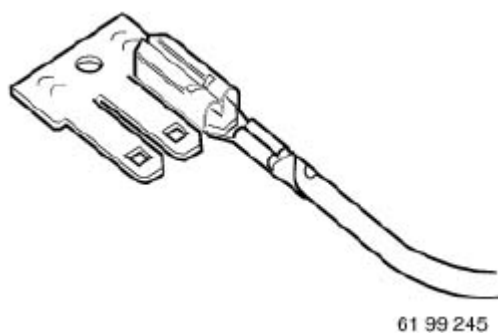


Fig. 102: Pressing Crimping Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Once contact sleeves have been pushed on, they should not be detached again from the fan connector or reused.

Push on further contact sleeves for potential branching.

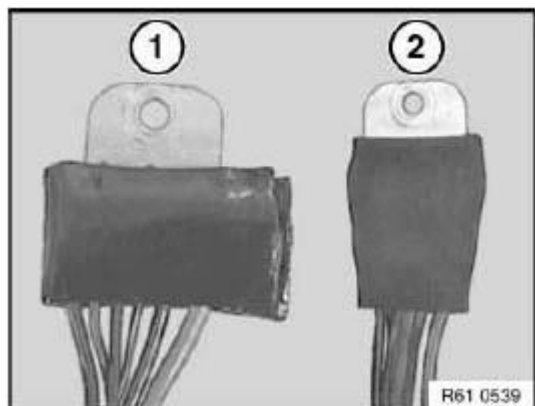
**Fig. 103: Identifying Contact Sleeves**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation in wet area (engine compartment, wheel arch):

Apply sealing compound on both sides and press into contacts (1).

Fit shrink-fit hose and heat up with hot air blower (2) (approx. 250 °C).

**Fig. 104: Identifying Sealing Compound**

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Ensure that fan connector has sufficient contact surface on mounting point. Do not heat shrink-fit hose on edges of fan connector too strongly, risk of cracking.

Allow shrink-fit hose to cool down until hand-warm. Then press sealing material again into contacts and onto edges of fan connector.

If necessary, carefully heat shrink-fit hose again.

Installation in dry area (interior, luggage compartment):

Slide assembled fan connector into insulation housing until it locks into place.

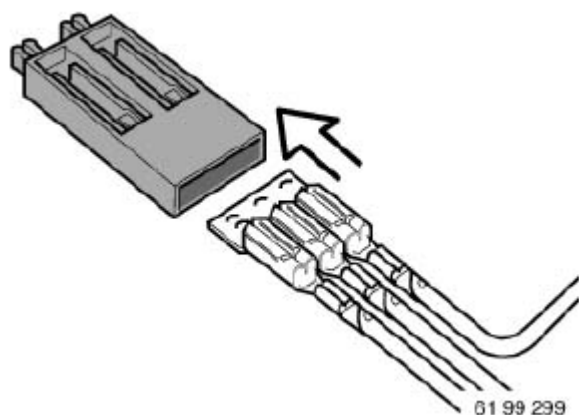


Fig. 105: Sliding Assembled Fan Connector Into Insulation Housing

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... OPENING PLUG HOUSINGS AND REMOVING CONTACTS OF DIFFERENT PLUG SYSTEMS

Special tools required:

- **61 0 300**
- **61 0 400**
- **61 1 100**
- **61 1 150**

ABBREVIATIONS OF CONTACTS REFERENCE CHART

Abbreviations of contacts and what they mean:	
ELA	Strand seal
D 1.5 / 2.5 / 3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
MDK	Miniature double flat spring contact
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
MLK	Mini laminated contact
Mcon	Multi contact

Ultrasonic-welded connectors:

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

The contacts of these connectors cannot be replaced. The plug must be replaced completely.

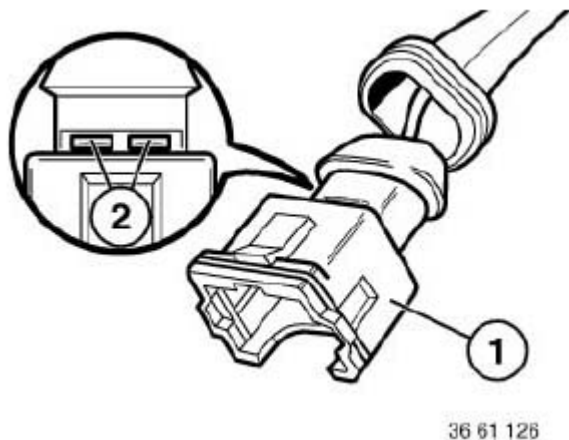


Fig. 106: Identifying Ultrasonic-Welded Connectors

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Special tools used for connector repair procedures in this service information are contained in the following special tool kits:

- **61 0 300 RELEASING TOOL (COMPLETE KIT)**
- **61 1 100 RELEASING KIT (engine)**

61 13... CONNECTOR HOUSING, LCC CONTACT (LOAD CURRENT CONTACT)

Special tools required:

- **61 0 317**

Socket housing:

Press lock (1) with suitable tool (2) in direction of arrow out of socket housing (3).

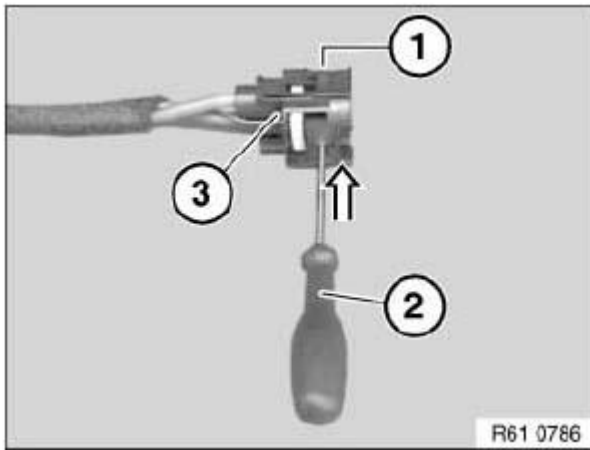


Fig. 107: Pressing Lock With Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Pull lock (1) out of socket housing (2).

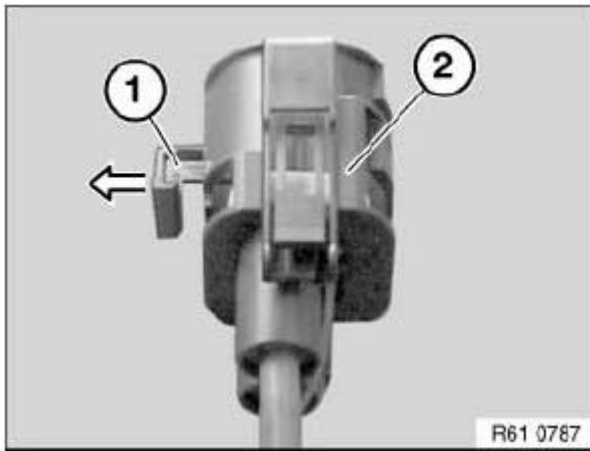


Fig. 108: Pulling Lock Out Of Socket Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 61 0 317 into socket housing (1) and pull out lead with LCC contact (2) in direction of arrow.

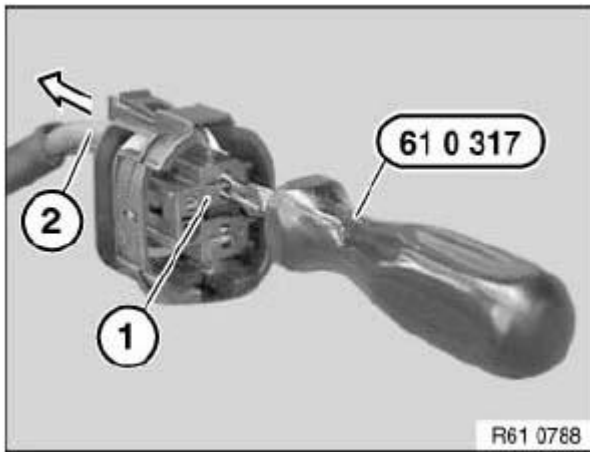


Fig. 109: Pulling Out Lead With LCC Contact
Courtesy of BMW OF NORTH AMERICA, INC.

Pin housing:

Unlock locking slide (1) of pin housing (2) with suitable tool (3) in direction of arrow.

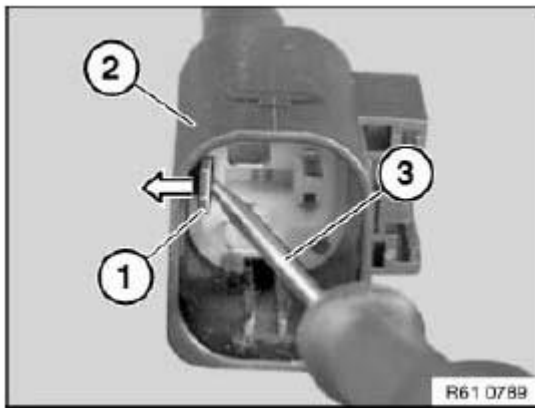


Fig. 110: Unlocking Locking Slide Of Pin Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 61 0 317 into pin housing (1) and pull out lead with LCC contact (2) in direction of arrow.

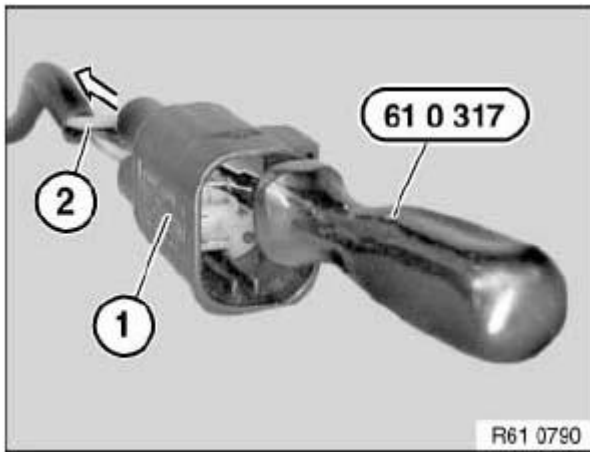


Fig. 111: Inserting Special Tool (61 0 317) Into Pin Housing
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... RELAY CARRIER

Place special tool **61 1 153** on relay carrier (1) and carefully pull in direction of arrow until retaining lugs (2) on relay carrier are raised.

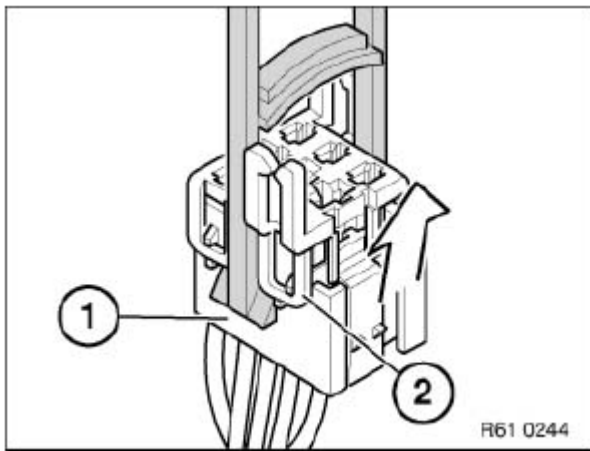
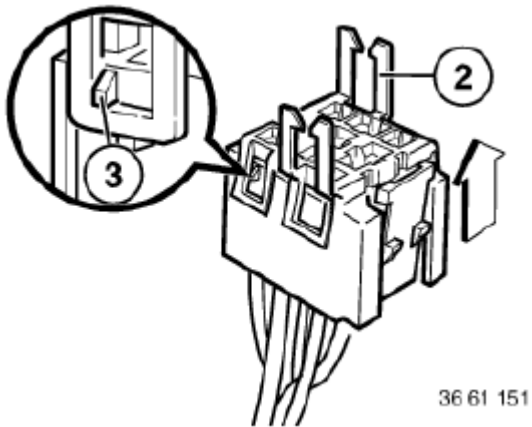


Fig. 112: Placing Special Tool (61 1 153) On Relay Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

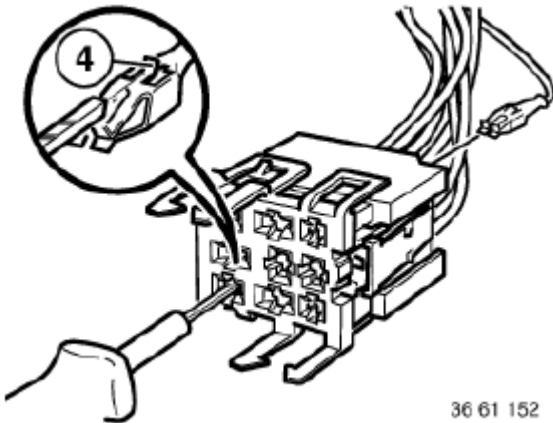
Pull relay carrier (2) in direction of arrow into first catch (3).

**Fig. 113: Pulling Relay Carrier**

Courtesy of BMW OF NORTH AMERICA, INC.

Press down arrester hook (4) of appropriate contact and pull out cable with contact.

Press out double flat spring contact with special tool **61 1 136** or **61 1 137** (ejector).

**Fig. 114: Pressing Down Arrester Hook**

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... REMOVING AND INSTALLING/REPLACING OBD-II SOCKET**Special tools required:**

- **61 0 315**

Necessary preliminary tasks:

- Remove **FOOTWELL SIDE TRIM PANEL ON A-PILLAR, LEFT**

Release screws (1).

Remove OBD-II socket (2) from holder (3).

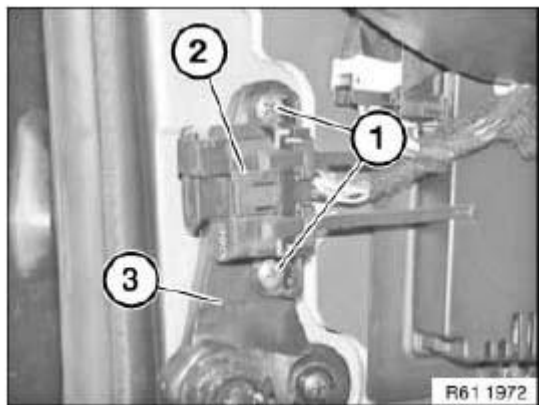


Fig. 115: Identifying OBD-II Socket, Holder And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove OBD-II socket cover (2) from OBD-II socket (1).

Unlock slide plate (3) with a suitable tool in direction of arrow.

Insert special tool **61 0 315** in OBD-II socket (1) in direction of arrow and press out associated flat spring contact (4). Press remaining flat spring contacts with special tool **61 0 315** out of OBD-II socket (1).

Installation:

Pay attention to pin assignment of OBD-II socket (1).

Make sure flat spring contacts and slide plate (3) are correctly engaged and seated in OBD-II socket (1).

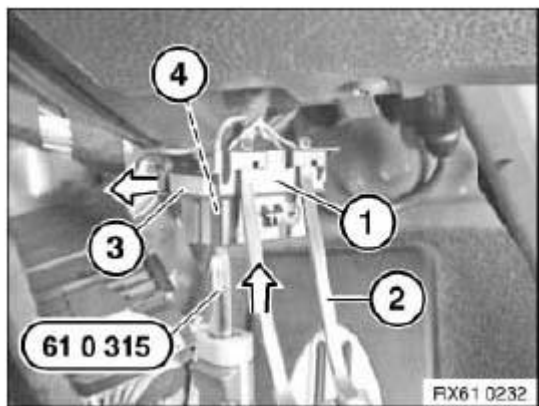


Fig. 116: Unlocking Slide Plate
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... REPAIRING RIBBON CABLES

Special tools required:**61 1 190**

Place ribbon cables (1) in connector housing (2) and close cover (3).

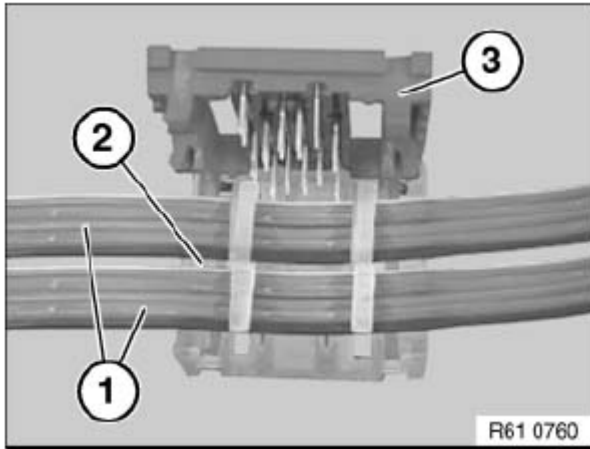


Fig. 117: Identifying Ribbon Cables And Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Place connector housing (1) in tool (2) 61 1 190 .

Close tool (2).

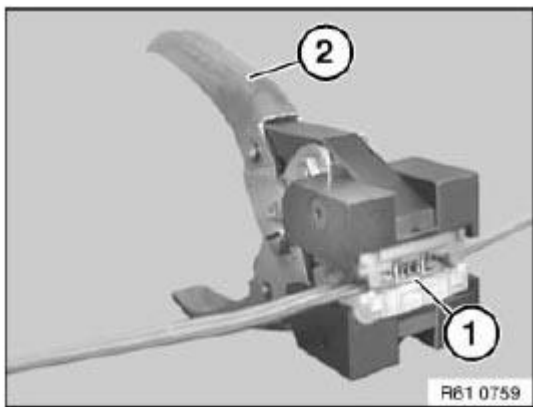


Fig. 118: Placing Connector Housing In Tool
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... FUSE HOLDER

Remove appropriate fuse from fuse holder (1).

NOTE: Identify the position when removing fuses.

Pull sliding lock (2) out of fuse holder (1) completely.

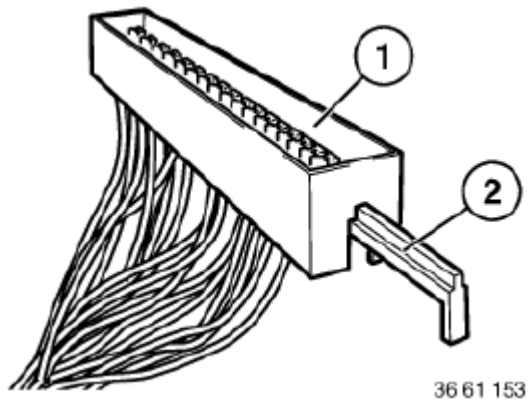


Fig. 119: Identifying Fuse Block

Courtesy of BMW OF NORTH AMERICA, INC.

With special tool 61 1 136 or 61 1 137 (pressing-off tool), press back retaining hooks (3) of appropriate contact and pull out cable.

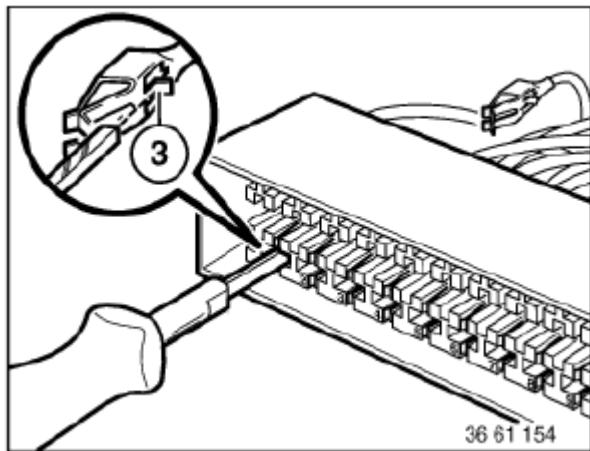


Fig. 120: Pressing Back Retainer Hook

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SOCKET HOUSING (RADIO PLUG), HYBRID SYSTEM MQS/MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the plug housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Removing MPQ contacts from radio plug:

Press lock (1) in direction of arrow.

Detach secondary lock (2) from radio plug.

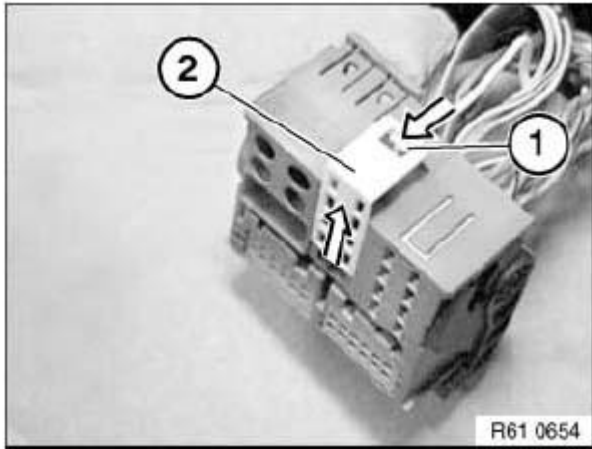


Fig. 121: Detaching Secondary Lock From Radio Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Feed special tool 61 1 135 past side of contact.

Press special tool 61 1 135 in direction of arrow.

Pull wire (1) with socket contact out of radio plug (2).

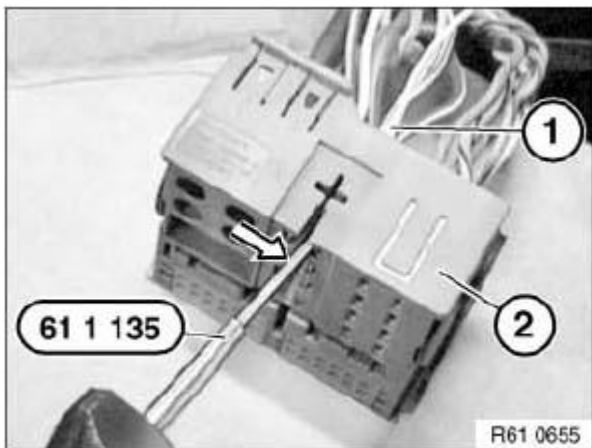


Fig. 122: Pressing Special Tool (61 1 135)
Courtesy of BMW OF NORTH AMERICA, INC.

Removing MQS contacts from contact carrier:

Press lock (1) in direction of arrow and pull housing (2) out of radio plug.

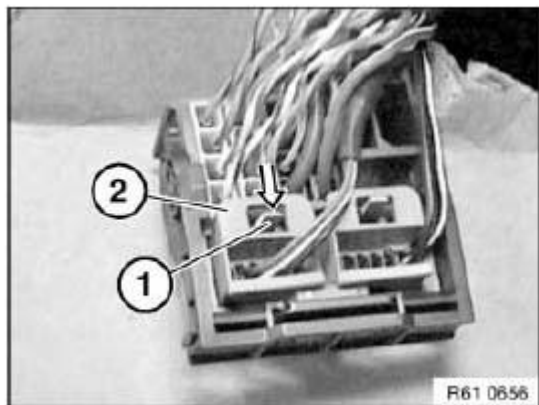


Fig. 123: Pulling Housing Out Of Radio Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock (1) in direction of arrow. Pull contact carrier (2) out of housing (3).

NOTE: When the contact carrier is pulled out, the secondary locks of the socket contacts are raised.

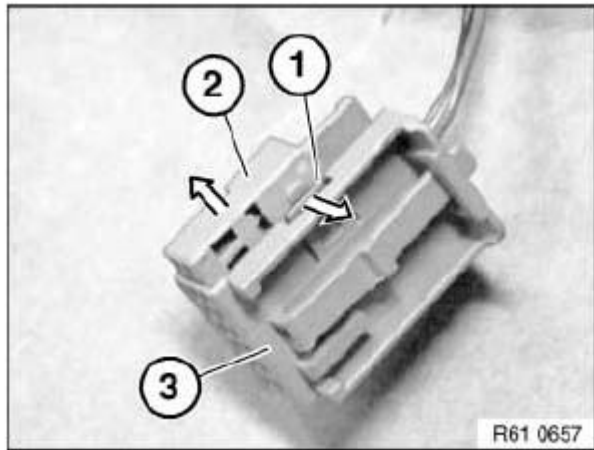


Fig. 124: Pulling Contact Carrier Out Of Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).

NOTE: The illustration shows an 8-pin socket housing where removal of the contacts is identical.

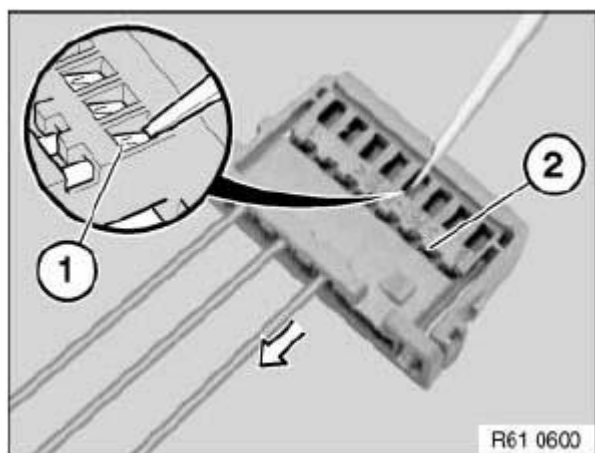


Fig. 125: Identifying Retaining Hook And Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down arrester hook in secondary lock (1) again. Pull wire with socket contact (2) out of contact carrier (3).

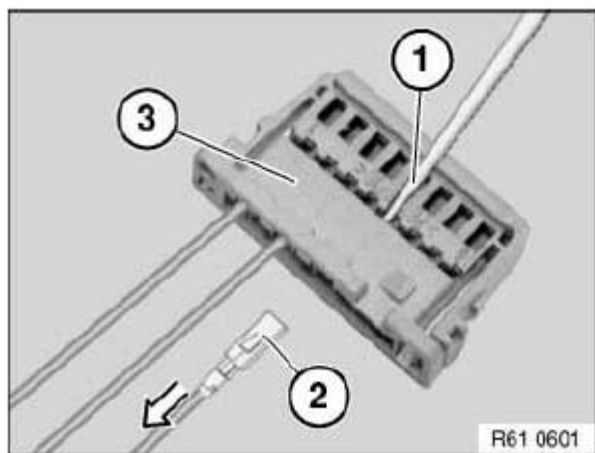


Fig. 126: Pulling Cable With Socket Contact
Courtesy of BMW OF NORTH AMERICA, INC.

Removing MPQ contacts from contact carrier:

Remove contact carrier (1) with MQS contacts from radio plug.

Raise lock (2) on radio plug.

Pull contact carrier (3) out of radio plug.

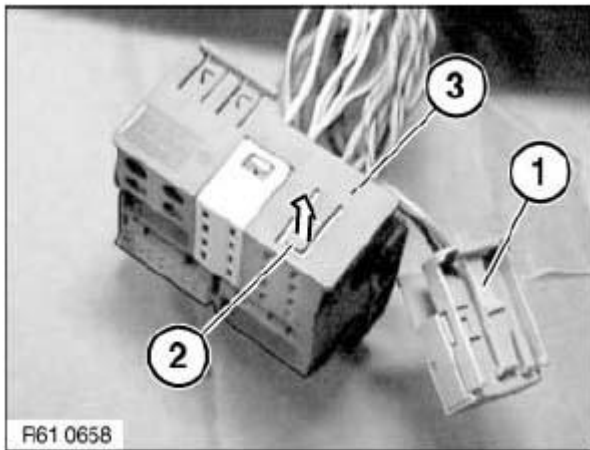


Fig. 127: Raising Lock On Radio Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock (1) in direction of arrow.

Pull secondary lock (2) in direction of arrow completely out of contact carrier (3).

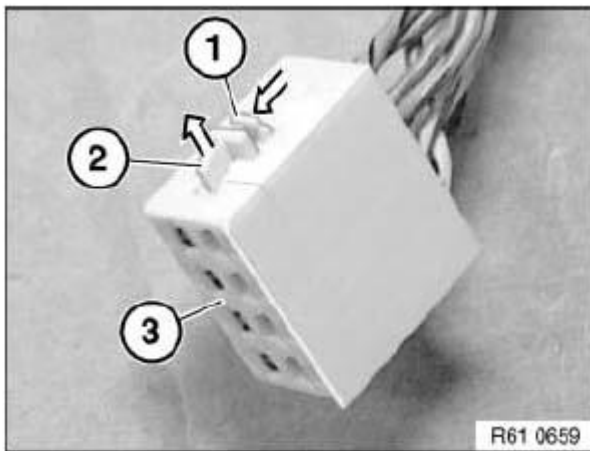


Fig. 128: Pulling Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 61 1 135 on inside of contact into contact carrier (2).

Pull wire with socket contact (1) out of contact carrier (2).

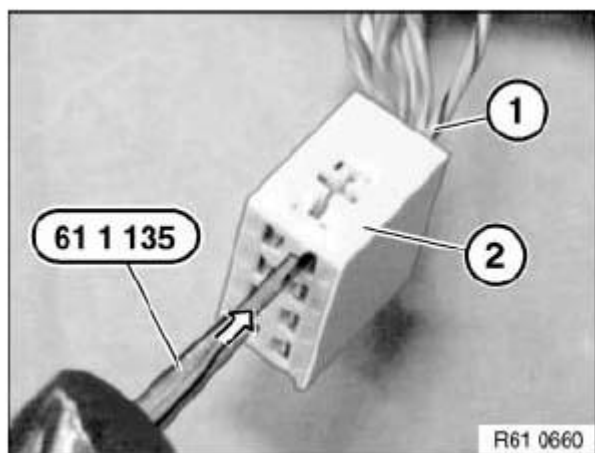


Fig. 129: Pressing Special Tool (61 1 135) Into Contact Carrier
 Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SOCKET HOUSING 42-, 43-PIN, HYBRID SYSTEM MQS / MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Open secondary locks (1) on socket housing.

Press back retaining hook of MQS contacts (2) with special tool 61 1 134 and pull out cable with contact.

Press back retaining hook of MPQ contacts (3) with screwdriver or similar tool and pull out cable with contact.

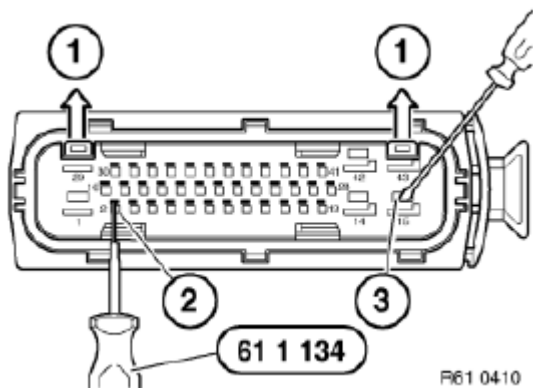
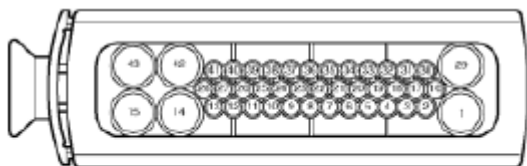


Fig. 130: Pressing Back Retaining Hook Of MQS Contacts Using Special Tool (61 1 134)
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bend open retaining hook of contacts gently before inserting into plug housing.

To install contacts, observe cavity numbers on reverse side of socket housing.



P61 0411

Fig. 131: Identifying Socket Housing

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SOCKET HOUSINGS, 2 X 21-, 2 X 27-PIN, HYBRID SYSTEMS MQS/MPQ, ELO/ELO-POWER

Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Manufactured by Siemens: The following contact types without strand sealing can be fitted in the socket housings:

- Elo (electronic contact)
- Elo-Power 2.8 mm wide (electronic contact for heavy loads)
- Elo-Power 5.2 mm wide (electronic contact for heavy loads)

Raise lock (1) on housing (2).

Push contact carrier (3) from rear out of housing.

NOTE: The second contact carrier is pushed out in the same way.
Pushing out the contact carrier releases the secondary locks of the socket contacts.

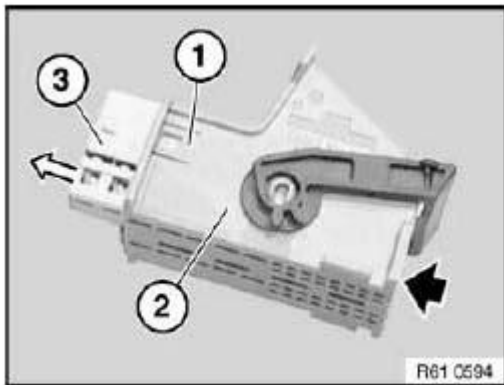


Fig. 132: Pushing Contact Carrier

Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).

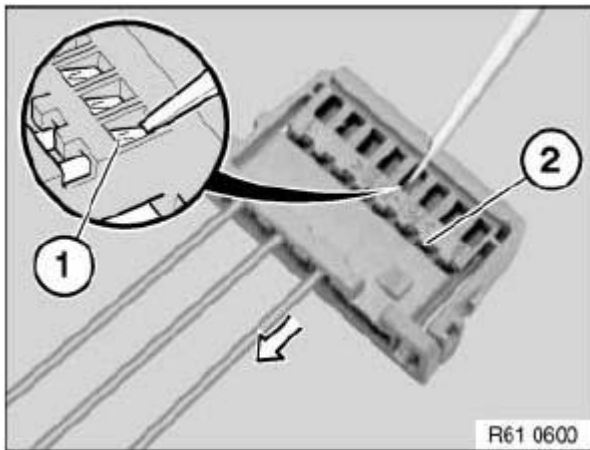


Fig. 133: Identifying Retaining Hook And Secondary Lock

Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

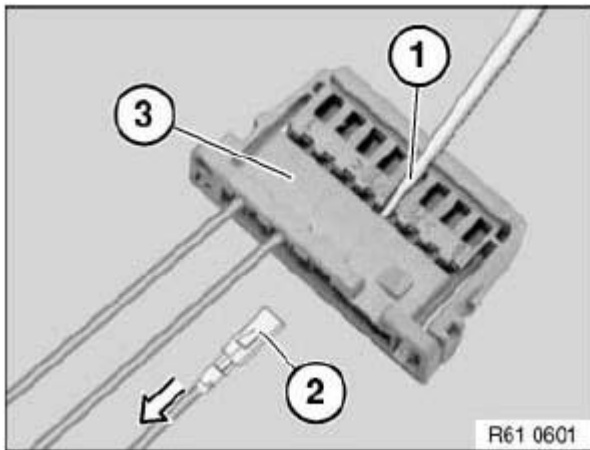


Fig. 134: Pulling Cable With Socket Contact
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SPECIAL TOOLS FOR WIRING HARNESS REPAIRS

Special tools required:

- 12 1 080
- 61 1 200
- 61 0 210
- 61 0 220
- 61 0 230
- 61 0 300
- 61 0 400
- 61 1 190
- 61 4 320
- 61 9 041
- 61 9 044

Repair range, vehicle electrical system:

- Refer to Service Information:

SI 2 04 07 341

Release and press-out tool:

- Special tool **61 0 300**
- Special tool **61 0 400** (MINI N12/N14)

Handling:

- **OPENING PLUG HOUSINGS AND REMOVING CONTACTS** of different plug systems

Refer to Service Information:

- SI 2 05 05 217
- SI 2 05 06 294
- SI 2 08 06 312



Fig. 135: Identifying Press-Out Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Cutting to length and stripping insulation from cables:

Handling:

- **CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES**

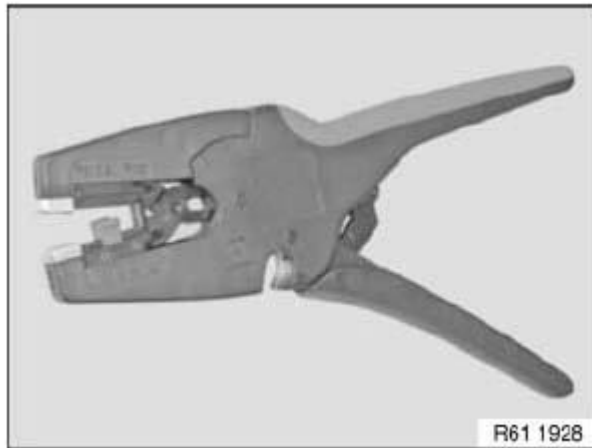
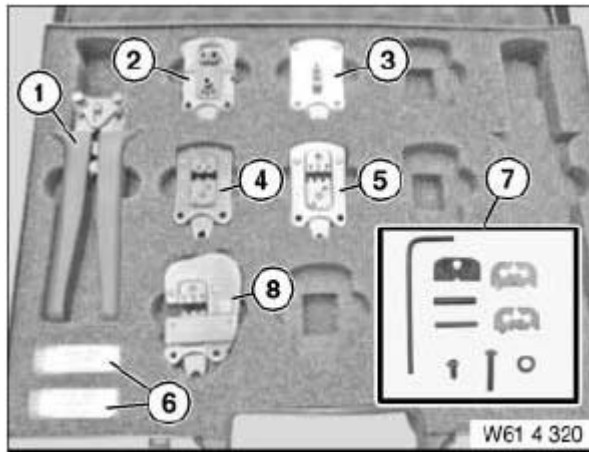


Fig. 136: Identifying Pliers

Courtesy of BMW OF NORTH AMERICA, INC.

Crimping stop parts (small contacts):

- special tool **61 4 320**
 1. Tool without crimping head
 2. Crimping head (**STRIPPING INSULATION AND CUTTING FIBRE-OPTIC CABLES TO LENGTH**)
 3. Crimping head (**CRIMPING FIBRE-OPTIC CABLE CONTACTS**)
 4. Crimping head (**CRIMPING MQS CONTACTS**)
 5. Crimping head (**CRIMPING MPQ CONTACTS**)
 6. Replacement blade (face-cutting fibre-optic cables)
 7. Replacement blade with tool (insulation stripping unit)
 8. Universal crimping head

**Fig. 137: Identifying Crimping Stop Parts (Small Contacts)**

Courtesy of BMW OF NORTH AMERICA, INC.

Crimping stop parts (large contacts):

- Special tool **61 0 200** (crimping set)
- Special tool **61 0 210** (matrix set LSK 8)
- Special tool **61 0 220** (matrix set SLK 2.8)
- Special tool **61 0 230** (matrix set MAK 8 / DFK4)

Handling:

- Refer to Service Information:

SI 2 02 05 194

SI 2 07 05 233

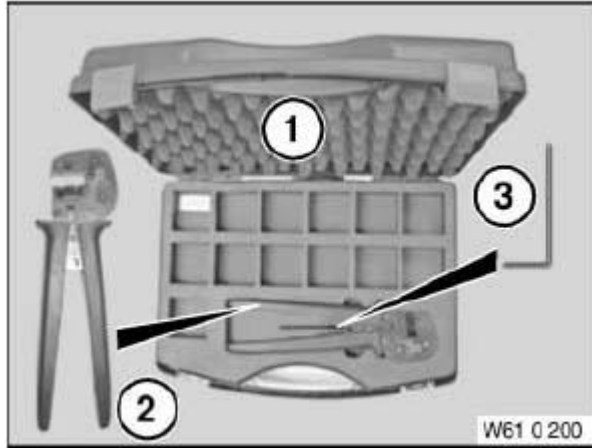


Fig. 138: Identifying Crimping Stop Parts (Large Contacts)
Courtesy of BMW OF NORTH AMERICA, INC.

Crimping antenna elbow plugs:

- Special tool **61 9 041** (hand crimping tool)
- Special tool **61 9 044** (matrix)

Handling:

- Antenna elbow plug on radio receiver

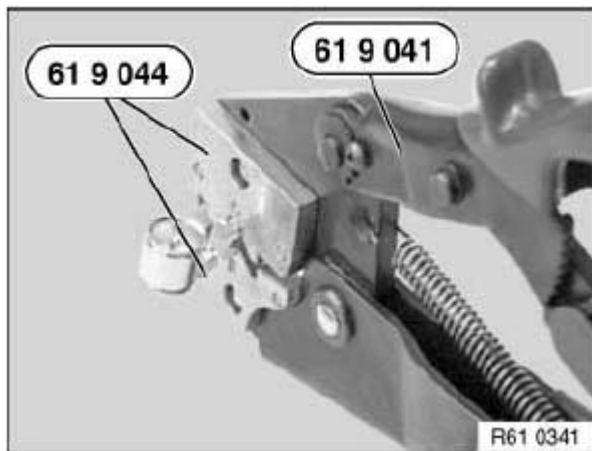


Fig. 139: Identifying Hand Crimping Tool (61 9 041) And Matrix (61 9 044)
Courtesy of BMW OF NORTH AMERICA, INC.

Repair kit for ignition cables and for crimping fan connector receptacles **4 mm²** :

- special tool **12 1 080**

Handling:

- **CRIMPING STOP PARTS (CONTACTS)**



W12 1 080

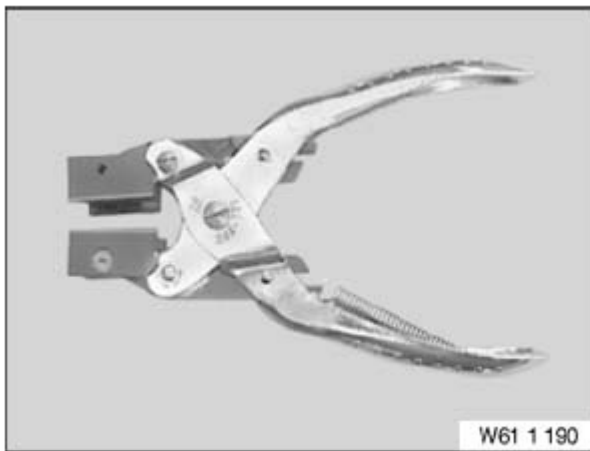
Fig. 140: Identifying Special Tool (12 1 080)
Courtesy of BMW OF NORTH AMERICA, INC.

Repairing ribbon cables:

- special tool **61 1 190**

Handling:

- **REPAIRING RIBBON CABLES**



W61 1 190

Fig. 141: Identifying Special Tool (61 1 190)

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... TREATING CABLES AND FIBRE-OPTIC CABLES

Special tools required:

- 61 1 190
- 61 4 320

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

SPECIAL TOOLS REFERENCE

Repair range for vehicle electrical system	
Crimping set with tool for fibre-optic cables, Micro Power Quadlock (MPQ), Micro Quadlock System (MQS) contacts and universal crimping head	61 4 320
Insulation displacement tool for ribbon cable	61 1 190

Subject of repair instructions

- SPECIAL TOOLS FOR WIRING HARNESS REPAIRS
- CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES
- CRIMPING STOP PARTS (CONTACTS)
- BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION
- FAN CONNECTOR FOR RETROFITTING/REPAIRS
- Aerial elbow plug on radio receiver
- CUTTING TO LENGTH AND STRIPPING INSULATION FROM OPTICAL FIBERS
- CRIMPING OPTICAL FIBRES
- Insulation displacement connector for REPAIRING RIBBON CABLES

61 13... UNLOCKING AND DISCONNECTING DIFFERENT PLUG CONNECTIONS

NOTE: Examples of unlocking and disconnecting different plug connections.

Press lock and open clip in direction of arrow.

Disconnect plug connection.

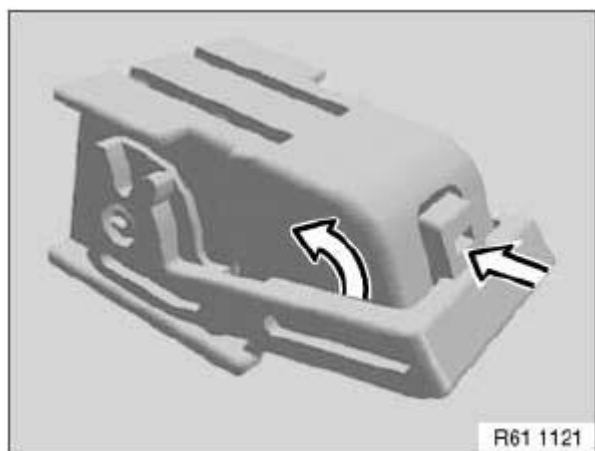


Fig. 142: Pressing Lock And Open Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and open clip in direction of arrow.

Disconnect plug connection.

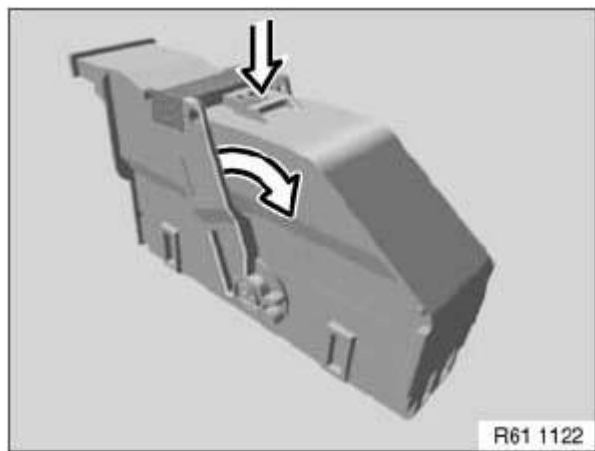


Fig. 143: Pressing Lock And Open Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Open clip in direction of arrow and disconnect plug connection in direction of arrow.

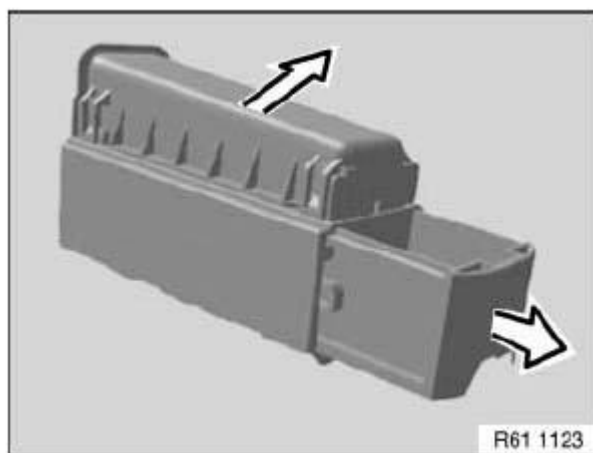


Fig. 144: Disconnecting Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

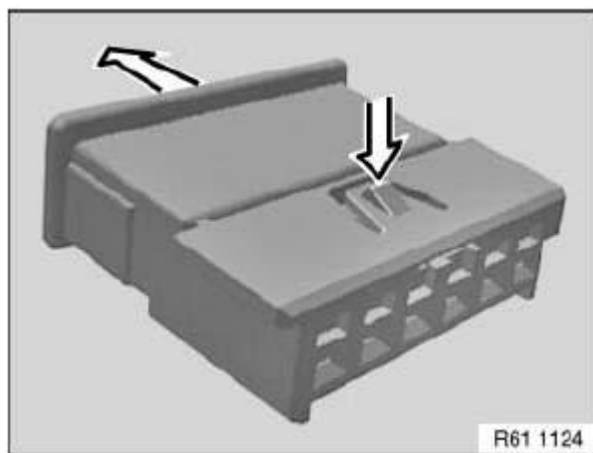


Fig. 145: Pressing Lock

Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

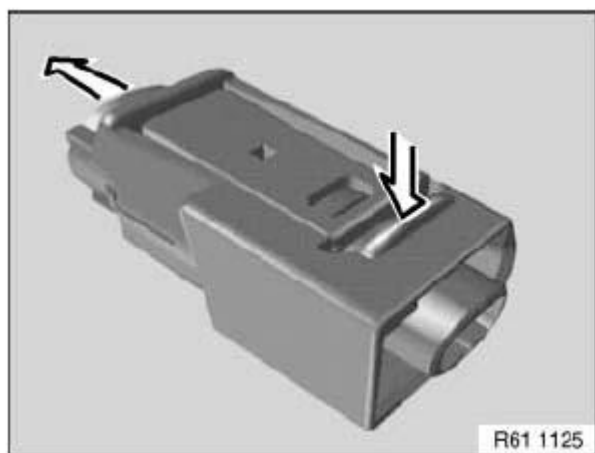


Fig. 146: Pressing Lock

Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

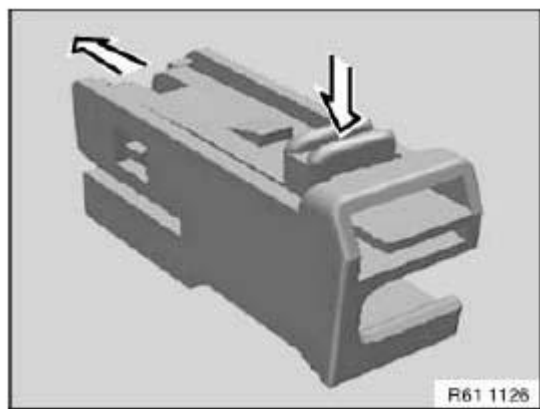
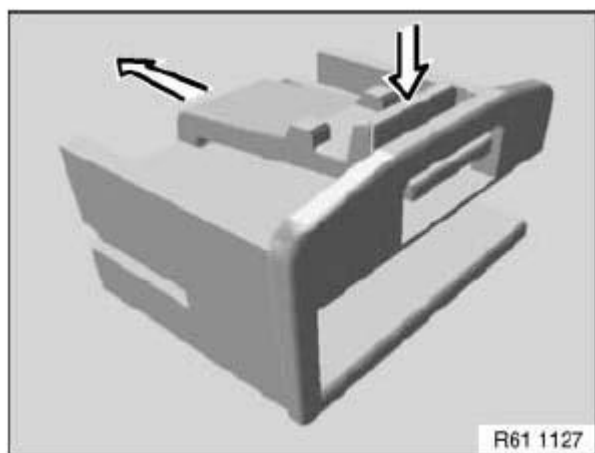


Fig. 147: Pressing Lock

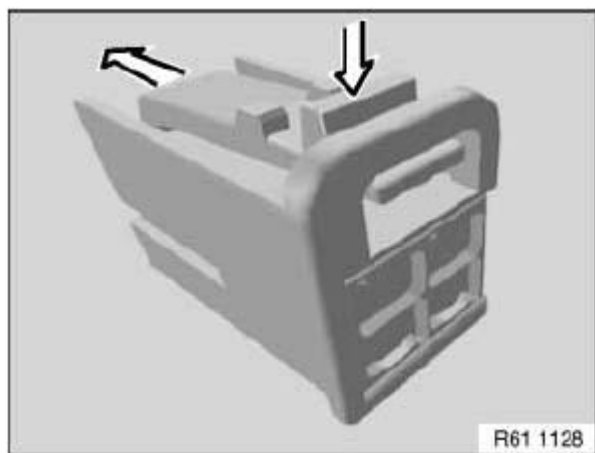
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

**Fig. 148: Pressing Lock**

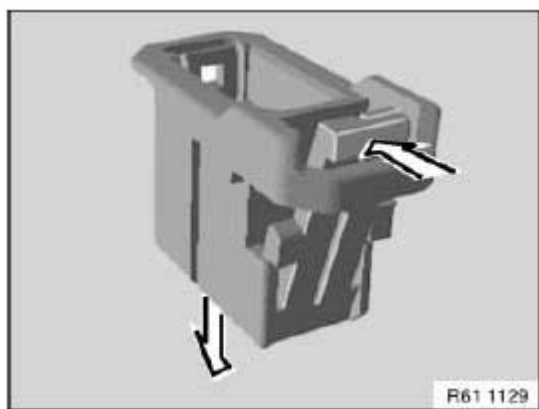
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

**Fig. 149: Pressing Lock**

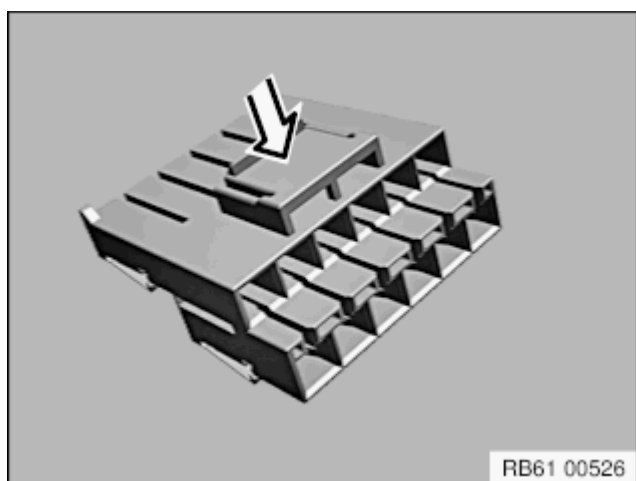
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

**Fig. 150: Pressing Lock**

Courtesy of BMW OF NORTH AMERICA, INC.

Press the lock and detach plug connection.

**Fig. 151: Pressing Lock**

Courtesy of BMW OF NORTH AMERICA, INC.

Press the lock and detach plug connection.

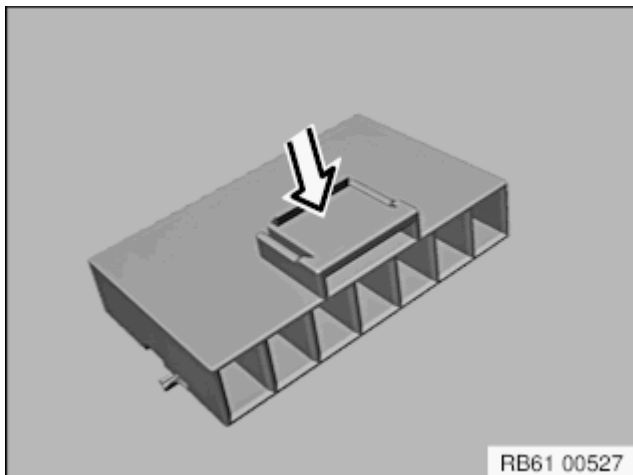


Fig. 152: Pressing Lock

Courtesy of BMW OF NORTH AMERICA, INC.

Press the lock on both sides and detach plug connection.

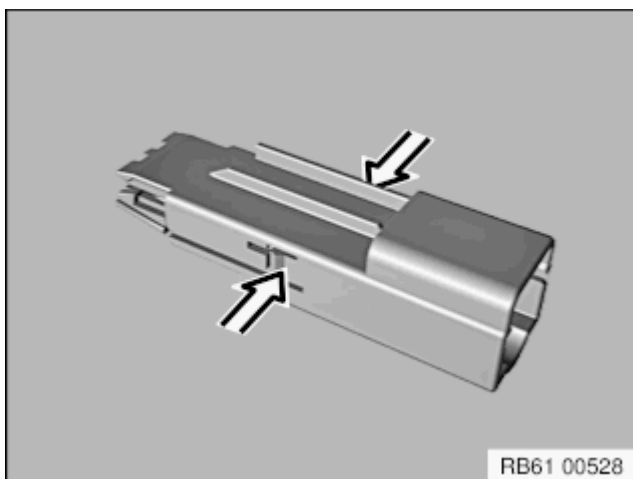


Fig. 153: Pressing Lock

Courtesy of BMW OF NORTH AMERICA, INC.

Press the lock and detach plug connection.

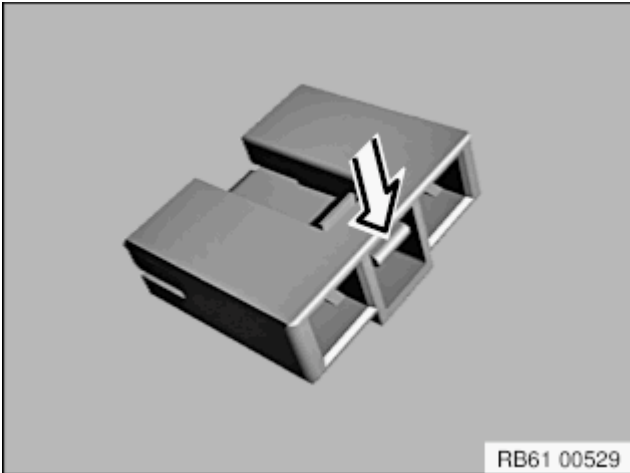


Fig. 154: Pressing Lock

Courtesy of BMW OF NORTH AMERICA, INC.

61 13 040 REPLACING DISTRIBUTION BOX (PASSENGER COMPARTMENT)

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary tasks:

- Remove LUGGAGE COMPARTMENT TRIM ON SIDE PANEL ON RIGHT
- Disconnect negative battery cable
- Remove TRIM FOR INSTRUMENT PANEL, BOTTOM LEFT
- Remove RIGHT GLOVEBOX WITH HOUSING

Release screws (1) and remove distribution box (2).

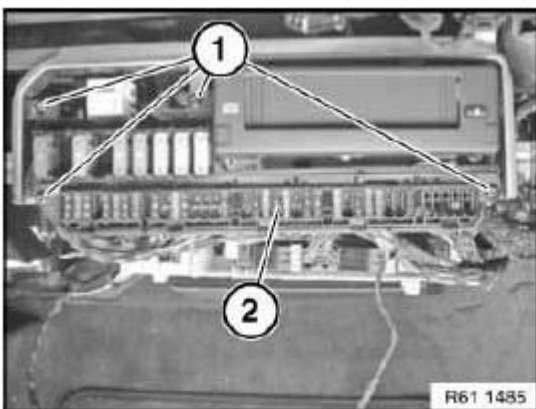


Fig. 155: Identifying Distribution Box And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect all plug connections (1).

Unlock relay base (3) and disconnect.

Open cover (2) on positive battery cable and release nut underneath.

Tightening torque **61 21 2AZ** .

Disconnect positive battery cable from distribution box.

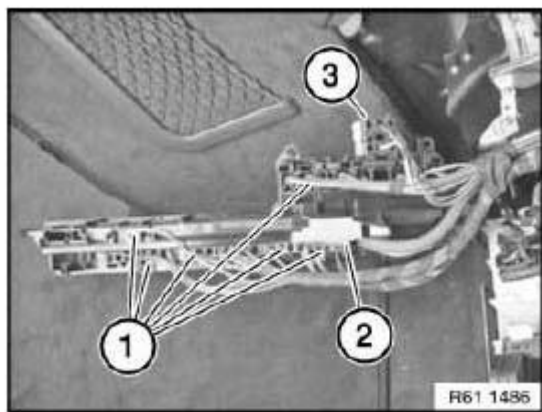


Fig. 156: Identifying Relay Base And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure positive battery cable is correctly seated on fuse box.

Replacement:

Remove fuses.

61 13 042 REPLACING DISTRIBUTION BOX (LUGGAGE COMPARTMENT)

WARNING: Observe **SAFETY INSTRUCTIONS** for handling vehicle battery.

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT TRIM ON SIDE PANEL ON RIGHT**
- Disconnect negative battery cable

Security version:

- Remove protective cover from distribution box/battery positive terminal (luggage compartment)

Open cover (1) and release nut underneath.

Tightening torque **61 21 2AZ** .

Disconnect plug connection (2) in direction of arrow.

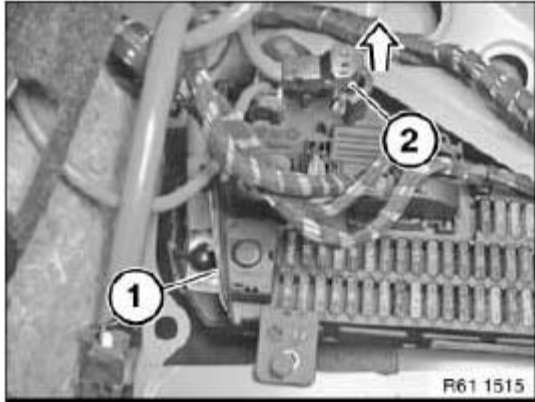


Fig. 157: Identifying Cover And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release screws (2) and remove distribution box.

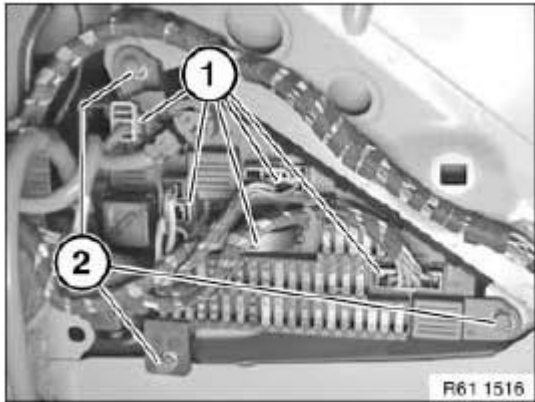


Fig. 158: Identifying Distribution Box Screws And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Security replacement only:

Remove rib (1).

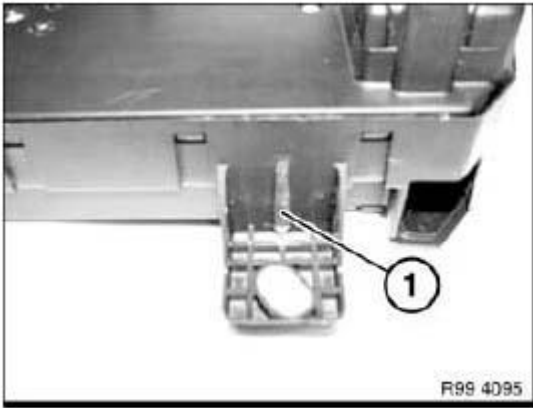


Fig. 159: Identifying Rib

Courtesy of BMW OF NORTH AMERICA, INC.

Remove rib (1).

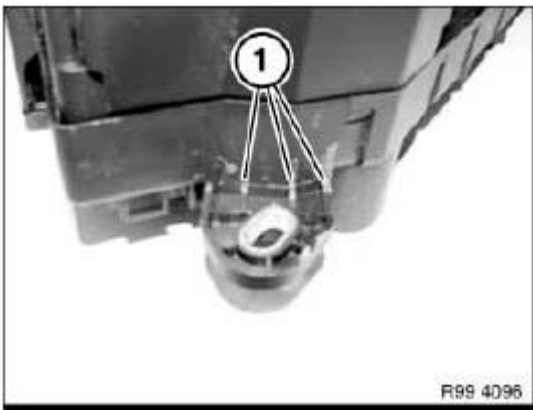


Fig. 160: Identifying Rib

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove fuses and relays.

BATTERY

12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.**

Before disconnecting battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

- IMPORTANT:**
- There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.
 - On vehicles with radio code: After disconnecting the battery, the radio code must be re-entered. Therefore obtain the radio code card from the customer beforehand. Note stored stations and restore them after connecting the battery.
 - Stored settings of the on-board computer and clock will also be lost.
 - All available central keys must be recoded for cars with first generation infrared transmitter locking systems.

General notes on disconnecting battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

Do not under any circumstances pull/lever off pole shoes by force.

Do not under any circumstances release socket-head cap screw of IBS.

- Detach **TERMINAL OF BATTERY NEGATIVE** lead from car battery and second battery if fitted. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque **61 21 1AZ**.

After connecting battery:

IMPORTANT: The scope of application of some systems may be restricted after a power supply interruption.

Likewise, individual settings may be lost.

Settings or activations must be carried out, depending on the equipment specification.

Example:

- Vehicles with automatic engine start-stop system (MSA):

MSA function is active only after learning period (vehicle must not be woken for a period of approx. 6 hours) > if necessary, notify customer of the situation

- E46 (AWD)/ E53/ E83: Carry out STEERING ANGLE SENSOR ADJUSTMENT
- If necessary, carry out ADJUSTMENT OF ACTIVE FRONT STEERING
- If necessary, activate SLIDING SUNROOF
- If necessary, activate POWER WINDOWS
- If necessary, activate mirror with compass

Please refer to the Progman user documentation for further information on vehicle-specific activation.

Vehicles with a two-battery system

Starter and equipment batteries

A two-battery system has a starter battery circuit and an equipment battery circuit. A supplementary control unit monitors both battery circuits. Depending on the situation, the battery circuits are connected to or isolated from the supplementary control unit via an isolating relay.

Two AGM batteries, whose design and properties are described in AGM BATTERIES, are used as a storage battery.

IMPORTANT: These batteries must not under any circumstances be charged with a voltage in excess of 14.8 V. Rapid programs must not be used either.

Receiving/giving starting assistance via jump start terminal

The engine can be jump-started with an external voltage supply via the jump start terminal on the right side of the engine compartment.

NOTE: The starter battery is isolated from the alternators when the engine hood/bonnet is open.

Giving starting assistance via the jump start terminal is thus limited by the capacity of the starter battery when the engine hood/bonnet is open.

Charging starter and equipment batteries via jump start terminal

The starter battery is charged as a matter of priority with a charger connected to the jump start terminal. The voltage at the starter battery is the decisive factor in determining whether the equipment battery is also included in the charging operation. The supplementary control unit automatically detects a charging operation at a charging voltage at the starter battery of $>$ or $=$ 13.5 V. The isolating relay is closed and thus the equipment battery is connected in parallel. Both batteries are now charged.

Prerequisite:

- Terminal 61 inactive
- Terminal 15 inactive

If terminal 15 becomes "active" during the charging operation, the isolating relay is opened immediately and again only the starter battery is charged.

NOTE: When the engine hood is open, the isolating relay is also opened in normal operation when the engine is running.
A special mode can be set by means of diagnosis for workshop/garage operation. The isolating relay is closed from terminal R in this operating mode. This mode is automatically reset once a distance of 5 km has been driven.

Trickle charging

The increased closed-circuit current consumption can be compensated for via the jump-start connection point with the aid of the "Acctiva easy" battery trickle charger .

IMPORTANT: The cigarette lighter is isolated from the electrical system after terminal R "OFF" on a timed basis (60 mins.), thereby interrupting charging of the equipment battery via the cigarette lighter. This is prevented if the battery master switch (on the right side of the luggage compartment behind the panel) is turned on and off again twice within 2 seconds. (Cigarette light battery charging function).

61 20... THRESHOLD VALUES FOR BATTERY INSPECTION OF ALL BATTERY (TELEPHONE EXCEPT FOR TELEPHONE BATTERY)

IMPORTANT: Read and comply with SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.

Test step 1 - before battery charge:

Charge state ⁽¹⁾	Starting capability ⁽²⁾	Test result
Not testable		Charge
less than 50 % ⁽²⁾		Charge
greater than 50 %	less than 75 %	Charge
greater than 50 %	greater than 75 % ⁽³⁾	Charge
greater than 80 %	greater than 75 %	O.K.
(1) State of charge and start output must always be evaluated in combination		
(2) Test charging for more than 5 hours with Gossen CG 32 or Siemens / Gossen VB 801 charger		

(3) Fully charge until the state of charge is greater than 80%.

Test step 2 - after battery charge:

Charge condition (1)	Starting capability (2)	Test result
Not testable		Faulty
less than 50 %	less than 75 %	Charge
greater than 50 %	greater than 75 %	Charge
(1) State of charge and start output must always be evaluated in combination		
(2) Test charging for more than 5 hours with Gossen CG 32 or Siemens / Gossen VB 801 charger		

NOTE: If the battery has been tested from the positive terminal in the engine compartment, repeat the test for safety directly on the battery.

61 20... (SAFETY) INFORMATION ON AGM BATTERY



T6104016

Fig. 161: Identifying AGM Battery
Courtesy of BMW OF NORTH AMERICA, INC.

Introduction

In September 2002 so-called VRLA batteries, better known as **AGM batteries**, were introduced.

(VRLA stands for Valve Regulated Lead Acid, i.e. lead acid battery with pressure relief valve; **AGM** stands for **A**bsorbent **G**lass **M**at, i.e. absorbent glass fibre fleece)

AGM batteries are fitted in models with electrical loads/consumers which have a high energy demand.

With the option SA 146 (2nd battery), the AGM battery (70 Ah) is fitted as the 2nd battery.

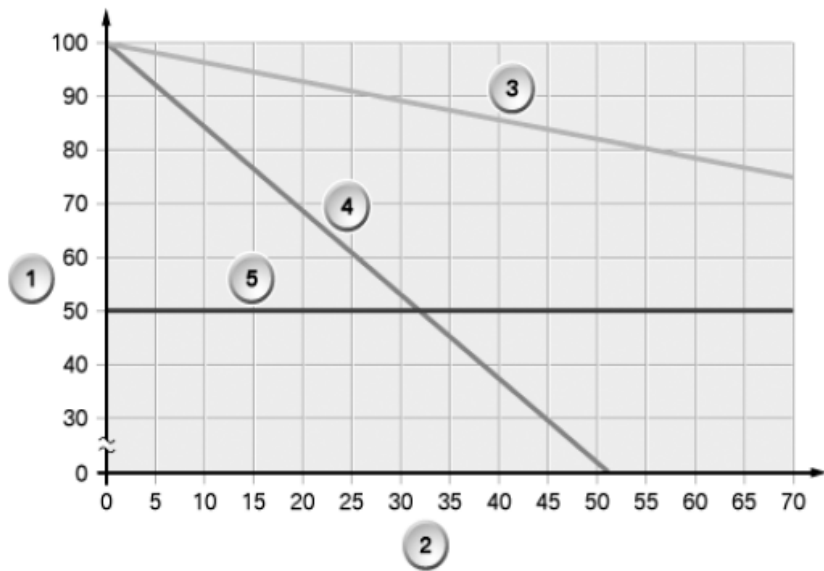
The constantly increasing energy demand of modern vehicle electrical systems calls for ever more powerful battery solutions.

Today, up to 100 servomotors, which have to be electrically powered, operate in a modern luxury-class motor vehicle. Added to these are safety, environmental and comfort and convenience elements which are increasingly becoming standard features, such as e.g. Anti-lock Brake System (ABS), Dynamic Stability Control (DSC), electric steering effort assistance (EPS), heated catalytic converter, electronic chassis and suspension control, air conditioning and navigation system. The power consumption is considerable even when the vehicle is parked.

The somewhat higher price compared with a battery of similar size is fully balanced by the following benefits:

- Significantly longer service life
- Increased starting reliability at low temperatures
- Safe starting of engines with high starting current demands, e.g. high-performance diesel engines
- 100 % freedom from maintenance
- Low risk in event of an accident (reduced risk to the environment)

Service life of AGM battery



T6102003

Key	Explanation	Key	Explanation
1	Available capacity [%]	2	Kilometres covered [1000 km]
3	AGM battery	4	Lead calcium battery
5	50 % capacity limit		

Fig. 162: AGM Battery Service Life Graph

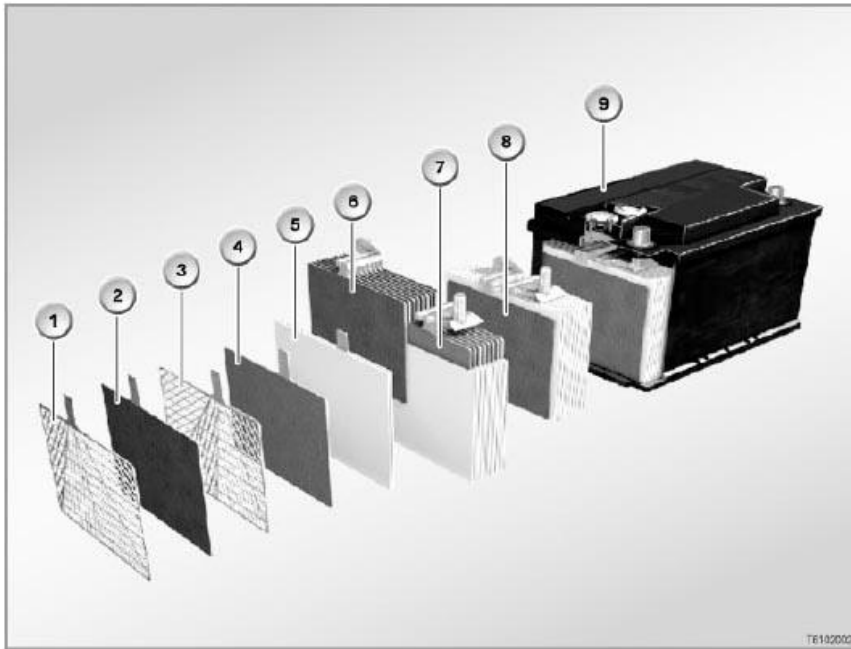
Courtesy of BMW OF NORTH AMERICA, INC.

Unlike the previously used lead calcium batteries, the sulfuric acid contained in batteries with fleece technology is not self-contained in the battery housing.

Instead, the sulfuric acid is 100 % bound up in glass fibre fleece mats (separators). Thus, no acid can escape if the battery housing is damaged. In addition, the AGM battery is sealed gas-tight. This is possible because the gases are converted back into water as a result of the separator permeability.

Brief description of components

An AGM battery can be recognized by its black housing and the lack of a so-called "Magic Eye".



Key	Explanation	Key	Explanation
1	Positive grid with silver alloy	2	Positive plate
3	Negative grid	4	Negative plate
5	Separator made of glass fibre fleece	6	Positive plate pack
7	Negative plate pack	8	Plate block
9	Block holder with bottom rails		

Fig. 163: Identifying AGM Battery Components
 Courtesy of BMW OF NORTH AMERICA, INC.

Design

The AGM battery differs from the conventional lead calcium battery as follows:

- Larger plates:
 Larger plates provide for a 25 % higher power density.
- Separators made of glass fibre fleece:
 These provide for up to 3 times higher cycle reliability.
 This in turn improves cold starting performance, current consumption and service life.
- Gas-tight housing with pressure relief valve (see also mode of operation):
 The cell plugs are welded and cannot be opened.

· Acid bound up in the glass fibre fleece:

The acid is not as previously self-contained in the housing, but 100 % bound up in the glass fibre fleece. This provides increased protection against acid leakage and thus represents a reduced risk to the environment.

Mode of operation

The AGM battery differs from conventional batteries in its non-polluting and substance-retaining behavior during charging.

When vehicle batteries are charged, the two gases oxygen and hydrogen are released by electrolysis.

- In a conventional wet lead calcium battery, the two gases hydrogen and oxygen are dissipated into the atmosphere.
- In an AGM battery, the two gases are converted back into water: The oxygen which is created at the positive electrode during charging passes through the permeable glass fibre fleece to the negative electrode. At the negative electrode the oxygen reacts with the arriving hydrogen ions in the electrolyte to form water (oxygen cycle).

In this way, the gas and thus also the electrolyte are not lost.

Only in the event of an excessively heavy buildup of gas, i.e. excessively high pressure buildup (20 to 200 mbar), does the pressure relief valve discharge the gas. In this process, the pressure relief valve does not allow any oxygen in the air to enter. Because a valve regulates the pressure in the battery, the AGM battery is also known as a VRLA battery (Valve Regulated Lead Acid).

Notes and instructions for service personnel

It is necessary when handling an AGM battery to observe some particular points pertaining to battery changing and installation location.

Charging

WARNING: Do not charge the AGM battery with > or = 15.2 V. No quick-charging routines!

When charging removed batteries (so-called stand-alone batteries), do not exceed the maximum charging voltage of 15.2 V at room temperature. Also when charging via the jump start terminal, do not exceed the maximum charging voltage of 15.2 V at room temperature.

The AGM battery will be damaged even when it is only briefly charged with a charging voltage of more than 15.2 V. A charging voltage of more than 15.2 V is usually used in quick-charging routines.

Installation location

WARNING: *Do not install the AGM battery in the engine compartment.*

The AGM battery must not be installed in the engine compartment on account of the high spatial temperature differences, otherwise its service life will be significantly shortened.

Housing

WARNING: *Do not open the AGM battery.*

The AGM battery must not be opened under any circumstances as the introduction of oxygen from the air will cause the battery to lose its chemical equilibrium and be rendered non-operational.

Battery changing

Any conventional lead calcium battery can always be replaced by an AGM battery.

Using an AGM battery does not require any alterations to be made to the vehicle electrical system.

NOTE: *The AGM battery is recommended for "problem customers".*

"Problem customers" encounter a high energy throughput through their batteries. This high energy throughput is caused by stationary loads/consumers (TV, independent heating, etc.) and a bad use profile for the battery ("chauffeur operation", short-distance driving, "stop-and-go"). The use of an AGM battery is recommended for these problem customers.

61 20... BATTERY CHARGING

If a normal or quick charger is used to charge the battery, the battery must be disconnected from the vehicle electrical system and removed. This prevents damage to paintwork and upholstery.

Ideally, battery charging is performed with BMW-approved charging computers, refer to

SI 2 03 98 350 and

SI 2 06 02 854.

IMPORTANT: In order to prevent malfunctions on the intelligent battery sensor (IBS), the charging terminals in the engine compartment must be used without fail on vehicles with IBS (from E60). On other vehicles, it is recommended that the charging terminals in the engine compartment are used.

IMPORTANT: Before charging the battery while it is installed, first carry out a **CLOSED-CIRCUIT CURRENT TEST**. If here the voltage is 10 V or less, one or more of the cells may be faulty or the entire battery may already be damaged. In this case, always remove the battery as escaping gases during charging could damage the interior equipment and trim. Attempt to regenerate faulty cells with low charging current.

If necessary, open existing plugs on the individual cells.

61 20... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular engine types and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents possible short-circuiting.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

NOTE: **Vehicles with energy management systems (IBS, power module): Register battery replacement**

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

If the performance readiness drops below a defined minimum, a Check Control message will be generated to advise the driver that the battery must be replaced.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

NOTE: **Only this registration/logon will ensure that the corresponding Check Control message will go out again.**

Diagnosis system

Register battery replacement

- Service functions
- Body
- Voltage supply
- Register battery replacement

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system

- Battery retrofitting

61 20... BATTERY OPEN-CIRCUIT CURRENT TEST

NOTE: **Observe SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.**
 Observe Service Information Adapter for open-circuit current measurement.



W05 95 001

Fig. 164: Identifying Battery Open-Circuit Current Test
Courtesy of BMW OF NORTH AMERICA, INC.

The open-circuit current test is performed using the Diagnosis and Information System (DIS).

61 20 005 TESTING BATTERY WITH BATTERY TESTER

See **TESTING BATTERY WITH BATTERY TESTER**.

61 20 503 VEHICLE BATTERY - CLOSED-CIRCUIT CURRENT MONITORING

Necessary preliminary tasks:

To access negative lead of battery, perform the necessary preliminary work described in **DISCONNECTING NEGATIVE BATTERY CABLE**.

IMPORTANT: Do not disconnect negative lead of battery.

Connect BMW diagnosis system

Connect clip-on probe to negative lead of battery. The arrow on the current clamp must point towards the

battery.

Measure closed-circuit current.

61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD

WARNING: Observe **SAFETY INSTRUCTIONS** for handling vehicle battery.
Follow instructions **FOR DISCONNECTING AND CONNECTING BATTERY!**

Observe notes on power supply / on intelligent battery sensor (IBS).

Necessary preliminary tasks:

REMOVE BATTERY COVER OR OPEN RIGHT LUGGAGE COMPARTMENT TRIM PANEL

Security version:

Remove luggage compartment equipment carrier

Loosen nut (1).

Tightening torque **61 21 1AZ** .

IMPORTANT: Do not under any circumstances use force to pull off pole shoe.
Do not under any circumstances release socket-head cap screw of IBS.

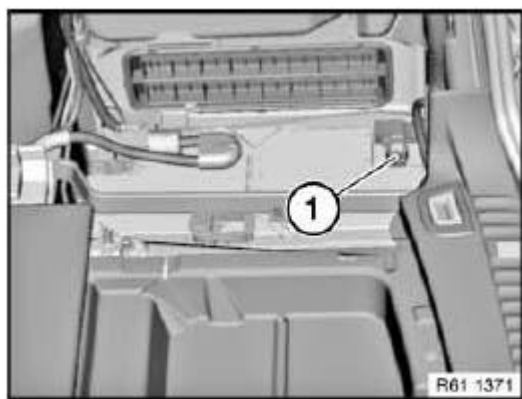


Fig. 165: Identifying Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Detach battery negative lead with IBS towards top, lay to one side and secure.

61 20 908 PERFORMING BATTERY "POWER RESET" (FOR PROGRAMMING/CODING CONTROL UNIT(S))

IMPORTANT: Observe SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.

The following steps must be carried out for a "power reset":

- Switch off and disconnect battery charger
- Switch off ignition

Cars with ignition key: Turn ignition key to 0 position

Cars with identification sensor: Remove identification sensor from slot

Cars with comfort access system: Make sure terminal is in 0 position

- Disconnect battery negative terminal
- Reconnect battery negative terminal (to ensure bus activity)
- Waiting time (5-10 seconds)
- Disconnect battery negative terminal
- Waiting time (1 minute)
- Connect battery negative terminal and tighten, tightening torque **61 21 1AZ**
- Connect and switch on battery charger
- Switch ignition on

BATTERY / VAPOR SEPARATOR**61 21... REMOVING AND INSTALLING BATTERY COVER**

Necessary preliminary tasks:

- Remove flap in luggage compartment panel on right. See **REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT FLOOR TRIM PANEL (WITH STOWAGE PACK)** and **REMOVING AND INSTALLING / REPLACING FLAP IN LUGGAGE COMPARTMENT TRIM, LEFT OR RIGHT**
- Remove rear trim for luggage compartment floor. See **REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT FLOOR TRIM PANEL (WITH STOWAGE PACK)** and **51 47 101 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

Unscrew nuts (1).

Release screw (4).

Fold back battery cover (2) in direction of arrow.

If necessary, lift luggage compartment floor storage tub (3) in area of battery cover (2).

Remove battery cover (2) towards top.

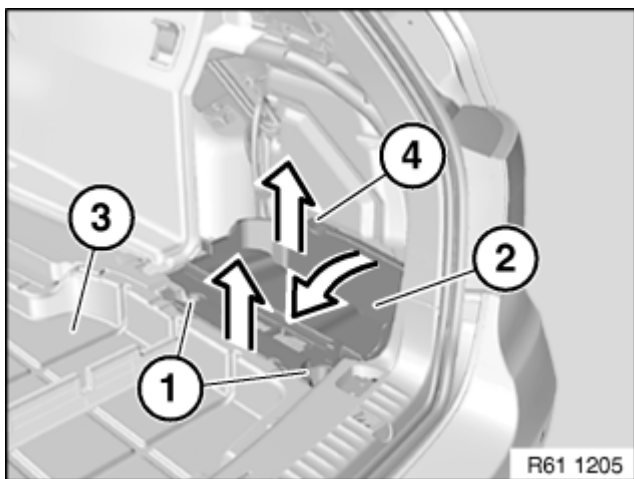


Fig. 166: Identifying Battery Cover, Nuts, And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 21 010 REMOVING AND INSTALLING OR REPLACING BATTERY

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.
Observe notes on power supply / on intelligent battery sensor (IBS).

Necessary preliminary tasks:

- Disconnect battery negative lead

Security version:

- Remove protective cover from distribution box/battery positive terminal (luggage compartment)

Disconnect plug connection (1) of IBS cable.

Unscrew nut (3). Tightening torque **61 21 1AZ** .

IMPORTANT: Do not under any circumstances pull/lever safety battery terminal (2) off by force.

Detach safety battery terminal (2) towards top, lay to one side and secure.

Release nuts (4) and remove rollover protection (5).

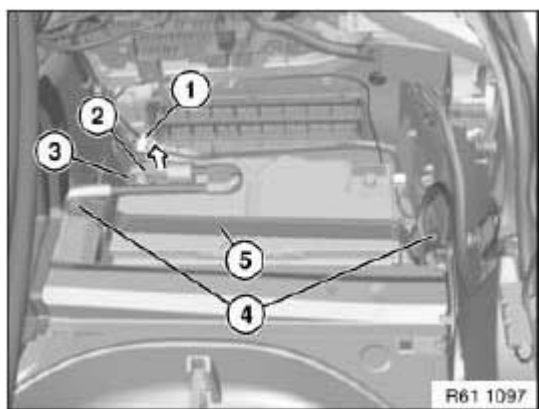


Fig. 167: Identifying IBS Cable Plug Connection, Battery Terminal And Rollover Protection
 Courtesy of BMW OF NORTH AMERICA, INC.

Release threaded pin (1) and remove holder (2).

Detach vent (4) in direction of arrow.

Fold both clips (3) open.

Pull battery (5) back from front fixture and remove towards top.

Installation:

Make sure battery (5) is correctly seated in front fixture.

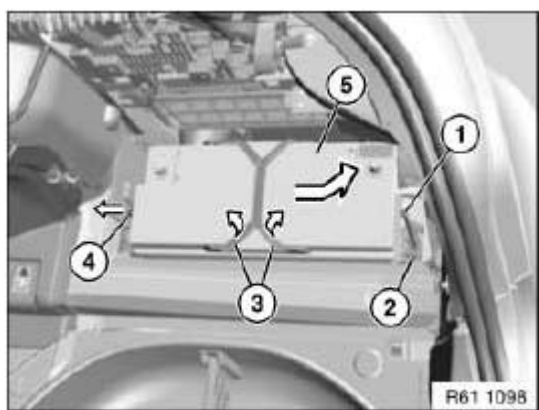


Fig. 168: Identifying Threaded Pin, Holder And Battery
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Read out fault memory, clear if necessary
- Register battery replacement

61 21 028 TESTING BATTERY WITH BATTERY TESTER

IMPORTANT: Check is not permissible for AGM batteries!

WARNING: Read and comply with SAFETY INFORMATION pertaining to vehicle battery.

Necessary preliminary tasks:

Remove LUGGAGE COMPARTMENT FLOOR TRIM PANEL .

NOTE: Use BMW-recommended battery tester to test the battery.

Procedure:

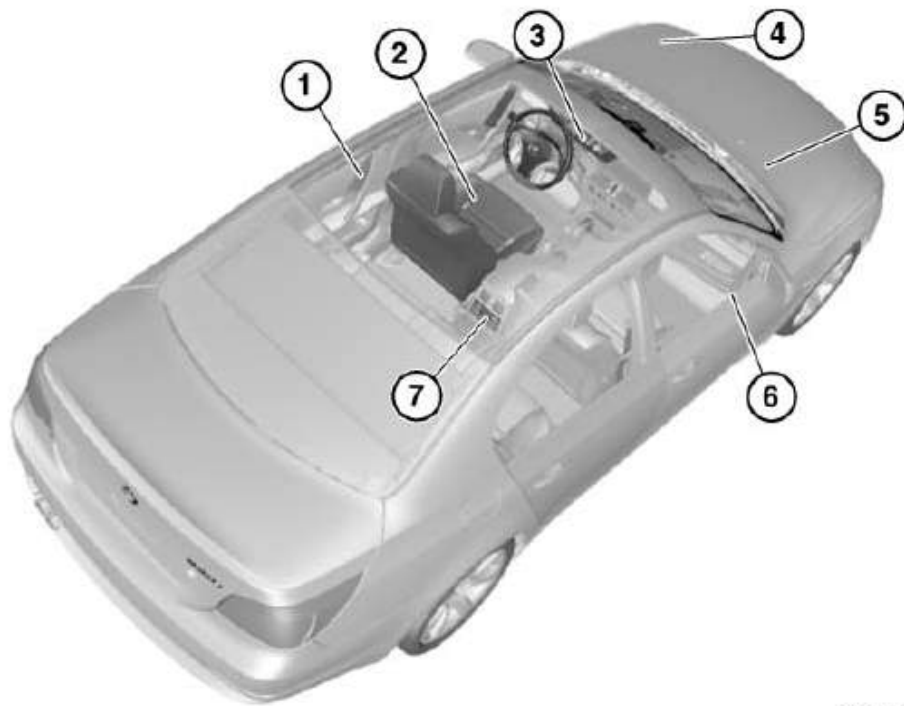
- Turn off ignition and close doors
- Connect battery tester directly to battery terminals
- Select Battery test and confirm
- Enter vehicle identification number
- Enter battery data
- Carry out battery test



Fig. 169: Identifying BMW-Recommended Battery Tester
Courtesy of BMW OF NORTH AMERICA, INC.

SWITCH

61 31. OVERVIEW OF SWITCHES



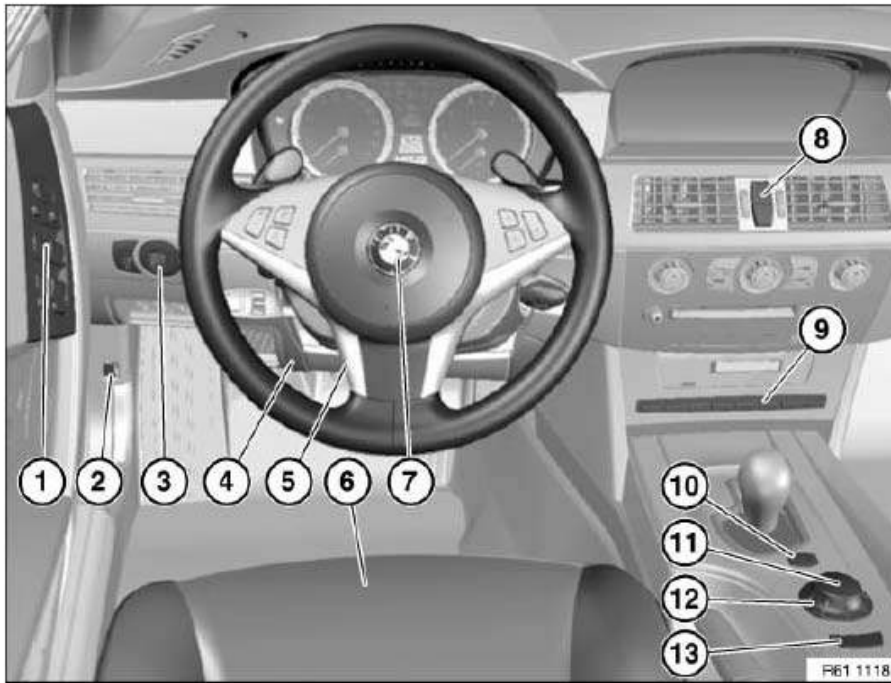
R61 1117

- | | |
|--|---|
| 1 Rocker switch for side window operation (rear) | 5 Engine hood contact switch |
| 2 Overview of switches in driver's area | 6 Switch for glovebox light |
| 3 Switch in front headliner trim | 7 Switch in rear insert (storage compartment) |
| 4 Level switch for windscreen washer system | |

Fig. 170: Overview Of Switches

Courtesy of BMW OF NORTH AMERICA, INC.

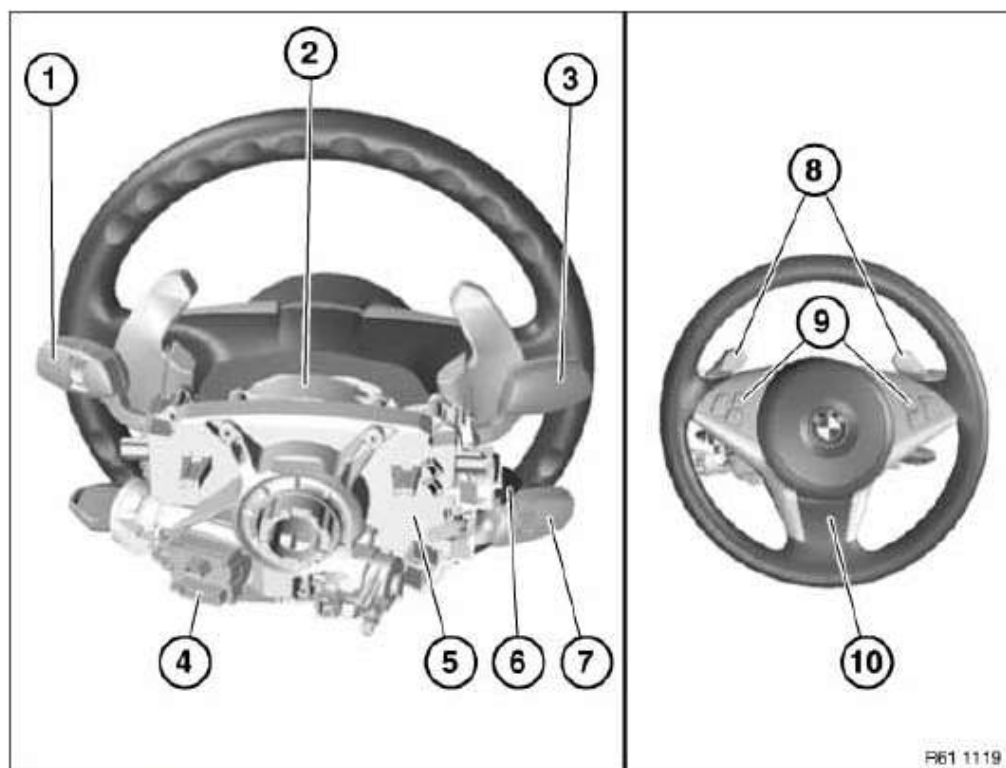
61 31.. OVERVIEW OF SWITCHES IN DRIVER'S AREA



- | | |
|---|--|
| 1 Rocker switch for side window operation (front) | 8 Switch for hazard warning system/central locking |
| 2 Rear lid unlocking switch | 9 Center console switch cluster |
| 3 Light operating unit | 10 Driving dynamics switch |
| 4 Clutch switch module | 11 Knob for controller |
| 5 Brake-light switch | 12 Controller |
| 6 Seat functions switch | 13 Button unit (for on-board monitor) |
| 7 Overview of switches in steering wheel area | |

Fig. 171: Overview Of Switches In Driver Area
 Courtesy of BMW OF NORTH AMERICA, INC.

61 31... OVERVIEW OF SWITCHES IN STEERING WHEEL AREA



- | | |
|---|--|
| 1 Windshield wiper switch | 6 Steering column adjustment switch /
Heated steering wheel button |
| 2 Coil spring casing | 7 Cruise control switch |
| 3 Turn signal/headlight dipping stalk | 8 Shifters for SMG transmission |
| 4 Ignition starter switch | 9 Multifunction steering wheel switch |
| 5 Fixture for steering column stalk | 10 Steering wheel module control unit |

Fig. 172: Overview Of Switches In Steering Wheel Area

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 006 REMOVING AND INSTALLING/REPLACING FIXTURE FOR STEERING COLUMN STALK (FROM 09/2005)

WARNING: Move wheels into straight-ahead position and do not alter this position during the repair work.
Read and comply with notes on protection against electrostatic damage (ESD PROTECTION).
Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES.

Necessary preliminary tasks:

- Remove STEERING WHEEL .
- Remove FRONT SECTION OF STEERING COLUMN TRIM

- Remove **LOWER SECTION OF STEERING COLUMN TRIM**
- Remove **TOP SECTION OF STEERING COLUMN CASING.**
- If necessary, remove deformation element for steering column trim.

Disconnect plug connections from rear on fixture for steering column stalk (2).

Release screws (1).

Remove fixture for steering column switch (2) in direction of arrow.

Installation:

Carry out **STEERING ANGLE SENSOR ADJUSTMENT.**

On vehicles with active front steering, steering angle sensor adjustment is performed by means of **INITIAL OPERATION** / adjustment of active front steering.

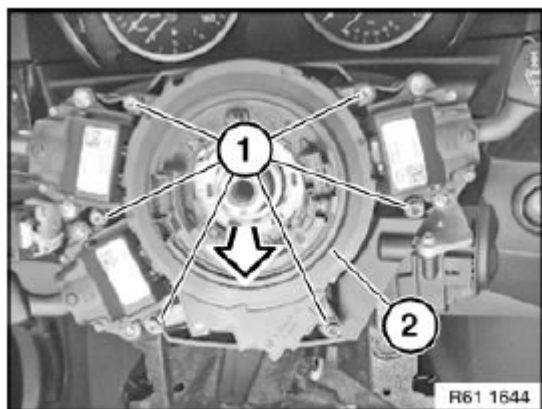


Fig. 173: Identifying Steering Column Stalk And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove **TURN INDICATOR/HEADLIGHT DIPPING SWITCH**
- Remove **WINDSHIELD WIPER SWITCH**
- If necessary, remove **CRUISE CONTROL SWITCH**
- Remove **VOLUTE SPRING CASSETTE**
- Carry out **VEHICLE PROGRAMMING/CODING**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

On vehicles with active front steering, steering angle sensor adjustment is performed by means of **INITIAL OPERATION** / adjustment of active front steering

61 31 011 REMOVING AND INSTALLING/REPLACING VOLUTE SPRING CASSETTE (FROM 09/2005)

WARNING: Move wheels into straight-ahead position and do not alter this position during the repair work.

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove AIRBAG UNIT
- Remove STEERING WHEEL
- Remove FRONT SECTION OF STEERING COLUMN TRIM
- Remove LOWER SECTION OF STEERING COLUMN TRIM
- Remove CRUISE CONTROL SWITCH
- Remove WINDSHIELD WIPER SWITCH

Release screws (1).

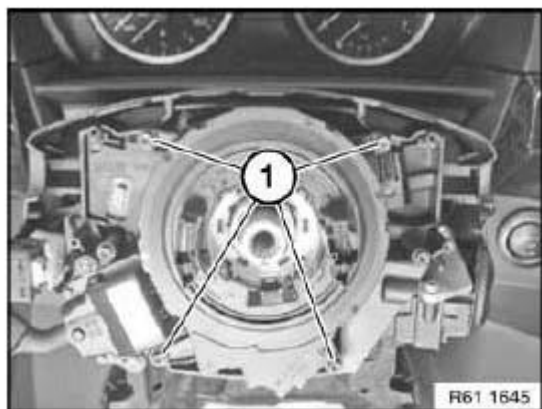


Fig. 174: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock catches (1) and remove volute spring cassette (2) in direction of arrow from fixture for steering column switch (3).

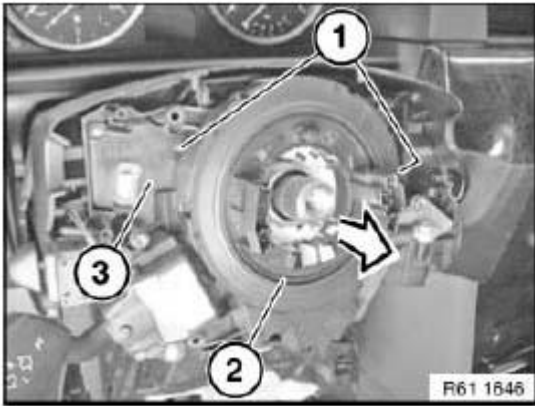


Fig. 175: Removing Volute Spring Cassette
Courtesy of BMW OF NORTH AMERICA, INC.

- IMPORTANT:**
- Do not turn ring (1).
 - Also turning ring (1) through 360° is not permitted!
 - Secure ring (1) against unauthorized turning.

Installation:

For purposes of clarity, fixture for steering column stalk (2) is shown removed.

Marking (3) must line up with marking (4).

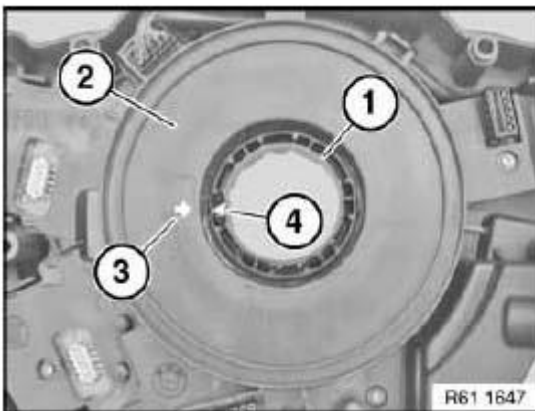


Fig. 176: Identifying Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive pin (1) of volute spring (2) must line up correctly with opening (3) in inner ring of stalk.

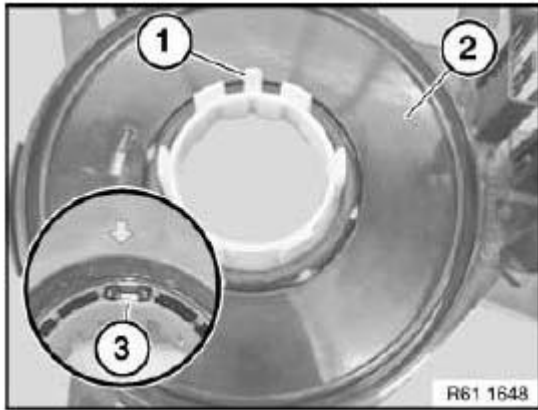


Fig. 177: Identifying Pin Of Volute Spring

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 016 REMOVING AND INSTALLING/REPLACING TURN INDICATOR/HEADLIGHT DIPPING SWITCH

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove **AIRBAG UNIT**
- Remove **STEERING WHEEL**
- Remove **FRONT SECTION OF STEERING COLUMN TRIM**

Release screws (1) and remove turn indicator/headlight dipping switch (2) towards rear.

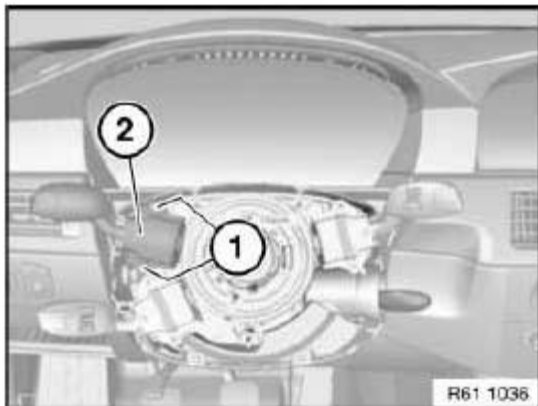


Fig. 178: Identifying Turn Indicator/Headlight Dipping Switch And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 018 REMOVING AND INSTALLING/REPLACING CRUISE CONTROL SWITCH

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove **AIRBAG UNIT**
- Remove **STEERING WHEEL**
- Remove **FRONT SECTION OF STEERING COLUMN TRIM**

Release screws (1) and remove cruise control switch (2) towards rear.

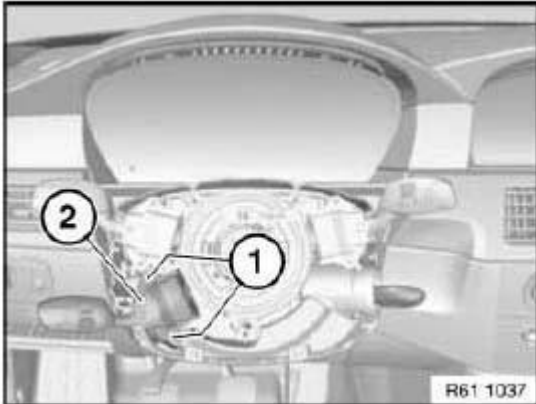


Fig. 179: Identifying Cruise Control Switch And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 020 REMOVING AND INSTALLING/REPLACING IGNITION STARTER SWITCH

Necessary preliminary tasks:

- Move ignition lock to key position 0 (stop)
- Remove **LOWER SECTION OF STEERING COLUMN TRIM**

IMPORTANT: Before removing ignition starter switch (1), secure inner shaft against turning:
Insert a M2.5*8 screw in bore (2).

Installation:

Remove screw in bore (2).

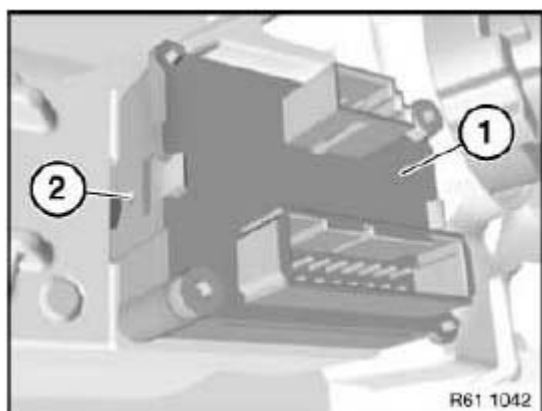


Fig. 180: Identifying Ignition Starter Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1), tightening torque **61 31 1AZ** .

Installation:

Secure screws (1) with sealing paint.

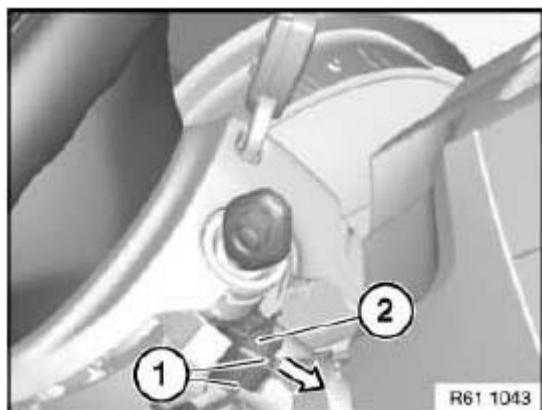


Fig. 181: Removing Ignition Starter Switch
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Carefully unlock and disconnect associated plug connection for ribbon cable.
Replace the ribbon cable if damaged.
The ribbon cable leads to the CONTROL UNIT FOR THE CAR ACCESS SYSTEM.

Remove ignition starter switch (2).

61 31 023 REMOVING AND INSTALLING/REPLACING START/STOP SWITCH

Special tools required:

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00 9 341

Attach special tool **00 9 341** as illustrated.

Unclip Start/Stop switch with associated ribbon cable in direction of arrow.

IMPORTANT: Carefully unlock and disconnect associated plug connection for ribbon cable.

Replace the ribbon cable if damaged.

Remove Start/Stop switch.

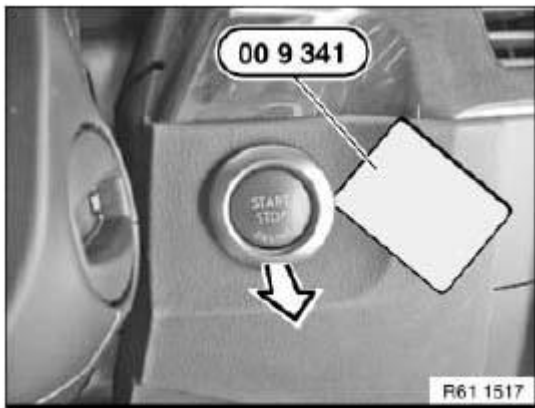


Fig. 182: Identifying Special Tool (00 9 341)

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 035 REMOVING AND INSTALLING/REPLACING SWITCH FOR STEERING COLUMN ADJUSTMENT

Necessary preliminary tasks:

- Remove **TOP SECTION OF STEERING COLUMN CASING** .

Disconnect associated plug connections of steering column adjustment switch (1).

Unclip steering column adjustment switch (1) in direction of arrow.

Remove steering column adjustment switch (1) towards front from fixture for steering column stalk (2).

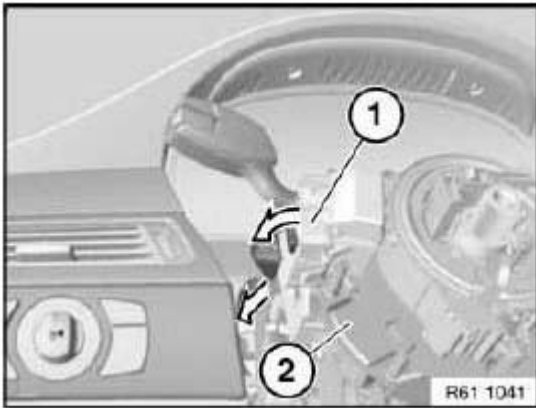


Fig. 183: Unclipping Steering Column Adjustment Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 037 REMOVING AND INSTALLING/REPLACING LIGHTING CONTROL UNIT

Special tools required:

64 1 020

Attach special tool **64 1 020** at openings (1) and lever out catches (2).

Pull back lighting control unit (3).

Unlock and disconnect associated plug connection, remove lighting control unit (3).

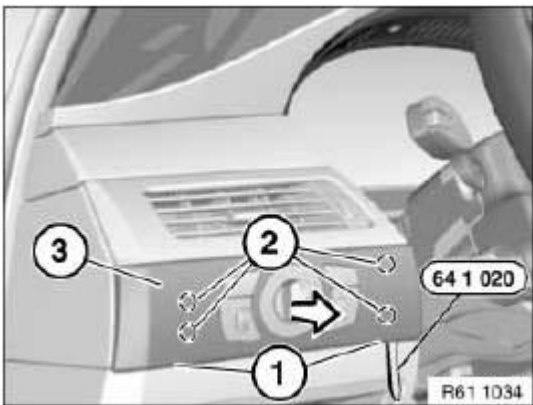


Fig. 184: Identifying Lighting Control Unit And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure clips (1) are correctly seated on trim of lighting control unit (2).

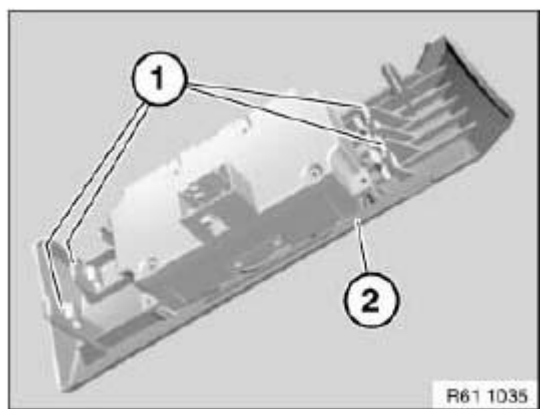


Fig. 185: Identifying Lighting Control Unit And Clips

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 038 REMOVING AND INSTALLING (REPLACING) SWITCH FOR PASSENGER AIRBAG DEACTIVATION

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt pretensioners.
Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks:

- Disconnect battery negative lead
- Open glovebox lid

Unclip switch receptacle for passenger airbag deactivation (1) in rear area by pressing in direction of arrow out of glovebox housing (2).

Feed switch receptacle for passenger airbag deactivation (1) in front area in direction of arrow out of glovebox housing (2).

Installation:

Make sure switch receptacle for passenger airbag deactivation (1) is correctly engaged on glovebox housing (2).

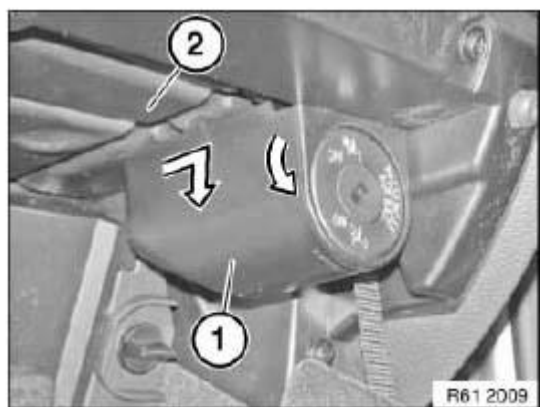


Fig. 186: Identifying Passenger Airbag Deactivation
 Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unlock catches (2) and feed switch for passenger airbag deactivation (4) in direction of arrow out of switch receptacle for passenger airbag deactivation (5).

Installation:

Guides (3) and retaining lugs (6) must not be damaged or missing.

Make sure switch for passenger airbag deactivation (4) is correctly seated in switch receptacle for passenger airbag deactivation (5).

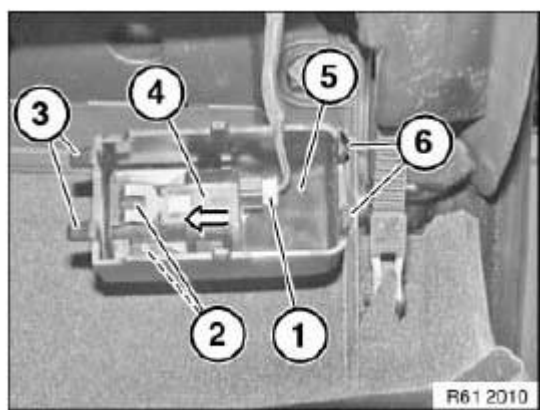


Fig. 187: Unlocking Catches And Feed Switch For Passenger Airbag Deactivation
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove **LOCK CYLINDER FOR PASSENGER AIRBAG DEACTIVATION** .

61 31 040 REMOVING AND INSTALLING/REPLACING SWITCH FOR WINDSCREEN WIPERS

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove AIRBAG UNIT
- Remove STEERING WHEEL
- Remove FRONT SECTION OF STEERING COLUMN TRIM

Release screws (1) and remove windshield wiper switch (2) towards rear.

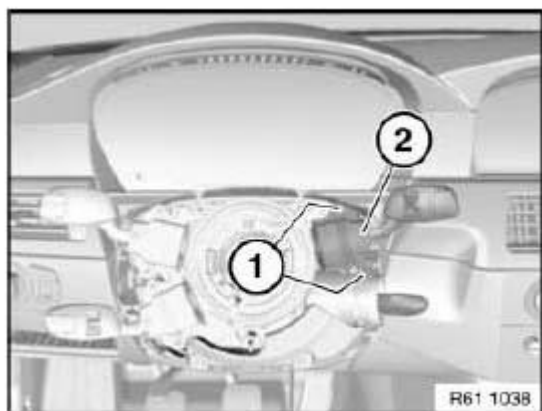


Fig. 188: Identifying Windshield Wiper Switch And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 044 REMOVING AND INSTALLING/REPLACING CENTER CONSOLE SWITCH CLUSTER ON LEFT (FROM 03/2007)

Operation is described in:

Removing and installing/replacing CENTRE CONSOLE SWITCH CLUSTER ON LEFT AND RIGHT

61 31 046 REMOVING AND INSTALLING/REPLACING CENTER CONSOLE SWITCH CLUSTER ON RIGHT (FROM 03/2007)

Operation is described in:

Removing and installing/replacing CENTRE CONSOLE SWITCH CLUSTER ON LEFT AND RIGHT

61 31 052 REMOVING AND INSTALLING (REPLACING) CENTER CONSOLE SWITCH CLUSTER (UP TO 03/2007)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION).

Necessary preliminary tasks:

- Remove **MIDDLE TRIM FOR INSTRUMENT PANEL**

Unclip switch cluster in center console (1) all round and remove from middle trim for instrument panel (2).

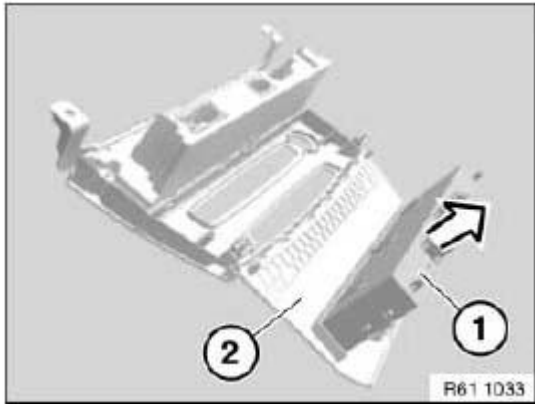


Fig. 189: Unclipping Switch Cluster In Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

61 31 052 REMOVING AND INSTALLING/REPLACING CENTER CONSOLE SWITCH CLUSTER ON LEFT AND RIGHT (FROM 03/2007)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION).

Necessary preliminary tasks:

- Remove **MIDDLE TRIM FOR INSTRUMENT PANEL**

Unclip center console switch cluster on left and right (1) all round and remove from middle trim for instrument panel (2).

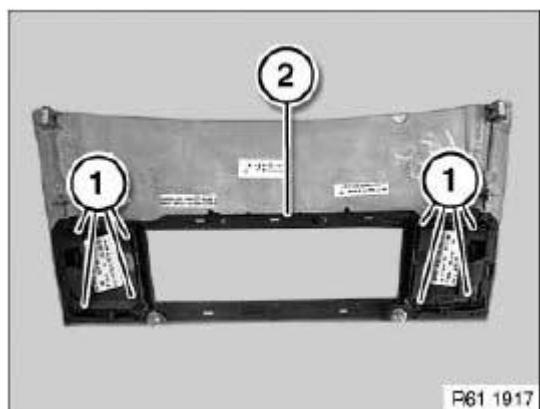


Fig. 190: Identifying Instrument Panel And Centre Console Switch Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

61 31 062 REMOVING AND INSTALLING/REPLACING BUTTON FOR STEERING WHEEL HEATING

This operation is described in:

"Removing and installing/replacing **SWITCH FOR STEERING COLUMN ADJUSTMENT**".

61 31 069 REMOVING AND INSTALLING/REPLACING INDICATOR FOR FRONT PASSENGER AIRBAG DEACTIVATION

Necessary preliminary tasks:

- **E60, E63:** Remove **FRONT ROOFLINER TRIM**
- **E64:** Remove front roofliner trim insert

Press locks (1) and unclip indicator for front passenger airbag deactivation (2) in direction of arrow from front roofliner trim (3).

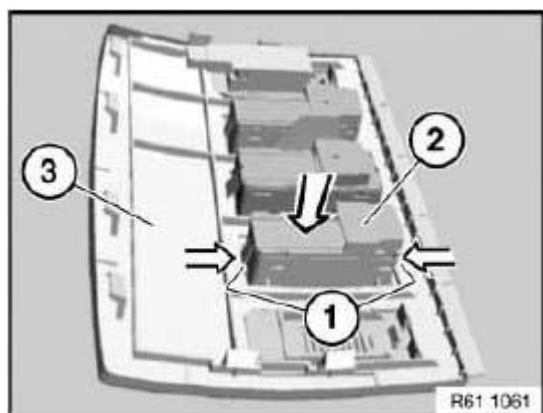


Fig. 191: Pressing Locks And Unclip Indicator For Front Passenger Airbag Deactivation
 Courtesy of BMW OF NORTH AMERICA, INC.

61 31 079 REMOVING AND INSTALLING/REPLACING SWITCH FOR HAZARD WARNING FLASHERS/CENTRAL LOCKING

Special tools required:

64 1 020

IMPORTANT: Risk of damage!

Protect middle fresh-air grille decorative trim in working area against damage, tape off if necessary.

Lever out switch for hazard warning system/central locking (1) with special tool **64 1 020** and pull back.

Disconnect associated plug connection and remove switch for hazard warning flashers/central locking (1).

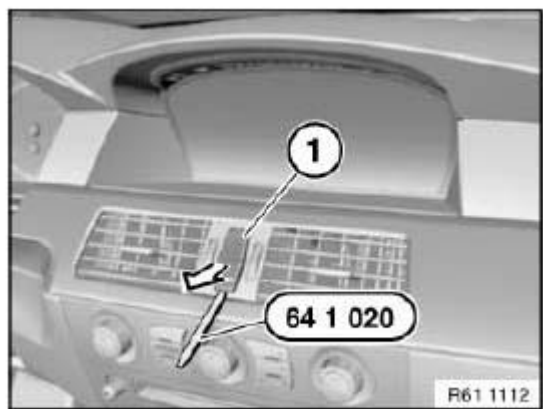


Fig. 192: Identifying Hazard Warning Flashers/Central Locking
 Courtesy of BMW OF NORTH AMERICA, INC.

61 31 083 REMOVING AND INSTALLING/REPLACING SWITCH FOR UNLOCKING REAR LID

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NOTE: To unclip switch for unlocking rear lid (4), partially detach mocket (1).
Grip from outside behind footwell side trim panel on A-pillar on left (2).

Press retaining lugs (3) together and feed switch for unlocking rear lid (4) out of footwell side trim panel on A-pillar on left (2). Disconnect associated plug connection and remove switch for unlocking rear lid (4).

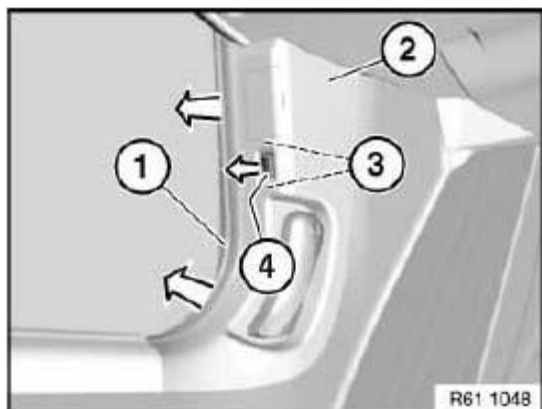


Fig. 193: Detaching Mocket And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 091 REMOVING AND INSTALLING/REPLACING SWITCH FOR LEFT OR RIGHT SEAT HEATING (REAR)

Necessary preliminary tasks:

- Remove **REAR INSERT (IN STORAGE COMPARTMENT)**

NOTE: Removal of switch for left seat heating (2) is depicted.
Switch for right seat heating (4) is removed in the same way as switch for left seating (2).

Press locks (1) together, feed switch for seat heating (2) out of rear insert (3) and remove.

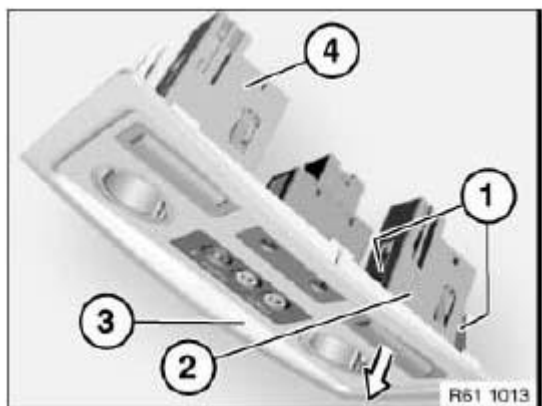


Fig. 194: Identifying Seat Heating

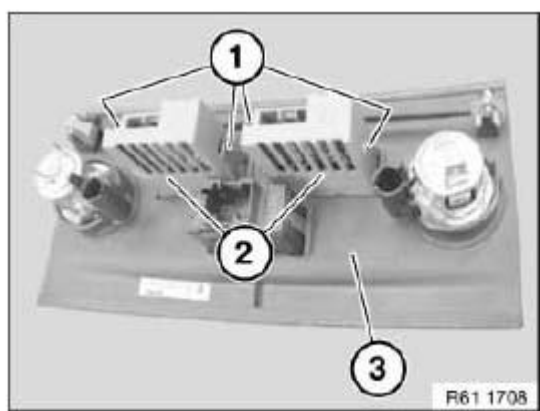
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 091 REMOVING AND INSTALLING/REPLACING SWITCH FOR LEFT OR RIGHT SEAT HEATING (REAR, LONG VERSION)

Necessary preliminary tasks:

- Remove **REAR INSERT (IN STORAGE COMPARTMENT)**

Press locks (1) together and press switches for seat heating (2) out of trim (3).

**Fig. 195: Pressing Switches For Seat Heating**

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 103 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SHIFT PADDLE FOR SMG TRANSMISSION

Necessary preliminary tasks:

- Remove **DECORATIVE TRIM FOR MULTIFUNCTION STEERING WHEEL SWITCH**

Disconnect plug connection (1).

Release screws (2).

Remove shift paddle for SMG transmission (3) from steering wheel (4).

Installation:

- Make sure wiring harness is routed exactly
- Make sure shift paddle for SMG transmission (3) is correctly seated on steering wheel (4)

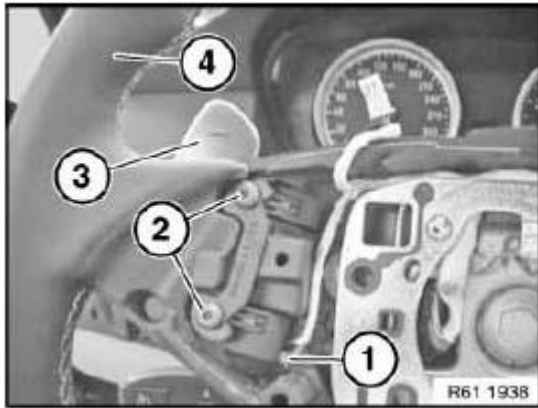


Fig. 196: Identifying Shift Paddle For SMG Transmission And Plug Connection
 Courtesy of BMW OF NORTH AMERICA, INC.

61 31 112 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SHIFT PADDLE FOR AUTOMATIC TRANSMISSION

Operation is described in:

Removing and installing/replacing left or right **SHIFT PADDLE FOR SMG TRANSMISSION**

61 31 115 REPLACING ROCKER SWITCH FOR SIDE WINDOW OPERATION (FRONT) (UP TO 03/2007)

Necessary preliminary tasks:

- Remove **FRONT DOOR TRIM PANEL**.

Unscrew nut (1).

Unlock catches (2). Remove rocker switch for side window operation (3) downwards out of front door trim panel (4).

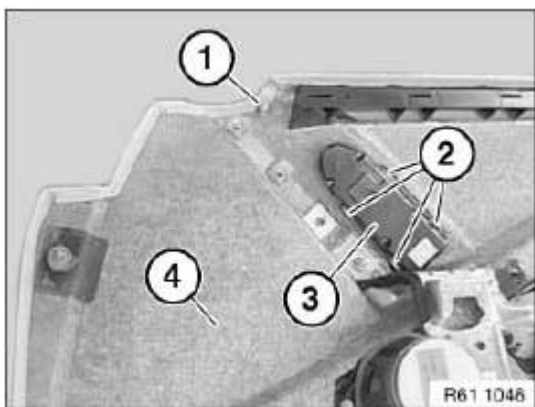


Fig. 197: Identifying Front Door Trim Panel, Catches And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hook (1) and plastic pin (2) must not be damaged.

Make sure rocker switch for side window operation (3) is installed in correct position.

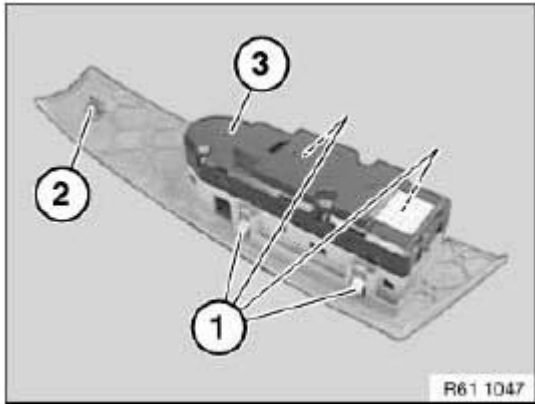


Fig. 198: Identifying Hook And Plastic Pin
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 116 REPLACING ROCKER SWITCH FOR SIDE WINDOW OPERATION (REAR) (UP TO 03/2007)

Necessary preliminary tasks:

- Remove **REAR DOOR TRIM PANEL** .

Unscrew nut (1).

Unlock catches (2). Remove rocker switch for side window operation (3) downwards out of rear door trim panel (4).

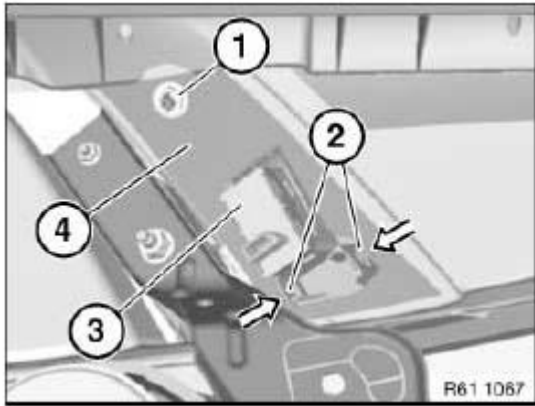


Fig. 199: Identifying Rear Door Trim Panel, Catches And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hook (1) and plastic pins (2) must not be damaged.

Make sure rocker switch for side window operation (3) is installed in correct position.

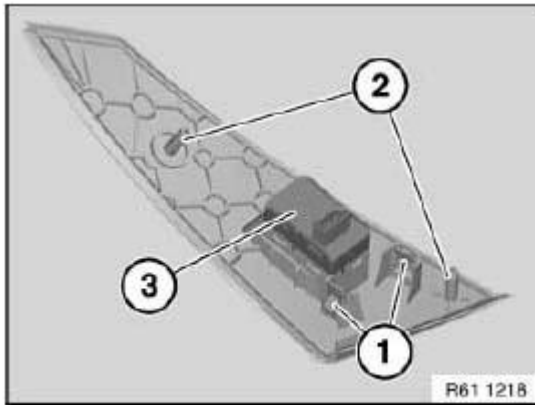


Fig. 200: Identifying Hook And Plastic Pins
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 116 REPLACING ROCKER SWITCH FOR SIDE WINDOW OPERATION (REAR, LONG VERSION OR FROM 03/2007)

Special tools required:

00 9 317

Lever rocker switch (1) with special tool **00 9 317** upwards out of armrest.

Disconnect plug connection.



Fig. 201: Identifying Rocker Switch And Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) of rocker switch (2) must not be damaged.

Make sure rocker switch (2) is correctly seated.

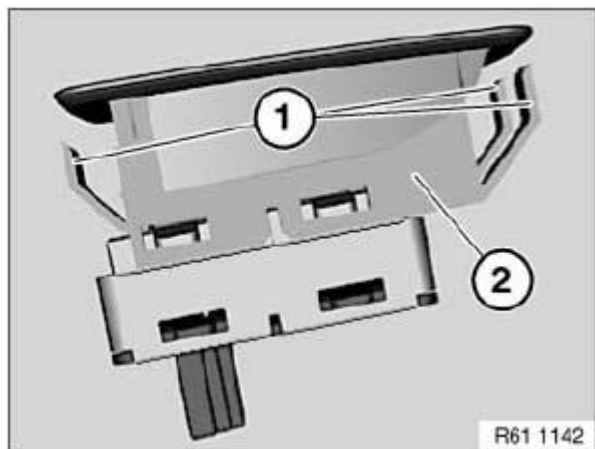


Fig. 202: Identifying Hooks Of Rocker Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 117 REMOVING AND INSTALLING/REPLACING POWER WINDOW SWITCH (DRIVER SIDE) (LONG VERSION OR FROM 03/2007)

Necessary preliminary tasks:

- Remove **FRONT DOOR TRIM PANEL**
- Remove **HANDLE RECESS IN FRONT DOOR**

Unlock catches (1) and remove switch for side window operation (2) downwards out of handle recess (3).

Installation:

Catch (1) must not be damaged.

Make sure rocker switch for side window operation (2) is installed in correct position.

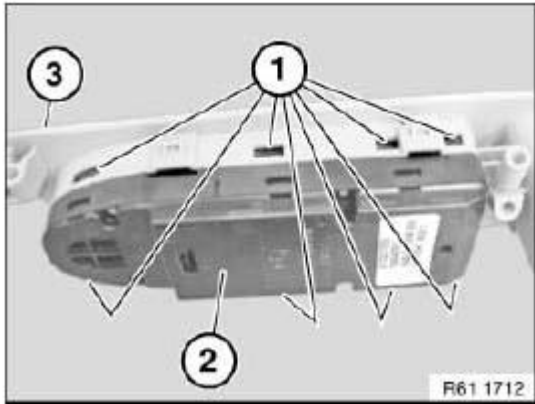


Fig. 203: Identifying Side Window And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

**61 31 118 REMOVING AND INSTALLING/REPLACING POWER WINDOW SWITCH
(PASSENGER SIDE) (LONG VERSION OR FROM 03/2007)**

Special tools required:

00 9 317

Lever rocker switch (1) with special tool **00 9 317** upwards out of armrest.

Disconnect plug connection.

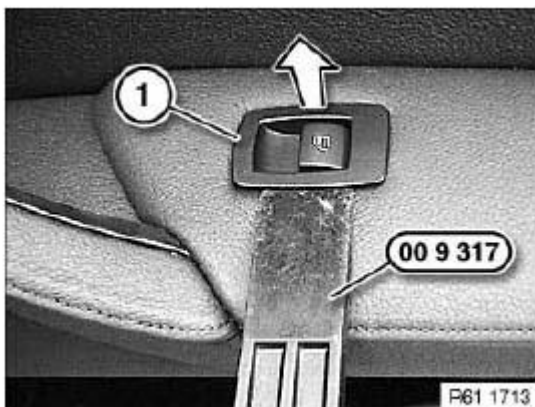


Fig. 204: Identifying Rocker Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) of rocker switch (2) must not be damaged.

Make sure rocker switch (2) is correctly seated.

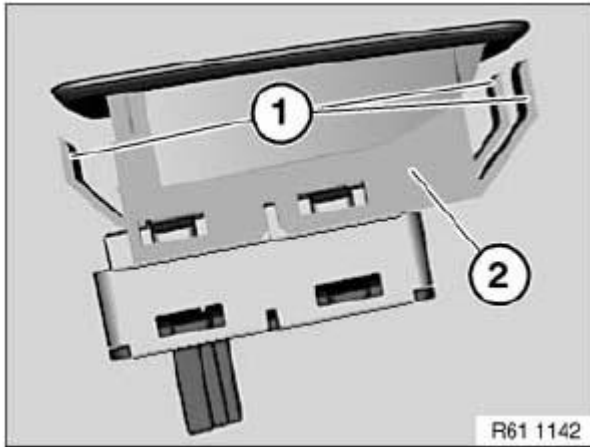


Fig. 205: Identifying Hooks Of Rocker Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 133 REMOVING AND INSTALLING/REPLACING AV CONNECTION SOCKET

Necessary preliminary tasks:

- Remove **REAR INSERT (IN STORAGE COMPARTMENT)**

Press locks (1) together, feed AV connection socket (2) out of rear insert (3) and remove.

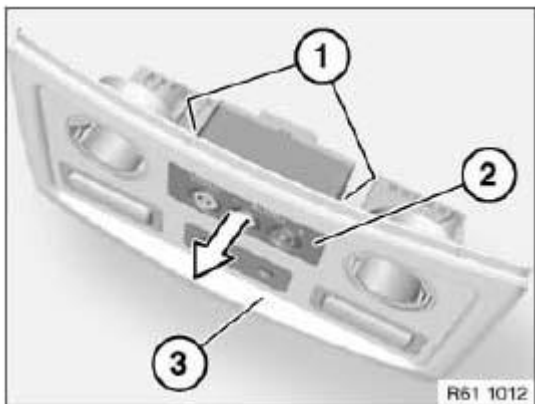


Fig. 206: Identifying AV Connection Socket And Locks
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 134 REMOVING AND INSTALLING/REPLACING USB/AUDIO INTERFACE CONNECTING

SOCKET

Necessary preliminary tasks:

- Remove **TRIM FOR STORAGE TRAY**

Insert suitable screwdriver (1) through opening (2) in direction of arrow.

NOTE: **Protect connecting socket wiring harness against being damaged by screwdriver (1).**

Press against connecting socket (3) in lower area.

Remove connecting socket (3) in direction of arrow.

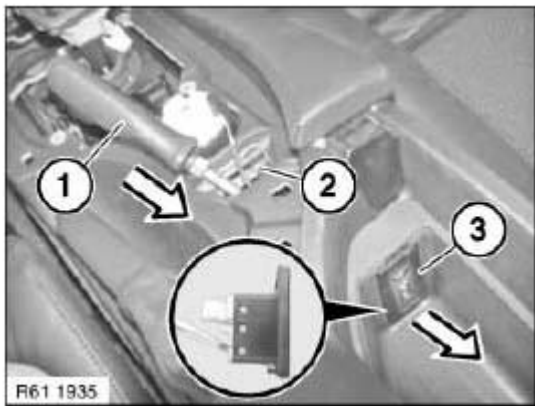


Fig. 207: Removing Connecting Socket
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Installation:

- Retaining lug (3) must not be damaged.
- Make sure connecting socket (2) is correctly seated in storage compartment (4).

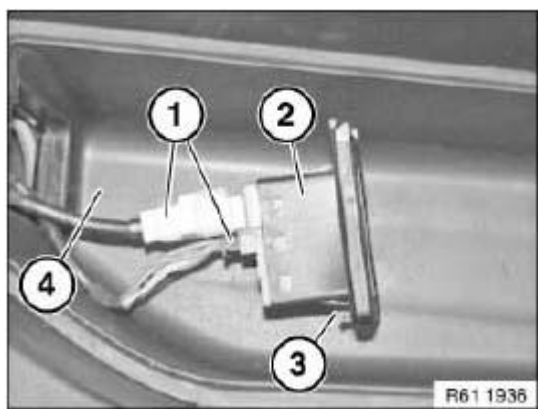


Fig. 208: Identifying Storage Compartment, Connecting Socket And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 135 REMOVING AND INSTALLING/REPLACING HEADPHONES CONNECTION SOCKET

Necessary preliminary tasks:

- Remove **REAR INSERT (IN STORAGE COMPARTMENT)**

Press locks (1) together, feed headphones connection socket (2) out of rear insert (3) and remove.

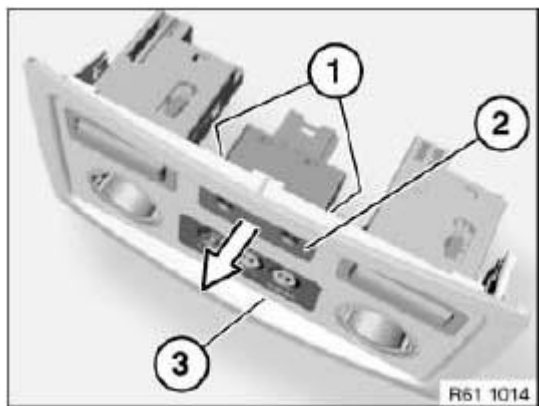


Fig. 209: Identifying Headphones Connection Socket And Locks
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 135 REMOVING AND INSTALLING/REPLACING HEADPHONES CONNECTION SOCKET (LONG VERSION)

Necessary preliminary tasks:

- Remove **REAR INSERT (IN STORAGE COMPARTMENT)**

Press locks (1) together and press headphones connection socket (2) out of trim (3).

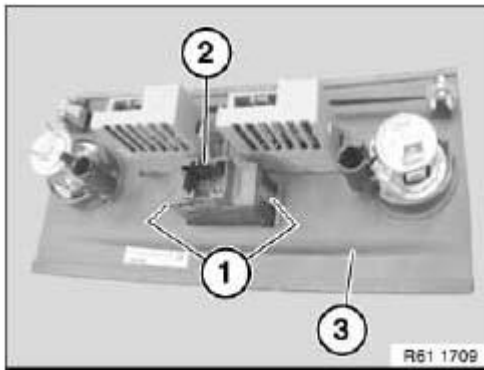


Fig. 210: Identifying Headphones Connection Socket And Locks
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 175 REMOVING AND INSTALLING/REPLACING SWITCH FOR SLIDE/TILT SUNROOF

Necessary preliminary tasks:

- Remove **FRONT ROOFLINER TRIM**

Press catches (1) and unclip switch for sunroof (2) in direction of arrow from front roofliner trim (3).

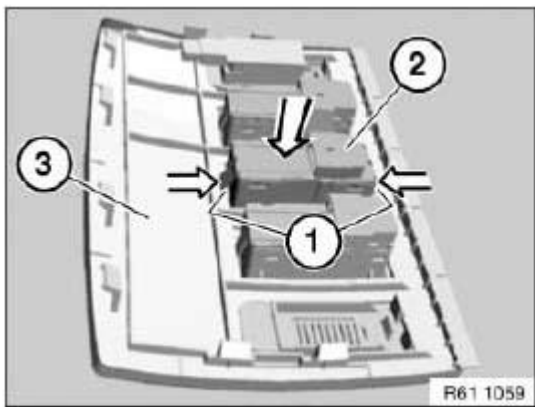


Fig. 211: Identifying Front Roofliner Trim And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Initialize **SLIDE/TILT SUNROOF**.

61 31 176 REMOVING AND INSTALLING/REPLACING EMERGENCY CALL BUTTON

Necessary preliminary tasks:

- Remove **FRONT ROOFLINER TRIM**

Press catches (1) and unclip emergency call button (2) in direction of arrow from front roofliner trim (3).

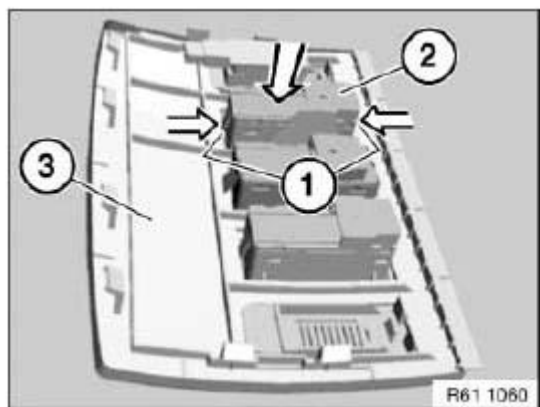


Fig. 212: Pressing Catches And Unclip Emergency Call Button
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 192 REPLACING BUTTON FOR CONTROLLER (UNTIL 09/2008)

IMPORTANT: Risk of damage!

Before dismantling the button it is imperative to note whether the controller is installed with a version before or after 09/2008 !

NOTE: The number of buttons and shape of controller can vary depending on vehicle type.

Before 09/2008: Controller (1) has buttons on bottom only .

After 09/2008: Controller (2) has buttons top and bottom .

Button may be removed from controller (1) only!

NOTE: These repair instructions describe the removal of the button from controller (1)!

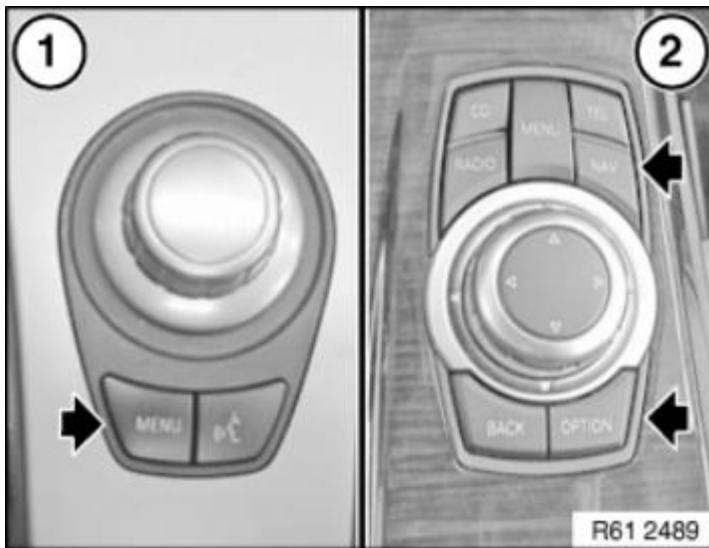


Fig. 213: Identifying Number Of Buttons And Shape Of Controller
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off button for controller (1) in direction of arrow.

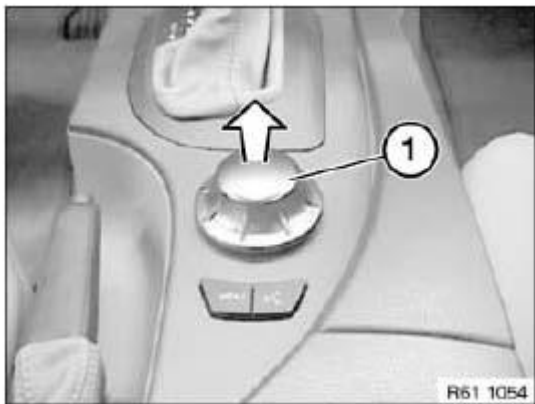


Fig. 214: Detaching Knob For Controller
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit button for controller (1) such that guides (2) are seated in mountings (3).

Press knob for controller (1) in middle until it engages.

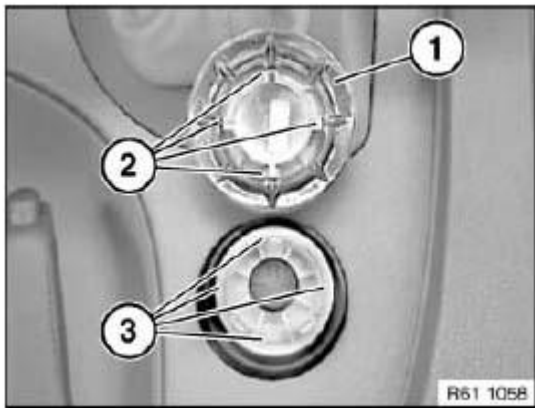


Fig. 215: Fitting Knob For Controller

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 193 REMOVING AND INSTALLING/REPLACING BUTTON UNIT (FOR ON-BOARD MONITOR)

Special tools required:

00 9 341

Unclip button unit (1) with special tool **00 9 341** at retaining points (2) and lever out in direction of arrow.

Unlock and disconnect associated plug connection, remove button unit (1).

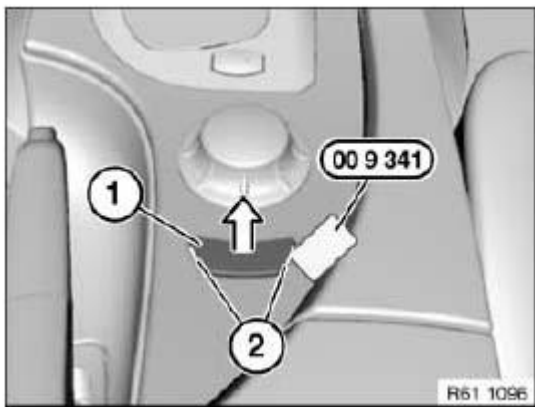


Fig. 216: Identifying Button Unit And Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 195 REMOVING AND INSTALLING (REPLACING) FRONT CONTROLLER (UNTIL 09/2008)

IMPORTANT: Risk of damage!

Before dismantling it is imperative to note whether the controller is installed

with a version before or after 09/2008 !

NOTE: The number of buttons and shape of controller can vary depending on vehicle type.

Before 09/2008: Controller (1) has buttons on bottom only .

After 09/2008: Controller (2) has buttons top and bottom .

NOTE: These repair instructions describe the removal and installation (replacement) of controller (1) !

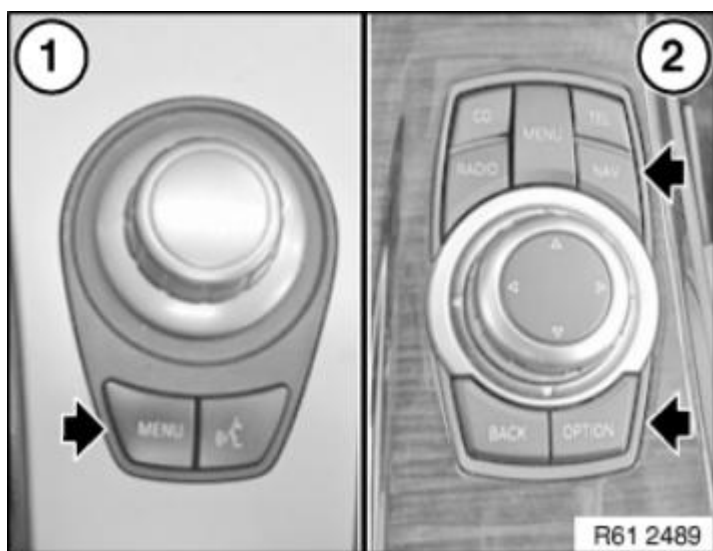


Fig. 217: Identifying Number Of Buttons And Shape Of Controller
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

The button for the controller must not be removed!

Necessary preliminary tasks:

Remove **STORAGE COMPARTMENT** .

If necessary, disconnect plug connections.

Release screws (1).

Remove controller (2) in direction of arrow from storage compartment (3).

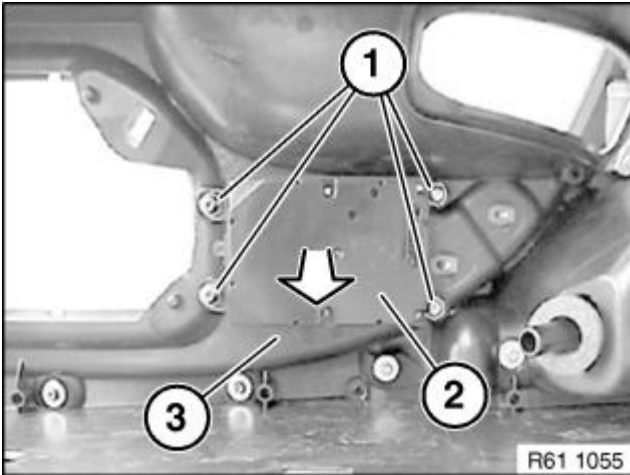


Fig. 218: Identifying Storage Compartment, Controller And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out VEHICLE PROGRAMMING/CODING.

61 31 195 REMOVING AND INSTALLING (REPLACING) FRONT CONTROLLER (FROM 09/2008)

IMPORTANT: Risk of damage!

Before dismantling it is imperative to note whether the controller is installed with a version before or after 09/2008 !

NOTE: The number of buttons and shape of controller can vary depending on vehicle type.

Before 09/2008: Controller (1) has buttons on bottom only .

After 09/2008: Controller (2) has buttons top and bottom .

NOTE: These repair instructions describe the removal and installation (replacement) of controller (2) !

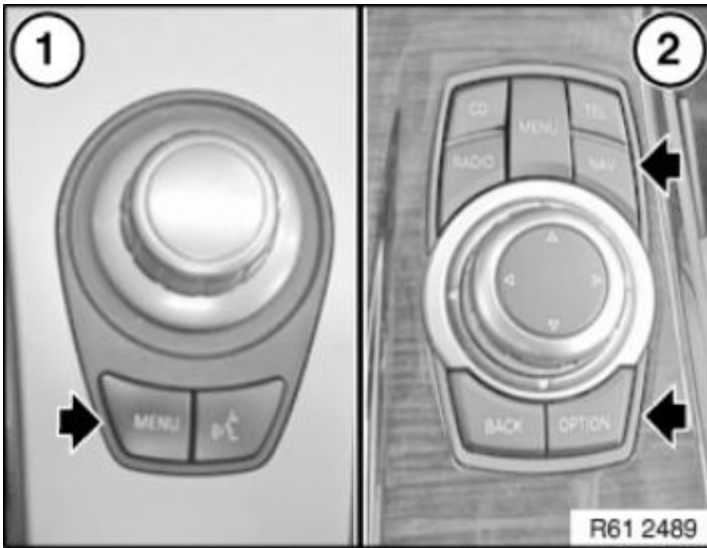


Fig. 219: Identifying Number Of Buttons And Shape Of Controller
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

The button for the controller must not be removed!

Necessary preliminary tasks:

- Remove **STORAGE COMPARTMENT**.

IMPORTANT: Risk of damage!

Carefully raise catches (1) on controller holder (3) and remove controller (2) towards top.

Installation note:

Make sure controller (2) is correctly engaged in controller holder (3).

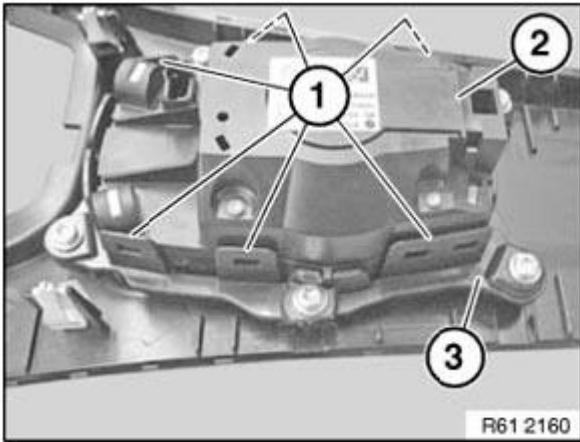


Fig. 220: Identifying Controller, Controller Holder And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/CODING**.

61 31 199 REMOVING AND INSTALLING/REPLACING SWITCH COMBINATION FOR REAR CABIN SEAT ADJUSTMENT

Necessary preliminary tasks:

- Remove **LOWER REAR PANEL FROM FRONT SEAT BACKREST ON RIGHT**

Unlock retaining hooks (1) and press seat adjustment switch (2) out of rear panel (3).

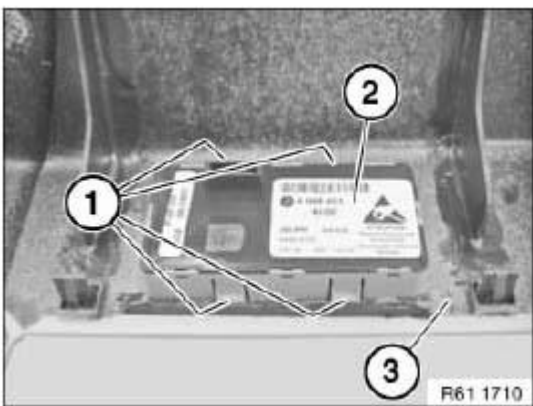


Fig. 221: Identifying Seat Adjustment Switch And Retaining Hooks
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 203 REPLACING SEAT ADJUSTMENT SWITCH COMBINATION (FULLY ELECTRIC FRONT SEAT)

Necessary preliminary tasks:

- Remove **OUTER COVER** on front seat.

Unfasten plug connection (1) and disconnect.

Loosen screws (2).

Unlock catch (3) in direction of arrow and remove seat adjustment switch combination (4) towards front.

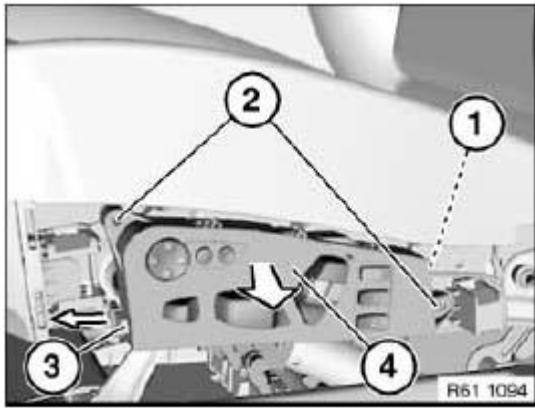


Fig. 222: Removing Seat Adjustment Switch Combination
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 204 REPLACING SEAT ADJUSTMENT SWITCH COMBINATION (SEMI-ELECTRIC FRONT SEAT)

Special tools required:

- 00 9 317**

Necessary preliminary tasks:

- Remove **OUTER COVER** on front seat.

Lever out seat adjustment control button (1) with special tool **00 9 317** in direction of arrow.

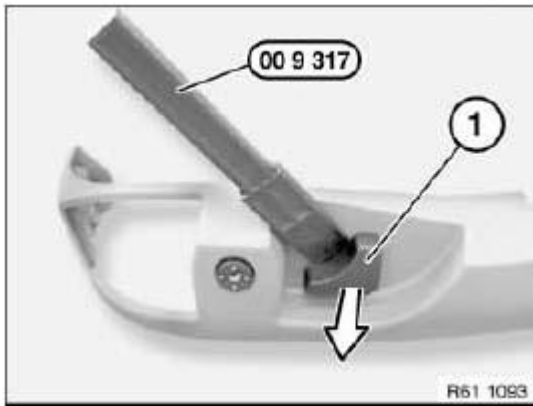


Fig. 223: Removing Seat Adjustment Control Button
 Courtesy of BMW OF NORTH AMERICA, INC.

Unlock catches (1) in direction of arrow and remove seat adjustment switch combination (2) from cover (3).

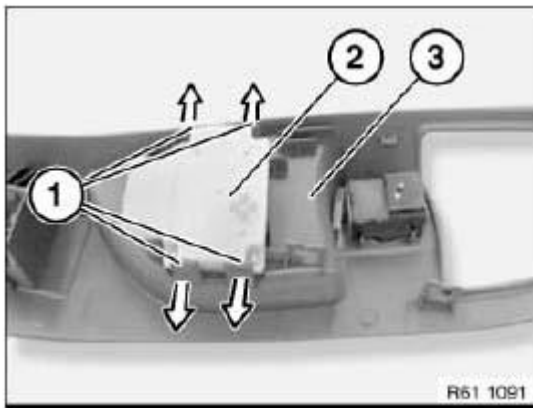


Fig. 224: Removing Catches And Seat Adjustment Switch Combination
 Courtesy of BMW OF NORTH AMERICA, INC.

61 31 208 REMOVING AND INSTALLING/REPLACING SWITCH FOR FRONT LUMBAR SUPPORT

Necessary preliminary tasks:

- Remove **OUTER COVER** on front seat.

Unlock catches (1) and remove switch for lumbar support (2) from cover (3).

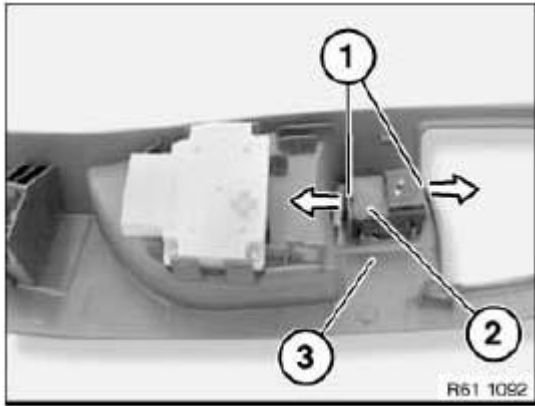


Fig. 225: Removing Catches And Switch For Lumbar Support
 Courtesy of BMW OF NORTH AMERICA, INC.

61 31 220 REMOVING AND INSTALLING/REPLACING MULTIFUNCTION STEERING WHEEL SWITCH

Special tools required:

- **61 3 120**

Necessary preliminary tasks:

- Remove **AIRBAG UNIT**

NOTE: Illustration shows steering wheel removed.

Release screws (1).

Remove retaining plate for steering wheel (2) from standard steering wheel (3).

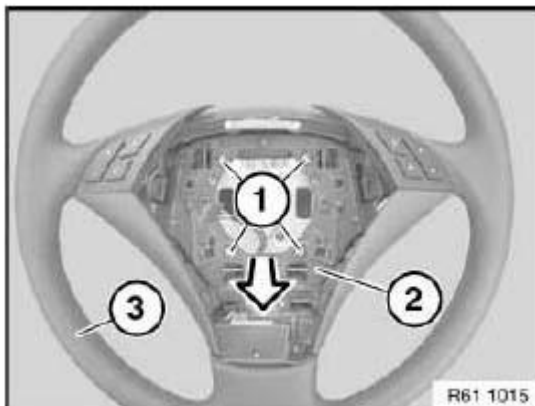


Fig. 226: Identifying Standard Steering Wheel, Retaining Plate And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustrations depict removal of the right multifunction steering wheel switch. The left multifunction steering wheel switch is removed in the same way.

Release screws (1).

Unclip right multifunction steering wheel switch (2) at point (3).

Disconnect associated plug connection and remove right multifunction steering wheel switch (2) with decorative strip.

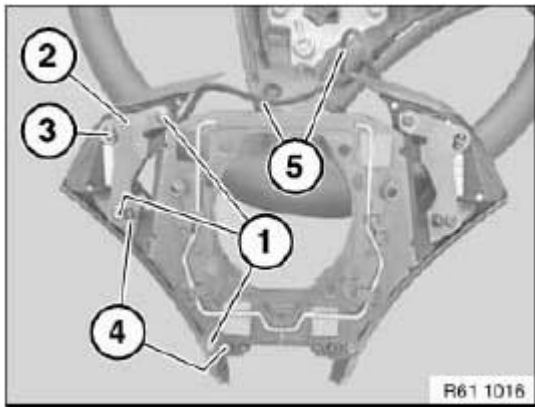


Fig. 227: Identifying Steering Wheel Switch, Guide Pins And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure guide pins (4) are correctly seated.

Make sure electrical leads (5) are correctly routed.

Installation:

Observe the following work steps to adjust the correct gap dimensions between decorative strips and airbag unit.

- Fit steering wheel retaining plate (1) with decorative strip (2) not yet screwed down on special tool **61 3 120**.
- Tighten screws (3).

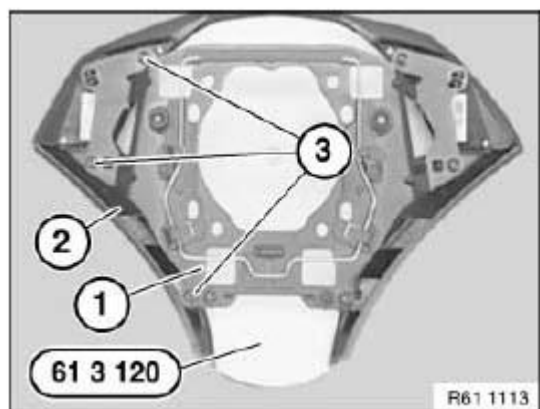


Fig. 228: Identifying Steering Wheel Retaining Plate With Decorative Strip
 Courtesy of BMW OF NORTH AMERICA, INC.

Unlock catch (1) and remove right multifunction steering wheel switch (2) in direction of arrow from decorative strip (3).

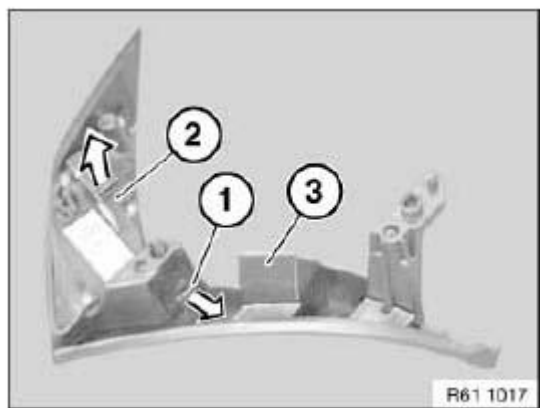


Fig. 229: Identifying Right Multifunction Steering Wheel Switch And Decorative Strip
 Courtesy of BMW OF NORTH AMERICA, INC.

61 31 220 REMOVING AND INSTALLING/REPLACING MULTIFUNCTION STEERING WHEEL SWITCH (FROM 03/2007)

Necessary preliminary tasks:

- Remove **AIRBAG UNIT**

Release screws (1).

Disconnect plug connection (2).

Remove retaining plate (3) from steering wheel.

Installation:

Make sure electrical leads are correctly routed.

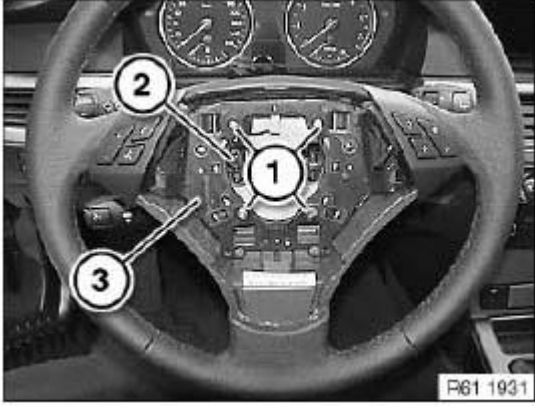


Fig. 230: Identifying Retaining Plate, Plug Connection And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustrations depict removal of the left multifunction steering wheel switch. The right multifunction steering wheel switch is removed in the same way.

Release screws (1).

Unclip multifunction steering wheel switch (2) at point (3).

Disconnect associated plug connections and remove multifunction steering wheel switch (2).

Installation:

Make sure guide pins (4) are correctly seated.

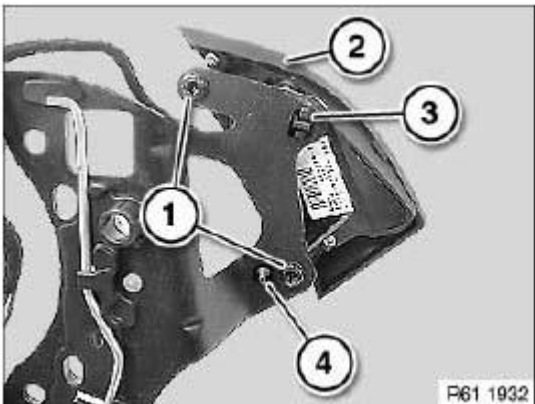


Fig. 231: Identifying Multifunction Steering Wheel Switch

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe the following work steps to adjust the correct gap dimensions between decorative strips and airbag unit.

- Fit airbag unit (1) on steering wheel retaining plate (2)
- Align switches (3)
- Tighten screws (4).

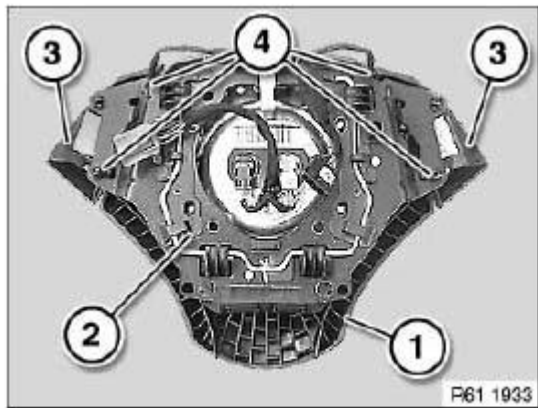


Fig. 232: Identifying Steering Wheel Retaining Plate, Switches And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

61 31 220 REMOVING AND INSTALLING/REPLACING MULTIFUNCTION STEERING WHEEL SWITCHES (SPORT STEERING WHEEL, FROM 09/2005)

Necessary preliminary tasks:

- Remove **AIRBAG UNIT**

Release screws (1).

IMPORTANT: Risk of breakage!

Lever out switches (2) complete with decorative strip (3) all round, do not tilt!

Disconnect associated plug connections and remove switches (2) complete with decorative strip (3).

Installation:

Make sure electrical leads are correctly routed.

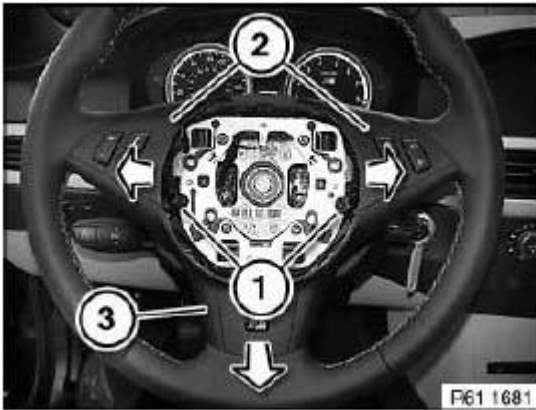


Fig. 233: Identifying Switches, Decorative Strip And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2) and remove left multifunction steering wheel switches (3) from decorative strip (1).

Installation:

Guide pins (4) must not be damaged and must be correctly inserted.

Make sure there is a uniform gap between both multifunction steering wheel switches (3) and decorative strip (1).

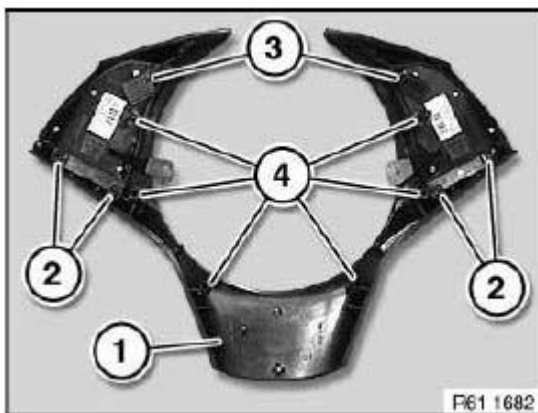


Fig. 234: Identifying Left Multifunction Steering Wheel Switches, Screws And Guide Pins
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 233 REMOVING AND INSTALLING/REPLACING LANE DEPARTURE WARNING MOTOR ELECTRICS (SPORT STEERING WHEEL)

Necessary preliminary tasks:

- Remove **DECORATIVE BAR FROM STEERING WHEEL**

Release screws (1) and remove retaining plate (2).

Tightening torque **32 33 2AZ** .

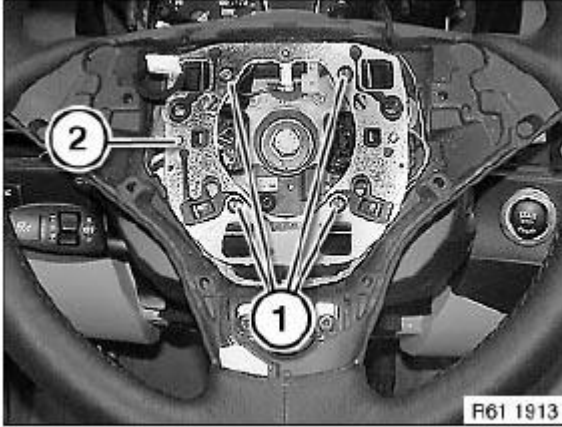


Fig. 235: Identifying Retaining Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release screw (2).

Release screws (3) and remove motor electrics (4) complete with electrical wires.

Installation:

Replace screws (2 and 3).

- Tightening torque **32 33 3AZ**
- Tightening torque **32 33 4AZ**

Ensure correct cable routing.

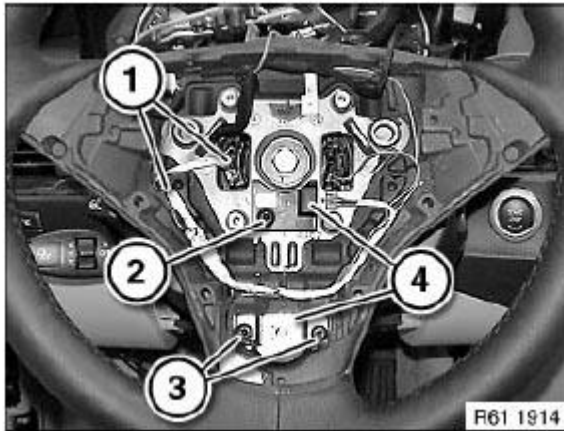


Fig. 236: Identifying Motor Electrics, Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 238 REMOVING AND INSTALLING/REPLACING LANE DEPARTURE WARNING MOTOR ELECTRICS (STANDARD STEERING WHEEL)

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove **AIRBAG UNIT**

Release screws (1) and remove retaining plate (2).

Tightening torque **32 33 2AZ** .

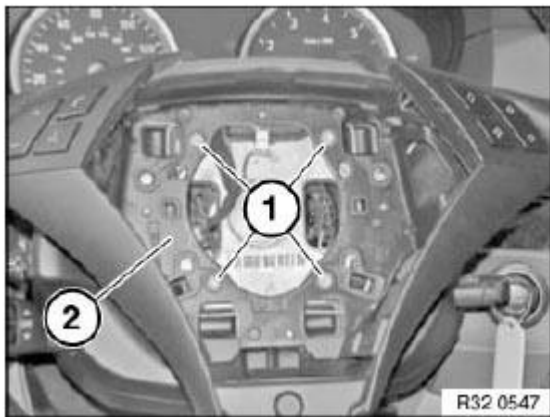


Fig. 237: Identifying Retaining Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release screw (2).

Release screws (3) and remove motor electrics (4) complete with electrical wires.

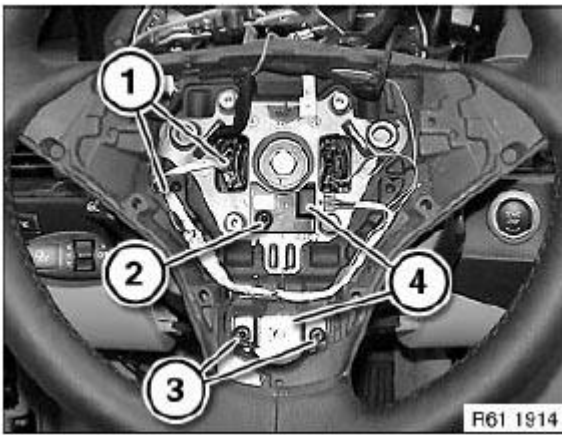


Fig. 238: Identifying Motor Electrics, Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace screws (2 and 3).

- Tightening torque **32 33 3AZ**
- Tightening torque **32 33 4AZ**

Ensure correct cable routing.

61 31 241 REMOVING AND INSTALLING/REPLACING ENGINE HOOD CONTACT SWITCH

Unfasten plug connection (1) and disconnect.

Pull engine hood contact switch (2) in direction of arrow and feed out of microfilter air duct (3).

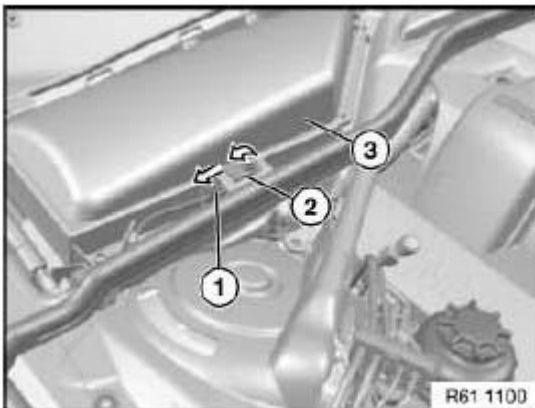


Fig. 239: Identifying Engine Hood Contact Switch, Microfilter Air Duct And Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 245 REMOVING AND INSTALLING / REPLACING REAR WINDOW BUTTON

Necessary preliminary tasks:

- Remove **SHAFT BEARING FOR REAR WINDOW WIPER**

IMPORTANT: When disconnecting plug connection (2), make sure no tensile load is exerted on foil conductor (risk of damage).

If necessary, remove adhesive tape (1).

Disconnect plug connection (2).

Remove secured rear window button (3).

Installation:

If necessary, replace gasket.

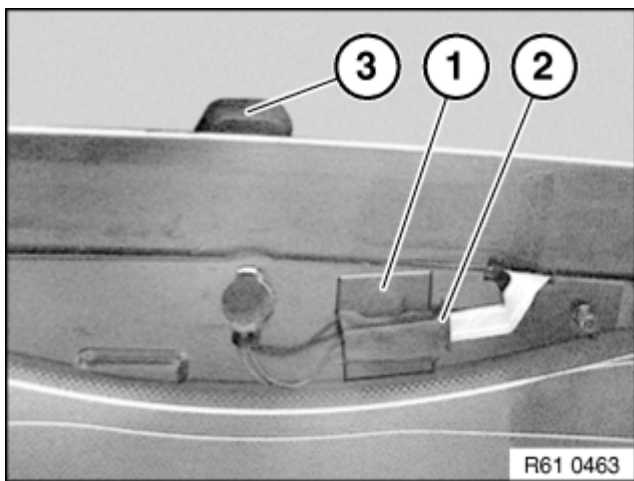


Fig. 240: Locating Plug Connection, Secured Rear Window Button, And Adhesive Tape
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Feed in cable (2) of rear window button (1) through bore hole (3).

Connect plug connection (4) and secure with adhesive tape if necessary.

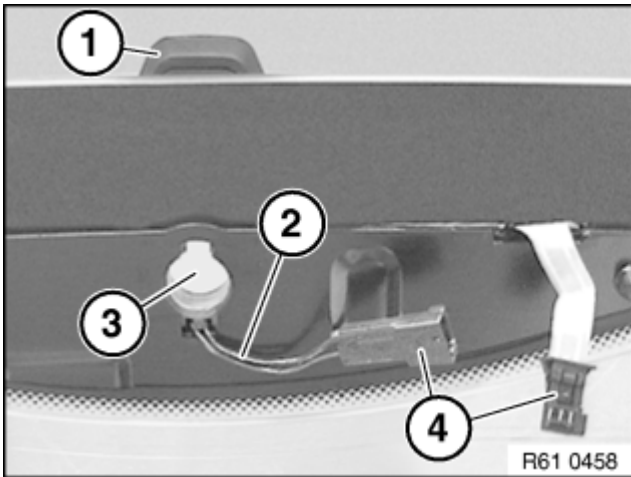


Fig. 241: Identifying Cable, Bore Hole, And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 255 REPLACING SWITCH FOR DOOR MIRROR

Operation is described in:

Replacing rocker switch for side window operation. See **SWITCH (UP TO 03/2007)** or **SWITCH (LONG VERSION OR FROM 03/2007)**

61 31 257 REMOVING AND INSTALLING/REPLACING SWITCH FOR LEFT OR RIGHT REAR CABIN MONITOR

Necessary preliminary tasks:

- Remove **UPPER REAR PANEL FROM FRONT SEAT BACKREST** on left or right

Press locks (1) together and press switches for seat heating (2) out of trim (3).

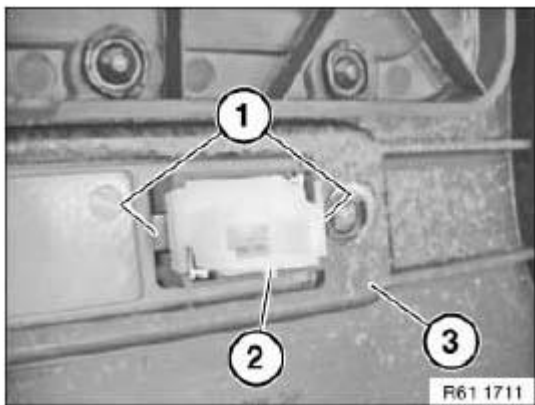


Fig. 242: Identifying Switches And Locks
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 270 REPLACING SWITCH FOR REVERSING LIGHT

NOTE: The installation location of the reversing light switch can vary, depending on the transmission model.

Necessary preliminary tasks:

If necessary, remove **REAR UNDERBODY PROTECTION**

Version A:

Disconnect plug connection (1).

Release switch for reversing light (2).

Tightening torque: 16 Nm

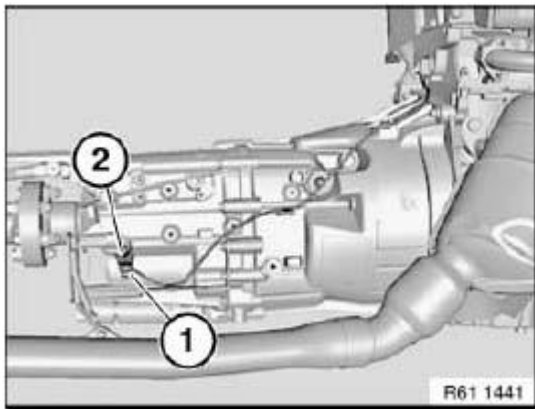


Fig. 243: Identifying Switch For Reversing Light And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Version B:

Disconnect plug connection (1).

Release switch for reversing light (2).

Tightening torque: 16 Nm

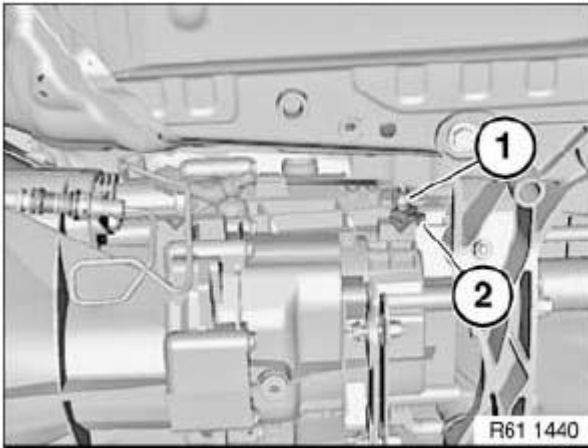


Fig. 244: Identifying Switch For Reversing Light And Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 287 REMOVING AND INSTALLING/REPLACING DYNAMIC DRIVING SWITCH (SPORT BUTTON)

Special tools required:

· **64 1 020**

Necessary preliminary tasks:

- Remove trim for preselector lever. See **REMOVING AND INSTALLING/REPLACING TRIM FOR PRESELECTOR LEVER (FROM 03/2007)** or **REMOVING AND INSTALLING/REPLACING TRIM FOR PRESELECTOR LEVER (UP TO 03/2007)** .

Release screws (1).

If necessary, lever out actuation trim (4) with special tool **64 1 020** and remove.

Remove driving dynamics switch (2) in direction of arrow from finisher for preselector lever (3).

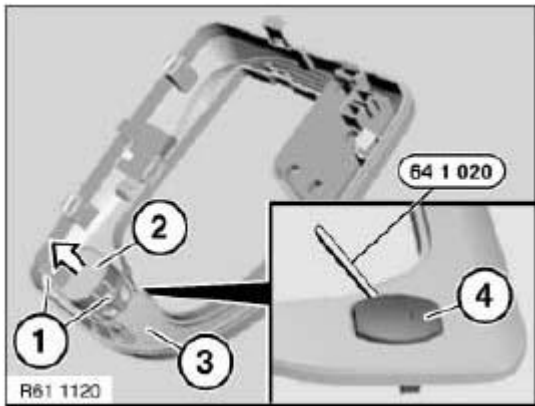


Fig. 245: Removing Driving Dynamics Switch
 Courtesy of BMW OF NORTH AMERICA, INC.

Version with automatic sport transmission:

Unlock catches (1).

Remove Sport button (2) in direction of arrow from trim for preselector lever (3).

Installation:

Make sure Sport button (2) is correctly seated on trim for preselector lever (3).

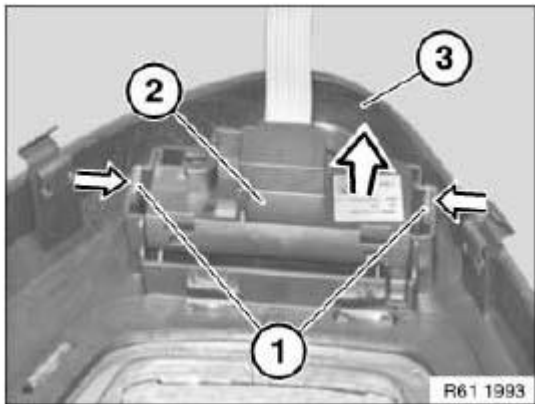


Fig. 246: Identifying Sport Button And Catches
 Courtesy of BMW OF NORTH AMERICA, INC.

61 31 299 REMOVING AND INSTALLING/REPLACING CLUTCH SWITCH MODULE

Necessary preliminary tasks:

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY**.

NOTE: Clutch master cylinder (2) is removed for purposes of clarity.

Lever out clutch switch module (1) from clutch master cylinder (2) with screwdriver.

Unlock plug (4) and disconnect from housing (3).

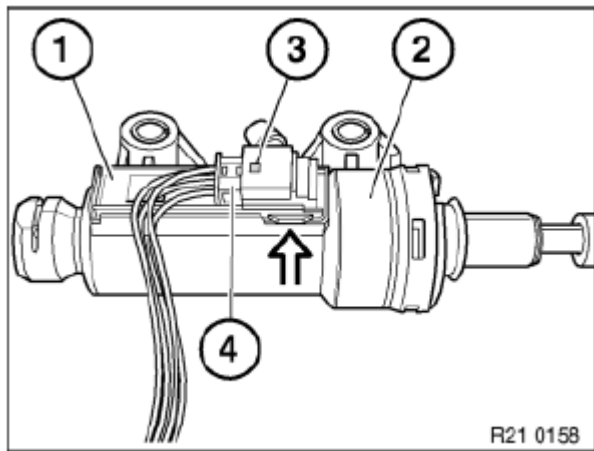


Fig. 247: Identifying Clutch Switch Module And Clutch Master Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clutch switch module is secured against incorrect installation.

Clutch switch module must snap audibly into place.

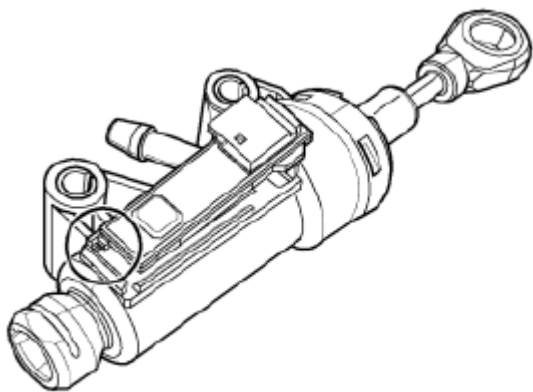


Fig. 248: Identifying Clutch Switch Module
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 310 REPLACING BRAKE LIGHT SWITCH

Necessary preliminary tasks:

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY** .

Unfasten plug connection (1) and disconnect.

Pull brake light switch (2) in direction of arrow out of brake light switch holder (3).

Installation:

- Press brake pedal (4) to floor.
- Slide brake light switch (2) as far as it will go into brake light switch holder (3).
- Grip brake light switch holder (3), slowly return brake pedal (4) to starting position and pull back to stop .

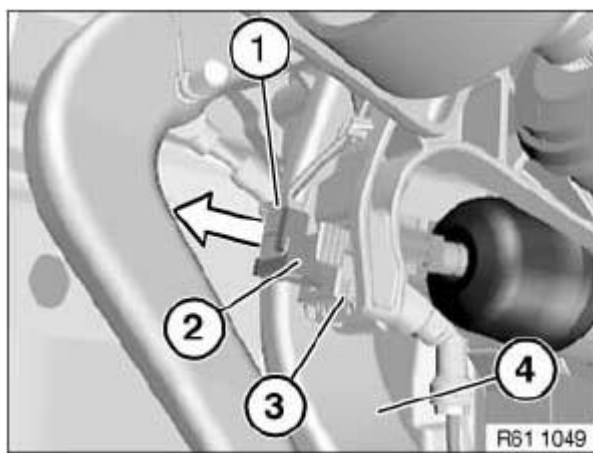


Fig. 249: Pulling Brake Light Switch

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Removing brake light switch holder (2):
 Press brake pedal.
 Press catches (1) together and unclip brake light switch holder (2) from bearing block (3).

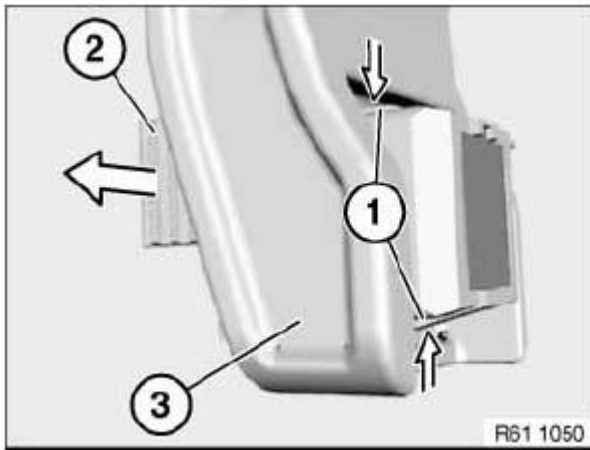


Fig. 250: Removing Brake Light Switch Holder
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 330 REMOVING SWITCH FOR GLOVEBOX LIGHT

Special tools required:

64 1 020

Lever switch for glovebox light (1) with special tool **64 1 020** as pictured out of glovebox housing (2).

Unlock and disconnect associated plug connection, remove switch for glovebox light (1).

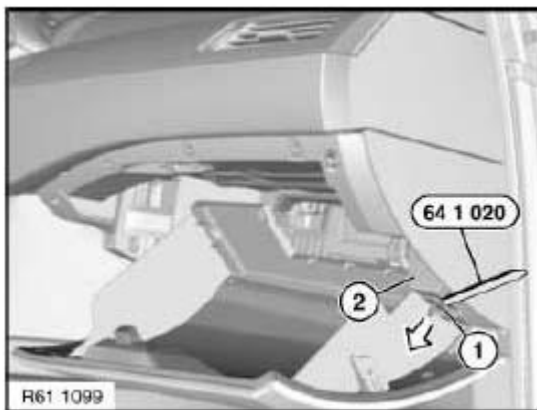


Fig. 251: Identifying Glovebox Light And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 334 REMOVING AND INSTALLING/REPLACING GRIP TRIM FOR GEAR SELECTOR SWITCH

Special tools required:

00 9 322

Lever off side section (1) with special tool **00 9 322** from gear selector switch (2) and remove.

Installation:

Position side section (1) on metal pins of gear selector switch (2) and uniformly press down firmly and without leaving a gap.



Fig. 252: Identifying Special Tool (00 9 322)

Courtesy of BMW OF NORTH AMERICA, INC.

Lever off front shell (1) with special tool **00 9 322** from gear selector switch (2) and remove.

Press P button (3) and remove front shell (1) starting from top.

Installation:

Insert front shell (1) at bottom in retaining ring (4). Uniformly press front shell (1) upwards onto metal pins of gear selector switch (2) firmly and without leaving a gap.



Fig. 253: Identifying P Button, Front Shell And Gear Selector Switch

Courtesy of BMW OF NORTH AMERICA, INC.

Lever off P button (1) with special tool **00 9 322** from gear selector switch (2) and uniformly remove.

Installation:

After installing front shell, insert P button (1) into upper opening on gear selector switch and uniformly press in until it engages.

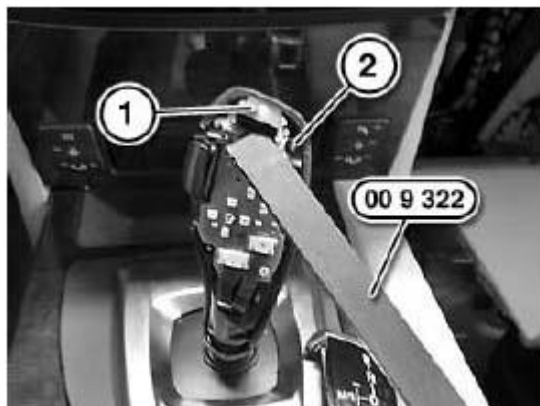


Fig. 254: Identifying P Button And Gear Selector Switch

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 342 REMOVING AND INSTALLING/REPLACING GEAR SELECTOR SWITCH

IMPORTANT: Read and comply with notes on protection against electrostatic damage (**ESD PROTECTION**).

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove **TRIM FOR STORAGE COMPARTMENT**

Disconnect plug connection (1).

Release screws (3) and lay emergence release mechanism to one side. Tightening torque **61 31 7AZ** .

Release screws (2). Tightening torque **61 31 6AZ** .

Remove gear selector switch (4) from center console (5).

Installation:

Align gear selector switch (4) centrally.

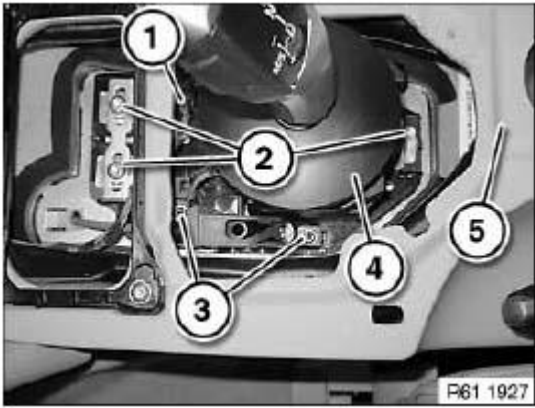


Fig. 255: Identifying Gear Selector Switch, Centre Console And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Modify spacer bolt.

Carry out **VEHICLE PROGRAMMING/CODING**.

61 31 382 REPLACING LEVEL SWITCH FOR COOLANT

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Release screws (1).

Unlock plug connection for coolant level switch (4) and disconnect.

Pull coolant expansion tank (2) in direction of arrow out of grommet (3) underneath.

Installation:

Make sure coolant expansion tank (2) is correctly seated in grommet (3).

If necessary, replace grommet (3).

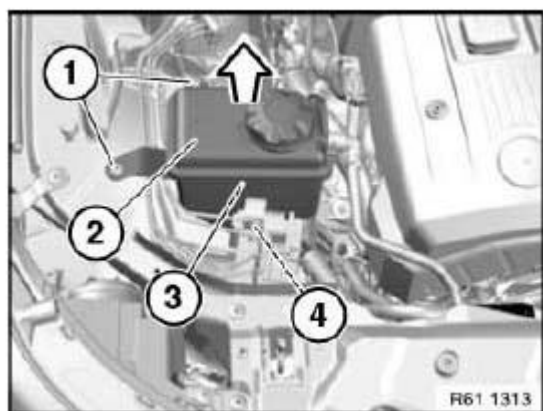


Fig. 256: Identifying Coolant Level Switch, Coolant Expansion Tank And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not damage connected water hoses.

Reposition coolant expansion tank (2) as far as possible until coolant level switch (4) forms the highest point. This will prevent coolant from escaping on opening.

If necessary, catch escaping coolant and feed back in later.

NOTE: For purposes of clarity, illustration shows coolant expansion tank (2) removed.

Turn coolant level switch (1) in direction of arrow, pull upwards out of coolant expansion tank (2) and remove.

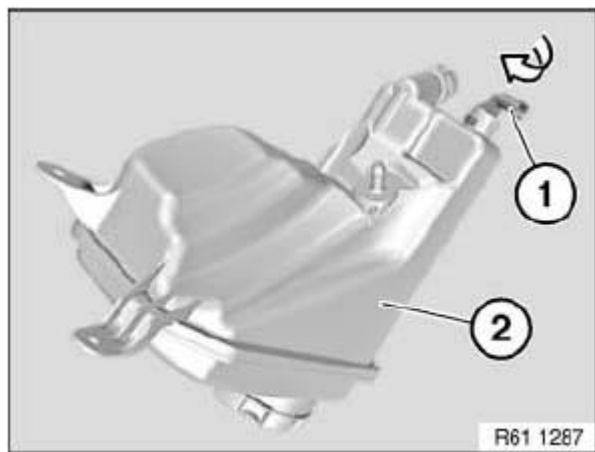


Fig. 257: Turning Coolant Level Switch

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 492 REPLACING (REMOVING AND INSTALLING) LEVEL SWITCH FOR WINDSCREEN WASHER UNIT

Necessary preliminary tasks:

E60 M5:

Remove **FRONT UNDERBODY PROTECTION**

NOTE: For purposes of clarity, illustration shows front wheel removed.

Release screws.

Fold back wheel arch trim (1) in direction of arrow.

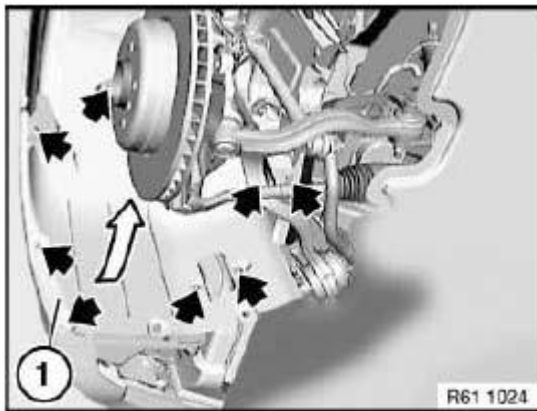


Fig. 258: Folding Back Wheel Arch Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Turn level switch for windscreen washer unit (2) in direction of arrow and remove towards bottom from fluid reservoir for windscreen washer unit (3).

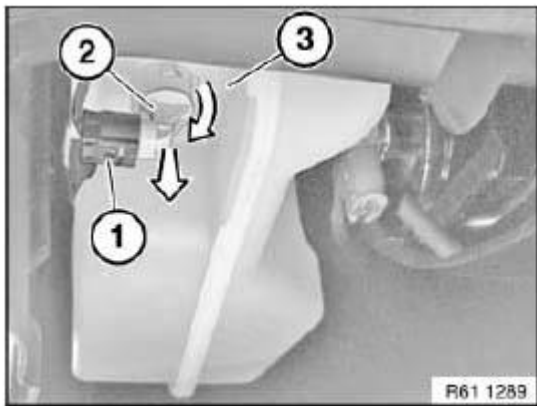


Fig. 259: Turning Level Switch For Windscreen Washer Unit
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 996 CARRYING OUT STEERING ANGLE SENSOR ADJUSTMENT

IMPORTANT: In vehicles with active front steering, steering angle sensor adjustment is integrated in the service function "INITIAL OPERATION/ADJUSTMENT FOR ACTIVE FRONT STEERING " and must not be carried out separately!

NOTE: Steering angle sensor adjustment must be carried out:

- after adjustment work on the front axle/steering
- after all mechanical work on the steering system
- E46 (AWD), E53, E83: after disconnection of battery
- after replacement / coding / programming of the following components:
 - Fixture for switches of steering column / switch cluster / steering angle sensor
 - Dynamic Stability Control (DSC) control unit
 - Control unit active anti-roll stabilization (ARS)

Connect vehicle to BMW diagnosis system or Software Service Station.

Select and carry out steering angle sensor adjustment under Service functions.

HORN

61 33 060 REMOVING AND INSTALLING/REPLACING BOTH FANFARE HORNS

Release screws (1).

Detach cover (2) from front underride protection (3) and feed out in direction of arrow.

Remove cover (2).

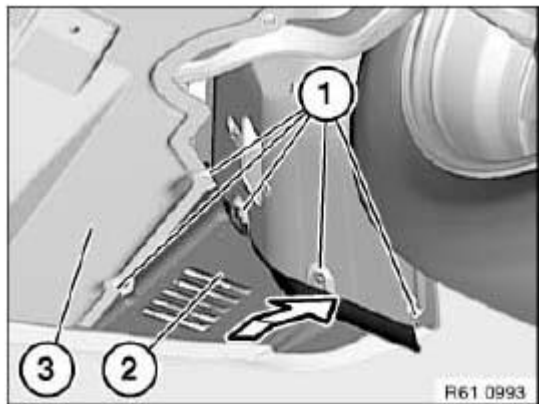


Fig. 260: Identifying Front Underride Protection And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Release nuts (2) and remove fanfare horns (3).

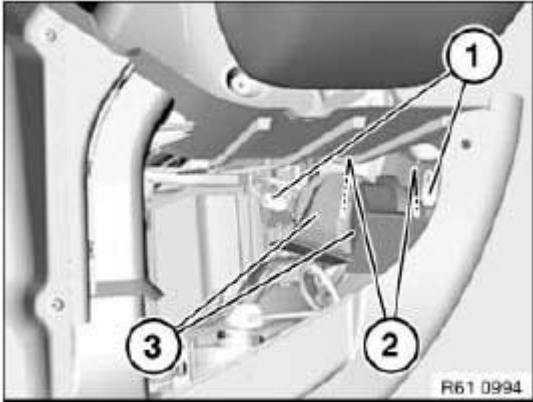


Fig. 261: Identifying Fanfare Horns And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

INSERT HOLDER FOR CIGARETTE LIGHTER

61 34... REMOVING AND INSTALLING/REPLACING POWER SOCKET IN REAR STORAGE COMPARTMENT

Necessary preliminary tasks:

- Remove rear insert (in storage compartment). See **REMOVING AND INSTALLING/REPLACING REAR INSERT (IN STORAGE COMPARTMENT)** or **REMOVING AND INSTALLING LOWER REAR CONSOLE TRIM (LONG VERSION)** .

Carefully lever bulb holder (1) in direction of arrow off power socket (2).

Press power socket (2) out of trim (3).

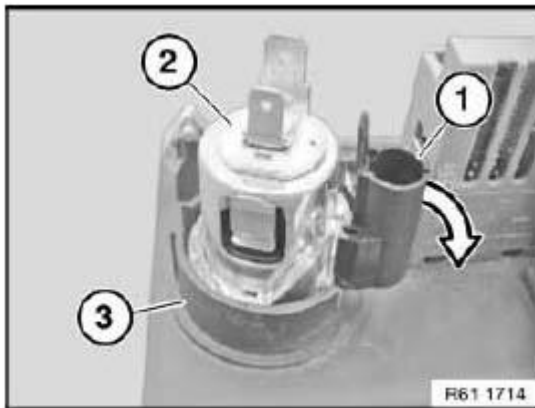
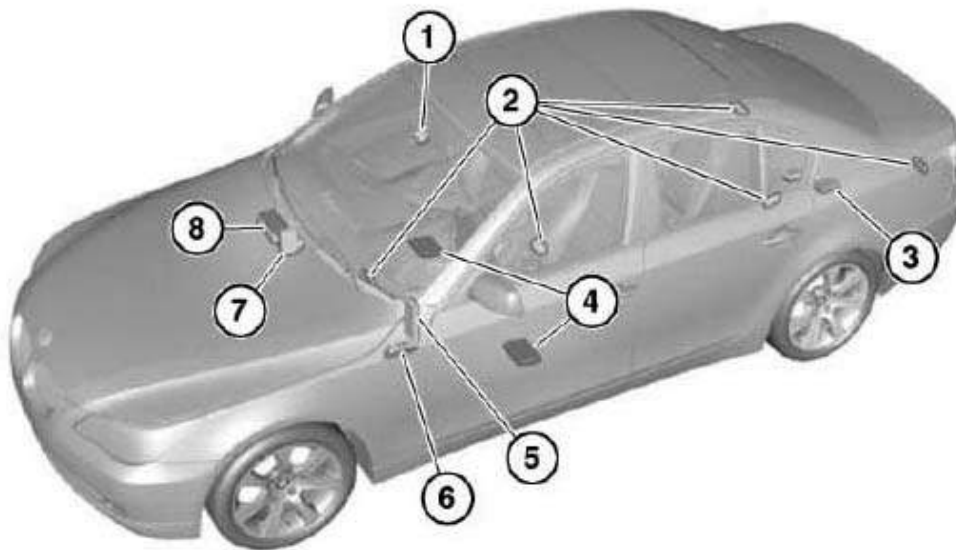


Fig. 262: Identifying Bulb Holder And Power Socket
Courtesy of BMW OF NORTH AMERICA, INC.

CONTROL UNITS, MODULES

61 35.. OVERVIEW OF CONTROL UNITS



R61 1522

- | | | | |
|---|--|---|---|
| 1 | <u>Rain/light sensor</u> | 5 | <u>Control unit, car access system</u> |
| 2 | <u>Antennas for comfort access system</u> | 6 | <u>Control unit, light module</u> |
| 3 | <u>Control unit, Park Distance Control</u> | 7 | <u>Control unit for comfort access system</u> |
| 4 | <u>Control unit for seat module</u> | 8 | <u>Control unit, body module</u> |

Fig. 263: Overview Of Control Units
Courtesy of BMW OF NORTH AMERICA, INC.

61 35... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE)**Special tools required:**

12 7 060

NOTE: Electrical components which are particularly sensitive to electrostatic discharge (electronic control units, sensors, etc.) are marked with the ESD warning symbol.

E -Electro

S -Static

D -Discharge

Statically charged persons can discharge by touching electrical components.

NOTE: Humans can only detect a discharge starting from a level of approx. 3000 V.

The danger threshold for electrical components already starts from a level of approx. 100 V.

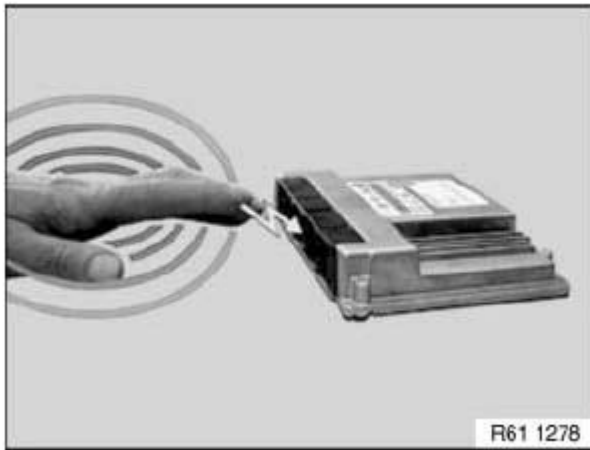


Fig. 264: Precaution For - Touching Electrical Components
Courtesy of BMW OF NORTH AMERICA, INC.

Example:

Mechatronic control unit.

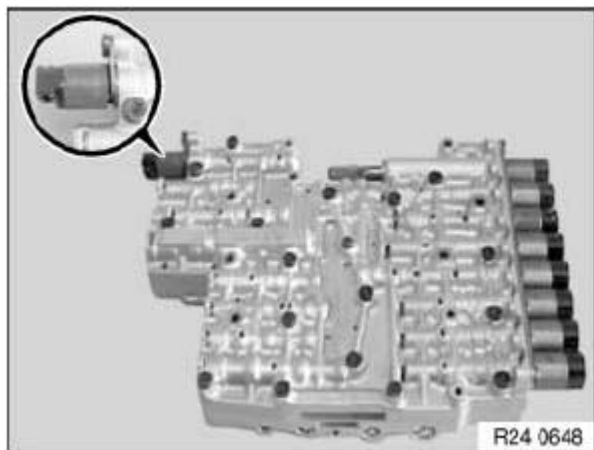


Fig. 265: Identifying Mechatronic Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 266: Precaution For - Do Not Touch Pins Or Multi-Pin Connectors Directly
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not touch pins or multi-pin connectors directly!

Touch electrical components by their housings only.

IMPORTANT: To prevent electrical components from being damaged or destroyed by electrostatic discharge, it is absolutely essential to comply with the following instructions:

- When replacing electrical components, leave the replacement components in their original packaging until immediately before they are to be installed
- If necessary, always return a removed component in its original packaging (always pack the component away immediately)
- Read and comply with user information on using the associated special tool 12 7 060

Personal protective equipment:

Electrically conducting clothing (high wool content, antistatic shoes required).

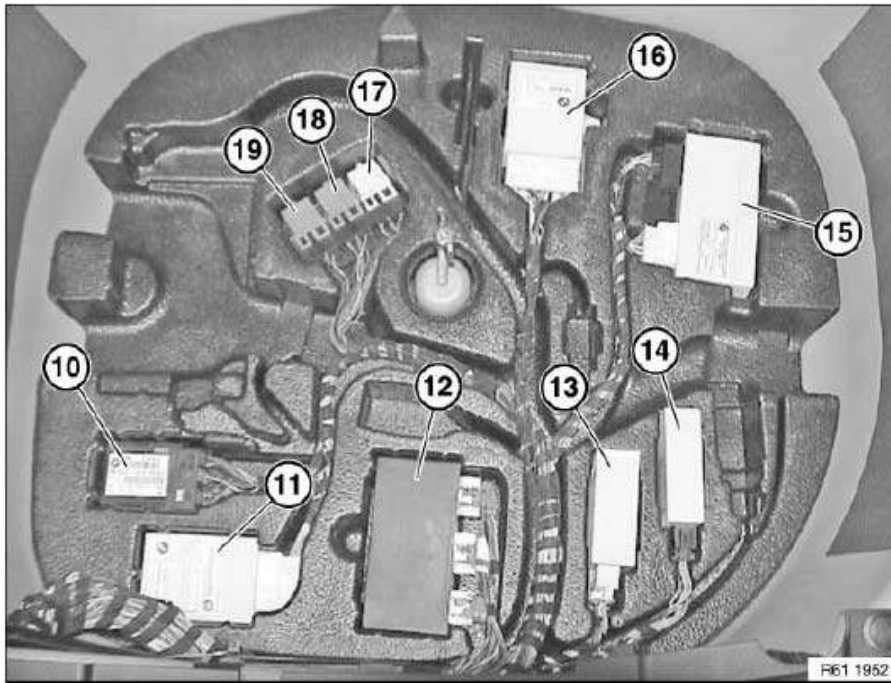
These can primarily be identified by the logo on the side.



Fig. 267: Identifying Antistatic Shoes

Courtesy of BMW OF NORTH AMERICA, INC.

61 35... OVERVIEW OF CONTROL UNITS, EQUIPMENT MOUNTING, LUGGAGE COMPARTMENT



- | | |
|---|---|
| 10 Power amplifier (E61) | 15 Control unit, slide/tilt sunroof, from 03/2007 (E61) |
| 11 Control unit, electronic ride-height control (E61) | 16 Control unit, automatic rear lid actuation (E61) |
| 12 Control unit, Park Distance Control | 17 Relay, Soft Close Automatic, rear lid (E61) |
| 13 Control unit, trailer tow hitch | 18 Relay, rear window wiper (E61) |
| 14 Trailer module | 19 Relay, electronic ride-height control (E61) |

Fig. 268: Overview Of Control Units, Equipment Mounting, Luggage Compartment
 Courtesy of BMW OF NORTH AMERICA, INC.

61 00... PROGRAM / ENCODE THE CONTROL UNIT(S)

See **PROGRAM / ENCODE THE CONTROL UNIT(S)**.

61 35 001 REMOVING AND INSTALLING (REPLACING) TRAILER MODULE

IMPORTANT: Read and comply with notes on protection against electrostatic damage (**ESD PROTECTION**).

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM**
- If necessary, remove storage tray for car jack
- If necessary, remove spare wheel
- Remove control unit cover

M5 only:

- Remove battery

NOTE: Depending on the equipment specification, the position of the trailer module (2) can vary.

Lift trailer module (2) out of equipment mounting (3).

Disconnect plug connection (1).

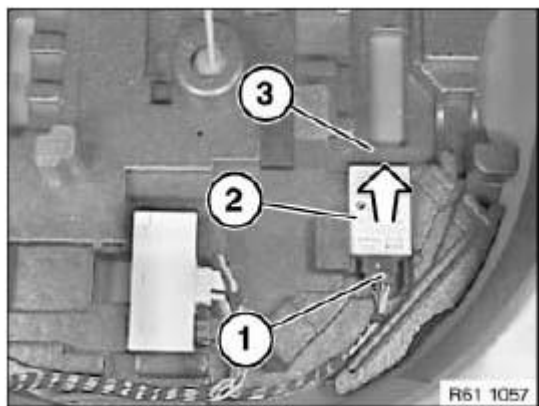


Fig. 269: Identifying Equipment Mounting And Trailer Module
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

61 35 015 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR CAR ACCESS SYSTEM

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION).

Necessary preliminary tasks:

- Remove TRIM PANEL FOR PEDAL ASSEMBLY.

Unfasten plug connection (2) and disconnect.

IMPORTANT: Carefully unlock and disconnect associated plug connection for ribbon cable (1).
Replace ribbon cable (1) if

- plug connection for ribbon cable (1) is damaged
- control unit for Car Access System (3) is replaced

The ribbon cable leads to the IGNITION STARTER SWITCH.

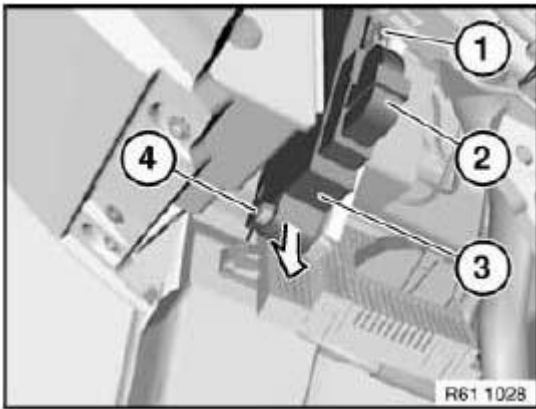


Fig. 270: Identifying Control Unit For Car Access System And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (4) and remove control unit for Car Access System (3) in direction of arrow.

Installation:

Feed guide (1) of control unit for Car Access System (2) correctly into associated mounting.

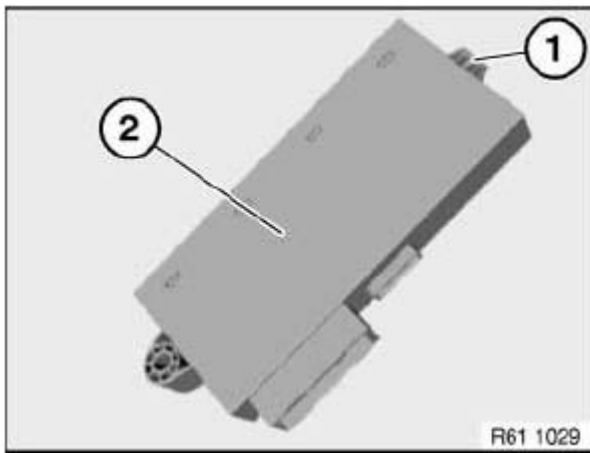


Fig. 271: Identifying Guide Of Control Unit For Car Access System
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

Version with independent heating:

Initialize all **INDEPENDENT HEATING REMOTE CONTROLS** .

61 35 030 REMOVING AND INSTALLING (REPLACING) POWER MODULE

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)**.

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM**
- Remove spare wheel

Take off cover for control units (1).

NOTE: Make sure cover for control units (1) is correctly seated on locating pins (2).

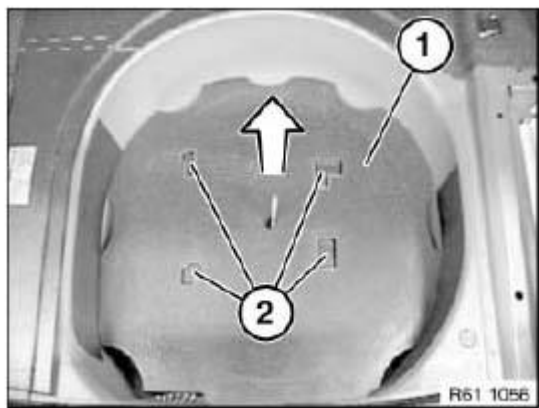


Fig. 272: Identifying Control Units And Locating Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove power module (2) in direction of arrow from mounting for control units (3).

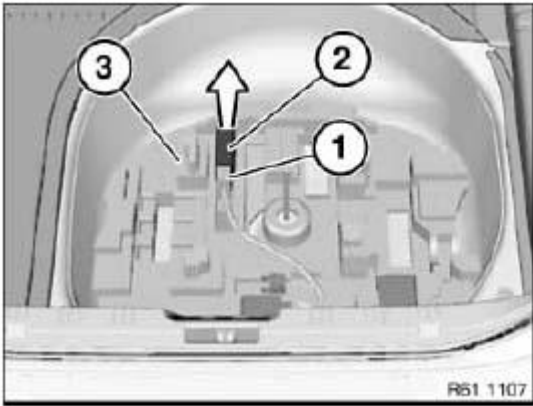


Fig. 273: Removing Power Module

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

61 35 076 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR BACKREST WIDTH ADJUSTMENT

Special tools required:

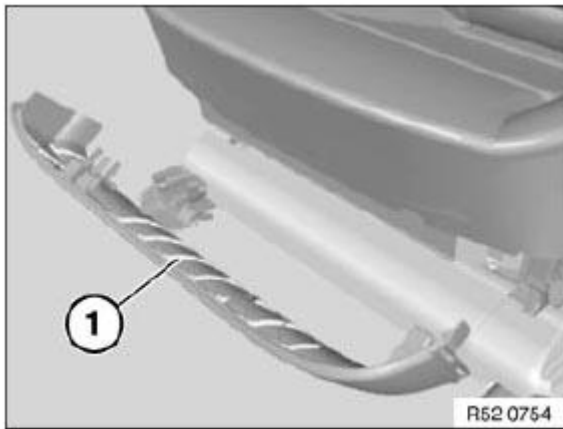
· **52 0 050**

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)**.

Necessary preliminary tasks:

· Remove switch combination for seat adjustment. See **REPLACING SEAT ADJUSTMENT SWITCH COMBINATION (FULLY ELECTRIC FRONT SEAT)** or **REPLACING SEAT ADJUSTMENT SWITCH COMBINATION (SEMI-ELECTRIC FRONT SEAT)**.

Unclip cover (1) on front seat.

**Fig. 274: Identifying Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

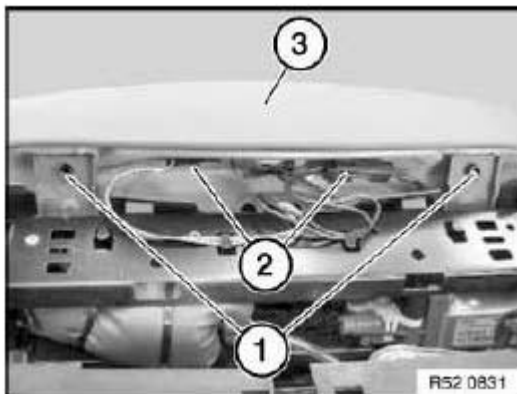
Release screws (1) on thigh support.

Disconnect plug connection (2).

Remove thigh support (3) towards top.

Installation:

Insert screws (1) with Loctite.

**Fig. 275: Identifying Thigh Support, Plug Connection And Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

Unclip trim (1) for thigh support carrier.

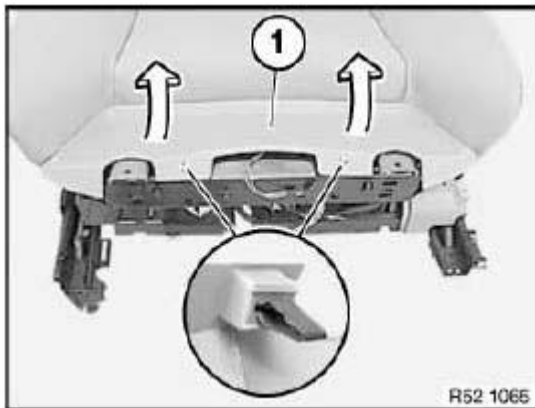


Fig. 276: Unclipping Trim For Thigh Support Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Detach seat cover (1).

Tilt back seat cover (1) with padding towards middle of vehicle.

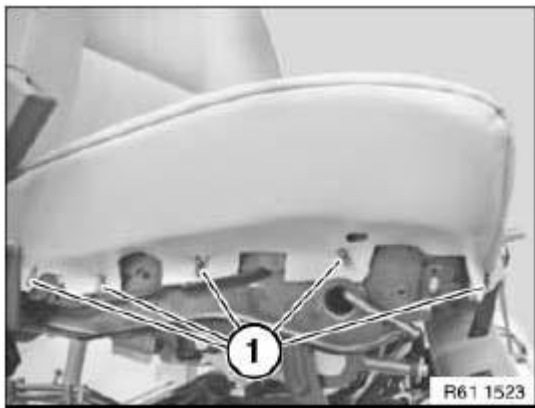


Fig. 277: Identifying Seat Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Loosen retainers (1).

Tilt back thigh support (2) towards rear.

Remove all remnants of clips from seat cover and seat mechanism.

Installation:

Bend new retainers closed with pliers **52 0 050**.

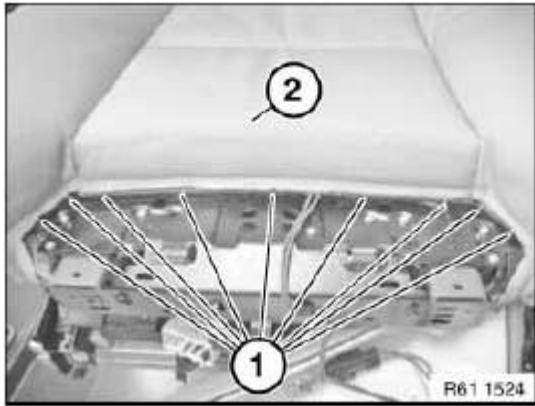


Fig. 278: Identifying Thigh Support And Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) under tilted-up seat padding.

Unlock plug connections (2) and disconnect.

Remove control unit for backrest width adjustment (3) towards bottom.

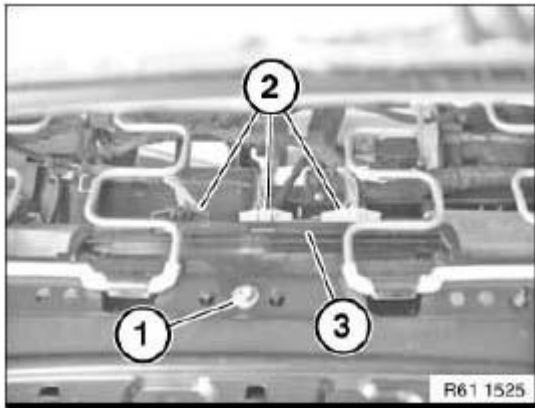


Fig. 279: Identifying Control Unit, Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

61 35 080 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR LEFT OR RIGHT SEAT ADJUSTMENT (FRONT SEAT)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)**.

Illustration of problem: (replacement only)

In the event of a faulty seat module, new variants with a 30 mm wider housing will be used as replacements as of 03/2005.

- Seat module up to 03/2005 approx. 135 mm
- Seat module from 03/2005 approx. 165 mm

This results (on the right seat only) in a collision with the central seat connector.

In vehicles up to 03/2005 it is therefore necessary to fit the right seat with a new seat pan (applicable from 03/2005).

The following SM variants are affected:

- SM H
- SM BA/M
- SM BA/M-HK

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove **TRIMS FOR TOP RAIL**

Removal and installation:

NOTE: To facilitate installation/removal of control unit, move seat upwards fully.

Unlock and disconnect all plug connections in area (1).

Unlock catches (2) towards rear, feed out control unit for seat adjustment (3) in direction of arrow and remove from seat rail (4).

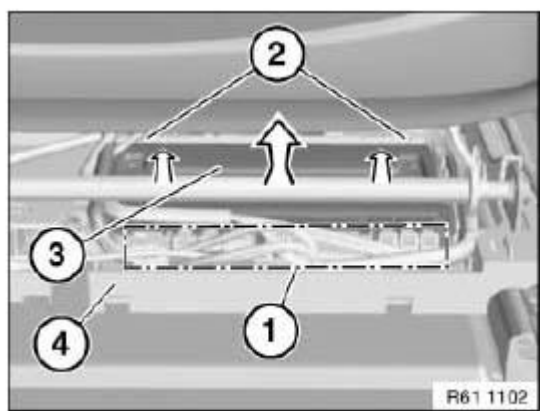


Fig. 280: Identifying Control Unit Of Seat Adjustment, Catches And Seat Rail
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure mounts (1) and retaining lugs (2) of control unit for seat adjustment (3) are correctly seated.

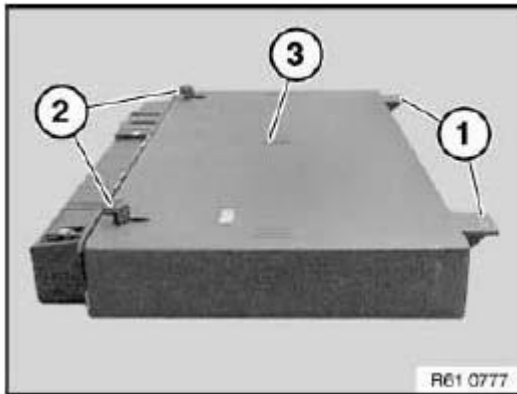


Fig. 281: Identifying Mounts And Retaining Lugs Of Control Unit
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

REMOVE trim for top rail on outside.

Unlock central seat connector (1) and disconnect.

Unlock and disconnect all plug connections from connector strips (2).

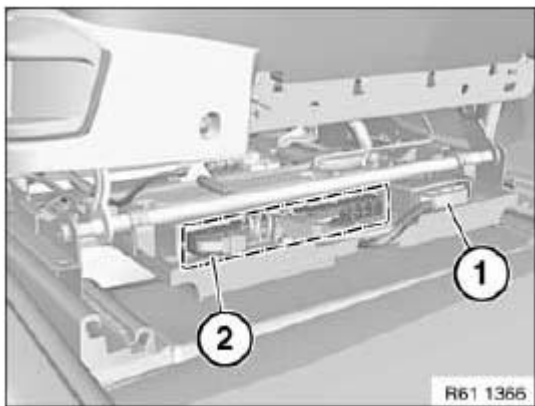


Fig. 282: Identifying Central Seat Connector And Connector Strips
 Courtesy of BMW OF NORTH AMERICA, INC.

Pull seat pan (1) forwards slightly and unclip from seat linkage.

Lift seat pan at rear left and right out of seat rail.

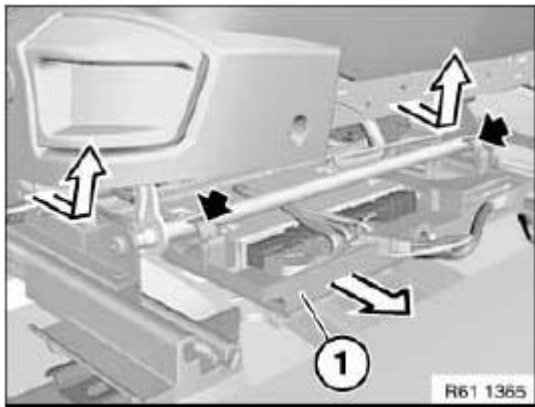


Fig. 283: Pulling Seat Pan

Courtesy of BMW OF NORTH AMERICA, INC.

Turn seat pan in seat mechanism and feed out towards front.

Unclip seat wiring harnesses from seat pan.

Remove seat pan.

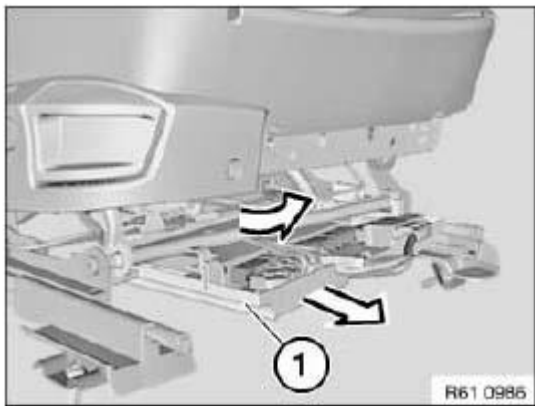


Fig. 284: Turning Seat Pan In Seat Mechanism

Courtesy of BMW OF NORTH AMERICA, INC.

The new seat module is secured to the new seat pan in the area marked "R".

Wiring harness (1) must be re-laid accordingly.

Pay attention to new clip positioning (2).

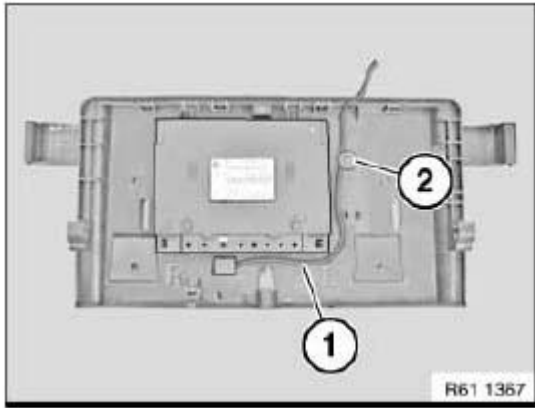


Fig. 285: Identifying Seat Module Wiring Harness

Courtesy of BMW OF NORTH AMERICA, INC.

Carry out **PROGRAMMING/CODING**.

61 35 125 REMOVING AND INSTALLING/REPLACING BODY MODULE

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)**.

Read out **PROGRAMMING/CODING**.

- Print out and make a note of settings for car and key memory in CKM menu

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove **TRIM FOR INSTRUMENT PANEL, BOTTOM LEFT**
- Detach **AIRBAG CONTROL UNIT WITH GATEWAY MODULE**

NOTE: Open glovebox.

Unclip pin (1) from retaining strap (2).

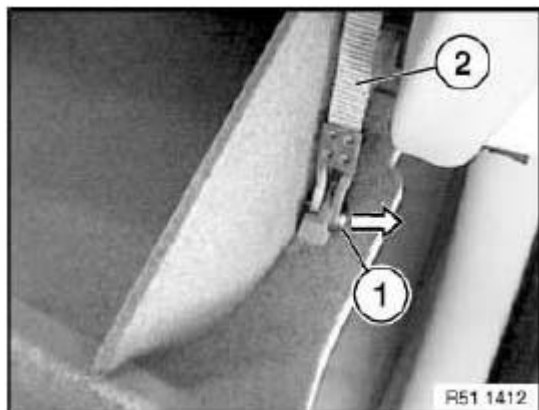


Fig. 286: Unclipping Pin From Retaining Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip pin (1) from shock absorber (2).

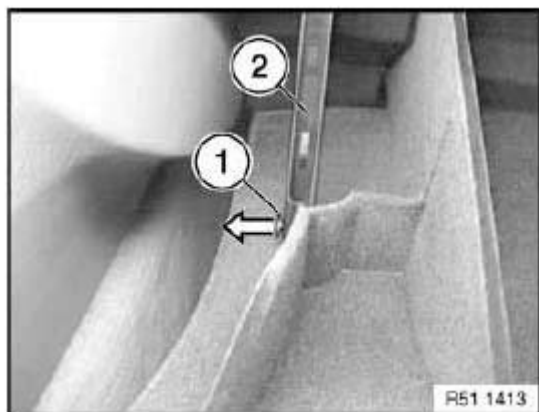
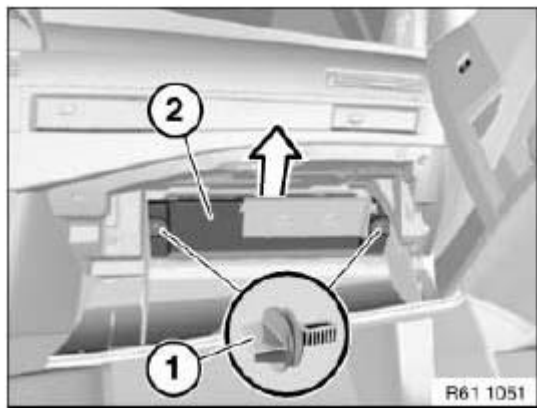


Fig. 287: Unclipping Pin From Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Open rotary clips (1) and remove.

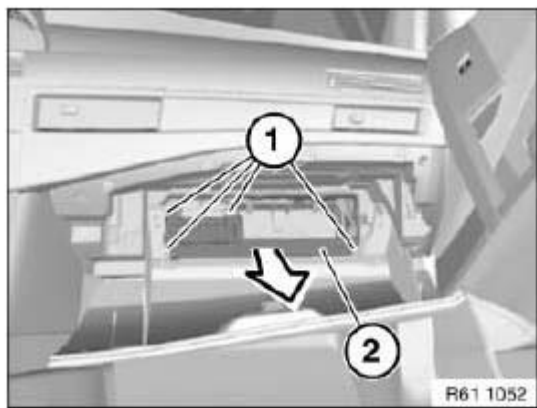
Remove cover (2) in direction of arrow.

**Fig. 288: Removing Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Pull fuse holder (2) back slightly.

**Fig. 289: Pulling Fuse Holder**

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Unlock catches (3) in direction of arrow and remove body module (2) from equipment carrier (4).

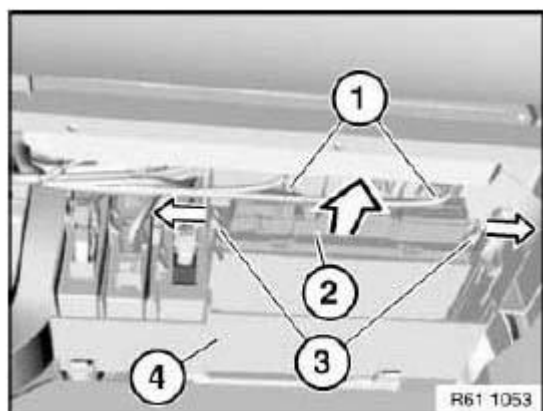


Fig. 290: Identifying Equipment Carrier, Plug Connections And Catches
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

- Check printed-out or noted-down settings for car and key memory in CKM menu and reset if necessary

61 35 127 REMOVING AND INSTALLING/REPLACING BODY GATEWAY MODULE

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)**.

Read out **PROGRAMMING/CODING**.

- Print out and make a note of settings for car and key memory in CKM menu

Necessary preliminary tasks:

- Disconnect negative battery cable
- Remove **TRIM FOR INSTRUMENT PANEL, BOTTOM LEFT**

NOTE: Open glovebox.

Unclip pin (1) from retaining strap (2).

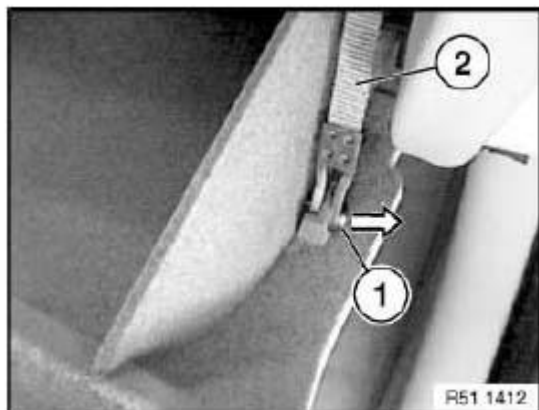


Fig. 291: Unclipping Pin From Retaining Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip pin (1) from shock absorber (2).

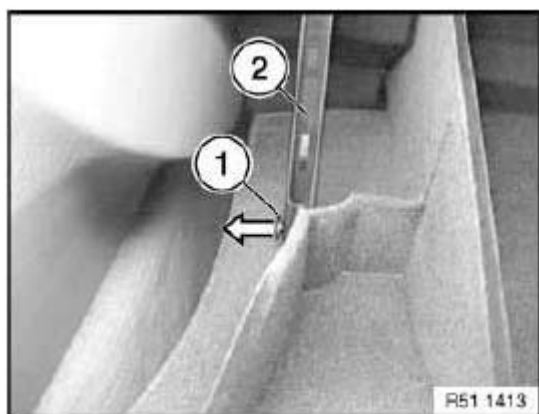


Fig. 292: Unclipping Pin From Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Open rotary clips (1) and remove cover (2) in direction of arrow.

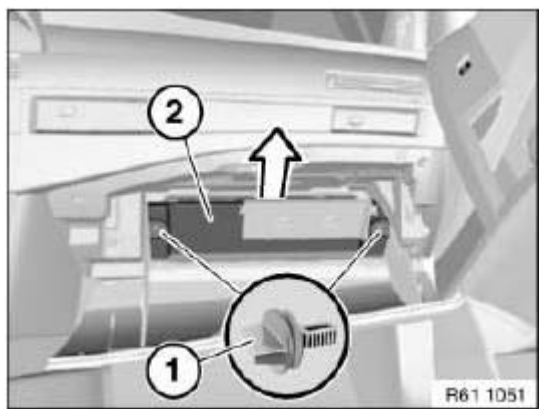
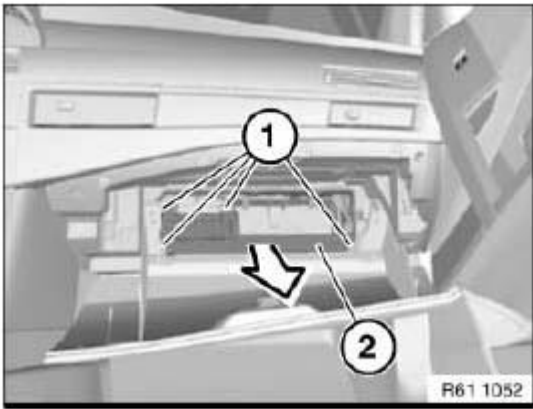


Fig. 293: Removing Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Pull fuse holder (2) back slightly.

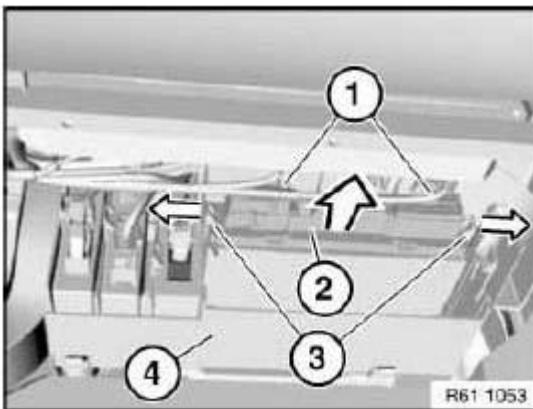
**Fig. 294: Pulling Fuse Holder**

Courtesy of BMW OF NORTH AMERICA, INC.

Detach AIRBAG CONTROL UNIT WITH GATEWAY MODULE.

Unlock plug connections (1) and disconnect.

Unlock catches (3) in direction of arrow and remove body module (2) from equipment carrier (4).

**Fig. 295: Identifying Body Module, Equipment Carrier And Plug Connections**

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out PROGRAMMING/CODING.

- Check printed-out or noted-down settings for car and key memory in CKM menu and reset if necessary

61 35 177 REMOVING AND INSTALLING (REPLACING) RAIN/LIGHT SENSOR

IMPORTANT: Read and comply with notes on protection against electrostatic damage ((ESD PROTECTION)).

Necessary preliminary tasks:

Version with Autobeam:

- Remove INTERIOR REAR-VIEW MIRROR

Detach two-part mirror base cover (1) by pressing from below.

Feed out two-part mirror base cover (1) and remove.

NOTE: Catches of two-part mirror base cover (1) must not be damaged or missing.

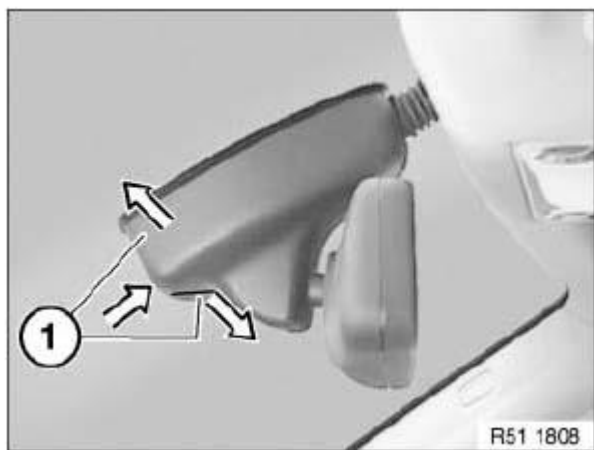


Fig. 296: Pressing Two-Part Mirror Base Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (3).

Release locks (1) in direction of arrow and remove rain/light sensor (2) from optical element.

Installation:

Do not damage optical element covered by rain/light sensor (2).

Initialize RAIN/LIGHT SENSOR.

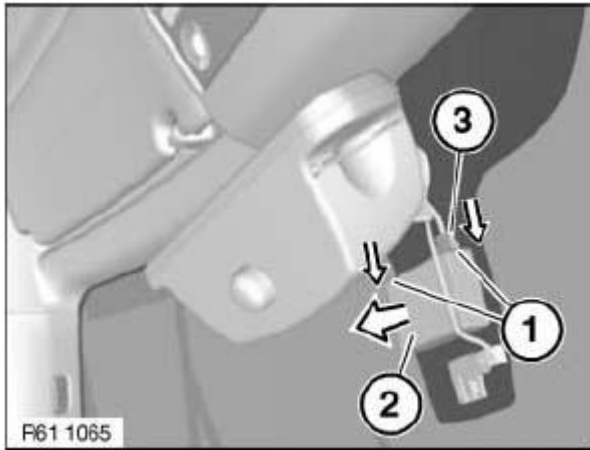


Fig. 297: Removing Rain/Light Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out VEHICLE PROGRAMMING/CODING.

61 35 220 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR LEFT OR RIGHT FRONT DOOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION).

Read out PROGRAMMING/CODING.

- Print out and make a note of settings for car and key memory in CKM menu

Necessary preliminary tasks:

- Remove FRONT DOOR TRIM

Unlock plug connections (1) and disconnect.

If necessary, unclip electrical leads at points (2).

Release screws (3).

Remove control unit in front door (4).

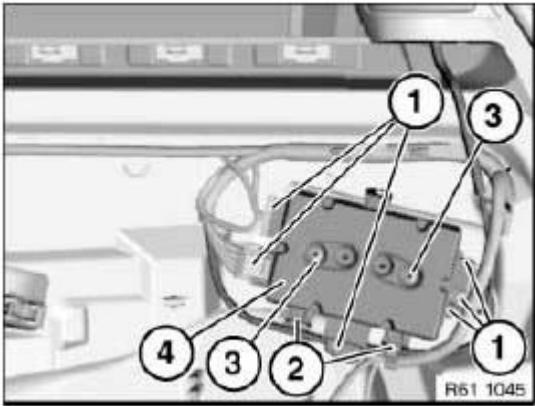


Fig. 298: Identifying Front Door Control Unit, Plug Connections And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

- Check printed-out or noted-down settings for car and key memory in CKM menu and reset if necessary

61 35 285 REMOVING AND INSTALLING (REPLACING) LIGHT MODULE

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION).

Necessary preliminary tasks:

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY** .

Unlock catch (1) and feed out/remove light module (2) in direction of arrow.

Installation:

Make sure light module (2) is correctly seated in mounting (3) and catch (1).

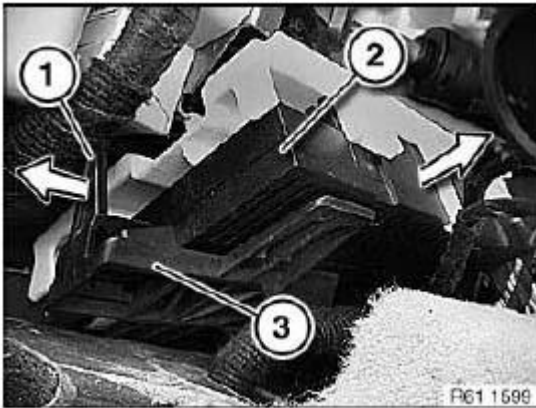


Fig. 299: Removing Light Module

Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, unlock catch (1) and remove cover (2) from light module (3).

Installation:

Make sure cover (2) is correctly seated on light module (3).

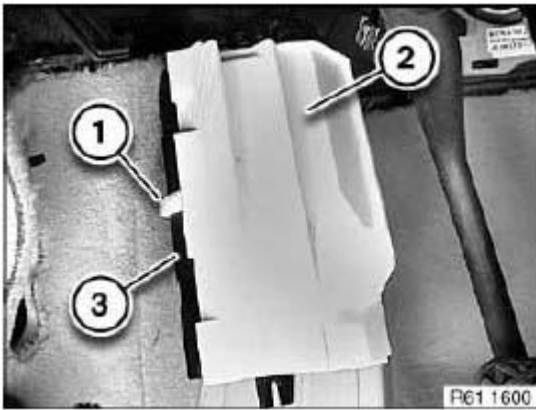


Fig. 300: Identifying Light Module, Cover And Catch

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

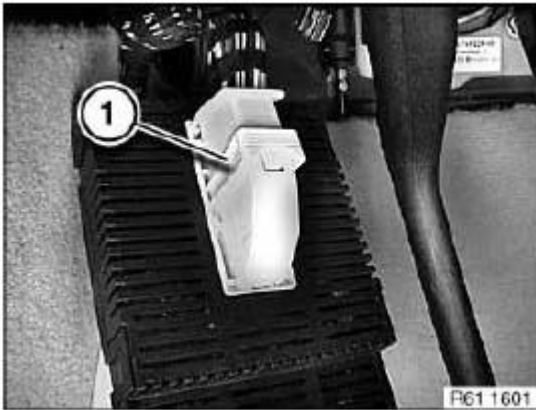


Fig. 301: Identifying Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

61 35 502 REPLACING TRAILER MODULE (09/2006-03/2009)

NOTE: From 03/2009 trailer module AHM3+ will be replaced by trailer module AHM4R.

Plug connectors and associated pin assignments must be adapted if the old plug connector AHM3(+) is fitted.

- A. Plug connector, new AHM4
- B. Plug connector, old AHM3(+)

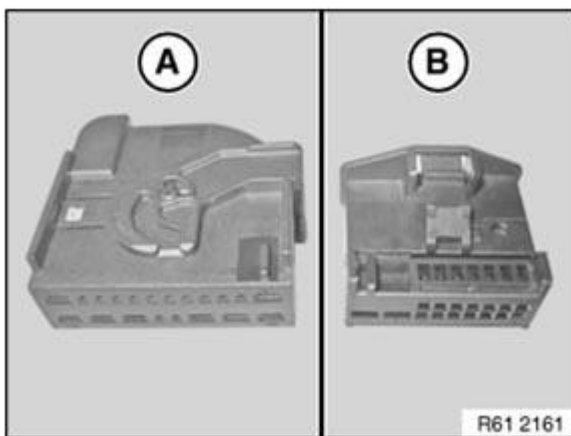


Fig. 302: Identifying Plug Connector Models

Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

Remove TRAILER MODULE

From build date/version 03/2007 Series E60/61:

Installation:

Cut out device holder up to marking (1).

Cut out indentation in area (2).

Make sure AHM module is exactly seated and wiring harness is correctly routed.

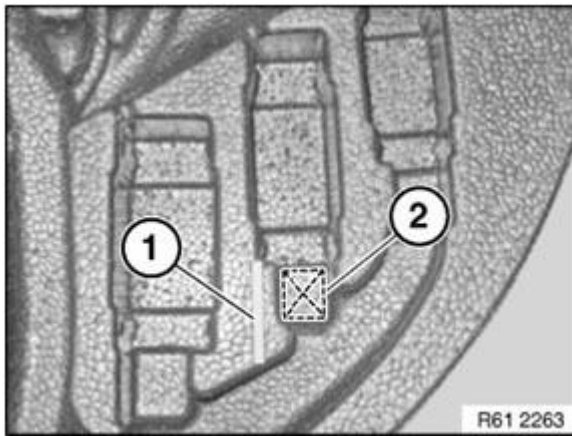


Fig. 303: Identifying Marking On Device Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Positions of plugs and associated pin assignments are set out in the diagnosis system.

The repair instruction represents the highest vehicle configuration. Pin assignments of plug connections may be absent if optional equipments are not fitted.

Special tools for disconnecting:

Secondary lock:

Special tool **61 0 324**

Primary lock:

Special tool **61 0 316**

Special tool for crimping:

Double flat spring contact:

Crimping tool special tool **61 0 202** (crimping tool) with special tool **61 0 230** (matrix)

For information about special tools used in this procedure, see **GENERAL ELECTRICAL SYSTEM - SPECIAL TOOLS**.

SPECIAL TOOL FOR CRIMPING REFERENCE CHART

(09/2006 - 03/2009)			
Previously AHM3(+)		New AHM4R	
Pin no.	Contact (mm ²)	Pin no.	Contact (mm ²)
1	2.8	13	2.8
2	2.8	20	2.8
3	0.63	-	-
4	0.63	17	0.63
5	0.63	2	0.63
6	0.63	3	0.63
7	0.63	11	0.63
8	0.63	9	0.63
9	0.63	10	0.63
10	0.63	18	2.8
Recrimp contact from 0.63 mm ² to 2.8 mm ²			
11	0.63	14	2.8
Recrimp contact from 0.63 mm ² to 2.8 mm ²			
12	0.63	15	2.8
Recrimp contact from 0.63 mm ² to 2.8 mm ²			
13	0.63	19	2.8
Recrimp contact from 0.63 mm ² to 2.8 mm ²			
14	0.63	12	2.8
Recrimp contact from 0.63 mm ² to 2.8 mm ²			
15	0.63	16	0.63
16	0.63	1	2.8
Recrimp contact from 0.63 mm ² to 2.8 mm ²			
-	-	4-8	0.63

Carry out **VEHICLE PROGRAMMING/CODING**.

61 35 679 INITIALIZING RAIN/LIGHT (SOLAR) SENSOR

NOTE: Initialization is necessary:

- after replacing windscreen
- after replacing rain/light (solar) sensor
- after replacing optical element on rain/light (solar) sensor
- after installing a used rain/light (solar) sensor

NOTE:

- Connect BMW diagnosis system
- Initializing rain/light (solar) sensor

61 35 683 REPLACING OPTICAL ELEMENT FOR SOLAR RAIN/LIGHT SENSOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION).

Necessary preliminary tasks:

Remove SOLAR RAIN/LIGHT SENSOR

Optical element can only be replaced in the following equipment specifications:

- E60/E61 without head-up display
- E60/E61 without lane departure warning

Carefully expand catches (1) of solar rain/light sensor (2).

Remove optical element (3).

Installation:

Remove protective cover from replacement optical element.

Catches (1) of solar sensor (2) must not be damaged.

Observe laser markings (4) of fitting aid.

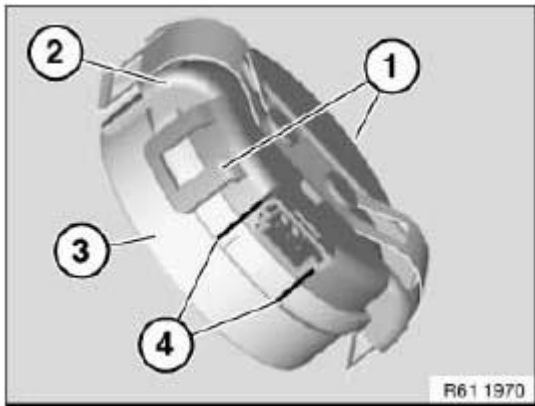


Fig. 304: Identifying Solar Rain/Light Sensor, Optical Element And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Carry out **INITIALIZATION**.

Carry out **PROGRAMMING/CODING** if installing a different windscreen type.

61 35 685 REPLACING RAIN/LIGHT SOLAR SENSOR

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)**.

Expand two-part mirror base cover (1) by pressing from below and detach.

Feed out two-part mirror base cover (1) and remove.

If necessary, remove **INTERIOR REARVIEW MIRROR**.

NOTE: Catches of two-part mirror base cover (1) must not be damaged.

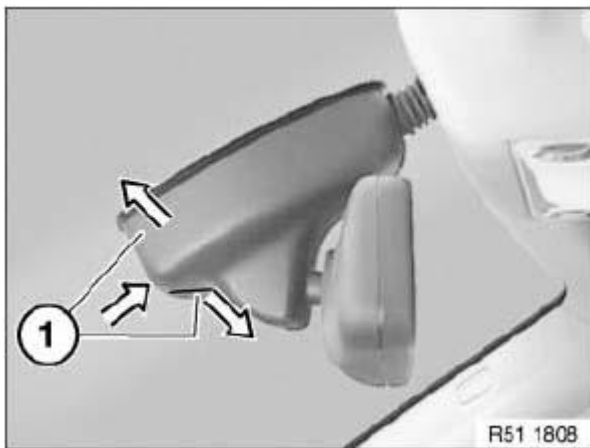


Fig. 305: Pressing Two-Part Mirror Base Cover
 Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unlock metal spring (3) in direction of arrow.

Pull off solar rain/light sensor (2) from windscreen.

Installation:

Close plug connection (1) only after fitting solar rain/light sensor on windscreen!

Carefully clean the windscreen where it comes in contact with the solar rain/light sensor! Remove all silicone residues!

Pull off protective cover from new solar rain/light sensor. Do not touch the silicon-coated surface underneath!

Align solar rain/light sensor (2) and press firmly on windscreen. Pay attention to mechanical coding (5).

Press metal spring (3) centrally to ensure that retaining element (4) engages correctly in both hooks (6).

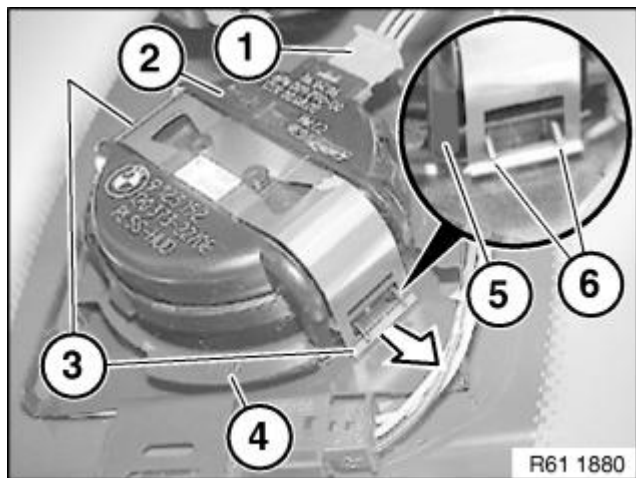


Fig. 306: Unlocking Metal Spring
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **CODING** to determine the windscreen type for the light sensor.
- Carry out **INITIALIZATION** to calibrate the rain sensor to the windscreen.

61 35 714 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR SLIDING/TILTING SUNROOF (UP TO 03/2007) (SPORTS WAGON)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (**ESD PROTECTION**).

Necessary preliminary tasks:

- Remove **TRIM FOR INSTRUMENT PANEL AT BOTTOM RIGHT**

Open lock (1) and pull back control unit for slide/tilt sunroof (2).

Disconnect associated plug connections (3).

Remove control unit for slide/tilt sunroof (2).

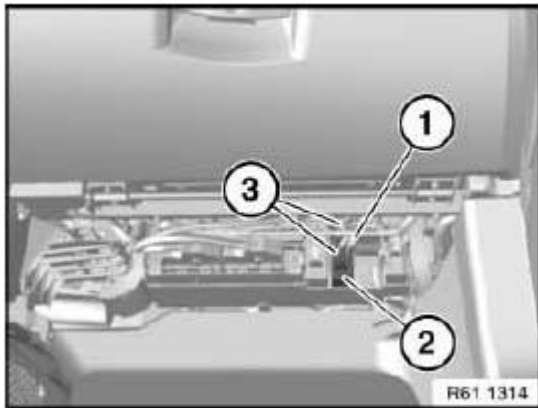


Fig. 307: Identifying Lock, Slide/Tilt Sunroof & Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Initialize **SLIDE/TILT SUNROOF**

Replacement:

- Carry out **VEHICLE PROGRAMMING/CODING**.

IMPORTANT: There is a risk of permanent battery discharge if programming/coding is not carried out!

61 35 795 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR ADAPTIVE HEADLIGHT

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)**.

Necessary preliminary tasks:

- Remove **TRIM FOR INSTRUMENT PANEL** , bottom left

Unlock catch (1) in direction of arrow.

Pull control unit for adaptive headlight (2) out of equipment carrier (3) slightly.

Unfasten plug connection (4) and disconnect.

Remove control unit for adaptive headlight (2).

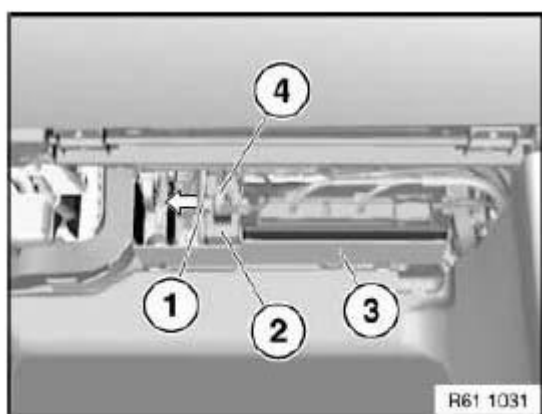


Fig. 308: Identifying Control Unit For Adaptive Headlight And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

61 35 900 REMOVING AND INSTALLING/REPLACING RING ANTENNA OF ELECTRONIC IMMOBILIZER

Special tools required:

- 61 3 300**

Necessary preliminary tasks:

- Remove **TOP SECTION OF STEERING COLUMN CASING** .

Disconnect plug connection (1).

Position special tool **61 3 300** as illustrated with flattened side (A) to ring antenna of electronic immobilizer (2).

Lever out ring antenna of electronic immobilizer (2) in direction of arrow and remove.

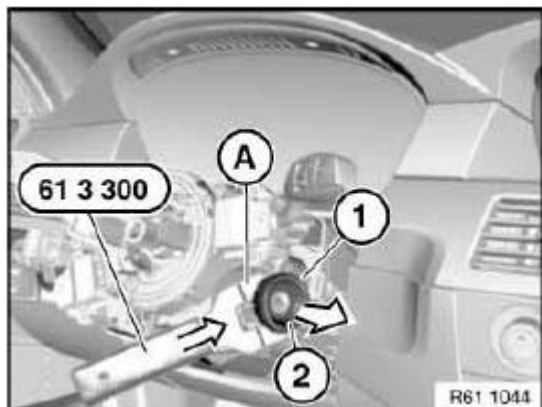


Fig. 309: Positioning Special Tool (61 3 300)

Courtesy of BMW OF NORTH AMERICA, INC.

61 35 950 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR COMFORT ACCESS SYSTEM

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION).

NOTE: The comfort access system is a radio-based system and can be interfered with by radio waves from other systems (e.g. mobile phone).

Necessary preliminary tasks:

- Remove LUGGAGE COMPARTMENT FLOOR TRIM PANEL
- Remove LUGGAGE COMPARTMENT TRIM ON SIDE PANEL ON RIGHT
- Disconnect battery negative lead
- Remove TRIM FOR INSTRUMENT PANEL, BOTTOM LEFT

Unclip pin (1) from shock absorber (2).

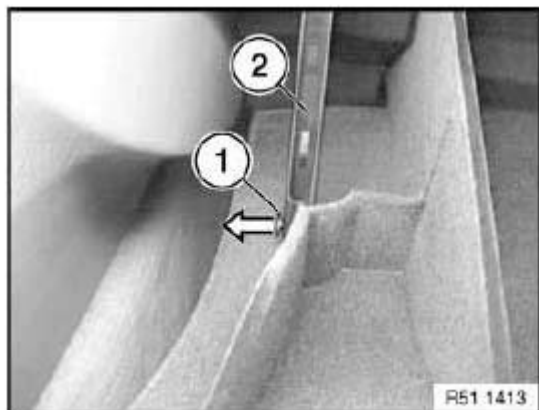


Fig. 310: Unclipping Pin From Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Open rotary clips (1) and remove.

Remove cover (2) in direction of arrow.

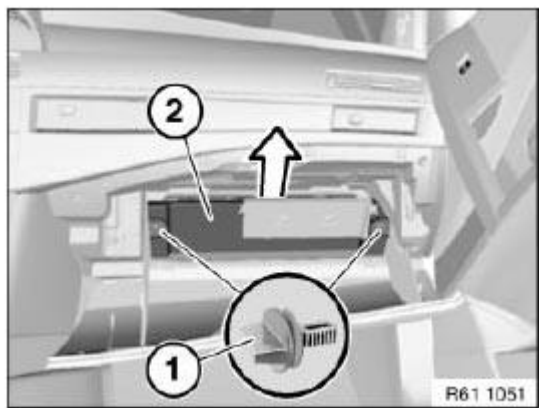


Fig. 311: Removing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Pull fuse holder (2) back slightly.

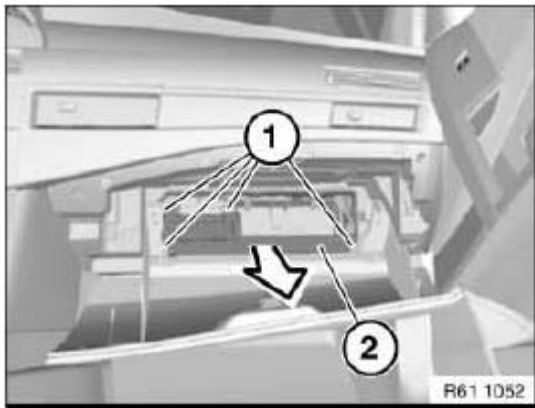


Fig. 312: Pulling Fuse Holder

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unlock catch (2) in direction of arrow and remove control unit for comfort access system (3) from device carrier (4).

Installation:

Make sure control unit (3) is correctly seated in device carrier (4).

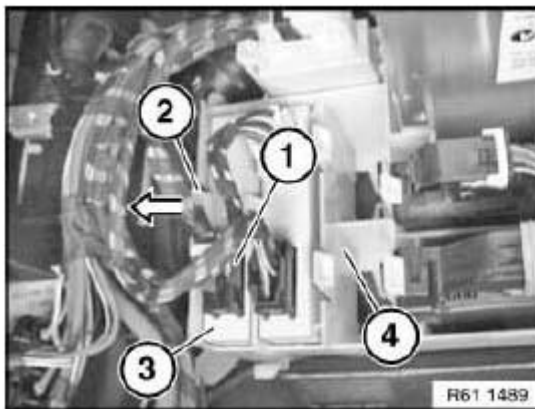


Fig. 313: Identifying Device Carrier, Control Unit And Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/CODING**.

61 35 953 REMOVING AND INSTALLING/REPLACING INTERIOR ANTENNA FOR COMFORT ACCESS SYSTEM (FRONT)

Necessary preliminary tasks:

- Remove **AUDIO SYSTEM CONTROLLER**
- Remove **STORAGE COMPARTMENT**

Release screws (2).

Remove middle function carrier (1) in direction of arrow.

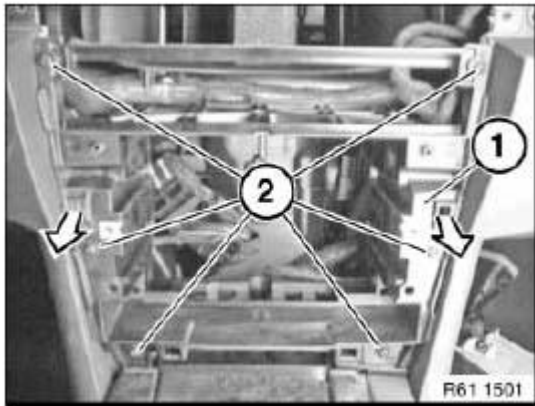


Fig. 314: Identifying Middle Function Carrier And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove middle air duct in direction of arrow.

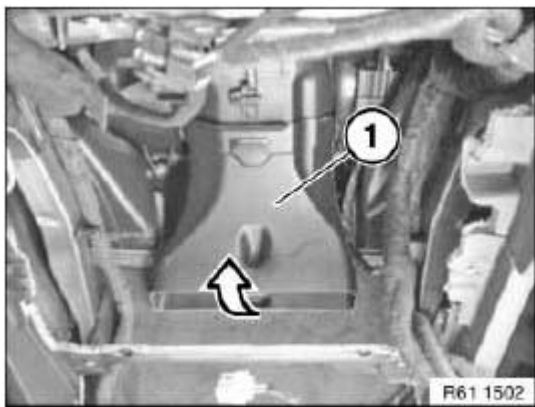


Fig. 315: Removing Middle Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Detach felt (1) from interior antenna for comfort access system (2).

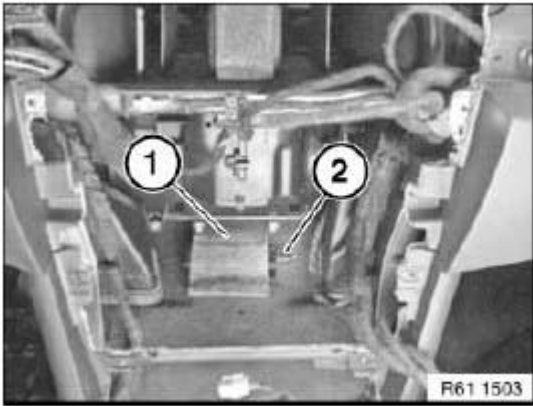


Fig. 316: Identifying Interior Antenna
 Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unclip interior antenna for comfort access system (2) from clip (3).

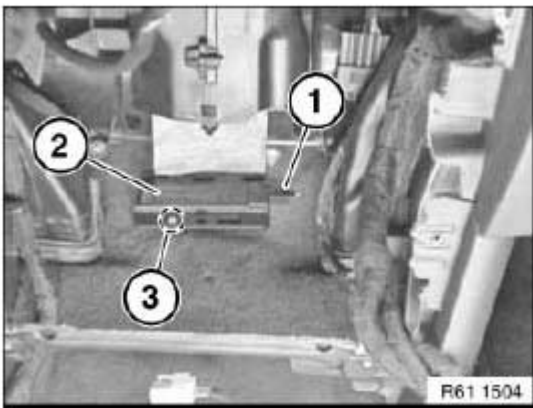


Fig. 317: Identifying Comfort Access System And Plug Connection
 Courtesy of BMW OF NORTH AMERICA, INC.

61 35 954 REMOVING AND INSTALLING/REPLACING INTERIOR ANTENNA FOR COMFORT ACCESS SYSTEM (REAR)

Necessary preliminary tasks:

- Remove **STORAGE COMPARTMENT**

Disconnect plug connection (1).

Disconnect plug connection (2).

Remove rear compartment air duct (3).

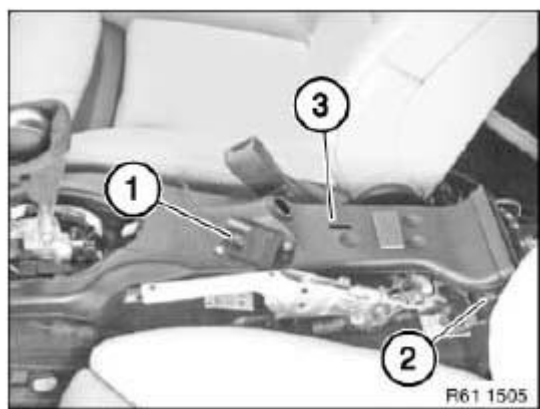


Fig. 318: Identifying Rear Compartment Air Duct And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove interior antenna for comfort access system (2).

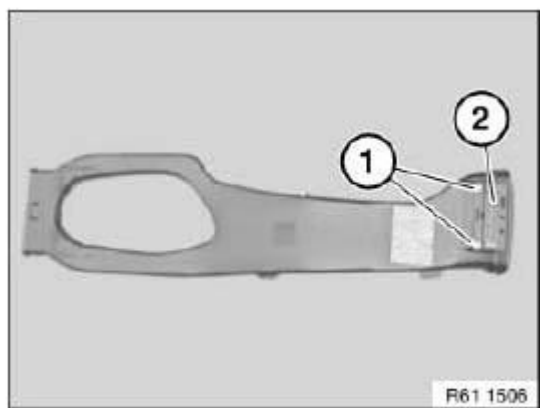


Fig. 319: Identifying Interior Antenna For Comfort Access System And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 965 REMOVING AND INSTALLING/REPLACING REAR PARCEL ANTENNA FOR COMFORT ACCESS SYSTEM

Necessary preliminary tasks:

- Remove both **TRIMS FOR ROOF PILLAR AT REAR (REAR)**
- Remove both **TRIMS FOR ROOF PILLAR AT REAR (FRONT)**
- Remove **BACKREST FOR REAR SEAT**
- Remove panel for parcel shelf. See **REMOVING AND INSTALLING TRIM FOR ODDMENTS TRAY (BACK SHELF WITH REAR WINDOW ROLLER BLIND)** and **REMOVING AND INSTALLING/REPLACING TRIM FOR REAR PARCEL SHELF**.

Disconnect plug connection (1).

Unfasten screws (2).

Remove interior antenna for comfort access system (3).

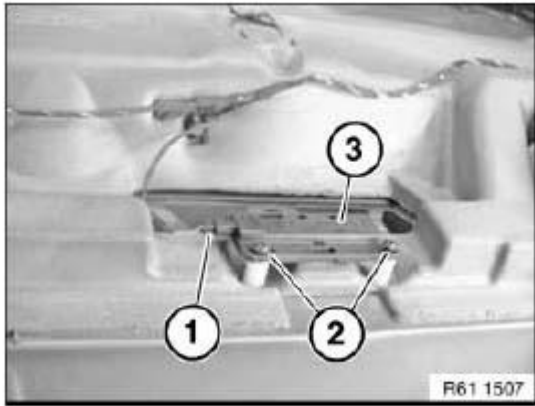


Fig. 320: Identifying Comfort Access System And Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

61 35 970 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT ANTENNA FOR COMFORT ACCESS SYSTEM

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**
- Remove storage tray for car jack
- Remove spare wheel
- Remove control unit cover

Disconnect plug connection (1).

Pull luggage compartment antenna (2) for comfort access system from control unit receptacle (3).

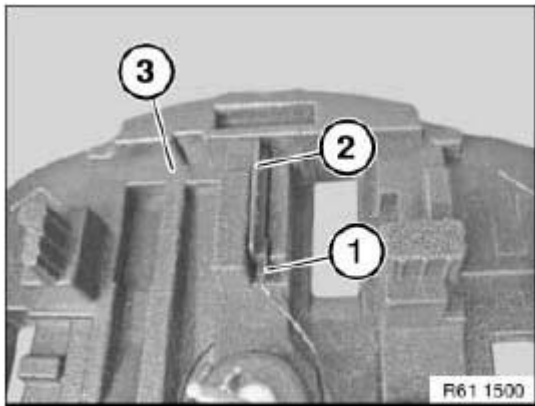


Fig. 321: Identifying Luggage Compartment Antenna And Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

61 35 975 REMOVING AND INSTALLING/REPLACING BUMPER ANTENNA FOR COMFORT ACCESS SYSTEM

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM**

Disconnect plug connection (2).

Press catches (1), feed out bumper antenna for comfort access system (3) in direction of arrow and remove.

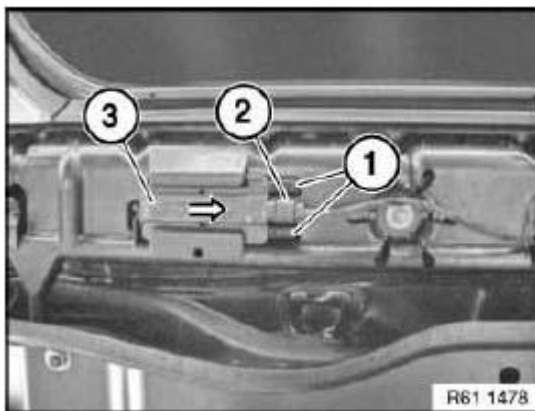


Fig. 322: Pressing Catches

Courtesy of BMW OF NORTH AMERICA, INC.

64 11 970 REPLACING FOGGING SENSOR

Special tools required:

- 00 9 317**

WARNING: Make sure rooms are well ventilated when working with adhesive remover indoors.

IMPORTANT: Do not under any circumstances use paint thinner to clean the bonding surface.

Expand two-part mirror base cover (1) by pressing from below and detach.

Feed out two-part mirror base cover (1) and remove.

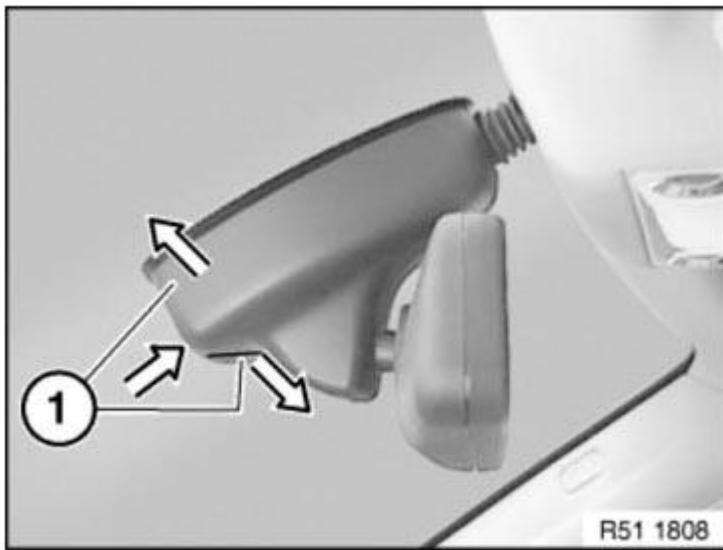


Fig. 323: Expanding Two-Part Mirror Base Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

NOTE: If necessary, carefully heat fogging sensor (2) with a hot air blower to approx. 40-60 °C.

Lift off fogging sensor (2) with special tool **00 9 317** and slowly pull off from windshield.

Installation:

Bonding surface must be dry and free of dust and grease.

Clean bonding surface with adhesive remover.

After cleaning, do not touch bonding surface with bare hands.

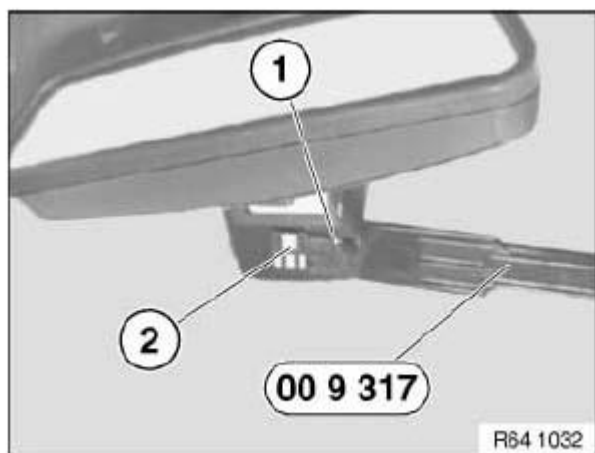


Fig. 324: Identifying Fogging Sensor With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off protective film completely from fogging sensor (3).

Place mounting template (1) as pictured on rain sensor (2).

Press fogging sensor (3) in direction of arrow with a contact pressure of $\geq 15 \text{ N/cm}^2$ onto inside of windshield.

NOTE: Firm thumb pressure attains approx. 30 N/cm^2 .

Remove mounting template (1) carefully from fogging sensor (3).

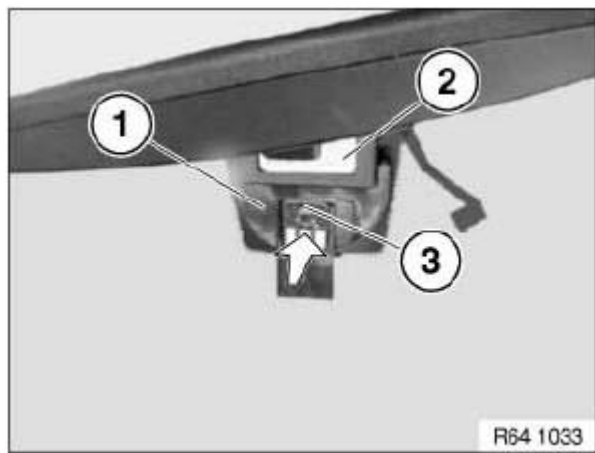


Fig. 325: Identifying Rain Sensor, Fogging Sensor And Mounting Template
Courtesy of BMW OF NORTH AMERICA, INC.

VEHICLE PROGRAMMING AND CODING

Select menu item (1).

Select corresponding procedure from selection list.

Example:

- Preparation and subsequent evaluation of vehicle programming
- Start a Progman session
- Sequence of BMW/MINI vehicle programming and coding
- BMW/MINI Car & Key Memory
- BMW/MINI initializations
- BMW/MINI service functions in Progman
- ...

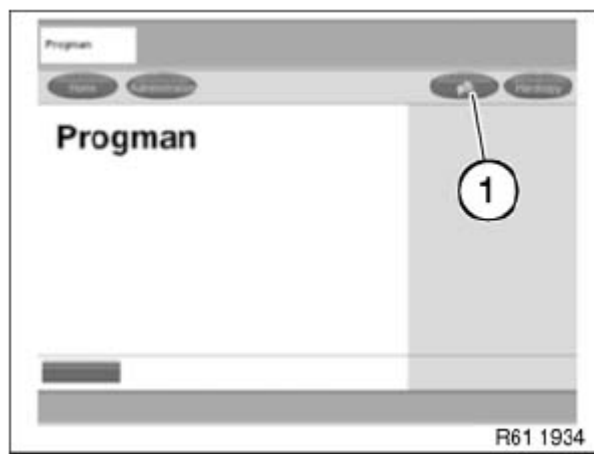


Fig. 326: Vehicle Programming And Coding Display - Menu Item
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: In order to avoid incorrect programming procedures and error messages, it is essential when working with the Progman programming system always to use the latest Progman version.

RELAYS

61 36 520 REMOVING AND INSTALLING / REPLACING RELIEF RELAY (EDC)

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**
- Remove storage tray for car jack
- Remove spare wheel

- Remove control unit cover

Detach relay (1).

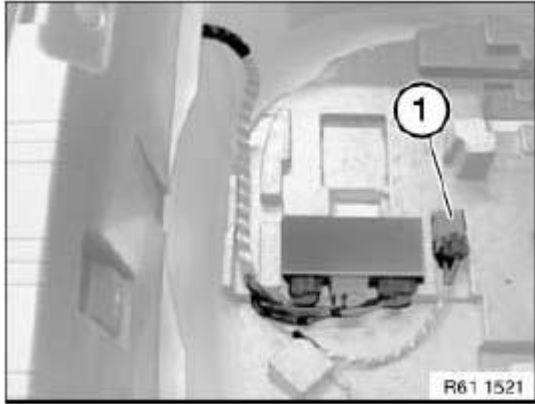


Fig. 327: Identifying Relay

Courtesy of BMW OF NORTH AMERICA, INC.

61 36 560 REMOVING AND INSTALLING/REPLACING HEADLIGHT WASHER RELAY

Necessary preliminary tasks:

- Open glovebox.

Unclip pin (1) from shock absorber (2).

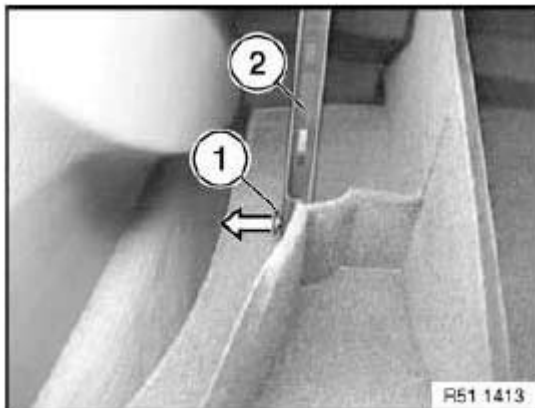
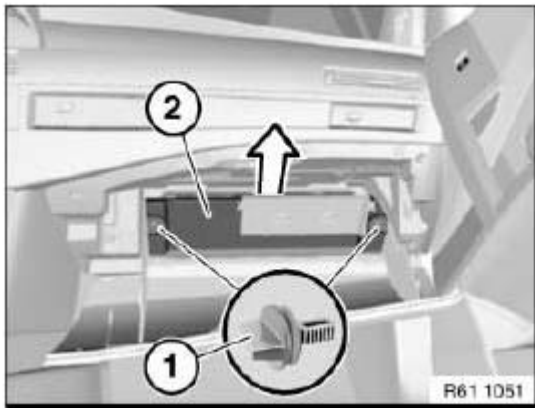


Fig. 328: Unclipping Pin From Shock Absorber

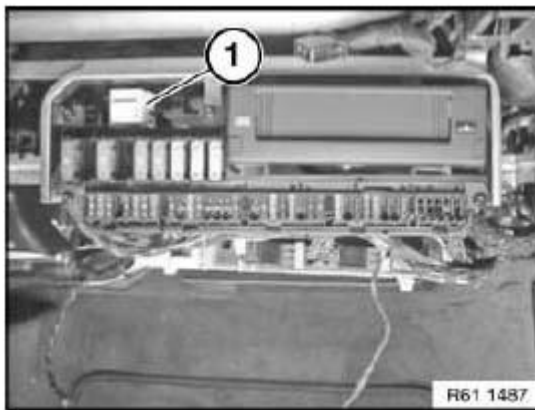
Courtesy of BMW OF NORTH AMERICA, INC.

Open rotary clips (1) and remove cover (2) in direction of arrow.

**Fig. 329: Removing Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

Detach relay (1).

**Fig. 330: Identifying Relay**

Courtesy of BMW OF NORTH AMERICA, INC.

61 36 570 REMOVING AND INSTALLING/REPLACING WINDSCREEN WIPER SYSTEM RELAY*Necessary preliminary tasks:*

- Remove **LOWER SECTION OF MICROFILTER HOUSING ON RIGHT** .

Release screws (1).

Remove electronics box cover (2).

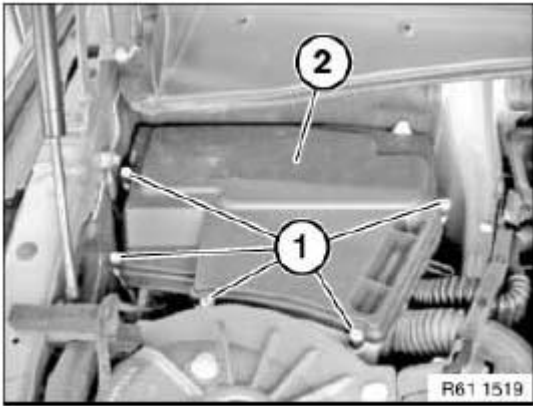


Fig. 331: Identifying Electronics Box Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach relay (1).

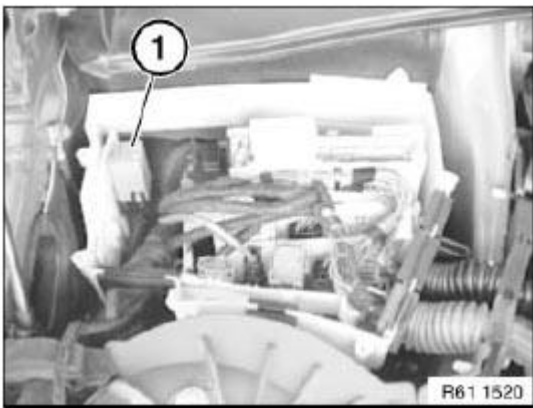
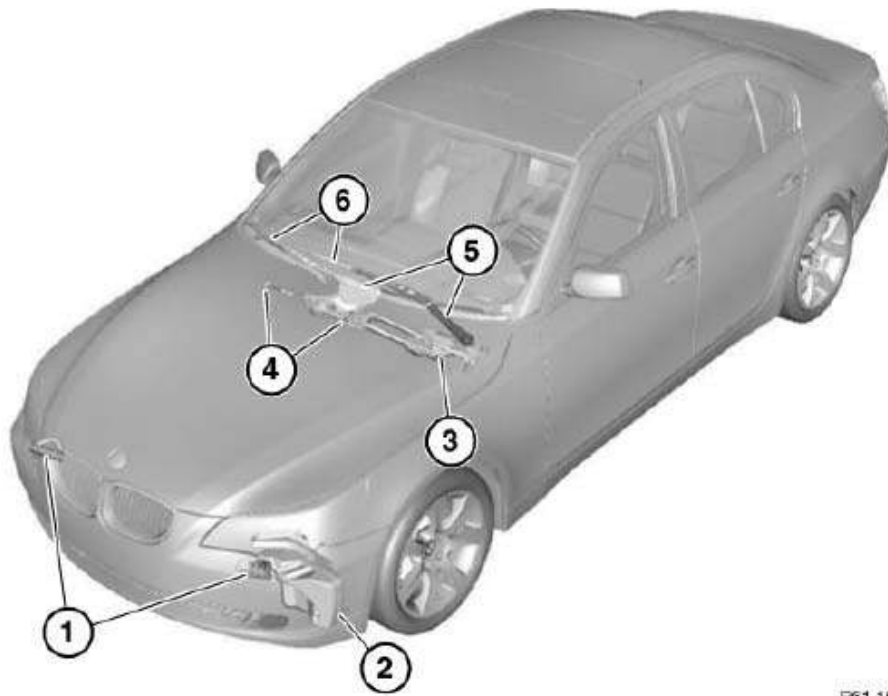


Fig. 332: Identifying Relay
Courtesy of BMW OF NORTH AMERICA, INC.

WINDSCREEN WIPERS

61 61.. OVERVIEW OF WINDOW WIPER SYSTEMS



F61 1518

- | | | | |
|---|--|---|--|
| 1 | <u>Spray nozzles of headlight washer system</u> | 4 | <u>Spray nozzles of windscreen washer system</u> |
| 2 | <u>Washer pumps, fluid reservoir for washer system</u> | 5 | <u>Windscreen wiper arms</u> |
| 3 | <u>Wiper bracket</u> | 6 | <u>Wiper blades</u> |

Fig. 333: Overview Of Window Wiper Systems
Courtesy of BMW OF NORTH AMERICA, INC.

61 61... ADJUSTING LEFT OR RIGHT WINDSCREEN WIPER

Special tools required:

61 6 100

Correctly adjusting the contact angle of the wiper arms on the windscreen increases wiping quality. For adjustment, refer to the vehicle-specific repair instruction.

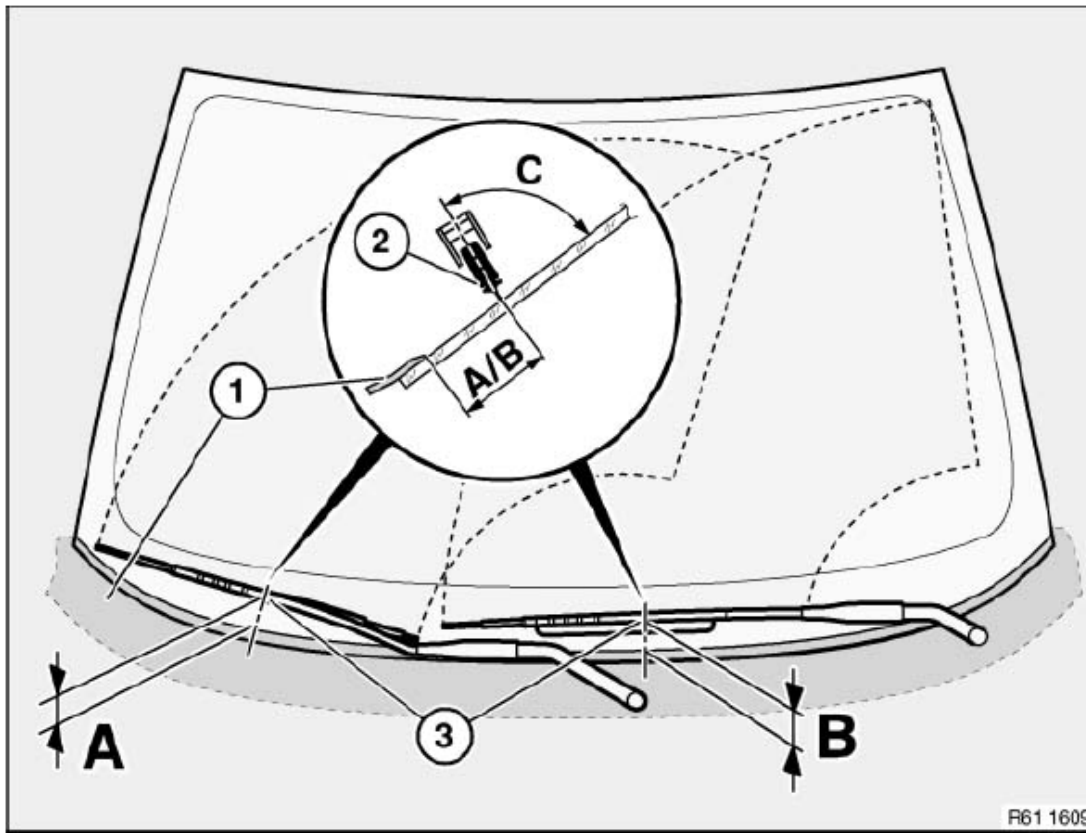


Fig. 334: Identifying Distance Between Windscreen Wiper Blade And Trim Panel
 Courtesy of BMW OF NORTH AMERICA, INC.

A/B = Distance between windscreen wiper blade (2) and trim panel on cowl panel (1)

NOTE: Measurement is taken at the height of the locators (3) for the windscreen wiper arms

C= Contact angle between wiper blade center plane and windscreen

When adjusting with special tool 61 6 100, set the scale value in accordance with the following table.

For RHD cars, change the preceding sign of the scale values.

- LHD cars, scale range 0 to -10
- RHD cars, scale range 0 to +10

WINDSCREEN WIPER ADJUSTING SPECIFICATION

Model	Contact angle (C) on windscreen wiper arm		Scale value (LHD) on special tool		Adjustment dimension (A, B) on windscreen wiper arm		
	Passenger side	Driver side	Passenger side	Driver side	Passenger side	Driver side	Rear end

CARMANUALSUSA

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1'	E81	85.5° +1.5 to 1.0°	85.5° +1.5 to 1.0°	-5	-5	47 ± 3 mm	54 ± 3 mm	
	E82	85.5° +1.5 to 1.0°	85.5° +1.5 to 1.0°	-5	-5	47 ± 3 mm	54 ± 3 mm	
	E87	85.5° +1.5 to 1.0°	85.5° +1.5 to 1.0°	-5	-5	47 ± 3 mm	54 ± 3 mm	
	E88	85.5° +1.5 to 1.0°	85.5° +1.5 to 1.0°	-5	-5	47 ± 3 mm	54 ± 3 mm	
3'	E46	85.7° ±1°	85.3° ±1°	-4	-5			
	E90	86.7° ±1°	86.0° ±1°	-3	-4	88 ± 3 mm	95 ± 3 mm	
	E91	86.7° ±1°	86.0° ±1°	-3	-4	88 ± 3 mm	95 ± 3 mm	35 ± 3 mm
	E92	86.7° ±1°	86.0° ±1°	-3	-4	75 ± 3 mm	84 ± 3 mm	
	E93	86.7° ±1°	86.0° ±1°	-3	-4	75 ± 3 mm	84 ± 3 mm	
5'	E39	86.5° ±1°	86.5° ±1°	-4	-4			60.1 ±1 mm
	E60	86.0° ±1°	86.0° ±1°	-4	-4	69 ± 3 mm	87 ± 3 mm	
	E61	86.0° ±1°	86.0° ±1°	-4	-4	69 ± 3 mm	87 ± 3 mm	30 ± 3 mm
6'	E63	86.0° ±1°	86.0° ±1°	-4	-4	69 ± 3 mm	87 ± 3 mm	
	E64	86.0° ±1°	86.0° ±1°	-4	-4	69 ± 3 mm	87 ± 3 mm	
7'	E38	87.0° ±1°	87.0° ±1°	-3	-3	65 ± 3 mm	58 ± 3 mm	
	E65	85.5° ±1°	87.0° ±1°	-	-	20 ± 3 mm	48 ± 3 mm	
	E66	85.5° ±1°	87.0° ±1°	-	-	20 ± 3 mm	48 ± 3 mm	
	E67	85.5° ±1°	87.0° ±1°	-	-	20 ± 3 mm	48 ± 3 mm	
8'	E52	85.5° ±1°	85.5° ±1°	-4	-4	38 ± 2 mm	104 ± 2 mm	
X	E53	85.0° ±1°	85.0° ±1°	-5	-5	54 ± 3 mm	55 ± 3 mm	32.5 ± 3 mm
	E70	85.6° ±1°	85.0° ±1°	-4	-5	103 ±3 mm	90 ±3 mm	39 ±2 mm
	E71	85.6° ±1°	85.0° ±1°	-4	-5	103 ±3 mm	90 ±3 mm	
	E83	85.2° ±1°	85.4° ±1°	-5	-5	66 ± 3 mm	61 ± 3 mm	29 ± 1 mm
Z	E85	85.5° ±1°	85.5° ±1°	-4	-4	57 ± 2 mm	52 ± 2 mm	
	E86	85.5° ±1°	85.5° ±1°	-4	-4	57 ± 2 mm	52 ± 2 mm	

61 61 010 CHECKING/ADJUSTING CONTACT ANGLE OF WINDSCREEN WIPER ARMS ON WINDSCREEN

Special tools required:

· **00 9 331**

· **61 6 100**

NOTE: Wipe quality is improved by precise adjustment of CONTACT/APPROACH ANGLE of wiper arms.
Adjustment angle can be checked with special tool 00 9 331 or 61 6 100.

Checking with setting gauge:

Remove load from windscreen wiper blades (1) before checking contact angle. To do so, lift wiper blades (1) briefly off windscreen before placing them back on windscreen.

Fit special tool **00 9 331** as illustrated on wiper arm and windscreen.

When the contact angle is correctly adjusted, no light gap is visible between special tool **00 9 331** and the wiper arm.

If necessary, adjust wiper arm.

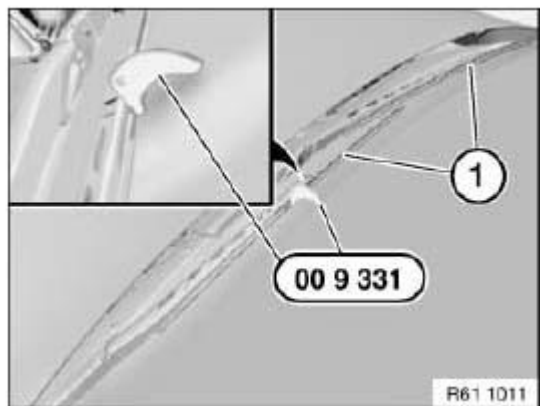


Fig. 335: Identifying Windscreen Wiper Blades
Courtesy of BMW OF NORTH AMERICA, INC.

Checking with angulometer:

Remove wiper blades.

Insert windscreen wiper arm (1) in special tool **61 6 100**.

Using screw (2) and pressure plate (3), locate windscreen wiper arm (1) and position on windscreen.

Read off scale value, adjust wiper arm if necessary.

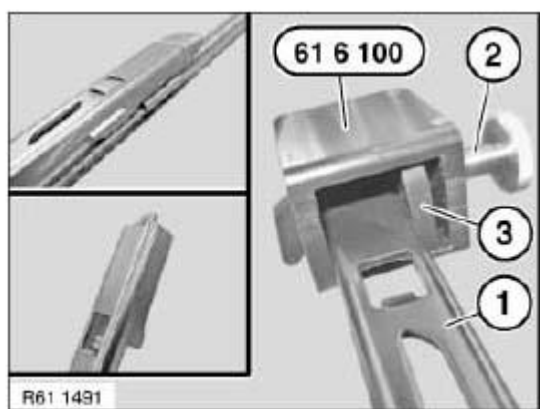


Fig. 336: Inserting Windscreen Wiper Arm In Special Tool (61 6 100)

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Windscreen wiper arm (1) must rest correctly on lower and side contact surfaces (4) of special tool 61 6 100.
On right-hand-drive cars, screw (2) must be located on left side of special tool 61 6 100.

Adjusting left wiper arm:

Unclip wiper arm cap (1) and remove in direction of arrow.

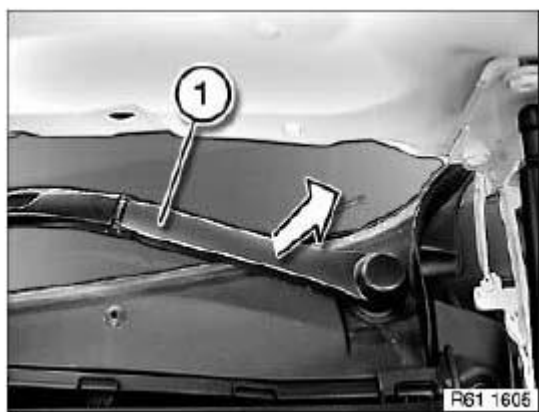


Fig. 337: Unclipping Wiper Arm Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) of wiper arm cap (2) must not be damaged.

Make sure wiper arm cap (2) is correctly seated.

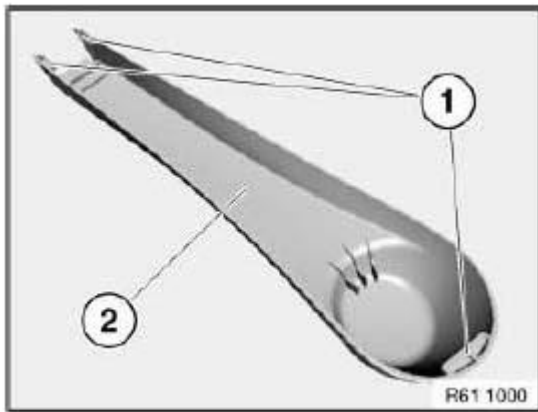


Fig. 338: Identifying Catches Of Wiper Arm Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) slightly.

Position windscreen wiper arm (2) with special tool **00 9 331** or **61 6 100** on windscreen.

Turn windscreen wiper arm (2) in direction of arrow until contact angle is correct.

Hold wiper arm (2) in this position and tighten down nut (1).

Installation:

Tightening torque **61 61 12AZ** .

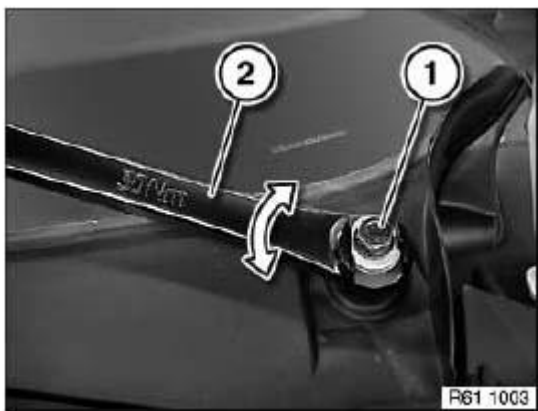


Fig. 339: Turning Windscreen Wiper Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting right wiper arm:

Unclip four-way linkage protective cap (1) and remove in direction of arrow.

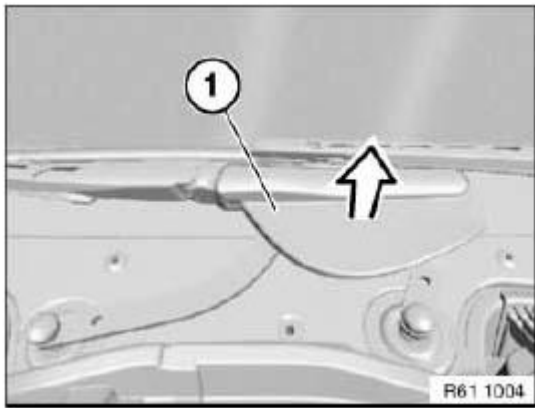


Fig. 340: Unclipping Four-Way Linkage Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) of four-way linkage protective cap (2) must not be damaged.

Make sure four-way linkage protective cap (2) is correctly seated.

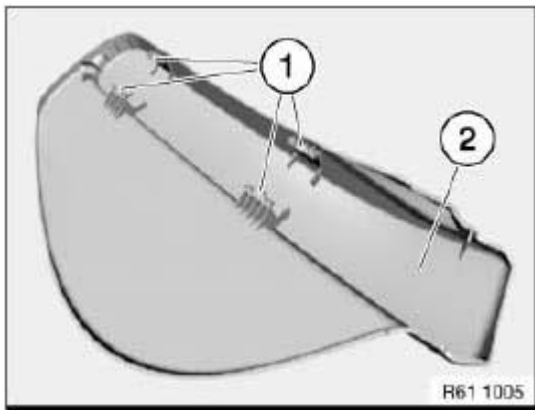


Fig. 341: Identifying Catches Of Four-Way Linkage Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) slightly.

Position windscreen wiper arm (2) with special tool **00 9 331** or **61 6 100** on windscreen.

Turn windscreen wiper arm (2) in direction of arrow until contact angle is correct.

Hold wiper arm (2) in this position and tighten down nut (1).

Installation:

Tightening torque **61 61 14AZ** .

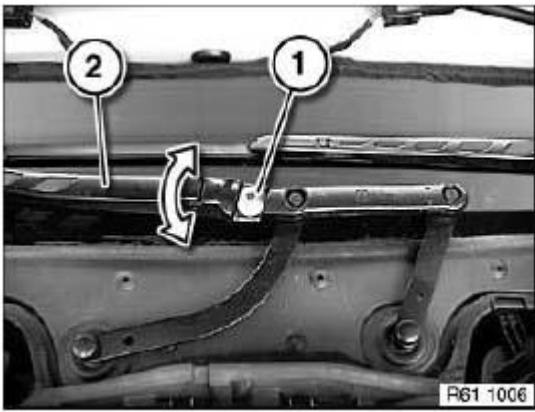


Fig. 342: Turning Windscreen Wiper Arm
Courtesy of BMW OF NORTH AMERICA, INC.

61 61 041 REPLACING BOTH WINDSHIELD WIPER BLADES

IMPORTANT: The windshield wiper arms can only be folded away approx. 45° from the windshield.

Make sure the wiper arm does not contact the windshield without its wiper blade.

Fold wiper arm (1) away from windshield.

Press lock (2) and remove wiper blade (3) in direction of arrow.

Installation:

Make sure wiper blade (3) is correctly seated.

Fold wiper arm back onto windshield.

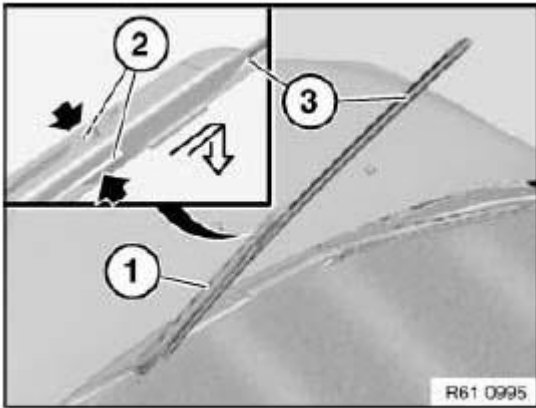


Fig. 343: Removing Wiper Blade

Courtesy of BMW OF NORTH AMERICA, INC.

61 61 101 REMOVING AND INSTALLING BOTH WINDSHIELD WIPER ARMS

Special tools required:

· **61 6 060**

IMPORTANT: Do not damage wiper arms when removing (risk of breakage).

Installation:

Adjust the position of the relevant wiper arm in the wiper rest position.

Measure distance between wiper lip (1) and top edge of cowl panel cover (3) at mounting point (2) of wiper blade.

Adjustment measurements:

- A: 87 ± 3 mm
- B: 69 ± 3 mm

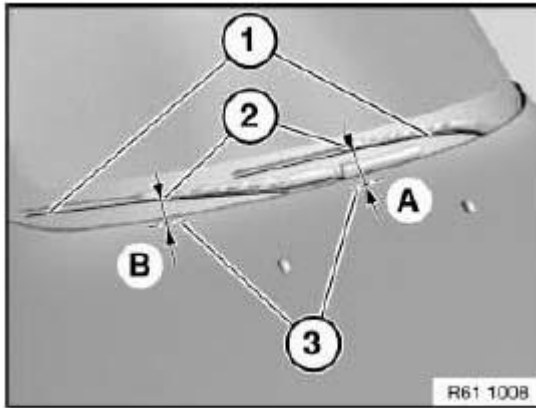


Fig. 344: Measuring Distance Between Wiper Lip And Top Edge Of Cowl Panel Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Removing left wiper arm:

Unclip wiper arm cap (1) and remove in direction of arrow.

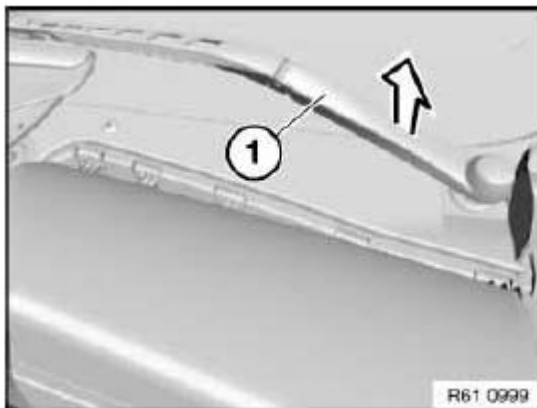


Fig. 345: Removing Left Wiper Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) of wiper arm cap (2) must not be damaged.

Make sure wiper arm cap (2) is correctly seated.

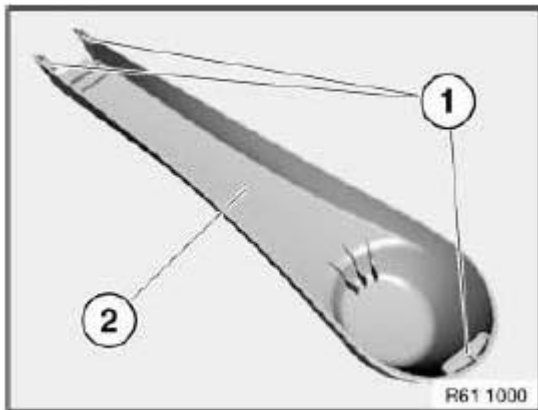


Fig. 346: Identifying Wiper Arm Cap And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Installation:

Tightening torque **61 61 12AZ** .

IMPORTANT: Observe tightening specification (settling time) without fail (risk of detaching).

Remove wiper arm (2) in direction of arrow.

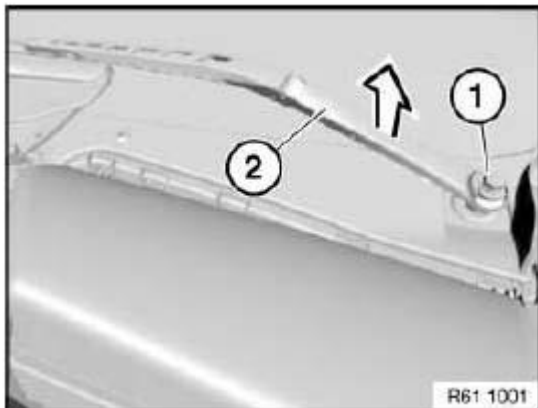


Fig. 347: Removing Wiper Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off adjusting disk (1) with special tool **61 6 060** .

Installation:

Replace adjusting disk (1).

Mount adjusting disk (1) together with wiper arm on shaft.

CHECK/ADJUST contact angle of wiper arms to windshield.

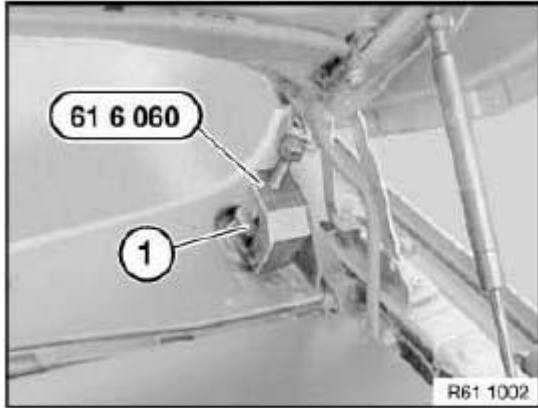


Fig. 348: Identifying Special Tool (61 6 060) On Adjusting Disk
Courtesy of BMW OF NORTH AMERICA, INC.

Removing right wiper arm:

Remove caps (1).

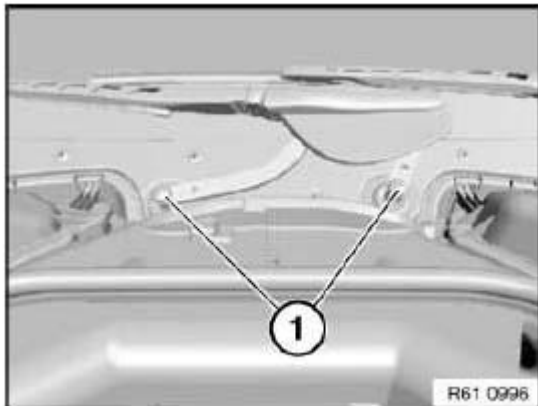


Fig. 349: Identifying Right Wiper Arm Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Installation:

Tightening torque **61 61 13AZ** .

IMPORTANT: Observe tightening specification (settling time) without fail (risk of detaching).

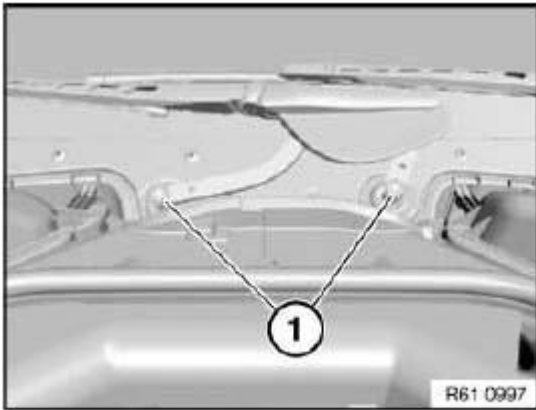


Fig. 350: Identifying Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Detach wiper arm (1) as illustrated with special tool 61 6 060 .

Installation:

CHECK/ADJUST contact angle of wiper arms to windshield.

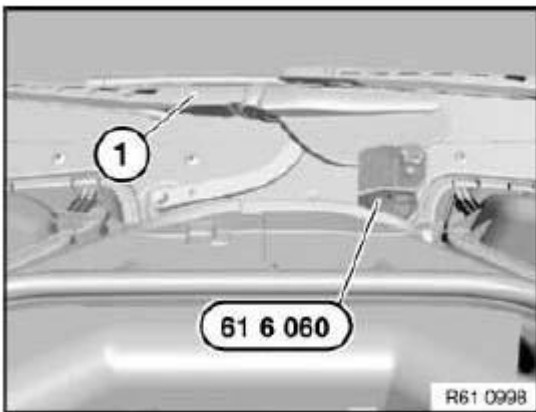


Fig. 351: Identifying Special Tool (61 6 060) On Wiper Arm

Courtesy of BMW OF NORTH AMERICA, INC.

61 61 102 REPLACING BOTH WINDSHIELD WIPER ARMS

Necessary preliminary tasks:

REMOVE BOTH WINDSHIELD WIPER ARMS.

NOTE: If necessary, FIT wiper blades on new wiper arms.

61 61 270 REMOVING AND INSTALLING CONSOLE FOR WINDSHIELD WIPER SYSTEM

COMPLETELY WITH MOTOR

Necessary preliminary tasks:

- **REMOVE COWL PANEL COVER** .
- **REMOVE TENSION STRUT ON SPRING STRUT DOME** .
- **REMOVE FRESH AIR DUCT** .

IMPORTANT: Before fitting windshield wiper arms, allow wiper motor to run into rest position.

Release screws (1).

Installation:

Tightening torque **61 61 15AZ** .

Remove cross-strut bearing block (2) in direction of arrow.

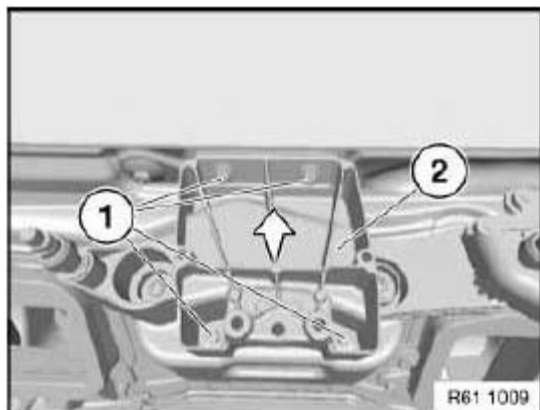


Fig. 352: Identifying Cross-Strut Bearing Block And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Release screws (A5...A1).

Installation:

Insert screws (A1...A5) in specified sequence until hand-tight.

To tighten down screw (A2), if necessary move complete wiper console linkage (2) into reversal position.

Tighten down screws (A1...A5) in specified sequence to tightening torque **61 61 6AZ** .

Lever out complete wiper console (2) in direction of arrow.

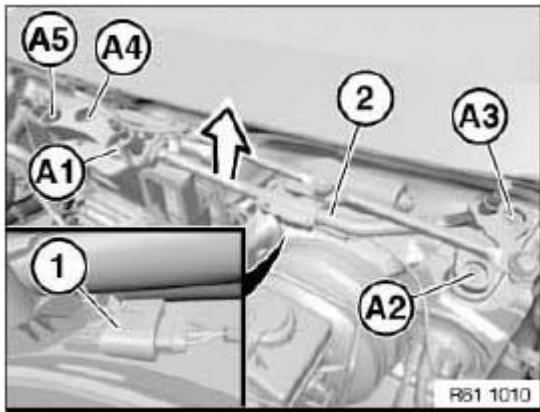


Fig. 353: Identifying Complete Wiper Console
Courtesy of BMW OF NORTH AMERICA, INC.

REAR SCREEN WIPER

61 62 030 REMOVING AND INSTALLING/REPLACING WIPER ARM ON REAR WINDOW

Fold up cover cap (1) in direction of arrow.

If necessary, spread internal mounts (2) as illustrated and remove cover cap (1).

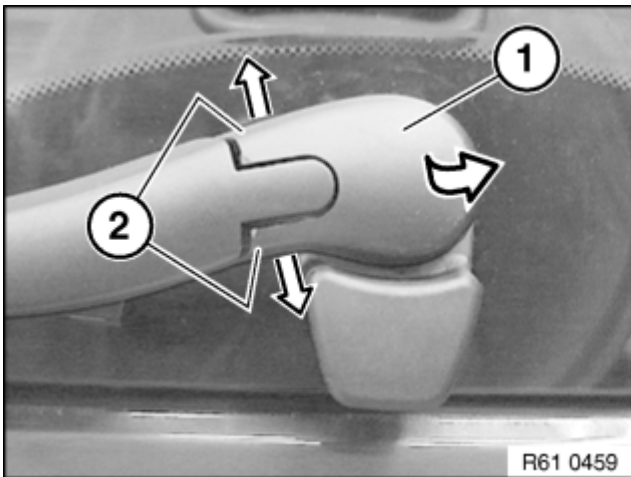


Fig. 354: Identifying Cover Cap And Internal Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

Mounts (1) and catches (2) of cover cap (3) must not be damaged.

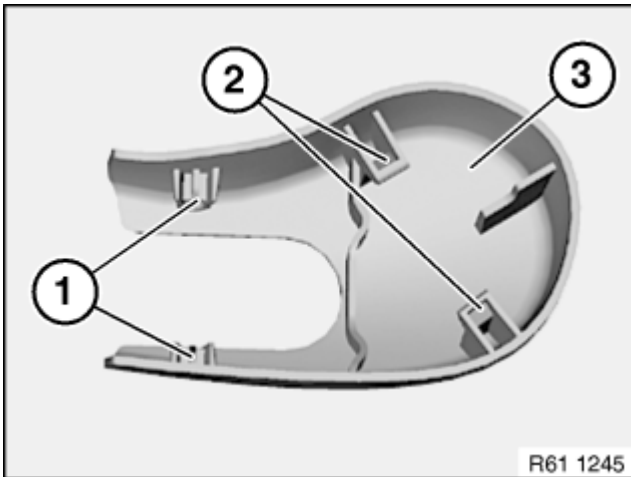


Fig. 355: Locating Mounts And Catches On Cover Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Raise rear window wiper arm (1).

Release nut (2) and remove rear window wiper arm (1).

If necessary, replace wiper blade.

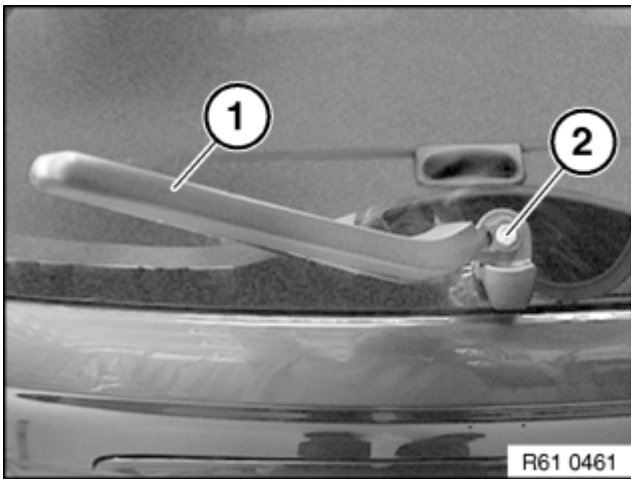


Fig. 356: Identifying Rear Window Wiper Arm And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Wiper motor must be in end position.

Adjust dimension (A) between middle of rear window wiper arm and rear window edge.

Measurement (A): 30 mm.

Tighten nut to specified torque, tightening torque **61 62 5AZ** .

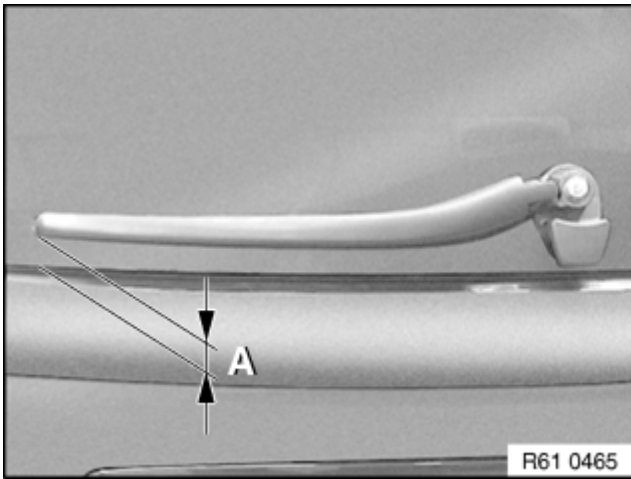


Fig. 357: Identifying Dimension (A) Measurement
Courtesy of BMW OF NORTH AMERICA, INC.

61 62 060 REMOVING AND INSTALLING/REPLACING REAR WINDOW WIPER MOTOR (TOURING)

Special tools required:

- **61 1 330**

Necessary preliminary tasks:

- Remove **TRIM FOR REAR LID**

Disconnect plug connections (1).

Release screws (2).

Remove rear window wiper motor (3).

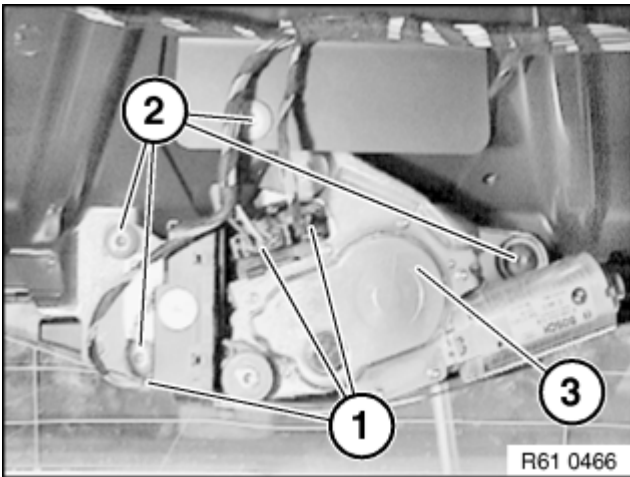


Fig. 358: Identifying Rear Window Wiper Motor, Plug Connections, And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1) and remove rear window lock (2).

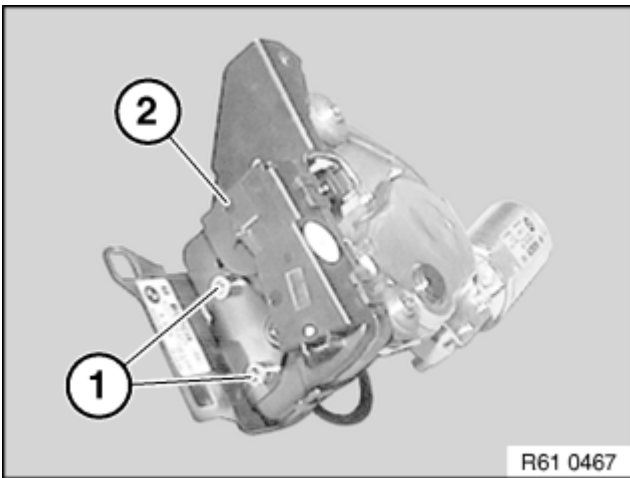


Fig. 359: Identifying Rear Window Lock And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Place special tool **61 1 330** on drive of rear window wiper and close rear window.

Allow journal of wiper shaft bearing to snap into bore (1) with rear window wiper standing vertical.

Tighten rear window wiper motor to specified torque, tightening torque **61 62 8AZ**.

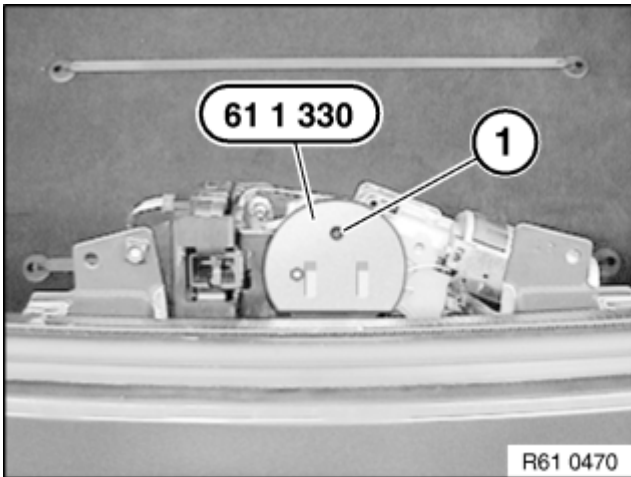


Fig. 360: Identifying Special Tool (61 1 330)

Courtesy of BMW OF NORTH AMERICA, INC.

61 62 090 REMOVING AND INSTALLING/REPLACING SHAFT BEARING FOR REAR WINDOW WIPER (TOURING)

Necessary preliminary tasks:

- Remove **REAR WINDOW WIPER ARM**
- Remove **TRIM ON SHAFT BEARING**

Secure rear window button (2) against falling down.

Release nut (1) and remove sealing ring underneath.

IMPORTANT: Risk of water ingress. Always replaced micro-coated nut (1) and associated sealing ring. New sealing ring must not show any signs of damage.

Tightening torque **61 62 7AZ** .

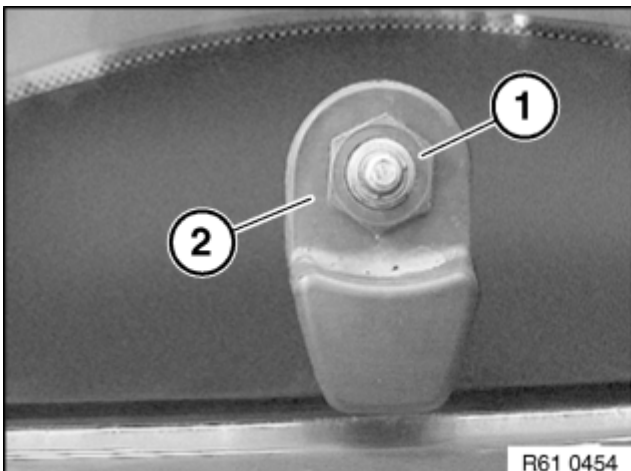


Fig. 361: Identifying Window Button And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and withdraw shaft bearing (2).

Installation:

Tighten nut (1) to specified torque, tightening torque **61 62 1AZ** .

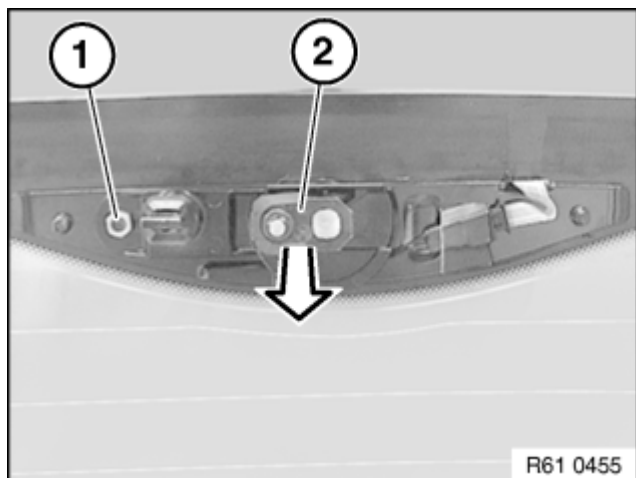


Fig. 362: Identifying Shaft Bearing And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

61 62 110 REMOVING AND INSTALLING/REPLACING SPRAY NOZZLE FOR REAR WINDOW WASHER UNIT

Necessary preliminary tasks:

- Remove **REAR SPOILER**

Release screws (1).

Open hose holder (2).

Installation:

Make sure hose holder (2) is correctly engaged.

Feed additional stop light (3) in direction of arrow out of rear spoiler (4) and remove.

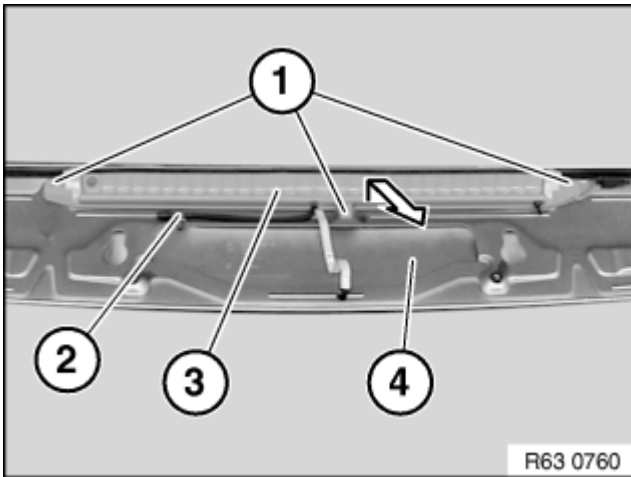


Fig. 363: Identifying Hose Holder, Stop Light, Rear Spoiler, And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock catch (1) and pull spray nozzle (2) in direction of arrow out of additional stop light (3).

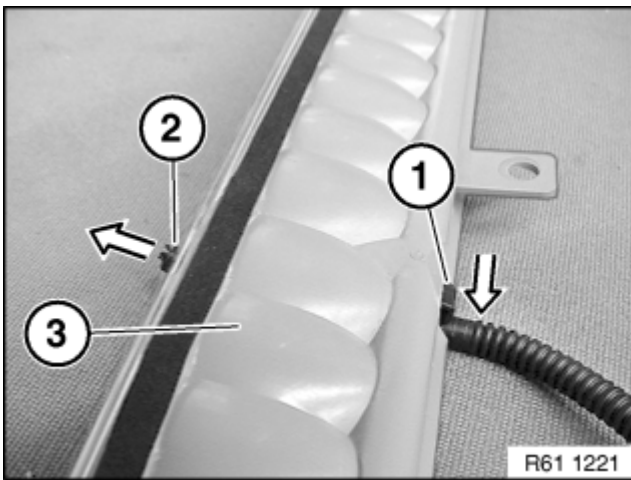


Fig. 364: Locating Catch And Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

HEADLIGHT WASHER SYSTEM

61 67 010 REMOVING AND INSTALLING/REPLACING WASHER PUMP OF HEADLIGHT WASHER SYSTEM

Necessary preliminary tasks:

- If necessary, remove left front wheel
- Remove **FRONT UNDERBODY PROTECTION**

NOTE: For purposes of clarity, illustration shows front wheel removed.

Release screws.

Fold back wheel arch trim (1) in direction of arrow.

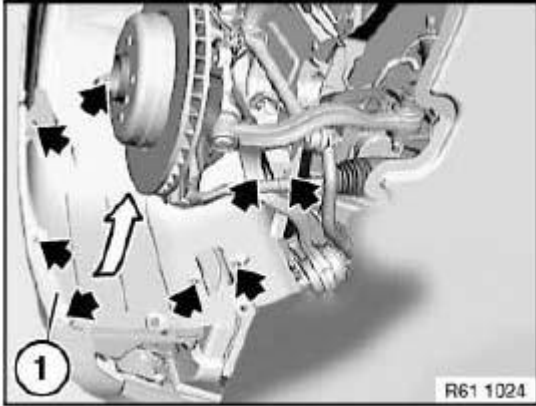


Fig. 365: Folding Back Wheel Arch Trim

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Catch any escaping washer fluid if necessary.

Disconnect plug connection (1).

Unlock hose (2) and detach from washer pump of headlight washer system (3).

Turn washer pump of headlight washer system (3) and pull in direction of arrow out of fluid reservoir for windscreen washer unit (4).

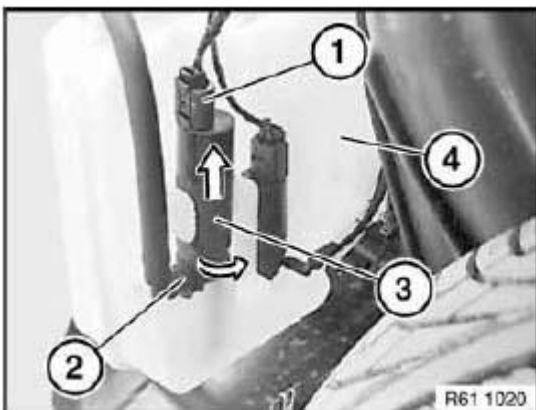


Fig. 366: Turning Washer Pump Of Headlight Washer System

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Replace strainer for washer pump
- If necessary, coat sealing ring of washer pump with antiseize agent
- Ensure hose is laid without kinks.
- Fill fluid reservoir

61 67 040 ADJUSTING SPRAY NOZZLES FOR HEADLIGHT CLEANING SYSTEM

NOTE: The spray nozzles of the headlight cleaning system have been adjusted at the factory and normally this setting is not altered (except by an accident). The nozzles therefore do not have to be adjusted.

The spray nozzles do not have to be adjusted even in the event of replacement as the nozzles themselves and the telescopic nozzle form a single unit (high-pressure nozzle) and are already preset.

61 67 083 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HIGH-PRESSURE NOZZLE OF HEADLIGHT CLEANING SYSTEM

Special tools required:

- **13 3 010**

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM**

To prevent excessive escape of washer fluid, seal off end of high-pressure line with special tool **13 3 010**.

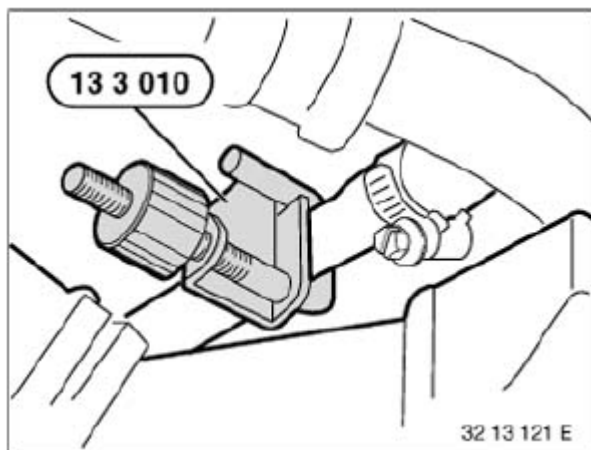


Fig. 367: Identifying Special Tool (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock high-pressure line (1) and detach from high-pressure nozzle (2).

Release screws (3).

Remove high-pressure nozzle (2).

Installation:

New spray nozzles are already preset.

Carry out a function test before fitting bumper trim.

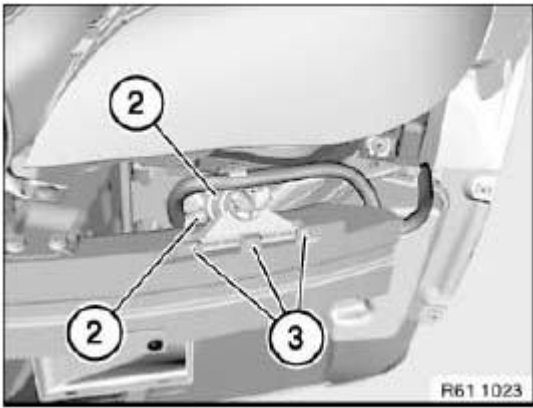


Fig. 368: Identifying High-Pressure Nozzle And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 67 200 REMOVING AND INSTALLING/REPLACING SPRAY NOZZLE FOR NIGHT VISION CAMERA

Special tools required:

- **13 3 010**

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM**

To prevent excess escape of washer fluid, seal off end of high-pressure line with special tool **13 3 010** .

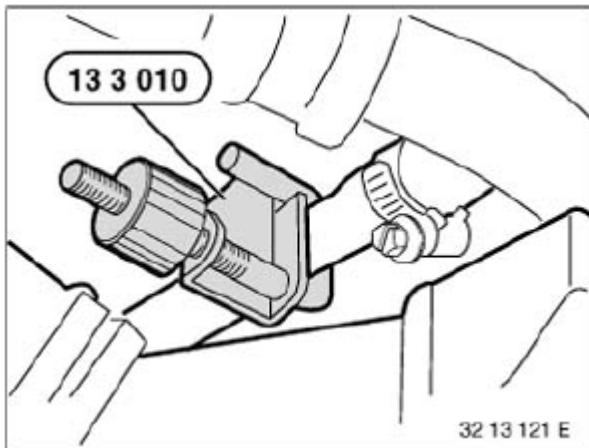


Fig. 369: Identifying Special Tool (13 3 010)

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Night vision camera removed for purposes of clarity.

Press retainer (1) and detach high-pressure line (2) from high-pressure nozzle.

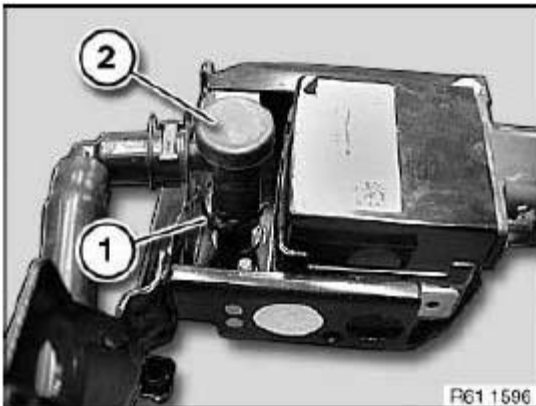


Fig. 370: Identifying Retainer And High-Pressure Line

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove high-pressure nozzle (2).

Installation:

New spray nozzles are already preset.

Check function.

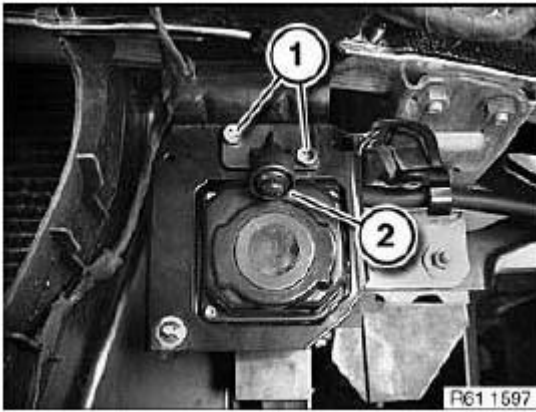


Fig. 371: Identifying High-Pressure Nozzle And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

WINDOW WASHER SYSTEM

61 71 015 REMOVING AND INSTALLING/REPLACING A JET NOZZLE IN WINDSHIELD WASHER SYSTEM

NOTE: The jet nozzles of the windshield washer system are preset at the factory and cannot be readjusted.

Unfasten plug connection (1) and disconnect.

Unlock plug housing (2) and disconnect.

Detach connector (3) in direction of arrow from nozzle of windshield washer system (4).

Unlock nozzle of windshield washer system (4), press out through opening and remove.

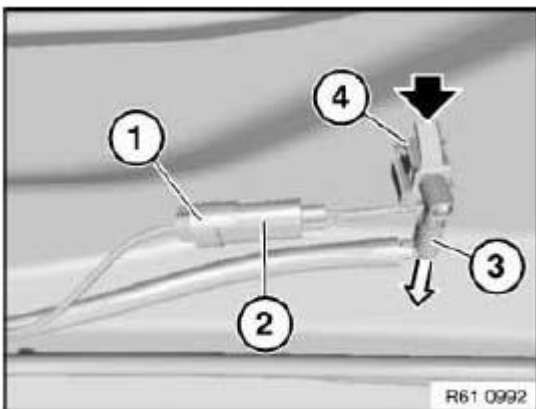


Fig. 372: Identifying Nozzle Of Windshield Washer System And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure nozzle of windshield washer system (4) is correctly seated.

Ensure hose is laid without kinks.

61 71 061 REPLACING (REMOVING AND INSTALLING) FLUID RESERVOIR FOR WINDSCREEN WASHER UNIT*Necessary preliminary tasks:*

- Remove **LEVEL SWITCH**
- Remove **WINDSCREEN WASHER PUMP**
- If necessary, remove **WASHER PUMP** for headlight washer system

Release screws (1) on fluid reservoir for windscreen washer unit.

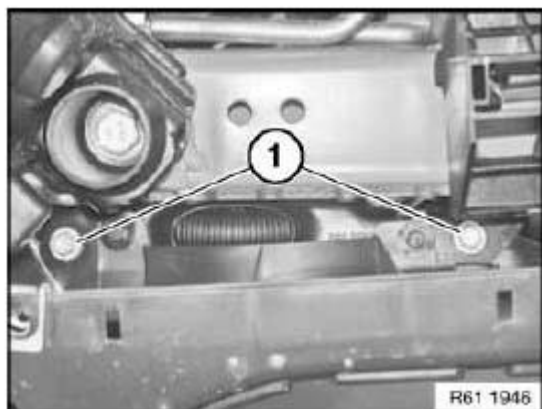


Fig. 373: Identifying Fluid Reservoir For Windscreen Washer Unit Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and pull fluid reservoir for windscreen washer unit (3) forward in direction of arrow slightly.

Disconnect filler hose (2).

If necessary, detach hose for headlight washer system from fluid reservoir for windscreen washer unit (3).

Remove fluid reservoir for windscreen washer unit (3).

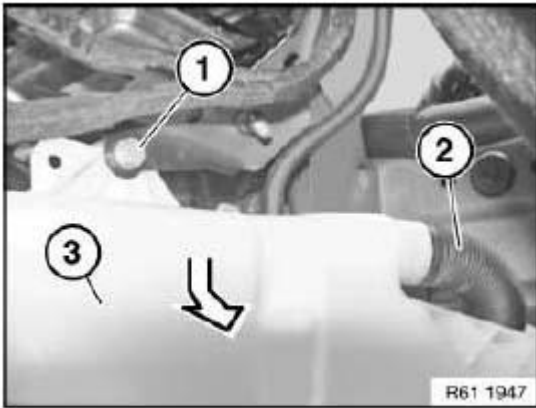


Fig. 374: Pulling Fluid Reservoir For Windscreen Washer Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Replace strainers on washer pumps
- Coat sealing rings of washer pumps with antiseize agent
- Lay lines of washer pumps without kinks and clip into holders on fluid reservoir
- Fill fluid reservoir

61 71 100 REMOVING AND INSTALLING/REPLACING WINDSCREEN WASHER PUMP

Necessary preliminary tasks:

- If necessary, remove left front wheel
- Remove **FRONT UNDERBODY PROTECTION**

NOTE: For purposes of clarity, illustration shows front wheel removed.

Release screws.

Fold back wheel arch trim (1) in direction of arrow.

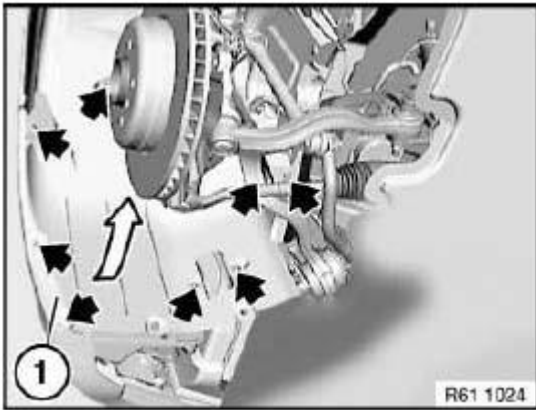


Fig. 375: Folding Back Wheel Arch Trim

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Catch any escaping washer fluid if necessary.

Disconnect plug connection (1).

Detach hose (2) from windscreen washer pump (3).

Pull windscreen washer pump (3) in direction of arrow out of fluid reservoir for windscreen washer unit (4).

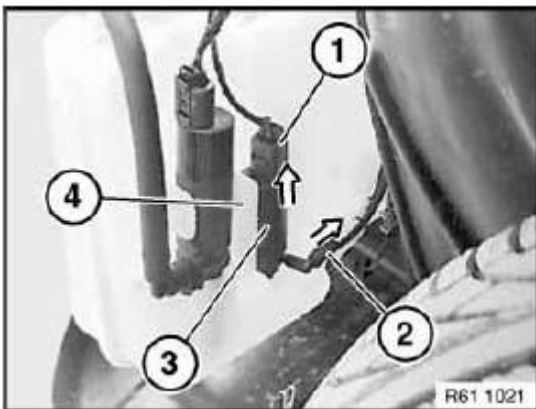


Fig. 376: Detaching Hose From Windscreen Washer Pump

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Replace strainer for windscreen washer pump.
- If necessary, coat sealing ring of windscreen washer pump with antiseize agent.
- Ensure hose is laid without kinks.
- Fill fluid reservoir

ELECTRICAL

General Vehicle Electronics - F10

INTRODUCTION

1.1. BUS DIAGRAM

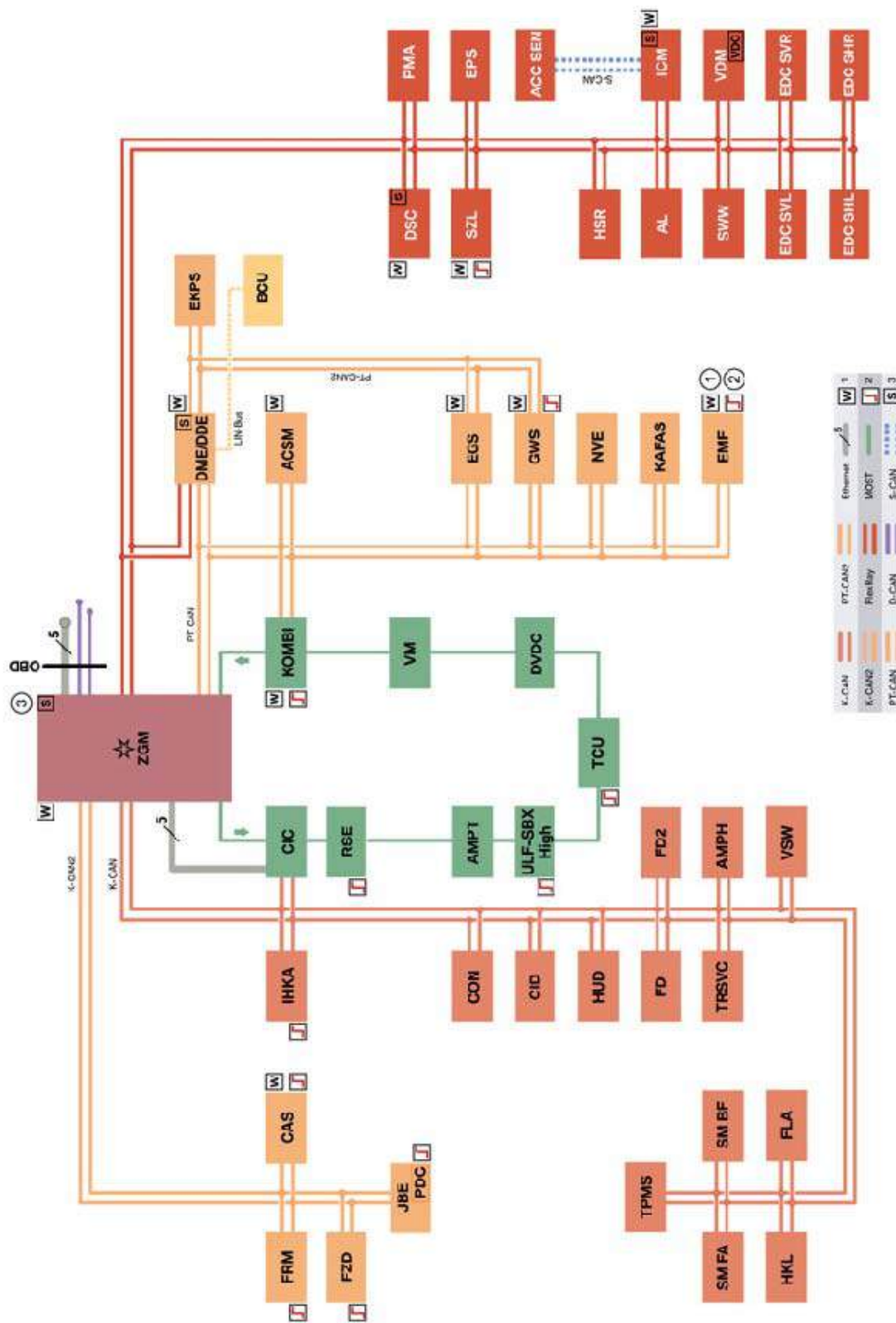


Fig. 1: F10 Bus Communication Diagram

Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Wakeable control units
2	Control units authorized to wake up the vehicle
3	Startup node control units, for starting up and synchronizing the FlexRay bus system
ACC-SEN	Active Cruise Control Sensor
ACSM	Advanced Crash Safety Module
AL	Active steering
AMPH	Amplifier High (high fidelity amplifier)
AMPT	Amplifier Top (top high fidelity amplifier)
BSD	Bit-serial data interface
BCU	Battery Charge Unit (for auxiliary battery)
CAS	Car Access System
CIC	Car Information Computer
CIC Basic	Car Information Computer Basic
CID	Central Information Display
CON	Controller
D-CAN	Diagnosis on Controller Area Network
DDE	Digital Diesel Electronics (Not for US)
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
DVD	DVD changer
EDC SHL	Electronic Damper Control, rear left satellite unit
EDC SHR	Electronic Damper Control, rear right satellite unit
EDC SVL	Electronic Damper Control, front left satellite unit
EDC SVR	Electronic Damper Control, front right satellite unit
EGS	Electronic transmission control
EKPS	Electronic fuel pump control
EMF	Electromechanical parking brake
EPS	Electronic Power Steering
Ethernet	Cabled data network technology for local data networks
FD	Rear display
FD2	Rear display 2
FLA	High-beam assistant
FlexRay	Fast, preset and fault-tolerant bus system for use in automotive applications
FRM	Footwell module
FZD	Roof function center
GWS	Gear selector switch
HKL	Luggage compartment lid lift
HSR	Rear suspension slip angle control
HUD	Head-Up Display

ICM	Integrated Chassis Management
IHKA	Integrated automatic heating/air conditioning
JBE	Junction box electronics
KAFAS	Camera-based driver assistance system
K-Bus	Body bus
K-CAN.	Body controller area network
K-CAN2	Body controller area network 2 (500 kBit/s)
KOMBI	Instrument cluster
LIN-Bus	Local Interconnect Network bus
Local-CAN	Local Controller Area Network
MOST	Media Oriented System Transport
MOST port	Media Oriented System Transport port
NVE	Night Vision electronics
PDC	Park Distance Control
PMA	Parking Maneuvering Assistant Control Unit
PT-CAN	Powertrain CAN
PT-CAN2	Powertrain controller area network 2
OBD	Diagnosis socket
RSE	Rear seat entertainment system
SDARS	Satellite tuner
SMBF	Front passenger seat module
SMFA	Seat module, driver
SWW	Blind Spot Detection
SZL	Steering column switch cluster
TCU	Telematics Control Unit
TPMS	Tire Pressure Monitoring System
TRSVc	Control unit for reversing camera and side view
ULF-SBX	Universal interface box
VDM	Vertical Dynamics Management
VM	Video Module
VSW	Video switch
ZGM	Central Gateway Module

VOLTAGE SUPPLY

The Voltage supply concept of the F10 is based on that of the F01. The components and the structure used are largely the same.

2.1. COMPONENTS

Due to the steady increase of electrical functions for comfort, communication and safety in BMW vehicles, the voltage supply is becoming ever more important.

In the F10, two separate power distribution boxes with fuse blocks are installed. The front power distribution box with fuse block is near the glove box and the rear power distribution box with fuse block is on the right-hand side of the luggage compartment.

The front power distribution box with fuse block forms the junction box together with the junction box electronics (JBE).

In the graphic below, you can see the layout of the most important components of the voltage supply system in the F10.

In the F10, three main power lines (bolted to on the underbody of the vehicle) are run from the power distribution box on the battery to the engine compartment:

- One of the main power lines runs via the positive battery terminal to the starter motor and to the alternator.
- The second line supplies the electronics box in the engine compartment with voltage for the engine electronics. This line is protected by a high-current fuse in the distribution box at the battery.
- The third line leads to the engine compartment power distribution box. This distribution box supplies the electric fan with power. This line is protected by the high-current fuse in the distribution box at the battery.

In addition, a battery cable is routed through the vehicle interior to the front power distribution box with fuse block. This line is also protected by a high-current circuit breaker.

Depending on the model, different line cross sections are used.

The transfer points for the main power cables are located under the luggage compartment floor. The main power lines on the underbody are laid in a protected area to prevent damage.

The electromechanical power steering is supplied with voltage differently, depending on equipment and engine.

2.2. SYSTEM WIRING DIAGRAM

NOTE: **Wiring diagram is for representation only. For actual wiring diagram, see SYSTEM WIRING DIAGRAMS article.**

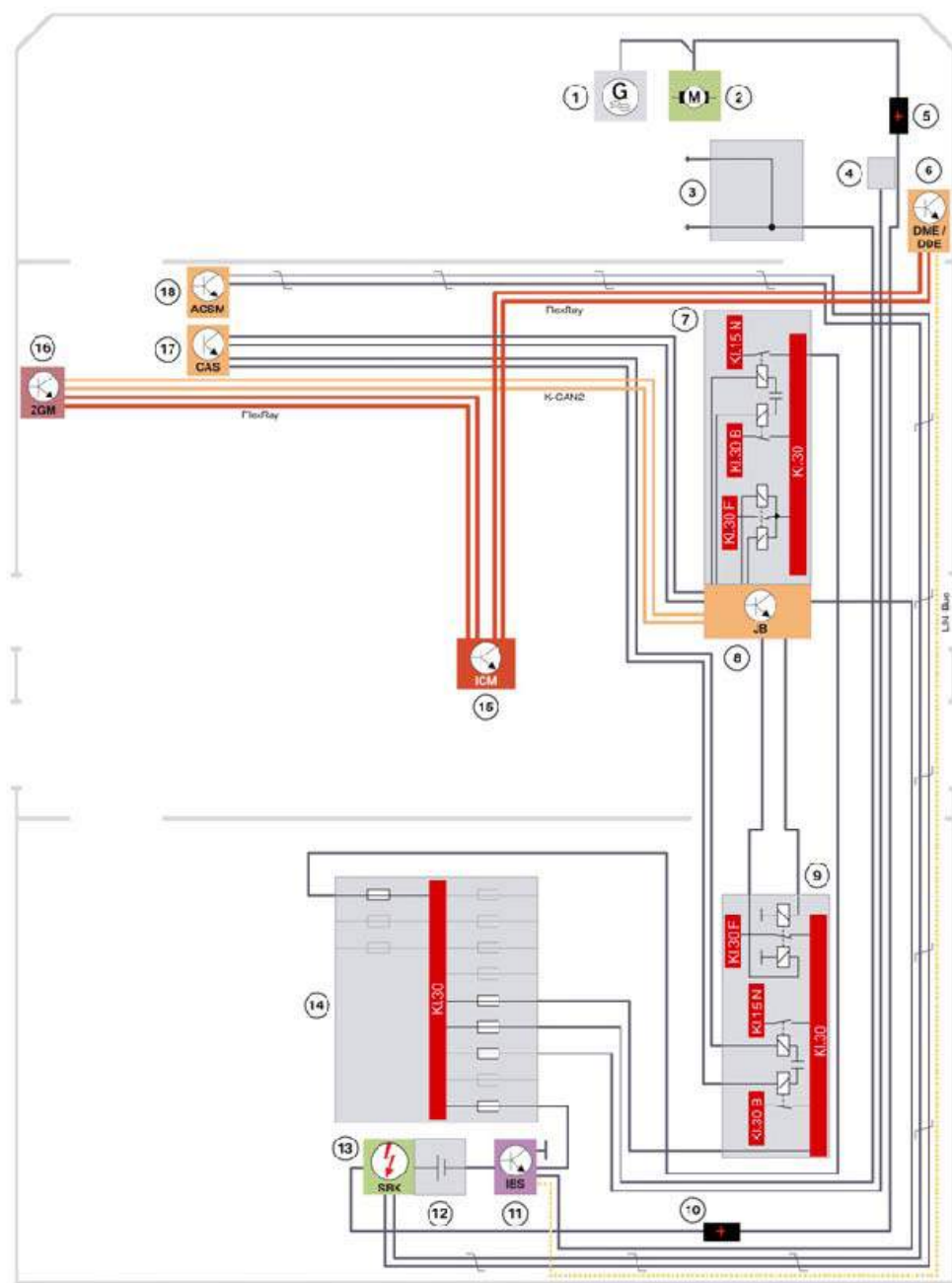


Fig. 2: F10 Voltage Supply System Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Alternator
2	Starter
3	Power distribution box in engine compartment
4	Electronics box in the engine compartment

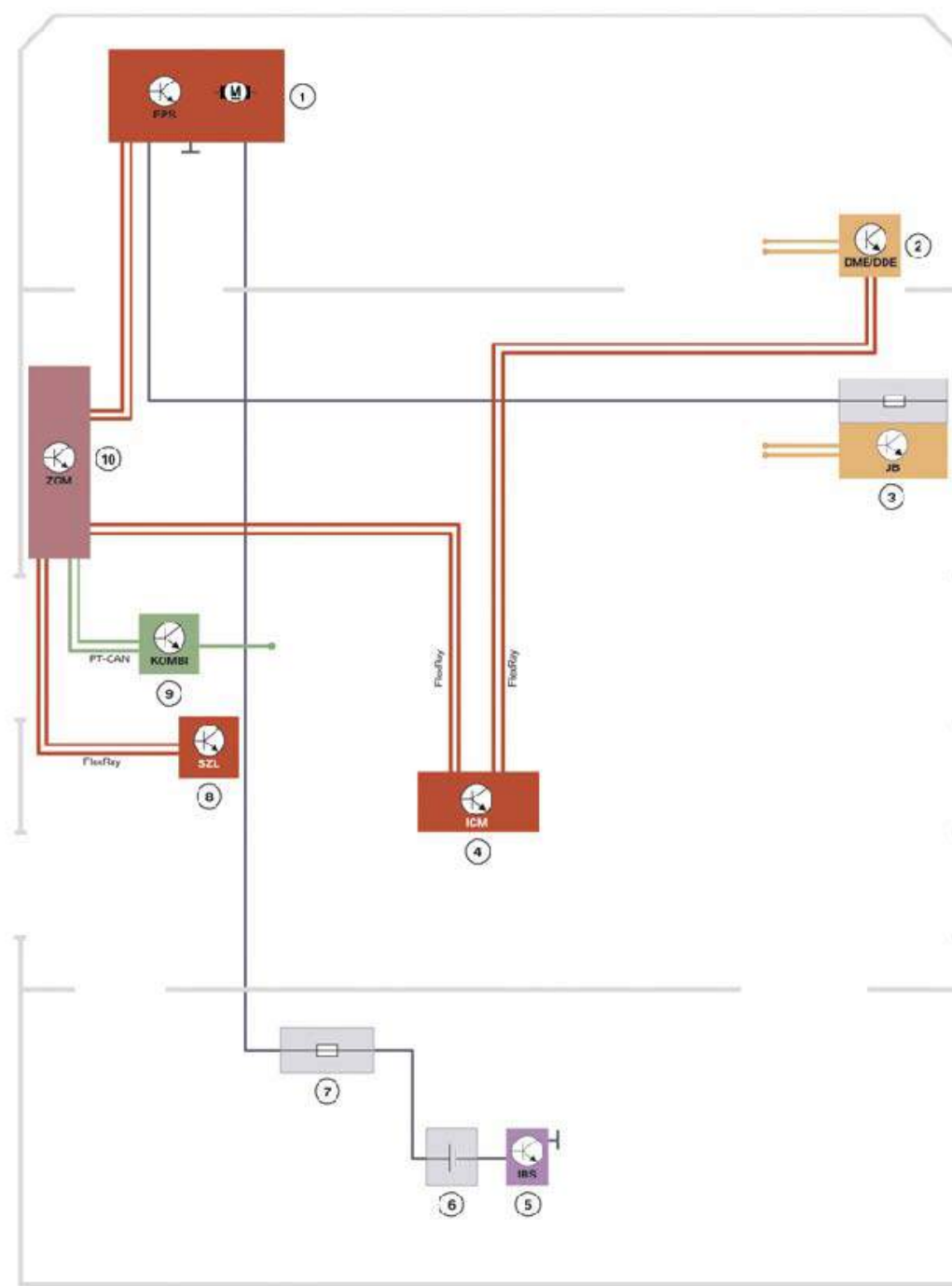
5	Positive battery connection point
6	Digital Motor Electronics (DME)
7	Power distribution box with fuse block in front behind the glove box
8	Junction box electronics
9	Power distribution box with fuse block, rear right in the luggage compartment
10	Transfer point under the luggage compartment floor
11	Intelligent battery sensor (IBS)
12	Battery
13	Safety battery terminal (SBK)
14	Power distribution box on the battery
15	Integrated Chassis Management (ICM)
16	Central Gateway Module (ZGM)
17	Car Access System (CAS)
18	Crash safety module (ACSM)

2.3. EPS VOLTAGE SUPPLY

The electromechanical power steering is supplied with voltage differently, depending on equipment and engine.

In the F10, electromechanical power steering is combined for the first time with the active steering planetary gearbox with override function already familiar from the F01. As a result, the steering is implemented completely electrically.

2.3.1. System wiring diagram



TE09-2243

Fig. 3: F10 Basic Steering System Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	EPS

2	Digital Motor Electronics (DME)
3	Junction box electronics with front power distribution box
4	Integrated Chassis Management (ICM)
5	Intelligent battery sensor (IBS)
6	Battery
7	Battery power distribution box
8	Steering column switch cluster (SZL)
9	Instrument cluster (KOMBI)
10	Central Gateway Module (ZGM)

2.3.2. EPS in conjunction with active steering

Due to the higher weight of the some engines and the higher steering forces associated with the greater front axle load, the power of a 12V steering system is no longer sufficient. For this reason, on F10 vehicles with the V8 engine a 24V EPS system will be installed in conjunction with the optional Integral Active Steering equipment.

The following table tells you when a 24V EPS is installed.

24V EPS REFERENCE

Engine	EPS voltage supply
528i	12V
535i	12V
550i	24V

EPS with 12V

Since active steering demands higher forces from the electromechanical steering and due to the higher current necessary, the voltage supply can no longer be implemented as in previous systems. If active steering is used in a vehicle with 12V EPS, the voltage is supplied through a separate positive battery connection point.



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Index	Explanation
1	EPS

2	Positive battery connection point
3	Capacitor box
4	Digital Motor Electronics (DME)
5	Junction box electronics with front power distribution box
6	Integrated Chassis Management
7	Battery power distribution box
8	Intelligent battery sensor (IBS)
9	Battery
10	Safety battery terminal (SBK)
11	Steering column switch cluster
12	Instrument cluster (KOMBI)
13	Central Gateway Module (ZGM)

EPS with 24V

The higher weight of the V8 engines in the BMW 550i results in a higher front axle load. This in turn causes the power required for the steering system to increase. In conjunction with the active steering, an even higher exertion of force, and therefore an even higher current is required by the steering electrical components. This high current made it necessary to increase the voltage supply of the EPS to 24V.

This system requires an auxiliary battery, a separator and a charging unit for the auxiliary battery. These components are installed in the luggage compartment of the F10.

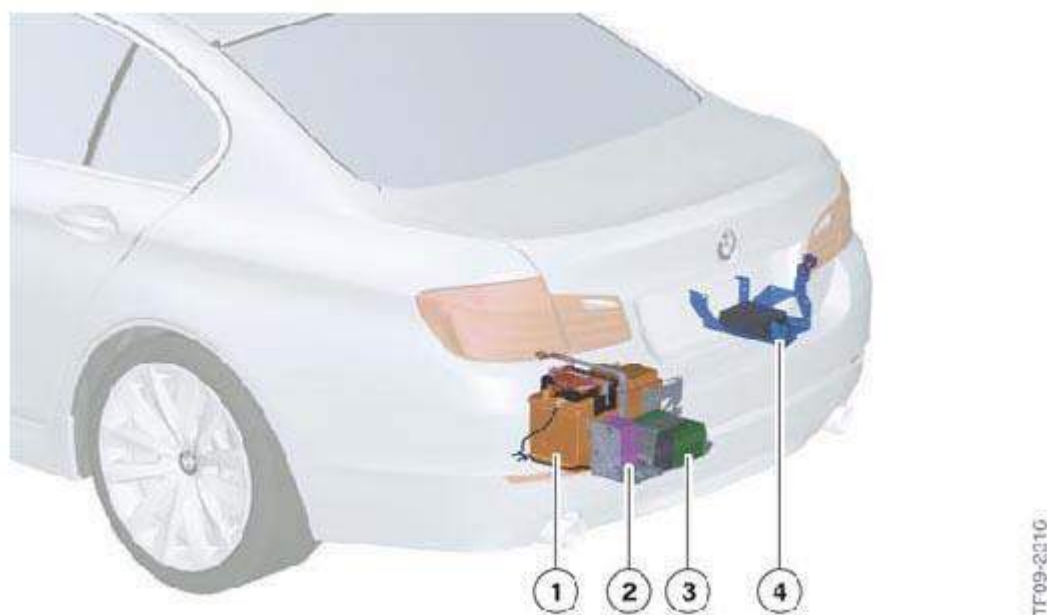


Fig. 5: Identifying F10 24V Battery, Separator, Auxiliary Battery, Battery Charge Unit (BCU) (For Auxiliary Battery)

Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Battery
2	Separator
3	Auxiliary battery
4	Battery Charge Unit (BCU) (for auxiliary battery)

The battery charging unit (BCU) takes over the monitoring of the state of charge and the charging of the auxiliary battery with an 150W DC/DC converter. It monitors a cable sheathing of the 24V line (isolation) and among various other preconditions; it also switches the relay in the separator with which the auxiliary battery is integrated into the circuit. The EPS is supplied with 24V only after this relay has been switched (closed). In the event of a fault, the EPS can also be operated with 12V. If there is no fault, the relay in the separator is switched (to close the circuit) as of terminal 15.

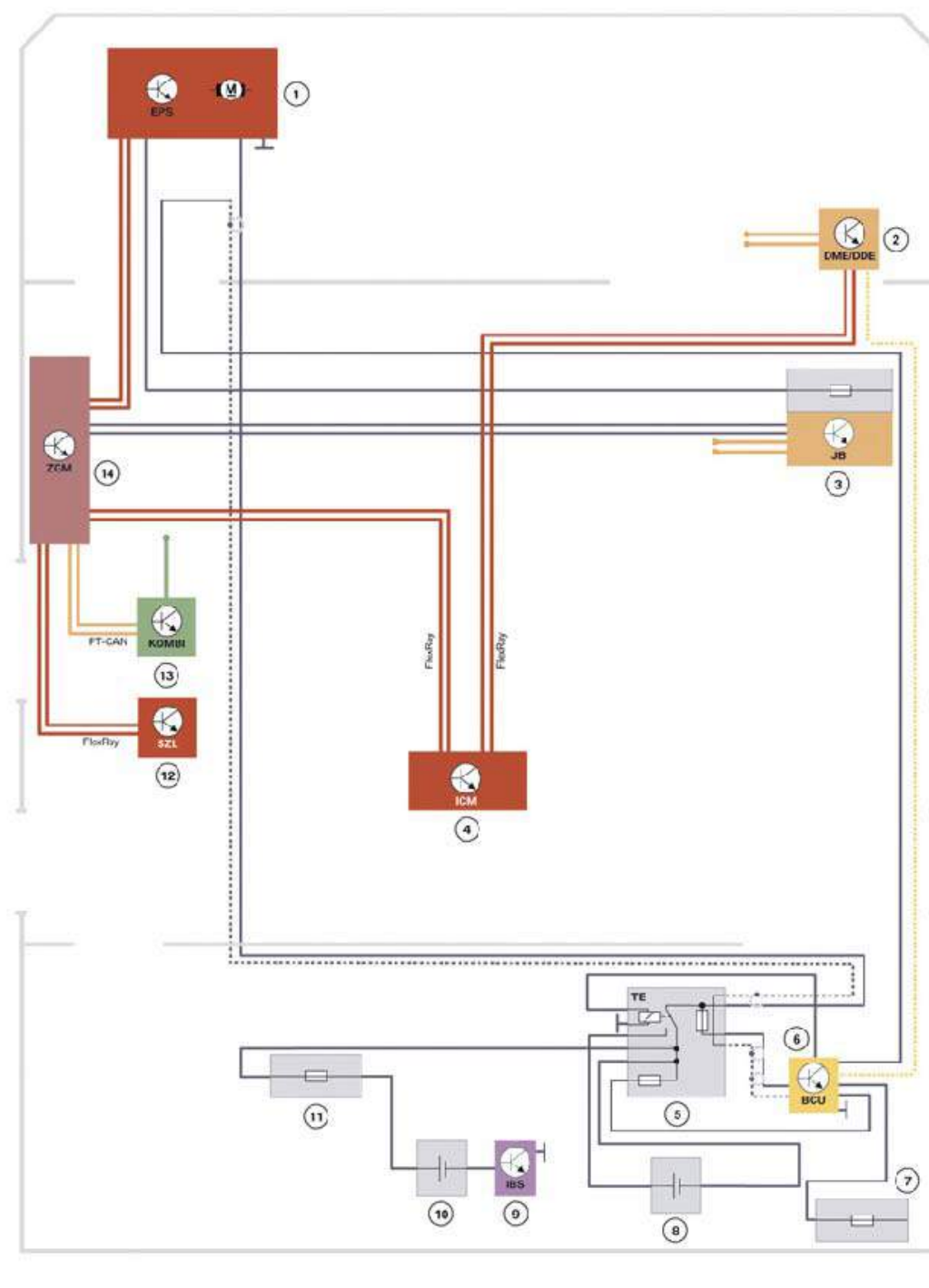


Fig. 6: F10 EPS With 24V And Active Steering System Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	EPS

2	Digital Motor Electronics (DME)
3	Junction box electronics with front power distribution box
4	Integrated Chassis Management (ICM)
5	Separator
6	Battery Charge Unit (BCU) (for auxiliary battery)
7	Rear right power distribution box
8	Auxiliary battery
9	Intelligent battery sensor (IBS)
10	Battery
11	Battery power distribution box
12	Steering column switch cluster (SZL)
13	Instrument cluster (KOMBI)
14	Central Gateway Module (ZGM)

The 24V line is routed on the vehicle floor. It is surrounded by a cable sheathing (isolation) that is monitored by the battery charging unit.

The following system wiring diagram details show the various switch situations and the charging of the auxiliary battery.

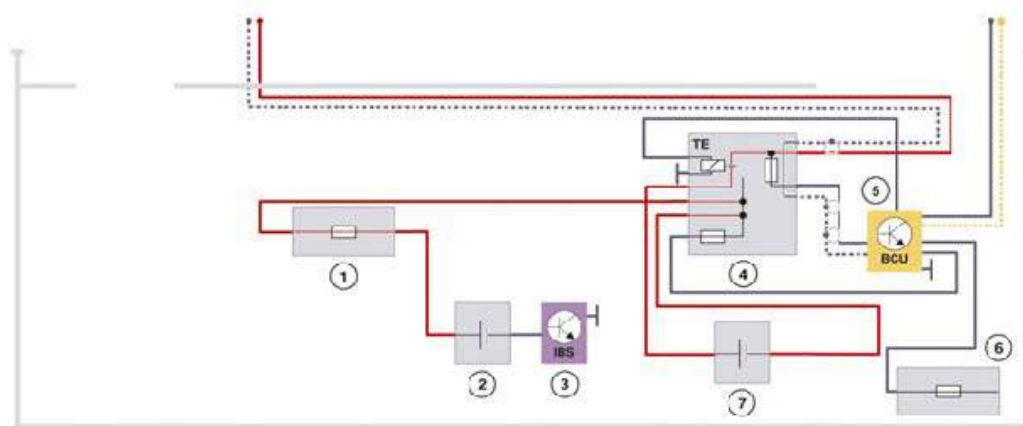


Fig. 7: F10 24V EPS Wiring Diagram

Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Battery power distribution box
2	Battery
3	Intelligent battery sensor IBS.
4	Separator (here: 24V operation)

5	Battery Charge Unit (BCU)
6	Rear right power distribution box
7	Auxiliary battery

In 24V operation, the battery and the auxiliary battery are connected in series by the relay in the separator. As a result, the EPS is operated with 24V.

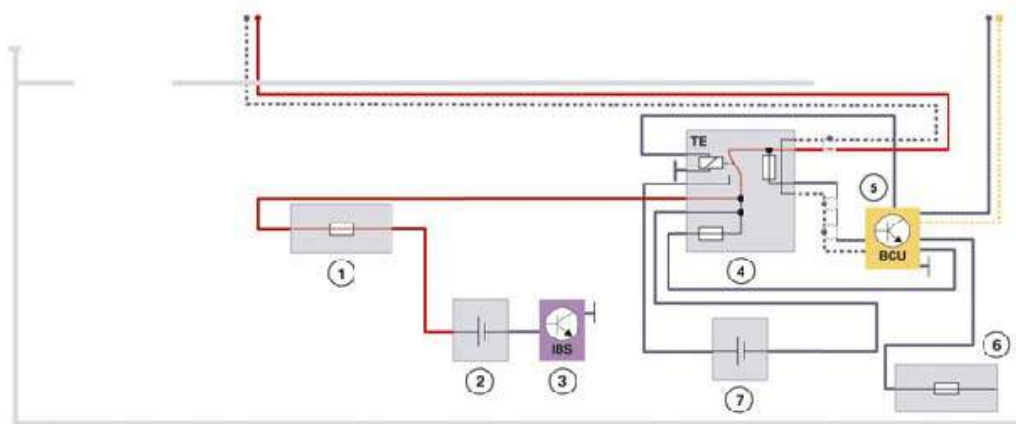
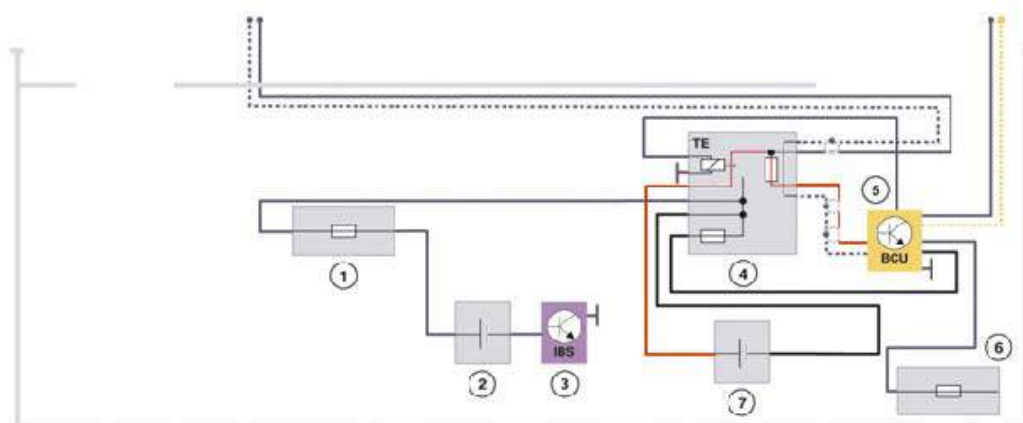


Fig. 8: F10 12V EPS Wiring Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Battery power distribution box
2	Battery
3	Intelligent battery sensor IBS.
4	Separator (here: 12V operation)
5	Battery Charge Unit (BCU)
6	Rear right power distribution box
7	Auxiliary battery

In the event of a fault or before terminal 15, the relay is open and the separator is in the 12V position. The auxiliary battery is no longer connected in series and is no longer in the circuit.



TE00-2275

Fig. 9: F10 Charging Of Auxiliary Battery - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Battery power distribution box
2	Battery
3	Intelligent battery sensor IBS.
4	Separator (here: 24V operation)
5	Battery Charge Unit (BCU)
6	Rear right power distribution box
7	Auxiliary battery

The auxiliary battery can be charged in 24V operation using the battery charging unit (BCU) for the auxiliary battery. To do so, the charging unit takes the energy it uses for charging the auxiliary battery from the vehicle electrical system via the rear right power distribution box.

The 24V line is routed on the vehicle floor and is surrounded by a cable sheathing that is monitored by the BCU.

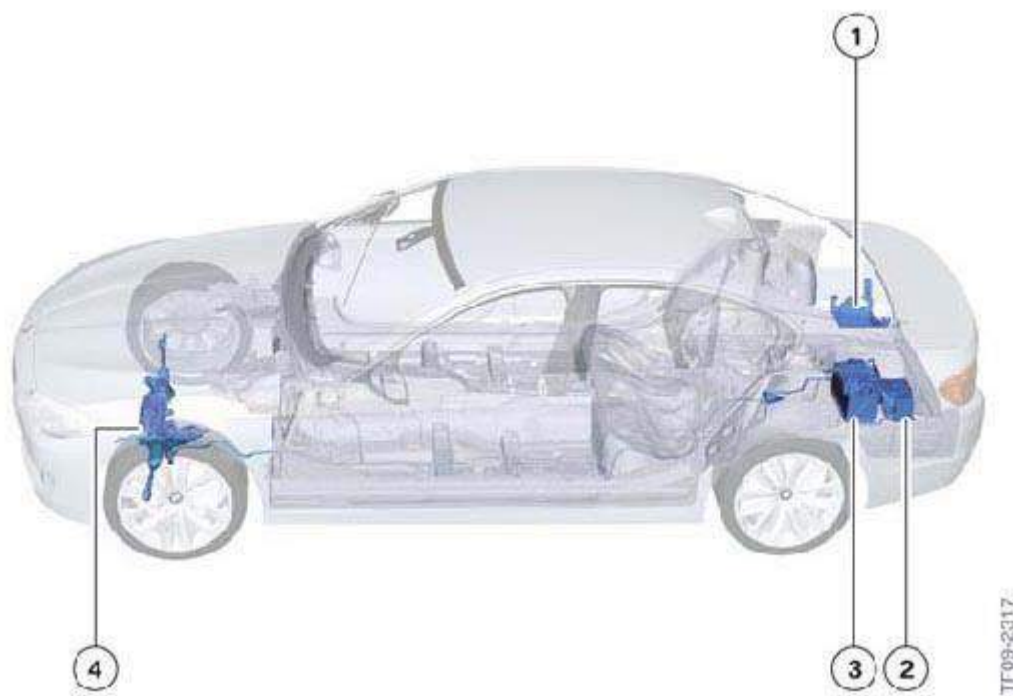


Fig. 10: Identifying F10 24V Components And Line Routing
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Battery Charge Unit (BCU) (Charging unit for auxiliary battery)
2	Separator and auxiliary battery
3	Battery
4	EPS with active steering

CAR ACCESS SYSTEM

The Car Access System used in the F10 is the fourth generation of the control unit and the same type as in the F01. The Comfort Access functions are completely integrated into the Car Access System.

All F10 models are equipped with "Passive Go" (drive authorization system) as standard equipment. Drive authorization allows the driver to start the engine without actively using the ID transmitter. Due to the drive authorization (Passive Go), the vehicle does not require any key insertion slot. The ID transmitter only needs to be somewhere inside the passenger compartment for the engine to be started.

The ID transmitter has a battery with a service life of approximately four years.

Up to eight ID transmitters can be used for a particular vehicle.

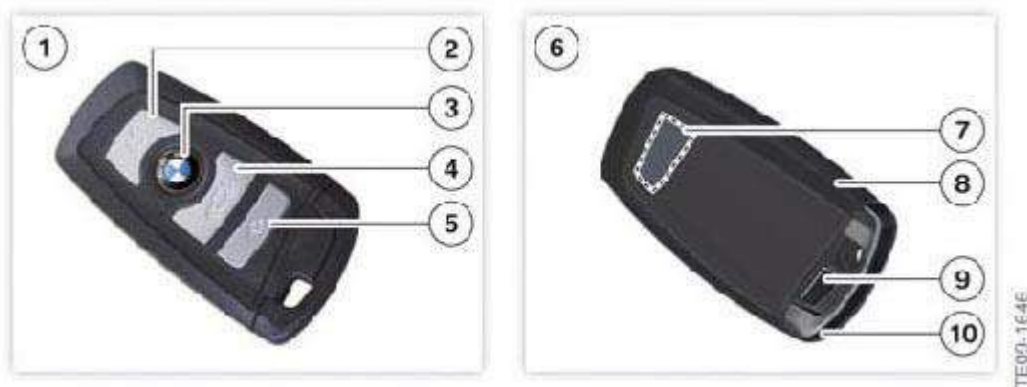


Fig. 11: Identifying F10 ID Transmitter
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	ID transmitter top view
2	Unlock Vehicle button
3	Lock Vehicle button
4	Tailgate unlock button
5	Headlight courtesy delay feature or open luggage compartment lid (automatic operation of tailgate, option 316)
6	ID transmitter rear view
7	Area for ring antenna (transponder coil for emergency start)
8	Battery compartment
9	ID transmitter release button
10	ID transmitter

3.1. SYSTEM WIRING DIAGRAM

NOTE: Wiring diagram is for representation only. For actual wiring diagram, see **SYSTEM WIRING DIAGRAMS** article.



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Index	Explanation

1	Engine compartment lid contact switch
2	Dynamic Stability Control (DSC)
3	Central Gateway Module (ZGM)
4	Electronic transmission control (EGS)
5	Starter
6	Digital Motor Electronics (DME)
7	Integrated Chassis Management (ICM)
8	Junction box electronics (JBE) and front power distribution box
9	Luggage compartment junction box
10	Tailgate central double-locking button
11	Telematics Control Unit (TCU)
12	Interior tailgate button, A-pillar
13	Instrument cluster (KOMBI)
14	Steering column switch cluster (SZL)
15	Central locking button/hazard warning switch
16	Brake light switch (BLS)
17	Footwell module (FRM)
18	Crash safety module (ACSM)
19	Comfort Access interior antenna
20	Remote control receiver in the diversity module DIV
21	Hotel position switch
22	Comfort Access interior antenna
23	Electric steering lock (not for US)
24	START/STOP button
25	Ring antenna (transponder coil)
26	Car Access System (CAS)
K1. 15_1	Terminal 15 (output 1)
K1. 15_3	Terminal 15 (output 3)
K1. 15 WUP	Terminal 15, wake-up
Term. 15N	Terminal 15 after-run
K1. 30	Terminal 30
Term. 30B	Terminal 30B, switched
K1. 50L	Terminal 50 load
CAS bus.	Car Access System bus
LIN-Bus	Local Interconnect Network bus
K-CAN2	Body controller area network 2
PT-CAN	Powertrain CAN
AS_START	Start/start termination DME

3.2. FUNCTION OVERVIEW

The Car Access System provides, among other things, the central control unit for accessing and locking the vehicle. Therefore, the Car Access System has full responsibility for central locking.

The Car Access System incorporates the following functions on the F10:

- Comfort Access
- Central locking system
- Power window regulator
- Glass sunroof
- Terminal control
- Electronic immobilizer

Other functions of the Car Access System include:

- Vehicle data storage
- Data transmission for Conditioned Based Service (CBS)
- Checking plausibility of ID transmitter signals

The Car Access System enables or disables the execution of a number of functions. However, other control units may be involved in the execution of the function:

- Junction box electronics
- Footwell module
- Roof function center
- Central locking system
- Power window regulator
- Glass sunroof

For the purposes of communication with other bus users in the vehicle electrical system, the Car Access System is connected via the K-CAN2, the CAS bus and the LIN-Bus.

The Car Access System analyzes the status of the trunk lid contact switch and broadcasts it for use by the alarm system.

The Car Access System also analyzes the status of the following buttons and initiates the central locking function:

- Central locking system button
- Open large trunk button on the A-pillar
- Complete locking of the vehicle with the button in the underside of the open luggage compartment lid.

The Car Access System provides the power supply for the brake light switch and also analyzes its status.

COMFORT ACCESS

Using Comfort Access, the customer can unlock and open the vehicle without active use of the ID transmitter. Access to the vehicle can be gained from any point. It is important that the ID transmitter be located in the vehicle's immediate vicinity (approx. 1.5 m). It is sufficient to have the ID transmitter somewhere on your person.

Comfort Access was first introduced on the E65 (03/2002). The system was then gradually introduced on different BMW models. Comfort Access can be ordered as optional equipment (option 322) as part of ZCV Convenience Package (which also includes 316 Power tailgate 323 Soft-close automatic doors.

The benefits of Comfort Access are:

- High level of convenience when unlocking and locking the vehicle
- Convenient and fast access to the vehicle
- Simple engine start/stop procedure
- Maximum comfort for the driver.

Comfort Access in the F10 is based on predecessor systems and is adapted to the F10. However, the complete function continues to be in the Car Access System, just as in the F01. That is why the F10 also has no separate Comfort Access control unit.

The vehicle is unlocked when your hand touches the handle recess of the outer door handle and is opened when you pull the door handle.

The vehicle can be locked simply by touching sensitive surfaces of the outer door handle.

For vehicles fitted with the Automatic Soft Close system (option 323), the drive for the Automatic Soft Close system fully closes the vehicle door. You can then lock the vehicle again by subsequently pressing on the sensitive surface of the outer door handle.

The ID transmitter must be located in the vehicle interior in order for the engine to be started. The engine can now be started by pressing the START-STOP button when the brake pedal is operated and the vehicle is ready to be driven.

4.1. SYSTEM WIRING DIAGRAM

NOTE: **Wiring diagram is for representation only. For actual wiring diagram, see SYSTEM WIRING DIAGRAMS article.**

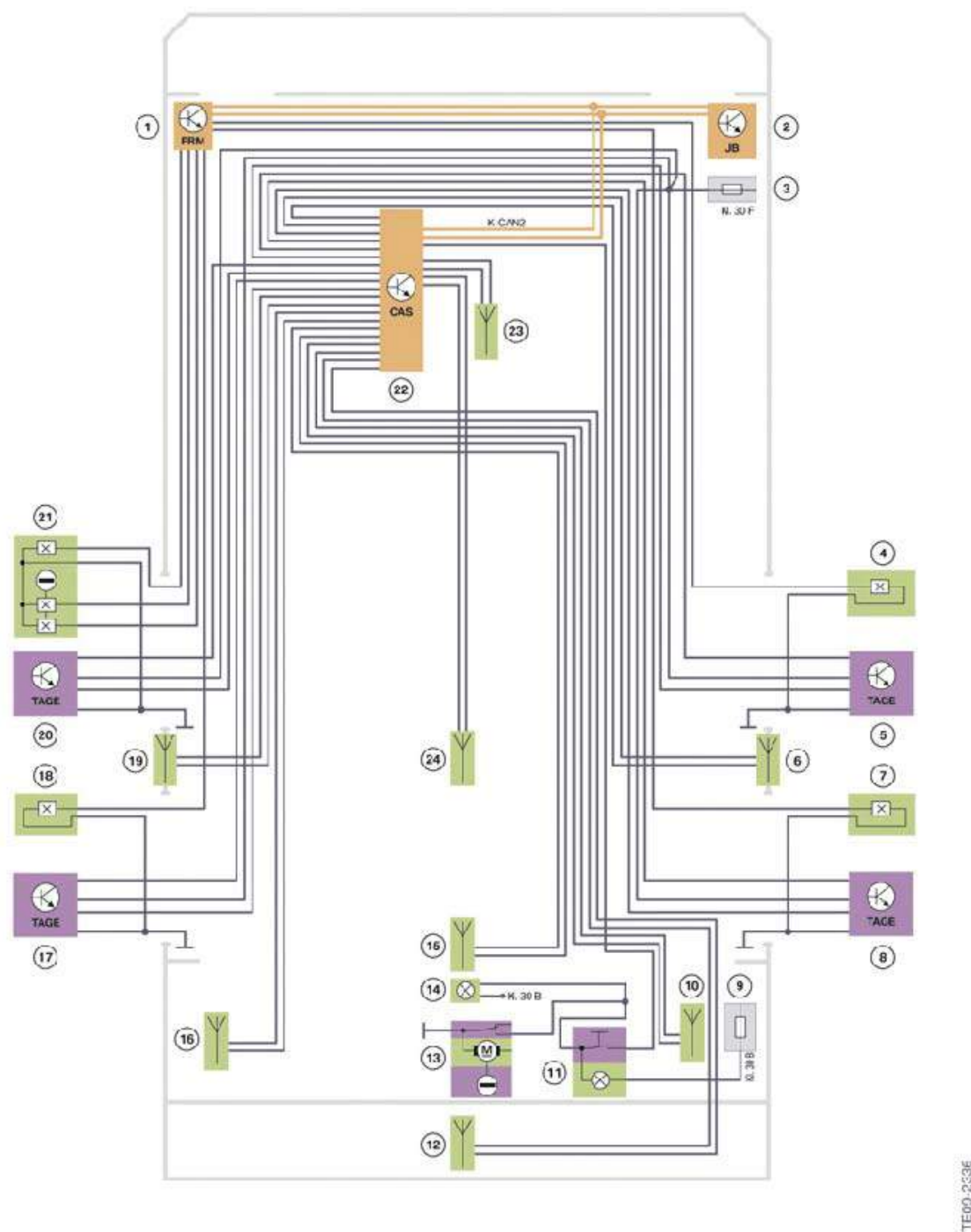


Fig. 13: F10 Comfort Access System Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Footwell module (FRM)
2	Junction Box (JB)

3	Front distribution box
4	Lock door contact, front-passenger side, front
5	Outside door handle electronics (TAGE), front passenger side
6	Antenna for Comfort Access, door sill, front-passenger side
7	Lock door contact, front-passenger side, rear
8	Outside door handle electronics (TAGE), rear passenger side
9	Luggage compartment junction box
10	Luggage compartment antenna, front-passenger side
11	Central locking system button
12	Antenna for Comfort Access, bumper
13	Tailgate lock
14	Luggage compartment lighting
15	Storage shelf antenna
16	Luggage compartment antenna, driver's side
17	Outside door handle electronics (TAGE), rear driver's side
18	Lock door contact, driver's side, rear
19	Antenna for Comfort Access, door sill, driver's side
20	Outside door handle electronics (TAGE), front driver's side
21	Lock door contact, driver's side, front and locking cylinder in driver's door
22	Car Access System (CAS) with Comfort Access function (CA)
23	Antenna for Comfort Access, interior, front
24	Antenna for Comfort Access, interior, rear
K-CAN2	Body controller area network 2

4.2. FUNCTION OVERVIEW

Comfort Access is divided into the following functions:

- Access authorization (Passive Entry)
- Drive authorization (Passive Go)
- Locking authorization (Passive Exit).

ID transmitters are required for Comfort Access to function.

An ID transmitter incorporates the following:

- A battery
- Remote control function
- Transponder coil for emergency start function
- Spare key
- Receiver unit.

The driver's door can also be unlocked and locked with the spare key.

CENTRAL LOCKING SYSTEM

The central locking system makes it possible to unlock or lock the vehicle. It is fitted as standard equipment and relates to all vehicle doors, the fuel filler flap and the tailgate.

The central locking can be operated via the following components:

- ID transmitter
- Driver's-door lock barrel (door lock)
- Central locking system button
- Exterior tailgate button
- Interior tailgate button in the A-pillar
- Outer door handle (outside door handle electronics with Comfort Access, option 322)
- Button in the underside of the open luggage compartment lid for central locking system (automatic operation of tailgate, option 316).

The F10 has no lock in the luggage compartment lid for unlocking with the mechanical or spare key.

The central locking system in the F10 is based on previous central locking systems used in, for instance, the E70, E90 or F01.

5.1. SYSTEM WIRING DIAGRAM

NOTE: **Wiring diagram is for representation only. For actual wiring diagram, see SYSTEM WIRING DIAGRAMS article.**

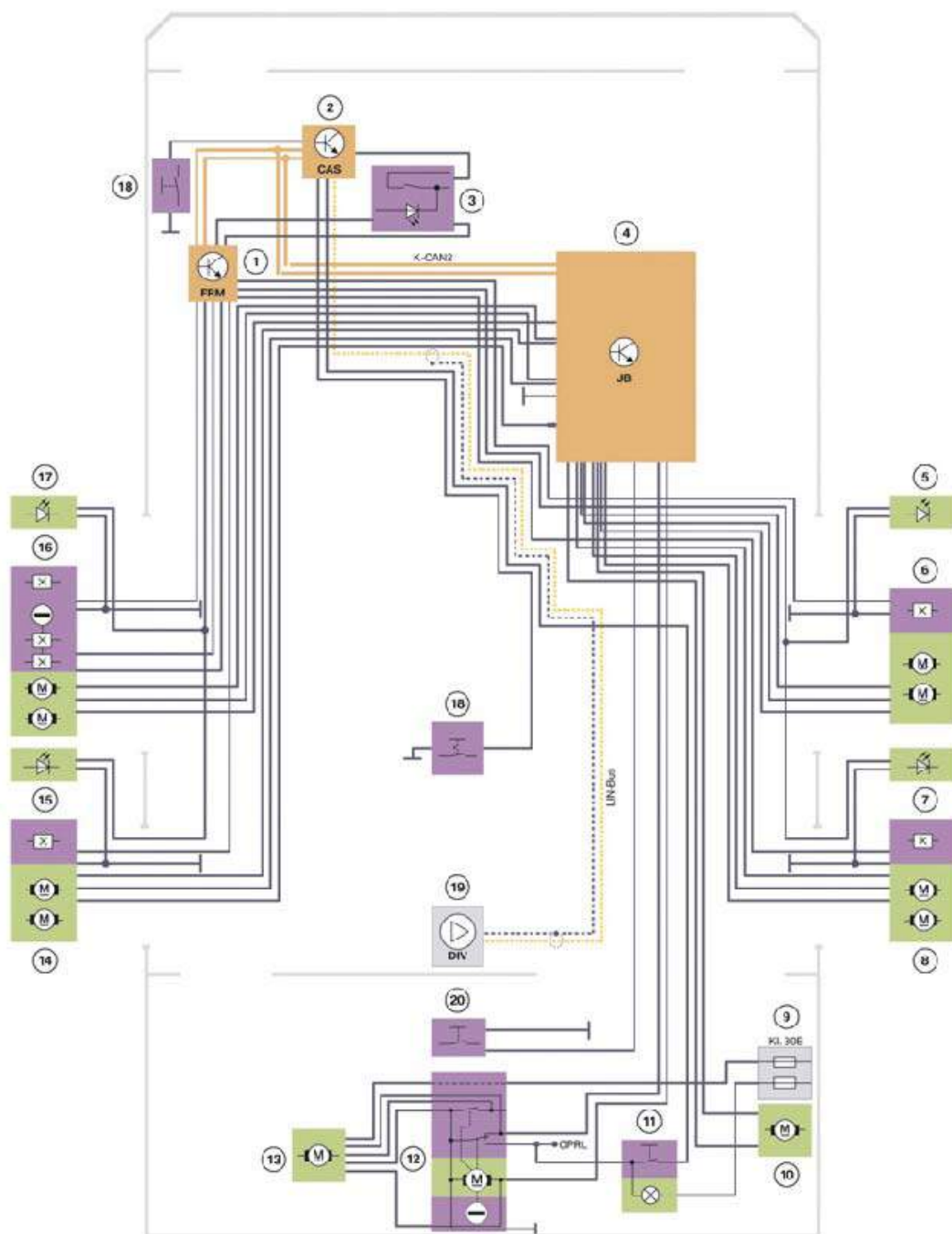


Fig. 14: F10 Central Locking System Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Footwell module (FRM)

2	Car Access System (CAS)
3	Central locking system button 4 Junction Box (JB)
5	Front-passenger-door illuminated entry system
6	Door contact, central locking, front passenger door
7	Rear, passenger-side illuminated entry system
8	Door contact, central locking, rear passenger side
9	Rear power distribution box
10	Central locking, fuel filler flap
11	Central locking button
12	Central locking system for tailgate lock
13	Automatic Soft Close system drive for luggage compartment lid
14	Rear, driver's side central locking system
15	Rear, driver's side illuminated entry system
16	Hall sensors for lock barrel, door contact, driver's-door central locking system
17	Driver's-door illuminated entry system
18	Hotel position switch (only vehicles in US version)
19	Antenna diversity module with antenna amplifier
20	Trunk lid button

5.2. FUNCTION OVERVIEW

The function of the central locking system is basically divided between two control units.

The Car Access System has overall control. The Car Access System is aware of the statuses of the central locking system. Therefore it is the Car Access System which causes the unlocking, locking and central deadlocking of the vehicle.

The junction box electronics execute the request to unlock or lock the vehicle.

It is possible to unlock and lock the vehicle actively or passively.

Active means that the vehicle can be opened after it has been unlocked by pressing the button on the ID transmitter. The vehicle can be locked by pressing the Lock button after the doors have been closed.

NOTE: The vehicle can only be locked with the driver's door closed.

Passive locking and unlocking requires the optional Comfort Access equipment (option 322).

Passive means that the vehicle is unlocked when the outer door handle is grasped, provided the ID transmitter is located no more than approx. 1.5 metres away from the vehicle. The locking function is triggered by pressing on the sensitive area on the outer door handle.

AUTOMATIC SOFT CLOSE SYSTEM

The Automatic Soft Close system (SCA) can be ordered as optional equipment (option 323) on all F10 models as part of the ZCV Convenience Package.

The ZCV Convenience Package also includes, Power tailgate (option 316) and Comfort Access keyless entry (option 322).

The luggage compartment lid is equipped with the Automatic Soft Close system only in conjunction with the Power tailgate (option 316).

The Automatic Soft Close system requires the installation of suitable door locks with drives for the Automatic Soft Close system.

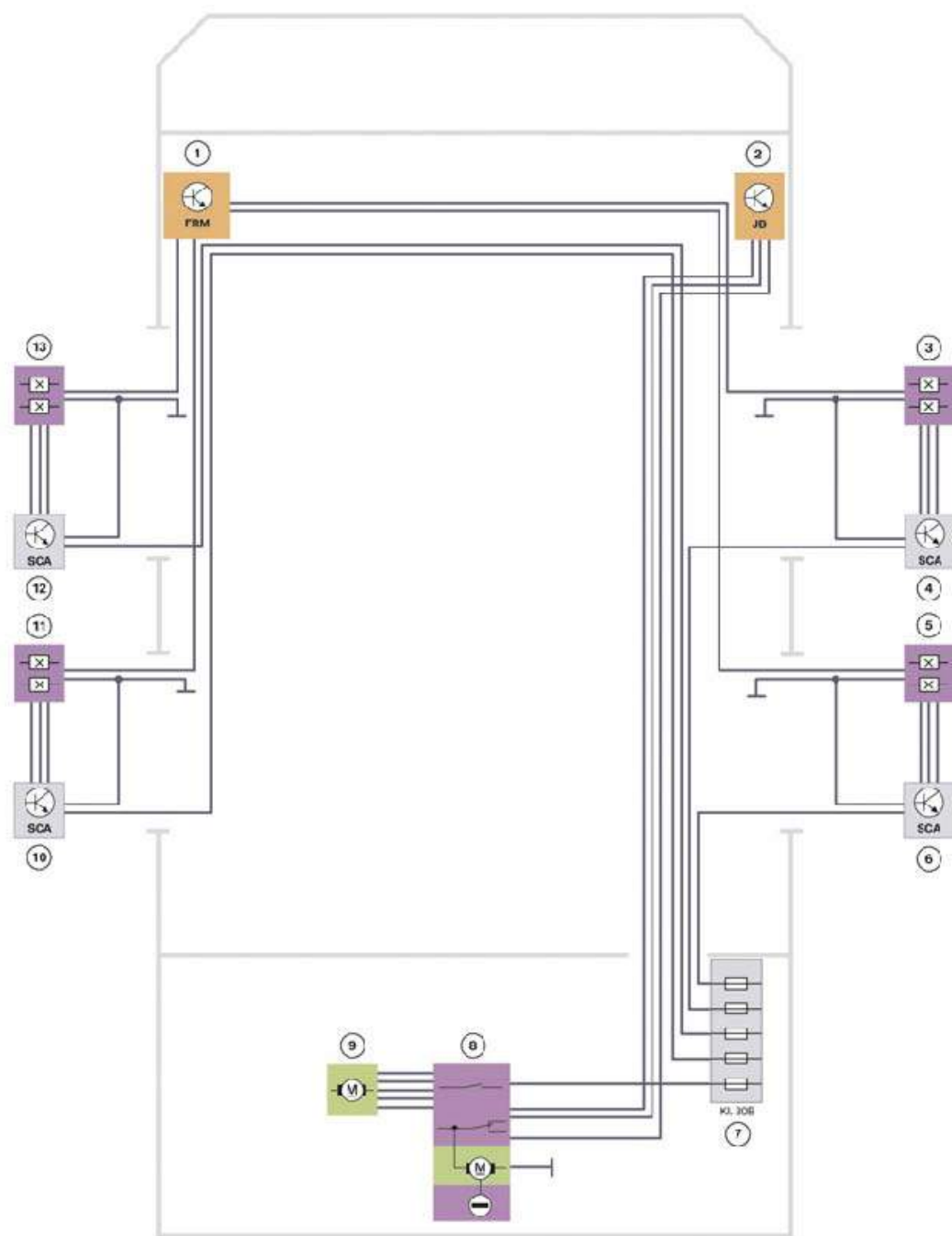
The special feature of the F10's Automatic Soft Close system is that the door lock and the drive for the Automatic Soft Close are no longer combined as a single component. The drive for the Automatic Soft Close system is separate and controls the door lock via a Bowden cable, the same as in the F01.

This means that the lock and the drive can be fitted separately.

With the Automatic Soft Close system, it is sufficient to press the luggage compartment lid gently into the trunk lid lock. As soon as the locking pawl reaches the pre-locking position, the Automatic Soft Close system fully closes the luggage compartment lid. The locking pawl is then located in the main locking position.

6.1. SYSTEM WIRING DIAGRAM

NOTE: **Wiring diagram is for representation only. For actual wiring diagram, see SYSTEM WIRING DIAGRAMS article.**



EXPLANATION CHART

Index	Explanation
1	Footwell module (FRM)

2	Junction Box (JB)
3	Door contact, central locking system, Hall sensor for front passenger door Automatic Soft Close system
4	Front passenger door Automatic Soft Close system (SCA)
5	Door contact, central locking system, Hall sensor for rear passenger side Automatic Soft Close system
6	Rear passenger side Automatic Soft Close system (SCA)
7	Rear power distribution box
8	Central locking, luggage compartment lid
9	Automatic Soft Close system for luggage compartment lid (only with option 316)
10	Rear driver side Automatic Soft Close system
11	Door contact, central locking system, Hall sensor for rear driver's side Automatic Soft Close system
12	Driver's door Automatic Soft Close system (SCA)
13	Door contact, central locking system, Hall sensor for driver's door Automatic Soft Close system

POWER WINDOWS

7.1. SYSTEM WIRING DIAGRAM

NOTE: Wiring diagram is for representation only. For actual wiring diagram, see **SYSTEM WIRING DIAGRAMS** article.

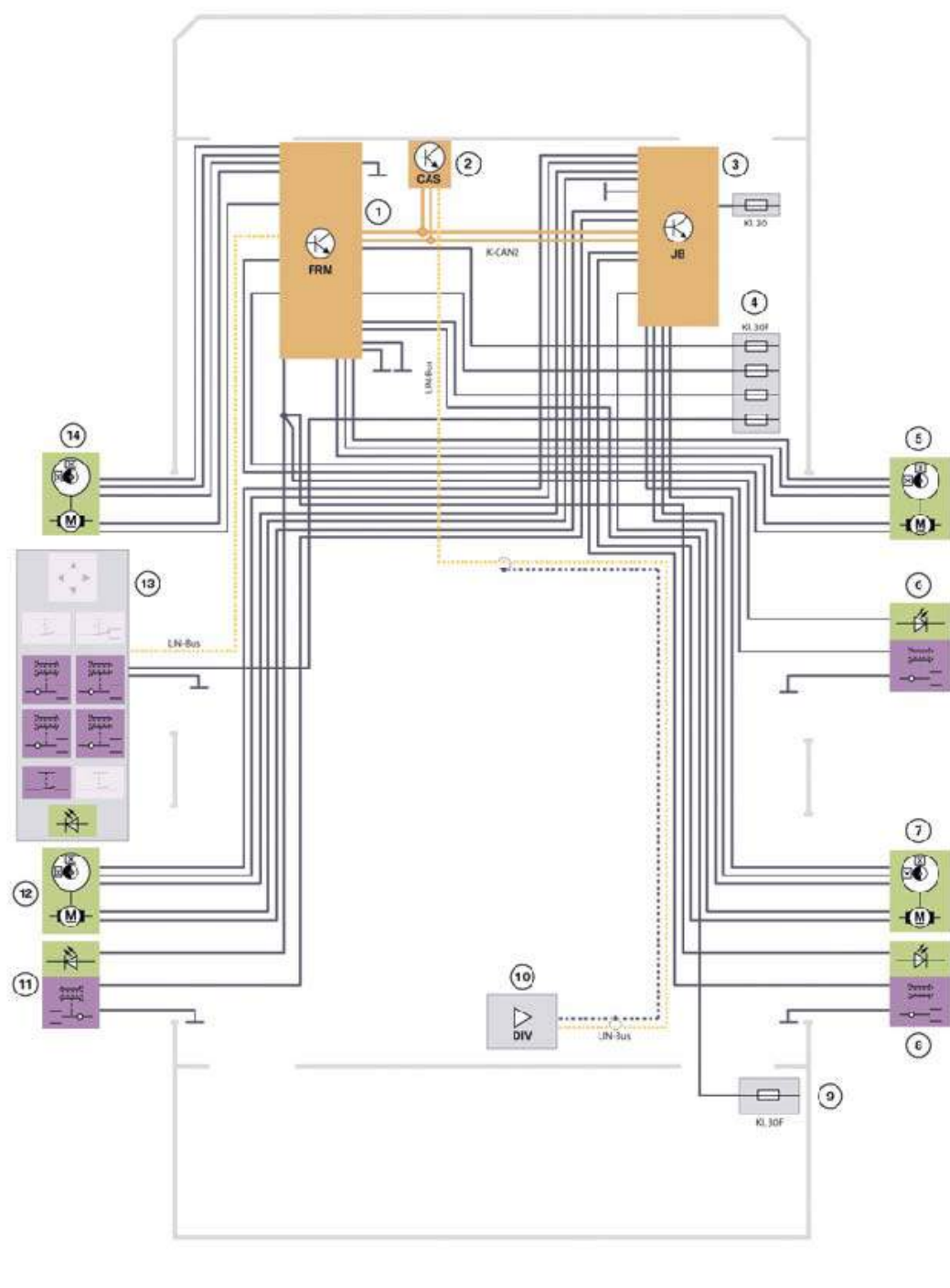


Fig. 16: F10 Power Windows System Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Footwell module (FRM)

2	Car Access System (CAS)
3	Junction Box (JB)
4	Front distribution box
5	Power window motor with front right indirect anti-trap mechanism
6	Power window switch, passenger side front
7	Power window motor with indirect anti-trap mechanism, rear right
8	Power window switch, passenger side rear
9	Luggage compartment junction box
10	Aerial diversity module with antenna amplifier
11	Power window switch, driver's side rear
12	Power window motor with indirect anti-trap mechanism, rear left
13	Switch block in the driver's door
14	Power window regulator with front left indirect anti-trap mechanism
K-CAN2	Body controller area network 2
LIN-Bus	Local Interconnect Network bus
KI. 30	Terminal 30
Term. 30F	Terminal 30 incorrectly switched

7.2. INPUT/OUTPUT SIGNALS

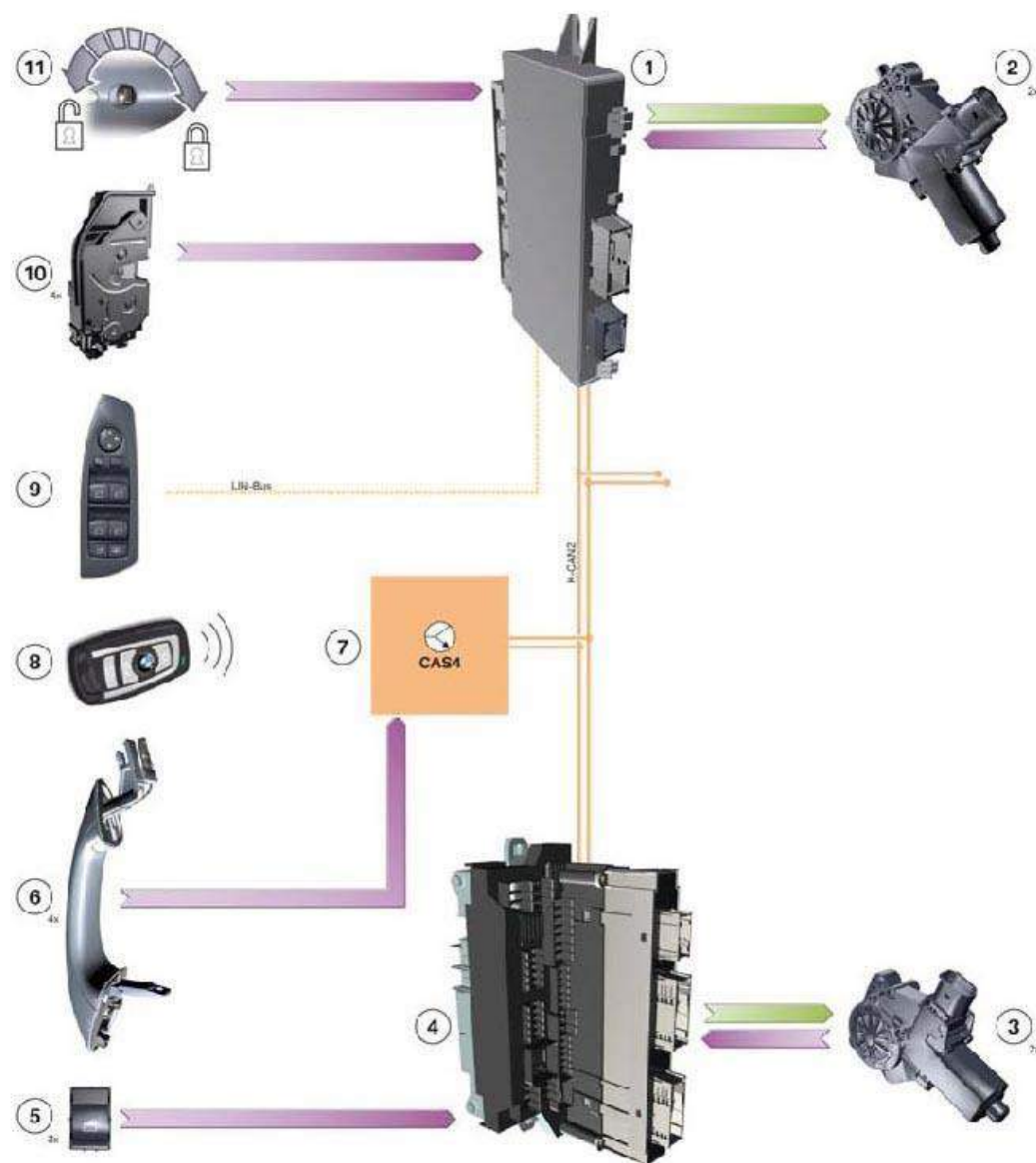


Fig. 17: F10 Power Window Input/Output Communication Diagram

Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Footwell module (FRM)
2	Power window motor, front doors
3	Power window motor, rear doors
4	Junction box electronics (JBE)
5	Power window switch, driver's side rear/passenger side front and rear
6	Outer door handle with Comfort Access (CA)
7	Car Access System (CAS)

8	ID transmitter
9	Switch block in the driver's door
10	Lock with door contact
11	Driver's-door lock barrel
K-CAN.	Body controller area network
LIN-Bus	Local Interconnect Network bus

7.3. EXAMPLES OF SIGNAL PATHS

The following signal path examples show the paths the signal takes before the power window motors open or close the windows. A requirement is that the Car Access System has issued the enable to operate the power windows.

7.3.1. Driver's door switch cluster

When the power window switch for the driver's window or front passenger's window is operated, the signal is routed via the LIN-Bus to the footwell module. The footwell module activates the corresponding power window motor.

The signal is routed from the driver's door switch cluster via the LIN-Bus to the footwell module when the power window switches for the windows in the rear doors are operated. The footwell module sends the signal via the K-CAN2 to the junction box electronics. The junction box electronics receive the signal and activate the corresponding power window motor.



Fig. 18: Identifying F10 Driver's Door Switch Cluster
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Button for exterior mirror adjustment
2	Mirror folding button
3	Mirror changeover switch
4	Power window regulator switch, front left
5	Power window regulator switch, front right
6	Power window regulator switch, rear left
7	Power window regulator switch, rear right
8	Safety switch

7.3.2. Power window switch, front passenger's door

The signal is routed to the junction box electronics when the power window switch in the front passenger's door is operated.

The junction box electronics sends the signal to the footwell module on the K-CAN2. The footwell module activates the power window motor.

7.3.3. Power window switch, rear doors

When the power window switches in the rear doors are operated, the signal is routed to the junction box electronics. The junction box electronics drives the power window motor.

8. Glass Sunroof

The glass sunroof is standard equipment on all F10 models. Several control units are involved in operating the glass sunroof.

For example, the roof function center (FZD) is linked with the Car Access System (CAS), which enables or disables operation of the glass sunroof.

The footwell module (FRM) supplies the signal from the door contacts. The Junction Box electronics provide the power supply for the motors via terminal 30.

The roof function center controls and monitors the motors of the glass sunroof. The function is identical to that of the slide/tilt sunroof of the F01/F02.

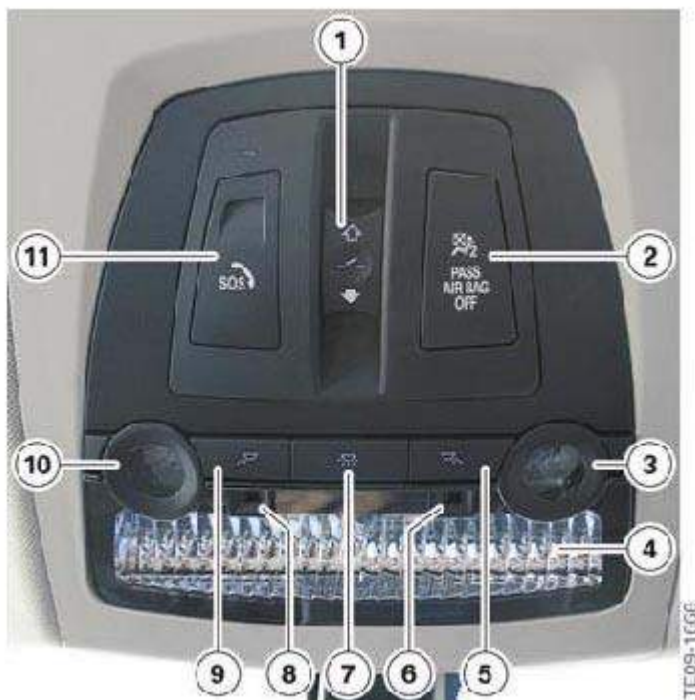


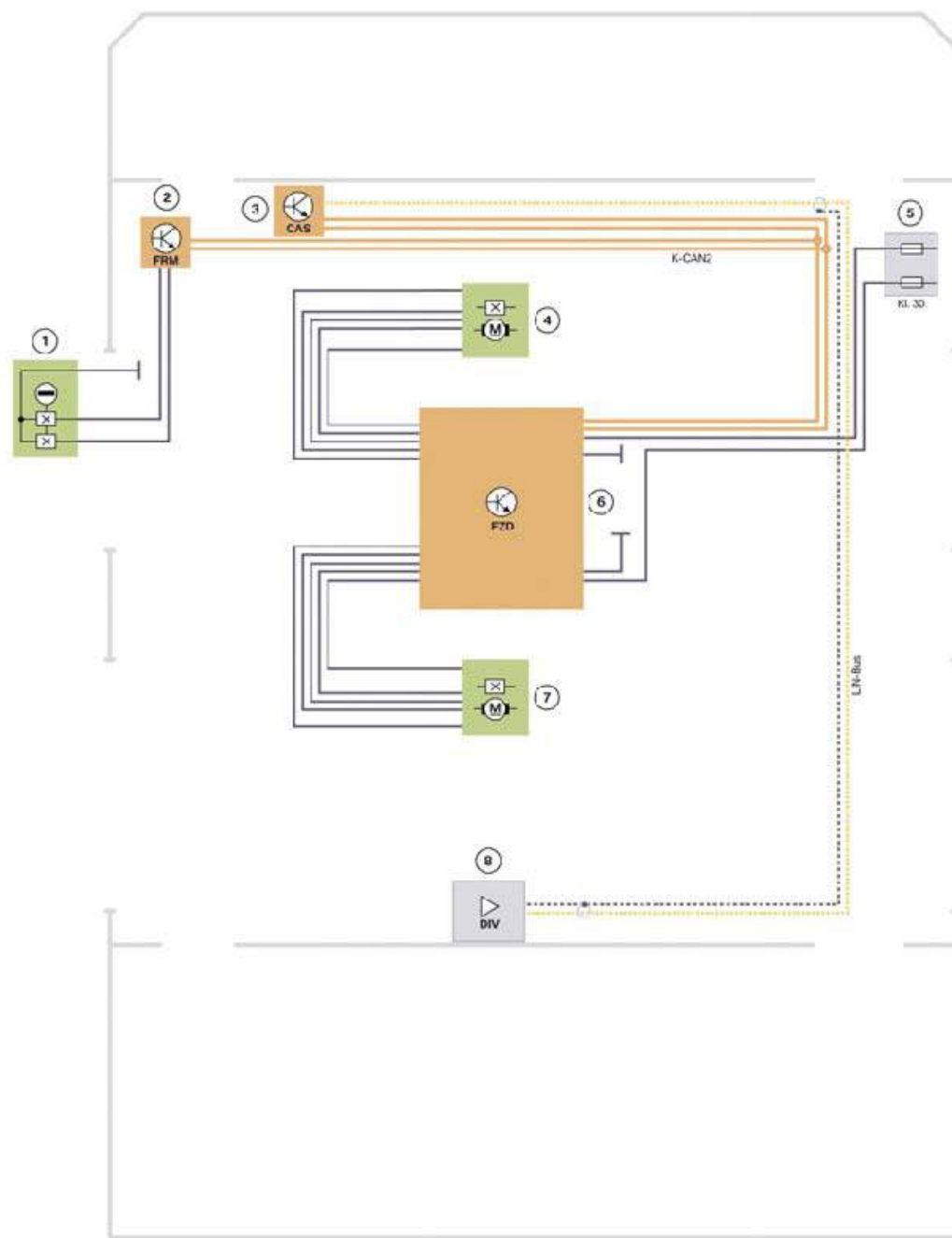
Fig. 19: Identifying F10 Roof Function Center
Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Glass sunroof switch
2	Indicator lamp for front passenger airbag deactivation
3	Right reading light
4	Interior light
5	Right reading light button
6	Ambient lighting
7	Interior light button
8	Ambient lighting
9	Left reading light button
10	Left reading light
11	Emergency call button

8.1. SYSTEM WIRING DIAGRAM

NOTE: Wiring diagram is for representation only. For actual wiring diagram, see **SYSTEM WIRING DIAGRAMS** article.



TE09-2342

Fig. 20: F10 Glass Sunroof System Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Hall sensors, driver's door lock barrel
2	Footwell module (FRM)

3	Car Access System (CAS)
4	Glass sunroof motor
5	Front distribution box
6	Roof function center (FZD) with button for glass sunroof
7	Sliding trim motor
8	Aerial diversity module with antenna amplifier
K-CAN2	Body controller area network 2
LIN-Bus	Local Interconnect Network bus
KI. 30	Terminal 30

ANTI-THEFT ALARM SYSTEM

The anti-theft alarm system is standard equipment on all F10 models. As on previous models, the alarm system must be activated. When activated, the alarm monitors the whole of the vehicle interior.

The alarm system monitors the engine compartment and the vehicle's rest position. So that nothing can be stolen from the luggage compartment, the alarm system monitors opening of the trunk lid.

The alarm system also signals an attempt to tamper with the vehicle, e.g. cutting the supply line to the emergency power siren.

An Ultrasonic interior movement detector is integrated in the roof function center.

The ultrasonic signal passes into the inside of vehicle through apertures in the grille of the roof function center. The emergency power siren with tilt sensor is located near the rear wheel arch.

9.1. SYSTEM WIRING DIAGRAM

NOTE: **Wiring diagram is for representation only. For actual wiring diagram, see SYSTEM WIRING DIAGRAMS article.**

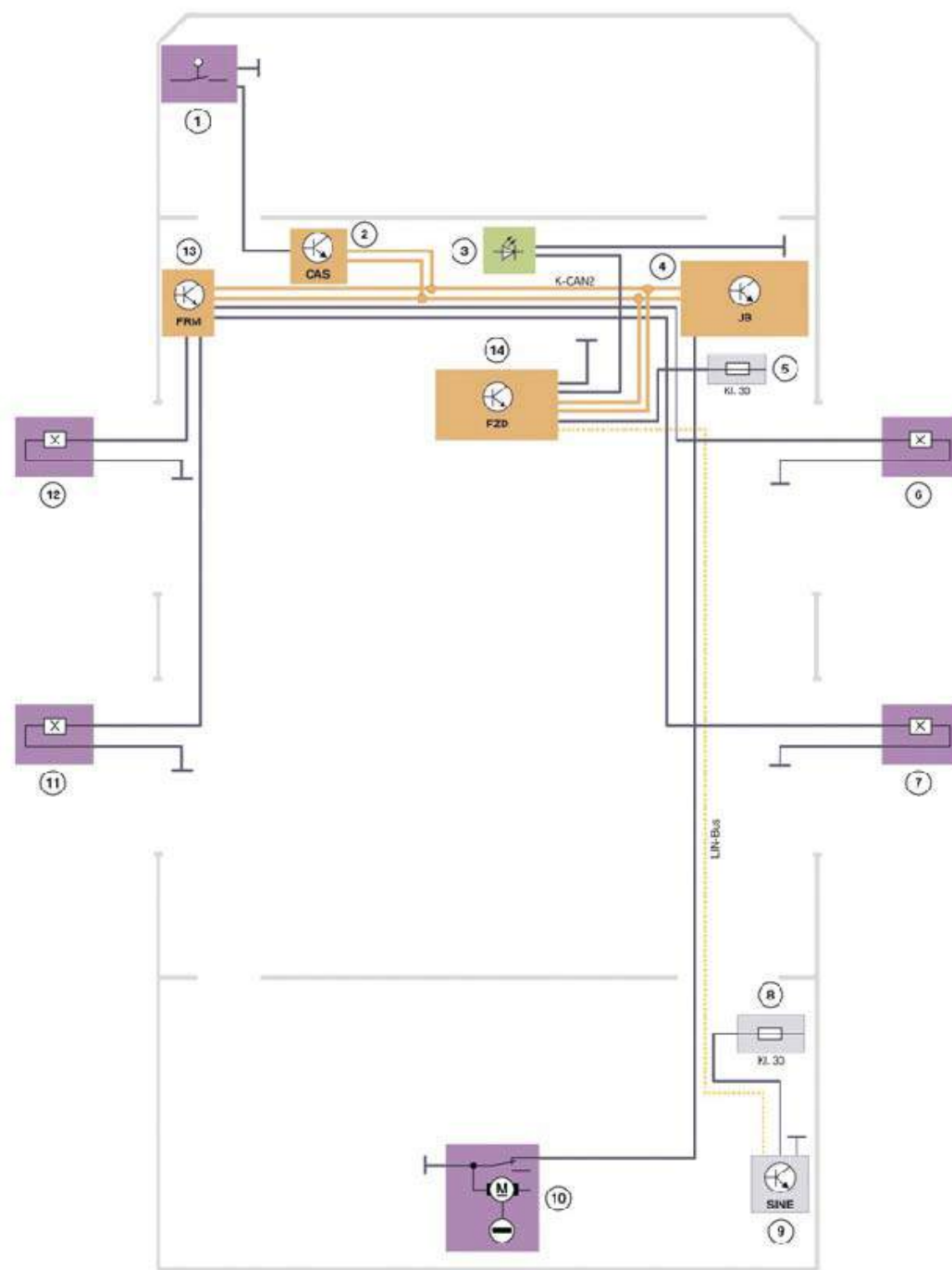


Fig. 21: F10 Alarm System - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Hood contact switch

2	Car Access System (CAS)
3	LED alarm system
4	Junction box electronics (JBE)
5	Front distribution box
6	Door contact, passenger's door
7	Door switch, passenger side, rear
8	Luggage compartment junction box
9	Emergency power siren with integrated tilt sensor (SINE)
10	Trunk lock with trunk-lid switch
11	Door switch, driver's side, rear
12	Door switch, driver's door
13	Footwell module (FRM)
14	Roof function center (FZD) with ultrasonic interior movement detector (USIS)
LIN-Bus	Local Interconnect Network bus
K-CAN2	Body controller area network 2
KI. 30	Terminal 30

The Hall sensors in the doors (6, 7, 11, 12) are monitored by the footwell module (13). As soon as the status of a Hall sensor changes, the ultrasonic interior movement detector (14) receives that information via the K-CAN2. If the anti-theft alarm system is activated, an alarm is triggered.

The hood contact switch (1) is monitored by the Car Access System (2). If the status changes, an alarm is triggered in the same way.

Opening of the trunk is monitored by the junction box electronics (4). If the status of the trunk lid contact switch (10) changes, it triggers an alarm.

AUTOMATIC TRUNK LID

The "Power Tailgate" option is offered in the F10 as part of the ZCV Convenience Package, which also includes Comfort Access keyless entry and Soft-close automatic doors.

The automatic operation of the trunk lid improves vehicle access by enabling the luggage compartment lid to be opened or closed automatically at the press of a button. A spindle-driven system is used in the F10 for automatic opening or closing of the luggage compartment lid.

With Comfort Access, it is even possible to open the luggage compartment lid while the vehicle is locked.

Pressing the outer trunk lid button opens the luggage compartment lid automatically. The only requirement is that a vehicle-specific ID transmitter must be present in the immediate vicinity of the rear end of the vehicle. The trunk lid can also be opened by pressing the button on the ID transmitter.

An open luggage compartment lid can be closed by pressing the "close trunk lid" button.



Fig. 22: Identifying Close Trunk Lid Button, Close And Lock Trunk Lid Button (Deadlocking)
Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Close trunk lid button
2	Close and lock trunk lid button (deadlocking)

In connection with Comfort Access, it is now also possible to deadlock the vehicle doors from the trunk lid. The "deadlock" button for this is located in the trunk lid.

10.1. SYSTEM WIRING DIAGRAM

NOTE: **Wiring diagram is for representation only. For actual wiring diagram, see SYSTEM WIRING DIAGRAMS article.**



cardiagn.com

Index	Explanation
1	Central gateway module (ZGM)

2	Footwell module (FRM)
3	Trunk lid button, A-pillar
4	Car Access System (CAS)
5	Junction Box (JB)
6	Luggage compartment junction box
7	Spindle drive motor, right
8	Control unit for automatic operation of trunk (HKL)
9	Interior trunk lid button and deadlocking button
10	Exterior trunk lid button
11	Trunk lock with trunk lid contact switch and lock barrel
12	Automatic Soft Close system for trunk lid
13	Spindle drive motor, left
14	Luggage compartment lighting
15	Antenna diversity module with antenna amplifier
K-CAN.	Body controller area network
K-CAN2	Body controller area network 2
KI. 30	Terminal 30
Term. 30B	Terminal 30 basic operation
LIN-Bus	Local Interconnect Network bus

The radio signal from the ID transmitter is received by the rear window antenna. The remote control receiver in the antenna diversity module (15) forwards the signal to the Car Access System (4). The Car Access System is the master control unit for the central locking function.

Once the signal has been successfully verified, the Car Access System issues a command to activate the central locking in the trunk lid.

The junction box electronics (5) execute the command to activate the central locking system in the trunk lid. The junction box electronics detect the status of the trunk lid contact switch (11) for the automatic operation of trunk lid function. The status of the trunk lid contact switch is sent via the K-CAN to the automatic operation of trunk (8). The status is one of the triggering criteria for trunk lid operation.

The sensors (13) and (7) in the spindle drives monitor the movement of the trunk lid. If the trunk lid is blocked while being closed, the automatic operation of trunk reverses a little if necessary to remove the obstacle.

An obstruction to luggage compartment lid movement during the opening procedure causes the trunk lid to stop and it is not reversed.

The control unit for the automatic operation of trunk lid monitors the power consumption of the spindle drive. A rise in current from the trunk lid being blocked results in the lid movement being stopped or reversed.

EXTERIOR LIGHTING

The exterior lights of the F10 are based on those of the F01.

The F10 535i and 550i come standard equipped with bi-xenon headlights (option 522).

The F10 528i is equipped with halogen headlights as standard equipment (bi-xenon headlights option 522 is available).

With bi-xenon headlights, the daytime running lights and the side lights are implemented using light-emitting diodes.

The familiar light switches from the F01 is used on the F10.

The adaptive headlights are available for the F10 as optional equipment (option 524). It is installed only in conjunction with bi-xenon headlights (option 522).

11.1. SYSTEM WIRING DIAGRAM

NOTE: **Wiring diagram is for representation only. For actual wiring diagram, see SYSTEM WIRING DIAGRAMS article.**

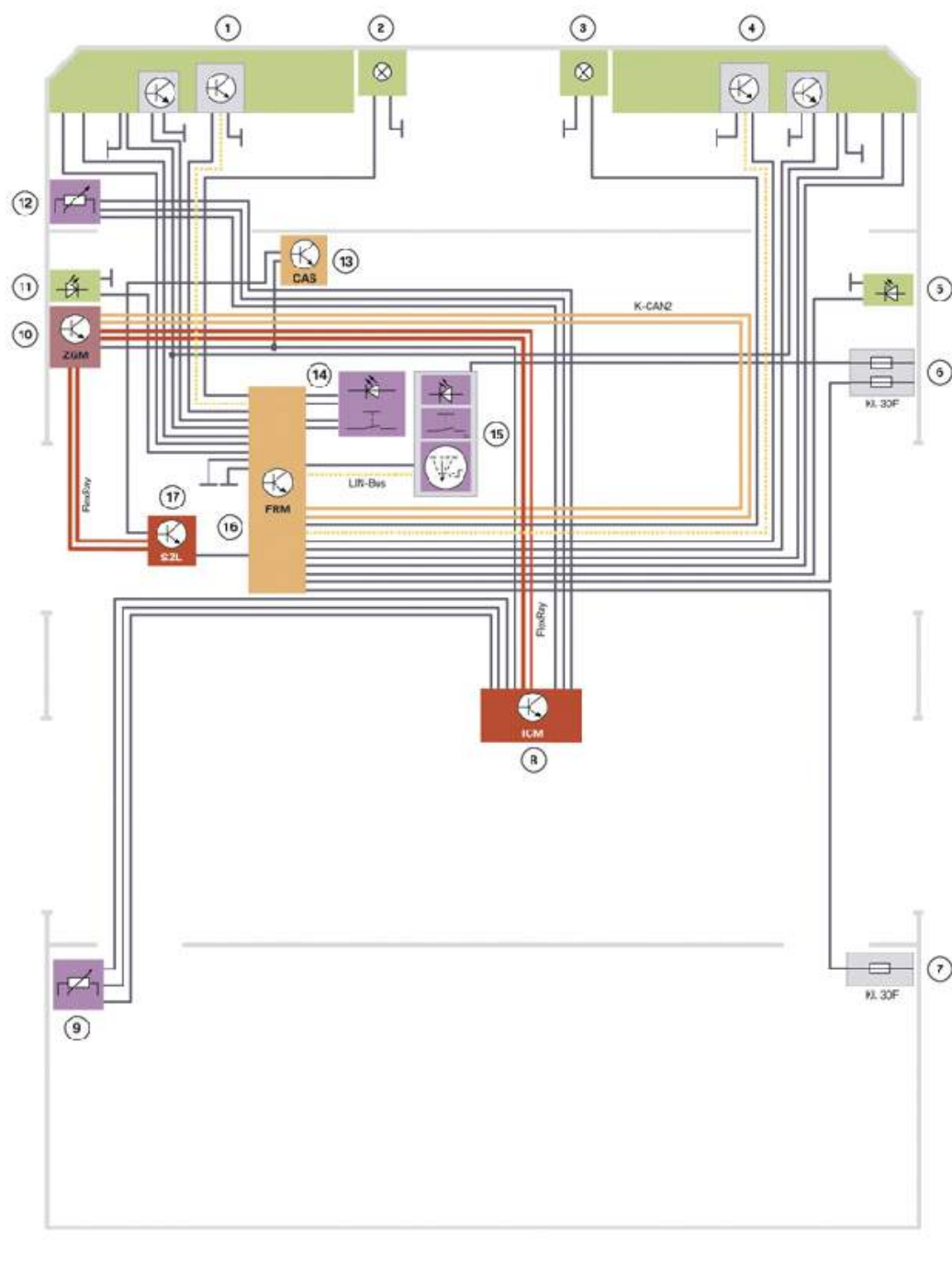


Fig. 24: F10 Front Exterior Lights System - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Left headlight
2	Front fog light, left

2011 BMW 535xi

ELECTRICAL General Vehicle Electronics - F10

3	Front fog light, right
4	Right headlight
5	Right auxiliary turn indicator
6	Front distribution box
7	Rear power distribution box
8	Integrated Chassis Management (ICM)
9	Rear ride height sensor (only with option 522)
10	Central Gateway Module (ZGM)
11	Left auxiliary turn indicator
12	Front ride height sensor (only with option 522)
13	Car Access System (CAS)
14	Hazard warning switch
15	Control panel, light switch
16	Footwell module (FRM)
17	Steering column switch cluster (SZL)



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Index	Explanation
1	Central Gateway Module (ZGM)
2	Car Access System (CAS)

3	Electronic transmission control (EGS) (with automatic transmission)
4	Reverse light switch (with manual transmission)
5	Rain-light-solar-condensation sensor
6	Junction Box (JB)
7	Front distribution box
8	Rear power distribution box
9	Trailer module AHM (Not for US)
10	Outer rear light cluster, right
11	Inner rear light cluster, right
12	Licence plate light
13	Inner rear light cluster, left
14	Outer rear light cluster, left
15	Filter with trap circuit
16	Additional brake light
17	Footwell module (FRM)
18	Control panel, light switch
19	Steering column switch cluster (SZL)
20	Hazard warning switch
21	Brake light switch

11.2. FRONT LIGHTING

The structure of the front headlights can be seen in the following graphic.

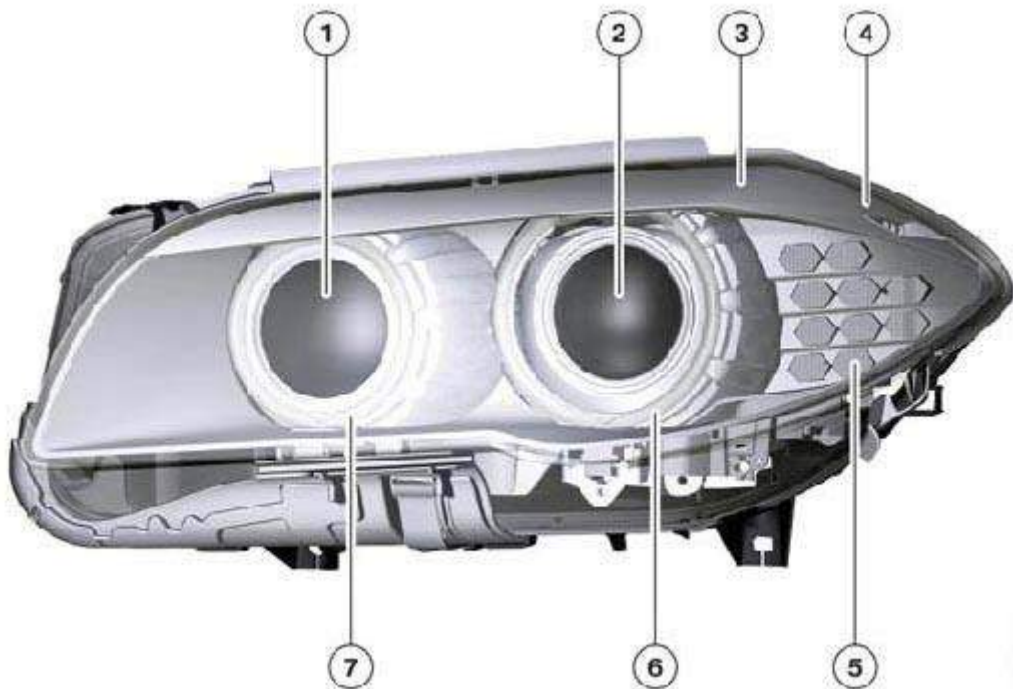


Fig. 26: Identifying F10 Front Headlight Components
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Turning light (option 524, only available with bi-xenon) or high beam headlight with halogen headlights
2	Bi-xenon low-beam headlight/high beam headlight or low-beam headlight with halogen headlights
3	Decorative lighting (light-emitting diodes)
4	Side marker light (light-emitting diodes)
5	Turn indicator (light-emitting diodes with bi-xenon)
6	Parking light/daytime driving lights corona ring (light-emitting diodes, daytime driving light function only with bi-xenon)
7	Parking light/daytime driving lights corona ring (light-emitting diodes, daytime driving light function only with bi-xenon)

11.3. REAR LIGHTING

The F10 has a two-piece rear light. The structure of the rear lights can be seen in the following graphic.

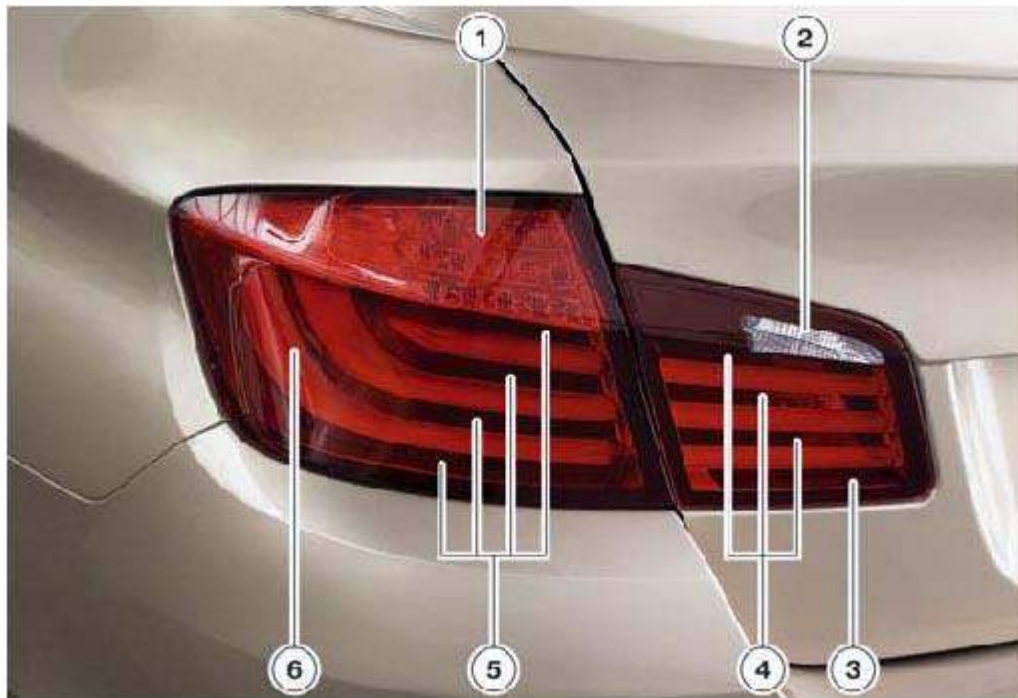


Fig. 27: Identifying F10 Rear Light Components
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
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Saturday, September 05, 2015 9:00:44 AM	Page 50 © 2011 Mitchell Repair Information Company, LLC.

1	Turn signal indicator light (LEDs)
2	Reverse light
3	Brake light for Brake Force Display
4	Brake light (LEDs)
5	Reflector, side marking
6	Tail light (LEDs)

INTERIOR LIGHTING

12.1. OVERVIEW

The interior lighting of the F10 is controlled by the footwell module FRM control unit.

The footwell module is the central control unit for the interior lighting. All interior lighting outputs of the footwell module are pulse-modulated. This ensures that the interior light functions at a constant brightness level in the event of voltage fluctuations. The pulse width modulation is also used for the "soft ON/soft OFF" function.

The components for the interior light in the front roof area are integrated in the roof function center and in the sun visors. The footwell lighting is located underneath the dashboard. The rear reading and interior lights are supplied with voltage via the roof function center.

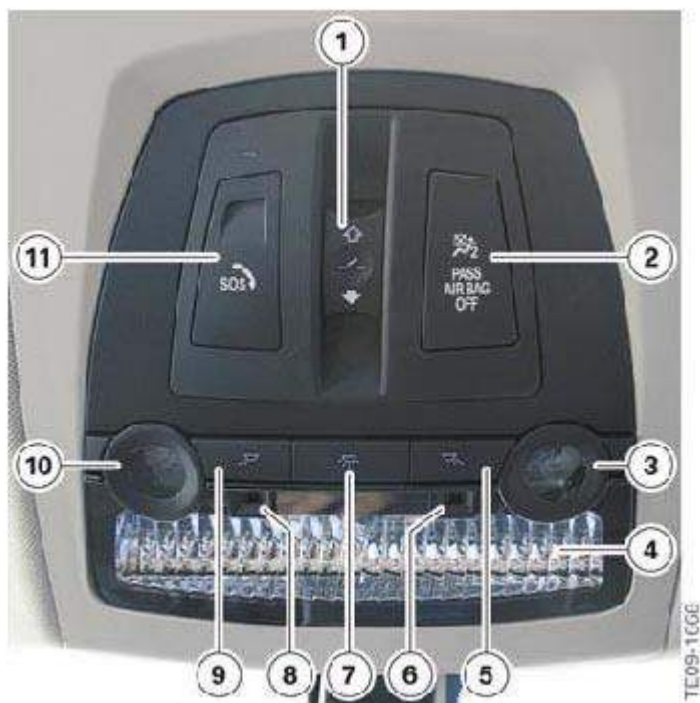


Fig. 28: Overview Of F10 Roof Function Center
Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Glass sunroof switch
2	Indicator lamp for front passenger airbag deactivation
3	Right reading light
4	Interior light
5	Right reading light button
6	Ambient lighting
7	Interior light button
8	Ambient lighting
9	Left reading light button
10	Left reading light
11	Emergency call button

12.2. SYSTEM WIRING DIAGRAM

NOTE: **Wiring diagram is for representation only. For actual wiring diagram, see SYSTEM WIRING DIAGRAMS article.**

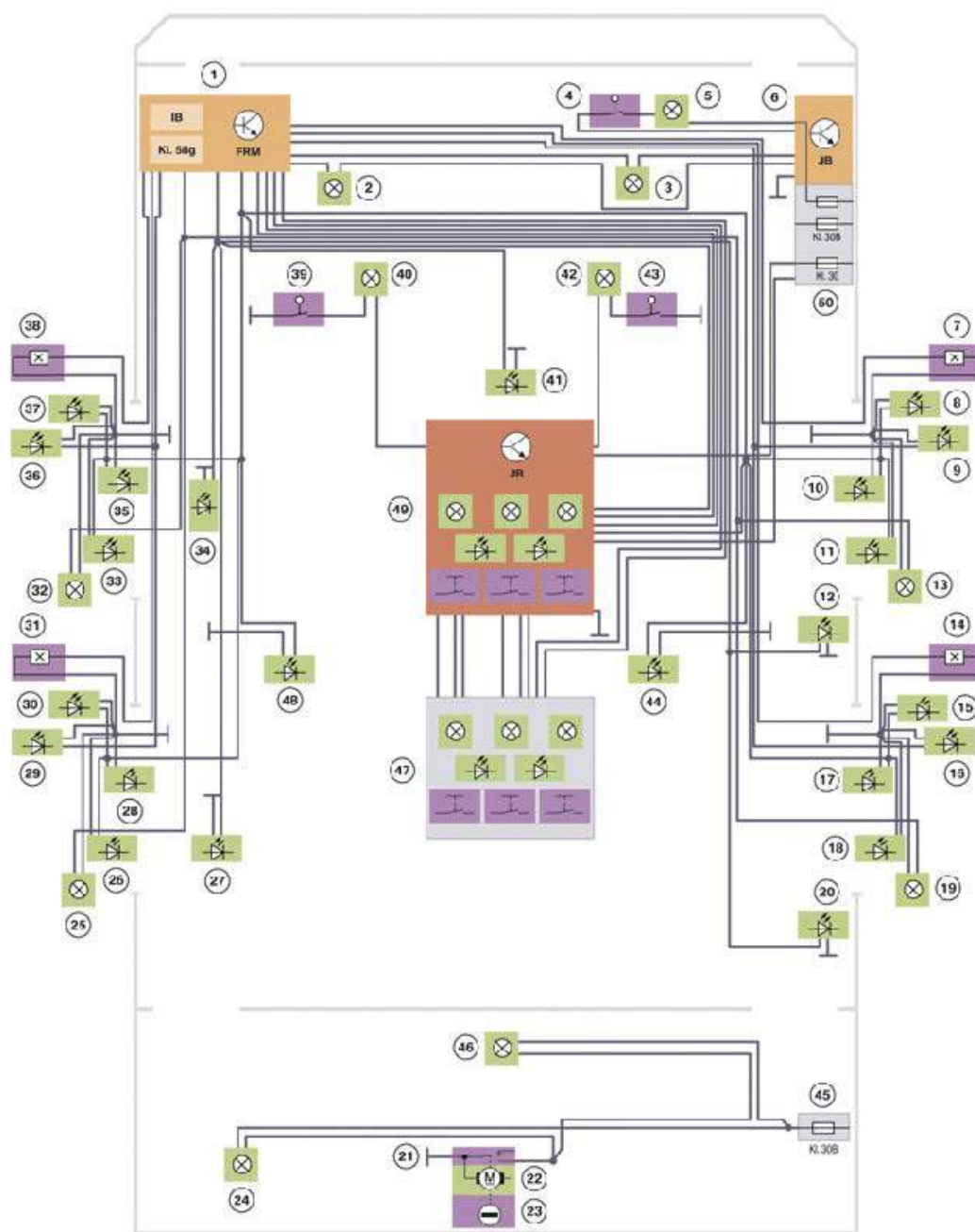
The system wiring diagram follows the description below and provides an overview of the full extent of all possible interior light options.

The following examples describe some switching operations for the interior light.

The status of the door contact (Hall sensor) in the lock (38) changes, for example, when the door is opened with the vehicle unlocked. The footwell module (1) evaluates the status and sends the request to switch on the interior light.

At the same time, the door entry lighting (32) for the door that is open and the footwell lights (2, 3) are switched on by the footwell module. The status of the door contact changes again when the vehicle door is closed. The footwell module initiates the procedure to switch off the interior light.

The luggage compartment lights and the lights in the luggage compartment lid (24, 46) are connected to the voltage supply via terminal 30B. If one of the luggage compartment lids is opened, the status of the tailgate contact switch changes (27). The luggage compartment lights and the luggage compartment lid light are switched on directly via the tailgate contact switch.



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Fig. 29: F10 Interior Light System - Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Footwell module (FRM)
2	Footwell light, driver's side

3	Footwell light, front passenger's side
4	Glove compartment switch
5	Glove box light
6	Junction Box (JB)
7	Door contact, front passenger side
8	Exterior door handle light, front passenger side
9	Ground lights, front passenger side
10	Inside door handle light, front passenger side
11	Door pocket lighting, front passenger side
12	Entrance lighting, front passenger side
13	Door entry lighting, front passenger side
14	Door switch, passenger side, rear
15	Exterior door handle light, passenger side, rear
16	Rear, passenger-side illuminated entry system
17	Interior door handle light, passenger side, rear
18	Door pocket light, passenger side, rear
19	Doorway light, passenger side, rear
20	Entrance lighting, rear passenger side
21	Tailgate contact switch
22	Tailgate lock motor
23	Lock barrel, tailgate
24	Luggage compartment light in tailgate
25	Doorway light, driver's side, rear
26	Door pocket light, driver's side, rear
27	Entrance lighting, rear driver's side
28	Interior door handle light, driver's side, rear
29	Rear, driver's side illuminated entry system
30	Exterior door handle light, driver's side, rear
31	Door switch, driver's side, rear
32	Door entry lighting, front driver's side
33	Door pocket lighting, front driver's side
34	Door pocket lighting, front driver's side
35	Inside door handle light, front driver's side
36	Ground lights, front driver's side
37	Outside door handle light, front driver's side
38	Door contact, front driver's side
39	Make-up mirror light switch, front driver's side
40	Make-up mirror light, front driver's side
41	Center console storage compartment light, front
42	Make-up mirror light, front passenger side
43	Make-up mirror light switch, front passenger side

	Map pocket light, front passenger seat backrest
45	Luggage compartment junction box
46	Luggage compartment light
47	Interior/reading light unit, rear
48	Map pocket light, driver's seat backrest
49	Interior/reading light unit, front
50	Front power distribution box Kl. 30 Terminal 30
Term. 30B	Terminal 30 basic operation
Kl. 58g	Terminal 58g
IB	Interior lighting control

SEATS

The electrical connection of the front seats and the seats in the rear passenger compartment is the same as in the F01.

13.1. FRONT SEATS

The following front seat variants are available for the F10:

- 20-way power front Comfort seats with memory (standard)
- ZAV Active vent seat package

The available ZAV Active vent seat package includes

- Multi contour seats (lumbar support)
- Front ventilated seats
- Active front seats
- Heated front seats

The front seats are largely identical to the front seats in the F07.

The following table provides an overview of the available optional equipment.

FRONT SEATS REFERENCE CHART

	Seat adjustment, electrical, with memory (option 459)	Comfort seat, electrically adjustable (option 456)
Seat memory	Standard	Standard
Seat heating for driver/passenger	Option 494	Option 494
Lumbar support for driver/passenger	Option 488	Standard
Active seat for driver/front		

passenger	-	Option 455
Active seat ventilation, front	Option 453	Option 453
Ambient light	Option 4UR	Option 4UR
Rear seat entertainment	Option 6FG	Option 6FG

13.1.1. Seat adjustment

With the maximum equipment specification, the F10 seats can be adjusted in eight directions.



Fig. 30: Adjusting F10 Comfort Seat
 Courtesy of BMW OF NORTH AMERICA, INC.

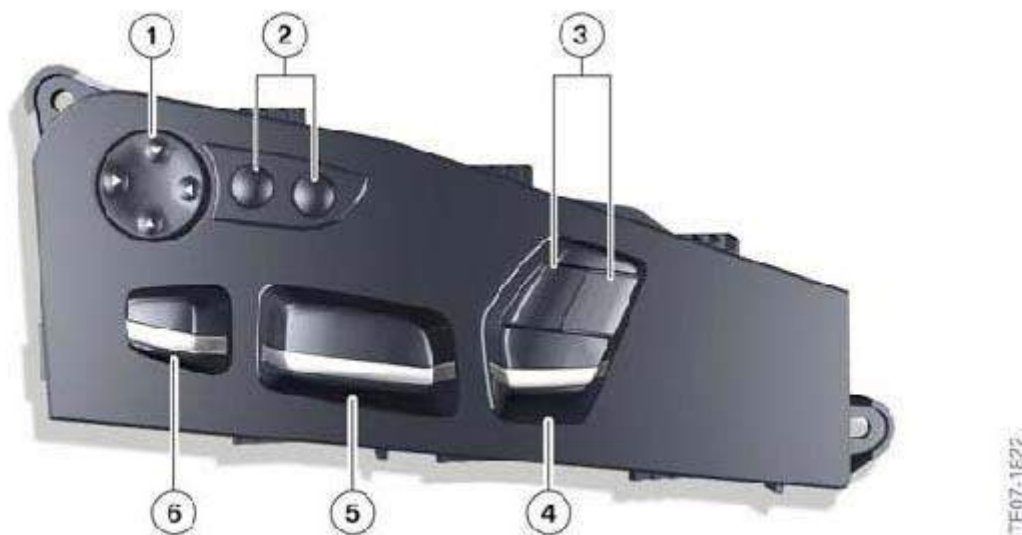
EXPLANATION CHART

Index	Explanation
1	Head rest height adjustment
2	Back rest upper section adjustment
3	Back rest angle adjustment

4	Forward/Back seat adjustment
5	Seat height adjustment
6	Seat angle adjustment
7	Seat depth adjustment
8	Back rest width adjustment

SEAT ADJUSTMENT OPTIONS REFERENCE CHART

Seat adjustment options	Seat adjustment, electrical, with memory (option 459)	Comfort seat, electrically adjustable (option 456)
Seat height adjustment	Electrical	Electrical
Forward/back seat adjustment	Electrical	Electrical
Seat angle adjustment	Electrical	Electrical
Backrest inclination adjustment	Electrical	Electrical
Head restraint, height adjustment	Electrical	Electrical
Seat depth adjustment	Manual*	Electrical
Backrest width adjustment	-	Electrical
Upper backrest adjustment	-	Electrical

**Fig. 31: Identifying F10 Switch Block For Comfort Seat Adjustment (On Seat)**

Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation

1	Lumbar support adjustment
2	Back rest width adjustment
3	Back rest upper section adjustment
4	Back rest angle and head rest adjustment
5	Forward/back, seat height and angle adjustment
6	Seat depth adjustment

13.1.2. Seat heating

Seat heating can be ordered for the front seats (option 494) for the F10.



Fig. 32: Identifying F10 Control Panel For Integrated Automatic Heating/Air Conditioning System
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Seat heating button, driver's seat
2	Seat heating button, front-passenger seat

13.1.3. Active seat ventilation

Active seat ventilation can be ordered for the front seats (option 453) for the F10.



Fig. 33: Identifying F10 Control Panel For Integrated Automatic Heating/Air Conditioning System
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Button, active seat ventilation, driver's seat
2	Button, active seat ventilation, front-passenger seat

13.2. SEATS IN THE REAR PASSENGER COMPARTMENT

In the F10, a seat bench with backrest in sandwich design is installed as standard, or a seat bench with through-loading system as optional equipment (option 465).

Highlights

- Backrest in sandwich design (only basic seat bench)
- center armrest (folding) with storage compartment and cup holder
- center head restraint, folding
- Backrests, folding 40 %, 60 % or 100 % (only with through-loading system, option 465)

The following seat equipment is possible in the rear passenger compartment.

BASIC SEAT BENCH REFERENCE CHART

	Basic seat bench	Seat bench with through-loading system (option 465)
Seat heating for rear seats	Option 496	Option 496
Remote control in storage compartment (with rear seat entertainment or rear seat entertainment Professional)	Option 6FG, option 6FH	Option 6FG, option 6FH
Ski bag	-	Standard

Seat heating can be ordered as an option (option 496).

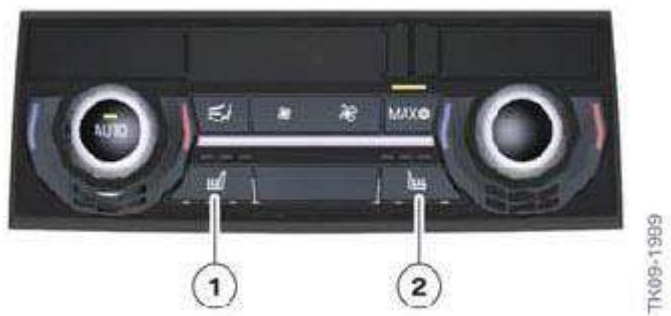


Fig. 34: Identifying Control Panel For Automatic Rear Air-Conditioning System
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Left seat heating button
2	Right seat heating button

CLIMATE CONTROL SYSTEMS

For the F10, 2 versions of the integrated automatic heating/air conditioning system IHKA are available.

- 2-zone IHKA Climate Control (option 534)
- 4-zone IHKA Climate Control (option 4NB)

The following table provides an overview of this of the 2 IHKA systems available:

IHKA SYSTEMS REFERENCE CHART

	2-zone IHKA	4-zone IHKA
Temperature	Left/right	Front: left/right Rear: left/right
Air volume	Left/right	Front: left/right Rear: shared
Air distribution	Left/right	Front: left/right Rear: shared

14.1. EQUIPMENT**IHKA SYSTEMS REFERENCE CHART**

	IHKA 2 zones	IHKA 4 zones
Separate control of temperature, front left/right	X	X
Separate control of amount of air and air distribution, front left/right	X	X
Separate control of temperature, rear passenger compartment	NA	X
Independent ventilation	X	X
Residual heat utilization	X	X
Anti-misting	X	X
Fresh air and recirculating air filter (microfilter)	X	X
Ionizer to prevent condenser odors	X	X
Individual automatic control with 5 intensity levels	X	X
Solar compensation	X	X
Automatic air recirculation control (including combination filter ⁽¹⁾)	X	X
ALL function (driver's settings are transferred to front passenger side)	X	NA
ALL function (driver's settings are transferred to front passenger side and left/rear passenger compartment)	NA	X

Separate IHKA controls in rear passenger compartment (center console)	NA	X
Comfort nozzle (fresh-air grille on center dashboard) with individual range of adjustment from spot (focused) to diffuse (draught-free)	NA	X
¹ A solar sensor takes into account any external light and/or heat sources that affect the climate in the passenger compartment. (1) A combination of microfilter and carbon filter traps dust and pollen and protects the system against unpleasant odors.		

14.2. 2-ZONE IHKA

2-zone IHKA is standard equipment for all F10 models.



Fig. 35: Identifying F10 Control Panel Of 2-Zone IHKA
Courtesy of BMW OF NORTH AMERICA, INC.

With the 2-zone IHKA you can adjust the amount of air and air distribution separately for the left and right side.

The driver's current settings for temperature, amount of air and air distribution can be transferred to the front passenger side using the ALL button.

The system is also equipped with the automatic air recirculation control AUC. This feature blocks the fresh air duct if there are odors or pollutants coming into the vehicle. In this situation, the interior air is then recirculated.

The rear seat passengers can only adjust the individual air flow out of the center vents. The rear temperature is dependent on the front passenger settings and can not be adjusted separately nor independently for the rear left and right passengers.

The function, operation and structure of the 2-zone IHKA are the same as the IHKA basic version in the F07.

14.3. 4-ZONE IHKA

The 4-zone IHKA is available as optional equipment (option 4NB) on all F10 models.



Fig. 36: Identifying F10 Control Panels For 4-Zone IHKA
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Front control panel
2	Control panel in the rear passenger compartment

In the front of the vehicle, the 4-zone IHKA has the same control panel as the 2-zone IHKA.

The 4-zone IHKA has an additional control panel in the rear passenger compartment. The rear seat passengers can use this to adjust the temperature separately for the left and right. The amount of air and air distribution can be controlled together for the rear passenger compartment.

With the 4-zone IHKA, the driver's current settings for temperature, amount of air and air distribution can be transferred to the front passenger side and rear passenger compartment using the ALL button.



Fig. 37: Identifying F10 Air Ducts And Zones Of 4-Zone IHKA
 Courtesy of BMW OF NORTH AMERICA, INC.

EXPLANATION CHART

Index	Explanation
1	Driver zone
2	Front passenger zone
3	Right rear passenger compartment zone
4	Left rear passenger compartment zone

The function, operation and structure of the 4-zone IHKA are the same as the IHKA High version in the F01/F02.

GENERAL INFORMATION

Introduction - F10

INTRODUCTION

1.1. THE NEW BMW 5 SERIES SALOON

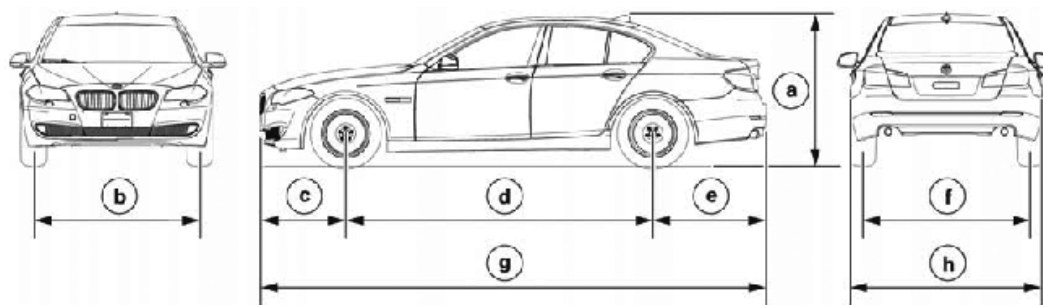
The F10 5 Series was introduced in to the US market in March of 2010. The vehicle is available in 528i, 535i and 550i models.



TK00-2037

Fig. 1: Identifying BMW 5 Series Sedan
Courtesy of BMW OF NORTH AMERICA, INC.

1.1.1. Dimensions



TK00-1994

Fig. 2: Identifying Exterior Dimensions Of BMW 5 Series Sedan
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
a	Vehicle height, empty (1464 mm) ⁽¹⁾

b	Track width of basic wheels, front (1600 mm)
c	Overhang, front (832 mm)
d	Wheelbase (2968 mm)
e	Overhang, rear (1099 mm)
f	Track width of basic wheels, rear (1627 mm)
g	Vehicle length (4899 mm)
h	Vehicle width without exterior mirrors (1860 mm)
(1) With roof-mounted antenna: 1475 mm.	

COMPARISON OF F10 WITH E60

		F10	E60
Vehicle height, empty	[mm]	1464	1467
Track width, front	[mm]	1600	1558
Overhang, front	[mm]	832	856
Wheelbase	[mm]	2968	2888
Overhang, rear	[mm]	1099	1111
Track width, rear	[mm]	1627	1582
Vehicle length	[mm]	4899	4855
Vehicle width without exterior mirrors	[mm]	1860	1846
Vehicle width over exterior mirrors	[mm]	2094	2030
Turning circle (at vehicle curb weight)	[m]	11.95	11.4
Shoulder room, front	[mm]	1480	1455
Shoulder room, rear	[mm]	1427	1454
Elbow room, front	[mm]	1518	1485
Elbow room, rear	[mm]	1485	1496
Maximum headroom, front (without slide/tilt sunroof)	[mm]	1028	1028
Maximum headroom, front (with slide/tilt sunroof)	[mm]	992	992
Maximum headroom, rear (without slide/tilt sunroof)	[mm]	973	967
Maximum headroom, rear (with slide/tilt sunroof)	[mm]	965	955
Luggage compartment capacity	[liters]	520	520

Weight and payload

Refer to the following table for the weight and payload of the F10 with automatic transmission according to the German Standardization Institute (DIN).

WEIGHT AND PAYLOAD OF F10

Vehicle	Vehicle curb weight (DIN)	Payload
F10 528i	1730 kg/3814 lb	480 kg/1058 lb
F10 535i	1855 kg/4090 lb	480 kg/1058 lb
F10 550i	1985 kg/4376 lb	450 kg 992 lb

1.1.2. Silhouette comparison

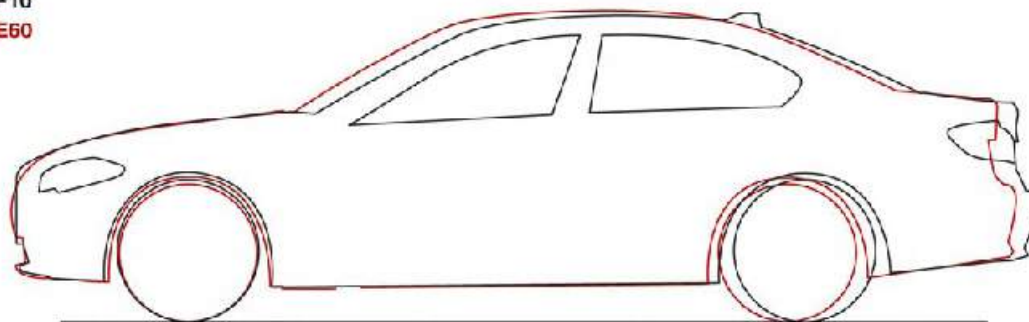
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F10

E60

F10

E60



TK03-1995

Fig. 3: F10 Silhouette Comparison With BMW 5 Series Sedan E60

Courtesy of BMW OF NORTH AMERICA, INC.

F10

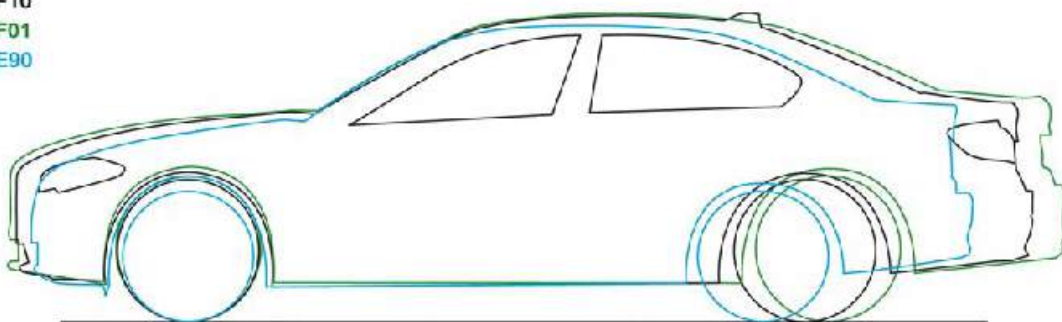
F01

E90

F10

F01

E90



TK03-1995

Fig. 4: F10 Silhouette Comparison With BMW 7 Series Sedan F01 And BMW 3 Series Sedan E90

Courtesy of BMW OF NORTH AMERICA, INC.

BODY

2.1. BODYSHELL



Fig. 5: Identifying F10 Bodyshell (Body In White)
Courtesy of BMW OF NORTH AMERICA, INC.

2.1.1. Introduction

As with other models, the use of lightweight materials was a major requirement in the F10 design. This involves the intelligent deployment of increased-strength multiphase steels and super high strength (press hardened) steels. In the F10, the average strength of the body materials has increased by 55% compared to the E60.

The lightweight materials contribute significantly to the overall reduction in vehicle weight, and in combination with the rigidity of the body structure.

The lightweight materials used on the F10 body structure contribute directly to its:

- Driving Dynamics
- Reduction of fuel consumption
- Reduction of CO2 emissions
- Passive safety

Weight saving features of the F10 bodyshell

- Strut towers are made of die-cast aluminum

- High proportion of multiphase steels (20 % of the body skeleton weight)
- High proportion of hot-formed steels (14 % of the body skeleton weight)

The die-cast aluminum strut towers reinforce the front section by ensuring the necessary rigidity that the component design requires to withstand the loads. Compared to a conventional steel-shell structure, the more compact design has significantly reduced the installation space and the weight in the front section. This provides a more uniform axle-load distribution, among other benefits.

The increased-strength multiphase steels and super high strength hot-formed steels combine low weight with maximum strength for the safety passenger cell, thus contributing significantly to passive safety.

For hot-formed steels, an innovative further development known as passive corrosion protection is used. Previously, no suitable hot-formed sheet metal materials with cathodic corrosion protection had been available on the market. With the development of press-hardening, a method is now available that enables mass production of galvanized hot-formed components. The components fabricated in this way can be used in the wet area without corrosion of the base material. There is no need for additional corrosion protection measures for this steel.

2.1.2. Materials

A modern vehicle body has to fulfill many different requirements. Despite small exterior dimensions, it is to provide the largest possible passenger compartment. In the event of an accident, it must provide the passengers with the best possible protection. All assemblies, such as the engine and transmission, are supported by the body against the torque they generate. Furthermore, the body must have high static and, above all, dynamic rigidity to guarantee the excellent driving characteristics typical of BMW vehicles.

In addition, the supporting structure of the vehicle must have high fatigue strength and be able to be repaired with reasonable effort and cost in the event of an accident.

To fulfill all these requirements, BMW applies a manufacturing strategy that produces each part from the material that is best suited for its function.

The two terms "aluminum" and "steel" are only the generic terms for the wide variety of alloys used in the construction of the body.

These different alloys have quite different properties.

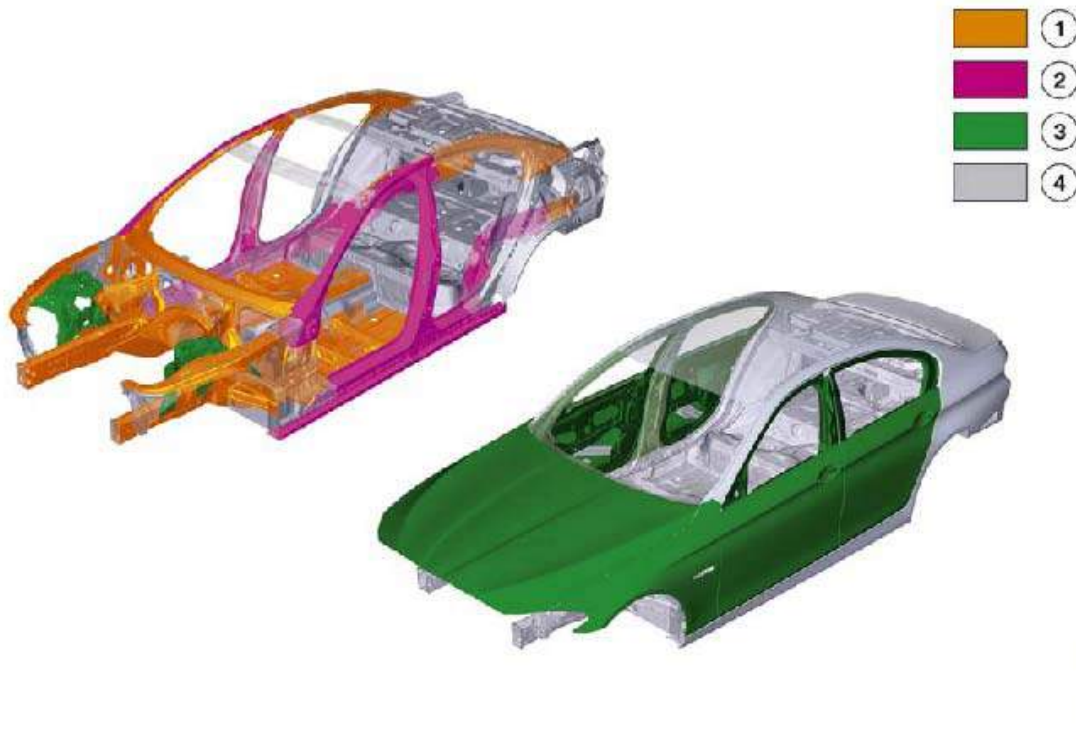


Fig. 6: Identifying F10 Material Qualities Of Bodyshell
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Multiphase steels (> 300 MPa)
2	Hot-formed steels (> 900 MPa)
3	Aluminum
4	Other steels (< 300 MPa)

Multiphase steels are steels with a structure that consists of multiple phases. Advanced-strength multiphase steels with a yield strength $R_{p0.2}$ of 300 to 600 MPa include, for example, dual-phase steels and TRIP steels. Advanced-strength multiphase steels with a yield strength $R_{p0.2}$ over 600 MPa include, for example, complex-phase steels and martensite-phase steels.

The hot-formed manganese-boron steels are ultra-high-strength steels with a yield strength $R_{p0.2}$ of over 900 MPa.

Weight proportions

The proportion of advanced-strength multiphase steels, super high strength hot-formed steels and aluminum is increasing. These measures decrease the vehicle weight while still guaranteeing maximum strength of the bodyshell.

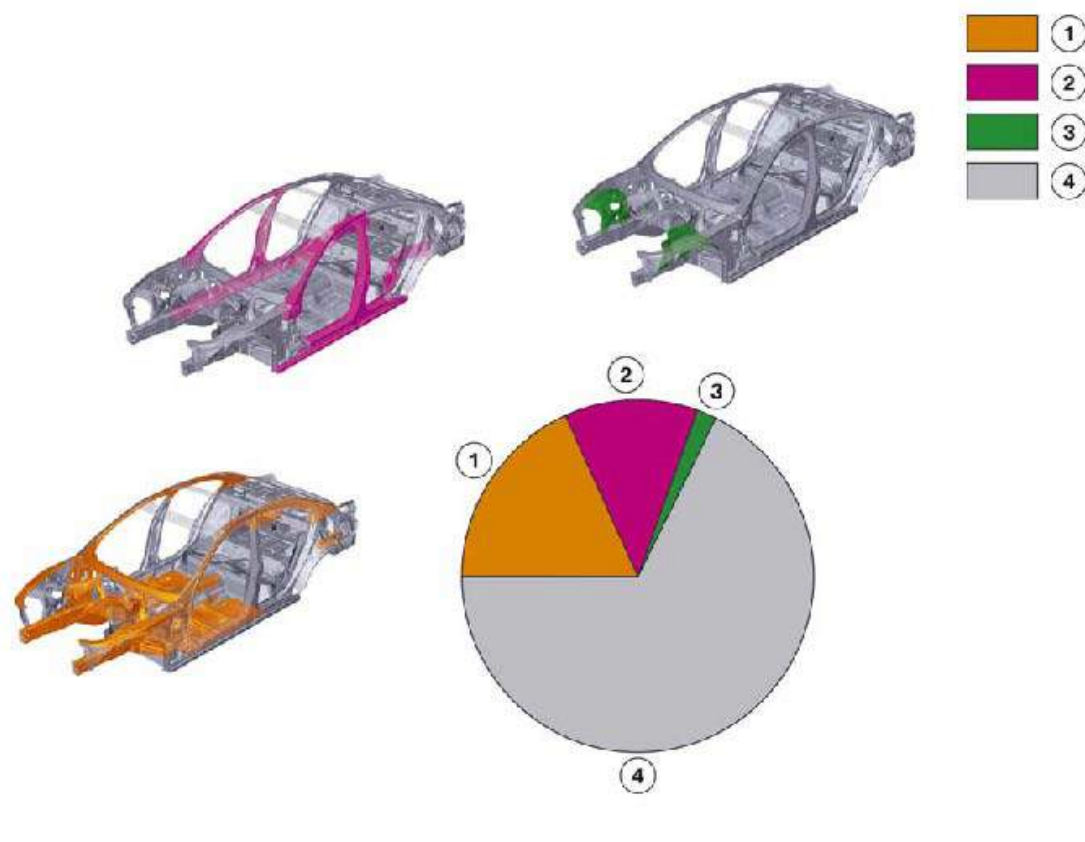


Fig. 7: Identifying F10 Bodyshell, Distribution Of Material Qualities
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Multiphase steels (> 300 MPa), proportion 20%
2	Hot-formed steels (> 900 MPa), proportion 12%
3	Aluminum, proportion 2%
4	Other steels (< 300 MPa), proportion 66 %

2.1.3. Corrosion protection and tightness

In order to optimize anti-corrosion protection, the body of the F10 is constructed primarily from galvanized sheet metal and aluminum or aluminum sandwich sheet metals. Welding, adhesive bonding and riveting are the assembly techniques used.

The overlaps of the panels are designed to minimize the joint surfaces, to prevent bondline corrosion. The penetration of water into the body structure is prevented in the design engineering of the vehicle by adhering and sealing the joint surfaces.

In particularly critical areas, expanding foam parts are used to seal the body cavities against moisture. Doubled up sheets in wet zones are double-sealed and, if necessary, they are also treated with wax to ensure a water tight

seal.

If necessary, the overlaps of the panels in dry zones are sealed to prevent dust from getting inside.

Corrosion-critical material pairing is avoided. The combinations of material substrates and joining methods were chosen with meticulous care in order to avoid corrosion risks.

Coating process

In the painting process, the bodyshell is dipped and:

- Alkaline-cleaned
- Phosphated (roughening the surface for better adhesion)
- Cathodic-dip coated (anticorrosion coating that coats the insides of all body cavities).

The organic paint coat is then baked on.

Furthermore, the body is sealed with PVC and protected by filler, topcoat and clear coat paints on the outer skin.

Critical parts of the body of the F10 are specially treated with cavity preservation sealant.

The objectives are:

- Three years without any visible corrosion whatsoever
- Twelve years without rust penetration
- High level of protection against water and dust intrusion.

2.1.4. Front section

Regarding the repair of the F10 front section, compared to the F01, there are no major changes.

As on previous vehicles, body struts are used to increase the rigidity of the front section.

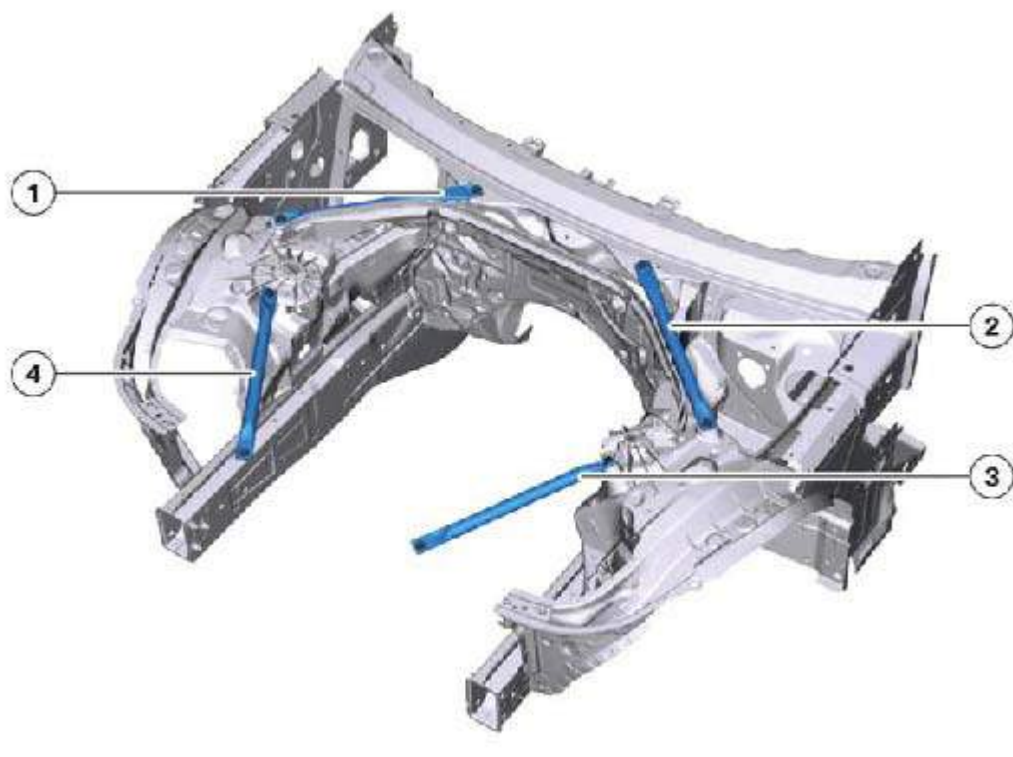


Fig. 8: Identifying F10 Front Body Section
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Rear right strut
2	Rear left strut
3	Front left strut
4	Front right strut

NOTE: When installing and dismantling the struts, it is mandatory to observe the repair instructions!

2.1.5. Side frame

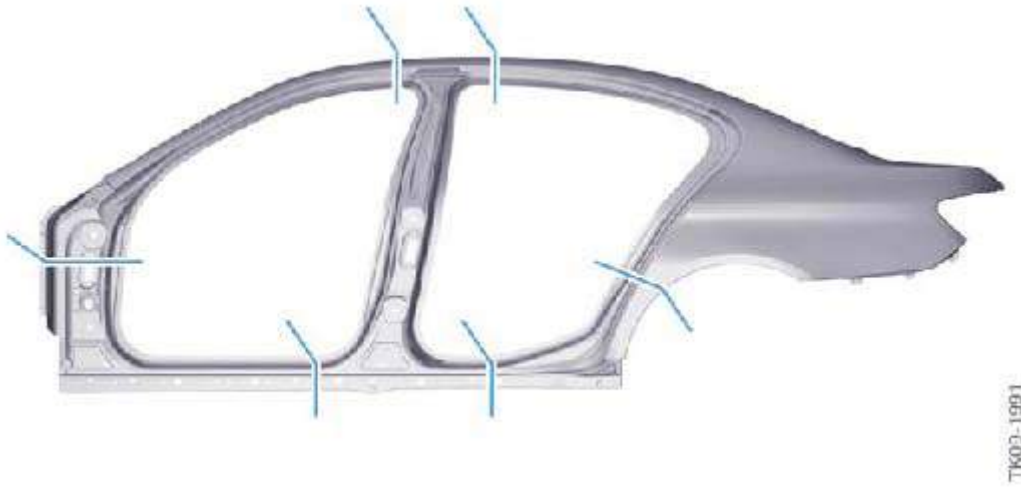


Fig. 9: Identifying F10 Separation Points On Side Frame
 Courtesy of BMW OF NORTH AMERICA, INC.

When performing a body repair, the separation points listed above should be used where possible.



Fig. 10: Identifying F10 Spare Part Sections
 Courtesy of BMW OF NORTH AMERICA, INC.

The rear side panel is welded to the bodyshell at the factory. However, if it needs to be replaced in the field, the rear side panel is to be bonded and riveted.

2.1.6. Roof

The roof is welded to the bodyshell at the factory. However, if it needs to be replaced in the field, the roof is to be bonded and riveted.

2.1.7. Rear Section

Regarding the repair of the F10 rear section, compared to the F01, there are no major changes.



TK09-2000

Fig. 11: Identifying F10 Body Rear Section
Courtesy of BMW OF NORTH AMERICA, INC.

2.1.8. Rear trim panel

The rear trim panel is welded to the bodyshell at the factory. However, if it needs to be replaced in the field, the rear trim panel is to be bonded and riveted.



Fig. 12: Identifying F10 Rear Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

2.2. PEDESTRIAN PROTECTION

The front section of the bodyshell of the F10 incorporates several pedestrian-protection measures. An impact absorber is installed between the bumper support and the bumper trim to provide protection for leg impact. The hood and the front fenders are made of aluminum and incorporate deformation elements. These design measures are adopted to produce a defined dissipation of energy in the event of an accident.

2.3. DOORS

As with the F01, the doors of the F10 are made of aluminum reinforced with sheet-metal intrusion beams.



TK03-2001

Fig. 13: Identifying F10 Front And Rear Doors
 Courtesy of BMW OF NORTH AMERICA, INC.



TK03-2047

Fig. 14: Identifying F10 Intrusion Beams On Doors
 Courtesy of BMW OF NORTH AMERICA, INC.

Large stamped sheet metal intrusion beams within the doors transfer force to the body and ensure high rigidity and component quality. The implementation of very deep stamping in the fabrication of the inner door panel structure and the clever use of a hinge reinforcement have enable a sophisticated design/contour of the exterior.

The window frame area fulfills the highest requirements for rigidity. It is a single section made of only two sheet-metal parts with minimum dimensions. Even in the visually sensitive window frame area, the intensive BMW exterior design queues where able to be implemented.

Advantages of this design are:

- Reduced CO₂ emissions and increased driving dynamics due to decreased weight (23 kg per vehicle)

- lighter than a comparable steel version)
- Interior impression of an improved spaciousness.
- Allows more light into the passenger compartment
- Improved visibility
- Window frames look lighter and slimmer when the doors are closed
- When the doors are open, the window frames look solid with a high-quality appeal
- Maximum form stability of the separate components provided by one-piece inner door panels
- Lowest possible number of components for the door structure
- Laser welding and structural adhesive bonding as the joining technologies of the door structure.

BMW has already made frequent use of aluminum door structures in the past, e. g. for the E52, E63, E64. However, only since the F01 have aluminum doors been produced for vehicles in large quantities.

The development objective for the F10 door structure, therefore, was to implement the familiar concept for an aluminum door from the F01 as a door that can be manufactured even in larger quantities at acceptable costs.

However, aluminum is not as easy to shape as steel, so aluminum stamping parts are much more difficult to manufacture than their steel counterparts, particularly when the stamping depths are considerable.

With the development of a new structure concept (with large braces to transmit force), manufacturing feasibility was ensured without having to forego the proven metal plate component construction methods

2.4. TRUNK LID

Regarding the repair of the F10 trunk lid, there are no major changes, compared to the F01.

Features of the trunk lid:

- Self-opening trunk lid
- Tension springs are located in horizontal position below the water gutter as for the F01
- Spindle drives are used instead of the tension springs for vehicles with automatic trunk lid ("Power tailgate" option 316)
- Trunk lid trim and toolkit as for F01
- Rear lights in the trunk lid, bulb are replaced as on F01
- New trunk lid push-button
- Rear view camera (option 3AG) integrated in the housing of the trunk lid push-button.



Fig. 15: Identifying F10 Rear View Camera
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Rear View camera

2.5. SLIDING/TILTING SUNROOF

An electrical glass sunroof is standard equipment on all F10 models.

It is designed as a slide/tilt sunroof system that is operated from the interior.

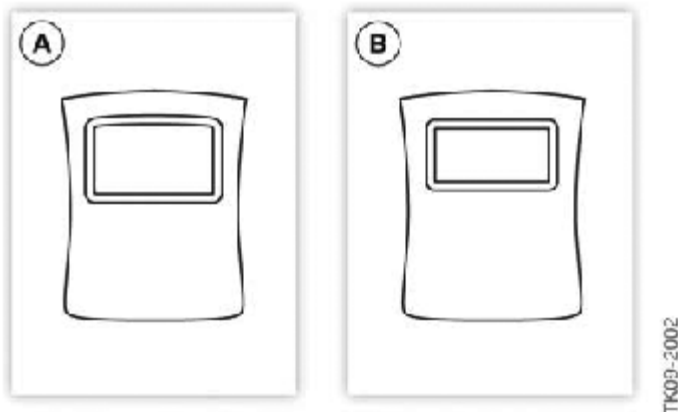


Fig. 16: Comparison Of Contour Roof And Standard Slide/Tilt Sunroof
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

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Index	Explanation
A	Contour roof
B	Standard slide/tilt sunroof

As with the F01, the front edge of the glass panel runs parallel to the windshield/roof edge (contour roof) and thus makes the appearance of the complete vehicle more harmonious. The larger glass area gives the passenger compartment a bright, spacious feeling. Thus the sensation of space is improved.

The glass panel and the sliding trim are all-electric and are operated using a switch in the roof function center (FZD).

The usual control and operation logic for the slide/tilt sunroof is maintained:

- **To open the roof-**
Push the switch to the rear
- **To close the roof-**
Push the switch forward
- **Set roof to vent position-**
Push the switch up.

The operation and control logic for opening the sliding trim is similar to that of the panorama-roof configurations. The operating logic corresponds to the direction of movement of the components and thus can be understood easily by the customer.

The sliding trim is integrated in the interior design of the headlining, providing a high-class interior effect.

To eliminate the risk of possible injuries, an anti-trap mechanism for the glass panel and for the gear mechanism cover is implemented over the entire travel path complying with the local legal requirements.

2.5.1. Dimensions

DIMENSIONS REFERENCE

Dimensions		F10	E60
Glass panel length	[mm]	Approx. 601	Approx. 487
Glass panel width	[mm]	Approx. 915	Approx. 921
Aperture size		F10	E60
Glass panel fully opened	[mm]	Approx. 394	Approx. 401
Glass panel in vent position		F10	E60
Vent gap of glass panel	[mm]	Approx. 22	Approx. 32
Vent gap of sliding trim	[mm]	Approx. 85	Approx. 75

2.5.2. Dismantling/installation and setting

COMPONENT CHART

Component	Notes
Glass panel	Possible with installed slide/tilt sunroof unit and installed roofliner
Sliding trim	Possible with glass panel removed
Drive of glass panel	Possible with roof function center removed
Drive of sliding trim	Possible with roofliner removed

2.6. COMMON PARTS STRATEGY

The objective of the common parts strategy is to enable the most stringent standards to be implemented at reasonable cost.



TK03-2003

Fig. 17: Identifying F10 Front Section, Floor Assembly And Rear Section
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Common part
2	New part

EXTERIOR AND INTERIOR EQUIPMENT

3.1. EXTERIOR EQUIPMENT

3.1.1. Front Bumper Carrier

The front bumper carrier of the F10 can be completely separated from the rest of the vehicle. It consists of the bumper, the lights, multiple sensors, and cover panels.

NOTE: Always follow proper repair instructions!

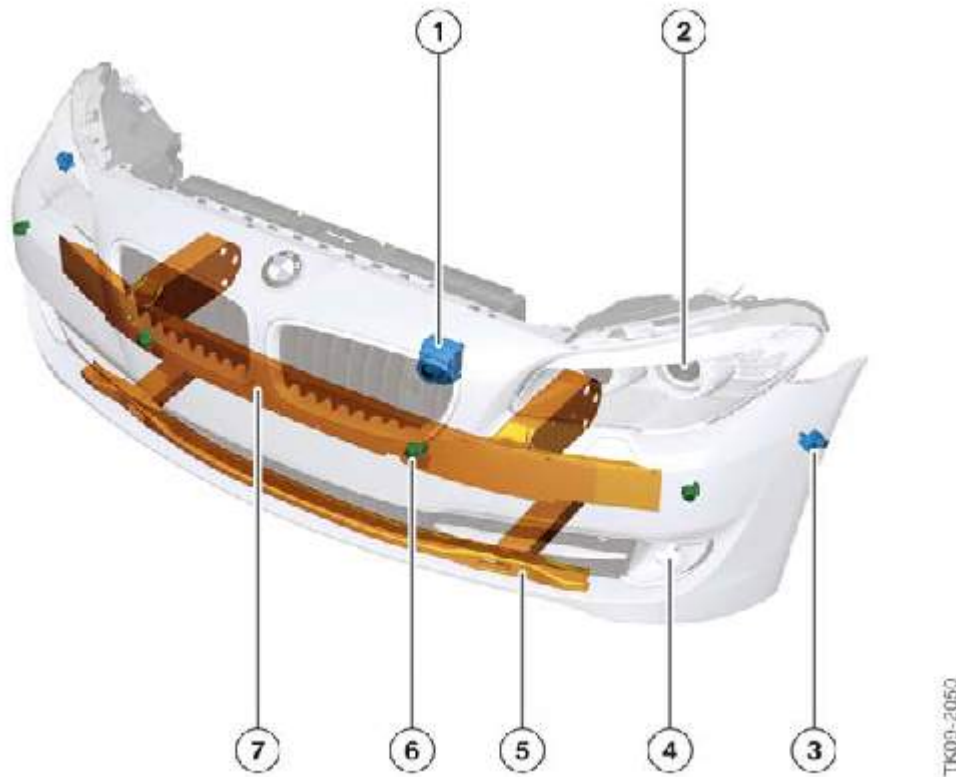


Fig. 18: Identifying F10 Front Bumper Carrier
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Night Vision Camera
2	Xenon headlights
3	Bumper camera
4	Fog lights
5	Lower bumper support
6	Sensor (Park Distance Control)
7	Upper bumper carrier

3.1.2. Rear bumper

The rear bumper carrier (with the impact absorber) is bolted to the bodyshell structure. It can absorb low-speed impacts (at least 4 km/h/2 5 mph) without damage to the bodywork.

The bumper system is a consumer-protection-compliant (low-speed impact) design that prevents damage to the vehicle's body structure. The consumer protection requirements are set forth in Europe by the German "Allianz" center for technology (AZT) and in the USA by the Insurance Institute for Highway Safety (IIHS). Deformation elements are specifically designed to lower repair costs.

3.1.3. Underbody design

The smooth vehicle underbody prevents air turbulence beneath the vehicle, this produces less drag and better road grip.

Modifying the vehicle underbody or removing the underbody panels will result in changes of the air flow which can have a negative effect on the road grip.



Fig. 19: Identifying F10 Underbody Panels (Aerodynamic Measures)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
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1	Front bottom cover
2	Engine compartment panel
3	Transmission panel
4	Air guide, flat
5	Underbody side panels
6	Air guide, flat

3.2. INTERIOR EQUIPMENT

3.2.1. Dimensions

INTERIOR DIMENSIONS REFERENCE

		F10	E60
Shoulder room, front	[mm]	1480	1455
Shoulder room, rear	[mm]	1427	1454
Elbow room, front	[mm]	1518	1485
Elbow room, rear	[mm]	1485	1496
Maximum headroom, front (without slide/tilt sunroof)	[mm]	1028	1028
Maximum headroom, front (with slide/tilt sunroof)	[mm]	992	992
Maximum headroom, rear (without slide/tilt sunroof)	[mm]	973	967
Maximum headroom, rear (with slide/tilt sunroof)	[mm]	965	955
Luggage compartment capacity	[liters]	520	520

3.2.2. Dashboard

As in the F07, a one-piece foam dashboard with a rigid foam support is installed in the F10.



Fig. 20: Identifying F10 Passenger Compartment, Dashboard
Courtesy of BMW OF NORTH AMERICA, INC.

The dashboard is foam-backed. The upper part is available in black or, for a bright interior color, also in "dark dolomite".

The interior color is continued in the bottom dashboard. This area below the decorative strip is available in the following colors:

- Black
- Everest grey
- Veneto beige
- Oyster
- Cinnamon brown

Highlights

- The cockpit is inclined towards the driver at an angle of approximately 7 degrees, this gives a clear orientation to the driver.
- Enhancement of decorative strips and fresh air grill by means of accentuating strips
- Fold-out DVD changer for 6 DVDs (option 696) in the glove box
- Folding compartment on the driver's side
- Sturdy cup holder in the center console

The attractive decorative strips lift as they terminate where they meet the doors. The decorative strips are available in high-gloss black or, as optional equipment, in finely polished aluminum or various types of wood.

In addition, the appearance of the fresh-air grille is enhanced by a chrome inlay on the adjusting lever for changing the air flow direction. For better operation at night, the F10 has added lighting to the thumbwheel on the center fresh-air grille. With the optional equipment 4-zone climate control (option 4NB), the thumbwheels on the outer fresh-air grille are also illuminated.

With the optional equipment 2-zone (option 534) or 4-zone climate control (option 4NB), the outer louvres and corresponding center bars on the center fresh-air grille have a galvanized finish.

For vehicles with the optional equipment 4-zone climate control, various ventilation levels can be selected using the thumbwheels on the center fresh-air grille.

- **Draft-free ventilation:**

Air flow is fanned out for a lower intensity

- **Maximum amount of air:**

Air is partially fanned out and bundled. This enables maximum air supply.

- **Direct ventilation:**

Air is bundled and can be specifically directed at one point.

The steel rod glove box hinge design of the F01 was replaced with a film type hinge on the F10.



TK03-2264

Fig. 21: Identifying F10 Glove Box Hinge
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Film hinge (F10)
B	Steel rod (F01)

3.2.3. Center console



TK03-2003

Fig. 22: Identifying F10 Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
A	Center console for automatic transmission

B Center console for manual transmission

Unlike the F01, a two-piece center console is installed in the F10. This consists of the center console carrier and the corresponding functional carrier, depending on the transmission installed (manual or automatic).

According to the equipment selected, the center armrest and the side bar on the driver's side come in either PVC leatherette, Dakota leather or Nappa leather with side double-lap seams.

The decorative areas of the dashboard are reflected in the center console decorative strip.

The rear passenger compartment also features galvanized inlays in the adjusting levers for changing the flow direction of the fresh-air grille. In addition, with the optional equipment 4-zone IHKA the symbols on the thumbwheel are illuminated.

With the optional equipment rear seat entertainment (option 6FG) or 4-zone IHKA, one storage compartment is omitted in each case and replaced by the corresponding operating controls.

3.2.4. Storage options, front

Fig. 23: Identifying F10 Folding Compartment And Front Door Storage, Front
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Folding compartment

2 Front door storage

The folding compartment on the driver's side provides an additional storage area within the driver's reach.



Fig. 24: Identifying F10 Storage Options, Front
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Cup holder/storage/ashtray (depending on the vehicle equipment)
2	Cup holder/storage/ashtray (depending on the vehicle equipment)
3	Center armrest
4	DVD changer
5	Glove box
6	Storage net

The front center armrest can be locked and is available on request with a side snap-in adapter. To connect an external audio device, such as a CD or MP3 player, an AUX- In connector and, on request, a USB audio interface is provided (with option 6FL).

The DVD changer for 6 DVDs (option 696) has been positioned in a fold-out unit in the glove box. This allows the capacity of the glove box to be used, even for vehicles with DVD changer. A handle marked with the relevant information is used for operation. The right side of the glove box contains a USB connection for import and export of data on a USB stick (e. g. Personal Profile or music collections).

Vehicles with automatic transmission

The cup holders are located in the front area of the center console. They have been positioned for optimal ergonomics and equipped with robust mechanisms that provides optimum stability of the cups and beverages placed in them. Between the cup holders, there is a 12V socket.

Behind the controller, there is another storage compartment.

Vehicles with manual transmission

The front area of the center console contains a storage compartment and a 12V socket.

The cup holder is located behind the controller. A second cup holder is below the front center armrest.

3.2.5. Rear storage options

Fig. 25: Identifying F10 Rear Storage Options
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Storage compartment in center armrest
2	Remote control (with option 6FG, rear seat entertainment)
3	Cup holder
4	Door panel
5	Storage compartment in front seat backrest

The center armrest contains two cup holders and a storage compartment. With the optional equipment rear seat entertainment (option 6FG), the remote control can be stowed in the storage compartment.

3.2.6. Front seats

The following front seat variants are available for selection in the F10:

- 20-way power front Comfort seats with memory (standard)
- ZAV Active vent seat package

The available ZAV Active vent seat package includes

- Multi contour seats (lumbar support)
- Front ventilated seats
- Active front seats
- Heated front seats

The front seats are largely identical to the front seats in the F07.

The following table provides an overview of the available optional equipment.

SEAT EQUIPMENT

	Seat adjustment, electrical, with memory (option 459)	Comfort seat, electrically adjustable (option 456)
Seat memory	Standard	Standard
Seat heating for driver/passenger	Option 494	Option 494
Lumbar support for driver/passenger	Option 488	Standard
Active seat for driver/front passenger	-	Option 455
Active seat ventilation, front	Option 453	Option 453
Ambient light	Option 4UR	Option 4UR
Rear seat entertainment	Option 6FG	Option 6FG

Seat adjustment

The comfort seat are essentially identical with the front seats in the F01.



Fig. 26: Adjusting F10 Comfort Seat
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Head restraint, height adjustment
2	Upper backrest adjustment
3	Backrest inclination adjustment

4	Forward/back seat adjustment
5	Seat height adjustment
6	Seat angle adjustment
7	Seat depth adjustment
8	Backrest width adjustment

NOTE: The Lumbar adjustment is not shown on this graphic but it counts for four other adjustments bringing the total adjustments of the Comfort seat to 20.

SEAT ADJUSTMENT REFERENCE

Seat adjustment options	Seat adjustment, electrical, with memory (option 459)	Comfort seat, electrically adjustable (option 456)
Seat height adjustment	Electrical	Electrical
Forward/back seat adjustment	Electrical	Electrical
Seat angle adjustment	Electrical	Electrical
Backrest inclination adjustment	Electrical	Electrical
Head restraint, height adjustment	Electrical	Electrical
Seat depth adjustment	Manual*	Electrical
Backrest width adjustment	-	Electrical
Upper backrest adjustment	-	Electrical

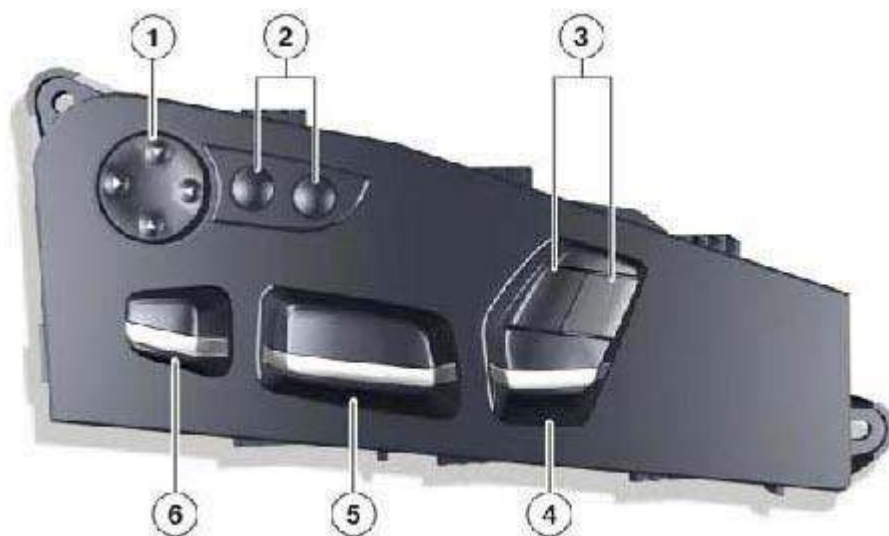


Fig. 27: F10 Switch Cluster For Driver's Seat Adjustment (On Seat), Comfort Seat
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Lumbar support adjustment
2	Backrest width adjustment
3	Upper backrest adjustment
4	Backrest inclination and head restraint height adjustment
5	Longitudinal, seat height and seat inclination adjustment
6	Seat depth adjustment

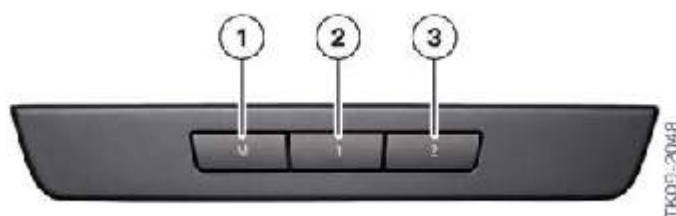


Fig. 28: F10 Switch Cluster Memory (On Door Panel)
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Button M (save current position)
2	Button 1 (call up stored position)
3	Button 2 (call up stored position)

Seat heating

Fig. 29: Identifying F10 IHKA Control Panel
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Seat heating button, driver's seat
2	Seat heating button, front passenger seat

Active seat ventilation



Fig. 30: Identifying F10 IHKA Control Panel
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Button, active seat ventilation, driver's seat
2	Button, active seat ventilation, front passenger seat

Side airbag



Fig. 31: Identifying F10 Side Airbag

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Airbag module in the backrest

The front side airbag is integrated into the backrest of the driver's and front passenger's seat. The seat back extends into the side of the seat, this is called the "encompassing seat wall". When the airbag is triggered, the side is pushed slightly open, this allows the airbag to open and provide its protective function. The front seats are equipped with seat-occupancy recognition and a belt tensioner.

Crash-active headrest

The front seats are equipped with a crash-active headrest. In the fully electrical seats, the head restraint has a button for adjusting the distance to your head.

In the comfort seat, the distance is adjustable using the upper backrest adjustment.

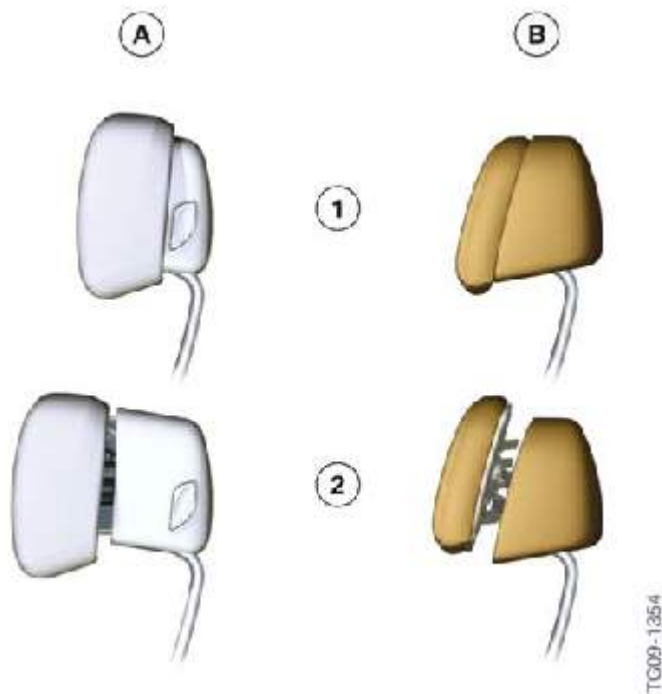


Fig. 32: Identifying F10 Crash-Active Head Restraint
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Comfort precision advance
2	Position of activated crash-active head restraint
A	Basic seat/sport seat

B Comfort seat**Rear display**

Fig. 33: Identifying F10 Rear Display
Courtesy of BMW OF NORTH AMERICA, INC.

With the optional equipment rear seat entertainment (option 6FG) one 8.2" swivelling display is installed in the headrest of each of the front seats.

3.2.7. Rear seats

In the F10, a seat bench with backrest in sandwich design is installed as standard, or a Split fold-down-rear seat with through-loading with through-loading as optional equipment (option 465).

Highlights

- Backrest in sandwich design (only basic seat bench)
- Center armrest (folding) with storage compartment and cup holder
- Center head restraint, folding
- Backrests, folding 40 %, 60 % or 100 % (only with through-loading system, option 465)

In the F10, a completely newly developed backrest is installed in the basic seat bench. Unlike the predecessor model, this does not consist of a metal structure, but instead of a composite material.

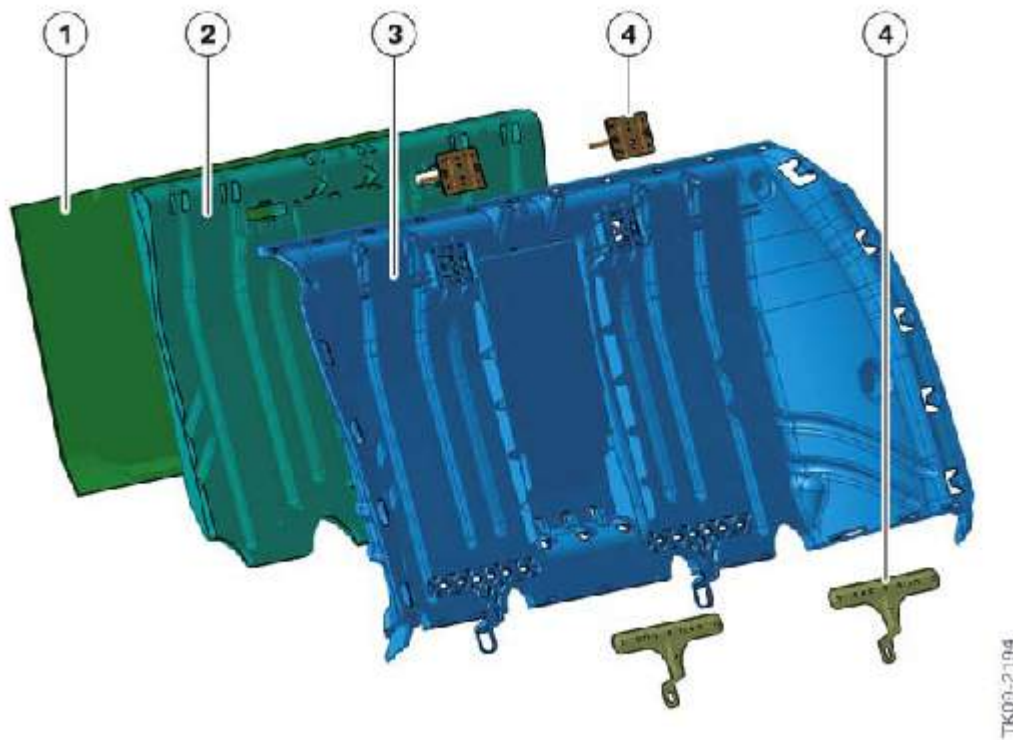


Fig. 34: Identifying F10 Sandwich Structure Of Basic Backrest
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Counter support
2	EPP insert
3	Moulded plastic part
4	Holder (embedded in the material)

The front moulded plastic part consists of polypropylene with 30 % glass fiber (PP-GF30, impact resistant). The moulded plastic part is foamed on the rear using expanded polypropylene EPP), a polypropylene-based particle foam.

The sandwich structure is highly stable, with a lower weight than a conventionally manufactured backrest structure.

SEAT EQUIPMENT

	Basic seat bench	Seat bench with through-loading system (option 465)
Seat heating for rear seats	Option 496	Option 496
Remote control in storage compartment (with rear seat entertainment)	Option 6FG	Option 6FG
Ski bag	-	Standard

Center armrest/head restraint

Another new feature in the F10 is the free-standing center armrest with separate folding head restraint in both seat bench versions.



Fig. 35: Identifying F10 Rear Seats

Courtesy of BMW OF NORTH AMERICA, INC.

Unlike the E60, the center head restraint has been separated from the center armrest and designed as a folding head restraint. When folded, the view towards the rear is improved without the need to actuate the center armrest. This also contributes to active safety.

Because the head restraint is in a far forward position when folded up, it provides the center rear seat passenger a high degree of safety despite a relatively low weight.

Through-loading system

The Split fold-down-rear seat system (option 465) with through-loading makes the F10 the perfect companion to both everyday life and leisure. Thanks to the divided rear seat backrest, even bulky goods can be transported without a problem, and there is still room for occupants in the rear passenger compartment.

The rear seat backrest can be divided and folded in a 60:40 ratio. The rear seat backrest elements are unlocked from the luggage compartment.

Together with the through-loading system, a ski bag (option 464) can also be installed. This allows up to four pairs of skis or two snowboards to be transported neatly and securely. When the ski bag is not in use, it is stowed compactly behind the center armrest.

Seat heating

Seat heating (option 496) can be ordered as parts as ZCW Cold Weather Package option.

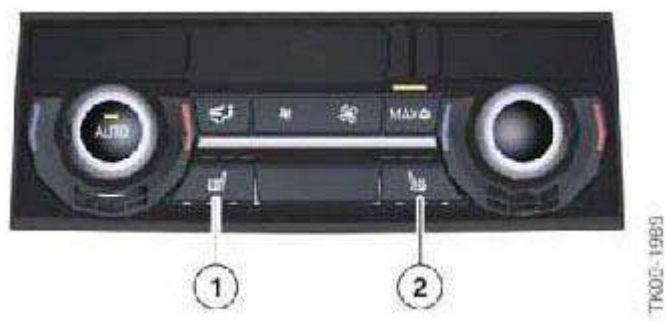


Fig. 36: Identifying F10 Control Panel For Rear IHKA

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION CHART

Index	Explanation
1	Seat heating button, left
2	Seat heating button, right

3.2.8. Climate control

For the F10, two versions of the integrated automatic heating/air conditioning system IHKA are available:

- 2-zone IHKA
- 4-zone IHKA (option 4NB)

IHKA REFERENCE CHART

	IHKA 2 zones	IHKA 4 zones
Separate control of temperature, front left/right	X	X
Separate control of amount of air and air distribution, front left/right	X	X
Separate control of temperature, rear passenger compartment left/right	-	X
Independent ventilation	X	X
Residual heat utilization	X	X
Anti-misting	X	X
Fresh air and recirculating air filter (microfilter)	X	X
Ionizer to prevent condenser odors	X	X
Individual automatic control with five intensity levels	X	X
Solar compensation	X	X
Automatic recirculated air control (including combination filter ⁽¹⁾)	X	X
ALL function (driver's settings are transferred to front passenger side)	X	-
ALL function (driver's settings are transferred to front passenger side and left/rear passenger compartment)	-	X
Separate IHKA controls in rear passenger compartment (center console)	-	X
Comfort nozzle (fresh-air grille on center dashboard) with individual range of adjustment from spot (focused) to diffuse (draught-free)	-	X

¹ A solar sensor takes into account any external light and/or heat sources that affect the climate in the passenger compartment.

(1) Combination of a carbon filter and microfilter traps dust and pollen protects against unpleasant odors.

3.3. LUGGAGE COMPARTMENT

The luggage compartment capacity is 520 liters. The luggage compartment has sufficient space for items such as four golf bags (46"), a stroller or four pairs of skis (with optional equipment ski bag, option 464). The optional seat bench with through-loading system (option 465) allows the luggage compartment capacity to be expanded even further.

3.3.1. Dimensions

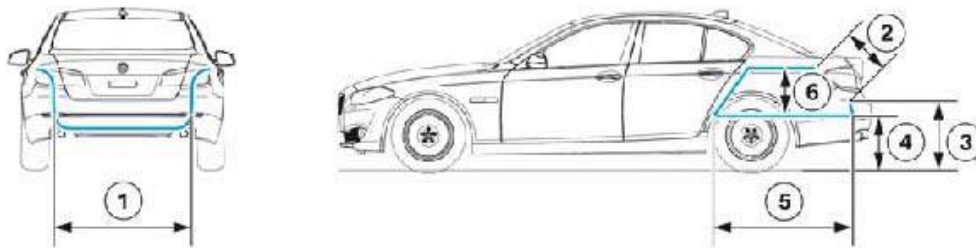


Fig. 37: Identifying F10 Luggage Compartment Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

F10 LUGGAGE COMPARTMENT DIMENSIONS REFERENCE

		F10	E60
(1) Smallest luggage compartment width (between the wheel arches)	[mm]	830 - 906	832 - 907
(2) Diagonal measurement of loading opening	[mm]	487	496
(3) Loading edge height above roadway	[mm]	649	664
(4) Luggage compartment floor height above roadway	[mm]	492	490
(5) Luggage compartment floor length	[mm]	1145	1111
(6) Smallest luggage compartment height	[mm]	516	-
Largest luggage compartment width on the floor	[mm]	1344	1374
Width of rear opening - top	[mm]	1182	1332
Width of rear opening - bottom	[mm]	914	809
Luggage compartment capacity	[l]	520	520

ACCESSORIES AND EQUIPMENT

Lights - Repair Instructions

HEADLIGHT ADJUSTMENT

63 10... TEST REQUIREMENTS FOR HEADLIGHT VERTICAL AIM ADJUSTMENT

IMPORTANT: Do not perform headlight adjustment immediately after lowering the vehicle on the vehicle hoist. In this case, move the vehicle for approx. 15 m on its own wheels before adjustment.

IMPORTANT: Refer to the operating instructions for the headlight adjustment device!

- Park vehicle on flat and even surface.
- Replace faulty glass and mirrors and blackened light bulbs.
- Correct adjustment of headlights in relation to engine compartment lid (gap dimensions).
- Check tire pressure and correct if necessary.
- Only halogen headlight, fog light and headlight for Dynamic Light Spot:
 - Apply load equivalent to one person on driver's seat (approx. 75 kg).
 - Vehicle with full fuel tank or appropriate additional weight in luggage compartment.
- Switch the ignition on.
- Manual headlight beam throw adjustment: Move handwheel to neutral position (1).
- Light switch must be in "low beam/driving light" position (3).
- Do not carry out the headlight adjustment in the "automatic driving lights control" light switch position (2).
- Version with Xenon or LED (automatic headlight beam throw adjustment): Wait 80 s after switching on lights. During this time, do not move the vehicle and avoid vibrations.

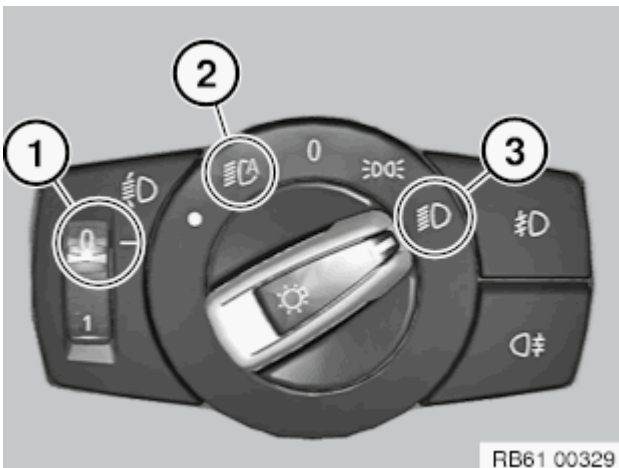


Fig. 1: Identifying Light Switch

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not move the vehicle and steering wheel during the measuring and adjustment procedures!

IMPORTANT: A correct measurement/adjustment requires exact positioning of the headlight adjustment device (1)!
Headlight adjustment device (1) must stand vertically to the vehicle longitudinal axis!
This applies to all headlights!

Position headlight adjustment device (1) centrally in front of vehicle (2) at distance (A) = **10 cm** .

Align headlight adjustment device (1) by laser beam (3). Laser beam (3) must hit two suitable points, e.g. marked by arrows.

IMPORTANT: Points must be vehicle proof! Trim panels are not suitable!

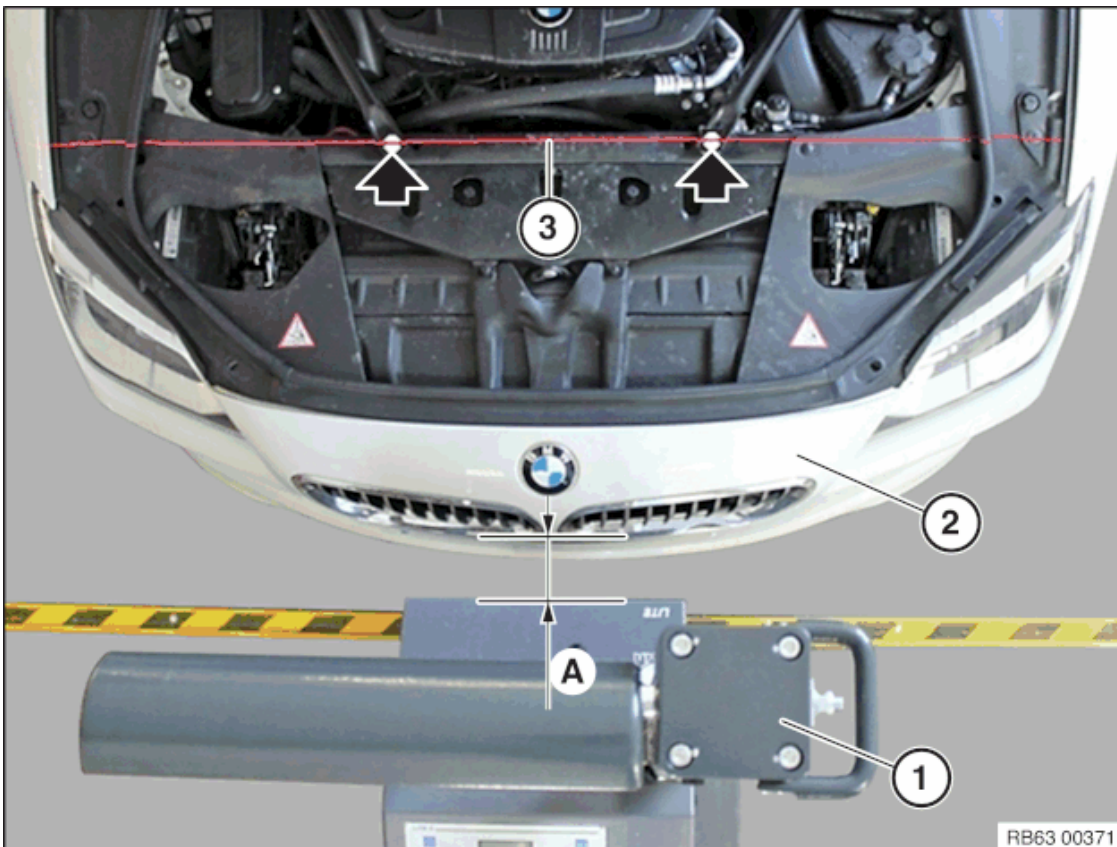


Fig. 2: Positioning Headlight Adjustment Device
Courtesy of BMW OF NORTH AMERICA, INC.

If the headlight adjustment device (1) does not have a laser beam (1), complete the alignment analogous with

the line in the mirror.

The center of the collecting lens (1) must match the center of headlight (2) horizontally.

Corrections are made by raising or lowering the headlight adjustment device.

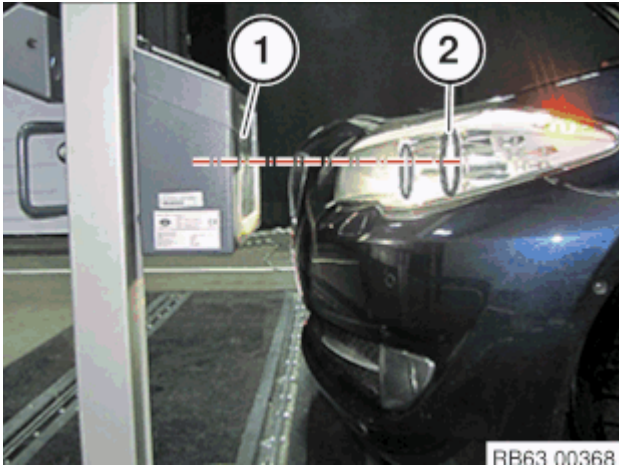


Fig. 3: Center Of Collecting Lens (1) Must Match Centre Of Headlight
Courtesy of BMW OF NORTH AMERICA, INC.

When positioned correctly, the light/dark boundary of the headlight (marked with arrow) must hit the collecting lens of the adjusting device in the center:

1. The headlight adjusting device is too low.
2. The headlight adjusting device is positioned correctly.
3. The headlight adjusting device is too high.

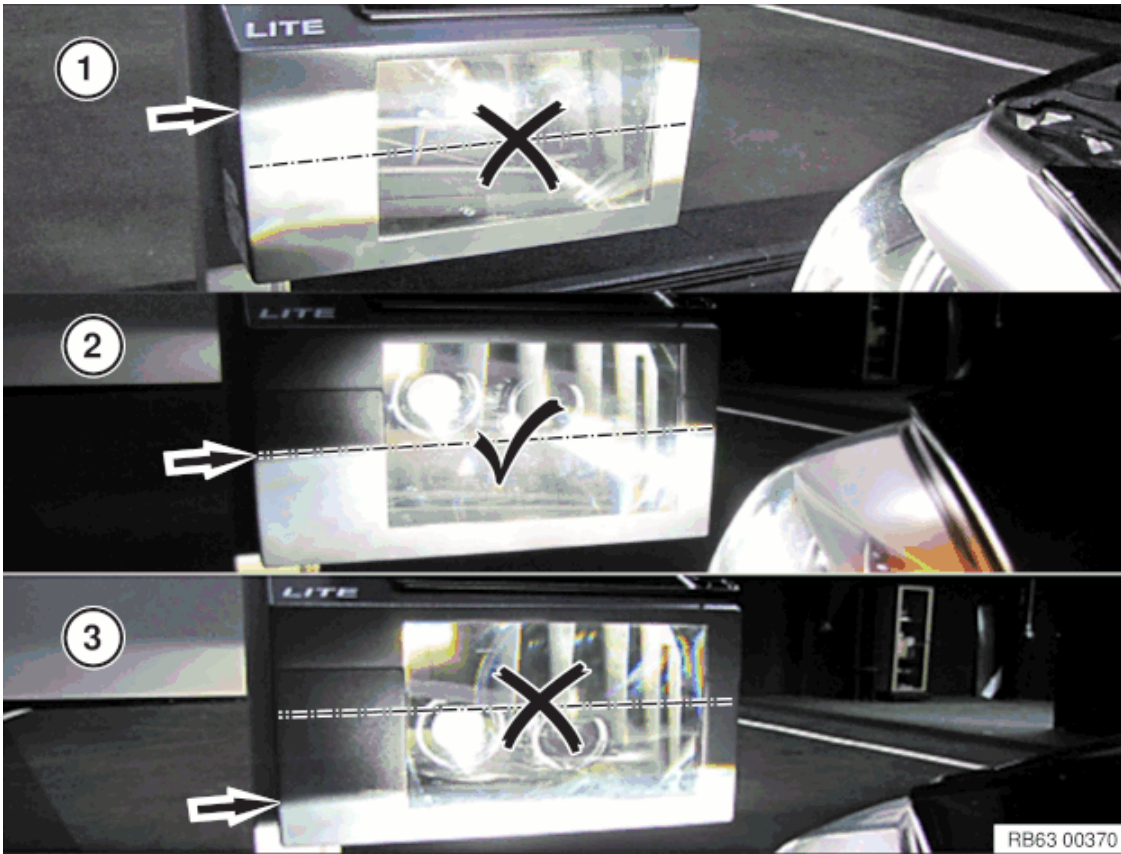


Fig. 4: Light/Dark Boundary Of Headlight (Marked With Arrow) Must Hit Collecting Lens
 Courtesy of BMW OF NORTH AMERICA, INC.

The center of the collecting lens (1) must match the center of headlight (2) vertically. Corrections are made by sliding the side of the headlight adjusting device to the left or right.

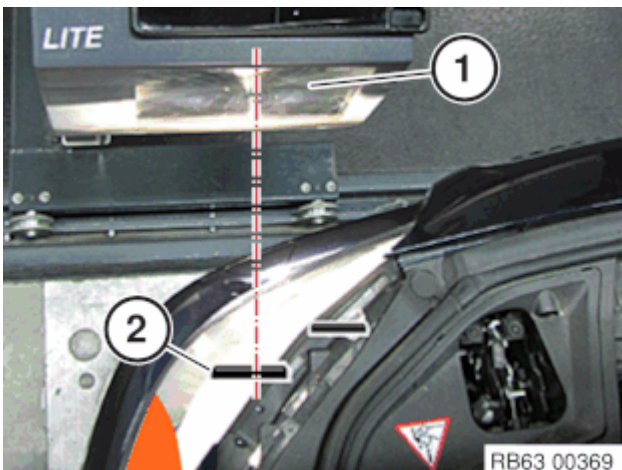


Fig. 5: Center Of Collecting Lens (1) Must Match Center Of Headlight Vertically
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The figure shows an example for the transparent screen of halogen headlights.

See **Transparent screens of different headlight types (halogen, xenon, LED).**

Set marker line {M} on aimer to {e}. Scale graduations on the headlight adjustment device are equal to a gradient in cm at a distance of 10 meters.

Light/dark boundary of headlights in the headlight adjustment device:

{e} Setting dimension, headlights:

- Value is indicated on the headlight housing and on vehicles with production date up to 2011 on the type plate in %.

(e.g.: **1.0 %** = -10 cm/10 m = - **1.0 %** on the headlight adjusting device)

- Value **1.1 %** (adjustment value - **1.1 %**)

Setting dimension, fog lights:

- Value **2.0 %** = -20 cm/10 m = - **2.0 %** on the headlight adjusting device applies to all BMW Group vehicles.

{H} Height of center of headlight above parking surface.

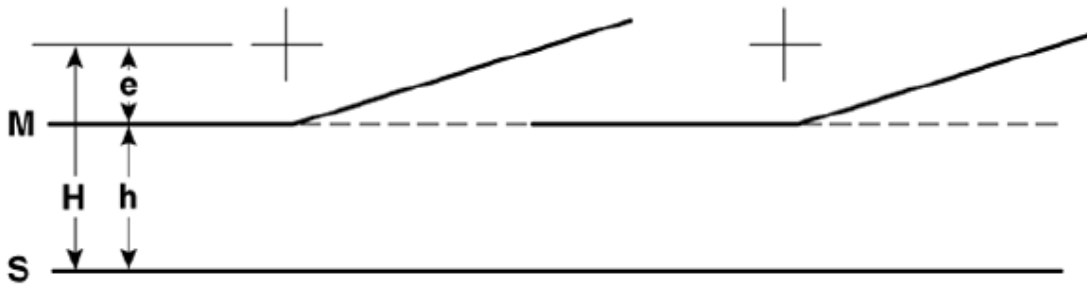
{h} {H} - {e} = height of marking line above parking surface

+ Central mark = center point of high-beam headlight.

{M} Marker line of the headlight adjustment device

{S} Standing surface of the vehicle and headlight adjustment device

NOTE: Adjustment dimension {e} is only valid for EUR. Observe differing national regulations.



30 63 067

Fig. 6: Headlight Vertical Aiming Screen
 Courtesy of BMW OF NORTH AMERICA, INC.

63 10 004 ADJUSTING HEADLIGHTS

NOTE: Comply with TEST PRECONDITIONS FOR HEADLIGHT ADJUSTMENT.

Adjust headlights at adjusting screws (1) and (2).

A definite allocation of adjusting screws is not possible.

1. Adjustment screw primarily for vertical adjustment
2. Adjustment screw primarily for lateral adjustment

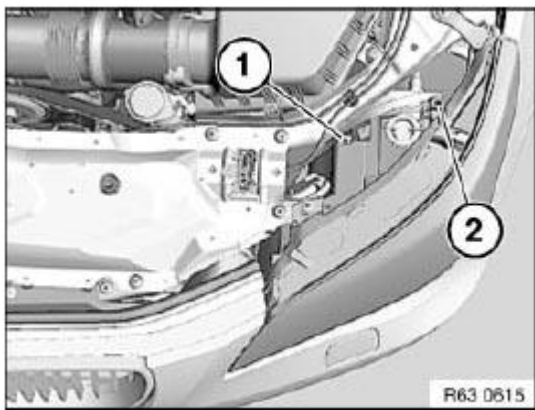


Fig. 7: Identifying Adjusting Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

63 10 014 ADJUSTING FOG LAMPS LIGHTS - REPAIR - E92/E93

Comply with TEST PRECONDITIONS FOR HEADLIGHT ADJUSTMENT.

With standard front bumper trim:

Adjust fog lamp (1) at adjusting screw (2).

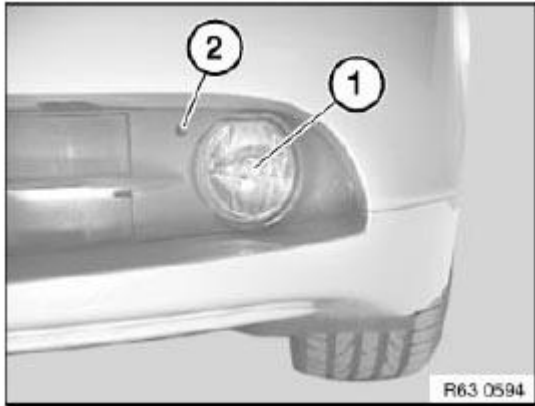


Fig. 8: Identifying Fog Lamp And Adjusting Screw (Bumper Trim)
Courtesy of BMW OF NORTH AMERICA, INC.

With M aerodynamic kit:

Adjust fog lamp (1) at adjusting screw (2).

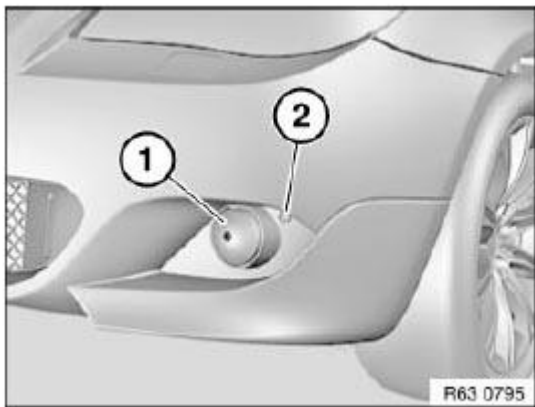


Fig. 9: Identifying Fog Lamp And Adjusting Screw (M Aerodynamic Kit)
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSPARENT SCREENS OF DIFFERENT HEADLIGHT TYPES (HALOGEN, XENON, LED)

The following equipment-specific and model-specific headlight types are used in BMW Group vehicles:

- Halogen headlights
- Xenon headlights
- LED headlight

Every headlight type has its specific transparent screen. In spite of these differences, all headlight types meet statutory specifications. The images below show transparent screens from the left headlight in the low-beam headlight switch position projected onto a wall (no automatic setting!). The transparent screens from the right headlight are the same. The transparent screens correspond with those in an accumulator box of a headlight adjusting device.

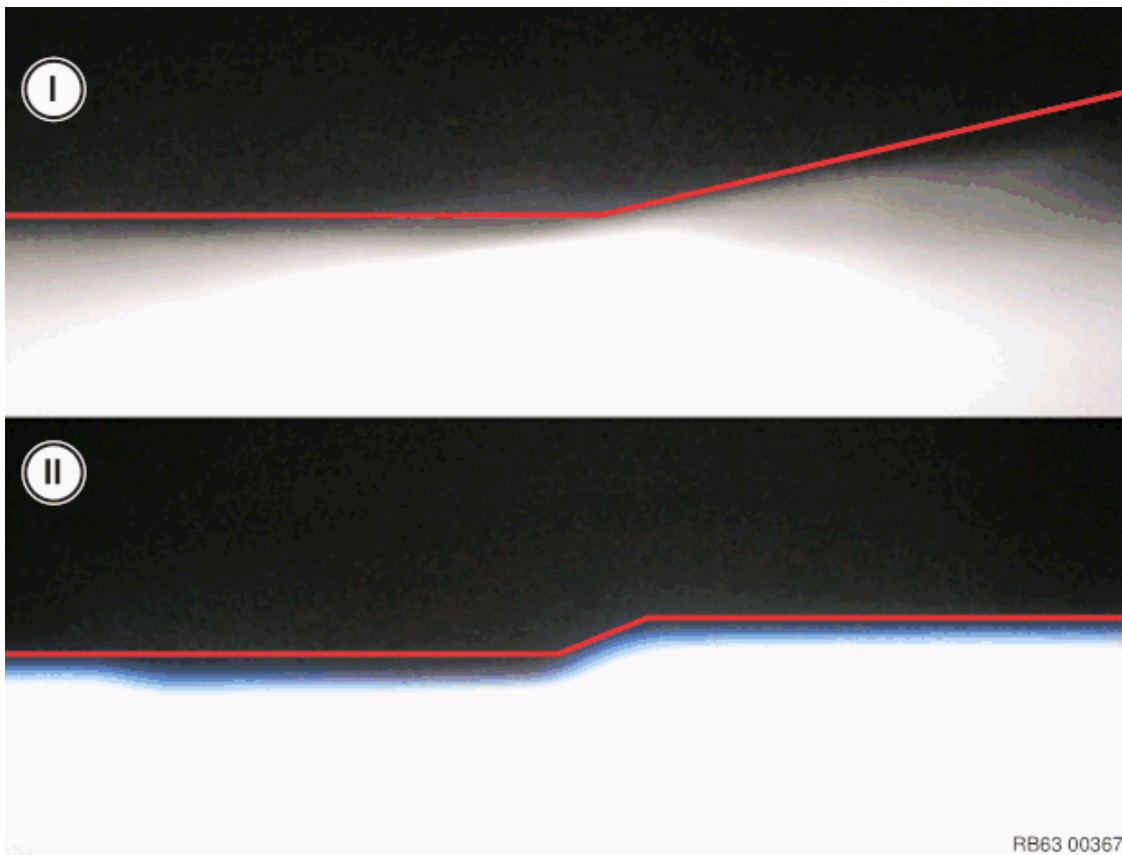


Fig. 10: Type I And Type II Transparent Screens
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: For headlight adjustments with electronic headlight adjustment devices, e.g. MAHA Lite 3, it is absolutely required to determine the type of transparent screen!

Type I: Transparent screen indicates a continuous rise of the light/dark boundary on the right side.

Type II: Transparent screen indicates a brief rise of the light/dark boundary on the right side.

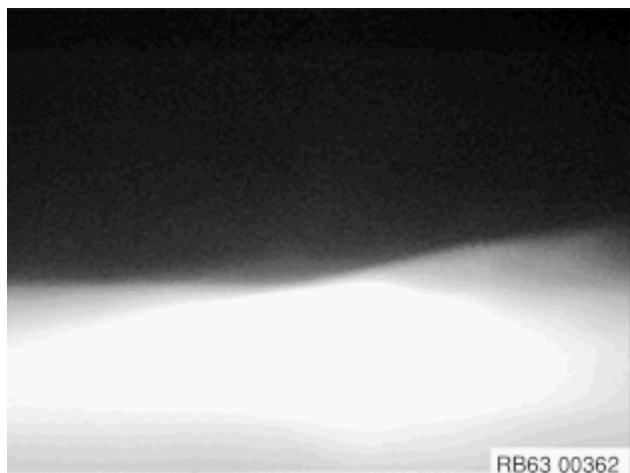


Fig. 11: Identifying Halogen Headlight Type I
Courtesy of BMW OF NORTH AMERICA, INC.

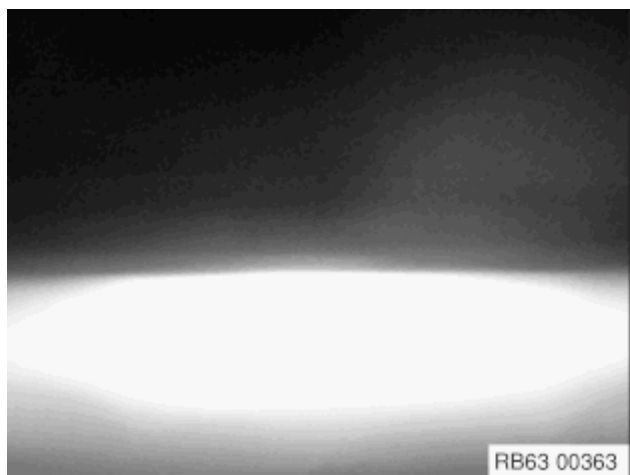


Fig. 12: Identifying Halogen Headlight US Version R60 Only
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 13: Identifying Xenon Headlights Type II

Courtesy of BMW OF NORTH AMERICA, INC.

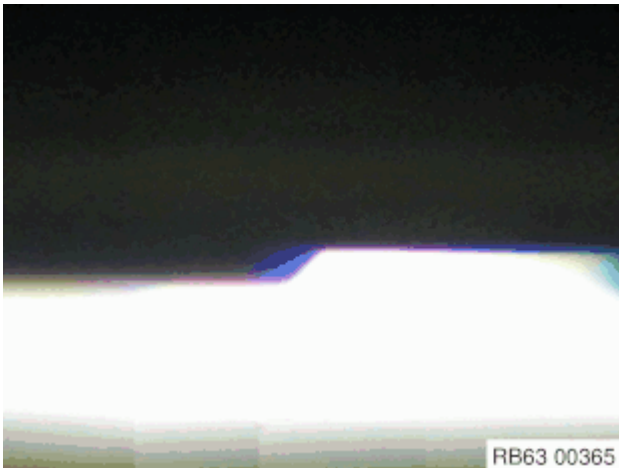


Fig. 14: Identifying LED Headlight F01, F02, F03 Type II
Courtesy of BMW OF NORTH AMERICA, INC.

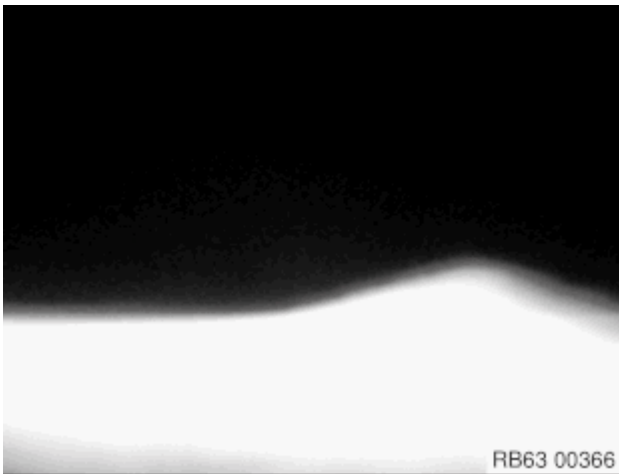


Fig. 15: Identifying LED Headlight F06, F12, F13, E71 Type I
Courtesy of BMW OF NORTH AMERICA, INC.

HEADLIGHTS

63 12... HEADLIGHT FOGGING FAULT PATTERN

NOTE: Certain weather conditions can lead to fogging on the inside of the headlight lens.

This is not necessarily a fault that requires replacement of the headlight.

(A): Permissible fogging. Headlight does not need to be replaced.

(B): Impermissible fogging. Replace the headlight.



Fig. 16: Identifying Permissible And Impermissible Fogging
Courtesy of BMW OF NORTH AMERICA, INC.

63 11... INSTALLING HEADLIGHT REPAIR KIT

Necessary preliminary tasks:

- Remove headlight. See XENON HEADLIGHT or ADAPTIVE HEADLIGHT.

NOTE: Damaged holder (1) can be replaced with the repair kit.

Replacement of headlight is not required !

A: Remove the damaged holder (1) as shown.

B: Fit holder from repair kit (3) as illustrated and tighten screws (2).

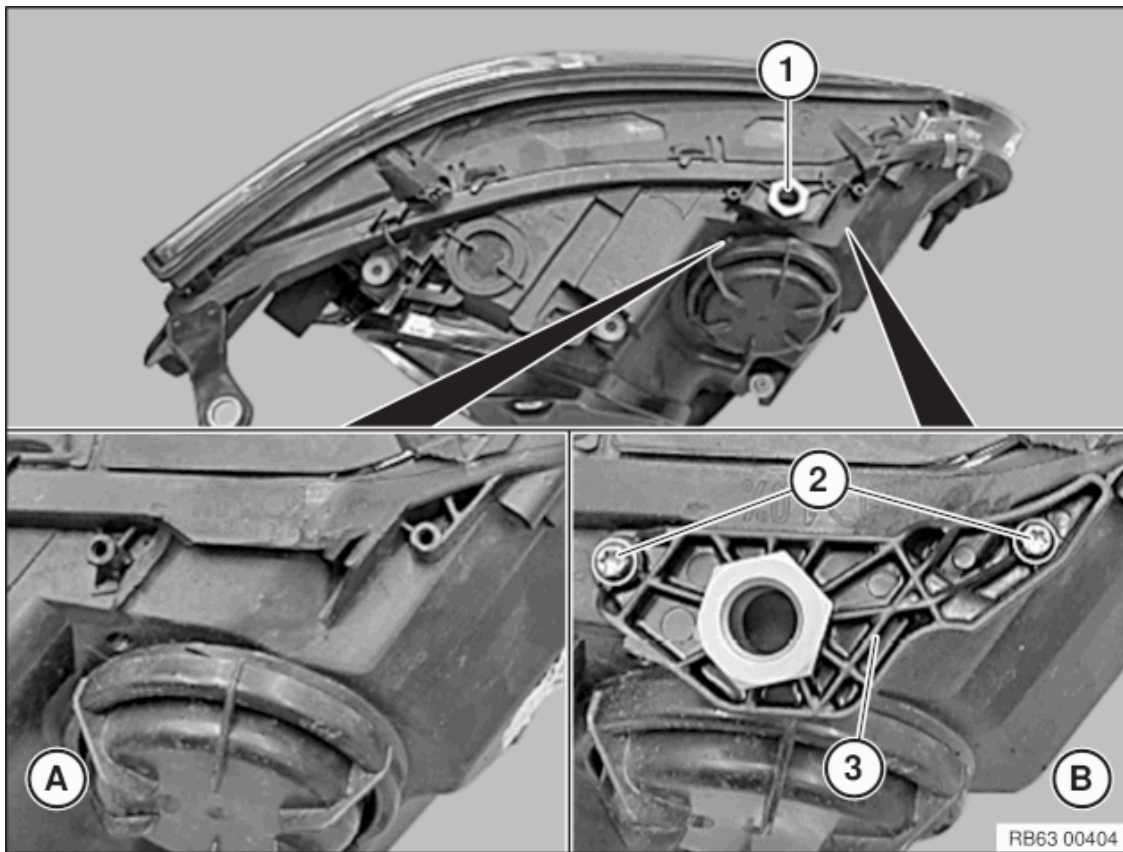


Fig. 17: Identifying Repair Kit, Screws, And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

Adjust **HEADLIGHTS**.

63 12 001 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT

NOTE: This operation is described in removing and installing/replacing **LEFT HEADLIGHT (XENON HEADLIGHT)**.

63 12 002 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT

Operation is described in:

Removing and installing/replacing **LEFT HEADLIGHT (XENON HEADLIGHT)**

63 12 010 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT (XENON HEADLIGHT)

WARNING: Follow instructions for **HANDLING LIGHT BULBS (EXTERIOR LIGHTS)**.

Unclip strip (1) in direction of arrow.

Release screws (2) underneath.

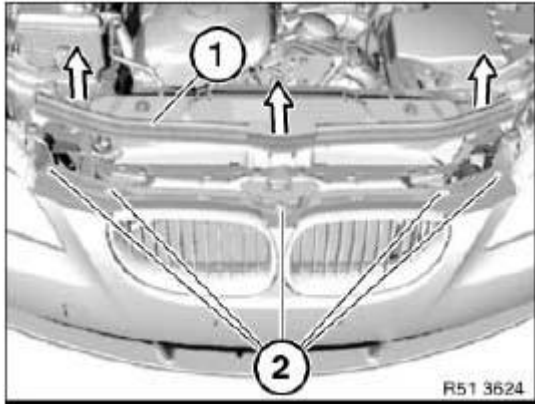


Fig. 18: Identifying Strip And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Turn cap (1) approx. 30° counterclockwise and remove from headlight (2).

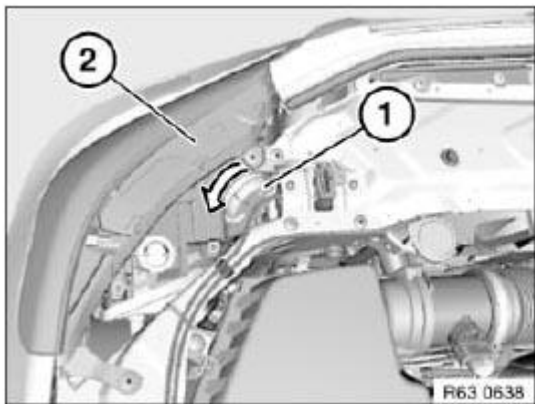


Fig. 19: Removing Headlight

Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1)

Unfasten screws (2).

Installation:

- Observe **GAP DIMENSIONS**
- Adjust **HEADLIGHTS**

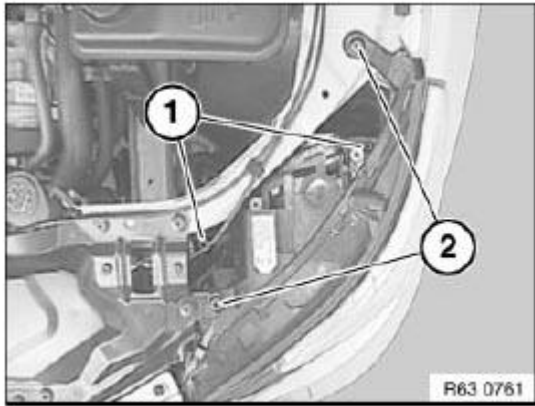


Fig. 20: Identifying Slacken Screws And Unfasten Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Pull bumper panel (1) forwards slightly and feed out headlight (2) in direction of arrow.

Installation:

Make sure headlight (2) is correctly seated in lower holder.

Unlock and disconnect associated plug connections (3).

Remove headlight (2).

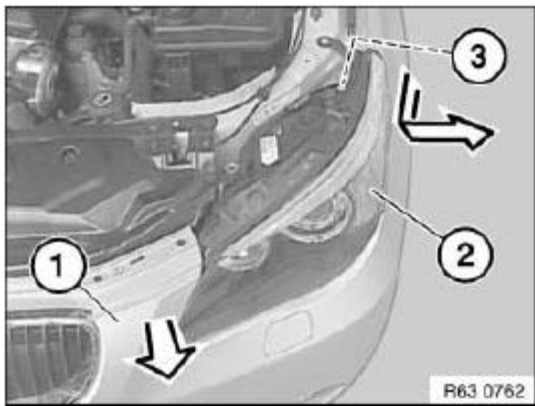


Fig. 21: Disconnecting Associated Plug Connections
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Unclip headlight holder (1) and remove.
- Remove **IGNITION UNIT AND BULB FOR XENON HEADLIGHT (2)**
- Remove **CONTROL UNIT FOR XENON HEADLIGHT (3)**

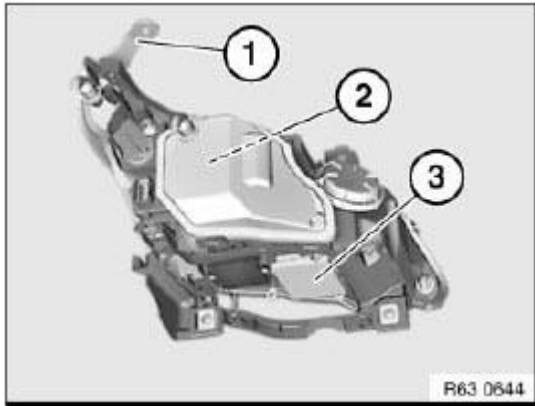


Fig. 22: Identifying Headlight Holder And Ignition Unit
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining lugs (1) on headlight holder (2) must not be damaged.

Make sure headlight holder (2) is correctly engaged on headlight.

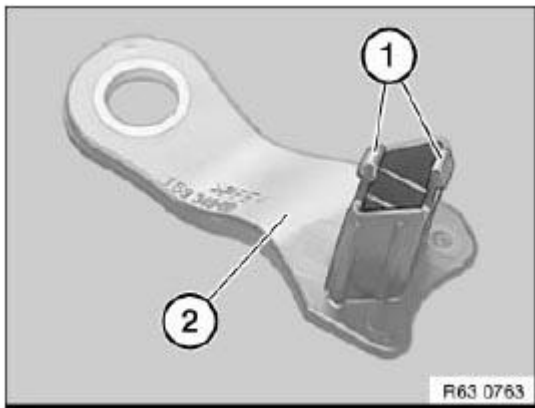


Fig. 23: Identifying Lugs And Headlight Holder
 Courtesy of BMW OF NORTH AMERICA, INC.

63 12 012 REMOVING AND INSTALLING RIGHT HEADLIGHT (XENON HEADLIGHT)

Operation is described in:

Removing and installing **LEFT HEADLIGHT (XENON HEADLIGHT)**

63 12 015 REMOVING AND INSTALLING LEFT HEADLIGHT (ADAPTIVE HEADLIGHT)

Operation is described in:

Removing and installing LEFT HEADLIGHT (XENON HEADLIGHT)

63 12 016 REPLACING LEFT HEADLIGHT (ADAPTIVE HEADLIGHT)

WARNING: Version with xenon headlights: Danger to life due to high voltage! Therefore, before removing, disconnect all components from the power supply (lighting system and ignition off). Work on the entire xenon lighting system (control unit, ignition unit with bulb) may only be carried out by specialist personnel. Follow instructions for handling light bulbs (EXTERIOR LIGHTS).

Necessary preliminary tasks:

- Remove LEFT HEADLIGHT
- Remove CONTROL UNIT FOR XENON HEADLIGHTS
- Remove DRIVE/ELECTRONICS BOX FOR ADAPTIVE HEADLIGHT
- REMOVE BULB/IGNITION UNIT FOR XENON HEADLIGHT
- If necessary, remove bulbs. See REPLACING HALOGEN BULB FOR HIGH-BEAM HEADLIGHT ON LEFT, REPLACING BULB FOR SIDE MARKER LAMP, FRONT LEFT, REPLACING BULB FOR FRONT LEFT SIDE LIGHTS (XENON HEADLIGHT) (FROM 03/2007), REPLACING BULB FOR FRONT LEFT (OR RIGHT) TURNING LIGHT, or REPLACING BULB FOR TURN INDICATOR, FRONT LEFT.

63 12 017 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT (ADAPTIVE HEADLIGHT)

Operation is described in:

Removing and installing LEFT HEADLIGHT (XENON HEADLIGHT).

63 12 860 REPLACING CONTROL UNIT FOR LEFT XENON HEADLIGHT

WARNING: Version with xenon headlights: Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal. Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks:

- Remove LEFT HEADLIGHT

Build date up to 03/07:

Release screws (1).

Remove control unit for xenon headlight (2) from headlight (3).

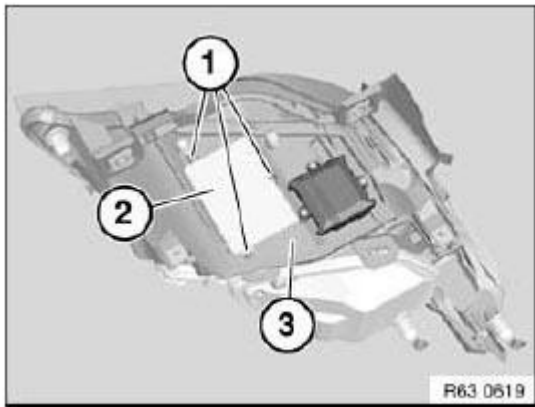


Fig. 24: Identifying Control Unit, Headlight And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Build date from 03/07:

Release screws (1).

Remove control unit for xenon headlight (2) from headlight (3).

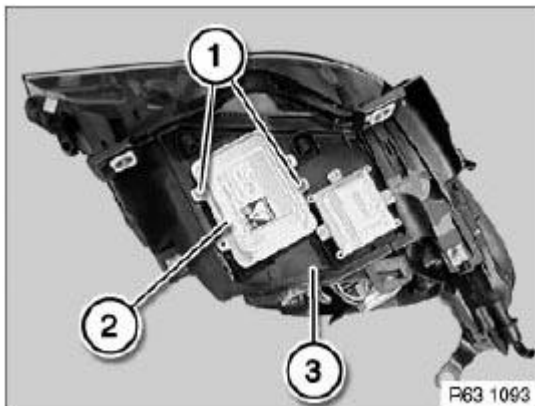


Fig. 25: Identifying Control Unit, Headlight And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing control unit for xenon headlight (1), make sure sealing sleeve (2) is correctly seated.

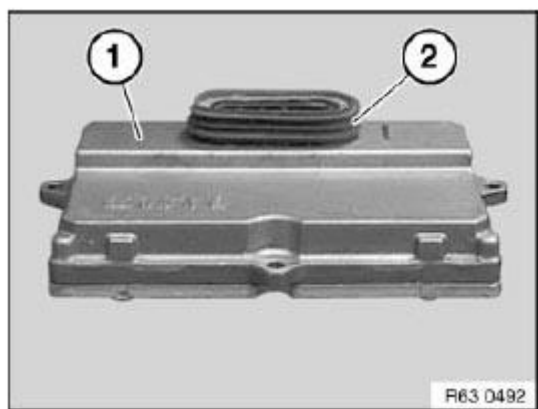


Fig. 26: Identifying Control Unit And Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

63 12 861 REPLACING CONTROL UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in:

Replacing **CONTROL UNIT FOR LEFT XENON HEADLIGHT**

63 12 870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT

WARNING: Version with xenon headlights: Danger to life due to high voltage!
Therefore disconnect all components from voltage supply before removal.
Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Slacken screws (1)

Release screws (2).

Pull out headlight (3) slightly in direction of arrow.

Installation:

Make sure headlight (3) is correctly seated in lower holder.

- Adjust **GAP DIMENSIONS**
- Adjust **HEADLIGHTS**

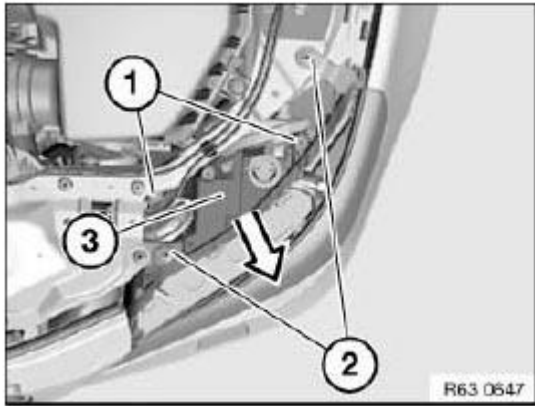


Fig. 27: Identifying Headlight And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Headlight shown removed for purposes of clarity.

Unlock catches (1) and remove cap (2) in direction of arrow.

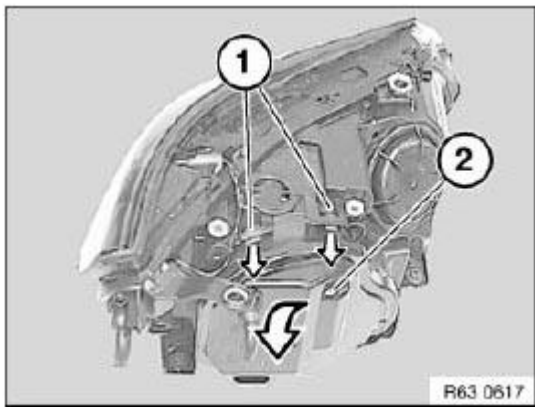


Fig. 28: Removing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Build date up to 02/05:

Turn ignition unit for xenon headlight (1) approx. 30° counterclockwise and detach.

Plug connection (2) is automatically released by turning ignition unit for xenon headlight (2).

Lay plug connection (2) to one side.

Installation:

Make sure ignition unit is correctly engaged.

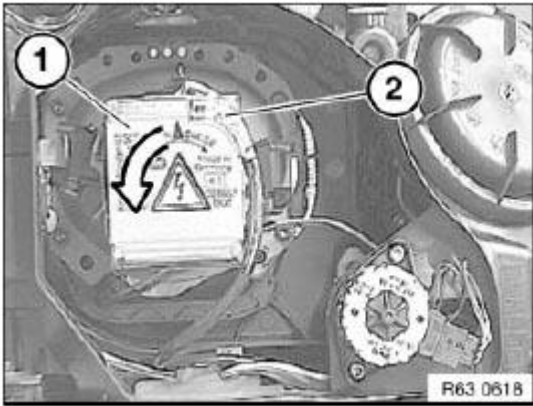


Fig. 29: Turning Ignition Unit For Xenon Headlight
Courtesy of BMW OF NORTH AMERICA, INC.

Build date from 02/05:

Disconnect plug connection (1).

Turn ignition unit for xenon headlight (2) approx. 30° counterclockwise and detach.

Replacement:

Remove xenon headlight bulb holder.

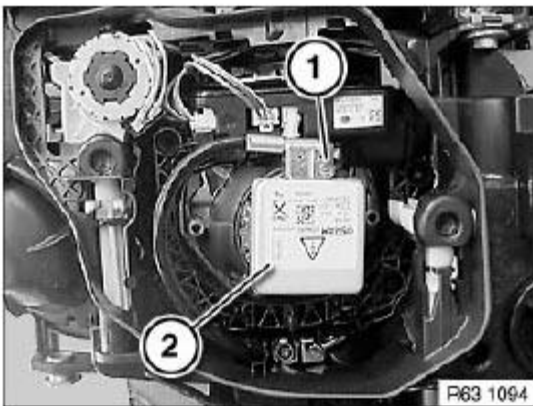


Fig. 30: Identifying Ignition Unit And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

63 12 871 REPLACING RIGHT IGNITION UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in:

Replacing **IGNITION UNIT FOR LEFT XENON HEADLIGHT**

63 12 895 REPLACING DRIVE FOR LEFT ADAPTIVE HEADLIGHT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

WARNING: Version with xenon headlights: Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal. Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks:

Remove LEFT HEADLIGHT

Release screws (1).

Remove drive for adaptive headlight (2) from headlight (3).

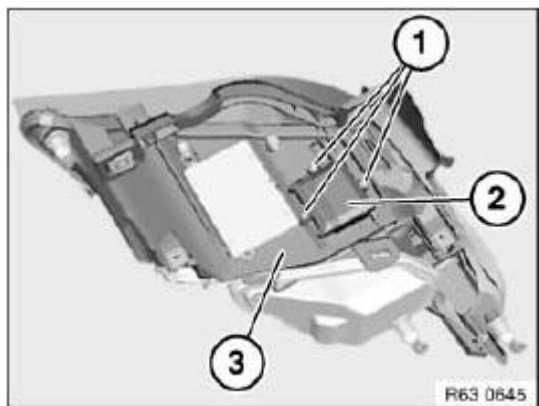


Fig. 31: Identifying Adaptive Headlight, Headlight And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit drive for adaptive headlight (1) exactly on headlight.

Make sure pin housing (2) is correctly seated in plug housing (3).

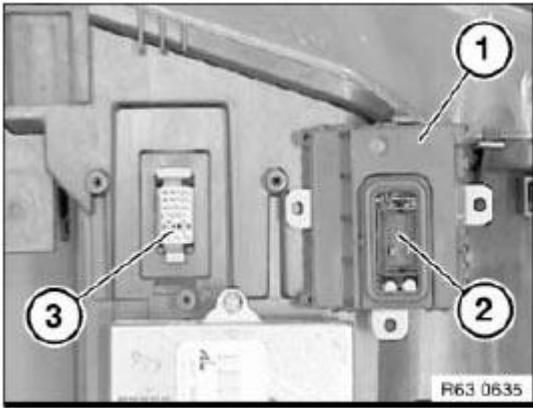


Fig. 32: Identifying Adaptive Headlight, Pin Housing And Plug Housing
 Courtesy of BMW OF NORTH AMERICA, INC.

Carry out CODING/PROGRAMMING .

63 12 896 REPLACING DRIVE/ELECTRONICS BOX FOR RIGHT ADAPTIVE HEADLIGHT

Operation is described in:

Replacing DRIVE/ELECTRONICS BOX FOR LEFT ADAPTIVE HEADLIGHT

63 12 950 REPLACING A LOWER HOLDER FOR HEADLIGHT MOUNTING

Necessary preliminary tasks:

- Remove HEADLIGHT

Release screws (1).

Remove holder (2) from front panel (3).

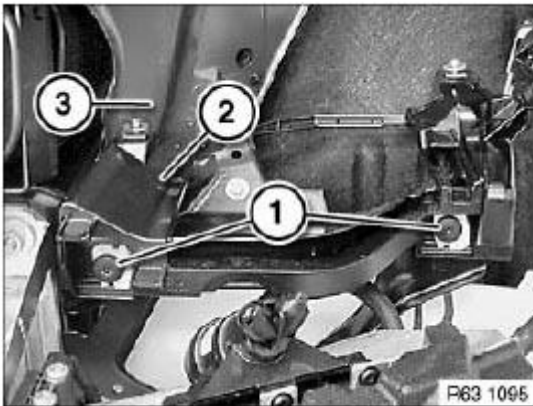


Fig. 33: Identifying Lower Holder, Panel And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

67 16 011 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT VERTICAL AIM ADJUSTER (XENON HEADLIGHT)

WARNING: Xenon headlights: Danger to life due to high voltage! Therefore disconnect xenon headlights from the power supply. Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks:

- Remove **LEFT HEADLIGHT**

Unlock catches (1) and remove cap (2) in direction of arrow.

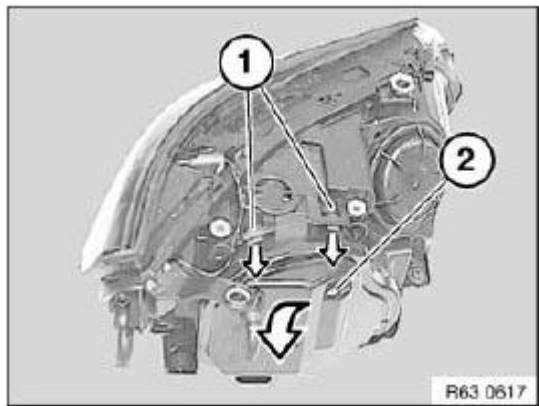


Fig. 34: Removing Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Loosen screws (2).

Feed headlight vertical aim adjuster (3) out of mounting (4) and remove.

Installation:

Headlight vertical aim adjuster (3) must be correctly seated in mounting (4).

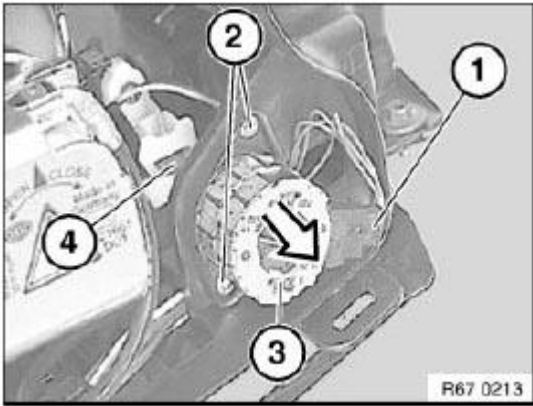


Fig. 35: Identifying Headlight Vertical Aim Adjuster, Plug Connection And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Adjust **HEADLIGHTS**

TURN SIGNAL INDICATOR LIGHTS

63 13 200 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT AUXILIARY TURN SIGNAL LAMP

Slide from auxiliary turn signal lamp (1) towards rear and fold in direction of arrow out of front side wall (2).

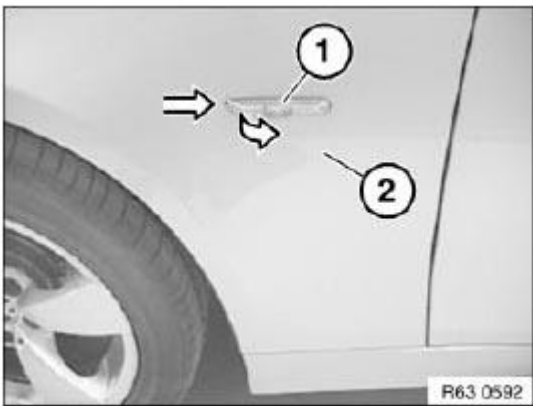


Fig. 36: Turning Signal Lamp
 Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove front auxiliary turn signal lamp (2).

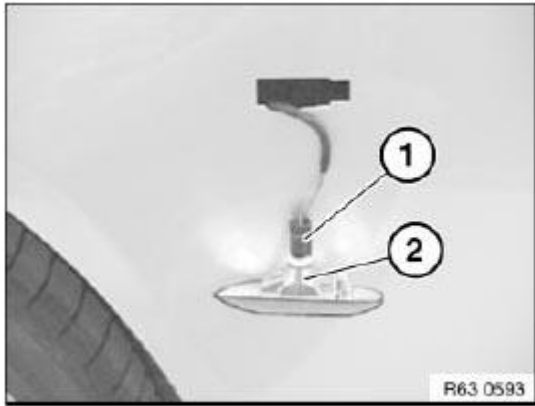


Fig. 37: Identifying Signal Lamp And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS).

Replacement:

If necessary, convert bulb.

CLEARANCE AND SIDE MARKER LIGHTS

63 14 120 REMOVING AND INSTALLING/REPLACING REAR REFLECTOR

Special tools required:

64 1 020

NOTE: Illustrations depict removal of the rear left reflector. The rear right reflector is removed in the same way as the rear left reflector.

Unclip reflector (1) with special tool **64 1 020** on right side.

Remove reflector (1) towards rear from rear bumper trim (2).

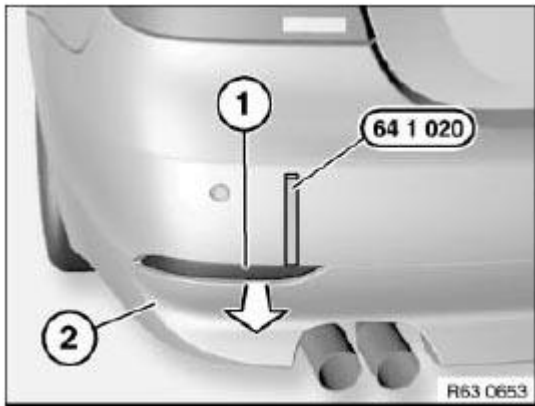


Fig. 38: Identifying Special Tool (64 1 020) And Reflector
 Courtesy of BMW OF NORTH AMERICA, INC.

FOG LIGHTS, AUXILIARY LIGHTS

63 17 060 REMOVING AND INSTALLING (REPLACING) LEFT OR RIGHT FRONT FOG LAMP

Necessary preliminary tasks:

- Remove **FRONT UNDERBODY PROTECTION**

Release screws (1).

Remove fog lamp wheel arch cover (2).

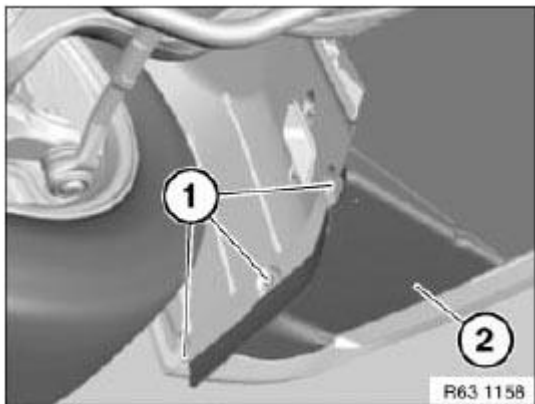


Fig. 39: Identifying Fog Lamp Wheel Arch Cover With Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Build date up to 03/2007:

Disconnect plug connection (1).

Release screws (2). Tightening torque **63 17 1AZ** .

Feed fog lamp (3) in direction of arrow out of mounting (4) and remove.

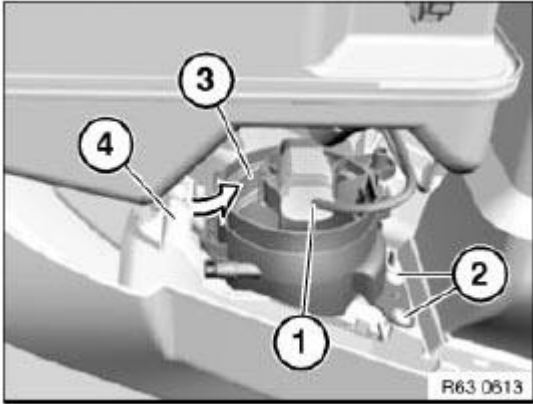


Fig. 40: Turning Fog Lamp

Courtesy of BMW OF NORTH AMERICA, INC.

Build date after 03/2007:

Disconnect plug connection (1).

Release screws (2) and remove front fog lamp. Tightening torque **63 17 1AZ** .

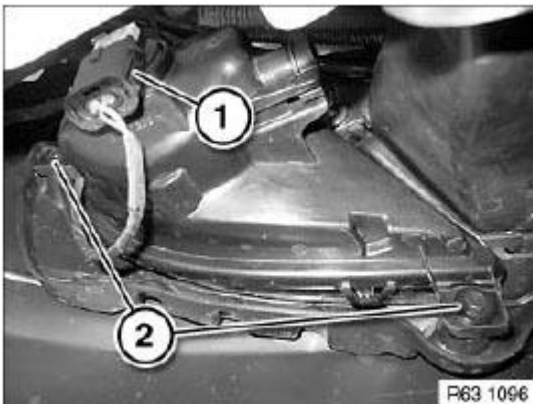


Fig. 41: Identifying Plug Connection And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove **BULB**.

ADJUST FRONT FOG LAMPS.

63 17 060 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT FOG LAMP (M AERODYNAMIC KIT)

Necessary preliminary tasks:

- Remove **FRONT UNDERBODY PROTECTION**

Release screws (1).

Remove fog lamp wheel arch cover (2).

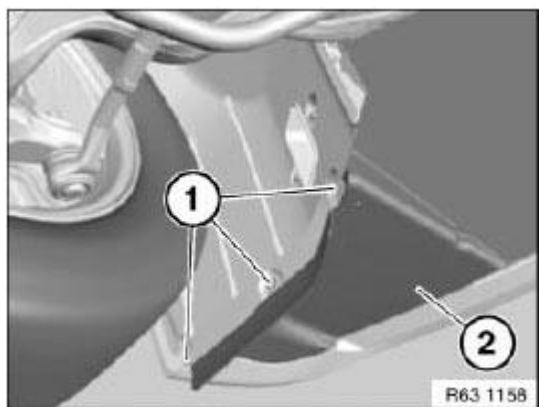


Fig. 42: Identifying Fog Lamp Wheel Arch Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release screws (2). Tightening torque **63 17 1AZ**.

Feed fog lamp (3) in direction of arrow out of mounting (4) and remove.

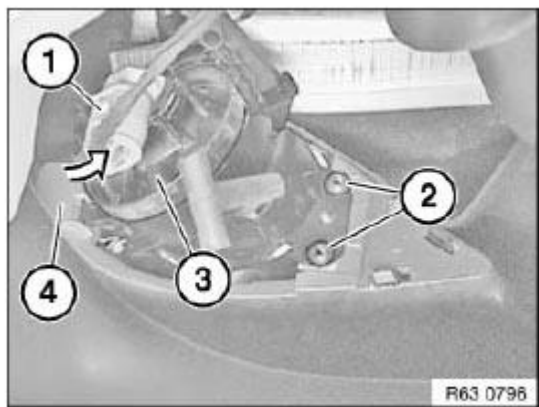


Fig. 43: Identifying Plug Connection, Fog Lamp, Mounting And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove **BULB**.

ADJUST FRONT FOG LAMPS.

REAR LIGHT CLUSTER

63 21 055 REPLACING A SOCKET HOUSING FOR LEFT OR RIGHT REAR LIGHT

Necessary preliminary tasks:

- Remove luggage compartment trim on side panel. See **REMOVING AND INSTALLING/REPLACING TRUNK TRIM PANEL ON LEFT SIDE PANEL** or **REMOVING AND INSTALLING/REPLACING TRUNK TRIM PANEL ON RIGHT SIDE PANEL**

WARNING: Follow instructions for **HANDLING LIGHT BULBS (EXTERIOR LIGHTS)**.

Build date up to 03/07:

Unfasten plug connection (1) and disconnect.

Unlock locking clip (2) in direction of arrow and remove socket housing for rear light (3) from rear light (4).

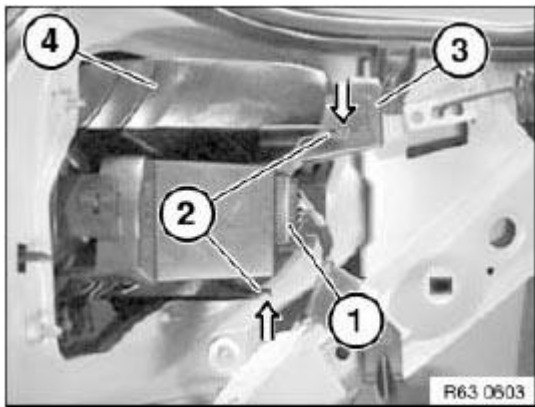


Fig. 44: Identifying Socket Housing, Locking Clip And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Build date after 03/07:

Disconnect plug connection (1).

Turn lock (2) in counterclockwise direction.

Remove socket housing for rear light (3) from rear light (4).

Replacement:

Remounting the **BULBS**.

Installation note:

For vehicle versions as of 03/07, the previous socket housing is replaced by the socket housing with additional ground cable in case of damage (erosion, charring) see the next operations!

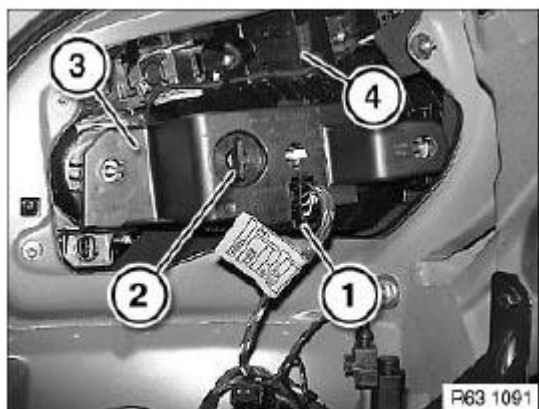


Fig. 45: Identifying Socket Housing, Lock And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Build date after 03/07:

Check the socket on the socket housing (1) and socket housing (2) for damage (erosion, charring).

Replace the damaged socket housing (1) with new part (part number 7 361 881 or 7 361 882).

Replace the damaged socket housing (2) and tab connector contact with new part (part number 7 505 477 and part number 7 502 933).

Note the pin assignment and unpin the tab connector contact from the socket housing (2) with special tool 61 0 321 (release tool).

See notes for **OPENING PLUG HOUSINGS AND REMOVING CONTACTS OF DIFFERENT PLUG SYSTEMS**.

Replace the discolored tab connector contacts (see Electronic Parts Catalogue) and pin in the new socket housing (2) according to the noted pin assignment.

See **CRIMPING OF STOP** and special tool for the wiring harness repair.

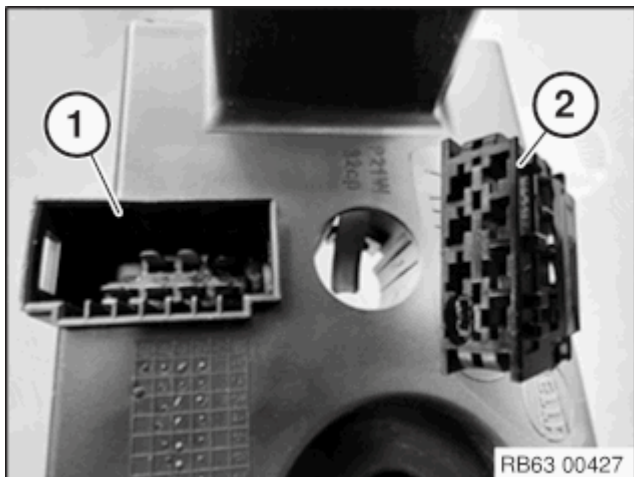


Fig. 46: Identifying Socket Housings

Courtesy of BMW OF NORTH AMERICA, INC.

Build date after 03/07:

Close plug connection on socket housing.

On left rear light:

Route the additional ground cable (1) along the present rear light wiring harness (2) and secure it with insulating tape.

On right rear light:

Route the additional ground cable (1) along the present rear light wiring harness (2) and secure it with insulating tape. Also secure the rear light wiring harness (2) to the main wiring harness with cable straps.

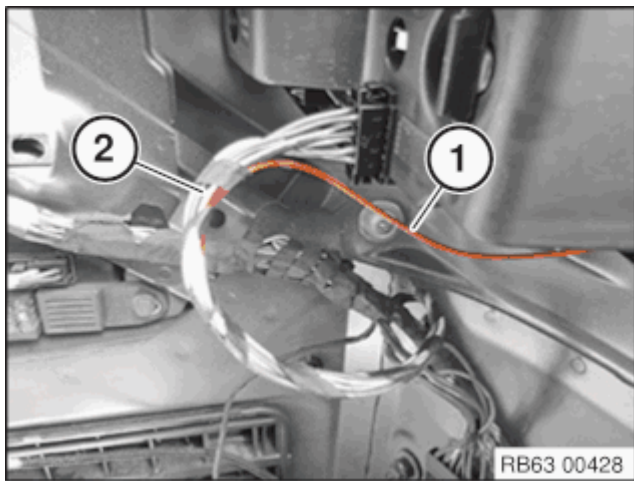


Fig. 47: Routing Additional Ground Cable Along Present Rear Light Wiring Harness

Courtesy of BMW OF NORTH AMERICA, INC.

Build date after 03/07:

Insert the additional ground cable (1) on a free pin in the comb connector (2).

Installation note:

Ensure correct locking of additional ground cable (1) in the comb connector (2).

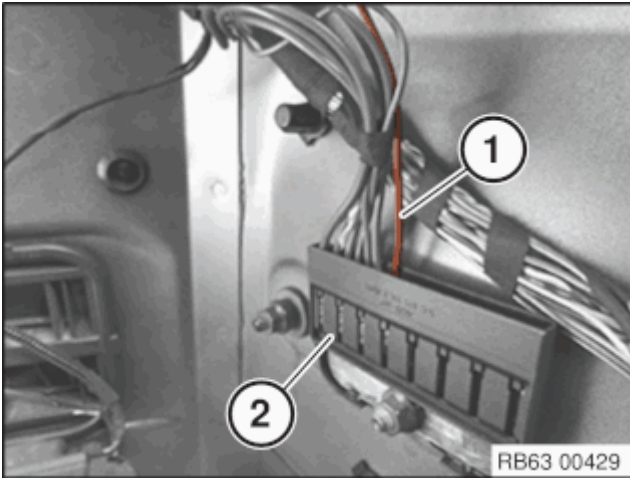


Fig. 48: Inserting Additional Ground Cable In Free Pin Of Comb Connector
Courtesy of BMW OF NORTH AMERICA, INC.

63 21 101 REPLACING SEALING FRAME FOR LEFT OR RIGHT REAR LIGHT

Necessary preliminary tasks:

- Remove **REAR LIGHT**.

Detach sealing frame for rear light (1) from rear light (2).

Installation:

Sealing frame for rear light (1) is centered via openings for threaded pins (3).

Make sure sealing frame for rear light (1) is correctly bonded all round on rear light (2).

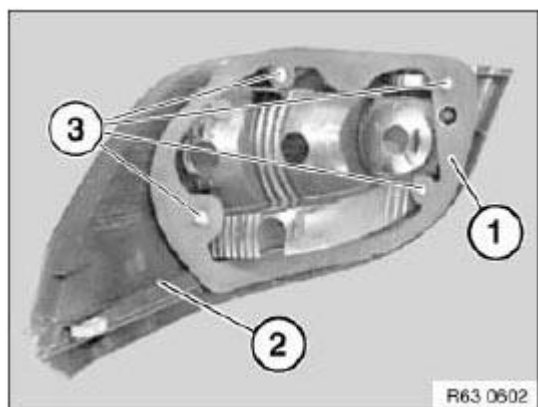


Fig. 49: Identifying Sealing Frame And Threaded Pins
Courtesy of BMW OF NORTH AMERICA, INC.

63 21 180 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR LIGHT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove luggage compartment trim on left side panel. See REMOVING AND INSTALLING/REPLACING TRUNK TRIM PANEL ON LEFT SIDE PANEL or REMOVING AND INSTALLING/REPLACING TRUNK TRIM PANEL ON RIGHT SIDE PANEL

Disconnect plug connection (1).

Release nuts (2) and remove rear light (3) towards outside.

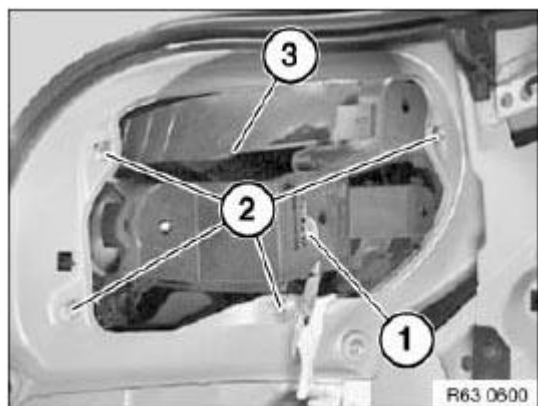


Fig. 50: Identifying Plug Connection, Rear Light And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe tightening sequence for 4 retaining nuts.

Tightening torque **63 21 1AZ** .

NOTE: Gap dimension to body side panel is established by means of retaining nut (4).

Avoid twisting rear light when screwing down.

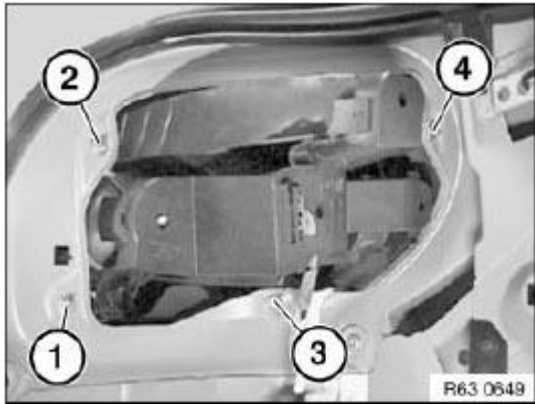


Fig. 51: Identifying Retaining Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure rear light seal (1) is correctly seated, replace if necessary.

Buffer stop (3) of rear light (2) must be fitted.

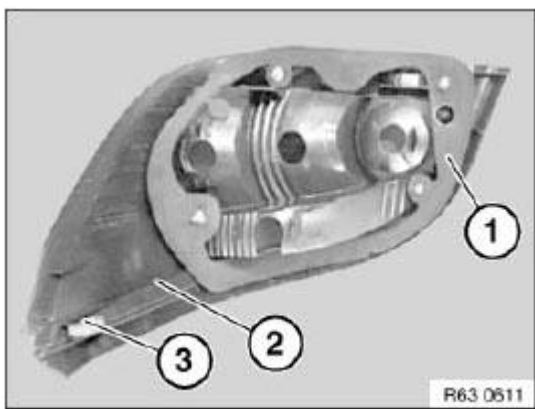


Fig. 52: Identifying Rear Light Seal And Buffer Stop

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, replace **SOCKET HOUSING FOR REAR LIGHT**

BRAKE LIGHTS

63 25 000 REMOVING AND INSTALLING/REPLACING AUXILIARY BRAKE LIGHT

Unclip cover for auxiliary brake light (1) at points (2) and feed out sideways in direction of arrow.

Remove cover for auxiliary brake light (1) from molded roofliner (3).

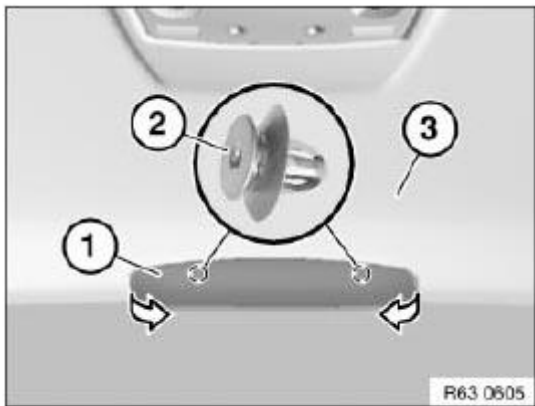


Fig. 53: Removing Cover For Auxiliary Brake Light
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clips (1) and locators (2) must not be damaged.

Make sure cover for auxiliary brake light (3) is correctly seated.

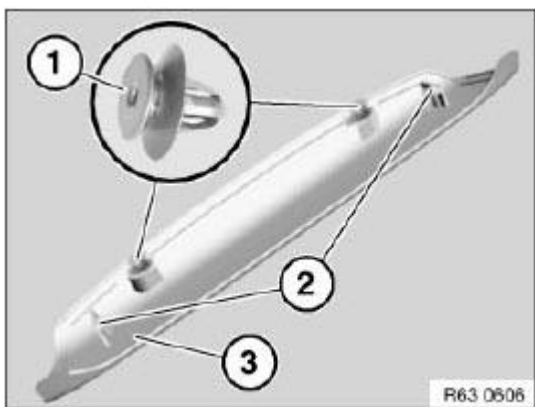


Fig. 54: Identifying Auxiliary Brake Light, Clips And Locators
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

If necessary, unclip plug connections (2) on auxiliary brake light (4).

Unlock slide (3) on both sides and remove auxiliary brake light (4) in direction of arrow from rear window (5).

Installation:

Make sure auxiliary brake light (4) is correctly positioned in rear window (5).

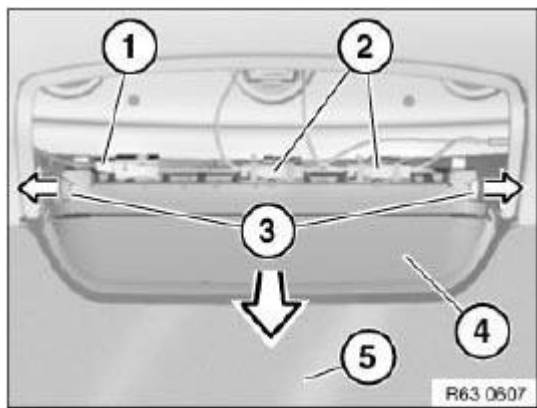


Fig. 55: Identifying Plug Connection, Auxiliary Brake Light And Rear Window
Courtesy of BMW OF NORTH AMERICA, INC.

LICENCE PLATE LIGHTS

63 26 000 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LICENSE PLATE LIGHT

Special tools required:

64 1 020

Slide license plate light (1) in direction of arrow slightly and lever out with special tool **64 1 020** .

Unlock plug connection underneath and disconnect.

Remove license plate light (1).

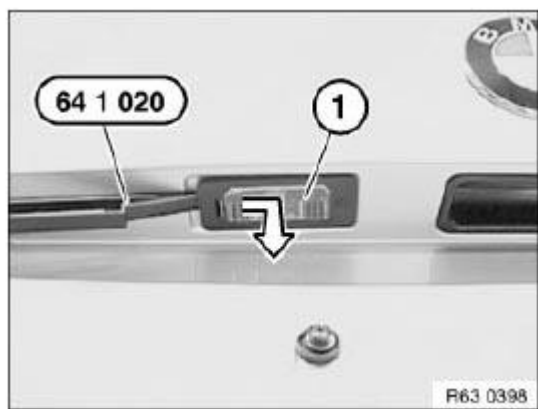


Fig. 56: Identifying Special Tool (64 1 020) And License Plate Light
Courtesy of BMW OF NORTH AMERICA, INC.

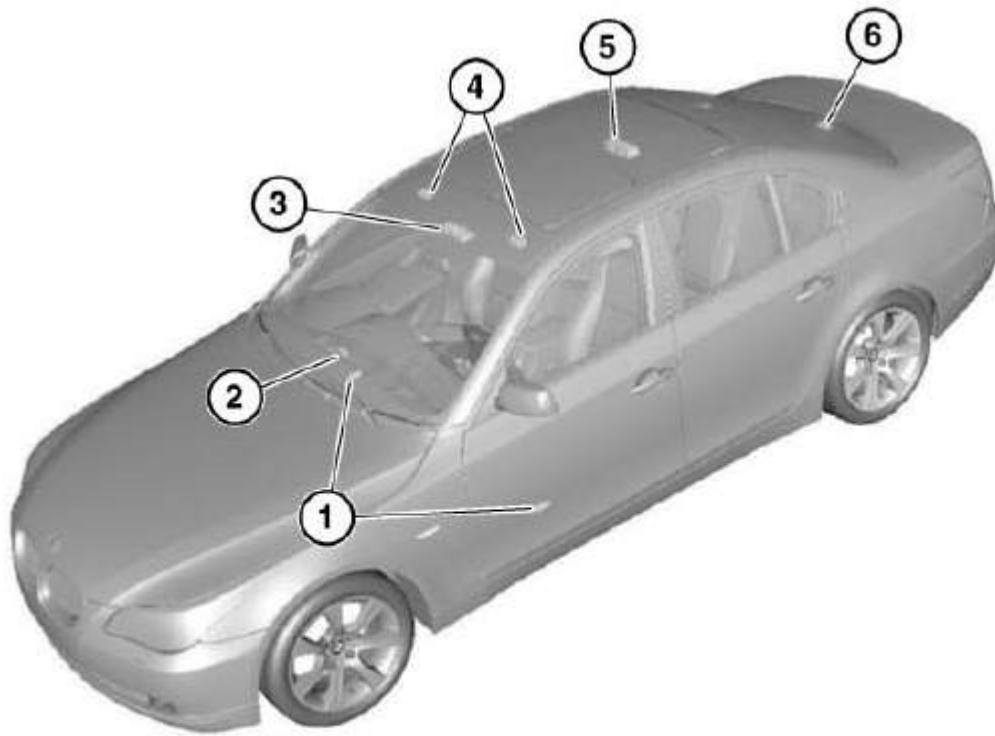
WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS).

Replacement:

If necessary, remove bulb.

INTERIOR LIGHTS

63 31.. OVERVIEW OF INTERIOR LIGHTS



F63 1534

1 Footwell light under instrument panel2 Glovebox light3 Front ceiling light4 Mirror lights5 Rear ceiling light6 Luggage compartment light**Fig. 57: Overview Of Interior Lights**

Courtesy of BMW OF NORTH AMERICA, INC.

63 31 000 REMOVING AND INSTALLING/REPLACING COMPLETE CEILING LIGHT (FRONT)**Special tools required:****00 9 317****IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).**

Replacement:

If necessary, convert bulbs.

Lever out ceiling light (1) with special tool **00 9 317** as illustrated.

Disconnect plug connection underneath and remove ceiling light (1).

Replacement:

Note **TYPE OF BULB** .

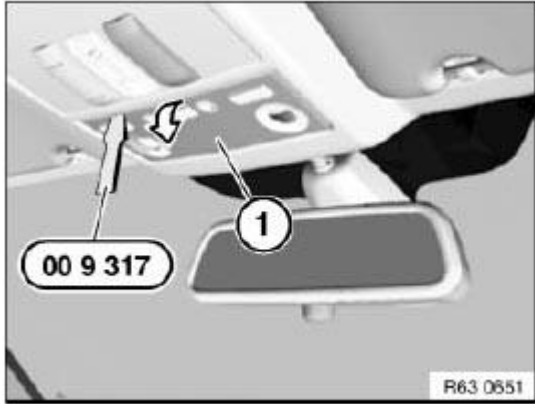


Fig. 58: Identifying Ceiling Light With Special Tool (00 9 317)

Courtesy of BMW OF NORTH AMERICA, INC.

63 31 003 REMOVING AND INSTALLING/REPLACING COMPLETE CEILING LIGHT (REAR)

Special tools required:

00 9 317

IMPORTANT: Follow instructions for **HANDLING LIGHT BULBS (INTERIOR LIGHTS)**.

Replacement:

If necessary, convert bulbs.

Lever out ceiling light (1) with special tool **00 9 317** as illustrated.

Disconnect plug connection underneath and remove ceiling light (1).

Replacement:

Note **TYPE OF BULB** .

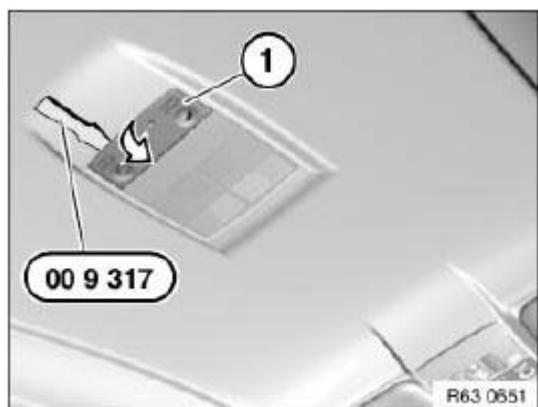


Fig. 59: Identifying Ceiling Light With Special Tool (00 9 317)

Courtesy of BMW OF NORTH AMERICA, INC.

63 31 015 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT INTERIOR LIGHT (VERSION WITH PANORAMA GLASS SUNROOF) (SPORTS WAGON)

Special tools required:

00 9 341

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Lever interior light (1) with special tool 00 9 341 in direction of arrow out of molded roofliner (2).

Disconnect associated plug connection and remove interior light (1).

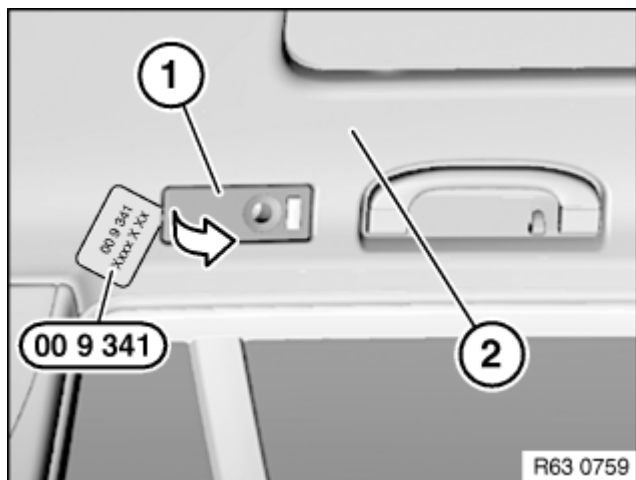


Fig. 60: Using Special Tool (00 9 341) To Lever Out Interior Light

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- If necessary, convert bulbs.
- Note **BULB TYPE** .

63 31 020 REMOVING AND INSTALLING/REPLACING FOOTWELL LIGHT

Special tools required:

- **64 1 020**

IMPORTANT: Follow instructions for **HANDLING LIGHT BULBS (INTERIOR LIGHTS)**.

Replacement:

If necessary, remove bulb.

In footwell:

Lever out footwell light (1) with special tool **64 1 020** as illustrated.

Disconnect associated plug connection and remove footwell light (1).

Replacement:

Note **TYPE OF BULB** .

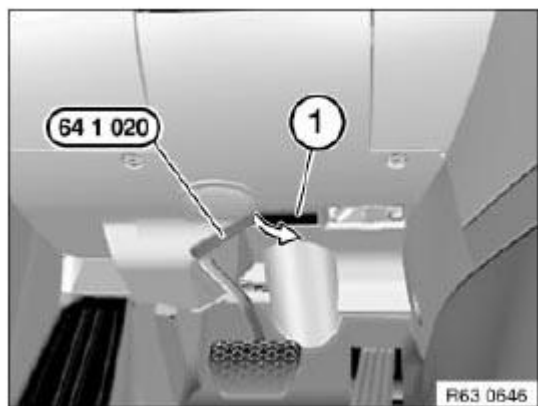


Fig. 61: Identifying Footwell Light With Special Tool (64 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

On underside of door:

Lever out footwell light (1) with special tool **64 1 020** as illustrated.

Disconnect associated plug connection and remove footwell light (1).

Replacement:

Note **TYPE OF BULB** .

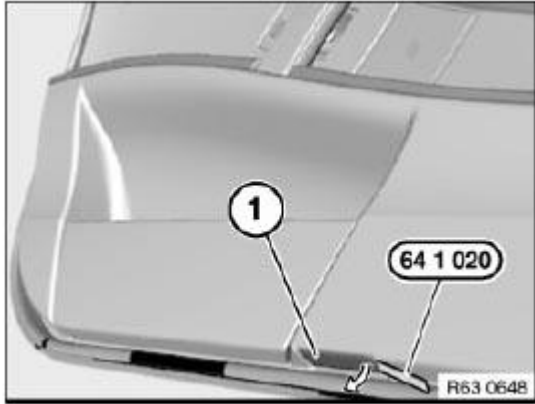


Fig. 62: Identifying Footwell Light With Special Tool (64 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 050 REMOVING AND INSTALLING/REPLACING MIRROR LIGHT

IMPORTANT: Follow instructions for **HANDLING LIGHT BULBS (INTERIOR LIGHTS)**.

Replacement:

If necessary, convert bulb.

Lever front mirror light (1) in direction of arrow.

Disconnect plug connection underneath and remove mirror plate light (1).

Replacement:

Note **TYPE OF BULB** .

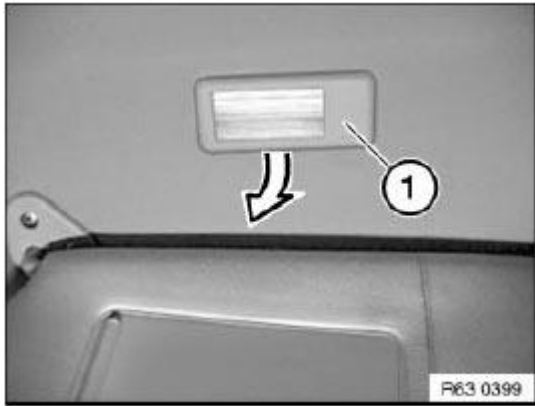


Fig. 63: Removing Front Mirror Light

Courtesy of BMW OF NORTH AMERICA, INC.

63 31 080 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT LIGHT

Special tools required:

64 1 020

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Replacement:

If necessary, convert bulb.

Under rear parcel shelf:

Lever out luggage compartment light (1) with special tool **64 1 020** as illustrated.

Disconnect associated plug connection and remove luggage compartment light (1).

Replacement:

Note **TYPE OF BULB** .

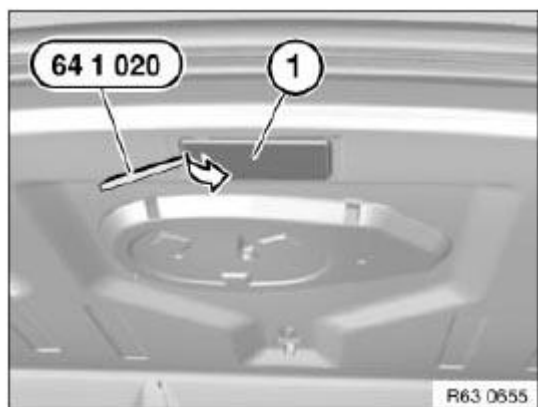


Fig. 64: Identifying Special Tool (64 1 020) And Luggage Compartment Light (Under Rear Parcel Shelf)
Courtesy of BMW OF NORTH AMERICA, INC.

In rear lid:

Lever out luggage compartment light (1) with special tool **64 1 020** as illustrated.

Disconnect associated plug connection and remove luggage compartment light (1).

Replacement:

Note **TYPE OF BULB** .

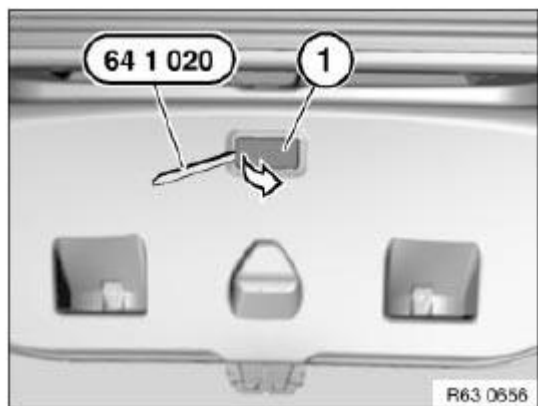


Fig. 65: Identifying Special Tool (64 1 020) And Luggage Compartment Light (Rear Lid)
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 150 REMOVING AND INSTALLING/REPLACING GLOVEBOX LIGHT

Special tools required:

64 1 020

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Replacement:

Note **TYPE OF BULB** .

Lever glovebox light (1) with special tool **64 1 020** as pictured out of glovebox housing (2).

Disconnect associated plug connection and remove glovebox light (1).

Replacement:

Note **TYPE OF BULB** .

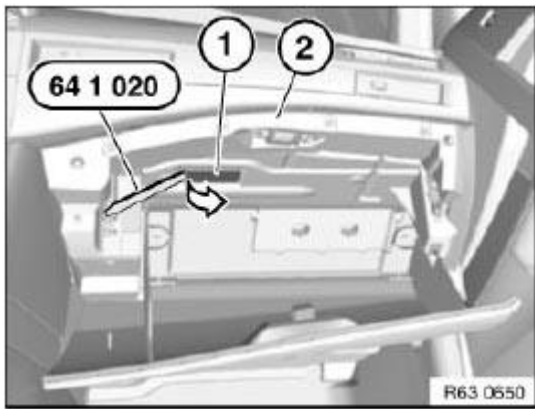


Fig. 66: Identifying Special Tool (64 1 020) With Glovebox Light And Glovebox Housing
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 160 REMOVING AND INSTALLING/REPLACING DOOR MIRROR LIGHT

Necessary preliminary tasks:

- Remove **RETAINING RING ON DOOR MIRROR**

Unclip door mirror light (1) in direction of arrow from retaining ring on door mirror (2) and remove.

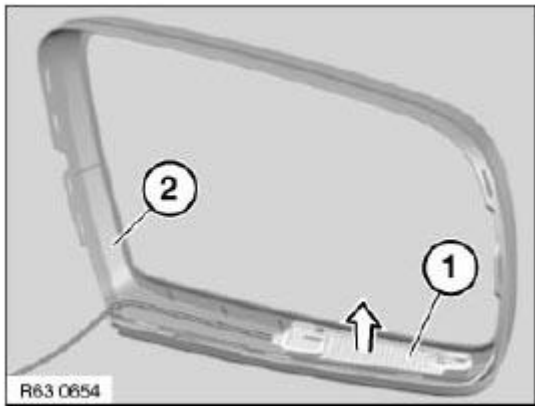


Fig. 67: Identifying Door Mirror Light And Door Mirror
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 180 REPLACING LED FOR FRONT DOOR TRIM PANEL LIGHT

Necessary preliminary tasks:

- Remove **FRONT DOOR TRIM PANEL**

Remove sheathing from wiring harness (1).

Disconnect cables.

Connect both cables with **BUTT CONNECTOR** .

Insulate wiring harness with insulating tape.

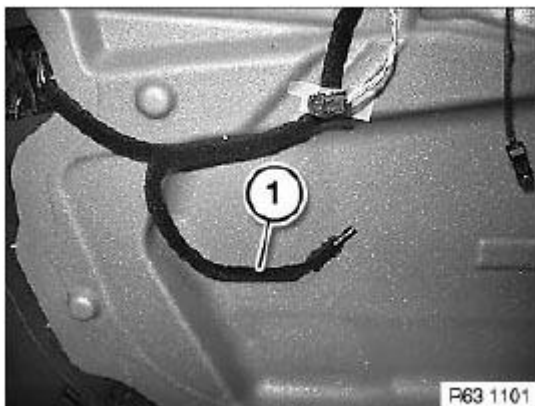


Fig. 68: Identifying Front Door Trim Panel Light Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 182 REPLACING LED FOR FRONT INSIDE DOOR OPENER

Necessary preliminary tasks:

- Remove **FRONT DOOR TRIM PANEL**

Remove sheathing from wiring harness (1).

Disconnect cables.

Connect both cables with **BUTT CONNECTOR**.

Insulate wiring harness with insulating tape.

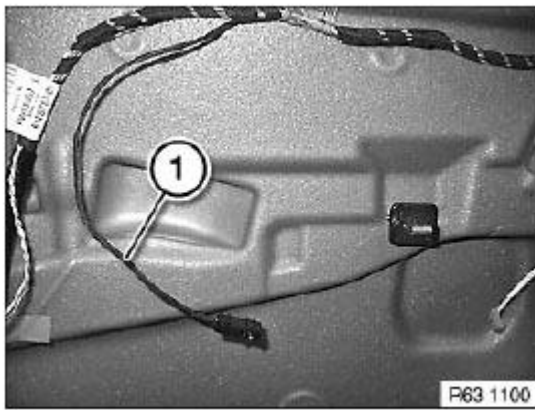


Fig. 69: Identifying Front Inside Door Opener Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 191 REPLACING LED FOR REAR DOOR TRIM PANEL LIGHT

Necessary preliminary tasks:

- Remove **REAR DOOR TRIM PANEL**

Remove sheathing from wiring harness (1).

Disconnect cables.

Connect both cables with **BUTT CONNECTOR**.

Insulate wiring harness with insulating tape.

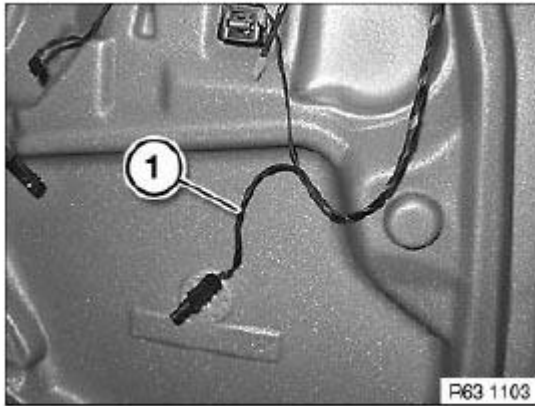


Fig. 70: Identifying Rear Door Trim Panel Light Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 193 REPLACING LED FOR REAR INSIDE DOOR OPENER

Necessary preliminary tasks:

- Remove **REAR DOOR TRIM PANEL**

Remove sheathing from wiring harness (1).

Disconnect cables.

Connect both cables with **BUTT CONNECTOR**.

Insulate wiring harness with insulating tape.

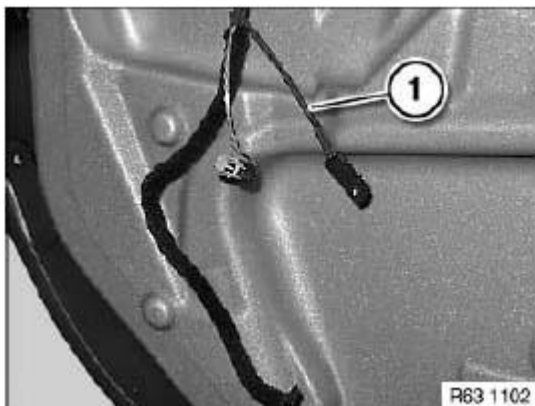


Fig. 71: Identifying Rear Inside Door Opener Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 210 REMOVING AND INSTALLING/REPLACING REAR READING LIGHT

Special tools required:

00 9 340

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Lever out reading light (1) with special tool **00 9 340** as illustrated.

Disconnect plug connection underneath and remove reading light (1).

Replacement:

If necessary, modify **BULBS**.

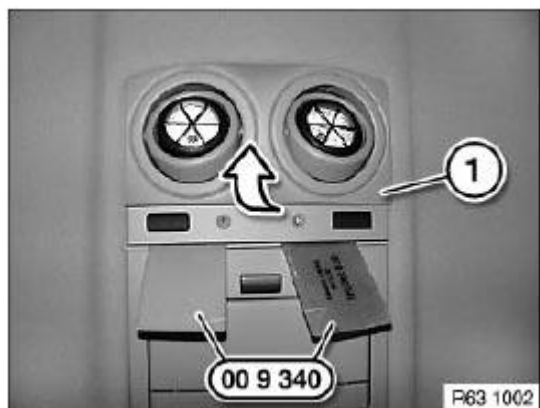


Fig. 72: Identifying Reading Light With Special Tool (00 9 340)

Courtesy of BMW OF NORTH AMERICA, INC.

LIGHT BULBS

63 99... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)

WARNING: Xenon headlights: Danger to life due to high voltage!
Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

WARNING: Halogen lamps are under pressure:
To avoid injury, wear protective goggles and gloves.

IMPORTANT: To prevent short-circuiting, disconnect light bulbs from voltage supply prior to replacement.

Do not touch the glass bulbs in new lights bulbs as even the slightest contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99... INSTRUCTIONS FOR REPLACING LIGHT BULBS (INTERIOR LIGHTS)

CAUTION: To prevent short-circuiting, disconnect light bulbs from voltage supply prior to replacement.

Do not touch the glass bulbs in new lights bulbs as even the slightest contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99... NOTES FOR REPLACING THE PROTECTIVE CAP OF THE HEADLIGHT

IMPORTANT: Risk of damage!

Damaged seals on the protective caps will lead to moisture penetration into the headlight.

This will in turn cause porous cable insulations and malfunctioning of the headlight.

When working on the headlight system, check the protective cap seals.

Replace the protective cap in the event of damage!

Example: screwed protective cap

Seal (1) on protective cap (2).

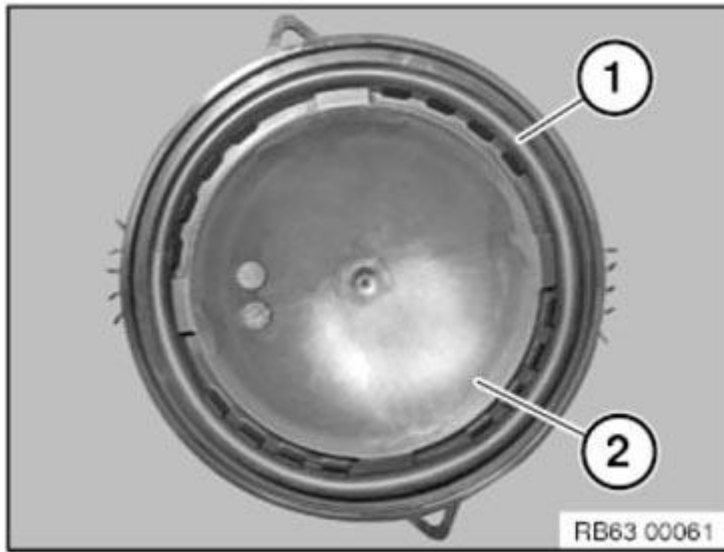


Fig. 73: Identifying Seal On Protective Cap (Screwed Protective Cap)
 Courtesy of BMW OF NORTH AMERICA, INC.

Example: latchable protective cap

Seal (1) on protective cap (2).

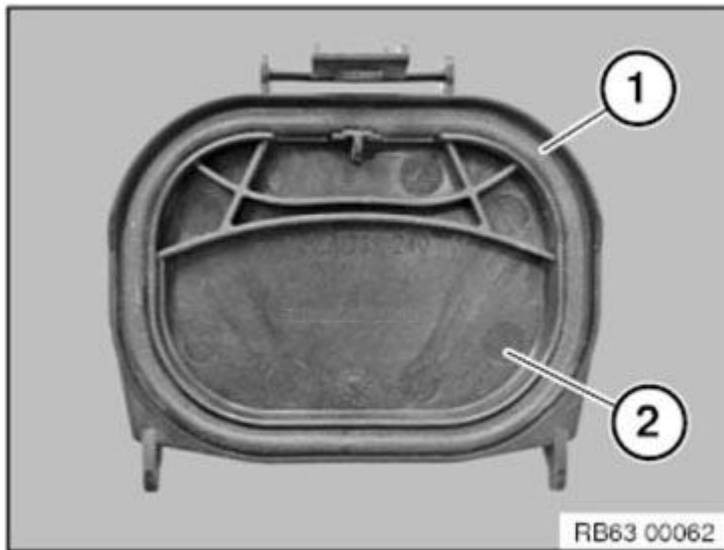


Fig. 74: Identifying Seal On Protective Cap (Latchable Protective Cap)
 Courtesy of BMW OF NORTH AMERICA, INC.

63 99... REPLACING BULB FOR REAR MAKE-UP MIRROR

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Necessary preliminary tasks:

- Remove **MAKE-UP MIRROR**

Unclip holders (2) from housing section (4).

Lever retainer (1) out of cover (3).

Carefully remove cover (3) towards top.

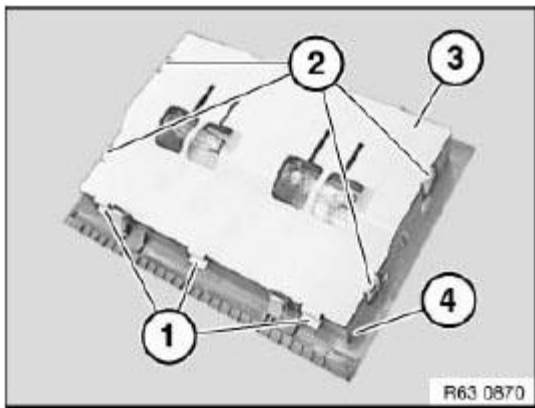


Fig. 75: Identifying Holders, Housing Section And Cover Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out bulb (2) underneath.

IMPORTANT: Make sure ejector (1) is correctly seated.

Installation:

Note **BULB TYPE** .

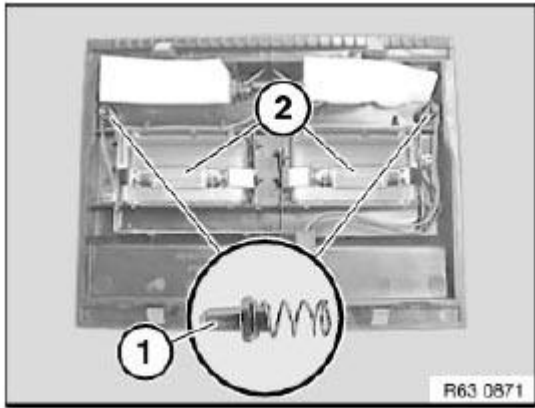


Fig. 76: Identifying Ejector And Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99... REPLACING DOOR HANDLE FIBRE OPTIC CABLE (LONG VERSION OR FROM 03/2007)

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Necessary preliminary tasks:

- Remove door trim panel. See **REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)** or **REMOVING AND INSTALLING REAR LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)**

Unclip fibre optic cable (1) from door trim panel (2).

Installation:

Make sure fibre optic cable (1) is correctly seated in catch (3) of door trim panel (2).

Retaining lugs (2) of door trim panel must not be damaged.

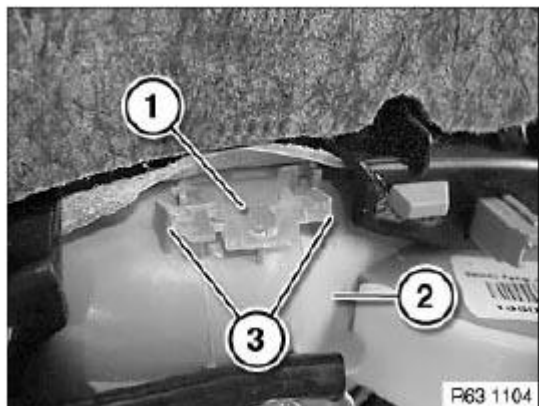


Fig. 77: Identifying Fibre Optic Cable, Door Trim Panel And Retaining Lugs
 Courtesy of BMW OF NORTH AMERICA, INC.

63 99... REPLACING FIBRE OPTIC CABLE IN DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Necessary preliminary tasks:

- Remove door trim panel. See REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007) or REMOVING AND INSTALLING REAR LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)

Detach spring washer (1) from fibre optic cable (2).

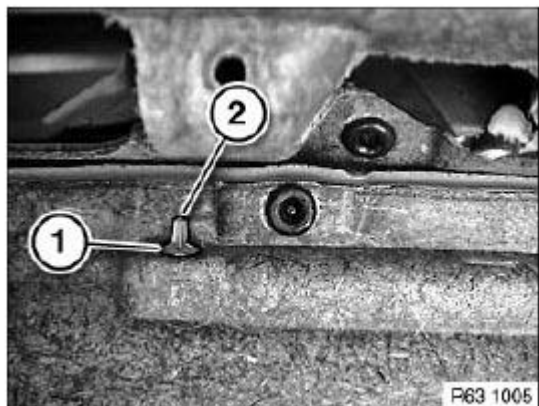


Fig. 78: Identifying Spring Washer And Fibre Optic Cable
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove fibre optic cable (1) in direction of arrow.



Fig. 79: Removing Fibre Optic Cable

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 002 REPLACING HALOGEN BULB FOR HIGH-BEAM HEADLIGHT ON LEFT

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS).

Turn cap (1) approx. 30° counterclockwise and remove from headlight (2).

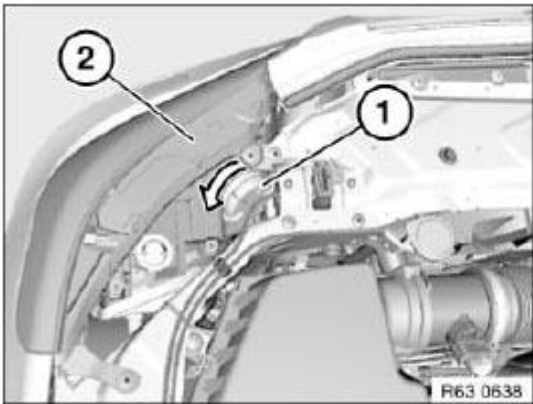


Fig. 80: Turning Headlight Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Turn bulb holder (1) counterclockwise and feed together with bulb out of headlight (2).

Installation:

Make sure retaining tabs (3) are correctly seated.

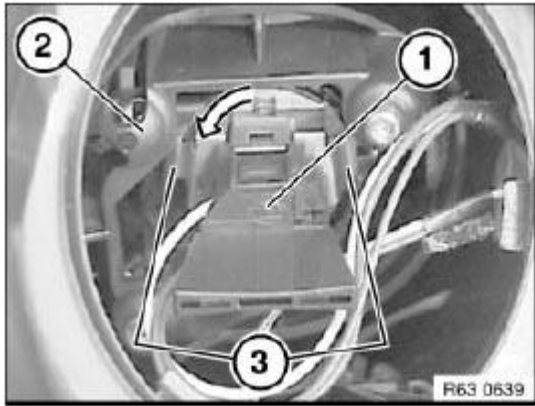


Fig. 81: Turning Bulb Holder

Courtesy of BMW OF NORTH AMERICA, INC.

Pull bulb (1) out of bulb holder (2).

Installation:

Make sure bulb (1) is exactly seated in bulb holder (2).

Note type of bulb. See **HEADLIGHTS** .

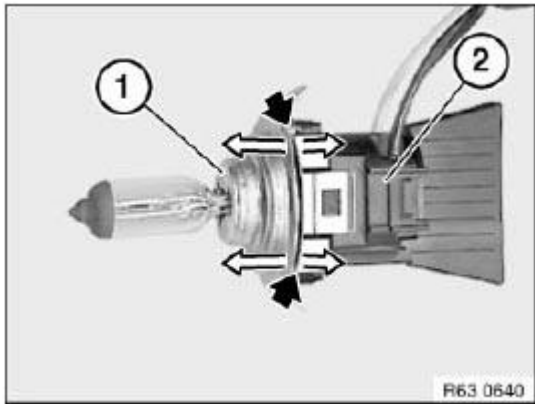


Fig. 82: Pulling Bulb Out Of Bulb Holder

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 003 REPLACING HALOGEN BULB FOR HIGH-BEAM HEADLIGHT ON RIGHT

Operation is described in:

Replacing **HALOGEN BULB FOR HIGH-BEAM HEADLIGHT ON LEFT**

63 99 072 REPLACING HALOGEN BULB FOR HEADLIGHT ON LEFT

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS).

Build date up to 03/07:

Turn protective cap (1) approx. 30° in direction of arrow and remove from headlight.

Installation:

Make sure cover (1) is correctly seated on headlight.

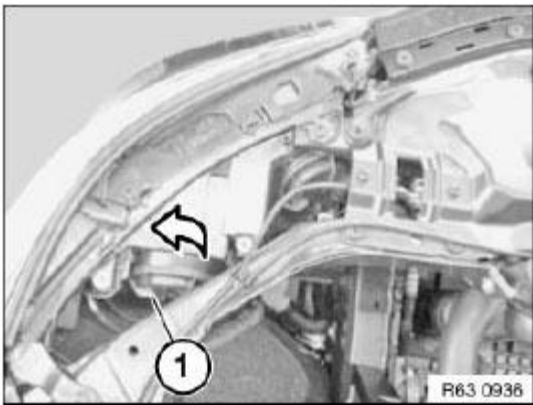


Fig. 83: Turning Protective Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Build date from 03/07:

Unclip cover cap (1) and remove towards rear.

Installation:

Make sure cover (1) is correctly seated on headlight (2).

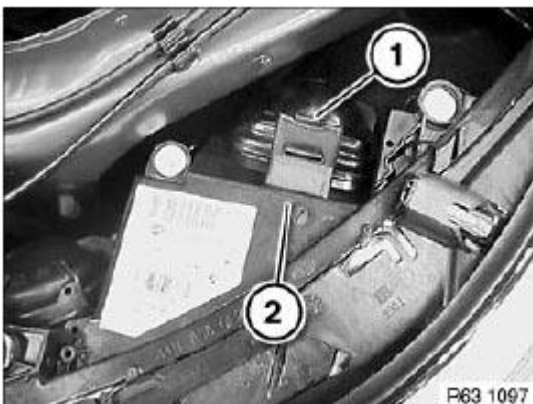


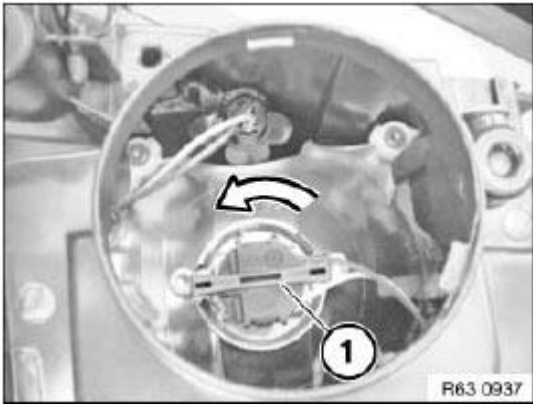
Fig. 84: Identifying Cover And Cover Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Turn bulb holder (1) in direction of arrow and feed together with bulb out of headlight.

Installation:

Make sure bulb holder (1) is correctly seated in headlight.

**Fig. 85: Turning Bulb Holder**

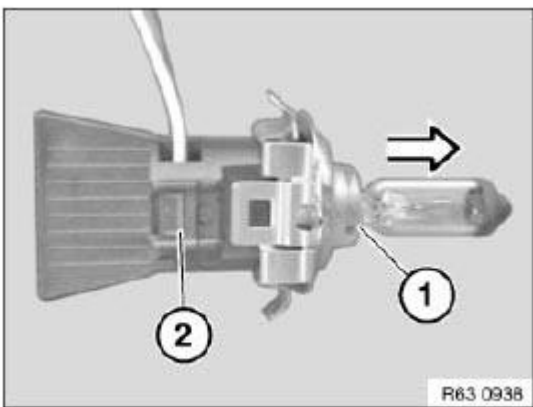
Courtesy of BMW OF NORTH AMERICA, INC.

Pull bulb (1) out of bulb holder (2) in direction of arrow.

Installation:

Make sure bulb (1) is exactly seated in bulb holder (2).

Note type of bulb. See **HEADLIGHTS**

**Fig. 86: Pulling Bulb Out Of Bulb Holder**

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 073 REPLACING HALOGEN BULB FOR HEADLIGHT ON RIGHT

Operation is described in:

Replacing **HALOGEN BULB FOR HEADLIGHT ON LEFT**

63 99 076 REPLACING BULB FOR LEFT XENON HEADLIGHT

WARNING: Follow instructions for **HANDLING LIGHT BULBS (EXTERIOR LIGHTS)**.

Necessary preliminary tasks:

Removing **IGNITION UNIT FOR LEFT XENON HEADLIGHT**

Unlock retaining ring (1).

Installation:

Retaining ring (1) must be located under holder (2).

Remove bulb for xenon headlight (3).

Installation:

Insert bulb for xenon headlight (3) exactly into locators (4).

Note bulb type. See **HEADLIGHTS**

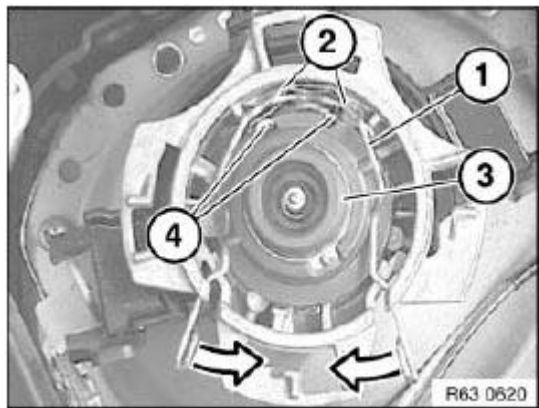


Fig. 87: Identifying Xenon Headlight, Retaining Ring And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 077 REPLACING BULB FOR RIGHT XENON HEADLIGHT

Operation is described in:

Replacing **BULB FOR LEFT XENON HEADLIGHT**

63 99 132 REPLACING BULB FOR SIDE MARKER LAMP, FRONT LEFT

WARNING: Follow instructions for **HANDLING LIGHT BULBS (EXTERIOR LIGHTS)**.

Necessary preliminary tasks:

Remove **HALOGEN LAMP FOR HIGH-BEAM HEADLIGHT**

Turn holder with bulb for side marker lamp (1) approx. 30° counterclockwise.

Feed holder with bulb for side marker lamp (1) out of aperture for headlight (2).

Unlock associated plug connection and disconnect.

Installation:

Holder with bulb for side marker lamp (1) must be correctly seated in mounting.

Note type of bulb. See **HEADLIGHTS** .

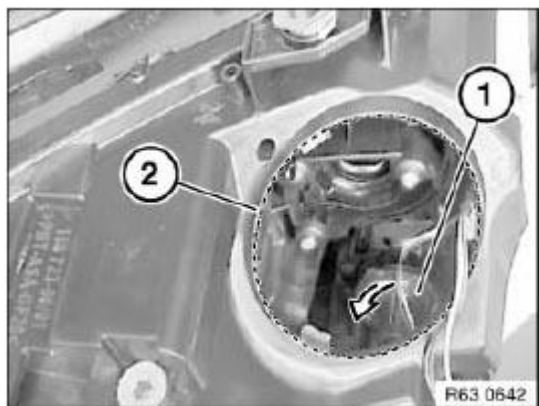


Fig. 88: Turning Holder With Bulb For Side Marker Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 133 REPLACING BULB FOR SIDE MARKER LAMP, FRONT RIGHT

Operation is described in:

Replacing **BULB FOR SIDE MARKER LAMP, FRONT LEFT**

63 99 155 REPLACING BULB FOR FRONT LEFT SIDE LIGHTS (XENON HEADLIGHT) (FROM 03/2007)

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS).

Turn cover cap (1) in counterclockwise direction and remove from headlight (2).

Installation:

Make sure cover cap (1) is correctly seated on headlight (2).

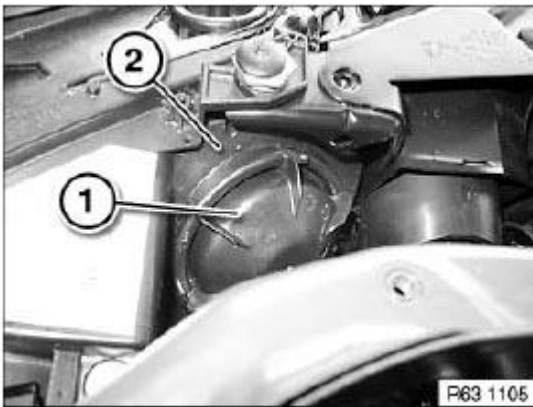


Fig. 89: Identifying Headlight And Cover Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Twist bulb (2) in counterclockwise direction out of bulb holder (3).

Installation:

Note type of bulb. See HEADLIGHTS .

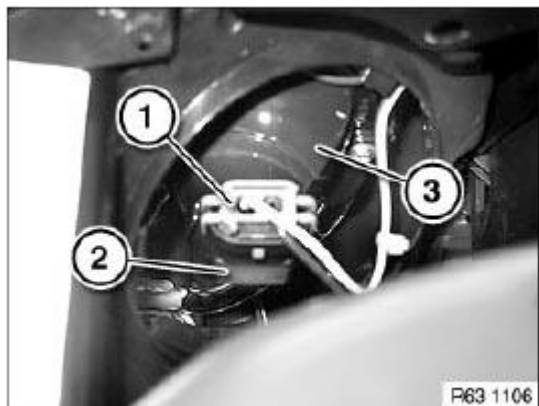


Fig. 90: Identifying Bulb, Plug Connection And Bulb Holder

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 156 REPLACING BULB FOR FRONT RIGHT SIDE LIGHT (XENON HEADLIGHT) (FROM 03/2007)

Operation is described in:

Replacing **BULB FOR FRONT LEFT SIDE LIGHTS**.

63 99 160 REPLACING BULB FOR FRONT LEFT (OR RIGHT) TURNING LIGHTS

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS).

Turn cover (1) in counterclockwise direction and remove from headlight (2).

Installation:

Make sure cover (1) is correctly seated on headlight (2).

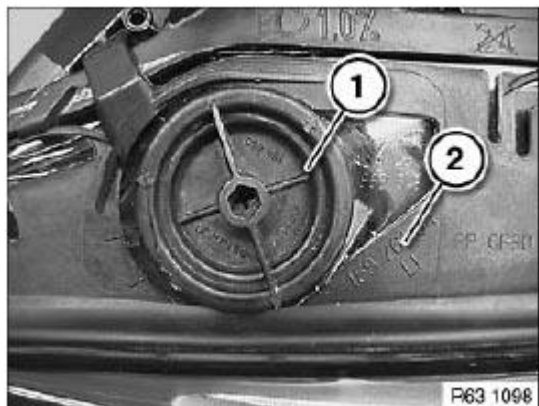


Fig. 91: Identifying Headlight And Cover

Courtesy of BMW OF NORTH AMERICA, INC.

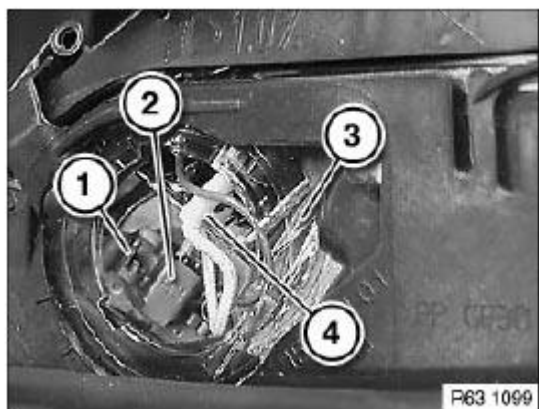
Release retaining clip (1) and feed bulb (2) out of headlight (3).

Disconnect plug connection (4).

Installation:

Make sure bulb (2) is correctly seated in headlight (3).

Note type of bulb. See **HEADLIGHTS** .

**Fig. 92: Identifying Retaining Clip, Feed Bulb, Headlight And Plug Connection**

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 201 REPLACING HALOGEN BULB FOR LEFT OR RIGHT FRONT FOG LAMP

WARNING: Follow instructions for **HANDLING LIGHT BULBS (EXTERIOR LIGHTS)**.

Necessary preliminary tasks:

- Remove **FRONT UNDERBODY PROTECTION**

NOTE: Operation is shown on the E60 (build date up to 03/2007). There may be differences in detail in the case of other vehicle models.

Release screws (1).

Remove fog lamp wheel arch cover (2).

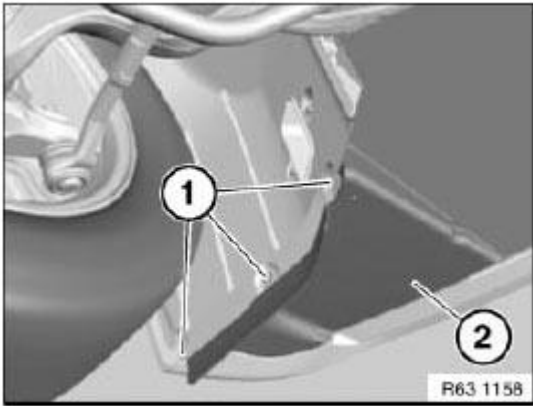


Fig. 93: Identifying Fog Lamp Wheel Arch Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Turn halogen bulb for fog lamp (2) in direction of arrow and remove from fog lamp.

Installation:

Note type of bulb. See **FOG LIGHTS, AUXILIARY LIGHTS** .

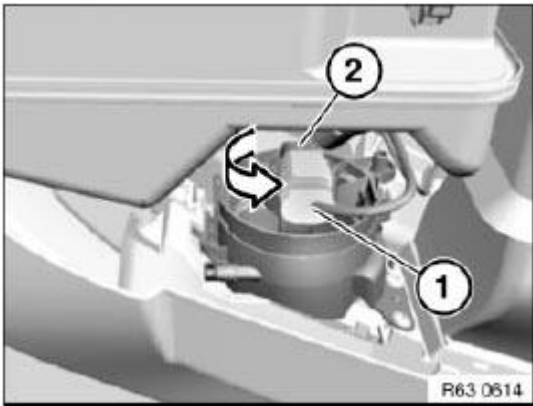


Fig. 94: Turning Halogen Bulb For Fog Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 273 REPLACING BULB FOR TURN INDICATOR, FRONT LEFT

WARNING: Follow instructions for **HANDLING LIGHT BULBS (EXTERIOR LIGHTS)**.

Turn bulb holder (1) approx. 30° counterclockwise.

Feed bulb holder (1) out of headlight (2).

Remove bulb from bulb holder (1).

Installation:

Note type of bulb. See **HEADLIGHTS** .

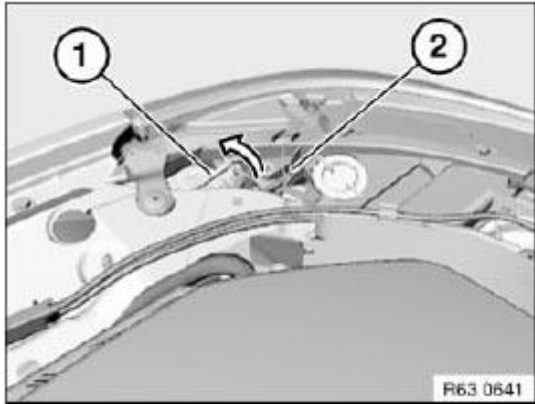


Fig. 95: Turning Bulb Holder

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 275 REPLACING BULB FOR TURN INDICATOR, FRONT RIGHT

Operation is described in:

Replacing **BULB FOR TURN INDICATOR, FRONT LEFT**

63 99 295 REPLACING BULB FOR AUXILIARY TURN SIGNAL LIGHT, FRONT LEFT OR RIGHT

WARNING: Follow instructions for **HANDLING LIGHT BULBS (EXTERIOR LIGHTS)**.

Necessary preliminary tasks:

- Remove **FRONT AUXILIARY TURN SIGNAL LIGHT**

Turn bulb holder (1) approx. 45° and remove from front auxiliary turn signal light (2).

Pull bulb out of holder (1).

Installation:

Note **TYPE OF BULB** .

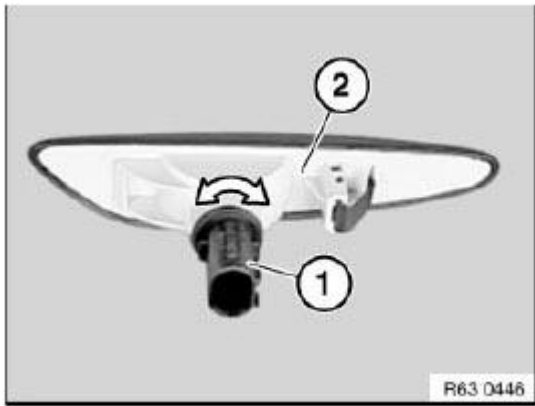


Fig. 96: Turning Bulb Holder

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 315 REPLACING BULB(S) FOR LEFT OR RIGHT REAR LIGHT (SALOON)

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS).

Necessary preliminary tasks:

- Remove SOCKET HOUSING FOR REAR LIGHT

Build date up to 03/07:

Turn faulty bulb(s) and pull out of socket housing for rear light (6).

Pull faulty reversing light bulb (1) out of socket housing for rear light (6).

NOTE:

1. Bulb, reversing light
2. Bulb, rear light/rear fog light
3. Bulb, rear light

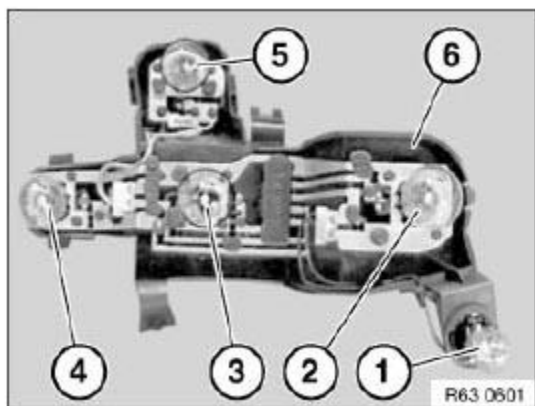


Fig. 97: Identifying Reversing Light, Rear Light/Rear Fog Light And Rear Light/Brake Light

Courtesy of BMW OF NORTH AMERICA, INC.

- 4. Bulb, rear light/brake light
- 5. Bulb, turn signal light

Build date up to 03/07:

Turn faulty bulb(s) and pull out of socket housing for rear light (5).

Pull faulty reversing light bulb (1) out of socket housing for rear light (5).

NOTE:

- 1. Bulb, reversing light
- 2. Bulb, rear light/rear fog light
- 3. Bulb, brake light
- 4. Bulb, brake light

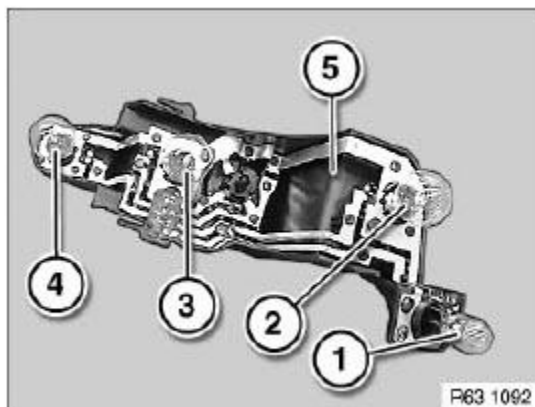


Fig. 98: Identifying Reversing Light, Rear Light/Rear Fog Light And Brake Light

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Note type of bulb. See **REAR LIGHT CLUSTER** .

63 99 401 REPLACING BULB FOR LEFT OR RIGHT LICENSE PLATE LIGHT

WARNING: Follow instructions for **HANDLING LIGHT BULBS (EXTERIOR LIGHTS)**.

Necessary preliminary tasks:

- Remove **LICENSE PLATE LIGHT**

Spread bow contacts (1) and remove festoon bulb (2).

Installation:

Note **TYPE OF BULB** .

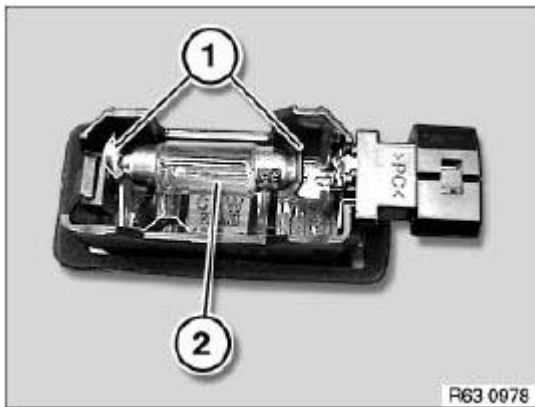


Fig. 99: Identifying Festoon Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 431 REPLACING BULB FOR FRONT CEILING LIGHT

WARNING: Follow instructions for **HANDLING LIGHT BULBS (INTERIOR LIGHTS)**.

Necessary preliminary tasks:

- Remove **FRONT CEILING LIGHT**

Turn bulb in direction of arrow and remove.

Installation:

Note **BULB TYPE** .

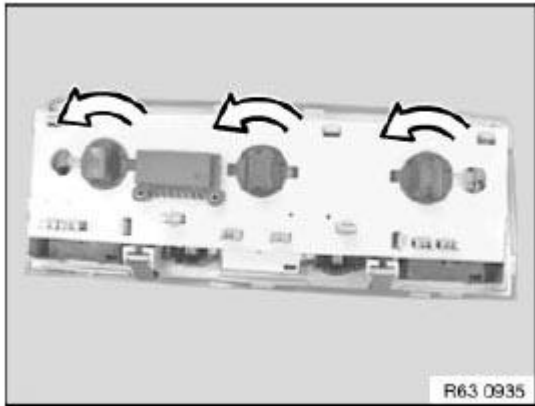


Fig. 100: Turning Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 432 REPLACING BULB FOR REAR CEILING LIGHT

WARNING: Follow instructions for **HANDLING LIGHT BULBS (INTERIOR LIGHTS)**.

Necessary preliminary tasks:

- Remove **REAR CEILING LIGHT**

Turn bulb in direction of arrow and remove.

Installation:

Note **BULB TYPE** .

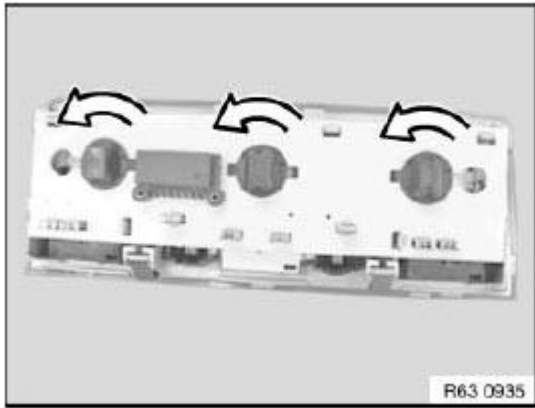


Fig. 101: Turning Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 433 REPLACING BULB FOR REAR READING LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Necessary preliminary tasks:

- Remove REAR READING LIGHT

Unlock retaining spring (1) and remove reflector (2).

Installation:

Make sure reflector (2) is correctly seated in guide (3).

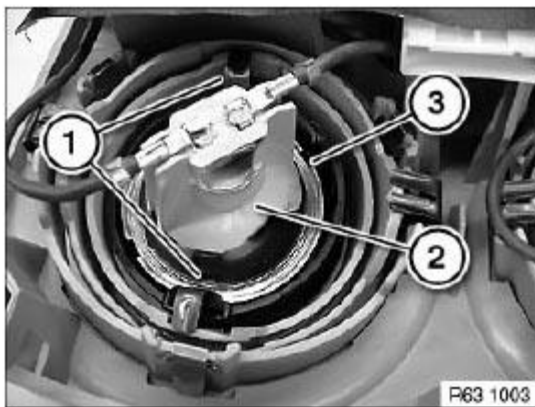


Fig. 102: Identifying Retaining Spring And Reflector With Guide

Courtesy of BMW OF NORTH AMERICA, INC.

Pull bulb (1) in direction of arrow out of reflector (2).

Installation:

Note **BULB TYPE** .

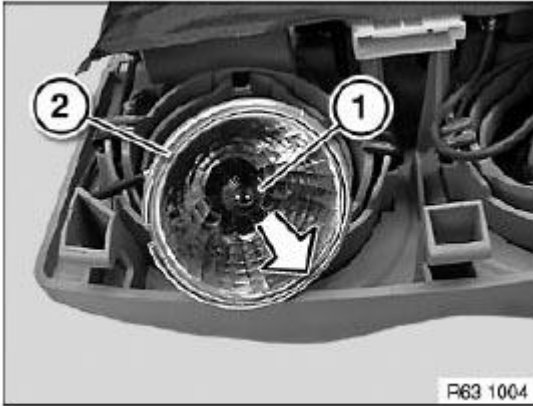


Fig. 103: Pulling Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 437 REPLACING BULB FOR FOOTWELL LIGHT (UNDERSIDE OF DOOR)

WARNING: Follow instructions for **HANDLING LIGHT BULBS (INTERIOR LIGHTS)**.

Necessary preliminary tasks:

- Remove **FOOTWELL LIGHT**

Version A:

Pull bulb (1) in direction of arrow from bulb holder.

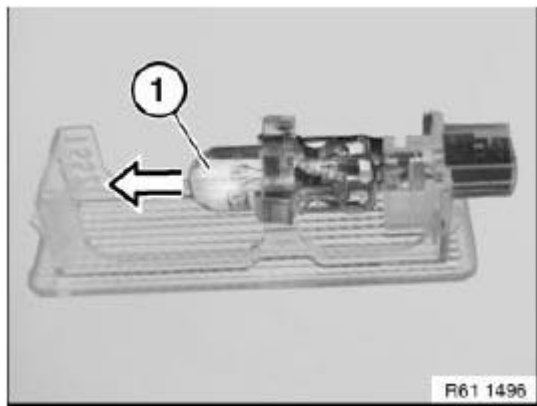


Fig. 104: Pulling Bulb From Bulb Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Version B:

Turn bulb holder (1) in direction of arrow and pull out of footwell light (2).

Installation:

Make sure bulb holder (1) is correctly engaged on footwell light (2).

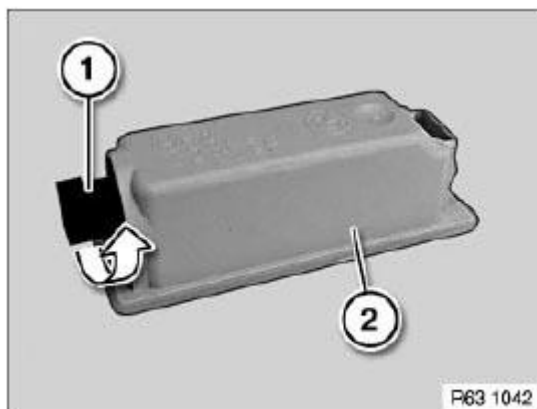


Fig. 105: Turning Bulb Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bulb (1) from bulb holder (2) in direction of arrow.

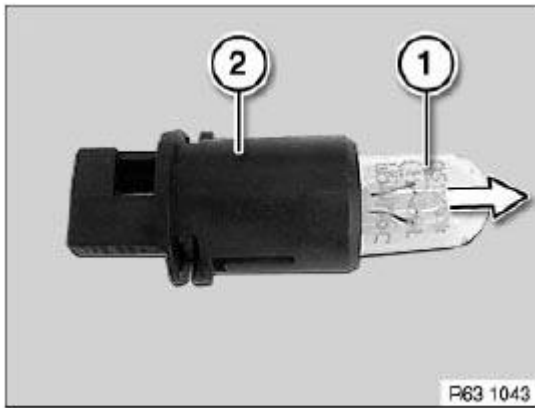


Fig. 106: Pulling Bulb From Bulb Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Note **TYPE OF BULB** .

63 99 437 REPLACING LIGHT BULB FOR FOOTWELL LIGHT

WARNING: Follow instructions for **HANDLING LIGHT BULBS (INTERIOR LIGHTS)**.

Necessary preliminary tasks:

- Remove **FOOTWELL LIGHT**

Move lens cover (1) in direction of arrow and remove.

Remove festoon (2) underneath.

Installation:

Note **BULB TYPE** .

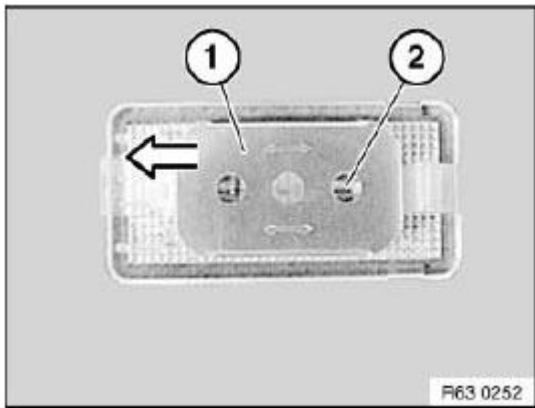


Fig. 107: Identifying Lens Cover And Festoon
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 445 REPLACING BULB(S) FOR MIRROR LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Necessary preliminary tasks:

- Remove MIRROR LIGHT

Expand bow contacts (1) and remove bulb for mirror light.

Installation:

Note TYPE OF BULB .

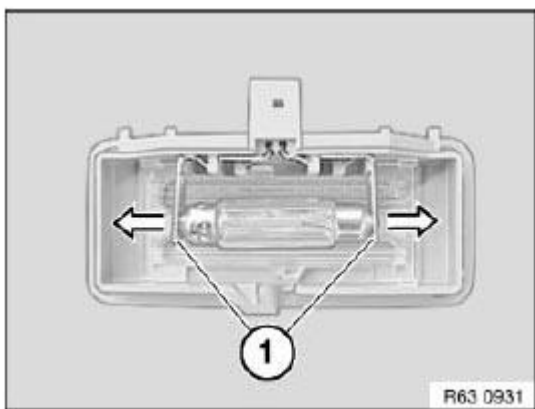


Fig. 108: Expanding Bow Contacts
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 452 REPLACING LIGHT BULB FOR LUGGAGE COMPARTMENT LIGHTING

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Necessary preliminary tasks:

- Remove **LUGGAGE COMPARTMENT LIGHT**

Move lens cover (1) in direction of arrow and remove.

Remove festoon (2) underneath.

Installation:

Note **BULB TYPE** .

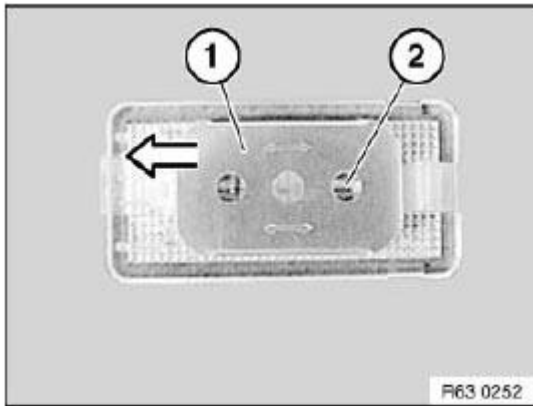


Fig. 109: Identifying Lens Cover And Festoon
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 461 REPLACING BULB FOR GLOVEBOX LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Necessary preliminary tasks:

- Remove **GLOVEBOX LIGHT**

Move lens cover (1) in direction of arrow and remove.

Remove festoon (2) underneath.

Installation:

Note **BULB TYPE** .

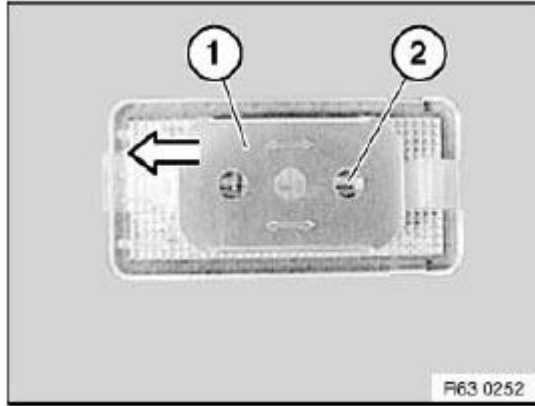


Fig. 110: Identifying Lens Cover And Festoon
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 495 REPLACING LED FOR LEFT OR RIGHT DOOR HANDLE/DOOR COMPARTMENT LIGHT (UP TO 03/2007)

WARNING: Follow instructions for **HANDLING LIGHT BULBS (INTERIOR LIGHTS)**.

For door compartment light:

Lever out cap for door compartment light.

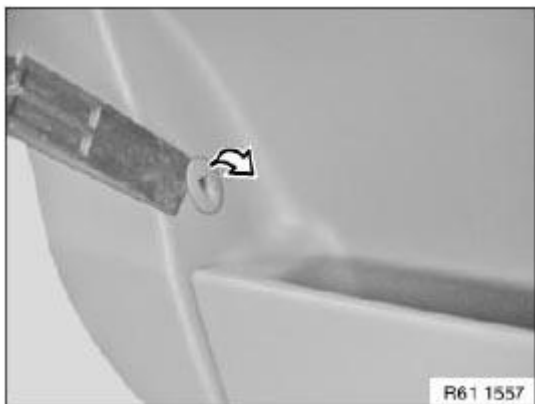


Fig. 111: Removing Door Compartment Light Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock LED in direction of arrow and detach cap.

Remove sheathing from wiring harness.

Disconnect cables.

Connect cables of new wiring harness with butt connectors and heat-shrink sleeves.

Insulate wiring harness with insulating tape.

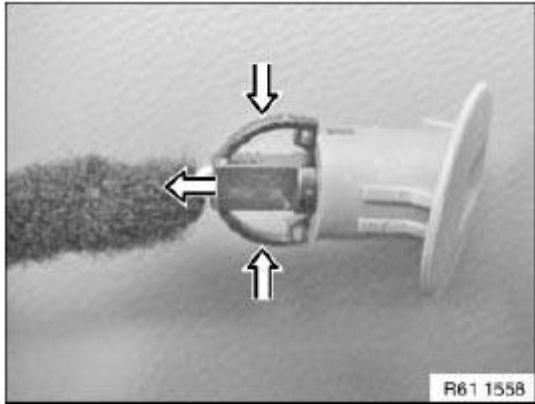


Fig. 112: Removing Sheathing From Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

For door handle light:

Lever out cap for door compartment light.



Fig. 113: Removing Door Handle Light Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock LED in direction of arrow and detach cap.

Remove sheathing from wiring harness.

Disconnect cables.

Connect cables of new wiring harness with butt connectors and heat-shrink sleeves.

Insulate wiring harness with insulating tape.

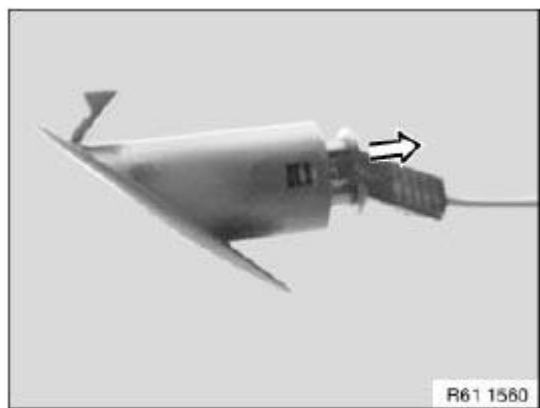


Fig. 114: Removing Sheathing From Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

GENERAL INFORMATION

BMW - 1982-13

BRAKE PAD WARNING LIGHT

NOTE: Most vehicles are equipped with a Malfunction Indicator Light (MIL) or check engine light. If light comes on and remains on while driving, the vehicle requires some type of repair. See appropriate service and repair information. After repairing fault(s) and clearing fault code(s), the Malfunction Indicator Light (MIL) or check engine light should go out. Some models may use a dual-function indicator light, which is also used to indicate emission component service is due. After performing required service, reset indicator light.

NOTE: Brake pad warning light should go out after replacement of brake pad thickness sensor. If warning light does not go out, turn ignition on, engine off, for 30-45 seconds. Warning light should go out. If the above procedure is not successful, connect vehicle to DIS tester, access Instrument Cluster/IKE, then "clear fault memory".

NOTE: The base instrument cluster OIL SERVICE INSPECTION display is located on the bottom of the cluster, to the right of center. The base cluster is also equipped with a graphic display of the car that shows if a door or the trunk lid is open. The high instrument cluster OIL SERVICE INSPECTION display is located on the bottom of the cluster, to the left of center.

NOTE: To determine the appropriate reset procedure, refer to **BRAKE PAD WARNING LIGHT RESET INDEX**. Only vehicles listed in this index have a specific brake pad warning light reset procedure. For other vehicles, perform **PROCEDURE 1** first. If light does not reset, perform **PROCEDURE 2**. If the above procedures are not successful, connect vehicle to DIS tester, access Instrument Cluster/IKE, then "clear fault memory".

BRAKE PAD WARNING LIGHT RESET INDEX

Model & Year	Reset Procedure
5-Series	
1997-00 (w/High Instrument Cluster)	<u>Brake Pad Warning Light Reset - Procedure 1</u>
1997-00 (w/Base Instrument Cluster)	<u>Brake Pad Warning Light Reset - Procedure 2</u>
7-Series	
1997-00	<u>Brake Pad Warning Light Reset - Procedure 1</u>

BRAKE PAD WARNING LIGHT RESET - PROCEDURE 1

To reset light after replacing brake pads, turn ignition on with engine off. Wait 30 seconds. Brake pad warning indicator light will switch off.

BRAKE PAD WARNING LIGHT RESET - PROCEDURE 2

Start engine. Brake pad warning indicator will switch off.

OXYGEN SENSOR WARNING LIGHT

NOTE: To determine the appropriate reset procedure, refer to **OXYGEN SENSOR WARNING LIGHT RESET INDEX**. Only vehicles listed in this index have an oxygen sensor warning light.

OXYGEN SENSOR WARNING LIGHT RESET INDEX

Model & Year	Reset Procedure
All Models	
1983 & Earlier	<u>Oxygen Sensor Warning Light Reset - Procedure 1</u>
1984 & Later	<u>Oxygen Sensor Warning Light Reset - Procedure 2</u>

OXYGEN SENSOR WARNING LIGHT RESET - PROCEDURE 1

1. Every 30,000 miles (25,000 miles on 528i) the OXYGEN light in dash will come on as a reminder to replace the oxygen sensor.

NOTE: On 528e models, pull the protective metal plate off before removing oxygen sensor.

2. On 528e models, no interval reset switch is provided. After replacing sensor, remove instrument panel. Remove and discard bulb for OXYGEN sensor light.
3. On all other models, trace speedometer cable to interval switch (in-line with cable, mounted on frame rail left of transmission). Press White reset button. See **Fig. 1**. Ensure warning light is out.

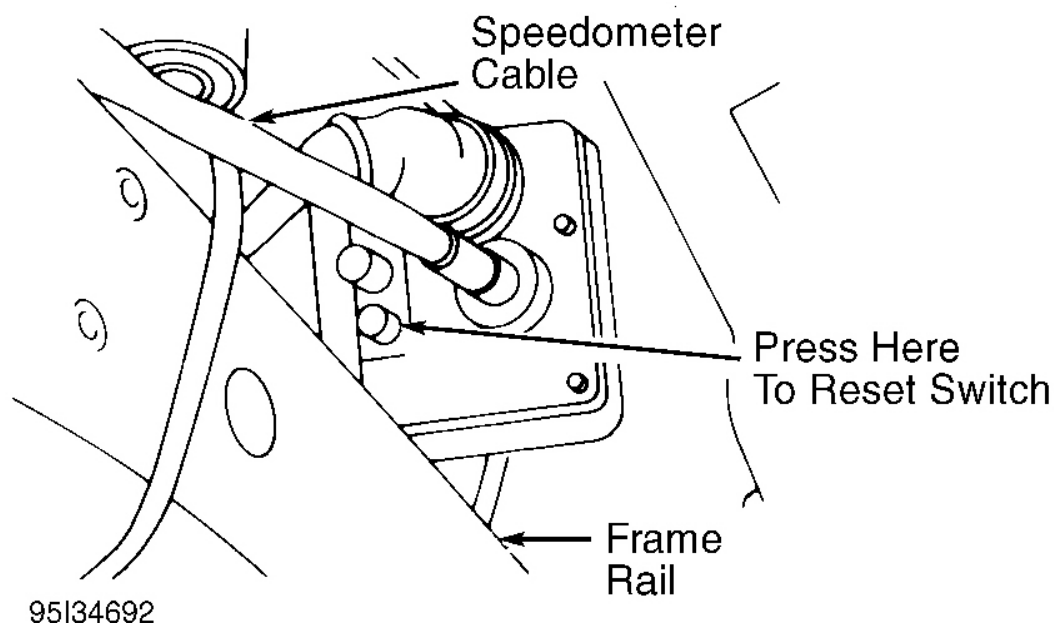


Fig. 1: Locating Oxygen Sensor Warning Light Reset Switch (All BMW Models Before 1983)
 Courtesy of BMW OF NORTH AMERICA, INC.

OXYGEN SENSOR WARNING LIGHT RESET - PROCEDURE 2

NOTE: Some late production (February 1985 and later) BMW models have a reset button on rear of the light control assembly located near pedal assembly. Press button to reset light after servicing oxygen sensor.

No reset switch is provided. When oxygen sensor light comes on, service oxygen sensor. Remove and discard bulb from indicator.

SERVICE INTERVAL REMINDER LIGHTS

NOTE: This is sometimes referred to as the "Oil Change Light" or "Oil Service Light".

NOTE: The service indicator can only be reset using the reset mode in the instrument cluster or by using BMW hardware. This procedure applies to 3-Series from production date 9/99, and 5-Series and 7-Series from production date 9/00 (except 2002-05 7-Series and 2004-05 5-Series) without an engine compartment diagnostic connector.

On models that still use the round diagnostic connector in engine

compartment, use SIA reset tool to reset service lights. See **SERVICE INTERVAL LIGHT RESET - PROCEDURE 1.**

On models without the round diagnostic connector in the engine compartment, the use of the SIA reset tool is not possible. See **SERVICE INTERVAL LIGHT RESET - PROCEDURE 2.**

For 2002-up models with condition based service (CBS) interval system reset procedure, see **SERVICE INTERVAL LIGHT RESET - PROCEDURE 3.**

NOTE: To determine the appropriate reset procedure, refer to **SERVICE INTERVAL REMINDER LIGHT RESET INDEX.** Only vehicles listed in this index have a service interval reminder.

SERVICE INTERVAL REMINDER LIGHT RESET INDEX

Model & Year	Reset Procedure
Models With Engine Compartment Diagnostic Connector	
1983-05	<u>Service Interval Light Reset - Procedure 1</u>
Models Without Engine Compartment Diagnostic Connector	
2001-05	<u>Service Interval Light Reset - Procedure 2</u>
Models Without Condition Based Service (CBS) Interval System	
2004-05	<u>Service Interval Light Reset - Procedure 3</u>
Models With Condition Based Service (CBS) Interval System	
2002-06	<u>Service Interval Light Reset - Procedure 4</u>
2007-13	<u>Service Interval Light Reset - Procedure 5</u>

DESCRIPTION & OPERATION

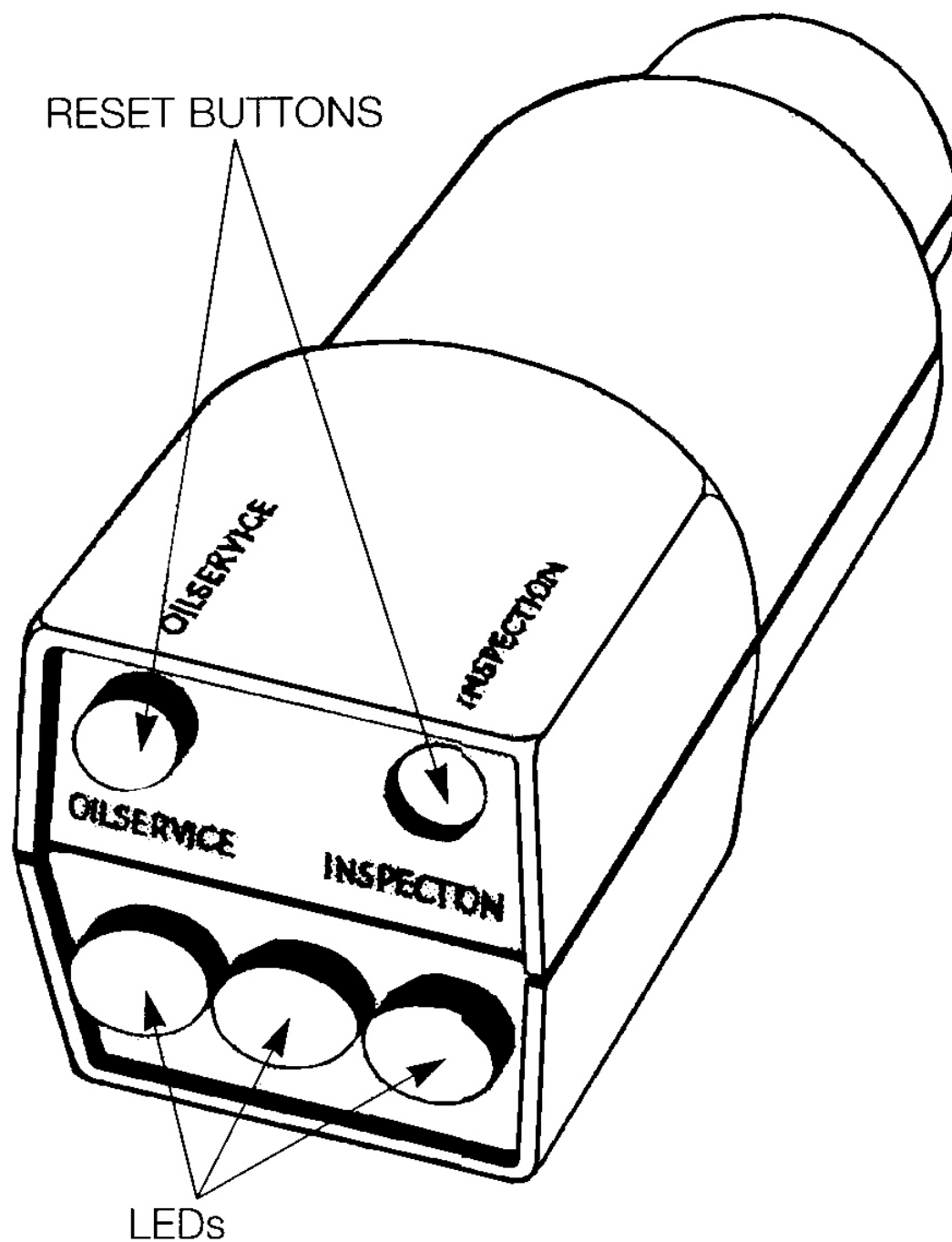
Starting in 1983 and ending on some models in 1999, service indicator on instrument panel consists of 5 Green, 3 Red and one Yellow Light Emitting Diodes (LED) and the inscriptions OIL SERVICE and INSPECTION. When ignition is on, as many as 5 Green LEDs will light up. The Green LEDs go out when the engine is started. If the Yellow LED glows and one of the inscriptions comes on and remains on when the engine is started, maintenance service is due immediately. When maintenance interval has been exceeded (after approximately 1000 miles) the Red LED's will come on in addition to the Yellow LED as a reminder for servicing.

Beginning on some models in 1999, a new method for displaying the service interval is used. Colored LEDs are no longer used to display the amount of time until the next service or inspection is due. The actual mileage remaining until the next service will be displayed for five seconds when the ignition is first switched on. The text OIL SERVICE or INSPECTION will also illuminate to show which service is due. A minus symbol (-) before the mileage display indicates that a service is past due.

The 2002-12 models with condition based service (CBS) interval system uses an entirely different service interval system. See **SERVICE INTERVAL LIGHT RESET - PROCEDURE 3.**

SERVICE INTERVAL LIGHT RESET - PROCEDURE 1

1. To reset instrument cluster SIA OIL SERVICE indicator, turn ignition switch to ON position. Connect Service Indicator Resetter (62 1 110) to diagnosis connector in engine compartment. See **Fig. 2**.
2. Press Yellow OIL SERVICE button. Green LED will illuminate. Wait until Yellow LED illuminates and then goes out again. Ensure that OIL SERVICE indicator has been reset.
3. To reset SERVICE INTERVAL indicator, press Red INSPECTION service button for inspection. Green LED illuminates. Wait until Red LED illuminates and then goes out again. Turn ignition switch to OFF position, wait 20 seconds and repeat procedure in order to adapt interval of annual inspection to inspection. Ensure that SERVICE INTERVAL indicator has been reset.



G00131569

Fig. 2: Identifying BMW Service Interval Reset Tool
Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INTERVAL LIGHT RESET - PROCEDURE 2

Reset service light by performing the following:

1. Ignition key must be in OFF position.
2. Press and hold trip odometer reset button in the instrument cluster (left button), and turn ignition key to first position.
3. Keep the button pressed for approximately 5 seconds until one of the following words appear in the display: "OIL SERVICE", or "INSPECTION", with "RESET".
4. Release reset button and press it again until "RESET" begins to flash in the display. See **Fig. 3** and **Fig. 4**.
5. Service due is shown with "RESET" if coded minimum consumption limit has been reached and resetting is possible. If "RESET" is not shown, minimum limit has not been reached and resetting is not possible.
6. While "RESET" is flashing, press left button briefly to reset service interval. After display has shown new interval, following will appear: "END SIA".
7. System can only be reset again after 2.5 gallons of fuel have been consumed.

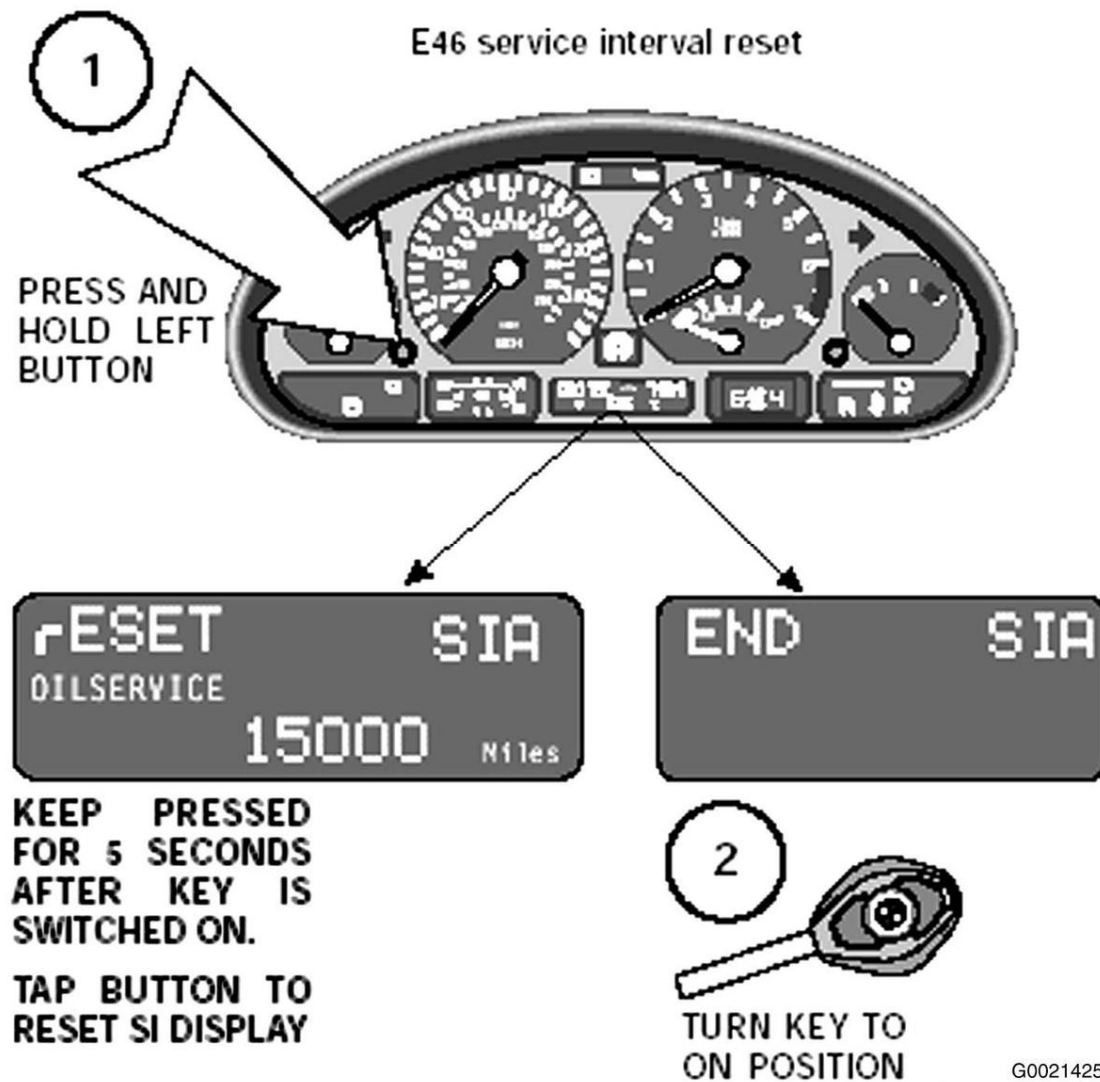
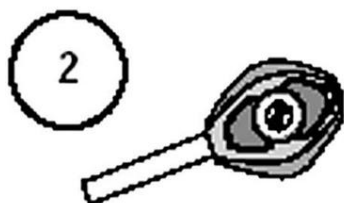
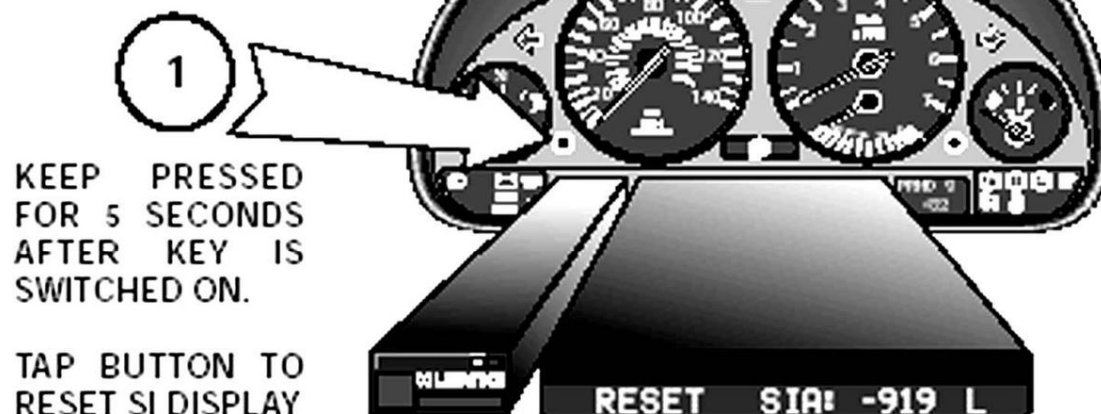


Fig. 3: Resetting Service Interval Light (E46)
 Courtesy of BMW OF NORTH AMERICA, INC.

E39 service interval reset (High Version)

PRESS AND HOLD
LEFT BUTTON.



TURN THE KEY TO
ON POSITION.

G00214254

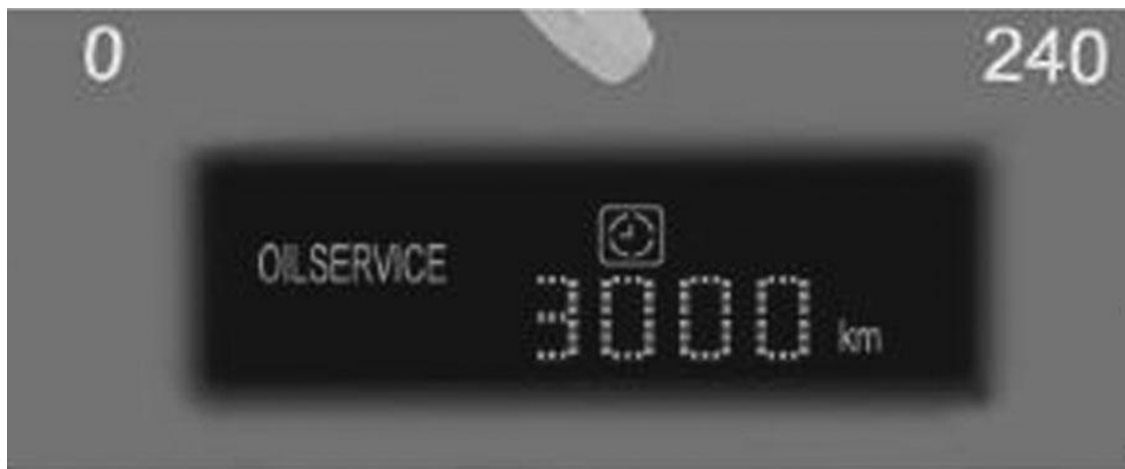
Fig. 4: Resetting Service Interval Light (E39)

Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INTERVAL LIGHT RESET - PROCEDURE 3

The BMW maintenance system SIA IV (service interval indicator) is used on X3 models (E83). The service interval indicator is a system subject to constant development which in its development stages has been integrated in various model series such as E85 (Z4) and E46 (3 and M3-Series).

The service indicator appears in the LC display in the instrument cluster's speedometer. The indicator is shown for 5 seconds in the LC display after terminal R is "ON". See [Fig. 5](#).



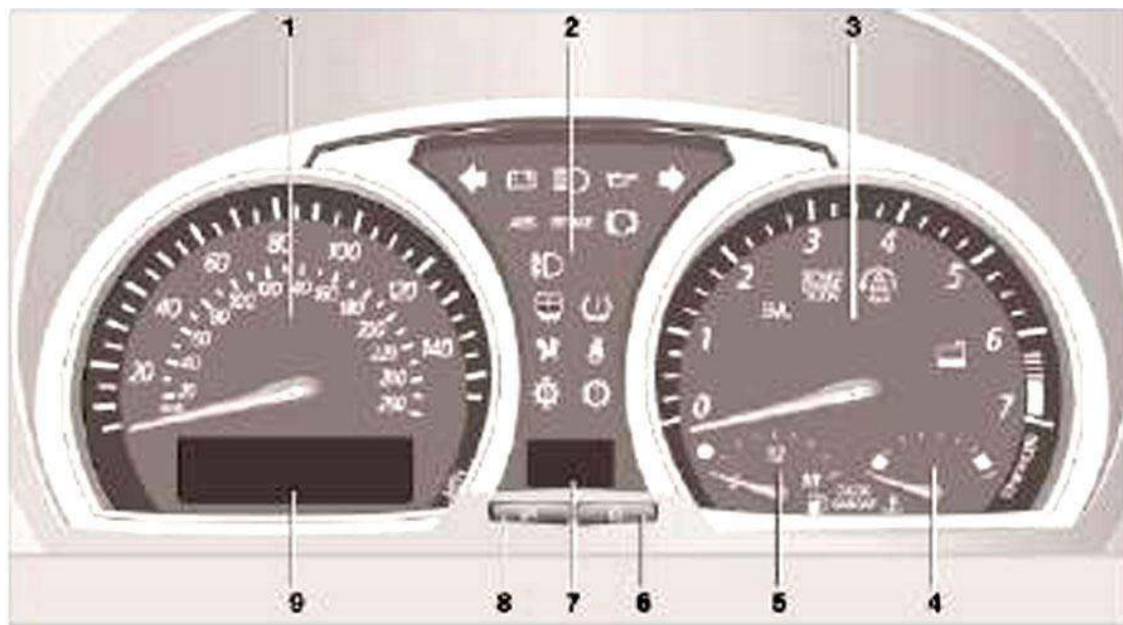
G00313209

Fig. 5: Identifying Service Interval Indicator

Courtesy of BMW OF NORTH AMERICA, INC.

Resetting Service Interval Indicator

Resetting the service interval indicator for the oil service and inspection procedures can only be done by pressing the left button in the instrument cluster. See [Fig. 6](#).



- | | |
|------------------------------|--|
| 1. Speedometer | 6. Button for display of Time and Service Interval |
| 2. Indicator Warning Lamps | 7. Display for Selector lever and program display |
| 3. Tachometer | 8. Button for reset of Trip Odometer and Time |
| 4. Coolant Temperature Gauge | 9. Display for Time, Service Interval, OBC |
| 5. Fuel Gauge | |

G00313208

Fig. 6: Identifying Service Interval Indicator Reset Button

Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INTERVAL LIGHT RESET - PROCEDURE 4

Models using a Condition Based Service (CBS) service interval system, which displays a Service Need Display (SND). When ignition is on, Service Need Display appears under the speedometer in the instrument cluster for 10 seconds in the place where the fuel tank level is normally displayed. The first line corresponds to the mileage dependent service items. It specifies the mileage when the next service is due.

If the mileage is exceeded (service overdue), it appears with a minus sign. The second line corresponds to the time dependent service items and is displayed by a clock symbol. It specifies the weeks/months/years when the next service is due. If the service is overdue, it appears with a minus sign. The actual service item (with additional information) can be viewed in the control display.

NOTE: On some models an appropriate scan tool may be used to reset CBS service schedules. By using suitable diagnostic equipment connected to the vehicle diagnostic connector it is possible to reset CBS service schedules at any time. By selecting the `CBS' option, the diagnostic equipment will gather information regarding the current state of CBS items from their relevant modules on the CAN network.

Service reset is accomplished using instrument cluster:

1. Insert key into ignition.
2. Press ignition start/stop button without depressing the clutch or brake, and wait for the service reminder to disappear.
3. Immediately after the service reminder indicator goes out, press and hold the odometer reset button or stalk. After 3 secs a warning triangle will appear, keep the odometer button pressed and after another 2-3 secs an oil can will appear.

NOTE: If the odometer button is pressed too long (10 secs in total), German writing will appear (giving the software level/ can bus etc. of the vehicle). This indicates that you've overshoot the reset procedure and you need to re-start from the beginning.

4. The service menu should now be displayed. Use the button (twist if the switch is a stalk - or if a button, tap repeatedly) to scroll up/down through the various service items.

NOTE: On newer models, it may be the rocker/toggle switch on the turn indicator lever that is used to scroll up/down through the various service items. See Fig. 9.

5. When the item to be reset is showing, press the BC button on end of turn indicator lever. "Reset" should now appear in the display. Press in and hold the BC button for 2-3 secs and a whirling clock icon will be

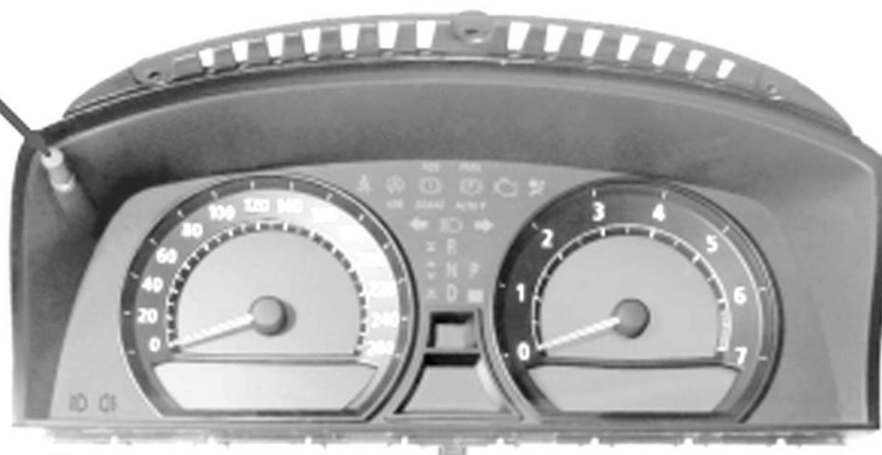
displayed. The reset procedure for the selected service item is done.

6. Scroll up/down to select another item (as in step 4), or press the ignition start/stop button to exit.

NOTE: Residual wear or remaining time are specified (possibly with a minus sign). The "1" symbol means that you can reset service operation (early production vehicles may show an "F"), while a "0" indicates it is not resettable (the first 20 percent of the service interval is also protected against accidental reset). For additional information about Condition Based Service (CBS), see **RESETTING AND CORRECTING CONDITION BASED SERVICE** under **PROGRAMMING** in **SELF-DIAGNOSIS - 7-SERIES** article.

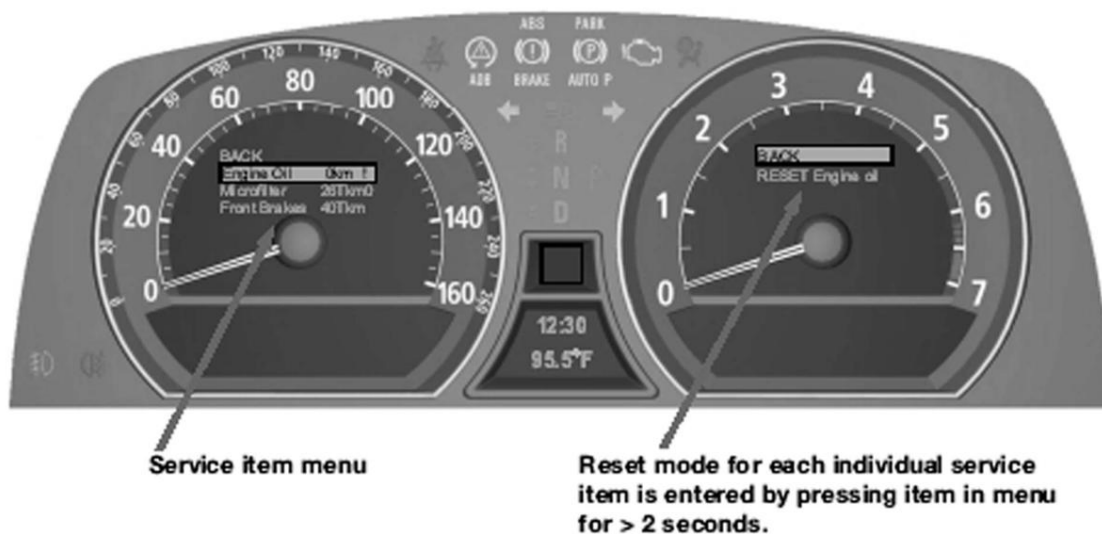
Reset Button

Press and
hold for 10
seconds.



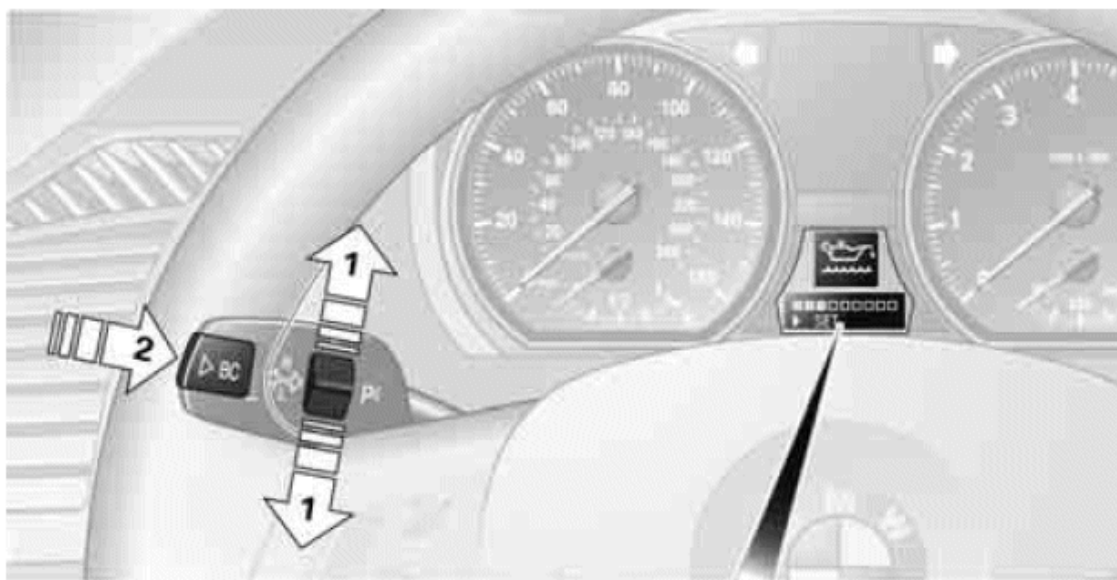
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Fig. 7: Identifying Condition Based Service (CBS) Instrument Panel Controls (Typical)
Courtesy of BMW OF NORTH AMERICA, INC.



G00214256

Fig. 8: Identifying Condition Based Service (CBS) Instrument Panel Controls (Typical)
Courtesy of BMW OF NORTH AMERICA, INC.



1 Button for:

- ▶ Selecting display
- ▶ Setting values

2 Button for:

- ▶ Confirming selected display or set values
- ▶ Calling up computer information

Fig. 9: Identifying Condition Based Service (CBS) Instrument Panel Controls (Typical)
Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INTERVAL LIGHT RESET - PROCEDURE 5

CBS Reset Using BMW Diagnosis System

IMPORTANT: Although the CBS maintenance jobs can be reset using in-car controls, it is recommended that the reset procedure be done via the diagnosis system. It is only possible to code the statutory intervals specific to individual countries with the diagnosis system.

IMPORTANT: To be able to check and/or correct the car's on-board date properly, the diagnosis system requires the correctly set tester system date.

The jobs may only be reset after the service measure has been completed.

The brake pads can only be reset with a new brake pad wear sensor.

The CBS jobs can be reset via the diagnosis system on the following path:

- Start diagnosis
- Carry out vehicle identification
- Function selection

- Service functions
- Maintenance
- CBS reset

CBS Reset Using In-Car Controls

On-the-vehicle service operations can be reset at the instrument panel.

NOTE: A reset is only possible in the car if:

- There is no Check Control message
- Availability of the service job is under 90%
- On-board date must be correctly set

NOTE: Resetting of a service job must always be carried out after a maintenance measure has been completed.

IMPORTANT: If engine oil and vehicle check are reset at the same time, always reset engine oil first.

1. Switch the ignition on.
2. Press the odometer reset button (1) for approx. 10 seconds, until the 1st service job appears in the display (2). See **Fig. 10**.
3. Bring up the next item by briefly pressing the button again.
4. Select the desired service job.
5. If a reset is possible, this is displayed in the instrument panel as "Reset executable".
6. Start the reset by pressing the button for 3 seconds.
7. Confirm text message "Execute reset?" by pressing the button for 3 seconds again.
8. The status of the reset is indicated in the display by a progress bar and in text as "Reset running".
9. The reset is confirmed after completion as "Reset successful".

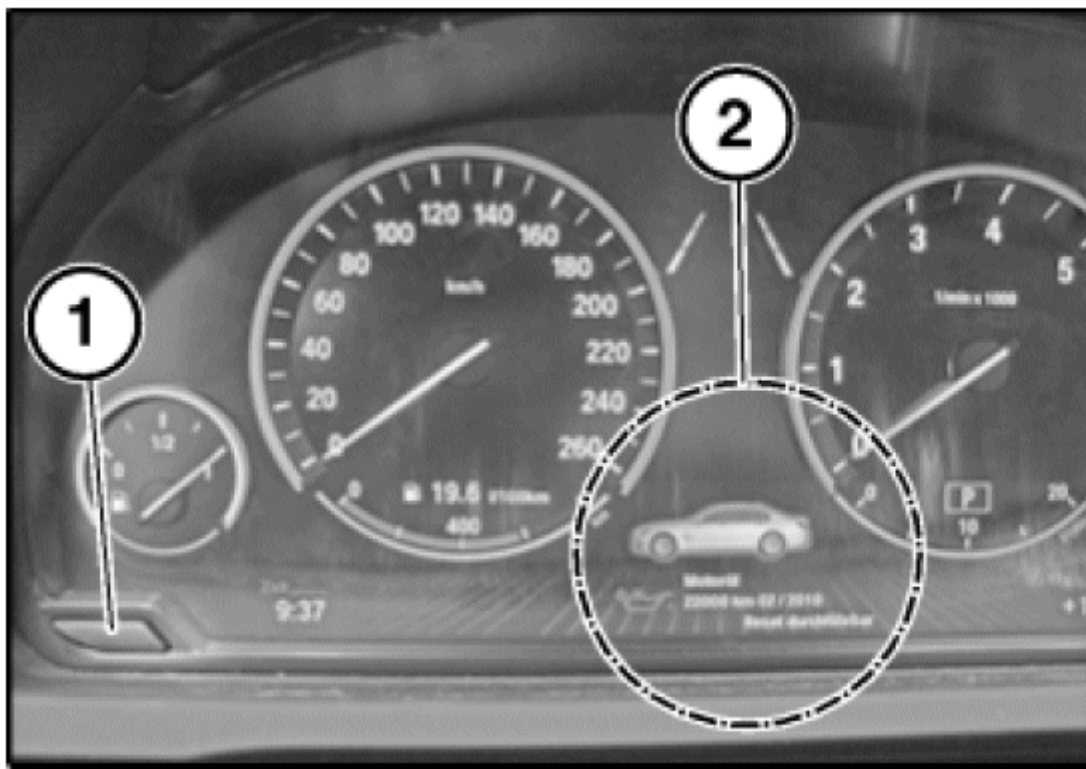


Fig. 10: Identifying Condition Based Service (CBS) Instrument Panel Controls & Display (Typical)
 Courtesy of BMW OF NORTH AMERICA, INC.

TIRE PRESSURE MONITOR SYSTEM (TPMS)

NOTE: If a tire pressure has been adjusted, or a wheel or tire has been changed or replaced, or repairs have been made to air spring suspension, the TPM system must be reinitialized. System must be reinitialized both before and after pulling a trailer.

CAUTION: When driving with snow chains or a space-saver spare tire, DO NOT initialize the system.

NOTE: To determine the appropriate reset procedure, refer to TPMS RESET INDEX. Only vehicles listed in this index have a TPMS reset.

TPMS RESET INDEX

Model & Year	Reset Procedure
1-Series (128i & 135i)	
2008	<u>TPMS Reset - Procedure 6</u>
2009-13	<u>TPMS Reset - Procedure 7</u>
3-Series	

2011 BMW 535xi

GENERAL INFORMATION BMW - 1982-13

2001-08	<u>TPMS Reset - Procedure 1</u>
2009-13	<u>TPMS Reset - Procedure 7</u>
5-Series	
2001-03	<u>TPMS Reset - Procedure 1</u>
2004-09	<u>TPMS Reset - Procedure 6</u>
2010-13	<u>TPMS Reset - Procedure 7</u>
6-Series	
2004-09	<u>TPMS Reset - Procedure 6</u>
2010-10	<u>TPMS Reset - Procedure 7</u>
2012-13	<u>TPMS Reset - Procedure 7</u>
7-Series	
2002-05	<u>TPMS Reset - Procedure 2</u>
2006-13	<u>TPMS Reset - Procedure 7</u>
ActiveHybrid Series	
2012-13	<u>TPMS Reset - Procedure 7</u>
Alpina	
2007-08	<u>TPMS Reset - Procedure 4</u>
2011-13	<u>TPMS Reset - Procedure 7</u>
M3	
2001-06	<u>TPMS Reset - Procedure 1</u>
2008	<u>TPMS Reset - Procedure 6</u>
2009-13	<u>TPMS Reset - Procedure 7</u>
M5	
2002-03	<u>TPMS Reset - Procedure 3</u>
2006-08	<u>TPMS Reset - Procedure 6</u>
2009-13	<u>TPMS Reset - Procedure 7</u>
M6	
2006-07	<u>TPMS Reset - Procedure 6</u>
2008-10	<u>TPMS Reset - Procedure 7</u>
2012-13	<u>TPMS Reset - Procedure 7</u>
M-Coupe & M-Roadster	
2006-08	<u>TPMS Reset - Procedure 5</u>
X3	
2004-10	<u>TPMS Reset - Procedure 5</u>
2011-13	<u>TPMS Reset - Procedure 7</u>
X5 & X5 M	
2001-05	<u>TPMS Reset - Procedure 1</u>
2006	<u>TPMS Reset - Procedure 5</u>
2007-13	<u>TPMS Reset - Procedure 7</u>
X6 & X6 M	
2008-13	<u>TPMS Reset - Procedure 7</u>

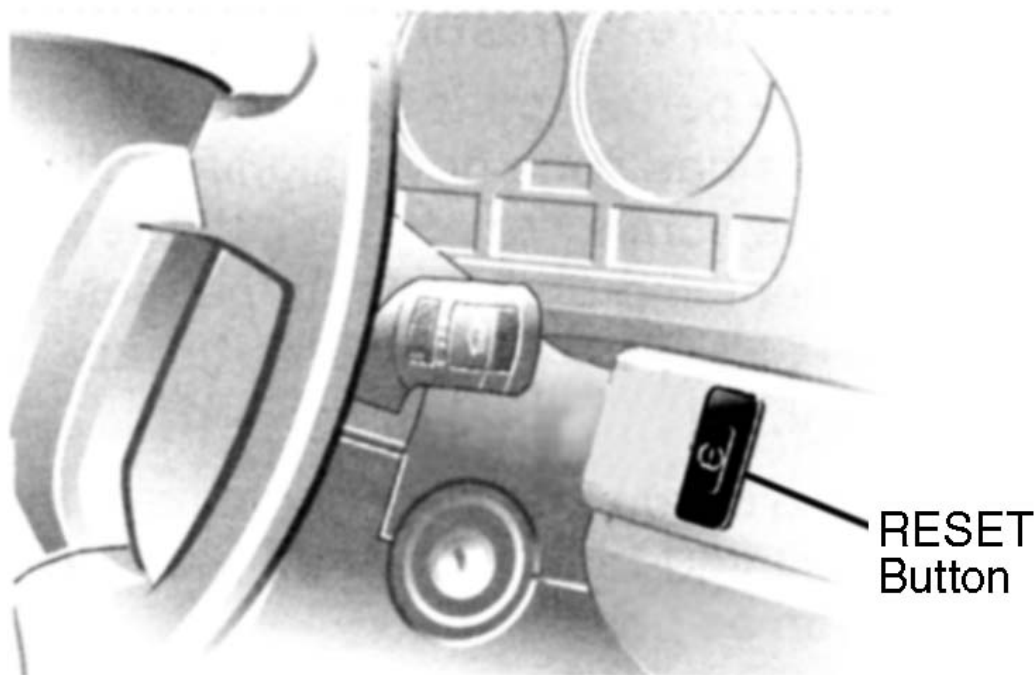
2001-02	<u>TPMS Reset - Procedure 1</u>
Z4	
2003-06	<u>TPMS Reset - Procedure 1</u>
2007-08	<u>TPMS Reset - Procedure 5</u>
2009-13	<u>TPMS Reset - Procedure 7</u>
Z8	
2001-03	<u>TPMS Reset - Procedure 1</u>

TPMS RESET - PROCEDURE 1

1. Set the tire pressure on all wheels to specification.
2. Turn ignition switch to ON position, with engine off.
3. Press reset button (for no longer than 10 seconds) until tire pressure warning light illuminates Yellow for a few seconds. See Fig. 11, Fig. 12, Fig. 13 or Fig. 14.

NOTE: On some X5 models, the reset button is marked "RDC".

4. Drive vehicle. Initialization is automatically completed during the drive, without any feedback issued.



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Fig. 11: Locating TPM System Reset Button (5-Series)
Courtesy of BMW OF NORTH AMERICA, INC.

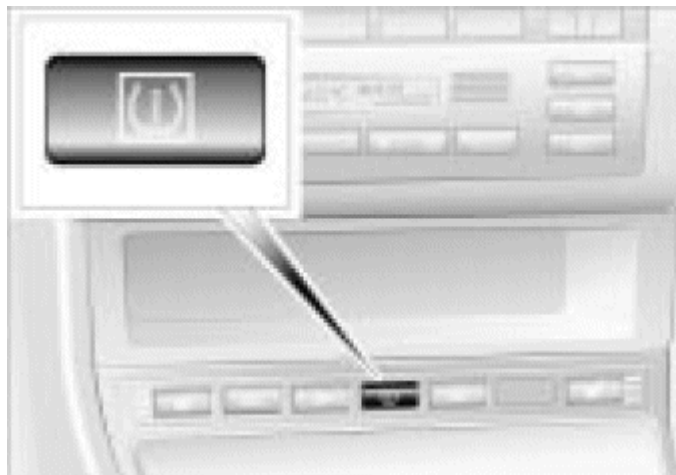
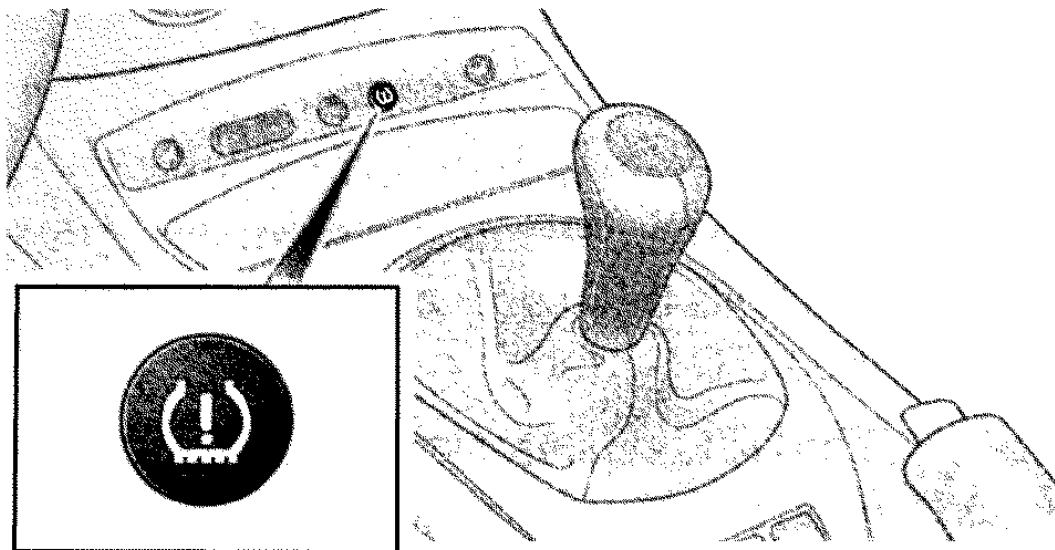
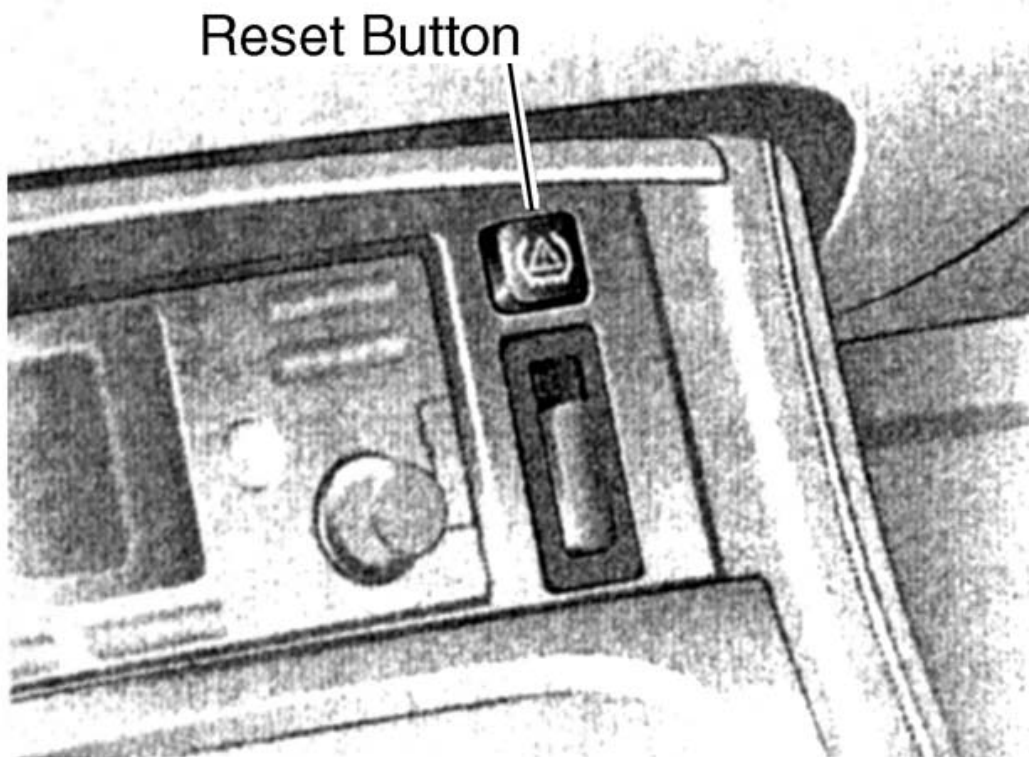


Fig. 12: Locating TPM System Reset Button (3-Series & X5 - Typical)
Courtesy of BMW OF NORTH AMERICA, INC.



G00225521

Fig. 13: Locating TPM System Reset Button (Z4)
Courtesy of BMW OF NORTH AMERICA, INC.



G00251684

Fig. 14: Locating TPM System Reset Button (Z28)
Courtesy of BMW OF NORTH AMERICA, INC.

TPMS RESET - PROCEDURE 2

NOTE: The initialization finishes during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.

1. Set the tire pressure of all wheels to specification.
2. Start engine, but do not start driving.
3. On Control Center, select "RPA" from the "SETTINGS" menu and confirm selection. The initialization menu will appear. See **Fig. 15**.
4. Select "SET" and confirm selection.
5. Drive vehicle. The message "FTM IS BEING INITIALIZED" will be displayed. See **Fig. 16**.

NOTE: It takes at least 10 minutes before the TPM system can detect and report a flat tire.

6. Select counterclockwise left arrow button and confirm to exit from menu.

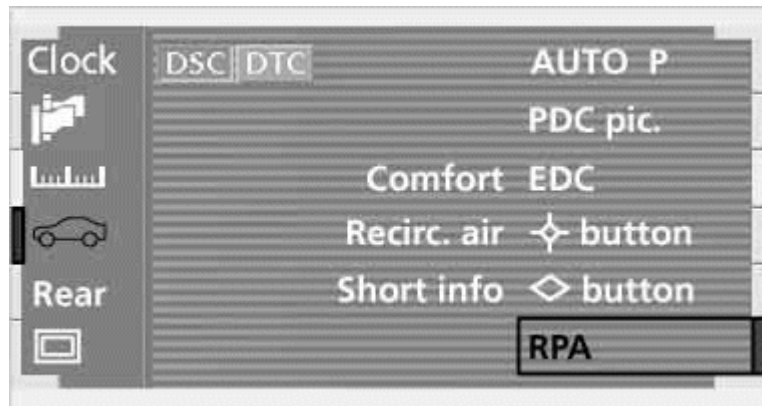


Fig. 15: Identifying TPM System Reinitialization Messages (1 Of 2)
 Courtesy of BMW OF NORTH AMERICA, INC.

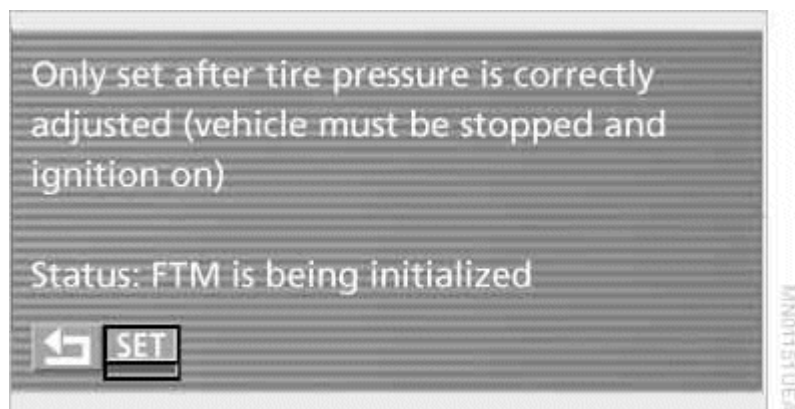


Fig. 16: Identifying TPM System Reinitialization Messages (2 Of 2)
 Courtesy of BMW OF NORTH AMERICA, INC.

TPMS RESET - PROCEDURE 3

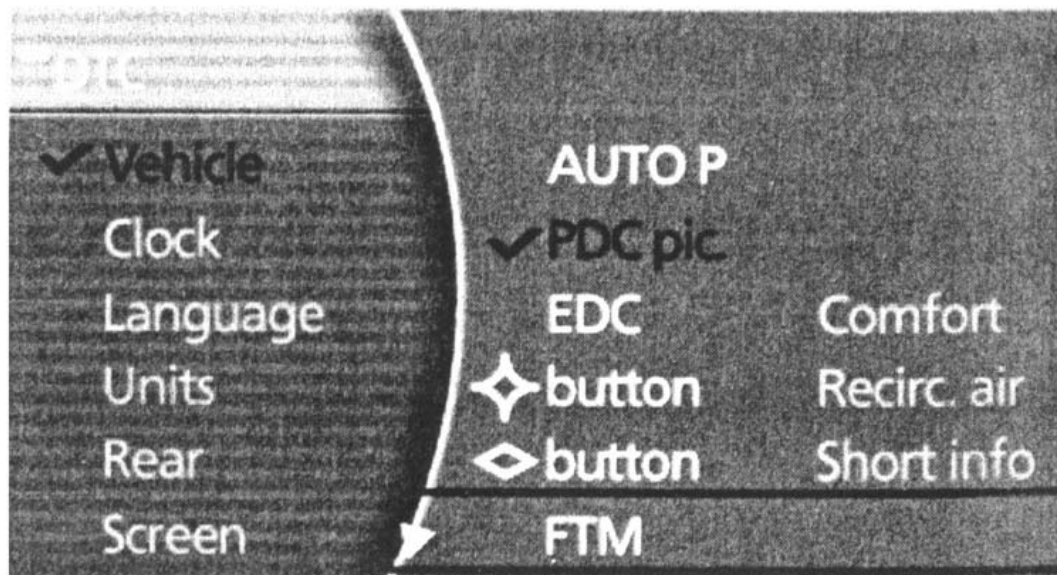
NOTE: The initialization finishes during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.

1. Set the tire pressure of all wheels to specification.
2. Start the engine.
3. Press iDrive knob down once to enter Vehicle Info.
4. Select Settings.
5. Select Vehicle Tires.
6. Select TPM.
7. Select Reset.
8. Scroll to Yes.
9. Select "YES" and press the controller.
10. After selecting Yes, drive vehicle until tires on iDrive screen turn green.

TPMS RESET - PROCEDURE 4

NOTE: The initialization finishes during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.

1. Set the tire pressure of all wheels to specification.
2. Press "MENU" button to open start menu.
3. Open the i-menu of the Control Center.
4. Select "SETTINGS" and press the controller.
5. Select "VEHICLE" and press the controller. See **Fig. 17**.
6. Select "TIRES: TPM" and press controller.
7. Start engine, but do not start driving.
8. Select "RESET" and press the controller.
9. Select "YES" and press the controller.
10. Drive vehicle. The message "RESETTING TPM...." will be displayed. Initialization is automatically completed during the drive. When initialization is complete, "STATUS: TPM ACTIVE" message will be displayed.



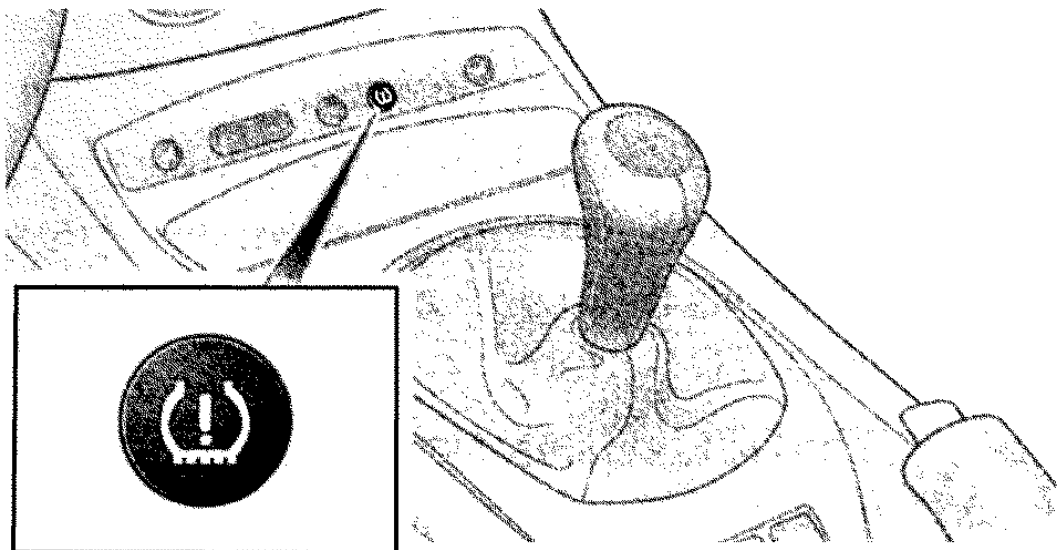
G00251686

Fig. 17: Identifying TPM System Reinitialization Messages
Courtesy of BMW OF NORTH AMERICA, INC.

TPMS RESET - PROCEDURE 5

CAUTION: When driving with snow chains or a space-saver spare tire, DO NOT initialize the system.

1. Set the tire pressure of all wheels to specification.
2. Start engine, but do not start driving.
3. Press reset button (for no longer than 10 seconds) until tire pressure warning light illuminates Yellow for a few seconds. See **Fig. 18**, **Fig. 19**, **Fig. 20** or **Fig. 21** .
4. Drive vehicle. Initialization is automatically completed during the drive, without any feedback issued.



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Fig. 18: Locating TPM System Reset Button (M-Coupe & Roadster)
Courtesy of BMW OF NORTH AMERICA, INC.

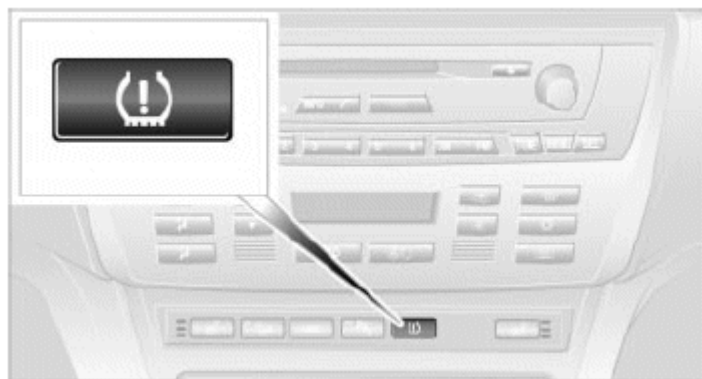
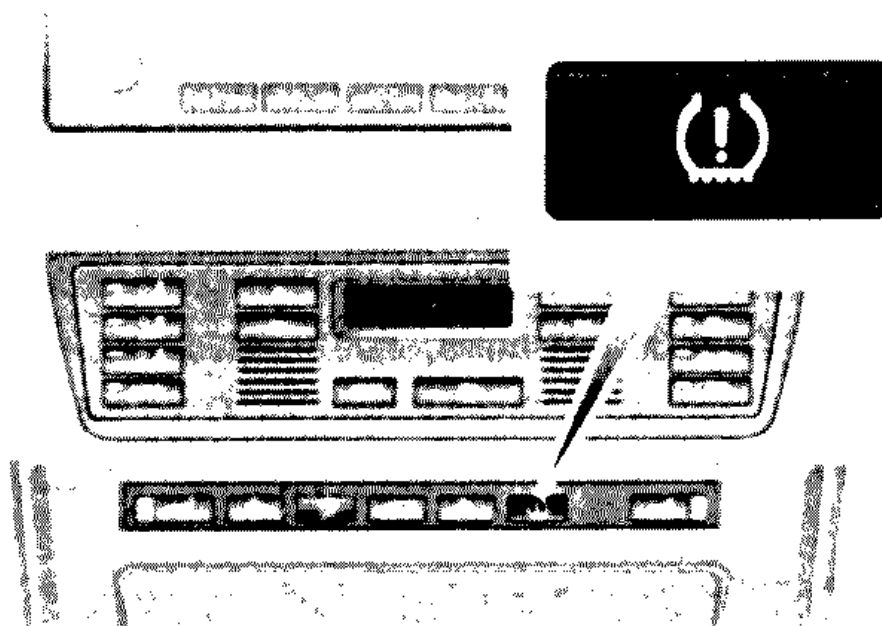
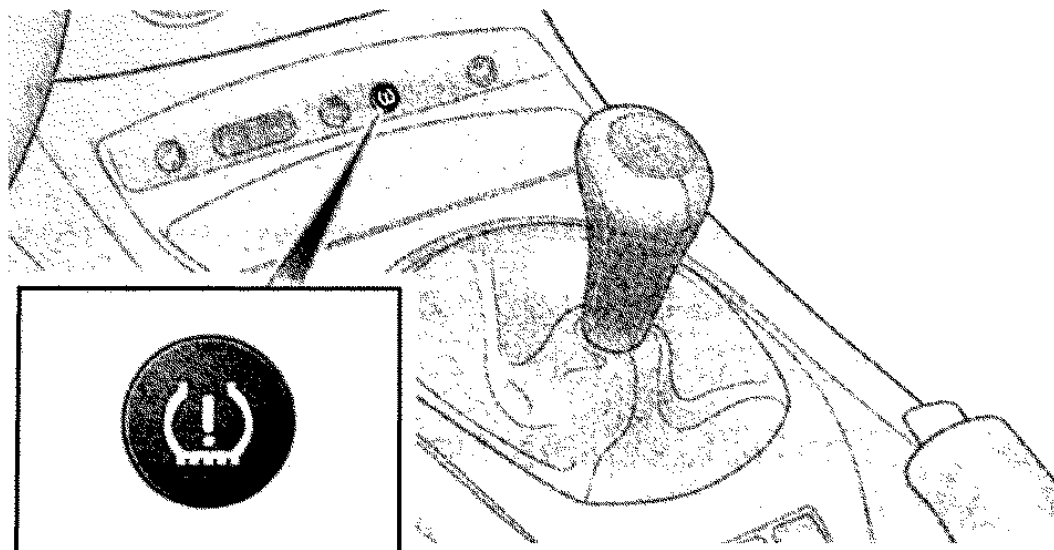


Fig. 19: Locating TPM System Reset Button (X3)
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 20: Locating TPM System Reset Button (X5)
 Courtesy of BMW OF NORTH AMERICA, INC.



G00225521

Fig. 21: Locating TPM System Reset Button (Z4)
 Courtesy of BMW OF NORTH AMERICA, INC.

TPMS RESET - PROCEDURE 6

Resetting TPM With iDrive

1. Set the tire pressure of all wheels to specification.
2. Turn ignition switch ON.
3. Press controller to call up I menu. See **Fig. 22**.
4. Select SETTINGS and press controller.
5. Select CAR/TIRES and press controller.
6. If necessary, switch to top field and select TIRES/RDC and press controller.
7. Start engine.
8. Select CONFIRM TIRE PRESSURE and press controller.
9. Drive vehicle. Initialization is automatically completed during the drive, without any feedback issued.



Fig. 22: Locating TPM System Reset Button (With iDrive)
Courtesy of BMW OF NORTH AMERICA, INC.

Resetting TPM Without iDrive

1. Set the tire pressure of all wheels to specification.
2. Start engine.
3. Move turn signal lever up or down until TPM warning symbol and RESET appears. See **Fig. 23**.
4. Press BC button on end of turn signal lever to confirm selection.
5. Press and hold BC button for approximately 5 seconds until a CHECK/TICK appears after RESET.
6. Drive vehicle. Initialization is automatically completed during the drive, without any feedback issued.

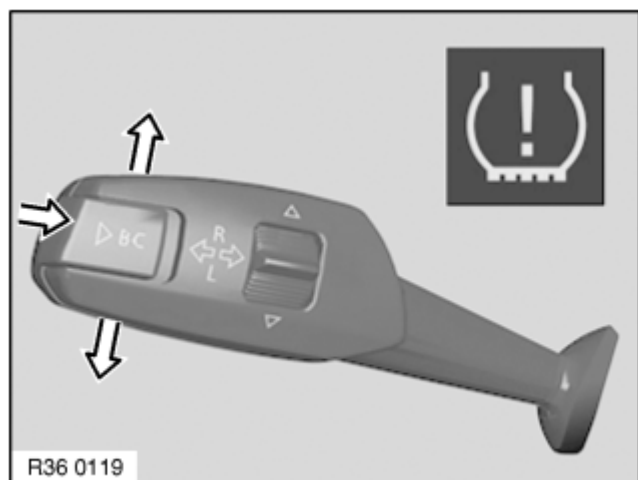


Fig. 23: Locating TPM System Reset Button (Without iDrive)
Courtesy of BMW OF NORTH AMERICA, INC.

TPMS RESET - PROCEDURE 7

With iDrive

Indirect System (Flat Tire Monitor)

CAUTION: Do not initialize the system while snow chains are attached.

NOTE: Each time a tire inflation pressure has been corrected or a wheel or tire has been changed, reset the system.

Initialization:

1. Using the iDrive MENU button, choose:
2. "Vehicle Info"
3. "Vehicle status"
4. "Reset"
5. Start the engine.
6. Start the initialization using "Reset". See **Fig. 24**.
7. Start to drive.

The initialization is completed during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.



Fig. 24: iDrive Showing "Reset" Display
 Courtesy of BMW OF NORTH AMERICA, INC.

Checking FTM Status:

1. Using the iDrive MENU button, choose:
2. "Vehicle Info"
3. "Vehicle status"
4. "Flat Tire Monitor"
5. The status will be displayed. See **Fig. 25**.



Fig. 25: iDrive Showing Tire Monitor Status
 Courtesy of BMW OF NORTH AMERICA, INC.

Direct System (Tire Pressure Monitor)

NOTE: Each time a tire inflation pressure has been corrected or a wheel or tire has been changed, reset the system.

TPMS Status indicator on the Control Display:

The color of the tires represents the status of the tires and the system. TPM takes into account that tire pressures change while the vehicle is being driven. The tire pressures do not need to be corrected unless the TPM instructs you to do so by means of color indicators.

Green: The tire inflation pressure corresponds to the established target value. "TPM active" appears on the Control Display.

- **One Wheel Yellow:** There is a flat tire or substantial loss of tire pressure in the indicated tire. A message appears on the Control Display.
- **All Wheels Yellow:** There is a flat tire or substantial loss of tire pressure in several tires. A message appears on the Control Display.
- **Gray:** The system cannot detect a puncture. Possible reasons for this:
 - TPM is being reset.
 - Temporary malfunction caused by systems or devices using the same radio frequency.
 - Malfunction.

Reset Procedure:

1. Using the iDrive MENU button, choose:
2. "Vehicle Info"
3. "Vehicle status"
4. "Reset"
5. Start the engine. Do not begin driving.
6. Start the reset using "Reset". See **Fig. 24**.
7. Start to drive.
8. The tires are shown in gray and "Resetting TPM..." is displayed.

After driving a few minutes, the set inflation pressures in the tires are accepted as the target values to be monitored. The system reset is completed during your drive, and can be interrupted at any time. When driving resumes, the reset is continued automatically. On the Control Display, the tires are shown in green and "TPM active" is displayed again.

IMPORTANT: If a flat tire is detected while the system is resetting and determining the inflation pressures, all tires on the Control Display are displayed in yellow. The message "Low tire!" is shown.

System Reset Failure:

- **Message For Unsuccessful System Reset:** The warning lamp lights up yellow. A message will appear on the Control Display. Check the tire inflation pressure and reset the system.
- **Malfunction:** The small warning lamp flashes in yellow and then lights up continuously; the larger warning lamp comes on in yellow. On the Control Display, the tires are shown in gray and a message appears. No punctures can be detected. This type of message is shown in the following situations:
 - If there is a malfunction. Have the system checked.
 - If a wheel without TPM electronics has been mounted.
 - If TPM is temporarily malfunctioning due to other systems or devices using the same radio frequency.

Without iDrive

Indirect System (Flat Tire Monitor)

CAUTION: Do not initialize the system while snow chains are attached.

NOTE: Each time a tire inflation pressure has been corrected or a wheel or tire has been changed, reset the system.

Reset:

1. Start the engine.
2. Lightly push button 1 on the turn indicator. See **Fig. 26**.
3. Lever the turn indicator up or down repeatedly until the tire monitor symbol appears in the display, accompanied by the word "RESET". See **Fig. 26**.
4. Press button 2 to confirm your choice of the Flat Tire Monitor.
5. Press button 2 for approx. 5 seconds until the a check mark is shown next to the "RESET" display.
6. Drive the vehicle.

The initialization is completed during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.



Fig. 26: Flat Tire Monitor Status Display
Courtesy of BMW OF NORTH AMERICA, INC.

Direct System (Tire Pressure Monitor)

CAUTION: Do not initialize the system while snow chains are attached.

NOTE: Each time a tire inflation pressure has been corrected or a wheel or tire has been changed, reset the system.

IMPORTANT: The system does not work correctly if it has not been reset; for example, a flat tire may be indicated even though the tire inflation pressures are correct. The system is inactive and cannot indicate a flat tire if a wheel without TPM electronics, such as a compact spare wheel, has been mounted, or if TPM is temporarily malfunctioning due to other systems or devices using the same radio frequency.

Reset:

1. Start the engine.
2. Lightly push button 1 on the turn indicator. See **Fig. 27**.
3. Lever the turn indicator up or down repeatedly until the tire monitor symbol appears in the display, accompanied by the word "RESET". See **Fig. 27**.
4. Press button 2 to confirm your choice of the Tire Pressure Monitor. In the display, "ACTIVE" will appear above "RESET". See **Fig. 27**.
5. Press button 2 for approx. 5 seconds. In the display, "RESETTING" will now appear above "RESET". See **Fig. 27**.
6. Drive the vehicle.

After driving a few minutes, the set inflation pressures in the tires are accepted as the target values to be monitored. The system reset is completed during your drive, and can be interrupted at any time. When driving resumes, the reset is continued automatically. The indicator lamp goes out after the system reset is completed.



Fig. 27: Tire Pressure Monitor Status Display
Courtesy of BMW OF NORTH AMERICA, INC.

System Reset Failure:

- **Message For Unsuccessful System Reset:** The warning lamp lights up yellow. The system was not reset. Check the tire inflation pressure and reset the system.
- **Malfunction:** The small warning lamp flashes in yellow and then lights up continuously; the larger warning lamp comes on in yellow. On the Control Display, the tires are shown in gray and a message appears. No punctures can be detected. This type of message is shown in the following situations:
 - If there is a malfunction. Have the system checked.
 - If a wheel without TPM electronics has been mounted.
 - If TPM is temporarily malfunctioning due to other systems or devices using the same radio

frequency.

TRANSMISSION**Manual Transmission - Repair Instructions****TRANSMISSION IN GENERAL****00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN****Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN**Danger of injury!**

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00 11..... DRAINING/TOPPING UP GEAR OIL IN MANUAL TRANSMISSION

NOTE: Gearbox must be at normal operating temperature.
Gear oil:

refer to MANUAL TRANSMISSION - OPERATING FLUIDS .

Filling capacities:

Refer to TECHNICAL DATA .

Draining gear oil:

- Release oil drain plug (1) and filler plug (2).
- Clean oil drain plug (1) and screw in.

Tightening torque 23 00 4AZ .

Fill transmission with ATF.

- Pour in gear oil until overflowing.
- Tighten in filler screw (2).

Tightening torque: 23 00 4AZ .

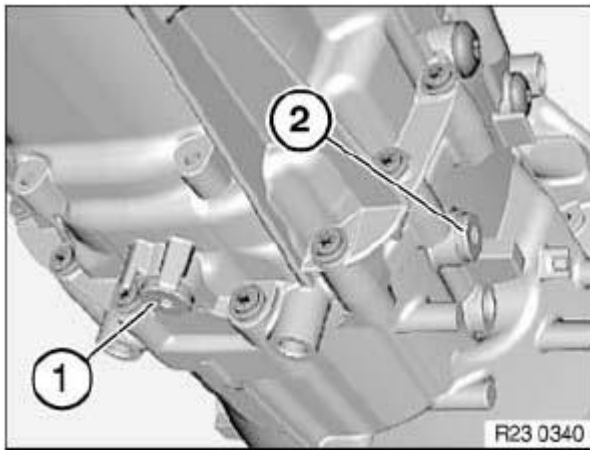


Fig. 1: Identifying Oil Drain Plug And Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

23 TRANSMISSION DESIGNATIONS

Breakdown of BMW designation:

TRANSMISSION DESIGNATIONS CHART

A5S 300J (old designation)		
CARMANUALSUSA		
Saturday, September 05, 2015 9:26:22 AM	Page 3	© 2011 Mitchell Repair Information Company, LLC.

2010 BMW 535xi

TRANSMISSION Manual Transmission - Repair Instructions

A	Transmission type	<ul style="list-style-type: none"> · S = Manual transmission · A = Automatic transmission
5	Number of forward gears	
S	Type of top gear	<ul style="list-style-type: none"> · D = Direct gear · S = Overdrive gear
300	Max. input torque (Nm)	
J	Code letter of transmission manufacturer	<ul style="list-style-type: none"> · G = Getrag · J = Jatco · R = GMPT (General Motors Powertrain) · Z = ZF (Zahnradfabrik Friedrichshafen)
SMG	Notes	SMG = Sequential M gearbox/transmission
GS6-37BZ (new designation according to BMW Group Standard GS 90007)		
G	Transmission	
S	Transmission type	<ul style="list-style-type: none"> · S = Manual transmission · A = Automatic transmission
6	Number of forward gears	
-		<ul style="list-style-type: none"> · - = Standard with manual gearshift · HP = Hydraulic planetary gear
37	Transmission type	<ul style="list-style-type: none"> · 26 = D-transmission · 31 = C-transmission · 39 = F-transmission · 37 = H-transmission · 53 = G-transmission · 17 = I-transmission · 47 = J-transmission
B	Gear set	<ul style="list-style-type: none"> · B = Gasoline gear ratio · D = Diesel gear ratio
Z	Code letter of transmission manufacturer	<ul style="list-style-type: none"> · G = Getrag · Z = ZF (Zahnradfabrik Friedrichshafen)

Manual transmission:

TRANSMISSION DESIGNATIONS CHART

BMW designation	Manufacturer	Manufacturer designation	Remark
S5D 200G	Getrag	B transmission (220/5)	
S5D 200G	Getrag	B transmission (221/5)	for M41 engine only
S5D 250G	Getrag	B transmission (220/5)	Reinforced design
S5D 260Z	ZF	C-transmission (S5-31 D)	for M51 engine only

S5D 280Z	ZF	C-transmission (S5-31)	
S5D 310Z	ZF	C-transmission (S5-31)	up to 9.95
S5D 320Z	ZF	C-transmission (S5-31)	from 9.95 (reinforced design)
GS5S31BZ (SMG)	ZF	C transmission	SMG
GS5-39DZ	ZF	F transmission	
S6S 420G	Getrag	D-transmission (226/6)	
S6S 420G (SMG)	Getrag	D transmission	SMG
S6S 560G	Getrag	E-transmission (286/6)	
GS6-37BZ	ZF	H-transmission	
GS6S37BZ (SMG)	ZF	H-transmission	
GS6-37DZ	ZF	H-transmission	
GS6-37BG	Getrag	H-transmission	
GS6-53BZ	ZF	G-transmission	
GS6-53DZ	ZF	G-transmission	
GS6-17BG	Getrag	I-transmission	
GS7S47BG (SMG)	Getrag	J-transmission (247)	SMG 7-speed

Automatic transmission:**TRANSMISSION DESIGNATIONS CHART**

BMW designation	Manufacturer	Manufacturer designation	Remark
A4S 200R	GMPT	GM4	
A4S 270R	GMPT	THM-R1w	Transmission widesteped
A4S 310R	GMPT	THM-R1	
A5S 300J	Jatco	Jatco	
A5S 310Z	ZF	5HP-18	
A5S 325Z	ZF	5HP-19	
A5S 440Z	ZF	5HP-24	
A5S 560Z	ZF	5HP-30	
A5S 360R / 390R	GM	GM5	
GA6HP19Z	ZF	6HP19	
GA6HP26Z	ZF	6HP26	
GA6HP32Z	ZF	6HP32	
GA6L45R	GM	GM6	

23... UNIVERSAL BMW TRANSMISSION TAKE-UP**Special tools required:**

- **00 2 030**
- **23 4 050**

NOTE:

- The universal transmission bracket is introduced for the E60 AWD
- Suitable for manual and automatic transmissions

IMPORTANT: Front and rear supports (1) can be laterally adjusted by means of screws (2).
Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.
Supports must be adapted in length and width to the transmission.

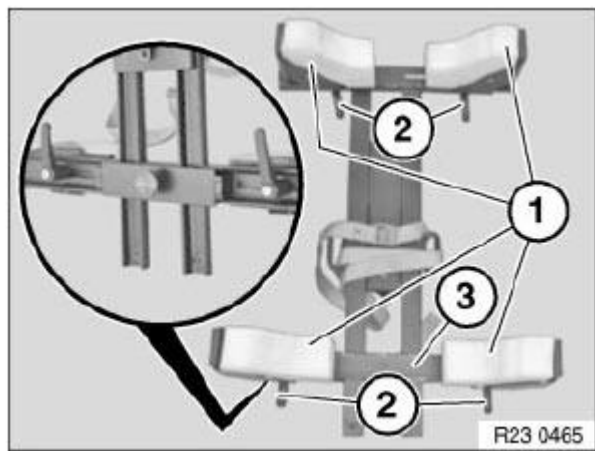


Fig. 2: Identifying Front And Rear Supports With Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission:

Support transmission with special tools 23 4 050, 00 2 030 .

IMPORTANT: Transmission must be secured with tensioning strap (1).

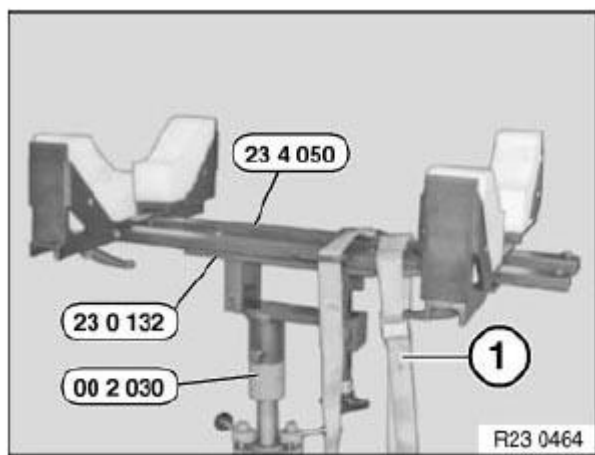


Fig. 3: Identifying Special Tools (00 2 030) And (23 4 050)

Courtesy of BMW OF NORTH AMERICA, INC.

23..... UNIVERSAL TRANSMISSION RETAINING BRIDGE

Special tools required:

- 00 1 450
- 24 0 200

NOTE: The transmission retaining bridge 24 0 200 is suitable for both manual and automatic transmissions

IMPORTANT: Adapters and spindles must be adapted for positive locking to the transmission.
(Risk of injury)

Adapt adapters (1) and spindle with thrust piece (3) to transmission.

Adapt length with slide (2).

Screw in spindle (4).

IMPORTANT: Before mounting on assembly stand 00 1 450, check retaining bridge for secure seating.

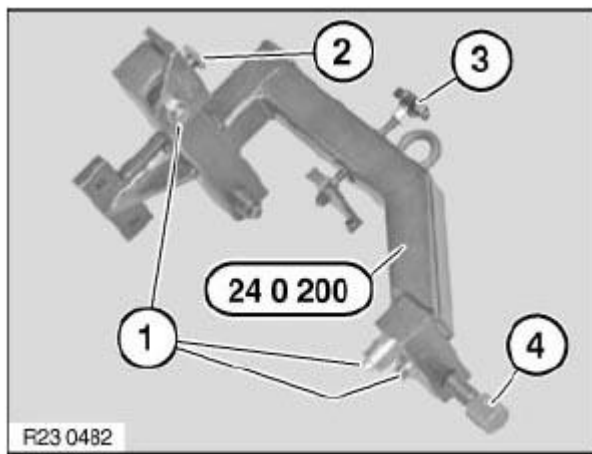
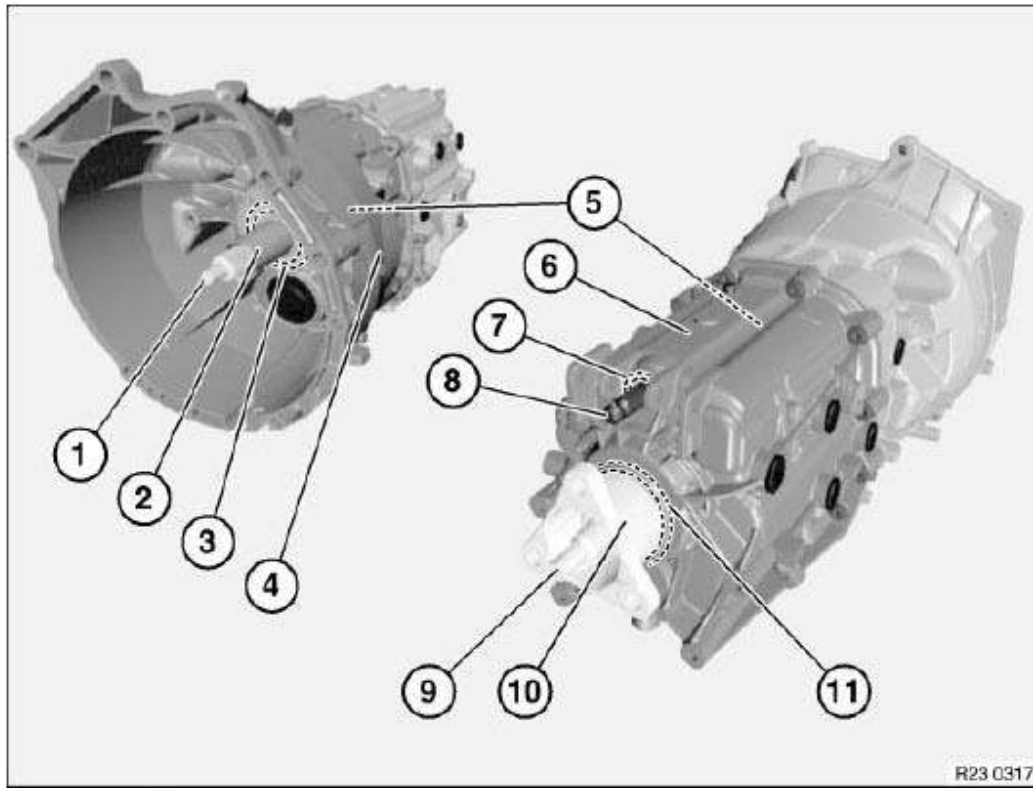


Fig. 4: Identifying Adapt Adapters And Spindle With Thrust Piece To Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

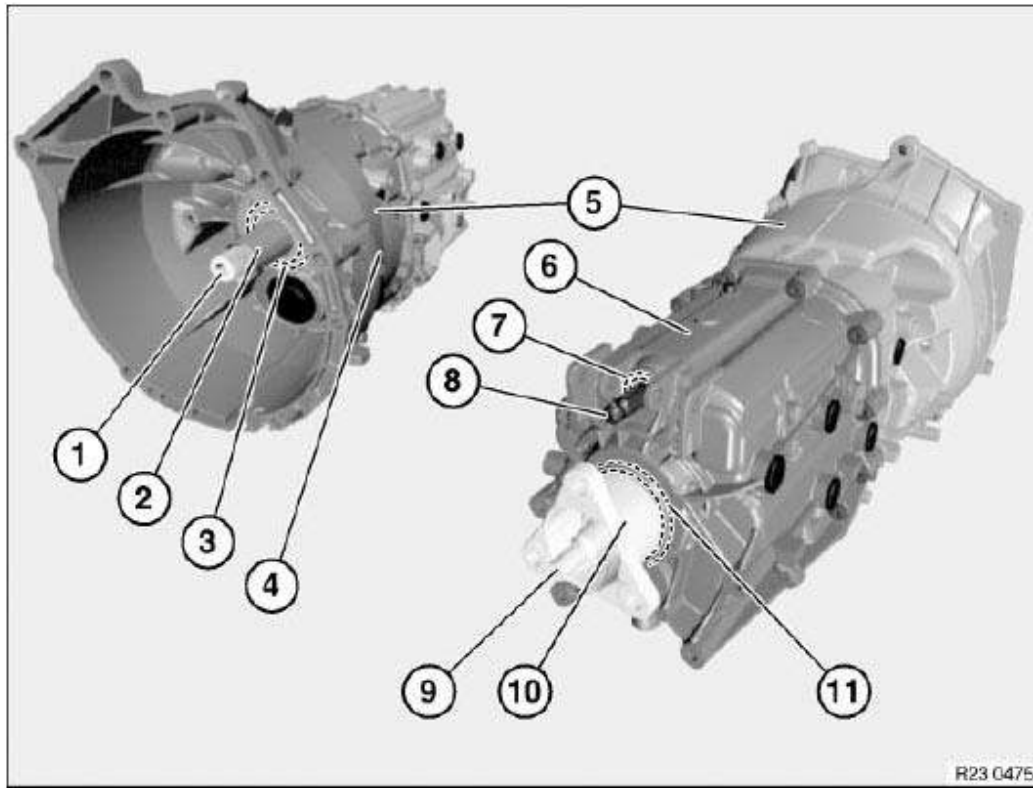
23 00... OVERVIEW OF TRANSMISSION HOUSING (GS6-37/53BZ/DZ)



- | | | |
|----|-------------------------------------|---|
| 0 | General information | Complete transmission, oil change,
transmission designations |
| 1 | Input shaft | |
| 2 | Guide tube | |
| 3 | Radial seal | For drive shaft |
| 4 | Transmission housing, front section | |
| 5 | Internal components | |
| 6 | Transmission housing, rear section | shafts, gear wheels, gearshift components |
| 7 | Radial seal | For selector shaft |
| 8 | Shift shaft | |
| 9 | Output shaft | |
| 10 | Output flange | |
| 11 | Radial seal | For output flange |

Fig. 5: Overview Of Transmission Housing
 Courtesy of BMW OF NORTH AMERICA, INC.

23 00... OVERVIEW OF TRANSMISSION HOUSING (GS6-53BZ/DZ)



- | | | |
|----|-------------------------------------|--|
| 0 | General information | Complete transmission, oil change, transmission designations |
| 1 | Input shaft | |
| 2 | Guide tube | |
| 3 | Radial seal | For drive shaft |
| 4 | Transmission housing, front section | |
| 5 | Internal components | |
| 6 | Transmission housing, rear section | shafts, gear wheels, gearshift components |
| 7 | Radial seal | For selector shaft |
| 8 | Shift shaft | |
| 9 | Output shaft | |
| 10 | Output flange | |
| 11 | Radial seal | For output flange |

Fig. 6: Overview Of Transmission Housing
 Courtesy of BMW OF NORTH AMERICA, INC.

23 01 010 REPLACING SEALING CAP (GS6-17BG/DG)

Necessary preliminary work:

- Remove gearbox
- Remove **CLUTCH RELEASE BEARING/LEVER**

Drive a hole into the sealing cap (1) with a suitable tool (2).

IMPORTANT: Do not use a drill as drillings may result in transmission malfunction.

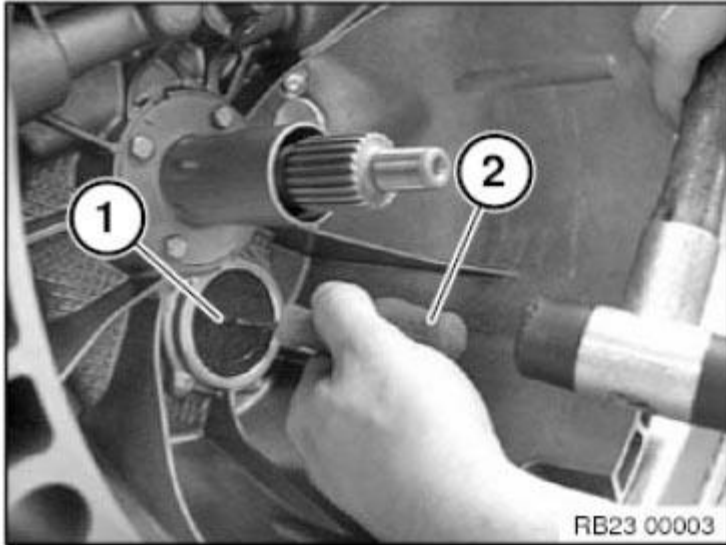


Fig. 7: Drilling Hole Into Sealing Cap Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 23 0 490 (puller) into sealing cap.

Withdraw sealing cap from transmission housing with aid of impact weight.

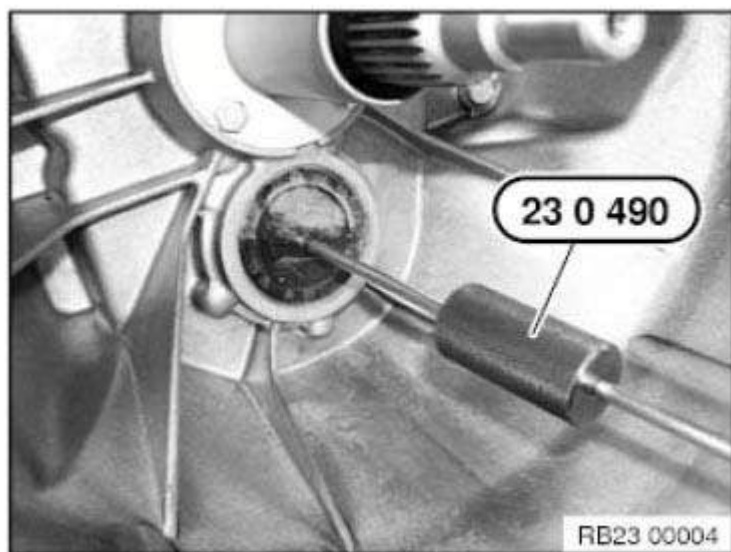


Fig. 8: Turning Sealing Cap Using Special Tool (23 0 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Apply transmission oil to the sealing lip of the sealing cap (1) and insert.

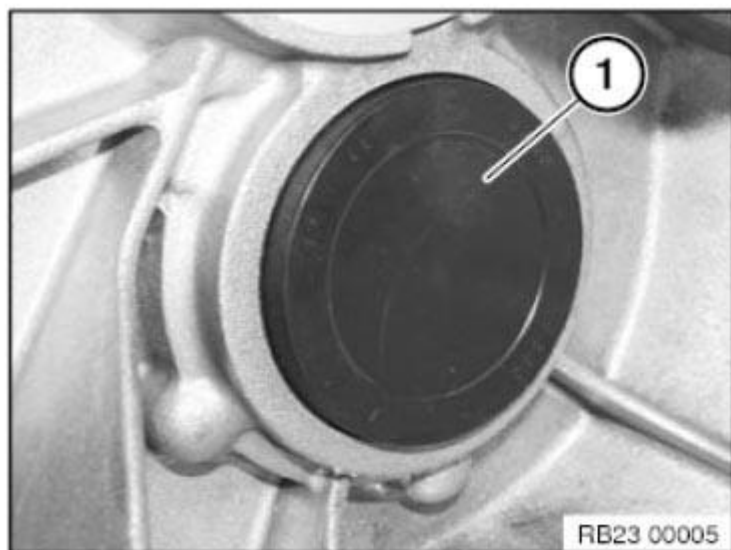


Fig. 9: Identifying Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Drive sealing cap firmly home with special tool 23 0 330 (mandrel).

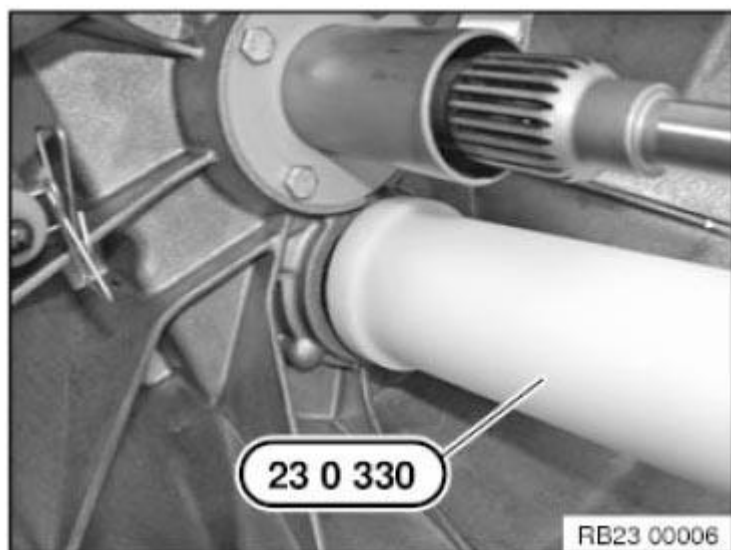


Fig. 10: Driving Sealing Cap Using Special Tool (23 0 330)
Courtesy of BMW OF NORTH AMERICA, INC.

23 00 018 REMOVING AND INSTALLING TRANSMISSION (GS6-53DZ) N54

Special tools required:

- 00 2 030
- 00 9 010
- 00 9 120
- 00 9 130
- 21 2 240
- 23 4 050

IMPORTANT: After completion of work, check GEAR OIL LEVEL .
Use only the approved gear oil.

Failure to comply with this requirement will result in serious damage to the manual transmission.

IMPORTANT: Aluminium screws/bolts must be replaced each time they are released .
Aluminium screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminium screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- **DISCONNECT BATTERY**
- Remove **REINFORCEMENT PLATE**
- Remove **EXHAUST SYSTEM**
- Support engine with lifter

Remove heat shields (1) and (2).

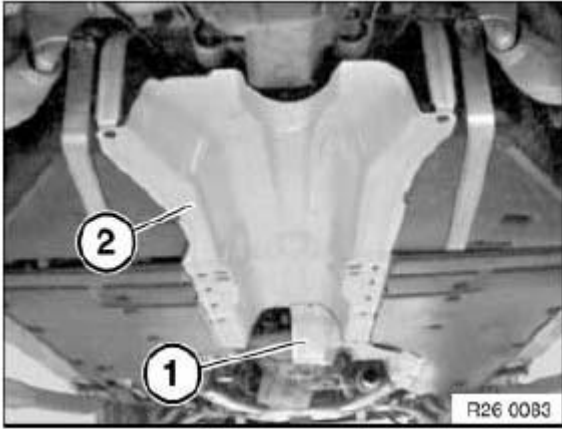


Fig. 11: Identifying Heat Shields

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Disconnect connector (2).

Steel screws, tightening torque **23 00 1AZ** .

Aluminium screws, tightening torque **23 00 2AZ** .

Release aluminium screws with special tool **00 9 010**.

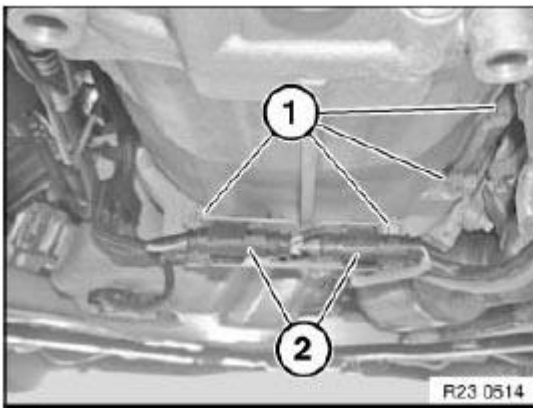


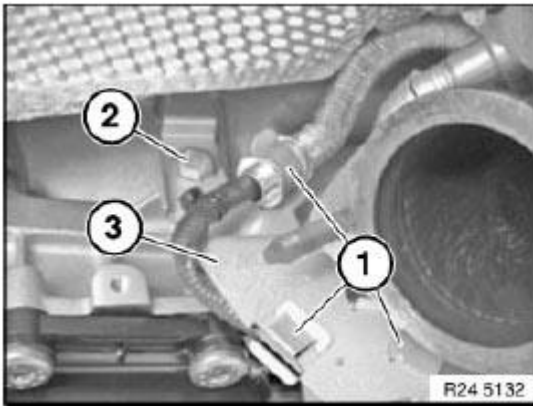
Fig. 12: Identifying Connector And Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable (1) from holder.

Release screw (2) and remove holder (3).

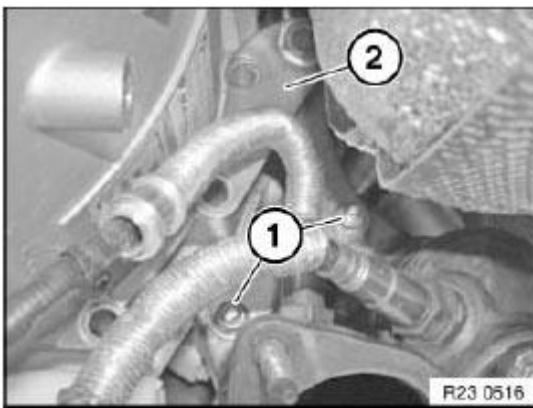
NOTE: Illustration similar

**Fig. 13: Identifying Cable, Screw And Holder**

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Remove holder (2).

**Fig. 14: Identifying Transmission Bolts And Holder**

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) from reversing light switch.

Release cable from retainers.

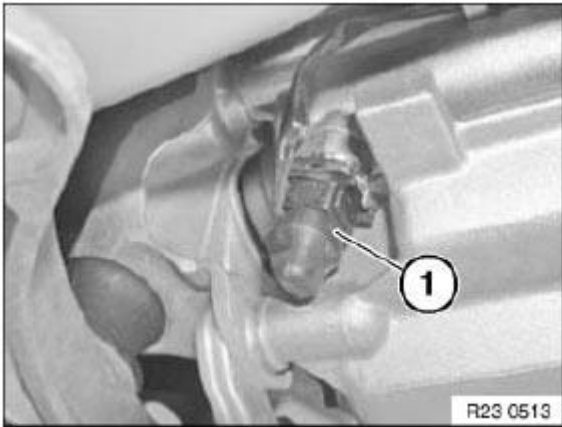


Fig. 15: Identifying Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission:

Support transmission with special tools **23 4 050**, **00 2 030**.

Secure transmission to mounting with tensioning strap (1).

Tasks are described in **TRANSMISSION BRACKET**.

After completion of work, check transmission oil level.

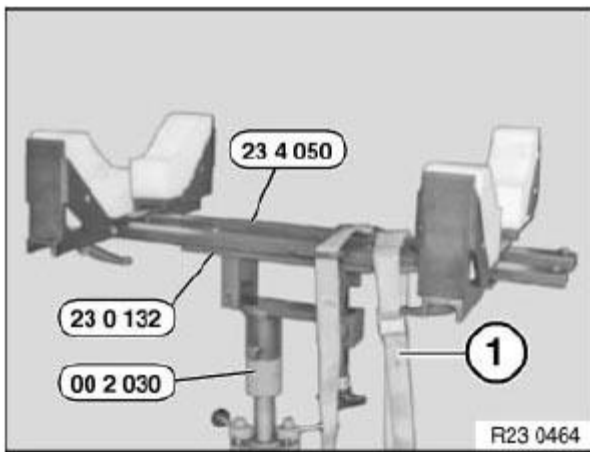


Fig. 16: Identifying Special Tools (00 2 030) And (23 4 050)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TRANSMISSION CROSS-MEMBER** .

Release screws.

Remove transmission support block.

Tightening torque **22 32 2AZ** .

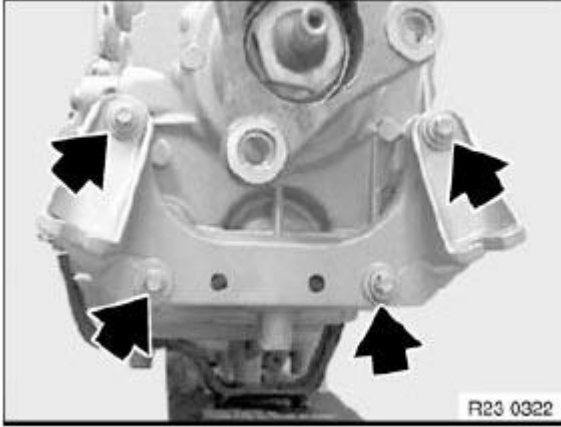


Fig. 17: Locating Transmission Support Block Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove propeller shaft from transmission.
- Release center bearing.
- Tie propeller shaft to one side.

Tasks are described in Removing **PROPELLER SHAFT** .

NOTE: **Pressure line of clutch slave cylinder remains connected.**

IMPORTANT: **Slowly relieve tension on clutch slave cylinder otherwise air is drawn in through sealing sleeve.**

Release nuts and remove clutch slave cylinder.

Tightening torque **21 52 5AZ** .

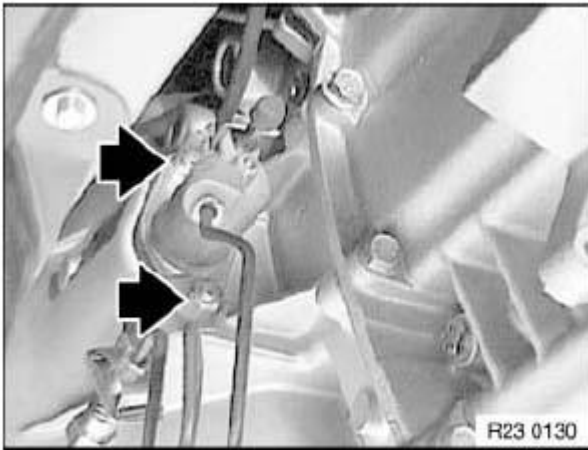


Fig. 18: Locating Clutch Slave Cylinder Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out retainer (1).

Disengage shift rod (2).

Installation:

Grease shift rod.

Grease, refer to **MANUAL TRANSMISSION - OPERATING FLUIDS** .

Make sure shims (3) are in correct position.

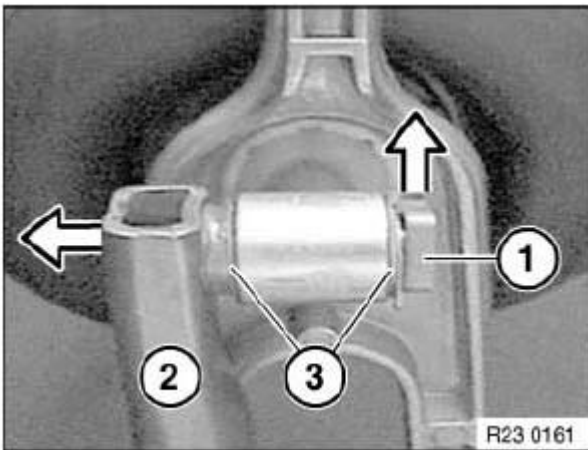


Fig. 19: Disengaging Shift Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Release and remove bearing pins (1) in direction of arrow.

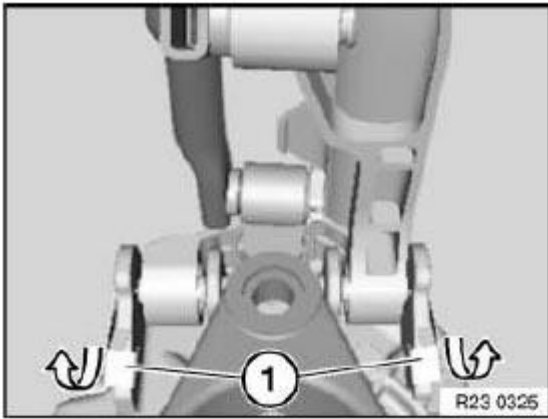


Fig. 20: Removing Bearing Pins

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out shift arm (1).

Installation:

Grease bearing pins (1).

Grease,

refer to **MANUAL TRANSMISSION - OPERATING FLUIDS** .

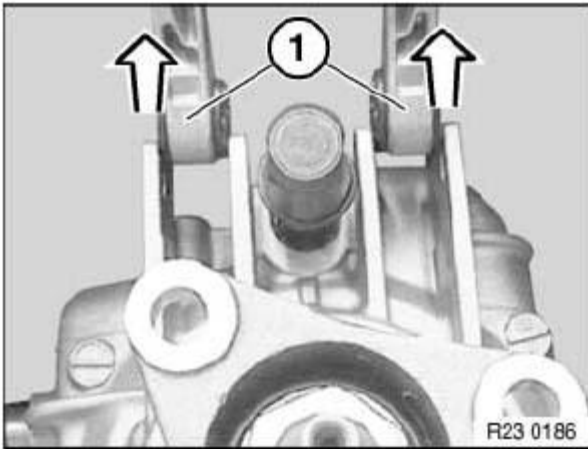


Fig. 21: Lifting Out Shift Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Installation:

Tightening torque, steel screws **23 00 1AZ** .

Tightening torque, aluminium screws **23 00 2AZ** . Screws: 3/4/5/9/10 (screw 3 only present on N54).

IMPORTANT: Do not allow the transmission to hang off from the transmission input shaft as this will deform the clutch plate. Pull out transmission towards rear and remove.

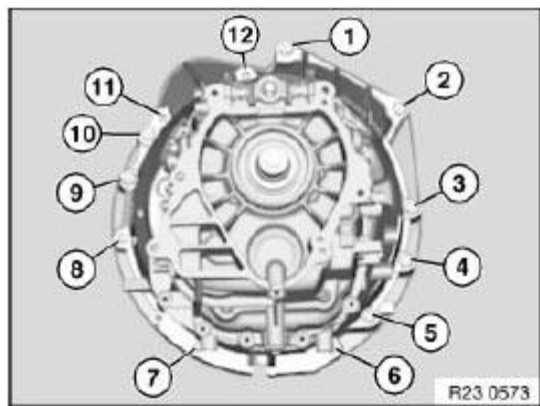


Fig. 22: Identifying Transmission Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Secure angle of rotation special tool **00 9 120** with magnet **00 9 130** to floor plate. Screw down aluminium screws according to angle of rotation. Angle of rotation **23 00 2AZ** .

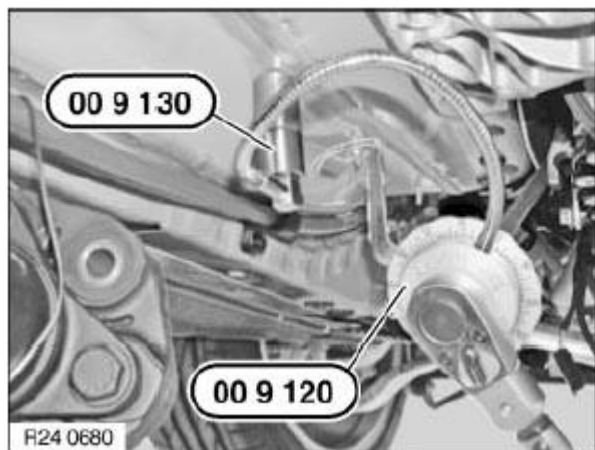


Fig. 23: Identifying Special Tools (00 9 130) And (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check that dowel sleeves are correctly seated.

Replace damaged dowel sleeves.

Ensure correct position of cover plate.

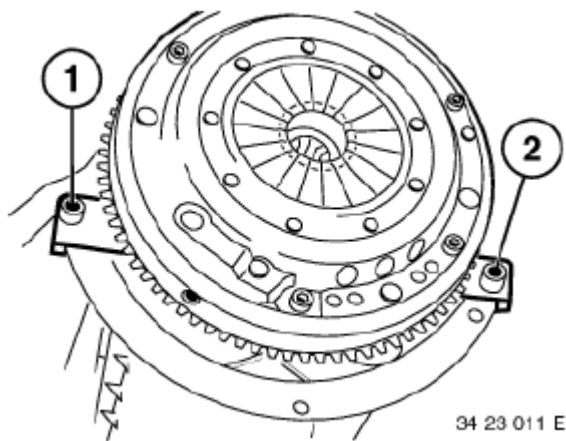


Fig. 24: Identifying Correct Position Of Cover Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check lubrication of transmission input shaft for sticky consistency. If grease is sticky, clean input shaft and **REPLACE CLUTCH PLATE**.

Check clutch plate for friction rust in splines and **REPLACE** if necessary.

Mechanically remove existing grease and lining abrasion from splines of clutch plate (with a cloth).

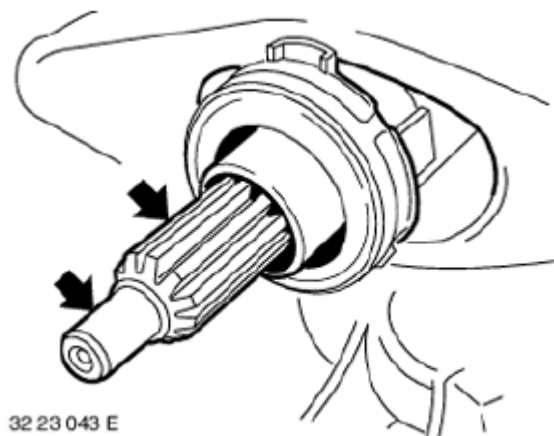


Fig. 25: Locating Input Shaft Splines
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Greasing specification:

- Remove and clean **RELEASE BEARING AND RELEASE LEVER** .
- Push on grease scraper ring **21 2 240** as far as it will go.
- Grease splines (1) of input shaft with a brush. refer to **MANUAL TRANSMISSION - OPERATING FLUIDS** .
- Detach grease scraper ring.
- Lightly grease guide sleeve for release bearing.

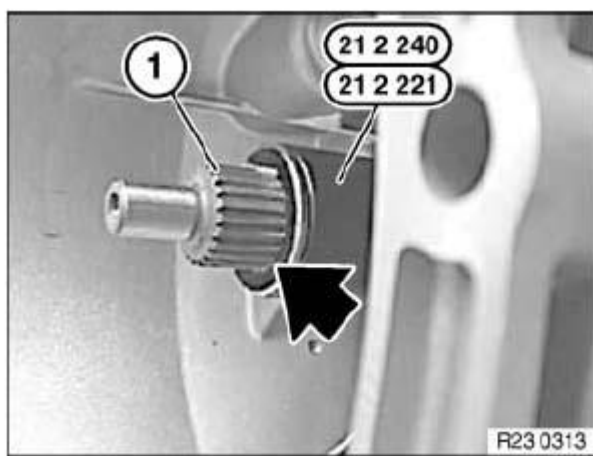


Fig. 26: Identifying Special Tools (21 2 240) And (21 2 221)
Courtesy of BMW OF NORTH AMERICA, INC.

23 00 018 REMOVING AND INSTALLING TRANSMISSION (GS6-53DZ) N54 AWD**Special tools required:**

- **00 2 030**
- **00 9 010**
- **00 9 120**
- **00 9 130**
- **21 2 240**
- **23 4 050**

IMPORTANT: After completion of work, check gear oil level.
Use only the approved gear oil.

Failure to comply with this requirement will result in serious damage to the manual transmission.

IMPORTANT: Aluminium screws/bolts must be replaced each time they are *released* .
Aluminium screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminium screws/bolts are *not magnetic* .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- **Disconnect battery**
- Remove **REINFORCEMENT PLATE**
- Remove **EXHAUST SYSTEM**
- Remove **FRONT PROPELLER SHAFT**
- Support **engine with lifter**

Remove heat shields (1) and (2).

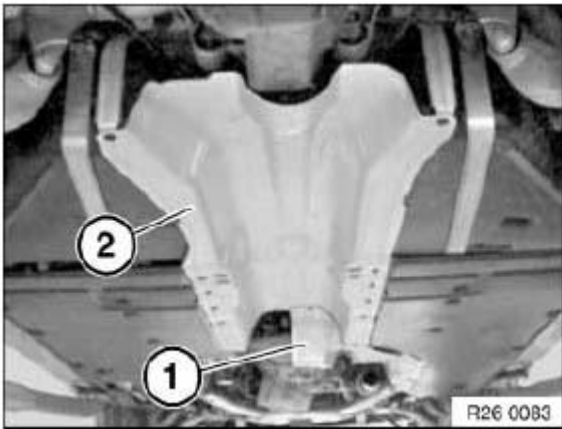


Fig. 27: Identifying Heat Shields
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Disconnect connector (2).

Steel screws, tightening torque **23 00 1AZ** .

Aluminium screws, tightening torque **23 00 2AZ** .

Release aluminium screws with special tool 00 9 010.

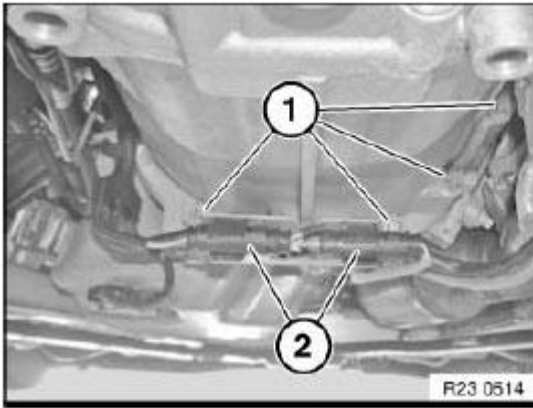


Fig. 28: Identifying Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable (1) from holder.

Release screw (2) and remove holder (3).

NOTE: Illustration similar

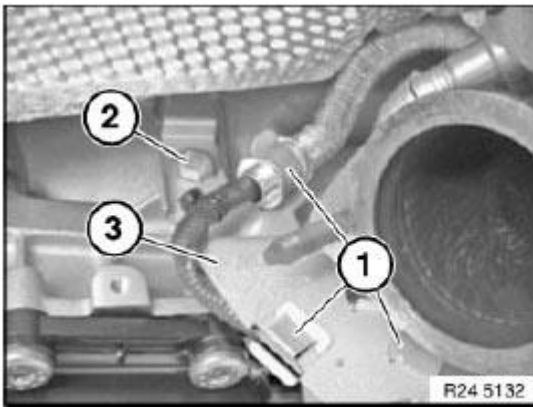


Fig. 29: Identifying Holder Screw And Cable

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove holder (2).

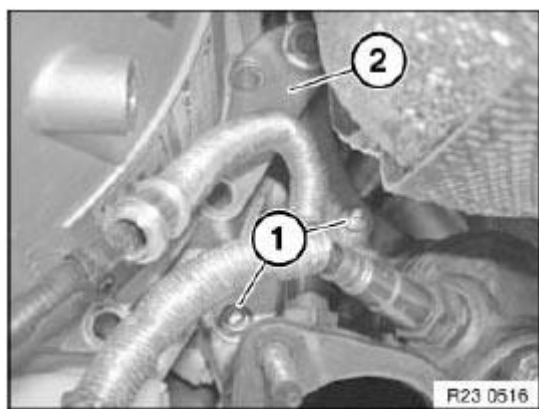


Fig. 30: Identifying Holder Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) from reversing light switch.

Release cable from retainers.

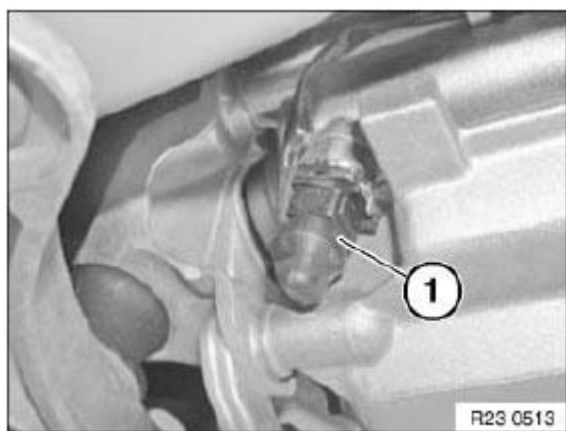


Fig. 31: Identifying Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

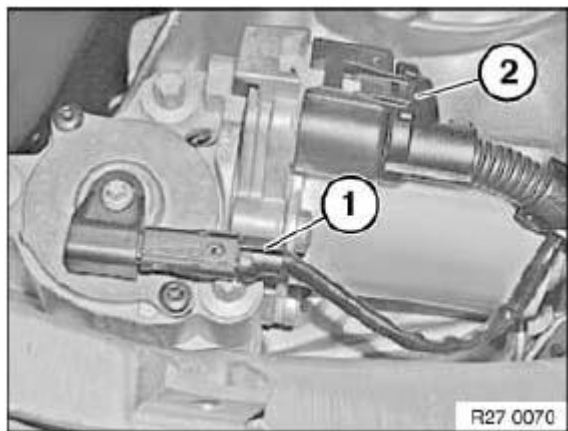


Fig. 32: Identifying Reversing Light Switch

Courtesy of BMW OF NORTH AMERICA, INC.

- Remove propeller shaft from transmission.
- Release center bearing.
- Tie propeller shaft to one side.

Tasks are described in **PROPELLER SHAFT** .

Supporting transmission:

Support transmission with special tools 23 4 050, 00 2 030.

Secure transmission to mounting with tensioning strap (1).

After completion of work, check transmission oil level.

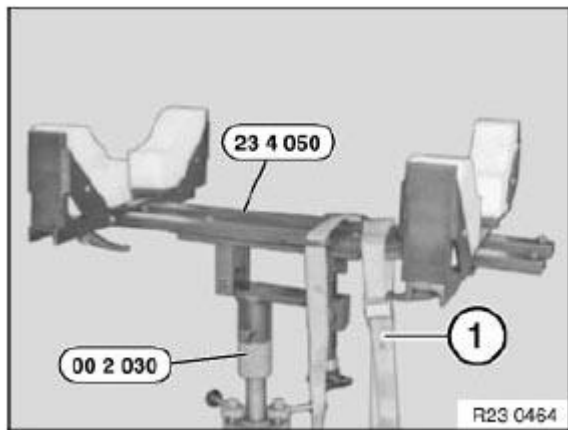


Fig. 33: Supporting Transmission With Special Tools 23 4 050 And 00 2 030

Courtesy of BMW OF NORTH AMERICA, INC.

Remove **CROSS-MEMBER FOR TRANSMISSION MOUNTING (AWD)** .

NOTE: Pressure line of clutch slave cylinder remains connected.

IMPORTANT: Slowly relieve tension on clutch slave cylinder otherwise air is drawn in through sealing sleeve.

Release nuts and remove clutch slave cylinder.

Tightening torque **21 52 5AZ** .

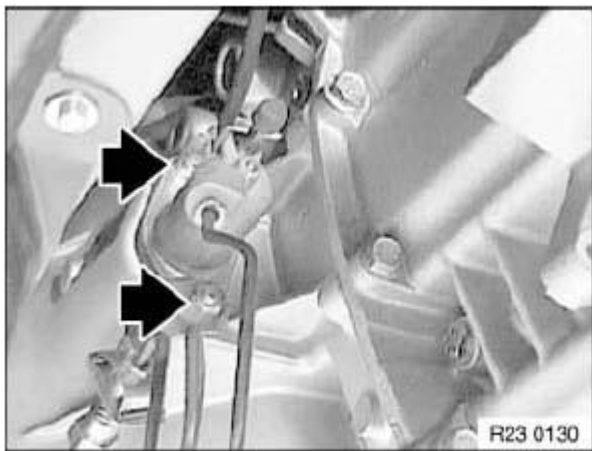


Fig. 34: Locating Clutch Slave Cylinder Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out retainer (1).

Disengage shift rod (2).

Installation:

Grease shift rod.

Make sure shims (3) are in correct position.

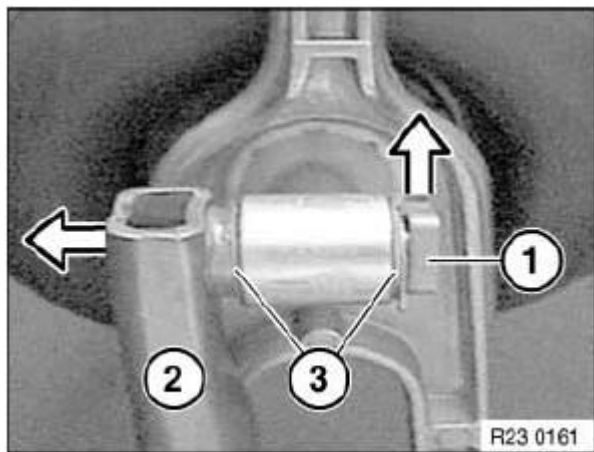


Fig. 35: Disengaging Shift Rod

Courtesy of BMW OF NORTH AMERICA, INC.

Release and remove bearing pins (1) in direction of arrow.

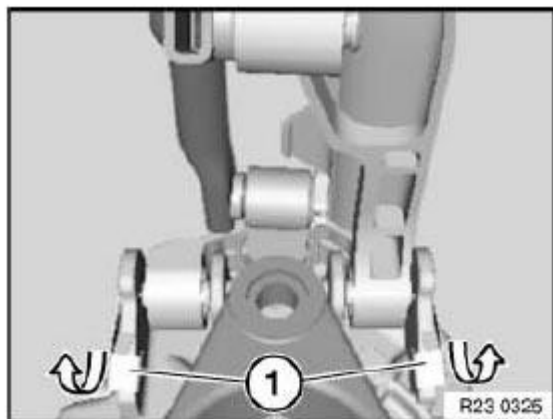


Fig. 36: Removing Bearing Pins

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out shift arm (1).

Installation:

Grease bearing pins (1).

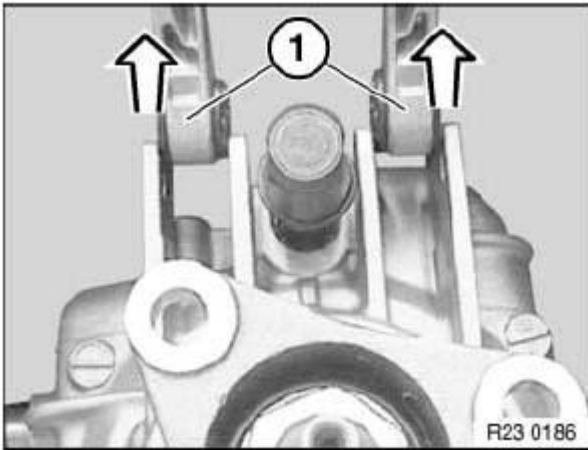


Fig. 37: Lifting Out Shift Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Installation:

Tightening torque, steel screws **23 00 1AZ** .

Tightening torque, aluminium screws **23 00 2AZ** .

Screws: 3/4/5/9/10 (screw 3 only present on N54).

IMPORTANT: Do not allow the transmission to hang off from the transmission input shaft as this will deform the clutch plate. Pull out transmission towards rear and remove.

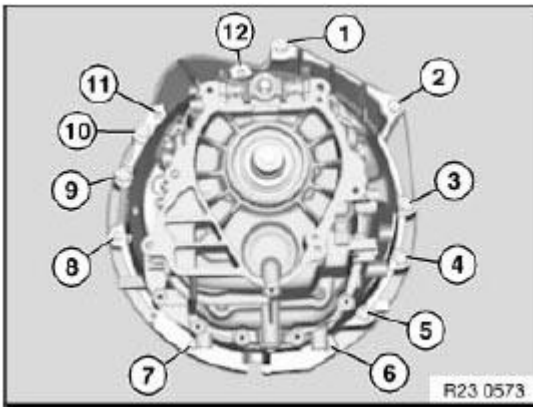


Fig. 38: Identifying Tightening Sequence Of Transmission Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Secure angle of rotation special tool 00 9 120 with magnet 00 9 130 to floor plate. Screw down aluminium screws/bolts according to angle of rotation 23 00 2AZ.

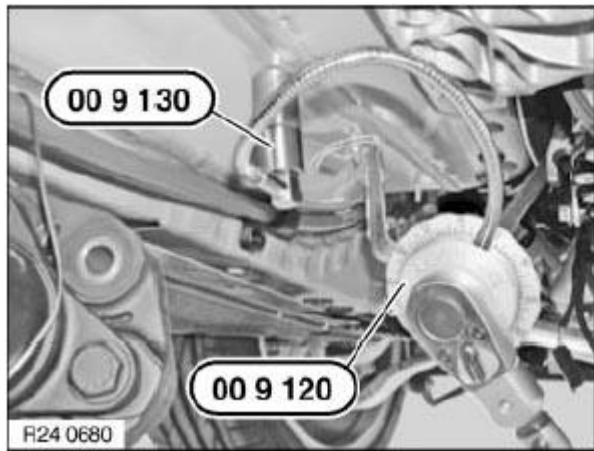


Fig. 39: Identifying Special Tool 00 9 120 And Magnet 00 9 130
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check that dowel sleeves are correctly seated.

Replace damaged dowel sleeves.

Ensure correct position of cover plate.

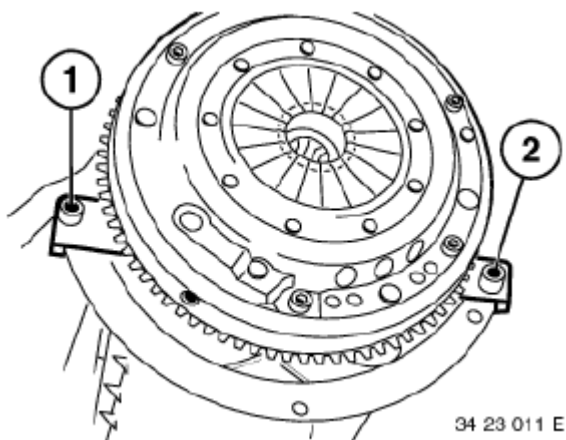


Fig. 40: Identifying Dowel Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check lubrication of transmission input shaft for sticky consistency. If grease is sticky, clean input shaft and **replace clutch plate** .

Check clutch plate for friction rust in splines and **replace** if necessary.

Mechanically remove existing grease and lining abrasion from splines of clutch plate (with a cloth).

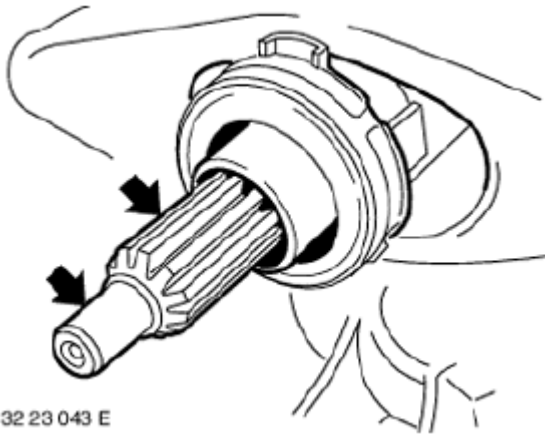


Fig. 41: Identifying Transmission Input Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Greasing specification:

- Remove and clean **release bearing and release lever** .
- Push on grease scraper ring 21 2 240 as far as it will go.
- Grease splines (1) of input shaft with a brush.
- Detach grease scraper ring.
- Lightly grease guide sleeve for release bearing.

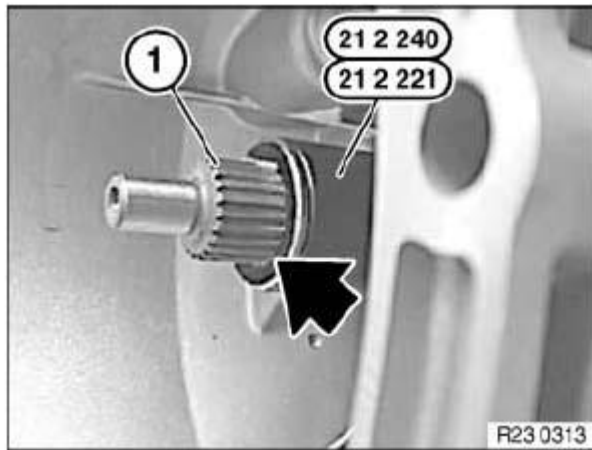


Fig. 42: Identifying Splines Of Input Shaft
 Courtesy of BMW OF NORTH AMERICA, INC.

23 00 037 INSTALLING REPLACEMENT TRANSMISSION (GS6-53BZ/DZ)

IMPORTANT: After completion of work, check TRANSMISSION FLUID LEVEL .
 Use only the approved transmission fluid. See MANUAL TRANSMISSION - OPERATING FLUIDS .

Failure to comply with this instruction will result in serious damage to the transmission.

Recycling:

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations

Necessary preliminary tasks:

- Drain gear oil at oil drain plug. Tightening torque: 23 00 4AZ .
- REMOVE TRANSMISSION.

If necessary, unfasten screws.

Remove and convert transmission bearing block.

Tightening torque 22 32 2AZ .

NOTE: Illustration shows E46.

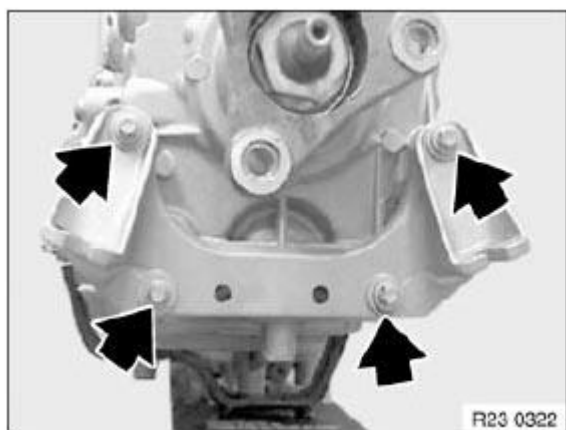


Fig. 43: Locating Transmission Support Block Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Convert shift rod joint.

Push back retaining ring (1) and drive out dowel pin (2).

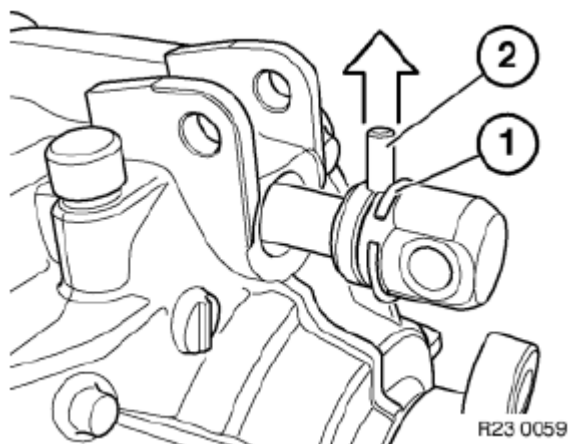
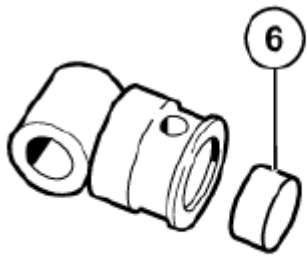


Fig. 44: Driving Out Dowel Pin
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check damping disk (6) for damage and replace if necessary.



36 25 020 U

Fig. 45: Identifying Damping Disk

Courtesy of BMW OF NORTH AMERICA, INC.

Convert following parts from previous transmission to new transmission.

- **RELEASE BEARING AND RELEASE LEVER** .
- Ball pin and spring wire clip
- Studs for clutch slave cylinder.
- Reversing light switch tightening torque: **23 41 5AZ** .

Add final details to vehicle.

Check oil level.

Installation:

23 00 037 INSTALLING REPLACEMENT TRANSMISSION (GS6-53BZ/DZ) AWD

IMPORTANT: After completion of work, check transmission fluid level . See **TRANSMISSION FLUID LEVEL** .

Use only the approved transmission fluid . See **MANUAL TRANSMISSION - OPERATING FLUIDS**

Failure to comply with this instruction will result in serious damage to the transmission.

Recycling:

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations

Necessary preliminary tasks:

- Drain gear oil at oil drain plug. Tightening torque: **23 00 4AZ** .
- **Remove transmission** .

Release screws.

Remove and convert transmission bearing block.

Tightening torque **22 32 2AZ** .

NOTE: Illustration shows E46.

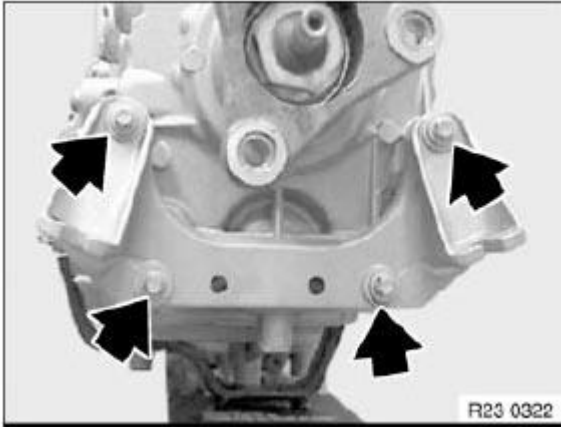


Fig. 46: Locating Convert Transmission Bearing Block Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Convert shift rod joint.

Push back retaining ring (1) and drive out dowel pin (2).

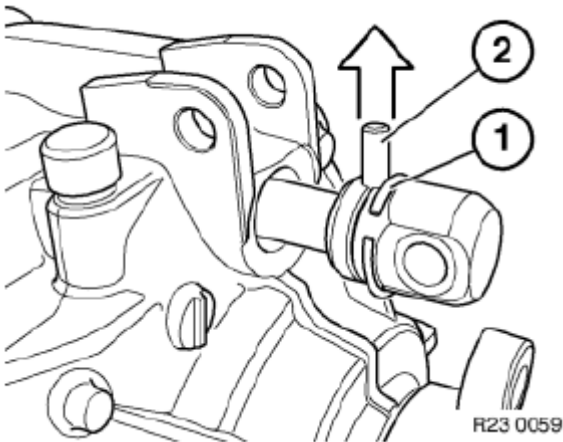
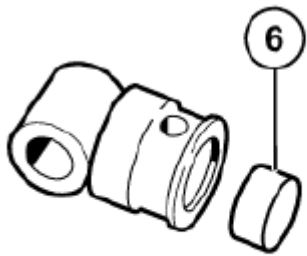


Fig. 47: Removing Dowel Pin
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check damping disk (6) for damage and replace if necessary.



36 25 020 U

Fig. 48: Identifying Damping Disk

Courtesy of BMW OF NORTH AMERICA, INC.

Convert following parts from previous transmission to new transmission.

- **Release bearing and release lever .**
- Ball pin and spring wire clip
- Studs for clutch slave cylinder.
- Reversing light switch tightening torque: **23 41 5AZ** .

Add final details to vehicle.

Check oil level.

HOUSING WITH COVER

23 11 615 REPLACING GUIDE TUBE FOR CLUTCH RELEASE UNIT (GS6-53BZ/DZ)

NOTE: (transmission removed)

Necessary preliminary tasks:

- Remove **CLUTCH RELEASE BEARING AND RELEASE LEVER** from guide tube

Release screws.

Remove guide tube (1).

Installation:

Clean thread.

Install screws with Loctite 243.

Tightening torque **23 11 2AZ** .

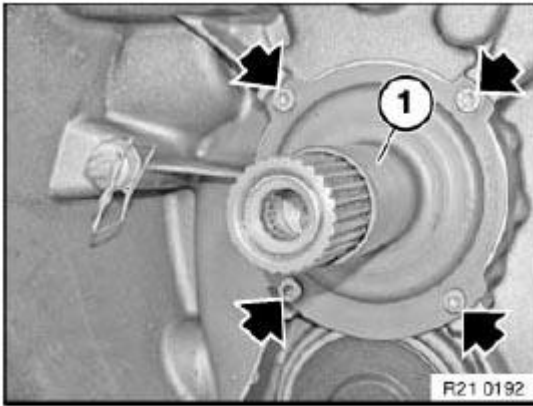


Fig. 49: Identifying Guide Tube And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Remove sticker (1) and adhesive with a suitable solvent.

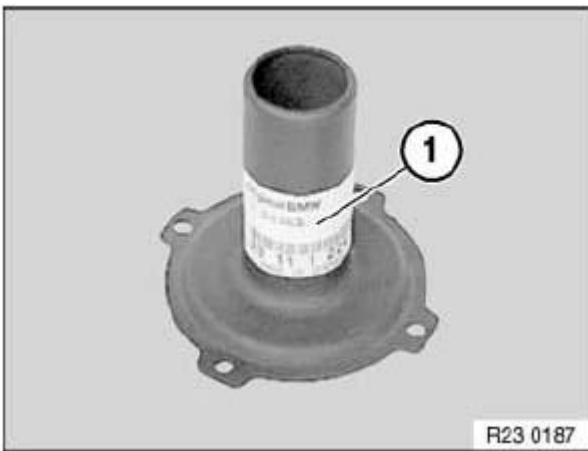


Fig. 50: Identifying Sticker
Courtesy of BMW OF NORTH AMERICA, INC.

BEARING IN HOUSING, SEALING RING

23 12 059 REPLACING RADIAL SHAFT SEAL FOR OUTPUT FLANGE (GS6-53BZ/DZ G-TRANSMISSION)

Special tools required:

- 23 0 020
- 23 0 200
- 23 2 320
- 23 3 210

- 23 3 230
- 33 1 150
- 33 1 154

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved transmission oil. See MANUAL TRANSMISSION - OPERATING FLUIDS .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Unflange propeller shaft from transmission and tie up to one side.

Tasks are described in Removing PROPELLER SHAFT .

Brace output flange with special tool **23 0 020**.

Release collar nut with special tool **23 2 320**.

Release E90, 91 M57T2, E60S85 with special tool **23 0 200**.

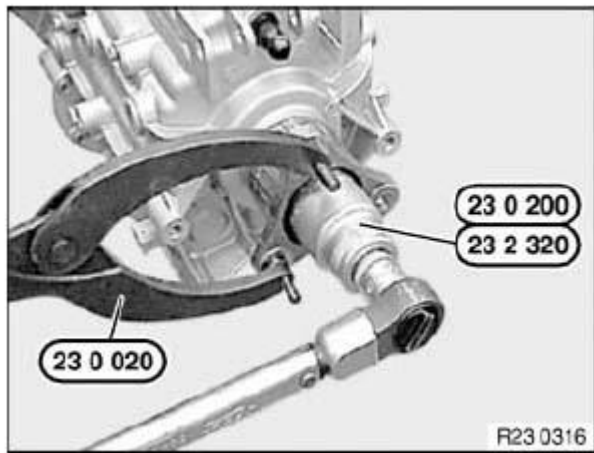


Fig. 51: Identifying Special Tools (23 0 200) And (23 2 320)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Mark flange with thermo pin and heat to min. 80°- 100°.

WARNING: Scalding hazard! Fit flange wearing suitable protective gloves only!

IMPORTANT: Do not drive on flange.

Secure collar nut with Loctite 243.

- Loctite 243: BMW Parts Service.
- Tightening torque: **23 21 1AZ** .

Detach output flange (1) with special tool **33 1 150** and adapter plate **33 1 154** from output shaft.

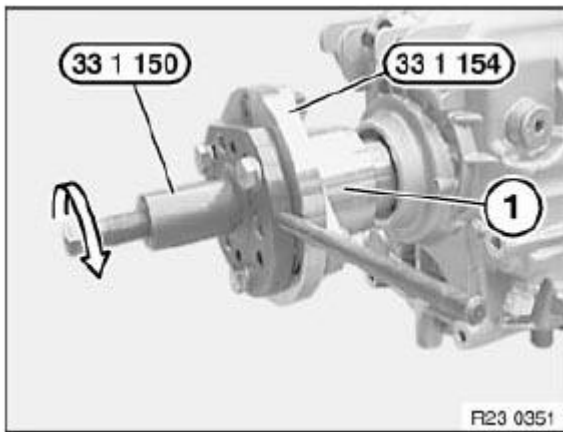


Fig. 52: Identifying Output Flange With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw on special tool **23 3 210** .

Slide special tool **23 3 210** over output shaft and screw into sealing ring firmly.

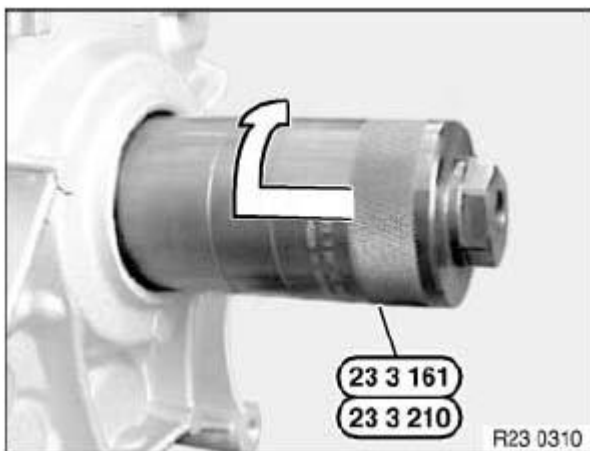


Fig. 53: Sliding Special Tool Over Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw into special tool **23 3 210** again and continue turning until sealing ring is pulled out of transmission housing.

If necessary, remove ring spring of sealing ring.

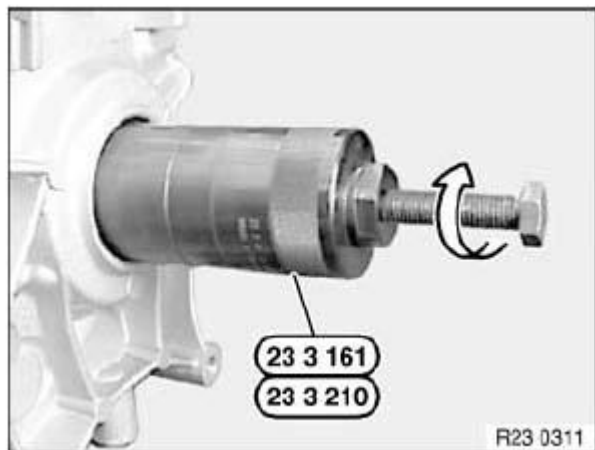


Fig. 54: Inserting Screw Into Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of new radial seal with gear oil.

Drive in radial seal as far as it will go with special tool **23 3 230** and plastic hammer.

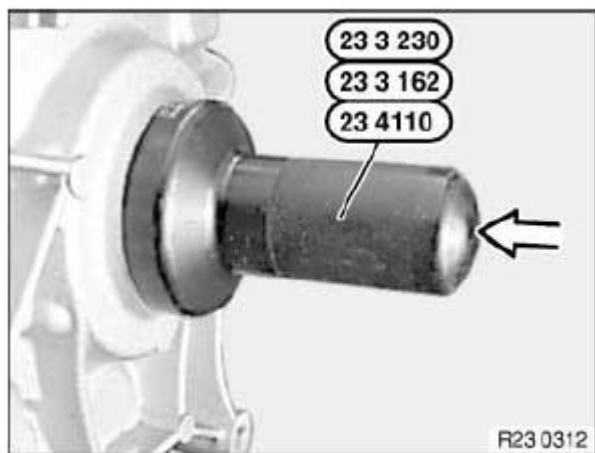


Fig. 55: Identifying Special Tools (23 3 230), (23 4110) And (23 3 162)
Courtesy of BMW OF NORTH AMERICA, INC.

23 12 089 REPLACING RADIAL SHAFT SEAL FOR SELECTOR SHAFT (GS6-53BZ/DZ)

Special tools required:

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· **23 0 210**

· **23 0 220**

IMPORTANT: After completion of work, check **TRANSMISSION OIL LEVEL** .
Use only approved transmission oil. See **MANUAL TRANSMISSION - OPERATING FLUIDS** .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Shift transmission into 2nd gear
- Unflange propeller shaft from transmission.

Tasks are described in Removing **PROPELLER SHAFT** .

Lever retaining ring (1) out of groove with a small screwdriver.

Slide locking ring (1) towards rear.

Drive out cylinder pin (2).

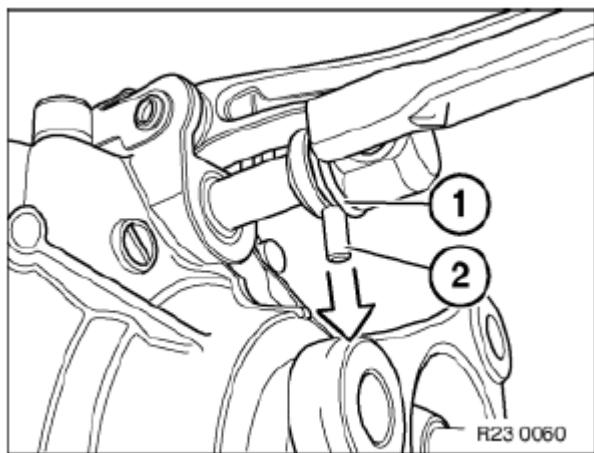


Fig. 56: Driving Out Cylinder Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **23 0 210** until it is firmly connected with radial seal (1).

Pull out radial seal with special tool **23 0 210** .

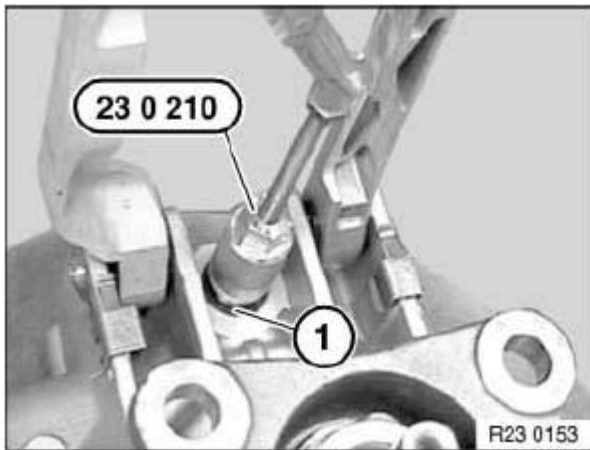


Fig. 57: Identifying Special Tools (23 0 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat sealing lips of radial seal and selector shaft with transmission oil.

Drive in radial seal with special tool **23 0 220**.

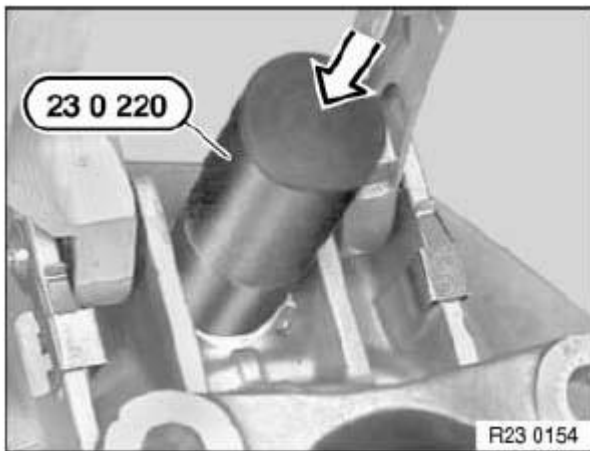


Fig. 58: Identifying Special Tools (23 0 220)
Courtesy of BMW OF NORTH AMERICA, INC.

23 12 510 REPLACING RADIAL SHAFT SEAL FOR DRIVE SHAFT (GS6-53BZ/DZ)

Special tools required:

- **23 3 200**
- **23 3 220**

IMPORTANT: After completion of work, check **TRANSMISSION OIL LEVEL** .
Use only approved transmission oil. See **MANUAL TRANSMISSION -**

OPERATING FLUIDS .

Failure to comply with this instruction will result in serious damage to the transmission!

Necessary preliminary tasks:

- Remove **TRANSMISSION**.
- Remove **CLUTCH RELEASE UNIT AND RELEASE LEVER** from guide tube.

Release screws.

Tightening torque: **23 11 2AZ** .

Remove guide tube (1).

Installation:

Clean guide tube.

Do not grease guide tube.

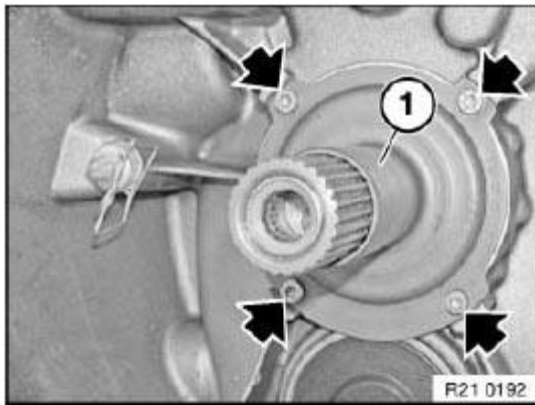


Fig. 59: Identifying Guide Tube And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw on special tool **23 3 200**.

Push special tool onto drive shaft and screw into sealing ring.

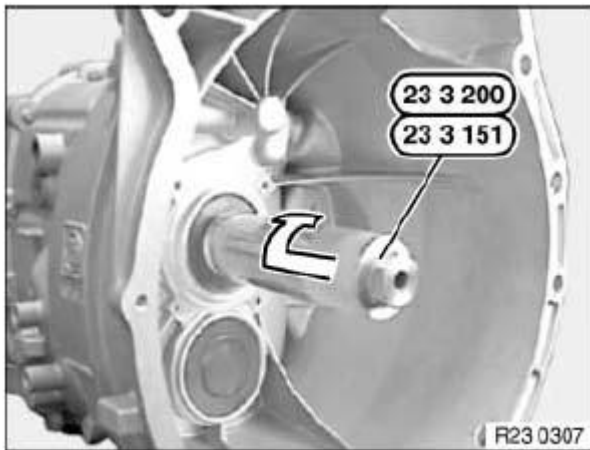


Fig. 60: Identifying Special Tools (23 3 200), (23 3 151) And (23 3 220)
 Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw into special tool **23 3 200** again and continue turning until sealing ring is pulled out of transmission housing.

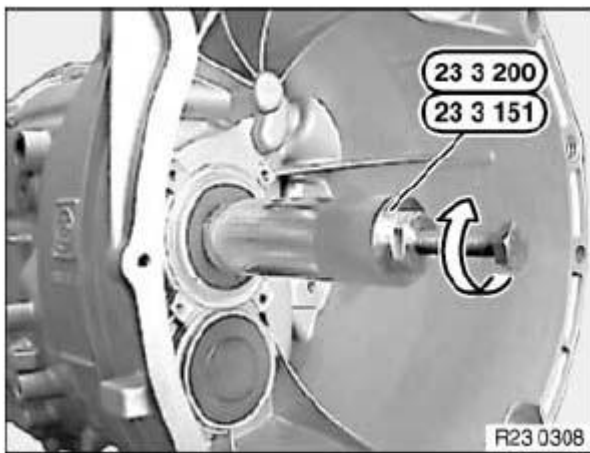


Fig. 61: Identifying Special Tools (23 3 200) And (23 3 251)
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of radial seal with gear oil.

Push radial seal (1) onto drive shaft up to housing.

Drive in radial seal (1) as far as it will go with special tool **23 3 220** and plastic hammer.

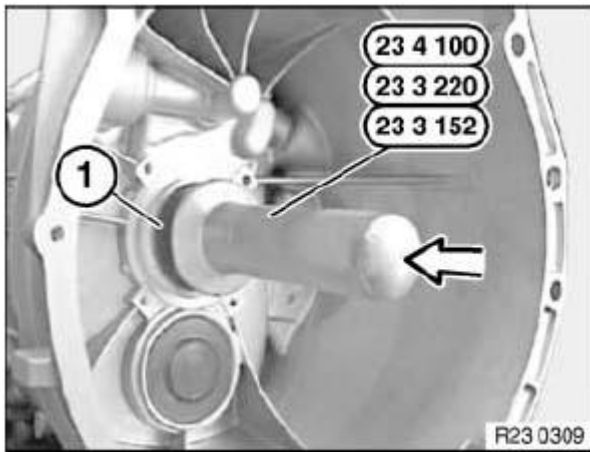


Fig. 62: Identifying Special Tools (23 3 200) And (23 3 251)
Courtesy of BMW OF NORTH AMERICA, INC.

ELECTRICAL ADD-ON PART

23 14 510 REPLACING REVERSING LIGHT SWITCH

Necessary preliminary tasks:

- Remove rear underbody protection

GS6-17DG/BG and GS6-37DG/BG transmissions only.

Disconnect plug connection (1) on reverse gear switch.

Remove reverse gear switch.

Tightening torque **23 14 1AZ** .

NOTE: **Illustration similar**

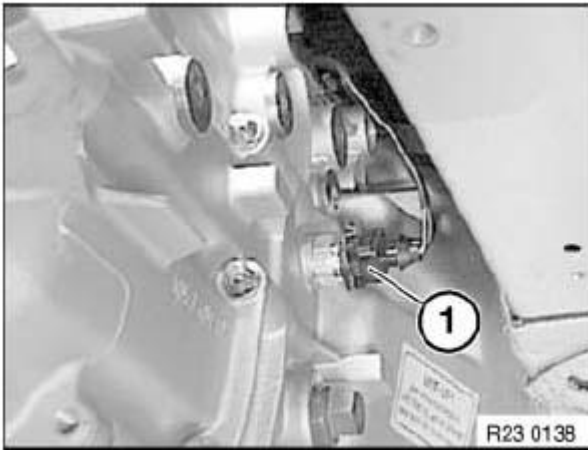


Fig. 63: Identifying Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

GS6-53DG/BG transmission only

Disconnect plug connection (1) on reverse gear switch.

Remove reverse gear switch.

Tightening torque **23 14 1AZ** .

NOTE: Illustration similar

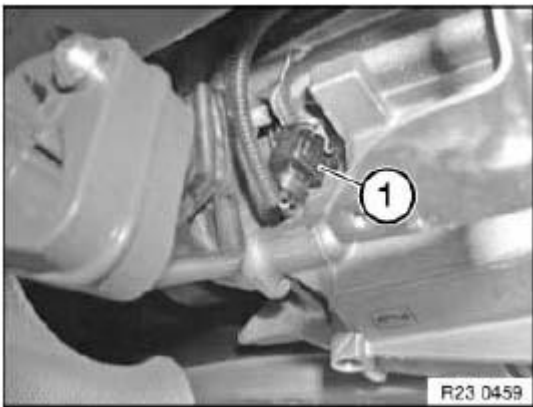


Fig. 64: Identifying Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

23 14 550 REMOVING/REPLACING ZERO GEAR SENSOR

IMPORTANT: After installing the zero gear sensor, it is necessary to teach in the position of the zero gear sensor again.

Adjustment is carried out with the "Service function" of the DIS Tester (learn/write zero gear sensor).

Necessary preliminary tasks:

- Lower transmission

Tasks are described in Removing transmission.

Disconnect plug connection (1) on zero gear sensor.

Release screws (2).

Remove zero gear sensor.

Tightening torque **23 14 2AZ** .

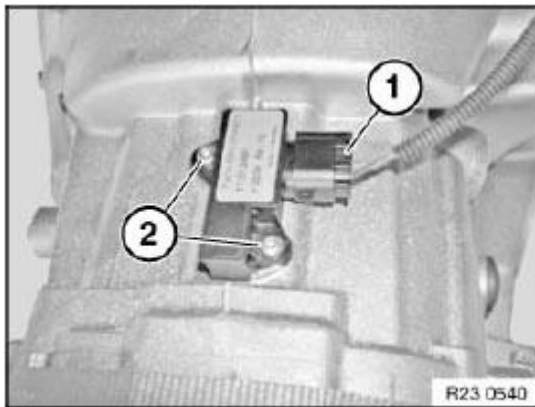


Fig. 65: Identifying Plug Connection On Zero Gear Sensor And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

RESTRAINTS

Passive Safety Systems - F10

INTRODUCTION

1.1. PASSIVE SAFETY SYSTEM

The passive safety system of the F10 builds on the objectives and characteristics of the F01. The passive safety system fulfils all legislative requirements worldwide.

Extensive measures were taken on the body and on the occupants safety and protection systems. The passive safety system includes, in addition to the restraint systems, a special body structure which offers a excellent crash performance. In the event of an accident, the forces are reduced in a defined manner and therefore have less impact on the occupants.

The restraint systems ensure that the risk of injury is significantly reduced.

The 3rd generation of the Advanced Crash Safety Module ACSM is used on the F10 as the central airbag control unit for the passive safety system. It differs from the previous crash safety modules in that it has an external sensor system.

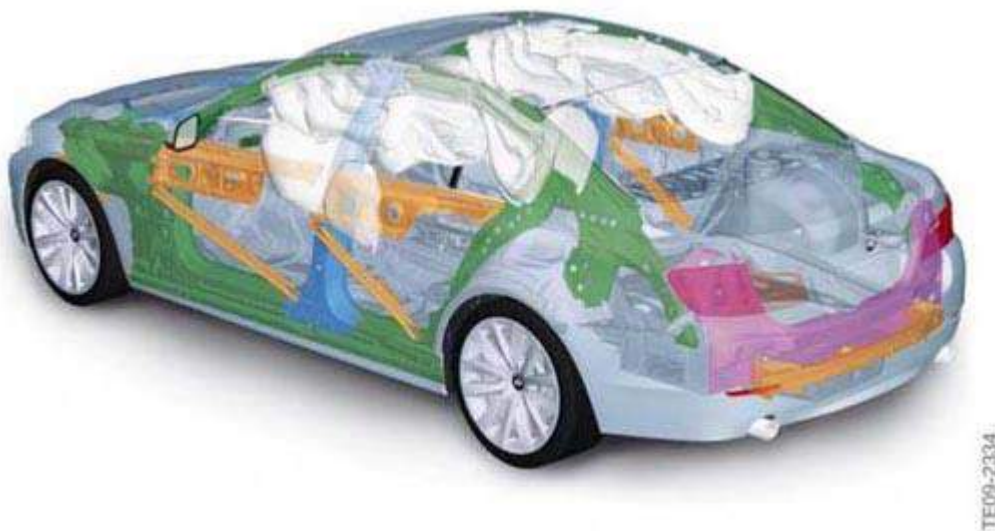


Fig. 1: Identifying Passive Safety System

Courtesy of BMW OF NORTH AMERICA, INC.

MODELS

2.1. OVERVIEW

The passive safety system installed in the F10 is the third-generation Crash Safety Module. The following illustration provides an overview of the installed versions for the various models:

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OVERVIEW OF INSTALLED VERSIONS FOR VARIOUS MODELS

Model series	Model	Used as of	Design
E60	5 Series Saloon	09/2005	ACSM1
E61	5 Series Touring 09/2005	ACSM	1
E63	6 Series Coupe 09/2005	ACSM	1
E64	6 Series Convertible 09/2005	ACSM	1
E85	Z4 Roadster 01/2006	ACSM	1
E86	Z4 Coupe 05/2006	ACSM	1
E88	1 Series Convertible 04/2008	ACSM	2
E70	X5SAV 11/2006	ACSM	2
E71	X6SAC 04/2008	ACSM	2
E93	3 Series Convertible 03/2007	ACSM	2
F01	7 Series Saloon	11/2008	ACSM 3
F02	7 Series Saloon long version 11/2008	ACSM	3
F07	5 Series Gran Turismo 10/2009	ACSM	3
F10	5 Series Saloon	03/2010	ACSM 3

SYSTEM OVERVIEW**3.1. SYSTEM WIRING DIAGRAMS**

The following bus overview provides you with an overview of the F10 vehicle electrical system/network structure and the integration of the modules into the PT-CAN.

3.1.1. Bus diagram

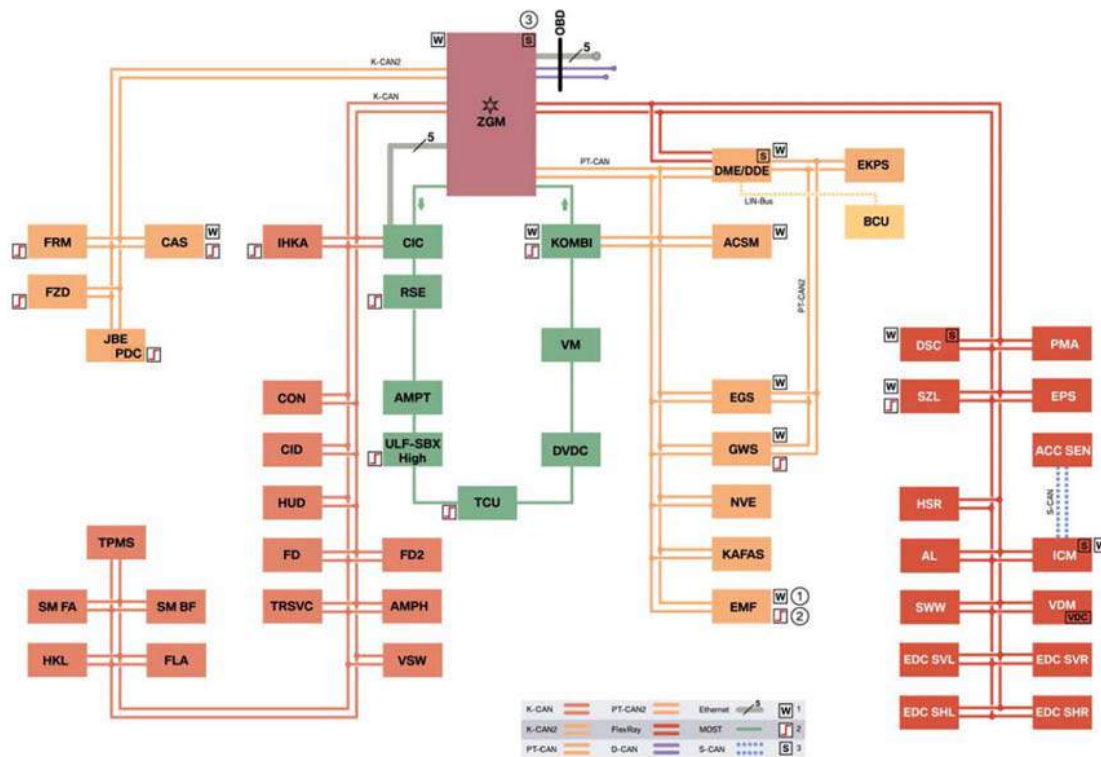


Fig. 2: Passive Safety System Bus Diagram

Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Wakeable control units
2	Control units authorized to wake up the vehicle
3	Startup node control units, for starting up and synchronizing the FlexRay bus system
ACC-SEN	Active Cruise Control Sensor
ACSM	Advanced Crash Safety Module
AL	Active steering
AMPH	Amplifier High (high fidelity amplifier)
AMPT	Amplifier Top (top high fidelity amplifier)
BSD	Bit-serial data interface
BCU	Battery Charge Unit (for auxiliary battery)
CAS	Car Access System
CIC	Car Information Computer
CIC	Basic Car Information Computer Basic
CID	Central Information Display
CON	Controller
D-CAN	Diagnosis on Controller Area Network
DDE	Digital Diesel Electronics (Not for US)

DME	Digital Motor Electronics
DSC	Dynamic Stability Control
DVD	DVD changer
EDC	SHL Electronic Damper Control, rear left satellite unit
EDC	SHR Electronic Damper Control, rear right satellite unit
EDC	SVL Electronic Damper Control, front left satellite unit
EDC	SVR Electronic Damper Control, front right satellite unit
EGS	Electronic transmission control
EKPS	Electronic fuel pump control
EMF	Electromechanical parking brake
EPS	Electronic Power Steering
Ethernet	Cabled data network technology for local data networks
FD	Rear display
FD2	Rear display 2
FLA	High-beam assistant
FlexRay	Fast, preset and fault-tolerant bus system for use in automotive applications
FRM	Footwell module
FZD	Roof function center
GWS	Gear selector switch
HKL	Luggage compartment lid lift
HSR	Rear suspension slip angle control
HUD	Head-Up Display
ICM	Integrated Chassis Management
IHKA	Integrated automatic heating/air conditioning
JBE	Junction box electronics
KAFAS	Camera-based driver assistance system
K-Bus	Body bus
K-CAN	Body controller area network
K-CAN2	Body controller area network 2 (500 kBit/s)
KOMBI	Instrument cluster
LIN-Bus	Local Interconnect Network bus
Local-CAN	Local Controller Area Network
MOST	Media Oriented System Transport
MOST port	Media Oriented System Transport port
NVE	Night Vision electronics
PDC	Park Distance Control
PMA	Parking Maneuvering Assistant Control Unit
PT-CAN	Powertrain CAN
PT-CAN2	Powertrain controller area network 2
OBD	Diagnosis socket
RSE	Rear seat entertainment system

	Satellite tuner
SMBF	Front passenger seat module
SMFA	Seat module, driver
SWW	Blind Spot Detection
SZL	Steering column switch cluster
TCU	Telematics Control Unit
TPMS	Tire Pressure Monitoring System
TRSVC	Control unit for reversing camera and side view
ULF-SBX	Universal interface box
VDM	Vertical Dynamics Management
VM	Video Module
VSW	Video switch
ZGM	Central Gateway Module

3.1.2. System wiring diagram

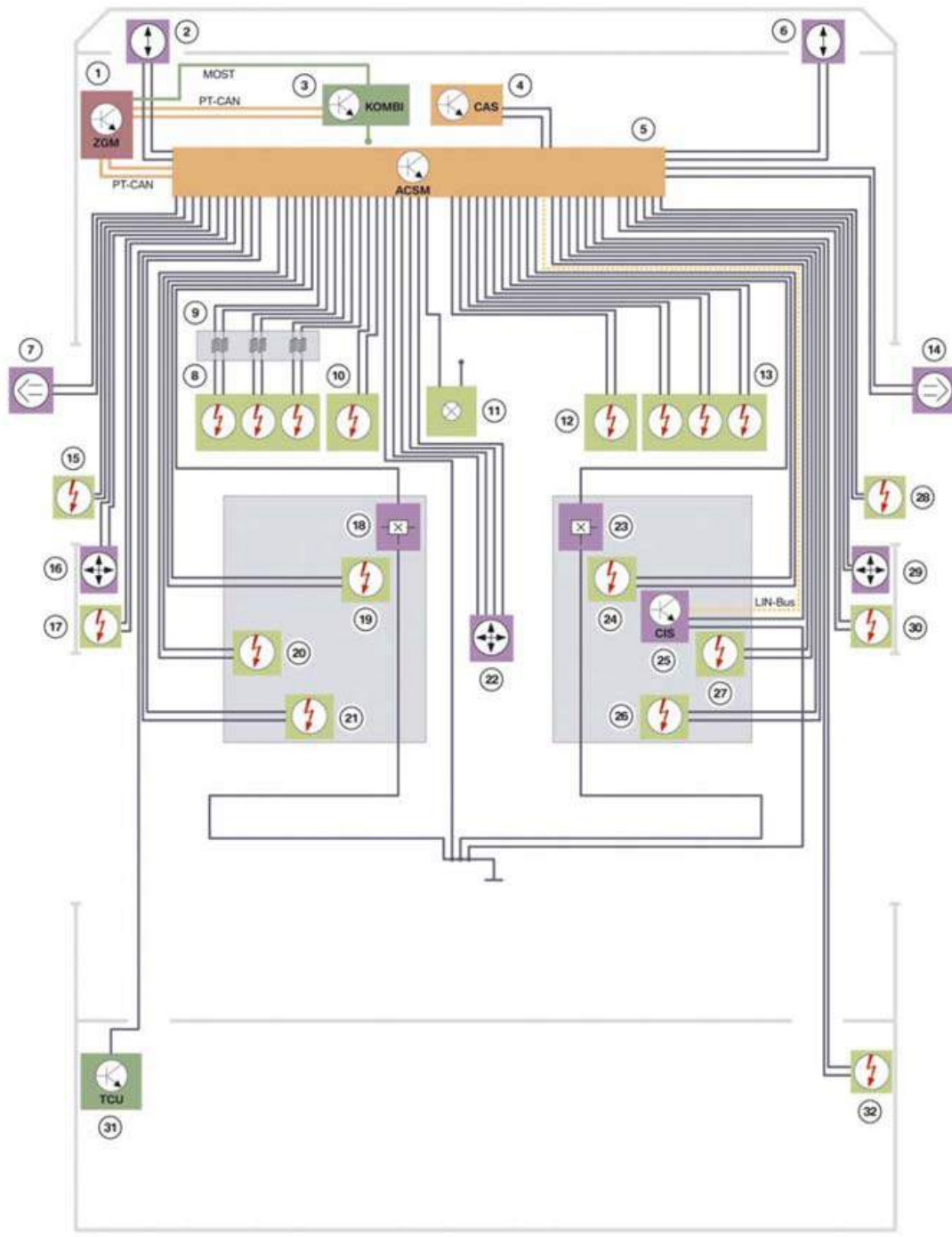


Fig. 3: Passive Safety System Wiring Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Central Gateway Module
2	Acceleration sensor, left engine support

3	Instrument cluster
4	Car Access System
5	Crash Safety Module
6	Acceleration sensor, right engine support
7	Door airbag sensor, front left (pressure)
8	Driver's airbag, two-stage with ventilation
9	Clock spring
10	Knee airbag, driver
11	Indicator lamp for front passenger airbag deactivation
12	Knee airbag, passenger
13	Front passenger airbag, two-stage with ventilation
14	Door airbag sensor, front right (pressure)
15	Head airbag, left
16	Acceleration sensor, B-pillar left
17	Automatic reel with adaptive force limiter, driver's side
18	Seat belt buckle contact, driver's seat
19	Seat belt pretensioner, driver
20	Side airbag, driver's side
21	Active head restraint, driver
22	Central sensor
23	Seat belt buckle contact, front passenger side
24	Seat belt pretensioner, front passenger
25	Seat-occupancy mat, CIS mat
26	Active head restraint, passenger
27	Side airbag, passenger side
28	Head air bag, right
29	Acceleration sensor, B-pillar right
30	Automatic reel with adaptive force limiter, front passenger's side
31	Telematics Control Unit for emergency call
32	Safety battery terminal

FUNCTIONS

4.1. FUNCTIONS OF THE CRASH SAFETY MODULE

The main function of the Crash Safety Module is to constantly evaluate all sensor signals in order to detect a crash situation. As a result of the sensor signals and their evaluation, the crash safety module identifies the direction of the crash and the severity of the impact.

Also included is information on seat occupancy and whether or not the driver and/or front passenger have their seat belts fastened. From this information, measures are taken to selectively trigger the necessary restraint systems.

The crash safety module monitors the system itself and indicates that the system is ready for operation when the airbag indicator light goes out.

In the event of a fault during operation, this is stored in a fault memory, which can be read out for diagnostic purposes.

If a crash situation is detected, this is communicated to the other users in the bus-system network by a crash message. The relevant control units respond to this signal by executing their own functions according to the severity of the crash.

These functions include:

- Opening the central-locking system
- Activating the hazard warning flashers
- Switching on the interior light
- Deactivating the electric fuel pump
- Switching off the auxiliary heating
- Automatic emergency call.

Another function of the Crash Safety Module is the acoustic seat belt warning, which uses visual and audible signals to remind the driver and front passenger to fasten their seat belts.

The functions of the Crash Safety Module are divided into the following areas:

- Crash-relevant functions
- System monitoring functions
- Additional convenience functions.

4.2. CRASH-RELEVANT FUNCTIONS

The Crash Safety Module must fulfill the following crash-relevant functions:

- Evaluating the sensor signals
- Detecting crashes
- Determining the triggering time and the triggering sequence
- Triggering the output stages of the firing circuits
- Sending the crash message to all bus users
- Crash documentation
- Emergency call function

4.2.1. Evaluating the sensor signals

The sensors serve to detect and verify front-end, side-on and rear-end crashes. In addition, the system is also equipped with rollover detection.

The sensors are directly connected to the crash safety module, where its signals are evaluated and processed.

4.2.2. Detecting crashes

European version vehicles are equipped with the following sensors:

- One transverse and longitudinal acceleration sensor in the central sensor (yellow)
- One transverse and longitudinal acceleration sensor in each of the B-pillars (green)
- One airbag sensor for pressure in each of the front doors (blue).
- One longitudinal acceleration sensor on each of the engine supports (red)

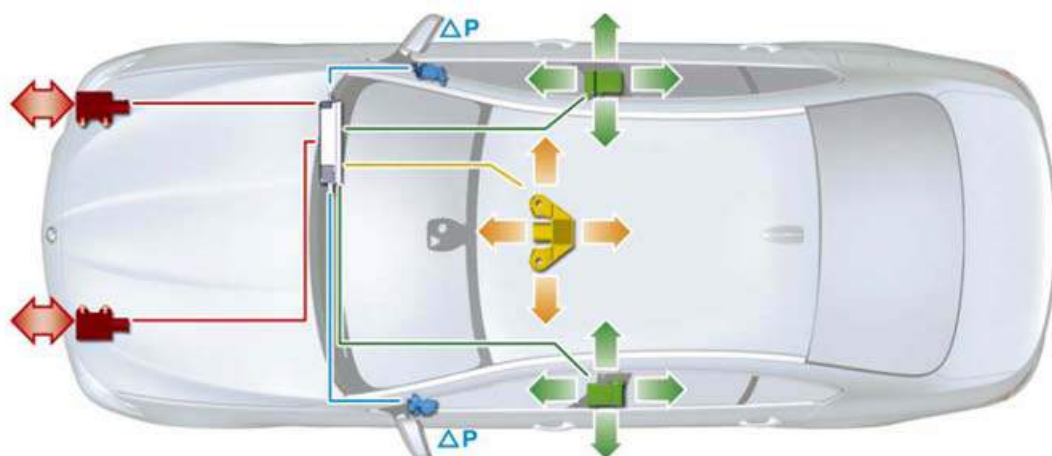


Fig. 4: ACSM Sensors System Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

The longitudinal acceleration sensors can measure both positive and negative acceleration. Using these signals, a front-end or rear-end crash is detected.

A side-on crash is detected using the lateral acceleration sensors and airbag sensors in the doors.

A crash in which the force-transfer direction is not perpendicular to the vehicle's longitudinal or transverse axis is detected by means of a combined transverse and longitudinal acceleration.

The longitudinal acceleration sensors on the engine supports serve to detect a front-end crash and its severity.

4.2.3. Triggering time and triggering sequence

The Crash Safety Module uses the values transmitted by the sensors to determine the direction and severity of the crash.

In the case of a front-end crash, for example, correspondingly high acceleration values must be detected by the

longitudinal acceleration sensor in the B-pillar and by the longitudinal acceleration sensor in the central sensor. Based on the acceleration forces, an algorithm detects the severity and direction of the crash. Using this information, the triggering times and the sequence of the restraint systems to be activated is calculated.

A possible imminent rollover is also detected and the appropriate protection systems are activated.

4.2.4. Triggering the output stages of the firing circuits

The Crash Safety Module is powered by the Car Access System 4 (CAS 4) through terminal 30B. At terminal 30B, the Crash Safety Module is in offline mode. This means that it is active on the data bus and can fulfill all diagnostic functions. The triggering of the ignition circuits is blocked and only possible from terminal 15, on completion of the system self-test. Likewise, the Crash Safety Module is ready for ignition, even if in terminal R the engine turns OFF.

The ignition capacitors are charged via a switching controller. These capacitors make the firing energy available in the event of a crash. If the voltage supply is interrupted during a crash, the firing capacitors serve briefly as an energy reserve.

The output stages of the firing circuits consist of a high-side and a low-side power circuit-breaker. The high-side power circuit-breaker controls the firing voltage, while the low-side power circuit-breaker switches to ground. The output stages of the firing circuits are controlled by a microprocessor.

The high-side and low-side power circuit-breakers also serve the purpose of checking the firing circuits during the system self-test.

4.2.5. Sending the crash message

In the event of a collision involving triggering of the restraint systems, the Crash Safety Module sends a crash message to the users in the bus-system network. Parallel to this, the TCU is informed via a direct single-wire connection to transmit an emergency call.

Then, the respective control units perform the following functions depending on the crash severity:

CONTROL UNIT FUNCTION DESCRIPTION CHART

Function	Control unit
Switch off electric fuel pump	Digital Motor Electronics (DME) Via electronic fuel pump control (EKPS)
Switch off the auxiliary heating	Integrated automatic heating and air conditioning (IHKA) (Not for US)
Release central locking	Junction box electronics (JBE)
Switch on hazard warning flashers	Footwell module (FRM)
Switch on interior lights	Footwell module (FRM)
Transmit emergency call (only when airbag triggered)	Telematics Control Unit (TCU)

4.2.6. Crash entries

In the event of a collision where one or more actuators are triggered, a crash entry is stored in a non-erasable memory. After three crash entries, a non-erasable fault memory entry is stored with the instruction to replace the Crash Safety Module.

NOTE: **The three crash entries can also be stored during the course of an accident. Each crash entry is assigned a system time. The electronic control unit remains capable of firing even after three crash entries. The crash entries cannot be erased and are used to diagnose the device. A maximum of three crash entries can be stored. The control unit must then be replaced.**

4.2.7. Emergency call function

The emergency call functions are country-dependent and are available to customers in countries with BMW Assist infrastructure. This means an appropriate service provider with a call center must be available. Another precondition for being able to make an emergency call is the availability of a telephone network.

With BMW ASSIST, the customer has a manual and an automatic emergency call as well as other functions.

A manual and an automatic emergency call function is provided as standard. Furthermore, the driver has the option of activating a breakdown call. Irrespective of whether the customer orders a telephone or not, each vehicle is equipped with a telematics control unit TCU, a telephone antenna, an emergency antenna, a handsfree kit and a GPS antenna for determining position.

Manual emergency call

The manual emergency call is intended for customers to request help quickly if they are present when an accident occurs without being involved themselves.

The emergency-call button is located in the roof function Center. The emergency call button is connected directly to the TCU.

Pressing the emergency-call buttons establishes a voice connection with the relevant country provider. The voice connection is indicated by a flashing LED in the switch.

Automatic emergency call

The crash safety module sends a crash telegram to the TCU in the event of an accident of corresponding crash severity. The TCU places an emergency call, which at the same time contains the location of the vehicle.

Parallel to this, attempts are made to set up a voice connection with the vehicle occupants to obtain more information on the accident (severity of the accident, number of injured) so that further rescue operations can be initiated.

Extended automatic emergency call

Vehicles with BMW Assist have an additional function, the extended automatic emergency call (Advanced

Automatic Crash Notification).

Using various sensor data of the extended automatic emergency call system, the risk of injury is determined and transmitted to the emergency coordination center.

The emergency call includes additional specific information about the accident. Thus the call center has more accurate information about the accident and the risk of injury, which can be passed on to the emergency coordination center. The emergency coordination center can then initiate the appropriate actions.

4.3. SYSTEM MONITORING FUNCTIONS

The Crash Safety Module has the following system monitoring functions:

- System self-test (pre-drive check)
- Indication of system operability
- Cyclic monitoring
- Fault indication and fault code storage
- Fault output (diagnosis)
- Acoustic and visual seat belt warning
- Deactivation of the front passenger front airbag, the knee airbag and side airbag in via the seat-occupancy detector

4.3.1. System self-test

The Crash Safety Module performs a system self-test as of terminal 15. The airbag indicator light is activated for approximately five seconds during the system self-test.

When the system self-test is concluded and no fault has been found, the airbag indicator light goes out and the system is ready for operation.

4.3.2. Indication of system operability

Crash Safety Module system operability is indicated by the airbag indicator light going out in the instrument panel.

4.3.3. Cyclic monitoring

Once the system self-test has been successfully concluded and the system is ready for operation, a cyclic monitoring procedure is performed for fault monitoring purposes. Cyclic monitoring serves the purpose of internal diagnosis of the electronic control unit and the overall airbag system. The cyclic monitoring is carried out continuously as of terminal 15 and it is also continued after reaching logical terminal R and after the engine is OFF.

4.3.4. Fault indication and fault code storage

The Crash Safety Module has a non-volatile fault memory. A fault entry is signalled by the airbag indicator

light illuminating.

A distinction is made between internal and external faults when entering the fault code. Events such as triggering of an airbag or seat belt pretensioner are also stored in the fault memory.

NOTE: **The entry of a triggered restraint system in the fault memory does not mean that the restraint system was defective in the crash situation, rather it only means that the ignited restraint system is not available for further triggering.**

4.3.5. Fault output (diagnosis)

With the aid of the BMW diagnosis system, Integrated Service Technical Application (ISTA), the fault memory can be read out via the diagnostic interface. After rectifying the faults or after replacing the triggered components, the fault memory can be cleared with the diagnosis command "Clear fault memory".

4.3.6. Acoustic and visual seat belt warning

All vehicles with Crash Safety Module come standard with an acoustic and visual seat belt warning. The Crash Safety Module detects whether the driver and front passenger have fastened their seat belt. If not, a corresponding acoustic and visual indicator reminds them to fasten their seat belt. Both seat belt buckle switches are monitored separately.

4.3.7. Deactivation of the airbags

Automatic deactivation of the airbag is provided in order to fulfill the requirements of the National Highway Traffic Safety Administration NHTSA. The child seats listed in the regulation (for an approximately one-year old child on the front passenger seat) must cause deactivation of the airbags.

To do so, a seat-occupancy mat is used to classify the occupant on the front passenger seat. As a further development of the Occupant Classification 3 mat (OC3 mat), the Capacitive Interior Sensing mat (CIS mat) is used in the F10.

The CIS mat consists of two elements: a sensor wire, which runs parallel to the seat heating in the seat cushion and an evaluation unit.

The CIS mat measures the capacitance and ohmic resistance between the sensor wire (anode) and the ground of the vehicle (cathode) at a frequency of 120 kHz. The change in capacitance and resistance enables the CIS mat to determine whether an adult or a child in a child seat is on the front passenger seat.



Fig. 5: Measuring Procedure Of CIS Mat
Courtesy of BMW OF NORTH AMERICA, INC.

Deactivation of the front passenger airbag, side airbag and knee airbag on the front passenger side is signalled by the indicator lamp for front passenger airbag deactivation

The indicator lamp for front passenger airbag deactivation in the roof function center is illuminated if a child restraint system tested according to the requirements of the NHTSA with a small child has been detected on the front passenger seat or the front passenger seat is unoccupied.

The brightness of this light is controlled by automatic regulation of the display lighting.

SYSTEM COMPONENTS

5.1. CRASH SAFETY MODULE

The Crash Safety Module is contained in a housing with three sockets.

Two sockets serve to connect the wiring harness. One other socket is provided for the cockpit wiring harness.



Fig. 6: Identifying Crash Safety Module
Courtesy of BMW OF NORTH AMERICA, INC.

The Crash Safety Module is located in the cockpit module behind the glove box, as it was not possible to locate it centrally on the transmission tunnel due to the size of the Crash Safety Module and the wiring harness connection. Only the associated sensor system has remained on the transmission tunnel, close to the center of gravity.

The Crash Safety Module does not contain any sensors. These have been relocated to an additional central sensor on the transmission tunnel.

5.2. SENSORS AND SWITCHES

The following sensors and switches are installed:

- Central sensor for longitudinal and lateral acceleration
- Sensor for transverse and longitudinal acceleration at the B-pillars
- One airbag sensor in each of the front doors (pressure).
- One longitudinal acceleration sensor on each of the engine supports
- CIS mat
- Seat belt buckle switch
- Emergency call button

5.2.1. Central sensor

The central sensor on the transmission tunnel contain a transverse and a longitudinal acceleration sensor.



Fig. 7: Identifying Central Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

5.2.2. B-pillar transverse and longitudinal acceleration sensor

The transverse and longitudinal acceleration sensors in the B-pillars serve to detect head-on, side-on and rear-end crashes.

The left and right sensors are identical in design.



Fig. 8: Identifying B-Pillar Transverse And Longitudinal Acceleration Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

5.2.3. Door airbag sensor, front (pressure)

The airbag sensors in the front doors are used for side impact detection. In addition to the high transverse acceleration values, the pressure in the cavity of the door increases in the event of a side-on crash.

The airbag sensors are located on the inner door panel of the front doors.



Fig. 9: Identifying Door Air Bag Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

5.2.4. Longitudinal acceleration sensor

Two longitudinal acceleration sensors are installed in the front area of the engine supports. The measured values are transmitted to the Crash Safety Module and evaluated there.



Fig. 10: Identifying Engine Support Longitudinal Acceleration Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

5.2.5. CIS mat

A Capacitive Interior Sensing mat (CIS mat) is installed in the front passenger seat for seat-occupancy detection. This replaces the OC3 mat, which was previously installed for this function. The CIS mat detects whether an adult or a child in a child seat is in the front passenger seat. Deactivation of the front passenger airbag, side airbag and knee airbag is signalled by the illumination of the indicator lamp for front passenger airbag deactivation in the roof function center.

The CIS mat consists of two elements, a sensor wire, which runs parallel to the seat heating in the seat cushion, and an evaluation unit. The CIS mat measures the capacity and the ohmic resistance between the sensor wire (anode) and the ground of the vehicle (katode) at a frequency of 120 kHz. The CIS mat uses changes in the capacity and the resistance to determine whether an adult or a child is in the front passenger seat.

5.2.6. Seat belt buckle switch

The seat belt buckle switches are located in the seat belt buckles of the driver's and front passenger's seat.

The seat belt buckle switch detects whether the seat belt buckle tongue is in the seat belt buckle. The supply of power to the sensor and the evaluation are carried out by the Crash Safety Module.

From terminal 15, the seat belt buckle switch is monitored continuously. The signal is used for the visual and acoustic seat belt warning and for determining which restraint systems are to be triggered.



Fig. 11: Identifying Seat Belt Buckle Switch
Courtesy of BMW OF NORTH AMERICA, INC.

5.2.7. Emergency call button

The emergency-call button is located in the roof function center.



Fig. 12: Display Roof Function Center With Emergency Call Button
Courtesy of BMW OF NORTH AMERICA, INC.

5.3. ACTUATORS

The following actuator are installed in the F10:

- Driver's airbag
- Front-passenger airbag
- Knee airbag, left and right
- Head airbag, left and right
- Side airbag, front left and right
- Belt tensioner, front left and right
- Active head restraints, front left and right
- Safety battery terminal.

In addition, the following indicator lights inform the occupants of the status of the safety systems:

- Airbag indicator light
- Seat belt warning light
- Indicator lamp for front passenger airbag deactivation

The following two graphics show the airbags in non-triggered and triggered status. Depending on the type of the specific crash, only certain airbags are triggered.



Fig. 13: Identifying Triggered Airbags

Courtesy of BMW OF NORTH AMERICA, INC.

5.3.1. Adaptive Driver's airbag

The task of the driver's airbag is to decrease the risk of injury for the driver in the event of a head-on crash. The driver's airbag is located in the impact plate on the steering wheel. The driver's airbag is equipped with a gas generator.



Fig. 14: Identifying Steering Wheel With Driver's Airbag
Courtesy of BMW OF NORTH AMERICA, INC.

An active vent valve and a two-stage generator are installed which, depending on the detected crash severity, the stages can be triggered with different timing.



Fig. 15: Identifying Vent Valve And Gas Generator On Steering Wheel

Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Gas generator with exhaust vents
2	Actuator for vent valve

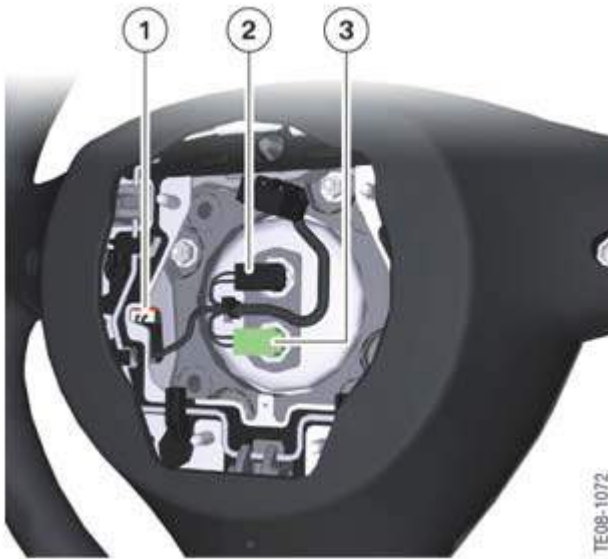


Fig. 16: Identifying Adaptive Driver's Airbag Connections (Rear View)

Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Connection of the squib for the active vent valve
2	Connection of the ignition squib for the first stage of the driver's airbag
3	Connection of the ignition squib for the second stage of the driver's airbag

NOTE: The Active driver's and passenger's airbags are equipped with an active vent valves.

5.3.2. Adaptive Front passenger airbag

The task of the front passenger airbag is to reduce the risk of injury to the passenger in the event of a head-on collision. The front passenger airbag is located in the dashboard. When the front passenger airbag unfolds, the dashboard is broken open at pre-defined locations. The front passenger airbag opens in the direction of the windshield, exits towards the top and rests against the windshield and the dashboard. The front passenger airbag is equipped with a two stage generator which, depending on the detected crash severity, the stages can be triggered with a time difference.

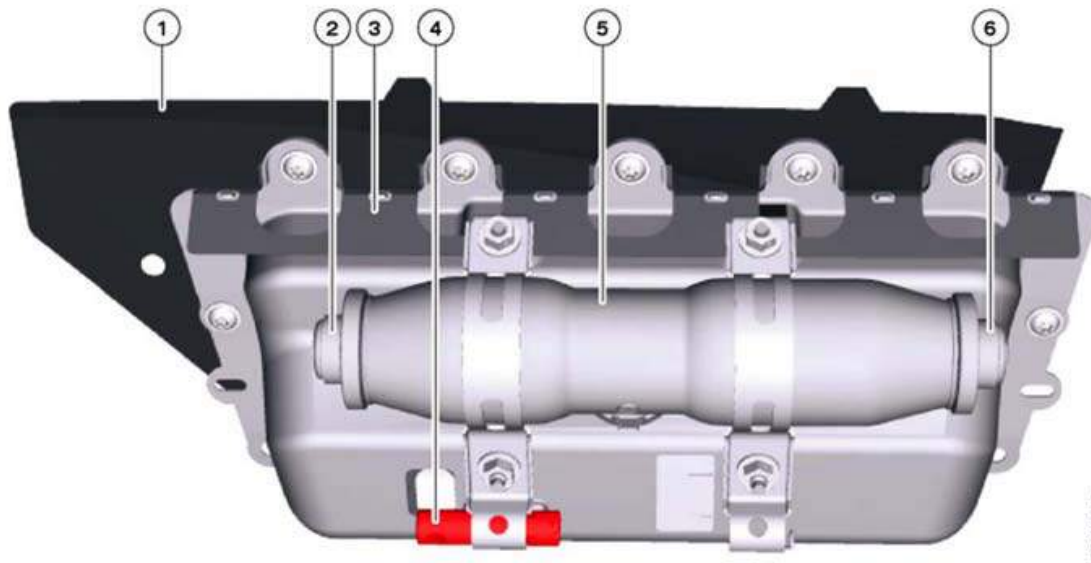


Fig. 17: Identifying Front Passenger Airbag Components
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Cover
2	First stage squib
3	Airbag housing
4	Actuator for the active vent valve
5	Inflator assembly
6	Second stage ignition squib

NOTE: The Active driver's and passenger's airbags are equipped with an active vent valves.

5.3.3. Knee airbag

The US legal requirements call for the passive restraint (without seat belt) of the occupants. Therefore, to control the occupant forward displacement in the event of a head-on collision, knee airbags are installed on the driver's side and front passenger side.



Fig. 18: Identifying Knee Airbag

Courtesy of BMW OF NORTH AMERICA, INC.

5.3.4. Head airbag

As additional protection of the occupants' head, the F10, uses curtain (head) airbags.

The curtain airbag extends from the A-pillar to the C-pillar and covers the entire area of the side windows. It unfolds between the occupants and the side structure.

System features:

- Extended covered area across all front windows, front and rear
- Reduction of risk of injury to occupants by glass splinters
- Covered area epitomized for occupants of different sizes

5.3.5. Side airbag, front

As in the F01, the front side airbags are triggered from the front seat backrests.

The side airbags and the gas generators are located in a plastic housing referred to as the airbag module. This is built into the front seat backrest and is covered by the rear panel.

In the event of activation, the side airbag emerges between the backrest frame and backrest rear panel as it unfolds between the side structure and occupant.

NOTE: It is important that no additional seat covers are installed as they would greatly impair the airbag function or even defeat it entirely.



Fig. 19: Identifying Seat With Side Airbag
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Side airbag

5.3.6. Front seat belt tensioner

In the F10, the familiar three-point seat belt is the belt system used on the front seats.



Fig. 20: Identifying Seat Belt Tensioners, Airbag And Automatic Reel With Adaptive Force E Limiter
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Seat belt tensioners
2	Side airbag
3	Automatic reel with adaptive force limiter

Seat belt tensioners

The task of the pyrotechnic belt tensioner is to minimize the seat belt slack in the pelvis and shoulder areas in the event of an impact, thereby improving the restraining action.

The belt tensioners are located on the driver's seat and front passenger seat. The belt tensioners are ignited in certain crash situations.

The seat belt buckle is connected by means of a steel cable to the piston in the tensioning tube. If the squib is triggered, gas pressure is created, which moves the piston in the tensioning tube. At this, the seat belt buckle is pulled down by the cable and the seat belt is tensioned.



Fig. 21: Belt Tensioner System Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Seat belt buckle switch
2	Connection for ignition squib
3	Tensioning tube with piston

Automatic reel with adaptive force limiter

For the driver and front passenger, an automatic reel is installed as on F01/F02.

With the aid of a gas generator, there is a changeover from a high to a low power level during the impact, in order to reduce the belt restraining forces.

With optimal tuning in connection with the airbags, the kinetic energy of the occupant is more uniformly reduced over the duration of the impact. Thus lower occupant stress values are achieved.

The operating principle of the adaptive force limiters in the F10 are the same as on the F01.

5.3.7. Active head restraints, front

For the F10, there are two versions depending on the installed seat. Both have a head restraint with pyrotechnic actuator which, in the event of a rear-end collision with sufficient severity, optimizes the distance and the height relative to the head. This reduces the load in the cervical spine area in the event of a rear-end collision. The headrest is activated at an early stage, even before the backward displacement of the occupant's head.

In order to offer as much convenience as possible, the front section of the manually adjustable head restraints can be pulled forward or pushed backward approximately 30 mm. It is a two-stage adjustment. This allows for three different positions for the head restraint depth adjustment.

On the multi-function seat, the headrest is adjusted by means of the headrest adjustment.

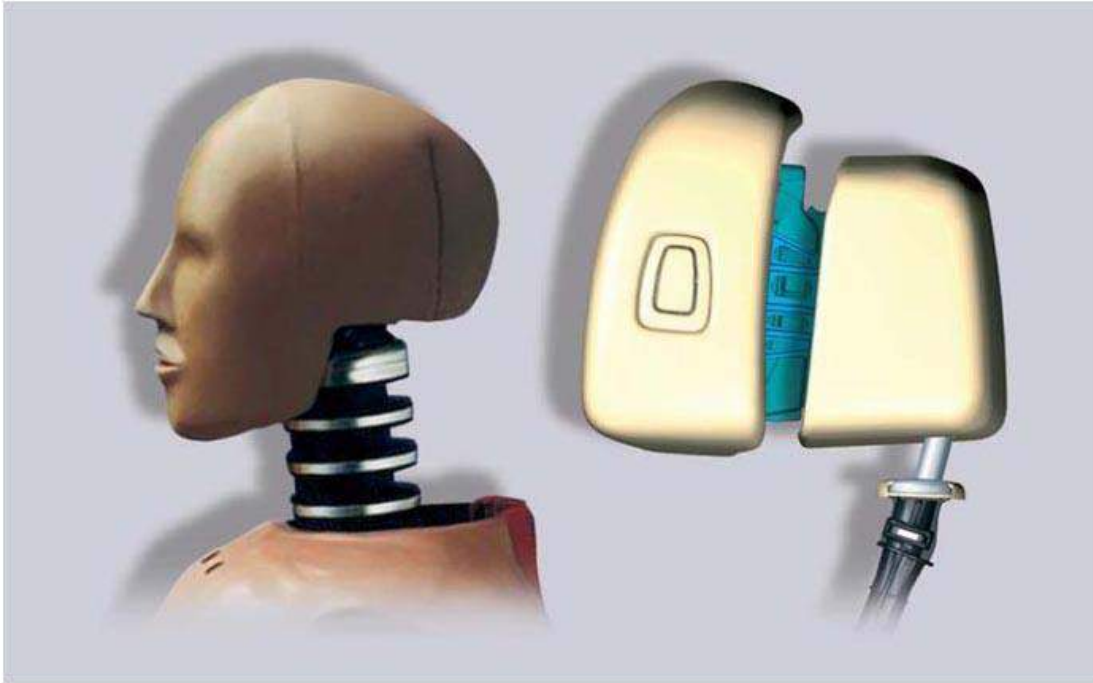


Fig. 22: View Of Manually Adjustable Head Restraint
Courtesy of BMW OF NORTH AMERICA, INC.

The active head restraint minimizes the load in the cervical spine area in the event of a rear-end collision. For the occupants in the vehicle, the correct adjustment of the head restraints and the distance of the head from the head restraint are of crucial importance.

In the event of a rear-end collision, the active head restraint reduces the distance between the head and the head restraint before the occupants are displaced backwards. This reduces the risk of injury to the cervical vertebrae, even in the event of a small accident.

NOTE: If the active head restraints have been triggered, the pyrotechnic actuators must be replaced in the workshop.

NOTE: Never use any seat or head restraint covers on the head rest that can impair the

5.3.8. Safety battery terminal

The safety battery terminal is triggered at different thresholds when the Crash Safety Module detects a head-on, side-on or rear-end crash of sufficient severity. The connecting cable between the battery and starter/alternator

and positive battery connection point is then disconnected pyrotechnically. The safety battery terminal is located directly at the positive terminal of the battery.

Despite the safety battery terminal being blown off, it is guaranteed that all consumers relevant to safety such as hazard warning flashers, interior lighting and telephone will continue to be supplied with voltage.

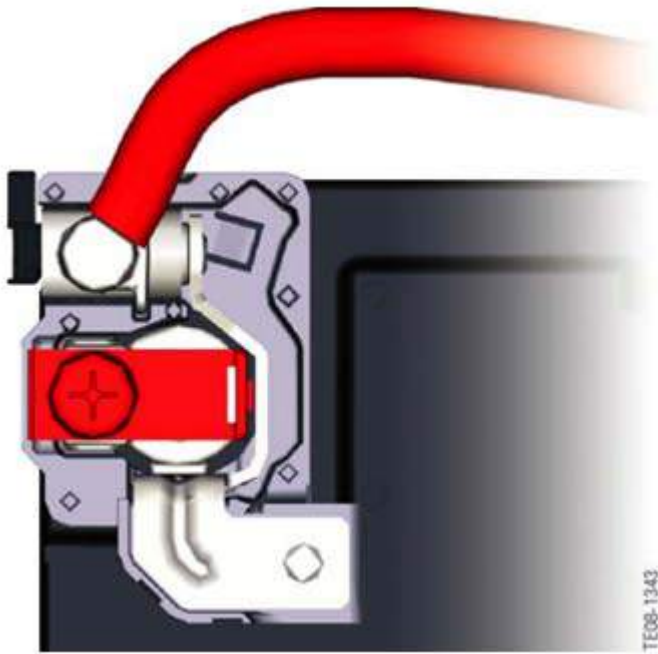


Fig. 23: Identifying Safety Battery Terminal
Courtesy of BMW OF NORTH AMERICA, INC.

5.3.9. Airbag indicator light

The airbag indicator light is located in the instrument cluster. Crash Safety Module system operability is indicated by the airbag indicator light lighting up and then going out during the pre-drive check. The airbag indicator light is controlled by means of a message on the PT-CAN from the Crash Safety Module. The instrument panel receives a message on a cyclical basis. If the message fails to arrive, the airbag indicator light is activated.



Fig. 24: Display Airbag Indicator Light
 Courtesy of BMW OF NORTH AMERICA, INC.

5.3.10. Seat belt warning light

A visual and audible warning is issued if the seat belt is not fastened or is unbuckled when the vehicle is in motion.



Fig. 25: Display Seat Belt Warning Light
 Courtesy of BMW OF NORTH AMERICA, INC.

The status of the seat belt buckle contacts of the seat bench is briefly visible in the TFT display of the instrument panel when the vehicle starts or a contact changes.

5.3.11. Indicator lamp for front passenger airbag deactivation

In the F10, the indicator lamp for front passenger airbag deactivation is in the roof function center. The

indicator lamp for front passenger airbag deactivation if the CIS mat detects a child seat with a child approximately one year old or if the front passenger seat is not occupied.

The brightness of the indicator lamp for front passenger airbag deactivation is controlled by the automatic brightness control of the display illumination.



Fig. 26: Display Roof Function Center With Indicator Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

SUSPENSION**Rear Axle - Repair Instructions - AWD****00 GENERAL****00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN****Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN**Danger of injury!**

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

**WARNING: Danger of poisoning if oil is ingested/absorbed through the skin!
Risk of injury if oil comes into contact with eyes and skin!**

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00..... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.
2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

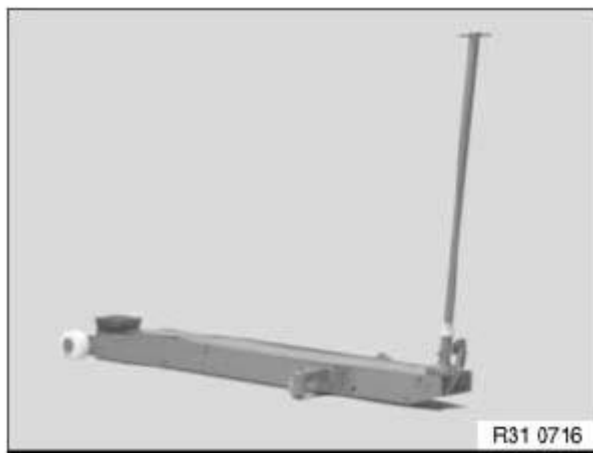


Fig. 1: Identifying Trolley Jack

Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

1. Car jacking point
2. Side car jacking points
3. Rear differential

Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

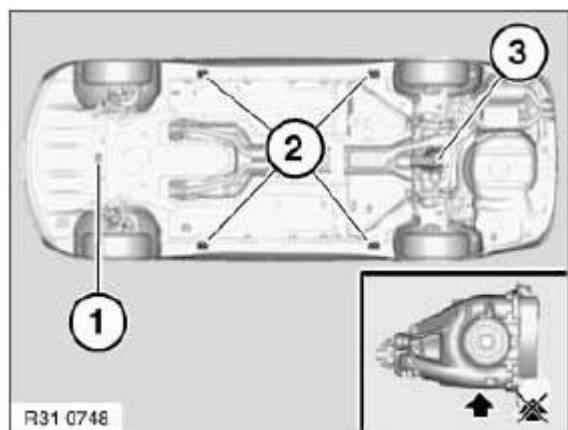
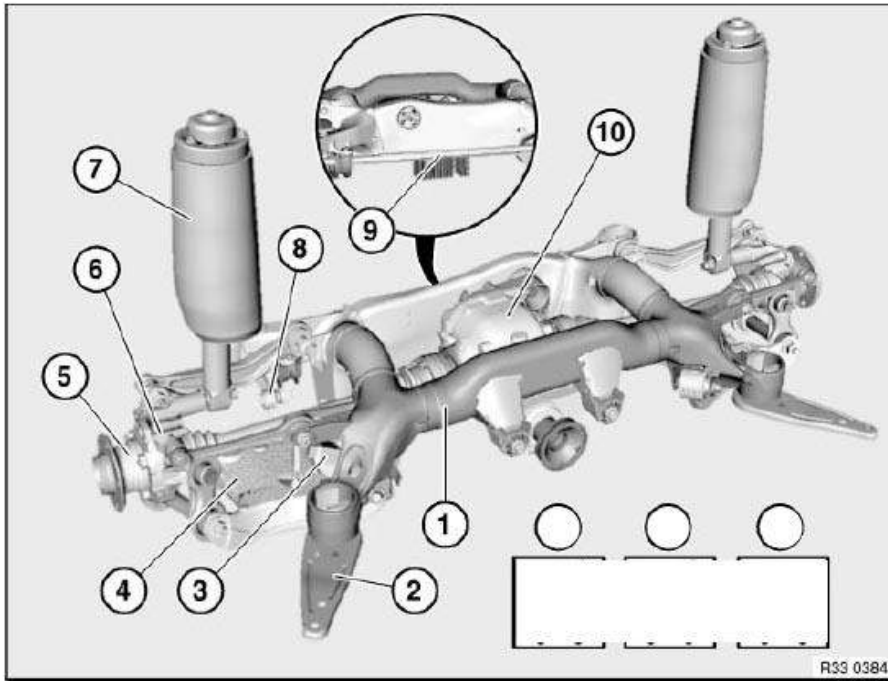


Fig. 2: Identifying Car Jacking Point

Courtesy of BMW OF NORTH AMERICA, INC.

33.... REAR AXLE LAYOUT



- | | | | |
|---|---|----|-----------------------------|
| 1 | Rear axle carrier | 8 | Stabilizer link |
| 2 | Tension strut | 9 | Stabiliser |
| 3 | Ride-height sensor | 10 | Final drive / output shafts |
| 4 | Control arm / swinging arm / ball joint | | |
| 5 | Wheel bearing / drive flange hub | | |
| 6 | Wheel carrier | | |
| 7 | Spring strut / coil spring | | |

Fig. 3: Identifying Rear Axle Components Location

Courtesy of BMW OF NORTH AMERICA, INC.

33 00... INFORMATION ON REPLACING SHOCK ABSORBERS

Facts:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

E32, E34, E38, E39: In the case of rear spring struts with ride-height control, there is always a slight oil spillage on the piston rod. These spring struts are permitted to be wet with oil over a maximum of half the shock absorber length on the outer tube, i.e. they are permitted to "sweat".

Consequence:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily

removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

Exception: On all M-models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

33 00... INSTRUCTIONS (CHASSIS COMPONENTS MADE OF ALUMINUM)

Due to the chemical and corrosion characteristics of aluminum, always comply with the following points when handling aluminum components:

- Do not bring into contact with battery acid!
- Do not clean with wire brushes made of brass or iron! Always use wire brushes with stainless steel bristles!
- Do not expose to flying sparks when grinding/separating! Cover components!
- Do not strike with steel welding splashes! Cover components!
- Do not expose to temperatures $> 80^{\circ}\text{C}$, even for brief periods! Temperatures in paint facilities do not have the same impact

33 00... NOTES ON REPAIRING THREADS

IMPORTANT: Install Heli-coil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads in the frame side member may be repaired with Heli-coil thread inserts. Comply with the procedure described in the example.



Fig. 4: Identifying Heli-coil

Courtesy of BMW OF NORTH AMERICA, INC.

33 00... REAR AXLE: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

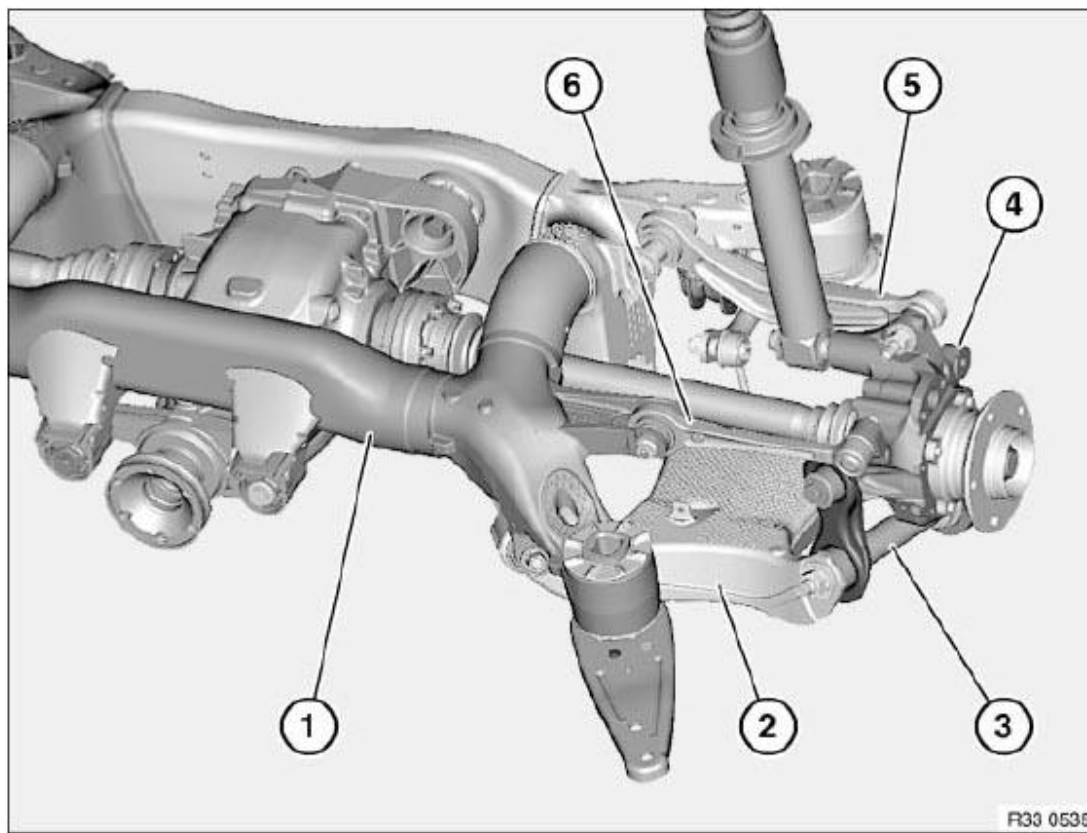


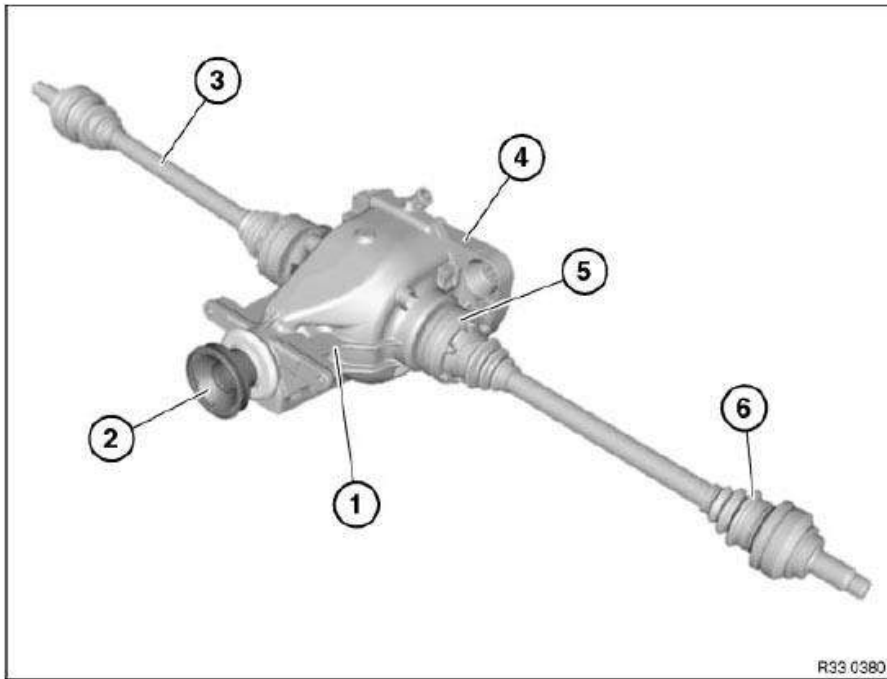
Fig. 5: Identifying Rear Axle Components Location
Courtesy of BMW OF NORTH AMERICA, INC.

A wheel/chassis alignment check must be carried out after the following work:

- Release of following screw/bolt connections:
 - Swinging arm, front/rear, to rear axle carrier
 - Swinging arm to integral link / wheel carrier
 - Integral link to wheel carrier
 - Guide arm to rear axle carrier
 - Control arm to rear axle carrier
- Replacement of following parts:
 1. Rear axle carrier
 2. Swinging arm
 3. Integral link

- 4. Wheel carrier / ball joint
- 5. Control arm
- 6. Guide arm

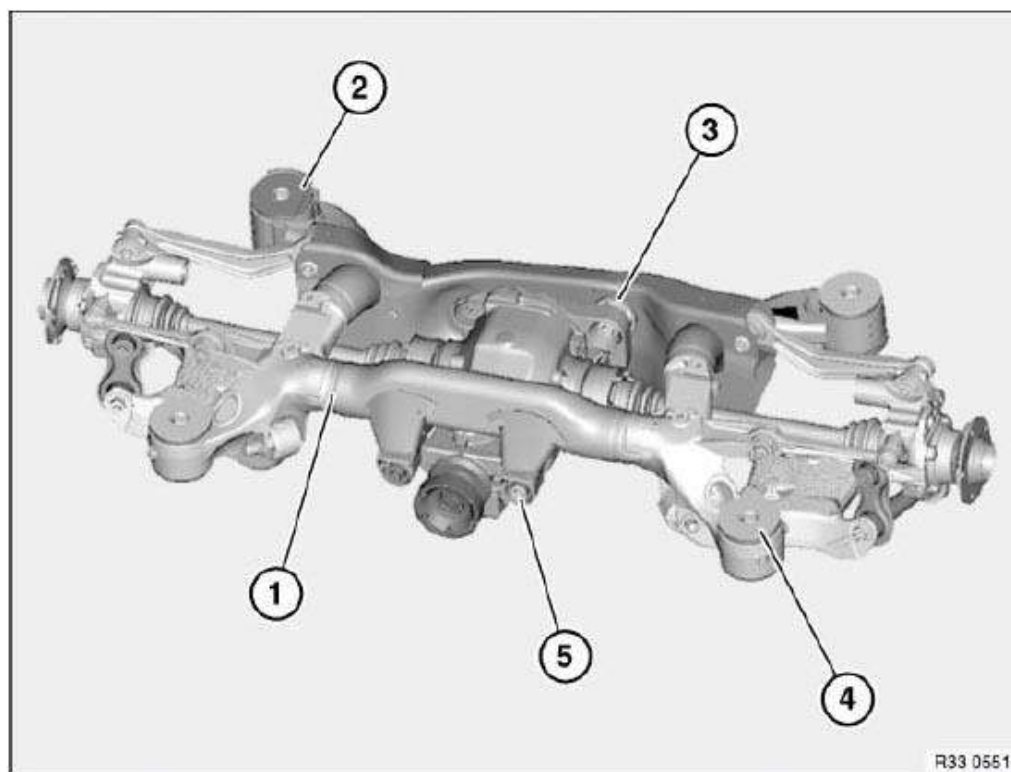
33 10... OVERVIEW OF REAR DIFFERENTIAL/OUTPUT SHAFTS



- | | | | |
|---|---------------------------|---|---------------------------|
| 1 | Rear differential | 4 | Cover gasket |
| 2 | Drive flange / shaft seal | 5 | Drive flange / shaft seal |
| 3 | Output shaft (left/right) | 6 | Output shaft gaiters |

Fig. 6: Identifying Rear Differential/Output Shafts Components Location
 Courtesy of BMW OF NORTH AMERICA, INC.

33 31... OVERVIEW OF REAR AXLE CARRIER WITH RUBBER MOUNTS

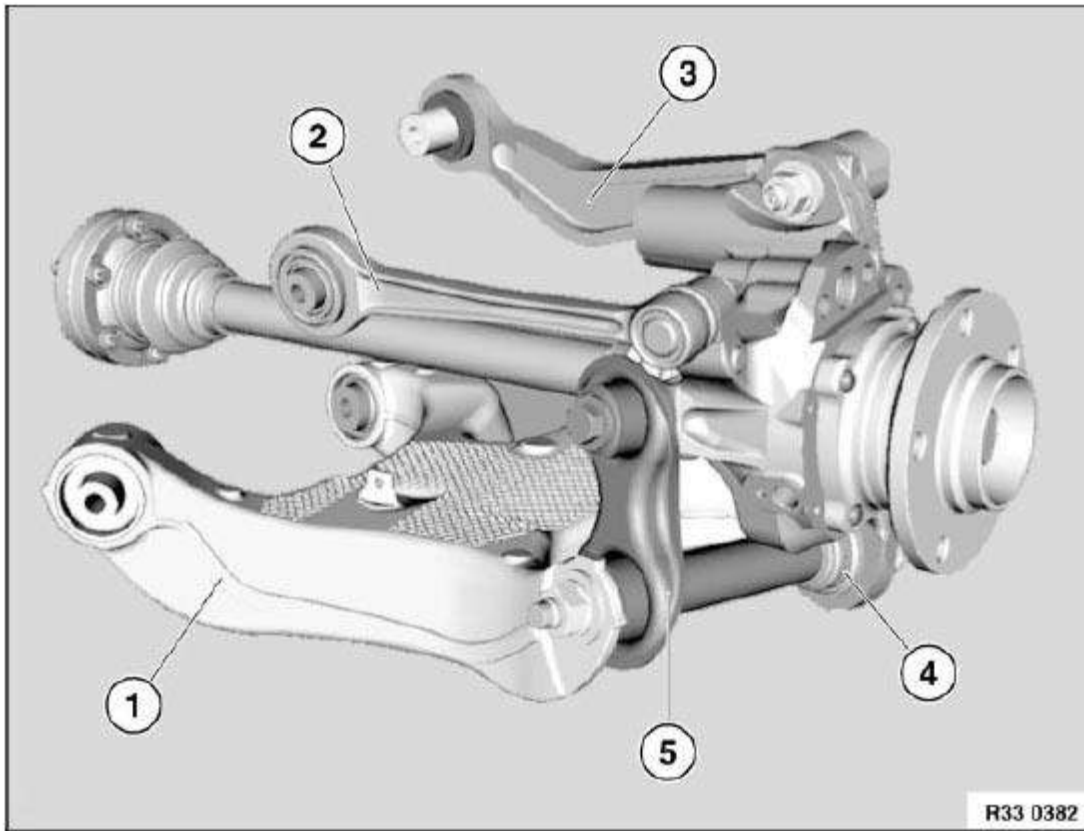


- | | | | |
|---|--------------------------------------|---|---------------------------------------|
| 1 | Rear axle carrier | 4 | Rear axle carrier rubber mount, front |
| 2 | Rear axle carrier rubber mount, rear | 5 | Rear differential rubber mount, front |
| 3 | Rear differential rubber mount, rear | | |

Fig. 7: Identifying Rear Axle Carrier With Rubber Mounts Components

Courtesy of BMW OF NORTH AMERICA, INC.

33 32... OVERVIEW OF STEERING LINKS



- 1 Swinging arm
- 2 Traction strut
- 3 Control arm

- 4 Ball joint
- 5 Integral link / push rod
Adjustment work

Fig. 8: Identifying Steering Links Components Location
Courtesy of BMW OF NORTH AMERICA, INC.

10 FINAL DRIVE

00 11... CHECKING/TOPPING UP OIL LEVEL IN REAR DIFFERENTIAL

IMPORTANT: Risk of damage!

To avoid serious damage to the rear differential, it is essential to use only approved gear oils in the differential.

Undo oil filler plug (1).

Check oil level.

If necessary, pour in rear differential oil up to lower edge of opening for oil filler plug (1).

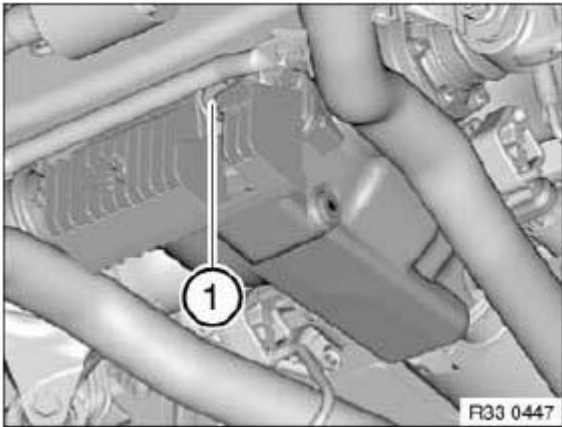


Fig. 9: Identifying Oil Filler Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- A. Oil filler plug with sealing ring:

Replace sealing ring (1).

Tightening torque **33 11 3AZ** .

- B. Oil filler plug with O-ring:

Replace oil filler plug (2).

Tightening torque **33 11 9AZ** .

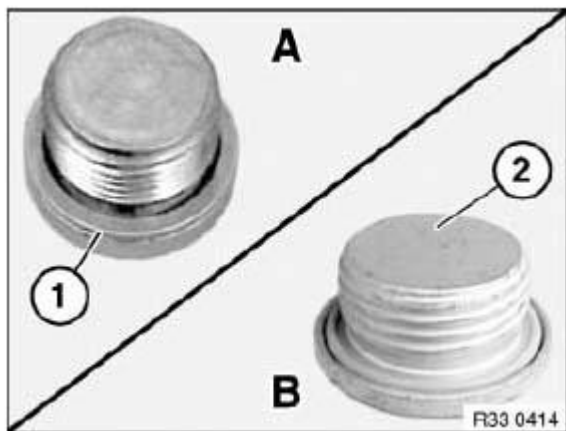


Fig. 10: Identifying Oil Filler Plug With Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

00 11 259 OIL CHANGE IN REAR DIFFERENTIAL INCL. USED OIL DISPOSAL

IMPORTANT: Risk of damage!

To avoid serious damage to the rear differential, it is essential to use only approved transmission oils in the differential.

NOTE:

The oil does not need to be changed in rear differentials carrying the "Life-Time-Oil" sticker.

Only change oil when rear differential is at normal operating temperature.

Recycling:

Catch and dispose of emerging differential oil.

Observe country-specific waste-disposal regulations

Oil drain plug present:

Place oil collecting apparatus underneath.

Remove oil drain plug (1).

Drain and dispose of differential oil.

Undo oil filler plug (2).

Add differential oil up to lower edge of opening for oil filler plug (2); if necessary.

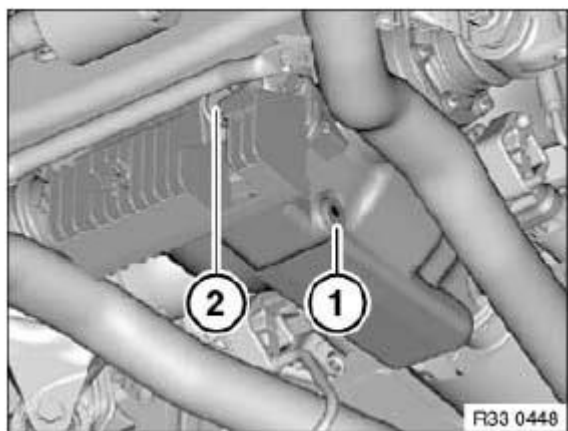


Fig. 11: Identifying Oil Drain Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- A. Oil drain or oil filler plug with sealing ring:

Replace sealing ring (1).

Tightening torque **33 11 3AZ** .

B. Oil drain or oil filler plug with O-ring:

Replace oil drain or oil filler plug (2).

Tightening torque **33 11 9AZ** .

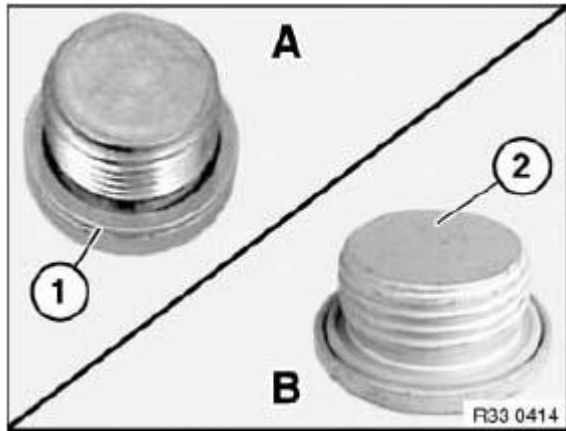


Fig. 12: Identifying Oil Filler Plug With Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

No oil drain plug:

Undo oil filler plug (1).

Drain and dispose of differential oil.

Add differential oil up to lower edge of opening for oil filler plug (1); if necessary.

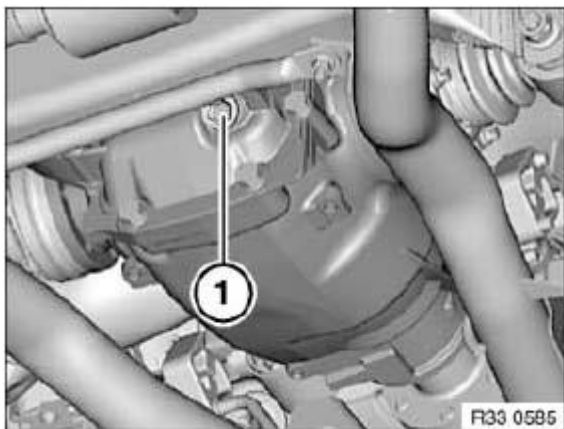


Fig. 13: Identifying Oil Filler Plug

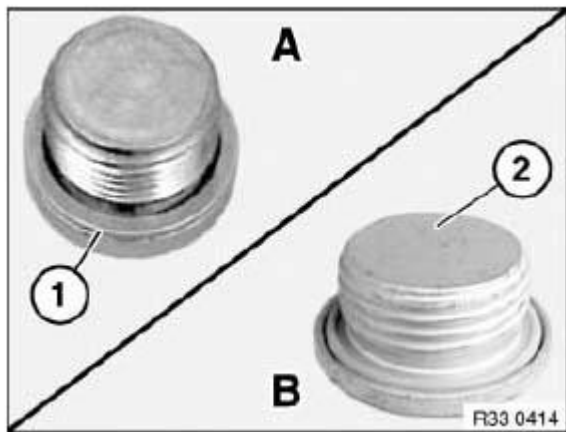
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:***A. Oil filler plug with sealing ring:**

Replace sealing ring (1).

Tightening torque **33 11 3AZ** .**B. Oil filler plug with O-ring:**

Replace oil filler plug (2).

Tightening torque **33 11 9AZ** .**Fig. 14: Identifying Oil Filler Plug With Sealing Ring**

Courtesy of BMW OF NORTH AMERICA, INC.

33 10... REAR DIFFERENTIAL: ASSIGNMENT TO MODEL SERIES**REAR DIFFERENTIAL - ASSIGNMENT TO MODEL SERIES**

Model series	Engine	Rear differential
E60	M54	188K
	M47T2, N52, N53	188L / 188LW
	N54	215LW
	M57TU, M57T2, N62, N62TU	215K
	S85	215 with lock
E61	M54	188K
	M47T2, N52, N53	188L / 188LW
	N54	215LW

	M57TU, M57T2, N62, N62TU	215K
	S85	215 with lock
K Compact		
L Light-running		
LW Light-running, efficiency-optimized		

33 10 010 REMOVING AND INSTALLING/REPLACING REAR DIFFERENTIAL

Special tools required:

- 33 4 420

IMPORTANT: Use only approved rear differential oils!

M5, M6: After the running-in phase of 2000 km, it is essential to carry out a rear differential oil change.

Necessary preliminary tasks:

- Remove propeller shaft from rear differential
- Remove **output shaft (left)** or **output shaft (right)** from rear differential at both ends and tie back

WARNING: Danger of injury!

Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Support rear differential with workshop jack and special tool 33 4 420.

IMPORTANT: Observe gap between special tool 33 4 420 and dust plates.

To avoid grinding noises, make sure the dust plates are not damaged (e.g. bent).

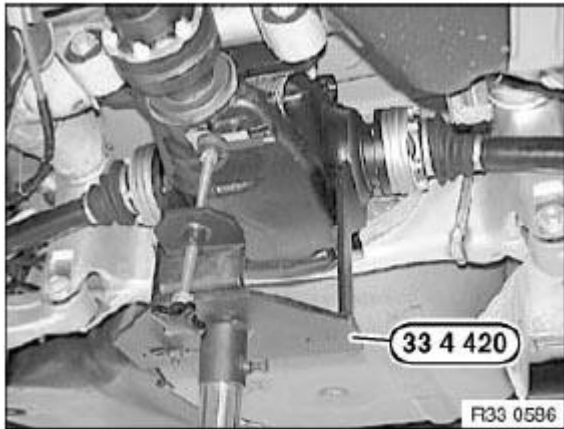


Fig. 15: Identifying Special Tool 33 4 420
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

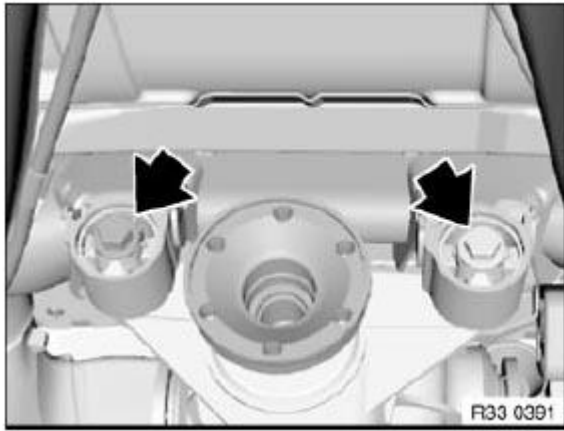


Fig. 16: Locating Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, unclip scavenging air line and screw off bracket.

Release nut and pull out screw towards rear.

Slowly lower workshop jack and remove rear differential towards rear.

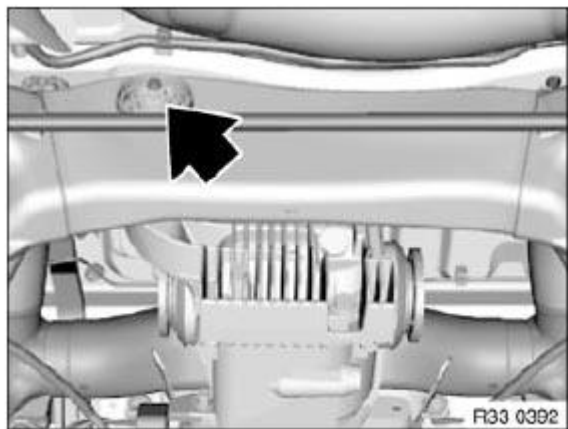


Fig. 17: Locating Differential Towards Rear
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Adhere to the following installation sequence in order to prevent distortion of the rear differential during installation and thereby avoid potential complaints about noise.

Installation sequence:

1. Install rear differential with workshop jack and special tool 33 4 420.
2. Insert bolts (1) (do not tighten down)
3. Insert bolt (2), replace and screw on nut (do not tighten down).
4. Lower workshop jack and place to one side
5. Tighten down screws (1)

Tightening torque **33 17 1AZ.** .

6. Tighten down screw (2)

Tightening torque **33 17 1AZ.** .

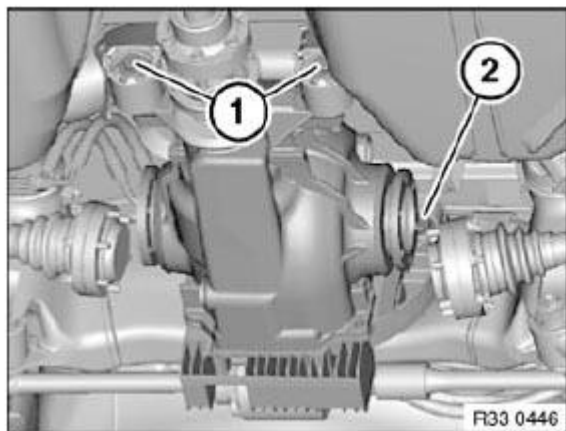


Fig. 18: Identifying Rear Differential

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check rear differential oil level, correct if necessary

11 FINAL DRIVE WITH COVER

33 11... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (188K)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid gaskets!
To prevent the differential oil from foaming over, make sure that no remnants of the liquid gasket are pressed into the rear differential housing.

Release screws (1).

Tightening torque (M10x75) **33 11 1AZ**

Unscrew screws (2).

Tightening torque (M10x25) **33 11 1AZ**

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

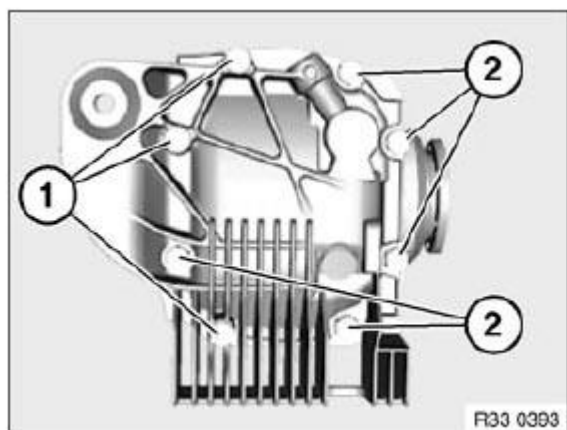


Fig. 19: Identifying Rear Differential Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If a paper gasket was fitted, a paper or liquid gasket can be used.

The liquid gasket can be found in Main Group 33 in the Electronic Parts Catalogue.

33 11... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (188L/188LW, 215L/215LW)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid gaskets!
To prevent the differential oil from foaming over, make sure that no remnants of the liquid gasket are pressed into the rear differential housing.

Release screws (1).

Tightening torque (M10x60) **33 11 1AZ**

Unscrew screws (2).

Tightening torque (M10x25) **33 11 1AZ**

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

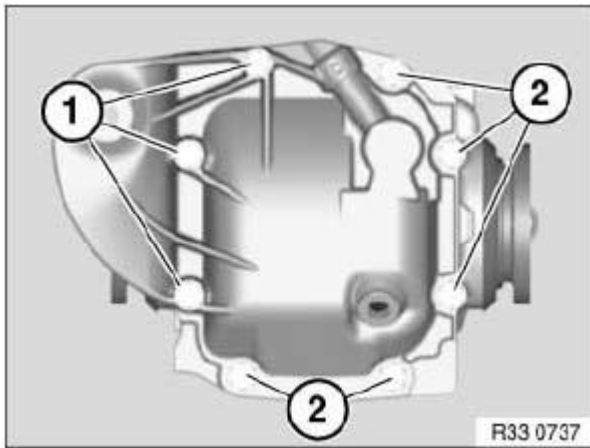


Fig. 20: Identifying Rear Differential Cover Screws (188L/188LW)
 Courtesy of BMW OF NORTH AMERICA, INC.

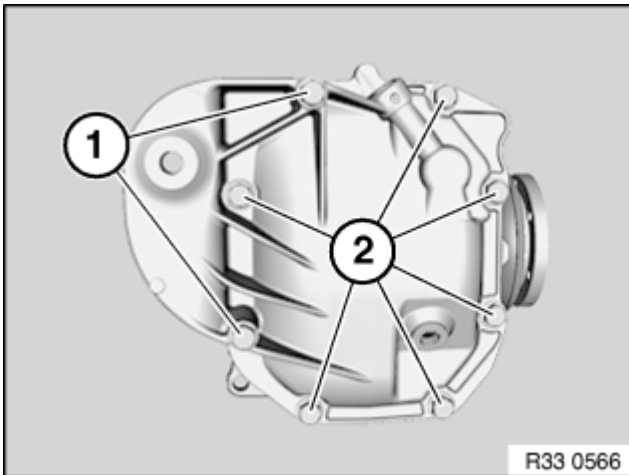


Fig. 21: Identifying Rear Differential Cover Screws (215L/215LW)
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If a paper gasket was fitted, a paper or liquid gasket can be used.

33 11... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (215K)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid gaskets!
 To prevent the differential oil from foaming over, make sure that no remnants of the liquid gasket are pressed into the rear differential housing.

Release screw (1).

Tightening torque (M10x75) **33 11 1AZ**

Unscrew screws (2).

Tightening torque (M10x25) **33 11 1AZ**

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

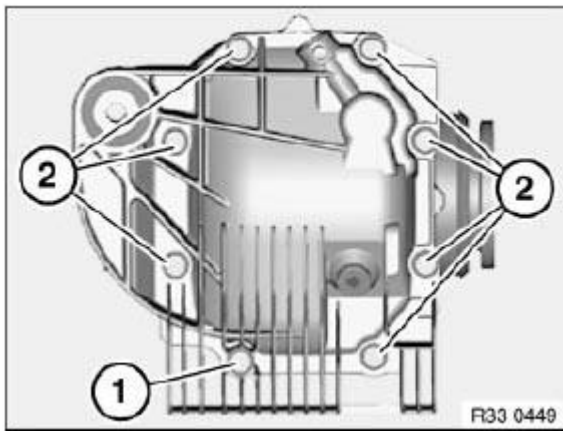


Fig. 22: Identifying Rear Differential Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If a paper gasket was fitted, a paper or liquid gasket can be used.

33 11 021 REPLACING SHAFT SEAL FOR INPUT FLANGE ON FINAL DRIVE

Special tools required:

- 00 5 010
- 00 5 500
- 23 0 020
- 23 1 300
- 23 1 302
- 23 1 303
- 31 2 101
- 31 2 102
- 31 2 103

- 31 2 104
- 33 1 150
- 33 1 341
- 33 3 440
- 33 3 470
- 33 3 480
- 33 3 490

IMPORTANT: Use only approved gear oils.

Failure to comply with this instruction will result in serious damage to the rear differential!

Necessary preliminary tasks:

- Remove propeller shaft from rear differential drive flange, remove complete propeller shaft if necessary

Removing drive flange:

Lift out retaining plate.

Mark position of collar nut (1) on drive shaft with peening tool.

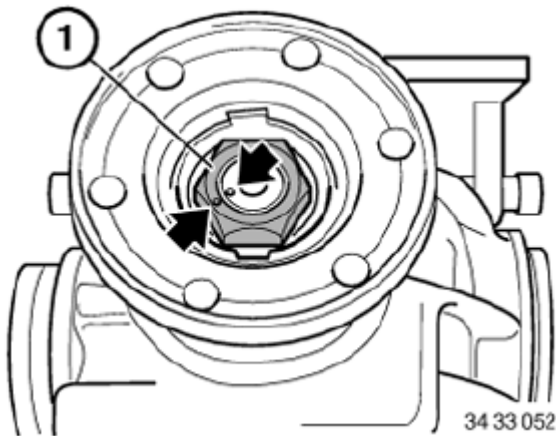


Fig. 23: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Brace drive flange with special tool 23 0 020 and release collar nut.

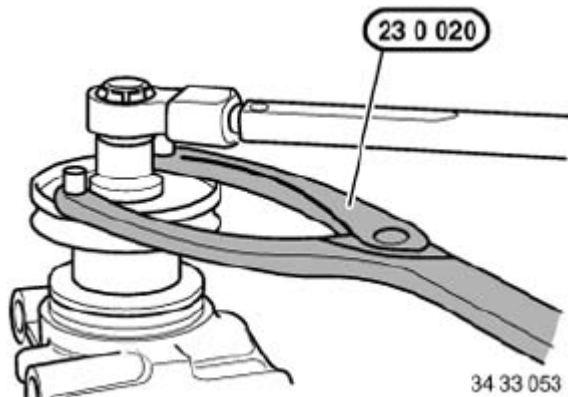


Fig. 24: Identifying Special Tool (23 0 020) On Collar Nut
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Read and comply with document "Rear differential: Assignment to model series".

215K / with lock:

Remove drive flange with special tools 31 2 101, 31 2 102, 31 2 103 / 31 2 104.

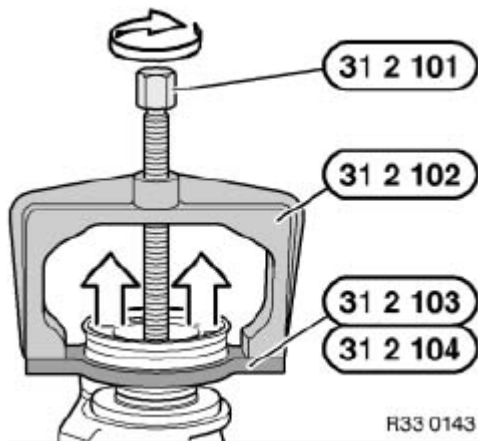


Fig. 25: Identifying Special Tools (31 2 101, 31 2 102, 31 2 103 / 31 2 104)
 Courtesy of BMW OF NORTH AMERICA, INC.

188K/L:

Remove drive flange with special tool 33 1 150.

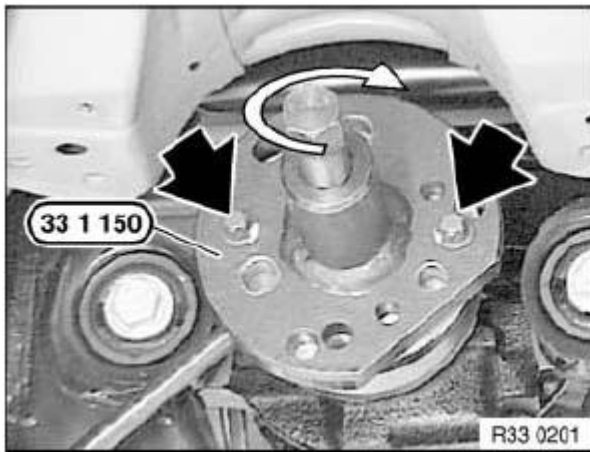


Fig. 26: Identifying Special Tool (33 1 150) On Drive Flange
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacing shaft seal:

Withdraw shaft seal with special tool 00 5 010.

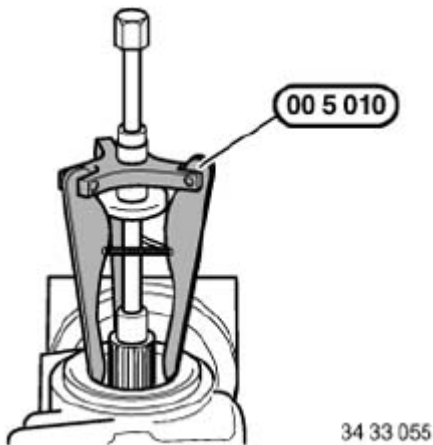


Fig. 27: Identifying Special Tool (00 5 010) On Shaft Seal
 Courtesy of BMW OF NORTH AMERICA, INC.

Drive in new shaft seal with following special tools (depending on rear differential) as far as it will go.

- 188K/L: Use special tools 00 5 500 and 33 3 470
- 215K / with lock: Use special tools 00 5 500 and 33 3 440

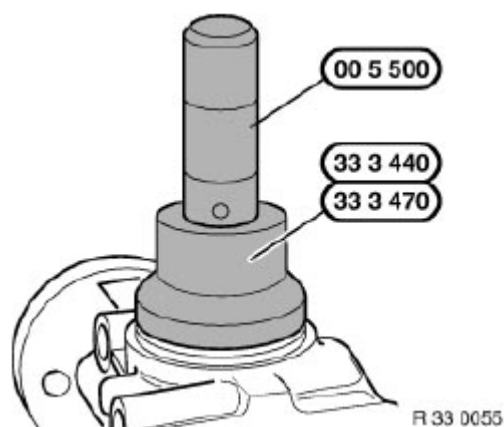


Fig. 28: Identifying Special Tools (00 5 500 And 33 3 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing drive flange:

Coat sealing lips of shaft seal and sealing surface of drive flange with differential oil.

Fit drive flange.

Press on drive flange with special tools 23 1 300, 33 1 341 and 23 1 303, if necessary 23 1 302 until collar nut can be screwed on.

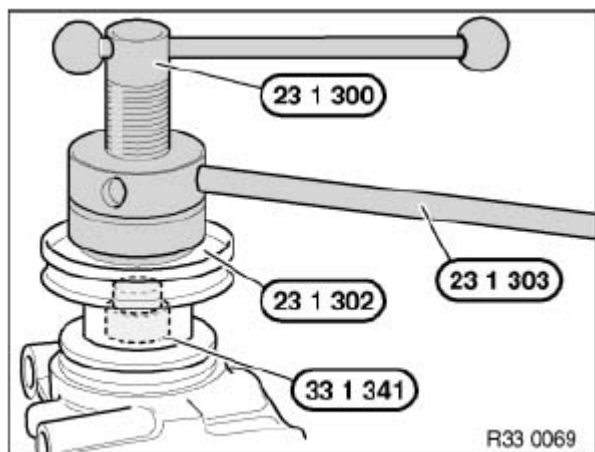


Fig. 29: Identifying Special Tools (23 1 300, 33 1 341 And 23 1 303) On Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not under any circumstances tighten down collar nut beyond marker points in order to avoid damaging the clamping sleeve.

Tighten down collar nut (1) to point where marker points are aligned.

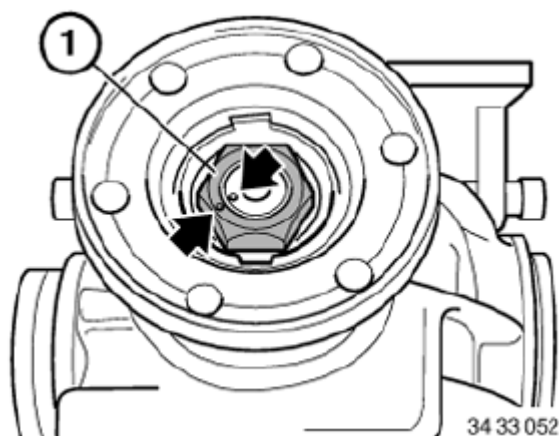


Fig. 30: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Drive in new retaining plate with following special tools (depending on rear differential) as far as it will go.

- 188K/L: Use special tools 00 5 500 and 33 3 480
- 215K / with lock: Use special tools 00 5 500 and 33 3 490

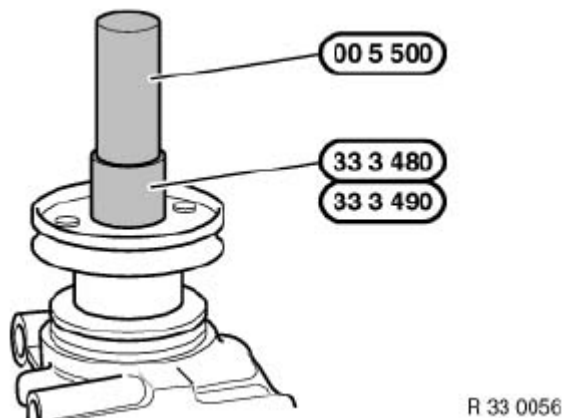


Fig. 31: Identifying Special Tools (00 5 500 And 33 3 490)

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Only for rear differentials 188K to 215K / with lock: Change rear differential oil
- Only for rear differential 188L: Correct rear differential fluid level

33 11 091 REPLACING DRIVE FLANGE ON LEFT OR RIGHT OF REAR DIFFERENTIAL

WARNING: Risk of burning on the exhaust system!

IMPORTANT: When replacing the drive flange, you must also replace the shaft seal!

Necessary preliminary tasks:

- Remove **output shaft (left)** or **output shaft (right)** from rear differential and tie back

Drive out drive flange.

Installation:

Insert drive flange and rotate until spline on flange meshes with teeth on differential bevel gear.

Press drive flange in further until circlip locates with an audible click.

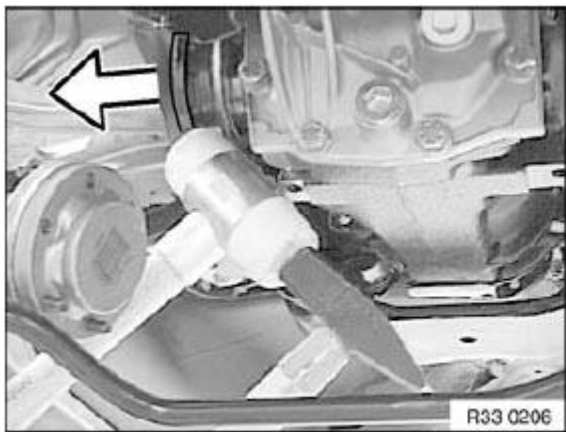


Fig. 32: Removing Drive Flange

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: High installation forces indicate that the spline teeth on the drive flange/differential bevel gear are damaged/deformed!
Check spline teeth, replaced damaged parts.**

Install retaining ring (1).

Installation:

Clean shaft seal race on drive flange thoroughly.

Coat drive flange at contact face of shaft seal with approved rear differential oil.

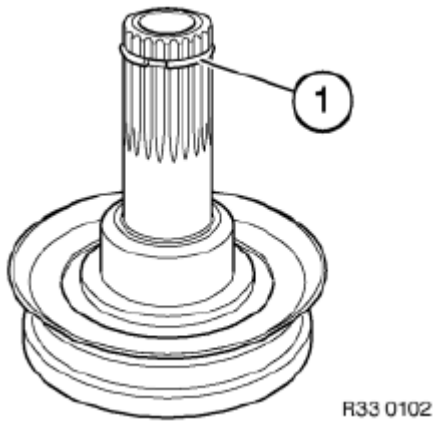


Fig. 33: Identifying Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Replace shaft seal.

After installation:

- Correct gearbox oil level/change differential oil

33 11 151 REPLACING SHAFT SEAL FOR DRIVE FLANGE LEFT OR RIGHT

Special tools required:

- 00 5 010
- 00 5 500
- 32 1 060
- 33 1 308
- 33 3 400
- 33 4 240
- 33 4 250
- 33 5 030

Necessary preliminary tasks:

- Remove drive flange from rear differential
- If necessary, press off dust cover

Withdraw shaft seal with special tools 00 5 010 and 32 1 060 / 33 1 308.

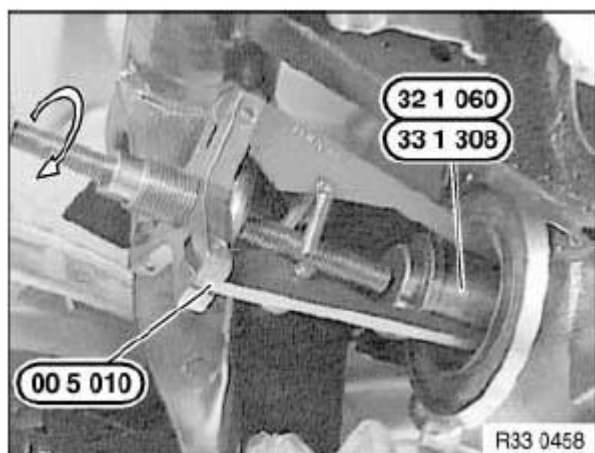


Fig. 34: Identifying Special Tools (00 5 010 And 32 1 060 / 33 1 308) On Shaft Seal
 Courtesy of BMW OF NORTH AMERICA, INC.

Coat housing plate flange and sealing lips of new shaft seal with approved rear differential oil.

Drive in new shaft seal as far as it will go with following special tool(s) (depending on rear differential /outside diameter).

00 5 500 + 33 3 400: 168K/L - 78x44x10

00 5 500 + 33 4 240: 188K/L/LW - 90x44x10

00 5 500 + 33 4 250: 215K/L/LW, 220K to 230K - 100x50x10

33 5 030: 210, 215 with lock - 76x50x10

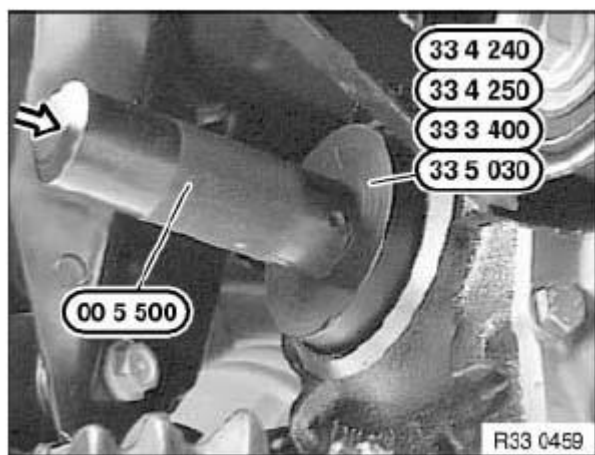


Fig. 35: Identifying Special Tools (33 4 240, 33 4 250, 33 3 400 And 33 5 030)
 Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

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- Correct gearbox oil level/change differential oil

33 11 271 REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL

IMPORTANT: In event of oil loss, always check rear differential for traces of wear and damage.

Necessary preliminary tasks:

- Draw off or drain and catch rear differential oil
- Remove rear differential

Select rear differential:

- **188K**
- **188L / 188LW**
- **215K**
- **215L / 215LW**
- 215 with lock

After installation:

- Add rear differential oil

17 FINAL DRIVE MOUNTING

33 17 004 REPLACING ALL FRONT RUBBER MOUNTS FOR REAR DIFFERENTIAL MOUNTING

Special tools required:

- 33 3 312
- 33 4 161
- 33 4 162
- 33 4 166
- 33 4 311
- 33 4 312
- 33 4 465
- 33 4 466

Necessary preliminary tasks:

- Remove **rear differential**

Withdraw front rubber mount with special tools 33 3 312, 33 4 161, 33 4 162, 33 4 466 and 33 4 465.

NOTE: Milled recess of special tool 33 4 161 must point upwards to rear axle carrier.

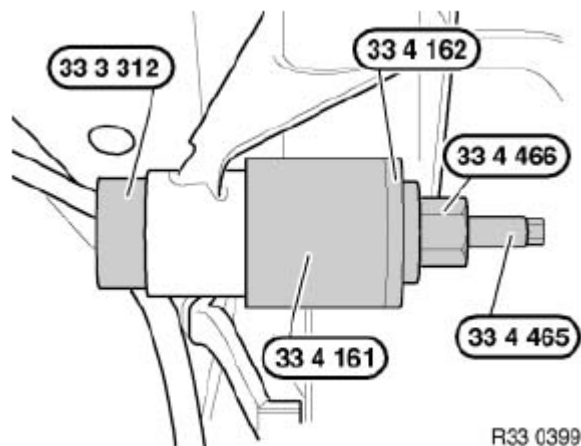


Fig. 36: Identifying Special Tools (33 3 312, 33 4 161, 33 4 162, 33 4 466 And 33 4 465)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Coat bearing bushing in rear axle carrier and new rubber mount with Circolight (refer to BMW Parts Service).

Align rubber mount by way of slots (1) to vehicle transversal direction.

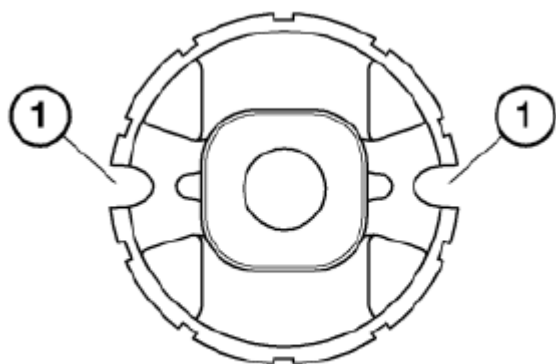


Fig. 37: Aligning Rubber Mount

Courtesy of BMW OF NORTH AMERICA, INC.

Insert rubber mount in special tool 33 4 311.

NOTE: Align rubber mount so that side slots (1) line up with marking (M) on special tool.

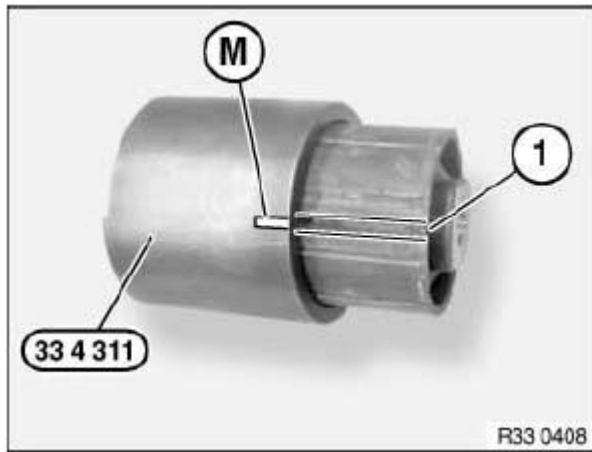


Fig. 38: Identifying Special Tool (33 4 311) On Rubber Mount
 Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount with special tools 33 4 465, 33 4 466, 33 4 166, 33 4 311 and 33 4 312 as far as it will go.

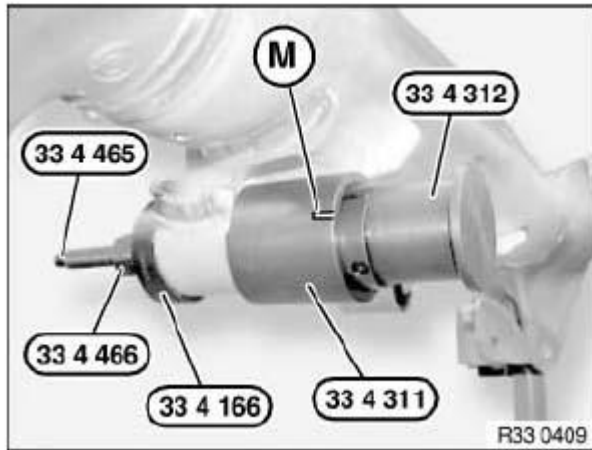


Fig. 39: Identifying Special Tools (33 4 465, 33 4 466, 33 4 166, 33 4 311 And 33 4 312)
 Courtesy of BMW OF NORTH AMERICA, INC.

33 17 005 REPLACING RUBBER MOUNT FOR REAR DIFFERENTIAL MOUNTING AT REAR

Special tools required:

- 33 4 281
- 33 4 282
- 33 4 283
- 33 4 284
- 33 4 465
- 33 4 466

Necessary preliminary tasks:

- Remove **rear differential**

Withdraw rubber mount with special tools 33 4 282, 33 4 281, 33 4 466, 33 4 465 and nut (1).

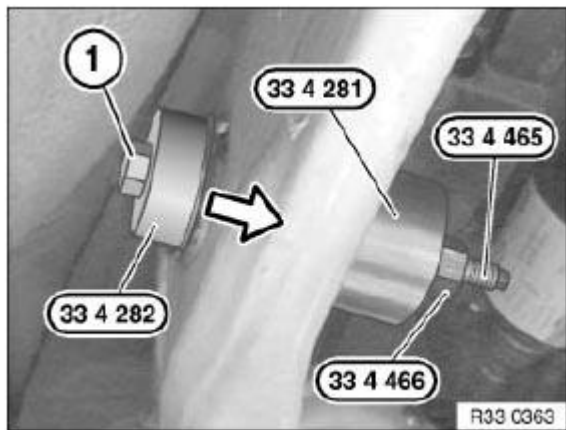


Fig. 40: Identifying Special Tools (33 4 282, 33 4 281, 33 4 466, 33 4 465)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Coat bearing bushing in rear axle carrier and new rubber mount with Circolight (refer to BMW Parts Service).

Align rubber mount by way of elongated hole (1) to vehicle transversal direction.

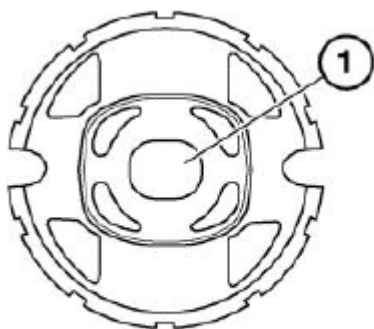


Fig. 41: Identifying Rubber Mount Elongated Hole

Courtesy of BMW OF NORTH AMERICA, INC.

Push new rubber mount (1) into special tool 33 4 283.

Align rubber mount (1) by way of elongated hole to vehicle transversal direction.

Draw in rubber mount with special tools 33 4 282, 33 4 283, 33 4 284, 33 4 466, 33 4 465 and nut (2) as far as it

will go.

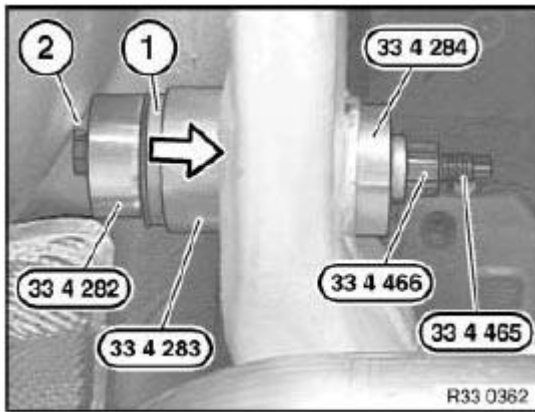


Fig. 42: Identifying Special Tools (33 4 282, 33 4 283, 33 4 284, 33 4 466 And 33 4 465)
Courtesy of BMW OF NORTH AMERICA, INC.

21 OUTPUT SHAFTS

33 21... PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE AND DRAWING IN (OUTPUT SHAFT REMOVED FROM REAR DIFFERENTIAL)

Special tools required:

- 33 2 111
- 33 2 115
- 33 2 116
- 33 2 117
- 33 2 118
- 33 2 119
- 33 2 160
- 33 2 201
- 33 2 202
- 33 2 203
- 33 2 205
- 33 2 206
- 33 2 207
- 33 5 070

WARNING: Risk of injury!

It is not permitted to use the impact screwdriver to press out and draw in the output shaft.

IMPORTANT: Risk of damage!

To avoid damaging the output shaft and adjoining parts, it is essential during the pressing-out process to repeatedly check and if necessary correct the position of the output shaft.

IMPORTANT: To avoid damaging the dust sleeve, use special tool 33 2 160 to press out and draw in the output shaft after removing the brake disk.

NOTE: Rounded inside edge of special tool 33 2 160 must point to drive flange.

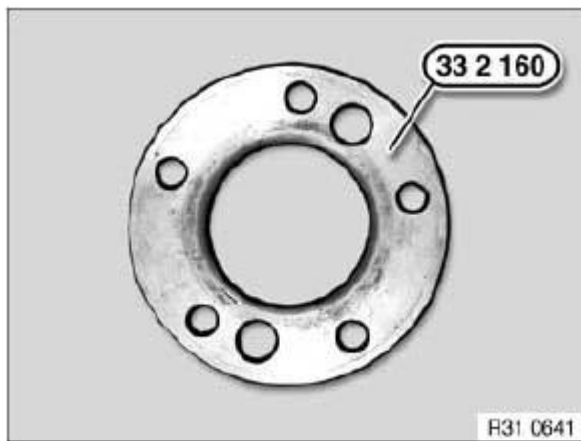


Fig. 43: Identifying Special Tool (33 2 160)

Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 200:

Secure output shaft against falling out.

Screw on special tool 33 2 203, 33 2 207 and 33 2 201 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070.

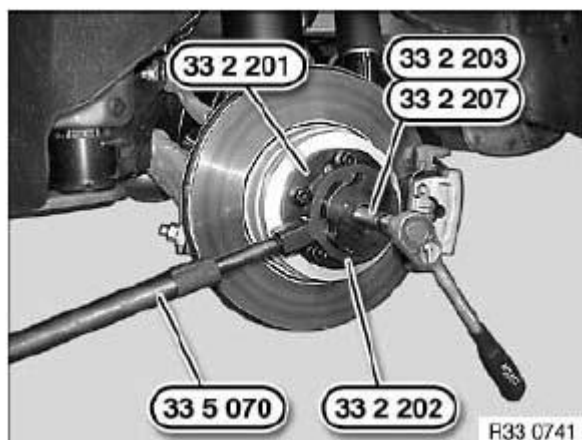


Fig. 44: Identifying Special Tool (33 2 203, 33 2 207 And 33 2 201) With All Wheel Studs To Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 205 / 33 2 206 onto output shaft.

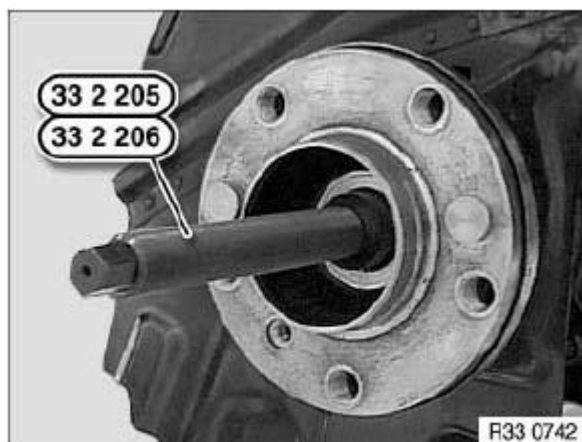


Fig. 45: Identifying Special Tool (33 2 205 And 33 2 206) Onto Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 201 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 205 up to stop; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070.

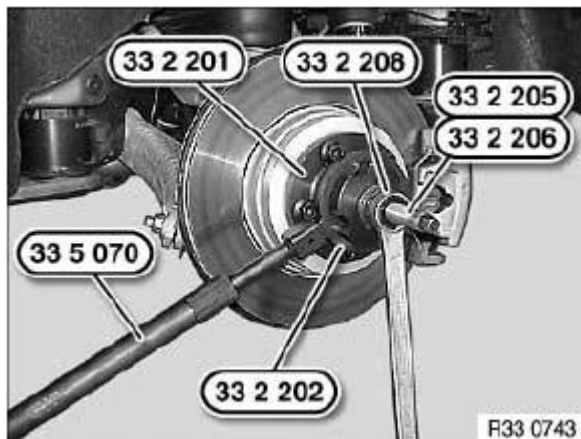


Fig. 46: Identifying Special Tool (33 2 201) With Wheel Studs To Drive Flange
 Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 100:

Secure output shaft against falling out.

Screw on special tool 33 2 111, 33 2 117 and 33 2 116 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070.

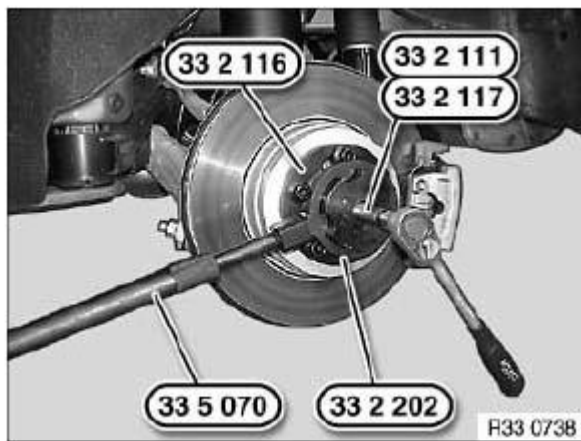


Fig. 47: Identifying Special Tool (33 2 111, 33 2 117 And 33 2 116) With Wheel Studs To Drive Flange
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 118 / 33 2 119 onto output shaft.

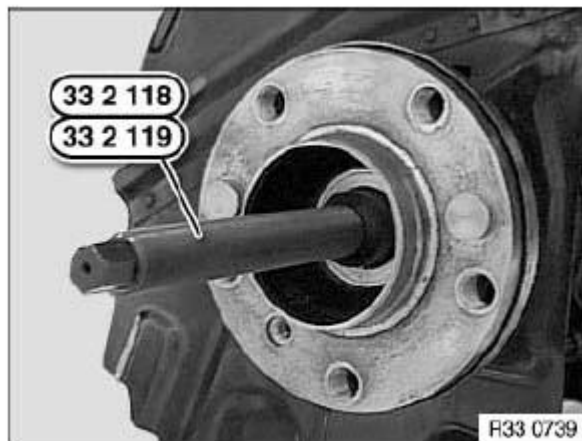


Fig. 48: Identifying Special Tool (33 2 118 And 33 2 119) Onto Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 116 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 115 up to stop; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070.

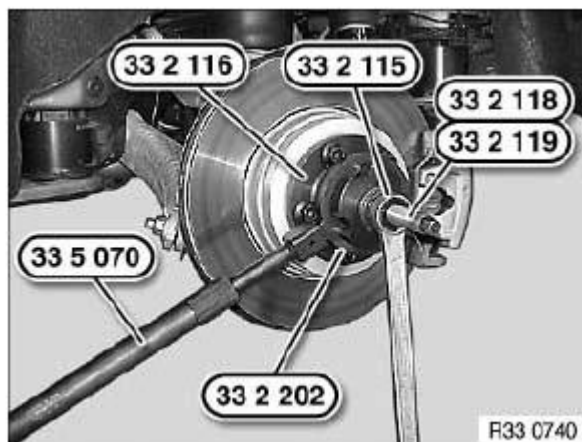


Fig. 49: Identifying Special Tool (33 2 116) With Wheel Studs To Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

33 21... RIBBED TEETH

IMPORTANT: Bolts with ribbed teeth must be replaced after they have been released!

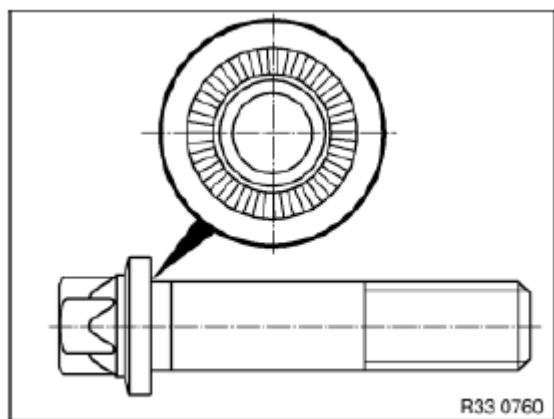


Fig. 50: Identifying Bolts With Ribbed Teeth
 Courtesy of BMW OF NORTH AMERICA, INC.

33 21 001 REMOVING AND INSTALLING/REPLACING LEFT OUTPUT SHAFT

WARNING: Scalding hazard!
 Only perform the following tasks after the vehicle has cooled down.

Necessary preliminary tasks:

- Remove entire exhaust system. See **EXHAUST SYSTEM - REPAIR**

The subsequent procedure is described in **33 21 002 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT**.

33 21 002 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT

WARNING: Scalding hazard!
 Only perform the following tasks after the vehicle has cooled down.

Apply handbrake.

Remove rear wheel.

E61: Deactivate and drain air spring/suspension system

Unscrew collar nut.

Installation:

Replace collar nut, apply a light coating of oil to contact surface and tighten down.

Tightening torque **33 41 3AZ**.

Secure collar nut by peening on flat areas of output shaft.

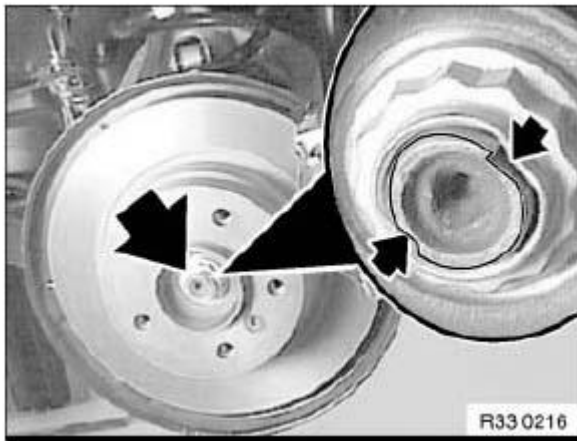


Fig. 51: Locating Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts and remove with washers (1).

Force output shaft off drive flange with a suitable tool.

Installation:

Before installing output shaft, make sure that drive flange is fully engaged in rear differential.

Replace bolts and washers (1).

Tightening torque **33 21 1AZ.** .

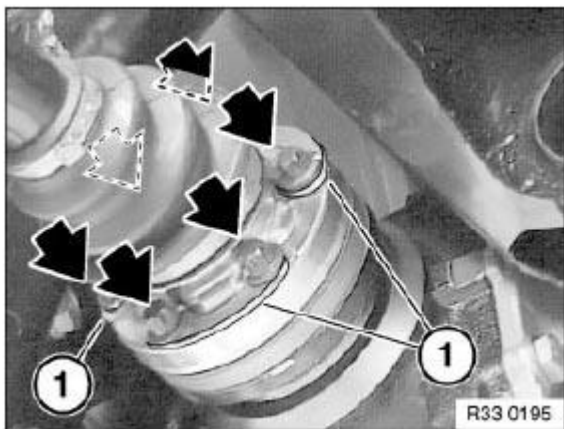


Fig. 52: Locating Output Shaft Bolts And Washers
Courtesy of BMW OF NORTH AMERICA, INC.

Remove stabilizer link from swinging arm.

E60: Remove spring strut shock absorber from wheel carrier.

E61: Remove rear shock absorber from swinging arm.

Raise wheel carrier for feeding output shaft out and in with workshop jack approx. 20 mm.



Fig. 53: Raising Wheel Carrier

Courtesy of BMW OF NORTH AMERICA, INC.

Press output shaft (1) out of drive flange and remove towards center of car.

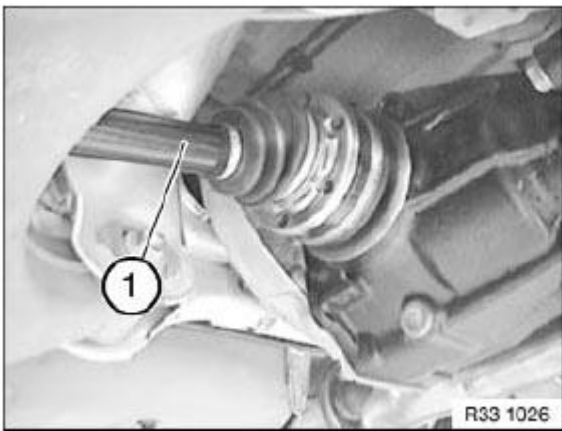


Fig. 54: Identifying Towards Centre Of Car

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- E61: Activate and fill air suspension system

33 21 035 REPLACING GAITER ON LEFT OUTPUT SHAFT**Special tools required:**

- 21 2 120
- 26 1 110
- 33 2 100

Necessary preliminary tasks:

- Remove **output shaft (left)** or **output shaft (right)**

Clean output shaft.

Press off sealing cap (1).

Installation:

Press on sealing cap with a thrust ring

Coat sealing faces of sealing cap with sealing compound (refer to BMW Parts Service).

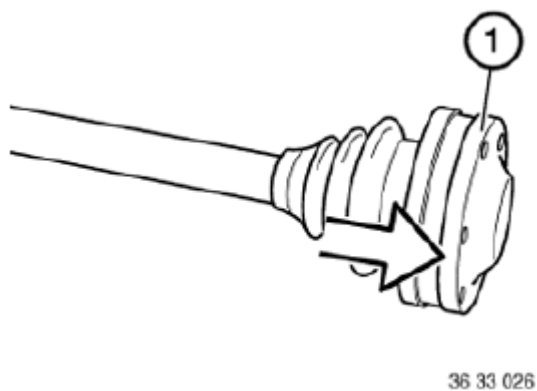


Fig. 55: Removing Sealing Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (2).

Press cap (3) off together with gaiter.

Remove circlip (4).

Installation:

Turn new gaiter with cap (3) so that fastener of large hose clamp is between two bores of constant-velocity

joint.

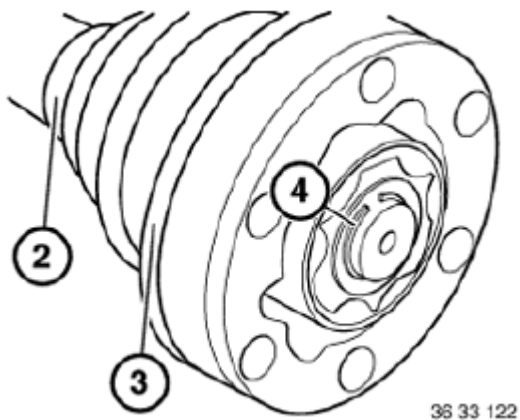


Fig. 56: Identifying Hose Clip, Cap And Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 26 1 110 must be used in accordance with diameter of output shaft. Bearing inner race must rest on rib of special tool.

Hollow shaft only: Also use special tool 21 2 120.

Press splined shaft out of constant-velocity joint.

Clean constant-velocity joint carefully and remove all traces of old grease.

Check constant-velocity joint for damage, replace if necessary.

Detach gaiter from splined shaft.

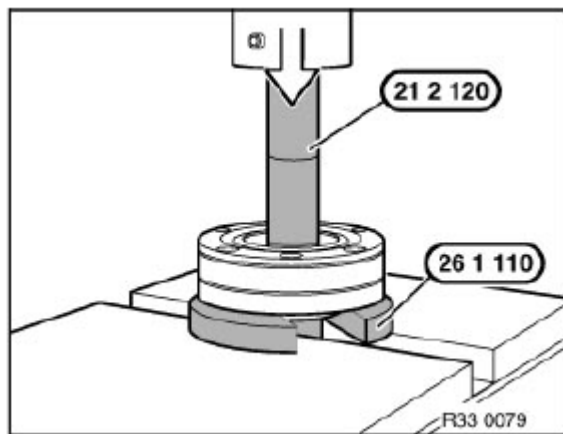


Fig. 57: Pressing Splined Shaft Using Special Tool (21 2 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull gaiter onto cap (3).

Coat sealing surface of cap (3) with sealing compound (refer to BMW Parts Service) and press with a thrust ring onto constant-velocity joint.

Fill constant-velocity joint with high-temperature grease (refer to BMW Parts Service).

Install new circlip.

Press constant-velocity joint and cap (3) over inner bearing race on splined shaft.

Mount special tool 33 2 100 with corresponding insert.

Push new gaiter onto splined shaft.

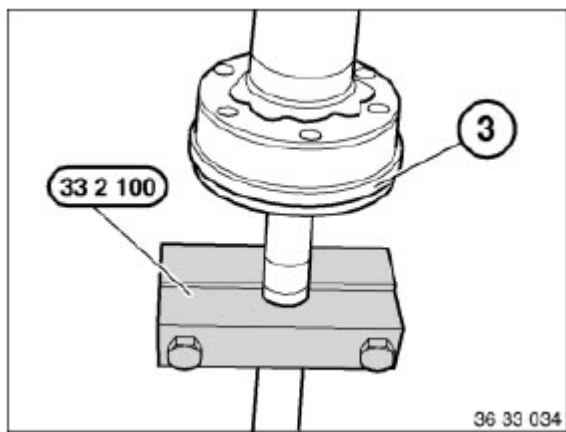


Fig. 58: Identifying Special Tool (33 2 100)
Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamps (5, 6).

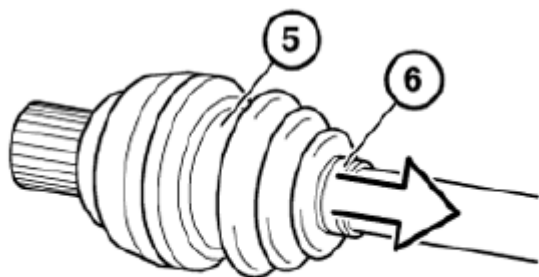
Detach gaiter from splined shaft.

Clean joint carefully and remove all traces of old grease.

Installation:

Pull new gaiter on.

Thoroughly clean joint while assembled and remove old grease completely.



36 33 123

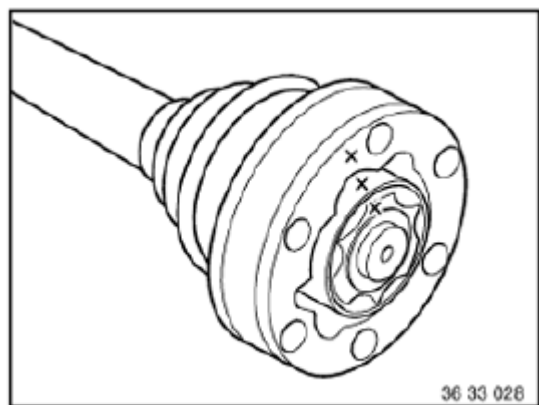
Fig. 59: Removing Hose Clamps

Courtesy of BMW OF NORTH AMERICA, INC.

Disassembling/assembling constant-velocity joint:

NOTE: Mark positions of ball hub, ball cage and joint with respect to each other with electric inscriber.

Ensure all parts are clean prior to assembly.



36 33 026

Fig. 60: Identifying Constant-Velocity Joint

Courtesy of BMW OF NORTH AMERICA, INC.

33 21 036 REPLACING GAITER ON RIGHT OUTPUT SHAFT

Procedure is described in the document "Replacing gaiter on left output shaft".

31 REAR SUB-FRAME**33 31 000 REMOVING AND INSTALLING COMPLETE REAR AXLE CARRIER****Special tools required:**

CARMANUALSUSA

Saturday, September 05, 2015 9:17:30 AM

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- 00 2 030
- 00 2 040
- 33 4 232
- 33 4 233

**IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Seal off pipe connections with plugs.**

Necessary preliminary tasks:

- Remove brake disc on both sides. See **BRAKES - REPAIR** .
- Disconnect handbrake cable on both sides of wheel brake and remove from hanging hook. See **34 41 120 REMOVING AND INSTALLING / REPLACING BOTH HANDBRAKE BOWDEN CABLES** .
- Remove propeller shaft from rear differential and tie back or remove completely if necessary. See **26 11 000 REMOVING AND INSTALLING COMPLETE PROPELLER SHAFT (CONSTANT-VELOCITY JOINT)** .
- E64 M6: Remove rear left and right tension struts
- E64 except M6: Remove cross strut
- Detach plug connection for pulse generator on both sides and expose line up to control arm
- Detach plug connection for brake pad wear sensor on right and expose line up to control arm
- If necessary, disconnect plug connection from ride-height sensor
- Remove **spring strut shock absorber** on both sides from wheel carrier

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Insert special tools 33 4 233 and 33 4 232 into corresponding mountings of special tool 00 2 040.

Align special tool 00 2 040 to rear axle carrier.

Support rear axle carrier by raising special tool 00 2 030.

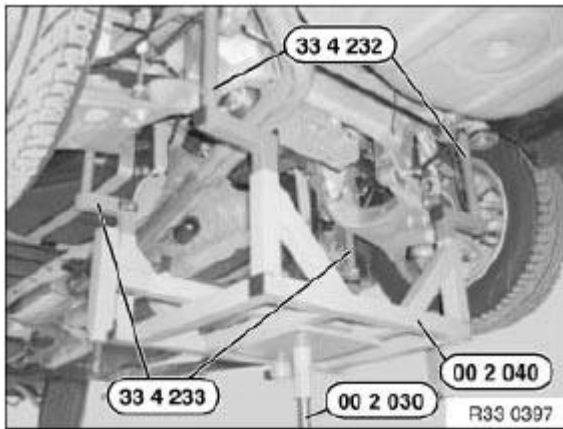


Fig. 61: Identifying Special Tools (33 4 233 And 33 4 232) Into Corresponding Mountings
 Courtesy of BMW OF NORTH AMERICA, INC.

Version with Dynamic Drive:

Disconnect pressure lines at point of separation II and seal with plugs.

Remove **tension struts**.

Release screws (1) and remove stop plate (2).

Lower rear axle carrier (3).

Installation:

Check threads for damage; if necessary, repair with Heli-coil thread inserts.

First install **tension struts** and then tighten down bolts (1).

Tightening torque **33 33 3AZ**.

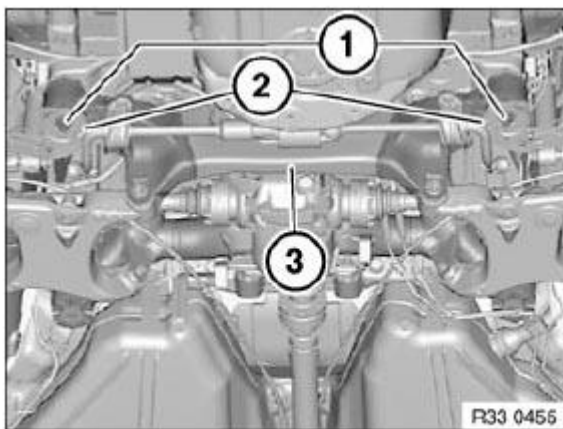


Fig. 62: Identifying Rear Axle Carrier And Stop Plate
 Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Version with Dynamic Drive:
 - Fill and bleed hydraulic system. See **32 13 006 BLEEDING POWER STEERING UNIT** .
 - Check pipe connections for leaks
 - If necessary, carry out initial Dynamic Drive operation
- Adjust **HANDBRAKE**

33 31 011 REPLACING REAR AXLE CARRIER

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Close off pipe connections with plugs.

Necessary preliminary tasks:

- Remove **rear differential**
- Remove **complete rear axle carrier** and if necessary with other workers assisting set down on a suitable surface
- Version with Dynamic Drive: Disconnect pressure lines for oscillating motor of rear axle from rear axle carrier
- Remove **both stabilizer links from stabilizer**
- Remove **stabilizer from rear axle carrier**
- Remove ride-height sensor with holder from rear axle carrier. See **37 14 512 REPLACING REAR RIDE-HEIGHT SENSOR** .

Remove **swinging arm on both sides from rear axle carrier**.

Remove **control arm on both sides from rear axle carrier**.

Remove **guide arm** on both sides from rear axle carrier.

Remove wheel carrier on both sides with output shaft, swinging arm and suspension arms.

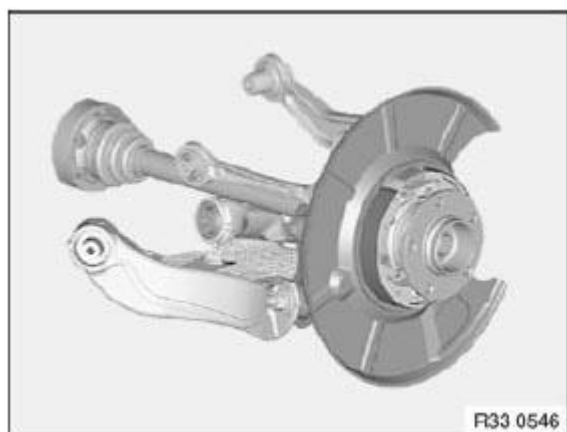


Fig. 63: Identifying Swinging Arm

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Version with Dynamic Drive:
 - Fill and bleed hydraulic system. See **32 13 006 BLEEDING POWER STEERING UNIT**
 - Check pipe connections for leaks
- Adjust **HANDBRAKE**
- Perform chassis alignment check
- If necessary, carry out initial Dynamic Drive operation

33 31 503 LOWERING/RAISING REAR AXLE CARRIER

Special tools required:

- 00 2 030
- 00 2 040
- 33 4 232
- 33 4 233

Necessary preliminary tasks:

- Remove rear wheels
- Remove **EXHAUST SYSTEM - REPAIR** .
- Partially detach heat insulation at rear
- Remove handbrake cable on both sides from hanging hook
- Detach plug connection for pulse generator on both sides and expose line up to control arm
- Detach plug connection for brake pad wear sensor on right and expose line up to control arm
- If necessary, disconnect plug connection from ride-height sensor

- Remove **spring strut shock absorber** on both sides from wheel carrier.

WARNING: Danger of injury!

Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Insert special tools 33 4 233 and 33 4 232 into corresponding mountings of special tool 00 2 040.

Align special tool 00 2 040 to rear axle carrier.

Support rear axle carrier by raising special tool 00 2 030.

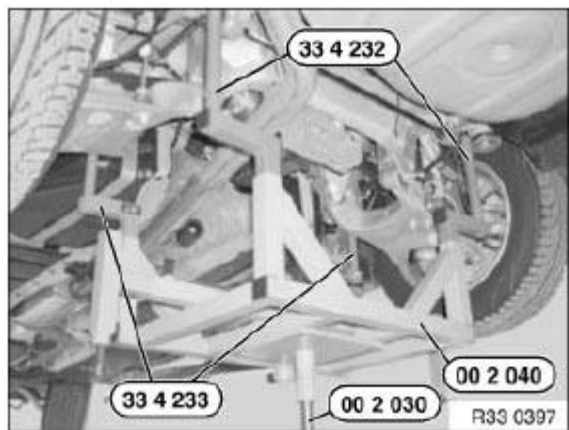


Fig. 64: Identifying Special Tools (33 4 233 And 33 4 232) Into Corresponding Mountings
Courtesy of BMW OF NORTH AMERICA, INC.

Version with Dynamic Drive:

Partially detach pressure lines for rear axle oscillating motor on floorpan and remove right bracket from rear axle carrier.

Remove **tension struts**.

Release screws (1) and remove stop plate (2).

Lower rear axle carrier (3).

Installation:

Check threads for damage; if necessary, repair with Heli-coil thread inserts.

First install **tension struts** and then tighten down bolts (1).

Tightening torque **33 33 3AZ**.

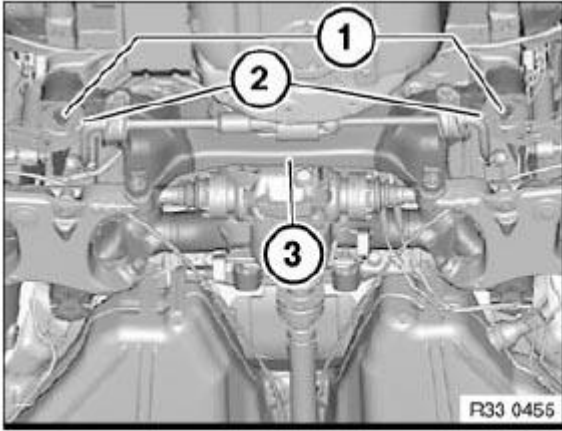


Fig. 65: Identifying Rear Axle Carrier And Stop Plate
Courtesy of BMW OF NORTH AMERICA, INC.

32 CONTROL ARMS AND STRUT

33 32 051 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT PUSH ROD/INTEGRAL LINK

NOTE: If the integral link is detached from the wheel carrier or swinging arm, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove rear wheel.
- E61: Deactivate and empty air spring system
- Remove **output shaft (left)** or **output shaft (right)** from rear differential

Support wheel carrier with workshop jack.

Release nut (1) and remove screw.

Release screw (2), press swinging arm downward and remove integral link (3).

Installation:

Replace self-locking nut.

First install swinging arm hand-tight, then tighten down screw (2).

Tighten screw/bolt connections in **NORMAL POSITION**.

Tightening torque (nut) **33 32 22AZ.**

Tightening torque (bolt) **33 32 21AZ.**

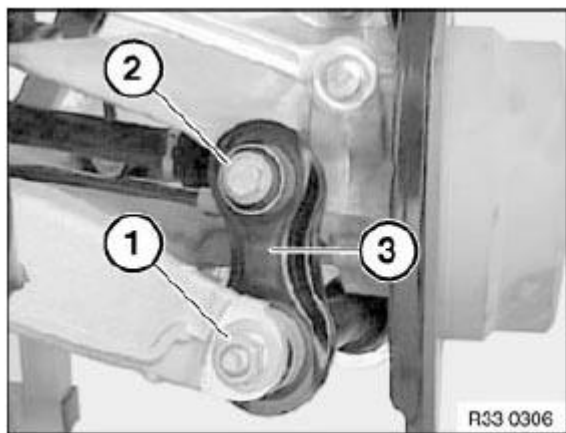


Fig. 66: Identifying Integral Link

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- E61: Activate and fill air suspension system
- Perform chassis alignment check

33 32 064 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SWINGING ARM

NOTE: If the swinging arm is detached from the integral link/wheel carrier or rear axle carrier, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove rear wheel.
- Remove jointed rod of ride-height sensor from swinging arm
- Remove **stabilizer link** from swinging arm

Mark position of eccentric screw to rear axle carrier.

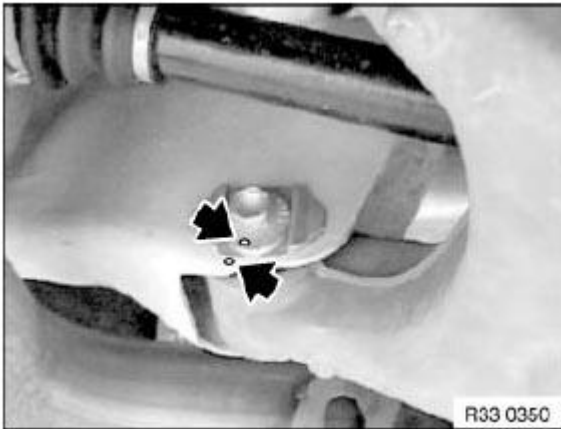


Fig. 67: Identifying Rear Axle Carrier Eccentric Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Support wheel carrier with workshop jack.

Release nut (1) and remove eccentric washer (2).

Remove eccentric screw towards front.

Installation:

Note insertion direction of eccentric screw.

Align eccentric screw by means of marking to rear axle carrier.

Refit eccentric washer.

Replace self-locking nut.

Tighten bolt connection in **NORMAL POSITION** .

Tightening torque **33 32 20AZ**.

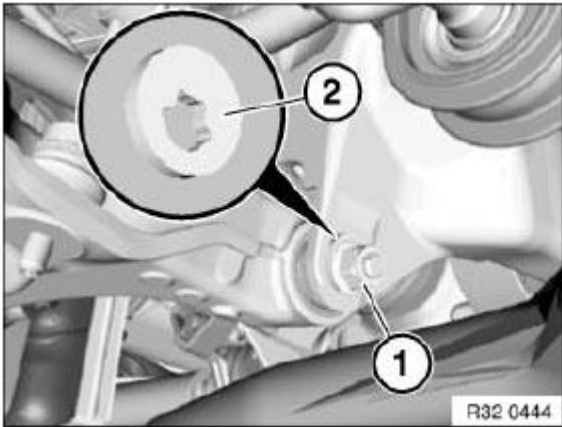


Fig. 68: Identifying Eccentric Washer
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut and pull out bolt towards rear.

Installation:

Replace self-locking nut.

Tighten bolt connection in **NORMAL POSITION**

Tightening torque **33 32 20AZ.** .

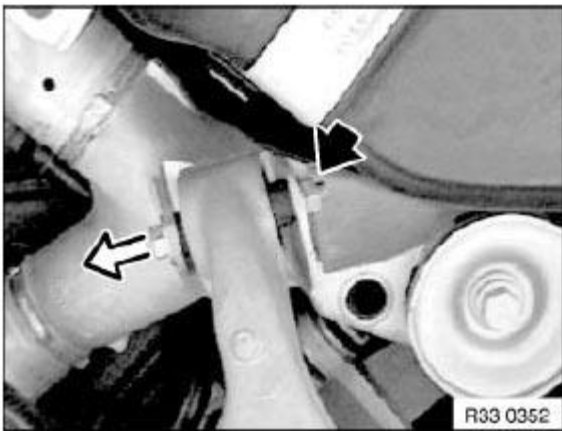


Fig. 69: Locating Bolt Towards Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Remove screw towards rear and remove swinging arm.

Installation:

Replace self-locking nut.

Tightening torque **33 32 22AZ**.

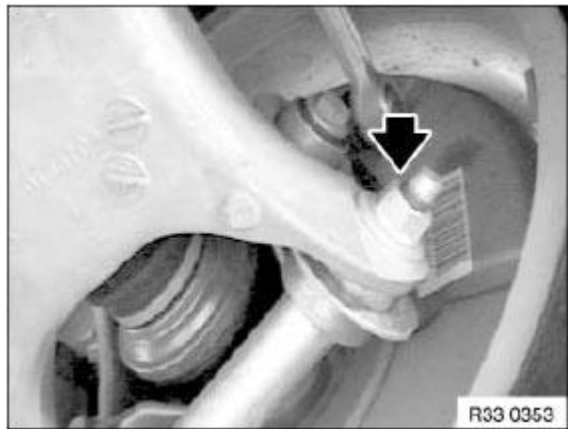


Fig. 70: Locating Swinging Arm

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check that output shaft is correctly seated in rear differential.
- Perform chassis alignment check

33 32 071 REPLACING ONE UPPER CONTROL ARM

IMPORTANT: The control arm to wheel carrier connection has been changed from a conical seat to a ball seat! Spare parts are offered for both variants.
To ensure a correct bolt connection, check before installing the control arm whether the seat for the control arm matches the seat for the wheel carrier.

Variants:

- A. Conical seat
- B. Ball seat

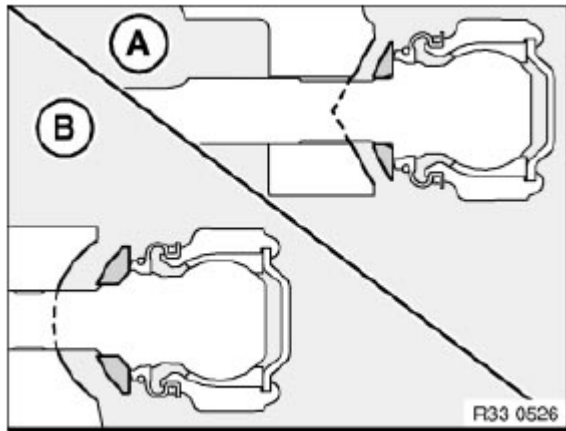


Fig. 71: Identifying Conical Seat And Ball Seat
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the control arm is detached from the rear axle carrier, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove rear wheel.
- E61: Deactivate and empty air spring system

Shown on vehicle at rear right:

Unclip line for pulse generator (1) from holder (2).

Only on right side: Unclip line for brake pad wear sensor (3) from holder (2).

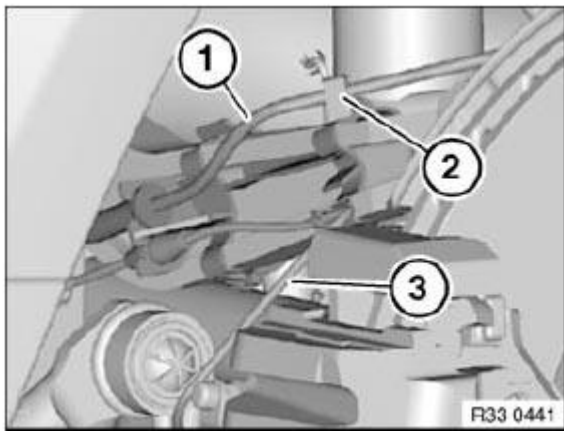


Fig. 72: Identifying Pulse Generator And Holder
 Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Remove control arm at top from wheel carrier.

Installation:

Keep control arm to wheel carrier connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque **33 32 8AZ.**

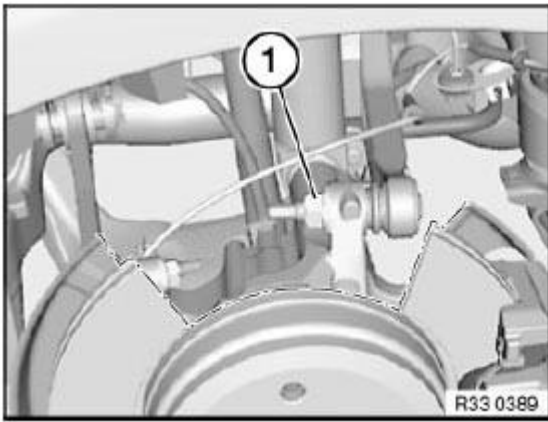


Fig. 73: Identifying Control Arm From Wheel Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Pull out bolt (2) and remove control arm.

Installation:

Note insertion direction of screw.

Replace self-locking nut.

Tighten bolt connection in **NORMAL POSITION**.

Tightening torque **33 32 14AZ.**

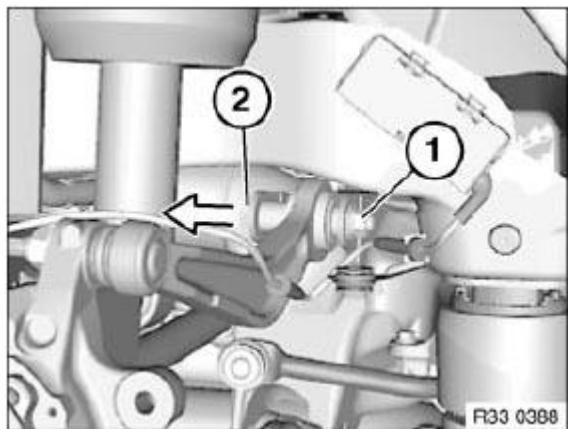


Fig. 74: Removing Control Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Unclip holder on control arm.

After installation:

- E61: Activate and fill air suspension system
- Perform chassis alignment check

33 32 091 REPLACING A GUIDE ARM

M5, Security:

IMPORTANT: The guide arm to wheel carrier connection has been changed from a conical seat to a ball seat! Spare parts are offered for both variants.
To ensure a correct bolt connection, check before installing the guide arm whether the seat for the guide arm matches the seat for the wheel carrier.
For reasons of driving dynamics, the guide arms may only be replaced in pairs!

Variants:

- A. M10 journal: Conical seat
- B. M12 journal: Ball seat

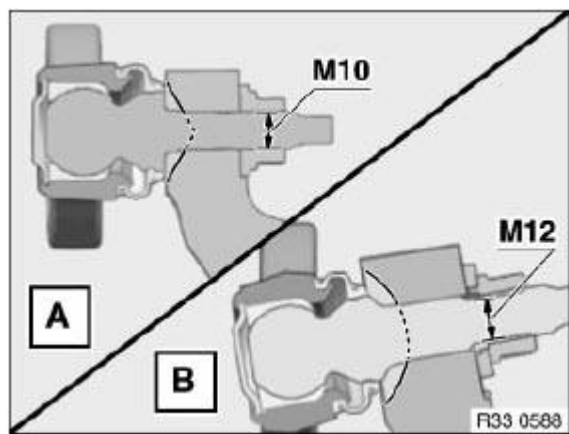


Fig. 75: Identifying Guide Arms (M10 And M12)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the guide arm is detached from the rear axle carrier, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove rear wheel.

Unscrew nut (1).

Remove guide arm from wheel carrier.

Installation:

Keep guide arm to wheel carrier connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque **33 32 4AZ.**

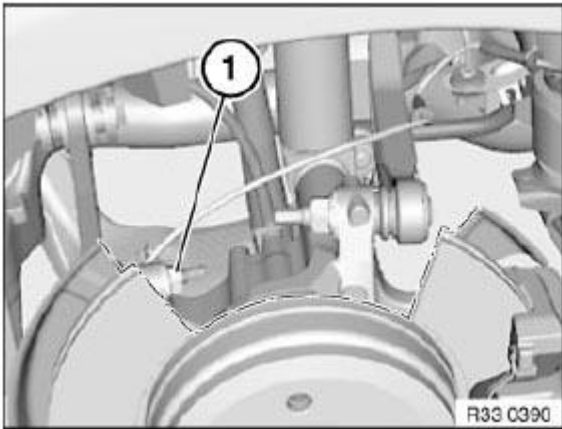


Fig. 76: Identifying Guide Arm Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of eccentric screw (3) to rear axle carrier.

Release nut (1) and remove eccentric washer (2).

Pull out eccentric screw (3) and remove guide arm.

Installation:

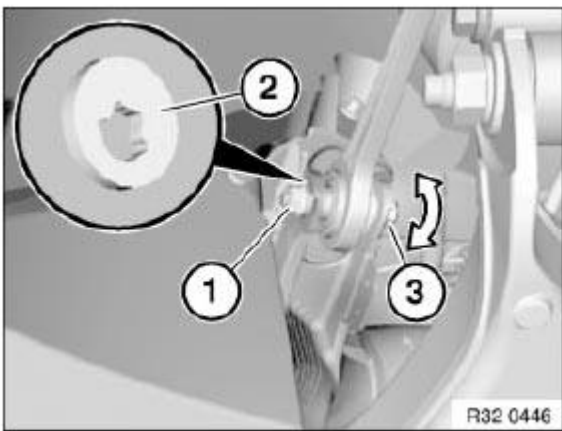


Fig. 77: Locating Eccentric Washer

Courtesy of BMW OF NORTH AMERICA, INC.

Note insertion direction of eccentric screw.

Align eccentric screw by means of marking to rear axle carrier.

Refit eccentric washer.

Replace self-locking nut.

Tighten bolt connection in **NORMAL POSITION** .

Tightening torque **33 32 5AZ**.

After installation:

- Perform chassis alignment check

33 32 125 REPLACING A BALL JOINT IN LOWER STEERING KNUCKLE / WHEEL CARRIER

Special tools required:

- 33 3 333
- 33 4 191
- 33 4 192
- 33 4 193
- 33 4 194

Necessary preliminary tasks:

- Remove **push rod/integral link**
- Remove **stabilizer link** from swinging arm
- Remove **spring strut shock absorber/shock absorber** from wheel carrier/swinging arm

Reconditioning special tool:

Cut highlighted area out of special tool 33 4 191 and then deburr.

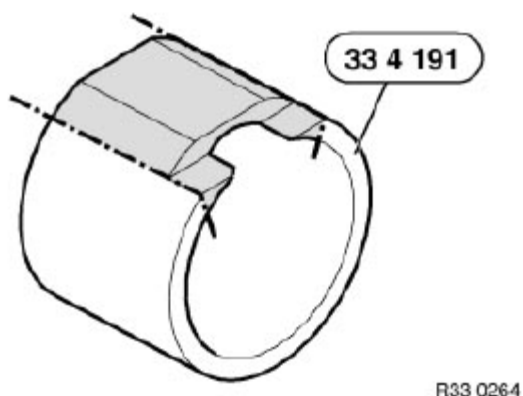


Fig. 78: Identifying Special Tool (33 4 191) Cutting Area Location
Courtesy of BMW OF NORTH AMERICA, INC.

Remove circlip (1).

Pull out ball joint with special tools 33 4 193, 33 4 191, 33 4 192 and 33 3 333. Slotted side of special tool 33 4 191 must point to wheel carrier.

Installation:

Install new circlip (1).

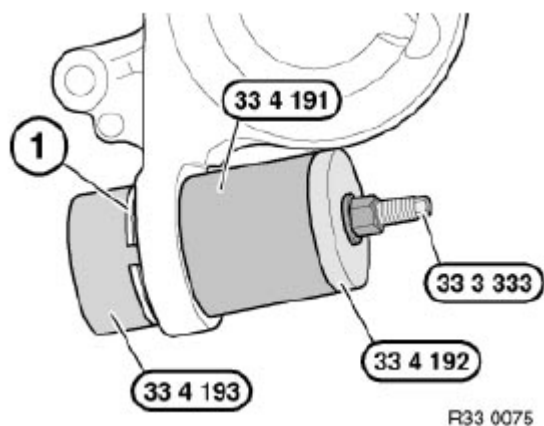


Fig. 79: Identifying Special Tools (33 4 193, 33 4 191, 33 4 192 And 33 3 333)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in new ball joint (1) with special tools 33 3 333, 33 4 192, 33 4 191 and 33 4 194 as far as it will go.

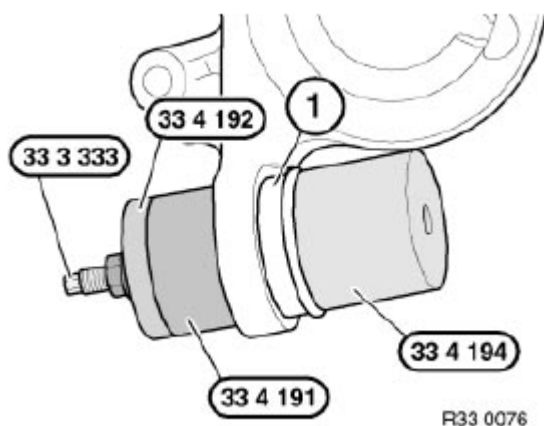


Fig. 80: Identifying Special Tools (33 3 333, 33 4 192, 33 4 191 And 33 4 194)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform chassis alignment check

33 32 131 REMOVING AND INSTALLING / REPLACING A STEERING KNUCKLE / WHEEL CARRIER

IMPORTANT: The control arm to wheel carrier connection has been changed from a conical seat to a ball seat.

To ensure a correct bolt connection, check before installing the control arm whether the seat for the control arm matches the seat for the wheel carrier.

A: Conical seat

B: Ball seat

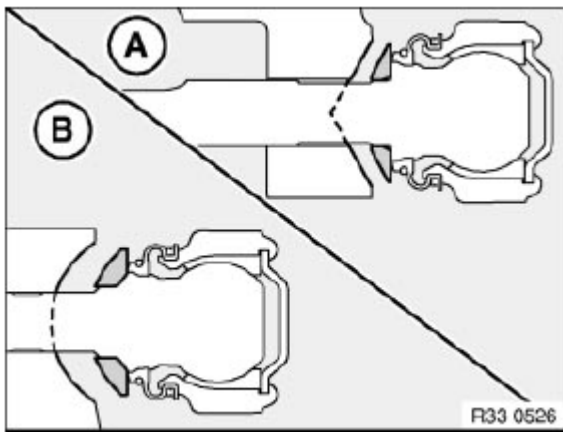


Fig. 81: Identifying Conical Seat And Ball Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only: Replace control arm with conical seat.

Remove rear wheel.

E61: Deactivate and drain air spring/suspension system

Release collar nut, activate handbrake for this purpose.

Installation: Replace collar nut, oil collar nut/wheel bearing contact surface lightly and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Tightening torque **33 41 3AZ.**

Secure collar nut by positive peening on flat areas of output shaft.

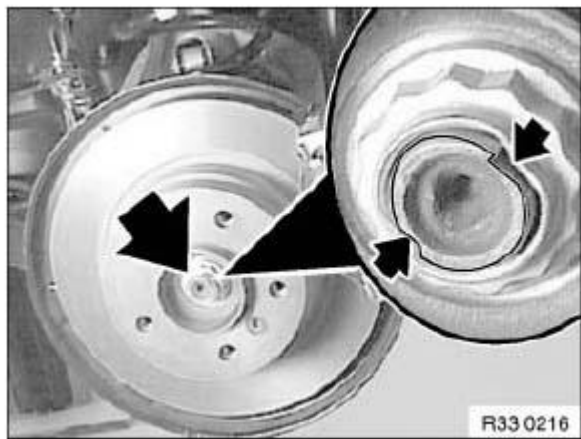


Fig. 82: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove **REAR BRAKE DISC** .

Disconnect handbrake **BOWDEN CABLES** from expander lock.

Replacement only: Drive out **drive flange** for rear axle shaft.

Remove **PULSE GENERATOR** .

Remove **stabilizer link** from stabilizer.

Remove **spring strut shock absorber/shock absorber** from wheel carrier/swinging arm.

Remove **integral link**.

IMPORTANT: Risk of damage! Do not drive output shaft out of drive flange with an impact tool.

Press **output shaft** out of drive flange.

Remove **guide arm** from wheel carrier.

Remove **upper control arm** from wheel carrier and remove wheel carrier.

Replacement

- Modify rear wheel brake. See **34 21 171 REMOVING AND INSTALLING / REPLACING A BRAKE CARRIER / BRAKE GUARD AT REAR**
- Install new wheel bearing
- Modify or replace **DRIVE FLANGE**.

- E61: Modify retainer for air spring

IMPORTANT: Check sensor head and line from pulse generator prior to installation for external damage, replacing if necessary.

After installation:

- E61: Activate and fill air suspension system
- Adjust **HANDBRAKE** .
- Perform chassis alignment check

33 AXLE MOUNTING

33 33 001 REPLACING LEFT OR RIGHT REAR AXLE CARRIER COMPRESSION STRUT

IMPORTANT: Observe safety instructions for raising the vehicle
Driving without tension and compression struts is not permitted!
Risk of damage!
The rear axle carrier must be supported at the front if both compression struts have to be replaced!

Necessary preliminary tasks:

- If necessary, remove rear tension strut
- Remove tank cover
- Version with Dynamic Drive: Disconnect pressure lines for oscillating motor of rear axle from tension strut.

Release screws (2).

Tightening torque **33 32 17AZ** .

Release bolt (1) and remove compression strut.

Secure rear axle carrier by inserting bolt (1).

Installation:

Check threads for damage; if necessary, repair with Heli-coil thread inserts.

Tightening torque **33 33 3AZ** .

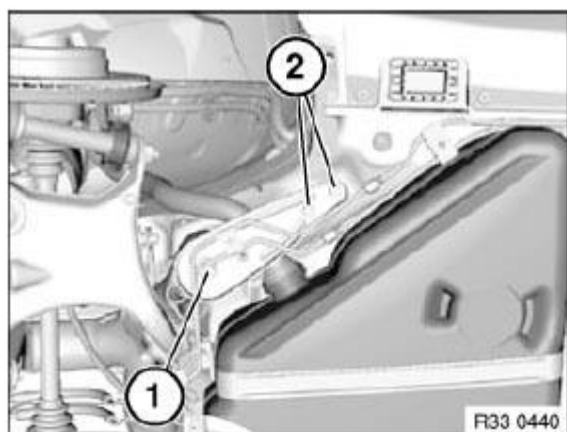


Fig. 83: Identifying Compression Strut

Courtesy of BMW OF NORTH AMERICA, INC.

33 33 111 REPLACING ALL RUBBER MOUNTS FOR REAR AXLE CARRIER

Special tools required:

- 33 4 153
- 33 4 154
- 33 4 155
- 33 4 271
- 33 4 272
- 33 4 274
- 33 4 275

WARNING: Danger of explosion!

Do not point air jet from hot air blower at fuel tank!

Necessary preliminary tasks:

- Lower rear axle carrier

Withdrawing rubber mount:

Assemble special tools 33 4 154, 33 4 155, 33 4 272, 33 4 274 and 33 4 275 as illustrated.

Check installation position of special tool 33 4 274 to rubber mount and 33 4 272 to bearing bushing, correct if necessary.

Using a hot air blower, heat bearing bushing at max. 600 °C outlet temperature for approx. 2 minutes.

Pull out rubber mount by turning special tool 33 4 155.



Fig. 84: Identifying Special Tools (33 4 154, 33 4 155, 33 4 272, 33 4 274 And 33 4 275)
Courtesy of BMW OF NORTH AMERICA, INC.

Drawing in rubber mount (view from below):

If necessary, apply a marking to special tool 33 4 272.

Coat rubber mount with Circolight anti-friction agent (refer to BMW Parts Service) and insert in special tool 33 4 272.

IMPORTANT: Arrows or stops (2) of inner sleeve must point in vehicle longitudinal direction (F) when rubber mount is installed. A maximum deviation (A) of $\pm 7^\circ$ must be observed.

Align rubber mount using arrows or stops (2) to marking on special tool 33 4 272.

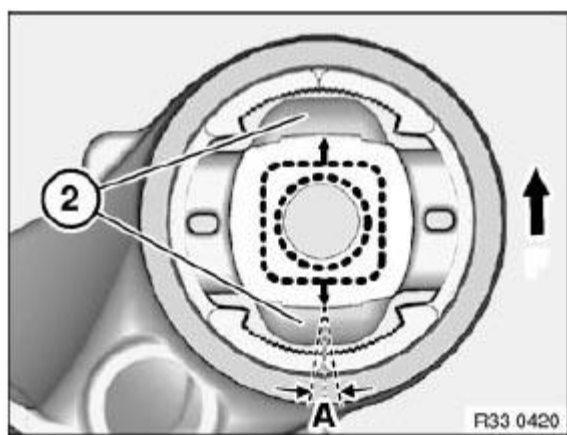


Fig. 85: Aligning Rubber Mount To Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tools 33 4 154, 33 4 155, 33 4 271, 33 4 272 as illustrated.

Check installation position of rubber mount to marking on special tool 33 4 272, correct if necessary.

Align special tool 33 4 272 using marking to vehicle longitudinal direction, fit on rear axle carrier and screw on special tool 33 4 153.

Check installation position of special tools 33 4 272 and 33 4 153, correct if necessary.

Draw in rubber mount by turning special tool 33 4 155.

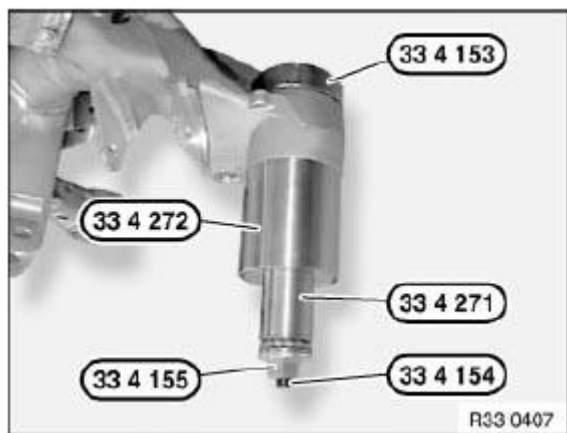


Fig. 86: Identifying Special Tools (33 4 154, 33 4 155, 33 4 271 And 33 4 272)
Courtesy of BMW OF NORTH AMERICA, INC.

41 WHEEL BEARINGS

33 41... DETACHING WHEEL BEARING INNER RACE FROM DRIVE FLANGE (DRIVE FLANGE REMOVED)

Special tools required:

- 33 1 307
- 33 4 400
- 33 4 401
- 33 4 402
- 33 4 403
- 33 4 404
- 33 4 405
- 33 4 406
- 33 4 407

NOTE: Detach wheel bearing ring with special tool 33 4 400 through groove in wheel bearing inner ring.

Position special tool 33 1 307 on drive flange.

Select one of the following special tools using the wheel bearing inner ring and insert into special tool 33 4 401.

33 4 405 for dia. 45-51 mm

33 4 406 for dia 50-55 mm

33 4 407 for dia. 55-61 mm

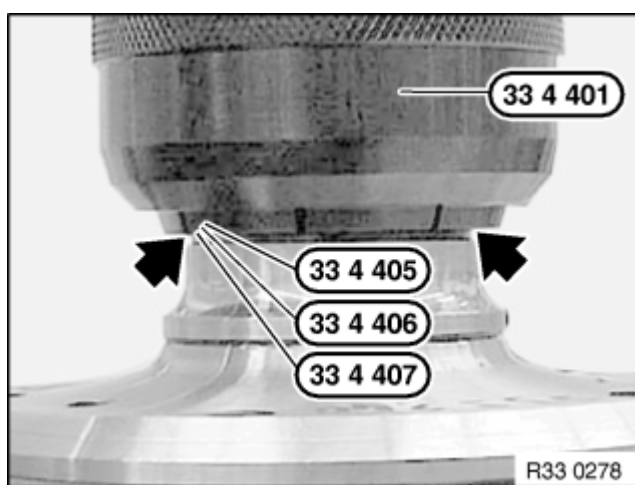


Fig. 87: Positioning Special Tool 33 4 401 With Corresponding Insert On Groove Of Wheel Bearing Inner Race

Courtesy of BMW OF NORTH AMERICA, INC.

Screw out special tool 33 4 402 until the tapered attachment of the spindle comes into contact with the special tool 33 4 401.

Position special tool 33 4 401 with the corresponding insert on groove of wheel bearing inner ring.

Compress special tool 33 4 401 with wrenches 33 4 403 and 33 4 404 until the special tool can still be turned in the groove.

Detach wheel bearing inner ring by turning special tool 33 4 402.

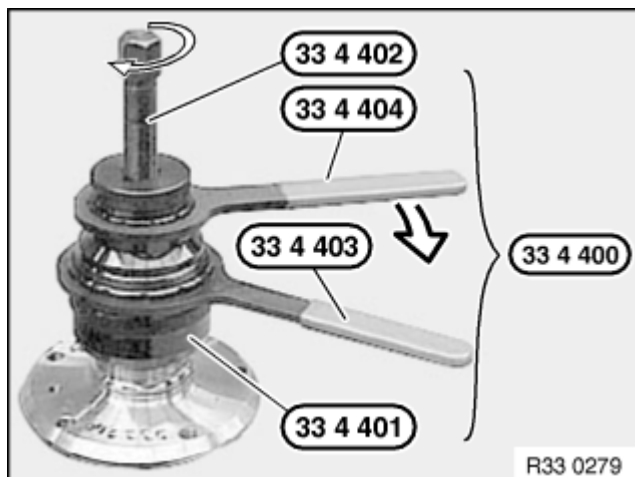


Fig. 88: Compressing Special Tool 33 4 401 With Wrenches 33 4 403 And 33 4 404 Until Special Tool Can Still Just Be Turned In Groove

Courtesy of BMW OF NORTH AMERICA, INC.

33 41 000 REPLACING DRIVE FLANGE ON LEFT/RIGHT REAR AXLE SHAFT

Special tools required:

- 33 2 116
- 33 2 160
- 33 2 201
- 33 4 200

Remove rear wheel.

IMPORTANT: Expand turning lock sufficiently to avoid damaging thread when releasing collar nut.

Release collar nut, activate handbrake for this purpose.

Installation:

Replace collar nut, oil collar nut/wheel bearing contact surface lightly and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Tightening torque **33 41 3AZ** .

Secure collar nut by positive peening on flat areas of output shaft.

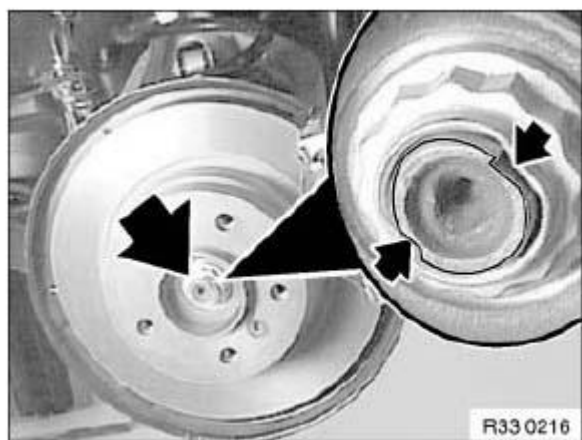


Fig. 89: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove **BRAKE DISC** .

Force drive flange with special tools 33 2 116 / 33 2 201, 33 2 160, 33 4 200 and 5 wheel bolts out of wheel bearing.

NOTE: Rounded inside edge of special tool 33 2 160 must point to drive flange.

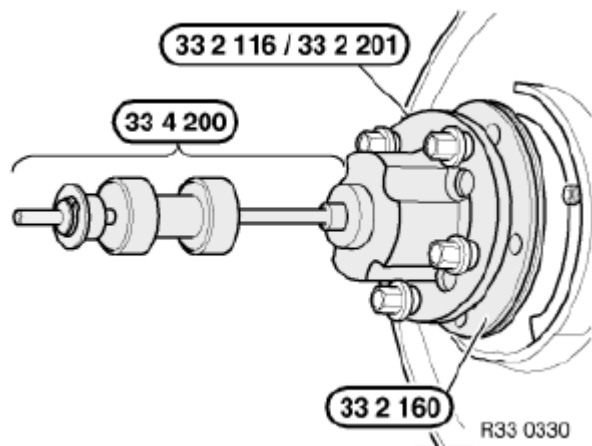


Fig. 90: Identifying Special Tools (33 2 116 / 33 2 201, 33 2 160, 33 4 200)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The wheel bearing is destroyed when the drive flange is removed and cannot be reused!

Replace wheel bearing.

Installation:

Oil drive flange lightly and attach to splines of output shaft.

Draw **drive flange into wheel bearing**.

After installation:

- Adjust **HANDBRAKE**

33 41 151 REPLACING LEFT OR RIGHT WHEEL BEARING ON REAR AXLE SHAFT

Necessary preliminary tasks:

- Remove **drive flange for rear axle shaft**
- Detach **wheel bearing inner race from drive flange**

If necessary, raise wheel carrier slightly with workshop jack.

Release screws with 3/8 Torx socket.

Tightening torque **33 41 2AZ** .

Remove wheel bearing.

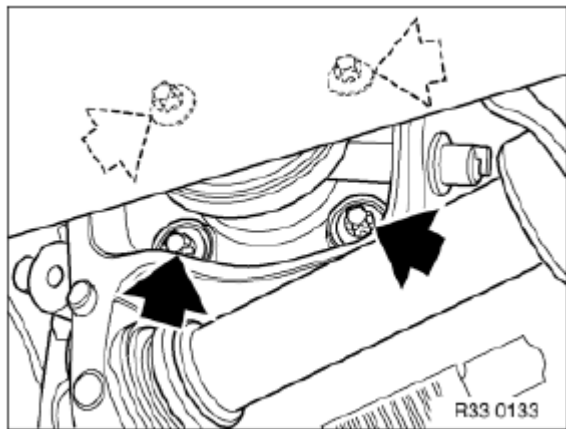


Fig. 91: Locating Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep contact surface (2) of wheel bearing/wheel carrier clean and free from oil and grease.

Except when replacing: Recondition tapped holes (1).

Install new wheel bearing.

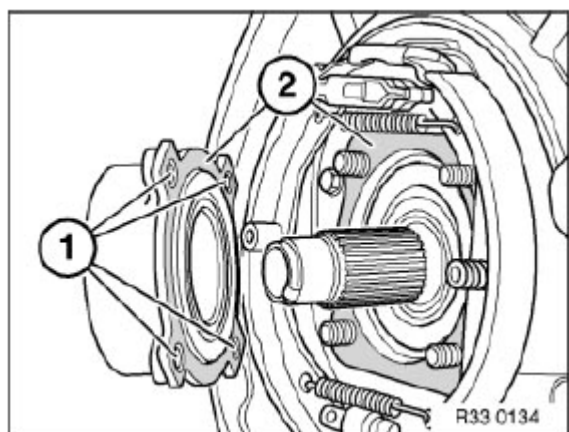


Fig. 92: Aligning Holes To Wheel

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

Adjust **HANDBRAKE**

52 SHOCK ABSORBER

33 00... INFORMATION ON REPLACING SHOCK ABSORBERS

Facts:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

E32, E34, E38, E39: In the case of rear spring struts with ride-height control, there is always a slight oil spillage on the piston rod. These spring struts are permitted to be wet with oil over a maximum of half the shock absorber length on the outer tube, i.e. they are permitted to "sweat".

Consequence:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

Exception: On all M-models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

33 52 100 REMOVING AND INSTALLING REAR LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

Necessary preliminary tasks:

- Remove rear wheel.
- Remove stabilizer link from swinging arm

IMPORTANT: Before tightening screw connection, check that spring strut shock absorber pin is correctly positioned in wheel carrier.

Screw must not be used as an aid to installing the spring strut shock absorber!

Release screw.

IMPORTANT: Secure spring strut shock absorber against falling out.

Remove spring strut shock absorber from wheel carrier and tie up.

Installation:

Replace screw.

Tightening torque 33 52 1AZ .

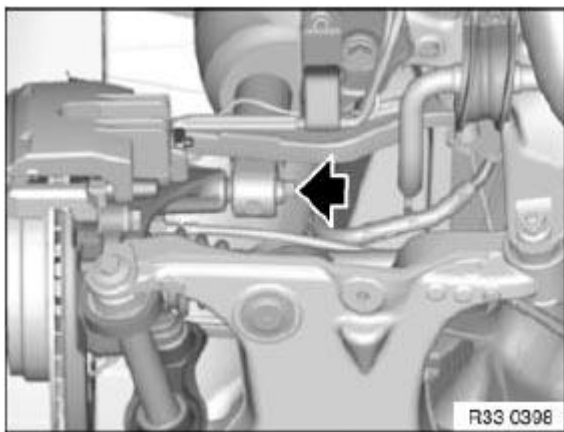


Fig. 93: Locating Spring Strut Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Partially remove luggage compartment wheel arch trim. See 51 47 161 REMOVING AND INSTALLING/REPLACING RIGHT LUGGAGE COMPARTMENT WHEEL ARCH TRIM or 51 47 151 REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM .

If necessary, remove sound insulation.

M5: Disconnect plug connection for Electronic Damper Control (EDC).

Unscrew nuts.

Installation:

Replace self-locking nuts.

Tightening torque **33 52 3AZ** .

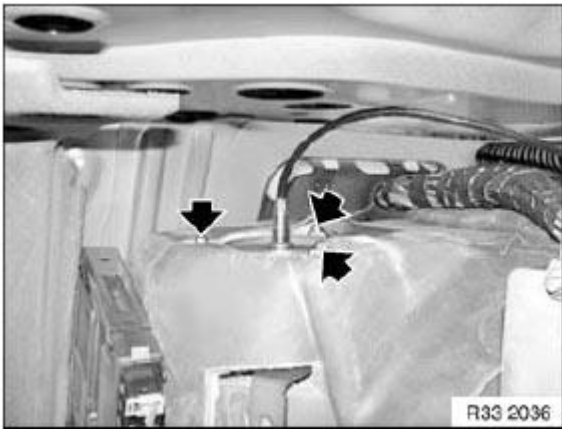


Fig. 94: Locating Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Press wheel carrier downwards, guide spring strut shock absorber downwards between guide arm and control arm and then remove in upwards direction.

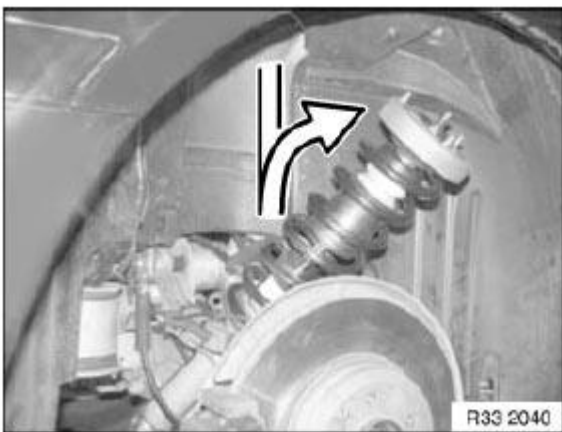


Fig. 95: Checking Strut Shock Absorber

Courtesy of BMW OF NORTH AMERICA, INC.

33 52 131 REPLACING REAR LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

Special tools required:

- 31 3 340
- 31 3 341
- 31 3 357

IMPORTANT: When replacing shock absorber/spring strut, renew auxiliary damper!

NOTE: Before using the special tool 31 3 340 take care to read through the Owner's Handbook! All the safety information and instructions contained in the Owner's Handbook must be strictly observed! Failure to observe these safety precautions and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!

IMPORTANT: Observe the following instructions to avoid any risk of injury by the coil springs.

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.
5. Keep special tools dry, clean and free of grease.
6. Impact screwdrivers may not be used!
7. Do not compress coil spring to full extent.

Necessary preliminary tasks:

- Remove rear spring strut shock absorber.

Removing:

Clamp special tool 31 3 341 in vice.

Fit special tools 31 3 357 from above on special tool 31 3 341 until locking pins (1) can be felt and heard to snap into place.

Check seating of special tools 31 3 357, correct if necessary.

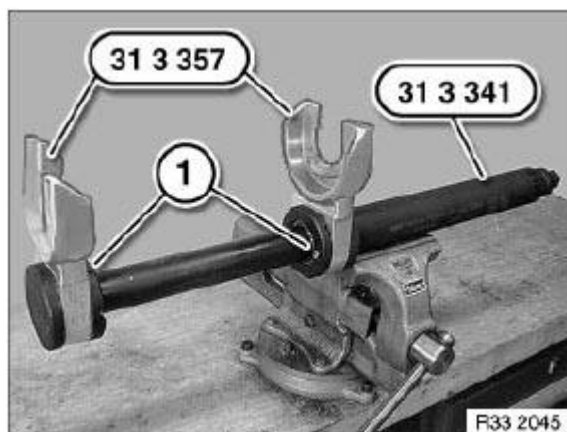


Fig. 96: Clamping Special Tool (31 3 341) In Vice
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recesses of special tools 31 3 357 when tensioned!
Compress coil spring until stress on piston rod is relieved.

Clean coil spring to remove all coarse dirt and mount on special tools 31 3 357.

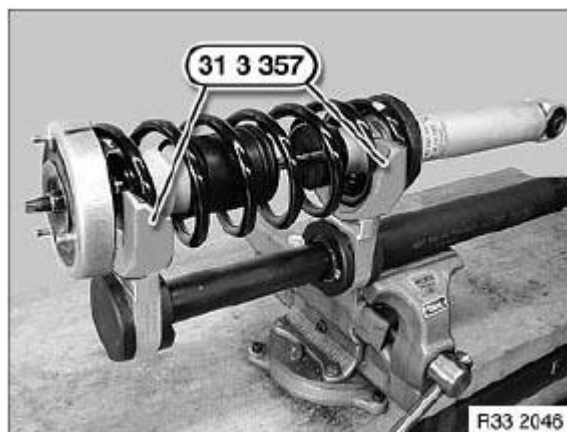


Fig. 97: Compressing Coil Spring Using Special Tools (31 3 357)
Courtesy of BMW OF NORTH AMERICA, INC.

Mark installation position of support bearing to spring strut shock absorber using a stud (arrow).

Compress coil spring until stress on piston rod is relieved.

Release nut (gripping piston rod in the process).

Remove plate and support bearing with upper spring pad.

Remove spring strut shock absorber with support pot, rear auxiliary damper, protective tube and lower spring pad sideways from tensioned coil spring.

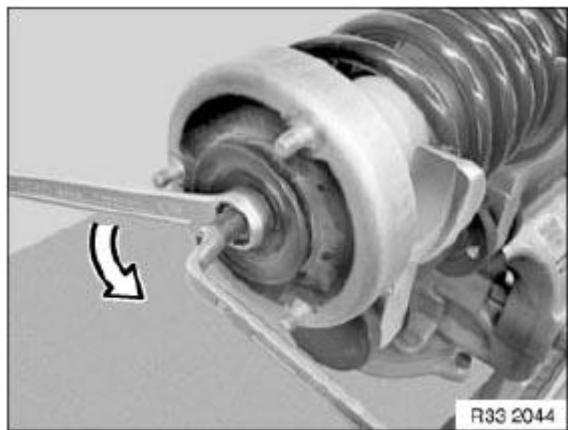
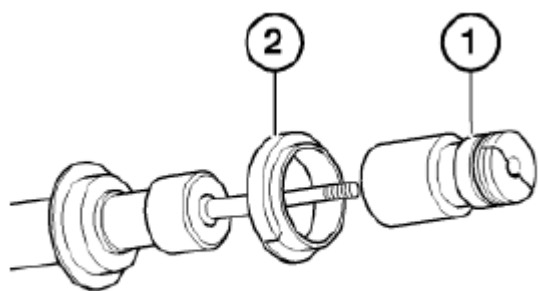


Fig. 98: Removing Strut Shock Absorber Nut
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, remove support cup, auxiliary damper (1) with protective tube and spring pad (2) from shock absorber.



R33 0454

Fig. 99: Identifying Rear Auxiliary Damper With Protective Tube
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve tension on coil spring and remove from special tools 31 3 357.



Fig. 100: Relieve Tension On Coil Spring And Remove From Special Tools 31 3 357
Courtesy of BMW OF NORTH AMERICA, INC.

Accommodate coil spring with special tools 31 3 357 in such a way that both ends of coil spring are approx. one coil (W) outside of special tools 31 3 357.

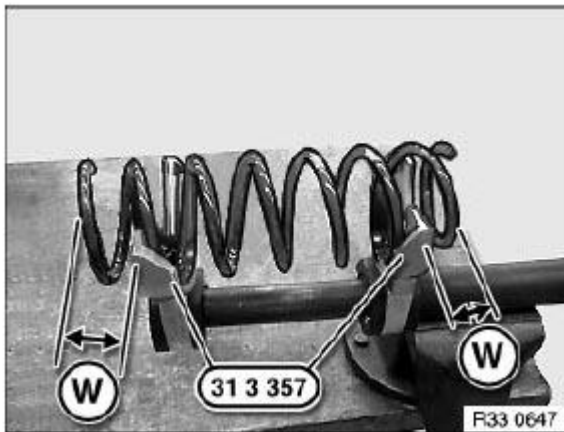


Fig. 101: Identifying Coil Spring And Special Tools 31 3 357
Courtesy of BMW OF NORTH AMERICA, INC.

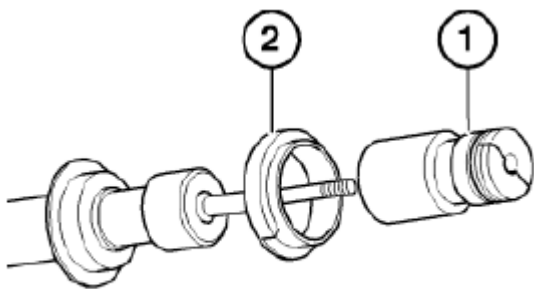
WARNING: Do not compress coil spring to full extent. Coils of coil spring must be located completely in recesses of special tools 31 3 357!

Tension coil spring.



Fig. 102: Identifying Special Tools 31 3 357 Onto Coil Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Check auxiliary damper (1) with protective tube and spring pad (2) for damage, replace if necessary.



R33 0454

Fig. 103: Identifying Lower Spring Pad And Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Attach support cup to piston rod. **Replacement only:** Carry over marking from old part to new part. Insert shock absorber in tensioned coil spring.

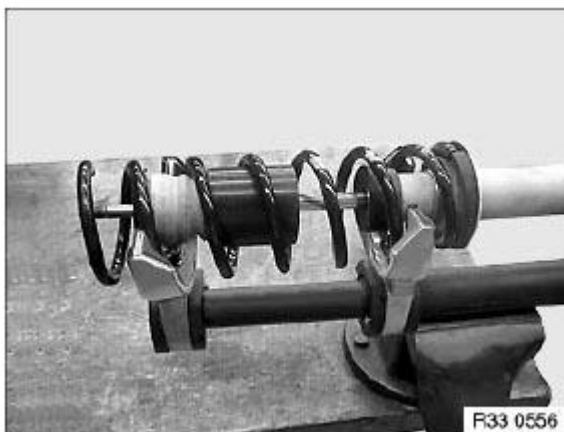


Fig. 104: Attaching Support Cup To Piston Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Check support bearing for damage, replace if necessary.

Attach support bearing and plate to piston rod. Replace nut and tighten down (gripping piston rod in so doing). Tightening torque **33 52 2AZ** .

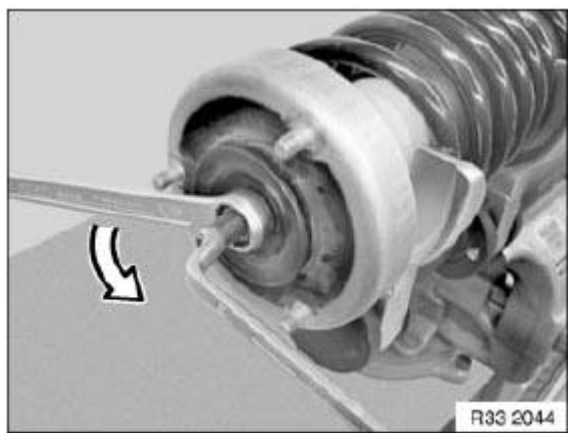


Fig. 105: Replace Nut And Tighten Down
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: One threaded pin (1) on the support bearing must be on one plane with the bore in the rubber mount (2) and the opposite side of the bush (3).

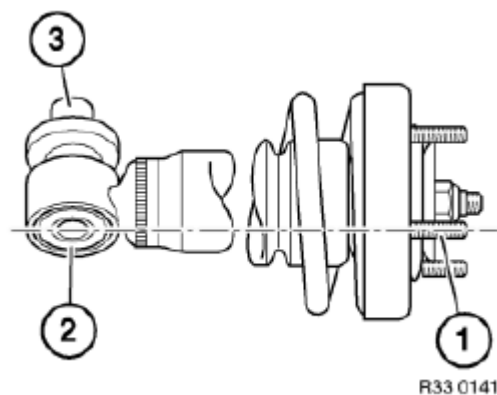


Fig. 106: Identifying Threaded Pin, Rubber Mount And Bush
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Align support bearing by way of spring pad to end of coil spring.

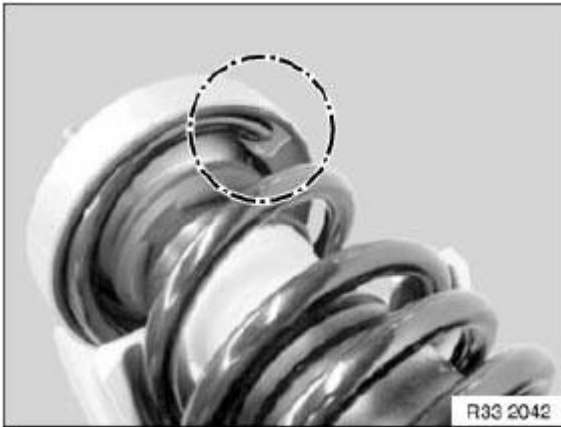


Fig. 107: Aligning Support Bearing To Coil Spring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Lower end of coil spring must rest on stop of spring pad!

Relieve tension on coil spring.

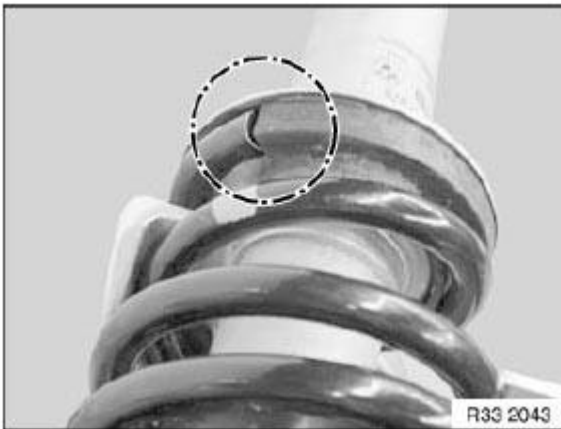


Fig. 108: Ensure Coil Spring Is Correctly Seated In Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

33 52 161 REPLACING REAR LEFT OR RIGHT THRUST BEARING FOR SPRING STRUT / SHOCK ABSORBER

NOTE: Procedure is described in 33 52 100 REMOVING AND INSTALLING REAR LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER.

53 SPRINGS WITH SUSPENSION

33 53... MEASURING RIDE-LEVEL HEIGHT OF VEHICLE

Necessary preliminary tasks:

- Move vehicle into **NORMAL POSITION**

Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to lower edge of wheel arch (1).

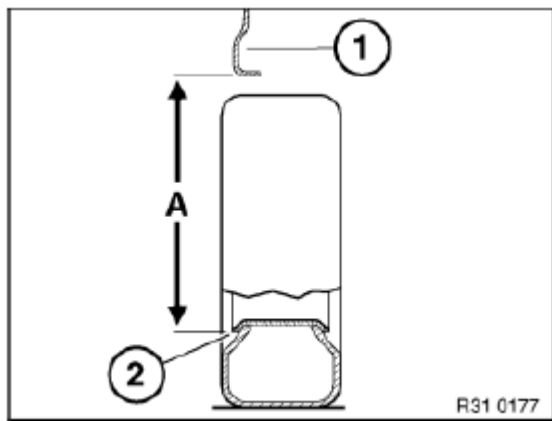


Fig. 109: Identifying Ride-Level Height Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

33 53 000 REMOVING AND INSTALLING / REPLACING REAR LEFT OR RIGHT COIL SPRING

Installation Note:

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

IMPORTANT: Except M5, M6 and E67: Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!

M5, M6 and E67: For safety reasons, both coil springs on the relevant axle must always be replaced on motorsport and safety vehicles!

NOTE: The coil spring is assigned after the vehicle identification number has been entered and the optional extras of the relevant vehicle selected. Procedure is described in **Rear spring strut shock absorber**.

55 STABILIZER BAR

33 55 000 REMOVING AND INSTALLING / REPLACING REAR STABILIZER

Necessary preliminary tasks:

- Remove **stabilizer link** on both sides from stabilizer

If necessary, remove vibration damper from right retaining bracket of stabilizer.

Tightening torque **33 55 2AZ** .

Release nuts at both ends.

Remove stabilizer sideways.

Installation:

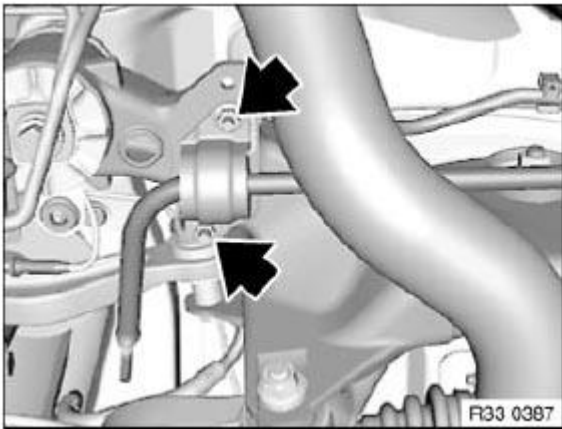


Fig. 110: Locating Rear Stabilizer

Courtesy of BMW OF NORTH AMERICA, INC.

Check rubber mount on both sides, replace if necessary.

Replace self-locking nuts.

Tightening torque **33 55 2AZ** .

Replacement:

Remove rubber mount on both sides from stabilizer.

33 55 021 REPLACING BOTH RUBBER MOUNTS FOR STABILIZER MOUNTING

E61: If necessary, remove vibration damper from right retaining bracket of stabilizer.

Tightening torque **33 55 6AZ** .

Release nuts (1) on both sides.

Tightening torque **33 55 3AZ** .

Turn stabilizer in downwards direction.

Remove retaining bracket (2) on both sides.

Remove rubber mount (3) on both sides.

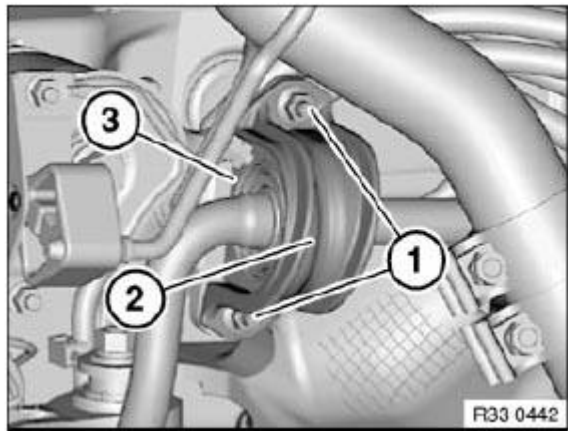


Fig. 111: Identifying Stabilizer Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep retaining bracket (2), rubber mount (3) and stabilizer if necessary clean and free from oil and grease.

Version with Dynamic Drive: Keep contact face for rubber mount on anti-friction bearing clean and free from oil and grease.

33 55 040 REPLACING STABILIZER LINKS FOR STABILIZER

Release nut (1); if necessary, grip at Torx socket.

Installation:

Replace self-locking nut.

Tightening torque **33 55 2AZ** .

Release nut (2); if necessary, grip at Torx socket.

Remove stabilizer link.

Installation:

Replace self-locking nut.

Tightening torque **33 55 2AZ** .

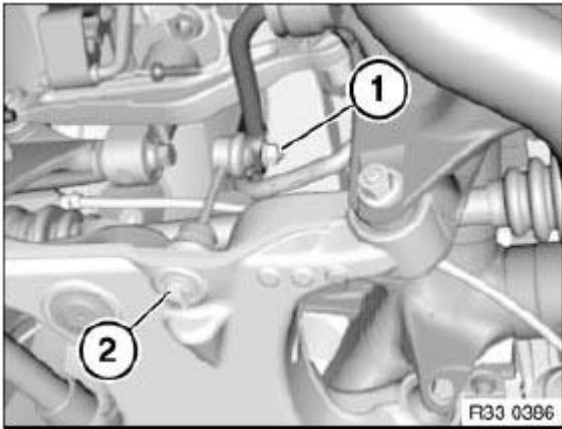


Fig. 112: Identifying Stabilizer Link Nut
Courtesy of BMW OF NORTH AMERICA, INC.

33 55 041 REPLACING ANTI-ROLL BAR LINK FOR ANTI-ROLL BAR ON LEFT OR RIGHT

Release nut (1); if necessary, grip at Torx socket. **Installation note:** Replace self-locking nut. Tightening torque **33 55 2AZ**.

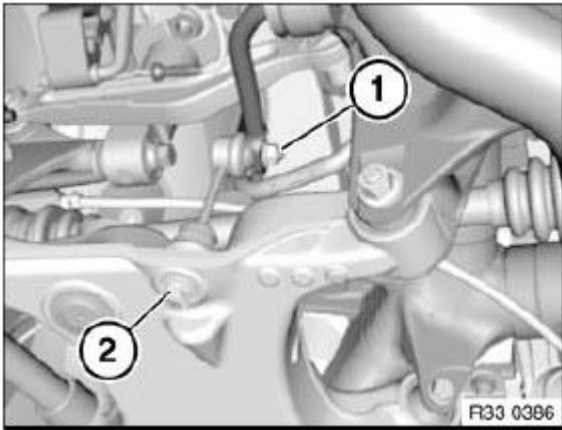


Fig. 113: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (2); if necessary, grip at Torx socket. Remove anti-roll bar link. **Installation note:** Replace self-locking nut. Tightening torque **33 55 2AZ**.

90 TROUBLESHOOTING

33 90... REAR AXLE TROUBLESHOOTING

Observe troubleshooting for shock absorbers.

TROUBLESHOOTING CHART - REAR AXLE

Fault	Cause	Remedy
Grinding noise (only when cornering)	Diagnose brake system.	
	Wheel bearings faulty	Replace wheel bearings
Vibration (90 - 160 km/h)	Wheel imbalance	Balance wheels
	Radial/lateral rim runout	Check rims, replace if necessary
	Radial tire runout	Match or replace tires
	Imbalance in output shaft	Replace output shaft
Drumming	Rubber mount of final drive suspension faulty	Replace rubber mount
	Rubber mount of rear axle carrier faulty	Replace rubber mount
Rattling noise	Refer to 33 90... TROUBLESHOOTING SHOCK ABSORBER.	
	Stabilizer link loose or defective	Check screw connection, replace stabilizer link if necessary
	Rubber mount of rear axle carrier loose or faulty	Check seat, replace rubber mount if necessary
Poor straight-running stability (steering wheel inclination)	Rubber mount of rear axle carrier faulty	Replace rubber mount
	Rubber mount/ball joint of control or guide arm faulty	Replace control or guide arm
	Ball joint in wheel carrier faulty	Replace ball joint
	Rubber mount of swinging arm faulty	Replace swinging arm
	Rear axle alignment incorrectly adjusted	Carry out chassis/wheel alignment check, align rear axle if necessary
Unsteady taking of curves due to self-steering or poor rear end track stability	Rubber mount of rear axle carrier faulty	Replace rubber mount
	Rubber mount of final drive suspension faulty	Replace rubber mount
	Refer to 33 90... TROUBLESHOOTING SHOCK ABSORBER.	
Excessive tire wear	Front or rear axle alignment incorrectly adjusted	Carry out chassis/wheel alignment check, align rear axle if necessary

33 90... TROUBLESHOOTING SHOCK ABSORBER

Read and comply with Information on replacing shock absorbers.

TROUBLESHOOTING CHART - SHOCK ABSORBER

Fault	Cause	Remedy
Wheel knocking (bottoming)	Auxiliary spring faulty	Visually inspect auxiliary spring for cracking, replace auxiliary spring

2010 BMW 535xi**SUSPENSION Rear Axle - Repair Instructions - AWD**

Rattling noise	Shock absorber leaking (oil/gas)	Replace shock absorber
	Shock absorber mounting loose	Tighten shock absorber
	Support bearing loose	Secure support bearing
	Support bearing defective (cracked)	Visually inspect for cracking, replace support bearing
	Protective tube defective/failed	Visually inspect protective tube for cracking, replace protective tube
	Rubber mount/joint eye for lower shock absorber mounting defective	Replace rubber mount/joint eye
	Shock absorber leaking (oil/gas)	Replace shock absorber
Worn down areas (flattened areas) on tire profile	Shock absorber leaking (gas/oil)	Replace shock absorber
Long after-swinging of body after driving over rough road	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Building-up of body in case of successive uneven surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Wheels jumping even on normal road surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber

ACCESSORIES AND EQUIPMENT

Restraints and Towing - Repair Instructions

VARIOUS ACCESSORIES

71 60... REPLACING GAITER FOR SELF-SWINGING-OUT TRAILER TOW HITCH (FROM 03/2007)

Special tools required:

- 00 9 317

Necessary preliminary tasks:

- Remove rear BUMPER TRIM

Unclip cable holder (1).

Lever out gaiter (2) with special tool 00 9 317 and slide in direction of arrow.

Swing out self-swinging-out trailer tow hitch.

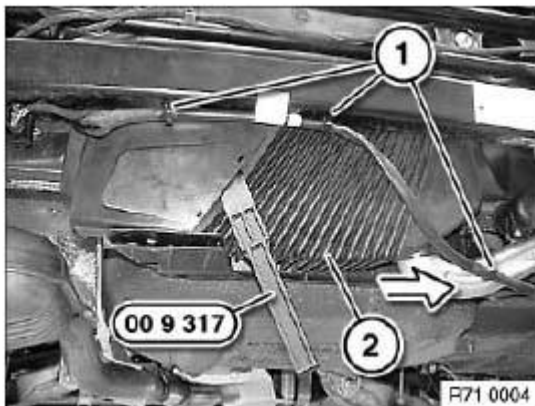


Fig. 1: Removing Gaiter With Special Tool 00 9 317
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove socket (2).

Tightening torque **71 60 3AZ** .

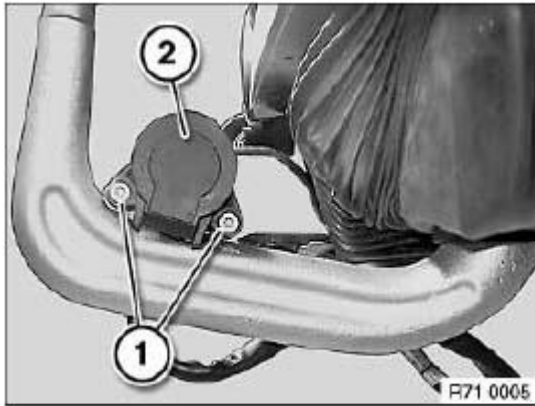


Fig. 2: Identifying Screws And Socket
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off gaiter (1) in direction of arrow from ball rod.

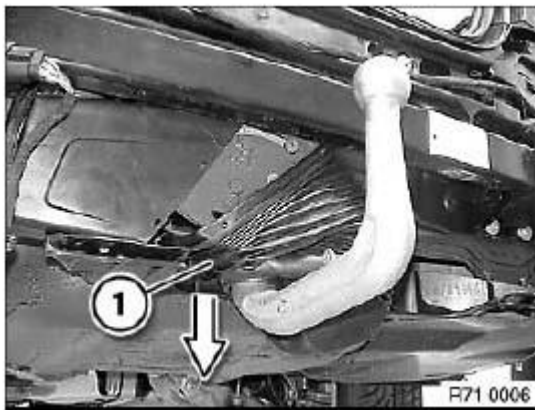


Fig. 3: Pulling Off Gaiter Of Ball Rod
Courtesy of BMW OF NORTH AMERICA, INC.

71 60 051 REPLACING COMPLETE TRAILER TOW HITCH

Necessary preliminary tasks:

- Remove rear bumper trim

Detach impact absorber (1) on both sides.

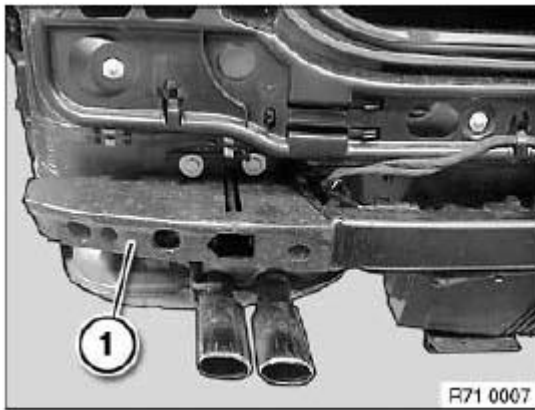


Fig. 4: Identifying Impact Absorber

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Replace screws (1).

Tightening torque **71 60 1AZ** .

Remove trailer tow hitch carrier with a 2nd person helping and disconnect associated plug connections.

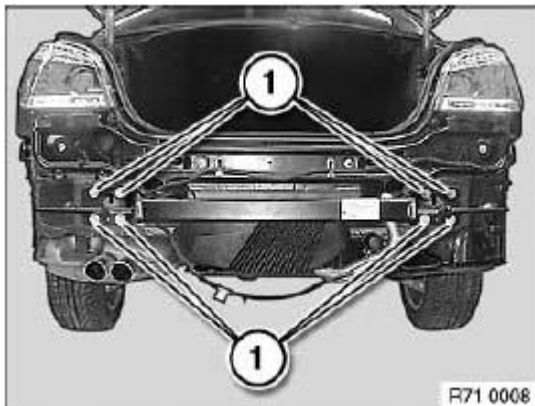


Fig. 5: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

71 60 100 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR TRAILER TOW HITCH UNLOCKING

Necessary preliminary tasks:

Open **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

- Remove spare wheel
- Remove cover for control units

IMPORTANT: Depending on the equipment specification, the position of the control unit for trailer tow hitch unlocking (2) can vary.

Remove control unit (2) and disconnect plug connection (1).

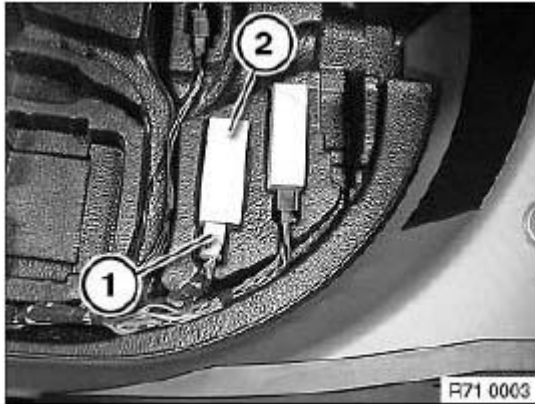


Fig. 6: Identifying Control Unit And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

A control unit of the fully automatic trailer tow hitch with is not initialized indicates this by way of the LED in the button. Initialization sequence:

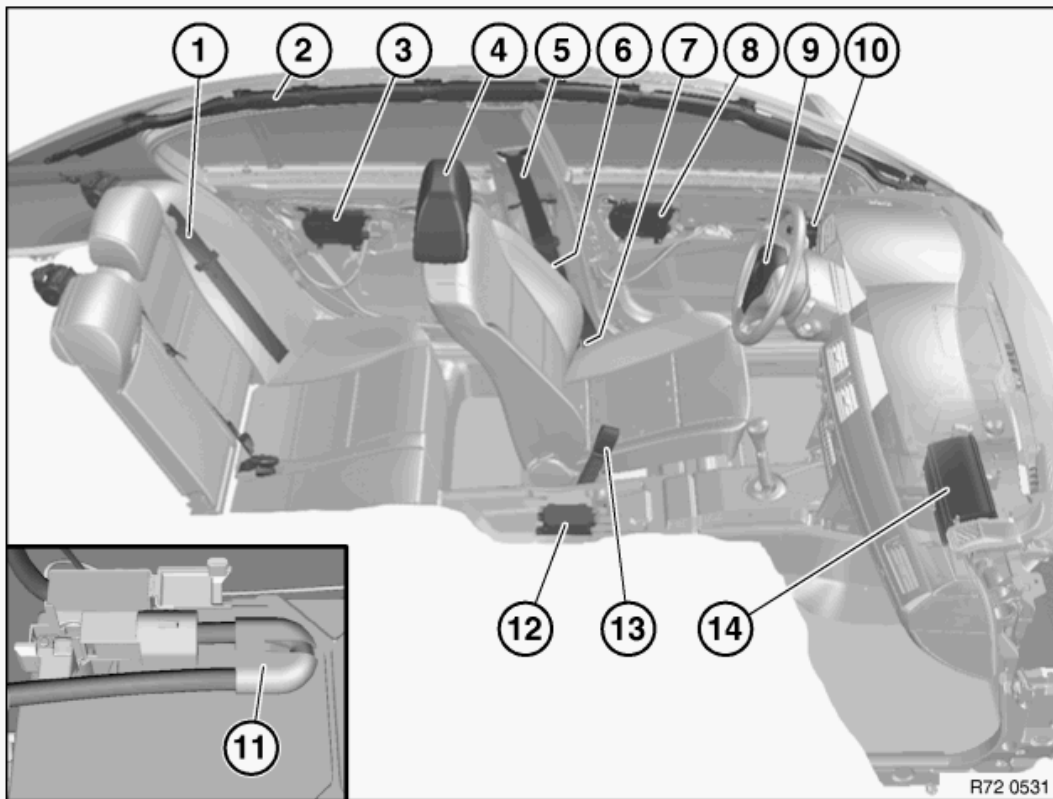
- If necessary, connect battery charger
- Ignition off
- Rear lid open
- Press and hold down button for fully automatic trailer tow hitch

The ball hitch must in the process be pivoted at least once completely from one end stop to the other.

If initialization is successful and the ball hitch is in an end position, the LED on the button is permanently lit green.

GENERAL

72 12... OVERVIEW OF AIRBAG MODULES, SEAT BELTS AND AIRBAG CONTROL UNITS



- | | |
|---|--|
| 1 Seat belt, rear, complete | 8 Airbag module, door, front left/right |
| 2 Head airbag, left/right | 9 Airbag unit, driver's side |
| 3 Airbag module, door, rear left/right | 10 Door module, driver/front passenger |
| 4 Active head restraint, front left/right | 11 Safety battery terminal |
| 5 Seat belt, front left/right | 12 Satellite, vehicle center |
| 6 Satellite, B-pillar, left/right | 13 Seat belt tensioner, front left/right |
| 7 ECE only: Anchor fitting tensioner, driver's side | 14 Airbag module, front passenger side |

Fig. 7: Overview Of Airbag Modules, Seat Belts And Airbag Control Units

Courtesy of BMW OF NORTH AMERICA, INC.

72 12...PROCEDURE AFTER AIRBAG DEPLOYMENT AS RESULT OF AN ACCIDENT

Check and/or replace following components after airbag deployment:

Satellites (control unit + sensor)

Components

- Satellite, A-/B-pillar, left/right
- Satellite, front door
- Satellite, rear seat

- Satellite, driver's/front passenger seat
- Satellite, vehicle center
- Procedure
 - Inspect visually for mechanical damage
 - Read out fault memory
 - Disconnect battery and observe waiting period
 - Rectify faults
 - Reconnect battery and observe waiting period (at least 10 seconds)
 - Clear fault memory
 - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. inside lights, radio, etc.)
 - Switch on ignition (wait at least 10 seconds)
 - Clear fault memory and if necessary rectify faults

Cables and plugs

- Components and procedure
 - Check cables and plugs for damage, replace if necessary (e. g. corrosion, correct engagement, bent pin).

Seat belt system

- Components
 - Automatic reel
 - Belt buckle tensioner
 - Seat belt height adjustment
 - End fitting pretensioner
- Procedure
 - Check components, replace if necessary

Seats

- Components
 - Seat
 - Airbag module
 - Active head restraint
- Procedure
 - Check seats (function check of seat mechanism), replace if necessary
 - Check seat screw/bolt connections
 - Replace gas generator of active head restraint system

If the severity of the impact has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

External feature: The triggered head restraint is folded forwards and engaged.

The repair work can be carried out in the car with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

The gas generator can be replaced up to 5 times.

- Replace airbag module and, if necessary, seat cover with upholstery

Driver's airbag

- Components
 - Airbag module
 - Steering wheel
 - Steering column (if damaged)
- Procedure
 - Check components, replace if necessary
 - Replace steering wheel

Passenger airbag

- Components
 - Airbag module
 - Dashboard trim panel (must be replaced with vehicles without replaceable airbag cover!)
 - Supporting tube (if damaged)
- Procedure
 - Check components, replace if necessary

Side airbag, front/rear

- Components
 - Airbag module
 - Door trim panel
 - Door in white
 - Seat
- Procedure
 - Check components, replace if necessary

Head airbag

- Components
 - Airbag module
 - Trim, A-pillar
 - Roofliner
 - Trim, B-pillar (if damaged)
 - Trim, C-pillar (if damaged)
 - Connection/mount (on side frame)
- Procedure
 - Check components, replace if necessary

Knee airbag

- Components
 - Panel (driver's side)
 - Lower section of glovebox
 - Knee protection (driver's and passenger sides)
- Procedure
 - Replace faulty components

Passive knee protection

- Components
 - Trim panels (driver's side)
 - Glovebox incl. knee protection (front passenger side)
- Procedure
 - Replace faulty components
 - Check retaining element

72 SAFETY PRECAUTIONS AND GENERAL INFORMATION

SAFETY PRECAUTIONS AND GENERAL INFORMATION

Safety instructions	<u>SAFETY REGULATIONS</u> for handling airbag modules, airbag components and pyrotechnical seat belt tensioners
	<u>NOTES ON SCRAPPING</u> vehicles with gas generators
	Deactivation/activation pyrotechnical components. See <u>DEACTIVATING FRONT PASSENGER AIRBAGS WITH KEY-OPERATED SWITCH</u> and <u>DEACTIVATION OF AIRBAGS</u>
	<u>UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS</u>
Handling electrical and electronic equipment	<u>REPAIRING AIRBAG LEADS</u>
	<u>HANDLING OPTICAL FIBRES</u>
	<u>CHECK SEAT BELT</u>

Check	<u>CHECKLIST FOR SEAT BELT</u>
Airbag system	Functional description and checking, refer to DIS
	Deactivating airbags. See <u>DEACTIVATING FRONT PASSENGER AIRBAGS WITH KEY-OPERATED SWITCH</u> and <u>DEACTIVATION OF AIRBAGS</u> .
	<u>PROCEDURE AFTER AIRBAG TRIGGERING</u> .

72 00... SAFETY REGULATIONS FOR HANDLING COMPONENTS WITH GAS GENERATORS

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

IMPORTANT: Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- Head airbag (ITS, AHPS)
- Active knee protection
- Active head restraint
- Safety battery terminal (SBK)

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1.

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Disassembly and assembly

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
 - 30 minutes for vehicles up to 9/93;
 - 1 minute for vehicles from 9/93
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75 °C.
- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Before installing, subject airbag system components (including electronic diagnostic components) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW diagnostic system / DIS.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing upwards. Otherwise the generator will be thrown upwards if it is fired.
- Do not point the firing pellet of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
 - Disconnect battery
 - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module - wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.

SEAT BELTS

72 11... CHECK LIST FOR AUTOMATIC SEAT BELT

Was the automatic seat belt with lower strap replaced after an accident, e.g. frontal and/or oblique collision in which the impact absorbers/deformation elements were permanently deformed? (only while seat belt was fastened)	NO: Replace complete automatic seat belt. The following must also be checked and replaced, if necessary: - seatbelt mounts on the vehicle body - seatbelt mounts on the seat - seat rails YES: <i>see next item below</i>
Does seat belt lock when pulled out suddenly?	NO: Replace automatic seat belt (upper seat belt). YES: <i>see next item below</i>
Does the automatic reel eliminate the belt slack?	NO: Replace automatic seat belt (upper seat belt). YES: <i>see next item below</i>
Can the seat belt strap be pulled out without jamming?	NO: Automatic reel is loose - tighten reel. If fault persists: Return spring broken - replace automatic seat belt (upper seat belt). YES: <i>see next item below</i>
Does the strap on the front seat belts retract automatically? Does the strap on the rear seat belts retract automatically? (a small remaining loop is acceptable if this remaining loop is fully retracted when the seat belt strap is readjusted)	NO: Automatic reel is loose - tighten reel. Excessive friction in belt guides - replace automatic seat belt (upper strap). Return spring broken - replace automatic seat belt (upper seat belt). YES: <i>see next item below</i>
Does automatic reel make a squeaking noise when belt is fastened or unfastened?	YES: Excessive friction in belt guides - replace automatic seat belt (upper strap). Automatic reel is loose - tighten reel. Return spring broken - replace automatic seat belt (upper seat belt).

	<p>.....</p> <p>NO: <i>see next item below</i></p>
Is the plastic casing on the belt tongue free from damage in the area of the belt opening?	<p>NO: Replace complete automatic seat belt</p> <p>.....</p> <p>YES: <i>see next item below</i></p>
Is the fully extended seat belt strap free from: - pinches? - burn marks? - tears and cuts? - creasing? - unraveling?	<p>NO: Replace complete automatic seat belt</p> <p>.....</p> <p>YES: <i>see next item below</i></p>
When the seat belt is fastened, is the belt tongue ejected by spring pressure from the buckle when the "red button" is pressed?	<p>NO: Replace complete automatic seat belt</p> <p>.....</p> <p>YES: <i>see next item below</i></p>
Does fastened seat belt lock during emergency braking on a dry roadway at double walking speed?	<p>NO: Replace complete automatic seat belt</p> <p>.....</p> <p>YES: <i>see next item below</i></p>
Is fully pulled-out seat belt strap free of serious dirt and other marks?	<p>NO: If dirt and marks cannot be removed with commercially available mild detergent, the automatic seat belt (upper seat belt) must be replaced.</p> <p>.....</p> <p>YES: <i>see next item below</i></p>
In the case of seat-integrated seat belts, is front tongue of reclining mechanism or seat rail free of deformation?	<p>NO: Replace both damaged parts and complete automatic-reel seat belt. The following must also be checked and replaced, if necessary: - seatbelt mounts on the vehicle body - seatbelt mounts on the seat - seat rails</p> <p>.....</p> <p>YES: <i>see next item below</i></p>
The automatic seat belt is OK!	

72 11... CHECKING AUTOMATIC SAFETY BELT

General considerations when checking seat belts:

The seat belts must be checked after an accident.

For the check, you should start by trying to get information on which seats in the car involved in the accident were occupied. If this is not possible, check all the seat belts in the car and replace them if necessary.

In the event of deformations on the car, you must subject the components of the restraint system affected in this area such as e.g.

- Seat belt
- Seatbelt height adjustment
- Belt buckle tensioner
- Triggering sensors
- etc.

to a function check and a visual inspection.

If you are in any doubt as to the unimpaired functional capability of restraint system components, these components must be replaced in the interests of safety!

If a seat belt has to be replaced following an accident (e.g. in the event of a frontal and/or side impact with permanently deformed impact dampers/deformation elements or cross-members), the complete seat belt must be replaced! The complete seat belt comprises:

- Upper belt
- Lower strap
- Seat belt buckle (buckle tensioner)
- Seatbelt height adjustment
- Retaining screws of all components

The following must also be checked and if necessary replaced:

- Seatbelt mounts on the car body
- Seatbelt mounts on the seat
- seat runners.
- Seat structure (frame, etc.)

Alignment tests on the seat and the seat runners are not permitted!

The following explanations and the **CHECKLIST** for the automatic safety belt can provide help.

An unusable seat belt or a seat belt worn in a serious accident should be destroyed immediately after removal to guarantee that it cannot be used again.

Checking automatic reel and seatbelt strap:

The automatic reel has two independent activation systems for seat-belt locking.

The first activation system locks the automatic reel when driving quickly around curves, driving in tight curves, on extreme inclinations (vehicle rolls over) and during sharp braking or impact.

To check, the seat backrest must be placed in the upright position and both hands held in a supporting position close to the steering wheel. The brakes are then applied fully while driving on a dry surface and at a road speed equal to twice that of walking speed.

The seat belt must lock.

The second activation system provides additional safety and is controlled by inertia mass.

If the reel locks when the strap is pulled out suddenly, this system is also OK.

Automatic reel does not require servicing and must not be opened.

Precondition for complete, problem-free retraction of straps:

- the straps must not be twisted!
- the straps must not be damaged!

When placed to one side, the straps of the front seats must retract fully.

With the straps in the rear seat bench, a small remaining loop is acceptable due to increased friction between the strap and the rear seat bench cover if:

- this remaining loop is fully retracted when the strap is reguided.

Belt straps should only be cleaned with a luke-warm soap solution or a commercial laundry detergent.

Belt straps must never be cleaned chemically or dyed.

The automatic reel and strap must be replaced in the event of:

1. creases
2. unravelling
3. pinches
4. cracks and tears
5. traces of melting
6. traces of wear on casing of seat belt tongue or on reversing clip.

Checking lower strap (belt buckle tensioner):

To fasten a seat belt, the tongue should insert easily and with a loud click in the lock.

When the "Red button" is pressed, the tongue must be ejected from the lock under spring pressure.

If the lock cover is missing or damaged, the lower strap must be replaced.

Replace the triggered belt buckle tensioner including the complete seat belt with seatbelt height adjustment and retaining screws and check the

- Seatbelt mounts on the car body
- Seatbelt mounts on the seat
- seat runners.
- Seat structure.

Criteria for a triggered mechanical belt buckle tensioner:

- very low position of seatbelt buckle (comparisons with new part).

Criteria for a triggered pyrotechnical belt buckle tensioner:

- very low position of seatbelt buckle (comparisons with new part).
- Airbag warning lamp permanently lit: read out airbag system fault memory.

The belt buckle tensioners can be triggered under certain circumstances even when the seat is not occupied. If it is definite that the belt system was not used (seat was not occupied), there is no need to replace the:

- upper strap
- attachment parts (belt height adjustment, screws)
- seatbelt mounts on the car body
- Seatbelt mounts on the seat
- seat rails.

after a check.

Checking anchor fitting tensioner:

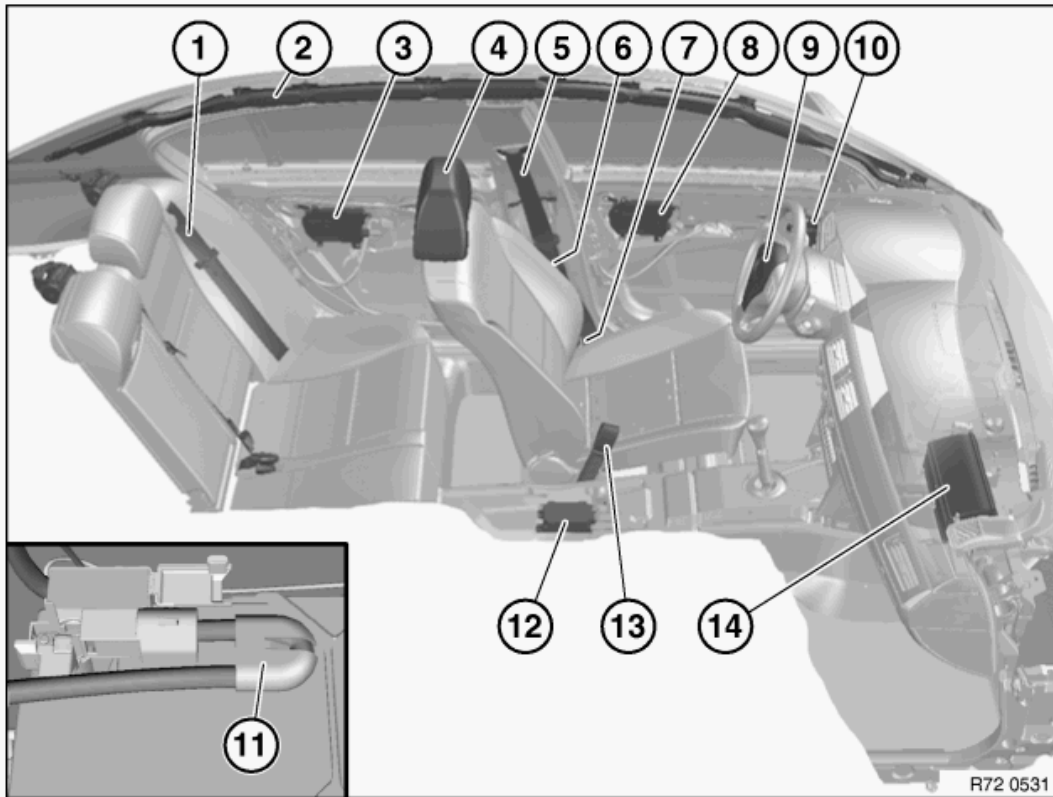
Replace the triggered anchor fitting tensioner including the complete seat belt with seatbelt height adjustment, lower strap and retaining screws and check the

- Seatbelt mountings on the car body
- Seatbelt mountings on the seat
- Seat runners
- Seat structure

Criteria for a triggered anchor fitting tensioner:

- A triggered anchor fitting tensioner can be recognized from the wrapped belt strap around the shaft.
- Airbag warning lamp permanently lit: read out airbag system fault memory.

72 12... OVERVIEW OF AIRBAG MODULES, SEAT BELTS AND AIRBAG CONTROL UNITS



- | | |
|--|--|
| 1 Seat belt, rear, complete | 8 Airbag module, door, front left/right |
| 2 Head airbag, left/right | 9 Airbag unit, driver's side |
| 3 Airbag module, door, rear left/right | 10 Door module, driver/front passenger |
| 4 Active head restraint, front left/right | 11 Safety battery terminal |
| 5 Seat belt, front left/right | 12 Satellite, vehicle center |
| 6 Satellite, B-pillar, left/right | 13 Seat belt tensioner, front left/right |
| 7 ECE only: Anchor fitting tensioner, driver's side | 14 Airbag module, front passenger side |

Fig. 8: Overview Of Airbag Modules, Seat Belts And Airbag Control Units
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 021 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SEAT BELT (REEL)

Necessary preliminary tasks:

- Remove **PANEL FOR DOOR POST**
- Remove outer trim on front seat. See **REMOVING AND INSTALLING/REPLACING OUTER COVER ON LEFT OR RIGHT FRONT SEAT (BASIC/ELECTRIC)** or **REMOVING AND INSTALLING/REPLACING OUTER COVER ON LEFT OR RIGHT FRONT SEAT (COMFORT)**

NOTE: Version with anchor fitting tensioner for driver's seat only.

Release screw (1).

Tightening torque **72 11 05AZ** .

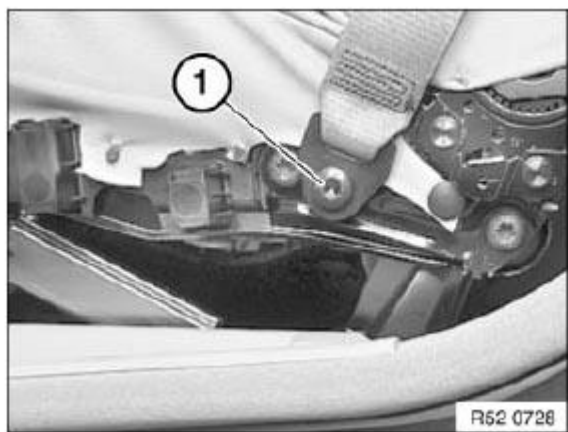


Fig. 9: Identifying Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **72 11 03AZ** .

Remove belt guide (2).

Unscrew bolt (3).

Tightening torque **72 11 03AZ** .

Remove belt (4).

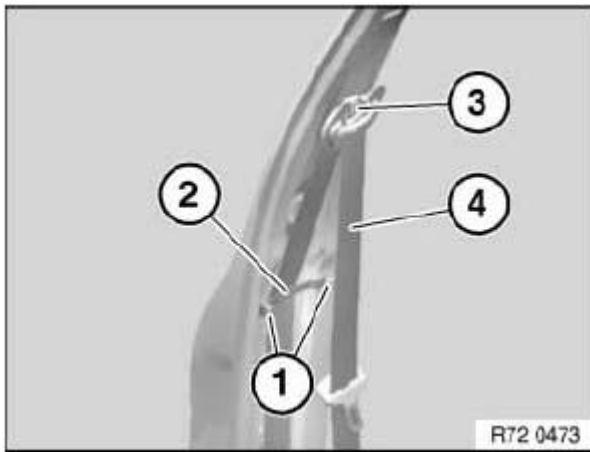


Fig. 10: Identifying Screws, Belt Guide, Bolt And Belt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 01AZ** .

Remove automatic reel (3).

Installation:

Coding (2) of automatic reel must be seated in body opening.

Retaining screw (1) locates automatic reel in position.

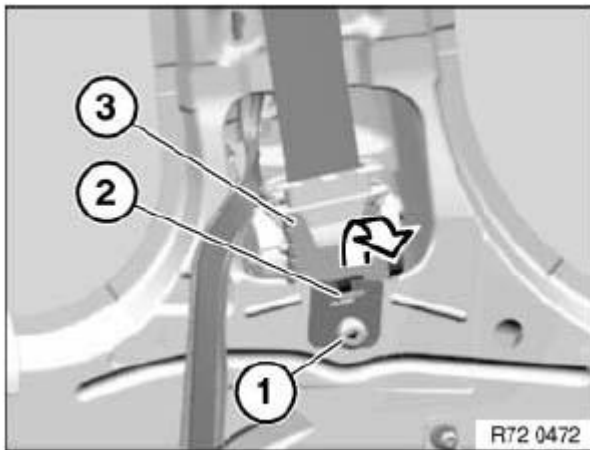


Fig. 11: Identifying Retaining Screw, Automatic Reel And Coding
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 033 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT SEAT BELT (REEL)

Necessary preliminary tasks:

Remove **PANEL FOR DOOR POST**

WARNING: Read and comply with **SAFETY REGULATIONS** for handling airbag modules and pyrotechnical belt tensioners. Improper handling can lead to triggering of the pyrotechnical seat belt tensioner or side airbag, resulting in injuries.

Switch off ignition!

Manual/semi-electric seat adjustment only:

Lever out plug (1).

Release screw (2).

Tightening torque **72 11 05AZ** .

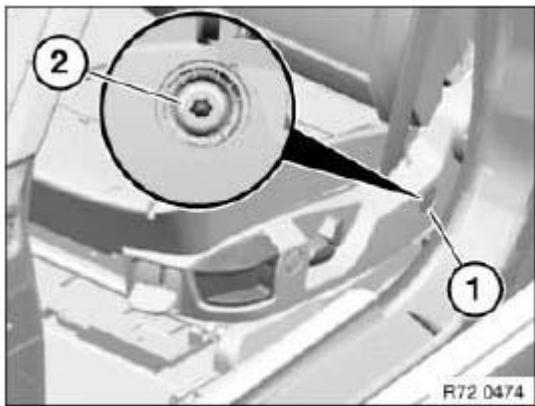


Fig. 12: Identifying Plug And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Driver's seat with anchor fitting tensioner only: (from 04/2004)

If necessary, detach felt.

Using screwdriver, press pin (1) into recess and release anchor fitting (2).

Installation:

Anchor fitting (2) is coded.

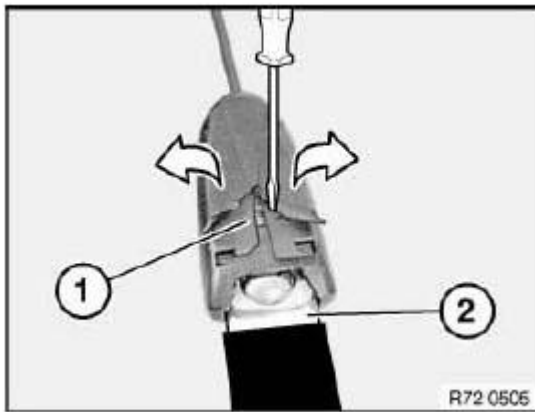


Fig. 13: Pressing Pin With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **72 11 03AZ** .

Remove belt guide (2).

Unscrew bolt (3).

Tightening torque **72 11 02AZ** .

Remove belt (4).

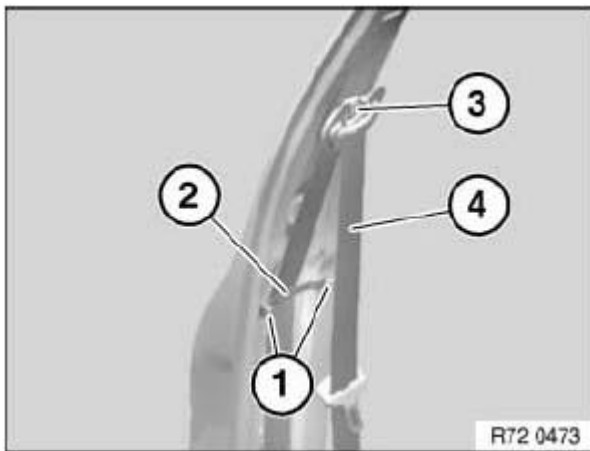


Fig. 14: Identifying Screws, Belt Guide, Bolt And Belt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 01AZ** .

Remove automatic reel (3).

Installation:

Coding (2) of automatic reel must be seated in body opening.

Retaining screw (1) locates automatic reel in position.

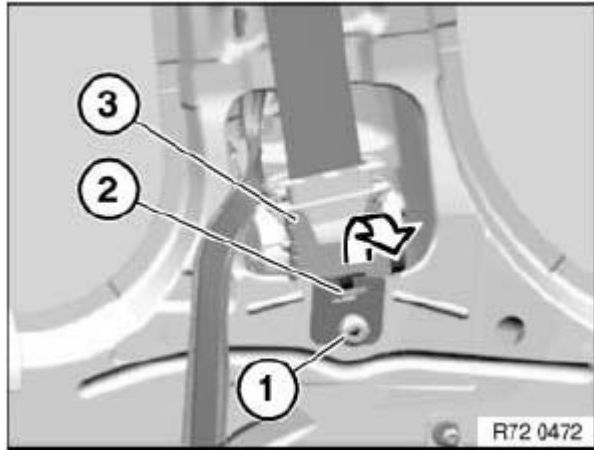


Fig. 15: Identifying Retaining Screw, Automatic Reel And Coding
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 041 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT LOWER BELT FITTING (SEAT BELT TENSIONER)

Necessary preliminary tasks:

- Remove **SEAT**

WARNING: Read and comply with **SAFETY REGULATIONS** for handling airbag modules and pyrotechnical belt tensioners. Improper handling can lead to triggering of the pyrotechnical seat belt tensioner or side airbag, resulting in injuries.

Switch off ignition!

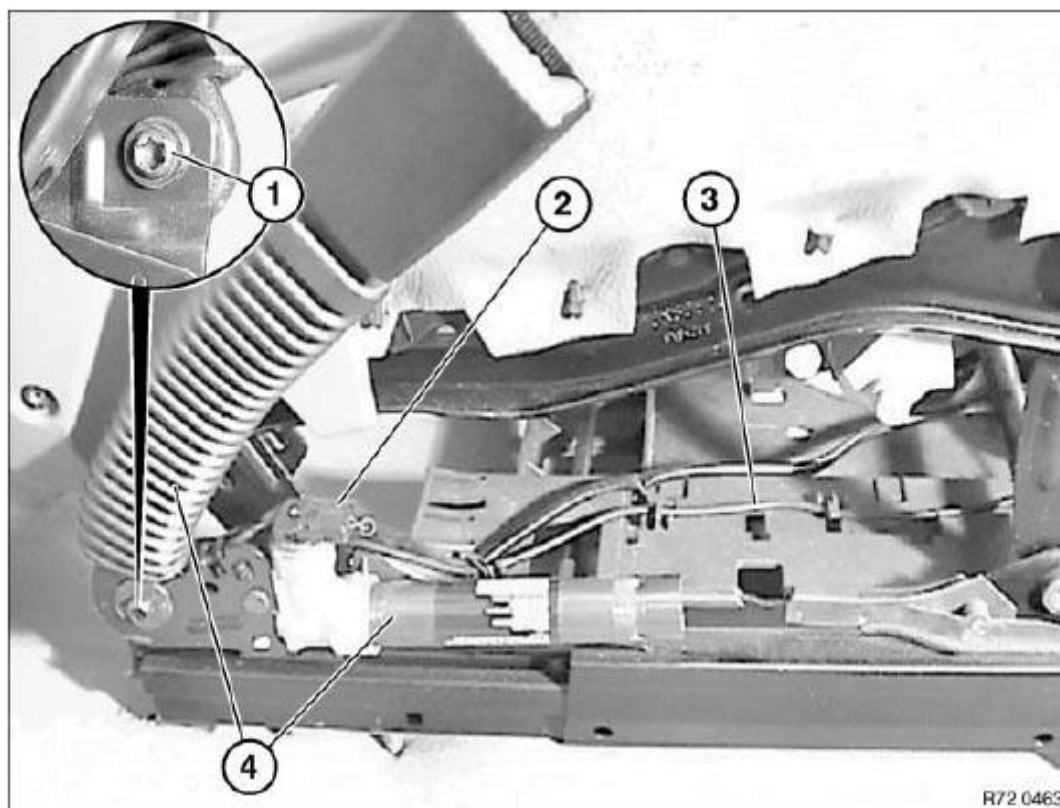


Fig. 16: Identifying Screw, Plug Connection, Lead And Lower Strap (Belt Tensioner)

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 06AZ** .

Disconnect **PLUG CONNECTION** (2) and plug connection of lead (3).

Remove lower strap (belt tensioner) (4).

72 11 050 REMOVING AND INSTALLING/REPLACING FRONT BELT ANCHOR FITTING TENSIONER (DRIVER SEAT ONLY)

WARNING: Read and comply with **SAFETY REGULATIONS** for handling airbag modules and pyrotechnical belt tensioners. Improper handling can lead to triggering of the pyrotechnical seat belt tensioner or side airbag, resulting in injuries.

Switch off ignition!

Necessary preliminary tasks:

Remove **UPPER RAIL TRIM**

Disconnect cable straps.

Installation:

Replace faulty cable straps.

Plug connection must not be under tension.

Unfasten plug connection (1) and disconnect.

Release screw (2).

Tightening torque **72 11 08AZ** .

Remove anchor fitting tensioner (3).

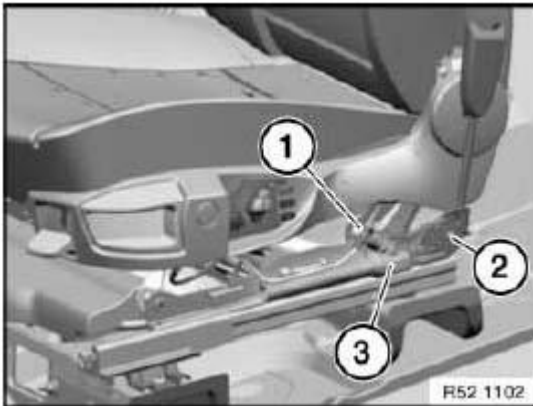


Fig. 17: Identifying Plug Connection, Screw And Fitting Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Secure plug connection with felt strip against unlocking.

If necessary, detach felt.

Using screwdriver, press pin (1) into recess and release anchor fitting (2).

Installation:

Anchor fitting (2) is coded.

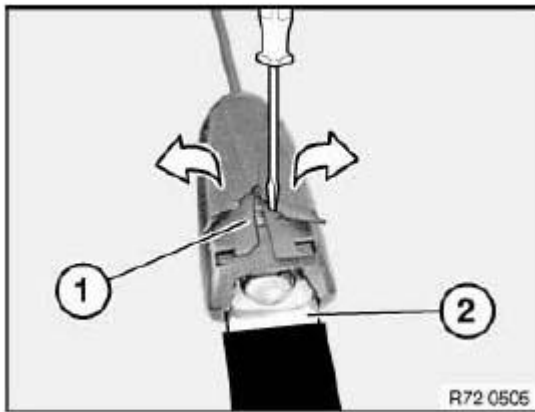


Fig. 18: Pressing Pin With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 102 REMOVING AND INSTALLING/REPLACING ALL REAR SEAT BELTS

Necessary preliminary tasks:

- Remove **PANEL FOR REAR WINDOW SHELF**
- Remove **REAR SEAT**

Removing left and right inertia reel units:

Release screw (1) on left and right inertia reel units (2).

Tightening torques **72 11 20AZ**

Remove left and right inertia reel units (2).

Removing middle inertia reel unit:

Unscrew bolt (3).

Tightening torques **72 11 20AZ** .

Remove inertia reel unit (4).

Installation:

Guide lug of inertia reel unit (4) must be correctly seated in opening in body.

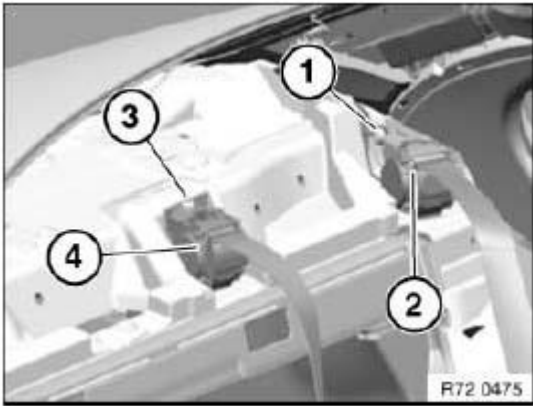


Fig. 19: Identifying Screw, Inertia Reel Units And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pay attention to coding on inertia reel unit (1) and on body (2).

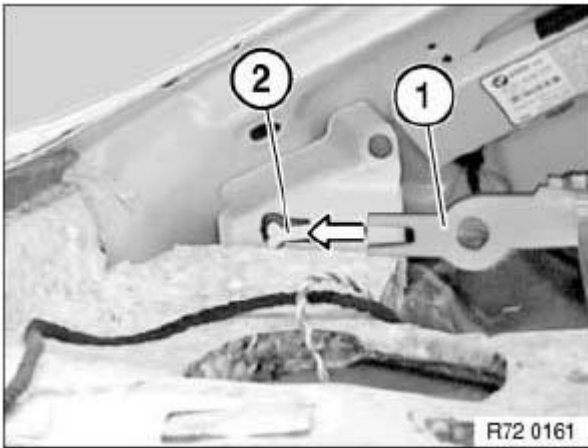


Fig. 20: Identifying Inertia Reel Unit And Body
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2) on left and right.

Tightening torques **72 11 22AZ** .

Remove left and right seat belts (1).

Installation:

Secure fittings of left and right seat belts (1) through guides (2) and stop (3).

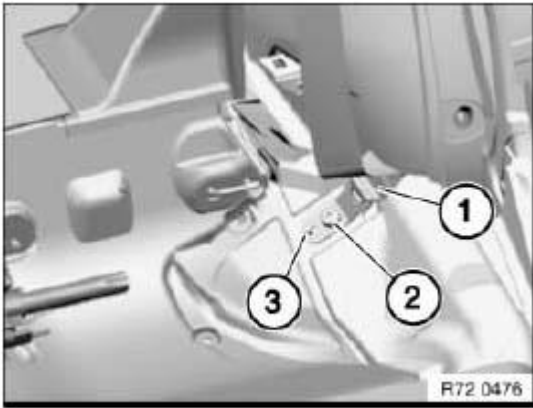


Fig. 21: Identifying Screws And Seat Belts
Courtesy of BMW OF NORTH AMERICA, INC.

Removing lower strap receptacles:

Release screws (1).

Tightening torque **72 11 23AZ** .

Remove lower strap receptacles (2).

Remove middle upper strap (3).

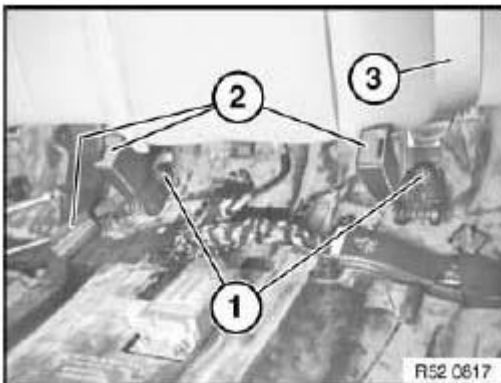


Fig. 22: Identifying Screws, Lower Strap Receptacles And Middle Upper Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Ensure correct installation sequence and installation position:

- Fittings of center lower strap/center upper strap must rest on stop (1).
- Secure lower strap on left and right through guides (2).

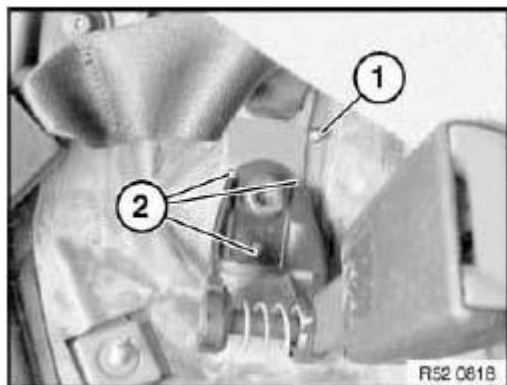


Fig. 23: Identifying Stop And Guides
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 302 REMOVING AND INSTALLING/REPLACING ALL SEAT BELTS (COMFORT)

Necessary preliminary tasks:

- Remove **TRIM FOR PARCEL SHELF**
- Remove **REAR SEAT**

WARNING: Read and comply with **SAFETY REGULATIONS** for handling airbag modules and pyrotechnical belt tensioners. Incorrect handling may trigger the pyrotechnical seatbelt tensioner or side airbag and thereby cause injuries.

Switch off ignition!

Removing left and right seat belts:

Release screw (1) from automatic reel (2) on left and right.

Tightening torques **72 11 20AZ** .

Remove automatic reels (2) on left and right.

Unscrew bolt (3).

Tightening torque **72 11 20AZ** .

Remove automatic reel (4).

Installation:

Guide lug of automatic reels (2 & 4) must be seated in body opening.

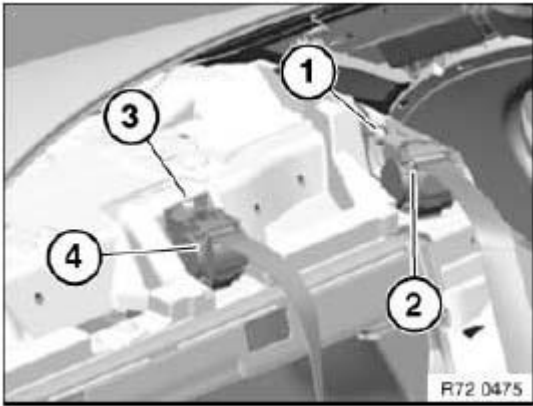


Fig. 24: Identifying Screws, Automatic Reel And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2) on left and right.

Tightening torque **72 11 22AZ** .

Remove left and right seat belts (1).

Installation:

Secure fittings of seat belts (1) on left and right through stop (3) in guide.

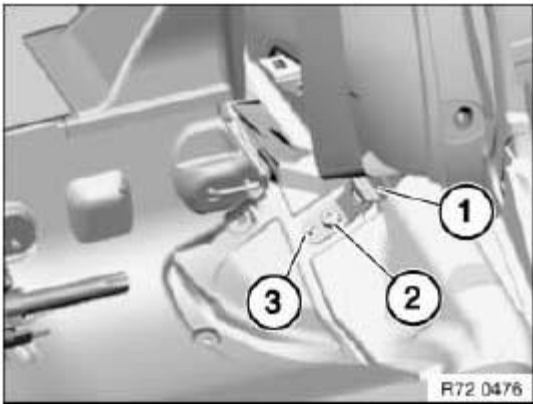


Fig. 25: Identifying Screws And Seat Belts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **72 11 23AZ**

Remove lower strap (2) on left and right.

Remove lower strap (3).

Installation:

Holder for lower strap (3) must be fitted below lower strap on right (2).

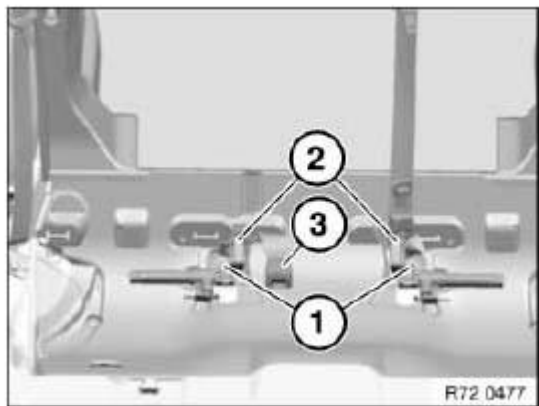


Fig. 26: Identifying Screws And Lower Strap
Courtesy of BMW OF NORTH AMERICA, INC.

GAS GENERATOR/AIRBAG

52 13 385 REPLACING GAS CARTRIDGE (PYROACTIVATOR) FOR CRASH-ACTIVE HEAD RESTRAINT ON FRONT SEAT

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt pretensioners. Incorrect handling may result in triggering of the crashactive head restraint and thereby cause injury.

Switch off ignition!

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**
- Remove crash-active head restraint. See **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT CRASH-ACTIVE HEAD RESTRAINT (NORMAL, MANUAL)** or **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT CRASH-ACTIVE HEAD RESTRAINT (COMFORT)** .

IMPORTANT: The pyrotechnical device may be replaced up to 5 times. Triggering frequency is denoted on the sticker on the head restraint carrier. Stickers are available as spare parts.

Starting situation:

Head restraint is in the crash position after being triggered.

NOTE: Pyroactivator can only be removed in the triggered state.

The complete crash-active head restraint must be replaced if the event of a head restraint fault signal and an untriggered pyroactivator.



Fig. 27: Identifying Head Restraint In Crash Position
Courtesy of BMW OF NORTH AMERICA, INC.

Removing cover:

Raise cover (1) and pull towards rear.



Fig. 28: Removing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Removing pyrotechnical device:

Press together retainer (1) for pyrotechnical device at lugs.

Feed out pyrotechnical device.

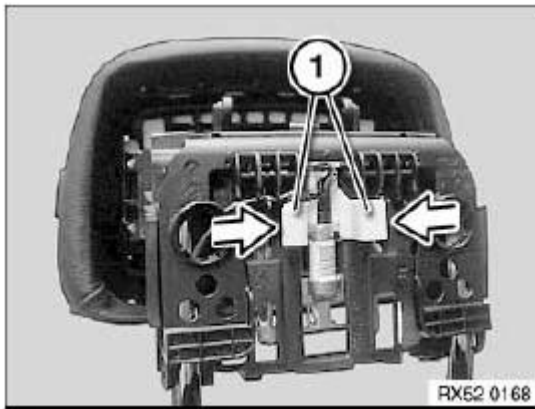


Fig. 29: Pressing Together Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Removing pyroactivator:

Pull pyroactivator (2) out of mounting (1) for pyrotechnical device.

Unlock **PLUG CONNECTION** (3) and disconnect.

IMPORTANT: Dispose of plastic element and pyroactivator.

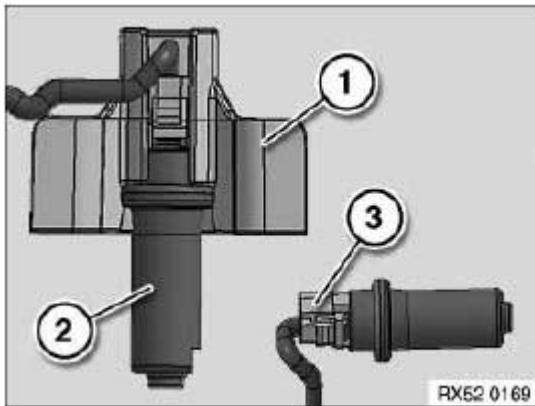


Fig. 30: Identifying Pyroactivator, Mounting And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure for installing pyrotechnical device:

Bringing head restraint together - version without button (MFS):

Pull spring catches apart and push head restraint together.

Maintain position.

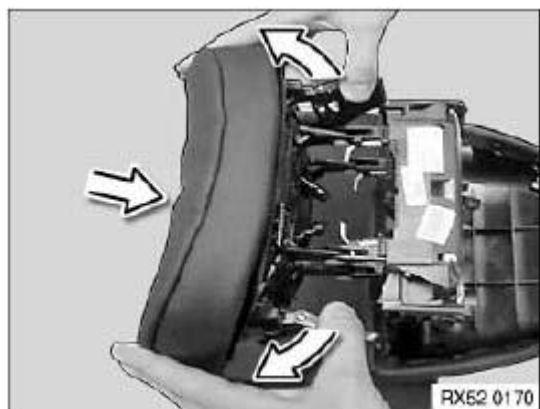


Fig. 31: Pulling Spring Catches And Pushing Head Restraint Together
Courtesy of BMW OF NORTH AMERICA, INC.

Bringing head restraint together - version with button (Basic):

Press button (1) and push head restraint together.

Maintain position.

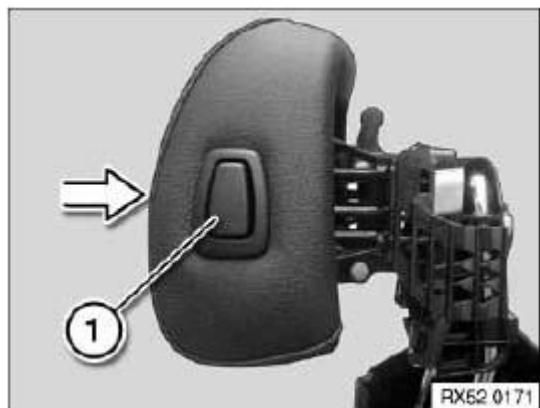


Fig. 32: Identifying Button
Courtesy of BMW OF NORTH AMERICA, INC.

Locking release plate:

Hold pushed-together head restraint in position and push release plate (1) upwards up to stop.

Release plate (1) must audibly snap into place.

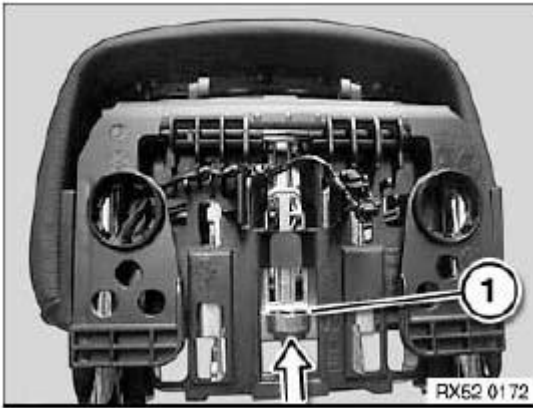


Fig. 33: Pushing Release Plate

Courtesy of BMW OF NORTH AMERICA, INC.

Checking head restraint lock:

Check end position of release plate (1).

All four springs must be engaged (snapped into place).

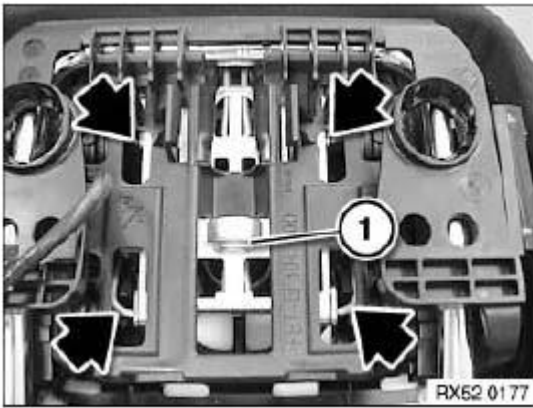


Fig. 34: Identifying Release Plate

Courtesy of BMW OF NORTH AMERICA, INC.

Replacing pyrotechnical device:

Connect plug (1) to new pyroactivator (2) and **LOCK**.

Clip pyroactivator (2) into new mounting (3).

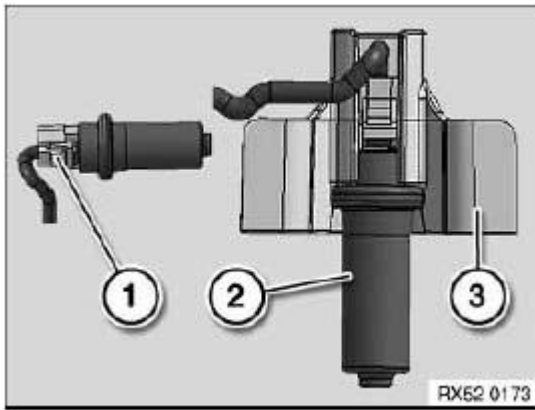


Fig. 35: Identifying Plug, Pyroactivator And Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Installing pyrotechnical device:

Press together retainer for pyrotechnical device at lugs.

Insert retainer for pyrotechnical device into release plate and tilt in upward direction.

Retainer for pyrotechnical device must audibly snap into place.

NOTE: Check seating of retaining lugs in retainer.

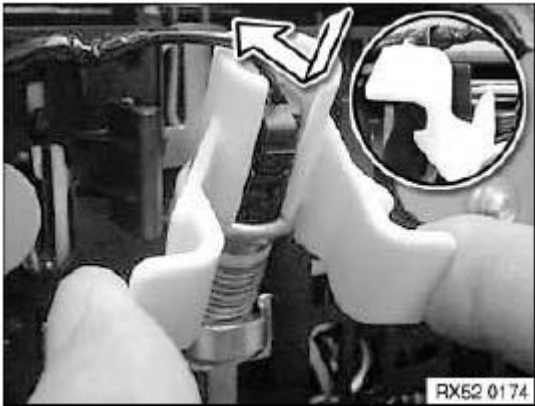


Fig. 36: Pressing Retainer For Pyrotechnical Device Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Laying wiring harness:

Secure wiring harness in carrier section with strain relief.

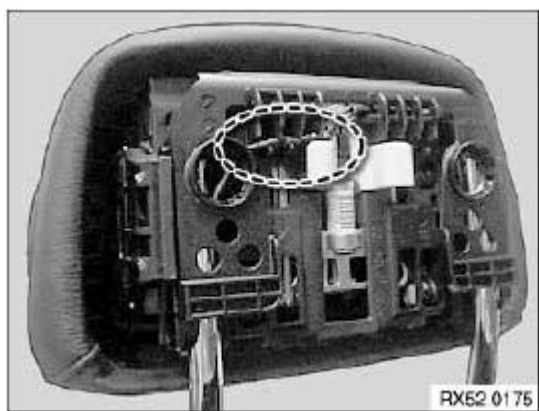


Fig. 37: Identifying Carrier Section With Strain Relief
Courtesy of BMW OF NORTH AMERICA, INC.

Mounting cover:

Clip cover onto carrier section.

Cover must audibly snap into place.



Fig. 38: Pulling Mounting Cover
Courtesy of BMW OF NORTH AMERICA, INC.

61 00... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations:

Safety regulations for **HANDLING COMPONENTS OF AIRBAG SYSTEM**.

INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

Procedure for cable repair

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of them being mixed up! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in car parallel to existing airbag lead.

Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the connectors and shrink-fit hoses in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colors. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

CUTTING OFF AND INSULATING CABLES .

REPAIRING A PLUG CONNECTION USING CONNECTORS .

INSTALLING AND REMOVING CONTACTS .

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables. Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

CUTTING OFF AND INSULATING CABLES .

REPAIRING A PLUG CONNECTION USING CONNECTORS .

INSTALLING AND REMOVING CONTACTS .**72 12... DEACTIVATING FRONT PASSENGER AIRBAGS WITH KEY-OPERATED SWITCH**

WARNING: The responsibility for deactivation/activation rests with the customer. Depending on the occupation of the front passenger seat, the front passenger and side airbags must be (de-) activated in accordance with the Owner's Handbook.

The passenger airbag can only be deactivated in accordance with the following instructions if the vehicle is equipped with a suitable key-operated switch!

The key-operated switch can be retrofitted if it is missing and has been ordered as an optional extra.

Key-operated switch:

- Optional extra SA 5DA for MINI
- Optional extra SA 470 for BMW

E83 up to 09/2004 only:

see **DEACTIVATION OF AIRBAGS**

E83 from 09/2004 only:

Deactivation via key-operated switch, see following work steps

R50/R53 up to 04/2004 only:

see **DEACTIVATION OF AIRBAGS**

R50/R53 from 04/2004 only:

Deactivation via key-operated switch, see following work steps

The following airbags are deactivated simultaneously with the key-operated switch (1):

- Passenger airbag
- Side airbag (passenger side)
- If necessary, knee airbag in US models (passenger side)

The airbags can only be deactivated/reactivated while the vehicle is stationary and with the door open.

IMPORTANT: The head airbag remains active.

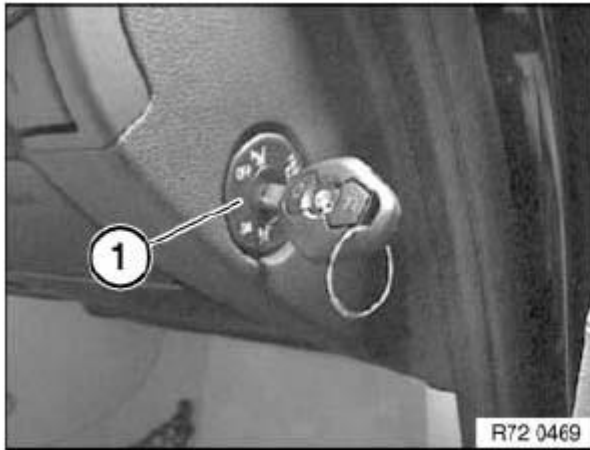


Fig. 39: Identifying Key-Operated Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Deactivation

1. Turn key-operated switch with ignition key to "OFF" position.

Deactivatable airbags on passenger side out of operation.

Head airbag on passenger side remains active.

All airbags on driver side remain active.

Activation

2. Turn key-operated switch with ignition key to "ON" position.

All the airbags in the vehicle are activated and are triggered in appropriate situations.

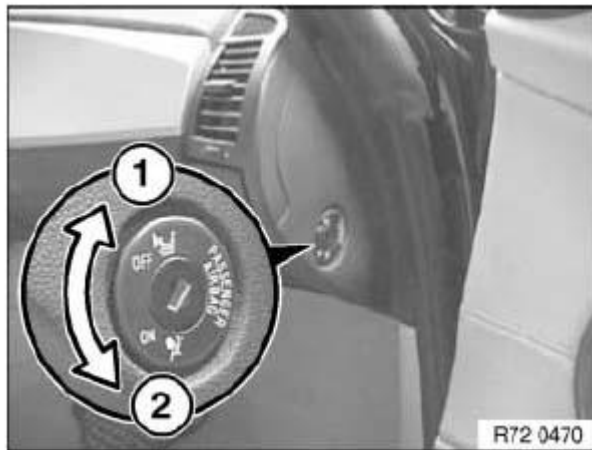


Fig. 40: Turning Key-Operated Switch With Ignition Key
 Courtesy of BMW OF NORTH AMERICA, INC.

Warning lamp

When the ignition key is turned in the ignition lock, the function of the airbag system is checked and the warning lamp in the center console lights up for several seconds.

1. The warning lamp is permanently lit when the passenger airbags are deactivated
2. The warning lamp goes out after a few seconds when the passenger airbags are activated

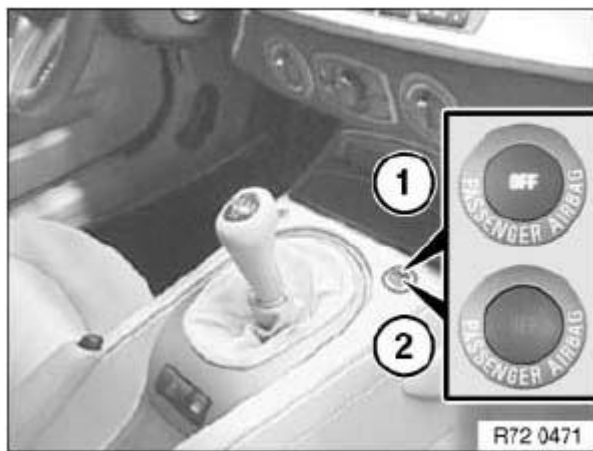


Fig. 41: Identifying Warning Lamp Of Passenger Airbags
 Courtesy of BMW OF NORTH AMERICA, INC.

72 12... DEACTIVATION OF AIRBAGS

WARNING:

- The responsibility for (de-)activation rests with the customer.

The airbags should always be deactivated if the front passenger seat is fitted with a child seat.

- Customer consent must be documented.
- Observe notes and instructions on (de-)activation procedure.

The following airbags can be (de-)activated:

- Passenger airbag
- Side airbag (front passenger), front
- Side airbag (front passenger), rear

IMPORTANT: Head airbag on passenger side remains active.

R50/R53 up to 04/2004 and E83 up to 09/2004 only:

For details of deactivation, see following work steps.

R50/R53 from 04/2004 and E83 from 09/2004 only:

see **DEACTIVATING FRONT PASSENGER AIRBAG** with key-operated switch.

Necessary preliminary tasks:

- Read and comply with **SAFETY REGULATIONS**
- Disconnect battery. See **INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** and **REMOVING AND INSTALLING OR REPLACING BATTERY**.

Passenger airbag

NOTE: **Seat occupancy detector remains connected.**

- Expose plug connection of **PASSENGER AIRBAG**
- Disconnect **PLUG CONNECTION**
- Tie back disconnected cable and secure with cable strap (rattling noises)
- Stick on warning signs (see below)
- Code Airbag Control Unit (see DIS)
- Documentation of customer consent and storage in car's file
- Replacement of **PASSENGER BELT** with belt force limitation by version without belt force limitation

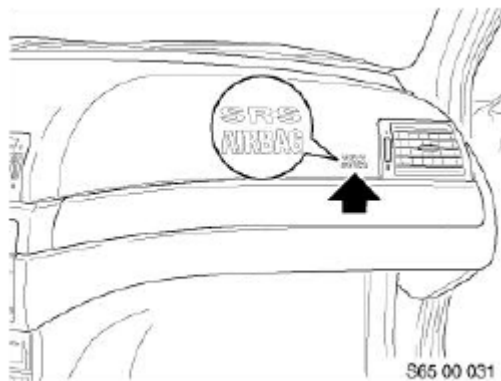


Fig. 42: Locating Passenger Airbag Label
Courtesy of BMW OF NORTH AMERICA, INC.

Side airbag, front

- Expose plug connection of side airbag. See **REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)** or **REMOVING AND**

INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (UP TO 03/2007) .

- Disconnect **PLUG CONNECTION** of corresponding side airbags
- Tie back disconnected cables and secure with cable strap (rattling noises)
- Stick on warning signs (see below)
- Code airbag control unit (see DIS)
- Documentation of customer consent and work in car's file
- Entry in car's documents (Germany only)

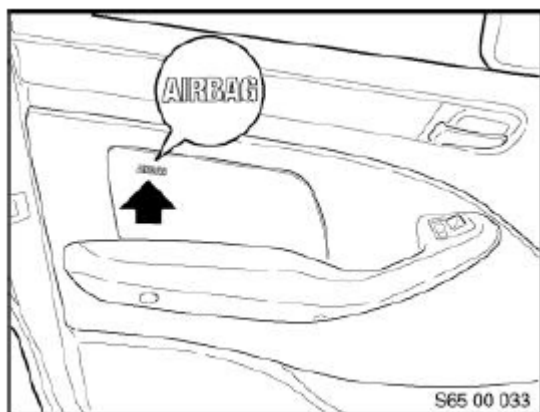


Fig. 43: Locating Side Airbag Label, Front
 Courtesy of BMW OF NORTH AMERICA, INC.

Side airbag, rear

- Expose plug connection of side airbag. See **REMOVING AND INSTALLING REAR LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)** or **REMOVING AND INSTALLING REAR LEFT OR RIGHT DOOR TRIM PANEL (UP TO 03/2007)** .
- Disconnect **PLUG CONNECTION** of corresponding side airbags
- Tie back disconnected cables and secure with cable strap (rattling noises)
- Stick on warning signs (see below)
- Code airbag control unit (via CIP)
- Documentation of customer consent and work in car's file
- Entry in car's documents (Germany only)

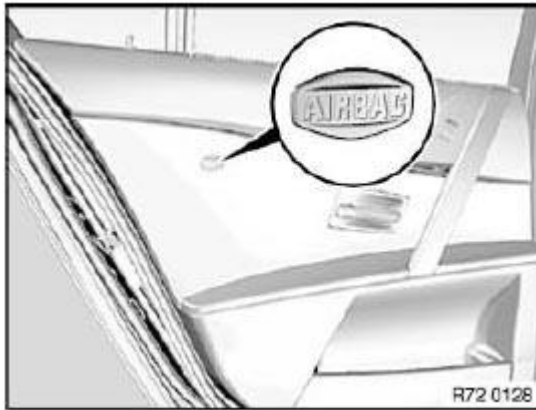


Fig. 44: Locating Side Airbag Label, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Warning sign, passenger airbag

Stick on a warning sign with the text "Passenger airbag out of operation" from the inside to the top outer edge of the windshield on the passenger side.

NOTE: Remove the warning sign when the passenger airbag is reactivated.



Fig. 45: Locating Warning Sign, Passenger Airbag Label
Courtesy of BMW OF NORTH AMERICA, INC.

Warning signs, side airbag

Stick on 2 warning signs with the text "Achtung Warning Side-Airbag" and "Side airbag out of operation" to the B-pillars (front side airbag) or C-pillars (rear side airbag) to the nearest free space below the door lock.

NOTE: Remove warning signs when reactivating side airbags.



Fig. 46: Locating Warning Signs, Side Airbag Label
Courtesy of BMW OF NORTH AMERICA, INC.

Passenger Airbag Off light (US version only)

- Remove **AIRBAG OFF INDICATOR** (POL) or trim
- Disconnect plug from Airbag Off indicator
- Tie back plug and secure with cable strap (rattling noises)
- Install trim
- Code airbag control unit

Function check (except US version)

The function of the airbag system is checked when the ignition key is turned in the ignition switch.

WARNING LAMP LIGHTS FUNCTION CHART

Warning lamp lights up:		Coding	
		before	after
1.	Warning lamp lights up continuously if an airbag is deactivated	X	
2.	Warning lamp goes out after several seconds when airbags are deactivated		X
3.	Warning lamp goes out after several seconds when airbags are activated	X	X

NOTE: A coding of the airbag control unit must be carried out so that the warning lamp goes out again after deactivation.

72 12... NOTES ON SCRAPPING VEHICLES WITH GAS GENERATORS (AIRBAG SYSTEM)

The gas generator is a pyrotechnical component and is for the most part permanently mounted on the following components:

- Airbag module
- Driver's/passenger airbag

- Side airbag
- Head airbag (e.g. AHPS2)
- Knee airbag
- Belt tensioner
- Belt buckle tensioner
- Safety battery terminal
- Active head restraint

In accordance with accident prevention regulations and specific national regulations, gas generators must be rendered unusable before they are scrapped. This is necessary because pyrotechnical objects can cause injury if improperly activated (e.g. scrapping with flame cutters).

With vehicles which are scheduled for scrapping, it is always essential prior to draining and further stripping work to ensure that all the gas generators **in the vehicle** are fired. The fired gas generators can then be scrapped together with the vehicle.

Gas generators that have not fired constitute a hazard (also to the environment)!

Firing failure:

If correct firing is not possible, the relevant components must be removed and disposed of by special waste disposal companies!

Comply with **SAFETY REGULATIONS** for handling airbag system components .

If a firing operation has failed:

- Disconnect the firing device from the battery and
- Only approach the vehicle after a few minutes have elapsed

The components of an airbag system must always be disposed of. Such components must not be sold on as used parts.

Firing:

Firing of the gas generators may only be carried out by expert personnel and under the supervision of a responsible person. Other standard accident prevention regulations (safety goggles, ear defenders etc.) must also be observed.

The gas generators must be fired from the outside in this vehicle which has been earmarked for scrapping. In this process

- the doors must be closed
- the rear lid must be open

- the side windows must be open and
- the sunroof must be open

To fire the gas generators, use the firing device with the appropriate cables (follow instructions).

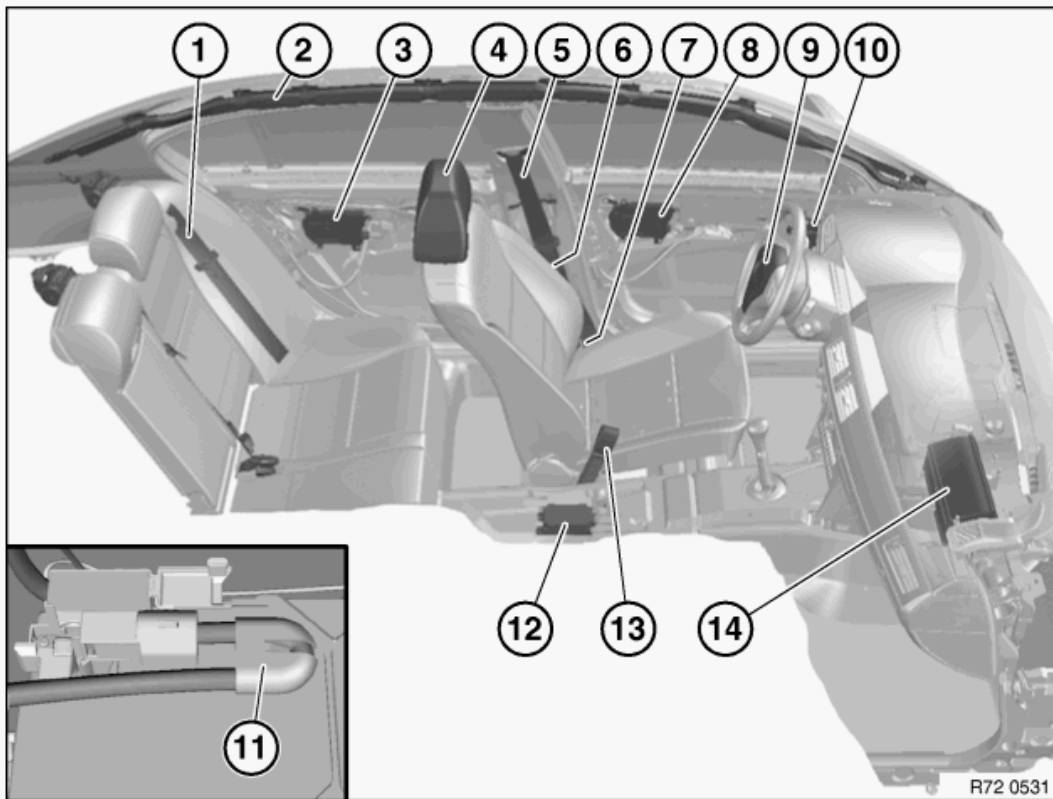
WARNING: Once gas generators have been fired, observe a ventilation period of 10 minutes with the doors opened. Only then is it permitted to continue work inside the vehicle.

Wear protective goggles and protective gloves when handling a fired gas generator!

The burning of solid fuel will heat up the airbag unit - danger of burning hands!

Wash skin with water after contact with fired gas generators!

72 12... OVERVIEW OF AIRBAG MODULES, SEAT BELTS AND AIRBAG CONTROL UNITS



- | | |
|---|--|
| 1 Seat belt, rear, complete | 8 Airbag module, door, front left/right |
| 2 Head airbag, left/right | 9 Airbag unit, driver's side |
| 3 Airbag module, door, rear left/right | 10 Door module, driver/front passenger |
| 4 Active head restraint, front left/right | 11 Safety battery terminal |
| 5 Seat belt, front left/right | 12 Satellite, vehicle center |
| 6 Satellite, B-pillar, left/right | 13 Seat belt tensioner, front left/right |
| 7 ECE only: Anchor fitting tensioner, driver's side | 14 Airbag module, front passenger side |

Fig. 47: Overview Of Airbag Modules, Seat Belts And Airbag Control Units

Courtesy of BMW OF NORTH AMERICA, INC.

72 12... PROCEDURE AFTER AIRBAG TRIGGERING AS RESULT OF AN ACCIDENT

Check and/or replace following components after airbag triggering:

Satellites (control unit + sensor)

Components

- Satellite, A-/B-pillar, left/right
- Satellite, front door
- Satellite, rear seat

- Satellite, driver's/front passenger seat
- Satellite, vehicle center
- Procedure
 - Read out fault memory
 - Disconnect battery and observe waiting period
 - Rectify faults
 - Reconnect battery and observe waiting period
 - Clear fault memory
 - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. inside lights, radio, etc.)
 - Switch ignition on
 - Clear fault memory and if necessary rectify faults

Cables and plugs

- Components and procedure
 - Check cables and plugs for damage, replace if necessary.

Belt system

- Components
 - Retractor mechanism
 - Belt buckle tensioner
 - Seatbelt height adjustment
- Procedure
 - Check components, replace if necessary

Seats

- Components
 - Seat
 - Airbag module
 - Active head restraint
- Procedure
 - Check seats (function check of seat mechanism), replace if necessary
 - Check seat screw/bolt connections
 - Replace gas generator, active head restraint system

If the severity of the impact has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

External feature: The triggered head restraint is folded forwards and engaged.

The repair work can be carried out in the car with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

The gas generator can be replaced up to 5 times.

- Replace airbag module and seat cover with padding

Driver's airbag

- Components
 - Airbag module
 - Steering wheel
 - Steering column (if damaged)
- Procedure
 - Check components, replace if necessary
 - Replace steering wheel

Passenger airbag

- Components
 - Airbag module
 - Instrument panel trim
 - Supporting tube (if damaged)
- Procedure
 - Check components, replace if necessary

Side airbag, front/rear

- Components
 - Airbag module
 - Door trim panel
 - Door in white
 - Seat
- Procedure
 - Check components, replace if necessary

Head airbag (AHPS)

- Components
 - Airbag module

- Trim, A-pillar
- Roofliner
- Trim, B-pillar (if damaged)
- Trim, C-pillar (if damaged)
- Connection/mounting (on side frame)
- Procedure
 - Check components, replace if necessary

Knee airbag

- Components
 - Panel (driver's side)
 - Lower section of glovebox
 - Active knee protector (driver's and passenger sides)
- Procedure
 - Check components, replace if necessary

Passive knee protector

- Components
 - Panel (driver's side)
 - Glovebox incl. knee protector (passenger side)
- Procedure
 - Check components for damage, replace if necessary
 - Check fastening elements

72 12... UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.

IMPORTANT: An airbag plug connection must be replaced if it is damaged.

Following versions of plug connections on airbag module/gas generator are possible:

- Airbag plug connection on gas generator/airbag module is offset by 90°
- Airbag plug connection on gas generator/airbag module is straight (3 versions)

Airbag plug connection on gas generator/airbag module offset by 90°:

There are two ways of unlocking this airbag plug connection on the gas generator/airbag module:

Method 1:

Simultaneously pull cover (1) upwards at lugs on left and right (2).

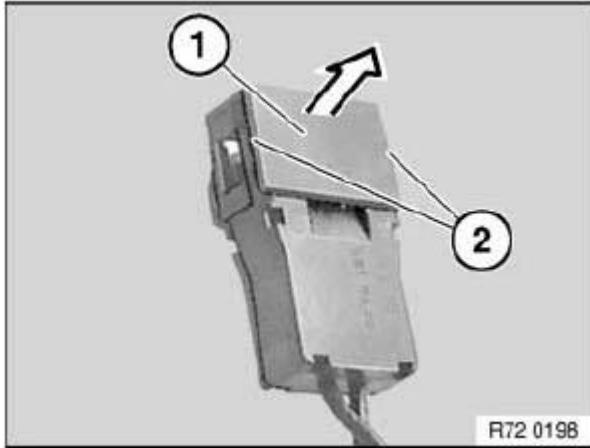


Fig. 48: Pulling Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Method 2:

Insert a narrow screwdriver into recess (1) in housing (2).

Carefully separate cover (3) off (4).

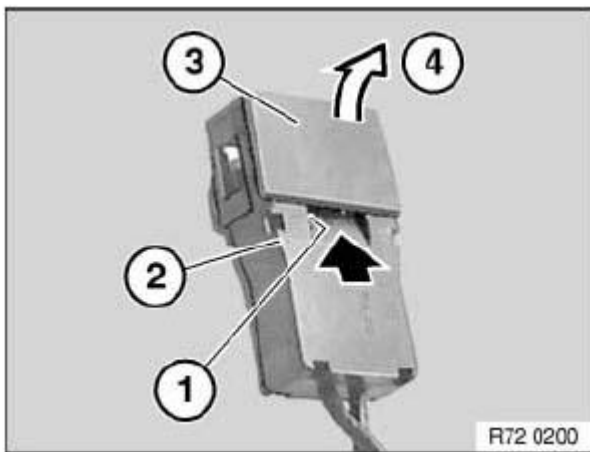


Fig. 49: Removing Housing Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Cover (1) is not positioned higher than housing (2).

The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.

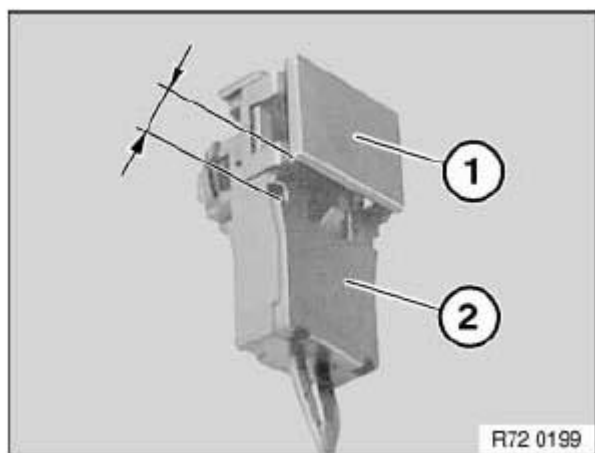


Fig. 50: Identifying Cover And Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

After attaching airbag plug connection to gas generator/airbag module, press cover (1) downwards until it rests flat on housing.

Check that it catches properly.

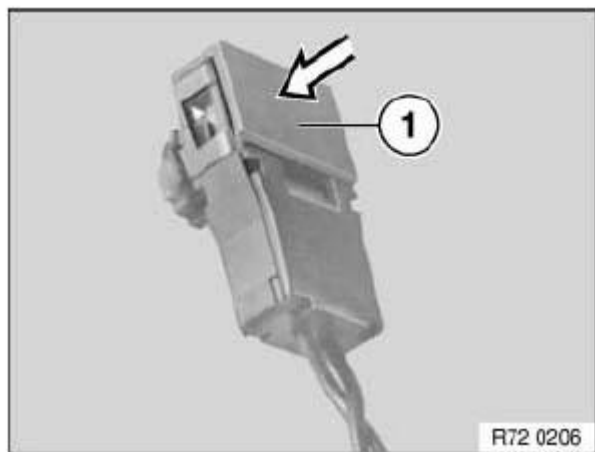


Fig. 51: Pressing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Airbag plug connection on gas generator/airbag module is straight (2 versions)

Version 1:

Press locking/unlocking plate (1) at edge (4).

Locking/unlocking plate (1) snaps upwards at opposite edge (3) and releases detent lug (2).

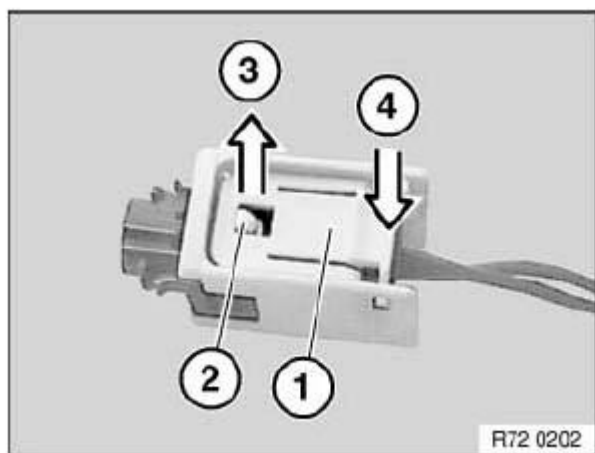


Fig. 52: Pressing Locking/Unlocking Plate Of Edge
Courtesy of BMW OF NORTH AMERICA, INC.

The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.



Fig. 53: Identifying Gas Generator/Airbag Module
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

After attaching airbag plug connection to gas generator/airbag module, check whether detent lug (2) is visible in opening of locking/unlocking plate (1).

Only if the detent lug (2) is visible will the airbag plug connection gas generator/airbag module be correctly engaged.

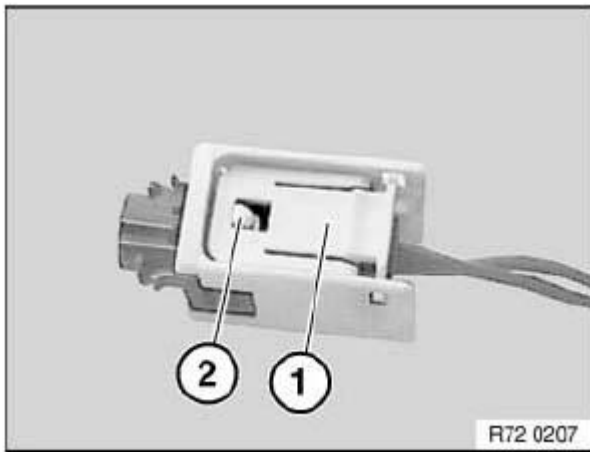


Fig. 54: Identifying Locking/Unlocking Plate And Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2:

Press locking/unlocking plate (1) on edge (3) and pull plug (2) out of plug housing (4).

Installation:

Only if the detent lug is visible in opening (5) will the gas generator/airbag module plug connection be correctly engaged.

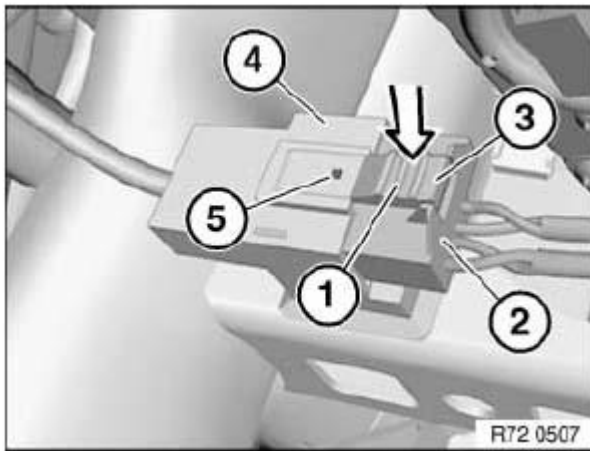


Fig. 55: Pressing Locking/Unlocking Plate On Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Version 3:

Press lock button (1) and pull out plug (2) up to initial engagement position.

Detach plug (2) from firing pellet.

Installation:

Insert plug connection in initial engagement position in gas generator/airbag module and engage in final engagement position.

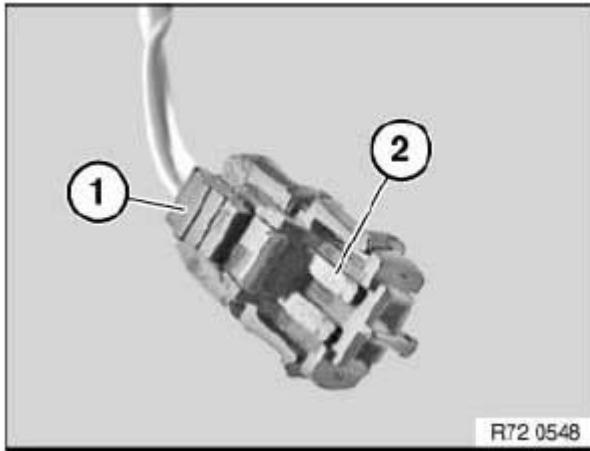


Fig. 56: Identifying Lock Button And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Illustration of version 3 with gas generator:

- A. Initial engagement position
 - B. Final engagement position
- 1. Lock button
 - 2. Gas generator

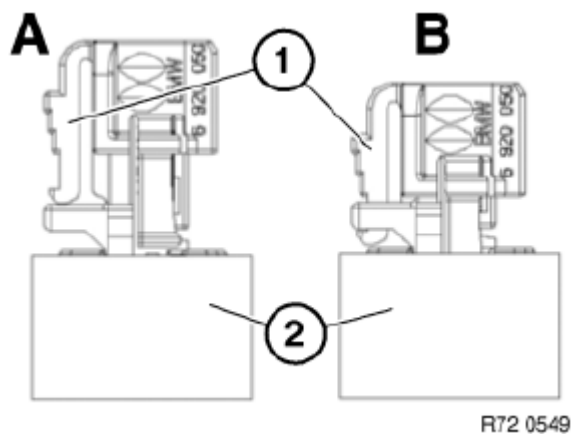


Fig. 57: Identifying Initial And Final Engagement Position With Lock Button And Gas Generator
Courtesy of BMW OF NORTH AMERICA, INC.

Version 4 - Crash-active head restraint:

Press locking clip at edge and disconnect plug (1).

Installation:

Check for correct engagement.

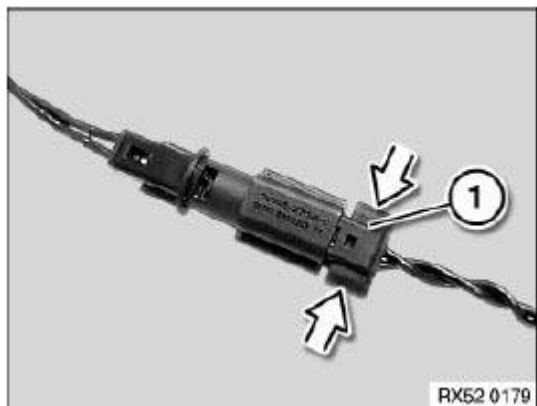


Fig. 58: Pressing Locking Clip Of Edge Disconnecting Plug
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 000 REMOVING AND INSTALLING/REPLACING AIRBAG MODULE ON PASSENGER SIDE

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.
Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks:

- Disconnect BATTERY NEGATIVE LEAD
- Follow INSTRUCTIONS for unlocking and locking airbag plug connections
- Remove GLOVEBOX with housing

Version (E60/E61) with front drinks holder:

- Remove front outer cup holder CARRIER
- Release front inner cup holder CARRIER

Inner carrier can only be removed together with airbag module.

Unfasten plug connection (1) and disconnect. Remove plug connection from holder (by turning).

IMPORTANT: Before releasing screws (3), secure airbag module (2) against falling out.

E63/ E64:

Release screws (3) and carefully feed out airbag module (2) towards bottom.

E60:

Release screws (3); if necessary, slide front inner cup holder carrier slightly to one side.

Carefully remove airbag module (2), if necessary with front inner cup holder carrier, towards bottom rear.

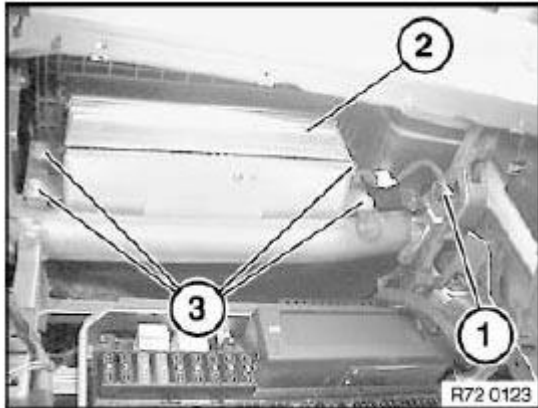


Fig. 59: Identifying Plug Connection, Screws And Airbag Module
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When inserting airbag module (1) in channel (2), make sure channel rests all round airbag module. If necessary, pull channel apart at sides.

Replace screws.

Tightening torque **72 12 02AZ** .

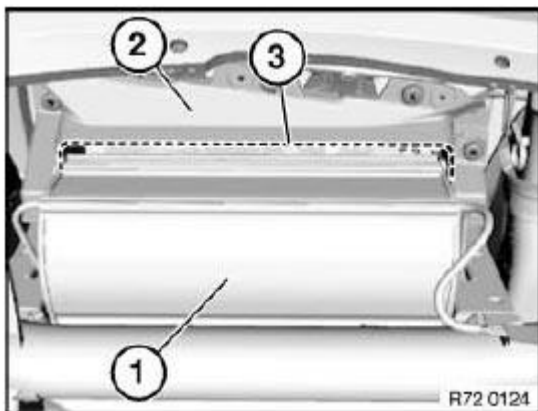


Fig. 60: Identifying Airbag Module And Channel
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 010 REMOVING AND INSTALLING/REPLACING AIRBAG MODULE ON LEFT OR RIGHT FRONT DOOR

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.
Incorrect handling can activate airbag and cause injury.
Front and rear airbag modules must not be mixed up.

Necessary preliminary tasks:

- Disconnect **BATTERY CABLE**
- Follow **INSTRUCTIONS** for disconnecting and connecting battery.
- Remove front door trim. See **REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007)** or **REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR TRIM PANEL (UP TO 03/2007)** .

Unfasten screws.

Carefully remove airbag module.

Installation:

Before installing airbag module, remove all foreign bodies (screws, etc.) from installation recess.

Replace screws.

Tightening torque **72 12 01AZ** .

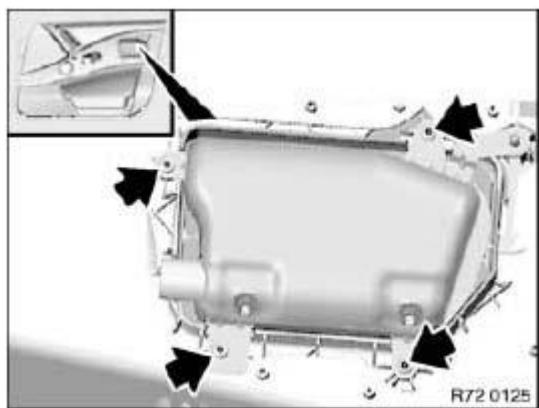


Fig. 61: Locating Airbag Module Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up with airbag module of rear door.
Difference:

- Coded plug

If the plug does not fit on the module, check whether a module was installed for the rear door.

- "VORN / FRONT" and "HINTEN / REAR" printed on

72 12 015 REMOVING AND INSTALLING/REPLACING AIRBAG MODULE ON LEFT OR RIGHT REAR DOOR

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.
Incorrect handling can activate airbag and cause injury.
Front and rear airbag modules must not be mixed up.

Necessary preliminary tasks:

- Disconnect BATTERY CABLE

Follow INSTRUCTIONS for disconnecting and connecting battery.

- Remove rear door trim. See REMOVING AND INSTALLING REAR LEFT OR RIGHT DOOR TRIM PANEL (LONG VERSION OR FROM 03/2007) or REMOVING AND INSTALLING REAR LEFT OR RIGHT DOOR TRIM PANEL (UP TO 03/2007) .

Unfasten screws.

Carefully remove airbag module.

Installation:

Before installing airbag module, remove all foreign bodies (screws, etc.) from installation recess.

Replace screws.

Tightening torque 72 12 01AZ .

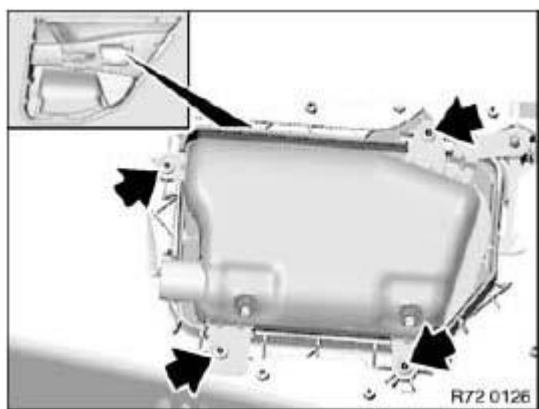


Fig. 62: Locating Airbag Module Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up with airbag module of front door.

Difference:

- Coded plug

If the plug does not fit on the module, check whether a module was installed for the front door.

- "VORN / FRONT" and "HINTEN / REAR" printed on

72 12 045 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT AHPS2 HEAD AIRBAG

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.
Incorrect handling can activate head airbag and cause injury.

Necessary preliminary tasks:

- Remove luggage compartment trim on side panel. See REMOVING AND INSTALLING/REPLACING TRUNK TRIM PANEL ON LEFT SIDE PANEL or REMOVING AND INSTALLING/REPLACING TRUNK TRIM PANEL ON RIGHT SIDE PANEL.
- Disconnect BATTERY CABLE

Follow INSTRUCTIONS for disconnecting and connecting battery.

- Remove ROOFLINER

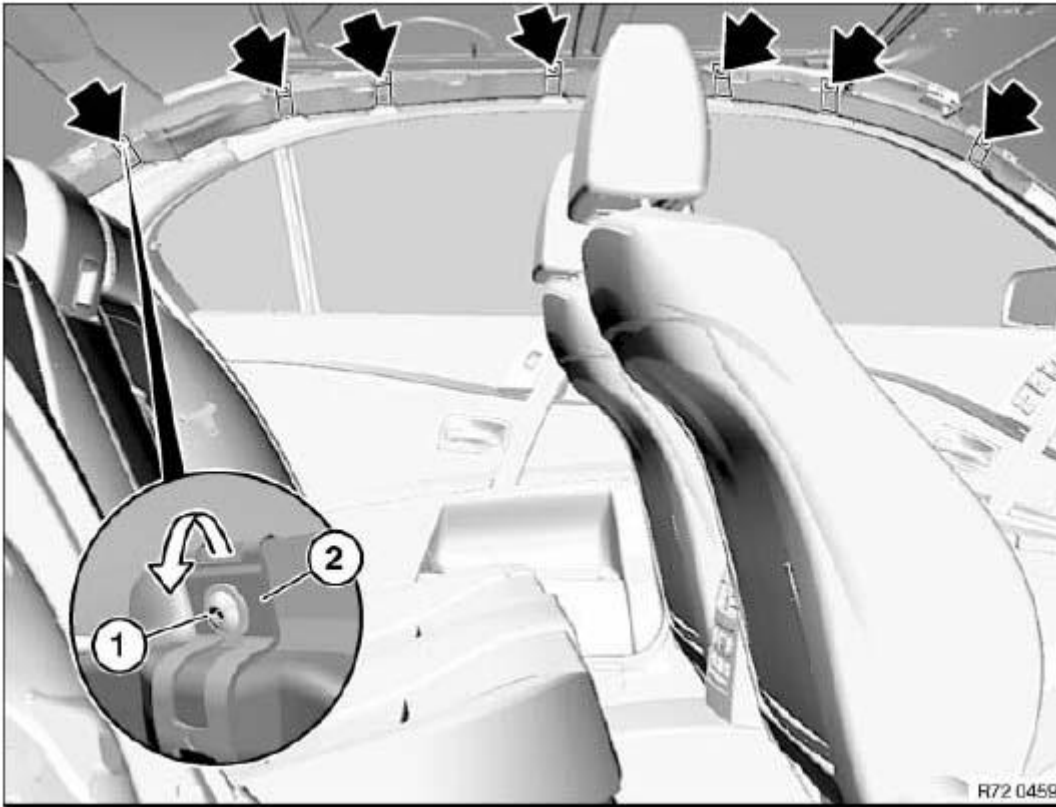


Fig. 63: Feeding Holders Out Of Sheet Metal Flange
Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws (1) of holders.

Tightening torque **72 12 03AZ** .

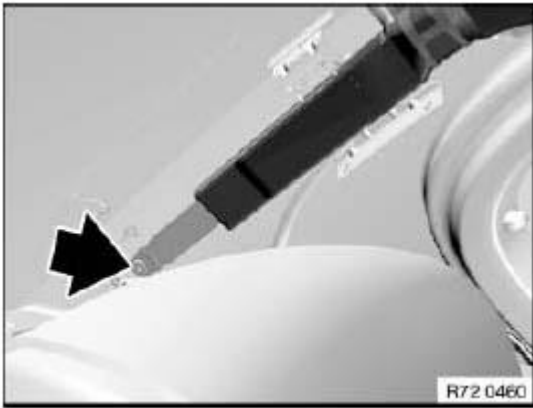
Feed all holders (2) out of sheet metal flange.

NOTE: The retainers behind the holders can break off. These retainers serve as an installation aid during series production and are not important for repairs.

Release rear screw.

Tightening torque **72 12 04AZ** .

Remove rear AHPS2.

**Fig. 64: Locating Screw**

Courtesy of BMW OF NORTH AMERICA, INC.

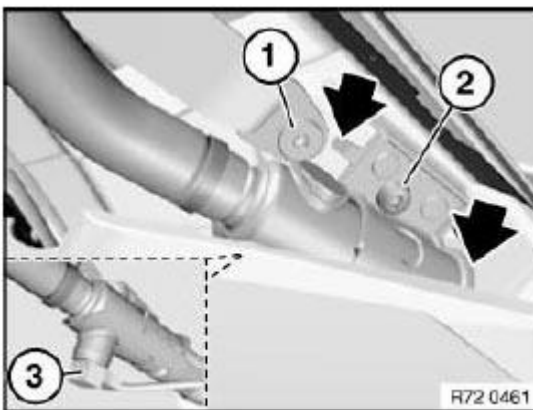
Release front screws (1 and 2).

Tightening torques:

- Screw 1 **72 12 04AZ**
- Screw 2 **72 12 06AZ**

Carefully feed gas generator out of guides towards rear, unlocking and disconnecting plug (3) in the process.

Remove gas generator completely.

**Fig. 65: Identifying Screws And Plug**

Courtesy of BMW OF NORTH AMERICA, INC.

Security version:

Gas generator (1) is mechanically modified, spare part changed.

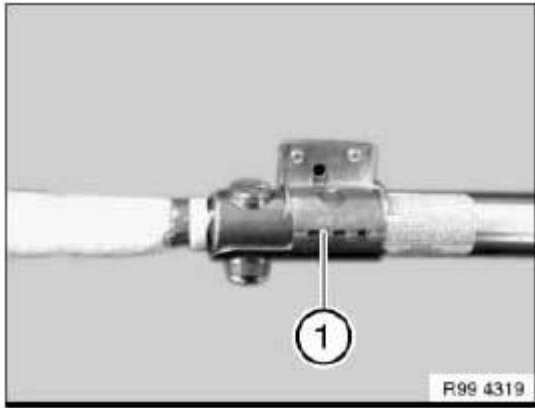


Fig. 66: Identifying Gas Generator

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: View of retaining screw with anchor fitting of AHPS2 head airbag:

1. Anchor fitting, AHPS2 head airbag
2. Lock washer
3. Retaining screw

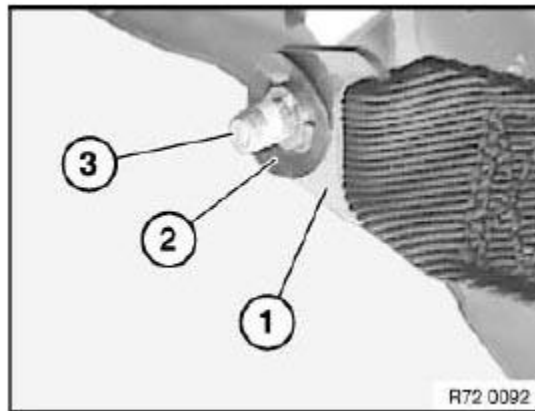


Fig. 67: Identifying Anchor Fitting, AHPS2 Head Airbag, Lock Washer And Retaining Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe the following when replacing grommet:

- Catches (1) must not be damaged
- Pay attention to guide lug (2) when feeding into body

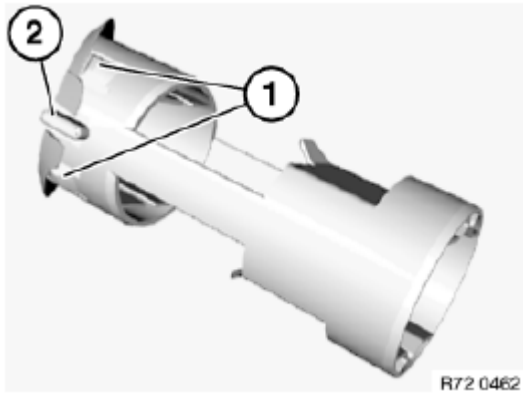


Fig. 68: Identifying Catches And Guide Lug

Courtesy of BMW OF NORTH AMERICA, INC.

CHILD SEAT QUICK FASTENING SYSTEM

72 14... REMOVING AND INSTALLING/REPLACING TOP TETHER EYELETS FOR CHILD SEAT

NOTE: Two or three Top Tether eyelets are installed, depending on the model.

Lever out covers (1) and release screws underneath.

Remove Top Tether eyelets (2).

Tightening torque **52 24 03AZ**.

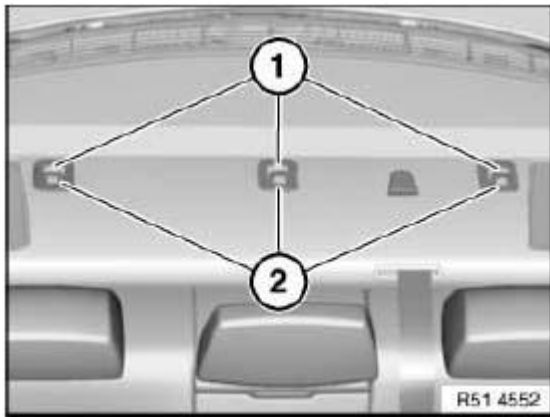


Fig. 69: Identifying Cover And Top Tether Eyelets

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Ensure Top Tether eyelets (1) are in correct installation position.
It must be possible for Top Tether eyelets (1) to be tilted in the direction of head restraints (2).

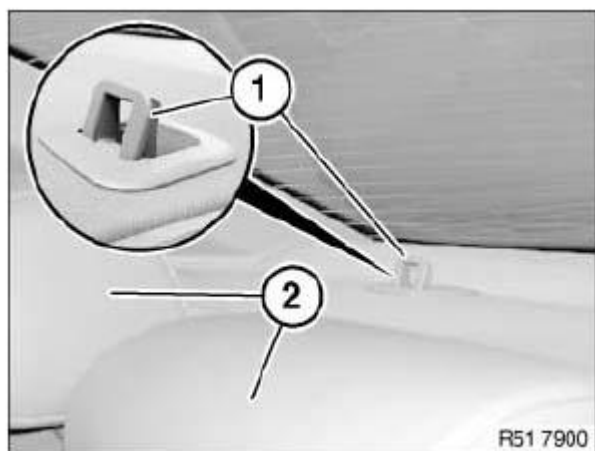


Fig. 70: Identifying Top Tether Eyelets And Head Restraints
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE PERFORMANCE

Self Diagnosis - Diagnostic Trouble Codes - N55

DIAGNOSTIC TROUBLE CODES (DTC)

DIAGNOSTIC TROUBLE CODE INDEX

DIAGNOSTIC TROUBLE CODE INDEX

DTC	Description
<u>DTC P1638; BMW DTC 100001</u>	Throttle valve, function: jammed briefly
<u>DTC P1639; BMW DTC 100101</u>	Throttle valve, function: jammed permanently
<u>DTC P11AA; BMW DTC 100201</u>	Throttle valve, function: sluggish, too slow
<u>DTC P1637; BMW DTC 100210</u>	Throttle-valve actuator, position monitoring: positional variation
<u>DTC P110D; BMW DTC 100A02</u>	Throttle valve, throttle potentiometer 1 and 2: Double fault
<u>DTC P1141; BMW DTC 100C08</u>	Throttle valve, throttle potentiometer 1: Signal implausible for air mass
<u>DTC P1162; BMW DTC 100E08</u>	Throttle valve, throttle potentiometer 2: Signal implausible for air mass
<u>DTC P0123; BMW DTC 101001</u>	Throttle valve, throttle-valve potentiometer 1, electric: short circuit to positive or open circuit
<u>DTC P0122; BMW DTC 101002</u>	Throttle valve, throttle-valve potentiometer 1, electric: short circuit to ground
<u>DTC P0223; BMW DTC 101201</u>	Throttle valve, throttle potentiometer 2, electrical: Short circuit to B+
<u>DTC P0222; BMW DTC 101202</u>	Throttle valve, throttle potentiometer 2, electrical: Short circuit to earth or line disconnection
<u>DTC P1632; BMW DTC 101401</u>	Throttle valve, adaptation: Marginal conditions not met
<u>DTC P1633; BMW DTC 101402</u>	Throttle valve, adaptation: emergency running position not adapted
<u>DTC P16BC; BMW DTC 101408</u>	Throttle valve, adaptation: Initial adaptation, lower limit position not taught in
<u>DTC P16E6; BMW DTC 101410</u>	Throttle valve, adaptation: Marginal conditions not met; battery voltage too low
<u>DTC P115F; BMW DTC 101C08</u>	Throttle valve, throttle potentiometer: plausibility Timing fault between potentiometer 1 and potentiometer 2
<u>DTC P112F; BMW DTC 101F01</u>	Throttle-valve angle - intake-manifold pressure, correlation: limit value exceeded
<u>DTC P112E; BMW DTC 101F02</u>	Throttle-valve angle - intake-manifold pressure, correlation: limit value undershot

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ENGINE PERFORMANCE Self Diagnosis - Diagnostic Trouble Codes - N55

<u>DTC P00BD; BMW DTC 102001</u>	none
<u>DTC P115D; BMW DTC 102001</u>	none
<u>DTC P00BC; BMW DTC 102002</u>	none
<u>DTC P115C; BMW DTC 102002</u>	none
<u>DTC P115D; BMW DTC 102010</u>	Air-mass sensor, plausibility: air mass too high in relation to model
<u>DTC P115C; BMW DTC 102011</u>	Air-mass sensor, plausibility: air mass too low in relation to model
<u>DTC P0103; BMW DTC 102610</u>	Air-mass sensor, signal: implausible period duration, loose contact at low frequency
<u>DTC P0102; BMW DTC 102611</u>	Air-mass sensor, signal: implausible period duration, loose contact at high frequency
<u>DTC P0100; BMW DTC 102612</u>	Air-mass sensor, signal: short circuit or open circuit
<u>DTC P00BC; BMW DTC 102801</u>	none
<u>DTC P0102; BMW DTC 102801</u>	none
<u>DTC P0100; BMW DTC 102A01</u>	none
<u>DTC P00BD; BMW DTC 102A02</u>	none
<u>DTC P0103; BMW DTC 102A02</u>	none
<u>DTC P2123; BMW DTC 103001</u>	Accelerator-pedal module, pedal-travel sensor 1, electric: short circuit to positive
<u>DTC P2122; BMW DTC 103002</u>	Accelerator-pedal module, pedal-travel sensor 1, electric: short circuit to ground or open circuit
<u>DTC P2128; BMW DTC 103101</u>	Accelerator-pedal module, pedal-travel sensor 2, electric: short circuit to positive
<u>DTC P2127; BMW DTC 103102</u>	Accelerator-pedal module, pedal-travel sensor 2, electric: short circuit to ground or open circuit
<u>DTC P2138; BMW DTC 103308</u>	Accelerator-pedal module, pedal-travel sensor, plausibility: synchronism fault between signal 1 and signal 2
<u>DTC P11C8; BMW DTC 10351C</u>	Accelerator-pedal module, pedal-travel sensor Multiple fault
<u>DTC P1250; BMW DTC 104301</u>	none
<u>DTC P12A5; BMW DTC 104301</u>	none
<u>DTC P1255; BMW DTC 104302</u>	none
<u>DTC P12A4; BMW DTC 104302</u>	none
<u>DTC P0108; BMW DTC 104401</u>	none
<u>DTC P119A; BMW DTC 104401</u>	none
<u>DTC P0107; BMW DTC 104402</u>	Absolute pressure sensor, intake pipe, electrical: Short circuit to earth
<u>DTC P119B; BMW DTC 104402</u>	Absolute pressure sensor, intake pipe, electrical: Short circuit to earth
<u>DTC P1250; BMW DTC 104610</u>	Absolute-pressure sensor, intake manifold, plausibility: intake-manifold pressure too high

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<u>DTC P1255; BMW DTC 104611</u>	Absolute-pressure sensor, intake manifold, plausibility: intake-manifold pressure too low
<u>DTC P119A; BMW DTC 104A40</u>	Absolute-pressure sensor, intake manifold, electric: short circuit to positive
<u>DTC P2229; BMW DTC 105001</u>	Ambient-pressure sensor, electric: short circuit to positive or open circuit
<u>DTC P2228; BMW DTC 105002</u>	Ambient-pressure sensor, electric: short circuit to ground
<u>DTC P11CB; BMW DTC 105101</u>	none
<u>DTC P0129; BMW DTC 105102</u>	none
<u>DTC P12B9; BMW DTC 105201</u>	Ambient pressure sensor, overrun: Pressure too high
<u>DTC P12B8; BMW DTC 105202</u>	Ambient-pressure sensor, run-on: pressure too low
<u>DTC P2227; BMW DTC 105A30</u>	Ambient-pressure sensor: collective error: electrical and plausibility
<u>DTC P11CB; BMW DTC 105A40</u>	Ambient-pressure sensor, plausibility: pressure too high
<u>DTC P0129; BMW DTC 105A41</u>	Ambient-pressure sensor, plausibility: pressure too low
<u>DTC P1247; BMW DTC 105A42</u>	Ambient pressure sensor, plausibility: Pressure implausible
<u>DTC P323C; BMW DTC 105A42</u>	Ambient pressure sensor, plausibility: Pressure implausible
<u>DTC P1247; BMW DTC 105A43</u>	Ambient pressure sensor, plausibility: Pressure implausible
<u>DTC P323C; BMW DTC 105A43</u>	Ambient pressure sensor, plausibility: Pressure implausible
<u>DTC P0121; BMW DTC 107A22</u>	Throttle valve, throttle potentiometer 1: Signal implausible in relation to substitute value from filling
<u>DTC P0223; BMW DTC 107A30</u>	Throttle valve, throttle-valve potentiometer 2, electric: short circuit to positive or open circuit
<u>DTC P0222; BMW DTC 107A31</u>	Throttle valve, throttle-valve potentiometer 2, electric: short circuit to ground
<u>DTC P0221; BMW DTC 107A32</u>	Throttle valve, throttle-valve potentiometer 2: signal implausible in rel. to substitute value from charge
<u>DTC P110D; BMW DTC 107A40</u>	Throttle-valve potentiometer: throttle-valve potentiometer 1 or 2, function
<u>DTC P169F; BMW DTC 107A50</u>	Throttle valve: Limp-home operating mode active
<u>DTC P2103; BMW DTC 107A70</u>	DME, internal fault, activation of throttle valve: Short circuit
<u>DTC P2118; BMW DTC 107A71</u>	DME, internal fault, activation of throttle valve: Excess temperature or current too high
<u>DTC P061F; BMW DTC 107A72</u>	DME, internal fault, activation of throttle valve: Internal communication fault

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<u>DTC P2100; BMW DTC 107A73</u>	DME, internal fault, activation of throttle valve: Line disconnection
<u>DTC P1634; BMW DTC 107A80</u>	Throttle-valve actuator, closing spring check: abort check, spring does not close
<u>DTC P1631; BMW DTC 107A81</u>	Throttle-valve actuator, closing spring check: error during spring check
<u>DTC P1629; BMW DTC 107A90</u>	Throttle-valve actuator, opening spring check: abort check, spring does not open
<u>DTC P1628; BMW DTC 107A91</u>	Throttle-valve actuator, opening spring check: error during spring check
<u>DTC P1644; BMW DTC 107AE0</u>	Throttle valve, adaptation: Re-teach, lower limit position not taught in
<u>DTC P1643; BMW DTC 107AF0</u>	Throttle valve actuator, amplifier adjustment: malfunction
<u>DTC P0113; BMW DTC 108001</u>	Intake air temperature sensor, electrical: Short circuit to B+
<u>DTC P0112; BMW DTC 108002</u>	Intake-air temperature sensor, electric: short circuit to ground
<u>DTC P0111; BMW DTC 108010</u>	Intake-air temperature sensor, electrical: signal not plausible
<u>DTC P007D; BMW DTC 108A01</u>	Charge-air temperature sensor, electrical: Short circuit to B+
<u>DTC P007C; BMW DTC 108A02</u>	Charge-air temperature sensor, electric: short circuit to ground
<u>DTC P007B; BMW DTC 108A10</u>	Charge-air temperature sensor, electrical: Signal not plausible
<u>DTC P10B0; BMW DTC 108C01</u>	none
<u>DTC P10B8; BMW DTC 108C08</u>	Charge-air temperature sensor, plausibility: Signal hangs
<u>DTC P0118; BMW DTC 109001</u>	Coolant-temperature sensor, electric: short circuit to positive or open circuit
<u>DTC P0117; BMW DTC 109002</u>	Coolant-temperature sensor, electric: short circuit to ground
<u>DTC P112B; BMW DTC 109208</u>	none
<u>DTC P316B; BMW DTC 109208</u>	none
<u>DTC P0116; BMW DTC 109308</u>	Coolant-temperature sensor, plausibility: signal change too fast
<u>DTC P3198; BMW DTC 109308</u>	Coolant-temperature sensor, plausibility: signal change too fast
<u>DTC P10D5; BMW DTC 10AA20</u>	Coolant temperature sensor, cold start: Coolant temperature too high
<u>DTC P10D4; BMW DTC 10AA21</u>	Coolant temperature sensor, cold start: Coolant temperature too low
<u>DTC P0115; BMW DTC 10AA40</u>	Coolant-temperature sensor, electrical: no signal

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<u>DTC P112A; BMW DTC 10AA50</u>	Coolant-temperature sensor, plausibility: engine temperature in rel. to model implausibly too high
<u>DTC P112B; BMW DTC 10AA51</u>	Coolant-temperature sensor, plausibility: engine temperature in rel. to model implausibly too low
<u>DTC P0116; BMW DTC 10AA52</u>	Coolant-temperature sensor, plausibility: engine temperature implausible
<u>DTC P3199; BMW DTC 10AA52</u>	Coolant-temperature sensor, plausibility: engine temperature implausible
<u>DTC P0073; BMW DTC 10B101</u>	none
<u>DTC P0072; BMW DTC 10B102</u>	none
<u>DTC P110F; BMW DTC 10B104</u>	none
<u>DTC P0073; BMW DTC 10BA20</u>	Outside temperature sensor, signal: Upper threshold value exceeded
<u>DTC P0072; BMW DTC 10BA21</u>	Outside temperature sensor, signal: Lower threshold value undershot
<u>DTC P110F; BMW DTC 10BA22</u>	Ambient-temperature sensor, signal: CAN message incorrect
<u>DTC P0071; BMW DTC 10BA40</u>	Outside temperature sensor, plausibility: Ambient temperature higher than model temperature
<u>DTC P10EA; BMW DTC 10BA40</u>	Outside temperature sensor, plausibility: Ambient temperature higher than model temperature
<u>DTC P0071; BMW DTC 10BA41</u>	Outside temperature sensor, plausibility: Ambient temperature less than model temperature
<u>DTC P10EB; BMW DTC 10BA41</u>	Outside temperature sensor, plausibility: Ambient temperature less than model temperature
<u>DTC P10C9; BMW DTC 10BA42</u>	Intake-air temperature sensor, cold start: intake-air temperature too high
<u>DTC P105D; BMW DTC 10BA43</u>	Intake-air temperature sensor, cold start: intake-air temperature too low
<u>DTC P0127; BMW DTC 10BA48</u>	Intake air temperature sensor, plausibility: Intake air temperature too high
<u>DTC P11C9; BMW DTC 10BA49</u>	Intake air temperature sensor, plausibility: Intake air temperature too low
<u>DTC P10D0; BMW DTC 10BA4A</u>	Charge-air temperature sensor, cold start: charge-air temperature too high
<u>DTC P10D1; BMW DTC 10BA4B</u>	Charge-air temperature sensor, cold start: charge-air temperature too low
<u>DTC P10B0; BMW DTC 10BA4F</u>	Charge-air temperature sensor, plausibility: Charge air temperature too high
<u>DTC P10D2; BMW DTC 10BA4F</u>	Charge-air temperature sensor, plausibility: Charge air temperature too high
<u>DTC P007B; BMW DTC 10C001</u>	none
<u>DTC P10B4; BMW DTC 10C001</u>	none

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<u>DTC P10D0; BMW DTC 10C004</u>	none
<u>DTC P10B4; BMW DTC 10C005</u>	Charge-air temperature sensor, gradient: Rise too high
<u>DTC P142E; BMW DTC 110001</u>	none
<u>DTC P306F; BMW DTC 110001</u>	none
<u>DTC P3149; BMW DTC 110101</u>	Injector, cylinder 1, activation: high-voltage side; short circuit to ground
<u>DTC P3102; BMW DTC 110102</u>	Injector, cylinder 1, activation: low-voltage side; short circuit to positive
<u>DTC P3150; BMW DTC 110104</u>	Injector, cylinder 1, activation: high-voltage side; short circuit to positive
<u>DTC P3101; BMW DTC 110108</u>	Injector, cylinder 1, activation: low-voltage side; short circuit to ground
<u>DTC P3152; BMW DTC 110201</u>	Injector, cylinder 2, activation: high-voltage side; short circuit to ground
<u>DTC P3106; BMW DTC 110202</u>	Injector, cylinder 2, activation: low-voltage side; short circuit to positive
<u>DTC P3153; BMW DTC 110204</u>	Injector, cylinder 2, activation: high-voltage side; short circuit to positive
<u>DTC P3105; BMW DTC 110208</u>	Injector, cylinder 2, activation: low-voltage side; short circuit to ground
<u>DTC P3155; BMW DTC 110301</u>	Injector, cylinder 3, activation: high-voltage side; short circuit to ground
<u>DTC P3110; BMW DTC 110302</u>	Injector, cylinder 3, activation: low-voltage side; short circuit to positive
<u>DTC P3156; BMW DTC 110304</u>	Injector, cylinder 3, activation: high-voltage side; short circuit to positive
<u>DTC P3109; BMW DTC 110308</u>	Injector, cylinder 3, activation: low-voltage side; short circuit to ground
<u>DTC P3158; BMW DTC 110401</u>	Injector, cylinder 4, activation: high-voltage side; short circuit to ground
<u>DTC P3114; BMW DTC 110402</u>	Injector, cylinder 4, activation: low-voltage side; short circuit to positive
<u>DTC P3159; BMW DTC 110404</u>	Injector, cylinder 4, activation: high-voltage side; short circuit to positive
<u>DTC P3113; BMW DTC 110408</u>	Injector, cylinder 4, activation: low-voltage side; short circuit to ground
<u>DTC P3161; BMW DTC 110501</u>	Injector, cylinder 5, activation: high-voltage side; short circuit to ground
<u>DTC P3118; BMW DTC 110502</u>	Injector, cylinder 5, activation: low-voltage side; short circuit to positive
<u>DTC P3162; BMW DTC 110504</u>	Injector, cylinder 5, activation: high-voltage side; short circuit to positive
<u>DTC P3117; BMW DTC 110508</u>	Injector, cylinder 5, activation: low-voltage side;

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	short circuit to ground
<u>DTC P3164; BMW DTC 110601</u>	Injector, cylinder 6, activation: high-voltage side; short circuit to ground
<u>DTC P3122; BMW DTC 110602</u>	Injector, cylinder 6, activation: low-voltage side; short circuit to positive
<u>DTC P3165; BMW DTC 110604</u>	Injector, cylinder 6, activation: high-voltage side; short circuit to positive
<u>DTC P3121; BMW DTC 110608</u>	Injector, cylinder 6, activation: low-voltage side; short circuit to ground
<u>DTC P3148; BMW DTC 111020</u>	Injector, cylinder 1, high-voltage side, activation: coil-winding short circuit
<u>DTC P3151; BMW DTC 111021</u>	Injector, cylinder 2, high-voltage side, activation: coil-winding short circuit
<u>DTC P3154; BMW DTC 111022</u>	Injector, cylinder 3, high-voltage side, activation: coil-winding short circuit
<u>DTC P3157; BMW DTC 111023</u>	Injector, cylinder 4, high-voltage side, activation: coil-winding short circuit
<u>DTC P3160; BMW DTC 111024</u>	Injector, cylinder 5, high-voltage side, activation: coil-winding short circuit
<u>DTC P3163; BMW DTC 111025</u>	Injector, cylinder 6, high-voltage side, activation: coil-winding short circuit
<u>DTC P3103; BMW DTC 111030</u>	Injector, cylinder 1, low-voltage side, activation: booster time window
<u>DTC P3107; BMW DTC 111031</u>	Injector, cylinder 2, low-voltage side, activation: booster time window
<u>DTC P3111; BMW DTC 111032</u>	Injector, cylinder 3, low-voltage side, activation: booster time window
<u>DTC P3115; BMW DTC 111033</u>	Injector, cylinder 4, low-voltage side, activation: booster time window
<u>DTC P3119; BMW DTC 111034</u>	Injector, cylinder 5, low-voltage side, activation: booster time window
<u>DTC P3123; BMW DTC 111035</u>	Injector, cylinder 6, low-voltage side, activation: booster time window
<u>DTC P3100; BMW DTC 111040</u>	Injector, cylinder 1, low-voltage side, activation: open circuit
<u>DTC P3104; BMW DTC 111041</u>	Injector, cylinder 2, low-voltage side, activation: open circuit
<u>DTC P3108; BMW DTC 111042</u>	Injector, cylinder 3, low-voltage side, activation: open circuit
<u>DTC P3112; BMW DTC 111043</u>	Injector, cylinder 4, low-voltage side, activation: open circuit
<u>DTC P3116; BMW DTC 111044</u>	Injector, cylinder 5, low-voltage side, activation: open circuit
<u>DTC P3120; BMW DTC 111045</u>	Injector, cylinder 6, low-voltage side, activation:

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	open circuit
<u>DTC P16A5; BMW DTC 111110</u>	DME, internal fault, HDEV output-stage module 1: SPI communication faulty
<u>DTC P16A5; BMW DTC 111111</u>	DME, internal fault, HDEV output-stage module 2: SPI communication faulty
<u>DTC P16A5; BMW DTC 111112</u>	DME, internal fault, HDEV output-stage module 1: SPI communication implausible
<u>DTC P16A5; BMW DTC 111113</u>	DME, internal fault, HDEV output-stage module 2: SPI communication implausible
<u>DTC P16A5; BMW DTC 111114</u>	DME, internal fault, HDEV output-stage module 1: SPI communication, signal error
<u>DTC P16A5; BMW DTC 111115</u>	DME, internal fault, HDEV output-stage module 2: SPI communication, signal error
<u>DTC P0171; BMW DTC 118001</u>	none
<u>DTC P2177; BMW DTC 118001</u>	none
<u>DTC P0172; BMW DTC 118002</u>	none
<u>DTC P2178; BMW DTC 118002</u>	none
<u>DTC P0171; BMW DTC 118401</u>	none
<u>DTC P306D; BMW DTC 118401</u>	none
<u>DTC P0172; BMW DTC 118402</u>	none
<u>DTC P306E; BMW DTC 118402</u>	none
<u>DTC P2097; BMW DTC 118601</u>	Oxygen sensor before catalytic converter, fine mixture control: exhaust gas after catalytic converter too rich
<u>DTC P2096; BMW DTC 118602</u>	Oxygen sensor before catalytic converter, fine mixture control: exhaust gas after catalytic converter too lean
<u>DTC P119D; BMW DTC 118C02</u>	Mixture adaptation, injector ageing: cylinder bank 1: long-term adaptation too high
<u>DTC P2187; BMW DTC 118E01</u>	Mixture adaptation, idle: mixture too lean
<u>DTC P2188; BMW DTC 118E02</u>	Mixture adaptation, idle: mixture too rich
<u>DTC P2177; BMW DTC 118F20</u>	Mixture adaptation, lower speed range: mixture at part load too lean
<u>DTC P2178; BMW DTC 118F21</u>	Mixture adaptation, lower speed range: mixture at part load too rich
<u>DTC P0193; BMW DTC 119001</u>	Rail pressure sensor, electrical: Short circuit to B+
<u>DTC P0192; BMW DTC 119002</u>	Rail-pressure sensor, electric: short circuit to ground
<u>DTC P2542; BMW DTC 119201</u>	Fuel low-pressure sensor, electric: short circuit to positive
<u>DTC P2541; BMW DTC 119202</u>	Fuel low-pressure sensor, electrical: Short to earth
<u>DTC P10CE; BMW DTC 119301</u>	Rail-pressure sensor, voltage test: upper threshold exceeded
<u>DTC P10CF; BMW DTC 119302</u>	Rail-pressure sensor, voltage test: lower threshold

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	undershot
<u>DTC P0088; BMW DTC 119304</u>	Rail pressure sensor, plausibility: Maximum pressure exceeded
<u>DTC P0087; BMW DTC 119308</u>	Rail pressure sensor, plausibility: Minimum pressure undershot
<u>DTC P10D9; BMW DTC 119404</u>	Rail pressure sensor, plausibility: Signal frozen
<u>DTC P0088; BMW DTC 11A001</u>	Fuel high-pressure system, fuel pressure: maximum pressure exceeded
<u>DTC P302A; BMW DTC 11A001</u>	Fuel high-pressure system, fuel pressure: maximum pressure exceeded
<u>DTC P0087; BMW DTC 11A002</u>	Fuel high-pressure system, fuel pressure: minimum pressure undershot
<u>DTC P302C; BMW DTC 11A002</u>	Fuel high-pressure system, fuel pressure: minimum pressure undershot
<u>DTC P008B; BMW DTC 11A201</u>	none
<u>DTC P008A; BMW DTC 11A204</u>	none
<u>DTC P10A2; BMW DTC 11A701</u>	none
<u>DTC P10A3; BMW DTC 11A702</u>	none
<u>DTC P306A; BMW DTC 11AA01</u>	Fuel supply system: Pressure too high, emergency operation with low pressure
<u>DTC P306B; BMW DTC 11AA02</u>	Fuel supply system: Pressure too high, emergency operation with injection deactivation
<u>DTC P306C; BMW DTC 11AA04</u>	Fuel supply system: Pressure too high for a short time, engine speed and load are restricted
<u>DTC P15DE; BMW DTC 11AC01</u>	Fuel high-pressure system, cold start: pressure too high
<u>DTC P15DF; BMW DTC 11AC02</u>	Fuel high-pressure system, cold start: pressure too low
<u>DTC P306F; BMW DTC 11AD10</u>	Fuel pressure: Pressure below minimum pressure; injection deactivation for catalytic converter protection
<u>DTC P306D; BMW DTC 11AE01</u>	Fuel supply system, oxygen sensor emissions control: upper limit exceeded
<u>DTC P306E; BMW DTC 11AE02</u>	Fuel supply system, oxygen sensor emissions control: lower limit undershot
<u>DTC P0004; BMW DTC 11C401</u>	Fuel-supply control valve, activation: short circuit to positive
<u>DTC P0003; BMW DTC 11C402</u>	Fuel-supply control valve, activation: short circuit to ground
<u>DTC P0001; BMW DTC 11C404</u>	Fuel-supply control valve, activation: open circuit
<u>DTC P0234; BMW DTC 120208</u>	Charge-air pressure control, upper value: charge-air pressure too high
<u>DTC P0299; BMW DTC 120308</u>	Charge-air pressure control, lower value: charge-air

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	pressure too low
<u>DTC P1260; BMW DTC 120408</u>	Charge-air pressure control, deactivation: charge-air pressure buildup disabled
<u>DTC P0238; BMW DTC 121001</u>	Charge-air pressure sensor, electric: short circuit to positive
<u>DTC P0237; BMW DTC 121002</u>	Charge-air pressure sensor, electric: short circuit to ground
<u>DTC P12A9; BMW DTC 121201</u>	none
<u>DTC P12A8; BMW DTC 121202</u>	none
<u>DTC P0236; BMW DTC 121521</u>	Charging pressure sensor, multiple fault: electrical and plausibility
<u>DTC P0234; BMW DTC 121530</u>	Charge-air pressure sensor, plausibility: pressure before throttle valve too high
<u>DTC P12A0; BMW DTC 121530</u>	Charge-air pressure sensor, plausibility: pressure before throttle valve too high
<u>DTC P0299; BMW DTC 121531</u>	Charge-air pressure sensor, plausibility: pressure before throttle valve too low
<u>DTC P12A1; BMW DTC 121531</u>	Charge-air pressure sensor, plausibility: pressure before throttle valve too low
<u>DTC P10F2; BMW DTC 121532</u>	Boost pressure sensor, plausibility: Pressure before throttle valve too high when engine not running
<u>DTC P12DA; BMW DTC 121532</u>	Boost pressure sensor, plausibility: Pressure before throttle valve too high when engine not running
<u>DTC P10F3; BMW DTC 121533</u>	Boost pressure sensor, plausibility: Pressure before throttle valve too low when engine not running
<u>DTC P12DB; BMW DTC 121533</u>	Boost pressure sensor, plausibility: Pressure before throttle valve too low when engine not running
<u>DTC P0234; BMW DTC 121601</u>	Charge-air pressure sensor: pressure too high
<u>DTC P12A9; BMW DTC 121601</u>	Charge-air pressure sensor: pressure too high
<u>DTC P0299; BMW DTC 121602</u>	Charge-air pressure sensor: pressure too low
<u>DTC P12A8; BMW DTC 121602</u>	Charge-air pressure sensor: pressure too low
<u>DTC P0035; BMW DTC 122001</u>	Bypass blow-off valve, activation: short circuit to positive
<u>DTC P0034; BMW DTC 122002</u>	Bypass blow-off valve, activation: short circuit to ground
<u>DTC P0033; BMW DTC 122004</u>	Bypass blow-off valve, activation: open circuit
<u>DTC P0246; BMW DTC 123001</u>	Wastegate, activation: short circuit to positive
<u>DTC P0245; BMW DTC 123002</u>	Wastegate, activation: short circuit to ground
<u>DTC P0243; BMW DTC 123004</u>	Wastegate, activation: open circuit
<u>DTC P2195; BMW DTC 128101</u>	Oxygen sensor before catalytic converter, system check: Signal fixed at lean
<u>DTC P2196; BMW DTC 128301</u>	Oxygen sensor before catalytic converter, system check: Signal fixed at grease

<u>DTC P2297; BMW DTC 128501</u>	Oxygen sensor before catalytic converter, in coasting/overrun mode: Signal outside limit value
<u>DTC P0133; BMW DTC 128901</u>	Oxygen sensor before catalytic converter, dynamic response: slow response
<u>DTC P2414; BMW DTC 128B01</u>	Oxygen sensor before catalytic converter, installation: sensor not connected
<u>DTC P2243; BMW DTC 128E01</u>	Oxygen sensor before catalytic converter, line fault: open circuit, nearest line
<u>DTC P2626; BMW DTC 128E08</u>	Oxygen sensor before catalytic converter, line fault: open circuit, compensation line
<u>DTC P0132; BMW DTC 129001</u>	Oxygen sensor before catalytic converter, signal lines: Short circuit to B+
<u>DTC P0131; BMW DTC 129002</u>	Oxygen sensor before catalytic converter, signal lines: Short circuit to earth
<u>DTC P3024; BMW DTC 129201</u>	DME, internal fault, oxygen sensor before catalytic converter: initialization fault
<u>DTC P3022; BMW DTC 129202</u>	DME, internal fault, oxygen sensor before catalytic converter: communication fault
<u>DTC P3012; BMW DTC 129A20</u>	DME, internal fault, oxygen sensor before catalytic converter: oxygen-sensor module, signal-circuit adaptation values too high
<u>DTC P3014; BMW DTC 129A21</u>	DME, internal fault, oxygen sensor before catalytic converter: oxygen-sensor module, undervoltage
<u>DTC P2271; BMW DTC 12A101</u>	Oxygen sensor after catalytic converter, system check: signal fixed at rich
<u>DTC P2270; BMW DTC 12A102</u>	Oxygen sensor after catalytic converter, system check: signal fixed at lean
<u>DTC P013A; BMW DTC 12A308</u>	Oxygen sensor after catalytic converter, dynamic response, from rich to lean: slow response
<u>DTC P0138; BMW DTC 12A701</u>	Oxygen sensor after catalytic converter, electrical: Short circuit to B+
<u>DTC P0137; BMW DTC 12A902</u>	Oxygen sensor after catalytic converter, electrical: Short circuit to earth
<u>DTC P0136; BMW DTC 12AB04</u>	Oxygen sensor after catalytic converter, electrical: Line disconnection
<u>DTC P013E; BMW DTC 12AF08</u>	Oxygen sensor after catalytic converter, trailing throttle, from rich to lean: delayed response
<u>DTC P0032; BMW DTC 12B101</u>	Oxygen-sensor heater before catalytic converter, activation: short circuit to positive
<u>DTC P0031; BMW DTC 12B102</u>	Oxygen-sensor heater before catalytic converter, activation: short circuit to ground
<u>DTC P0030; BMW DTC 12B104</u>	Oxygen-sensor heater before catalytic converter, activation: open circuit
<u>DTC P0038; BMW DTC 12B301</u>	Oxygen-sensor heater after catalytic converter,

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	activation: short circuit to positive
<u>DTC P0037; BMW DTC 12B302</u>	Oxygen-sensor heater after catalytic converter, activation: short circuit to ground
<u>DTC P0036; BMW DTC 12B304</u>	Oxygen-sensor heater after catalytic converter, activation: open circuit
<u>DTC P102A; BMW DTC 12B505</u>	Oxygen sensor heating before catalytic converter, function: Heater fault
<u>DTC P0141; BMW DTC 12B701</u>	Oxygen-sensor heater after catalytic converter, function: internal resistance too high
<u>DTC P3026; BMW DTC 12BD20</u>	Oxygen-sensor heater before catalytic converter, function: operating temperature not reached
<u>DTC P0135; BMW DTC 12BD21</u>	Oxygen-sensor heater before catalytic converter, function: lack of signal readiness
<u>DTC P3016; BMW DTC 12BD22</u>	Oxygen-sensor heater before catalytic converter, function: internal resistance of signal circuit too highly resistant
<u>DTC P0139; BMW DTC 12BD33</u>	Oxygen sensor after catalytic converter, ageing: voltage threshold not reached
<u>DTC P0138; BMW DTC 12BD40</u>	Oxygen sensor after catalytic converter, electrical: short circuit to positive
<u>DTC P0137; BMW DTC 12BD41</u>	Oxygen sensor after catalytic converter, electrical: intercore short circuit or oxygen sensor contaminated
<u>DTC P0136; BMW DTC 12BD43</u>	Oxygen sensor after catalytic converter, electrical: open circuit
<u>DTC P3018; BMW DTC 12BD50</u>	Oxygen sensor before catalytic converter, pump current line: lambda control value above threshold due to open pump current line
<u>DTC P3020; BMW DTC 12BD51</u>	Oxygen sensor before catalytic converter, pump current line: signal voltage in overrun mode too low due to open pump current line
<u>DTC P2237; BMW DTC 12BD52</u>	Oxygen sensor before catalytic converter, line fault: Open circuit, pump current lead
<u>DTC P2251; BMW DTC 12BD60</u>	Oxygen sensor before catalytic converter, line fault: Open circuit, virtual ground
<u>DTC P0130; BMW DTC 12BD70</u>	Oxygen sensor before catalytic converter, electrical: Nernst-cell resistance or ceramic temperature implausible, line or heater fault
<u>DTC P2097; BMW DTC 12BD90</u>	Oxygen sensor before catalytic converter, plausibility: mixture after catalytic converter too rich
<u>DTC P2096; BMW DTC 12BD91</u>	Oxygen sensor before catalytic converter, plausibility: mixture after catalytic converter too lean

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<u>DTC P2195; BMW DTC 12BD92</u>	Oxygen sensor before catalytic converter, plausibility: fixed at lean
<u>DTC P2196; BMW DTC 12BD93</u>	Oxygen sensor before catalytic converter, plausibility: fixed at rich
<u>DTC P2089; BMW DTC 130001</u>	VANOS solenoid valve, inlet, activation: short circuit to positive
<u>DTC P2088; BMW DTC 130002</u>	VANOS solenoid valve, inlet, activation: short circuit to ground
<u>DTC P0010; BMW DTC 130004</u>	VANOS solenoid valve, inlet, activation: open circuit
<u>DTC P13C0; BMW DTC 130104</u>	VANOS, inlet: control fault, camshaft jammed
<u>DTC P0012; BMW DTC 130108</u>	VANOS, inlet: control fault, position not reached
<u>DTC P2091; BMW DTC 130201</u>	VANOS solenoid valve, exhaust, activation: short circuit to positive
<u>DTC P2090; BMW DTC 130202</u>	VANOS solenoid valve, exhaust, activation: short circuit to ground
<u>DTC P0013; BMW DTC 130204</u>	VANOS solenoid valve, exhaust, activation: open circuit
<u>DTC P13C9; BMW DTC 130304</u>	VANOS, exhaust: control fault, camshaft jammed
<u>DTC P0015; BMW DTC 130308</u>	VANOS, exhaust: control fault, position not reached
<u>DTC P0341; BMW DTC 130E11</u>	Inlet-camshaft sensor: signal implausible
<u>DTC P1338; BMW DTC 130E20</u>	Inlet camshaft: offset angle to crankshaft outside tolerance
<u>DTC P0366; BMW DTC 130F11</u>	Exhaust-camshaft sensor: signal implausible
<u>DTC P1339; BMW DTC 130F20</u>	Exhaust camshaft: offset angle to crankshaft outside tolerance
<u>DTC P054B; BMW DTC 131401</u>	VANOS, exhaust, cold start: not controllable
<u>DTC P052B; BMW DTC 131501</u>	VANOS, inlet, cold start: not controllable
<u>DTC P1325; BMW DTC 132408</u>	VANOS, exhaust: camshaft not at locking position at start
<u>DTC P1323; BMW DTC 132508</u>	VANOS, inlet: camshaft not at locking position at start
<u>DTC P10D8; BMW DTC 133101</u>	Valvetronic relay, activation: short circuit to positive
<u>DTC P10D7; BMW DTC 133102</u>	Valvetronic relay, activation: short circuit to ground
<u>DTC P10D6; BMW DTC 133104</u>	Valvetronic relay, activation: open circuit
<u>DTC P1047; BMW DTC 133201</u>	Valvetronic servomotor, activation: short circuit to positive
<u>DTC P1048; BMW DTC 133202</u>	Valvetronic servomotor, activation: short circuit to ground
<u>DTC P1050; BMW DTC 133208</u>	Valvetronic servomotor, activation: open circuit
<u>DTC P10DF; BMW DTC 133304</u>	none
<u>DTC P1030; BMW DTC 133B04</u>	none

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<u>DTC P10E8; BMW DTC 134A02</u>	none
<u>DTC P101A; BMW DTC 134F02</u>	Valvetronic, adjustment range: stop not learned
<u>DTC P1023; BMW DTC 134F04</u>	Valvetronic, adjustment range: error, range check
<u>DTC P1023; BMW DTC 134F08</u>	Valvetronic, adjustment range: range check, deviation from original learning
<u>DTC P10DF; BMW DTC 135301</u>	Valvetronic, component protection, output stage: deactivation, system
<u>DTC P10E0; BMW DTC 135302</u>	Valvetronic, component protection, servomotor: deactivation, system
<u>DTC P10E7; BMW DTC 135401</u>	Valvetronic, overload protection: output stage overloaded
<u>DTC P10E8; BMW DTC 135402</u>	Valvetronic, overload protection: servomotor overloaded
<u>DTC P1030; BMW DTC 135604</u>	Valvetronic system: control deviation too great
<u>DTC P10E1; BMW DTC 135608</u>	Valvetronic system: no movement detected
<u>DTC P10E2; BMW DTC 135808</u>	Valvetronic servomotor, position sensors: Short- circuit or line break (open circuit)
<u>DTC P10E6; BMW DTC 135908</u>	Valvetronic servomotor, position sensors: Supply voltage faulty
<u>DTC P1017; BMW DTC 135A08</u>	Valvetronic servomotor, position sensors: Signal implausible
<u>DTC P10F4; BMW DTC 135B10</u>	Valvetronic servomotor, activation, voltage phase: Line disconnection
<u>DTC P10F5; BMW DTC 135B11</u>	Valvetronic servomotor, activation, volt phase: Line disconnection
<u>DTC P10F6; BMW DTC 135B12</u>	Valvetronic servomotor, activation, watt phase: Line disconnection
<u>DTC P0478; BMW DTC 138101</u>	Exhaust flap, activation: short circuit to positive
<u>DTC P0477; BMW DTC 138102</u>	Exhaust flap, activation: short circuit to ground
<u>DTC P0475; BMW DTC 138104</u>	Exhaust flap, activation: open circuit
<u>DTC P303E; BMW DTC 138201</u>	Radiator shutter, top, supply voltage, actuator: voltage fault
<u>DTC P303F; BMW DTC 138301</u>	Radiator shutter, top, overtemperature, actuator: limit value exceeded
<u>DTC P304A; BMW DTC 138401</u>	Radiator shutter, top, actuator internal: electrical fault
<u>DTC P304B; BMW DTC 138501</u>	Radiator shutter, top, lower stop: not detected
<u>DTC P304C; BMW DTC 138601</u>	Radiator shutter, top, upper stop: not detected
<u>DTC P304D; BMW DTC 138701</u>	Radiator shutter, top, upper stop: detected too early
<u>DTC P300D; BMW DTC 138901</u>	Radiator shutter, bottom, electrical: Short circuit to B+
<u>DTC P300E; BMW DTC 138902</u>	Radiator shutter, bottom, electrical: Short circuit to earth

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<u>DTC P300F; BMW DTC 138904</u>	Radiator shutter, bottom, electrical: Line disconnection
<u>DTC P0300; BMW DTC 140001</u>	Misfire, several cylinders: injection is cut out
<u>DTC P0300; BMW DTC 140002</u>	Misfire, several cylinders: damaging exhaust gas after starting
<u>DTC P0300; BMW DTC 140004</u>	Misfire, several cylinders: damaging exhaust gas
<u>DTC P0301; BMW DTC 140101</u>	Combustion misfiring, cylinder 1: Injection is switched off
<u>DTC P0301; BMW DTC 140102</u>	Combustion misfiring, cylinder 1: damaging exhaust gas after start sequence
<u>DTC P0301; BMW DTC 140104</u>	Combustion misfiring, cylinder 1: damaging exhaust gas
<u>DTC P0302; BMW DTC 140201</u>	Misfire, cylinder 2: injection is cut out
<u>DTC P0302; BMW DTC 140202</u>	Misfire, cylinder 2: damaging exhaust gas after starting
<u>DTC P0302; BMW DTC 140204</u>	Misfire, cylinder 2: damaging exhaust gas
<u>DTC P0303; BMW DTC 140301</u>	Misfire, cylinder 3: injection is cut out
<u>DTC P0303; BMW DTC 140302</u>	Misfire, cylinder 3: damaging exhaust gas after starting
<u>DTC P0303; BMW DTC 140304</u>	Misfire, cylinder 3: damaging exhaust gas
<u>DTC P0304; BMW DTC 140401</u>	Misfire, cylinder 4: injection is cut out
<u>DTC P0304; BMW DTC 140402</u>	Misfire, cylinder 4: damaging exhaust gas after starting
<u>DTC P0304; BMW DTC 140404</u>	Misfire, cylinder 4: damaging exhaust gas
<u>DTC P0305; BMW DTC 140501</u>	Misfire, cylinder 5: injection is cut out
<u>DTC P0305; BMW DTC 140502</u>	Misfire, cylinder 5: damaging exhaust gas after starting
<u>DTC P0305; BMW DTC 140504</u>	Misfire, cylinder 5: damaging exhaust gas
<u>DTC P0306; BMW DTC 140601</u>	Misfire, cylinder 6: injection is cut out
<u>DTC P0306; BMW DTC 140602</u>	Misfire, cylinder 6: damaging exhaust gas after starting
<u>DTC P0306; BMW DTC 140604</u>	Misfire, cylinder 6: damaging exhaust gas
<u>DTC P1301; BMW DTC 150102</u>	Ignition, cylinder 1: combustion duration too short
<u>DTC P1302; BMW DTC 150202</u>	Ignition, cylinder 2: combustion duration too short
<u>DTC P1303; BMW DTC 150302</u>	Ignition, cylinder 3: combustion duration too short
<u>DTC P1304; BMW DTC 150402</u>	Ignition, cylinder 4: combustion duration too short
<u>DTC P1305; BMW DTC 150502</u>	Ignition, cylinder 5: combustion duration too short
<u>DTC P1306; BMW DTC 150602</u>	Ignition, cylinder 6: combustion duration too short
<u>DTC P050B; BMW DTC 151001</u>	Ignition timing adjustment in idle, cold start Ignition timing too early
<u>DTC P13EA; BMW DTC 151101</u>	Ignition timing adjustment at partial load, cold start Ignition timing too early

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<u>DTC P13A0; BMW DTC 152108</u>	Super-knocking, cylinder 1: Injection switch-off
<u>DTC P13A1; BMW DTC 152208</u>	Super-knocking, cylinder 2: Injection switch-off
<u>DTC P13A2; BMW DTC 152308</u>	Super-knocking, cylinder 3: Injection switch-off
<u>DTC P13A3; BMW DTC 152408</u>	Super-knocking, cylinder 4: Injection switch-off
<u>DTC P13A4; BMW DTC 152508</u>	Super-knocking, cylinder 5: Injection switch-off
<u>DTC P13A5; BMW DTC 152608</u>	Super-knocking, cylinder 6: Injection switch-off
<u>DTC P137F; BMW DTC 152D08</u>	Super-knocking: Injection switch-off
<u>DTC P0335; BMW DTC 160001</u>	Crankshaft sensor, signal: no signal
<u>DTC P0336; BMW DTC 160020</u>	Crankshaft sensor: disturbed crankshaft signal
<u>DTC P13CE; BMW DTC 160510</u>	Crankshaft sensor, parked position: Not plausible
<u>DTC P0343; BMW DTC 164020</u>	Inlet-camshaft sensor: signal high
<u>DTC P0342; BMW DTC 164021</u>	Inlet-camshaft sensor: signal low
<u>DTC P0368; BMW DTC 164030</u>	Exhaust-camshaft sensor: signal high
<u>DTC P0367; BMW DTC 164031</u>	Exhaust-camshaft sensor: signal low
<u>DTC P13CA; BMW DTC 164040</u>	Inlet camshaft, mechanism: installation faulty
<u>DTC P13CB; BMW DTC 164041</u>	Exhaust camshaft, mechanism: installation faulty
<u>DTC P0324; BMW DTC 168A20</u>	Knock control, fault check: malfunction, system fault
<u>DTC P13AF; BMW DTC 168A30</u>	Knock sensor, electrical: signal input A, short circuit to positive
<u>DTC P13AE; BMW DTC 168A31</u>	Knock sensor, electrical: signal input A, short circuit to ground
<u>DTC P13B9; BMW DTC 168A40</u>	Knock sensor, electrical: signal input B, short circuit to positive
<u>DTC P13B8; BMW DTC 168A41</u>	Knock sensor, electrical: signal input B, short circuit to ground
<u>DTC P13BF; BMW DTC 168A50</u>	Knock sensor 2, electrical: signal input A, short circuit to positive
<u>DTC P13BE; BMW DTC 168A51</u>	Knock sensor 2, electrical: signal input A, short circuit to ground
<u>DTC P13C8; BMW DTC 168A60</u>	Knock sensor 2, electrical: signal input B, short circuit to positive
<u>DTC P13C7; BMW DTC 168A61</u>	Knock sensor 2, electrical: signal input B, short circuit to ground
<u>DTC P0328; BMW DTC 168A70</u>	Knock sensor, signal: engine mechanically too loud or KS outside tolerance (sensitivity)
<u>DTC P0327; BMW DTC 168A71</u>	Knock sensor, signal: electrical fault KS (loose contact) or KS loose
<u>DTC P1328; BMW DTC 168A80</u>	Knock sensor 2, signal: engine mechanically too loud or KS outside tolerance (sensitivity)
<u>DTC P1327; BMW DTC 168A81</u>	Knock sensor 2, signal: electrical fault KS (loose contact) or KS loose

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<u>DTC P0420; BMW DTC 180001</u>	Catalytic converter: efficiency below limit value
<u>DTC P2420; BMW DTC 190001</u>	DMTL solenoid valve, activation: short circuit to positive
<u>DTC P2419; BMW DTC 190002</u>	DMTL solenoid valve, activation: short circuit to ground
<u>DTC P2418; BMW DTC 190004</u>	DMTL solenoid valve, activation: open circuit
<u>DTC P0442; BMW DTC 190201</u>	Fuel tank ventilation system and purge air system, minor leak: Leak greater than 1.0 mm
<u>DTC P0456; BMW DTC 190302</u>	Fuel tank ventilation system and purge air system, micro-leak: Leak greater than 0.5 mm
<u>DTC P1449; BMW DTC 190401</u>	DMTL, system fault: pump current too high during reference measurement
<u>DTC P1448; BMW DTC 190402</u>	DMTL, system fault: pump current too low during reference measurement
<u>DTC P1434; BMW DTC 190404</u>	DMTL, system fault: abort due to current fluctuations during reference measurement
<u>DTC P1447; BMW DTC 190408</u>	DMTL, system fault: pump current reaches limit value during valve test
<u>DTC P240C; BMW DTC 190501</u>	DMTL, heating, activation: short circuit to positive
<u>DTC P240B; BMW DTC 190502</u>	DMTL, heating, activation: short circuit to ground
<u>DTC P240A; BMW DTC 190504</u>	DMTL, heating, activation: open circuit
<u>DTC P2402; BMW DTC 190601</u>	DMTL leak diagnosis pump, activation: Short circuit to B+
<u>DTC P2401; BMW DTC 190702</u>	DMTL leak diagnosis pump, activation: Short to earth
<u>DTC P2400; BMW DTC 190704</u>	DMTL leak diagnosis pump, activation: Open circuit
<u>DTC P0459; BMW DTC 191001</u>	Tank-venting valve, activation: short circuit to positive
<u>DTC P0458; BMW DTC 191002</u>	Tank-venting valve, activation: short circuit to ground
<u>DTC P0444; BMW DTC 191004</u>	Tank-venting valve, activation: open circuit
<u>DTC P2421; BMW DTC 191A21</u>	Tank-venting valve: jammed open
<u>DTC P149C; BMW DTC 191B01</u>	Tank safety valve shut-off valve, activation: Short circuit to B+
<u>DTC P149B; BMW DTC 191B02</u>	Tank safety valve shut-off valve, activation: Short circuit to earth
<u>DTC P149A; BMW DTC 191B04</u>	Tank safety valve shut-off valve, activation: Line disconnection
<u>DTC P149D; 191C01</u>	Tank safety valve shut-off valve: jammed open
<u>DTC P0440; BMW DTC 191C02</u>	Tank safety valve: malfunction
<u>DTC P143F; BMW DTC 191C03</u>	Tank safety valve, after-run: malfunction
<u>DTC P0440; BMW DTC 191D01</u>	Tank safety valve: malfunction

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<u>DTC P0462; BMW DTC 193002</u>	Fuel level sensor, left, signal: Short to earth
<u>DTC P1407; BMW DTC 193008</u>	Fuel level sensor, left, signal: CAN value implausible
<u>DTC P2068; BMW DTC 193011</u>	Fuel level sensor, right, signal: Short circuit to B+
<u>DTC P2067; BMW DTC 193102</u>	Fuel level sensor, right, signal: Short to earth
<u>DTC P1408; BMW DTC 193108</u>	Fuel level sensor, right, signal: CAN value implausible
<u>DTC P0463; BMW DTC 193111</u>	Fuel level sensor, left, signal: Short circuit to B+
<u>DTC P144B; BMW DTC 193221</u>	Fuel level sensor: Deviation between consumption and fill-level change
<u>DTC P0692; BMW DTC 1A2001</u>	Electric fan, activation: short circuit to positive
<u>DTC P0691; BMW DTC 1A2002</u>	Electric fan, activation: short circuit to ground
<u>DTC P0480; BMW DTC 1A2004</u>	Electric fan, activation: open circuit
<u>DTC P14C0; BMW DTC 1A2108</u>	Electric fan, self-diagnosis, stage 1: minor fan fault
<u>DTC P14C0; BMW DTC 1A2308</u>	Electric fan, self-diagnosis, stage 2: fan fault with potential danger to fan
<u>DTC P14C0; BMW DTC 1A2408</u>	Electric fan, self-diagnosis, stage 3: fan fault with restricted motor function
<u>DTC P14C0; BMW DTC 1A2508</u>	Electric fan, self-diagnosis, stage 4: serious fan fault
<u>DTC P144E; BMW DTC 1A2601</u>	Fuse relay, electric fan, activation: short circuit to positive
<u>DTC P144D; BMW DTC 1A2602</u>	Fuse relay, electric fan, activation: short circuit to ground
<u>DTC P144C; BMW DTC 1A2604</u>	Fuse relay, electric fan, activation: open circuit
<u>DTC P1518; BMW DTC 1B0A20</u>	Poor-road-surface detection: wheel speed too high
<u>DTC P1517; BMW DTC 1B0A21</u>	Poor-road-surface detection: no wheel-speed signal received
<u>DTC P0503; BMW DTC 1B0A40</u>	Vehicle speed: signal too high
<u>DTC P152A; BMW DTC 1B0A60</u>	Vehicle speed, plausibility: minimum speed under load not reached
<u>DTC P152B; BMW DTC 1B0A61</u>	Vehicle speed, plausibility: minimum speed in overrun mode not reached
<u>DTC P0501; BMW DTC 1B0A62</u>	Vehicle speed, plausibility: implausible speed signal
<u>DTC P15DC; BMW DTC 1B0A64</u>	Vehicle speed, wheel sensor rear/left, plausibility: signal implausible
<u>DTC P15DA; BMW DTC 1B0A65</u>	Vehicle speed, wheel sensor front/left, plausibility: signal implausible
<u>DTC P15DD; BMW DTC 1B0A66</u>	Vehicle speed, wheel sensor rear/right, plausibility: signal implausible
<u>DTC P15DB; BMW DTC 1B0A67</u>	Vehicle speed, wheel sensor front/right, plausibility: signal implausible
<u>DTC P1667; BMW DTC 1B2002</u>	EWS anti-tampering protection: no starting value programmed

<u>DTC P16CF; BMW DTC 1B2008</u>	EWS anti-tampering protection: expected response implausible
<u>DTC P165A; BMW DTC 1B2101</u>	Interface EWS-DME: hardware fault
<u>DTC P1660; BMW DTC 1B2102</u>	Interface EWS-DME: frame fault
<u>DTC P1661; BMW DTC 1B2104</u>	Interface EWS-DME: timeout
<u>DTC P165C; BMW DTC 1B2201</u>	DME, internal fault, EWS data: no available memory possibility
<u>DTC P165D; BMW DTC 1B2202</u>	DME, internal fault, EWS data: fault-activation-code storage
<u>DTC P165E; BMW DTC 1B2208</u>	DME, internal fault, EWS data: checksum fault
<u>DTC U1166; BMW DTC 1B2302</u>	Message, EWS-DME, incorrect: frame fault
<u>DTC U0167; BMW DTC 1B2304</u>	Message, EWS-DME, incorrect: timeout
<u>DTC P15B0; BMW DTC 1B5101</u>	Terminal 15_3, line from CAS, electrical: short circuit to positive
<u>DTC P15B1; BMW DTC 1B5102</u>	Terminal 15_3, line from CAS, electrical: short circuit to ground or open circuit
<u>DTC P15D9; BMW DTC 1B5202</u>	Terminal 15N_1, power supply switched by CAS, electrical: Short to earth or open circuit
<u>DTC P15ED; BMW DTC 1B5302</u>	Terminal 15N_2, power supply switched by CAS, electrical: Short to earth or open circuit
<u>DTC P15F8; BMW DTC 1B5402</u>	Terminal 15N_3, power supply switched by CAS, electrical: Short to earth or open circuit
<u>DTC P0571; BMW DTC 1B6008</u>	Brake-light switch, plausibility: signal implausible
<u>DTC P15E8; BMW DTC 1B9508</u>	Engine switch-off time, plausibility: time too short in correlation to engine-coolant cooling
<u>DTC P15E9; BMW DTC 1B9608</u>	Engine switch-off time, plausibility: time too long in correlation to engine-coolant cooling
<u>DTC P15FA; BMW DTC 1B9701</u>	Engine switch-off time: too fast during engine operation
<u>DTC P15FB; BMW DTC 1B9702</u>	Engine switch-off time: too slow during engine operation
<u>DTC P15FE; BMW DTC 1B9804</u>	Engine switch-off time, signal: no signal
<u>DTC P15FC; BMW DTC 1B9A01</u>	Engine switch-off time: too fast during run-on
<u>DTC P15FD; BMW DTC 1B9A02</u>	Engine switch-off time: too slow during run-on
<u>DTC P159E; BMW DTC 1C0001</u>	Engine-oil pressure control, dynamic: pressure fluctuations
<u>DTC P159F; BMW DTC 1C0101</u>	Engine-oil pressure control, static: engine-oil pressure too high, limp-home operation
<u>DTC P15A0; BMW DTC 1C0102</u>	Engine-oil pressure control, static: engine-oil pressure too low, limp-home operation
<u>DTC P15EC; BMW DTC 1C0201</u>	Oil-pressure regulating valve, activation: short circuit to positive
<u>DTC P15EB; BMW DTC 1C0202</u>	Oil-pressure regulating valve, activation: short

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	circuit to ground
<u>DTC P15EA; BMW DTC 1C0204</u>	Oil-pressure regulating valve, activation: open circuit
<u>DTC P15A1; BMW DTC 1C0301</u>	Oil-pressure regulating valve, mechanical: sticks in fully energized position (minimum oil pressure)
<u>DTC P15A2; BMW DTC 1C0302</u>	Oil-pressure regulating valve, mechanical: sticks in non-energized position (maximum oil pressure)
<u>DTC P15A3; BMW DTC 1C2001</u>	Oil pump, mechanical: oil pressure too high
<u>DTC P0524; BMW DTC 1C2002</u>	Oil pump, mechanical: oil pressure too low
<u>DTC P0523; BMW DTC 1C3001</u>	Engine-oil pressure sensor, electric: short circuit to positive
<u>DTC P0522; BMW DTC 1C3002</u>	Engine oil pressure sensor, electrical: Short to earth
<u>DTC P0521; BMW DTC 1C3108</u>	Engine-oil pressure sensor, plausibility: signal hangs
<u>DTC P250F; BMW DTC 1C4002</u>	Engine-oil level: too low
<u>DTC P252A; BMW DTC 1C4110</u>	Oil-condition sensor, electrical: malfunction
<u>DTC P1587; BMW DTC 1C4111</u>	Oil-condition sensor, plausibility: level implausible
<u>DTC P1586; BMW DTC 1C4112</u>	Oil-condition sensor, plausibility: temperature implausible
<u>DTC P1587; BMW DTC 1C4113</u>	Oil-condition sensor, plausibility: level implausible
<u>DTC P1586; BMW DTC 1C4115</u>	Oil-condition sensor, plausibility: temperature implausible
<u>DTC P1587; BMW DTC 1C4116</u>	Oil-condition sensor, electrical: level, malfunction
<u>DTC P1588; BMW DTC 1C4117</u>	Oil-condition sensor, electrical: permittivity, malfunction
<u>DTC P1586; BMW DTC 1C4118</u>	Oil-condition sensor, electrical: temperature, malfunction
<u>DTC P0195; BMW DTC 1C4119</u>	Engine-oil temperature sensor, electrical: malfunction
<u>DTC P0196; BMW DTC 1C4120</u>	Engine-oil temperature sensor, plausibility: temperature implausible
<u>DTC P1521; BMW DTC 1C5A20</u>	BSD message from oil-condition sensor: no message
<u>DTC P0128; BMW DTC 1D2008</u>	Map thermostat, mechanical: jammed open
<u>DTC P0599; BMW DTC 1D2401</u>	Map thermostat, activation: short circuit to positive
<u>DTC P0598; BMW DTC 1D2402</u>	Map thermostat, activation: short circuit to ground
<u>DTC P0597; BMW DTC 1D2404</u>	Map thermostat, activation: open circuit
<u>DTC P0507; BMW DTC 1E0001</u>	Idle-speed control: speed too high
<u>DTC P0506; BMW DTC 1E0002</u>	Idle-speed control: speed too low
<u>DTC P1562; BMW DTC 1E0101</u>	Idle-speed control, cold start: engine speed too high
<u>DTC P1561; BMW DTC 1E0102</u>	Idle-speed control, cold start: engine speed too low
<u>DTC P10E3; BMW DTC 1F0514</u>	Valvetronic relay, supply voltage: Short to earth

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<u>DTC P10E4; BMW DTC 1F0515</u>	Valvetronic relay, supply voltage: Open circuit
<u>DTC P326A; BMW DTC 1F0516</u>	DME, internal fault, electric accelerator pedal monitoring: A/D converter idling test pulse check
<u>DTC P326A; BMW DTC 1F0517</u>	DME, internal fault, electric accelerator pedal monitoring: AD converter, test voltage check
<u>DTC P326B; BMW DTC 1F0518</u>	DME, internal fault, electric accelerator pedal monitoring: Air quantity adjustment
<u>DTC P060D; BMW DTC 1F0519</u>	DME, internal fault: monitoring, signal plausibilization, accelerator-pedal module or pedal-travel sensor
<u>DTC P325C; BMW DTC 1F0520</u>	DME, internal fault, electric accelerator pedal monitoring: Speed sensor
<u>DTC P3237; BMW DTC 1F0521</u>	DME, internal fault: monitoring, plausibilization of mixture-correction factors
<u>DTC P325D; BMW DTC 1F0522</u>	DME, internal fault: monitoring, injection-rate limitation, level 1
<u>DTC P325D; BMW DTC 1F0523</u>	DME, internal fault: monitoring, injection-rate limitation, level 2
<u>DTC P3337; BMW DTC 1F0524</u>	DME, internal fault: Monitoring of the nominal oxygen sensor value
<u>DTC P325F; BMW DTC 1F0525</u>	DME, internal fault: monitoring, plausibilization of relative fuel mass
<u>DTC P061B; BMW DTC 1F0526</u>	DME, internal fault: monitoring, torque comparison
<u>DTC P326C; BMW DTC 1F0527</u>	DME, internal fault, electric accelerator pedal monitoring: Drive train transmission ratio implausible
<u>DTC P3235; BMW DTC 1F0528</u>	DME, internal fault: monitoring, variant coding
<u>DTC P325E; BMW DTC 1F0529</u>	DME, internal fault, electric accelerator pedal monitoring: Ignition-timing monitoring
<u>DTC P326D; BMW DTC 1F0530</u>	DME, internal fault: Switch-off path test by monitoring module
<u>DTC P325F; BMW DTC 1F0531</u>	DME, internal fault: Plausibility monitoring, fuel mass
<u>DTC P1646; BMW DTC 1F0532</u>	DME, internal fault, monitoring MSC communication Malfunction in module R2S2/1
<u>DTC P1646; BMW DTC 1F0533</u>	DME, internal fault, monitoring MSC communication Malfunction in module R2S2/2
<u>DTC P10E5; BMW DTC 1F0904</u>	DME, internal fault, activation Valvetronic: malfunction
<u>DTC P062F; BMW DTC 1F1A50</u>	DME, internal fault: erase EEPROM faulty
<u>DTC P062F; BMW DTC 1F1A52</u>	DME, internal fault: write EEPROM faulty
<u>DTC P060A; BMW DTC 1F1A60</u>	DME, internal fault: monitoring-module fault
<u>DTC P16EA; BMW DTC 1F1A80</u>	DME, internal fault, watchdog output: malfunction

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<u>DTC P16EB; BMW DTC 1F1A81</u>	DME, internal fault, watchdog output: faulty question/answer communication
<u>DTC P16EC; BMW DTC 1F1A82</u>	DME, internal fault, watchdog output: overvoltage detection
<u>DTC P16E7; BMW DTC 1F1A90</u>	DME, internal fault, monitoring 5V sensor supply: voltage outside valid range
<u>DTC P16E8; BMW DTC 1F1A91</u>	DME, internal fault, monitoring 5V sensor supply 2: voltage outside valid range
<u>DTC P16E9; BMW DTC 1F1A92</u>	DME, internal fault, monitoring 5V sensor supply 3: voltage outside valid range
<u>DTC P0617; BMW DTC 1F1B40</u>	Starter, activation: short circuit to positive
<u>DTC P0616; BMW DTC 1F1B41</u>	Starter, activation: short circuit to ground
<u>DTC P0615; BMW DTC 1F1B42</u>	Starter, activation: open circuit
<u>DTC P0687; BMW DTC 1F1B50</u>	System voltage, DME master relay: voltage too high
<u>DTC P3288; BMW DTC 1F2104</u>	Incorrect data record: CAN timeout
<u>DTC P3289; BMW DTC 1F2108</u>	Incorrect data record: Variant monitoring
<u>DTC P0634; BMW DTC 1F5020</u>	DME, internal fault, interior-temperature sensor: value too high
<u>DTC P163A; BMW DTC 1F5021</u>	DME, internal fault, interior-temperature sensor: value too low
<u>DTC P0634; BMW DTC 1F5101</u>	DME temperature: Overtemperature
<u>DTC P10DC; BMW DTC 201010</u>	CAN hardware: Faulty
<u>DTC P10DD; BMW DTC 201020</u>	FlexRay hardware: Faulty
<u>DTC P15D0; BMW DTC 20A701</u>	Coolant pump, speed deviation: outside tolerance
<u>DTC P15D1; BMW DTC 20A801</u>	Coolant pump, deactivation: internal temperature too high
<u>DTC P15D2; BMW DTC 20A802</u>	Coolant pump, shutdown: Overvoltage detected
<u>DTC P15D3; BMW DTC 20A804</u>	Coolant pump, shutdown: Pump blocked
<u>DTC P15D4; BMW DTC 20A901</u>	Coolant pump, operation with reduced output: Dry running detected
<u>DTC P15D5; BMW DTC 20A902</u>	Coolant pump, operation with reduced output: Undervoltage detected
<u>DTC P15D6; BMW DTC 20A904</u>	Coolant pump, power-reduced operation: temperature limit 1 exceeded
<u>DTC P15D7; BMW DTC 20A908</u>	Coolant pump, power-reduced operation: temperature limit 2 exceeded
<u>DTC U1170; BMW DTC 20AA04</u>	Coolant pump, communication: malfunction
<u>DTC P0620; BMW DTC 210201</u>	Alternator, electric: malfunction
<u>DTC P325A; BMW DTC 210301</u>	Alternator, plausibility, electric: calculated
<u>DTC P0A3B; BMW DTC 210401</u>	Alternator, temperature: overtemperature
<u>DTC P324C; BMW DTC 210501</u>	Alternator, plausibility, temperature: overtemperature calculated

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<u>DTC P3223; BMW DTC 210601</u>	Alternator, mechanical: malfunction
<u>DTC P324E; BMW DTC 210701</u>	Alternator, regulator: model incorrect
<u>DTC P324A; BMW DTC 210801</u>	Alternator, model incorrect
<u>DTC P160C; BMW DTC 213301</u>	Power management: Overvoltage
<u>DTC P160D; BMW DTC 213401</u>	Power management: Undervoltage
<u>DTC P160A; BMW DTC 213501</u>	Power management: Exhaustive battery charge
<u>DTC P160F; BMW DTC 213604</u>	Power management: Closed-circuit current fault
<u>DTC P160E; BMW DTC 213701</u>	Power management: Ripple in system voltage too high
<u>DTC P0563; BMW DTC 213A20</u>	System voltage: voltage too high
<u>DTC P0562; BMW DTC 213A21</u>	System voltage: voltage too low
<u>DTC P0560; BMW DTC 213A22</u>	System voltage: analogue-digital converter faulty
<u>DTC P150A; BMW DTC 215001</u>	Intelligent battery sensor, signal: bus fault
<u>DTC P150D; BMW DTC 215101</u>	Intelligent battery sensor (IBS): Internal temperature measurement implausible
<u>DTC P150E; BMW DTC 215104</u>	Intelligent battery sensor (IBS): Internal voltage measurement implausible
<u>DTC P150F; BMW DTC 215108</u>	Intelligent battery sensor (IBS): Internal current measurement implausible
<u>DTC P15CE; BMW DTC 215801</u>	Intelligent battery sensor (IBS): Wake-up line, short circuit to B+ or earth
<u>DTC P15CF; BMW DTC 215901</u>	Intelligent battery sensor (IBS): Incorrect version
<u>DTC P15C3; BMW DTC 215A01</u>	Intelligent battery sensor (IBS): Wake-up line, line disconnection
<u>DTC P0A16; BMW DTC 219001</u>	Active engine mount, electric: short circuit to positive
<u>DTC P0A15; BMW DTC 219002</u>	Active engine mount, electric: short circuit to ground
<u>DTC P0A14; BMW DTC 219004</u>	Active engine mount, electric: open circuit
<u>DTC U1190; BMW DTC 231F04</u>	Electronic transmission control (EGS), PT-CAN, PT-CAN2: Communication fault
<u>DTC U1169; BMW DTC 233004</u>	No message (OBD sensor, diagnosis, status, 0x5E0, 0x8C), receiver DME, IHKA, transmitter KOMBI
<u>DTC U1185; BMW DTC CD840A</u>	DME/DDE PT-CAN: Communication fault
<u>DTC U119E; BMW DTC CD8420</u>	DME/DDE FlexRay bus: Communication fault
<u>DTC U1184; BMW DTC CD8486</u>	DME/DDE PT-CAN2: Communication fault
<u>DTC U1117; BMW DTC CD9902</u>	Message (vehicle speed, 55.3.4) not current, receiver DME/DDE, transmitter ICM
<u>DTC U1118; BMW DTC CD9904</u>	No message (vehicle speed, 55.3.4), receiver DME/DDE, transmitter IC
<u>DTC U1119; BMW DTC CD9908</u>	Message (vehicle speed, 55.3.4) checksum error, receiver DME/DDE, transmitter ICM

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<u>DTC U11C6; BMW DTC CD9932</u>	Message (yaw rate, vehicle, 38.0.2) alive check
<u>DTC U0123; BMW DTC CD9933</u>	No message (yaw rate, vehicle, 38.0.2)
<u>DTC U11C7; BMW DTC CD9934</u>	Message (yaw rate, vehicle, 38.0.2) checksum error
<u>DTC U0122; BMW DTC CD9935</u>	No message (data, driving dynamics sensor, extended, 38.0.2)
<u>DTC U1197; BMW DTC CD9A02</u>	Message (actual braking torque, sum, 43.3.4) not current, receiver DME/DDE, transmitter DSC
<u>DTC U1198; BMW DTC CD9A04</u>	No message (actual braking torque, sum, 43.3.4), receiver DME/DDE, transmitter DSC
<u>DTC U1199; BMW DTC CD9A08</u>	Message (actual braking torque, sum, 43.3.4) checksum error, receiver DME/DDE, transmitter DSC
<u>DTC U1195; BMW DTC CD9B02</u>	Message (actual wheel speed, 46.0.1) not current, receiver DME/DDE, transmitter DSC
<u>DTC U116D; BMW DTC CD9B04</u>	No message (actual wheel speed, 46.0.1), receiver DME/DDE, transmitter DSC
<u>DTC U1196; BMW DTC CD9B08</u>	Message (actual wheel speed, 46.0.1) checksum error, receiver DME/DDE, transmitter DSC
<u>DTC U1125; BMW DTC CD9F02</u>	Message (Dynamic Stability Control stabilization, 47.1.2) not current, receiver DME/DDE, transmitter DSC
<u>DTC U1126; BMW DTC CD9F04</u>	No message (Dynamic Stability Control stabilization, 47.1.2), receiver DME/DDE, transmitter DSC
<u>DTC U1127; BMW DTC CD9F08</u>	Message (Dynamic Stability Control stabilization, 47.1.2) checksum error, receiver DME/DDE, transmitter DSC
<u>DTC U1101; BMW DTC CDA804</u>	No message (relative time, 0x328), receiver DME/DDE, transmitter KOMBI
<u>DTC U0137; BMW DTC CDA904</u>	No message (status, trailer, 0x2E4), receiver DME/DDE, transmitter AH
<u>DTC U1129; BMW DTC CDAB04</u>	No message (reverse gear, 0x3B0), receiver DME/DDE, transmitter FRM, FEM
<u>DTC U11A5; BMW DTC CDAC04</u>	No message (status, transmission control unit, 0x39A), receiver DME/DDE, transmitter EGS
<u>DTC U112D; BMW DTC CDAD04</u>	No message (control, crash shutdown, electric fuel pump, 0x135), receiver DME/DDE, transmitter ACSM
<u>DTC U113C; BMW DTC CDAE04</u>	No message (time display, 0x2F8), receiver DME/DDE, transmitter KOMB
<u>DTC U113A; BMW DTC CDAF04</u>	No message (central locking and lid status, 0x2FC), receiver DME/DDE, transmitter CAS, FEM
<u>DTC U119B; BMW DTC CDB204</u>	No message (ambient temperature, 0x2CA), receiver DME/DDE, transmitter KOMBI

<u>DTC U111C; BMW DTC CDB504</u>	No message (kilometer reading / range, 0x330), receiver DME/DDE, transmitter KOMBI
<u>DTC U111D; BMW DTC CDB602</u>	Message (terminals, 0x12F) not current, receiver DME/DDE, transmitter CAS
<u>DTC U111E; BMW DTC CDB604</u>	No message (terminals, 0x12F), receiver DME/DDE, transmitter CAS, FEM
<u>DTC U111F; BMW DTC CDB608</u>	Message (terminals, 0x12F) checksum error, receiver DME/DDE, transmitter CAS
<u>DTC U11A7; BMW DTC CDB904</u>	No message (diagnosis, OBD gearbox, 0x396), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11B3; BMW DTC CDBB02</u>	Message (request, torque, crankshaft, gearbox 2, 0xA0) not current, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11B4; BMW DTC CDBB04</u>	No message (request, torque, crankshaft, gearbox 2, 0xA0), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11B5; BMW DTC CDBB08</u>	Message (request, torque, crankshaft, gearbox 2, 0xA0) checksum error, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A6; BMW DTC CDBF04</u>	No message (status, transmission control unit, 0x39A), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A4; BMW DTC CDC004</u>	No message (diagnosis, OBD gearbox, 0x396), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A1; BMW DTC CDC102</u>	Message (data, transmission line, 0x1AF) not current, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A2; BMW DTC CDC104</u>	No message (data, transmission line, 0x1AF), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11A3; BMW DTC CDC108</u>	Message (data, transmission line, 0x1AF) checksum error, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11AD; BMW DTC CDC202</u>	Message (request, torque, crankshaft, EGS, 0x0B0) not current, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11AE; BMW DTC CDC204</u>	No message (request, torque, crankshaft, EGS, 0x0B0), receiver DME/DDE, transmitter DKG, EGS
<u>DTC U11AF; BMW DTC CDC208</u>	Message (request, torque, crankshaft, EGS, 0x0B0) checksum error, receiver DME/DDE, transmitter DKG, EGS
<u>DTC U1128; BMW DTC CDC304</u>	No message (status, electric fuel pump, 335), receiver DME/DDE, transmitter EKP

DTC P1638; BMW DTC 100001: THROTTLE VALVE, FUNCTION: JAMMED BRIEFLY

Information saved in

DME

Fault code

100001 - P1638

Fault description

The diagnostic function monitors the throttle valve control signal for excessively high figures that would indicate that the throttle valve is sticking or seizing.

Condition for fault identification

Test condition:

This fault is logged and the throttle valve is deactivated when the PWM signal used to control the throttle valve remains above 80% for longer than 5 sec.

Potential problem source(s):

- Throttle valve moves stiffly, sticking, contaminated
- Defect in wiring harness between throttle-valve actuator motor and DME
- Defective throttle-valve actuator motor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Active control signal to throttle valve

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

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- Use tester to activate throttle valve and observe repositioning speed
- Check wiring harness between DME and throttle valve
- Visual inspection of throttle valve and air-induction system for contamination
- Move the throttle valve manually to determine whether it progresses throughout its entire travel range freely without excess resistance
- Replace throttle valve

Fault effect and breakdown warning

Breakdown notice:

Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1639; BMW DTC 100101: THROTTLE VALVE, FUNCTION: JAMMED PERMANENTLY

Information saved in

DME

Fault code

100101 - P1639

Fault description

The diagnostic function checks the throttle valve's control signal for excessively high figures that would

indicate that the throttle valve is seizing.

Condition for fault identification

Test condition:

This fault is entered when the PWM signal used to control the throttle valve remains above 80% for longer than 0.6 sec.

Potential problem source(s):

- Throttle valve moves stiffly, sticking, contaminated
- Defect in wiring harness between throttle-valve actuator motor and DME
- Defective throttle-valve actuator motor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Active control signal to throttle valve

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Use tester to activate throttle valve and observe repositioning speed
- Check wiring harness between DME and throttle valve
- Visual inspection of throttle valve and air-induction system for contamination
- Move the throttle valve manually to determine whether it progresses throughout its entire travel range freely without excess resistance
- Replace throttle-valve actuator motor

Fault effect and breakdown warning

Breakdown notice:

Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P11AA; BMW DTC 100201: THROTTLE VALVE, FUNCTION: SLUGGISH, TOO SLOW

Information saved in

DME

Fault code

100201 - P11AA

Fault description

The diagnostic function monitors the difference between specified and actual throttle-valve values. If this figure remains too high for a specified period, a fault is recognized and the throttle valve is deactivated.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the difference between the specified and the actual value is greater than the characteristic curve over throttle-valve gradient (4% - 50%).

Potential problem source(s):

- Friction in throttle valve
- Defect in wiring harness between throttle-valve actuator motor and DME
- Defective throttle-valve actuator motor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Active control signal to throttle valve

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Use tester to activate throttle valve and observe its reaction
- Check throttle valve for contamination and foreign objects
- Move throttle valve by hand, checking for resistance to motion and noting how quickly it closes when released
- Replace throttle-valve actuator motor

Fault effect and breakdown warning

Breakdown notice:

Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1637; BMW DTC 100210: THROTTLE-VALVE ACTUATOR, POSITION MONITORING: POSITIONAL VARIATION**Information saved in**

DME

Fault code

100210 - P1637

Fault description

The diagnostic function monitors the difference between specified and actual throttle-valve values. If this figure remains too high for a specified period, a fault is recognized and the throttle valve is deactivated.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the difference between the specified and the actual value is greater than the characteristic curve over throttle-valve gradient (4% - 50%).

Potential problem source(s):

- Friction in throttle valve
- Defect in wiring harness between throttle-valve actuator motor and DME
- Defective throttle-valve actuator motor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Active control signal to throttle valve

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Use tester to activate throttle valve and observe its reaction
- Check throttle valve for contamination and foreign objects
- Move throttle valve by hand, checking for resistance to motion and noting how quickly it closes when released
- Replace throttle-valve actuator motor

Fault effect and breakdown warning

Breakdown notice:

Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on

- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P110D; BMW DTC 100A02: THROTTLE VALVE, THROTTLE POTENTIOMETER 1 AND 2: DOUBLE FAULT**Information saved in**

DME

Fault code

100A02 - P110D

Fault description

Collective fault: Throttle valve.

Condition for fault identification

Test condition:

The fault is recognized when another fault related to the throttle valve (L4: 10404, 10405, 10406, 10408, 10409, 10410, 10432, 10433, 10004, 10000, 10001; L6: 0x101001, 0x101002, 0x107A22, 0x107A30, 0x107A31, 0x107A32, 0x107A80, 0x107A81, 0x107A90, 0x107A91, 0x100210) is present.

Potential problem source(s):

- Additional throttle valve error path at one or both throttle-valve potentiometers
- The diagnostic fault code is entered together with faults for the throttle-valve potentiometer 1 and/or 2, position controller faults, or faults detected during the spring test

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

Depends on original fault source (min. 0.14 sec., max. 0.6 sec.)

Action in service

- Composite fault
- Seek original source fault for throttle valve in ECU fault memory (L4: 10404, 10405, 10406, 10408, 10409, 10410, 10432, 10433, 10004, 10000, 10001; L6: 0x101001, 0x101002, 0x107A22, 0x107A30, 0x107A31, 0x107A32, 0x107A80, 0x107A81, 0x107A90, 0x107A91, 0x100210) and repair it using test plan

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1141; BMW DTC 100C08: THROTTLE VALVE, THROTTLE POTENTIOMETER 1: SIGNAL IMPLAUSIBLE FOR AIR MASS

Information saved in

DME

Fault code

100C08 - P1141

Fault description

When a single fault occurs at the throttle valve, the diagnostic function monitors the operation of the remaining sensor. The deviation in the sensor signal is plausibilized against the default value from air mass.

Condition for fault identification

Test condition:

The fault is recognized when a defect at sensor 2 or a clocking error [deviation between sensor 1 and sensor 2 > 6.3% throttle valve] is detected and comparison between sensor 1 and default value is greater than 14.9%.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input on DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the ECU fault memory immediately.

0.28 sec.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1162; BMW DTC 100E08: THROTTLE VALVE, THROTTLE POTENTIOMETER 2: SIGNAL IMPLAUSIBLE FOR AIR MASS

Information saved in

DME

Fault code

100E08 - P1162

Fault description

When a single fault occurs at the throttle valve, the diagnostic function monitors the operation of the remaining sensor. The deviation in the sensor signal is plausibilized against the default value from air mass.

Condition for fault identification

Test condition:

The fault is recognized when a defect at sensor 1 or a clocking error [deviation between sensor 1 and sensor 2 > 6.3% throttle valve] is detected and comparison between sensor 2 and default value is greater than 14.9%.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

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- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0123; BMW DTC 101001: THROTTLE VALVE, THROTTLE-VALVE POTENTIOMETER 1, ELECTRIC: SHORT CIRCUIT TO POSITIVE OR OPEN CIRCUIT

Information saved in

DME

Fault code

101001 - P0123

Fault description

The diagnostic function checks the signal from throttle valve actuator 1 for electrical faults.

Condition for fault identification

Test condition:

The fault is recognized when the signal from throttle valve sensor 1 rises above the fault threshold of 4.75 V.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US 01/10:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY10 US 03/10:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0122; BMW DTC 101002: THROTTLE VALVE, THROTTLE-VALVE POTENTIOMETER 1, ELECTRIC: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

101002 - P0122

Fault description

The diagnostic function checks the signal from throttle valve actuator 1 for electrical faults.

Condition for fault identification

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Test condition:

The fault is recognized when the signal from throttle valve sensor 1 falls below the fault threshold of 0.22 V.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning**Breakdown notice:**

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US 01/10:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY10 US 03/10:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0223; BMW DTC 101201: THROTTLE VALVE, THROTTLE POTENTIOMETER 2, ELECTRICAL: SHORT CIRCUIT TO B+

Information saved in

DME

Fault code

101201 - P0223

Fault description

The diagnostic function checks the voltage of throttle valve sensor 2 for electrical faults.

Condition for fault identification

Test condition:

The fault is recognized when the signal from throttle valve sensor 2 rises above the fault threshold of 4.77 V.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US 01/10:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY10 US 03/10:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0222; BMW DTC 101202: THROTTLE VALVE, THROTTLE POTENTIOMETER 2, ELECTRICAL: SHORT CIRCUIT TO EARTH OR LINE DISCONNECTION

Information saved in

DME

Fault code

101202 - P0222

Fault description

The diagnostic function checks the voltage of throttle valve sensor 2 for electrical faults.

Condition for fault identification

Test condition:

The fault is recognized when the signal from throttle valve sensor 2 falls below the fault threshold of 0.22 V.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning**Breakdown notice:**

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US 01/10:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY10 US 03/10:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1632; BMW DTC 101401: THROTTLE VALVE, ADAPTATION: MARGINAL CONDITIONS NOT MET

Information saved in

DME

Fault code

101401 - P1632

Fault description

During the throttle valve adaptation the diagnostic function monitors compliance with the prescribed process conditions.

Condition for fault identification

Test condition:

Learning routine for lower mechanical travel stop aborted owing to low battery voltage (< 10 V).

Potential problem source(s):

- Fault code entry is for information only
- Throttle-valve adaptation aborted in response to low onboard electrical system voltage

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 30 sec. after Terminal 15 on

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check battery voltage (> 10 V), Terminal 15 off -> Terminal 15 on -> Wait 1 min
- Provided that the voltage condition has been met the fault should not occur again
- Component replacement based on this fault is not necessary!

Fault effect and breakdown warning

Breakdown notice:

Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1633; BMW DTC 101402: THROTTLE VALVE, ADAPTATION: EMERGENCY RUNNING POSITION NOT ADAPTED**Information saved in**

DME

Fault code

101402 - P1633

Fault description

The diagnostic function monitors the throttle valve to determine whether it is at the emergency air position (open at angle of roughly 7.6°) when no voltage is applied.

Condition for fault identification

Test condition:

The fault is recognized when the values for the emergency air point are determined to be less than 1.8% or larger than 16% during the adaptation process.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Dirt/contamination on throttle valve
- Throttle valve seized in open or fully-closed position

- Defective throttle-valve actuator motor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 30 sec. after Terminal 15 on

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Determine whether throttle valve is open to an aperture of roughly 8° (almost closed) when no voltage is applied, check measured data in tester (sensor 1 and 2 voltage, throttle-valve angle)
- Visual inspection of throttle valve and air-induction system for contamination
- Check wiring harness between DME and throttle valve
- Replace throttle-valve actuator motor

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P16BC; BMW DTC 101408: THROTTLE VALVE, ADAPTATION: INITIAL ADAPTATION, LOWER LIMIT POSITION NOT TAUGHT IN**Information saved in**

DME

Fault code

101408 - P16BC

Fault description

The diagnostic function monitors the throttle valve to determine whether it reaches the lower mechanical travel stop (UMA) during a repeat throttle-valve adaptation routine (after roughly 30 sec. Terminal 15 without engine start).

Condition for fault identification**Test condition:**

The fault is recognized when the limits specified for the signal voltages (sensor 1 signal voltage < 0.27 V, sensor 2 > 4.73 V) are violated during the repeat adaptation routine (roughly 30 sec. at Terminal 15 without engine start) or the mutual deviation between the sum voltages for sensors 1 and 2 of 5 V is more than X V.

Potential problem source(s):

- Fault during repeat initialization attempt; lower mechanical travel limit range violation;;
 - 1.a. Travel stop dirty,
 - 1.b. Foreign object/matter
 - 1.c. Sporadic contact resistance

1.d. Defective throttle valve

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 30 sec. after Terminal 15 on

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Clear ECU fault memory? Ignition off? Ignition on for at least 1 minute
- If fault remains:
 - Check wiring harness DME - throttle valve (sum of throttle-valve voltages must equal 5 V)
 - Check to determine whether foreign objects/matter in the intake manifold or at the throttle valve are preventing the throttle valve from closing
 - Completely close the throttle valve by hand and measures the voltages on the two sensors (S1: 0.5 V +/- tolerance, S2: 4.5 V +/- tolerance)
- Replace throttle valve

Fault effect and breakdown warning

Breakdown notice:

Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P16E6; BMW DTC 101410: THROTTLE VALVE, ADAPTATION: MARGINAL CONDITIONS NOT MET; BATTERY VOLTAGE TOO LOW

Information saved in

DME

Fault code

101410 - P16E6

Fault description

The diagnostic function monitors the throttle valve to determine whether it reaches the lower mechanical travel stop (UMA) during the initial adaptation.

Condition for fault identification

Test condition:

The fault is recognized when the limits for the approved signal voltages (signal voltage sensor 1 < 0.27 V, sensor 2 > 4.73 V) are violated during the initial adaptation, or when the deviation of the sum voltage of sensor 1 and sensor 2 of 5 V exceeds X V.

Potential problem source(s):

- Fault during initial initialization attempt; lower mechanical travel stop range violation:
- Dirt/contamination on travel stop
- Foreign matter/object(s)
- Sporadic contact resistance

- Defective throttle valve

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 30 sec. after Terminal 15 on

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Clear ECU fault memory? Ignition off? Ignition on for at least 1 minute
- If fault is still present:
- Check wiring harness DME - throttle valve (sum of throttle valve voltages must equal 5 V)
- Inspect to determine whether any objects are present in the intake manifold or within the throttle valve's travel range
- Completely close the throttle valve by hand and measures the voltages on the two sensors (S1: 0.5 V +/- tolerance, S2: 4.5 V +/- tolerance)
- Replace throttle valve

Fault effect and breakdown warning

Breakdown notice:

Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P115F; BMW DTC 101C08: THROTTLE VALVE, THROTTLE POTENTIOMETER: PLAUSIBILITY TIMING FAULT BETWEEN POTENTIOMETER 1 AND POTENTIOMETER 2

Information saved in

DME

Fault code

101C08 - P115F

Fault description

The diagnostic function monitors the mutual deviation between the two sensor voltages.

Condition for fault identification

Test condition:

If the deviation in the two voltages from sensors 1 and 2 exceeds a value defined in the application (characteristic curve) the fault is recognized.

Potential problem source(s):

- Defect in wiring harness between throttle valve potentiometer and DME
- Throttle valve potentiometer defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between throttle valve potentiometer and DME
- Replace throttle valve potentiometer

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Limit on pedal value variation and on maximum absolute value (34.5% pedal)
- In combination with fault in accelerator pedal sensor 1 and/or 2, increased idle speed and no processing of accelerator pedal data

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: on
- US electronic engine power reduction: on

· CC message: on

Service instruction

None

DTC P112F; BMW DTC 101F01: THROTTLE-VALVE ANGLE - INTAKE-MANIFOLD PRESSURE, CORRELATION: LIMIT VALUE EXCEEDED**Information saved in**

DME

Fault code

101F01 - P112F

Fault description

The diagnostic function monitors the throttle valve aperture and the current intake manifold pressure reading to determine whether they are mutually plausible.

Condition for fault identification

Test condition:

The fault is recognized when the relationship between the indicated intake manifold pressure and the mass airflow calculated based on throttle-valve angle is not correct.

Potential problem source(s):

- Measured value for intake manifold pressure (absolute) too high
- Vacuum leak within induction tract/crankcase
- Incorrect throttle-valve angle
- Pressure sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- 30°C < intake-air temperature < 120°C
- -30°C < coolant temperature

Time condition:

- None

Other conditions:

- Engine on
- Pressure drop at throttle valve exceeds 18 hPa
- 745hPa < barometric pressure
- 500 RPM < engine speed < 7000 RPM
- 133 RPM < dynamic RPM response (RPM window)
- 7.7% < dynamic load response (load window)

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check intake system and crankcase for leakage
- Check throttle valve (contamination, carbon deposits, icing)
- Check plug and wiring harness between intake-manifold pressure sensor and DME
- Check plug, wiring harness at electric throttle-valve actuator
- Replace pressure sensor
- Replace throttle valve

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off

- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P112E; BMW DTC 101F02: THROTTLE-VALVE ANGLE - INTAKE-MANIFOLD PRESSURE, CORRELATION: LIMIT VALUE UNDERSHOT**Information saved in**

DME

Fault code

101F02 - P112E

Fault description

The diagnostic function monitors the throttle valve aperture and the current intake manifold pressure reading to determine whether they are mutually plausible.

Condition for fault identification

Test condition:

The fault is recognized when the relationship between the indicated intake manifold pressure and the mass airflow calculated based on throttle-valve angle is not correct.

Potential problem source(s):

- Measured value for intake manifold pressure (absolute) is too low
- Defective plug or wiring harness
- Vacuum leak within induction tract/crankcase
- Incorrect throttle-valve angle
- Pressure sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Pressure drop at throttle valve exceeds 18 hPa

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check intake system and crankcase for leakage
- Check throttle valve (contamination, carbon deposits, icing)
- Check wiring harness between intake-manifold pressure sensor and DME
- Check plug, wiring harness at electric throttle-valve actuator
- Replace pressure sensor
- Replace throttle valve

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P00BD; BMW DTC 102001: NONE**Information saved in**

DME

Fault code

102001 - P00BD

Fault description

Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P115D; BMW DTC 102001: NONE**Information saved in**

DME

Fault code

102001 - P115D

Fault description

Mass or Volume Air Flow 'A' Air Mass Too High Compared to Model

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P00BC; BMW DTC 102002: NONE**Information saved in**

DME

Fault code

102002 - P00BC

Fault description

Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P115C; BMW DTC 102002: NONE

Information saved in

DME

Fault code

102002 - P115C

Fault description

Mass or Volume Air Flow 'A' Air Mass Too Low Compared to Model

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P115D; BMW DTC 102010: AIR-MASS SENSOR, PLAUSIBILITY: AIR MASS TOO HIGH IN RELATION TO MODEL**Information saved in**

DME

Fault code

102010 - P115D

Fault description

The diagnostic function compares the calculated air mass with the measured air mass.

Condition for fault identification

Test condition:

The fault is recognized when the calculated air mass deviates too starkly from the measured air mass.

Potential problem source(s):

- Collateral fault caused by other components in the intake system, Valvetronic, turbocharger
- Intake system leaking
- HFM defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If other diagnostic fault codes related to components in the induction tract, Valvetronic or turbocharger have been logged, then process these first (collateral faults)
- Check intake system for leaks
- Replace HFM

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P115C; BMW DTC 102011: AIR-MASS SENSOR, PLAUSIBILITY: AIR MASS TOO LOW IN RELATION TO MODEL**Information saved in**

DME

Fault code

102011 - P115C

Fault description

The diagnostic function compares the air mass calculated from the model with the measured air mass.

Condition for fault identification

Test condition:

The fault is recognized when the indicated air mass does not correlate with the calculated mass airflow rate.

Potential problem source(s):

- Defective HFM, problem with airflow to HFM, clean air tube fallen off intake air noise attenuator
- Leak within induction tract on engine-side of throttle valve (leaks in vicinity of intake air plenum chamber, open oil filler cap)
- Malfunction in components affecting airflow (valve lift monitoring, position of VANOS, throttle valve, pressure sensors....)
- Compressor bypass valve stuck in open position (accompanied by low boost pressure malfunction)
- Severely contaminated air filter

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- $30^{\circ}\text{C} < \text{intake-air temperature} < 120^{\circ}\text{C}$
- $-30^{\circ}\text{C} < \text{coolant temperature}$

Time condition:

- None

Other conditions:

- Engine on
- Pressure drop at throttle valve exceeds 18 hPa
- 745hPa < barometric pressure
- 500 RPM < engine speed < 7000 RPM
- 133 RPM < dynamic RPM response (RPM window)
- 7.7% < dynamic load response (load window)

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness on HFM
- Check intake system for leaks on engine side of throttle valve
- Seal on oil filler cap is defective
- Problem with airflow to HFM (air filter insert is defective or installed incorrectly)
- Replace HFM

Fault effect and breakdown warning**Breakdown notice:**

- none

Possible apparent symptoms:

If the HFM is recognized as defective it is deactivated, following jerk during deactivation owing to lambda error no limitations

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

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none

DTC P0103; BMW DTC 102610: AIR-MASS SENSOR, SIGNAL: IMPLAUSIBLE PERIOD DURATION, LOOSE CONTACT AT LOW FREQUENCY

Information saved in

DME

Fault code

102610 - P0103

Fault description

The diagnostic function monitors the upper limit of the digital HFM signal's period duration.

Condition for fault identification

Test condition:

This fault is recognized when the period duration of the HFM signal exceeds 640 μ s.

Potential problem source(s):

- Defect in wiring harness between HFM and DME
- Mass-airflow sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and mass-airflow sensor
- Replace mass-airflow sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0102; BMW DTC 102611: AIR-MASS SENSOR, SIGNAL: IMPLAUSIBLE PERIOD DURATION, LOOSE CONTACT AT HIGH FREQUENCY

Information saved in

DME

Fault code

102611 - P0102

Air-mass sensor, signal: implausible period duration, loose contact at high frequency

Fault description

The diagnostic function monitors the lower limit of the digital HFM signal's period duration.

Condition for fault identification

Test condition:

This fault is recognized when the period duration of the HFM signal is less than 84 μ s.

Potential problem source(s):

- Defect in wiring harness between HFM and DME
- Mass-airflow sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and mass-airflow sensor
- Replace mass-airflow sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0100; BMW DTC 102612: AIR-MASS SENSOR, SIGNAL: SHORT CIRCUIT OR OPEN CIRCUIT

Information saved in

DME

Fault code

102612 - P0100

Fault description

The diagnostic function determines whether a digital signal from the HFM is present.

Condition for fault identification

Test condition:

This fault is recognized when the period duration of the HFM signal is zero.

Potential problem source(s):

- Defect in wiring harness between HFM and DME
- Mass-airflow sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and mass-airflow sensor
- Replace mass-airflow sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P00BC; BMW DTC 102801: NONE

Information saved in

DME

Fault code

102801 - P00BC

Fault description

Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0102; BMW DTC 102801: NONE**Information saved in**

DME

Fault code

102801 - P0102

Fault description

Mass or Volume Air Flow Sensor 'A' Circuit Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0100; BMW DTC 102A01: NONE**Information saved in**

DME

Fault code

102A01 - P0100

Fault description

Mass or Volume Air Flow Sensor 'A' Circuit

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P00BD; BMW DTC 102A02: NONE**Information saved in**

DME

Fault code

102A02 - P00BD

Fault description

Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0103; BMW DTC 102A02: NONE**Information saved in**

DME

Fault code

102A02 - P0103

Fault description

Mass or Volume Air Flow Sensor 'A' Circuit High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P2123; BMW DTC 103001: ACCELERATOR-PEDAL MODULE, PEDAL-TRAVEL SENSOR 1, ELECTRIC: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

103001 - P2123

Fault description

The diagnostic function monitors the voltage of sensor 1.

Condition for fault identification

Test condition:

The fault is recognized when the voltage at sensor 1 rises above 4.085 V.

Potential problem source(s):

- Defect in wiring harness between DME and accelerator pedal module sensor 1
- Accelerator pedal module defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and accelerator pedal
- Replace accelerator pedal

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Limit on pedal value variation and on maximum absolute value (34.5% pedal)
- In combination with fault in accelerator pedal sensor 2 or clocking error, increased idle speed and no processing of accelerator pedal

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P2122; BMW DTC 103002: ACCELERATOR-PEDAL MODULE, PEDAL-TRAVEL SENSOR 1, ELECTRIC: SHORT CIRCUIT TO GROUND OR OPEN CIRCUIT**Information saved in**

DME

Fault code

103002 - P2122

Fault description

The diagnostic function monitors the voltage of sensor 1.

Condition for fault identification

Test condition:

The fault is recognized when the voltage at sensor 1 is less than 0.566 V.

Potential problem source(s):

- Defect in wiring harness between DME and accelerator pedal module sensor 1
- Voltage supply for accelerator pedal module in the DME is defective
- Accelerator pedal module defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and accelerator pedal
- Check voltage supply at accelerator pedal module sensor 1 for 5 V
- Replace accelerator pedal
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Limit on pedal value variation and on maximum absolute value (34.5% pedal)
- In combination with fault in accelerator pedal sensor 2 or clocking error, increased idle speed and no processing of accelerator pedal

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P2128; BMW DTC 103101: ACCELERATOR-PEDAL MODULE, PEDAL-TRAVEL SENSOR 2, ELECTRIC: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

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103101 - P2128

Fault description

The diagnostic function monitors the voltage of sensor 2.

Condition for fault identification

Test condition:

The fault is recognized when the voltage at sensor 2 rises above 2.043 V.

Potential problem source(s):

- Defect in wiring harness between DME and accelerator pedal module sensor 2
- Accelerator pedal module defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and accelerator pedal
- Check voltage supply at accelerator pedal module sensor 2 for 5 V
- Replace accelerator pedal

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Limit on pedal value variation and on maximum absolute value (34.5% pedal)
- In combination with fault in accelerator pedal sensor 1 or clocking error, increased idle speed and no processing of accelerator pedal data

Driver information**Warning light:**

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P2127; BMW DTC 103102: ACCELERATOR-PEDAL MODULE, PEDAL-TRAVEL SENSOR 2, ELECTRIC: SHORT CIRCUIT TO GROUND OR OPEN CIRCUIT**Information saved in**

DME

Fault code

103102 - P2127

Fault description

The diagnostic function monitors the voltage of sensor 2.

Condition for fault identification**Test condition:**

The fault is recognized when the voltage at sensor 2 is less than 0.430 V.

Potential problem source(s):

- Defect in wiring harness between DME and accelerator pedal module sensor 2
- Accelerator pedal module defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and accelerator pedal
- Check voltage supply at accelerator pedal module sensor 2 for 5 V
- Replace accelerator pedal

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Limit on pedal value variation and on maximum absolute value (34.5% pedal)
- In combination with fault in accelerator pedal sensor 1 or clocking error, increased idle speed and no processing of accelerator pedal data

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P2138; BMW DTC 103308: ACCELERATOR-PEDAL MODULE, PEDAL-TRAVEL SENSOR, PLAUSIBILITY: SYNCHRONISM FAULT BETWEEN SIGNAL 1 AND SIGNAL 2

Information saved in

DME

Fault code

103308 - P2138

Fault description

The diagnostic function monitors the mutual deviation between the two sensor voltages.

Condition for fault identification

Test condition:

This fault is detected when the voltage differential between sensor 1 and sensor 2 exceeds a specific defined value.

Potential problem source(s):

- Defective wiring harness
- Accelerator pedal module defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring and plug connections
- Check voltage supply to accelerator pedal for 5 V
- Replace accelerator pedal module

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Limit on pedal value variation and on maximum absolute value (34.5% pedal)
- In combination with fault in accelerator pedal sensor 1 and/or 2, increased idle speed and no processing of accelerator pedal data

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on

- US electronic engine power reduction: on
- CC message: on

Service instruction

none

**DTC P11C8; BMW DTC 10351C: ACCELERATOR-PEDAL MODULE, PEDAL-TRAVEL SENSOR
MULTIPLE FAULT****Information saved in**

DME

Fault code

10351C - P11C8

Fault description

Collective fault: Accelerator pedal module's pedal-travel sensor.

Condition for fault identification

Test condition:

The response to the fault is specified for a different fault entry.

Potential problem source(s):

- None

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

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- none

Condition for fault memory entry

immediately

Action in service

- None

Fault effect and breakdown warning

Breakdown notice:

Depending on fault source (L4: 10201, 10202, 10203, 10204, 10216; L6: 0x103001, 0x103002, 0x103101, 0x103102, 0x103308)

Possible apparent symptoms:

Depending on fault source (L4: 10201, 10202, 10203, 10204, 10216; L6: 0x103001, 0x103002, 0x103101, 0x103102, 0x103308)

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1250; BMW DTC 104301: NONE

Information saved in

DME

Fault code

104301 - P1250

Fault description

Manifold Absolute Pressure Too High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P12A5; BMW DTC 104301: NONE**Information saved in**

DME

Fault code

104301 - P12A5

Fault description

Manifold Absolute Pressure Sensor 'A' Afterrunning Diagnosis Pressure Too High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P1255; BMW DTC 104302: NONE

Information saved in

DME

Fault code

104302 - P1255

Fault description

Manifold Absolute Pressure Too Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P12A4; BMW DTC 104302: NONE**Information saved in**

DME

Fault code

104302 - P12A4

Fault description

Manifold Absolute Pressure Sensor 'A' Afterrunning Diagnosis Pressure Too Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0108; BMW DTC 104401: NONE

Information saved in

DME

Fault code

104401 - P0108

Fault description

Manifold Absolute Pressure/Barometric Pressure Sensor Circuit High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P119A; BMW DTC 104401: NONE**Information saved in**

DME

Fault code

104401 - P119A

Fault description

Manifold Absolute Pressure Sensor Circuit High (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0107; BMW DTC 104402: ABSOLUTE PRESSURE SENSOR, INTAKE PIPE, ELECTRICAL: SHORT CIRCUIT TO EARTH**Information saved in**

DME

Fault code

104402 - P0107

Fault description

The diagnostic function monitors the intake-manifold pressure sensor's lower voltage limit.

Condition for fault identification**Test condition:**

The fault is recognized when the voltage of the intake-manifold pressure sensor is less than 0.2 V.

Potential problem source(s):

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- Defect in wiring harness between DME and Intake-manifold pressure sensor
- Intake-manifold pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between intake-manifold pressure sensor and DME
- Replace intake-manifold pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P119B; BMW DTC 104402: ABSOLUTE PRESSURE SENSOR, INTAKE PIPE, ELECTRICAL: SHORT CIRCUIT TO EARTH**Information saved in**

DME

Fault code

104402 - P119B

Fault description

The diagnostic function monitors the intake-manifold pressure sensor's lower voltage limit.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the intake-manifold pressure sensor is less than 0.2 V.

Potential problem source(s):

- Defect in wiring harness between DME and Intake-manifold pressure sensor
- Intake-manifold pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between intake-manifold pressure sensor and DME
- Replace intake-manifold pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1250; BMW DTC 104610: ABSOLUTE-PRESSURE SENSOR, INTAKE MANIFOLD, PLAUSIBILITY: INTAKE-MANIFOLD PRESSURE TOO HIGH**Information saved in**

DME

Fault code

104610 - P1250

Fault description

During the shutdown phase the diagnosis function monitors the DME to determine whether the ambient-air, intake-manifold and boost-pressure sensors are measuring the same pressure.

Condition for fault identification

Test condition:

The fault is recognized when the intake-manifold pressure sensor deviates from the average for the pressure sensors (barometric pressure, boost pressure, intake-manifold pressure) by more than 70 mbar.

Potential problem source(s):

- Defective wiring harness
- Sensor has been tampered with
- Sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine off

Other conditions:

- Shutdown phase

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness at sensor
- Replace sensor

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

Best case scenario: None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P1255; BMW DTC 104611: ABSOLUTE-PRESSURE SENSOR, INTAKE MANIFOLD, PLAUSIBILITY: INTAKE-MANIFOLD PRESSURE TOO LOW

Information saved in

DME

Fault code

104611 - P1255

Fault description

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The diagnostic function monitors the DME's barometric pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the barometric-pressure sensor > 4.5 V.

Potential problem source(s):

- Internal DME fault, because barometric-pressure sensor is located in the DME ECU; sensor voltage above threshold;

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine off

Other conditions:

- Shutdown phase

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check air-induction system (wastegate, etc.)
- Check air-induction tract between turbocharger and intake-air plenum
- Check wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

· none

Possible apparent symptoms:

Best case scenario: None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P119A; BMW DTC 104A40: ABSOLUTE-PRESSURE SENSOR, INTAKE MANIFOLD, ELECTRIC: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

104A40 - P119A

Fault description

The diagnostic function monitors the intake-manifold pressure sensor's upper voltage limit.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the intake-manifold pressure sensor exceeds 4.8 V.

Potential problem source(s):

- Defect in wiring harness between DME and intake-manifold pressure sensor

- Intake-manifold pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between intake-manifold pressure sensor and DME
- Replace intake-manifold pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on

- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2229; BMW DTC 105001: AMBIENT-PRESSURE SENSOR, ELECTRIC: SHORT CIRCUIT TO POSITIVE OR OPEN CIRCUIT**Information saved in**

DME

Fault code

105001 - P2229

Fault description

The diagnostic function monitors the DME's barometric pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the barometric pressure sensor's signal voltage falls below 4.5 V.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Clear the ECU fault memory, if the diagnostic fault code is logged again, replace the DME.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2228; BMW DTC 105002: AMBIENT-PRESSURE SENSOR, ELECTRIC: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

105002 - P2228

Fault description

The diagnostic function monitors the DME's barometric pressure sensor.

Condition for fault identification

Test condition:

The fault is detected by the internal calculation algorithms.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If the diagnostic fault code has been logged more than 3 times replace the DME.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P11CB; BMW DTC 105101: NONE

Information saved in

DME

Fault code

105101 - P11CB

Fault description

Barometric Pressure Too High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0129; BMW DTC 105102: NONE**Information saved in**

DME

Fault code

105102 - P0129

Fault description

Barometric Pressure Too Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P12B9; BMW DTC 105201: AMBIENT PRESSURE SENSOR, OVERRUN: PRESSURE TOO HIGH

Information saved in

DME

Fault code

105201 - P12B9

Fault description

During the control module's shutdown phase the diagnostic function monitors the barometric-pressure sensor, intake-manifold pressure sensor and boost-pressure sensor to determine whether they are all measuring the same pressure.

Condition for fault identification

Test condition:

The fault is recognized when the barometric-pressure sensor deviates from the average for the pressure sensors (barometric pressure, boost pressure, intake-manifold pressure) by more than 70 mbar.

Potential problem source(s):

- Error in sensor measurement
- Sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine off

Other conditions:

- Shutdown phase

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If the diagnostic fault code has been logged more than 3 times replace the DME.

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P12B8; BMW DTC 105202: AMBIENT-PRESSURE SENSOR, RUN-ON: PRESSURE TOO LOW**Information saved in**

DME

Fault code

105202 - P12B8

Fault description

The diagnostic function monitors the voltage at the boost pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the boost-pressure sensor's voltage is < 0.2 V.

Potential problem source(s):

- Defect in wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine off

Other conditions:

- Shutdown phase

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace the DME if the fault code is currently present or has been logged more than three times

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P2227; BMW DTC 105A30: AMBIENT-PRESSURE SENSOR: COLLECTIVE ERROR: ELECTRICAL AND PLAUSIBILITY

Information saved in

DME

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Fault code

105A30 - P2227

Fault description

The diagnostic function monitors the DME's barometric pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the signal from the barometric-pressure sensor is less than 0.5 V.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If the fault is logged again, replace the DME.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P11CB; BMW DTC 105A40: AMBIENT-PRESSURE SENSOR, PLAUSIBILITY: PRESSURE TOO HIGH

Information saved in

DME

Fault code

105A40 - P11CB

Fault description

The diagnostic function monitors the barometric-pressure sensor.

Condition for fault identification

Test condition:

No electrical fault in barometric pressure sensor (PUEmax, PUEmin)

Potential problem source(s):

- Barometric pressure sensor installed in DME ECU; sensor voltage above threshold
- DME defective owing to internal fault

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace the DME if the fault code is currently present or has been logged more than three times

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P0129; BMW DTC 105A41: AMBIENT-PRESSURE SENSOR, PLAUSIBILITY: PRESSURE TOO LOW

Information saved in

DME

Fault code

105A41 - P0129

Fault description

The diagnostic function monitors the barometric-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit is present.

Potential problem source(s):

- Defective wiring harness
- Cutoff relay for electric fan defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between electric fan cutoff relay and DME
- Check cutoff relay (when Terminal 15 is off then 0 V should be present at both screw connections (M6). When activated the relay should click loudly, while virtually no resistance (0 ohms) should be measured between the screw connections
- Replace cutoff relay

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P1247; BMW DTC 105A42: AMBIENT PRESSURE SENSOR, PLAUSIBILITY: PRESSURE IMPLAUSIBLE**Information saved in**

DME

Fault code

105A42 - P1247

Fault description

The diagnostic function monitors the plausibility of the barometric pressure relative to that measured in the previous driving cycle.

Condition for fault identification

Test condition:

The fault is recognized in response to excessive variations in the value.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace the DME if the fault code is currently present or has been logged more than three times

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P323C; BMW DTC 105A42: AMBIENT PRESSURE SENSOR, PLAUSIBILITY: PRESSURE IMPLAUSIBLE

Information saved in

DME

Fault code

105A42 - P323C

Fault description

The diagnostic function monitors the plausibility of the barometric pressure relative to that measured in the previous driving cycle.

Condition for fault identification

Test condition:

The fault is recognized in response to excessive variations in the value.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace the DME if the fault code is currently present or has been logged more than three times

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P1247; BMW DTC 105A43: AMBIENT PRESSURE SENSOR, PLAUSIBILITY: PRESSURE IMPLAUSIBLE

Information saved in

DME

Fault code

105A43 - P1247

Fault description

The diagnostic function monitors variations in the barometric pressure reading for plausibility.

Condition for fault identification

Test condition:

The fault is recognized when the value remains constant.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace the DME if the fault code is currently present or has been logged more than three times

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P323C; BMW DTC 105A43: AMBIENT PRESSURE SENSOR, PLAUSIBILITY: PRESSURE IMPLAUSIBLE**Information saved in**

DME

Fault code

105A43 - P323C

Fault description

The diagnostic function monitors variations in the barometric pressure reading for plausibility.

Condition for fault identification

Test condition:

The fault is recognized when the value remains constant.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace the DME if the fault code is currently present or has been logged more than three times

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P0121; BMW DTC 107A22: THROTTLE VALVE, THROTTLE POTENTIOMETER 1: SIGNAL IMPLAUSIBLE IN RELATION TO SUBSTITUTE VALUE FROM FILLING

Information saved in

DME

Fault code

107A22 - P0121

Fault description

When a single fault occurs at the throttle valve, the diagnostic function monitors the operation of the remaining sensor. The deviation in the sensor signal is plausibilized against the default value from air mass.

Condition for fault identification

Test condition:

The fault is recognized when a defect at sensor 2 or a clocking error [deviation between sensor 1 and sensor 2 > 6.3% throttle valve] is detected and comparison between sensor 1 and default value is greater than 14.9%.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input on DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

· none

Condition for fault memory entry

This fault is logged in the ECU fault memory immediately.

0.28 sec.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0223; BMW DTC 107A30: THROTTLE VALVE, THROTTLE-VALVE POTENTIOMETER 2, ELECTRIC: SHORT CIRCUIT TO POSITIVE OR OPEN CIRCUIT

Information saved in

DME

Fault code

107A30 - P0223

Fault description

The diagnostic function checks the voltage of throttle valve sensor 2 for electrical faults.

Condition for fault identification

Test condition:

The fault is recognized when the signal from throttle valve sensor 2 rises above the fault threshold of 4.77 V.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve

- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US 01/10:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY10 US 03/10:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0222; BMW DTC 107A31: THROTTLE VALVE, THROTTLE-VALVE POTENTIOMETER 2, ELECTRIC: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

107A31 - P0222

Fault description

The diagnostic function checks the voltage of throttle valve sensor 2 for electrical faults.

Condition for fault identification

Test condition:

The fault is recognized when the signal from throttle valve sensor 2 falls below the fault threshold of 0.22 V.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve

- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US 01/10:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY10 US 03/10:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0221; BMW DTC 107A32: THROTTLE VALVE, THROTTLE-VALVE POTENTIOMETER 2: SIGNAL IMPLAUSIBLE IN REL. TO SUBSTITUTE VALUE FROM CHARGE

Information saved in

DME**Fault code**

107A32 - P0221

Fault description

When a single fault occurs at the throttle valve, the diagnostic function monitors the operation of the remaining sensor. The deviation in the sensor signal is plausibilized against the default value from air mass.

Condition for fault identification

Test condition:

The fault is recognized when a defect at sensor 1 or a clocking error [deviation between sensor 1 and sensor 2 > 6.3% throttle valve] is detected and comparison between sensor 2 and default value is greater than 14.9%.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

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- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P110D; BMW DTC 107A40: THROTTLE-VALVE POTENTIOMETER: THROTTLE-VALVE POTENTIOMETER 1 OR 2, FUNCTION**Information saved in**

DME

Fault code

107A40 - P110D

Fault description

Collective fault: Throttle valve.

Condition for fault identification

Test condition:

The fault is recognized when another fault related to the throttle valve (L4: 10404, 10405, 10406, 10408, 10409, 10410, 10432, 10433, 10004, 10000, 10001; L6: 0x101001, 0x101002, 0x107A22, 0x107A30, 0x107A31, 0x107A32, 0x107A80, 0x107A81, 0x107A90, 0x107A91, 0x100210) is present.

Potential problem source(s):

- Additional throttle valve error path at one or both throttle-valve potentiometers
- The diagnostic fault code is entered together with faults for the throttle-valve potentiometer 1 and/or 2, position controller faults, or faults detected during the spring test

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

Depends on original fault source (min. 0.14 sec., max. 0.6 sec.)

Action in service

- Composite fault
- Seek original source fault for throttle valve in ECU fault memory (L4: 10404, 10405, 10406, 10408, 10409, 10410, 10432, 10433, 10004, 10000, 10001; L6: 0x101001, 0x101002, 0x107A22, 0x107A30, 0x107A31, 0x107A32, 0x107A80, 0x107A81, 0x107A90, 0x107A91, 0x100210) and repair it using test plan

Fault effect and breakdown warning

Breakdown notice:

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- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P169F; BMW DTC 107A50: THROTTLE VALVE: LIMP-HOME OPERATING MODE ACTIVE

Information saved in

DME

Fault code

107A50 - P169F

Fault description

Throttle Valve Limp Home Mode Active

Condition for fault identification

Test condition:

Potential problem source(s):

0

Voltage condition:

Temperature condition:

Time condition:

Other conditions:

Condition for fault memory entry

none

Action in service

0

Fault effect and breakdown warning

Breakdown notice:

Possible apparent symptoms:

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P2103; BMW DTC 107A70: DME, INTERNAL FAULT, ACTIVATION OF THROTTLE VALVE: SHORT CIRCUIT

Information saved in

DME

Fault code

107A70 - P2103

Fault description

The diagnostic function monitors the driver circuit controlling operation of the throttle valve.

Condition for fault identification

Test condition:

The fault is detected by the internal calculation algorithms.

Potential problem source(s):

- Defective wiring harness between DME and throttle valve
- Defective throttle valve
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P2118; BMW DTC 107A71: DME, INTERNAL FAULT, ACTIVATION OF THROTTLE VALVE: EXCESS TEMPERATURE OR CURRENT TOO HIGH**Information saved in**

DME

Fault code

107A71 - P2118

Fault description

The diagnostic function monitors the driver circuit controlling operation of the throttle valve.

Condition for fault identification**Test condition:**

The fault is detected by the internal calculation algorithms.

Potential problem source(s):

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- Defective wiring harness between DME and throttle valve
- Defective throttle valve
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P061F; BMW DTC 107A72: DME, INTERNAL FAULT, ACTIVATION OF THROTTLE VALVE: INTERNAL COMMUNICATION FAULT**Information saved in**

DME

Fault code

107A72 - P061F

Fault description

The diagnostic function monitors the driver circuit controlling operation of the throttle valve.

Condition for fault identification

Test condition:

The fault is detected by the internal calculation algorithms.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P2100; BMW DTC 107A73: DME, INTERNAL FAULT, ACTIVATION OF THROTTLE VALVE:

LINE DISCONNECTION**Information saved in**

DME

Fault code

107A73 - P2100

Fault description

The diagnostic function monitors the driver circuit controlling operation of the throttle valve.

Condition for fault identification

Test condition:

The fault is detected by the internal calculation algorithms.

Potential problem source(s):

- Defective wiring harness between DME and throttle valve
- Defective throttle valve
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- Ability to continue driving is restricted because engine speed is limited to roughly 1300 RPM.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P1634; BMW DTC 107A80: THROTTLE-VALVE ACTUATOR, CLOSING SPRING CHECK: ABORT CHECK, SPRING DOES NOT CLOSE

Information saved in

DME

Fault code

107A80 - P1634

Fault description

During the spring test the diagnostic function monitors the throttle valve to determine whether it returns to the emergency air position within the specified period when no voltage is being applied.

Condition for fault identification

Test condition:

The fault is recognized when the throttle valve does not return to an aperture of less than roughly 19% within 560 ms when voltage is not being applied to the unit.

Potential problem source(s):

- Friction in valve
- Return spring defective
- Defect in wiring harness between throttle-valve actuator motor and DME
- Defective throttle-valve actuator motor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Use tester to activate throttle valve and observe its reaction
- Check throttle valve for contamination and foreign objects

- Move throttle valve by hand, checking for resistance to motion and noting how quickly it closes when released
- Replace throttle-valve actuator motor

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1631; BMW DTC 107A81: THROTTLE-VALVE ACTUATOR, CLOSING SPRING CHECK: ERROR DURING SPRING CHECK**Information saved in**

DME

Fault code

107A81 - P1631

Fault description

During the spring test the diagnostic function monitors the throttle valve to determine whether it reaches the specified position within the specified period.

Condition for fault identification

Test condition:

The fault is recognized when the throttle valve fails to achieve an effective aperture of roughly 30% within 140 ms.

Potential problem source(s):

- Friction in throttle valve
- Return spring defective
- Defect in wiring harness between throttle-valve actuator motor and DME
- Defective throttle-valve actuator motor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Use tester to activate throttle valve and observe its reaction
- Check throttle valve for contamination and foreign objects
- Move throttle valve by hand, checking for resistance to motion and noting how quickly it closes when released
- Replace throttle-valve actuator motor

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1629; BMW DTC 107A90: THROTTLE-VALVE ACTUATOR, OPENING SPRING CHECK: ABORT CHECK, SPRING DOES NOT OPEN

Information saved in

DME

Fault code

107A90 - P1629

Fault description

During the spring test the diagnostic function monitors the throttle valve to determine whether it returns to the emergency-air position within the specified period when no voltage is being applied.

Condition for fault identification

Test condition:

The fault is recognized when the throttle valve does not return to an aperture of more than 7.4% within 560 ms when voltage is not being applied to the unit.

Potential problem source(s):

- Friction in throttle valve
- Return spring defective
- Defect in wiring harness between throttle-valve actuator motor and DME
- Defective throttle-valve actuator motor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Use tester to activate throttle valve and observe its reaction
- Check throttle valve for contamination and foreign objects
- Move throttle valve by hand, checking for resistance to motion and noting how quickly it closes when released
- Replace throttle-valve actuator motor

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1628; BMW DTC 107A91: THROTTLE-VALVE ACTUATOR, OPENING SPRING CHECK: ERROR DURING SPRING CHECK

Information saved in

DME

Fault code

107A91 - P1628

Fault description

During the spring test the diagnostic function monitors the throttle valve to determine whether it reaches the specified position below the emergency-air point within the specified time.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the throttle valve fails to reach a position of less than 2.5 % and more than 0.4 % opening within 300 ms.

Potential problem source(s):

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- Friction in throttle valve
- Return spring defective
- Defect in wiring harness between throttle-valve actuator motor and DME
- Defective throttle-valve actuator motor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Use tester to activate throttle valve and observe its reaction
- Check throttle valve for contamination and foreign objects
- Move throttle valve by hand, checking for resistance to motion and noting how quickly it closes when released
- Replace throttle-valve actuator motor

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the reduction in engine output.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1644; BMW DTC 107AE0: THROTTLE VALVE, ADAPTATION: RE-TEACH, LOWER LIMIT POSITION NOT TAUGHT IN**Information saved in**

DME

Fault code

107AE0 - P1644

Fault description

During the throttle valve adaptation routine the diagnostic function monitors the offset and amplification of throttle valve potentiometer 1 in the amplified range.

Condition for fault identification

Test condition:

This fault is recognized when the amplifier's offset exceeds 0.1 V or drops below -0.1 V. This fault is also registered when the amplification factor is greater than 4.15 or less than 3.85.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 30 sec. after Terminal 15 on

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P1643; BMW DTC 107AF0: THROTTLE VALVE ACTUATOR, AMPLIFIER ADJUSTMENT: MALFUNCTION**Information saved in**

DME

Fault code

107AF0 - P1643

Fault description

During the throttle valve adaptation routine the diagnostic function monitors the offset and amplification of throttle valve potentiometer 1 in the amplified range.

Condition for fault identification

Test condition:

This fault is recognized when the amplifier's offset exceeds 0.1 V or drops below -0.1 V. This fault is also registered when the amplification factor is greater than 4.15 or less than 3.85.

Potential problem source(s):

- Defect in wiring harness between throttle-valve actuator motor and DME
- Throttle-valve sensor defective
- AD converter input in DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 30 sec. after Terminal 15 on

Other conditions:

- Engine on
- Vehicle velocity = 0 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and throttle valve
- Replace throttle valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0113; BMW DTC 108001: INTAKE AIR TEMPERATURE SENSOR, ELECTRICAL: SHORT

CIRCUIT TO B+**Information saved in**

DME

Fault code

108001 - P0113

Fault description

The diagnostic function monitors the upper voltage limit of the intake-air temperature sensor on the engine-side of the air filter.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the intake-air temperature sensor exceeds 4.85 V.

Potential problem source(s):

- Defective wiring harness between DME and intake-air temperature sensor
- Intake-air temperature sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and intake-air temperature sensor
- Replace intake-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0112; BMW DTC 108002: INTAKE-AIR TEMPERATURE SENSOR, ELECTRIC: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

108002 - P0112

Fault description

The diagnostic function monitors the lower voltage limit of the intake-air temperature sensor on the engine-side of the air filter.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the intake-air temperature sensor is less than 0.17 V.

Potential problem source(s):

- Defective wiring harness between DME and intake-air temperature sensor
- Intake-air temperature sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and intake-air temperature sensor
- Replace intake-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0111; BMW DTC 108010: INTAKE-AIR TEMPERATURE SENSOR, ELECTRICAL: SIGNAL NOT PLAUSIBLE

Information saved in

DME

Fault code

108010 - P0111

Fault description

The diagnostic function monitors the voltage of the intake-air temperature sensor on the engine-side of the air filter to detect jumps that violate the specified level.

Condition for fault identification

Test condition:

The fault is recognized when the difference between the raw voltage value and the low-pass-filtered voltage is greater than 0.6 V.

Potential problem source(s):

- Defective wiring harness between DME and intake-air temperature sensor
- Intake-air temperature sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and intake-air temperature sensor
- Replace intake-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P007D; BMW DTC 108A01: CHARGE-AIR TEMPERATURE SENSOR, ELECTRICAL: SHORT CIRCUIT TO B+**Information saved in**

DME

Fault code

108A01 - P007D

Fault description

The diagnostic function monitors the upper voltage limit of the intake-air temperature sensor on the engine-side of the air filter.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the intake-air temperature sensor exceeds 4.85 V.

Potential problem source(s):

- Defect in wiring harness between DME and charge-air temperature sensor
- Charge-air temperature sensor defective
- Charge-air temperature sensor has been tampered with
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and charge-air temperature sensor
- Replace charge-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P007C; BMW DTC 108A02: CHARGE-AIR TEMPERATURE SENSOR, ELECTRIC: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

108A02 - P007C

Fault description

The diagnostic function monitors the lower voltage limit of the intake-air temperature sensor on the engine-side of the air filter.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the intake-air temperature sensor is less than 0.17 V.

Potential problem source(s):

- Defect in wiring harness between DME and charge-air temperature sensor
- Charge-air temperature sensor defective
- Charge-air temperature sensor has been tampered with
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

· none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and charge-air temperature sensor
- Replace charge-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

**DTC P007B; BMW DTC 108A10: CHARGE-AIR TEMPERATURE SENSOR, ELECTRICAL:
SIGNAL NOT PLAUSIBLE**

Information saved in

DME

Fault code

108A10 - P007B

Fault description

The diagnostic function monitors the voltage of the intake-air temperature sensor on the engine-side of the air filter to detect jumps that violate the specified level.

Condition for fault identification

Test condition:

The fault is recognized when the difference between the raw voltage value and the low-pass-filtered voltage > 0.6 V.

Potential problem source(s):

- Defect in wiring harness between DME and charge-air temperature sensor
- Charge-air temperature sensor defective
- Charge-air temperature sensor has been tampered with
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and charge-air temperature sensor

- Replace charge-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10B0; BMW DTC 108C01: NONE

Information saved in

DME

Fault code

108C01 - P10B0

Fault description

Charge Air Cooler Temperature Too High (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P10B8; BMW DTC 108C08: CHARGE-AIR TEMPERATURE SENSOR, PLAUSIBILITY: SIGNAL HANGS**Information saved in**

DME

Fault code

108C08 - P10B8

Fault description

The diagnostic function monitors the charge-air temperature sensor for an invariable signal.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the charge-air temperature sensor does not change by at least 0.005 V.

Potential problem source(s):

- Defect in wiring harness between DME and charge-air temperature sensor
- Charge-air temperature sensor defective
- Charge-air temperature sensor has been tampered with

- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 27 sec. after reaching engine temperature of 80 °C

Other conditions:

Drive vehicle at a speed above 40 km/h for at least 2 minutes to reduce the charge-air temperature, then allow the engine to idle for at least 2 minutes to allow the charge-air temperature to rise again. This sequence must be repeated 3x.

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and charge-air temperature sensor
- Replace charge-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0118; BMW DTC 109001: COOLANT-TEMPERATURE SENSOR, ELECTRIC: SHORT CIRCUIT TO POSITIVE OR OPEN CIRCUIT**Information saved in**

DME

Fault code

109001 - P0118

Fault description

The diagnostic function monitors the coolant temperature sensor's wires.

Condition for fault identification

Test condition:

The fault is recognized when the sensor voltage is above 4.95 V.

Potential problem source(s):

- The coolant temperature sensor's wiring harness is shorted to positive or has an open wire
- Temperature is outside measurement range
- Coolant temperature sensor defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 21 sec. after engine start

Other conditions:

- Cold engine start

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check coolant temperature sensor wiring harness
- Replace coolant temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible power reduction

Fan at maximum rotation speed

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0117; BMW DTC 109002: COOLANT-TEMPERATURE SENSOR, ELECTRIC: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

109002 - P0117

Fault description

The diagnostic function monitors the coolant temperature sensor's wires.

Condition for fault identification

Test condition:

The fault is recognized when the sensor voltage lies below 0.1 V.

Potential problem source(s):

- Coolant temperature sensor wiring harness has short circuit to ground
- Temperature is outside measurement range
- Coolant temperature sensor defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check coolant temperature sensor wiring harness
- Replace coolant temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible power reduction

Fan at maximum rotation speed

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P112B; BMW DTC 109208: NONE

Information saved in

DME

Fault code

109208 - P112B

Fault description

Engine Coolant Temperature Too Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P316B; BMW DTC 109208: NONE

Information saved in

DME

Fault code

109208 - P316B

Fault description

Engine Coolant Temperature Signal Stuck Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0116; BMW DTC 109308: COOLANT-TEMPERATURE SENSOR, PLAUSIBILITY: SIGNAL CHANGE TOO FAST**Information saved in**

DME

Fault code

109308 - P0116

Fault description

The diagnostic function monitors the coolant temperature sensor's voltage signal for plausibility.

Condition for fault identification

Test condition:

The fault is recognized when temperature jumps of 30°C occur.

Potential problem source(s):

- Defect in wiring harness to coolant temperature sensor
- Coolant temperature sensor installed incorrectly
- Coolant temperature sensor defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check coolant temperature sensor wiring harness
- Replace coolant temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible power reduction

Fan at maximum rotation speed

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P3198; BMW DTC 109308: COOLANT-TEMPERATURE SENSOR, PLAUSIBILITY: SIGNAL CHANGE TOO FAST**Information saved in**

DME

Fault code

109308 - P3198

Fault description

The diagnostic function monitors the coolant temperature sensor's voltage signal for plausibility.

Condition for fault identification

Test condition:

The fault is recognized when temperature jumps of 30°C occur.

Potential problem source(s):

- Defect in wiring harness to coolant temperature sensor
- Coolant temperature sensor installed incorrectly
- Coolant temperature sensor defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check coolant temperature sensor wiring harness
- Replace coolant temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible power reduction

Fan at maximum rotation speed

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10D5; BMW DTC 10AA20: COOLANT TEMPERATURE SENSOR, COLD START: COOLANT TEMPERATURE TOO HIGH

Information saved in

DME

Fault code

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10AA20 - P10D5

Fault description

The diagnostic function monitors the coolant temperature to detect excessively high values during cold starts.

Condition for fault identification

Test condition:

The fault is recognized when the coolant temperature is 18°C above the average of several temperatures at cold start.

Potential problem source(s):

- Engine block heater or auxiliary heater may be installed
- Defect in wiring harness between DME and sensor
- Sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 21 sec. after engine start

Other conditions:

- None

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Determine whether an engine block heater or auxiliary heater is installed
- Check wiring harness between DME and sensor

- Replace sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Rough engine, possibly followed by power reduction caused by thermal management

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P10D4; BMW DTC 10AA21: COOLANT TEMPERATURE SENSOR, COLD START: COOLANT TEMPERATURE TOO LOW**Information saved in**

DME

Fault code

10AA21 - P10D4

Fault description

The diagnostic function monitors the coolant temperature to detect excessively low values during cold starts.

Condition for fault identification

Test condition:

The fault is recognized when the coolant temperature is 18°C below the average of several temperatures at cold start.

Potential problem source(s):

- Defect in wiring harness between DME and sensor
- Sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 21 sec. after engine start

Other conditions:

- Cold engine start

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and sensor
- Replace sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Rough engine, possibly followed by power reduction caused by thermal management

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0115; BMW DTC 10AA40: COOLANT-TEMPERATURE SENSOR, ELECTRICAL: NO SIGNAL

Information saved in

DME

Fault code

10AA40 - P0115

Fault description

The diagnostic function monitors the CAN transmission.

Condition for fault identification

Test condition:

The fault is recognized when no signal is available.

Potential problem source(s):

- Defect in wiring harness between DME and coolant temperature sensor
- Coolant temperature sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and coolant temperature sensor
- Replace coolant temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible power reduction

Fan at maximum rotation speed

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P112A; BMW DTC 10AA50: COOLANT-TEMPERATURE SENSOR, PLAUSIBILITY: ENGINE TEMPERATURE IN REL. TO MODEL IMPLAUSIBLY TOO HIGH

Information saved in

DME

Fault code

10AA50 - P112A

Fault description

The diagnostic function monitors the coolant temperature sensor.

Condition for fault identification

Test condition:

The fault is recognized when the coolant temperature sensor transmits implausible temperature data.

Potential problem source(s):

- Defect in wiring harness between DME and coolant temperature sensor
- Coolant temperature sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON
- Minimum engine speed 2000 RPM
- Minimum air mass 1.46 kg

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and coolant temperature sensor
- Replace coolant temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible power reduction

Fan at maximum rotation speed

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P112B; BMW DTC 10AA51: COOLANT-TEMPERATURE SENSOR, PLAUSIBILITY: ENGINE TEMPERATURE IN REL. TO MODEL IMPLAUSIBLY TOO LOW

Information saved in

DME

Fault code

10AA51 - P112B

Fault description

The diagnostic function monitors the coolant temperature sensor.

Condition for fault identification

Test condition:

The fault is recognized when the coolant temperature sensor transmits implausible temperature data.

Potential problem source(s):

- Defect in wiring harness between DME and coolant temperature sensor
- Coolant temperature sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 1 min. after engine start

Other conditions:

- Engine on
- No block heater active

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and coolant temperature sensor
- Replace coolant temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible power reduction

Fan at maximum rotation speed

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0116; BMW DTC 10AA52: COOLANT-TEMPERATURE SENSOR, PLAUSIBILITY: ENGINE TEMPERATURE IMPLAUSIBLE**Information saved in**

DME

Fault code

10AA52 - P0116

Fault description

The diagnostic function monitors the coolant temperature sensor.

Condition for fault identification

Test condition:

The fault is recognized when the coolant temperature sensor transmits implausible temperature data.

Potential problem source(s):

- Defect in wiring harness between DME and coolant temperature sensor
- Coolant temperature sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Engine temperature between 15°C and 60°C

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and coolant temperature sensor
- Replace coolant temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible power reduction

Fan at maximum rotation speed

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P3199; BMW DTC 10AA52: COOLANT-TEMPERATURE SENSOR, PLAUSIBILITY: ENGINE TEMPERATURE IMPLAUSIBLE**Information saved in**

DME

Fault code

10AA52 - P3199

Fault description

The diagnostic function monitors the coolant temperature sensor.

Condition for fault identification

Test condition:

The fault is recognized when the coolant temperature sensor transmits implausible temperature data.

Potential problem source(s):

- Defect in wiring harness between DME and coolant temperature sensor
- Coolant temperature sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Engine temperature between 15°C and 60°C

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and coolant temperature sensor
- Replace coolant temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible power reduction

Fan at maximum rotation speed

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0073; BMW DTC 10B101: NONE

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DME

Fault code

10B101 - P0073

Fault description

Ambient Air Temperature Sensor Circuit 'A' High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0072; BMW DTC 10B102: NONE**Information saved in**

DME

Fault code

10B102 - P0072

Fault description

Ambient Air Temperature Sensor Circuit 'A' Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P110F; BMW DTC 10B104: NONE**Information saved in**

DME

Fault code

10B104 - P110F

Fault description

Ambient Air Temperature Sensor Faulty CAN Signal

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0073; BMW DTC 10BA20: OUTSIDE TEMPERATURE SENSOR, SIGNAL: UPPER THRESHOLD VALUE EXCEEDED**Information saved in**

DME

Fault code

10BA20 - P0073

Fault description

The diagnostic function monitors the outside temperature sensor for excessively high temperature figures.

Condition for fault identification

Test condition:

This is monitored in the instrument cluster.

Potential problem source(s):

- Wiring harness to outside temperature sensor defective
- Outside temperature sensor defective
- Instrument cluster faulty

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis at the instrument cluster

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0072; BMW DTC 10BA21: OUTSIDE TEMPERATURE SENSOR, SIGNAL: LOWER

THRESHOLD VALUE UNDERSHOT**Information saved in**

DME

Fault code

10BA21 - P0072

Fault description

The diagnostic function monitors the outside temperature sensor for excessively low temperature figures.

Condition for fault identification

Test condition:

This is monitored in the instrument cluster.

Potential problem source(s):

- Wiring harness to outside temperature sensor defective
- Outside temperature sensor defective
- Instrument cluster faulty

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis at the instrument cluster

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P110F; BMW DTC 10BA22: AMBIENT-TEMPERATURE SENSOR, SIGNAL: CAN MESSAGE INCORRECT

Information saved in

DME

Fault code

10BA22 - P110F

Fault description

The diagnostic function monitors the outside temperature sensor's CAN data.

Condition for fault identification

Test condition:

This is monitored in the instrument cluster.

Potential problem source(s):

- Wiring harness to outside temperature sensor defective
- Outside temperature sensor defective
- Instrument cluster faulty

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Continue fault diagnosis at the instrument cluster

Fault effect and breakdown warning

Breakdown notice:

Clarification in progress

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0071; BMW DTC 10BA40: OUTSIDE TEMPERATURE SENSOR, PLAUSIBILITY: AMBIENT TEMPERATURE HIGHER THAN MODEL TEMPERATURE

Information saved in

DME

Fault code

10BA40 - P0071

Fault description

The diagnostic function checks the plausibility of the outside temperature.

Condition for fault identification

Test condition:

The fault is recognized when the outside temperature remains more than 20°C above the model value for longer than 14 sec.

Potential problem source(s):

- Defective wiring harness
- Outside temperature sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Vehicle speed in excess of 45 km/h
- Mass-airflow rate less than 200 kg/h
- Intake-air temperature is less than 60°C, above -10°C

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check outside temperature
- Check outside temperature sensor
- Check wiring harness between the instrument cluster and the outside temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off

- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

- The following conditions can lead to an incorrect diagnosis:
- Battery change or defective battery
- Engine heated by secondary source, such as auxiliary heater
- Sensor frozen

DTC P10EA; BMW DTC 10BA40: OUTSIDE TEMPERATURE SENSOR, PLAUSIBILITY: AMBIENT TEMPERATURE HIGHER THAN MODEL TEMPERATURE

Information saved in

DME

Fault code

10BA40 - P10EA

Fault description

The diagnostic function checks the plausibility of the outside temperature.

Condition for fault identification

Test condition:

The fault is recognized when the outside temperature remains more than 20°C above the model value for longer than 14 sec.

Potential problem source(s):

- Defective wiring harness
- Outside temperature sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Vehicle speed in excess of 45 km/h
- Mass-airflow rate less than 200 kg/h
- Intake-air temperature is less than 60°C, above -10°C

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check outside temperature
- Check outside temperature sensor
- Check wiring harness between the instrument cluster and the outside temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off

- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

- The following conditions can lead to an incorrect diagnosis:
- Battery change or defective battery
- Engine heated by secondary source, such as auxiliary heater
- Sensor frozen

DTC P0071; BMW DTC 10BA41: OUTSIDE TEMPERATURE SENSOR, PLAUSIBILITY: AMBIENT TEMPERATURE LESS THAN MODEL TEMPERATURE

Information saved in

DME

Fault code

10BA41 - P0071

Fault description

The diagnostic function checks the plausibility of the outside temperature.

Condition for fault identification

Test condition:

The fault is recognized when the outside temperature remains more than 20°C below the model value for longer than 14 sec.

Potential problem source(s):

- Defective wiring harness
- Outside temperature sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Vehicle speed in excess of 45 km/h
- Mass-airflow rate less than 200 kg/h
- Intake-air temperature is less than 60°C, above -10°C

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check outside temperature
- Check outside temperature sensor
- Check wiring harness between the instrument cluster and the outside temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off

- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

- The following conditions can lead to an incorrect diagnosis:
- Battery change or defective battery
- Engine heated by secondary source, such as auxiliary heater
- Sensor frozen

DTC P10EB; BMW DTC 10BA41: OUTSIDE TEMPERATURE SENSOR, PLAUSIBILITY: AMBIENT TEMPERATURE LESS THAN MODEL TEMPERATURE

Information saved in

DME

Fault code

10BA41 - P10EB

Fault description

The diagnostic function checks the plausibility of the outside temperature.

Condition for fault identification

Test condition:

The fault is recognized when the outside temperature remains more than 20°C below the model value for longer than 14 sec.

Potential problem source(s):

- Defective wiring harness
- Outside temperature sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Vehicle speed in excess of 45 km/h
- Mass-airflow rate less than 200 kg/h
- Intake-air temperature is less than 60°C, above -10°C

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check outside temperature
- Check outside temperature sensor
- Check wiring harness between the instrument cluster and the outside temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off

- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

- The following conditions can lead to an incorrect diagnosis:
- Battery change or defective battery
- Engine heated by secondary source, such as auxiliary heater
- Sensor frozen

DTC P10C9; BMW DTC 10BA42: INTAKE-AIR TEMPERATURE SENSOR, COLD START: INTAKE-AIR TEMPERATURE TOO HIGH

Information saved in

DME

Fault code

10BA42 - P10C9

Fault description

The diagnostic function monitors the intake-air temperature to detect excessively high values during cold starts.

Condition for fault identification

Test condition:

The fault is recognized when the intake-air temperature exceeds an average figure from several temperatures during cold starts.

Potential problem source(s):

- Defective wiring harness between DME and intake-air temperature sensor
- Intake-air temperature sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 21 sec. after engine start

Other conditions:

- Cold engine start

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and intake-air temperature sensor
- Replace intake-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Rough engine, possibly followed by power reduction caused by thermal management

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

**DTC P105D; BMW DTC 10BA43: INTAKE-AIR TEMPERATURE SENSOR, COLD START:
INTAKE-AIR TEMPERATURE TOO LOW**

Information saved in

DME

Fault code

10BA43 - P105D

Fault description

The diagnostic function monitors the intake-air temperature to detect excessively low values during cold starts.

Condition for fault identification

Test condition:

The fault is recognized when the intake-air temperature is below an average figure from several temperatures during cold starts.

Potential problem source(s):

- Defective wiring harness between DME and intake-air temperature sensor
- Intake-air temperature sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 21 sec. after engine start

Other conditions:

- Cold engine start

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and intake-air temperature sensor
- Replace intake-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0127; BMW DTC 10BA48: INTAKE AIR TEMPERATURE SENSOR, PLAUSIBILITY: INTAKE AIR TEMPERATURE TOO HIGH**Information saved in**

DME

Fault code

10BA48 - P0127

Fault description

The diagnostic function monitors the intake-air temperature to detect implausibly high figures.

Condition for fault identification

Test condition:

The fault is recognized when the intake-air temperature on the engine-side of the air filter is more than 24°C above the intake-air temperature before the throttle valve.

Potential problem source(s):

- Defective wiring harness between DME and intake-air temperature sensor
- Intake-air temperature sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

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- Engine on
- Vehicle speed in excess of 40 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and intake-air temperature sensor
- Replace intake-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

**DTC P11C9; BMW DTC 10BA49: INTAKE AIR TEMPERATURE SENSOR, PLAUSIBILITY:
INTAKE AIR TEMPERATURE TOO LOW**

Information saved in

DME

Fault code

10BA49 - P11C9

Fault description

The diagnostic function monitors the intake-air temperature to detect implausibly low figures.

Condition for fault identification

Test condition:

The fault is recognized when the intake-air temperature on the engine-side of the air filter is more than 39°C below the intake-air temperature before the throttle valve.

Potential problem source(s):

- Defective wiring harness between DME and intake-air temperature sensor
- Intake-air temperature sensor defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Vehicle speed exceeds 40 km/h for at least 2 minutes

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and intake-air temperature sensor
- Replace intake-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10D0; BMW DTC 10BA4A: CHARGE-AIR TEMPERATURE SENSOR, COLD START: CHARGE-AIR TEMPERATURE TOO HIGH

Information saved in

DME

Fault code

10BA4A - P10D0

Fault description

The diagnostic function monitors the charge-air temperature to detect excessively high values during cold starts.

Condition for fault identification

Test condition:

The fault is recognized when the charge-air temperature exceeds an average figure from several temperatures during cold starts.

Potential problem source(s):

- Defect in wiring harness between DME and charge-air temperature sensor
- Charge-air temperature sensor defective
- Charge-air temperature sensor has been tampered with
- Defective DME

Terminal condition: none**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 21 sec. after engine start

Other conditions:

- Cold engine start

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and charge-air temperature sensor
- Replace charge-air temperature sensor
- Replace DME

Fault effect and breakdown warning**Breakdown notice:****Standard EML Text**

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

**DTC P10D1; BMW DTC 10BA4B: CHARGE-AIR TEMPERATURE SENSOR, COLD START:
CHARGE-AIR TEMPERATURE TOO LOW**

Information saved in

DME

Fault code

10BA4B - P10D1

Fault description

The diagnostic function monitors the charge-air temperature to detect excessively low values during cold starts.

Condition for fault identification

Test condition:

The fault is recognized when the charge-air temperature is below an average figure from several temperatures during cold starts.

Potential problem source(s):

- Defect in wiring harness between DME and charge-air temperature sensor
- Charge-air temperature sensor defective
- Charge-air temperature sensor has been tampered with
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 21 sec. after engine start

Other conditions:

- Cold engine start

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and charge-air temperature sensor
- Replace charge-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

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Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10B0; BMW DTC 10BA4F: CHARGE-AIR TEMPERATURE SENSOR, PLAUSIBILITY: CHARGE AIR TEMPERATURE TOO HIGH

Information saved in

DME

Fault code

10BA4F - P10B0

Fault description

The diagnostic function monitors the charge-air temperature to detect implausibly high figures.

Condition for fault identification

Test condition:

The fault is recognized when the boost-air temperature is more than 24°C above the intake-air temperature.

Potential problem source(s):

- Defect in wiring harness between DME and charge-air temperature sensor
- Charge-air temperature sensor defective
- Charge-air temperature sensor has been tampered with
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

Drive vehicle at a speed above 40 km/h for at least 2 minutes to reduce the charge-air temperature, then allow the engine to idle for at least 2 minutes to allow the charge-air temperature to rise again. This sequence must be repeated 3x.

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and charge-air temperature sensor
- Replace charge-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10D2; BMW DTC 10BA4F: CHARGE-AIR TEMPERATURE SENSOR, PLAUSIBILITY: CHARGE AIR TEMPERATURE TOO HIGH**Information saved in**

DME

Fault code

10BA4F - P10D2

Fault description

The diagnostic function monitors the charge-air temperature to detect implausibly high figures.

Condition for fault identification

Test condition:

The fault is recognized when the boost-air temperature is more than 24°C above the intake-air temperature.

Potential problem source(s):

- Defect in wiring harness between DME and charge-air temperature sensor
- Charge-air temperature sensor defective
- Charge-air temperature sensor has been tampered with
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

Drive vehicle at a speed above 40 km/h for at least 2 minutes to reduce the charge-air temperature, then allow the engine to idle for at least 2 minutes to allow the charge-air temperature to rise again. This sequence must be repeated 3x.

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and charge-air temperature sensor
- Replace charge-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P007B; BMW DTC 10C001: NONE

Information saved in

DME

Fault code

10C001 - P007B

Fault description

Charge Air Cooler Temperature Sensor Circuit Range/Performance (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P10B4; BMW DTC 10C001: NONE**Information saved in**

DME

Fault code

10C001 - P10B4

Fault description

Charge Air Cooler Temperature Sensor Gradient Too High (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P10D0; BMW DTC 10C004: NONE**Information saved in**

DME

Fault code

10C004 - P10D0

Fault description

Cold Start Charge Air Temperature Too High (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P10B4; BMW DTC 10C005: CHARGE-AIR TEMPERATURE SENSOR, GRADIENT: RISE TOO HIGH

Information saved in

DME

Fault code

10C005 - P10B4

Fault description

The diagnostic function monitors the charge-air temperature for excessively rapid rises.

Condition for fault identification

Test condition:

The fault is recognized when the boost-air temperature rises by at least 39 °C within 10 sec.

Potential problem source(s):

- Defect in wiring harness between DME and charge-air temperature sensor
- Charge-air temperature sensor defective
- Charge-air temperature sensor has been tampered with
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

Drive vehicle at a speed above 40 km/h for at least 2 minutes to reduce the charge-air temperature, then allow the engine to idle for at least 2 minutes to allow the charge-air temperature to rise again. This sequence must be repeated 3x.

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and charge-air temperature sensor
- Replace charge-air temperature sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P142E; BMW DTC 110001: NONE

Information saved in

DME

Fault code

110001 - P142E

Fault description

Cylinder Injection Cut-Off, Pressure Too Low in High-Pressure System

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

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Driver information

none

Service instruction

none

DTC P306F; BMW DTC 110001: NONE

Information saved in

DME

Fault code

110001 - P306F

Fault description

Fuel Rail Pressure, Minimum Pressure Fallen Below, Injection Cut-Off

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P3149; BMW DTC 110101: INJECTOR, CYLINDER 1, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110101 - P3149

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 1, if fault remains switch the new injector to cylinder 2.
- Replace the DME control module only if the fault is still present continuously.

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3102; BMW DTC 110102: INJECTOR, CYLINDER 1, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

110102 - P3102

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when the outside temperature remains more than 20°C above the model value for longer than 14 sec.

Potential problem source(s):

- Defective wiring harness
- Outside temperature sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Read out outside temperature with tester and assess plausibility
- Visual inspection of outside temperature sensor
- Check wiring harness between the instrument cluster and the outside temperature sensor

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- The following conditions can lead to an incorrect diagnosis:
- Battery change or defective battery
- Engine heated by secondary source, such as auxiliary heater
- Sensor frozen

DTC P3150; BMW DTC 110104: INJECTOR, CYLINDER 1, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

110104 - P3150

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 1, if fault remains switch the new injector to cylinder 2
- Replace DME only if the fault remains present continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3101; BMW DTC 110108: INJECTOR, CYLINDER 1, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110108 - P3101

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

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- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 2
- Replace injector 1, if the defect remains present respond by switching the new injector to cylinder 2.
- Replace the DME control module only if the fault is still present continuously.

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3152; BMW DTC 110201: INJECTOR, CYLINDER 2, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110201 - P3152

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective plug or wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect plugs/wiring harness between DME and injector 2, replace injector 2.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3106; BMW DTC 110202: INJECTOR, CYLINDER 2, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

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110202 - P3106

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Inspect wiring harness between DME and injector 2, replace injector 2.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3153; BMW DTC 110204: INJECTOR, CYLINDER 2, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

110204 - P3153

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Inspect wiring harness between DME and injector 2, replace injector 2.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector.

DTC P3105; BMW DTC 110208: INJECTOR, CYLINDER 2, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110208 - P3105

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification**Test condition:**

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Inspect wiring harness between DME and injector 2, replace injector 2.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3155; BMW DTC 110301: INJECTOR, CYLINDER 3, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110301 - P3155

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 3 and 4
- Replace injector 4, if the defect remains present respond by switching the new injector to cylinder 3.
- Replace DME only if the fault remains present continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3110; BMW DTC 110302: INJECTOR, CYLINDER 3, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE

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DME

Fault code

110302 - P3110

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the ECU fault memory if it remains present for longer than 3 sec.

Action in service

- Read out and work through diagnostic fault codes in instrument cluster and in junction box

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3156; BMW DTC 110304: INJECTOR, CYLINDER 3, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

110304 - P3156

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 3 and 4
- Replace injector 4, if the defect remains present respond by switching the new injector to cylinder 3.
- Replace DME only if the fault remains present continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3109; BMW DTC 110308: INJECTOR, CYLINDER 3, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110308 - P3109

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification**Test condition:**

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 3 and 4
- Replace injector 4, if the defect remains present respond by switching the new injector to cylinder 3.
- Replace DME only if the fault remains present continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3158; BMW DTC 110401: INJECTOR, CYLINDER 4, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110401 - P3158

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective plug or wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

· Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and injectors 3 and 4
- Replace injector 4, if the defect remains present respond by switching the new injector to cylinder 3.
- Replace DME only if the fault remains present continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3114; BMW DTC 110402: INJECTOR, CYLINDER 4, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

110402 - P3114

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 4 and 3, replace injector 4, if fault remains switch the new injector to cylinder 3

- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3159; BMW DTC 110404: INJECTOR, CYLINDER 4, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

110404 - P3159

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 4 and 3, replace injector 4, if fault remains switch the new injector to cylinder 3
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector.

DTC P3113; BMW DTC 110408: INJECTOR, CYLINDER 4, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110408 - P3113

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 4 and 3, replace injector 4, if fault remains switch the new injector to cylinder 3
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3161; BMW DTC 110501: INJECTOR, CYLINDER 5, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110501 - P3161

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered immediately when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 3 and 4, replace injector 3, if fault remains switch the new injector to cylinder 4

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3118; BMW DTC 110502: INJECTOR, CYLINDER 5, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

110502 - P3118

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 3 and 4, replace injector 3, if fault remains switch the new injector to cylinder 4
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

N20: Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

N55: Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3162; BMW DTC 110504: INJECTOR, CYLINDER 5, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

110504 - P3162

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered immediately when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 3 and 4, replace injector 3, if fault remains switch the new injector to cylinder 4
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3117; BMW DTC 110508: INJECTOR, CYLINDER 5, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110508 - P3117

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Inspect wiring harness between DME and injector 5, replace injector 5.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3164; BMW DTC 110601: INJECTOR, CYLINDER 6, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110601 - P3164

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 2, if fault remains switch the new injector to cylinder 1
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3122; BMW DTC 110602: INJECTOR, CYLINDER 6, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

110602 - P3122

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 2, if fault remains switch the new injector to cylinder 1.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3165; BMW DTC 110604: INJECTOR, CYLINDER 6, ACTIVATION: HIGH-VOLTAGE SIDE; SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

110604 - P3165

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 2, if fault remains switch the new injector to cylinder 1
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3121; BMW DTC 110608: INJECTOR, CYLINDER 6, ACTIVATION: LOW-VOLTAGE SIDE; SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

110608 - P3121

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 6
- Replace injector 6, if the defect remains present respond by switching the new injector to cylinder 1
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3148; BMW DTC 111020: INJECTOR, CYLINDER 1, HIGH-VOLTAGE SIDE, ACTIVATION: COIL-WINDING SHORT CIRCUIT**Information saved in**

DME

Fault code

111020 - P3148

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification**Test condition:**

The fault is recognized when a short circuit between the high and low-voltage sides is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 1, if fault remains switch the new injector to cylinder 2
- Replace the DME control module only if the fault is still present continuously.

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3151; BMW DTC 111021: INJECTOR, CYLINDER 2, HIGH-VOLTAGE SIDE, ACTIVATION: COIL-WINDING SHORT CIRCUIT**Information saved in**

DME

Fault code

111021 - P3151

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit between the high and low-voltage sides is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Inspect wiring harness between DME and injector 2, replace injector 2.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3154; BMW DTC 111022: INJECTOR, CYLINDER 3, HIGH-VOLTAGE SIDE, ACTIVATION: COIL-WINDING SHORT CIRCUIT**Information saved in**

DME

Fault code

111022 - P3154

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit between the high and low-voltage sides is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 3 and 4

- Replace injector 4, if the defect remains present respond by switching the new injector to cylinder 3.
- Replace DME only if the fault remains present continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3157; BMW DTC 111023: INJECTOR, CYLINDER 4, HIGH-VOLTAGE SIDE, ACTIVATION: COIL-WINDING SHORT CIRCUIT**Information saved in**

DME

Fault code

111023 - P3157

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit between the high and low-voltage sides is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 4 and 3, replace injector 4, if fault remains switch the new injector to cylinder 3
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3160; BMW DTC 111024: INJECTOR, CYLINDER 5, HIGH-VOLTAGE SIDE, ACTIVATION: COIL-WINDING SHORT CIRCUIT

Information saved in

DME

Fault code

111024 - P3160

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit between the high and low-voltage sides is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 3 and 4, replace injector 3, if fault remains switch the new injector to cylinder 4
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3163; BMW DTC 111025: INJECTOR, CYLINDER 6, HIGH-VOLTAGE SIDE, ACTIVATION: COIL-WINDING SHORT CIRCUIT**Information saved in**

DME

Fault code

111025 - P3163

Fault description

The diagnostic function monitors control-activation of the injector's high-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit between the high and low-voltage sides is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 2, if fault remains switch the new injector to cylinder 1.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3103; BMW DTC 111030: INJECTOR, CYLINDER 1, LOW-VOLTAGE SIDE, ACTIVATION:

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BOOSTER TIME WINDOW**Information saved in**

DME

Fault code

111030 - P3103

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when the current rises too slowly.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

If the fault occurs on the same cylinder 3 times in an uninterrupted sequence, plus the debounce time of 0.5 sec..

the diagnostic fault code is logged.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 1, if fault remains switch the new injector to cylinder 2
- Replace the DME control module only if the fault is still present continuously.

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3107; BMW DTC 111031: INJECTOR, CYLINDER 2, LOW-VOLTAGE SIDE, ACTIVATION: BOOSTER TIME WINDOW**Information saved in**

DME

Fault code

111031 - P3107

Fault description

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The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when the current rises too slowly.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

If the fault occurs on the same cylinder 3 times in an uninterrupted sequence, plus the debounce time of 0.5 sec., the diagnostic fault code is logged.

Action in service

- Check wiring harness between DME and injectors 1 and 6, replace injector 6, if fault remains switch the new injector to cylinder 1
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3111; BMW DTC 111032: INJECTOR, CYLINDER 3, LOW-VOLTAGE SIDE, ACTIVATION: BOOSTER TIME WINDOW

Information saved in

DME

Fault code

111032 - P3111

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when the current rises too slowly.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

If the fault occurs on the same cylinder 3 times in an uninterrupted sequence, plus the debounce time of 0.5 sec., the diagnostic fault code is logged.

Action in service

- Check wiring harness between DME and injectors 3 and 4
- Replace injector 4, if the defect remains present respond by switching the new injector to cylinder 3.
- Replace DME only if the fault remains present continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

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- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3115; BMW DTC 111033: INJECTOR, CYLINDER 4, LOW-VOLTAGE SIDE, ACTIVATION: BOOSTER TIME WINDOW**Information saved in**

DME

Fault code

111033 - P3115

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when the current rises too slowly.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

If the fault occurs on the same cylinder 3 times in an uninterrupted sequence, plus the debounce time of 0.5 sec., the diagnostic fault code is logged.

Action in service

- Check wiring harness between DME and injectors 3 and 4
- Replace injector 4, if the defect remains present respond by switching the new injector to cylinder 3.
- Replace DME only if the fault remains present continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3119; BMW DTC 111034: INJECTOR, CYLINDER 5, LOW-VOLTAGE SIDE, ACTIVATION: BOOSTER TIME WINDOW**Information saved in**

DME

Fault code

111034 - P3119

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when the current rises too slowly.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

If the fault occurs on the same cylinder 3 times in an uninterrupted sequence, plus the debounce time of 0.5 sec., the diagnostic fault code is logged.

Action in service

- Check wiring harness between DME and injectors 3 and 4, replace injector 3, if fault remains switch the new injector to cylinder 4
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3123; BMW DTC 111035: INJECTOR, CYLINDER 6, LOW-VOLTAGE SIDE, ACTIVATION: BOOSTER TIME WINDOW**Information saved in**

DME

Fault code

111035 - P3123

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when the current rises too slowly.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

If the fault occurs on the same cylinder 3 times in an uninterrupted sequence, plus the debounce time of 0.5 sec., the diagnostic fault code is logged.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 2, if fault remains switch the new injector to cylinder 1
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3100; BMW DTC 111040: INJECTOR, CYLINDER 1, LOW-VOLTAGE SIDE, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

111040 - P3100

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when an open wire is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 2, replace injector 1, if fault remains switch the new injector to cylinder 2
- Replace the DME control module only if the fault is still present continuously.

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3104; BMW DTC 111041: INJECTOR, CYLINDER 2, LOW-VOLTAGE SIDE, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

111041 - P3104

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification**Test condition:**

The fault is recognized when an open wire is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Inspect wiring harness between DME and injector 2, replace injector 2.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3108; BMW DTC 111042: INJECTOR, CYLINDER 3, LOW-VOLTAGE SIDE, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

111042 - P3108

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when an open wire is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 3 and 4
- Replace injector 4, if the defect remains present respond by switching the new injector to cylinder 3.
- Replace DME only if the fault remains present continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 2, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective.

DTC P3112; BMW DTC 111043: INJECTOR, CYLINDER 4, LOW-VOLTAGE SIDE, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

111043 - P3112

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when an open wire is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 4 and 3, replace injector 4, if fault remains switch the new injector to cylinder 3
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3116; BMW DTC 111044: INJECTOR, CYLINDER 5, LOW-VOLTAGE SIDE, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

111044 - P3116

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when an open wire is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Inspect wiring harness between DME and injector 5, replace injector 5.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P3120; BMW DTC 111045: INJECTOR, CYLINDER 6, LOW-VOLTAGE SIDE, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

111045 - P3120

Fault description

The diagnostic function monitors control-activation of the injector's low-voltage side.

Condition for fault identification

Test condition:

The fault is recognized when an open wire is present.

Potential problem source(s):

- Defective wiring harness
- Defective injector

- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is entered when the fault occurs 3 times in sequence with no interruption on a single cylinder.

Action in service

- Check wiring harness between DME and injectors 1 and 6, replace injector 6, if fault remains switch the new injector to cylinder 1.
- Replace DME only if the fault remains continuously

Fault effect and breakdown warning

Breakdown notice:

Engine fault

Possible apparent symptoms:

Engine runs roughly and can stall in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on

- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

Injectors 1 and 6, and 3 and 4, are connected to shared DME driver circuits. This means that diagnostic fault codes are always logged for both injectors, although usually only one is defective. When interchanging positions use injectors operated by a DME driver circuit that only activates one injector!

DTC P16A5; BMW DTC 111110: DME, INTERNAL FAULT, HDEV OUTPUT-STAGE MODULE 1: SPI COMMUNICATION FAULTY**Information saved in**

DME

Fault code

111110 - P16A5

Fault description

The diagnostic function monitors the driver circuit responsible for activating the injector.

Condition for fault identification

Test condition:

The fault is recognized when communications with the driver circuit that activates the injector break down.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly with power loss
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P16A5; BMW DTC 11111: DME, INTERNAL FAULT, HDEV OUTPUT-STAGE MODULE 2: SPI COMMUNICATION FAULTY

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DME

Fault code

111111 - P16A5

Fault description

The diagnostic function monitors the driver circuit responsible for activating the injector.

Condition for fault identification

Test condition:

The fault is recognized when communications with the driver circuit that activates the injector break down.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly with power loss
- Breakdown in extreme cases

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P16A5; BMW DTC 11112: DME, INTERNAL FAULT, HDEV OUTPUT-STAGE MODULE 1: SPI COMMUNICATION IMPLAUSIBLE**Information saved in**

DME

Fault code

11112 - P16A5

Fault description

The diagnostic function monitors the driver circuit responsible for activating the injector.

Condition for fault identification**Test condition:**

The fault is recognized when communications with the driver circuit that activates the injector break down.

Potential problem source(s):

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- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly with power loss
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P16A5; BMW DTC 111113: DME, INTERNAL FAULT, HDEV OUTPUT-STAGE MODULE 2: SPI COMMUNICATION IMPLAUSIBLE**Information saved in**

DME

Fault code

111113 - P16A5

Fault description

The diagnostic function monitors the driver circuit responsible for activating the injector.

Condition for fault identification

Test condition:

The fault is recognized when communications with the driver circuit that activates the injector break down.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly with power loss
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P16A5; BMW DTC 11114: DME, INTERNAL FAULT, HDEV OUTPUT-STAGE MODULE 1: SPI COMMUNICATION, SIGNAL ERROR

Information saved in

DME

Fault code

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111114 - P16A5

Fault description

The diagnostic function monitors the driver circuit responsible for activating the injector.

Condition for fault identification

Test condition:

The fault is recognized when communications with the driver circuit that activates the injector break down.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly with power loss
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P16A5; BMW DTC 111115: DME, INTERNAL FAULT, HDEV OUTPUT-STAGE MODULE 2: SPI COMMUNICATION, SIGNAL ERROR

Information saved in

DME

Fault code

111115 - P16A5

Fault description

The diagnostic function monitors the driver circuit responsible for activating the injector.

Condition for fault identification

Test condition:

The fault is recognized when communications with the driver circuit that activates the injector break down.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly with power loss
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0171; BMW DTC 118001: NONE**Information saved in**

DME

Fault code

118001 - P0171

Fault description

System Too Lean (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P2177; BMW DTC 118001: NONE**Information saved in**

DME

Fault code

118001 - P2177

Fault description

System Too Lean Off Idle (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0172; BMW DTC 118002: NONE**Information saved in**

DME

Fault code

118002 - P0172

Fault description

System Too Rich (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P2178; BMW DTC 118002: NONE

Information saved in

DME

Fault code

118002 - P2178

Fault description

System Too Rich Off Idle (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0171; BMW DTC 118401: NONE**Information saved in**

DME

Fault code

118401 - P0171

Fault description

System Too Lean (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P306D; BMW DTC 118401: NONE**Information saved in**

DME

Fault code

118401 - P306D

Fault description

Fuel Supply Closed Loop Fuel Control, Upper Limit Exceeded

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0172; BMW DTC 118402: NONE**Information saved in**

DME

Fault code

118402 - P0172

Fault description

System Too Rich (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P306E; BMW DTC 118402: NONE**Information saved in**

DME

Fault code

118402 - P306E

Fault description

Fuel Supply Closed Loop Fuel Control, Lower Limit Fallen Below

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P2097; BMW DTC 118601: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, FINE MIXTURE CONTROL: EXHAUST GAS AFTER CATALYTIC CONVERTER TOO RICH

Information saved in

DME

Fault code

118601 - P2097

Fault description

The diagnostic function monitors the oxygen sensor behind the catalytic converter to determine whether it displays a consistent deviation.

Condition for fault identification

Test condition:

The fault is recognized when the trim control on the oxygen sensor behind catalytic converter exceeds a level of negative 4%.

Potential problem source(s):

- Defective wiring harness
- Leak in exhaust system on engine-side of catalytic converter

- Oxygen sensor before catalytic converter defective
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Drive at a constant speed between 50 and 80 km/h at moderate RPM (1400 to 3240 RPM).
- No faults that would cause mixture faults are registered.

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 10 min.

Action in service

- If faults related to mixture control are present repair these first
- Conduct system test for oxygen sensors in wrong mutual positions
- Check muffler unit before oxygen sensor behind catalytic converter for leaks
- Check wiring harness between oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2096; BMW DTC 118602: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, FINE MIXTURE CONTROL: EXHAUST GAS AFTER CATALYTIC CONVERTER TOO LEAN

Information saved in

DME

Fault code

118602 - P2096

Fault description

The diagnostic function monitors the oxygen sensor behind the catalytic converter to determine whether it displays a consistent deviation.

Condition for fault identification

Test condition:

The fault is recognized when the trim control on the oxygen sensor behind the catalytic converter exceeds a level of positive 4%.

Potential problem source(s):

- Defective wiring harness
- Leak in exhaust system on engine-side of catalytic converter
- Oxygen sensor before catalytic converter defective
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Drive at a constant speed between 50 and 80 km/h at moderate RPM (1400 to 3240 RPM).
- No faults that would cause mixture faults are registered.

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 10 min.

Action in service

- If faults related to mixture control are present repair these first
- Conduct system test for oxygen sensors in wrong mutual positions
- Check muffler unit before oxygen sensor behind catalytic converter for leaks
- Check wiring harness between oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P119D; BMW DTC 118C02: MIXTURE ADAPTATION, INJECTOR AGEING: CYLINDER BANK 1: LONG-TERM ADAPTATION TOO HIGH**Information saved in**

DME

Fault code

118C02 - P119D

Fault description

The diagnostic function monitors the mixture correction required to dial in the specified lambda excess-air factor.

Condition for fault identification

Test condition:

The fault is recognized when the mixture correction rises above or falls below a fault threshold owing to the long-term adaptation value.

Potential problem source(s):

- Collateral fault caused by malfunction in mixture adaptation

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

None, adaptation is updated every 500 km, if the fault threshold is exceeded following the update the diagnostic fault code is logged immediately.

Action in service

- Work through faults related to mixture adaptation

Fault effect and breakdown warning**Breakdown notice:**

None, engine continues running without negative effects

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P2187; BMW DTC 118E01: MIXTURE ADAPTATION, IDLE: MIXTURE TOO LEAN**Information saved in**

DME

Fault code

118E01 - P2187

Fault description

The diagnostic function monitors the air-fuel mixture at idle.

Condition for fault identification

Test condition:

Data adoption/matching with Summary Table; as indicated PP -> ST

Mass-airflow rate > 20 kg/h

Engine speed > 1600 RPM

Potential problem source(s):

- Diagnostic fault code logged owing to defective:
- Oxygen sensor (pre-catalyst)
- HFM
- Injection nozzle
- Intake-manifold pressure sensor
- Leaks in and around induction system (positive crankcase ventilation, oil cap, oil dipstick, tank EVAP)

- vent line, brake booster)
- Leak in exhaust system (exhaust-side cylinder head to post-catalyst oxygen sensor) Fuel presupply pump
- Rail-pressure sensor
- Camshaft position sensor
- Intake-air temperature
- Poor-quality gasoline

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the possible low engine output.

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Always delete the mixture adaptation after repairing the problem source!

DTC P2188; BMW DTC 118E02: MIXTURE ADAPTATION, IDLE: MIXTURE TOO RICH**Information saved in**

DME

Fault code

118E02 - P2188

Fault description

The diagnostic function monitors the air-fuel mixture at idle.

Condition for fault identification

Test condition:

Data adoption/matching with Summary Table; as indicated PP -> ST

Mass-airflow rate > 20 kg/h

Engine speed > 1600 RPM

Potential problem source(s):

- Diagnostic fault code logged owing to defective:
- Oxygen sensor (pre-catalyst)
- HFM
- Injection nozzle
- Intake-manifold pressure sensor
- Leaks in and around induction system (positive crankcase ventilation, oil cap, oil dipstick, tank EVAP)

- vent line, brake booster)
- Leak in exhaust system (exhaust-side cylinder head to post-catalyst oxygen sensor) Fuel presupply pump
- Rail-pressure sensor
- Camshaft position sensor
- Intake-air temperature
- Poor-quality gasoline

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to the possible low engine output.

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Always delete the mixture adaptation after repairing the problem source!

DTC P2177; BMW DTC 118F20: MIXTURE ADAPTATION, LOWER SPEED RANGE: MIXTURE AT PART LOAD TOO LEAN**Information saved in**

DME

Fault code

118F20 - P2177

Fault description

The diagnostic function monitors the mixture adaptation.

Condition for fault identification**Test condition:**

The fault is recognized when the mixture is too lean and must be enriched by more than 25-30%, depending on load factor.

Potential problem source(s):

- Oxygen sensor before catalytic converter defective
- Mass-airflow sensor defective
- Defective injectors
- Intake-manifold pressure sensor defective
- Intake-air temperature sensor defective
- Camshaft position sensor defective
- Defect in high-pressure fuel system

- Defect in low-pressure fuel system
- Intake system leaking
- Oil cap not sealing
- Leak in exhaust system before oxygen sensor behind catalytic converter
- Poor-quality gasoline

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- EVAP not active

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If additional faults related to the following components are present, process these first: Pre-catalyst oxygen sensor, mass-airflow sensor, intake-manifold pressure sensor, intake-air temperature sensor, camshaft position sensor, high-pressure fuel system, low-pressure fuel system Check air-induction system for leaks (also checking the following components: Positive crankcase ventilation, oil cap, tank evaporative emissions system)
- Check exhaust system for leaks
- Replace injectors

Fault effect and breakdown warning

Breakdown notice:

- Loss of power

Possible apparent symptoms:

- Engine runs poorly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- Delete mixture adaptations following repair

DTC P2178; BMW DTC 118F21: MIXTURE ADAPTATION, LOWER SPEED RANGE: MIXTURE AT PART LOAD TOO RICH

Information saved in

DME

Fault code

118F21 - P2178

Fault description

The diagnostic function monitors the mixture adaptation.

Condition for fault identification

Test condition:

The fault is recognized when the mixture is too rich and must be leaned out by more than 25-30%, depending on load factor.

Potential problem source(s):

- Oxygen sensor before catalytic converter defective
- Mass-airflow sensor defective
- Defective injectors

- Intake-manifold pressure sensor defective
- Intake-air temperature sensor defective
- Camshaft position sensor defective
- Defect in high-pressure fuel system
- Defect in low-pressure fuel system
- Leak in exhaust system before oxygen sensor behind catalytic converter
- Poor-quality gasoline

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- EVAP not active

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If additional faults related to the following components are present, process these first: Pre-catalyst oxygen sensor, mass-airflow sensor, intake-manifold pressure sensor, intake-air temperature sensor, camshaft position sensor, high-pressure fuel system, low-pressure fuel system Check exhaust system for leaks
- Replace injectors

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- Delete mixture adaptations following repair

DTC P0193; BMW DTC 119001: RAIL PRESSURE SENSOR, ELECTRICAL: SHORT CIRCUIT TO B+**Information saved in**

DME

Fault code

119001 - P0193

Fault description

The diagnosis function monitors the upper voltage limit of the rail-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the rail-pressure sensor exceeds 4.6 V.

Potential problem source(s):

- Defect in wiring harness between DME and rail-pressure sensor
- Defective rail-pressure sensor
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and rail-pressure sensor
- Replace rail-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on

- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0192; BMW DTC 119002: RAIL-PRESSURE SENSOR, ELECTRIC: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

119002 - P0192

Fault description

The diagnostic function monitors the rail-pressure sensor's lower voltage limit.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the rail-pressure sensor is less than 0.2 V.

Potential problem source(s):

- Defect in wiring harness between DME and rail-pressure sensor
- Defective rail-pressure sensor
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and rail-pressure sensor
- Replace rail-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P2542; BMW DTC 119201: FUEL LOW-PRESSURE SENSOR, ELECTRIC: SHORT CIRCUIT TO POSITIVE

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DME

Fault code

119201 - P2542

Fault description

The diagnostic function monitors the upper voltage limit of the low-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the low-pressure sensor is $> 3.6 \text{ V}$.

Potential problem source(s):

- Wiring harness between DME and low-pressure sensor
- Defect in low-pressure sensor
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and low-pressure sensor

- Replace low-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2541; BMW DTC 119202: FUEL LOW-PRESSURE SENSOR, ELECTRICAL: SHORT TO EARTH

Information saved in

DME

Fault code

119202 - P2541

Fault description

The diagnostic function monitors the lower voltage limit of the low-pressure sensor.

Condition for fault identification

Test condition:

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The fault is recognized when the voltage of the low-pressure sensor is $< 0.3 \text{ V}$.

Potential problem source(s):

- Wiring harness between DME and low-pressure sensor
- Defect in low-pressure sensor
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and low-pressure sensor
- Replace low-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10CE; BMW DTC 119301: RAIL-PRESSURE SENSOR, VOLTAGE TEST: UPPER THRESHOLD EXCEEDED**Information saved in**

DME

Fault code

119301 - P10CE

Fault description

The diagnostic function monitors the voltage of the rail-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the rail-pressure sensor is between 4.1 V and 4.8 V.

Potential problem source(s):

- Defect in wiring harness between DME and rail-pressure sensor
- Defective rail-pressure sensor
- Defect in high-pressure system
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and rail-pressure sensor
- Replace rail-pressure sensor
- Repair problem in high-pressure fuel system
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on

- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10CF; BMW DTC 119302: RAIL-PRESSURE SENSOR, VOLTAGE TEST: LOWER THRESHOLD UNDERSHOT**Information saved in**

DME

Fault code

119302 - P10CF

Fault description

The diagnostic function monitors the voltage of the rail-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the rail-pressure sensor is between 0.2 V and 0.52 V.

Potential problem source(s):

- Defect in wiring harness between DME and rail-pressure sensor
- Defective rail-pressure sensor
- Defect in high-pressure system
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- DME not in shutdown phase

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between DME and rail-pressure sensor
- Replace rail-pressure sensor
- Repair problem in high-pressure fuel system
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0088; BMW DTC 119304: RAIL PRESSURE SENSOR, PLAUSIBILITY: MAXIMUM PRESSURE EXCEEDED

Information saved in

DME

Fault code

119304 - P0088

Fault description

The diagnostic function monitors the fuel rail for excessive pressure levels prior to the engine start.

Condition for fault identification

Test condition:

The fault is recognized when the relative rail pressure prior to engine start is >10 bar, and a mixture fault or fuel high-pressure circuit fault appears following the engine start.

Potential problem source(s):

- Defect in wiring harness between DME and rail-pressure sensor
- Defective rail-pressure sensor
- Defect in high-pressure system
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 10 sec. after engine start

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between DME and rail-pressure sensor
- Replace rail-pressure sensor
- Repair problem in high-pressure fuel system
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0087; BMW DTC 119308: RAIL PRESSURE SENSOR, PLAUSIBILITY: MINIMUM PRESSURE UNDERSHOT

Information saved in

DME

Fault code

119308 - P0087

Fault description

The diagnostic function monitors the rail pressure to determine whether it drops too low during engine operation.

Condition for fault identification

Test condition:

The fault is recognized when the relative rail pressure during engine operation is > 40 bar and a mixture fault or a fuel high-pressure fault is present at the same time.

Potential problem source(s):

- Defect in wiring harness between DME and rail-pressure sensor
- Defective rail-pressure sensor
- Defect in high-pressure system
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and rail-pressure sensor
- Replace rail-pressure sensor
- Repair problem in high-pressure fuel system

- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10D9; BMW DTC 119404: RAIL PRESSURE SENSOR, PLAUSIBILITY: SIGNAL FROZEN**Information saved in**

DME

Fault code

119404 - P10D9

Fault description

The diagnostic function monitors the variations in the signal from the rail-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the rail-pressure sensor varies by less than 5 mV.

Potential problem source(s):

- Defect in wiring harness between DME and rail-pressure sensor
- Defective rail-pressure sensor
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Rail pressure exceeds 4 MPa

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and rail-pressure sensor
- Replace rail-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Loss of power

Driver information

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Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P0088; BMW DTC 11A001: FUEL HIGH-PRESSURE SYSTEM, FUEL PRESSURE: MAXIMUM PRESSURE EXCEEDED**Information saved in**

DME

Fault code

11A001 - P0088

Fault description

The diagnostic function monitors the high-pressure fuel system to determine whether the pressure levels remain at the specified levels.

Condition for fault identification**Test condition:**

The fault is recognized when the rail pressure rises beyond the specified level.

Potential problem source(s):

- Defect in low-pressure system
- Defective rail-pressure sensor
- High-pressure pump defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check low-pressure system (filter, pump pressure and flow rate, sensor, plugs/wiring harness), replace as indicated
- Low-pressure ECU (EKP electric fuel pump), read out diagnostic fault codes
- Delete adaptation data for fuel low-pressure control
- Check rail pressure sensor incl. plugs/wiring harness, replace as indicated
- Replace high-pressure pump

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P302A; BMW DTC 11A001: FUEL HIGH-PRESSURE SYSTEM, FUEL PRESSURE: MAXIMUM PRESSURE EXCEEDED**Information saved in**

DME

Fault code

11A001 - P302A

Fault description

The diagnostic function monitors the high-pressure fuel system to determine whether the pressure levels remain at the specified levels.

Condition for fault identification

Test condition:

The fault is recognized when the rail pressure rises beyond the specified level.

Potential problem source(s):

- Defect in low-pressure system
- Defective rail-pressure sensor
- High-pressure pump defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check low-pressure system (filter, pump pressure and flow rate, sensor, plugs/wiring harness), replace as indicated
- Low-pressure ECU (EKP electric fuel pump), read out diagnostic fault codes
- Delete adaptation data for fuel low-pressure control
- Check rail pressure sensor incl. plugs/wiring harness, replace as indicated
- Replace high-pressure pump

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0087; BMW DTC 11A002: FUEL HIGH-PRESSURE SYSTEM, FUEL PRESSURE: MINIMUM PRESSURE UNDERSHOT

Information saved in

DME

Fault code

11A002 - P0087

Fault description

The diagnostic function monitors the high-pressure fuel system to determine whether the pressure levels remain at the specified levels.

Condition for fault identification

Test condition:

The fault is recognized when the rail pressure is below the specified level.

Potential problem source(s):

- Fuel tank empty
- Obstruction in fuel filter
- Fuel pump defective
- Defective rail-pressure sensor
- High-pressure pump defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check fuel level
- Check low-pressure system (filter, pump pressure and flow rate, sensor, plugs/wiring harness), replace as indicated
- Low-pressure ECU (EKP electric fuel pump), read out diagnostic fault codes
- Delete adaptation data for fuel low-pressure control
- Check rail pressure sensor incl. plugs/wiring harness, replace as indicated
- Replace high-pressure pump

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P302C; BMW DTC 11A002: FUEL HIGH-PRESSURE SYSTEM, FUEL PRESSURE: MINIMUM

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PRESSURE UNDERSHOT**Information saved in**

DME

Fault code

11A002 - P302C

Fault description

The diagnostic function monitors the high-pressure fuel system to determine whether the pressure levels remain at the specified levels.

Condition for fault identification

Test condition:

The fault is recognized when the rail pressure is below the specified level.

Potential problem source(s):

- Fuel tank empty
- Obstruction in fuel filter
- Fuel pump defective
- Defective rail-pressure sensor
- High-pressure pump defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check fuel level
- Check low-pressure system (filter, pump pressure and flow rate, sensor, plugs/wiring harness), replace as indicated
- Low-pressure ECU (EKP electric fuel pump), read out diagnostic fault codes
- Delete adaptation data for fuel low-pressure control
- Check rail pressure sensor incl. plugs/wiring harness, replace as indicated
- Replace high-pressure pump

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P008B; BMW DTC 11A201: NONE

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DME

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Fault code

11A201 - P008B

Fault description

Low Pressure Fuel System Pressure - Too High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P008A; BMW DTC 11A204: NONE**Information saved in**

DME

Fault code

11A204 - P008A

Fault description

Low Pressure Fuel System Pressure - Too Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P10A2; BMW DTC 11A701: NONE

Information saved in

DME

Fault code

11A701 - P10A2

Fault description

Fuel Volume Regulator System Deviation Too High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P10A3; BMW DTC 11A702: NONE**Information saved in**

DME

Fault code

11A702 - P10A3

Fault description

Fuel Volume Regulator System Deviation Too Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P306A; BMW DTC 11AA01: FUEL SUPPLY SYSTEM: PRESSURE TOO HIGH, EMERGENCY OPERATION WITH LOW PRESSURE

Information saved in

DME

Fault code

11AA01 - P306A

Fault description

The diagnostic function monitors fuel high-pressure system to detect whether it rises above a defined maximum value.

Condition for fault identification

Test condition:

The fault is recognized when the rail pressure rises above 22 bar.

Potential problem source(s):

- Defect in wiring harness between DME and rail-pressure sensor
- Defective rail-pressure sensor
- Defect in low-pressure system
- High-pressure pump defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between rail-pressure sensor and DME
- Replace rail-pressure sensor
- Check low-pressure sensor
- Check operation of fuel pump
- Replace high-pressure pump

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P306B; BMW DTC 11AA02: FUEL SUPPLY SYSTEM: PRESSURE TOO HIGH, EMERGENCY OPERATION WITH INJECTION DEACTIVATION

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DME

Fault code

11AA02 - P306B

Fault description

The diagnostic function monitors fuel high-pressure system to detect whether it rises above a defined maximum value.

Condition for fault identification

Test condition:

The fault is recognized when the rail pressure rises above 25 bar.

Potential problem source(s):

- Defect in wiring harness between DME and rail-pressure sensor
- Defective rail-pressure sensor
- Defect in low-pressure system
- High-pressure pump defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between rail-pressure sensor and DME
- Replace rail-pressure sensor
- Check operation of fuel pump
- Replace high-pressure pump

Fault effect and breakdown warning**Breakdown notice:**

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Loss of power

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P306C; BMW DTC 11AA04: FUEL SUPPLY SYSTEM: PRESSURE TOO HIGH FOR A SHORT TIME, ENGINE SPEED AND LOAD ARE RESTRICTED

Information saved in

DME

Fault code

11AA04 - P306C

Fault description

The diagnostic function monitors the fuel pressure.

Condition for fault identification

Test condition:

The fault is recognized when the rail pressure rises above maximum limit of 22 bar.

Potential problem source(s):

- Collateral fault caused by extreme pressure spikes in high-pressure fuel system

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Work through any other diagnostic fault codes related to fuel pressure system.

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P15DE; BMW DTC 11AC01: FUEL HIGH-PRESSURE SYSTEM, COLD START: PRESSURE TOO HIGH**Information saved in**

DME

Fault code

11AC01 - P15DE

Fault description

The diagnostic function monitors the high-pressure fuel system to determine whether the pressure levels remain as specified during the catalyst preheating phase.

Condition for fault identification

Test condition:

The fault is recognized when the pressure level in the high-pressure fuel system exceeds the specified value.

Potential problem source(s):

- Defective rail-pressure sensor
- Defect in low-pressure system
- High-pressure pump defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check rail-pressure sensor
- Replace rail-pressure sensor
- Check low-pressure sensor
- Check operation of fuel pump
- Replace high-pressure pump

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: on

- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P15DF; BMW DTC 11AC02: FUEL HIGH-PRESSURE SYSTEM, COLD START: PRESSURE TOO LOW**Information saved in**

DME

Fault code

11AC02 - P15DF

Fault description

The diagnostic function monitors pressure levels in the high-pressure fuel system to determine whether they conform to specified levels during the catalyst preheating phase.

Condition for fault identification

Test condition:

The fault is recognized when the pressure level in the high-pressure system is 3.5 bar lower than the specified value.

Potential problem source(s):

- Fuel tank empty
- Defective rail-pressure sensor
- Defect in low-pressure system
- High-pressure pump defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

None

Time condition:

· None

Other conditions:

· None

Condition for fault memory entry

This fault is logged in the ECU fault memory if it remains present for longer than 45 sec.

Action in service

- Check rail-pressure sensor
- Replace rail-pressure sensor
- Check low-pressure sensor
- Check operation of fuel pump
- Replace high-pressure pump

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P306F; BMW DTC 11AD10: FUEL PRESSURE: PRESSURE BELOW MINIMUM PRESSURE; INJECTION DEACTIVATION FOR CATALYTIC CONVERTER PROTECTION

Information saved in

DME

Fault code

11AD10 - P306F

Fault description

The diagnostic function monitors the high-pressure system for pressure deviations.

Condition for fault identification

Test condition:

The fault is recognized when the fuel pressure in the high or low-pressure system falls below a value based on the program map.

Potential problem source(s):

- Tank fuel level too low
- Collateral malfunction stemming from defective fuel system

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check fuel level
- Repair the source of the problem (if present) in the fuel system

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P306D; BMW DTC 11AE01: FUEL SUPPLY SYSTEM, OXYGEN SENSOR EMISSIONS CONTROL: UPPER LIMIT EXCEEDED

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DME

Fault code

11AE01 - P306D

Fault description

The diagnostic function monitors the lambda closed-loop mixture control. The mixture is too lean and the lambda control enriches it.

Condition for fault identification

Test condition:

The fault is recognized when an enrichment of more than 30 % is required for longer than 30 seconds.

Potential problem source(s):

- Oxygen sensor before catalytic converter defective
- Mass-airflow sensor defective
- Defective injectors
- Intake-manifold pressure sensor defective
- Intake-air temperature sensor defective
- Camshaft position sensor defective
- Defect in high-pressure fuel system
- Defect in low-pressure fuel system
- Leak in exhaust system before oxygen sensor behind catalytic converter
- Poor-quality gasoline

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- EVAP not active

Condition for fault memory entry

This fault is logged in the control module's fault memory if it remains present for longer than 30 sec.

Action in service

- If additional faults related to the following components are present, process these first: Pre-catalyst oxygen sensor, mass-airflow sensor, intake-manifold pressure sensor, intake-air temperature sensor, camshaft position sensor, high-pressure fuel system, low-pressure fuel system Check exhaust system for leaks
- Replace injectors

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P306E; BMW DTC 11AE02: FUEL SUPPLY SYSTEM, OXYGEN SENSOR EMISSIONS CONTROL: LOWER LIMIT UNDERSHOT

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DME

Fault code

11AE02 - P306E

Fault description

The diagnostic function monitors the lambda closed-loop mixture control. The mixture is too rich and the lambda control dials in a leaner mixture.

Condition for fault identification

Test condition:

The fault is recognized when the mixture requires a lean correction of more than 30 % for longer than 30 seconds.

Potential problem source(s):

- Oxygen sensor before catalytic converter defective
- Mass-airflow sensor defective
- Defective injectors
- Intake-manifold pressure sensor defective
- Intake-air temperature sensor defective
- Camshaft position sensor defective
- Defect in high-pressure fuel system
- Defect in low-pressure fuel system
- Intake system leaking
- Oil cap not sealing
- Leak in exhaust system before oxygen sensor behind catalytic converter
- Poor-quality gasoline

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- EVAP not active

Condition for fault memory entry

This fault is logged in the control module's fault memory if it remains present for longer than 30 sec.

Action in service

- If additional faults related to the following components are present, process these first: Pre-catalyst oxygen sensor, mass-airflow sensor, intake-manifold pressure sensor, intake-air temperature sensor, camshaft position sensor, high-pressure fuel system, low-pressure fuel system Check air-induction system for leaks (also checking the following components: Positive crankcase ventilation, oil cap, tank evaporative emissions system)
- Check exhaust system for leaks
- Replace injectors

Fault effect and breakdown warning

Breakdown notice:

- Loss of power

Possible apparent symptoms:

- Engine runs poorly

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P0004; BMW DTC 11C401: FUEL-SUPPLY CONTROL VALVE, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

11C401 - P0004

Fault description

The diagnostic function monitors the flow-control valve's control-activation wire for shorts to positive.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit diagnostic function.

Potential problem source(s):

- Defect in plug or wiring harness between DME and flow-control valve
- Defective flow-control valve
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check plug and wiring harness between flow-control valve and DME
- Replace flow-control valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0003; BMW DTC 11C402: FUEL-SUPPLY CONTROL VALVE, ACTIVATION: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

11C402 - P0003

Fault description

The diagnostic function monitors the flow-control valve's control-activation wire for shorts to ground.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit diagnostic function.

Potential problem source(s):

- Defect in plug or wiring harness between DME and flow-control valve
- Defective flow-control valve
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check plug and wiring harness between flow-control valve and DME
- Replace flow-control valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0001; BMW DTC 11C404: FUEL-SUPPLY CONTROL VALVE, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

11C404 - P0001

Fault description

The diagnostic function monitors the flow-control valve's control-activation wire for an open circuit.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit diagnostic function.

Potential problem source(s):

- Defect in plug or wiring harness between DME and flow-control valve
- Defective flow-control valve

- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check plug and wiring harness between flow-control valve and DME
- Replace flow-control valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on

- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0234; BMW DTC 120208: CHARGE-AIR PRESSURE CONTROL, UPPER VALUE: CHARGE-AIR PRESSURE TOO HIGH**Information saved in**

DME

Fault code

120208 - P0234

Fault description

The diagnostic function monitors the pressure measured by the boost-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the monitored pressure exceeds the specified pressure.

Potential problem source(s):

- Boost-pressure sensor is defective or has been tampered with
- Electropneumatic pressure converter in wastegate valve is defective
- Wastegate valve is defective (seized in closed position)
- Vacuum line defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine speed above 1900 RPM
- Engine load
- Turbocharger boost in control range

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness
- Boost-pressure sensor
- Check electropneumatic pressure converter
- Check vacuum line and vacuum

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

**DTC P0299; BMW DTC 120308: CHARGE-AIR PRESSURE CONTROL, LOWER VALUE:
CHARGE-AIR PRESSURE TOO LOW****Information saved in**

DME

Fault code

120308 - P0299

Fault description

The diagnostic function monitors the pressure measured by the boost-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the monitored pressure is less than the specified pressure.

Potential problem source(s):

- Boost-pressure sensor defective
- Defective electropneumatic pressure converter in wastegate valve
- Wastegate valve is defective (seized in open position)
- Air-induction tract between turbocharger and intake-air plenum has leak
- Vacuum line for controlling wastegate valve is defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine speed above 1900 RPM
- Engine load
- Turbocharger boost in control range

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness
- Boost-pressure sensor
- Check electropneumatic pressure converter
- Check vacuum line and vacuum
- Check air-induction tract between turbocharger and intake-air plenum for vacuum leaks

Fault effect and breakdown warning**Breakdown notice:**

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Reduced power

Driver information**Warning light:**

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

**DTC P1260; BMW DTC 120408: CHARGE-AIR PRESSURE CONTROL, DEACTIVATION:
CHARGE-AIR PRESSURE BUILDUP DISABLED****Information saved in**

DME

Fault code

120408 - P1260

Fault description

The diagnostic function monitors the DME's deactivation of active boost.

Condition for fault identification

Test condition:

Collective fault, only serves to trigger the emissions warning lamp, and can also trigger a CC message. The response to the fault is specified for a different fault entry.

Potential problem source(s):

- None

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- None

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- Boost-pressure control is deactivated to protect the engine.

DTC P0238; BMW DTC 121001: CHARGE-AIR PRESSURE SENSOR, ELECTRIC: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

121001 - P0238

Fault description

The diagnostic function monitors the wire to the boost-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the boost-pressure sensor's voltage exceeds 4.9 V.

Potential problem source(s):

- Defect in wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0237; BMW DTC 121002: CHARGE-AIR PRESSURE SENSOR, ELECTRIC: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

121002 - P0237

Fault description

The diagnostic function monitors the wire to the boost-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the boost-pressure sensor's voltage is less than 4.9 V.

Potential problem source(s):

- Defect in wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on

CC message: on

Service instruction

None

DTC P12A9; BMW DTC 121201: NONE

Information saved in

DME

Fault code

121201 - P12A9

Fault description

Boost Sensor 'A' Afterrunning Diagnosis Pressure Too High

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P12A8; BMW DTC 121202: NONE

Information saved in

DME

Fault code

121202 - P12A8

Fault description

Boost Sensor 'A' Afterrunning Diagnosis Pressure Too Low

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0236; BMW DTC 121521: CHARGING PRESSURE SENSOR, MULTIPLE FAULT: ELECTRICAL AND PLAUSIBILITY**Information saved in**

DME

Fault code

121521 - P0236

Fault description

Collective fault: Boost-pressure sensor.

Condition for fault identification

Test condition:

The response to the fault is specified for a different fault entry.

Potential problem source(s):

- None

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- None

Fault effect and breakdown warning

Breakdown notice:

see Individual fault

Possible apparent symptoms:

see Individual fault

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

see Individual fault

DTC P0234; BMW DTC 121530: CHARGE-AIR PRESSURE SENSOR, PLAUSIBILITY: PRESSURE BEFORE THROTTLE VALVE TOO HIGH**Information saved in**

DME

Fault code

121530 - P0234

Fault description

The diagnostic function monitors the boost pressure.

Condition for fault identification**Test condition:**

The fault is recognized when, prior to engine start, the absolute boost pressure is greater than 3.0 bar, or the absolute boost pressure is greater than 1.4 bar.

Potential problem source(s):

- Defect in boost-pressure system
- Defect in wiring harness between boost-pressure sensor and DME
- Boost-pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check air-induction system operation (wastegate, etc....)
- Inspect wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P12A0; BMW DTC 121530: CHARGE-AIR PRESSURE SENSOR, PLAUSIBILITY: PRESSURE BEFORE THROTTLE VALVE TOO HIGH

Information saved in

DME

Fault code

121530 - P12A0

Fault description

The diagnostic function monitors the boost pressure.

Condition for fault identification

Test condition:

The fault is recognized when, prior to engine start, the absolute boost pressure is greater than 3.0 bar, or the absolute boost pressure is greater than 1.4 bar.

Potential problem source(s):

- Defect in boost-pressure system
- Defect in wiring harness between boost-pressure sensor and DME
- Boost-pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check air-induction system operation (wastegate, etc....)
- Inspect wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on

· CC message: on

Service instruction

None

DTC P0299; BMW DTC 121531: CHARGE-AIR PRESSURE SENSOR, PLAUSIBILITY: PRESSURE BEFORE THROTTLE VALVE TOO LOW

Information saved in

DME

Fault code

121531 - P0299

Fault description

The diagnostic function monitors the boost-pressure sensor.

Condition for fault identification

Test condition:

Collective fault, only serves to trigger the emissions warning lamp, and can also trigger a CC message. The response to the fault is specified for a different fault entry.

Potential problem source(s):

· None

Terminal condition: Terminal 15

Voltage condition:

· Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

· None

Time condition:

· None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- None

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P12A1; BMW DTC 121531: CHARGE-AIR PRESSURE SENSOR, PLAUSIBILITY: PRESSURE BEFORE THROTTLE VALVE TOO LOW

Information saved in

DME

Fault code

121531 - P12A1

Fault description

The diagnostic function monitors the boost-pressure sensor.

Condition for fault identification

Test condition:

Collective fault, only serves to trigger the emissions warning lamp, and can also trigger a CC message. The response to the fault is specified for a different fault entry.

Potential problem source(s):

- None

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- None

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10F2; BMW DTC 121532: BOOST PRESSURE SENSOR, PLAUSIBILITY: PRESSURE BEFORE THROTTLE VALVE TOO HIGH WHEN ENGINE NOT RUNNING

Information saved in

DME

Fault code

121532 - P10F2

Fault description

The diagnostic function monitors the boost pressure.

Condition for fault identification

Test condition:

The fault is recognized when the boost pressure is higher than the ambient barometric pressure while the engine is not running.

Potential problem source(s):

- Defect in boost-pressure system
- Defect in wiring harness between boost-pressure sensor and DME
- Boost-pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine OFF

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check operation of air system (wastegate, etc.)
- Check wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P12DA; BMW DTC 121532: BOOST PRESSURE SENSOR, PLAUSIBILITY: PRESSURE BEFORE THROTTLE VALVE TOO HIGH WHEN ENGINE NOT RUNNING

Information saved in

DME

Fault code

121532 - P12DA

Fault description

The diagnostic function monitors the boost pressure.

Condition for fault identification

Test condition:

The fault is recognized when the boost pressure is higher than the ambient barometric pressure while the engine is not running.

Potential problem source(s):

- Defect in boost-pressure system
- Defect in wiring harness between boost-pressure sensor and DME
- Boost-pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine OFF

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check operation of air system (wastegate, etc.)
- Check wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10F3; BMW DTC 121533: BOOST PRESSURE SENSOR, PLAUSIBILITY: PRESSURE BEFORE THROTTLE VALVE TOO LOW WHEN ENGINE NOT RUNNING

Information saved in

DME

Fault code

121533 - P10F3

Fault description

The diagnostic function monitors the boost pressure.

Condition for fault identification

Test condition:

The fault is recognized when the boost pressure is lower than the ambient barometric pressure while the engine is not running.

Potential problem source(s):

- Defect in boost-pressure system
- Defect in wiring harness between boost-pressure sensor and DME

- Boost-pressure sensor defective
- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine OFF

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check operation of air system (wastegate, etc.)
- Check wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P12DB; BMW DTC 121533: BOOST PRESSURE SENSOR, PLAUSIBILITY: PRESSURE BEFORE THROTTLE VALVE TOO LOW WHEN ENGINE NOT RUNNING

Information saved in

DME

Fault code

121533 - P12DB

Fault description

The diagnostic function monitors the boost pressure.

Condition for fault identification

Test condition:

The fault is recognized when the boost pressure is lower than the ambient barometric pressure while the engine is not running.

Potential problem source(s):

- Defect in boost-pressure system
- Defect in wiring harness between boost-pressure sensor and DME
- Boost-pressure sensor defective
- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine OFF

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check operation of air system (wastegate, etc.)
- Check wiring harness between DME and boost-pressure sensor
- Boost-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Standard EML Text

Possible apparent symptoms:

Reduced power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0234; BMW DTC 121601: CHARGE-AIR PRESSURE SENSOR: PRESSURE TOO HIGH**Information saved in**

DME

Fault code

121601 - P0234

Fault description

During the control module's shutdown phase the diagnostic function monitors the barometric-pressure sensor, intake-manifold pressure sensor and boost-pressure sensor to determine whether they are all measuring the same pressure.

Condition for fault identification

Test condition:

The fault is recognized when the boost-pressure sensor deviates from the average for the pressure sensors (barometric pressure, boost pressure, intake-manifold pressure) by more than 70 mbar.

Potential problem source(s):

- Defective wiring harness
- Sensor has been tampered with
- Sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine off

Other conditions:

- Shutdown phase

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Replace sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on

- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P12A9; BMW DTC 121601: CHARGE-AIR PRESSURE SENSOR: PRESSURE TOO HIGH**Information saved in**

DME

Fault code

121601 - P12A9

Fault description

During the control module's shutdown phase the diagnostic function monitors the barometric-pressure sensor, intake-manifold pressure sensor and boost-pressure sensor to determine whether they are all measuring the same pressure.

Condition for fault identification

Test condition:

The fault is recognized when the boost-pressure sensor deviates from the average for the pressure sensors (barometric pressure, boost pressure, intake-manifold pressure) by more than 70 mbar.

Potential problem source(s):

- Defective wiring harness
- Sensor has been tampered with
- Sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine off

Other conditions:

- Shutdown phase

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Replace sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on

- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0299; BMW DTC 121602: CHARGE-AIR PRESSURE SENSOR: PRESSURE TOO LOW

Information saved in

DME

Fault code

121602 - P0299

Fault description

During the control module's shutdown phase the diagnostic function monitors the barometric pressure sensor, intake-manifold sensor and the pressure sensor on the air-intake side of the throttle valve to determine whether they are all measuring the same pressure.

Condition for fault identification

Test condition:

The fault is recognized when the boost-pressure sensor deviates from the average for the pressure sensors (barometric pressure, boost pressure, intake-manifold pressure) by less than 70 mbar.

Potential problem source(s):

- Wiring harness defective
- Error in sensor measurement
- Sensor has been tampered with

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine off

Other conditions:

- Engine on
- Rail pressure > 4 MPa

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Replace sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P12A8; BMW DTC 121602: CHARGE-AIR PRESSURE SENSOR: PRESSURE TOO LOW**Information saved in**

DME

Fault code

121602 - P12A8

Fault description

During the control module's shutdown phase the diagnostic function monitors the barometric pressure sensor, intake-manifold sensor and the pressure sensor on the air-intake side of the throttle valve to determine whether they are all measuring the same pressure.

Condition for fault identification**Test condition:**

The fault is recognized when the boost-pressure sensor deviates from the average for the pressure sensors (barometric pressure, boost pressure, intake-manifold pressure) by less than 70 mbar.

Potential problem source(s):

- Wiring harness defective
- Error in sensor measurement
- Sensor has been tampered with

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine off

Other conditions:

- Engine on
- Rail pressure > 4 MPa

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Replace sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0035; BMW DTC 122001: BYPASS BLOW-OFF VALVE, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

122001 - P0035

Fault description

The diagnostic function monitors the wire to the compressor bypass valve.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between compressor bypass valve and DME
- Compressor bypass valve defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

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- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Control signal being transmitted to compressor bypass valve

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between compressor bypass valve and DME
- Replace compressor bypass valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Power reduction, CC message for engine malfunction

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0034; BMW DTC 122002: BYPASS BLOW-OFF VALVE, ACTIVATION: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

122002 - P0034

Fault description

The diagnostic function monitors the wire to the compressor bypass valve.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between compressor bypass valve and DME
- Compressor bypass valve defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

· none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between compressor bypass valve and DME
- Replace compressor bypass valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Power reduction, CC message for engine malfunction

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0033; BMW DTC 122004: BYPASS BLOW-OFF VALVE, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

122004 - P0033

Fault description

The diagnostic function monitors the wire to the compressor bypass valve.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between compressor bypass valve and DME
- Compressor bypass valve defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Control signal being transmitted to compressor bypass valve

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between compressor bypass valve and DME
- Replace compressor bypass valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Power reduction, CC message for engine malfunction

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0246; BMW DTC 123001: WASTEGATE, ACTIVATION: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

123001 - P0246

Fault description

The diagnostic function monitors the electrical wire from the DME to the electropneumatic pressure converter.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defective wiring harness
- Electropneumatic pressure converter is defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Activation signal applied to wastegate

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Replace electropneumatic pressure converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, customer proceeds to service facility, loss of power

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0245; BMW DTC 123002: WASTEGATE, ACTIVATION: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

123002 - P0245

Fault description

The diagnostic function monitors the electrical wire from the DME to the electropneumatic pressure converter.

Condition for fault identification**Test condition:**

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defective wiring harness
- Electropneumatic pressure converter is defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Activation signal applied to wastegate

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Replace electropneumatic pressure converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, customer proceeds to service facility, clarification pending

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0243; BMW DTC 123004: WASTEGATE, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

123004 - P0243

Fault description

The diagnostic function monitors the electrical wire from the DME to the electropneumatic pressure converter.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defective wiring harness
- Electropneumatic pressure converter is defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Activation signal applied to wastegate

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Replace electropneumatic pressure converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, customer proceeds to service facility, loss of power

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P2195; BMW DTC 128101: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, SYSTEM CHECK: SIGNAL FIXED AT LEAN

Information saved in

DME

Fault code

128101 - P2195

Fault description

The diagnostic function monitors the voltage of the precatalyst oxygen sensor and compares it with the voltage of the oxygen sensor behind the catalytic converter (at $\lambda = 1$).

Condition for fault identification

Test condition:

The fault is recognized when the lambda signal from the pre-catalyst oxygen sensor deviates too much from the lambda signal from the oxygen sensor behind the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Defective oxygen sensors

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- No diagnostic fault codes logged indicating a mixture fault

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between oxygen sensors before/behind catalytic converter and DME
- Replace oxygen sensors before and behind catalytic converter

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lights up when fault is detected in two consecutive driving cycles

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2196; BMW DTC 128301: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, SYSTEM CHECK: SIGNAL FIXED AT GREASE

Information saved in

DME

Fault code

128301 - P2196

Fault description

The diagnostic function monitors the voltage of the precatalyst oxygen sensor and compares it with the voltage of the oxygen sensor behind the catalytic converter (at $\lambda = 1$).

Condition for fault identification**Test condition:**

The fault is recognized when the lambda signal from the pre-catalyst oxygen sensor deviates too much from the lambda signal from the oxygen sensor behind the catalytic converter.

Potential problem source(s):

- Leak in exhaust system before oxygen sensors
- Defective wiring harness
- Oxygen sensor before catalytic converter defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- No diagnostic fault codes logged indicating a mixture fault

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Conduct catalytic converter diagnosis
- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lights up when fault is detected in two consecutive driving cycles

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2297; BMW DTC 128501: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, IN COASTING/OVERRUN MODE: SIGNAL OUTSIDE LIMIT VALUE

Information saved in

DME

Fault code

128501 - P2297

Fault description

The diagnostic function monitors the voltage of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor before the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

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- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- Overrun operation must be present for at least 3 seconds and the EGR valve must be closed.

Other conditions:

- Engine on
- Vehicle underway
- Pre-catalyst oxygen sensor heated to adequate temperature
- Overrun mode

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0133; BMW DTC 128901: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, DYNAMIC RESPONSE: SLOW RESPONSE**Information saved in**

DME

Fault code

128901 - P0133

Fault description

The diagnostic function monitors the dynamic response of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when closed-loop sensor reacts too slowly to changes in the oxygen concentration within the exhaust gas.

Potential problem source(s):

- Oxygen sensor before catalytic converter defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Drive at a constant speed between 50 and 80 km/h at moderate RPM (1400 to 3240 RPM).
- No faults that would cause mixture faults are registered.

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Replace oxygen sensor before catalytic converter if fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Determine whether cylinder balancing is plausible; if not plausible, perform cylinder balancing following repair

DTC P2414; BMW DTC 128B01: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, INSTALLATION: SENSOR NOT CONNECTED

Information saved in

DME

Fault code

128B01 - P2414

Fault description

The diagnostic function monitors correct installation of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when the oxygen sensor on the engine-side of the catalytic converter is not screwed firmly into place and/or the threaded connection is not sealed.

Potential problem source(s):

- Pre-catalyst oxygen sensor not screwed in tightly or hanging in the air

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- Determine whether the pre-catalyst oxygen sensor is installed at the correct position
- Determine whether the pre-catalyst oxygen sensor is screwed in tightly
- Inspect the pre-catalyst oxygen sensor for damage
- Replace pre-catalyst oxygen sensor

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2243; BMW DTC 128E01: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, LINE FAULT: OPEN CIRCUIT, NEAREST LINE

Information saved in

DME

Fault code

128E01 - P2243

Fault description

The diagnostic function monitors the internal resistance and the output voltage of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor before the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME

- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2626; BMW DTC 128E08: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, LINE FAULT: OPEN CIRCUIT, COMPENSATION LINE

Information saved in

DME

Fault code

128E08 - P2626

Fault description

The diagnostic function monitors the pre-catalyst oxygen sensor.

Condition for fault identification

Test condition:

The fault is recognized when the oxygen sensor before the catalytic converter fails to transmit a signal.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Vehicle underway
- Pre-catalyst oxygen sensor heated to adequate temperature
- Overrun mode

Condition for fault memory entry

600 sec. if the tank is not confirmed full

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0132; BMW DTC 129001: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, SIGNAL LINES: SHORT CIRCUIT TO B+

Information saved in

DME

Fault code

129001 - P0132

Fault description

The diagnostic function monitors the controller in the DME.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor before the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning**Breakdown notice:**

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0131; BMW DTC 129002: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, SIGNAL LINES: SHORT CIRCUIT TO EARTH

Information saved in

DME

Fault code

129002 - P0131

Fault description

The diagnostic function monitors the controller in the DME.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor before the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P3024; BMW DTC 129201: DME, INTERNAL FAULT, OXYGEN SENSOR BEFORE CATALYTIC CONVERTER: INITIALIZATION FAULT**Information saved in**

DME

Fault code

129201 - P3024

Fault description

The diagnostic function monitors the controller in the DME.

Condition for fault identification

Test condition:

The fault is recognized when the oxygen sensor chip in the DME detects a fault.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P3022; BMW DTC 129202: DME, INTERNAL FAULT, OXYGEN SENSOR BEFORE CATALYTIC CONVERTER: COMMUNICATION FAULT**Information saved in**

DME

Fault code

129202 - P3022

Fault description

The diagnostic function monitors the controller in the DME.

Condition for fault identification

Test condition:

The fault is recognized when the oxygen sensor chip in the DME detects a fault.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P3012; BMW DTC 129A20: DME, INTERNAL FAULT, OXYGEN SENSOR BEFORE CATALYTIC CONVERTER: OXYGEN-SENSOR MODULE, SIGNAL-CIRCUIT ADAPTATION VALUES TOO HIGH

Information saved in

DME

Fault code

129A20 - P3012

Fault description

The diagnostic function monitors the controller in the DME.

Condition for fault identification

Test condition:

The fault is recognized when the oxygen sensor chip in the DME detects a fault.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P3014; BMW DTC 129A21: DME, INTERNAL FAULT, OXYGEN SENSOR BEFORE CATALYTIC CONVERTER: OXYGEN-SENSOR MODULE, UNDERVOLTAGE**Information saved in**

DME

Fault code

129A21 - P3014

Fault description

The diagnostic function monitors the controller in the DME.

Condition for fault identification

Test condition:

The fault is recognized when the oxygen sensor chip in the DME detects a fault.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Engine runs poorly
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P2271; BMW DTC 12A101: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, SYSTEM CHECK: SIGNAL FIXED AT RICH**Information saved in**

DME

Fault code

12A101 - P2271

Fault description

The diagnostic function monitors whether the voltage of the oxygen sensor behind catalytic converter remains stuck at a high value.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the oxygen sensor behind the catalytic converter remains consistently too high.

Potential problem source(s):

- Mixture too rich
- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Steady-state at low to medium partial load

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 10 min.

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lights up when fault is detected in two consecutive driving cycles

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2270; BMW DTC 12A102: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, SYSTEM CHECK: SIGNAL FIXED AT LEAN

Information saved in

DME

Fault code

12A102 - P2270

Fault description

The diagnostic function monitors whether the voltage of the oxygen sensor behind catalytic converter remains stuck at a low value.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the oxygen sensor behind the catalytic converter remains consistently too low.

Potential problem source(s):

- Mixture too lean
- Leak in exhaust system on engine-side of catalytic converter
- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Steady-state at low to medium partial load

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 10 min.

Action in service

- Check the connection between the DME and the oxygen sensor behind catalytic converter
- Determine whether the oxygen sensors are in the wrong mutual locations
- Check the exhaust system upstream from the oxygen sensor for leaks
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lights up when fault is detected in two consecutive driving cycles

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P013A; BMW DTC 12A308: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, DYNAMIC RESPONSE, FROM RICH TO LEAN: SLOW RESPONSE

Information saved in

DME

Fault code

12A308 - P013A

Fault description

O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 2)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P0138; BMW DTC 12A701: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, ELECTRICAL: SHORT CIRCUIT TO B+

Information saved in

DME

Fault code

12A701 - P0138

Fault description

The diagnostic function monitors electrical status of the oxygen sensor behind catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor behind the catalytic

converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temperature, more than 80°C
- Exhaust-gas temperature at post-catalyst oxygen sensor not higher than 800 °C

Time condition:

- Active heating activation more than 1 min.

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check the connection between the DME and the oxygen sensor behind catalytic converter
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lamp on after second driving cycle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0137; BMW DTC 12A902: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, ELECTRICAL: SHORT CIRCUIT TO EARTH

Information saved in

DME

Fault code

12A902 - P0137

Fault description

The diagnostic function monitors electrical status of the oxygen sensor behind catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor behind the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine switched off at temperature higher than 60 °C
- Engine starting temperature less than 40 °C, then engine warmed to normal temperature
- Exhaust-gas temperature at post-catalyst oxygen sensor not higher than 800 °C

Time condition:

- Active heating activation more than 1 min.

Other conditions:

- Engine ON

Condition for fault memory entry

600 sec., if tank is not verifiability full

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning**Breakdown notice:**

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lamp on after second driving cycle

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0136; BMW DTC 12AB04: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, ELECTRICAL: LINE DISCONNECTION**Information saved in**

DME

Fault code

12AB04 - P0136

Fault description

The diagnostic function monitors the oxygen sensor behind catalytic converter.

Condition for fault identification**Test condition:**

The fault is recognized when an electrical malfunction is present in the oxygen sensor behind the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temperature, more than 80°C
- Exhaust-gas temperature at post-catalyst oxygen sensor for detection of signal interruption: 600..800 °C

Time condition:

- Active heating activation more than 1 min.

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 6 min.

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Check heating of oxygen sensor behind catalytic converter
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lamp on after second driving cycle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P013E; BMW DTC 12AF08: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, TRAILING THROTTLE, FROM RICH TO LEAN: DELAYED RESPONSE**Information saved in**

DME

Fault code

12AF08 - P013E

Fault description

The diagnostic function monitors response lag/aging in the oxygen sensor behind catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when the dynamic signal from the post-catalyst oxygen sensor displays excessive lag.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine in overrun phase 5 times

Condition for fault memory entry

The diagnostic fault code is logged once the fault appears five times.

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Replace oxygen sensor behind catalytic converter

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0032; BMW DTC 12B101: OXYGEN-SENSOR HEATER BEFORE CATALYTIC CONVERTER, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

12B101 - P0032

Fault description

The diagnostic function monitors activation of the heater for the oxygen sensor before the catalytic converter.

Condition for fault identification

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Test condition:

The fault is recognized when an activation signal is transmitted to the oxygen sensor before the catalytic converter and an electrical defect is present.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 10 sec. after engine start

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning**Breakdown notice:**

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0031; BMW DTC 12B102: OXYGEN-SENSOR HEATER BEFORE CATALYTIC CONVERTER, ACTIVATION: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

12B102 - P0031

Fault description

The diagnostic function monitors activation of the heater for the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the oxygen sensor before the catalytic converter and an electrical defect is present.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 10 sec. after engine start

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0030; BMW DTC 12B104: OXYGEN-SENSOR HEATER BEFORE CATALYTIC CONVERTER, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

12B104 - P0030

Fault description

The diagnostic function monitors activation of the heater for the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the oxygen sensor before the catalytic converter and an electrical defect is present.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

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- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 10 sec. after engine start

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0038; BMW DTC 12B301: OXYGEN-SENSOR HEATER AFTER CATALYTIC CONVERTER, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

12B301 - P0038

Fault description

The diagnostic function monitors activation of the heater for the oxygen sensor behind the catalytic converter.

Condition for fault identification**Test condition:**

The fault is recognized when an activation signal is transmitted to the heater for the oxygen sensor behind the catalytic converter and an electrical defect is present.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 10 sec. after engine start

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0037; BMW DTC 12B302: OXYGEN-SENSOR HEATER AFTER CATALYTIC CONVERTER,

ACTIVATION: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

12B302 - P0037

Fault description

The diagnostic function monitors activation of the heater for the oxygen sensor behind the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the heater for the oxygen sensor behind the catalytic converter and an electrical defect is present.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 10 sec. after engine start

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0036; BMW DTC 12B304: OXYGEN-SENSOR HEATER AFTER CATALYTIC CONVERTER, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

12B304 - P0036

Fault description

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The diagnostic function monitors activation of the heater for the oxygen sensor behind the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the heater for the oxygen sensor behind the catalytic converter and an electrical defect is present.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 10 sec. after engine start

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P102A; BMW DTC 12B505: OXYGEN SENSOR HEATING BEFORE CATALYTIC CONVERTER, FUNCTION: HEATER FAULT

Information saved in

DME

Fault code

12B505 - P102A

Fault description

O2 Sensor Heating, Heater Error (Bank 1 Sensor 1)

Condition for fault identification

Test condition:

Potential problem source(s):

0

Voltage condition:

Temperature condition:

Time condition:

Other conditions:

Condition for fault memory entry

none

Action in service

0

Fault effect and breakdown warning

Breakdown notice:

Possible apparent symptoms:

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P0141; BMW DTC 12B701: OXYGEN-SENSOR HEATER AFTER CATALYTIC CONVERTER, FUNCTION: INTERNAL RESISTANCE TOO HIGH

Information saved in

DME

Fault code

12B701 - P0141

Fault description

The diagnostic function monitors the difference between the expected and the actual internal resistance in the heater for the oxygen sensor behind the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when the actual internal resistance of the heater for the oxygen sensor behind the catalytic converter remains higher than expected for a specified period of time.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- Engine off for longer than 13 min.

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between oxygen sensor behind catalytic converter and DME (contact resistance)
- Replace oxygen sensor behind catalytic converter

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Because diagnosis relies on assessment of the post-catalyst oxygen sensor, following logging of a diagnostic fault code the exhaust system must be inspected for leaks and sealed if any leakage is found (without additional repair)

DTC P3026; BMW DTC 12BD20: OXYGEN-SENSOR HEATER BEFORE CATALYTIC CONVERTER, FUNCTION: OPERATING TEMPERATURE NOT REACHED

Information saved in

DME

Fault code

12BD20 - P3026

Fault description

The diagnostic function monitors the temperature of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when the oxygen sensor before the catalytic converter fails to achieve the specified operating temperature although the heater is operating.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 2 min. after engine start

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0135; BMW DTC 12BD21: OXYGEN-SENSOR HEATER BEFORE CATALYTIC CONVERTER, FUNCTION: LACK OF SIGNAL READINESS**Information saved in**

DME

Fault code

12BD21 - P0135

Fault description

The diagnostic function monitors heating of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when the oxygen sensor before the catalytic converter fails to achieve the specified operating temperature although the heater is operating.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off

- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P3016; BMW DTC 12BD22: OXYGEN-SENSOR HEATER BEFORE CATALYTIC CONVERTER, FUNCTION: INTERNAL RESISTANCE OF SIGNAL CIRCUIT TOO HIGHLY RESISTANT

Information saved in

DME

Fault code

12BD22 - P3016

Fault description

The diagnostic function monitors the calibrated resistance of the heater for the oxygen sensor before the catalytic converter in the DME.

Condition for fault identification

Test condition:

The fault is recognized when the calibrated resistance of the heater for the oxygen sensor before the catalytic converter in the DME control module is outside the tolerance range.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace DME if fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0139; BMW DTC 12BD33: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, AGEING: VOLTAGE THRESHOLD NOT REACHED

Information saved in

DME

Fault code

12BD33 - P0139

Fault description

The diagnostic function monitors the voltage of the oxygen sensor behind the catalytic converter on overrun.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the oxygen sensor behind the catalytic converter falls too slowly during trailing throttle/overrun operation.

Potential problem source(s):

- Defect in wiring harness between DME and oxygen sensor behind catalytic converter
- Oxygen sensor behind catalytic converter defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- At least 10 sec. in overrun phase

Other conditions:

- Engine in overrun mode

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Replace oxygen sensor behind catalytic converter

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P0138; BMW DTC 12BD40: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, ELECTRICAL: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

12BD40 - P0138

Fault description

The diagnostic function monitors electrical status of the oxygen sensor behind catalytic converter.

Condition for fault identification

Test condition:

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The fault is recognized when an electrical malfunction is present in the oxygen sensor behind the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temperature, more than 80°C
- Exhaust-gas temperature at post-catalyst oxygen sensor not higher than 800 °C

Time condition:

- Active heating activation more than 1 min.

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check the connection between the DME and the oxygen sensor behind catalytic converter
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lamp on after second driving cycle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0137; BMW DTC 12BD41: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, ELECTRICAL: INTERCORE SHORT CIRCUIT OR OXYGEN SENSOR CONTAMINATED

Information saved in

DME

Fault code

12BD41 - P0137

Fault description

The diagnostic function monitors electrical status of the oxygen sensor behind catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor behind the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine switched off at temperature higher than 60 °C
- Engine starting temperature less than 40 °C, then engine warmed to normal temperature
- Exhaust-gas temperature at post-catalyst oxygen sensor not higher than 800 °C

Time condition:

- Active heating activation more than 1 min.

Other conditions:

- Engine ON

Condition for fault memory entry

600 sec., if tank is not verifiability full

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning**Breakdown notice:**

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lamp on after second driving cycle

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0136; BMW DTC 12BD43: OXYGEN SENSOR AFTER CATALYTIC CONVERTER, ELECTRICAL: OPEN CIRCUIT**Information saved in**

DME

Fault code

12BD43 - P0136

Fault description

The diagnostic function monitors the oxygen sensor behind catalytic converter.

Condition for fault identification**Test condition:**

The fault is recognized when an electrical malfunction is present in the oxygen sensor behind the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor behind catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temperature, more than 80°C
- Exhaust-gas temperature at post-catalyst oxygen sensor for detection of signal interruption: 600..800 °C

Time condition:

- Active heating activation more than 1 min.

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 6 min.

Action in service

- Inspect wiring harness between oxygen sensor behind catalytic converter and DME
- Check heating of oxygen sensor behind catalytic converter
- Replace oxygen sensor behind catalytic converter
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lamp on after second driving cycle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P3018; BMW DTC 12BD50: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, PUMP CURRENT LINE: LAMBDA CONTROL VALUE ABOVE THRESHOLD DUE TO OPEN PUMP CURRENT LINE**Information saved in**

DME

Fault code

12BD50 - P3018

Fault description

The diagnostic function monitors the voltage of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor before the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P3020; BMW DTC 12BD51: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, PUMP CURRENT LINE: SIGNAL VOLTAGE IN OVERRUN MODE TOO LOW DUE TO OPEN PUMP CURRENT LINE

Information saved in

DME

Fault code

12BD51 - P3020

Fault description

The diagnostic function monitors the voltage of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor before the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- Overrun operation must be present for at least 3 seconds and the EGR valve must be closed.

Other conditions:

- Engine on
- Vehicle underway
- Pre-catalyst oxygen sensor heated to adequate temperature
- Overrun mode

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2237; BMW DTC 12BD52: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, LINE FAULT: OPEN CIRCUIT, PUMP CURRENT LEAD

Information saved in

DME

Fault code

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12BD52 - P2237

Fault description

The diagnostic function monitors the voltage of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when an electrical malfunction is present in the oxygen sensor before the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2251; BMW DTC 12BD60: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, LINE FAULT: OPEN CIRCUIT, VIRTUAL GROUND

Information saved in

DME

Fault code

12BD60 - P2251

Fault description

The diagnostic function monitors the internal resistance and the output voltage of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

Engine running

Battery voltage: 10.7 V to 16 V

No deactivation of voltage to pre-catalyst oxygen sensor

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0130; BMW DTC 12BD70: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, ELECTRICAL: NERNST-CELL RESISTANCE OR CERAMIC TEMPERATURE IMPLAUSIBLE, LINE OR HEATER FAULT

Information saved in

DME

Fault code

12BD70 - P0130

Fault description

The diagnostic function monitors the temperature of the oxygen sensor before the catalytic converter.

Condition for fault identification

Test condition:

The fault is recognized when the oxygen sensor before the catalytic converter fails to achieve the specified operating temperature although the heater is operating.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective

Terminal condition: none**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor

Fault effect and breakdown warning**Breakdown notice:**

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

- MIL lamp lights up after 2nd driving cycle
- Higher exhaust emissions
- Higher fuel consumption
- Surge

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2097; BMW DTC 12BD90: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, PLAUSIBILITY: MIXTURE AFTER CATALYTIC CONVERTER TOO RICH

Information saved in

DME

Fault code

12BD90 - P2097

Fault description

The diagnostic function monitors the voltage of the precatalyst oxygen sensor and compares it with the voltage of the oxygen sensor behind the catalytic converter (at $\lambda = 1$).

Condition for fault identification

Test condition:

The fault is recognized when the lambda signal from the pre-catalyst oxygen sensor deviates too much from the lambda signal from the oxygen sensor behind the catalytic converter.

Potential problem source(s):

- Defective wiring harness
- Defective oxygen sensors

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- No diagnostic fault codes logged indicating a mixture fault

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between oxygen sensors before/behind catalytic converter and DME
- Replace oxygen sensors before and behind catalytic converter

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lights up when fault is detected in two consecutive driving cycles

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2096; BMW DTC 12BD91: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, PLAUSIBILITY: MIXTURE AFTER CATALYTIC CONVERTER TOO LEAN

Information saved in

DME

Fault code

12BD91 - P2096

Fault description

The diagnostic function monitors the voltage of the precatalyst oxygen sensor and compares it with the voltage of the oxygen sensor behind the catalytic converter (at $\lambda = 1$).

Condition for fault identification

Test condition:

The fault is recognized when the lambda signal from the pre-catalyst oxygen sensor deviates too much from the lambda signal from the oxygen sensor behind the catalytic converter.

Potential problem source(s):

- Leak in exhaust system before oxygen sensors
- Defective wiring harness
- Oxygen sensor before catalytic converter defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- No diagnostic fault codes logged indicating a mixture fault

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Conduct catalytic converter diagnosis
- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lights up when fault is detected in two consecutive driving cycles

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2195; BMW DTC 12BD92: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, PLAUSIBILITY: FIXED AT LEAN

Information saved in

DME

Fault code

12BD92 - P2195

Fault description

The diagnostic function monitors whether the voltage of the pre-catalyst oxygen sensor is within a plausible range.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the pre-catalyst oxygen sensor remains consistently too high.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Leak in exhaust system on engine-side of catalytic converter

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

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- Engine on
- No diagnostic fault codes logged indicating a mixture fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- If faults related to mixture control are present, repair these first
- Check exhaust system for leaks
- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lights up when fault is detected in two consecutive driving cycles

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2196; BMW DTC 12BD93: OXYGEN SENSOR BEFORE CATALYTIC CONVERTER, PLAUSIBILITY: FIXED AT RICH

Information saved in

DME

Fault code

12BD93 - P2196

Fault description

The diagnostic function monitors whether the voltage of the pre-catalyst oxygen sensor is within a plausible range.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the pre-catalyst oxygen sensor remains consistently too low.

Potential problem source(s):

- Defective wiring harness
- Oxygen sensor before catalytic converter defective
- Leak in exhaust system on engine-side of catalytic converter

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- No diagnostic fault codes logged indicating a mixture fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- If faults related to mixture control are present, repair these first
- Check exhaust system for leaks
- Check wiring harness between pre-catalyst oxygen sensor and DME
- Replace pre-catalyst oxygen sensor

Fault effect and breakdown warning

Breakdown notice:

Continued driving is possible, but because the oxygen sensor is not ready for closed-loop control, conversion of exhaust gases in the catalytic converter will be seriously impaired.

Possible apparent symptoms:

MIL lights up when fault is detected in two consecutive driving cycles

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2089; BMW DTC 130001: VANOS SOLENOID VALVE, INLET, ACTIVATION: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

130001 - P2089

Fault description

The diagnostic function monitors the wire to the VANOS solenoid valve.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and VANOS solenoid valve
- VANOS solenoid valve defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and VANOS solenoid valve
- Replace VANOS solenoid valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, performance reduction, turbo deactivation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P2088; BMW DTC 130002: VANOS SOLENOID VALVE, INLET, ACTIVATION: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

130002 - P2088

Fault description

The diagnostic function monitors the wire to the VANOS solenoid valve.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and VANOS solenoid valve
- VANOS solenoid valve defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and VANOS solenoid valve
- Replace VANOS solenoid valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, performance reduction, turbo deactivation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P0010; BMW DTC 130004: VANOS SOLENOID VALVE, INLET, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

130004 - P0010

Fault description

The diagnostic function monitors the wire to the VANOS solenoid valve.

Condition for fault identification

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Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and VANOS solenoid valve
- VANOS solenoid valve defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and VANOS solenoid valve
- Replace VANOS solenoid valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, performance reduction, turbo deactivation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P13C0; BMW DTC 130104: VANOS, INLET: CONTROL FAULT, CAMSHAFT JAMMED

Information saved in

DME

Fault code

130104 - P13C0

Fault description

The diagnostic function monitors the camshaft timing adjustment.

Condition for fault identification

Test condition:

The fault is recognized when the actual angle fails to conform to the specified angle while the engine is running.

Potential problem source(s):

- Contaminated oil passage at VANOS solenoid valve
- Oil pressure too low
- Defect in wiring harness to VANOS solenoid valve
- VANOS solenoid valve seized
- VANOS solenoid valve defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Specified/actual angle difference exceeds 15° crankshaft

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check oil level, change engine oil and filter as indicated
- If faults related to the camshaft position sensor have been logged, repair these first
- Check wiring harness between VANOS solenoid valve and DME
- Perform system test
- Check camshaft and VANOS unit for freedom of movement and mechanical damage
- Clean VANOS solenoid valve, replace as required

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Engine runs poorly

Driver information**Warning light:****MY10 ECE:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P0012; BMW DTC 130108: VANOS, INLET: CONTROL FAULT, POSITION NOT REACHED

Information saved in

DME

Fault code

130108 - P0012

Fault description

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The diagnostic function monitors the camshaft timing adjustment.

Condition for fault identification

Test condition:

The fault is recognized when the actual angle assumes the specified angle too slowly while the engine is running.

Potential problem source(s):

- Contaminated oil passage at VANOS solenoid valve
- Oil pressure too low
- Defective wires or plug terminals on VANOS solenoid valve
- VANOS solenoid valve seized
- VANOS solenoid valve defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Specified/actual angle difference exceeds 15° crankshaft

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check oil level, change engine oil and filter as indicated
- If faults related to the camshaft position sensor have been logged, repair these first
- Check wiring harness between VANOS solenoid valve and DME

- Perform system test
- Check camshaft and VANOS unit for freedom of movement and mechanical damage
- Clean VANOS solenoid valve, replace as required

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Engine runs poorly

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P2091; BMW DTC 130201: VANOS SOLENOID VALVE, EXHAUST, ACTIVATION: SHORT CIRCUIT TO POSITIVE

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DME

Fault code

130201 - P2091

Fault description

The diagnostic function monitors the wire to the VANOS solenoid valve.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and VANOS solenoid valve
- VANOS solenoid valve defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and VANOS solenoid valve

- Replace VANOS solenoid valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, performance reduction, turbo deactivation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P2090; BMW DTC 130202: VANOS SOLENOID VALVE, EXHAUST, ACTIVATION: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

130202 - P2090

Fault description

The diagnostic function monitors the wire to the VANOS solenoid valve.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and VANOS solenoid valve
- VANOS solenoid valve defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and VANOS solenoid valve
- Replace VANOS solenoid valve

- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, performance reduction, turbo deactivation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P0013; BMW DTC 130204: VANOS SOLENOID VALVE, EXHAUST, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

130204 - P0013

Fault description

The diagnostic function monitors the wire to the VANOS solenoid valve.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and VANOS solenoid valve
- VANOS solenoid valve defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and VANOS solenoid valve
- Replace VANOS solenoid valve

- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, performance reduction, turbo deactivation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P13C9; BMW DTC 130304: VANOS, EXHAUST: CONTROL FAULT, CAMSHAFT JAMMED

Information saved in

DME

Fault code

130304 - P13C9

Fault description

The diagnostic function monitors the camshaft timing adjustment.

Condition for fault identification

Test condition:

The fault is recognized when the actual angle fails to conform to the specified angle while the engine is running.

Potential problem source(s):

- Contaminated oil passage at VANOS solenoid valve
- Oil pressure too low
- Defect in wiring harness to VANOS solenoid valve
- VANOS solenoid valve seized
- VANOS solenoid valve defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Specified/actual angle difference exceeds 15° crankshaft

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check oil level, change engine oil and filter as indicated

- If faults related to the camshaft position sensor have been logged, repair these first
- Check wiring harness between VANOS solenoid valve and DME
- Perform system test
- Check camshaft and VANOS unit for freedom of movement and mechanical damage
- Clean VANOS solenoid valve, replace as required

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Engine runs poorly

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P0015; BMW DTC 130308: VANOS, EXHAUST: CONTROL FAULT, POSITION NOT

REACHED**Information saved in**

DME

Fault code

130308 - P0015

Fault description

The diagnostic function monitors the camshaft timing adjustment.

Condition for fault identification

Test condition:

The fault is recognized when the actual angle assumes the specified angle too slowly while the engine is running.

Potential problem source(s):

- Contaminated oil passage at VANOS solenoid valve
- Oil pressure too low
- Defective wires or plug terminals on VANOS solenoid valve
- VANOS solenoid valve seized
- VANOS solenoid valve defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on

- Specified/actual angle difference exceeds 15° crankshaft

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check oil level, change engine oil and filter as indicated
- If faults related to the camshaft position sensor have been logged, repair these first
- Check wiring harness between VANOS solenoid valve and DME
- Perform system test
- Check camshaft and VANOS unit for freedom of movement and mechanical damage
- Clean VANOS solenoid valve, replace as required

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Engine runs poorly

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P0341; BMW DTC 130E11: INLET-CAMSHAFT SENSOR: SIGNAL IMPLAUSIBLE**Information saved in**

DME

Fault code

130E11 - P0341

Fault description

The diagnostic function monitors the intake camshaft position sensor.

Condition for fault identification

Test condition:

The fault is recognized when the engine is turning over and camshaft signals have been present.

Potential problem source(s):

- Defect in wiring harness between DME and camshaft position sensor
- Incorrect gap between camshaft position sensor and camshaft sensor reluctor ring
- Sensor contaminated or defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

If the 'crankshaft revolutions' fault is present.

Action in service

- Check wiring harness between DME and camshaft position sensor
- Check installation of camshaft position sensor and camshaft position sensor reluctor ring
- Replace sensor

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

Extended starting time, power loss, and no restart possible in combination with an exhaust sensor fault

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P1338; BMW DTC 130E20: INLET CAMSHAFT: OFFSET ANGLE TO CRANKSHAFT OUTSIDE TOLERANCE**Information saved in**

DME

Fault code

130E20 - P1338

Fault description

The diagnostic function monitors the offset angle between crankshaft and camshaft.

Condition for fault identification

Test condition:

The fault is recognized when the camshaft's reference position does not align with the specified position.

Potential problem source(s):

- Loose center bolt
- Camshaft position sensor reluctor ring out of adjustment
- Timing chain has jumped time
- Defective timing chain (stretched)

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- After execution of camshaft position sensor adaptation

Condition for fault memory entry

Camshaft reference position has shifted by more than 0° and the camshaft has executed rotations.

Action in service

- When intake and exhaust camshafts display simultaneous angular offset errors relative to crankshaft:
 - Check center bolt
- Check camshaft position sensor reluctor ring
- Check timing chain
- Check valve timing

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

MIL comes on

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on

- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P0366; BMW DTC 130F11: EXHAUST-CAMSHAFT SENSOR: SIGNAL IMPLAUSIBLE**Information saved in**

DME

Fault code

130F11 - P0366

Fault description

The diagnostic function monitors the exhaust camshaft position sensor.

Condition for fault identification

Test condition:

The fault is recognized when the engine is turning over and camshaft signals have been present.

Potential problem source(s):

- Defect in wiring harness between DME and camshaft position sensor
- Incorrect gap between camshaft position sensor and camshaft sensor reluctor ring
- Sensor contaminated or defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

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- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

If the 'crankshaft revolutions' fault is present.

Action in service

- Check wiring harness between DME and camshaft position sensor
- Check installation of camshaft position sensor and camshaft position sensor reluctor ring
- Replace sensor

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

Extended starting time, power loss, and no restart possible in combination with an exhaust sensor fault

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on

- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P1339; BMW DTC 130F20: EXHAUST CAMSHAFT: OFFSET ANGLE TO CRANKSHAFT OUTSIDE TOLERANCE

Information saved in

DME

Fault code

130F20 - P1339

Fault description

The diagnostic function monitors the offset angle between crankshaft and camshaft.

Condition for fault identification

Test condition:

The fault is recognized when the camshaft's reference position does not align with the specified position.

Potential problem source(s):

- Loose center bolt
- Camshaft position sensor reluctor ring out of adjustment
- Timing chain has jumped time
- Defective timing chain (stretched)

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- After execution of camshaft position sensor adaptation

Condition for fault memory entry

Camshaft reference position has shifted by more than θ and the camshaft has executed rotations.

Action in service

- When intake and exhaust camshafts display simultaneous angular offset errors relative to crankshaft:
Check center bolt
- Check camshaft position sensor reluctor ring
- Check timing chain
- Check valve timing

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

MIL comes on

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P054B; BMW DTC 131401: VANOS, EXHAUST, COLD START: NOT CONTROLLABLE**Information saved in**

DME

Fault code

131401 - P054B

Fault description

The diagnostic function monitors adjustment of the exhaust camshaft during the catalytic converter's warm-up phase.

Condition for fault identification

Test condition:

The fault is recognized when the camshaft cannot be adjusted to the specified position.

Potential problem source(s):

- Contaminated oil passage at VANOS solenoid valve
- Oil pressure too low
- Defective wires or plug terminals on VANOS solenoid valve
- VANOS solenoid valve seized
- VANOS solenoid valve defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine cold start to ensure that catalyst heater is active.

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check oil level, change engine oil and filter as indicated
- If faults related to the camshaft position sensor have been logged, repair these first
- Check wiring harness between VANOS solenoid valve and DME
- Perform system test
- Check camshaft and VANOS unit for freedom of movement and mechanical damage
- Clean VANOS solenoid valve, replace as required

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Engine runs poorly

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P052B; BMW DTC 131501: VANOS, INLET, COLD START: NOT CONTROLLABLE**Information saved in**

DME

Fault code

131501 - P052B

Fault description

The diagnostic function monitors adjustment of the intake-side camshaft during the catalytic converter's warm-up phase.

Condition for fault identification

Test condition:

The fault is recognized when the camshaft cannot be adjusted to the specified position.

Potential problem source(s):

- Contaminated oil passage at VANOS solenoid valve
- Oil pressure too low
- Defective wires or plug terminals on VANOS solenoid valve
- VANOS solenoid valve seized
- VANOS solenoid valve defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine cold start to ensure that catalyst heater is active.

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check oil level, change engine oil and filter as indicated
- If faults related to the camshaft position sensor have been logged, repair these first
- Check wiring harness between VANOS solenoid valve and DME
- Perform system test
- Check camshaft and VANOS unit for freedom of movement and mechanical damage
- Clean VANOS solenoid valve, replace as required

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Engine runs poorly

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1325; BMW DTC 132408: VANOS, EXHAUST: CAMSHAFT NOT AT LOCKING POSITION AT START**Information saved in**

DME

Fault code

132408 - P1325

Fault description

The diagnostic function monitors camshaft position locking.

Condition for fault identification

Test condition:

The fault is recognized when the camshaft is not locked during starting.

Potential problem source(s):

- Engine oil dirty, old or not to specification
- VANOS adjustment unit dirty
- VANOS adjustment unit defective

Terminal condition: none

Voltage condition:

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- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The fault is logged immediately when it occurs during an engine start.

Action in service

- Check engine oil, replace engine oil and filter as required
- Perform system test on VANOS solenoid valves
- Replace VANOS adjustment unit

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Non-starter in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P1323; BMW DTC 132508: VANOS, INLET: CAMSHAFT NOT AT LOCKING POSITION AT START**Information saved in**

DME

Fault code

132508 - P1323

Fault description

The diagnostic function monitors camshaft position locking.

Condition for fault identification

Test condition:

The fault is recognized when the camshaft is not locked during starting.

Potential problem source(s):

- Engine oil dirty, old or not to specification
- VANOS adjustment unit dirty
- VANOS adjustment unit defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The fault is logged immediately when it occurs during an engine start.

Action in service

- Check engine oil, replace engine oil and filter as required
- Perform system test on VANOS solenoid valves
- Replace VANOS adjustment unit

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Non-starter in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P10D8; BMW DTC 133101: VALVETRONIC RELAY, ACTIVATION: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

133101 - P10D8

Fault description

The diagnostic function monitors electrical control-activation of the Valvetronic relay for a short circuit to positive.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is detected when activation voltage is transmitted to the Valvetronic relay.

Potential problem source(s):

- Defective wiring harness
- Valvetronic relay defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between DME and Valvetronic relay
- Replace Valvetronic relay

- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

If the malfunction occurs while the VVT system is at maximum stroke extension (full load, vehicle parked), only limited or no effects will be apparent to the customer. (Switching process may be felt after GD, starting response).

Otherwise breakdown vehicle, as power is no longer transmitted to the VVT system, which thus closes.

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10D7; BMW DTC 133102: VALVETRONIC RELAY, ACTIVATION: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

133102 - P10D7

Fault description

The diagnostic function monitors electrical activation of the Valvetronic relay for short circuits to ground.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is detected when activation voltage is transmitted to the Valvetronic relay.

Potential problem source(s):

- Defective wiring harness
- Valvetronic relay defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between DME and Valvetronic relay
- Replace Valvetronic relay
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

If the malfunction occurs while the VVT system is at maximum stroke extension (full load, vehicle parked), only limited or no effects will be apparent to the customer. (Switching process may be felt after GD, starting response).

Otherwise breakdown vehicle, as power is no longer transmitted to the VVT system, which thus closes.

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10D6; BMW DTC 133104: VALVETRONIC RELAY, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

133104 - P10D6

Fault description

The diagnostic function monitors electrical activation of the Valvetronic relay for open circuits.

Condition for fault identification

Test condition:

The fault is recognized if an open circuit is detected when activation voltage is transmitted to the Valvetronic relay.

Potential problem source(s):

- Defective wiring harness
- Valvetronic relay defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between DME and Valvetronic relay
- Replace Valvetronic relay
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

If the malfunction occurs while the VVT system is at maximum stroke extension (full load, vehicle parked), only limited or no effects will be apparent to the customer. (Switching process may be felt after GD, starting response).

Otherwise breakdown vehicle, as power is no longer transmitted to the VVT system, which thus closes.

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1047; BMW DTC 133201: VALVETRONIC SERVOMOTOR, ACTIVATION: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

133201 - P1047

Fault description

The diagnostic function monitors the Valvetronic actuator motor's three phases for a short circuit to positive.

Condition for fault identification

Test condition:

The driver circuit is deactivated when a fault is suspected. The fault is logged when the measured diagnosis voltage is greater than 1.2 V? 2.3 V and the voltage behind the Valvetronic relay exceeds 10 V.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Voltage behind motor relay > 5V

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between Valvetronic actuator motor and DME
- Replace Valvetronic actuator motor

Fault effect and breakdown warning

Breakdown notice:

No continued driving possible.

Possible apparent symptoms:

If the malfunction occurs while the VVT system is not at its maximum stroke position, the engine stalls/vehicle breaks down. Engine will not restart, as the VVT driver circuit is deactivated and the VVT system reverts to minimum stroke. If the fault occurs at maximum stroke, unrestricted throttled operation is possible.

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1048; BMW DTC 133202: VALVETRONIC SERVOMOTOR, ACTIVATION: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

133202 - P1048

Fault description

The diagnostic function monitors the Valvetronic actuator motor's three phases for a short circuit to ground.

Condition for fault identification

Test condition:

The driver circuit is deactivated when a fault is suspected. The diagnostic fault code is logged when the voltage measured during diagnosis is less than 0.2 V and the voltage behind the Valvetronic relay is greater than 6 V.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Voltage behind motor relay > 5V

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between Valvetronic actuator motor and DME
- Replace Valvetronic actuator motor

Fault effect and breakdown warning

Breakdown notice:

Continued driving is usually not possible.

Possible apparent symptoms:

If the malfunction occurs while the VVT system is not at its maximum stroke position, the engine stalls/vehicle breaks down. Engine will not restart, as the VVT driver circuit is deactivated and the VVT system reverts to minimum stroke. If the fault occurs at maximum stroke, unrestricted throttled operation is possible.

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on

- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1050; BMW DTC 133208: VALVETRONIC SERVOMOTOR, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

133208 - P1050

Fault description

The diagnostic function monitors the Valvetronic actuator motor's three phases for an open circuit in one of the wires.

Condition for fault identification

Test condition:

The driver circuit is deactivated when a fault is suspected. The fault is logged when the measured diagnosis voltage is less than 0.35 V? 0.61 V.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Voltage behind motor relay > 5V

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between Valvetronic actuator motor and DME
- Replace Valvetronic actuator motor

Fault effect and breakdown warning

Breakdown notice:

Continued driving is usually not possible.

Possible apparent symptoms:

If the malfunction occurs while the VVT system is not at its maximum stroke position, the engine stalls/vehicle breaks down. Engine will not restart, as the VVT driver circuit is deactivated and the VVT system reverts to minimum stroke. If the fault occurs at maximum stroke, unrestricted throttled operation is possible.

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10DF; BMW DTC 133304: NONE**Information saved in**

DME

Fault code

133304 - P10DF

Fault description

VVT-Overload Protection Output Stage System Shutdown

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P1030; BMW DTC 133B04: NONE**Information saved in**

DME

Fault code

133B04 - P1030

Fault description

VVT-Actuator Monitoring Position Control; Tight, no Adjustment possible (Bank 1)

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P10E8; BMW DTC 134A02: NONE**Information saved in**

DME

Fault code

134A02 - P10E8

Fault description

VVT-Overload Protection Control Motor Overload

Condition for fault identification

none

Condition for fault memory entry

none

Action in service

none

Fault effect and breakdown warning

-

Driver information

none

Service instruction

none

DTC P101A; BMW DTC 134F02: VALVETRONIC, ADJUSTMENT RANGE: STOP NOT LEARNED**Information saved in**

DME

Fault code

134F02 - P101A

Fault description

The diagnostic function determines whether a valid travel limit is reached during initialization of the Valvetronic system.

Condition for fault identification

Test condition:

In order to initialize the Valvetronic system, each time the DME control module wakes up, and each time terminals are changed on the DME, the upper travel stop is relearned. This fault is logged when the system fails to recognize the travel stop correctly.

Potential problem source(s):

Valvetronic system travel stops damaged

- Friction in the Valvetronic system

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Initialization of Valvetronic systems

Condition for fault memory entry

none

Action in service

- Check travel stops in cylinder head and on the eccentric shaft
- Inspect Valvetronic system to verify correct installation and freedom of movement

Fault effect and breakdown warning

Breakdown notice:

Continued driving is usually not possible.

Possible apparent symptoms:

Once the VVT has reached its emergency running position, unlimited throttled operation is possible.

If it fails to reach the emergency running position, results ranging from a power loss to breakdown vehicle can occur depending on the VVT position that the system does reach.

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1023; BMW DTC 134F04: VALVETRONIC, ADJUSTMENT RANGE: ERROR, RANGE CHECK**Information saved in**

DME

Fault code

134F04 - P1023

Fault description

The diagnostic function monitors whether the adjustment range has varied from the base learning data during the course of the vehicle's service life.

Condition for fault identification**Test condition:**

The fault is recognized when the adjustment range deviates from the base adjustment range by more than 2°.

Potential problem source(s):

- Wear at the travel stops
- Wear in the Valvetronic mechanism

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- Adjustment range check every 1800 min. of operating time

Other conditions:

- Shutdown phase

Condition for fault memory entry

none

Action in service

- Repeat Valvetronic travel stop learning routine, refer to service functions
- Inspect Valvetronic for mechanical wear and resistance to motion
- Replace components with mechanical wear

Fault effect and breakdown warning

Breakdown notice:

The engine runs in throttled mode, full driveability/power

Possible apparent symptoms:

VVT reverts to limp-home mode, minor effects can be felt

Driver information

Warning light:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1023; BMW DTC 134F08: VALVETRONIC, ADJUSTMENT RANGE: RANGE CHECK, DEVIATION FROM ORIGINAL LEARNING**Information saved in**

DME

Fault code

134F08 - P1023

Fault description

The diagnostic function monitors the adjustment range during the check of the Valvetronic's range.

Condition for fault identification

Test condition:

The fault is recognized when the adjustment range deviates from the base adjustment range by more than 1°.

Potential problem source(s):

- Wear at the travel stops
- Wear in the Valvetronic mechanism

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- Adjustment range check every 18000 min. of operating time

Other conditions:

- Shutdown phase

Condition for fault memory entry

none

Action in service

- Repeat Valvetronic travel stop learning routine, refer to service functions
- Inspect Valvetronic for mechanical wear and resistance to motion
- Replace components with mechanical wear

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10DF; BMW DTC 135301: VALVETRONIC, COMPONENT PROTECTION, OUTPUT STAGE: DEACTIVATION, SYSTEM

Information saved in

DME

Fault code

135301 - P10DF

Fault description

The diagnostic function monitors the temperature of the driver circuit.

Condition for fault identification

Test condition:

The fault is recognized when the calculated driver circuit temperature rises above 130°C.

Potential problem source(s):

- Valvetronic system consumes excessive energy owing to:
- Friction and high resistance in the Valvetronic system
- Abuse ("blipping" the accelerator pedal, etc.)
- Frequent open-loop operation (limp-home mode/learning routines)

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

none

Action in service

- Check electrical system voltage
- If other diagnostic fault codes related to Valvetronic are logged, work through these first
- Check Valvetronic mechanism for freedom of movement, wear and friction (with external voltage source connected as required)
- Replace components with mechanical wear

Fault effect and breakdown warning

Breakdown notice:

VVT driver circuit component protection

Possible apparent symptoms:

Range from no effects to power reduction/breakdown

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10E0; BMW DTC 135302: VALVETRONIC, COMPONENT PROTECTION, SERVOMOTOR: DEACTIVATION, SYSTEM

Information saved in

DME

Fault code

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135302 - P10E0

Fault description

The diagnostic function monitors the temperature of the Valvetronic actuator motor.

Condition for fault identification

Test condition:

The fault is recognized when the calculated temperature of the Valvetronic actuator motor rises above 200°C / 65535 (temperature in the windings of the Valvetronic servo motor).

Potential problem source(s):

- Valvetronic system consumes excessive energy owing to:
- Friction and high resistance in the Valvetronic system
- Abuse ("blipping" the accelerator pedal, etc.)
- Frequent open-loop operation (limp-home mode/learning routines)

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

none

Action in service

- Check electrical system voltage
- If other diagnostic fault codes related to Valvetronic are logged, work through these first

- Check Valvetronic mechanism for freedom of movement, wear and friction (with external voltage source connected as required)
- Replace components with mechanical wear

Fault effect and breakdown warning

Breakdown notice:

VVT system component protection

Possible apparent symptoms:

Range from no effects to power reduction/breakdown

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10E7; BMW DTC 135401: VALVETRONIC, OVERLOAD PROTECTION: OUTPUT STAGE OVERLOADED**Information saved in**

DME

Fault code

135401 - P10E7

Fault description

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The diagnostic function monitors the temperature of the driver circuit.

Condition for fault identification

Test condition:

The fault is recognized when the calculated driver circuit temperature rises above 120°C.

Potential problem source(s):

- Valvetronic system consumes excessive energy owing to:
- Friction and high resistance in the Valvetronic system
- Abuse ("blipping" the accelerator pedal, etc.)
- Frequent open-loop operation (limp-home mode/learning routines)

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

none

Action in service

- Check electrical system voltage
- If other diagnostic fault codes related to Valvetronic are logged, work through these first
- Check Valvetronic mechanism for freedom of movement, wear and friction (with external voltage source connected as required)
- Replace components with mechanical wear

Fault effect and breakdown warning

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Breakdown notice:

The engine runs in throttled mode, full driveability/power

Possible apparent symptoms:

VVT reverts to limp-home mode, minor effects can be felt

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10E8; BMW DTC 135402: VALVETRONIC, OVERLOAD PROTECTION: SERVOMOTOR OVERLOADED**Information saved in**

DME

Fault code

135402 - P10E8

Fault description

The diagnostic function monitors the temperature of the Valvetronic actuator motor.

Condition for fault identification

Test condition:

The fault is recognized when the calculated temperature of the Valvetronic actuator motor rises above 190°C / (temperature in the windings of the Valvetronic actuator motor).

Potential problem source(s):

- Valvetronic system consumes excessive energy owing to:
- Friction and high resistance in the Valvetronic system
- Abuse ("blipping" the accelerator pedal, etc.)
- Frequent open-loop operation (limp-home mode/learning routines)

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

none

Action in service

- Check electrical system voltage
- If other diagnostic fault codes related to Valvetronic are logged, work through these first
- Check Valvetronic mechanism for freedom of movement, wear and friction (with external voltage source connected as required)
- Replace components with mechanical wear

Fault effect and breakdown warning

Breakdown notice:

The engine runs in throttled mode, full driveability/power

Possible apparent symptoms:

VVT reverts to limp-home mode, minor effects can be felt

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1030; BMW DTC 135604: VALVETRONIC SYSTEM: CONTROL DEVIATION TOO GREAT**Information saved in**

DME

Fault code

135604 - P1030

Fault description

The diagnostic function monitors the Valvetronic system's control precision.

Condition for fault identification

Test condition:

The fault is recognized when a counter rises above the fault threshold of 10 000. The counter is incrementalized when the closed-loop control difference exceeds a specified threshold while the Valvetronic actuator motor is stationary.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective
- Valvetronic system sticking
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

none

Action in service

- Check wiring harness and plug connectors for electrical faults
- If other diagnostic fault codes related to Valvetronic are logged, work through these first
- Check Valvetronic mechanism for freedom of movement, wear and friction (with external voltage source connected as required)
- Replace Valvetronic actuator motor
- Replace components with mechanical wear
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Unrestricted, throttled operation remains available if the VVT system's stroke is at maximum extension.

If maximum stroke is not achieved, results ranging from a power loss to breakdown can occur depending on the VVT position that the system does reach.

Driver information

Warning light:

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ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10E1; BMW DTC 135608: VALVETRONIC SYSTEM: NO MOVEMENT DETECTED**Information saved in**

DME

Fault code

135608 - P10E1

Fault description

The diagnostic function determines whether the Valvetronic system moves freely and without resistance during the initialization routine.

Condition for fault identification**Test condition:**

The fault is recognized when neither upward nor downward motion of 6° is possible during initialization of the Valvetronic system.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective
- Valvetronic system sticking
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- When the Valvetronic system is initialized (Terminal 15/Wake-up)

Condition for fault memory entry

none

Action in service

- Check wiring harness and plug connectors for electrical faults
- If other diagnostic fault codes related to Valvetronic are logged, work through these first
- Check Valvetronic mechanism for freedom of movement, wear and friction (with external voltage source connected as required)
- Replace Valvetronic actuator motor
- Replace components with mechanical wear
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Once the VVT has reached its emergency running position, unlimited throttled operation is possible.

If it fails to reach the emergency running position, results ranging from a power loss to breakdown vehicle can occur depending on the VVT position that the system does reach.

Driver information

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Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10E2; BMW DTC 135808: VALVETRONIC SERVOMOTOR, POSITION SENSORS: SHORT-CIRCUIT OR LINE BREAK (OPEN CIRCUIT)

Information saved in

DME

Fault code

135808 - P10E2

Fault description

The diagnostic function monitors the wires to the five position sensors.

Condition for fault identification

Test condition:

The fault is recognized when all three position sensors have the same level.

Potential problem source(s):

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- No power-supply voltage to sensors
- One or several wires to the position sensors is/are shorted to positive or ground
- One or several position-sensor wires is open
- One or more position sensors in the Valvetronic actuator motor is defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between Valvetronic actuator motor and DME
- Replace Valvetronic actuator motor

Fault effect and breakdown warning

Breakdown notice:

The engine runs in throttled mode, full driveability/power

Possible apparent symptoms:

VVT reverts to limp-home mode, minor effects can be felt

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10E6; BMW DTC 135908: VALVETRONIC SERVOMOTOR, POSITION SENSORS: SUPPLY VOLTAGE FAULTY**Information saved in**

DME

Fault code

135908 - P10E6

Fault description

The diagnostic function monitors the power-supply wires to the position sensors.

Condition for fault identification

Test condition:

The fault is recognized when the DME hardware detects a fault in the voltage supply to the Hall-effect sensors.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

none

Action in service

- Check wiring harness between Valvetronic actuator motor and DME
- Check Valvetronic actuator motor

Check Valvetronic actuator motor with multimeter, specified results:

Pin 11 to Pin 10: roughly 1 mOhm

Pin 11 to cylinder head: Infinite resistance

Pin 10 to cylinder head: Infinite resistance

- Replace Valvetronic actuator motor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

The engine runs in throttled mode, full driveability/power

Possible apparent symptoms:

VVT reverts to limp-home mode, minor effects can be felt

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off

- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1017; BMW DTC 135A08: VALVETRONIC SERVOMOTOR, POSITION SENSORS: SIGNAL IMPLAUSIBLE**Information saved in**

DME

Fault code

135A08 - P1017

Fault description

The diagnostic function monitors the switching sequence of the position sensors.

Condition for fault identification

Test condition:

The fault is recognized when the position sensors indicate an incorrect switching sequence.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between Valvetronic actuator motor and DME
- Replace Valvetronic actuator motor

Fault effect and breakdown warning

Breakdown notice:

The engine runs in throttled mode, full driveability/power

Possible apparent symptoms:

VVT reverts to limp-home mode, minor effects can be felt

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10F4; BMW DTC 135B10: VALVETRONIC SERVOMOTOR, ACTIVATION, VOLTAGE PHASE: LINE DISCONNECTION

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DME

Fault code

135B10 - P10F4

Fault description

The diagnostic function monitors activation of Phase U in the Valvetronic actuator motor for open circuits.

Condition for fault identification

Test condition:

The fault is recognized when the current falls below 0.3 amps despite application of voltage to Phase U.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

Diagnostic fault code is logged when condition is present for at least 8 ms.

Action in service

- Check wiring harness between Valvetronic actuator motor and DME

- Replace Valvetronic actuator motor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Engine runs in throttled operation. Normally no limitations will be noticed. However continued driving is impossible in worst-case scenario

Possible apparent symptoms:

Range from no effects to power reduction/breakdown

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10F5; BMW DTC 135B11: VALVETRONIC SERVOMOTOR, ACTIVATION, VOLT PHASE: LINE DISCONNECTION**Information saved in**

DME

Fault code

135B11 - P10F5

Fault description

The diagnostic function monitors activation of Phase V in the Valvetronic actuator motor for open circuits.

Condition for fault identification

Test condition:

The fault is recognized when the current falls below 0.3 amps despite application of voltage to Phase V.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the condition is present for at least 8 ms.

Action in service

- Check wiring harness between Valvetronic actuator motor and DME
- Replace Valvetronic actuator motor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Engine runs in throttled operation. Normally no limitations will be noticed. However continued driving is impossible in worst-case scenario

Possible apparent symptoms:

Range from no effects to power reduction/breakdown

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10F6; BMW DTC 135B12: VALVETRONIC SERVOMOTOR, ACTIVATION, WATT PHASE: LINE DISCONNECTION

Information saved in

DME

Fault code

135B12 - P10F6

Fault description

The diagnostic function monitors activation of Phase W in the Valvetronic actuator motor for indication of an open circuit.

Condition for fault identification

Test condition:

The fault is recognized when the current falls below 0.3 amps despite application of voltage to Phase W.

Potential problem source(s):

- Defective wiring harness
- Valvetronic actuator defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

Diagnostic fault code is logged when condition is present for at least 8 ms.

Action in service

- Check wiring harness between Valvetronic actuator motor and DME
- Replace Valvetronic actuator motor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Engine runs in throttled operation. Normally no limitations will be noticed. However continued driving is impossible in worst-case scenario

Possible apparent symptoms:

Range from no effects to power reduction/breakdown

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off

- CC message: none

Service instruction

None

DTC P0478; BMW DTC 138101: EXHAUST FLAP, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

138101 - P0478

Fault description

The diagnostic function monitors the activation wire to the exhaust-gas flap.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wire between DME and exhaust flap
- Exhaust-gas flap's valve defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Exhaust-gas flap recognized

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and exhaust-gas flap
- Replace valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Vehicle quieter during driving

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0477; BMW DTC 138102: EXHAUST FLAP, ACTIVATION: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

138102 - P0477

Fault description

The diagnostic function monitors the activation wire to the exhaust-gas flap.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wire between DME and exhaust flap
- Exhaust-gas flap's valve defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Exhaust-gas flap recognized

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and exhaust-gas flap

- Replace valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Vehicle louder when stationary

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0475; BMW DTC 138104: EXHAUST FLAP, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

138104 - P0475

Fault description

The diagnostic function monitors the activation wire to the exhaust-gas flap.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wire between DME and exhaust flap
- Exhaust-gas flap's valve defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Exhaust-gas flap recognized

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and exhaust-gas flap
- Replace valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Vehicle louder when stationary

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P303E; BMW DTC 138201: RADIATOR SHUTTER, TOP, SUPPLY VOLTAGE, ACTUATOR: VOLTAGE FAULT**Information saved in**

DME

Fault code

138201 - P303E

Fault description

The diagnostic function monitors the power-supply voltage to the radiator vent slat actuator.

Condition for fault identification

Test condition:

The fault is recognized when then the power-supply voltage to the radiator vent slat actuator is too low.

Potential problem source(s):

- Voltage at radiator vent slat actuator is less than 10 V
- Defective wiring harness
- Radiator vent slat actuator is defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Replace radiator vent slat assembly

Fault effect and breakdown warning

Breakdown notice:

Continued driving possible, avoid subjecting engine to major loads. (mountain driving, full throttle, etc.)

Possible apparent symptoms:

Engine could overheat if the vent slats remain closed while demand for engine power is high.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P303F; BMW DTC 138301: RADIATOR SHUTTER, TOP, OVERTEMPERATURE, ACTUATOR: LIMIT VALUE EXCEEDED

Information saved in

DME

Fault code

138301 - P303F

Fault description

The diagnostic function monitors the radiator vent slat actuator's internal temperature.

Condition for fault identification

Test condition:

The fault is recognized when the maximum temperature is exceeded in the radiator vent slat actuator.

Potential problem source(s):

- Outside temperature too high
- Radiator vent slat actuator defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

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This fault is logged in the control module's fault memory immediately.

Action in service

- If the fault has occurred one time only, clear the ECU fault memory. No further action necessary.
- If the fault appears repeatedly, replace the radiator vent slat assembly.

Fault effect and breakdown warning

Breakdown notice:

Continued driving possible, avoid subjecting engine to major loads. (mountain driving, full throttle, etc.)

Possible apparent symptoms:

Engine could overheat if the vent slats remain closed while demand for engine power is high.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P304A; BMW DTC 138401: RADIATOR SHUTTER, TOP, ACTUATOR INTERNAL: ELECTRICAL FAULT**Information saved in**

DME

Fault code

138401 - P304A

Fault description

The diagnostic function monitors the radiator vent slat actuator for internal electrical faults.

Condition for fault identification

Test condition:

The fault is recognized when the actuator for the radiator vent slats reports an internal electrical fault via the LIN bus.

Potential problem source(s):

- Defect in radiator vent slat assembly

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace radiator vent slat assembly

Fault effect and breakdown warning

Breakdown notice:

Continued driving possible, avoid subjecting engine to major loads. (mountain driving, full throttle, etc.)

Possible apparent symptoms:

Engine could overheat if the vent slats remain closed while demand for engine power is high.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P304B; BMW DTC 138501: RADIATOR SHUTTER, TOP, LOWER STOP: NOT DETECTED**Information saved in**

DME

Fault code

138501 - P304B

Fault description

The diagnostic function monitors whether the radiator vent slat assembly closes within a specified angle of rotation.

Condition for fault identification

Test condition:

The fault is recognized when the radiator vent slat actuator is not able to close the radiator slat assembly within a specified angle.

Potential problem source(s):

- Mechanical defect in radiator vent slat mechanism (for instance: broken control linkage...)

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check radiator vent slat assembly for freedom of movement (perform system test), repair mechanical components as required
- Replace radiator vent slat assembly

Fault effect and breakdown warning

Breakdown notice:

Radiator vent slats can be opened by hand

Possible apparent symptoms:

- The engine may overheat.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P304C; BMW DTC 138601: RADIATOR SHUTTER, TOP, UPPER STOP: NOT DETECTED**Information saved in**

DME

Fault code

138601 - P304C

Fault description

The diagnostic function monitors whether the travel-range limits are reached during the self-test.

Condition for fault identification

Test condition:

The fault is recognized when the system fails to reach the upper limit of its travel range (radiator vent slat assembly open).

Potential problem source(s):

- Mechanical defect in radiator vent slat mechanism (for instance: broken control linkage...)

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 6 sec. over 30 km/h

Other conditions:

- None

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check radiator vent slat assembly for freedom of movement (perform system test), repair mechanical components as required
- Replace radiator vent slat assembly

Fault effect and breakdown warning

Breakdown notice:

Radiator vent slats can be opened by hand

Possible apparent symptoms:

- The engine may overheat.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P304D; BMW DTC 138701: RADIATOR SHUTTER, TOP, UPPER STOP: DETECTED TOO EARLY

Information saved in

DME

Fault code

138701 - P304D

Fault description

The diagnostic function monitors the radiator vent slats to confirm freedom of motion.

Condition for fault identification

Test condition:

The fault is recognized when it is not possible to progress through a specific rotational angle.

Potential problem source(s):

- Radiator vent slats physically seized (dirt, ice, snow, etc.)

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 6 sec. over 30 km/h

Other conditions:

- None

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check radiator vent slat assembly for travel resistance (perform system test)
- Examine the diagnostic fault code: If the temperature was less than 0°C when the fault was logged, ice may have been present: Examine the diagnostic fault code: If the vehicle speed was > 150 km/h, wind resistance may be the problem source

Fault effect and breakdown warning

Breakdown notice:

Radiator vent slats can be opened by hand

Possible apparent symptoms:

- The engine may overheat.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P300D; BMW DTC 138901: RADIATOR SHUTTER, BOTTOM, ELECTRICAL: SHORT CIRCUIT TO B+**Information saved in**

DME

Fault code

138901 - P300D

Fault description

The diagnostic function monitors the wiring harness to the radiator vent slats.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit is present in the wire to the radiator vent slats.

Potential problem source(s):

- Defect in wiring harness between radiator vent slats and DME
- Radiator vent slat assembly is defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between radiator vent slats and DME
- Replace radiator vent slat assembly

Fault effect and breakdown warning

Breakdown notice:

Radiator vent slats should open automatically.

Possible apparent symptoms:

Engine overheating is possible

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P300E; BMW DTC 138902: RADIATOR SHUTTER, BOTTOM, ELECTRICAL: SHORT CIRCUIT TO EARTH**Information saved in**

DME

Fault code

138902 - P300E

Fault description

The diagnostic function monitors the wiring harness to the radiator vent slats.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit is present in the wire to the radiator vent slats.

Potential problem source(s):

- Defect in wiring harness between radiator vent slats and DME
- Radiator vent slat assembly is defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between radiator vent slats and DME
- Replace radiator vent slat assembly

Fault effect and breakdown warning

Breakdown notice:

Radiator vent slats should open automatically.

Possible apparent symptoms:

Engine overheating is possible

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P300F; BMW DTC 138904: RADIATOR SHUTTER, BOTTOM, ELECTRICAL: LINE DISCONNECTION

Information saved in

DME

Fault code

138904 - P300F

Fault description

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The diagnostic function monitors the wiring harness to the radiator vent slats.

Condition for fault identification

Test condition:

The fault is recognized when an open circuit is present in the wiring harness to the radiator vent slats.

Potential problem source(s):

- Defect in wiring harness between radiator vent slats and DME
- Radiator vent slat assembly defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness between radiator vent slats and DME
- Replace radiator vent slat assembly

Fault effect and breakdown warning

Breakdown notice:

Radiator vent slats should open automatically.

Possible apparent symptoms:

Engine overheating is possible

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0300; BMW DTC 140001: MISFIRE, SEVERAL CYLINDERS: INJECTION IS CUT OUT

Information saved in

DME

Fault code

140001 - P0300

Fault description

The diagnostic function monitors whether multiple "combustion miss" malfunctions are logged in the course of a single driving cycle.

Condition for fault identification

Test condition:

The fault is recognized when combustion miss is present on at least two cylinders.

Potential problem source(s):

- see Individual fault

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

see Individual fault

Action in service

- see Individual fault

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

see Individual fault

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

none

DTC P0300; BMW DTC 140002: MISFIRE, SEVERAL CYLINDERS: DAMAGING EXHAUST GAS AFTER STARTING

Information saved in

DME

Fault code

140002 - P0300

Fault description

The diagnostic function monitors whether multiple "combustion miss" malfunctions are logged in the course of a single driving cycle.

Condition for fault identification

Test condition:

The fault is recognized when combustion miss is present on at least two cylinders.

Potential problem source(s):

- see Individual fault

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

see Individual fault

Action in service

- see Individual fault

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

see Individual fault

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P0300; BMW DTC 140004: MISFIRE, SEVERAL CYLINDERS: DAMAGING EXHAUST GAS**Information saved in**

DME

Fault code

140004 - P0300

Fault description

The diagnostic function monitors whether multiple "combustion miss" malfunctions are logged in the course of a single driving cycle.

Condition for fault identification

Test condition:

The fault is recognized when combustion miss is present on at least two cylinders.

Potential problem source(s):

- see Individual fault

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

see Individual fault

Action in service

- see Individual fault

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

see Individual fault

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P0301; BMW DTC 140101: COMBUSTION MISFIRING, CYLINDER 1: INJECTION IS SWITCHED OFF**Information saved in**

DME

Fault code

140101 - P0301

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification**Test condition:**

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when within 200: (KFKSWF) crankshaft revolutions a specified number of ignition miss events is detected.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Reduced engine power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0301; BMW DTC 140102: COMBUSTION MISFIRING, CYLINDER 1: DAMAGING EXHAUST GAS AFTER START SEQUENCE**Information saved in**

DME

Fault code

140102 - P0301

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized during the first 1000 crankshaft revolutions following the start.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0301; BMW DTC 140104: COMBUSTION MISFIRING, CYLINDER 1: DAMAGING EXHAUST GAS

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Fault code

140104 - P0301

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized within 1000 crankshaft revolutions.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0302; BMW DTC 140201: MISFIRE, CYLINDER 2: INJECTION IS CUT OUT**Information saved in**

DME

Fault code

140201 - P0302

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Collateral fault logged, from problem with mixture formation, ignition system or mechanism.

Terminal condition: none**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events are recognized within 200 crankshaft revolutions. The number depends on RPM and load factor.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning**Breakdown notice:**

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Reduced engine power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0302; BMW DTC 140202: MISFIRE, CYLINDER 2: DAMAGING EXHAUST GAS AFTER STARTING**Information saved in**

DME

Fault code

140202 - P0302

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Collateral fault logged, from problem with mixture formation, ignition system or mechanical components

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized during the first 1000 crankshaft revolutions following the start.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0302; BMW DTC 140204: MISFIRE, CYLINDER 2: DAMAGING EXHAUST GAS**Information saved in**

DME

Fault code

140204 - P0302

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Collateral fault logged, from problem with mixture formation, ignition system or mechanical components

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized within 1000 crankshaft revolutions. This must proceed in 4 intervals.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0303; BMW DTC 140301: MISFIRE, CYLINDER 3: INJECTION IS CUT OUT**Information saved in**

DME

Fault code

140301 - P0303

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining

cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events are recognized within 200 crankshaft revolutions.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Reduced engine power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0303; BMW DTC 140302: MISFIRE, CYLINDER 3: DAMAGING EXHAUST GAS AFTER STARTING

Information saved in

DME

Fault code

140302 - P0303

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized during the first 1000 crankshaft revolutions following the start.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0303; BMW DTC 140304: MISFIRE, CYLINDER 3: DAMAGING EXHAUST GAS**Information saved in**

DME

Fault code

140304 - P0303

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized within 1000 crankshaft revolutions.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0304; BMW DTC 140401: MISFIRE, CYLINDER 4: INJECTION IS CUT OUT**Information saved in**

DME

Fault code

140401 - P0304

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Collateral fault logged, from problem with mixture formation, ignition system or mechanism.

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events are recognized within

200 crankshaft revolutions. The number depends on RPM and load factor.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Reduced engine power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0304; BMW DTC 140402: MISFIRE, CYLINDER 4: DAMAGING EXHAUST GAS AFTER STARTING**Information saved in**

DME

Fault code

140402 - P0304

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining

cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Collateral fault logged, from problem with mixture formation, ignition system or mechanism.

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized during the first 1000 crankshaft revolutions following the start.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0304; BMW DTC 140404: MISFIRE, CYLINDER 4: DAMAGING EXHAUST GAS**Information saved in**

DME

Fault code

140404 - P0304

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Collateral fault logged, from problem with mixture formation, ignition system or mechanical components

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized within 1000 crankshaft revolutions. This must proceed in 4 intervals.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

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None

DTC P0305; BMW DTC 140501: MISFIRE, CYLINDER 5: INJECTION IS CUT OUT

Information saved in

DME

Fault code

140501 - P0305

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events are recognized within 200 crankshaft revolutions.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Reduced engine power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0305; BMW DTC 140502: MISFIRE, CYLINDER 5: DAMAGING EXHAUST GAS AFTER STARTING

Information saved in

DME

Fault code

140502 - P0305

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized during the first 1000 crankshaft revolutions following the start.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0305; BMW DTC 140504: MISFIRE, CYLINDER 5: DAMAGING EXHAUST GAS**Information saved in**

DME

Fault code

140504 - P0305

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized within 1000 crankshaft revolutions.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0306; BMW DTC 140601: MISFIRE, CYLINDER 6: INJECTION IS CUT OUT**Information saved in**

DME

Fault code

140601 - P0306

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events are recognized within 200 crankshaft revolutions.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its limp-home program, continued vehicle operation is possible but driveability is restricted, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

- Reduced engine power

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0306; BMW DTC 140602: MISFIRE, CYLINDER 6: DAMAGING EXHAUST GAS AFTER STARTING**Information saved in**

DME

Fault code

140602 - P0306

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized during the first 1000 crankshaft revolutions following the start.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0306; BMW DTC 140604: MISFIRE, CYLINDER 6: DAMAGING EXHAUST GAS

Information saved in

DME

Fault code

140604 - P0306

Fault description

The diagnostic function monitors the duration of the combustion strokes and compares them with the remaining cylinders by assessing the RPM signals (segment periods).

Condition for fault identification

Test condition:

The fault is recognized when the combustion stroke in a particular cylinder is slower than the combustion strokes on the other cylinders.

Potential problem source(s):

- Defect in mixture formation
- Defect in ignition system
- Mechanical defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when a specific number of combustion miss events, with their negative effects on exhaust emissions, are recognized within 1000 crankshaft revolutions.

Action in service

- Because this is a secondary fault, start by repairing the primary faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Combustion miss may be noticed.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1301; BMW DTC 150102: IGNITION, CYLINDER 1: COMBUSTION DURATION TOO SHORT**Information saved in**

DME

Fault code

150102 - P1301

Fault description

The diagnostic function monitors the spark duration.

Condition for fault identification

Test condition:

The fault is recognized when the spark duration is below a value stored in the program map.

Potential problem source(s):

- Defective spark plug
- Defect in wiring harness between ignition coil and DME
- Defective ignition coil
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault counter total is above 320.

Action in service

- Replace spark plug
- Check wiring harness between ignition coil and DME
- Check ignition coil
- Replace DME if the fault code remains logged continuously

Fault effect and breakdown warning

Breakdown notice:

Continued driving possible if only the one cylinder is affected. The ignition miss detection should recognize the

affected cylinder and deactivate the injection to protect the catalytic converter.

Possible apparent symptoms:

Ignition miss and hard starting can occur.

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1302; BMW DTC 150202: IGNITION, CYLINDER 2: COMBUSTION DURATION TOO SHORT

Information saved in

DME

Fault code

150202 - P1302

Fault description

The diagnostic function monitors the spark duration.

Condition for fault identification

Test condition:

The fault is recognized when the spark duration is below a value stored in the program map.

Potential problem source(s):

- Defective spark plug
- Defect in wiring harness between ignition coil and DME
- Defective ignition coil
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault counter total is above 320.

Action in service

- Replace spark plug
- Check wiring harness between ignition coil and DME
- Check ignition coil
- Replace DME if the fault code remains logged continuously

Fault effect and breakdown warning

Breakdown notice:

Continued driving possible if only the one cylinder is affected. The ignition miss detection should recognize the affected cylinder and deactivate the injection to protect the catalytic converter.

Possible apparent symptoms:

Ignition miss and hard starting can occur.

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1303; BMW DTC 150302: IGNITION, CYLINDER 3: COMBUSTION DURATION TOO SHORT

Information saved in

DME

Fault code

150302 - P1303

Fault description

The diagnostic function monitors the spark duration.

Condition for fault identification

Test condition:

The fault is recognized when the spark duration is below a value stored in the program map.

Potential problem source(s):

- Defective spark plug
- Defect in wiring harness between ignition coil and DME
- Defective ignition coil
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault counter total is above 320.

Action in service

- Replace spark plug
- Check wiring harness between ignition coil and DME
- Check ignition coil
- Replace DME if the fault code remains logged continuously

Fault effect and breakdown warning

Breakdown notice:

Continued driving possible if only the one cylinder is affected. The ignition miss detection should recognize the affected cylinder and deactivate the injection to protect the catalytic converter.

Possible apparent symptoms:

Ignition miss and hard starting can occur.

Driver information**Warning light:****MY10 ECE:**

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1304; BMW DTC 150402: IGNITION, CYLINDER 4: COMBUSTION DURATION TOO SHORT**Information saved in**

DME

Fault code

150402 - P1304

Fault description

The diagnostic function monitors the spark duration.

Condition for fault identification

Test condition:

The fault is recognized when the spark duration is below a value stored in the program map.

Potential problem source(s):

- Defective spark plug
- Defect in wiring harness between ignition coil and DME
- Defective ignition coil
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault counter total is above 320.

Action in service

- Replace spark plug
- Check wiring harness between ignition coil and DME
- Check ignition coil
- Replace DME if the fault code remains logged continuously

Fault effect and breakdown warning

Breakdown notice:

Continued driving possible if only the one cylinder is affected. The ignition miss detection should recognize the affected cylinder and deactivate the injection to protect the catalytic converter.

Possible apparent symptoms:

Ignition miss and hard starting can occur.

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1305; BMW DTC 150502: IGNITION, CYLINDER 5: COMBUSTION DURATION TOO SHORT

Information saved in

DME

Fault code

150502 - P1305

Fault description

The diagnostic function monitors the spark duration.

Condition for fault identification

Test condition:

The fault is recognized when the spark duration is below a value stored in the program map.

Potential problem source(s):

- Defective spark plug
- Defect in wiring harness between ignition coil and DME
- Defective ignition coil
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault counter total is above 320.

Action in service

- Replace spark plug
- Check wiring harness between ignition coil and DME
- Check ignition coil

- Replace DME if the fault code remains logged continuously

Fault effect and breakdown warning

Breakdown notice:

Continued driving possible if only the one cylinder is affected. The ignition miss detection should recognize the affected cylinder and deactivate the injection to protect the catalytic converter.

Possible apparent symptoms:

Ignition miss and hard starting can occur.

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1306; BMW DTC 150602: IGNITION, CYLINDER 6: COMBUSTION DURATION TOO SHORT

Information saved in

DME

Fault code

150602 - P1306

Fault description

The diagnostic function monitors the spark duration.

Condition for fault identification

Test condition:

The fault is recognized when the spark duration is below a value stored in the program map.

Potential problem source(s):

- Defective spark plug
- Defect in wiring harness between ignition coil and DME
- Defective ignition coil
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault counter total is above 320.

Action in service

- Replace spark plug

- Check wiring harness between ignition coil and DME
- Check ignition coil
- Replace DME if the fault code remains logged continuously

Fault effect and breakdown warning

Breakdown notice:

Continued driving possible if only the one cylinder is affected. The ignition miss detection should recognize the affected cylinder and deactivate the injection to protect the catalytic converter.

Possible apparent symptoms:

Ignition miss and hard starting can occur.

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

**DTC P050B; BMW DTC 151001: IGNITION TIMING ADJUSTMENT IN IDLE, COLD START
IGNITION TIMING TOO EARLY**

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DME

Fault code

151001 - P050B

Fault description

The diagnostic function monitors the ignition angle while the catalytic converter is being heated.

Condition for fault identification

Test condition:

The fault is recognized when the ignition-angle adjustment is outside the tolerance range.

Potential problem source(s):

- Poor fuel quality

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine on

Other conditions:

- Engine on and running at idle
- Catalyst heating (always takes place for at least 45 sec. following engine start)

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- Replace fuel

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P13EA; BMW DTC 151101: IGNITION TIMING ADJUSTMENT AT PARTIAL LOAD, COLD START IGNITION TIMING TOO EARLY**Information saved in**

DME

Fault code

151101 - P13EA

Fault description

The diagnostic function monitors the ignition angle while the catalytic converter is being heated.

Condition for fault identification

Test condition:

The fault is recognized when the ignition-angle adjustment is outside the tolerance range.

Potential problem source(s):

- Poor fuel quality

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 5 sec. after engine on

Other conditions:

- Engine on and running at idle
- Catalyst heating (always takes place for at least 45 sec. following engine start)

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- Replace fuel

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P13A0; BMW DTC 152108: SUPER-KNOCKING, CYLINDER 1: INJECTION SWITCH-OFF**Information saved in**

DME

Fault code

152108 - P13A0

Fault description

The diagnostic function responds to extreme combustion knock by deactivating the injection at the 1st cylinder.

Condition for fault identification

Test condition:

The fault is recognized when a high number of intense knock events is detected during engine operation in the upper end of the load range.

Potential problem source(s):

- Misuse, terminal status switch during vehicle operation
- Temporary contamination in combustion chamber or intake passages

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on, in upper load range

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been logged once, clear the ECU fault memory
- If the fault has been logged multiple times, check the spark plug, injector and ignition coil on the cylinder

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P13A1; BMW DTC 152208: SUPER-KNOCKING, CYLINDER 2: INJECTION SWITCH-OFF

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DME

Fault code

152208 - P13A1

Fault description

The diagnostic function responds to extreme combustion knock by deactivating the injection at the 2nd cylinder.

Condition for fault identification

Test condition:

The fault is recognized when a high number of intense knock events is detected during engine operation in the upper end of the load range.

Potential problem source(s):

- Misuse, terminal status switch during vehicle operation
- Temporary contamination in combustion chamber or intake passages

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on, in upper load range

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been logged once, clear the ECU fault memory

- If the diagnostic fault code has been logged multiple times, check the injector and ignition coil at cylinder 2

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P13A2; BMW DTC 152308: SUPER-KNOCKING, CYLINDER 3: INJECTION SWITCH-OFF

Information saved in

DME

Fault code

152308 - P13A2

Fault description

The diagnostic function responds to extreme combustion knock by deactivating the injection at the 3rd cylinder.

Condition for fault identification

Test condition:

The fault is recognized when a high number of intense knock events is detected during engine operation in the upper end of the load range.

Potential problem source(s):

- Misuse, terminal status switch during vehicle operation
- Temporary contamination in combustion chamber or intake passages

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on, in upper load range

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been logged once, clear the ECU fault memory
- If the fault has been logged multiple times, check the spark plug, injector and ignition coil on the cylinder

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P13A3; BMW DTC 152408: SUPER-KNOCKING, CYLINDER 4: INJECTION SWITCH-OFF

Information saved in

DME

Fault code

152408 - P13A3

Fault description

The diagnostic function responds to extreme combustion knock by deactivating the injection at the 4th cylinder.

Condition for fault identification

Test condition:

The fault is recognized when a high number of intense knock events is detected during engine operation in the upper end of the load range.

Potential problem source(s):

- Misuse, terminal status switch during vehicle operation
- Temporary contamination in combustion chamber or intake passages

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

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- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on, in upper load range

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been logged once, clear the ECU fault memory
- If the diagnostic fault code has been logged multiple times, check the injector and ignition coil at cylinder 4

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P13A4; BMW DTC 152508: SUPER-KNOCKING, CYLINDER 5: INJECTION SWITCH-OFF**Information saved in**

DME

Fault code

152508 - P13A4

Fault description

The diagnostic function responds to extreme combustion knock by deactivating the injection at the 5th cylinder.

Condition for fault identification**Test condition:**

The fault is recognized when a high number of intense knock events is detected during engine operation in the upper end of the load range.

Potential problem source(s):

- Misuse, terminal status switch during vehicle operation
- Temporary contamination in combustion chamber or intake passages

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on, in upper load range

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been logged once, clear the ECU fault memory
- If the fault has been logged multiple times, check the spark plug, injector and ignition coil on the cylinder

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P13A5; BMW DTC 152608: SUPER-KNOCKING, CYLINDER 6: INJECTION SWITCH-OFF

Information saved in

DME

Fault code

152608 - P13A5

Fault description

The diagnostic function responds to extreme combustion knock by deactivating the injection at the 6th cylinder.

Condition for fault identification

Test condition:

The fault is recognized when a high number of intense knock events is detected during engine operation in the upper end of the load range.

Potential problem source(s):

- Misuse, terminal status switch during vehicle operation
- Temporary contamination in combustion chamber or intake passages

Terminal condition: none**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on, in upper load range

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been logged once, clear the ECU fault memory
- If the fault has been logged multiple times, check the spark plug, injector and ignition coil on the cylinder

Fault effect and breakdown warning**Breakdown notice:**

None

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P137F; BMW DTC 152D08: SUPER-KNOCKING: INJECTION SWITCH-OFF**Information saved in**

DME

Fault code

152D08 - P137F

Fault description

The diagnostic function responds to extreme combustion knock by deactivating the injection.

Condition for fault identification

Test condition:

The fault is recognized when a high number of intense knock events is detected during engine operation in the upper end of the load range.

Potential problem source(s):

- Misuse, terminal status switch during vehicle operation
- Temporary contamination in combustion chamber or intake passages

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on, in upper load range

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been logged once, clear the ECU fault memory
- If the fault has been logged multiple times, check the spark plug, injector and ignition coil on the cylinder

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0335; BMW DTC 160001: CRANKSHAFT SENSOR, SIGNAL: NO SIGNAL**Information saved in**

DME

Fault code

160001 - P0335

Fault description

The diagnostic function monitors the crankshaft sensor.

Condition for fault identification

Test condition:

The fault is recognized when no crankshaft position sensor signal is detected, although a signal from the camshaft position sensor is present.

Potential problem source(s):

- Defect in wiring harness between DME and crankshaft sensor
- Crankshaft sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Terminal 50 (starter) or,
- engine on, with engine speed > 500 RPM

Condition for fault memory entry

No signal for camshaft revolutions

Action in service

- Check wiring harness between DME and crankshaft sensor
- Replace crankshaft sensor

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

When the fault is logged the engine stalls at idle, at higher engine speeds a brief drop in RPM can be felt / It is possible to restart engine when the fault is present (starting takes longer), engine runs in limp-home mode

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P0336; BMW DTC 160020: CRANKSHAFT SENSOR: DISTURBED CRANKSHAFT SIGNAL**Information saved in**

DME

Fault code

160020 - P0336

Fault description

The diagnostic function monitors the crankshaft sensor.

Condition for fault identification

Test condition:

The fault is recognized when an interference factor affecting the crankshaft sensor signal is detected.

Potential problem source(s):

- Defect in wiring harness between DME and crankshaft sensor
- Oscillation in reluctor ring (for instance, when starter engages)
- Reluctor ring contaminated or defective
- Crankshaft sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Terminal 50 (starter) or,
- engine on, with engine speed > 500 RPM

Condition for fault memory entry

Malfunctions

Action in service

- Check wiring harness between DME and crankshaft sensor
- Inspect installation of crankshaft sensor
- Clean or replace reluctor ring
- Replace crankshaft sensor

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

When the fault is logged the engine stalls at idle, at higher engine speeds a brief drop in RPM can be felt / It is possible to restart engine when the fault is present (starting takes longer), engine runs in limp-home mode

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P13CE; BMW DTC 160510: CRANKSHAFT SENSOR, PARKED POSITION: NOT PLAUSIBLE**Information saved in**

DME

Fault code

160510 - P13CE

Fault description

The diagnostic function monitors the crankshaft sensor.

Condition for fault identification

Test condition:

The fault is recognized when the engine is synchronized using a secure initial position during starting (supply to sensor was permanent - MSA)

Potential problem source(s):

- Defect in wiring harness between DME and crankshaft sensor
- Oscillation in reductor ring (for instance, when starter engages)
- Defective reductor ring
- Crankshaft sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on with MSA start

Condition for fault memory entry

If the reference mark was incorrect by during the MSA automatic engine start/stop.

Action in service

- Check wiring harness between DME and crankshaft sensor
- Inspect installation of crankshaft sensor
- Replace crankshaft sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Extended starting times

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0343; BMW DTC 164020: INLET-CAMSHAFT SENSOR: SIGNAL HIGH**Information saved in**

DME

Fault code

164020 - P0343

Fault description

The diagnostic function monitors the intake camshaft position sensor.

Condition for fault identification

Test condition:

The fault is recognized when the engine is turning over and no fault related to the crankshaft sensor is present.

Potential problem source(s):

- Defect in wiring harness between DME and camshaft position sensor or crankshaft sensor.

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

1. Camshaft rotates but no signal from camshaft reluctor

Action in service

- Check wiring harness between DME and camshaft position sensor
- Camshaft sensor defective

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

Extended starting times and power loss, if it appears in combination with an exhaust camshaft sensor fault then no restart is possible

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P0342; BMW DTC 164021: INLET-CAMSHAFT SENSOR: SIGNAL LOW**Information saved in**

DME

Fault code

164021 - P0342

Fault description

The diagnostic function monitors the intake camshaft position sensor.

Condition for fault identification

Test condition:

The fault is recognized when the engine is turning over and no fault related to the crankshaft sensor is present.

Potential problem source(s):

- Defect in wiring harness between DME and camshaft position sensor or crankshaft sensor.

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

1. Camshaft rotates but no signal from camshaft reluctor

Action in service

- Check wiring harness between DME and camshaft position sensor
- Camshaft sensor defective

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

Extended starting times and power loss, if it appears in combination with an exhaust camshaft sensor fault then no restart is possible

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P0368; BMW DTC 164030: EXHAUST-CAMSHAFT SENSOR: SIGNAL HIGH

Information saved in

DME

Fault code

164030 - P0368

Fault description

The diagnostic function monitors the exhaust camshaft position sensor.

Condition for fault identification

Test condition:

The fault is recognized when the engine is turning over and no fault related to the crankshaft sensor is present.

Potential problem source(s):

- Defect in wiring harness between DME and camshaft position sensor or crankshaft sensor.

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

1. Camshaft rotates but no signal from camshaft reluctor

Action in service

- Check wiring harness between DME and camshaft position sensor
- Camshaft sensor defective

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

Extended starting times and power loss, if it appears in combination with an intake camshaft sensor fault then no restart is possible

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P0367; BMW DTC 164031: EXHAUST-CAMSHAFT SENSOR: SIGNAL LOW

Information saved in

DME

Fault code

164031 - P0367

Fault description

The diagnostic function monitors the exhaust camshaft position sensor.

Condition for fault identification

Test condition:

The fault is recognized when the engine is turning over and no fault related to the crankshaft sensor is present.

Potential problem source(s):

- Defect in wiring harness between DME and camshaft position sensor or crankshaft sensor.

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

1. Camshaft rotates but no signal from camshaft retractor

Action in service

- Check wiring harness between DME and camshaft position sensor
- Camshaft sensor defective

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

Extended starting times and power loss, if it appears in combination with an intake camshaft sensor fault then no restart is possible

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on'
- Electronic engine output reduction, ECE: on
- CC message: on

Service instruction

None

DTC P13CA; BMW DTC 164040: INLET CAMSHAFT, MECHANISM: INSTALLATION FAULTY

Information saved in

DME

Fault code

164040 - P13CA

Fault description

The diagnostic function monitors the installation position of the intake camshaft.

Condition for fault identification

Test condition:

The fault is recognized when the camshaft sensor reductor rings run through the adaptation routine during initial start or following programming.

Potential problem source(s):

- Incorrect installation of intake camshaft

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

When assembly test is performed.

Action in service

- Install intake camshaft correctly
- Adjust valve timing

Fault effect and breakdown warning

Breakdown notice:

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P13CB; BMW DTC 164041: EXHAUST CAMSHAFT, MECHANISM: INSTALLATION FAULTY**Information saved in**

DME

Fault code

164041 - P13CB

Fault description

The diagnostic function monitors the installation position of the exhaust camshaft.

Condition for fault identification

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Test condition:

The fault is recognized when the camshaft sensor reluctor rings run through the adaptation routine during initial start or following programming.

Potential problem source(s):

- Incorrect installation of exhaust camshaft

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

When assembly test is performed.

Action in service

- Install exhaust camshaft correctly
- Adjust valve timing

Fault effect and breakdown warning**Breakdown notice:**

The engine reverts to its emergency limp-home program, continued vehicle operation is possible, because power is reduced the driver should refrain from passing maneuvers.

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0324; BMW DTC 168A20: KNOCK CONTROL, FAULT CHECK: MALFUNCTION, SYSTEM FAULT

Information saved in

DME

Fault code

168A20 - P0324

Fault description

The diagnostic function monitors the quality of the signals from the knock sensors.

Condition for fault identification

Test condition:

The fault is recognized when the signal from the knock sensors is outside the measurement range.

Potential problem source(s):

- Signal-processing error, incorrect measurement range
- Defective wiring harness
- Knock sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If faults related to the knock sensors have been logged, repair these first
- Check wiring harness between knock sensor and DME
- Replace knock sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Engine runs poorly with power loss

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P13AF; BMW DTC 168A30: KNOCK SENSOR, ELECTRICAL: SIGNAL INPUT A, SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

168A30 - P13AF

Fault description

The diagnostic function monitors the sensor wire for short circuits.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the knock sensor's signal voltage is above 1 V.

Potential problem source(s):

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- Defective wiring harness
- Knock sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between knock sensor and DME
- Replace knock sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P13AE; BMW DTC 168A31: KNOCK SENSOR, ELECTRICAL: SIGNAL INPUT A, SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

168A31 - P13AE

Fault description

The diagnostic function monitors the sensor wire for short circuits.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the knock sensor's signal voltage is below -0.7 V.

Potential problem source(s):

- Defective wiring harness
- Knock sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between knock sensor and DME
- Replace knock sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on

- CC message: on

Service instruction

None

DTC P13B9; BMW DTC 168A40: KNOCK SENSOR, ELECTRICAL: SIGNAL INPUT B, SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

168A40 - P13B9

Fault description

The diagnostic function monitors the sensor wire for short circuits.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the knock sensor's signal voltage is above 1 V.

Potential problem source(s):

- Defective wiring harness
- Knock sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

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- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between knock sensor and DME
- Replace knock sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P13B8; BMW DTC 168A41: KNOCK SENSOR, ELECTRICAL: SIGNAL INPUT B, SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

168A41 - P13B8

Fault description

The diagnostic function monitors the sensor wire for short circuits.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the knock sensor's signal voltage is below -0.7 V.

Potential problem source(s):

- Defective wiring harness
- Knock sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between knock sensor and DME
- Replace knock sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P13BF; BMW DTC 168A50: KNOCK SENSOR 2, ELECTRICAL: SIGNAL INPUT A, SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

168A50 - P13BF

Fault description

The diagnostic function monitors the sensor wire for short circuits.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the knock sensor's signal voltage is above 1 V.

Potential problem source(s):

- Defective wiring harness
- Knock sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between knock sensor and DME
- Replace knock sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P13BE; BMW DTC 168A51: KNOCK SENSOR 2, ELECTRICAL: SIGNAL INPUT A, SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

168A51 - P13BE

Fault description

The diagnostic function monitors the sensor wire for short circuits.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the knock sensor's signal voltage is below -0.7 V.

Potential problem source(s):

- Defective wiring harness
- Knock sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between knock sensor and DME
- Replace knock sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P13C8; BMW DTC 168A60: KNOCK SENSOR 2, ELECTRICAL: SIGNAL INPUT B, SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

168A60 - P13C8

Fault description

The diagnostic function monitors the sensor wire for short circuits.

Condition for fault identification**Test condition:**

The fault is logged in the ECU fault memory when the knock sensor's signal voltage is above 1 V.

Potential problem source(s):

- Defective wiring harness
- Knock sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between knock sensor and DME
- Replace knock sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P13C7; BMW DTC 168A61: KNOCK SENSOR 2, ELECTRICAL: SIGNAL INPUT B, SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

168A61 - P13C7

Fault description

The diagnostic function monitors the sensor wire for short circuits.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the knock sensor's signal voltage is below -0.7 V.

Potential problem source(s):

- Defective wiring harness
- Knock sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between knock sensor and DME
- Replace knock sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0328; BMW DTC 168A70: KNOCK SENSOR, SIGNAL: ENGINE MECHANICALLY TOO LOUD OR KS OUTSIDE TOLERANCE (SENSITIVITY)**Information saved in**

DME

Fault code

168A70 - P0328

Fault description

The diagnostic function monitors the engine's noise level.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the reference level is too high relative to the program map.

Potential problem source(s):

- Knock sensor is defective or installed incorrectly
- Engine too loud owing to mechanical defect
- Low-quality fuel < RON 91

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Engine speed above 1600 RPM
- Relative charge factor above 30%

- No load and no dynamic engine RPM change

Condition for fault memory entry

Debounce via event counter

Action in service

- Check installation torque and installation position of sensor
- Check wiring harness
- Check engine for mechanical defects (chain, crankshaft assembly)
- Refuel with RON 95 or higher
- Replace knock sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0327; BMW DTC 168A71: KNOCK SENSOR, SIGNAL: ELECTRICAL FAULT KS (LOOSE

CONTACT) OR KS LOOSE**Information saved in**

DME

Fault code

168A71 - P0327

Fault description

The diagnostic function monitors the knock sensor's electrical signal.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the reference level is too low relative to the program map.

Potential problem source(s):

- Knock sensor is defective or installed incorrectly
- Wiring harness defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Engine speed above 2000 RPM
- Relative charge factor: > 30%
- No load, no dynamic changes in engine speed

Condition for fault memory entry

Debounce via event counter

Action in service

- Check installation torque and installation position of sensor
- Check wiring harness
- Check engine for mechanical defects (chain, crankshaft assembly)
- Refuel with RON 95 or higher
- Replace knock sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1328; BMW DTC 168A80: KNOCK SENSOR 2, SIGNAL: ENGINE MECHANICALLY TOO LOUD OR KS OUTSIDE TOLERANCE (SENSITIVITY)

Information saved in

DME

Fault code

168A80 - P1328

Fault description

The diagnostic function monitors the engine's noise level.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the reference level is too high relative to the program map.

Potential problem source(s):

- Knock sensor is defective or installed incorrectly
- Engine too loud owing to mechanical defect
- Low-quality fuel < RON 91

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Engine speed above 1600 RPM
- Relative charge factor above 30%
- No load and no dynamic engine RPM change

Condition for fault memory entry

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Debounce via event counter

Action in service

- Check installation torque and installation position of sensor
- Check wiring harness
- Check engine for mechanical defects (chain, crankshaft assembly)
- Refuel with RON 95 or higher
- Replace knock sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P1327; BMW DTC 168A81: KNOCK SENSOR 2, SIGNAL: ELECTRICAL FAULT KS (LOOSE CONTACT) OR KS LOOSE

Information saved in

DME

Fault code

168A81 - P1327

Fault description

The diagnostic function monitors the knock sensor's electrical signal.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the reference level is too low relative to the program map.

Potential problem source(s):

- Knock sensor is defective or installed incorrectly
- Wiring harness defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on
- Engine speed above 2000 RPM
- Relative charge factor: > 30%
- No load, no dynamic changes in engine speed

Condition for fault memory entry

Debounce via event counter

Action in service

- Check installation torque and installation position of sensor
- Check wiring harness
- Check engine for mechanical defects (chain, crankshaft assembly)
- Refuel with RON 95 or higher
- Replace knock sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible reduction in power

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P0420; BMW DTC 180001: CATALYTIC CONVERTER: EFFICIENCY BELOW LIMIT VALUE

Information saved in

DME

Fault code

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180001 - P0420

Fault description

The diagnostic function monitors the ability of the catalytic converter to store oxygen.

Condition for fault identification

Test condition:

The fault is recognized when the catalytic converter loses the ability to store sufficient levels of oxygen.

Potential problem source(s):

- Collateral fault stemming from defective oxygen sensor or mixture adaptation fault
- Leak in exhaust system
- Catalytic converter defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If faults related to the oxygen sensor or mixture adaptation have been logged, repair these first (collateral fault)
- Check exhaust system for leaks
- If the fault is continuously present or has multiple log entries respond by replacing the catalytic converter

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P2420; BMW DTC 190001: DMTL SOLENOID VALVE, ACTIVATION: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

190001 - P2420

Fault description

The diagnostic function monitors electrical activation of the DMTL solenoid valve.

Condition for fault identification

Test condition:

The fault is recognized when a control signal is transmitted to the DMTL solenoid valve and a short circuit is present.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 4 °C and 35 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P2419; BMW DTC 190002: DMTL SOLENOID VALVE, ACTIVATION: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

190002 - P2419

Fault description

The diagnostic function monitors electrical activation of the leakage diagnosis pump.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the leakage diagnosis pump and a short circuit is present.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 4 °C and 35 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P2418; BMW DTC 190004: DMTL SOLENOID VALVE, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

190004 - P2418

Fault description

The diagnostic function monitors electrical activation of the DMTL solenoid valve.

Condition for fault identification**Test condition:**

The fault is recognized when a control signal is transmitted to the DMTL solenoid valve and an open wire is present.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 4 °C and 35 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P0442; BMW DTC 190201: FUEL TANK VENTILATION SYSTEM AND PURGE AIR SYSTEM, MINOR LEAK: LEAK GREATER THAN 1.0 MM**Information saved in**

DME

Fault code

190201 - P0442

Fault description

The diagnostic function monitors the leakage diagnosis pump's current draw within a time window.

Condition for fault identification

Test condition:

The fault is recognized when the leak diagnosis pump's current fails to reach a specified limit within a time window defined in the program map.

Potential problem source(s):

- Leakage > 1 mm in tank evaporative emissions and purge air system
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 3.8 °C and 35.3 °C

Time condition:

- None

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If diagnostic fault codes for the DMTL are logged, then clear the ECU fault memory. Should it prove impossible to reproduce the fault using the DMTL function test then terminate the repair session.
- Check fuel tank for leaks
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off

· CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P0456; BMW DTC 190302: FUEL TANK VENTILATION SYSTEM AND PURGE AIR SYSTEM, MICRO-LEAK: LEAK GREATER THAN 0.5 MM**Information saved in**

DME

Fault code

190302 - P0456

Fault description

The diagnostic function monitors the leakage diagnosis pump's test current.

Condition for fault identification

Test condition:

The fault is recognized when the leak diagnosis pump's current fails to reach a specified limit within a time window defined in the program map.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 1.5 °C and 38 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P1449; BMW DTC 190401: DMTL, SYSTEM FAULT: PUMP CURRENT TOO HIGH DURING REFERENCE MEASUREMENT

Information saved in

DME

Fault code

190401 - P1449

Fault description

The diagnostic function monitors the leakage diagnosis pump's current draw during the DMTL solenoid valve's switching process.

Condition for fault identification

Test condition:

The fault is recognized when the leak diagnosis pump's current fails to reach a specified limit within a time window defined in the program map.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 3.8 °C and 35.3 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If diagnostic fault codes for the DMTL are logged, then clear the ECU fault memory. Should it prove impossible to reproduce the fault using the DMTL function test then terminate the repair session.
- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

To be submitted by end of week 44

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but

not to diagnosis in the course of normal operation.

DTC P1448; BMW DTC 190402: DMTL, SYSTEM FAULT: PUMP CURRENT TOO LOW DURING REFERENCE MEASUREMENT

Information saved in

DME

Fault code

190402 - P1448

Fault description

The diagnostic function monitors the leakage diagnosis pump's current draw during the reference current measurement.

Condition for fault identification

Test condition:

The fault is recognized when the leak diagnosis pump's current fails to reach a specified limit within a time window defined in the program map.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 3.8 °C and 35.3 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)

2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If diagnostic fault codes for the DMTL are logged, then clear the ECU fault memory. Should it prove impossible to reproduce the fault using the DMTL function test then terminate the repair session.
- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

To be submitted by end of week 44

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P1434; BMW DTC 190404: DMTL, SYSTEM FAULT: ABORT DUE TO CURRENT FLUCTUATIONS DURING REFERENCE MEASUREMENT**Information saved in**

DME

Fault code

190404 - P1434

Fault description

The diagnostic function monitors the leakage diagnosis pump's current draw during the reference current measurement.

Condition for fault identification**Test condition:**

The fault is registered when the current draw from the leakage diagnosis pump fluctuates by more than 1 mA during a time window defined in the program map.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 1.5 °C and 38 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.

3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P1447; BMW DTC 190408: DMTL, SYSTEM FAULT: PUMP CURRENT REACHES LIMIT VALUE DURING VALVE TEST

Information saved in

DME

Fault code

190408 - P1447

Fault description

The diagnostic function monitors the leakage diagnosis pump's current draw during the DMTL solenoid valve's switching process.

Condition for fault identification

Test condition:

The fault is recognized when the current draw from the leakage diagnosis pump drops by less than 2 mA.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 1.5 °C and 38 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine. Terminal 15 off

7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P240C; BMW DTC 190501: DMTL, HEATING, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

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190501 - P240C

Fault description

The diagnostic function monitors the electrical connection between the DME and the DMTL heater.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the heater and a short circuit is present.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 4 °C and 35 °C

Time condition:

- 10 sec. after engine off

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

To be submitted by end of week 44

L6 (MSD85): - None

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P240B; BMW DTC 190502: DMTL, HEATING, ACTIVATION: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

190502 - P240B

Fault description

The diagnostic function monitors the electrical connection between the DME and the DMTL heater.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the DMTL heater and a short circuit is present.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 4 °C and 35 °C

Time condition:

- 10 sec. after engine off

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL

- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

To be submitted by end of week 44

L6 (MSD85): - None

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P240A; BMW DTC 190504: DMTL, HEATING, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

190504 - P240A

Fault description

The diagnostic function monitors the electrical connection between the DME and the DMTL heater.

Condition for fault identification

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Test condition:

The fault is recognized when an activation signal is transmitted to the DMTL heater and an open wire is present.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 4 °C and 35 °C

Time condition:

- 10 sec. after engine off

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

To be submitted by end of week 44

L6 (MSD85): - None

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P2402; BMW DTC 190601: DMTL LEAK DIAGNOSIS PUMP, ACTIVATION: SHORT CIRCUIT TO B+

Information saved in

DME

Fault code

190601 - P2402

Fault description

The diagnostic function monitors electrical activation of the leakage diagnosis pump.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the leakage diagnosis pump and a short circuit is present.

Potential problem source(s):

- Defective wiring harness
- DMTL defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 4 °C and 35 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, customer seeks

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P2401; BMW DTC 190702: DMTL LEAK DIAGNOSIS PUMP, ACTIVATION: SHORT TO EARTH**Information saved in**

DME

Fault code

190702 - P2401

Fault description

The diagnostic function monitors electrical activation of the leakage diagnosis pump.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the leakage diagnosis pump and a short circuit is present.

Potential problem source(s):

- Fault in wiring harness between DME and low-pressure sensor
- Defective in-tank overpressure valve
- Defect in low-pressure sensor

- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 4 °C and 35 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P2400; BMW DTC 190704: DMTL LEAK DIAGNOSIS PUMP, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

190704 - P2400

Fault description

The diagnostic function monitors electrical activation of the leakage diagnosis pump.

Condition for fault identification

Test condition:

The fault is recognized when an activation signal is transmitted to the leakage diagnosis pump and an open wire is present.

Potential problem source(s):

- Fault in wiring harness between DME and low-pressure sensor
- Defect in low-pressure sensor
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Ambient temperature between 4 °C and 35 °C

Time condition:

- 10 min. in shutdown phase

Other conditions:

1. Cold start (engine temperature max. 6 °C above ambient temperature)
2. Then drive at least 600 sec.
3. Remain stationary for at least 30 sec. at idle
4. Drive over 45 km/h for at least 300 sec. (total)
5. Fuel level between 15% and 85% of maximum tank capacity
6. Then switch off engine, Terminal 15 off
7. Wait roughly 10 min. until diagnostic routine is completed

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and DMTL
- Replace DMTL

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Function testing on the DMTL (Diagnostic Module Tank Leakage) can only be carried out provided that no faults related to the DMTL have been logged. The conditions for fault detection apply to the function test, but not to diagnosis in the course of normal operation.

DTC P0459; BMW DTC 191001: TANK-VENTING VALVE, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

191001 - P0459

Fault description

The diagnostic function monitors the control wire to the EVAP valve for short circuits to positive.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and EVAP evaporative emissions valve
- Defect in evaporative emissions valve
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between evaporative emissions valve and DME
- Replace EVAP evaporative emissions valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0458; BMW DTC 191002: TANK-VENTING VALVE, ACTIVATION: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

191002 - P0458

Fault description

The diagnostic function monitors the control wire to the EVAP valve for short circuits to ground.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and EVAP evaporative emissions valve
- Defect in evaporative emissions valve
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between evaporative emissions valve and DME
- Replace EVAP evaporative emissions valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0444; BMW DTC 191004: TANK-VENTING VALVE, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

191004 - P0444

Fault description

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The diagnostic function monitors the control wire to the EVAP valve for an open circuit.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and EVAP evaporative emissions valve
- Defect in evaporative emissions valve
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between evaporative emissions valve and DME
- Replace EVAP evaporative emissions valve
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL on, customer proceeds to service facility

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2421; BMW DTC 191A21: TANK-VENTING VALVE: JAMMED OPEN**Information saved in**

DME

Fault code

191A21 - P2421

Fault description

The diagnostic function monitors the flow through the fuel tank's EVAP vent line.

Condition for fault identification

Test condition:

The fault is recognized when there is no drop in the current consumed by the leakage diagnosis pump.

Potential problem source(s):

- EVAP evaporative emissions valve seizes in closed position - Obstruction in path between intake manifold and tank

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace EVAP evaporative emissions valve
- Check flow in lines between intake manifold and tank

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off

· CC message: none

Service instruction

None

DTC P149C; BMW DTC 191B01: TANK SAFETY VALVE SHUT-OFF VALVE, ACTIVATION: SHORT CIRCUIT TO B+**Information saved in**

DME

Fault code

191B01 - P149C

Fault description

The diagnostic function monitors electrical activation of the tank cutoff valve.

Condition for fault identification

Test condition:

The fault is recognized when the diagnostic fault code for the sensor is logged on the PT CAN (OBD services message) from the TFE1 ECU (ECU for tank's electronic functions).

Potential problem source(s):

- Global LIN bus fault 'LIN bus communications: signal missing'
- Defective fuse
- Defect in the LIN bus wire, ground wire or Terminal 30 wire (open wire, short to ground, short to UBatt)
- Corrosion on plug
- Electric water pump component fault

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the ECU fault memory if it remains present for longer than 45 sec.

Action in service

- If diagnostic fault code 'LIN bus communications: signal missing' is logged, start by repairing this problem, then clear the ECU fault memory, switch on the ignition, then wait at least 1 minute before checking to determine whether the fault has been logged again
- Check pump plug (also for corrosion)
- Check power-supply voltage to Terminal 30 / Terminal 31
- If no voltage is present, check the fuse - If the fuse is defective, replace it and check power supply for short and open circuits
- Check the LIN wire for opens and shorts to UBatt and ground
- Perform tester job, if not successful: Replace EWP electric water pump

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL comes on

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P149B; BMW DTC 191B02: TANK SAFETY VALVE SHUT-OFF VALVE, ACTIVATION: SHORT CIRCUIT TO EARTH**Information saved in**

DME

Fault code

191B02 - P149B

Fault description

The diagnostic function monitors electrical activation of the tank cutoff valve.

Condition for fault identification

Test condition:

The fault is recognized when the diagnostic fault code for the sensor is logged on the PT CAN (OBD services message) from the TFE1 ECU (ECU for tank electronic functions).

Potential problem source(s):

- Defective wiring harness
- Tank cutoff valve defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

· none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness at TFE1 ECU and tank cutoff valve
- Replace tank cutoff valve

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL comes on

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P149A; BMW DTC 191B04: TANK SAFETY VALVE SHUT-OFF VALVE, ACTIVATION: LINE DISCONNECTION

Information saved in

DME

Fault code

191B04 - P149A

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Fault description

The diagnostic function monitors electrical activation of the tank cutoff valve.

Condition for fault identification

Test condition:

The fault is recognized when the diagnostic fault code for the sensor is logged on the PT CAN (OBD services message) from the TFE1 ECU (ECU for tank electronic functions).

Potential problem source(s):

- Defective wiring harness
- Tank cutoff valve defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness at TFE1 ECU and tank cutoff valve
- Replace tank cutoff valve

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

MIL comes on

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P149D; 191C01: TANK SAFETY VALVE SHUT-OFF VALVE: JAMMED OPEN

Information saved in

DME

Fault code

191C01 - P149D

Fault description

Evaporative Emission System Shutoff Valve 2 Stuck Off

Condition for fault identification

Test condition:

Potential problem source(s):

- none

Terminal condition: none

Voltage condition:

Temperature condition:

Time condition:

Other conditions:

Condition for fault memory entry

If the fault, then it is logged.

Action in service

- None

Fault effect and breakdown warning

Breakdown notice:

Possible apparent symptoms:

Customer perception in prose at this juncture

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P0440; BMW DTC 191C02: TANK SAFETY VALVE: MALFUNCTION

Information saved in

DME

Fault code

191C02 - P0440

Fault description

Open

Condition for fault identification

Test condition:

The fault is recognized when?

Potential problem source(s):

- ?
- ?

Terminal condition: none

Voltage condition:

Temperature condition:

Time condition:

Other conditions:

Condition for fault memory entry

If the fault?, then it is logged.

Action in service

- ?
- ?

Fault effect and breakdown warning

Breakdown notice:

Possible apparent symptoms:

Customer perception in prose at this juncture

Driver information

Warning light:

- ECE emissions warning lamp: on

- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P143F; BMW DTC 191C03: TANK SAFETY VALVE, AFTER-RUN: MALFUNCTION**Information saved in**

DME

Fault code

191C03 - P143F

Fault description

Open

Condition for fault identification

Test condition:

The fault is recognized when?

Potential problem source(s):

- ?
- ?

Terminal condition: none

Voltage condition:

Temperature condition:

Time condition:

Other conditions:

Condition for fault memory entry

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If the fault?, then it is logged.

Action in service

- ?
- ?

Fault effect and breakdown warning

Breakdown notice:

Possible apparent symptoms:

Customer perception in prose at this juncture

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P0440; BMW DTC 191D01: TANK SAFETY VALVE: MALFUNCTION**Information saved in**

DME

Fault code

191D01 - P0440

Fault description

The diagnostic function monitors the flow through the fuel tank's EVAP vent line.

Condition for fault identification

Test condition:

The fault is recognized when there is no drop in the current consumed by the leakage diagnosis pump.

Potential problem source(s):

- Tank EVAP evaporative emissions valve sticks in closed position
- Obstruction in line between tank and intake manifold

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged once the fault appears four times.

Action in service

- Replace EVAP evaporative emissions valve
- Check flow in line between intake manifold and tank and replace as indicated

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0462; BMW DTC 193002: FUEL LEVEL SENSOR, LEFT, SIGNAL: SHORT TO EARTH**Information saved in**

DME

Fault code

193002 - P0462

Fault description

The diagnostic function monitors the tank fuel-level sensor for a valid output signal within specified limits. The fault is first stored in the junction box electronics and then relayed to the DME.

Condition for fault identification

Test condition:

The fault is recognized when the output signal from the tank fuel-level sensor is below a specified level.

Potential problem source(s):

- Defective wiring harness
- Tank fuel-level sensor on left (looking toward front) is defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Read out and work through diagnostic fault codes in instrument cluster and in junction box

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible problem with fuel gauge display in I-cluster

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

With the JPE Terminal 15 is adequate to trigger entry of a fault code, with the DME the engine must also be running.

DTC P1407; BMW DTC 193008: FUEL LEVEL SENSOR, LEFT, SIGNAL: CAN VALUE IMPLAUSIBLE**Information saved in**

DME

Fault code

193008 - P1407

Fault description

The diagnostic function monitors the message on the CAN bus to assess the plausibility of the fuel level indicated by the left-side fuel-level sensor.

Condition for fault identification

Test condition:

The fault is recognized when the left-side fuel-level sensor transmits correct data, but the processed fuel level is too high to be plausible.

Potential problem source(s):

- Problem with CAN communications between instrument cluster, junction box and DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Read out and work through diagnostic fault codes in instrument cluster and in junction box

Fault effect and breakdown warning

Breakdown notice:

Tank may be empty. Please refuel using fuel canister and proceed to nearest service station. Then proceed to BMW Service facility.

Possible apparent symptoms:

Possible problem with fuel gauge display in I-cluster

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P2068; BMW DTC 193011: FUEL LEVEL SENSOR, RIGHT, SIGNAL: SHORT CIRCUIT TO B+

Information saved in

DME

Fault code

193011 - P2068

Fault description

The diagnostic function monitors the tank fuel-level sensor for a valid output signal within specified limits. The fault is first stored in the junction box electronics and then relayed to the DME.

Condition for fault identification

Test condition:

The fault is recognized when the output signal from the tank fuel-level sensor exceeds a specified level.

Potential problem source(s):

- Open electrical circuit to fuel-level sensor on right (looking toward front)

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Read out and work through diagnostic fault codes in instrument cluster and in junction box

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible problem with fuel gauge display in I-cluster

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

With the JPE Terminal 15 is adequate to trigger entry of a fault code, with the DME the engine must also be running.

DTC P2067; BMW DTC 193102: FUEL LEVEL SENSOR, RIGHT, SIGNAL: SHORT TO EARTH**Information saved in**

DME

Fault code

193102 - P2067

Fault description

The diagnostic function monitors the tank fuel-level sensor for a valid output signal within specified limits. The fault is first stored in the junction box electronics and then relayed to the DME.

Condition for fault identification**Test condition:**

The fault is recognized when the output signal from the tank fuel-level sensor is below a specified level.

Potential problem source(s):

- Open electrical circuit to fuel-level sensor on right (looking toward front)

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Read out and work through diagnostic fault codes in instrument cluster and in junction box

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible problem with fuel gauge display in I-cluster

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

With the JPE Terminal 15 is adequate to trigger entry of a fault code, with the DME the engine must also be running.

DTC P1408; BMW DTC 193108: FUEL LEVEL SENSOR, RIGHT, SIGNAL: CAN VALUE IMPLAUSIBLE

Information saved in

DME

Fault code

193108 - P1408

Fault description

The diagnostic function monitors the message on the CAN bus to assess the plausibility of the fuel level indicated by the right-side fuel-level sensor.

Condition for fault identification

Test condition:

The fault is recognized when the right-side fuel-level sensor transmits correct data, but the processed fuel level is too high to be plausible.

Potential problem source(s):

- Problem with CAN communications between instrument cluster, junction box and DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Read out and work through diagnostic fault codes in instrument cluster and in junction box

Fault effect and breakdown warning

Breakdown notice:

Tank may be empty. Please refuel using fuel canister and proceed to nearest service station. Then proceed to BMW Service facility.

Possible apparent symptoms:

Possible problem with fuel gauge display in I-cluster

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0463; BMW DTC 193111: FUEL LEVEL SENSOR, LEFT, SIGNAL: SHORT CIRCUIT TO B+

Information saved in

DME

Fault code

193111 - P0463

Fault description

The diagnostic function monitors the tank fuel-level sensor for a valid output signal within specified limits. The fault is first stored in the junction box electronics and then relayed to the DME.

Condition for fault identification

Test condition:

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The fault is recognized when the output signal from the tank fuel-level sensor exceeds a specified level.

Potential problem source(s):

- Defective wiring harness
- Tank fuel-level sensor on left (looking toward front) is defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the ECU fault memory if it remains present for longer than 3 sec.

Action in service

- Read out and work through diagnostic fault codes in instrument cluster and in junction box

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Possible problem with fuel gauge display in I-cluster

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

With the JPE Terminal 15 is adequate to trigger entry of a fault code, with the DME the engine must also be running.

DTC P144B; BMW DTC 193221: FUEL LEVEL SENSOR: DEVIATION BETWEEN CONSUMPTION AND FILL-LEVEL CHANGE**Information saved in**

DME

Fault code

193221 - P144B

Fault description

The diagnostic function monitors the drop in the tank's fuel level and compares it to the quantity of fuel injected into the engine during the same period.

Condition for fault identification

Test condition:

The fault is recognized when the tank content that the DME calculates from the injection signal deviates too starkly from the actual gauge reading appearing in the instrument cluster.

Potential problem source(s):

- Fuel level sensor sticking
- Fuel level sensor mechanically damaged
- Float on fuel level sensor is damaged
- Frequent refueling with quantities of less than 5 liters (as with rental vehicles)

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- No fault related to tank fuel-level sensor is currently present
- At least 20 liters of fuel must be consumed without refueling (multiple cycles possible)

Condition for fault memory entry

The diagnostic fault code is logged the first time (pending FC) and then confirmed the second time (confirmed fault code).

Action in service

- Read out instrument cluster ECU fault memory and work through logged faults

Fault effect and breakdown warning

Breakdown notice:

Tank may be empty. Please refuel using fuel canister and proceed to nearest service station. Then proceed to BMW Service facility.

Possible apparent symptoms:

- Fuel gauge fails to read full after refueling.
- Tank is empty although gauge indicates that fuel is still present.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off

- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0692; BMW DTC 1A2001: ELECTRIC FAN, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

1A2001 - P0692

Fault description

The diagnostic function monitors the wire between the electric fan and the DME.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit is present between the DME and the electric fan.

Potential problem source(s):

- Defective wiring harness
- Electric fan defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Check electric fan (specified resistance between PWM pin and Terminal 30 pin with electric fan plug disconnected: greater than 10 ohms)
- Replace electric fan

Fault effect and breakdown warning

Breakdown notice:

Probably not possible to activate electric fan, continued driving at reduced power possible.

Possible apparent symptoms:

Engine can overheat, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P0691; BMW DTC 1A2002: ELECTRIC FAN, ACTIVATION: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

1A2002 - P0691

Fault description

The diagnostic function monitors the wire between the electric fan and the DME.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit is present between the DME and the electric fan.

Potential problem source(s):

- Defective wiring harness
- Electric fan defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness
- Check electric fan cutoff relay
- Check electric fan (specified resistance between PWM pin and Terminal 30 pin with electric fan plug)

disconnected: greater than 10 ohms)

- Replace electric fan

Fault effect and breakdown warning

Breakdown notice:

Probably not possible to activate electric fan, continued driving at reduced power possible.

Possible apparent symptoms:

Engine can overheat, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P0480; BMW DTC 1A2004: ELECTRIC FAN, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

1A2004 - P0480

Fault description

The diagnostic function monitors the wire between the electric fan and the DME.

Condition for fault identification

Test condition:

The fault is recognized when the electric fan has no power supply.

Potential problem source(s):

- Defect in wiring harness
- Cutoff relay for electric fan defective
- Electric fan defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness
- Check electric fan cutoff relay
- Check electric fan (specified resistance between PWM pin and Terminal 30 pin with electric fan plug disconnected: less than 1 mOhm)
- Replace electric fan

Fault effect and breakdown warning

Breakdown notice:

Probably not possible to activate electric fan, continued driving at reduced power possible.

Possible apparent symptoms:

Engine can overheat, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P14C0; BMW DTC 1A2108: ELECTRIC FAN, SELF-DIAGNOSIS, STAGE 1: MINOR FAN FAULT**Information saved in**

DME

Fault code

1A2108 - P14C0

Fault description

The diagnostic function monitors operation of the electric fan.

Condition for fault identification

Test condition:

The fault is recognized when unit fails to reach the specified rotation rate within the specified period.

Potential problem source(s):

- Fan shows resistance to rotation
- Electric fan is defective (electronics)

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Disconnect plug from fan (to prevent injury hazard). Check freedom of movement of fan. Remove any foreign objects/matter as required.
- Fan is physically seized: Replace fan
- Fan turns freely: Connect plug and use tester to transmit activation signal of at least 30 %; if fan fails to start rotating: Replace fan
- Allow engine to run roughly 6 minutes, until it warms to normal temperature (above 80 °C), read out diagnostic fault codes from ECU; if fan fault has returned: Replace fan
- Allow engine to run an additional 10 minutes, read out diagnostic fault codes from ECU; if fan fault is again present: Replace fan
- If no new diagnostic fault code has been entered: Test OK

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P14C0; BMW DTC 1A2308: ELECTRIC FAN, SELF-DIAGNOSIS, STAGE 2: FAN FAULT WITH POTENTIAL DANGER TO FAN**Information saved in**

DME

Fault code

1A2308 - P14C0

Fault description

The diagnostic function monitors operation of the electric fan.

Condition for fault identification

Test condition:

The fault is recognized when unit fails to reach the specified rotation rate within the specified period.

Potential problem source(s):

- Fan shows resistance to rotation
- Electric fan is defective (electronics)

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Disconnect plug from fan (to prevent injury hazard). Check freedom of movement of fan. Remove any foreign matter/objects that may be present.
- Fan is physically seized: Replace fan
- Fan turns freely: Connect plug and use tester to transmit activation signal of at least 30 %; if fan fails to start rotating: Replace fan
- Allow engine to run roughly 6 minutes, until it warms to normal temperature (above 80 °C), read out diagnostic fault codes from ECU; if fan fault has returned: Replace fan
- Allow engine to run an additional 10 minutes, read out diagnostic fault codes from ECU; if fan fault is again present: Replace fan
- If no new diagnostic fault code has been entered: Test OK

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P14C0; BMW DTC 1A2408: ELECTRIC FAN, SELF-DIAGNOSIS, STAGE 3: FAN FAULT WITH RESTRICTED MOTOR FUNCTION**Information saved in**

DME

Fault code

1A2408 - P14C0

Fault description

The diagnostic function monitors operation of the electric fan.

Condition for fault identification

Test condition:

The fault is recognized when the electric fan fails to turn.

Potential problem source(s):

- Fan is seized
- Electric fan is defective (electronics)

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Disconnect plug from fan (to prevent injury hazard). Check freedom of movement of fan. Remove any foreign matter/objects that may be present.
- Fan is physically seized: Replace fan
- Fan turns freely: Connect plug and use tester to transmit activation signal of at least 30 %; if fan fails to start rotating: Replace fan
- Allow engine to run roughly 6 minutes, until it warms to normal temperature (above 80 °C), read out diagnostic fault codes from ECU; if fan fault has returned: Replace fan
- Allow engine to run an additional 10 minutes, read out diagnostic fault codes from ECU; if fan fault is again present: Replace fan
- If no new diagnostic fault code has been entered: Test OK

Fault effect and breakdown warning

Breakdown notice:

Probably not possible to activate electric fan, continued driving at reduced power possible.

Possible apparent symptoms:

Engine can overheat, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P14C0; BMW DTC 1A2508: ELECTRIC FAN, SELF-DIAGNOSIS, STAGE 4: SERIOUS FAN FAULT

Information saved in

DME

Fault code

1A2508 - P14C0

Fault description

The diagnostic function monitors the electric fan's electronic components.

Condition for fault identification

Test condition:

The fault is recognized when a hardware fault is present in the electric fan.

Potential problem source(s):

- Electric fan electronics defect
- Multiple entries of another electric fan fault

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace electric fan

Fault effect and breakdown warning

Breakdown notice:

Electric fan failed, vehicle should not be driven

Possible apparent symptoms:

Engine can overheat, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

A terminal status switch must be conducted before this fault can be deleted.

DTC P144E; BMW DTC 1A2601: FUSE RELAY, ELECTRIC FAN, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

1A2601 - P144E

Fault description

The diagnostic function monitors the wire between the electric fan cutoff relay and the DME.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defect in wiring harness
- Cutoff relay for electric fan defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and electric fan cutoff relay
- Check cutoff relay (with Terminal 15 off: 0 V at both screw connections, 12V at both screw connections when voltage is applied: Relay makes a loud click and the measured resistance between the two screw connections is roughly 0 ohms)
- Replace cutoff relay

Fault effect and breakdown warning

Breakdown notice:

Probably not possible to activate electric fan, continued driving at reduced power possible.

Possible apparent symptoms:

Engine can overheat, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P144D; BMW DTC 1A2602: FUSE RELAY, ELECTRIC FAN, ACTIVATION: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

1A2602 - P144D

Fault description

The diagnostic function monitors the wire between the electric fan cutoff relay and the DME.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defect in wiring harness
- Cutoff relay for electric fan defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and electric fan cutoff relay
- Check cutoff relay (with Terminal 15 off: 0 V at both screw connections, 12V at both screw connections when voltage is applied: Relay makes a loud click and the measured resistance between the two screw connections is roughly 0 ohms)
- Replace cutoff relay

Fault effect and breakdown warning

Breakdown notice:

Probably not possible to activate electric fan, continued driving at reduced power possible.

Possible apparent symptoms:

Engine can overheat, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P144C; BMW DTC 1A2604: FUSE RELAY, ELECTRIC FAN, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

1A2604 - P144C

Fault description

The diagnostic function monitors the wire between the electric fan cutoff relay and the DME.

Condition for fault identification

Test condition:

The fault is recognized when the electric fan has no power supply.

Potential problem source(s):

- Defective wiring harness
- Cutoff relay for electric fan defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and electric fan cutoff relay
- Check cutoff relay (with Terminal 15 off: 0 V at both screw connections, 12V at both screw connections when voltage is applied: Relay makes a loud click and the measured resistance between the two screw connections is roughly 0 ohms)
- Replace cutoff relay

Fault effect and breakdown warning

Breakdown notice:

Probably not possible to activate electric fan, continued driving at reduced power possible.

Possible apparent symptoms:

Engine can overheat, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

none

DTC P1518; BMW DTC 1B0A20: POOR-ROAD-SURFACE DETECTION: WHEEL SPEED TOO HIGH**Information saved in**

DME

Fault code

1B0A20 - P1518

Fault description

The diagnostic function monitors the signals from the wheel speed sensors to determine if they are valid.

Condition for fault identification

Test condition:

The fault is recognized when one peripheral wheel speed is too high.

Potential problem source(s):

- Vehicle speed signal implausible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1517; BMW DTC 1B0A21: POOR-ROAD-SURFACE DETECTION: NO WHEEL-SPEED SIGNAL RECEIVED**Information saved in**

DME

Fault code

1B0A21 - P1517

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Signal error from at least one wheelspeed sensor

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0503; BMW DTC 1B0A40: VEHICLE SPEED: SIGNAL TOO HIGH**Information saved in**

DME

Fault code

1B0A40 - P0503

Fault description

The diagnostic function determines whether the speed signal is within a plausible range.

Condition for fault identification

Test condition:

None

Potential problem source(s):

- Speed signal too high (possible tampering)

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Vehicle speed in excess of 4 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P152A; BMW DTC 1B0A60: VEHICLE SPEED, PLAUSIBILITY: MINIMUM SPEED UNDER LOAD NOT REACHED

Information saved in

DME

Fault code

1B0A60 - P152A

Fault description

The diagnostic function monitors the plausibility of the speed signal.

Condition for fault identification

Test condition:

The fault is recognized when the vehicle speed deviates from the calculated vehicle speed.

Potential problem source(s):

- Vehicle speed signal implausible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine speed above 1800 RPM
- Left-to-right speed differential less than 10 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P152B; BMW DTC 1B0A61: VEHICLE SPEED, PLAUSIBILITY: MINIMUM SPEED IN OVERRUN MODE NOT REACHED

Information saved in

DME

Fault code

1B0A61 - P152B

Fault description

The diagnostic function monitors the plausibility of the speed signal while the overrun cutoff is active.

Condition for fault identification

Test condition:

The fault is recognized when the vehicle speed deviates from the calculated vehicle speed.

Potential problem source(s):

- Vehicle speed signal implausible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON
- Trailing throttle/overrun between 4520 RPM and 1520 RPM
- Speed > 4 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off

- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0501; BMW DTC 1B0A62: VEHICLE SPEED, PLAUSIBILITY: IMPLAUSIBLE SPEED SIGNAL

Information saved in

DME

Fault code

1B0A62 - P0501

Fault description

The diagnostic function monitors the difference in signals from the left and right wheelspeed sensors.

Condition for fault identification

Test condition:

The fault is recognized when the vehicle speed deviates from the calculated vehicle speed.

Potential problem source(s):

- Vehicle speed signal implausible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine speed above 1800 RPM
- Left-to-right speed differential less than 10 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P15DC; BMW DTC 1B0A64: VEHICLE SPEED, WHEEL SENSOR REAR/LEFT, PLAUSIBILITY: SIGNAL IMPLAUSIBLE**Information saved in**

DME

Fault code

1B0A64 - P15DC

Fault description

The diagnostic function monitors the signals from the wheelspeed sensors for plausibility.

Condition for fault identification

Test condition:

The fault is recognized when the signal from one wheelspeed sensor varies from that of the other sensors during stable vehicle operating conditions.

Potential problem source(s):

- Vehicle speed signal implausible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Vehicle speed in excess of 4 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Driver assistance systems failed

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15DA; BMW DTC 1B0A65: VEHICLE SPEED, WHEEL SENSOR FRONT/LEFT, PLAUSIBILITY: SIGNAL IMPLAUSIBLE

Information saved in

DME

Fault code

1B0A65 - P15DA

Fault description

The diagnostic function monitors the signals from the wheelspeed sensors for plausibility.

Condition for fault identification

Test condition:

The fault is recognized when the signal from one wheelspeed sensor varies from that of the other sensors during stable vehicle operating conditions.

Potential problem source(s):

- Vehicle speed signal implausible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Vehicle speed in excess of 4 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning**Breakdown notice:**

None

Possible apparent symptoms:

Driver assistance systems failed

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15DD; BMW DTC 1B0A66: VEHICLE SPEED, WHEEL SENSOR REAR/RIGHT, PLAUSIBILITY: SIGNAL IMPLAUSIBLE

Information saved in

DME

Fault code

1B0A66 - P15DD

Fault description

The diagnostic function monitors the signals from the wheelspeed sensors for plausibility.

Condition for fault identification**Test condition:**

The fault is recognized when the signal from one wheelspeed sensor varies from that of the other sensors during stable vehicle operating conditions.

Potential problem source(s):

- Vehicle speed signal implausible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

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- None

Time condition:

- None

Other conditions:

- Vehicle speed in excess of 4 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Driver assistance systems failed

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15DB; BMW DTC 1B0A67: VEHICLE SPEED, WHEEL SENSOR FRONT/RIGHT, PLAUSIBILITY: SIGNAL IMPLAUSIBLE

Information saved in

DME

Fault code

1B0A67 - P15DB

Fault description

The diagnostic function monitors the signals from the wheelspeed sensors for plausibility.

Condition for fault identification

Test condition:

The fault is recognized when the signal from one wheelspeed sensor varies from that of the other sensors during stable vehicle operating conditions.

Potential problem source(s):

- Vehicle speed signal implausible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Vehicle speed in excess of 4 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis with DSC

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Driver assistance systems failed

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1667; BMW DTC 1B2002: EWS ANTI-TAMPERING PROTECTION: NO STARTING VALUE PROGRAMMED

Information saved in

DME

Fault code

1B2002 - P1667

Fault description

The diagnostic function determines whether a start value is programmed.

Condition for fault identification

Test condition:

The fault is recognized when no start value has been programmed.

Potential problem source(s):

- No start value programmed

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- DME defective

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None, as this fault occurs only on new units

Driver information

Warning light:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P16CF; BMW DTC 1B2008: EWS ANTI-TAMPERING PROTECTION: EXPECTED RESPONSE IMPLAUSIBLE**Information saved in**

DME

Fault code

1B2008 - P16CF

Fault description

The diagnostic function determines whether a start value is programmed.

Condition for fault identification

Test condition:

The fault is recognized when the start values of CAS and DME do not agree.

Potential problem source(s):

- Defective CAS
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Vehicle key recognized and valid

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Starter turns, engine fails to start

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P165A; BMW DTC 1B2101: INTERFACE EWS-DME: HARDWARE FAULT

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DME

Fault code

1B2101 - P165A

Fault description

The diagnostic function monitors the electronic immobilizer messages.

Condition for fault identification

Test condition:

The fault is registered when a message error is present.

Potential problem source(s):

- Defective wiring harness
- Defective CAS
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine off
- Vehicle key recognized and valid for the duration of the monitoring process

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between CAS and DME
- Replace CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

In worst case the starter turns but the engine fails to start

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1660; BMW DTC 1B2102: INTERFACE EWS-DME: FRAME FAULT**Information saved in**

DME

Fault code

1B2102 - P1660

Fault description

The diagnostic function monitors the electronic immobilizer messages.

Condition for fault identification

Test condition:

The fault is registered when a message error is present.

Potential problem source(s):

- Defective CAS
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine off
- Vehicle key recognized and valid for the duration of the monitoring process

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Replace CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

In worst case the starter turns but the engine fails to start

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1661; BMW DTC 1B2104: INTERFACE EWS-DME: TIMEOUT**Information saved in**

DME

Fault code

1B2104 - P1661

Fault description

The diagnostic function monitors the electronic immobilizer messages.

Condition for fault identification

Test condition:

The fault is registered when a time limit violation is detected.

Potential problem source(s):

- Defective wiring harness
- Defective CAS
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine off
- Vehicle key recognized and valid for the duration of the monitoring process

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Check wiring harness between CAS and DME
- Replace CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

In worst case the starter turns but the engine fails to start

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P165C; BMW DTC 1B2201: DME, INTERNAL FAULT, EWS DATA: NO AVAILABLE MEMORY POSSIBILITY

Information saved in

DME

Fault code

1B2201 - P165C

Fault description

The diagnostic function monitors the electronic immobilizer messages.

Condition for fault identification

Test condition:

The fault is recognized when no memory is available for the EWS electronic immobilizer synchronization.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P165D; BMW DTC 1B2202: DME, INTERNAL FAULT, EWS DATA: FAULT-ACTIVATION-CODE STORAGE**Information saved in**

DME

Fault code

1B2202 - P165D

Fault description

The diagnostic function monitors the electronic immobilizer messages.

Condition for fault identification

Test condition:

The fault is recognized when errors are present in the saved EWS electronic immobilizer data.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P165E; BMW DTC 1B2208: DME, INTERNAL FAULT, EWS DATA: CHECKSUM FAULT**Information saved in**

DME

Fault code

1B2208 - P165E

Fault description

The diagnostic function monitors the electronic immobilizer messages.

Condition for fault identification

Test condition:

The fault is recognized when errors are present in the saved EWS electronic immobilizer data.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC U1166; BMW DTC 1B2302: MESSAGE, EWS-DME, INCORRECT: FRAME FAULT

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DME

Fault code

1B2302 - U1166

Fault description

The diagnostic function monitors communications on the CAN bus to assess electronic immobilizer messages.

Condition for fault identification

Test condition:

The fault is registered when a message error is present.

Potential problem source(s):

- Defective CAS
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine off
- Vehicle key recognized and valid for the duration of the monitoring process

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Replace CAS

- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

In worst case the starter turns but the engine fails to start

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U0167; BMW DTC 1B2304: MESSAGE, EWS-DME, INCORRECT: TIMEOUT**Information saved in**

DME

Fault code

1B2304 - U0167

Fault description

The diagnostic function monitors communications on the CAN bus to assess electronic immobilizer messages.

Condition for fault identification

Test condition:

The fault is recognized when no message has been received from the CAS.

Potential problem source(s):

- Defective wiring harness
- Gateway defect
- Defective CAS
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine off
- Vehicle key recognized and valid for the duration of the monitoring process

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Check wiring harness on CAS, gateway and at the DME
- Replace gateway
- Replace CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

In worst case the starter turns but the engine fails to start

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15B0; BMW DTC 1B5101: TERMINAL 15_3, LINE FROM CAS, ELECTRICAL: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

1B5101 - P15B0

Fault description

The diagnostic function monitors the redundant "Terminal 15 off" wire from the CAS to the DME for short circuits to positive.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit diagnostic function.

Potential problem source(s):

- Defect in wiring harness between CAS and DME
- Defective CAS
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Shutdown phase

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between CAS and DME
- Replace CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off

- CC message: on

Service instruction

None

DTC P15B1; BMW DTC 1B5102: TERMINAL 15_3, LINE FROM CAS, ELECTRICAL: SHORT CIRCUIT TO GROUND OR OPEN CIRCUIT

Information saved in

DME

Fault code

1B5102 - P15B1

Fault description

The diagnostic function monitors the redundant "Terminal 15 off" wire from the CAS to the DME for short circuits to ground and opens.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit diagnostic function.

Potential problem source(s):

- Defect in wiring harness between CAS and DME
- Defective CAS
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between CAS and DME
- Replace CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P15D9; BMW DTC 1B5202: TERMINAL 15N_1, POWER SUPPLY SWITCHED BY CAS, ELECTRICAL: SHORT TO EARTH OR OPEN CIRCUIT

Information saved in

DME

Fault code

1B5202 - P15D9

Fault description

The diagnostic function monitors the voltage-supply wire to Terminals 15N_1 and KL87_1 for an open wire or short circuit to ground.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when no voltage is present at the DME input (KL87_1 or 15N_1) although the main relay has closed.

Potential problem source(s):

- Fuse defective
- Defect in wiring harness between main relay and DME
- Main relay defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check fuse
- Check wiring harness between main relay and DME
- Replace main relay
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Range from reduced power to breakdown vehicle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P15ED; BMW DTC 1B5302: TERMINAL 15N_2, POWER SUPPLY SWITCHED BY CAS,

ELECTRICAL: SHORT TO EARTH OR OPEN CIRCUIT**Information saved in**

DME

Fault code

1B5302 - P15ED

Fault description

The diagnostic function monitors the voltage-supply wire to Terminals 15N_2 and KL87_2 for an open wire or short circuit to ground.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when no voltage is present at the DME input (KL87_2 or 15N_2) although the main relay has closed.

Potential problem source(s):

- Fuse defective
- Defect in wiring harness between main relay and DME
- Main relay defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check fuse
- Check wiring harness between main relay and DME
- Replace main relay
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Range from reduced power to breakdown vehicle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P15F8; BMW DTC 1B5402: TERMINAL 15N_3, POWER SUPPLY SWITCHED BY CAS, ELECTRICAL: SHORT TO EARTH OR OPEN CIRCUIT

Information saved in

DME

Fault code

1B5402 - P15F8

Fault description

The diagnostic function monitors the voltage-supply wire to Terminals 15N_3 and KL87_3 for an open wire or short circuit to ground.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when no voltage is present at the DME input (Terminal 87_3 or 15 N_3) although the main relay has closed.

Potential problem source(s):

- Fuse defective
- Defect in wiring harness between main relay and DME
- Main relay defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check fuse

- Check wiring harness between main relay and DME
- Replace main relay
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Range from reduced power to breakdown vehicle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0571; BMW DTC 1B6008: BRAKE-LIGHT SWITCH, PLAUSIBILITY: SIGNAL IMPLAUSIBLE

Information saved in

DME

Fault code

1B6008 - P0571

Fault description

The diagnostic function monitors the plausibility of the brake light switch

Condition for fault identification

Test condition:

The fault is recognized when the status of the brake light switch does not correspond to that of the brake light test switch.

Potential problem source(s):

- Defective wiring harness
- Brake light switch defective
- Defective DME

Terminal condition: Terminal 15**Voltage condition:**

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 2 min. continuous open circuit at both switches (brake light switch and brake light test switch)

Other conditions:

- Multiple brake applications

Condition for fault memory entry

This fault code is logged in the control module's fault memory when it remains present for longer than 2 sec.

Action in service

- Check wiring harness between DME and brake light switch
- Replace brake light switch
- Replace DME

Fault effect and breakdown warning**Breakdown notice:**

None

Possible apparent symptoms:

CC message

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P15E8; BMW DTC 1B9508: ENGINE SWITCH-OFF TIME, PLAUSIBILITY: TIME TOO SHORT IN CORRELATION TO ENGINE-COOLANT COOLING

Information saved in

DME

Fault code

1B9508 - P15E8

Fault description

The diagnostic function monitors the engine's calculated downtime by comparing it with the drop in coolant temperature while the engine is stationary.

Condition for fault identification

Test condition:

The fault is recognized when the time required for engine cooling is implausibly short relative to the calculated time.

Potential problem source(s):

- Instrument cluster disconnected from Terminal 30 during stationary phase (battery change)
- Collateral fault stemming from a defective engine temperature sensor
- Collateral fault from incorrect time signal from the instrument cluster

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine temperature at engine shutdown > 80 °C
- Engine cooled by > 10 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If Terminal 30 was disconnected, no further action required
- Note any logged faults related to the coolant temperature sensor
- Check whether the instrument cluster time is correct

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15E9; BMW DTC 1B9608: ENGINE SWITCH-OFF TIME, PLAUSIBILITY: TIME TOO LONG IN CORRELATION TO ENGINE-COOLANT COOLING**Information saved in**

DME

Fault code

1B9608 - P15E9

Fault description

The diagnostic function monitors the engine's calculated downtime by comparing it with the drop in coolant temperature while the engine is stationary.

Condition for fault identification

Test condition:

The fault is recognized when the time required for engine cooling is implausibly long relative to the calculated time.

Potential problem source(s):

- Collateral fault stemming from a defective engine temperature sensor
- Collateral fault stemming from incorrect time signal from instrument cluster

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine temperature at engine shutdown > 80°C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Watch for diagnostic fault code entries related to the coolant temperature sensor, replace the coolant temperature sensor as indicated
- Check whether the instrument cluster time is correct

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15FA; BMW DTC 1B9701: ENGINE SWITCH-OFF TIME: TOO FAST DURING ENGINE OPERATION

Information saved in

DME

Fault code

1B9701 - P15FA

Fault description

The diagnostic function compares the internal timers of the DME and the instrument cluster while the engine is running.

Condition for fault identification

Test condition:

The fault is recognized in response to a disparity of 12 sec. The comparison starts again every minute while the engine is running.

Potential problem source(s):

- Collateral fault resulting from fault memory entries in the DME and/or instrument cluster

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Because this is a collateral fault, start by resolving issues related to other faults logged in the DME or instrument cluster; no additional action will be needed with these kinds of faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15FB; BMW DTC 1B9702: ENGINE SWITCH-OFF TIME: TOO SLOW DURING ENGINE OPERATION**Information saved in**

DME

Fault code

1B9702 - P15FB

Fault description

The diagnostic function compares the internal timers of the DME and the instrument cluster while the engine is running.

Condition for fault identification

Test condition:

The fault is recognized in response to a disparity of 12 sec. The comparison starts again every minute while the engine is running.

Potential problem source(s):

- Collateral fault resulting from fault memory entries in the DME and/or instrument cluster

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 3 min.

Action in service

- Because this is a collateral fault, start by resolving issues related to other faults logged in the DME or instrument cluster; no additional action will be needed with these kinds of faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15FE; BMW DTC 1B9804: ENGINE SWITCH-OFF TIME, SIGNAL: NO SIGNAL

Information saved in

DME

Fault code

1B9804 - P15FE

Fault description

The diagnostic function monitors transmission of the CAN time signal from the instrument cluster. Diagnosis is interlocked by CAN fault.

Condition for fault identification

Test condition:

The fault is recognized when no CAN time signal is transmitted for longer than 5 sec.

Potential problem source(s):

- Collateral fault resulting from fault memory entries in the DME and/or instrument cluster

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Because this is a collateral fault, start by resolving issues related to other faults logged in the DME or instrument cluster; no additional action will be needed with these kinds of faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

No display of time and date

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15FC; BMW DTC 1B9A01: ENGINE SWITCH-OFF TIME: TOO FAST DURING RUN-ON**Information saved in**

DME

Fault code

1B9A01 - P15FC

Fault description

The diagnostic function compares the internal timers of the DME and the instrument cluster when the ignition is switched on again while the control module is in its shutdown phase.

Condition for fault identification

Test condition:

The fault is recognized when a deviation of more than 12 sec. is present.

Potential problem source(s):

- Collateral fault resulting from fault memory entries in the DME and/or instrument cluster

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Because this is a collateral fault, start by resolving issues related to other faults logged in the DME or instrument cluster; no additional action will be needed with these kinds of faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- The ECU shutdown phase lasts between 1 min. and 20 min.

DTC P15FD; BMW DTC 1B9A02: ENGINE SWITCH-OFF TIME: TOO SLOW DURING RUN-ON**Information saved in**

DME

Fault code

1B9A02 - P15FD

Fault description

The diagnostic function compares the internal timers of the DME and the instrument cluster when the ignition is switched on again while the control module is in its shutdown phase.

Condition for fault identification

Test condition:

The fault is recognized when a deviation of more than 12 sec. is present.

Potential problem source(s):

- Collateral fault resulting from fault memory entries in the DME and/or instrument cluster

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Because this is a collateral fault, start by resolving issues related to other faults logged in the DME or instrument cluster; no additional action will be needed with these kinds of faults

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- The ECU shutdown phase lasts between 1 min. and 20 min.

DTC P159E; BMW DTC 1C0001: ENGINE-OIL PRESSURE CONTROL, DYNAMIC: PRESSURE FLUCTUATIONS**Information saved in**

DME

Fault code

1C0001 - P159E

Fault description

The diagnostic function monitors the oscillation characteristics of the oil pressure.

Condition for fault identification

Test condition:

The fault is recognized when the oil pressure rises above the limit several times within a defined period.

Potential problem source(s):

- Oil pressure control valve defective
- Oil pump defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace oil pressure control valve
- Replace oil pump

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Vibration noise at a frequency between 5 Hz and 7 Hz

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

· none

DTC P159F; BMW DTC 1C0101: ENGINE-OIL PRESSURE CONTROL, STATIC: ENGINE-OIL PRESSURE TOO HIGH, LIMP-HOME OPERATION**Information saved in**

DME

Fault code

1C0101 - P159F

Fault description

The diagnostic function monitors the oil pressure.

Condition for fault identification

Test condition:

The fault is recognized when the oil pressure rises beyond a defined level in relation to oil temperature and engine speed.

Potential problem source(s):

- Defect in wiring harness between oil-pressure sensor and DME
- Defective oil-pressure sensor
- Oil pressure control valve defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between oil-pressure sensor and DME
- Replace oil-pressure sensor
- Replace oil pressure control valve

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P15A0; BMW DTC 1C0102: ENGINE-OIL PRESSURE CONTROL, STATIC: ENGINE-OIL PRESSURE TOO LOW, LIMP-HOME OPERATION

Information saved in

DME

Fault code

1C0102 - P15A0

Fault description

The diagnostic function monitors the oil pressure.

Condition for fault identification

Test condition:

The fault is recognized when the oil pressure drops below a defined level in relation to oil temperature and engine speed.

Potential problem source(s):

- Defect in wiring harness between oil-pressure sensor and DME
- Defective oil-pressure sensor
- Oil pressure control valve defective
- Oil pump defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between oil-pressure sensor and DME
- Replace oil-pressure sensor

- Replace oil pressure control valve
- Replace oil pump

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P15EC; BMW DTC 1C0201: OIL-PRESSURE REGULATING VALVE, ACTIVATION: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

1C0201 - P15EC

Fault description

The diagnostic function monitors the wire from the DME to the oil-pressure control valve for shorts to positive.

Condition for fault identification

Test condition:

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The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defective plug or wiring harness
- Oil pressure control valve/oil pump defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Control-activation of oil-pressure control valve (PWM) between 5% and 95%

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between oil pump and DME
- Replace oil pressure control valve/oil pump
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15EB; BMW DTC 1C0202: OIL-PRESSURE REGULATING VALVE, ACTIVATION: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

1C0202 - P15EB

Fault description

The diagnostic function monitors the wire from the DME to the oil-pressure control valve for shorts to ground.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defective plug or wiring harness
- Oil pressure control valve/oil pump defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Control-activation of oil-pressure control valve (PWM) between 5% and 95%

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between oil pump and DME
- Replace oil pressure control valve/oil pump
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None (possible increase in fuel consumption)

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15EA; BMW DTC 1C0204: OIL-PRESSURE REGULATING VALVE, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

1C0204 - P15EA

Fault description

The diagnostic function monitors the wire from the DME to the oil-pressure control valve for open circuits.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defective plug or wiring harness
- Oil pressure control valve/oil pump defective
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Control-activation of oil-pressure control valve (PWM) between 5% and 95%

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between oil pump and DME
- Replace oil pressure control valve/oil pump
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15A1; BMW DTC 1C0301: OIL-PRESSURE REGULATING VALVE, MECHANICAL: STICKS IN FULLY ENERGIZED POSITION (MINIMUM OIL PRESSURE)

Information saved in

DME

Fault code

1C0301 - P15A1

Fault description

The diagnostic function monitors the oil pressure.

Condition for fault identification

Test condition:

The fault is recognized when the oil pressure remains at maximum level despite targeted application of voltage to the solenoid valve.

Potential problem source(s):

- Oil pressure control valve defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace oil pressure control valve

Fault effect and breakdown warning

Breakdown notice:

- Engine damage possible. Switch off engine, continued driving is not possible.

Possible apparent symptoms:

- none

Driver information**Warning light:**

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

- none

DTC P15A2; BMW DTC 1C0302: OIL-PRESSURE REGULATING VALVE, MECHANICAL: STICKS IN NON-ENERGIZED POSITION (MAXIMUM OIL PRESSURE)**Information saved in**

DME

Fault code

1C0302 - P15A2

Fault description

The diagnostic function monitors the oil pressure.

Condition for fault identification**Test condition:**

The fault is recognized when the oil pressure remains at maximum level despite targeted application of voltage to the solenoid valve.

Potential problem source(s):

- Oil pressure control valve defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace oil pressure control valve

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off

- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P15A3; BMW DTC 1C2001: OIL PUMP, MECHANICAL: OIL PRESSURE TOO HIGH**Information saved in**

DME

Fault code

1C2001 - P15A3

Fault description

The diagnostic function monitors the oil pressure.

Condition for fault identification

Test condition:

The fault is recognized when the oil pressure rises beyond a defined level in relation to oil temperature and engine speed.

Potential problem source(s):

- Mechanical defect in oil pump

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

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- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace oil pump

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P0524; BMW DTC 1C2002: OIL PUMP, MECHANICAL: OIL PRESSURE TOO LOW**Information saved in**

DME

Fault code

1C2002 - P0524

Fault description

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The diagnostic function monitors the oil pressure.

Condition for fault identification

Test condition:

The fault is recognized when the oil pressure rises beyond a defined level in relation to oil temperature and engine speed.

Potential problem source(s):

- Mechanical defect in oil pump

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace oil pump

Fault effect and breakdown warning

Breakdown notice:

- Engine damage possible. Switch off engine, continued driving is not possible.

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

- none

DTC P0523; BMW DTC 1C3001: ENGINE-OIL PRESSURE SENSOR, ELECTRIC: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

1C3001 - P0523

Fault description

The diagnostic function monitors the upper voltage limit of the engine oil-pressure sensor.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the engine oil-pressure sensor exceeds 4.9 V.

Potential problem source(s):

- Fault in wiring harness between sensor and DME
- Sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and sensor
- Replace sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off

- CC message: none

Service instruction

None

DTC P0522; BMW DTC 1C3002: ENGINE OIL PRESSURE SENSOR, ELECTRICAL: SHORT TO EARTH**Information saved in**

DME

Fault code

1C3002 - P0522

Fault description

The diagnostic function monitors the engine oil-pressure sensor's lower voltage limit.

Condition for fault identification

Test condition:

The fault is recognized when the voltage of the engine oil-pressure sensor is less than 0.1 V.

Potential problem source(s):

- Fault in wiring harness between engine oil-pressure sensor and DME
- Engine oil-pressure sensor defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect wiring harness between engine oil-pressure sensor and DME
- Replace engine oil-pressure sensor
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0521; BMW DTC 1C3108: ENGINE-OIL PRESSURE SENSOR, PLAUSIBILITY: SIGNAL HANGS

Information saved in

DME

Fault code

1C3108 - P0521

Fault description

The diagnostic function monitors the oil pressure.

Condition for fault identification

Test condition:

The fault is recognized when the oil pressure fails to change by more than 12 hPa for longer than 2.5 sec.

Potential problem source(s):

- Defect in wiring harness between oil-pressure sensor and DME
- Defective oil-pressure sensor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Shutdown phase

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between oil-pressure sensor and DME
- Replace oil-pressure sensor

Fault effect and breakdown warning

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Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information**Warning light:**

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P250F; BMW DTC 1C4002: ENGINE-OIL LEVEL: TOO LOW**Information saved in**

DME

Fault code

1C4002 - P250F

Fault description

The diagnostic function monitors the engine oil level.

Condition for fault identification**Test condition:**

The fault is recognized when the engine oil level falls below 5 liters.

Potential problem source(s):

- Engine operated with oil level too low

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when = TRUE is recognized 50 times.

Action in service

- Top up engine oil
- Check oil level

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off

- CC message: on

Service instruction

None

DTC P252A; BMW DTC 1C4110: OIL-CONDITION SENSOR, ELECTRICAL: MALFUNCTION**Information saved in**

DME

Fault code

1C4110 - P252A

Fault description

The diagnostic function monitors the signal from the oil condition sensor for electrical faults.

Condition for fault identification

Test condition:

The fault is recognized when the oil condition sensor reports a fault over the bus.

Potential problem source(s):

- Defect in plugs or wiring harness between oil condition sensor and DME
- Oil condition sensor defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

· none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check plugs and wiring harness between oil condition sensor and DME
- Replace oil condition sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1587; BMW DTC 1C4111: OIL-CONDITION SENSOR, PLAUSIBILITY: LEVEL IMPLAUSIBLE

Information saved in

DME

Fault code

1C4111 - P1587

Fault description

The diagnostic function monitors the plausibility of the oil level signal.

Condition for fault identification

Test condition:

The fault is recognized when the signal remains constant, implausible signal jumps are present, and when the signal's mean value leaves the specified range.

Potential problem source(s):

- Defect in plugs or wiring harness between oil condition sensor and DME
- Oil condition sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check plugs and wiring harness between oil condition sensor and DME
- Replace oil condition sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1586; BMW DTC 1C4112: OIL-CONDITION SENSOR, PLAUSIBILITY: TEMPERATURE IMPLAUSIBLE

Information saved in

DME

Fault code

1C4112 - P1586

Fault description

The diagnostic function monitors the plausibility of the oil temperature signal.

Condition for fault identification

Test condition:

The fault is recognized when the signal remains constant, implausible signal jumps are present, and when the signal's mean value leaves the specified range.

Potential problem source(s):

- Defect in plugs or wiring harness between oil condition sensor and DME

- Oil condition sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check plugs and wiring harness between oil condition sensor and DME
- Replace oil condition sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1587; BMW DTC 1C4113: OIL-CONDITION SENSOR, PLAUSIBILITY: LEVEL IMPLAUSIBLE**Information saved in**

DME

Fault code

1C4113 - P1587

Fault description

The diagnostic function monitors the plausibility of the oil level signal.

Condition for fault identification**Test condition:**

The fault is recognized when the signal remains constant, implausible signal jumps are present, and when the signal's mean value leaves the specified range.

Potential problem source(s):

- Defect in plugs or wiring harness between oil condition sensor and DME
- Oil condition sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Engine speed above 5000 RPM
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check plugs and wiring harness between oil condition sensor and DME
- Replace oil condition sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1586; BMW DTC 1C4115: OIL-CONDITION SENSOR, PLAUSIBILITY: TEMPERATURE IMPLAUSIBLE

Information saved in

DME

Fault code

1C4115 - P1586

Fault description

The diagnostic function monitors the oil temperature signal to assess plausibility.

Condition for fault identification

Test condition:

The fault is recognized when the oil condition sensor reports a fault.

Potential problem source(s):

- Defect in plugs or wiring harness between oil condition sensor and DME
- Oil condition sensor defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Engine speed above 5000 RPM
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check plugs and wiring harness between oil condition sensor and DME
- Replace oil condition sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1587; BMW DTC 1C4116: OIL-CONDITION SENSOR, ELECTRICAL: LEVEL, MALFUNCTION

Information saved in

DME

Fault code

1C4116 - P1587

Fault description

The diagnostic function monitors the oil condition sensor.

Condition for fault identification

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Test condition:

The fault is recognized when the oil condition sensor reports a fault.

Potential problem source(s):

- Defect in plugs or wiring harness between oil condition sensor and DME
- Oil condition sensor defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Engine speed above 5000 RPM
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check plugs and wiring harness between oil condition sensor and DME
- Replace oil condition sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1588; BMW DTC 1C4117: OIL-CONDITION SENSOR, ELECTRICAL: PERMITTIVITY, MALFUNCTION

Information saved in

DME

Fault code

1C4117 - P1588

Fault description

The diagnostic function detects an electrical fault in the oil quality signal

Condition for fault identification

Test condition:

The fault is recognized when the oil condition sensor reports a fault over the bus.

Potential problem source(s):

- Water in oil
- Defect in plug or wiring harness at oil condition sensor
- Sensor defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine oil temperature greater than 100 °C

Time condition:

- Longer than 15 minutes

Other conditions:

- Engine on
- Engine speed above 5000 RPM
- No BSD fault

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check plug and wiring harness and oil condition sensor
- Replace engine oil
- Replace oil condition sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1586; BMW DTC 1C4118: OIL-CONDITION SENSOR, ELECTRICAL: TEMPERATURE, MALFUNCTION**Information saved in**

DME

Fault code

1C4118 - P1586

Fault description

The diagnostic function monitors the oil temperature signal to detect electrical faults.

Condition for fault identification

Test condition:

The fault is recognized when the oil condition sensor reports a fault over the bus.

Potential problem source(s):

- Defect in plugs or wiring harness between oil condition sensor and DME
- Water in oil
- Oil condition sensor defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine oil temperature greater than 100 °C

Time condition:

- Longer than 15 minutes

Other conditions:

- Engine on
- Engine speed above 5000 RPM
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check plugs and wiring harness between oil condition sensor and DME
- Replace engine oil
- Replace oil condition sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0195; BMW DTC 1C4119: ENGINE-OIL TEMPERATURE SENSOR, ELECTRICAL: MALFUNCTION

Information saved in

DME

Fault code

1C4119 - P0195

Fault description

The diagnostic function monitors the signal from the engine oil temperature sensor for electrical malfunctions.

Condition for fault identification

Test condition:

The fault is recognized when the signal voltage exceeds 3.6 V.

Potential problem source(s):

- Defect in plugs or wiring harness between engine oil temperature sensor and DME
- Defective engine oil temperature sensor

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- Check plugs and wiring harness between engine oil temperature sensor and DME
- Replace engine oil temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0196; BMW DTC 1C4120: ENGINE-OIL TEMPERATURE SENSOR, PLAUSIBILITY: TEMPERATURE IMPLAUSIBLE

Information saved in

DME

Fault code

1C4120 - P0196

Fault description

The diagnostic function monitors the plausibility of the oil temperature signal.

Condition for fault identification

Test condition:

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The fault is recognized when the signal is frozen, implausible signal jumps are present, and when the signal's mean value leaves the specified range.

Potential problem source(s):

- Defect in plugs or wiring harness between engine oil temperature sensor and DME
- Defective engine oil temperature sensor

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check plugs and wiring harness between engine oil temperature sensor and DME
- Replace engine oil temperature sensor

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1521; BMW DTC 1C5A20: BSD MESSAGE FROM OIL-CONDITION SENSOR: NO MESSAGE

Information saved in

DME

Fault code

1C5A20 - P1521

Fault description

The diagnostic function monitors the BSD message from the oil level sensor (QLT).

Condition for fault identification

Test condition:

The fault is recognized when no BSD telegram from the oil condition sensor (QLT) is received.

Potential problem source(s):

- Problem with BSD wire between DME and oil quality sensor (QLT)
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- Check wiring harness between DME and oil quality sensor (QLT),
- replace oil quality sensor (QLT),
- replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Adaptation (reduction) of engine oil service interval

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0128; BMW DTC 1D2008: MAP THERMOSTAT, MECHANICAL: JAMMED OPEN**Information saved in**

DME

Fault code

1D2008 - P0128

Fault description

The diagnostic function monitors the rise in coolant temperature at the engine's discharge connection.

Condition for fault identification

Test condition:

A fault is recognized when the engine temperature is below 80 °C when the test is executed. Because the test time is defined by the temperature model, it is also determined by the model's input variables (air mass, ambient temperature and model temperature).

Potential problem source(s):

- Defective wiring harness
- Characteristic map thermostat defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Coolant temperature sensor less than 40 °C

Time condition:

- None

Other conditions:

- Engine cold start
- Vehicle speed in excess of 30 km/h
- Ambient temperature higher than minus 10°C

- Engine speed between 800 RPM and 7000 RPM

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check wiring harness
- Replace map-controlled thermostat

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- The output of the interior heater may be reduced.

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

- When the engine is heated from external sources, such as an auxiliary heater, diagnosis errors can result!

DTC P0599; BMW DTC 1D2401: MAP THERMOSTAT, ACTIVATION: SHORT CIRCUIT TO POSITIVE

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DME

Fault code

1D2401 - P0599

Fault description

The diagnostic function monitors activation of the program map thermostat.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and program map thermostat

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and map-controlled thermostat
- Replace map-controlled thermostat
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

US: MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0598; BMW DTC 1D2402: MAP THERMOSTAT, ACTIVATION: SHORT CIRCUIT TO GROUND

Information saved in

DME

Fault code

1D2402 - P0598

Fault description

The diagnostic function monitors activation of the program map thermostat.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and program map thermostat

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and map-controlled thermostat
- Replace map-controlled thermostat
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

US: MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0597; BMW DTC 1D2404: MAP THERMOSTAT, ACTIVATION: OPEN CIRCUIT**Information saved in**

DME

Fault code

1D2404 - P0597

Fault description

The diagnostic function monitors activation of the program map thermostat.

Condition for fault identification

Test condition:

The fault is recognized by the driver circuit's diagnostic function.

Potential problem source(s):

- Defect in wiring harness between DME and program map thermostat

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

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- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and map-controlled thermostat
- Replace map-controlled thermostat
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

US: MIL on, customer proceeds to service facility.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0507; BMW DTC 1E0001: IDLE-SPEED CONTROL: SPEED TOO HIGH

Information saved in

DME

Fault code

1E0001 - P0507

Fault description

The diagnostic function monitors the idle speed when the engine is warmed to normal operating temperature.

Condition for fault identification

Test condition:

The fault is recognized when the actual idle speed exceeds the specified idle speed by more than 100 RPM.

Potential problem source(s):

- Collateral fault from defective throttle valve
- Leak in air-induction tract between throttle valve and engine

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 3 sec. after engine on

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If faults related to the throttle valve have been logged, repair these first
- Check for leaks in air-induction tract between throttle valve and engine

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Idle speed too high

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0506; BMW DTC 1E0002: IDLE-SPEED CONTROL: SPEED TOO LOW

Information saved in

DME

Fault code

1E0002 - P0506

Fault description

The diagnostic function monitors the idle speed when the engine is warmed to normal operating temperature.

Condition for fault identification

Test condition:

The fault is recognized when the actual idle speed falls below the specified idle speed by more than 100 RPM.

Potential problem source(s):

- Collateral fault from defective throttle valve
- Leak in air-induction tract between throttle valve and engine

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- 3 sec. after engine on

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If faults related to the throttle valve have been logged, repair these first
- Check for leaks in air-induction tract between throttle valve and engine

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- In extreme cases the engine may stall.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on

- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1562; BMW DTC 1E0101: IDLE-SPEED CONTROL, COLD START: ENGINE SPEED TOO HIGH**Information saved in**

DME

Fault code

1E0101 - P1562

Fault description

The diagnostic function monitors the idle speed during the catalytic converter's warmup phase.

Condition for fault identification

Test condition:

The fault is recognized when the actual idle speed exceeds the specified idle speed by more than 300 RPM.

Potential problem source(s):

- Collateral fault from defective throttle valve
- Leak in air-induction tract between throttle valve and engine

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If faults related to the throttle valve have been logged, repair these first
- Check for leaks in air-induction tract between throttle valve and engine

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Idle speed too high

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P1561; BMW DTC 1E0102: IDLE-SPEED CONTROL, COLD START: ENGINE SPEED TOO LOW

Information saved in

DME

Fault code

1E0102 - P1561

Fault description

The diagnostic function monitors the idle speed during the catalytic converter's warmup phase.

Condition for fault identification

Test condition:

The fault is recognized when the actual idle speed falls below the specified idle speed by more than 300 RPM.

Potential problem source(s):

- Collateral fault from defective throttle valve
- Leak in air-induction tract between throttle valve and engine

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If faults related to the throttle valve have been logged, repair these first
- Check for leaks in air-induction tract between throttle valve and engine

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- In extreme cases the engine may stall.

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P10E3; BMW DTC 1F0514: VALVETRONIC RELAY, SUPPLY VOLTAGE: SHORT TO EARTH

Information saved in

DME

Fault code

1F0514 - P10E3

Fault description

The diagnostic function monitors the wire from the Valvetronic relay to the DME for short circuits to ground.

Condition for fault identification

Test condition:

The fault is recognized when the voltage in the control wire to the Valvetronic relay is less than 2 V.

Potential problem source(s):

- Defect in wiring harness between Valvetronic relay and DME
- Valvetronic relay defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between Valvetronic relay and DME (U_VVTR)
- Replace Valvetronic relay
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, customer seeks

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P10E4; BMW DTC 1F0515: VALVETRONIC RELAY, SUPPLY VOLTAGE: OPEN CIRCUIT

Information saved in

DME

Fault code

1F0515 - P10E4

Fault description

The diagnostic function monitors the wire from the Valvetronic relay to the DME for open wires, and monitors the control wire to the Valvetronic relay for open wires and shorts to ground.

Condition for fault identification

Test condition:

The fault is recognized when the difference between battery voltage and buffer capacitor exceeds 7 V.

Potential problem source(s):

- Valvetronic fuse defective
- Defect in wiring harness between Valvetronic relay and DME
- Valvetronic relay defective
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Inspect Valvetronic fuse
- Check wiring harness between Valvetronic relay and DME (U_VVTR)
- Check wiring harness between Valvetronic relay and DME (S_VVTR)
- Replace Valvetronic relay
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message, customer seeks

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

None

DTC P326A; BMW DTC 1F0516: DME, INTERNAL FAULT, ELECTRIC ACCELERATOR PEDAL MONITORING: A/D CONVERTER IDLING TEST PULSE CHECK

Information saved in

DME

Fault code

1F0516 - P326A

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P326A; BMW DTC 1F0517: DME, INTERNAL FAULT, ELECTRIC ACCELERATOR PEDAL MONITORING: AD CONVERTER, TEST VOLTAGE CHECK**Information saved in**

DME

Fault code

1F0517 - P326A

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning**Breakdown notice:**

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P326B; BMW DTC 1F0518: DME, INTERNAL FAULT, ELECTRIC ACCELERATOR PEDAL MONITORING: AIR QUANTITY ADJUSTMENT**Information saved in**

DME

Fault code

1F0518 - P326B

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON
- Engine speed above 1200 RPM

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power

- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P060D; BMW DTC 1F0519: DME, INTERNAL FAULT: MONITORING, SIGNAL PLAUSIBILIZATION, ACCELERATOR-PEDAL MODULE OR PEDAL-TRAVEL SENSOR**Information saved in**

DME

Fault code

1F0519 - P060D

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- Accelerator pedal module defective
- Wiring harness defective
- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and accelerator pedal module
- Replace accelerator pedal module
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on

- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P325C; BMW DTC 1F0520: DME, INTERNAL FAULT, ELECTRIC ACCELERATOR PEDAL MONITORING: SPEED SENSOR**Information saved in**

DME

Fault code

1F0520 - P325C

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- Crankshaft sensor defective
- Wiring harness defective
- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and crankshaft sensor
- Replace crankshaft sensor
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on

- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P3237; BMW DTC 1F0521: DME, INTERNAL FAULT: MONITORING, PLAUSIBILIZATION OF MIXTURE-CORRECTION FACTORS**Information saved in**

DME

Fault code

1F0521 - P3237

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P325D; BMW DTC 1F0522: DME, INTERNAL FAULT: MONITORING, INJECTION-RATE LIMITATION, LEVEL 1

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DME

Fault code

1F0522 - P325D

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P325D; BMW DTC 1F0523: DME, INTERNAL FAULT: MONITORING, INJECTION-RATE LIMITATION, LEVEL 2**Information saved in**

DME

Fault code

1F0523 - P325D

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification**Test condition:**

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on

- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P3337; BMW DTC 1F0524: DME, INTERNAL FAULT: MONITORING OF THE NOMINAL OXYGEN SENSOR VALUE**Information saved in**

DME

Fault code

1F0524 - P3337

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- Wiring harness defective
- Oxygen sensor defective
- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between oxygen sensor and DME
- Replace oxygen sensor
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P325F; BMW DTC 1F0525: DME, INTERNAL FAULT: MONITORING, PLAUSIBILIZATION OF RELATIVE FUEL MASS

Information saved in

DME

Fault code

1F0525 - P325F

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- Rail-pressure sensor defective
- Wiring harness defective
- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and rail-pressure sensor
- Replace rail-pressure sensor
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P061B; BMW DTC 1F0526: DME, INTERNAL FAULT: MONITORING, TORQUE COMPARISON**Information saved in**

DME

Fault code

1F0526 - P061B

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- Secondary fault from mixture formation
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Start by repairing faults related to logged ECU fault memory entries for mixture formation
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

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- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P326C; BMW DTC 1F0527: DME, INTERNAL FAULT, ELECTRIC ACCELERATOR PEDAL MONITORING: DRIVE TRAIN TRANSMISSION RATIO IMPLAUSIBLE

Information saved in

DME

Fault code

1F0527 - P326C

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- Secondary fault from mixture formation
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Start by repairing faults related to logged ECU fault memory entries for mixture formation
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to

reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P3235; BMW DTC 1F0528: DME, INTERNAL FAULT: MONITORING, VARIANT CODING

Information saved in

DME

Fault code

1F0528 - P3235

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on

- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P325E; BMW DTC 1F0529: DME, INTERNAL FAULT, ELECTRIC ACCELERATOR PEDAL MONITORING: IGNITION-TIMING MONITORING**Information saved in**

DME

Fault code

1F0529 - P325E

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

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- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P326D; BMW DTC 1F0530: DME, INTERNAL FAULT: SWITCH-OFF PATH TEST BY MONITORING MODULE**Information saved in**

DME

Fault code

1F0530 - P326D

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to

reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P325F; BMW DTC 1F0531: DME, INTERNAL FAULT: PLAUSIBILITY MONITORING, FUEL MASS

Information saved in

DME

Fault code

1F0531 - P325F

Fault description

The diagnostic function monitors the DME's internal status.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on

- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P1646; BMW DTC 1F0532: DME, INTERNAL FAULT, MONITORING MSC COMMUNICATION MALFUNCTION IN MODULE R2S2/1**Information saved in**

DME

Fault code

1F0532 - P1646

Fault description

The diagnostic function monitors communications within the DME.

Condition for fault identification

Test condition:

The fault is detected by the internal calculation algorithms.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

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- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

Active fault can cause engine to stall or fail to start.

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P1646; BMW DTC 1F0533: DME, INTERNAL FAULT, MONITORING MSC COMMUNICATION MALFUNCTION IN MODULE R2S2/2**Information saved in**

DME

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Fault code

1F0533 - P1646

Fault description

The diagnostic function monitors communications of DME hardware components.

Condition for fault identification

Test condition:

The fault is recognized when interference occurs in communications between the CPU and a driver circuit.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Breakdown in extreme cases

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

- none

DTC P10E5; BMW DTC 1F0904: DME, INTERNAL FAULT, ACTIVATION VALVETRONIC: MALFUNCTION

Information saved in

DME

Fault code

1F0904 - P10E5

Fault description

The diagnostic function monitors the current flow through the Valvetronic actuator motor when the driver circuit is switched off.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the current draw in the driver circuit exceeds 4 amps while the driver circuit is deactivated.

Potential problem source(s):

- Defective wiring harness
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Voltage behind motor relay > 5 V

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between Valvetronic actuator motor and DME
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Breakdown in extreme cases

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

If the fault occurs while the Valvetronic unit's stroke is not at full extension then the engine will stall and fail to restart. This is because the Valvetronic driver circuit is deactivated and the Valvetronic unit cannot return to minimum stroke. If the fault occurs at maximum stroke, unrestricted throttled operation is possible.

DTC P062F; BMW DTC 1F1A50: DME, INTERNAL FAULT: ERASE EEPROM FAULTY

Information saved in

DME

Fault code

1F1A50 - P062F

Fault description

The diagnostic function monitors the EEPROM emulation's "delete sector."

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

Engine can fail to start when fault is active (electronic immobilizer).

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: None

Service instruction

- none

DTC P062F; BMW DTC 1F1A52: DME, INTERNAL FAULT: WRITE EEPROM FAULTY**Information saved in**

DME

Fault code

1F1A52 - P062F

Fault description

The diagnostic function monitors the EEPROM emulation's "write block."

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P060A; BMW DTC 1F1A60: DME, INTERNAL FAULT: MONITORING-MODULE FAULT

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DME

Fault code

1F1A60 - P060A

Fault description

The diagnostic function monitors the DME's internal monitor modules.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Loss of power
- Speed limitation

Driver information**Warning light:**

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P16EA; BMW DTC 1F1A80: DME, INTERNAL FAULT, WATCHDOG OUTPUT: MALFUNCTION**Information saved in**

DME

Fault code

1F1A80 - P16EA

Fault description

The diagnostic function monitors the internal ABE and WDA wire in the DME.

Condition for fault identification**Test condition:**

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

Continued driving is not possible while fault is active. When the fault is no longer present continued driving is possible with no restrictions.

Possible apparent symptoms:

- Non-starter in extreme cases

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P16EB; BMW DTC 1F1A81: DME, INTERNAL FAULT, WATCHDOG OUTPUT: FAULTY QUESTION/ANSWER COMMUNICATION

Information saved in

DME

Fault code

1F1A81 - P16EB

Fault description

The diagnostic function monitors the internal WDA wire in the DME.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Breakdown in extreme cases

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P16EC; BMW DTC 1F1A82: DME, INTERNAL FAULT, WATCHDOG OUTPUT: OVERVOLTAGE DETECTION**Information saved in**

DME

Fault code

1F1A82 - P16EC

Fault description

The diagnostic function monitors the internal ABE wire in the DME.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Breakdown in extreme cases

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on

MY10 US:

- US emissions warning lamp: off
- US electronic engine power reduction: on
- CC message: on

Service instruction

- A terminal status switch must be conducted before this fault can be deleted.

DTC P16E7; BMW DTC 1F1A90: DME, INTERNAL FAULT, MONITORING 5V SENSOR SUPPLY: VOLTAGE OUTSIDE VALID RANGE**Information saved in**

DME

Fault code

1F1A90 - P16E7

Fault description

The diagnostic function monitors the sensor voltage supply G1.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Reduced performance
- Speed limitation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P16E8; BMW DTC 1F1A91: DME, INTERNAL FAULT, MONITORING 5V SENSOR SUPPLY 2: VOLTAGE OUTSIDE VALID RANGE

Information saved in

DME

Fault code

1F1A91 - P16E8

Fault description

The diagnostic function monitors the internal sensor supply voltage G2.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Reduced performance
- Speed limitation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P16E9; BMW DTC 1F1A92: DME, INTERNAL FAULT, MONITORING 5V SENSOR SUPPLY 3: VOLTAGE OUTSIDE VALID RANGE**Information saved in**

DME

Fault code

1F1A92 - P16E9

Fault description

The diagnostic function monitors the internal sensor supply voltage G2.

Condition for fault identification

Test condition:

The fault is recognized by the self-diagnosis.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- It is possible to continue driving the vehicle, but passing maneuvers should not be attempted owing to reduction in engine output.

Possible apparent symptoms:

- Reduced performance
- Speed limitation

Driver information

Warning light:

MY10 ECE:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: off
- CC message: on

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

MY11 ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P0617; BMW DTC 1F1B40: STARTER, ACTIVATION: SHORT CIRCUIT TO POSITIVE**Information saved in**

DME

Fault code

1F1B40 - P0617

Fault description

The diagnostic function monitors the starter control-activation wire (Terminal 50) from the DME to the CAS.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defect in wiring harness between CAS and DME
- CAS defective
- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between CAS and DME
- Continue fault diagnosis with CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off

- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0616; BMW DTC 1F1B41: STARTER, ACTIVATION: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

1F1B41 - P0616

Fault description

The diagnostic function monitors the starter control-activation wire (Terminal 50) from the DME to the CAS.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defect in wiring harness between CAS and DME
- CAS defective
- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between CAS and DME
- Continue fault diagnosis with CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Delayed engine start

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0615; BMW DTC 1F1B42: STARTER, ACTIVATION: OPEN CIRCUIT

Information saved in

DME

Fault code

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1F1B42 - P0615

Fault description

The diagnostic function monitors the starter control-activation wire (Terminal 50) from the DME to the CAS.

Condition for fault identification

Test condition:

The fault is recognized when an open wire is present.

Potential problem source(s):

- Defect in wiring harness between CAS and DME
- CAS defective
- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between CAS and DME
- Continue fault diagnosis with CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0687; BMW DTC 1F1B50: SYSTEM VOLTAGE, DME MASTER RELAY: VOLTAGE TOO HIGH

Information saved in

DME

Fault code

1F1B50 - P0687

Fault description

The diagnostic function monitors the battery voltage relative to an upper limit.

Condition for fault identification

Test condition:

Electrical system voltage above 16 V

Potential problem source(s):

- Systematic fault, for instance, jump start with 24 V
- Defect in power supply to DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- 2 min. after engine start

Other conditions:

- Speed > 20 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- If an overvoltage fault is logged in the fault memories of multiple control modules then the source is a systematic malfunction in the vehicle (for instance, jump start with 24 V). - If the overvoltage fault is logged in the fault memory of only one control module, then the problem lies with the power supply to this specific control module.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P3288; BMW DTC 1F2104: INCORRECT DATA RECORD: CAN TIMEOUT**Information saved in**

DME

Fault code

1F2104 - P3288

Fault description

The diagnostic function monitors the CAN bus between the CAS and DME.

Condition for fault identification

Test condition:

The fault is recognized when the VEHICLE VERSION message from the CAS is missing.

Potential problem source(s):

- Time limit violation transmitting VEHICLE VERSION message from CAS
- Defective CAS
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis at the following ECU: CAS Replace CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Avoid passing maneuvers as engine power is reduced

Possible apparent symptoms:

- Possible power reduction caused by incorrect performance class

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P3289; BMW DTC 1F2108: INCORRECT DATA RECORD: VARIANT MONITORING

Information saved in

DME

Fault code

1F2108 - P3289

Fault description

The diagnostic function monitors the software versions in the CAS and DME.

Condition for fault identification

Test condition:

The fault is recognized when the software versions are not mutually compatible.

Potential problem source(s):

- DME programming error
- DME encoded incorrectly
- Defective CAS
- Defective DME

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Continue fault diagnosis at the following ECU: CAS

Reprogram and encode DME

- Replace CAS
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

Avoid passing maneuvers as engine power is reduced

Possible apparent symptoms:

- Possible power reduction caused by incorrect performance class

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0634; BMW DTC 1F5020: DME, INTERNAL FAULT, INTERIOR-TEMPERATURE SENSOR: VALUE TOO HIGH

Information saved in

DME

Fault code

1F5020 - P0634

Fault description

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The diagnostic function monitors control module temperature for violation of an upper limit.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the voltage value for ECU temperature > 4.9 V.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

- none

DTC P163A; BMW DTC 1F5021: DME, INTERNAL FAULT, INTERIOR-TEMPERATURE SENSOR: VALUE TOO LOW**Information saved in**

DME

Fault code

1F5021 - P163A

Fault description

The diagnostic function monitors control module temperature for violation of a lower limit.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the voltage for the control module temperature is > 0.1 V.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

- none

DTC P0634; BMW DTC 1F5101: DME TEMPERATURE: OVERTEMPERATURE

Information saved in

DME

Fault code

1F5101 - P0634

Fault description

The diagnostic function monitors the interior temperature of the DME.

Condition for fault identification

Test condition:

The fault is recognized when the temperature in the DME is too high.

Potential problem source(s):

- DME overheated
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check E-box fan as indicated
- Only replace the DME if the fault remains present continuously or if the fault frequency is greater than 3

Fault effect and breakdown warning

Breakdown notice:

- none

Possible apparent symptoms:

- Loss of power

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: on
- US electronic engine power reduction: on
- CC message: on

Service instruction

- none

DTC P10DC; BMW DTC 201010: CAN HARDWARE: FAULTY

Information saved in

DME

Fault code

201010 - P10DC

Fault description

The diagnostic function monitors the CAN controller in the DME.

Condition for fault identification

Test condition:

The fault is recognized when a hardware fault is present in the CAN controller.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- No tachometer display in the instrument cluster
- Brief RPM drop when IHKA automatic climate control is activated at idle

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P10DD; BMW DTC 201020: FLEXRAY HARDWARE: FAULTY

Information saved in

DME

Fault code

201020 - P10DD

Fault description

The diagnostic function monitors the CAN controller in the DME.

Condition for fault identification

Test condition:

The fault is recognized when a hardware fault is present in the FlexRay controller.

Potential problem source(s):

- DME defective

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- DSC Failure
- Cruise control failure

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P15D0; BMW DTC 20A701: COOLANT PUMP, SPEED DEVIATION: OUTSIDE TOLERANCE**Information saved in**

DME

Fault code

20A701 - P15D0

Fault description

The diagnostic function monitors the rotation speed of the electric water pump.

Condition for fault identification

Test condition:

The fault is recognized when the specified and actual rotation speeds of the electric water pump fail to match.

Potential problem source(s):

- Air in the cooling system
- Defect in wiring harness to water pump
- Defective water pump

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- Engine warmed to normal temp, above 80 °C

Time condition:

- None

Other conditions:

- Engine on

- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check mixture ratio of coolant and inspect for contamination
- Bleed air from cooling system
- Transmit activation voltage to water pump and evaluate operation with visual inspection at the expansion tank
- Check wiring harness between water pump and DME
- Replace water pump

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message if engine becomes too hot, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Observe sequence for fault rectification:

- If the pump is activated at TMOT>90 °C as tester job the diagnostic fault code 0x3792 or 0x20AD08 'Water pump: rotation speed implausible' can be logged, ignore this fault and delete it --> Carry out tester job at Tmot<90°C

DTC P15D1; BMW DTC 20A801: COOLANT PUMP, DEACTIVATION: INTERNAL

TEMPERATURE TOO HIGH**Information saved in**

DME

Fault code

20A801 - P15D1

Fault description

The diagnostic function monitors the temperature of the electric water pump's electronics.

Condition for fault identification

Test condition:

The fault is recognized when the temperature of the water pump's electronics is $>136^{\circ}\text{C}$. A power reduction is entered.

Potential problem source(s):

- Electric fan defective
- Coolant thermostat defective
- Insufficient coolant
- Defective water pump

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Continue testing with test modules focusing on problems with the electric fan and the thermostat
- Start engine, set heat to maximum output, allow to run for 5 minutes and the check to determine whether the diagnostic fault code has been logged again
- If the diagnostic fault code continues to appear despite correct engine temperature replace the water pump

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message if engine becomes too hot, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Observe sequence for fault rectification:

- If the pump is activated at TMOT>90 °C as tester job the diagnostic fault code 0x3792 or 0x20AD08 'Water pump: rotation speed implausible' can be logged, ignore this fault and delete it --> Carry out tester job at Tmot<90°C

DTC P15D2; BMW DTC 20A802: COOLANT PUMP, SHUTDOWN: OVERVOLTAGE DETECTED**Information saved in**

DME

Fault code

20A802 - P15D2

Fault description

The diagnostic function monitors the power-supply voltage to the electric water pump.

Condition for fault identification

Test condition:

The fault is recognized when the electric water pump deactivates as a result of overvoltage.

Potential problem source(s):

- Jump-start with 24 V battery
- Problem with electrical system voltage
- Defective water pump

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Continue test routine with test modules that deal with problems related to voltage in onboard electrical

system

- Start engine, set heat to maximum output, allow to run for one minute and then check to determine whether the diagnostic fault code has been logged again
- If the diagnostic fault code continues to appear despite correct electrical system voltage replace the water pump

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message if engine becomes too hot, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Observe sequence for fault rectification:

- If the pump is activated at TMOT > 90 °C as tester job the diagnostic fault code 0x3792 or 0x20AD08 'Water pump: rotation speed implausible' can be logged, ignore this fault and delete it --> Carry out tester job at Tmot < 90 °C

DTC P15D3; BMW DTC 20A804: COOLANT PUMP, SHUTDOWN: PUMP BLOCKED

Information saved in

DME

Fault code

20A804 - P15D3

Fault description

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The diagnostic function monitors the electric water pump for mechanical seizure.

Condition for fault identification

Test condition:

The fault is recognized when the electric water pump deactivates in response to recognized seizure.

Potential problem source(s):

- Foreign matter/contamination in coolant
- Incorrect coolant mixture ratio
- Defective water pump

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Execute operational check
- Check coolant mixture ratio
- Check water pump and coolant for foreign matter/objects
- Replace water pump

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message if engine becomes too hot, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Observe sequence for fault rectification:

- If the pump is activated at TMOT>90 °C as tester job the diagnostic fault code 0x3792 or 0x20AD08 'Water pump: rotation speed implausible' can be logged, ignore this fault and delete it --> Carry out tester job at Tmot<90°C

DTC P15D4; BMW DTC 20A901: COOLANT PUMP, OPERATION WITH REDUCED OUTPUT: DRY RUNNING DETECTED

Information saved in

DME

Fault code

20A901 - P15D4

Fault description

The diagnostic function monitors the electric water pump for cavitation.

Condition for fault identification

Test condition:

The fault is recognized when the electric water pump recognizes cavitation.

Potential problem source(s):

- Coolant loss, leak in cooling system
- Air in the cooling system

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check cooling system for leaks
- Refill and then bleed cooling system as indicated
- If the fault continues to appear although the cooling system is bled and no leaks are present, replace the water pump.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message if engine becomes too hot, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Observe sequence for fault rectification:

- If the pump is activated at TMOT>90 °C as tester job the diagnostic fault code 0x3792 or 0x20AD08 'Water pump: rotation speed implausible' can be logged, ignore this fault and delete it --> Carry out tester job at Tmot<90°C

DTC P15D5; BMW DTC 20A902: COOLANT PUMP, OPERATION WITH REDUCED OUTPUT: UNDERVOLTAGE DETECTED**Information saved in**

DME

Fault code

20A902 - P15D5

Fault description

The diagnostic function monitors the power-supply voltage to the electric water pump.

Condition for fault identification

Test condition:

The fault is recognized when the voltage is <10 V.

Potential problem source(s):

- Battery charge status or electrical system voltage is not OK
- Defective wiring harness
- Defective water pump

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- No BSD fault
- No alternator fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Continue test routine with test modules that deal with problems related to voltage in onboard electrical system
- Start engine, set heat to maximum output, allow to run for one minute and then check to determine whether the diagnostic fault code has been logged again
- If the fault continues to appear despite correct electrical system voltage replace the water pump

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message if engine becomes too hot, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Observe sequence for fault rectification:

- If the pump is activated at TMOT>90 °C as tester job the diagnostic fault code 0x3792 or 0x20AD08 'Water pump: rotation speed implausible' can be logged, ignore this fault and delete it --> Carry out tester job at Tmot<90°C

DTC P15D6; BMW DTC 20A904: COOLANT PUMP, POWER-REDUCED OPERATION: TEMPERATURE LIMIT 1 EXCEEDED**Information saved in**

DME

Fault code

20A904 - P15D6

Fault description

The diagnostic function monitors the temperature of the water pump's electronics.

Condition for fault identification

Test condition:

The fault is recognized when the temperature of the water pump's electronics is >133 °C. A power reduction is entered.

Potential problem source(s):

- Electric fan defective
- Coolant thermostat defective
- Insufficient coolant
- Defective water pump

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Continue testing with test modules focusing on problems with the electric fan and the thermostat
- Start engine, set heat to maximum output, allow to run for 5 minutes and then check to determine whether the diagnostic fault code has been logged again
- If the diagnostic fault code continues to appear despite correct engine temperature replace the water pump

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message if engine becomes too hot, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off

- US electronic engine power reduction: off
- CC message: on

Service instruction

Observe sequence for fault rectification:

- If the pump is activated at $T_{MOT} > 90^{\circ}\text{C}$ as tester job the diagnostic fault code 0x3792 or 0x20AD08 'Water pump: rotation speed implausible' can be logged, ignore this fault and delete it --> Carry out tester job at $T_{mot} < 90^{\circ}\text{C}$

DTC P15D7; BMW DTC 20A908: COOLANT PUMP, POWER-REDUCED OPERATION: TEMPERATURE LIMIT 2 EXCEEDED**Information saved in**

DME

Fault code

20A908 - P15D7

Fault description

The diagnostic function monitors the temperature of the water pump's electronics.

Condition for fault identification

Test condition:

The fault is recognized when the temperature of the water pump's electronics is $> 133^{\circ}\text{C}$. A power reduction is entered.

Potential problem source(s):

- Electric fan defective
- Coolant thermostat defective
- Insufficient coolant
- Defective water pump

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Continue testing with test modules focusing on problems with the electric fan and the thermostat
- Start engine, set heat to maximum output, allow to run for 5 minutes and the check to determine whether the diagnostic fault code has been logged again
- If the diagnostic fault code continues to appear despite correct engine temperature replace the water pump

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

CC message if engine becomes too hot, breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Observe sequence for fault rectification:

- If the pump is activated at TMOT>90 °C as tester job the diagnostic fault code 0x3792 or 0x20AD08 'Water pump: rotation speed implausible' can be logged, ignore this fault and delete it --> Carry out tester job at Tmot<90°C

DTC U1170; BMW DTC 20AA04: COOLANT PUMP, COMMUNICATION: MALFUNCTION**Information saved in**

DME

Fault code

20AA04 - U1170

Fault description

The diagnostic function monitors BSD bus communications with the electric water pump.

Condition for fault identification

Test condition:

The fault is recognized when the electric water pump fails to respond to BSD bus messages from the DME.

Potential problem source(s):

- Defect in wiring harness to water pump
- Communications problem on BSD bus
- Defective water pump

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- No BSD fault

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Continue test routine with test modules that deal with problems related to voltage in onboard electrical system
- Check wiring harness between water pump and DME
- Conduct tester job
- Replace water pump

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Breakdown in extreme cases, electric water pump stops operating - engine overheats

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Observe sequence for fault rectification:

- If the pump is activated at TMOT>90 °C as tester job the diagnostic fault code 0x3792 or 0x20AD08 'Water pump: rotation speed implausible' can be logged, ignore this fault and delete it --> Carry out tester job at Tmot<90°C

DTC P0620; BMW DTC 210201: ALTERNATOR, ELECTRIC: MALFUNCTION**Information saved in**

DME

Fault code

210201 - P0620

Fault description

The diagnostic function monitors whether the alternator is supplying power.

Condition for fault identification

Test condition:

The fault is recognized by complex self-diagnosis routines in the regulator and transmitted to the DME via the BSD bus.

Potential problem source(s):

- Positive wire not correctly connected to battery
- Ground not correctly connected
- Defective regulator
- Alternator defect

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Alternator not fully loaded

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check positive wire for correct installation
- Check ground wire for correct installation
- Check alternator
- Fault frequency = 1: If the IMIB is available, perform an alternator test / If no IMIB is available, delete stored fault codes from control module fault memory and do not perform any other actions
- Fault frequency > 1: Replace alternator

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Charge indicator lamp lights up
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Can occur during vehicle servicing when external power source is connected, etc.

DTC P325A; BMW DTC 210301: ALTERNATOR, PLAUSIBILITY, ELECTRIC: CALCULATED

Information saved in

DME

Fault code

210301 - P325A

Fault description

The diagnostic function monitors the voltage of the onboard electrical system and compares it with the specified alternator voltage.

Condition for fault identification

Test condition:

The fault is recognized when the actual voltage of the onboard electrical system is below the specified voltage.

Potential problem source(s):

- Positive wire not correctly connected to battery
- Ground not correctly connected
- Defective battery
- Defective regulator
- Alternator defect

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Alternator not fully loaded

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 6 min.

Action in service

- Check positive wire for correct installation
- Check ground wire for correct installation
- Check battery
- If the IMIB is available, perform an alternator test
- If no IMIB is available, replace alternator

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Charge indicator lamp lights up
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Can occur during vehicle servicing when external power source is connected, etc.

DTC P0A3B; BMW DTC 210401: ALTERNATOR, TEMPERATURE: OVERTEMPERATURE

Information saved in

DME

Fault code

210401 - P0A3B

Fault description

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The diagnostic function monitors the alternator temperature.

Condition for fault identification

Test condition:

The fault is recognized by temperature measurement in the regulator and transmitted to the DME via the BSD bus.

Potential problem source(s):

- Alternator dirty
- Airflow to alternator obstructed
- Thermal overload from unfavorable driving profile possible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Alternator not fully loaded

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Inspect alternator for unobstructed air current
- If the IMIB is available, perform an alternator test
- If no IMIB is available, delete stored fault codes from control module fault memory and take no further action

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Reduction in availability of comfort and convenience accessories

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

If no other faults related to the alternator have been logged, do not replace the alternator.

This fault only indicates that the alternator's thermal protection function has assumed active status in response to excessive component temperature.

This is not a case of a defective component.

DTC P324C; BMW DTC 210501: ALTERNATOR, PLAUSIBILITY, TEMPERATURE: OVERTEMPERATURE CALCULATED

Information saved in

DME

Fault code

210501 - P324C

Fault description

The diagnostic function monitors the alternator temperature.

Condition for fault identification

Test condition:

The fault is recognized when the calculated diode temperature rises above a specified limit temperature.

Potential problem source(s):

- Alternator dirty
- Airflow to alternator obstructed
- Thermal overload from unfavorable driving profile possible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Alternator not fully loaded

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Inspect alternator for unobstructed air current
- If the IMIB is available, perform an alternator test
- If no IMIB is available, delete stored fault codes from control module fault memory and take no further action

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Reduction in availability of comfort and convenience accessories

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

If no other faults related to the alternator have been logged, do not replace the alternator.

This fault only indicates that the alternator's thermal protection function has assumed active status in response to excessive component temperature.

This is not a case of a defective component.

DTC P3223; BMW DTC 210601: ALTERNATOR, MECHANICAL: MALFUNCTION**Information saved in**

DME

Fault code

210601 - P3223

Fault description

The diagnostic function monitors the alternator's rotation speed.

Condition for fault identification

Test condition:

The fault is recognized by complex self-diagnosis routines in the regulator and transmitted to the DME via the BSD bus.

Potential problem source(s):

- Alternator drive defective

- Alternator defect (bearing damage)

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Alternator not fully loaded

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check alternator drive (belt)
- Replace alternator

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Charge indicator lamp lights up
- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

Can occur during vehicle servicing when external power source is connected, etc.

DTC P324E; BMW DTC 210701: ALTERNATOR, REGULATOR: MODEL INCORRECT**Information saved in**

DME

Fault code

210701 - P324E

Fault description

The diagnostic function monitors the regulator code and compares it with the specified value stored in the DME.

Condition for fault identification

Test condition:

The fault is recognized when the regulator code does not match the code stored in the DME.

Potential problem source(s):

- Incorrect regulator installed

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Alternator not fully loaded

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the fault frequency is less than or equal to 3, clear the control module fault memory and do not take any further action
- If the fault frequency is > 3 , then replace the alternator

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P324A; BMW DTC 210801: ALTERNATOR, MODEL INCORRECT

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DME

Fault code

210801 - P324A

Fault description

The diagnostic function monitors alternator's code and compares it with the specified value.

Condition for fault identification

Test condition:

The fault is recognized when the regulator code does not match the code stored in the DME.

Potential problem source(s):

- Incorrect alternator installed

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Alternator not fully loaded

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the fault frequency is less than or equal to 3, clear the control module fault memory and do not take any further action

- If the fault frequency is > 3, then replace the alternator

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Mild roughness at idle can occur

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

Alternator continues to supply power to vehicle.

DTC P160C; BMW DTC 213301: POWER MANAGEMENT: OVERVOLTAGE**Information saved in**

DME

Fault code

213301 - P160C

Fault description

The diagnostic function monitors the onboard electrical system's voltage at the DME while the engine is running.

Condition for fault identification

Test condition:

The fault is recognized when the onboard electrical system's voltage exceeds 16 V.

Potential problem source(s):

- With engine running, excessive voltage from:
- External charger/battery (jump-start from truck, 24 V)
- Defective voltage regulator
- PCU Power Control Unit defective, if present
- DME/DDE voltage measurement defective

Terminal condition: none

Voltage condition:

- Electrical system voltage greater than 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Ask customer if charge from external source/jump start has been performed
- Check voltage regulator
- Determine whether diagnostic fault codes are logged in the PCU.
- Determine whether internal control module faults have been logged in the DME/DDE.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Flickering lights,
- Functional failure (loss of functionality)
- Possible destruction of electrical equipment.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P160D; BMW DTC 213401: POWER MANAGEMENT: UNDERVOLTAGE

Information saved in

DME

Fault code

213401 - P160D

Fault description

The diagnostic function monitors the electrical system voltage at the DME/DDE with the engine running.

Condition for fault identification

Test condition:

The fault is recognized when the onboard electrical system's voltage falls below 9 V.

Potential problem source(s):

- Defective battery
- Defective voltage regulator

- Defect in wiring harness (power supply wiring to DME/DDE)
- DME/DDE voltage measurement defective

Terminal condition: none

Voltage condition:

- Electrical system voltage less than 9 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Use battery tester to check battery condition
- Check battery for damage (electrolyte loss, deformation,?), replace as indicated
- Check alternator, replace as indicated
- Check power-supply voltage to DME/DDE,
- Determine whether internal ECU errors are logged in the DME/DDE.
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Flickering lights
- Functional failure (loss of functionality)
- Electrical devices cease to operate

- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P160A; BMW DTC 213501: POWER MANAGEMENT: EXHAUSTIVE BATTERY CHARGE**Information saved in**

DME

Fault code

213501 - P160A

Fault description

The diagnostic function monitors the electrical system voltage at the DME/DDE.

Condition for fault identification

Test condition:

The fault is recognized when the battery voltage is too low.

Potential problem source(s):

- Increased power consumption while stationary leading to battery damage,
- Vehicle parked too long

Terminal condition: none

Voltage condition:

- Electrical system voltage less than 9.5 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Conduct (ABL) energy diagnosis test module
- Ask customer if vehicle has remained parked for an extended period

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P160F; BMW DTC 213604: POWER MANAGEMENT: CLOSED-CIRCUIT CURRENT FAULT**Information saved in**

DME

Fault code

213604 - P160F

Fault description

The diagnostic function monitors the standby current draw.

Condition for fault identification

Test condition:

The fault is recognized when the discharge from excessively high standby currents is higher than 1 Ah.

Potential problem source(s):

- Closed-circuit current too high

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Conduct (ABL) energy diagnosis test module
- Conduct external standby current measurement

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Breakdown in extreme cases

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P160E; BMW DTC 213701: POWER MANAGEMENT: RIPPLE IN SYSTEM VOLTAGE TOO HIGH**Information saved in**

DME

Fault code

213701 - P160E

Fault description

The diagnostic function monitors the electrical system voltage at the DME/DDE with the engine running.

Condition for fault identification

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Test condition:

The fault is logged in the control module's fault memory when the electrical system voltage is less than 8.5 V or higher than 18 V.

Potential problem source(s):

- Battery not connected correctly (loose contact).
- Defect in wiring harness (power supply wiring to DME/DDE)
- DME/DDE voltage measurement defective

Terminal condition: none**Voltage condition:**

- Electrical system voltage less than 8.5 V
- Electrical system voltage greater than 18 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check screws on battery terminals
- Check DME/DDE power-supply voltage
- Determine whether internal control module faults have been logged in the DME/DDE.

Fault effect and breakdown warning**Breakdown notice:**

None

Possible apparent symptoms:

- Flickering lights
- Functional failure (loss of functionality)
- In extreme cases engine fails to operate owing to undervoltage.

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC P0563; BMW DTC 213A20: SYSTEM VOLTAGE: VOLTAGE TOO HIGH

Information saved in

DME

Fault code

213A20 - P0563

Fault description

The diagnostic function monitors the electrical system voltage relative to an upper limit value.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the electrical system voltage exceeds 16V.

Potential problem source(s):

- Alternator voltage regulator is defective

Terminal condition: none

Voltage condition:

- Electrical system voltage greater than 16 V

Temperature condition:

- None

Time condition:

- 2 min. after engine start

Other conditions:

- Engine on
- Speed > 20 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Replace alternator

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

Power reduction, CC message for engine malfunction

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off

· CC message: on

Service instruction

None

DTC P0562; BMW DTC 213A21: SYSTEM VOLTAGE: VOLTAGE TOO LOW**Information saved in**

DME

Fault code

213A21 - P0562

Fault description

The diagnostic function monitors the battery voltage relative to a lower limit.

Condition for fault identification

Test condition:

The fault code is logged in the ECU fault memory when the electrical system voltage is higher than 2.54 V but lower than 9.99 V.

Potential problem source(s):

- Plug or wiring harness on alternator defective
- Plug or wiring harness on DME defective
- Alternator defect
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 2.54 V and 9.99 V

Temperature condition:

- None

Time condition:

- 3 min. after engine start

Other conditions:

- Engine ON

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check alternator and power manager
- Check plug and wiring harness at alternator
- Check plug and wiring harness at DME
- Replace alternator
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0560; BMW DTC 213A22: SYSTEM VOLTAGE: ANALOGUE-DIGITAL CONVERTER FAULTY

Information saved in

DME

Fault code

213A22 - P0560

Fault description

The diagnostic function monitors the voltage of the analog-digital converter.

Condition for fault identification

Test condition:

The fault is logged in the ECU fault memory when the voltage at the AD converter (inside DME) is less than 2.54 V.

Potential problem source(s):

- Defective DME (analog-digital converter)

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Clear diagnostic fault codes from ECU fault memory,
- if fault appears again replace the DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P150A; BMW DTC 215001: INTELLIGENT BATTERY SENSOR, SIGNAL: BUS FAULT

Information saved in

DME

Fault code

215001 - P150A

Fault description

The diagnostic function monitors expanded communications between the IBS and DME on the LIN bus.

Condition for fault identification

Test condition:

The fault is recognized when frequent interference occurs on the LIN bus.

Potential problem source(s):

- Intermittent open on LIN bus wire
- Other defective components on LIN bus
- IBS defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Check LIN bus and plug connector between IBS and DME/DDE
- Note faults at other devices on the bus
- Replace IBS

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Anything from no symptoms to breakdown from undercharged battery

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P150D; BMW DTC 215101: INTELLIGENT BATTERY SENSOR (IBS): INTERNAL TEMPERATURE MEASUREMENT IMPLAUSIBLE**Information saved in**

DME

Fault code

215101 - P150D

Fault description

The diagnostic system plausibilities the IBS temperature measurement.

Condition for fault identification

Test condition:

The fault is recognized when a fault with the temperature measurement is present.

Potential problem source(s):

- IBS defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been entered with a frequency > 3 or is present continuously then replace the IBS

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Anything from no symptoms to breakdown from undercharged battery

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P150E; BMW DTC 215104: INTELLIGENT BATTERY SENSOR (IBS): INTERNAL VOLTAGE MEASUREMENT IMPLAUSIBLE**Information saved in**

DME

Fault code

215104 - P150E

Fault description

The diagnostic system plausibilities the IBS voltage measurement.

Condition for fault identification

Test condition:

The fault is recognized when a fault with the voltage measurement is present.

Potential problem source(s):

- IBS defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been entered with a frequency > 3 or is present continuously then replace the IBS

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Anything from no symptoms to breakdown from undercharged battery

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P150F; BMW DTC 215108: INTELLIGENT BATTERY SENSOR (IBS): INTERNAL CURRENT MEASUREMENT IMPLAUSIBLE

Information saved in

DME

Fault code

215108 - P150F

Fault description

The diagnostic system plausibilities the IBS current measurement.

Condition for fault identification

Test condition:

The fault is recognized when the IBS current measurement is incorrect.

Potential problem source(s):

- IBS defective

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- If the diagnostic fault code has been entered with a frequency > 3 or is present continuously then replace the IBS

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Anything from no symptoms to breakdown from undercharged battery

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15CE; BMW DTC 215801: INTELLIGENT BATTERY SENSOR (IBS): WAKE-UP LINE, SHORT CIRCUIT TO B+ OR EARTH

Information saved in

DME

Fault code

215801 - P15CE

Fault description

L4: The diagnostic function monitors the wake-up wire

L6: The diagnostic function monitors the wake-up wire to the junction box electronics.

Condition for fault identification

Test condition:

The fault is recognized when the wake-up wire has a short circuit.

Potential problem source(s):

- L4: Defect in wake-up wire
- L6: Defect in wake-up wire from IBS to junction box electronics

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- L4: Check wake-up wire
- L6: Check wake-up wire between IBS and junction box electronics

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15CF; BMW DTC 215901: INTELLIGENT BATTERY SENSOR (IBS): INCORRECT VERSION**Information saved in**

DME

Fault code

215901 - P15CF

Fault description

The diagnostic function monitors compatibility of the IBS version with the power management in the DME/DDE.

Condition for fault identification

Test condition:

The fault is recognized when the IBS and DME/DDE are not compatible.

Potential problem source(s):

- DME/DDE and IBS are not compatible

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Replace IBS

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- none

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P15C3; BMW DTC 215A01: INTELLIGENT BATTERY SENSOR (IBS): WAKE-UP LINE, LINE DISCONNECTION

Information saved in

DME

Fault code

215A01 - P15C3

Fault description

L4: The diagnostic function monitors the wake-up wire

L6: The diagnostic function monitors the wake-up wire to the junction box electronics.

Condition for fault identification

Test condition:

L4: The fault is recognized when the signal level in the wake-up wire is implausible.

L6: The fault is recognized when the wake-up wire is open.

Potential problem source(s):

- L4: Defect in wake-up wire or IBS
- L6: Defect in wake-up wire from IBS to junction box electronics

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- L4: Check wake-up wire, replace IBS
- L6: Check wake-up wire between IBS and junction box electronics

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0A16; BMW DTC 219001: ACTIVE ENGINE MOUNT, ELECTRIC: SHORT CIRCUIT TO POSITIVE

Information saved in

DME

Fault code

219001 - P0A16

Fault description

The diagnostic function monitors the wire from the DME to the engine mount for shorts to positive.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to positive is present.

Potential problem source(s):

- Defect in wiring harness between engine mount and DME
- Defective engine mount
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Engine speed > 1200 RPM,
- Vehicle speed > 8.8 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and engine mount
- Replace engine mount
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off

- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0A15; BMW DTC 219002: ACTIVE ENGINE MOUNT, ELECTRIC: SHORT CIRCUIT TO GROUND**Information saved in**

DME

Fault code

219002 - P0A15

Fault description

The diagnostic function monitors the wire from the DME to the engine mount for shorts to ground.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit to ground is present.

Potential problem source(s):

- Defect in wiring harness between engine mount and DME
- Defective engine mount
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Engine speed > 1200 RPM,
- Vehicle speed > 8.8 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and engine mount
- Replace engine mount
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC P0A14; BMW DTC 219004: ACTIVE ENGINE MOUNT, ELECTRIC: OPEN CIRCUIT**Information saved in**

DME

Fault code

219004 - P0A14

Fault description

The diagnostic function monitors the electrical wire from the DME to the engine mount for opens.

Condition for fault identification

Test condition:

The fault is recognized when an open wire is present.

Potential problem source(s):

- Defect in wiring harness between engine mount and DME
- Defective engine mount
- Defective DME

Terminal condition: none

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- Engine on
- Engine speed > 1200 RPM,
- Vehicle speed > 8.8 km/h

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Check wiring harness between DME and engine mount
- Replace engine mount
- Replace DME

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1190; BMW DTC 231F04: ELECTRONIC TRANSMISSION CONTROL (EGS), PT-CAN, PT-CAN2: COMMUNICATION FAULT

Information saved in

DME

Fault code

231F04 - U1190

Fault description

The diagnostic function monitors the two communications paths A CAN and FA CAN between the transmission and the engine-management ECU.

Condition for fault identification

Test condition:

The fault is recognized when communications with the EGS electronic gearbox control in the A and FA CAN break down.

Potential problem source(s):

- Interference in communications to EGS via A and FA CAN

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Transmission in emergency program

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1169; BMW DTC 233004: NO MESSAGE (OBD SENSOR, DIAGNOSIS, STATUS, 0X5E0, 0X8C), RECEIVER DME, IHKA, TRANSMITTER KOMBI

Information saved in

DME

Fault code

233004 - U1169

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1185; BMW DTC CD840A: DME/DDE PT-CAN: COMMUNICATION FAULT**Information saved in**

DME

Fault code

CD840A - U1185

Fault description

The diagnostic function monitors the FA CAN.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit is present.

Potential problem source(s):

- Defect in FA CAN plugs or wiring harness

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- No tachometer display in the instrument cluster
- Brief RPM drop when IHKA automatic climate control is activated at idle

Driver information

Warning light:

- ECE emissions warning lamp: on
- ECE electronic engine power reduction: on
- CC message: on
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U119E; BMW DTC CD8420: DME/DDE FLEXRAY BUS: COMMUNICATION FAULT**Information saved in**

DME

Fault code

CD8420 - U119E

Fault description

The diagnosis monitors the FlexRay.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit is present.

Potential problem source(s):

- Defective FlexRay plug or wiring harness

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- DSC Failure
- Cruise control failure

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: on
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1184; BMW DTC CD8486: DME/DDE PT-CAN2: COMMUNICATION FAULT

Information saved in

DME

Fault code

CD8486 - U1184

Fault description

The diagnostic function monitors the A CAN.

Condition for fault identification

Test condition:

The fault is recognized when a short circuit is present.

Potential problem source(s):

- Defect in A CAN plug(s) or wiring harness

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1117; BMW DTC CD9902: MESSAGE (VEHICLE SPEED, 55.3.4) NOT CURRENT, RECEIVER DME/DDE, TRANSMITTER ICM

Information saved in

DME

Fault code

CD9902 - U1117

Fault description

The diagnostic function monitors the currency of the message.

Condition for fault identification

Test condition:

The fault is recognized when the keep-alive counter has not timed the message.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U1118; BMW DTC CD9904: NO MESSAGE (VEHICLE SPEED, 55.3.4), RECEIVER DME/DDE, TRANSMITTER IC

Information saved in

DME

Fault code

CD9904 - U1118

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U1119; BMW DTC CD9908: MESSAGE (VEHICLE SPEED, 55.3.4) CHECKSUM ERROR, RECEIVER DME/DDE, TRANSMITTER ICM

Information saved in

DME

Fault code

CD9908 - U1119

Fault description

The diagnostic function monitors the checksum of the message.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the message has a checksum error.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U11C6; BMW DTC CD9932: MESSAGE (YAW RATE, VEHICLE, 38.0.2) ALIVE CHECK**Information saved in**

DME

Fault code

CD9932 - U11C6

Fault description

The diagnostic function monitors the currency of the message.

Condition for fault identification

Test condition:

The fault is recognized when the keep-alive counter has not timed the message.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U0123; BMW DTC CD9933: NO MESSAGE (YAW RATE, VEHICLE, 38.0.2)

Information saved in

DME

Fault code

CD9933 - U0123

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U11C7; BMW DTC CD9934: MESSAGE (YAW RATE, VEHICLE, 38.0.2) CHECKSUM ERROR

Information saved in

DME

Fault code

CD9934 - U11C7

Fault description

The diagnostic function monitors the currency and the checksum of the message.

Condition for fault identification

Test condition:

The fault is recognized when the keep-alive counter has not timed the message and the message checksum is incorrect.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U0122; BMW DTC CD9935: NO MESSAGE (DATA, DRIVING DYNAMICS SENSOR, EXTENDED, 38.0.2)

Information saved in

DME

Fault code

CD9935 - U0122

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U1197; BMW DTC CD9A02: MESSAGE (ACTUAL BRAKING TORQUE, SUM, 43.3.4) NOT CURRENT, RECEIVER DME/DDE, TRANSMITTER DSC

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DME

Fault code

CD9A02 - U1197

Fault description

The diagnostic function monitors the currency of the message.

Condition for fault identification

Test condition:

The fault is recognized when the keep-alive counter has not timed the message.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1198; BMW DTC CD9A04: NO MESSAGE (ACTUAL BRAKING TORQUE, SUM, 43.3.4), RECEIVER DME/DDE, TRANSMITTER DSC

Information saved in

DME

Fault code

CD9A04 - U1198

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off

- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1199; BMW DTC CD9A08: MESSAGE (ACTUAL BRAKING TORQUE, SUM, 43.3.4) CHECKSUM ERROR, RECEIVER DME/DDE, TRANSMITTER DSC**Information saved in**

DME

Fault code

CD9A08 - U1199

Fault description

The diagnostic function monitors the checksum of the message.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the message has a checksum error.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

· none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

· Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1195; BMW DTC CD9B02: MESSAGE (ACTUAL WHEEL SPEED, 46.0.1) NOT CURRENT, RECEIVER DME/DDE, TRANSMITTER DSC

Information saved in

DME

Fault code

CD9B02 - U1195

Fault description

The diagnostic function monitors the currency of the message.

Condition for fault identification

Test condition:

The fault is recognized when the keep-alive counter has not timed the message.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U116D; BMW DTC CD9B04: NO MESSAGE (ACTUAL WHEEL SPEED, 46.0.1), RECEIVER DME/DDE, TRANSMITTER DSC

Information saved in

DME

Fault code

CD9B04 - U116D

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U1196; BMW DTC CD9B08: MESSAGE (ACTUAL WHEEL SPEED, 46.0.1) CHECKSUM ERROR, RECEIVER DME/DDE, TRANSMITTER DSC

Information saved in

DME

Fault code

CD9B08 - U1196

Fault description

The diagnostic function monitors the checksum of the message.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the message has a checksum error.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U1125; BMW DTC CD9F02: MESSAGE (DYNAMIC STABILITY CONTROL STABILIZATION, 47.1.2) NOT CURRENT, RECEIVER DME/DDE, TRANSMITTER DSC

Information saved in

DME

Fault code

CD9F02 - U1125

Fault description

The diagnostic function monitors the currency of the message.

Condition for fault identification

Test condition:

The fault is recognized when the keep-alive counter has not timed the message.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Cruise control failure
- Accelerator pedal progression failure

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1126; BMW DTC CD9F04: NO MESSAGE (DYNAMIC STABILITY CONTROL STABILIZATION, 47.1.2), RECEIVER DME/DDE, TRANSMITTER DSC

Information saved in

DME

Fault code

CD9F04 - U1126

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Cruise control failure
- Accelerator pedal progression failure

Driver information

Warning light:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1127; BMW DTC CD9F08: MESSAGE (DYNAMIC STABILITY CONTROL STABILIZATION, 47.1.2) CHECKSUM ERROR, RECEIVER DME/DDE, TRANSMITTER DSC

Information saved in

DME

Fault code

CD9F08 - U1127

Fault description

The diagnostic function monitors the checksum of the message.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the message has a checksum error.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Cruise control failure
- Accelerator pedal progression failure

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1101; BMW DTC CDA804: NO MESSAGE (RELATIVE TIME, 0X328), RECEIVER DME/DDE, TRANSMITTER KOMBI

Information saved in

DME

Fault code

CDA804 - U1101

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

DTC U0137; BMW DTC CDA904: NO MESSAGE (STATUS, TRAILER, 0X2E4), RECEIVER DME/DDE, TRANSMITTER AH

Information saved in

DME

Fault code

CDA904 - U0137

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 6 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1129; BMW DTC CDAB04: NO MESSAGE (REVERSE GEAR, 0X3B0), RECEIVER DME/DDE, TRANSMITTER FRM, FEM**Information saved in**

DME

Fault code

CDAB04 - U1129

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Accelerator pedal progression failure

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11A5; BMW DTC CDAC04: NO MESSAGE (STATUS, TRANSMISSION CONTROL UNIT, 0X39A), RECEIVER DME/DDE, TRANSMITTER EGS

Information saved in

DME

Fault code

CDAC04 - U11A5

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U112D; BMW DTC CDAD04: NO MESSAGE (CONTROL, CRASH SHUTDOWN, ELECTRIC FUEL PUMP, 0X135), RECEIVER DME/DDE, TRANSMITTER ACSM

Information saved in

DME

Fault code

CDAD04 - U112D

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U113C; BMW DTC CDAE04: NO MESSAGE (TIME DISPLAY, 0X2F8), RECEIVER DME/DDE, TRANSMITTER KOMB

Information saved in

DME

Fault code

CDAE04 - U113C

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U113A; BMW DTC CDAF04: NO MESSAGE (CENTRAL LOCKING AND LID STATUS, 0X2FC), RECEIVER DME/DDE, TRANSMITTER CAS, FEM

Information saved in

DME

Fault code

CDAF04 - U113A

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U119B; BMW DTC CDB204: NO MESSAGE (AMBIENT TEMPERATURE, 0X2CA), RECEIVER DME/DDE, TRANSMITTER KOMBI

Information saved in

DME

Fault code

CDB204 - U119B

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

ECE:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none

MY10 US:

- US emissions warning lamp: on
- US electronic engine power reduction: off
- CC message: on

Service instruction

None

**DTC U111C; BMW DTC CDB504: NO MESSAGE (KILOMETER READING / RANGE, 0X330),
RECEIVER DME/DDE, TRANSMITTER KOMBI**

Information saved in

DME

Fault code

CDB504 - U111C

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 2 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U111D; BMW DTC CDB602: MESSAGE (TERMINALS, 0X12F) NOT CURRENT, RECEIVER DME/DDE, TRANSMITTER CAS

Information saved in

DME

Fault code

CDB602 - U111D

Fault description

The diagnostic function monitors the currency of the message.

Condition for fault identification

Test condition:

The fault is recognized when the keep-alive counter has not timed the message.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Next engine start may take longer - No automatic car wash function

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U111E; BMW DTC CDB604: NO MESSAGE (TERMINALS, 0X12F), RECEIVER DME/DDE, TRANSMITTER CAS, FEM

Information saved in

DME

Fault code

CDB604 - U111E

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Next engine start may take longer - No automatic car wash function

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U111F; BMW DTC CDB608: MESSAGE (TERMINALS, 0X12F) CHECKSUM ERROR,

RECEIVER DME/DDE, TRANSMITTER CAS**Information saved in**

DME

Fault code

CDB608 - U111F

Fault description

The diagnostic function monitors the checksum of the message.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the message has a checksum error.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

- Next engine start may take longer - No automatic car wash function

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11A7; BMW DTC CDB904: NO MESSAGE (DIAGNOSIS, OBD GEARBOX, 0X396), RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDB904 - U11A7

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off

- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11B3; BMW DTC CDBB02: MESSAGE (REQUEST, TORQUE, CRANKSHAFT, GEARBOX 2, 0XA0) NOT CURRENT, RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDBB02 - U11B3

Fault description

The diagnostic function monitors the currency of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11B4; BMW DTC CDBB04: NO MESSAGE (REQUEST, TORQUE, CRANKSHAFT, GEARBOX 2, 0XA0), RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDBB04 - U11B4

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11B5; BMW DTC CDBB08: MESSAGE (REQUEST, TORQUE, CRANKSHAFT, GEARBOX 2, 0XA0) CHECKSUM ERROR, RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDBB08 - U11B5

Fault description

The diagnostic function monitors the checksum of the message.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the message has a checksum error.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11A6; BMW DTC CDBF04: NO MESSAGE (STATUS, TRANSMISSION CONTROL UNIT, 0X39A), RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDBF04 - U11A6

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11A4; BMW DTC CDC004: NO MESSAGE (DIAGNOSIS, OBD GEARBOX, 0X396), RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDC004 - U11A4

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11A1; BMW DTC CDC102: MESSAGE (DATA, TRANSMISSION LINE, 0X1AF) NOT CURRENT, RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDC102 - U11A1

Fault description

The diagnostic function monitors the currency of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Repair any problems indicated by diagnostic fault codes for other mixture-formation problems
- Replace the DME if currently present or the fault frequency is greater than 3.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11A2; BMW DTC CDC104: NO MESSAGE (DATA, TRANSMISSION LINE, 0X1AF), RECEIVER DME/DDE, TRANSMITTER DKG, EGS**Information saved in**

DME

Fault code

CDC104 - U11A2

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11A3; BMW DTC CDC108: MESSAGE (DATA, TRANSMISSION LINE, 0X1AF) CHECKSUM ERROR, RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDC108 - U11A3

Fault description

The diagnostic function monitors the checksum of the message.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the message has a checksum error.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11AD; BMW DTC CDC202: MESSAGE (REQUEST, TORQUE, CRANKSHAFT, EGS, 0X0B0) NOT CURRENT, RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDC202 - U11AD

Fault description

The diagnostic function monitors the currency of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11AE; BMW DTC CDC204: NO MESSAGE (REQUEST, TORQUE, CRANKSHAFT, EGS, 0X0B0), RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDC204 - U11AE

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U11AF; BMW DTC CDC208: MESSAGE (REQUEST, TORQUE, CRANKSHAFT, EGS, 0X0B0) CHECKSUM ERROR, RECEIVER DME/DDE, TRANSMITTER DKG, EGS

Information saved in

DME

Fault code

CDC208 - U11AF

Fault description

The diagnostic function monitors the checksum of the message.

Condition for fault identification

Test condition:

The diagnostic fault code is logged when the message has a checksum error.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

This fault is logged in the control module's fault memory immediately.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off

- US electronic engine power reduction: off
- CC message: none

Service instruction

None

DTC U1128; BMW DTC CDC304: NO MESSAGE (STATUS, ELECTRIC FUEL PUMP, 335), RECEIVER DME/DDE, TRANSMITTER EKP

Information saved in

DME

Fault code

CDC304 - U1128

Fault description

The diagnostic function monitors reception of the message.

Condition for fault identification

Test condition:

The fault is recognized when the message is not received in the specified time.

Potential problem source(s):

- Fault with transmitting control module

Terminal condition: Terminal 15

Voltage condition:

- Onboard electrical system voltage between 9 V and 16 V

Temperature condition:

- None

Time condition:

- None

Other conditions:

- none

Condition for fault memory entry

The diagnostic fault code is logged when the fault remains present for longer than 1 min.

Action in service

- Carry out system analysis.

Fault effect and breakdown warning

Breakdown notice:

None

Possible apparent symptoms:

None

Driver information

Warning light:

- ECE emissions warning lamp: off
- ECE electronic engine power reduction: off
- CC message: none
- US emissions warning lamp: off
- US electronic engine power reduction: off
- CC message: none

Service instruction

None

SUSPENSION**Steering and Wheel Alignment - Repair Instructions - 528xi, 535xi****00 ELECTRONIC CHASSIS ALIGNMENT****00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN****Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN**Danger of injury!**

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00... ... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.
2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

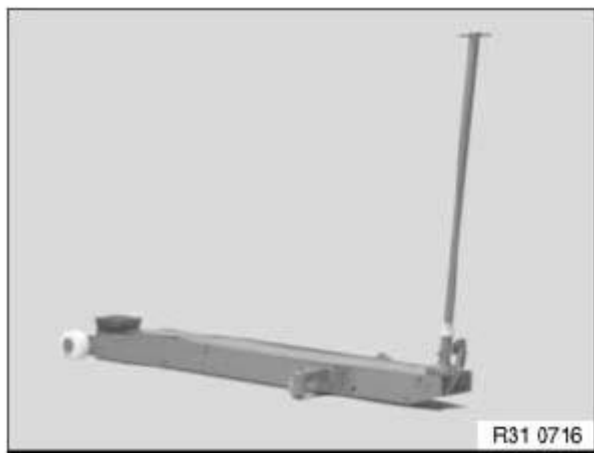


Fig. 1: Identifying Trolley Jack

Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

1. Carjacking point
2. Side carjacking points
3. Rear differential

Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

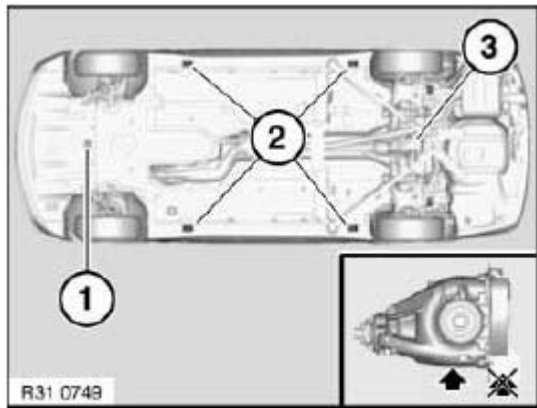


Fig. 2: Identifying Jacking Points

Courtesy of BMW OF NORTH AMERICA, INC.

31 00 ... FRONT AXLE + STEERING (AWD): WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

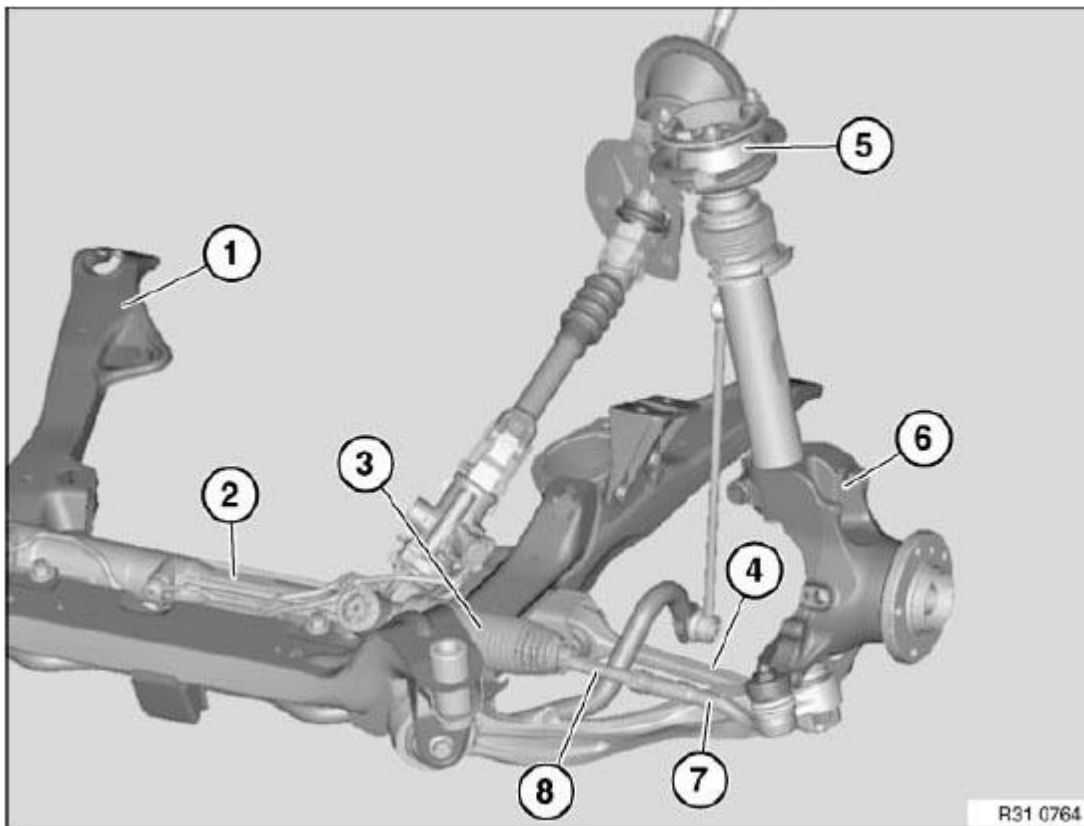


Fig. 3: Identifying Front Axle Components

Courtesy of BMW OF NORTH AMERICA, INC.

A wheel/chassis alignment check (see **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP**)

TO DESIGN POSITION or KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT WITHOUT LOAD) must be carried out after the following work:

- Release of following screw/bolt connections:
 - Steering gear to front axle carrier
 - Control arm to front axle carrier
 - Support bearing to body (if centering pin is missing)
 - Tie rod end to tie rod
- Replacement of following parts:
 1. Front axle carrier
 2. Steering gear
 3. Gaiter (if the tie rod end has to be screwed off)
 4. Control arm
 5. Support bearing (if centering pin is missing)
 6. Swivel bearing
 7. Tie rod end
 8. Tie rod

31 00 ... INSTRUCTIONS (DAMAGE TO SUSPENSION)

Substandard roadholding, atypical noises, tires worn on one side, camber and toe-in values which deviate from nominal value and mis-shaped components are all indicators of damage to the suspension caused by road traffic accidents or similar impacts.

To repair vehicle correctly, depending on condition of vehicle, perform the following troubleshooting procedure:

You must also follow the **RULES AND GUIDELINES FOR ACCIDENT-RELATED REPAIRS TO THE STEERING GEAR**.

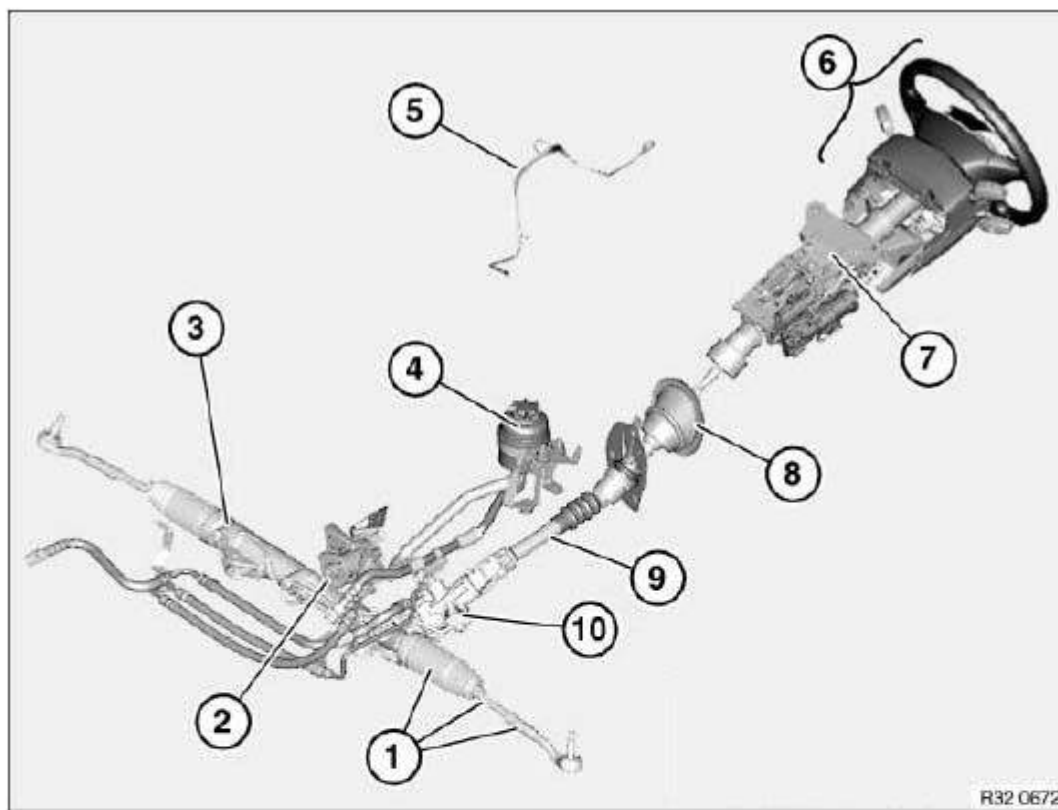
Troubleshooting

TROUBLESHOOTING CHART

Vehicle condition	Possible cause	Remedy
1 Camber inside/toe-in outside the nominal value, adjustment of track alignment possible	a. Screw connection not OK b. Tie rod or journal of tie rod end is deformed c. One or both tension struts is/are deformed d. Control arm deformed	a. Check screw connections: <u>TIE ROD END</u> to swivel bearing <u>TIE ROD</u> to power steering gear <u>POWER STEERING</u>

		<p><u>GEAR</u> to front axle carrier</p> <p>b. Replace <u>TIE ROD</u>, <u>TENSION STRUT</u> and <u>SWIVEL BEARING</u></p> <p>IMPORTANT: If the journal of the tie rod end is deformed, the <u>POWER STEERING GEAR</u> must also be replaced</p> <p>c. Replace <u>TENSION STRUT</u> and <u>SWIVEL BEARING</u></p> <p>d. Replace <u>CONTROL ARM</u>, <u>TENSION STRUT</u> and <u>SWIVEL BEARING</u></p>
2 Camber inside/toe-in outside the nominal value, adjustment of track alignment possible	Powerful forces acting on steering/front axle components	<p>Replace <u>TIE RODS</u></p> <p>Replace <u>SWIVEL BEARING</u></p> <p>Replace <u>POWER STEERING GEAR</u></p> <p>Replace <u>TENSION STRUT</u></p> <p>Replace <u>CONTROL ARMS</u></p>
3 Camber/toe-in outside the nominal value, adjustment of track alignment not possible	<p>Powerful forces acting on front axle with distortion of:</p> <p>a. Screw connections</p> <p>b. Front axle support</p> <p>c. See Pt. 1 b) to d)</p> <p>d. Spring strut/piston rod</p>	<p>a. Check screw connections, replace the relevant part if necessary</p> <p>b. Replace <u>FRONT AXLE CARRIER</u></p> <p>c. See Pt. 1 b) to d)</p> <p>d. Replace <u>SPRING STRUT</u></p>

32 OVERVIEW OF STEERING (AWD)



- | | | | |
|---|---|----|---|
| 1 | <u>Tie rod / tie rod end / gaiter</u> | 7 | <u>Steering column / el. steering column lock</u> |
| 2 | <u>Vane pump</u> | 8 | <u>Sleeve</u> |
| 3 | <u>Power steering gear</u> | 9 | <u>Steering spindle lower section</u> |
| 4 | <u>Oil container</u> | 10 | <u>Servotronic converter</u> |
| 5 | Up to 09/2005: <u>Interlock cable</u> | | |
| 6 | <u>Overview of steering wheel/casing components</u> | | |

Fig. 4: Identifying Steering Components (AWD)
 Courtesy of BMW OF NORTH AMERICA, INC.

32 OVERVIEW OF STEERING WHEEL / CASING COMPONENTS / LOCK CYLINDER

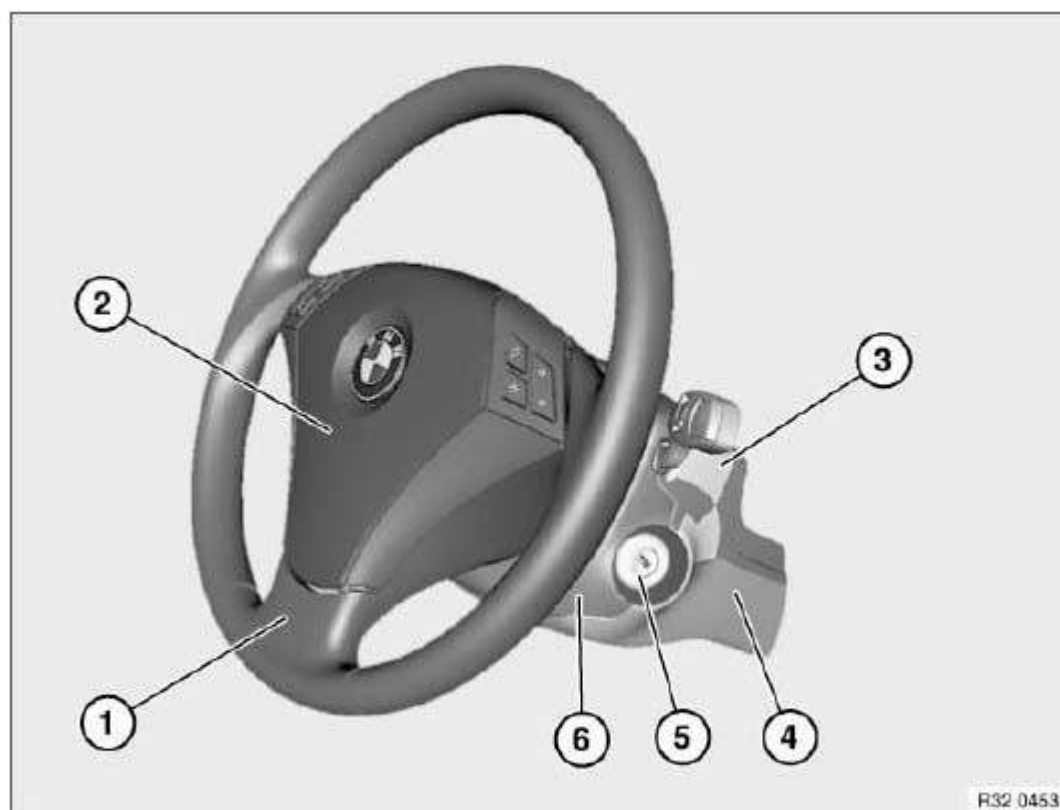
1 Steering wheel / decorative strips2 Airbag unit3 Upper steering column casing4 Lower steering column casing5 Lock cylinder6 Front steering column casing

Fig. 5: Identifying Steering Wheel Components
 Courtesy of BMW OF NORTH AMERICA, INC.

32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE

CHASSIS/WHEEL ALIGNMENT CHECKING PROCEDURE CHART

	Check adherence to test conditions					
	I V					
	Position vehicle on measuring stand					
	I V					
	Measure vehicle ride height		OK ->		Carry out CHASSIS/WHEEL ALIGNMENT CHECK with ride-	

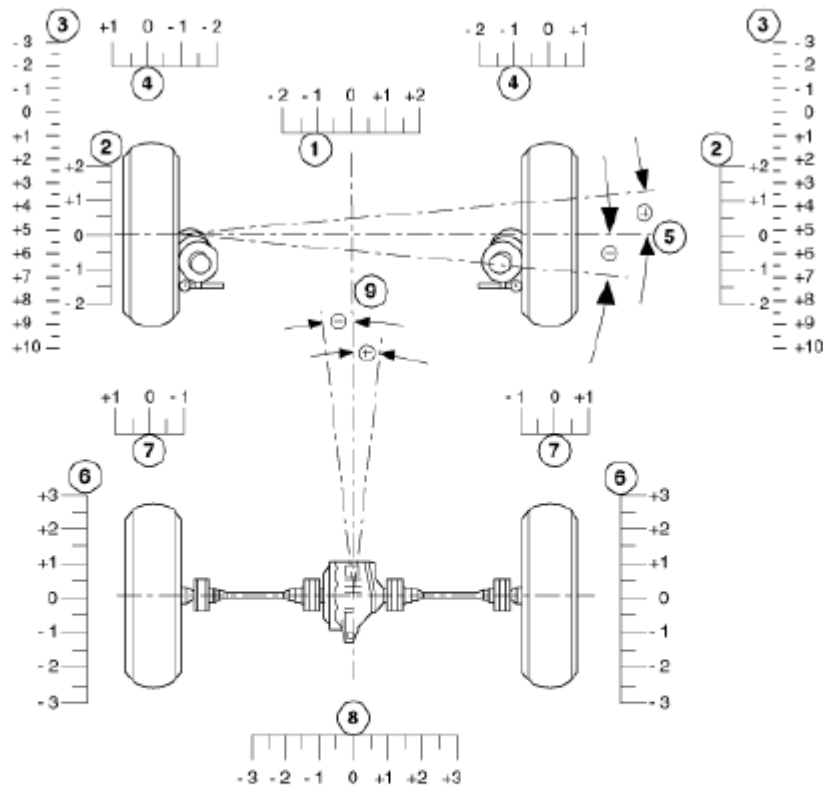
2010 BMW 535xi

SUSPENSION Steering and Wheel Alignment - Repair Instructions - 528xi, 535xi

					height measurement without load..	
	Read off setpoint value in KDS Tolerance -20 / +40 mm per wheel permissible Difference between left / right max. 10 mm permissible					
	Not OK / no data I V					
	Move vehicle into <u>NORMAL POSITION</u>					
	Introduce load and measure ride heights					
	Read off setpoint value in KDS Tolerance \pm 10 mm per wheel permissible Difference between left / right max. 10 mm permissible		Not OK ->			
	OK I V				Check suspension for damage, repair if necessary	
	Move vehicle into <u>DESIGN POSITION</u>		<- Not OK			
	Add/distribute weights and measure ride heights					
	Read off setpoint value in KDS Tolerance \pm 2 mm per wheel permissible Difference between left / right max. 2 mm permissible					
	I V					
	Carry out KDS					

CHASSIS/WHEEL ALIGNMENT CHECK with load up to design position				
--	--	--	--	--

32 00 ... GENERAL CHASSIS AND SUSPENSION DEFINITIONS



31 32 018

- | | |
|---|------------------------|
| 1. Toe | 5. Wheel offset |
| 2. Camber | 6. Camber |
| 3. Caster (with 10° or 20° wheel lock) | 7. Rear-wheel position |
| 4. Toe angle difference (with 20° wheel lock) | 8. Toe |
| | 9. Geometrical axis |

Fig. 6: Identifying Chassis And Suspension Dimensions
 Courtesy of BMW OF NORTH AMERICA, INC.

32 00 ... GENERAL INFORMATION AND DEFINITIONS

Toe angle difference

a Toe angle difference

D Center point of operating circle

The toe angle difference is the angle adjustment of the inner cornering wheel relative to the outer cornering wheel when negotiating a curve. Steering is designed in such a way that angular position of wheels changes as steering lock progresses.

A correctly adjusted toe angle difference produces equal values for left and right lock with consideration of factory tolerances.

Toe angle difference provides information on corresponding operation of steering trapezoid for left or right steering lock from center position.

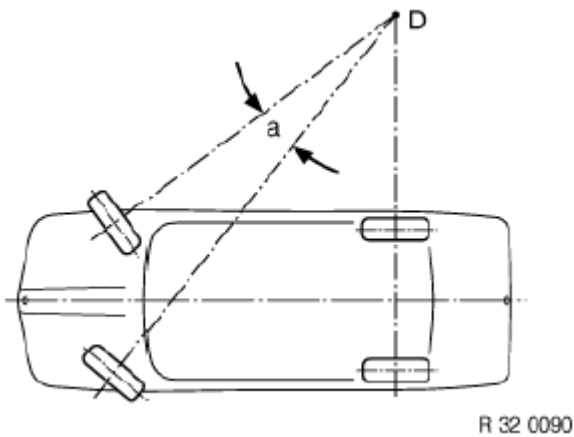


Fig. 7: Identifying Toe Angle Difference
Courtesy of BMW OF NORTH AMERICA, INC.

Camber

Inclination of the wheel from the perpendicular.

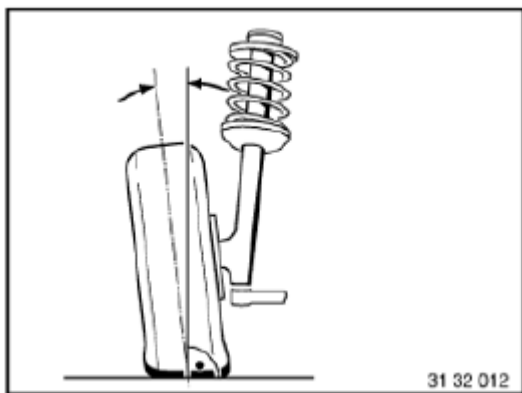


Fig. 8: Identifying Camber
Courtesy of BMW OF NORTH AMERICA, INC.

Toe

Reduction in distance of front of front wheels to rear of front wheels. The toe-in prevents the wheels from moving apart during driving and thus:

- the wheels from vibrating and grinding
- excessive tire wear
- excessive strain on the steering linkage and its links/joints
- heavy vehicle steering

Measurement is performed in "straight-ahead mode".

Caster

Is the inclination of the kingpin in the direction of travel viewed from the side. The line through the center point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

Thanks to caster, wheels are pulled and not pushed. In a similar manner to king pin inclination, when driving in curves or around corners, returning forces are reproduced to help return wheels to straight-ahead position.

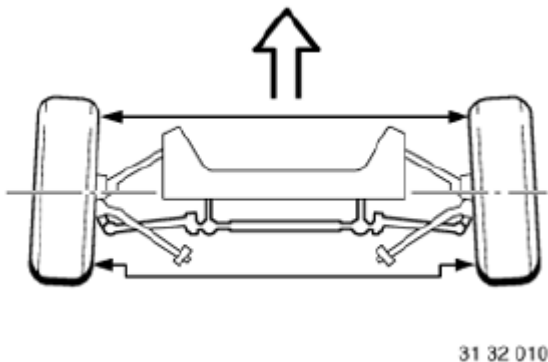
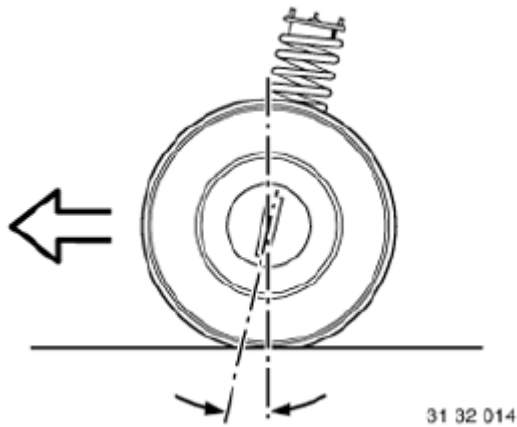


Fig. 9: Identifying Toe

Courtesy of BMW OF NORTH AMERICA, INC.

**Fig. 10: Identifying Caster**

Courtesy of BMW OF NORTH AMERICA, INC.

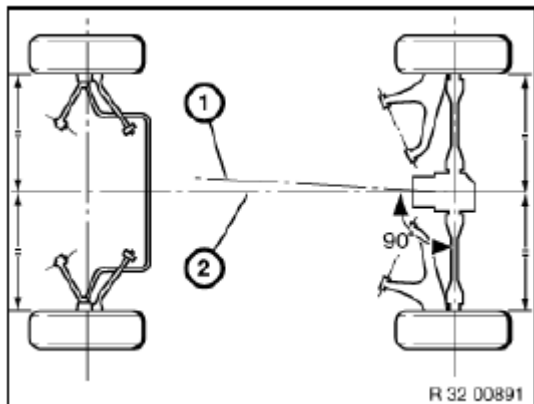
Geometrical axis 1

Is the angle bisector from the total rear-wheel toe.

Front-wheel measurements are taken in reference to this axis.

Symmetrical axis 2

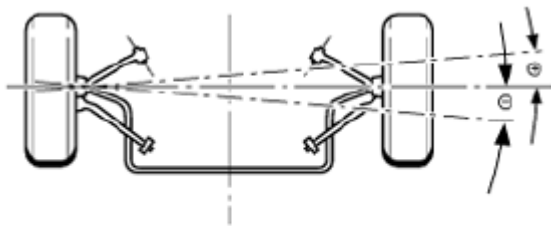
Center line running through front and rear axles.

**Fig. 11: Identifying Geometrical Axis 1**

Courtesy of BMW OF NORTH AMERICA, INC.

Wheel offset

Angle by which one front wheel is displaced more towards front or rear than the other front wheel. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear.



31 32 016

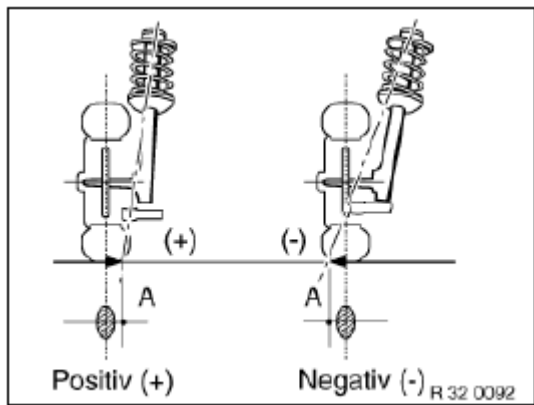
Fig. 12: Identifying Wheel Offset

Courtesy of BMW OF NORTH AMERICA, INC.

Kingpin offset/scrub radius

Is the distance from the center of the wheel contact face to the intersection point of the kingpin extension. The line through the center point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

The scrub radius is influenced by camber, kingpin angle and wheel offset of the wheel rim.

**Fig. 13: Identifying Kingpin Offset/Scrub Radius**

Courtesy of BMW OF NORTH AMERICA, INC.

32 00 ... IDENTIFICATION OF SUSPENSION WITHOUT LABEL

NOTE: If the front spring strut does not have a label for suspension identification, the type of suspension can be identified from the part number in the Electronic Parts Catalogue.

32 00 ... IDENTIFYING SUSPENSION FROM LABEL ON FRONT AXLE

NOTE: The type of suspension can be identified from the label on the spring strut/shock absorber.

Label:

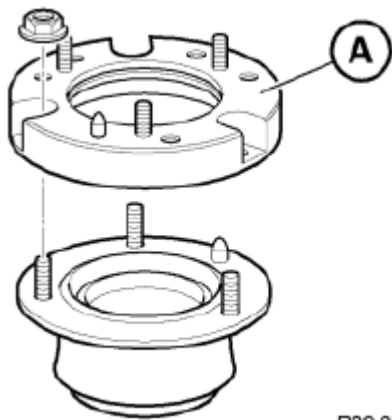
1. BMW part number
2. Type of suspension
 - BA = Standard suspension (basic)
 - SP = Sport suspension or rough road package SP
 - 60BAX = E60, E61 AWD
 - MSP = M Sport suspension
 - CHL = China Long
 - Option SA 815 = rough road package



Fig. 14: Identifying Spring Strut/Shock Absorber Label
Courtesy of BMW OF NORTH AMERICA, INC.

In the case of "SP" identification, there is a further distinction between:

- Sport suspension without spacer ring (A)
- Rough road package with spacer ring (A) above the support bearing



R32 0717

Fig. 15: Identifying Spacer Ring

Courtesy of BMW OF NORTH AMERICA, INC.

32 00 ... INFORMATION ON REPLACING STEERING GEAR AFTER ACCIDENT DAMAGE**Facts:**

In the event of accidents or driving conditions similar to accidents, shocklike loads can cause different types of damage to steering gears. When a steering gear is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering gear and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure:

The steering gear must be replaced if one or more of the following points apply:

- A. Visible or noticeable damage to the steering gear
 - Version with electric steering gear (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.
- B. Unacceptable torque increase and jamming when the steering gear is turned from lock to lock (without hydraulic/electrical assistance)
- C. Permissible tolerances exceeded during axle/wheel alignment check (if necessary, include alignment record with invoice / report)
- D. Fire damage
- E. Damage, permanent deformation or fractures to:
 - Wheel rims in the event of a negative result from the wheel/axle alignment check
 - Spring struts, steering knuckles, wheel carriers
 - Control arms

- Compression or tension struts or stabilizer bars with this function
- Body-side screwing/bolting points for wheel guide/control components
- Front axle carrier
- Pitman arms
- Tie rods
- Steering gear fixtures
- Steering column

This guideline is binding for all accident repairs to BMW and MINI vehicles.

NOTE: If the steering gear replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

IMPORTANT: The vehicle's type approval will be invalidated whenever the function of any of its safety components is compromised!

32 00 ... MOVING VEHICLE INTO DESIGN POSITION

Necessary preliminary tasks:

- Move **VEHICLE INTO NORMAL POSITION**
- Version with air spring system:
 - Remove ignition key
 - Pull fuse for air supply unit control unit
- Add/distribute weights in area of spring struts until the vehicle ride height is within the tolerance (refer to Technical Data: See **FRONT AXLE - RIDE HEIGHT E60, E61** . **FRONT AXLE - RIDE HEIGHT E61 / AWD** , **REAR AXLE - RIDE HEIGHT E61** , or **REAR AXLE - RIDE HEIGHT E61 / AWD**).

Measure **RIDE-LEVEL HEIGHT OF VEHICLE**

32 00 ... MOVING VEHICLE INTO NORMAL POSITION

Necessary preliminary tasks:

- Check compliance with **TEST CONDITIONS**, bring vehicle to a stop if necessary.
- Version with air spring system: Carry out **RIDE-HEIGHT-CALIBRATION**
- Check vehicle interior and luggage compartment (incl. luggage compartment recess) for load, unload vehicle if necessary
- Introduce DIN load (refer to **TECHNICAL DATA**) into vehicle
- Determine **VEHICLE RIDE HEIGHT**

NOTE: If the vehicle ride height is not inside the tolerance (refer to FRONT AXLE - RIDE HEIGHT E60, E61 , FRONT AXLE - RIDE HEIGHT E61 / AWD , REAR AXLE - RIDE HEIGHT E61 , or REAR AXLE - RIDE HEIGHT E61 / AWD), the vehicle must be repaired (coil spring/leakage).

32 00 ... PERFORMING RIM RUNOUT COMPENSATION

NOTE: Rim runout compensation involves electronically recording the lateral runout of the rim and the possible clamping error of the quick-clamping unit for one wheel rotation and compensating the toe and camber for measurement/alignment.

Raise body.

Perform rim runout compensation in accordance with equipment manufacturer's instructions.

Compress/deflect car.

32 00 ... TEST CONDITIONS FOR CHASSIS/WHEEL ALIGNMENT CHECK

Observe the following test conditions prior to the chassis/wheel alignment check:

1. Correct and identical rim and tire sizes.
2. Correct tread depth. The tread depth for each axle may differ from left to right by max. 1-2 mm.
3. Correct tire inflation pressure (see instruction plate on car).
4. Wheel bearing clearance OK
5. Steering backlash OK
6. Condition of suspension and shock absorbers OK: Visually inspect for breakage, etc.
7. Cars with ride level control: Pull fuse of air supply unit so that there is no controlling down or up.

32 00 ... TROUBLESHOOTING AFTER WHEEL/CHASSIS ALIGNMENT CHECK ON FRONT AXLE

Substandard roadholding, atypical noises, tires worn on one side and toe-in/camber values which deviate from the nominal value are all indicators of damage to the suspension caused by road traffic accidents or similar impacts.

To carry out proper repairs, you must follow the procedure set out in the troubleshooting table below depending on the condition of the vehicle in question.

You must also follow the **RULES AND GUIDELINES FOR ACCIDENT-RELATED REPAIRS TO THE STEERING GEAR**.

NOTE: If after chassis/suspension components have been replaced adjustment of

camber/track alignment is not possible, the vehicle must be placed on the straightening bench

TROUBLESHOOTING CHART

Fault	Cause	Remedy
Toe deviation	Tie rod end worn	Replace <u>TIE ROD END</u>
	Tie rod bent	Replace <u>TIE ROD</u>
	Rubber mount or ball joint of control arm faulty	Replace <u>CONTROL ARMS</u>
	Rubber mount or ball joint/guide joint of tension strut faulty	Replace <u>RUBBER MOUNT</u> or <u>GUIDE JOINT /BOTH TENSION STRUTS</u>
Camber deviation	Rubber mount or ball joint of control arm faulty	Replace <u>CONTROL ARMS</u>
	Control arm deformed	Replace <u>CONTROL ARMS</u>
	Rubber mount or ball joint/guide joint of tension strut faulty	Replace <u>RUBBER MOUNT</u> or <u>GUIDE JOINT /BOTH TENSION STRUTS</u>
	Tension strut deformed	Replace <u>BOTH TENSION STRUTS</u>
	Spring strut/piston rod of shock absorber deformed	Replace <u>FRONT SPRING STRUT</u>
	Ride height between driver's and passenger sides different	Check load, correct if necessary Replace <u>COIL SPRING</u>
	Front axle carrier deformed	Replace <u>FRONT AXLE CARRIER</u>
Caster deviation NOTE: Caster is defined by design and cannot be adjusted	Rubber mount or ball joint of control arm faulty	Replace <u>CONTROL ARMS</u>
	Control arm deformed	Replace <u>CONTROL ARMS</u>
	Rubber mount or ball joint/guide joint of tension strut faulty	Replace <u>RUBBER MOUNT</u> or <u>GUIDE JOINT /BOTH TENSION STRUTS</u>
	Tension strut deformed	Replace <u>BOTH TENSION STRUTS</u>
	Spring strut/piston rod of shock absorber deformed	Replace <u>FRONT SPRING STRUT</u>
	Front axle carrier deformed	Replace <u>FRONT AXLE CARRIER</u>
	Ride height between driver's and passenger sides different	Check load , correct if necessary Air spring strut: Carry out <u>RIDE-HEIGHT-CALIBRATION</u> Check <u>COIL SPRINGS</u> , replace if necessary

Toe-difference angle deviation Prerequisite: camber and caster are correct	Tie rods not adjusted uniformly	Adjust toe on left and right sides to same value
Wheel-offset deviation Prerequisite: front wheels have equal single toe to geometrical axis	Front axle carrier deformed	Replace <u>FRONT AXLE CARRIER</u>
	Control arm deformed	Replace <u>CONTROL ARMS</u>
	Tension strut deformed	Replace <u>BOTH TENSION STRUTS</u>

32 00 ... TROUBLESHOOTING AFTER WHEEL/CHASSIS ALIGNMENT CHECK ON REAR AXLE

Substandard roadholding, atypical noises, tires worn on one side and toe/camber values which deviate from the nominal value are all indicators of damage to the suspension caused by road traffic accidents or similar impacts.

To carry out proper repairs, you must follow the procedure set out in the troubleshooting table below depending on the condition of the vehicle in question.

NOTE: If after chassis/suspension components have been replaced adjustment of camber/track alignment is not possible, the vehicle must be placed on the straightening bench

TROUBLESHOOTING CHART

Fault	Cause	Remedy
Camber/toe deviation	Rubber mount/ball joint of control or guide arm faulty	Replace <u>CONTROL</u> or <u>GUIDE ARM</u>
	Control or guide arm deformed	Replace <u>CONTROL</u> or <u>GUIDE ARM</u>
	Ball joint in wheel carrier faulty	Replace <u>BALL JOINT</u>
	Integral link deformed	Replace <u>INTEGRAL LINK</u>
	Rubber mount of swinging arm faulty	Replace <u>SWINGING ARM</u>
	Swinging arm deformed	Replace <u>SWINGING ARM</u>
	Rubber mount of rear axle carrier faulty	Replace <u>RUBBER MOUNT</u>
	Rear axle carrier deformed	Replace <u>REAR AXLE CARRIER</u>
Rear-wheel position incorrect	Rear axle carrier laterally displaced/skewed	Replace <u>RUBBER MOUNT</u>

32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION

IMPORTANT: Carry out chassis/wheel alignment check in design position only:

if the technical prerequisites for an alignment check with ride-height input

are lacking

- if, in spite of repairs having been carried out, the car's ride height between the left and right sides is still outside the tolerance
- if the vehicles in question have been involved in an accident
- if the models are M models

NOTE:

- Read and comply with GENERAL INFORMATION AND DEFINITIONS.
- Read and comply with GENERAL CHASSIS DEFINITION.
- If necessary, prepare lifting platform.
- Drive vehicle onto lifting platform.

NOTE: The front and rear wheels must be positioned centrally on the rotary and sliding plates.

- Remove locking pins from both rotary and sliding plates, align pickup using bubble level and activate

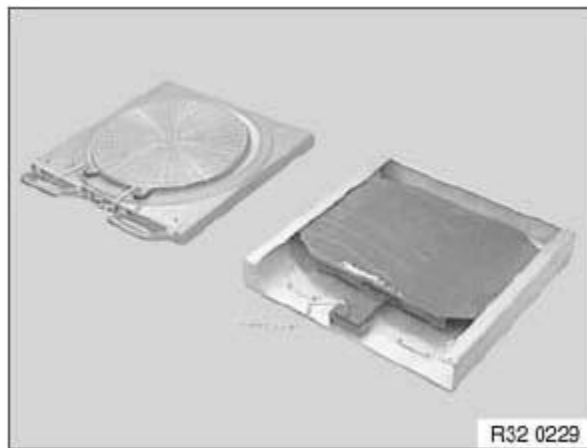


Fig. 16: Identifying Rotary And Sliding Plates
Courtesy of BMW OF NORTH AMERICA, INC.

- Attach quick-clamping holder/quick-clamping unit to vehicle and remove clamping levers in area of front wheels
- Attach pickup to quick-clamping holder/quick-clamping unit, align using bubble level and connect to rotary plates

NOTE: When using quick-clamping units, perform RIM RUNOUT COMPENSATION after installing the pickups.



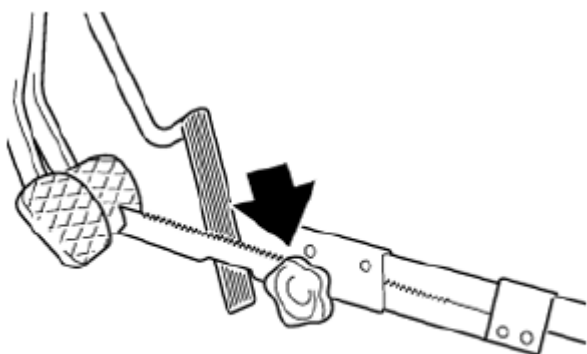
Fig. 17: Identifying Quick-Clamping Holder/Quick-Clamping Unit
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, attach spoiler adapter.



Fig. 18: Identifying Spoiler Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, switch on chassis alignment system
- Enter customer and vehicle data
- Identify chassis version and select vehicle. See **IDENTIFICATION OF SUSPENSION WITHOUT LABEL** and **IDENTIFYING SUSPENSION FROM LABEL ON FRONT AXLE**.
- Enter tire pressure and tread depth
- Move **VEHICLE INTO DESIGN POSITION**
- Install brake tensioner.



31 34 021

Fig. 19: Locating Brake Tensioner

Courtesy of BMW OF NORTH AMERICA, INC.

E81, E82, E87, E88, E90, E91, E92, E93:

IMPORTANT: Risk of damage!

In order to avoid damaging the front side panel during the "Max. steering lock" drive-in routine, make sure the pickups are removed from the quick-clamping holders/quick-clamping units during output and input alignment. In the process do not detach the connecting cable from the pickups or the rotary plates.

NOTE: After the drive-in routine, reconnect the pickups to the quick-clamping holders/quick-clamping units, align using the bubble levels and secure in place.

- Perform input measurement in accordance with equipment manufacturer's instructions.
- Compare **SPECIFIED VALUES** with actual values

Only in event of customer complaint (e.g. poor driving performance):

IMPORTANT: Do not remove screws/bolts (front axle carrier to engine carrier / body).

Slacken all screws/bolts (front axle carrier to engine carrier / body) and then retighten to specified torque.

Refer to **LOWERING FRONT AXLE CARRIER** .

If necessary, adjust **FRONT AXLE** and **REAR AXLE**.

IMPORTANT: Only on cars with Active Cruise Control:

Because the axis of motion is the reference for ACC adjustment, it is necessary after an adjustment of the rear axle which alters the axis of motion also to

check the adjustment of the ACC sensor!

It is not necessary to check the ACC sensor after only one adjustment of the front axle!

- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT/ADJUSTMENT FOR ACTIVE FRONT STEERING**
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system
- Drive vehicle off lifting platform
- If necessary, carry out **ADJUSTMENT OF ACC SENSOR**

32 00 155 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT WITHOUT LOAD

IMPORTANT: Do not carry out chassis/wheel alignment without load:

- if the technical prerequisites for an alignment check with ride-height input are lacking
- if, in spite of repairs having been carried out, the car's ride height between the left and right sides is still outside the tolerance
- if the vehicles in question have been involved in an accident
- if the models are M models

NOTE:

- Read and comply with **GENERAL INFORMATION AND DEFINITIONS**.
- Read and comply with **GENERAL CHASSIS DEFINITION**.
- Check compliance with **TEST CONDITIONS**, bring vehicle to a stop if necessary.
- If necessary, prepare lifting platform.
- Drive vehicle onto lifting platform.

NOTE: The front and rear wheels must be positioned centrally on the rotary and sliding plates.

- Remove locking pins from both rotary and sliding plates, align pickup using bubble level and activate

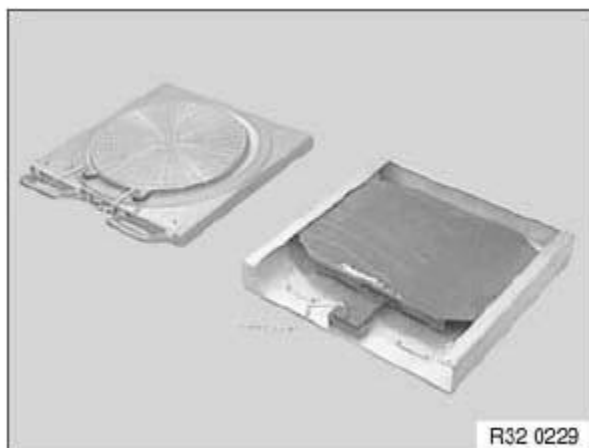


Fig. 20: Identifying Rotary And Sliding Plates
Courtesy of BMW OF NORTH AMERICA, INC.

- Attach quick-clamping holder/quick-clamping unit to vehicle and remove clamping levers in area of front wheels
- Attach pickup to quick-clamping holder/quick-clamping unit, align using bubble level and connect to rotary plates

NOTE: When using quick-clamping units, perform RIM RUNOUT COMPENSATION after installing the pickups.



Fig. 21: Identifying Quick-Clamping Holder/Quick-Clamping Unit
Courtesy of BMW OF NORTH AMERICA, INC.

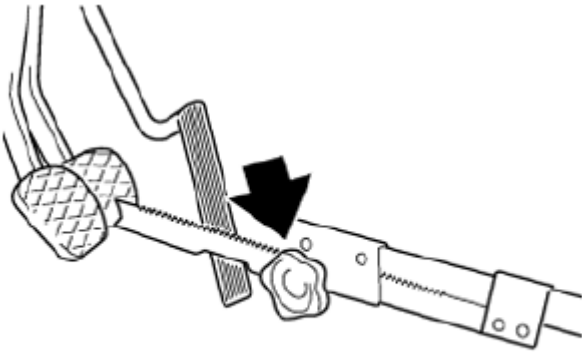
- If necessary, attach spoiler adapter.



R32 0241

Fig. 22: Identifying Spoiler Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, switch on chassis alignment system
- Enter customer and vehicle data
- Identify chassis version and select vehicle. See IDENTIFICATION OF SUSPENSION WITHOUT LABEL and IDENTIFYING SUSPENSION FROM LABEL ON FRONT AXLE.
- Enter tire pressure and tread depth
- Measure and enter VEHICLE RIDE HEIGHT
- Install brake tensioner.



31 34 021

Fig. 23: Locating Brake Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

E81, E82, E87, E88, E90, E91, E92, E93:

IMPORTANT: Risk of damage!

In order to avoid damaging the front side panel during the "Max. steering lock"

drive-in routine, make sure the pickups are removed from the quick-clamping holders/quick-clamping units during output and input alignment. In the process do not detach the connecting cable from the pickups or the rotary plates.

NOTE: After the drive-in routine, reconnect the pickups to the quick-clamping holders/quick-clamping units, align using the bubble levels and secure in place.

- Perform input measurement in accordance with equipment manufacturer's instructions.
- Compare **SPECIFIED VALUES** with actual values

Only in event of customer complaint (e.g. poor driving performance):

IMPORTANT: Do not remove screws/bolts (front axle carrier to engine carrier / body).

Slacken all screws/bolts (front axle carrier to engine carrier / body) and then retighten to specified torque.

Refer to **LOWERING FRONT AXLE CARRIER** .

If necessary, adjust **FRONT AXLE** and **REAR AXLE**.

IMPORTANT: Only on cars with Active Cruise Control:

Because the axis of motion is the reference for ACC adjustment, it is necessary after an adjustment of the rear axle which alters the axis of motion also to check the adjustment of the ACC sensor!

It is not necessary to check the ACC sensor after only one adjustment of the front axle!

- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT/ADJUSTMENT FOR ACTIVE FRONT STEERING**
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system
- Drive vehicle off lifting platform.
- If necessary, carry out **ADJUSTMENT OF ACC SENSOR**

32 00 610 ADJUSTING TOE-IN AND CAMBER ON FRONT AXLE (AWD)

Special tools required:

- **32 3 190**

IMPORTANT: Changes in axle geometry caused by accidents must under no circumstances be rectified by camber adjustment!

NOTE: Camber and toe-in influence each other. Adjust the toe-in first in order to simplify the adjustment procedure.
The centering pin may only be driven or twisted out (hexagon socket) if the camber is outside the specified tolerance after toe adjustment.

Adjust toe-in:

If necessary, remove steering gear cover at side

Move steering into straight-ahead position by means of markings on cap (1) and steering gear (2).

Align steering wheel and secure with steering wheel arrester.

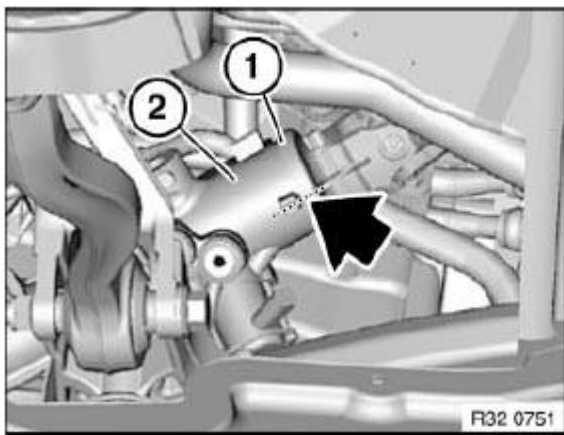


Fig. 24: Locating Markings On Cap And Steering Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Clean thread on tie rod.

Slacken clamping nut (2), gripping tie rod end (1) in the process.

Remove clamp (4).

Turn tie rod (3) to adjust toe-in to specified value.

Tighten down clamping nut (2).

Tightening torque **32 21 5AZ** .

Fit clamp (4).

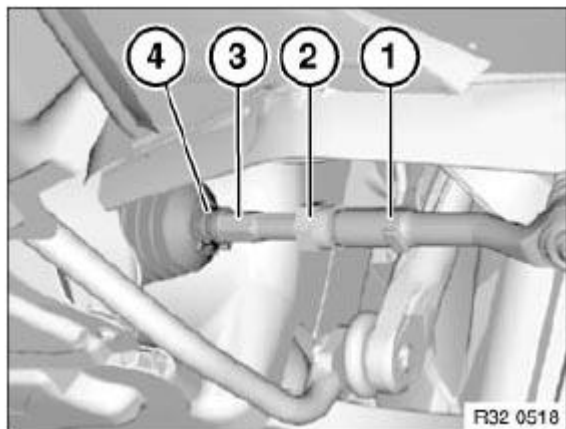


Fig. 25: Identifying Clamping Nut, Tie Rod End And Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting camber:

If necessary, remove protective cap.

Drive or twist out centering pin (1) in downward direction (hexagon socket).

Clean wheel arch from below in area of support bearing with compressed air.

Slacken nut (2) approx. 1 to 1.5 turns.

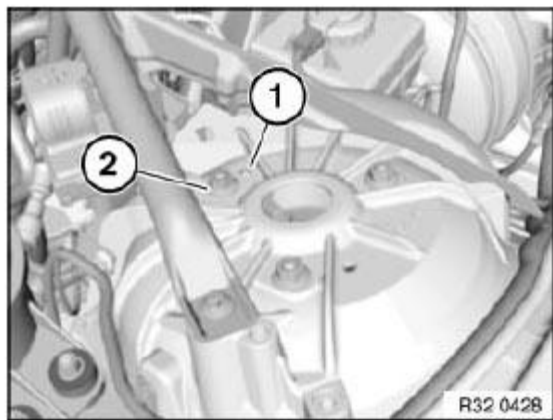


Fig. 26: Identifying Centering Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **32 3 190** into wheel arch opening and over nut.

Replace nuts (3) and screw on but do not tighten down fully.

Turn nut (4) in special tool **32 3 190** to adjust camber to specified value.

Tighten down nuts (3).

Tightening torque **32 31 1AZ** .

Remove special tool **32 3 190** .

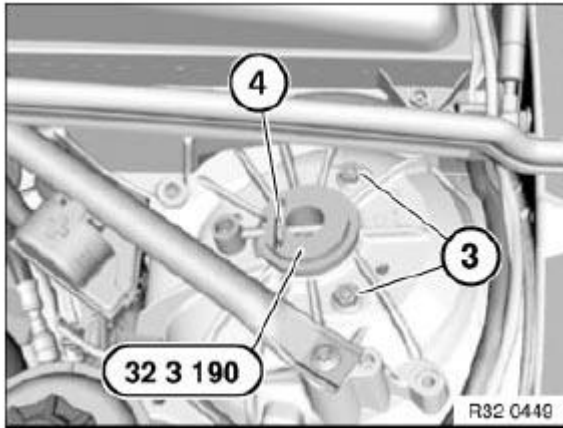


Fig. 27: Identifying Special Tool 32 3 190
Courtesy of BMW OF NORTH AMERICA, INC.

Replace nut (2) and tighten down.

Tightening torque **32 31 1AZ** .

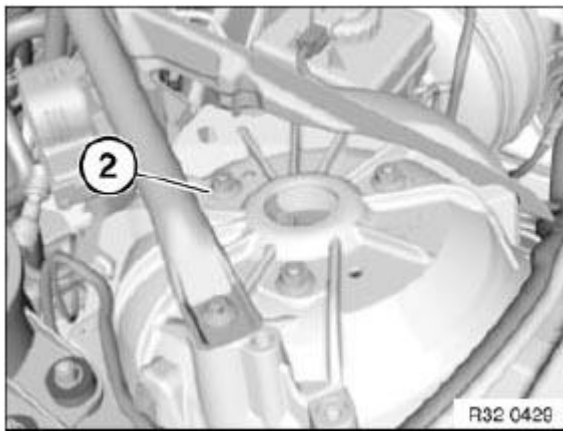


Fig. 28: Identifying Nut
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check directional stability of car; if necessary, repeat toe-in adjustment

32 00 620 ADJUSTING REAR AXLE

NOTE: A camber change always means a toe change as well. The camber must therefore be adjusted first.

IMPORTANT: Only on cars with Active Cruise Control:

Because the axis of motion is the reference for ACC adjustment, it is necessary after an adjustment of the rear axle which alters the axis of motion also to check the ADJUSTMENT OF THE ACC SENSOR!

Adjusting camber:

Replace nut (2) and tighten to 5 Nm.

Turn eccentric bolt (1) to adjust camber to setpoint value.

Tighten nut (2).

Tightening torque 33 32 20AZ .

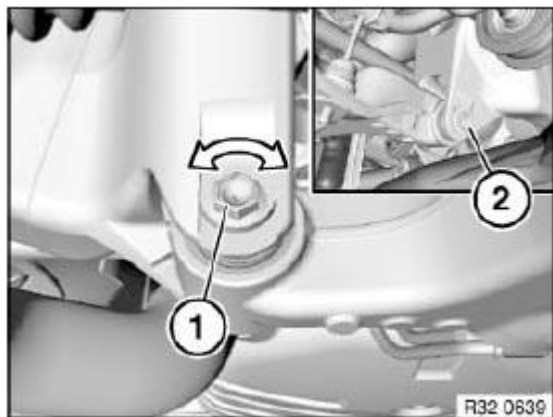


Fig. 29: Adjusting Camber

Courtesy of BMW OF NORTH AMERICA, INC.

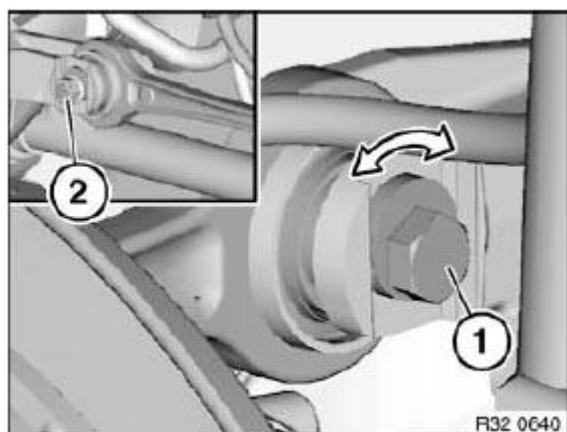
Adjusting toe:

Replace nut (2) and tighten to 5 Nm.

Turn eccentric bolt (1) to adjust toe to specified value.

Tighten nut (2).

Tightening torque 33 32 5AZ .

**Fig. 30: Adjusting Toe**

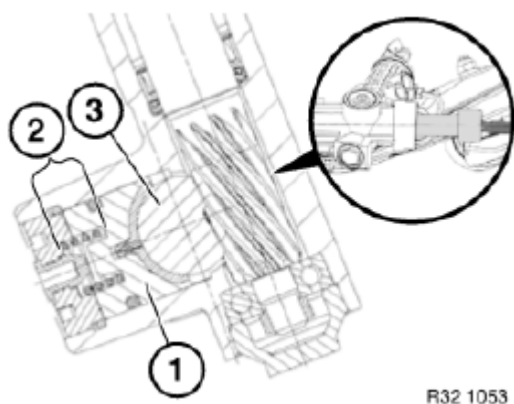
Courtesy of BMW OF NORTH AMERICA, INC.

11 MECHANICAL STEERING GEAR

32 11 ... NOTES ON CHECKING STEERING BACKLASH ON VEHICLES WITH RACK-AND-PINION STEERING (WITH FRONT AXLE RAISED)

NOTE: When the front axle is raised, the applied force is distributed via the tie rod into horizontal and vertical forces. If there is now no electric or hydraulic assistance, the forces created cause the thrust member (1) to be unloaded against the spring (2). The play created in this way is incorrectly referred to as steering backlash.

3 = Rack

**Fig. 31: Identifying Thrust Member And Spring**

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Target state: steering must be free from play in all the mechanical components (except for steering gear and tie rod)!

NOTE: For checking purposes, the steering gear must be pressurized by means of electric or hydraulic assistance.

- Hydraulic steering assistance: Start engine
- Electro-hydraulic steering assistance: Switch ignition on
- Electric steering assistance: Switch ignition on

32 11 100 REPLACING GAITER FOR STEERING GEAR ON LEFT OR RIGHT (AWD)

IMPORTANT: The power steering gear must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

Necessary preliminary tasks:

- Remove **TIE ROD END**
- Remove steering gear cover at side

Clean tie rod.

Release band clamp (1) and **EAR CLIP** (3).

Detach gaiter (2) from tie rod.

Installation:

Clean rack and check surface for damage (e.g. by corrosion).

Grease rack .

Clean tie rod and apply grease to taper.

NOTE: This ensures that the gaiter is not rotated when the tie rod is rotated.

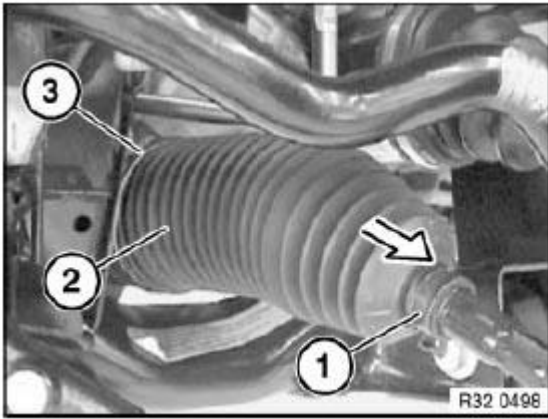


Fig. 32: Detaching Gaiter From Tie Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Replace and grease O-ring (1).

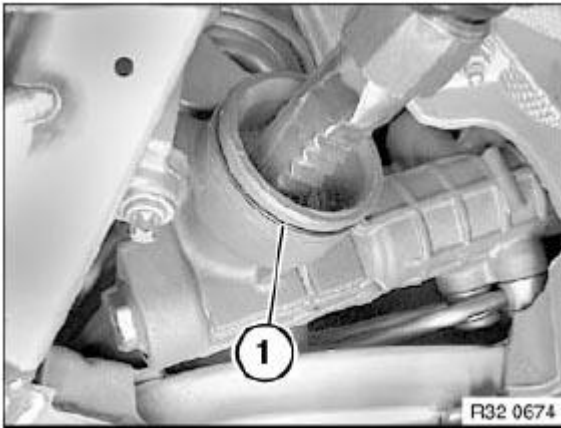


Fig. 33: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform chassis alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT WITHOUT LOAD**.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

13 STEERING GEAR WITH SERVO UNIT

32 13 006 BLEEDING POWER STEERING UNIT

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Using contaminated equipment to add fluid may introduce dirt particles into the fluid reservoir and significantly reduce the service life of the power steering system. Do not use any filler funnels or similar!

The fill level may only be checked or adjusted when the engine is stopped! The fluid temperature should be approx. 20 °C here.

Ensure that the cap is fully screwed in prior to the fill level check.

NOTE: To avoid mix-ups when filling with hydraulic fluid, mark the fluid reservoirs or their caps with identification marks.

ATF Automatic transmission fluid

CHF Pentosin CHF11S

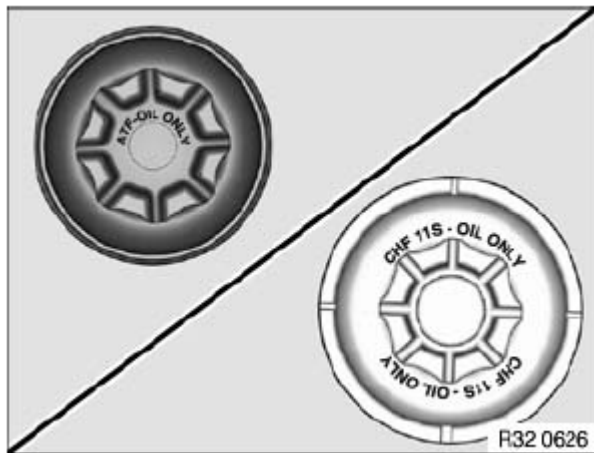


Fig. 34: Identifying Fluid Reservoir Caps
Courtesy of BMW OF NORTH AMERICA, INC.

1. Thoroughly clean fluid reservoir and its immediate surroundings
2. Check and correct fill level

NOTE: The fill level can come to rest above the "MAX" mark when the engine is at normal operating temperature. This is dictated by the design in that the marking on the dipstick is referred to a fluid temperature of 20 °C. With the engine at normal operating temperature (approx. 50-60 °C fluid

temperature) adjust a fill height 10 mm above the "MAX" mark. Do not under any circumstances draw off the fluid to the "MAX" mark when the engine is at normal operating temperature.

3. Start engine
4. Turn steering wheel left and right twice in each case up to full lock; if necessary, top up hydraulic fluid (e.g. if hydraulic system is completely drained)
5. Move steering wheel to straight-ahead position and turn off engine
6. Check and correct fill level with engine stopped
7. Check hydraulic system for leaks

32 13 060 REMOVING AND INSTALLING/REPLACING POWER STEERING GEAR (AWD)

WARNING: Danger to life!

SECURE ENGINE IN INSTALLATION POSITION to prevent it from falling down.

DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Seal off hydraulic lines with plugs.

Necessary preliminary tasks:

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Secure **ENGINE IN INSTALLATION POSITION**
- Remove both **TIE ROD ENDS FROM SWIVEL BEARING**
- Replacement only: Remove both **TIE ROD ENDS FROM TIE ROD**
- Remove both **CONTROL ARMS FROM SWIVEL BEARING**
- Remove both **STABILIZER LINKS FROM STABILIZER**
- Lower **FRONT AXLE CARRIER** until power steering gear rests on output shaft

IMPORTANT: Replacement only:

Banjo bolt (A) for pressure line (expansion hose) must be replaced by banjo bolt with non-return valve (B).

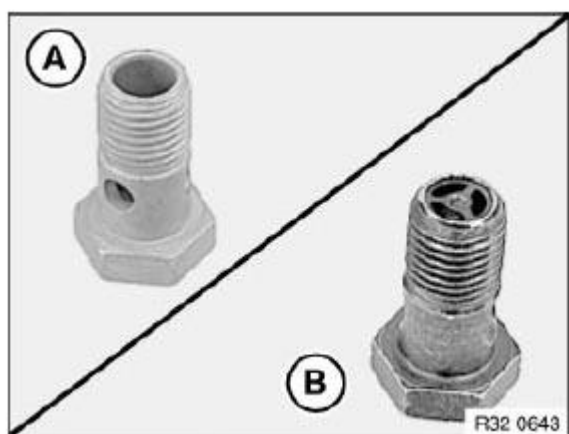


Fig. 35: Identifying Banjo Bolt With Non-Return Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Release banjo bolts (1, 4).

Remove brackets for pressure and return lines from front axle carrier.

Disconnect pressure line (2) and return line (3) from power steering gear.

Installation:

Replace all sealing rings.

Make sure hydraulic lines are laid without tension and with sufficient spacing to adjoining components.

Tightening torque **32 41 3AZ** .

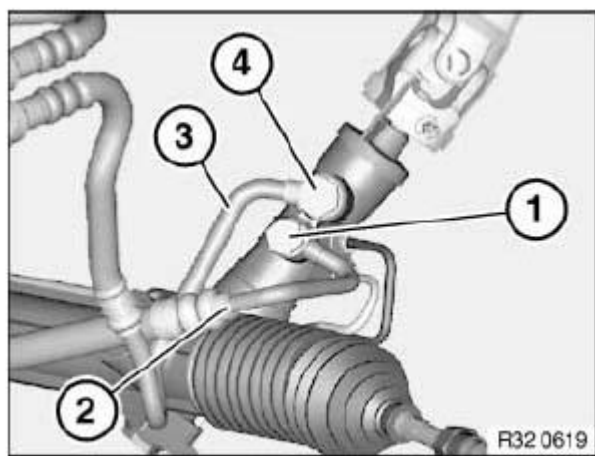


Fig. 36: Identifying Banjo Bolts, Pressure Line And Return Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove nuts.

Installation:

Replace screws and self-locking nuts.

Tightening torque **32 00 1AZ** .

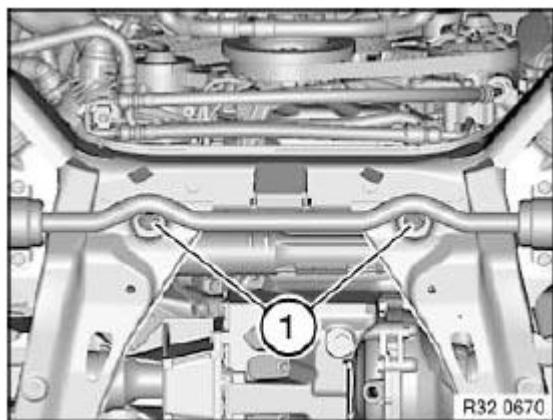


Fig. 37: Identifying Power Steering Gear Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to power steering hoses and lines when lowering. Hoses/lines must not be tensioned/bent/kinked!

When lowering and raising, make sure the cover for the relevant tension strut rubber mount is free to move.

Press front axle carrier forwards to guide power steering gear past output shaft.

Lower front axle carrier further.

IMPORTANT: Pay attention to vacuum hose of electric switchover valve.

Slide power steering gear towards rear up to stop, rotate and remove at side.

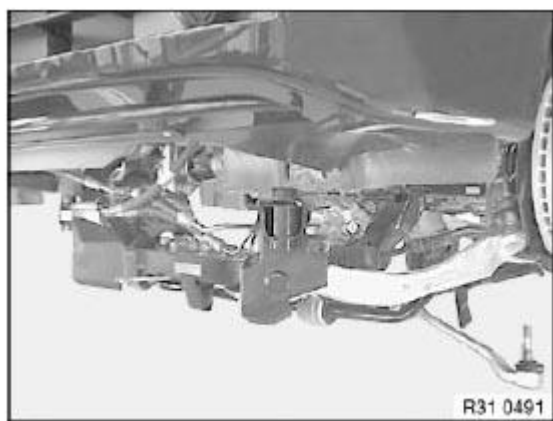


Fig. 38: Identifying Front Axle Carrier
 Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks
- Perform chassis alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT WITHOUT LOAD**.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

32 13 650 REMOVING AND INSTALLING/REPLACING EH CONVERTER FOR SERVOTRONIC (AWD)

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Necessary preliminary tasks:

- Remove steering gear cover at side

Disconnect plug connection (1).

Unfasten screws (2).

Remove EH converter (3).

Installation:

Clean side return orifice with compressed air.

Align EH converter (3) to opening in power steering gear, press by hand into power steering gear up to stop,

insert screws (2) and tighten down.

Tightening torque **32 13 12AZ** .

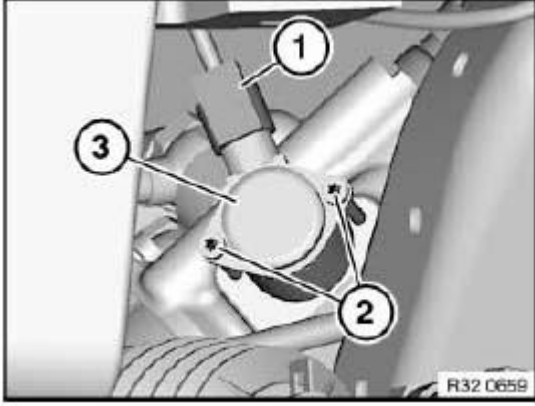


Fig. 39: Identifying Plug Connection And EH Converter
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**

21 STEERING ARMS, TIE RODS, STEERING DAMPER

32 21 151 REPLACING LEFT OR RIGHT TIE ROD END (AWD)

Special tools required:

- **31 2 300**

NOTE: If the tie rod end to tie rod screw/bolt connection is released, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove front wheel

IMPORTANT: Do not release tie rod end from swivel bearing with impact tool.

Rubber gaiter of tie rod end must not be damaged!

Release nut; if necessary, grip at hexagon.

Force tie rod end off swivel bearing with special tool **31 2 300** .

Installation:

Keep tie rod end to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque **32 21 3Z** .

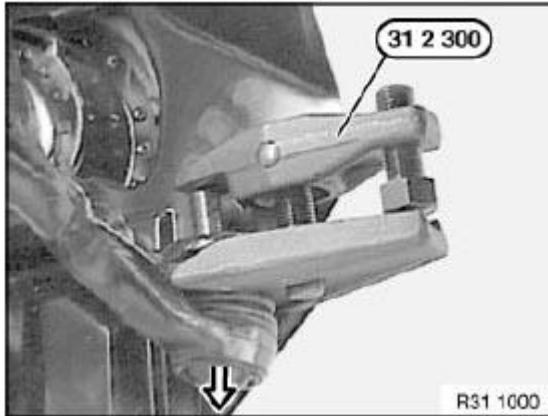


Fig. 40: Identifying Special Tool 31 2 300

Courtesy of BMW OF NORTH AMERICA, INC.

Determine measurement (A) to simplify following adjustment of front axle.

Release clamping nut.

Screw off tie rod end; if necessary, grip tie rod with open-end wrench.

Installation:

Check **GAITER** for damage, replace if necessary.

Mount clamping ring (1).

Screw tie rod end onto tie rod to measurement (A).

Tightening torque **32 21 5AZ** .

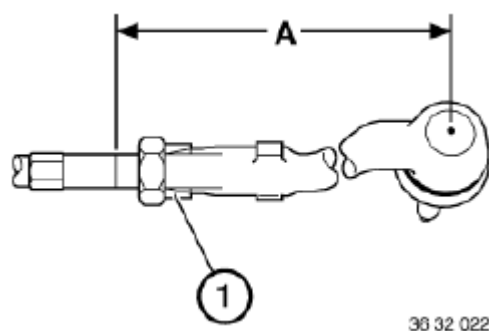


Fig. 41: Identifying Tie Rod End Dimension
 Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform chassis alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT WITHOUT LOAD**.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

32 21 231 REPLACING (REMOVING AND INSTALLING) LEFT OR RIGHT TIE ROD

Special tools required:

- **32 3 160**

IMPORTANT: The steering gear must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

Necessary preliminary tasks:

- Remove **TIE ROD END FROM SWIVEL BEARING**
- Remove **GAITER FROM POWER STEERING GEAR** and slide back

IMPORTANT: To avoid damage to rack and to suspension mounting, move rack in as far as possible.

Unscrew tie rod with special tool **32 3 160** from rack of power steering gear.

Installation:

Tightening torque **32 21 2AZ** .

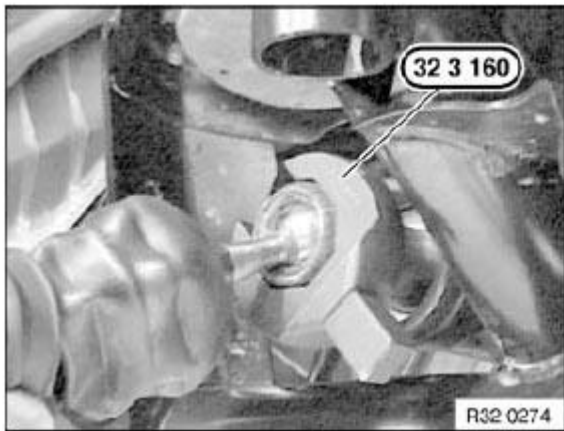


Fig. 42: Unscrewing Tie Rod With Special Tool 32 3 160
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean rack.

Check surface of rack for damage (e.g. corrosion).

Replace O-ring (1).

Grease rack and O-ring (1) .

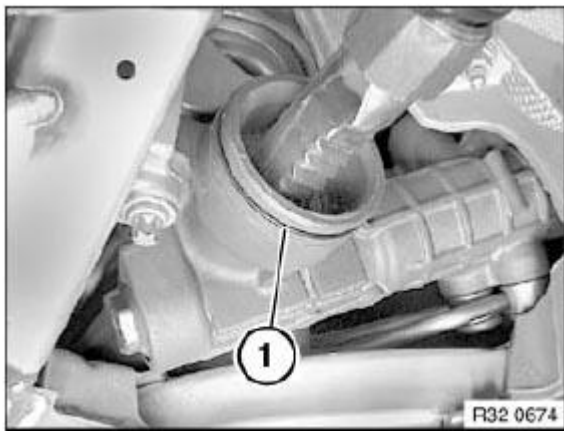


Fig. 43: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

On replacement, assemble new part with gaiter:

- Determine measurement (A) on old part to simplify following adjustment of front axle
- Slacken clamping nut (2)

- Screw off tie rod end; if necessary, grip tie rod with open-end wrench
- Remove clamping ring (1) and screw off clamping nut (2)
- Slide gaiter (4) and ear clamp and band clamp (3) onto tie rod
- Slide clamping nut (2) and clamping ring (1) onto tie rod
- Screw tie rod end onto tie rod to measurement (A)
- Tighten down clamping nut (2)

Tightening torque **32 21 5AZ** .

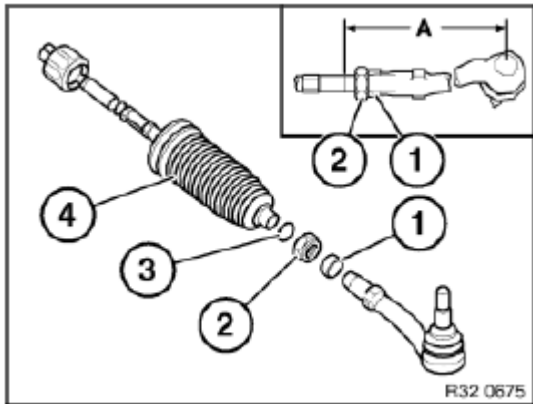


Fig. 44: Identifying Clamping Ring, Clamping Nut, Gaiter And Band Clamp
 Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Only if replacing/removing tie rod end: Perform chassis alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT WITHOUT LOAD**.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT/ADJUSTMENT FOR ACTIVE FRONT STEERING**

31 STEERING COLUMN

32 31 004 REMOVING AND INSTALLING / REPLACING UPPER SECTION OF STEERING COLUMN TRIM

Necessary preliminary tasks:

- Remove **LOWER SECTION OF TRIM**
- Move steering column into "lower" and "extended" position

Unclip steering column cover (1) from upper section of trim.

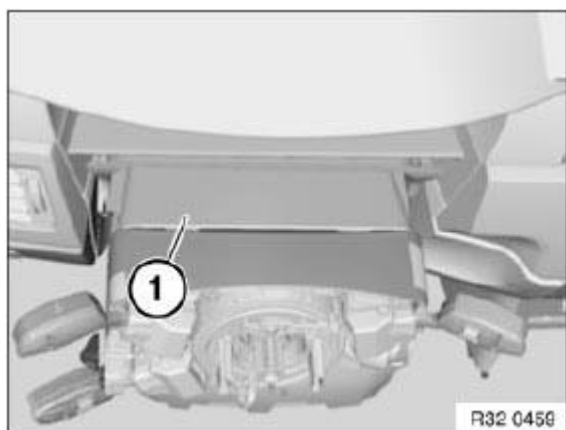


Fig. 45: Identifying Steering Column Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

Installation:

Replace expansion rivets.

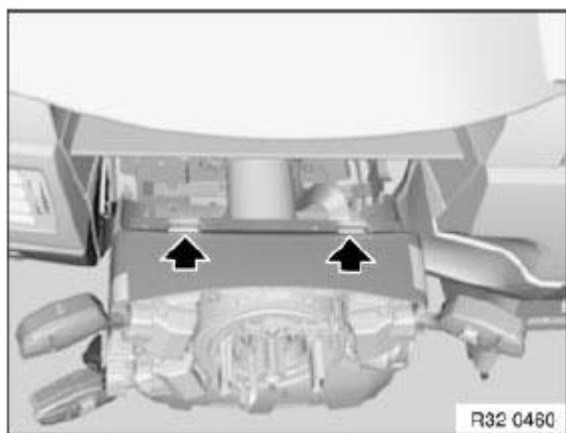


Fig. 46: Identifying Steering Column Trim Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Bend upper section of trim on both sides outwards and remove towards top.

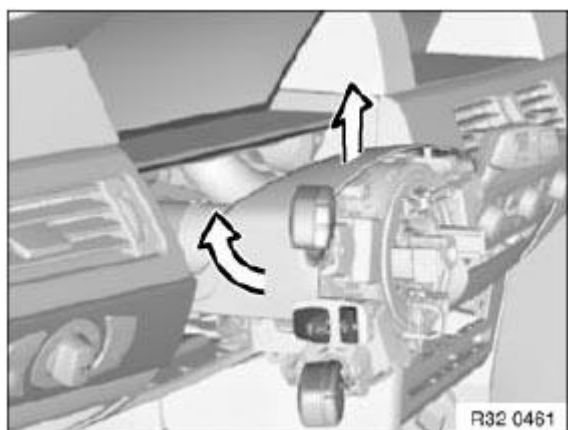


Fig. 47: Removing Upper Section Of Steering Column Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Locks (2) must engage in hooks (1) on both sides.

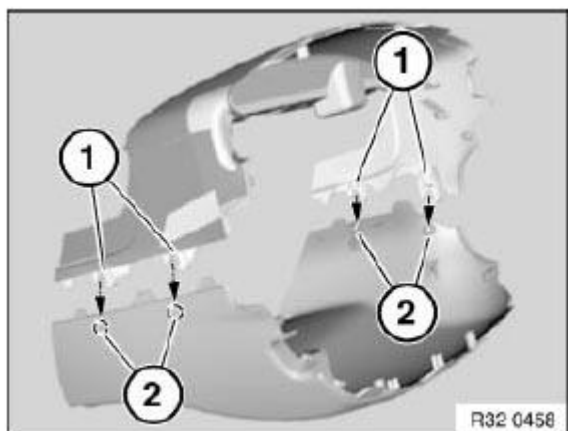


Fig. 48: Identifying Locks And Hooks
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 010 REMOVING AND INSTALLING/REPLACING FRONT SECTION OF STEERING COLUMN COVER

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove steering wheel. See **REMOVING AND INSTALLING (REPLACING) STEERING WHEEL (UP TO 03/2007)**, **REMOVING AND INSTALLING/REPLACING STEERING WHEEL (FROM 03/2007)**, or **REMOVING AND INSTALLING/REPLACING SPORT STEERING WHEEL**.

Pull of front section.

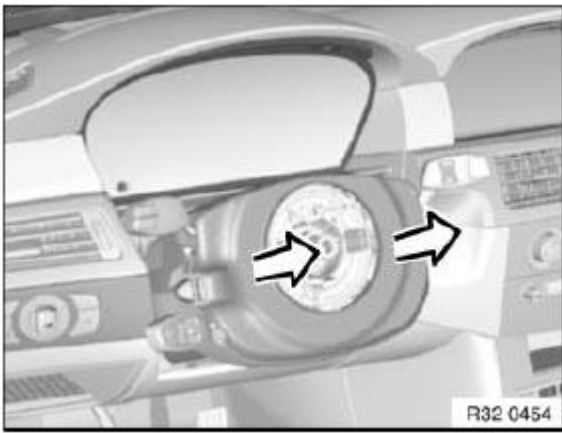


Fig. 49: Removing Front Section Of Steering Column Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Locks (2) must engage in hooks (1).

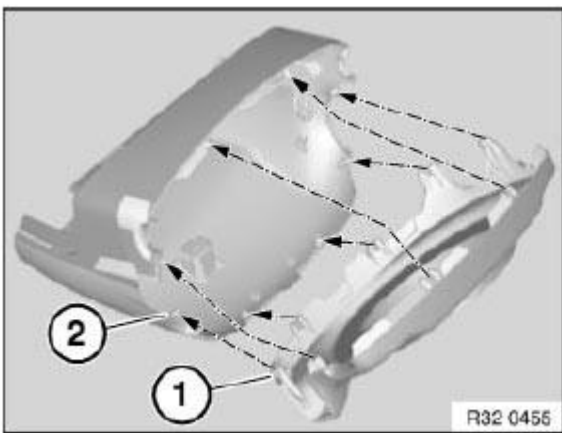


Fig. 50: Identifying Locks And Hooks
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 020 REMOVING AND INSTALLING / REPLACING LOWER SECTION OF STEERING COLUMN TRIM

Necessary preliminary tasks:

- Remove **FRONT SECTION OF TRIM**
- Move steering column in "top" and "extended" position.

Release screw.

Unclip lower trim section (1).

If necessary, unclip wiring harness from lower trim section (1).

Installation:

Replace expansion rivet.

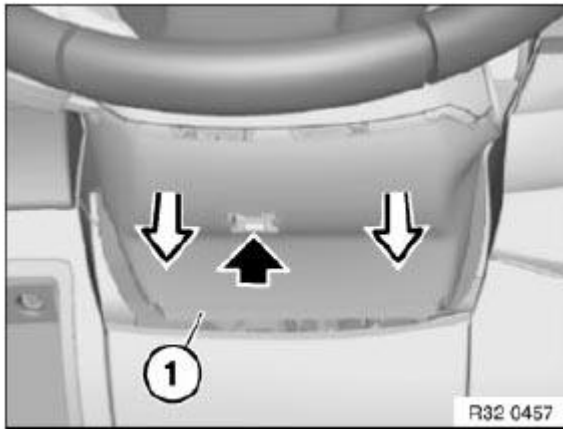


Fig. 51: Removing Lower Section Of Steering Column Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Locks (2) must engage in hooks (1) on both sides.

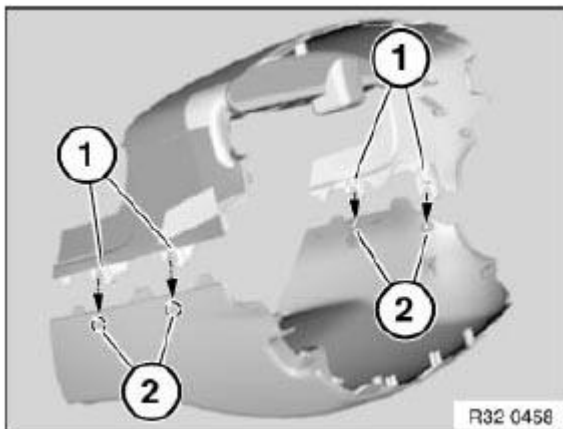


Fig. 52: Identifying Locks And Hooks
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip steering column cover (1) from lower section of trim (2).

Remove lower section of trim (2).

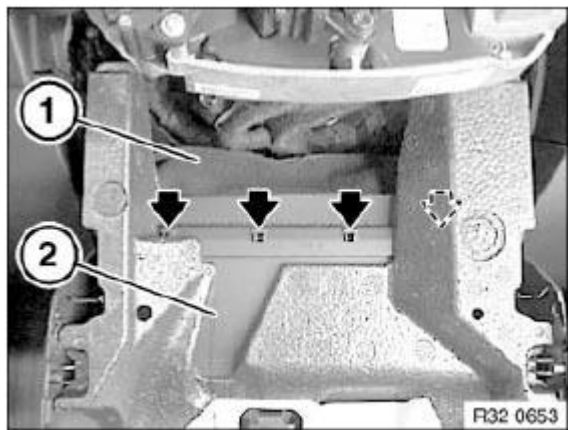


Fig. 53: Identifying Steering Column Cover And Lower Section Of Trim
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 070 REMOVING AND INSTALLING / REPLACING STEERING SPINDLE LOWER SECTION (AWD)

IMPORTANT: If the lower section of the steering spindle is separated from the power steering gear/steering column, the steering column switch cluster may be damaged when the steering wheel is turned.

Necessary preliminary tasks:

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY**

Release clamping screw (1).

NOTE: Before detaching steering spindle (3) from steering column, mark double joint in relation to steering column.

Detach double joint (2) of steering spindle (3) from steering column.

Pull upper section (2) out of steering spindle (3).

Installation:

Clean thread to remove all remnants of screw securing adhesive.

Replace clamping screw.

Clamping screw must rest in groove of steering column.

Tightening torque **32 31 1AZ** .

N52: Remove gaiter with resonator.

M57T2: Remove steering gear cover at side.

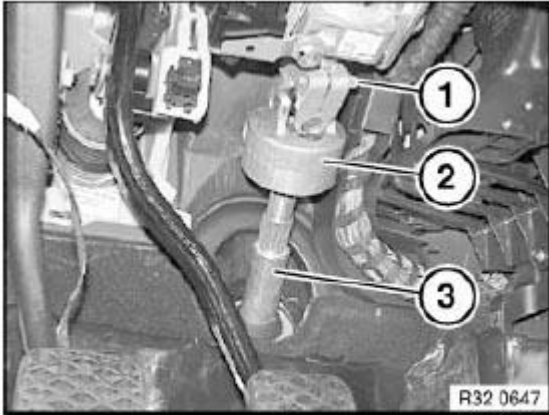


Fig. 54: Identifying Double Joint Of Steering Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamping screw (1).

Move power steering gear into zero setting.

NOTE: **The markings on the cap and housing must match up (see arrow).**

Remove ignition key.

Detach steering spindle lower section (2) from power steering gear.

Installation:

Clean thread to remove all remnants of screw securing adhesive.

Replace clamping screw.

Tightening torque **32 31 1AZ** .

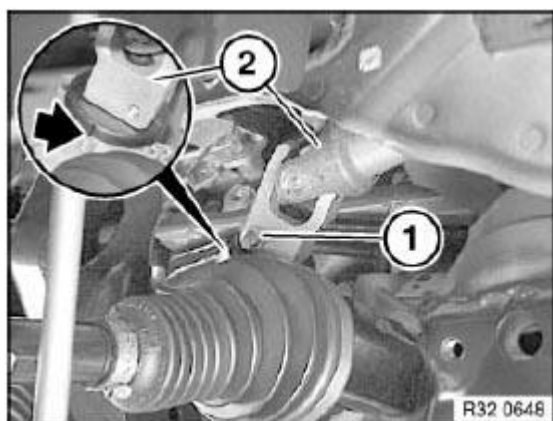


Fig. 55: Identifying Steering Spindle Lower Section
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **32 31 17AZ** .

Remove steering spindle lower section (2).

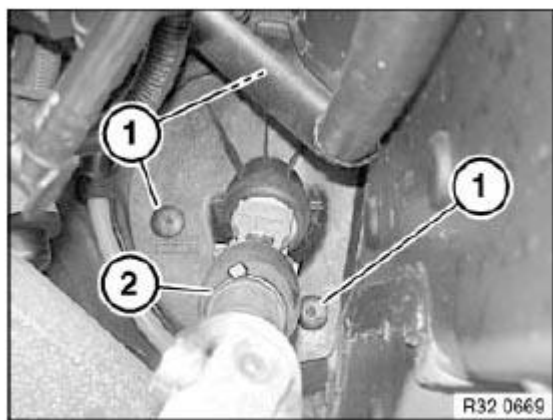


Fig. 56: Identifying Steering Spindle Lower Section
Courtesy of BMW OF NORTH AMERICA, INC.

Observe installation sequence:

1. If necessary, move power steering gear into zero position or steering wheel into straight-ahead position
2. Slide steering spindle lower section (1) through sleeve (3)
3. Slide double joint (2) into steering spindle lower section (1)
4. Attach steering spindle lower section (1) to power steering gear
5. Attach double joint (2) to steering column
6. Align bracket (4) to engine compartment partition wall and press into place

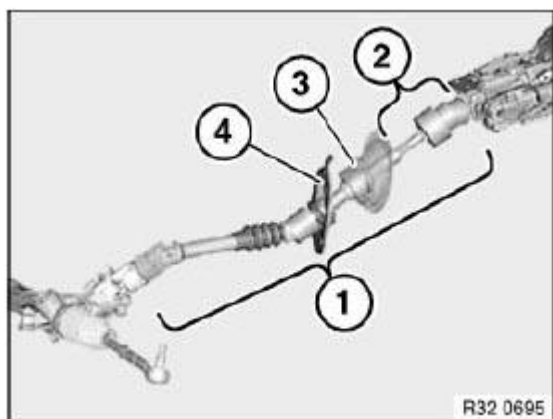


Fig. 57: Identifying Steering Spindle Lower Section, Double Joint, Sleeve And Bracket
 Courtesy of BMW OF NORTH AMERICA, INC.

7. Refer to the above-mentioned work steps for other notes on installation

After installation:

- Turn steering wheel in both directions to full lock. The airbag warning lamp must not light up in the process.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**
- Check directional stability of car

32 31 082 REMOVING AND INSTALLING/REPLACING STEERING ANGLE SENSOR

NOTE: Steering angle sensor is integrated in the **STEERING COLUMN STALK FIXTURE** .

After installation:

- Replacement only: Carry out **PROGRAMMING/CODING**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT/ADJUSTMENT FOR ACTIVE FRONT STEERING**

32 31 087 REMOVING AND INSTALLING/REPLACING STEERING COLUMN LOCK

NOTE: Steering column lock can only replaced in vehicles from 09/2005 with electric steering column adjustment.

Necessary preliminary tasks:

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY** .

Disconnect plug connection (1).

NOTE: There is the risk of mixing up the 3-pin plug connection for the footwell light.
Release shear screws (2).
Remove steering column lock (3).

Installation:

Spherical side of shim must point to steering column lock (3).

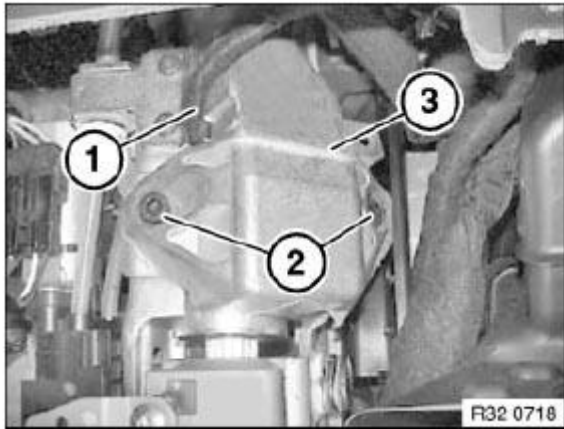


Fig. 58: Identifying Plug Connection And Steering Column Lock
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Carry out operational check.

32 31 090 REMOVING AND INSTALLING/REPLACING STEERING COLUMN

Necessary preliminary tasks:

- Return steering to straight-ahead drive setting and remove ignition key
- Remove **TRIM PANEL FOR PEDAL ASSEMBLY**.
- Remove **STEERING SPINDLE LOWER SECTION FROM STEERING COLUMN**
- Remove **UPPER SECTION OF TRIM**

Replacement only:

- Remove **FIXTURE FOR STEERING COLUMN STALK**

Vehicles (up to 09/2005) with automatic transmissions:

Remove interlock cable (1) from steering lock positioning unit.

Disconnect plug connections (2).

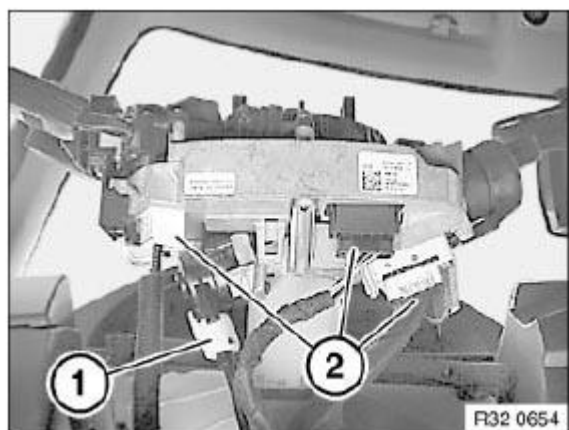


Fig. 59: Identifying Plug Connections And Interlock Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Version with electric steering column adjustment (build date up to 09/2004):

NOTE: As from 09/2004 the new steering column with a 6-pin plug connection and matching adapter lead will be supplied.

Installation:

Fit adapter lead between wiring harness and steering column.

Secure adapter lead to wiring harness.

Version with electric steering column adjustment:

Disconnect plug connection (3) from drive for electric steering column adjustment.

From 09/2005: Disconnect plug connection from electric **STEERING COLUMN LOCK**.

Vehicles (up to 09/2005) with automatic transmissions:

Remove interlock cable (1) from steering column.

Remove wiring harness (2) from steering column and place to one side.

Installation:

Replace ribbon cable from ignition starter switch to CAS control unit and secure with adhesive tape. See **REMOVING AND INSTALLING/REPLACING IGNITION STARTER SWITCH** and **REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR CAR ACCESS SYSTEM**.

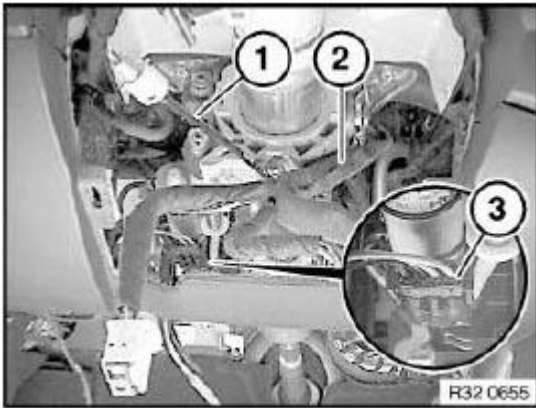


Fig. 60: Identifying Interlock Cable, Plug Connection And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Mark installation position of steering column.

Unfasten screws.

Tightening torque **32 31 6AZ** .

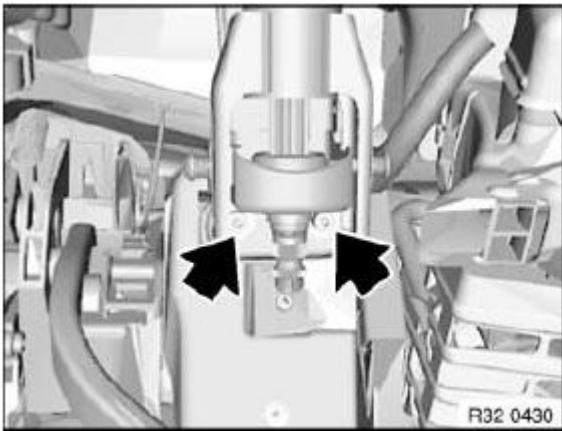


Fig. 61: Locating Steering Column Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Mark installation position of steering column (2).

Release screws (1).

Remove steering column (2) towards rear.

Installation:

Insert steering column (2) through instrument panel and insert screws (1).

Align steering column (2) by way of markings and tighten down screws (1).

Tightening torque **32 31 6AZ** .

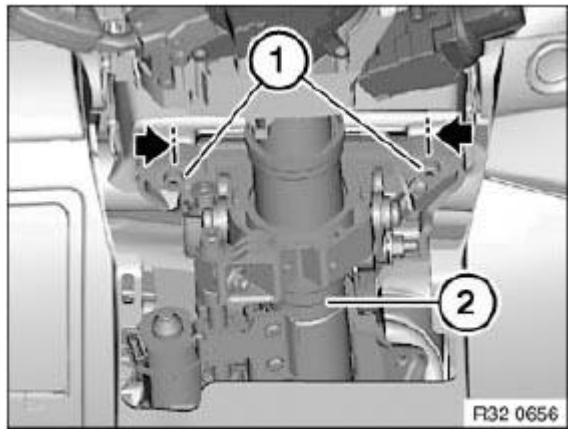


Fig. 62: Identifying Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove **IGNITION STARTER SWITCH**
- Remove **RING ANTENNA**
- Remove lock cylinder

After installation:

- Carry out **STEERING ANGLE SENSOR ADJUSTMENT/ADJUSTMENT FOR ACTIVE FRONT STEERING**
- Perform function check:
 - I. Check for ease of movement in overall adjustment range of steering column to adjoining components/wires
 - II. Turn steering wheel in both directions to full lock. The airbag warning lamp must not light up in the process.
- Check directional stability of car

32 31 102 REPLACING SLEEVE FOR STEERING SPINDLE (4WD)

IMPORTANT: Do not kink floor panelling under any circumstances!

After installation:

- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

Necessary preliminary tasks:

- Remove **LOWER SECTION OF STEERING SPINDLE**
- Remove **ACCELERATOR PEDAL MODULE**
- Take floor panelling out of bulkhead and secure

Release nut (1) and press cable duct a little to one side.

Remove sleeve (2) from bulkhead.

Installation:

Grease/spray sleeve (2) from outside with silicone grease.

Align sleeve (2) by way of arrow to bulkhead and insert.

Check seating of sleeve (2), correct if necessary.

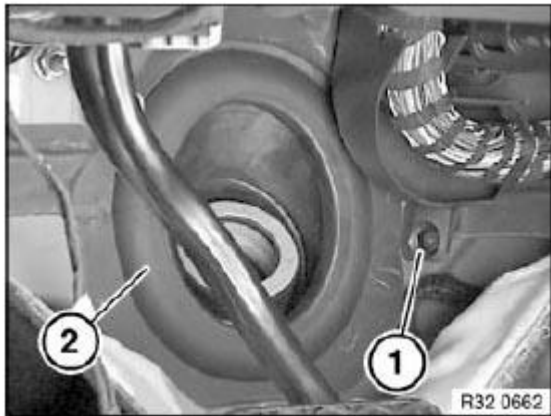


Fig. 63: Identifying Steering Spindle Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 102 REPLACING STEERING SPINDLE SLEEVE*Necessary preliminary tasks:*

- Remove lower section of steering spindle.

After installation:

- Carry out **STEERING ANGLE SENSOR ADJUSTMENT/ADJUSTMENT FOR ACTIVE FRONT STEERING**

Pop sleeve (1) out of bulkhead and press together.

Push steering spindle into steering column.

Remove sleeve (1) from steering column.

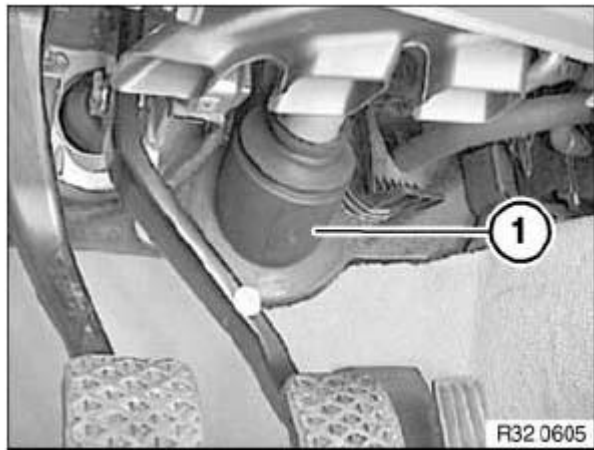


Fig. 64: Identifying Steering Spindle Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Detach pull-in lug from sleeve and lubricate gap with silicone grease.

Press sleeve together, slide onto steering column, align to opening in bulkhead and insert in bulkhead.

NOTE: To prevent the sleeve from slipping out and to avoid complaints by the customer about noise, make sure that sealing lip (1) on engine compartment side rests against bulkhead all round and sealing lip (2) in inside the car rests against the damping.

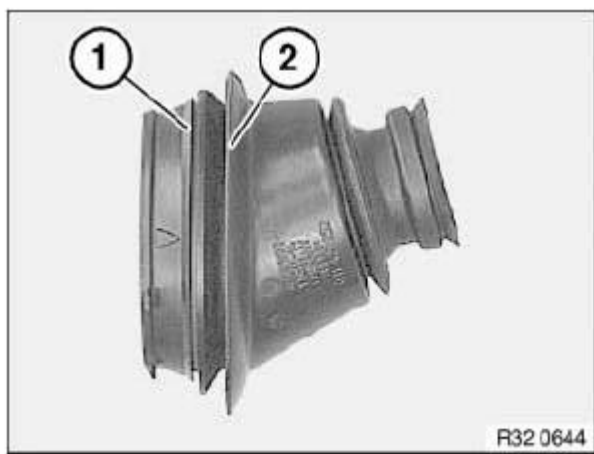


Fig. 65: Identifying Sealing Lip

Courtesy of BMW OF NORTH AMERICA, INC.

32 31 241 REPLACING ADJUSTING LEVER FOR STEERING COLUMN (STEERING COLUMN WITH NACAM CLAMP)

Necessary preliminary tasks:

- Remove **LOWER SECTION OF STEERING COLUMN TRIM**
- Remove **TRIM PANEL FOR PEDAL ASSEMBLY** .

Unclip adjusting lever.

Installation:

Align adjusting lever to steering column and attach straight to prevent the locks from being damaged.

Check locks after attachment, replace adjusting lever if necessary.

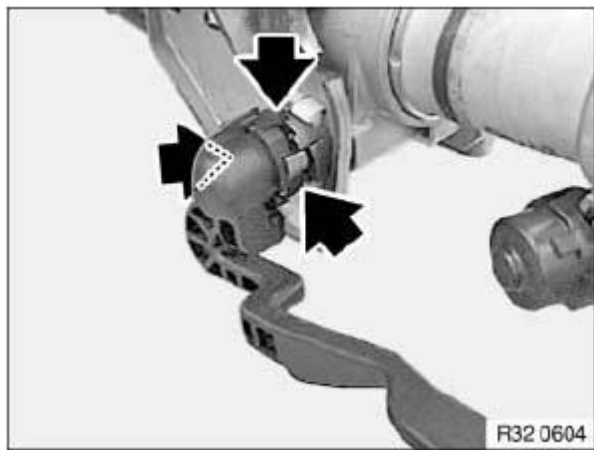


Fig. 66: Locating Adjusting Lever

Courtesy of BMW OF NORTH AMERICA, INC.

33 STEERING WHEEL

32 33 ... REPLACING DECORATIVE STRIP FOR SPORT STEERING WHEEL

The procedure is described in the article "**... MULTIFUNCTION STEERING WHEEL SWITCHES**".

32 33 ... REPLACING DECORATIVE STRIPS FOR STEERING WHEEL (UP TO 03/2007)

Special tools required:

- **61 3 120**

Necessary preliminary tasks:

Remove **AIRBAG UNIT**

Release screws (1).

IMPORTANT: Risk of breakage!

Carefully remove multifunction steering wheel switches with decorative strips and retaining plate (2) from steering wheel.

Disconnect plug connections on reverse side and remove retaining plate (2).

Installation:

Make sure connecting cables are correctly routed.

Make sure that decorative strips and both multifunction steering wheel switches are correctly positioned on steering wheel (guide pins must not be damaged).

Tightening torque **32 33 2AZ** .

Release screws (1) and remove decorative strips (2).

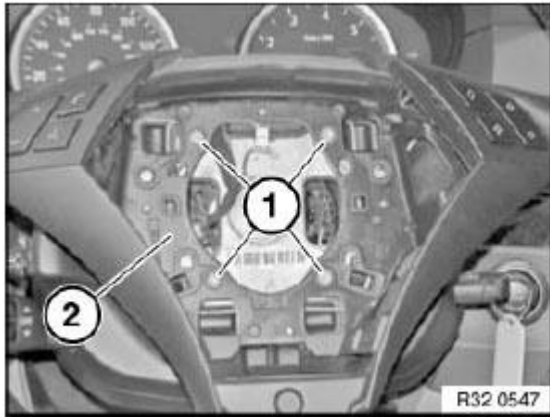


Fig. 67: Identifying Retaining Plate

Courtesy of BMW OF NORTH AMERICA, INC.

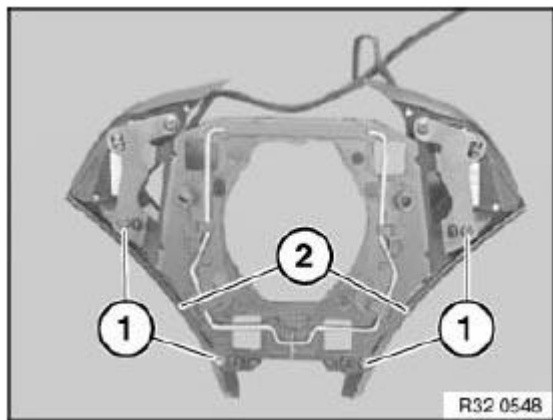


Fig. 68: Identifying Decorative Strips Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Attach decorative strips (1) to retaining plate (2) (do not tighten down screws (3)).

Lay retaining plate (2) with decorative strips (1) on special tool **61 3 120**.

Tighten down screws (3).

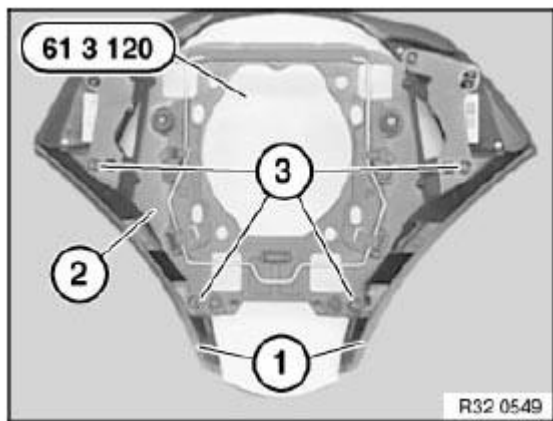


Fig. 69: Identifying Decorative Strips And Retaining Plate
Courtesy of BMW OF NORTH AMERICA, INC.

32 33 001 REMOVING AND INSTALLING (REPLACING) STEERING WHEEL (UP TO 03/2007)

NOTE: Wheel/chassis alignment is not necessary after the steering wheel has been removed and installed or replaced.

Necessary preliminary tasks:

- Remove **AIRBAG UNIT**
- Replacement only: Remove **RETAINING PLATE FOR MULTIFUNCTION STEERING WHEEL SWITCH**

Move wheels/steering wheel into straight-ahead position.

Disconnect plug connection(s) and remove connecting lead(s) from steering wheel.

Release screw (1) and remove steering wheel.

Secure volute spring cassette with adhesive tape against twisting.

Installation:

Make sure connecting lead(s) is/are correctly laid.

Tightening torque **32 33 1AZ** .

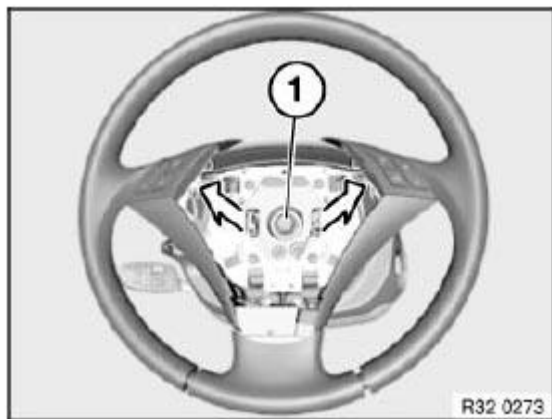


Fig. 70: Removing Steering Wheel

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Locking pin (1) must engage in recess of driver (2).

Installation:

Align steering wheel using grooved toothing to steering column and attach.

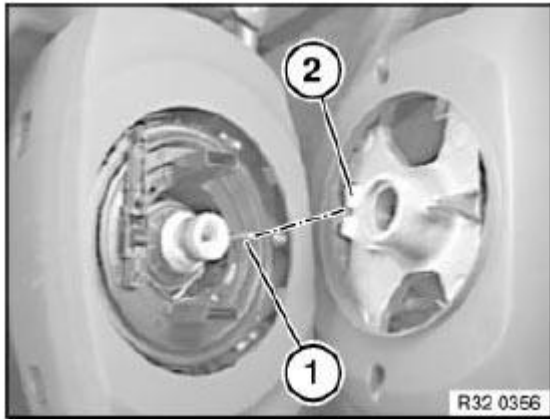


Fig. 71: Identifying Locking Pin And Driver
Courtesy of BMW OF NORTH AMERICA, INC.

32 33 001 REMOVING AND INSTALLING/REPLACING STEERING WHEEL (FROM 03/2007)

NOTE: Wheel/chassis alignment is not necessary after the steering wheel has been removed and installed or replaced.

Necessary preliminary tasks:

- Remove **AIRBAG UNIT**
- Replacement only: Remove **RETAINING PLATE FOR MULTIFUNCTION STEERING WHEEL SWITCH**

Move wheels/steering wheel into straight-ahead position.

Disconnect plug connection (1).

Release screw (2) and remove steering wheel.

Installation:

Make sure connecting lead(s) is/are correctly laid.

Tightening torque **32 33 1AZ** .

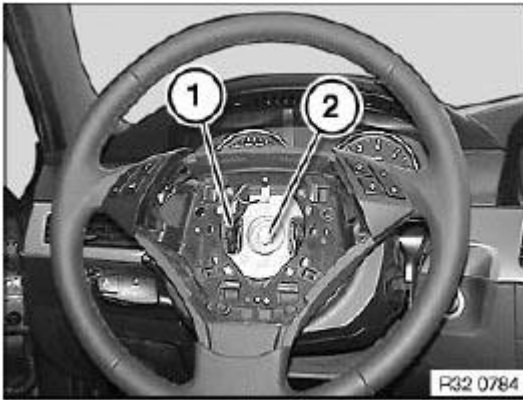


Fig. 72: Identifying Plug Connection And Steering Wheel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Driver (1) must engage in opening (2).

Installation:

Align steering wheel using grooved toothing to steering column and attach.

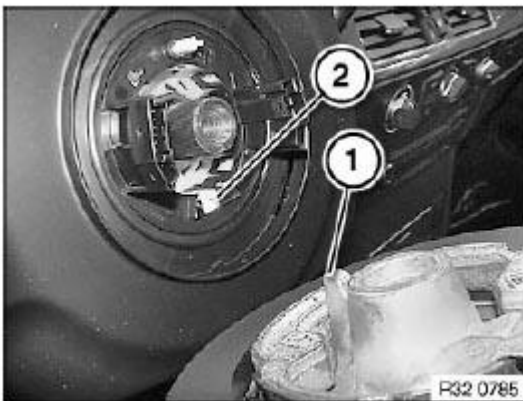


Fig. 73: Identifying Driver
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Modify LANE DEPARTURE WARNING MOTOR ELECTRICS

32 33 010 REMOVING AND INSTALLING/REPLACING SPORT STEERING WHEEL

NOTE: Wheel/chassis alignment is not necessary after the steering wheel has been removed and installed or replaced.

Necessary preliminary tasks:

- Remove **AIRBAG UNIT**

Move wheels/sport steering wheel into straight-ahead position.

Disconnect plug connection (1).

Release screw (2) and remove sport steering wheel.

Secure volute spring cassette with adhesive tape against twisting.

Installation:

Make sure connecting lead(s) is/are correctly laid.

Tightening torque **32 33 1AZ** .

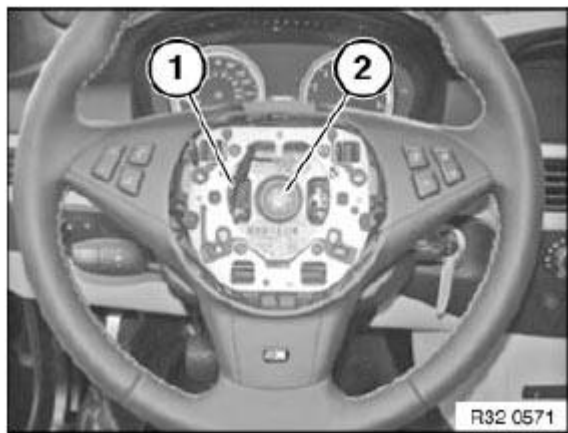


Fig. 74: Identifying Plug Connection And Steering Wheel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align sport steering wheel using grooved toothing (1) to steering column and attach.

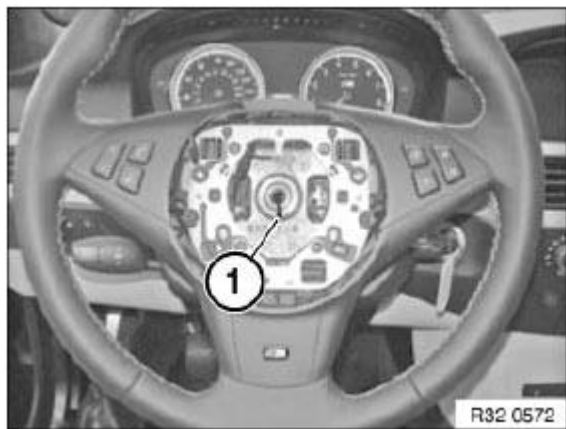


Fig. 75: Identifying Grooved Tooththing

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove **RETAINING PLATE FOR MULTIFUNCTION STEERING WHEEL SWITCH**
- Version with Sequential Manual Gearbox/Transmission: Remove shift paddles. See **REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SHIFT PADDLE FOR SMG TRANSMISSION** or **REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SHIFT PADDLE FOR AUTOMATIC TRANSMISSION**.
- Version with Lane Departure Warning: Remove **LANE DEPARTURE WARNING MOTOR ELECTRICS**

34 STEERING WHEEL FOR AIRBAG

32 34 020 REMOVING AND INSTALLING/REPLACING AIRBAG UNIT

WARNING: Observe the following instructions to avoid any risk of injury by the airbag unit.

- Comply with **SAFETY REGULATIONS** for handling components with gas generators.
- Do not exert any force on the airbag unit.
- Use only specified tools for releasing the airbag unit.

NOTE: Incorrect handling may result in triggering of the airbag unit and thereby cause serious injury.

IMPORTANT: Steering wheel must be replaced if airbag unit has been triggered! See **REMOVING AND INSTALLING (REPLACING) STEERING WHEEL (UP TO 03/2007)** or **REMOVING AND INSTALLING/REPLACING STEERING WHEEL (FROM 03/2007)**.

Follow procedure after airbag triggering.

NOTE: To avoid airbag rattling on standard steering wheels, it is essential to replace the retaining plate together with the airbag unit.

Necessary preliminary tasks:

- Disconnect battery negative lead

Insert T25/T27 Torx screwdriver (1) from below into hole (2) until a springy resistance can be felt through annular spring (3) of airbag unit.

Continue to press in T25/T27 Torx screwdriver (1) until airbag unit is released.

Installation:

Make sure connecting lines are correctly positioned.

Snap airbag unit with uniform pressing force plane-parallel in direction of steering column shaft into steering wheel.

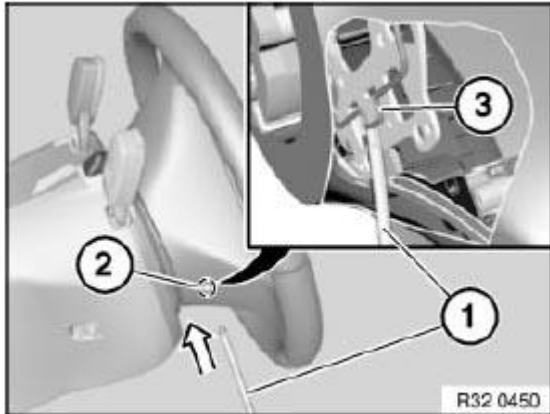


Fig. 76: Inserting Torx Screwdriver Into Hole
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!

Airbag unit may only be set down with the airbag itself facing upwards .

Build date up to 03/2007:

Disconnect plug connection (1) and remove airbag unit.

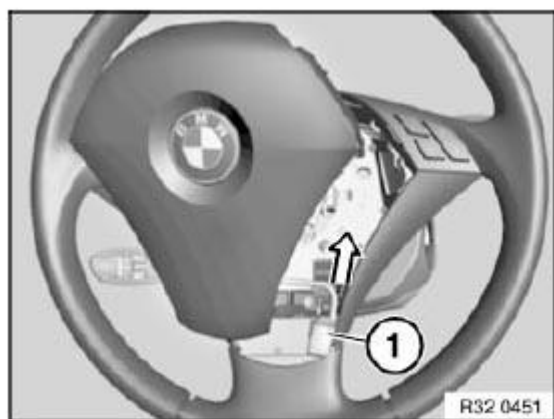


Fig. 77: Disconnecting Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Build date after 03/2007:

Disconnect plug connection (1) and remove airbag unit (2).

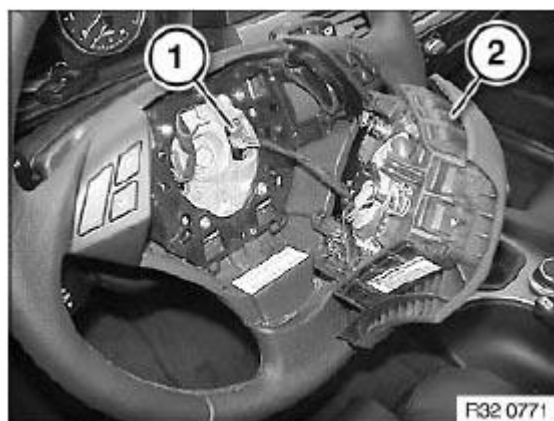


Fig. 78: Identifying Plug Connection And Airbag Unit
Courtesy of BMW OF NORTH AMERICA, INC.

32 34 030 REMOVING AND INSTALLING / REPLACING AIRBAG UNIT (SPORT STEERING WHEEL)

WARNING: Observe the following instructions to avoid any risk of injury by the airbag unit.

- Comply with **SAFETY REGULATIONS** for handling components with gas generators.
- Do not exert any force on the airbag unit.
- Use only specified tools for releasing the airbag unit.

NOTE: Incorrect handling may result in triggering of the airbag unit and thereby cause serious injury.

IMPORTANT: STEERING WHEEL must be replaced if airbag unit has been triggered!
Follow procedure after airbag triggering.

Necessary preliminary tasks:

- Disconnect battery negative lead

Insert Torx screwdriver (T25) from below into opening on rear side of steering wheel until a spring resistance is felt (approx. 3 cm).

Increase pressure on annular spring using Torx screwdriver (T25) until airbag unit is unlocked on both sides.

Installation:

Make sure connecting cables are correctly routed.

Snap airbag unit with uniform pressing force plane-parallel in direction of steering column shaft into steering wheel.

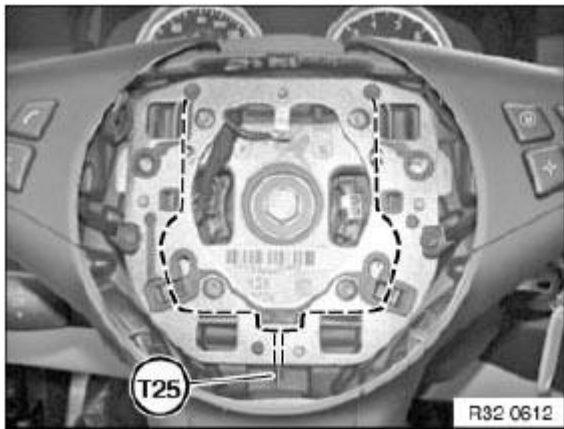


Fig. 79: Identifying Torx Screwdriver (T25)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!
Airbag unit may only be set down with the airbag itself facing upwards .

Tilt airbag unit (1) towards front.

Disconnect plug connection (2) and remove airbag unit (1).

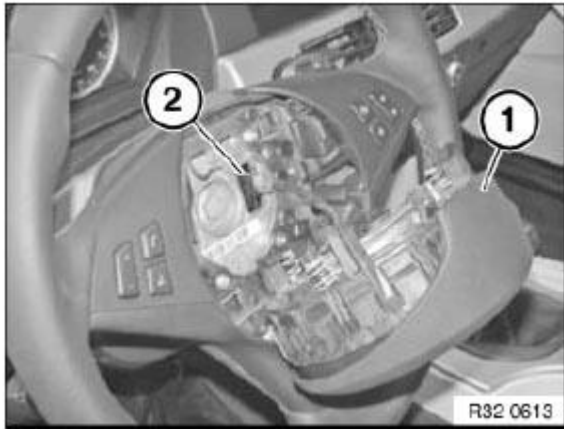


Fig. 80: Identifying Plug Connection And Airbag Unit
Courtesy of BMW OF NORTH AMERICA, INC.

41 PUMP AND OIL SUPPLY

32 41 ... INSTRUCTIONS FOR REMOVING AND INSTALLING EAR CLIPS

Special tools required:

32 1 260

NOTE: The work steps are show on assorted components.
Ear clip must always be replaced.

To remove an ear clip, place special tool 32 1 260 at right angles to ear and cut ear open.

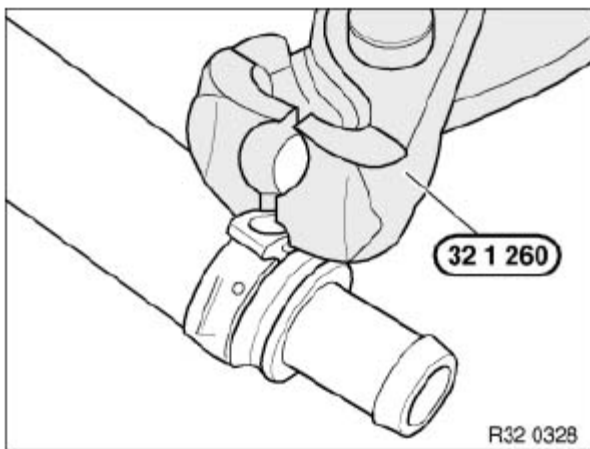


Fig. 81: Identifying Special Tool 32 1 260
Courtesy of BMW OF NORTH AMERICA, INC.

The ear clip can be fitted not only axially but also radially after the hook fastener has been opened.

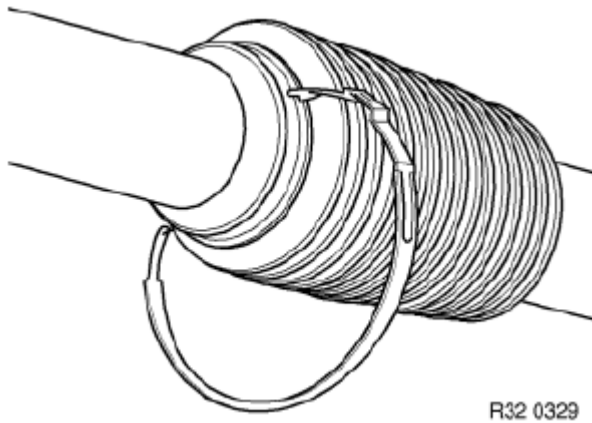


Fig. 82: Identifying Ear Clip

Courtesy of BMW OF NORTH AMERICA, INC.

Attach hook fastener and press ear together with special tool 32 1 260 .

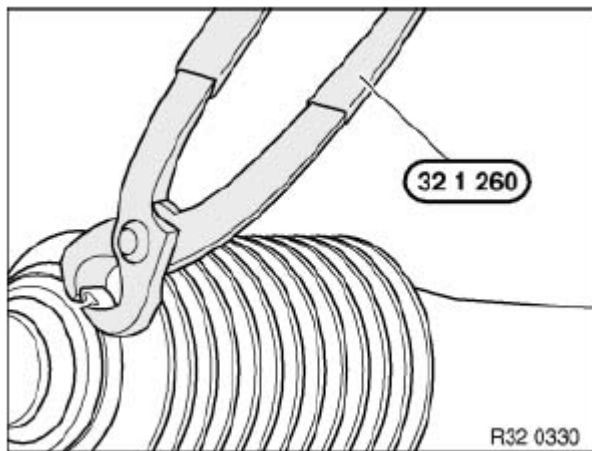


Fig. 83: Pressing Ear Together With Special Tool 32 1 260

Courtesy of BMW OF NORTH AMERICA, INC.

Side cutter of special tool 32 1 260 can be used in areas which are difficult to access.

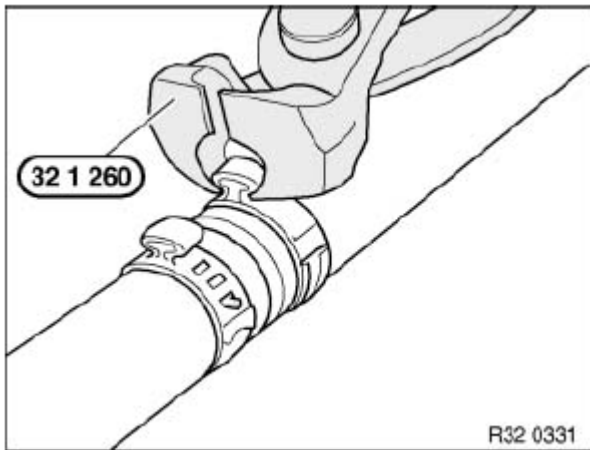


Fig. 84: Identifying Special Tool 32 1 260
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Gap (A) max. 1 mm!

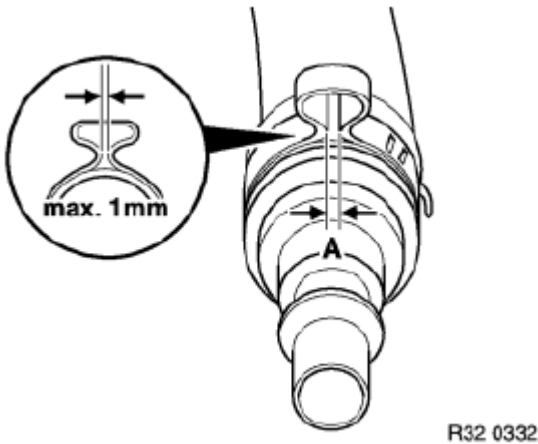


Fig. 85: Identifying Ear Gap
Courtesy of BMW OF NORTH AMERICA, INC.

32 41 ... INSTRUCTIONS FOR USING SPECIAL TOOL 32 4 000

Special tools required:

- 32 4 000
- 32 4 004
- 32 4 005
- 32 4 006
- 32 4 011
- 32 4 012

Depending on the pressure hose connection on the pump, the special tool **32 4 000** must be assembled.

1 = Connection, pump

2 = Connection, steering gear

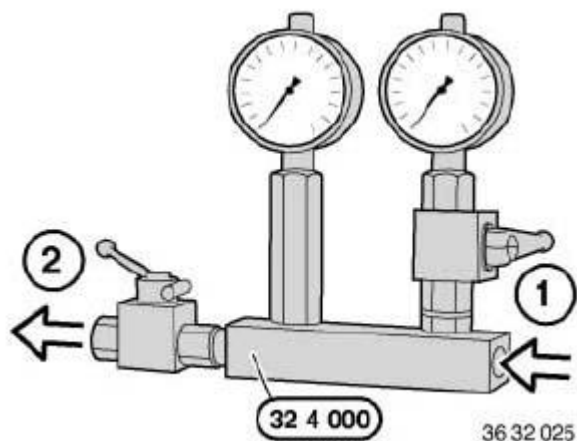


Fig. 86: Identifying Special Tool 32 4 000

Courtesy of BMW OF NORTH AMERICA, INC.

Pressure hose connection to pump with M14 x 1.5 banjo bolt:

Screw special tool **32 4 004** with M14 x 1.5 banjo bolt (1) and 2 sealing rings to special tool **32 4 000**.

Screw special tool **32 4 011** onto pump and connect special tool **32 4 004**.

Screw special tools **32 4 006** / **32 4 012** onto special tool **32 4 000** and connect pressure hose with M14 x 1.5 banjo bolts and 2 sealing rings.

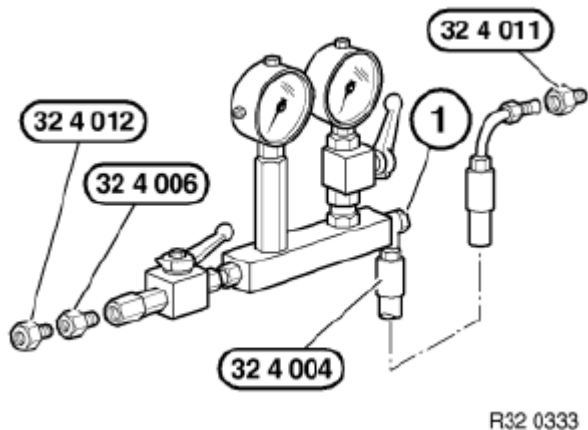


Fig. 87: Identifying Special Tools

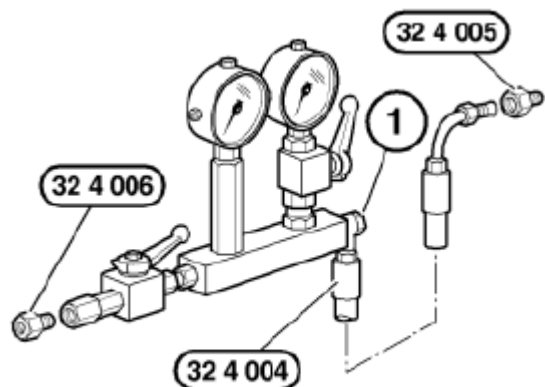
Courtesy of BMW OF NORTH AMERICA, INC.

Pressure hose connection to pump with M16 x 1.5 banjo bolt:

Screw special tool **32 4 004** with M14 x 1.5 banjo bolt (1) and 2 sealing rings to special tool **32 4 000**.

Screw special tool **32 4 005** onto pump and connect special tool **32 4 004**.

Screw special tool **32 4 006** onto special tool **32 4 000** and connect pressure hose with M16 x 1.5 banjo bolt and 2 sealing rings.



R32 0334

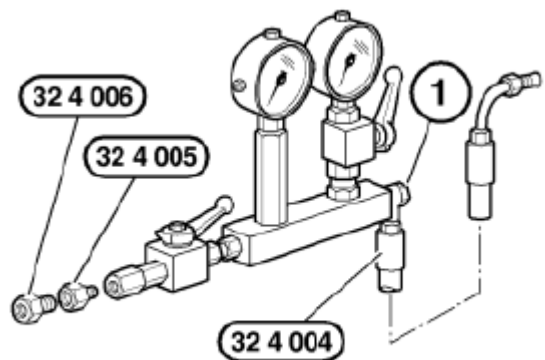
Fig. 88: Identifying Special Tool 32 4 004 And 32 4 005
Courtesy of BMW OF NORTH AMERICA, INC.

Pressure hose connection to pump with M16 x 1.5 union screw:

Screw special tool **32 4 004** with M14 x 1.5 banjo bolt (1) and 2 sealing rings to special tool **32 4 000**.

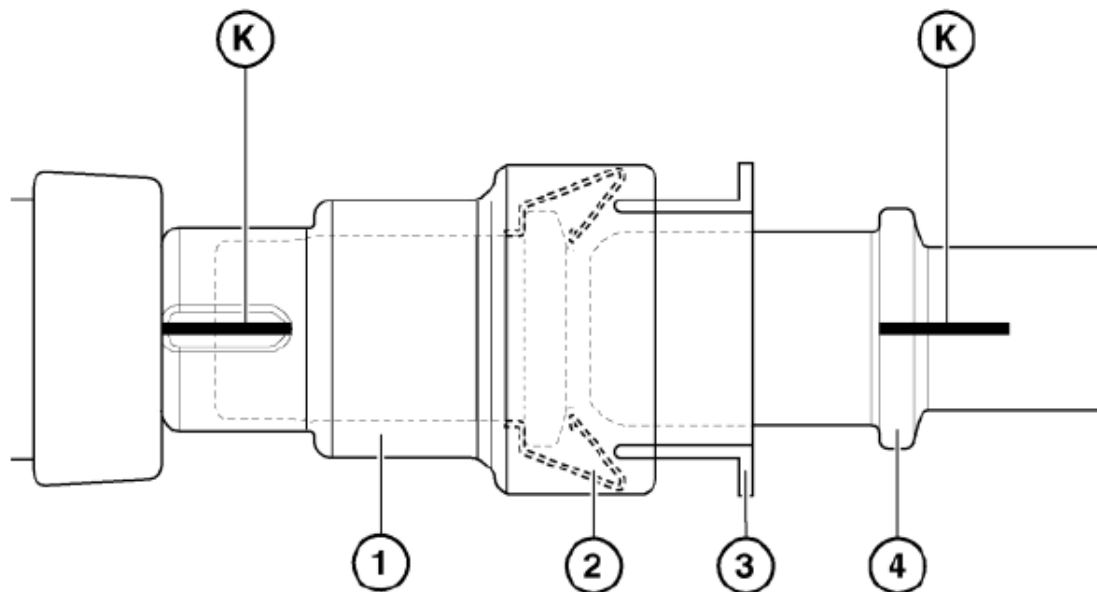
Connect special tool **32 4 004** to pump.

Screw special tools **32 4 006** / **32 4 005** onto special tool **32 4 000** and connect pressure hose.



R32 0335

Fig. 89: Identifying Special Tool 32 4 004, 32 4 005 And 32 4 006
Courtesy of BMW OF NORTH AMERICA, INC.

32 41 ... NOTES ON HYDRAULIC LINE WITH QUICK-CONNECT COUPLING**1. Quick-connect coupling with ID marking**

R32 0183

Fig. 90: Identifying Quick-Connect Coupling With ID Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Removing:

Push quick-connect coupling (1) against pipe (4) (thereby relieving strain on spring (2)).

Press plastic ring (3) into quick-connect coupling (1) and remove coupling (1).

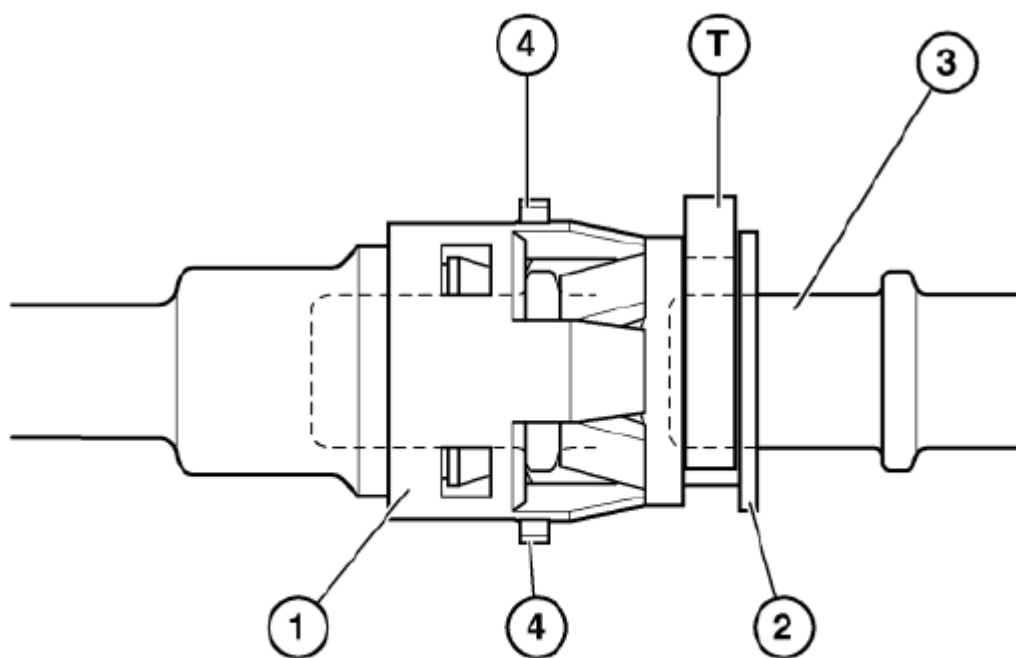
Assembly:

Markings (K) on coupling (1) and pipe (4) must be flush.

Push quick-connect coupling (1) onto pipe (4) until a "click" can clearly be heard.

To check that quick-connect coupling (1) has been installed correctly, pull it back forcefully.

2. Quick-connect coupling with indication pins



R32 0372

Fig. 91: Identifying Quick-Connect Coupling With Indication Pins
 Courtesy of BMW OF NORTH AMERICA, INC.

Removing:

Press plastic ring (2) into quick-connect coupling (1) and remove coupling (1).

Assembly:

When replacing hydraulic line: remove transportation lock (T).

Push quick-connect coupling (1) onto pipe (3) until both indication pins (4) can be seen and felt to point outwards at outside diameter of housing.

To check that quick-connect coupling (1) has been correctly fitted, feel indication pins (4) at outside diameter of housing. When correctly seated, indication pins (4) cannot be pressed into housing.

IMPORTANT: Coupling is not correctly engaged if both indication pins (4) fail to protrude from housing. Leakage is thus unavoidable.

32 41 001 SERVOTRONIC TROUBLESHOOTING

Refer to the following two Service Information bulletins for all the necessary information.

32 41 009 CHECKING FUNCTION OF POWER STEERING VANE PUMP**Special tools required:**

· **32 4 000**

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Prior to this check, first check all hose connections, the vane pump and the power steering gear for leaks.
Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Recycling:

Catch and dispose of hydraulic fluid in a suitable container.

Observe country-specific waste-disposal regulations

Necessary preliminary tasks:

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Remove **FRONT UNDERBODY PROTECTION**
- Disconnect **PRESSURE LINE FROM VANE PUMP**

Version with Dynamic Drive only:

- NOTE:**
- 1. Pressure line to valve block (Dynamic Drive)**
 - 2. Pressure line to power steering gear**
 - 3. Suction line from fluid reservoir**

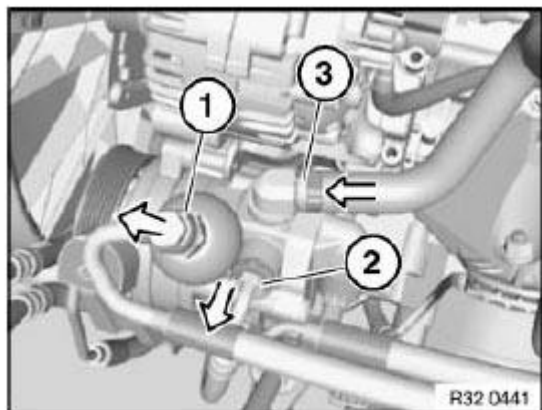


Fig. 92: Disconnecting Power Steering Gear Pressure Line
 Courtesy of BMW OF NORTH AMERICA, INC.

Connecting special tool:

Connect special tool **32 4 000** (refer to **NOTES ON USE**) with new sealing rings to vane pump and pressure line.

1. Connection, vane pump
2. Connection, power steering gear

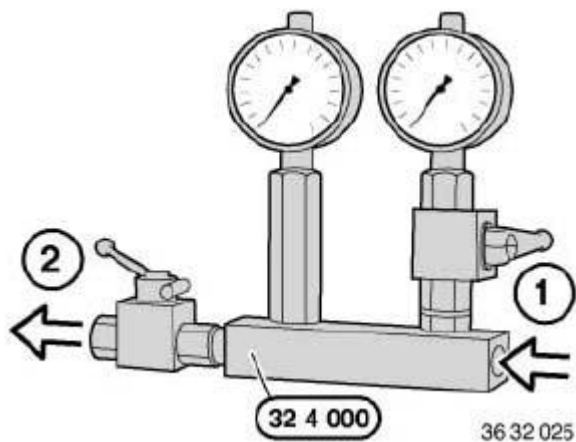


Fig. 93: Identifying Special Tool 32 4 000
 Courtesy of BMW OF NORTH AMERICA, INC.

Checking pump pressure:

1. Close valve (A).
2. Open valve (B).
3. Fill and bleed hydraulic system
4. Start engine

5. Heat hydraulic fluid to approx. 50 °C by moving steering wheel at increased engine speed.
6. Close valve (B) for max. 10 secs. and read off pressure.
7. Compare measured pressure with specified **NOMINAL PRESSURE** .

Replace **VANE PUMP** if the nominal pressure is exceeded by more than 10 %.

Check belt tension if the nominal pressure is undershot by more than 10 %. Replace vane pump if belt tension is OK.

After installation:

- Fill and bleed hydraulic system
- Check pipe connections for leaks
- Version with Dynamic Drive: If necessary, carry out **INITIAL DYNAMIC DRIVE OPERATION**

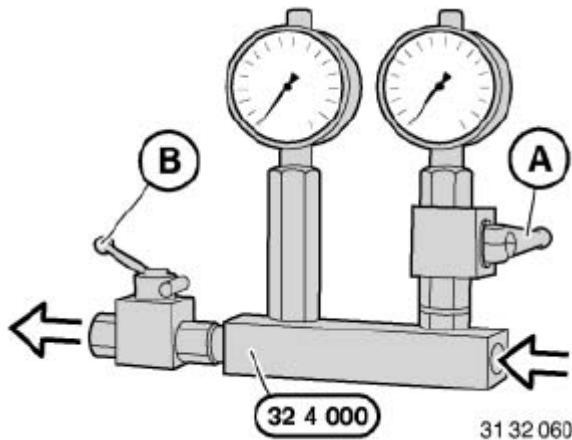


Fig. 94: Identifying Special Tool 32 4 000 And Valve
Courtesy of BMW OF NORTH AMERICA, INC.

32 41 060 REMOVING AND INSTALLING/REPLACING VANE PUMP FOR POWER STEERING (N54)

WARNING: Danger to life!

SECURE ENGINE IN INSTALLATION POSITION to prevent it from falling down.

DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Close off pipe connections with plugs.*Recycling:*

Catch and dispose of hydraulic fluid in a suitable container.

Observe country-specific waste-disposal regulations

Necessary preliminary tasks:

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Remove **BELT PULLEY**
- Lower **FRONT AXLE SUPPORT**

Release screws (1, 2) and remove power steering pump towards front.

Installation:

Observe installation sequence at end of document.

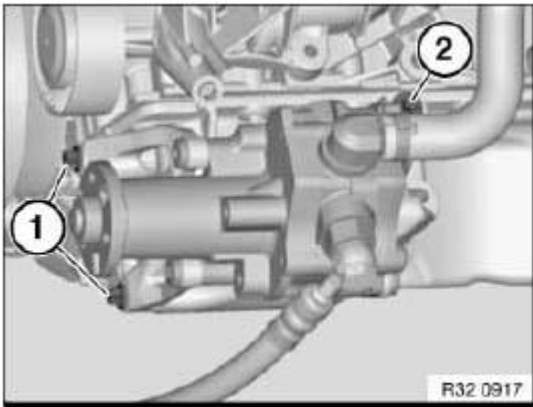


Fig. 95: Identifying Power Steering Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release banjo bolt (2) and detach pressure line (1) from vane pump.

Installation:

Replace all sealing rings.

Tightening torque **32 41 3AZ** .

Release hose clamp (3) and detach suction line (4) from vane pump.

Remove vane pump.

Installation:

Markings (5) on suction line and vane pump connection must match up.

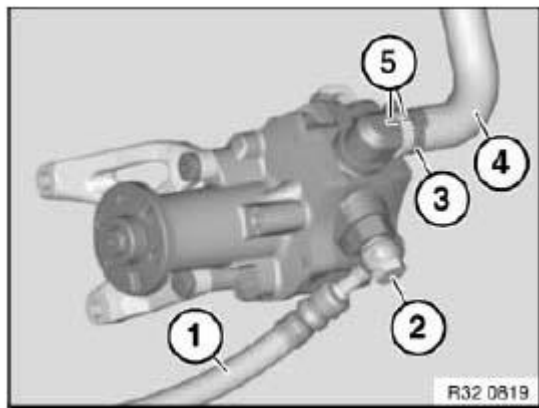


Fig. 96: Identifying Banjo Bolt, Pressure Line, Hose Clamp And Suction Line
Courtesy of BMW OF NORTH AMERICA, INC.

Installation sequence:

1. Insert screws (1, 2) (do not tighten down)
2. Tighten first screw (2) and then screws (1) to 2 Nm
3. Tighten down screws (1)

Tightening torque **32 41 1AZ** .

4. Release screw (2) and check screw fastening point for gap freedom
5. Tighten down screw (2)

Tightening torque **32 41 1AZ** .

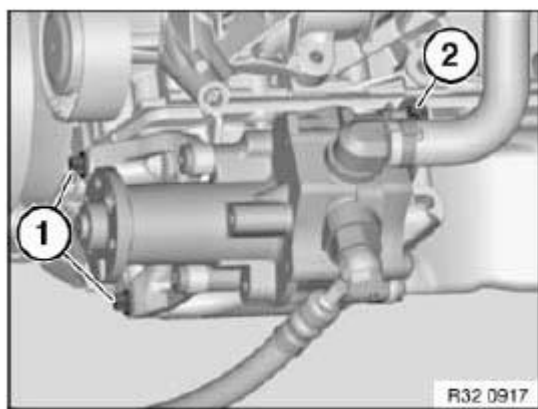


Fig. 97: Identifying Power Steering Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks

32 41 037 REMOVING AND INSTALLING POWER STEERING PUMP FOR POWER STEERING GEAR WITH DYNAMIC DRIVE (N52, N53)

See **Removing and installing power steering pump for power steering gear with Dynamic Drive (N52, N53)** .

32 41 060 REMOVING AND INSTALLING (REPLACING) POWER STEERING VANE PUMP (N52, N53)

See **Removing and installing (replacing) power steering vane pump (N52, N53)** .

32 41 311 REPLACING SUCTION LINE FOR POWER STEERING (N52, N53)

See **Replacing suction line for power steering (N52, N53)** .

32 41 332 REPLACING PRESSURE LINE FOR POWER STEERING (N52, N53)

See **Replacing pressure line for power steering (N52, N53)** .

32 41 351 REPLACING RETURN LINE FOR POWER STEERING (N52, N53)

See **Replacing return line for power steering (N52, N53)** .

32 41 061 REPLACING POWER STEERING VANE PUMP

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Close off pipe connections with plugs.

Recycling:

Catch and dispose of hydraulic fluid in a suitable container.

Observe country-specific waste-disposal regulations

Necessary preliminary tasks:

- Remove **VANE PUMP**

Release screws (1) and remove belt pulley (2).

Installation:

Lettering on belt pulley (2) points forwards.

Tightening torque **32 41 14AZ** .

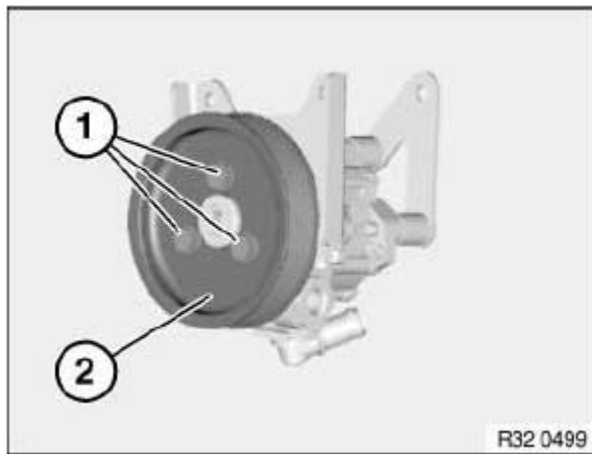


Fig. 98: Identifying Belt Pulley Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks

Version with Dynamic Drive: If necessary, carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 100 REMOVING AND INSTALLING/REPLACING BELT PULLEY ON VANE PUMP FOR POWER STEERING

NOTE: Carry out preliminary work as described in the document "**REPLACING DRIVE BELT**".

Slacken screws (1)

Relieve tension on **DRIVE BELT** and remove from belt pulley (2).

Unscrew bolts (1) and remove belt pulley (2).

Installation:

Lettering on belt pulley (2) must point forwards.

Tightening torque **32 41 14AZ** .

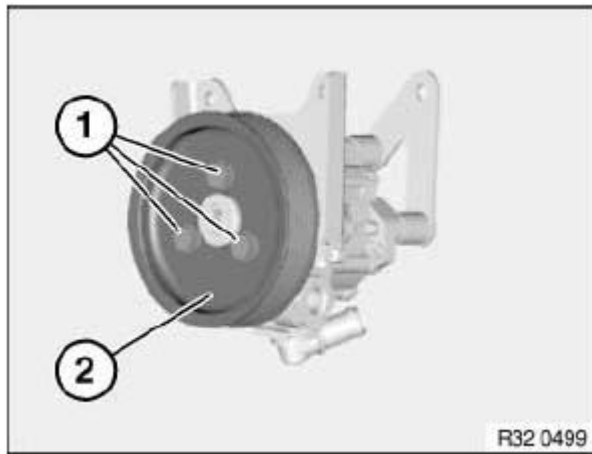


Fig. 99: Identifying Belt Pulley Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

32 41 250 REMOVING AND INSTALLING/REPLACING FLUID RESERVOIR FOR POWER STEERING

Special tools required:

32 1 260

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Seal off pipe connections with plugs.*Necessary preliminary tasks:*

- Draw off and dispose of hydraulic fluid from fluid reservoir
- M54, N52, N53, N54: Remove intake filter housing

Release screw (1).

Tightening torque **32 41 9AZ** .

NOTE: **If necessary, raise and/or turn fluid reservoir in order to gain better access to hose clamps.**

Remove hose clamps if necessary with special tool **32 1 260** .

Disconnect suction and cooler return lines from fluid reservoir, check and if necessary replace.

Lift out fluid reservoir.

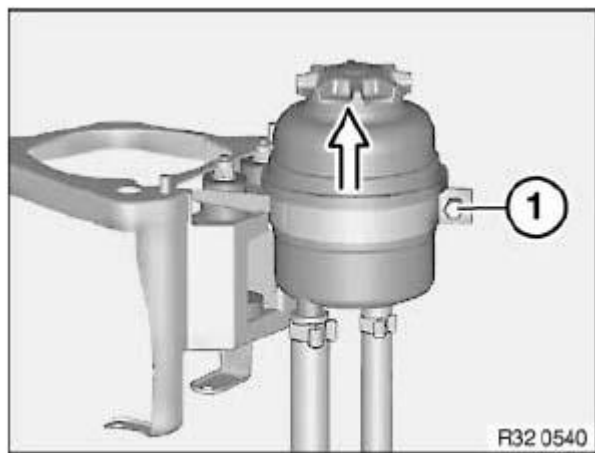


Fig. 100: Lifting Out Fluid Reservoir
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks

32 41 311 REPLACING SUCTION LINE FOR POWER STEERING (N54 AWD)

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Close off pipe connections with plugs.*Necessary preliminary tasks:*

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Remove **FRONT UNDERBODY PROTECTION**
- Remove steering gear cover at side

Version with automatic transmission:

Release bolts (1).

Remove bracket (2) for transmission oil cooler lines from front axle carrier.

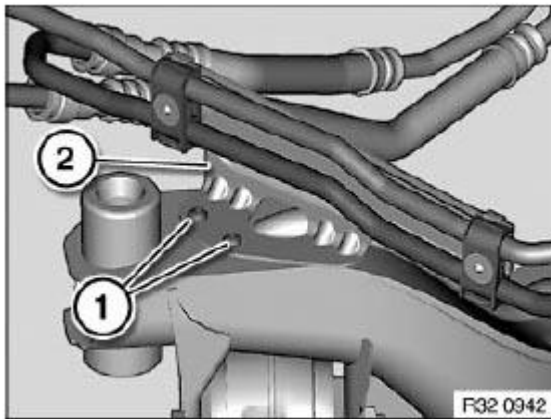


Fig. 101: Identifying Bracket For Transmission Oil Cooler Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Detach suction line (2) from vane pump; if necessary, remove return line for power steering from front axle carrier.

Installation:

Markings (3) on suction line and vane pump connection must match up.

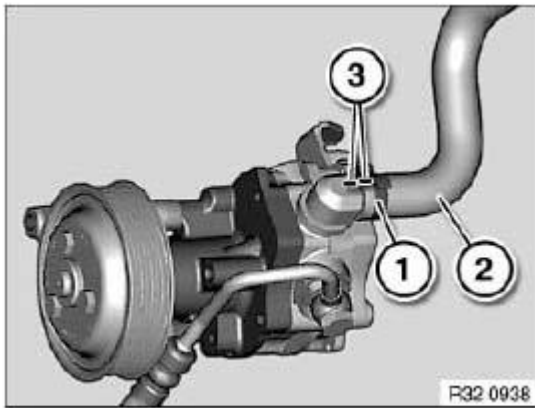


Fig. 102: Identifying Suction Line And Hose Clip
 Courtesy of BMW OF NORTH AMERICA, INC.

Expose suction line up to connection on fluid reservoir.

Remove **FLUID RESERVOIR FROM MOUNTING BRACKET/BODY**.

Unfasten hose clip (1).

Disconnect suction line (2) from fluid reservoir.

Installation:

Make sure hydraulic line is laid without tension and with sufficient spacing to adjoining components.

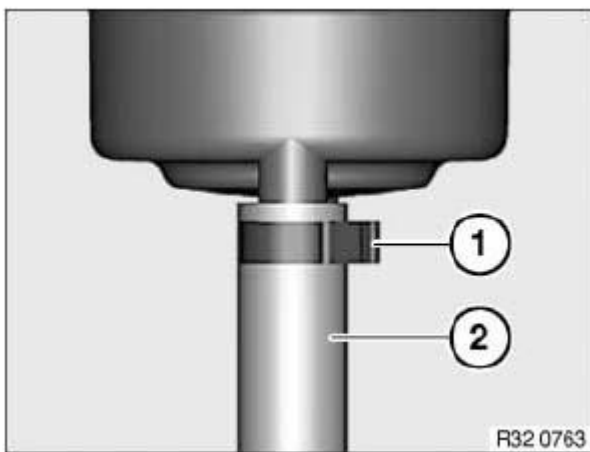


Fig. 103: Identifying Hose Clip And Suction Line
 Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**

- Check pipe connections for leaks

32 41 332 REPLACING PRESSURE LINE FOR POWER STEERING (N54 AWD)

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Close off pipe connections with plugs.

Recycling:

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks:

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Lower **FRONT AXLE SUPPORT**

Release banjo bolt (1) and detach pressure line (2) from vane pump.

Installation:

Replace all sealing rings.

Make sure hydraulic line is laid without tension and with sufficient spacing to adjoining components.

Tightening torque **32 41 3AZ** .

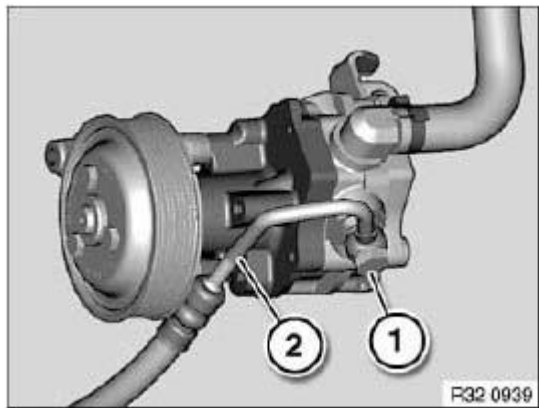


Fig. 104: Identifying Banjo Bolt And Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Expose pressure line up to connection on power steering gear.

Release banjo bolt (1) and remove pressure line (2).

Installation:

Replace all sealing rings.

Make sure hydraulic line is laid without tension and with sufficient spacing to adjoining components.

Tightening torque **32 41 3AZ** .

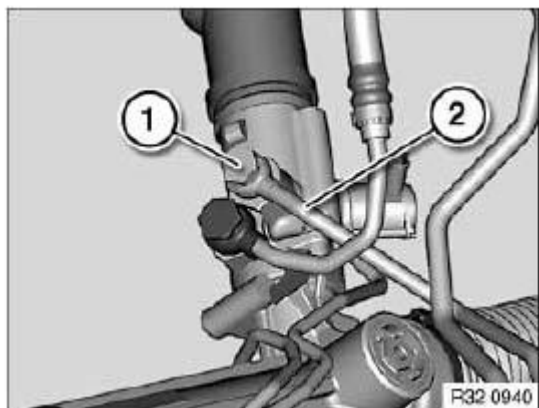


Fig. 105: Identifying Banjo Bolt And Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks

32 41 341 REPLACING COOLER RETURN LINE FOR POWER STEERING

WARNING: **DANGER OF POISONING** if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Close off pipe connections with plugs.

Recycling:

Catch and dispose of hydraulic fluid in a suitable container.

Observe country-specific waste-disposal regulations

Necessary preliminary tasks:

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Remove **FRONT UNDERBODY PROTECTION**
- M54, N52, N53: Remove intake filter housing
- N54: Remove charge-air duct

Remove **FLUID RESERVOIR FROM BRACKET**.

Release hose clamp (1) and detach cooler return line (2) from fluid reservoir.

Installation:

Make sure radiator return line is laid without tension and with sufficient spacing to adjoining components.

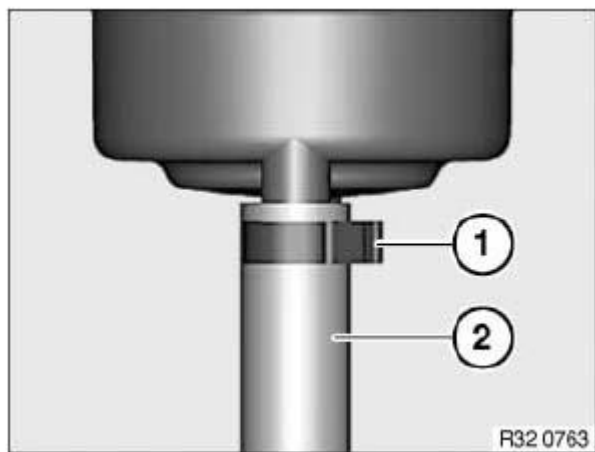


Fig. 106: Identifying Hose Clamp And Cooler Return Line
Courtesy of BMW OF NORTH AMERICA, INC.

Expose cooler return line up to connection on power steering cooler.

Release **QUICK-CONNECT COUPLING** and seal power steering cooler connection with a suitable plug.

Installation:

Make sure radiator return line is laid without tension and with sufficient spacing to adjoining components.

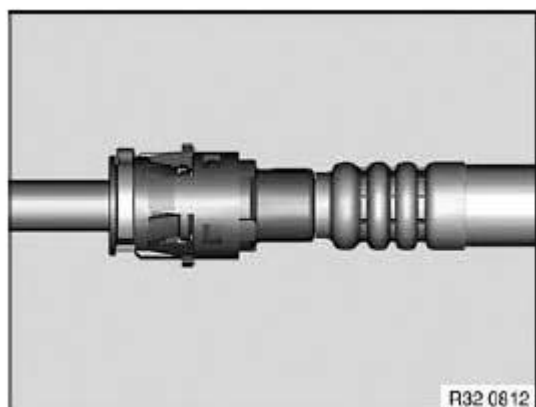


Fig. 107: Identifying Cooler Return Line For Power Steering
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks

32 41 351 REPLACING RETURN LINE FOR POWER STEERING (N54 AWD)

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Close off pipe connections with plugs.

Recycling:

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks:

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Lower **FRONT AXLE SUPPORT**

Release **QUICK-CONNECT COUPLING** and seal power steering cooler connection with a suitable plug.

Installation:

Make sure hydraulic line is laid without tension and with sufficient spacing to adjoining components.

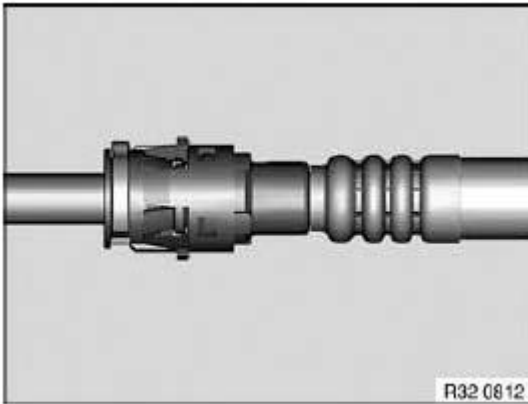


Fig. 108: Identifying Return Line For Power Steering (N54 AWD)
Courtesy of BMW OF NORTH AMERICA, INC.

Expose return line up to connection on power steering gear.

Release banjo bolt (1) and remove return line (2).

Installation:

Replace all sealing rings.

When tightening down banjo bolt, make sure stop (3) rests correctly on power steering gear.

Tightening torque **32 41 3AZ** .

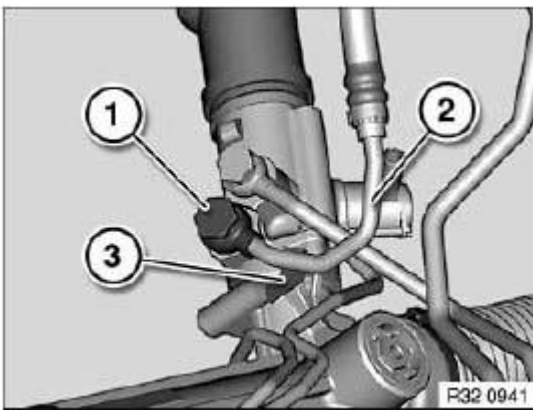


Fig. 109: Identifying Banjo Bolt And Return Line
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks

90 TROUBLESHOOTING

32 90 ... TROUBLESHOOTING ON STEERING (4WD)

Observe **TROUBLESHOOTING ON FRONT AXLE AND DIAGNOSIS HELP FOR STEERING (SI)**.

TROUBLESHOOTING CHART

Fault	Cause	Remedy
Excessive steering wheel play/steering wheel shake	Screw connections, steering spindle lower section to steering gear, loose	Replace screws and tighten down (refer to <u>REMOVING AND INSTALLING/REPLACING LOWER SECTION OF STEERING SPINDLE</u>)
	Connection, steering spindle lower section to assembly partition wall, loose	Tighten down screws (refer to <u>REMOVING AND INSTALLING/REPLACING STEERING SPINDLE LOWER SECTION</u>)
	Journal of tie rod end deformed	Replace <u>STEERING GEAR</u> and <u>TIE ROD ENDS</u>
	Tie rod end worn	Check steering gear rack; if necessary, replace <u>STEERING GEAR</u>
		Check <u>TIE RODS</u> , replace if necessary
		Replace <u>TIE ROD END</u>
Steering wheel inclination	Steering gear rack damaged	Replace <u>STEERING GEAR</u>
	refer to <u>TROUBLESHOOTING ON FRONT AXLE</u>	
	refer to <u>TROUBLESHOOTING ON FRONT AXLE</u>	

GENERAL INFORMATION**Symptom Check List Worksheets***** PLEASE READ THIS FIRST ***

NOTE: This article is intended for general information purposes only. It does not apply specifically to one make or model.

PURPOSE

NOTE: This article is intended for general information purposes only. It does not apply specifically to one make or model.

WHY USE THE SYMPTOM CHECK LIST WORKSHEETS?

One of the most difficult and critical lines of communication is between the service customer and the technician. The clearer the technician understands the customer's concerns, the more likely the problem will be "fixed right the first time".

The Symptom Check List Worksheets in this article are designed to improve this communication. When used consistently, they can be helpful in reducing shop comebacks, increasing technician productivity, and producing satisfied customers. They also provide other benefits:

- Reduce "No Trouble Found" problems
- Increase customer involvement
- Customer perceive that "they really care and listen"
- Save time during peak write-up periods
- Reduce recontacting customers for additional information
- Improve night drop information
- Insure all the right questions are asked at write-up

MAKING THE WORKSHEETS A PART OF YOUR NORMAL ROUTINE

The following information contains ideas that may be helpful in forming habits that promote daily use of the Symptom Check Lists:

- HAVE THE SERVICE ADVISER FILL OUT THE FORM(S) WITH THE CUSTOMER WHENEVER POSSIBLE.
- Place them in your night drop for the customer to fill out, along with an instruction sheet to help them understand what to do.
- Hand out the worksheets to customers while they wait in line during the peak morning rush and ask them to fill it out. It will save time for all concerned and improve the quality of information received from the customer.

- Make sure it is attached to the hard copy when it goes to the technician.
- Place a copy with the final repair papers and review it with the customer at delivery.
- Put a new worksheet in the glovebox of all departing customers.
- Require that you personally see a copy of all worksheets filled out for shop comebacks.
- Hold a shop meeting to get employee buy-in and their ideas on how to make it effective in your shop.

There are many other ways to utilize the concept, but as with every other idea, successful implementation depends on employee involvement and buy-in.

SYMPTOM CHECK LIST WORKSHEETS

CONDENSED VERSION - ALL ON ONE PAGE

NOTE: Have the service adviser fill out this form with the customer whenever possible.

DRIVEABILITY WORKSHEET (To Be Filled Out By Vehicle Owner)	
Name: _____ Date: _____ Make: _____ Model: _____ Year: _____ Engine: _____ Mileage: _____	
FAULT CHARACTERISTICS - SYMPTOMS - DESCRIPTION OF PROBLEM (Please Check All That Apply In All Categories)	
Starting Problems	<input type="checkbox"/> Will Not Crank <input type="checkbox"/> Cranks, But Won't Start <input type="checkbox"/> Starts, But Takes A Long Time
Engine Quits/Running Problems	Quits: <input type="checkbox"/> Right After Starting <input type="checkbox"/> When Put Into Gear <input type="checkbox"/> Right After Vehicle Comes To A Stop <input type="checkbox"/> During Steady Speed Driving <input type="checkbox"/> While Idling <input type="checkbox"/> During Acceleration <input type="checkbox"/> When Parking
Poor Idling Conditions	Idle Speed: <input type="checkbox"/> Is Too Slow At All Times <input type="checkbox"/> Is Too Slow With A/C On <input type="checkbox"/> Is Too Fast <input type="checkbox"/> Is Rough Or Uneven <input type="checkbox"/> Fluctuates Up and Down
Poor Running Conditions	<input type="checkbox"/> Runs Rough <input type="checkbox"/> Lacks Power <input type="checkbox"/> Hesitates Or Stumbles On Acceleration <input type="checkbox"/> Bucks and Jerks <input type="checkbox"/> Engine Knocks, Pings, Rattles <input type="checkbox"/> Backfires <input type="checkbox"/> Poor Fuel Economy <input type="checkbox"/> Misfires or Cuts Out <input type="checkbox"/> Surges and/or Chuggles <input type="checkbox"/> Dieseling or Run-On <input type="checkbox"/> Engine Light Always On <input type="checkbox"/> Engine Light On Sometimes <input type="checkbox"/> Fuel, Gas, or Sulfur Smell
Auto. Transmission Problems	<input type="checkbox"/> Improper Shifting (early/late) <input type="checkbox"/> Changes Gear Randomly On Its Own <input type="checkbox"/> Vehicle Does Not Move When In Gear
Poor Handling	<input type="checkbox"/> Pulls To One Side <input type="checkbox"/> Hard Steering <input type="checkbox"/> Vehicle Shakes and/or Vibrates While Moving
Noise Problems	Explain: _____
Odor Problems	Explain: _____
Problem Frequency	<input type="checkbox"/> Always <input type="checkbox"/> Often <input type="checkbox"/> Occasionally
Usually Occurs	<input type="checkbox"/> Morning <input type="checkbox"/> Afternoon <input type="checkbox"/> Anytime
Engine Temp.	<input type="checkbox"/> Cold <input type="checkbox"/> Warm <input type="checkbox"/> Hot
Vehicle Speed	<input type="checkbox"/> Low <input type="checkbox"/> Cruising <input type="checkbox"/> High
Driving Conditions During Occurrence	<input type="checkbox"/> Short - Less Than 2 Miles <input type="checkbox"/> 2-10 Miles <input type="checkbox"/> Long - More Than 10 Miles <input type="checkbox"/> Stop & Go <input type="checkbox"/> While Turning <input type="checkbox"/> While Braking <input type="checkbox"/> At Gear Engagement <input type="checkbox"/> With A/C Operating <input type="checkbox"/> With Headlights On <input type="checkbox"/> During Acceleration <input type="checkbox"/> During Deceleration <input type="checkbox"/> Mostly Downhill <input type="checkbox"/> Mostly Uphill <input type="checkbox"/> Mostly Level <input type="checkbox"/> Mostly Curvy <input type="checkbox"/> Rough Road
Driving Habits	<input type="checkbox"/> Drive Hard Before Engine Is Warmed <input type="checkbox"/> Allow Engine To Warm <input type="checkbox"/> Mostly City Driving <input type="checkbox"/> Highway <input type="checkbox"/> Park Vehicle Inside <input type="checkbox"/> Outside Drive Per Day: <input type="checkbox"/> Less Than 10 Miles <input type="checkbox"/> 10-50 <input type="checkbox"/> More Than 50 Fuel Octane: <input type="checkbox"/> 87 <input type="checkbox"/> 89 <input type="checkbox"/> 91 <input type="checkbox"/> More Than 91 Brand: _____ <input type="checkbox"/> Gasohol <input type="checkbox"/> Propane Conversion
Outside Weather	<input type="checkbox"/> Cold <input type="checkbox"/> Warm <input type="checkbox"/> Hot <input type="checkbox"/> Wet/Rainy <input type="checkbox"/> Fog <input type="checkbox"/> Snow/Hail <input type="checkbox"/> Dust/Dirt <input type="checkbox"/> Dry <input type="checkbox"/> Humid

Fig. 1: Entire Vehicle - Symptom Check List For Customer

FULL VERSION - ALL ON FOUR PAGES

NOTE: Have the service adviser fill out these forms with the customer whenever

possible.

Dear Valued Customer:

Our goal is to fix your problem correctly and get you back on the road as soon as possible in the unlikely event you experience a problem with your vehicle. Help us identify the exact nature of the concern by taking a few moments to complete the appropriate section of this diagnostic worksheet. Thank you.

CUSTOMER NAME:

PHONE NO.:

REPAIR ORDER NO.:

DIAGNOSTIC WORKSHEET**DRIVEABILITY - ENGINE - AUTOMATIC TRANSMISSION****SYMPTOM (CHECK ALL THAT APPLY)****ENGINE**

- ☐ "Service Engine Soon"/"Malfunction Indicator Light" on
☐ Hard start/no start (cranks OK)
☐ Won't crank
☐ Engine stalls
☐ Engine miss
☐ Miss while driving
☐ Hesitates, stumbles or sags
☐ Rough idle
☐ Idle is too high ☐ Idle is too low
☐ Poor power/performance
☐ Surge or chuggle, buck - jerk - skip
☐ Poor gas mileage ☐ Highway ☐ City
☐ Pings, detonates
☐ Suphur, rotten egg odor
☐ Backfires (popping noise) - underhood/tailpipe
☐ Exhaust smoke ☐ Increased oil consumption
☐ Runs on after key is turned off
☐ Speed fluctuates without moving accelerator
☐ Engine noise (explain): _____

 (whine, rattle, groan, clunk, etc.)
☐ Other: _____

TRANSMISSION

- ☐ Does not shift properly ☐ Hard shift
☐ Will not shift ☐ Up ☐ Down
☐ Will not shift into overdrive
☐ Engine starts in other than "P" or "N"
☐ Noise (describe): _____

 (whine, rattle, groan, clunk, buzz, etc.)
☐ Shifts into gear too early
☐ Overdrive doesn't work with speed control, but is otherwise OK
☐ Highway speed - shudder, surge, etc.
☐ Other: _____

EXPLAIN: _____

 _____**OPERATING CONDITIONS (CHECK ALL THAT APPLY)****HOW OFTEN DOES IT OCCUR? (Engine and/or Transmission)**

- ☐ Always ☐ Few seconds ☐ Few minutes
☐ Few hours ☐ Few days ☐ Few weeks
☐ Few months ☐ Variable ☐ Only during event
☐ Every _____ to _____ miles ☐ Unknown
☐ Other (explain): _____
☐ Just started ☐ Getting better ☐ Getting worse
☐ Since new

WHEN DOES IT OCCUR? (Engine and/or Transmission)**When Engine Temperature is:**

- ☐ Cold ☐ Warm ☐ Hot
☐ All the time ☐ Only during warmup

Weather Conditions:

- ☐ Very cold - below 0 degrees F ☐ Cold - 0 to 32 degrees F
☐ Cool - 32 to 60 degrees F ☐ Warm - 60 to 80 degrees F
☐ Hot - Above 80 degrees F ☐ Any environment
☐ Raining ☐ Dry ☐ Humid
☐ Snow/ice ☐ Wet roads ☐ Other (explain below)

Driving Conditions:

- ☐ Light throttle ☐ Medium throttle ☐ Hard throttle
☐ Starting ☐ At idle ☐ Decelerating
☐ Over bumps ☐ When shifting ☐ While turning
☐ Cruising steady at _____ MPH ☐ While braking
☐ Anytime ☐ Uphill ☐ Downhill
☐ Highway ☐ City/town ☐ Stop and go
☐ Between _____ MPH and _____ MPH
☐ Only with A/C or Defrost on

What Type of Fuel?

- ☐ Regular UL ☐ Mid range UL ☐ Premium Unleaded
☐ Gasohol ☐ Ethanol ☐ Methanol
☐ Diesel #1 ☐ Diesel #2 ☐ Various brands

What Brand? _____**When Gear Selector is in:**

- ☐ Park/Neutral ☐ Reverse ☐ Overdrive
☐ Drive/3 ☐ Drive/2 ☐ Drive/1

Between Gears:

- ☐ Park to R or D ☐ Rev/Drive ☐ First/Second
☐ Second/Third ☐ Third/Overdrive

50G15061

Fig. 2: Symptom Check List - Page 1

BRAKES - STEERING - SUSPENSION**SYMPTOM**

- | | | |
|---|--|---------------------------------------|
| <input type="checkbox"/> Vehicle pulls right - When _____ | <input type="checkbox"/> Suspension bottoms out | <input type="checkbox"/> Sits uneven |
| <input type="checkbox"/> Vehicle pulls left - When _____ | <input type="checkbox"/> Leans or sways in corners | <input type="checkbox"/> "Dog" tracks |
| <input type="checkbox"/> Steering wheel vibrates at _____ MPH | <input type="checkbox"/> Brake light on | <input type="checkbox"/> ABS light on |
| <input type="checkbox"/> Excessive play in steering | <input type="checkbox"/> Traction control light on | <input type="checkbox"/> Soft ride |
| <input type="checkbox"/> Erratic steering when braking | <input type="checkbox"/> Uneven tire wear | |
| <input type="checkbox"/> Poor steering wheel return after cornering | | |

Hard to steer

- ☐ Effort ☐ Wanders
☐ Steering wheel off center

Shimmy/vibration (check box below for location)

- | | | |
|--------------------------------|--------------------------------|--------------------------------------|
| <input type="checkbox"/> Front | <input type="checkbox"/> Rear | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Seat | <input type="checkbox"/> Floor | <input type="checkbox"/> Other _____ |

Brake pedal

- ☐ Noise ☐ Pulses ☐ Squeaks ☐ Hard ☐ Mushy ☐ Excessive travel

WHEN DOES IT OCCUR?

- | | | | | |
|--|--|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> Cold days | <input type="checkbox"/> Hot days | <input type="checkbox"/> Wet/rain | <input type="checkbox"/> All the time | <input type="checkbox"/> Intermittent |
| <input type="checkbox"/> Parking maneuvers | <input type="checkbox"/> At road speed | <input type="checkbox"/> Accelerating | <input type="checkbox"/> Decelerating | |

EXPLAIN: _____**SQUEAK - RATTLE - NOISE CONDITIONS****AREA OF NOISE**

- | | | | | |
|--|----------------------------------|--------------------------------------|---------------------------------|-------------------------------------|
| <input type="checkbox"/> Engine Compartment | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Front Suspension | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Rear Suspension | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Passenger Compartment | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Instrument Panel | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Doors | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Rear seat area | <input type="checkbox"/> Console | <input type="checkbox"/> Other _____ | | |

NOISE SOUNDS LIKE

- | | | | | | |
|----------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|----------------------------------|--------------------------------|
| <input type="checkbox"/> Knocks | <input type="checkbox"/> Hard metal | <input type="checkbox"/> Light metal | <input type="checkbox"/> Roars | <input type="checkbox"/> Ticking | <input type="checkbox"/> Whine |
| <input type="checkbox"/> Squeaks | <input type="checkbox"/> Rattles | <input type="checkbox"/> Scraping | <input type="checkbox"/> Other _____ | | |

HOW OFTEN DOES IT OCCUR?

- ☐ Continuous ☐ Often ☐ Intermittent ☐ Just started ☐ Since new

WHEN DOES IT OCCUR?

- | | | | | | |
|--|---|--|--|---------------------------------------|---|
| <input type="checkbox"/> All the time | <input type="checkbox"/> Speed | <input type="checkbox"/> RPM | <input type="checkbox"/> Only moving | <input type="checkbox"/> On turns | <input type="checkbox"/> Braking |
| <input type="checkbox"/> Hard throttle | <input type="checkbox"/> Light throttle | <input type="checkbox"/> Decelerate | <input type="checkbox"/> Steady speed | <input type="checkbox"/> Idle in gear | <input type="checkbox"/> Idle out of gear |
| <input type="checkbox"/> Hot days | <input type="checkbox"/> Cold days | <input type="checkbox"/> Humid or rainy | <input type="checkbox"/> Temperature _____ | | |
| <input type="checkbox"/> Heavy bumps | <input type="checkbox"/> Light bumps | <input type="checkbox"/> Smooth pavement | | | |

EXPLAIN: _____

CUSTOMER NAME:

PHONE NO.:

REPAIR ORDER NO:

SHOP USE ONLY:

VIN#:

MILES:

TECHNICIAN:

ADVISOR#:

50H15062

Fig. 3: Symptom Check List - Page 2

AIR CONDITIONING - HEATER - VENTILATION**SYSTEM OR AREA AFFECTED**

- ☐ Air conditioner ☐ Heater ☐ Defroster ☐ Vent ☐ Bi-Level ☐ Fan/blower
☐ Max A/C ☐ Automatic Temperature Control ☐ Mix/blend ☐ Economy ☐ All

SYMPTOM

- ☐ Does not work ☐ Blows wrong temperature air ☐ No air comes out of vents ☐ Rapid cycling
☐ Noisy (explain) ☐ Broken ☐ Odor ☐ Air comes from wrong outlets ☐ Blows fuse
☐ Leaks ☐ Insufficient heat or cool ☐ Other (explain below)

WHEN DOES IT OCCUR?

- ☐ All the time ☐ Hot ☐ Cold ☐ Intermittent ☐ Right after startup
☐ When change controls only ☐ Other (explain below) ☐ Fan blower speed High / Med / Low

EXPLAIN: _____

ELECTRICAL - RADIO - TAPE/CD PLAYER**SYMPTOM - MUSIC SYSTEM**

- ☐ Does not work ☐ Noisy ☐ Static ☐ Won't load ☐ Won't eject ☐ Poor reception
☐ Controls do not work ☐ Blows fuse ☐ Other (explain below)

SYSTEM AFFECTED

- ☐ Radio only ☐ AM ☐ FM ☐ FM stereo ☐ Graphic equalizer
☐ Tape player ☐ CD player ☐ Whole system ☐ Steering wheel buttons ☐ Phone
☐ Speakers ☐ Front ☐ Rear ☐ Left ☐ Right
☐ Antenna ☐ Clock ☐ Radio or player controls ☐ Rear seat controls

ALL OTHER ELECTRICAL ITEMS OR ACCESSORIES

Please list the complaint accessory or item and check any applicable symptom(s) from the list that follows:

- _____ ☐ Inoperable ☐ Noisy ☐ No control ☐ Erratic
 ☐ Check light on or flashing ☐ Works improperly (explain below)
 ☐ Blows fuse ☐ Intermittent ☐ Related system affected (explain below)
- _____ ☐ Inoperable ☐ Noisy ☐ No control ☐ Erratic
 ☐ Check light on or flashing ☐ Works improperly (explain below)
 ☐ Blows fuse ☐ Intermittent ☐ Related system affected (explain below)
- _____ ☐ Inoperable ☐ Noisy ☐ No control ☐ Erratic
 ☐ Check light on or flashing ☐ Works improperly (explain below)
 ☐ Blows fuse ☐ Intermittent ☐ Related system affected (explain below)

WHEN DOES IT OCCUR?

- ☐ All the time ☐ Hot ☐ Cold ☐ Just after starting - malfunctions for a while
☐ Intermittent ☐ After runs for _____ minutes ☐ Rough roads or bumps only
☐ Other (explain below)

EXPLAIN: _____

CUSTOMER NAME:

PHONE NO.:

REPAIR ORDER NO:

SHOP USE ONLY:

VIN#:

MILES:

TECHNICIAN:

ADVISOR#:

50115063

Fig. 4: Symptom Check List - Page 3

WATER LEAK - WINDNOISE**WATER LEAK****Leak Occurs When?**

- ☐ Setting level ☐ Any time it rains ☐ While driving in the rain ☐ Car wash only
☐ Back lower than front (facing uphill) ☐ Front lower than back (facing downhill)

Location of Leak (where water appears):

- ☐ LF Door ☐ RF Door ☐ LR Door ☐ RR Door ☐ Windshield ☐ Rear window
☐ LF window ☐ RF window ☐ LR window ☐ RR window ☐ Side door ☐ Sunroof/T-Top
☐ Under instrument panel ☐ Rear door/rear hatch

WINDNOISE:**Location:**

- ☐ LF Door ☐ RF Door ☐ LR Door ☐ RR Door ☐ Windshield ☐ Rear window
☐ LF window ☐ RF window ☐ LR window ☐ RR window ☐ Side door ☐ Sunroof/T-Top
☐ Under instrument panel ☐ Rear door/rear hatch

EXPLAIN: _____

MANUAL TRANSMISSION - CLUTCH**SYMPTOM - MANUAL GEAR SHIFT**

- ☐ Hard to shift ☐ Doesn't shift
☐ Grinds going into _____ gear
☐ Noisy when in _____ gear or neutral _____
☐ Slips/pops out of gear
☐ Noise (describe): _____

☐ Upshift light stays on
☐ Upshift light doesn't light

WHEN DOES IT OCCUR?

- ☐ All the time ☐ Light load
☐ Heavy load

EXPLAIN: _____

SYMPTOM - CLUTCH

- ☐ Hard to push ☐ Fail to release
☐ Noise when pressing pedal down (describe): _____

☐ Slips ☐ Chattering (grabbing)
☐ Odor present ☐ Pedal stays on the floor
☐ Squealing sound

WHEN DOES IT OCCUR?**When Engine Temperature is:**

- ☐ Cold ☐ Hot
☐ Accelerating ☐ Decelerating

COMMENTS:

CUSTOMER NAME:**PHONE NO.:****REPAIR ORDER NO.:****SHOP USE ONLY:**

VIN#:

MILES:

TECHNICIAN:

ADVISOR#:

50J15064

Fig. 5: Symptom Check List - Page 4**INDIVIDUAL SYSTEM-BASED CHECK LISTS**

NOTE: Have the service adviser fill out these forms with the customer whenever possible.

DRIVEABILITY - ENGINE - AUTOMATIC TRANSMISSION

SYMPTOM (CHECK ALL THAT APPLY)
ENGINE

- ☐ "Service Engine Soon"/Malfunction Indicator Light" on
- ☐ Hard start/no start (cranks OK)
- ☐ Won't crank
- ☐ Engine stalls
- ☐ Engine miss
- ☐ Miss while driving
- ☐ Hesitates, stumbles or sags
- ☐ Rough idle
- ☐ Idle is too high
- ☐ Poor power/performance
- ☐ Surge or chuggle, buck - jerk - skip
- ☐ Poor gas mileage
- ☐ Ping, detonates
- ☐ Sulphur/rotten egg odor
- ☐ Backfires (popping noise) - underhood/tailpipe
- ☐ Exhaust smoke
- ☐ Runs on after key is turned off
- ☐ Speed fluctuates without moving accelerator
- ☐ Engine noise (explain):

(whine, rattle, groan, clunk, etc.)

- ☐ Other: _____

TRANSMISSION

- ☐ Does not shift properly ☐ Hard shift
☐ Will not shift ☐ Up ☐ Down
☐ Will not shift into overdrive
☐ Engine starts in other than "P" or "N"
☐ Noise (describe): _____

(whine, rattle, groan, clunk, buzz, etc.)

- ☐ Shifts into next gear too early
- ☐ Overdrive doesn't work with speed control, but is otherwise OK
- ☐ Highway speed - shudder, surge, etc.
- ☐ Other: _____

EXPLAIN: _____

OPERATING CONDITIONS (CHECK ALL THAT APPLY)
HOW OFTEN DOES IT OCCUR? (Engine &/or Transmission)

- ☐ Always ☐ Few Seconds ☐ Few minutes
☐ Few hours ☐ Few days ☐ Few weeks
☐ Few months ☐ Variable ☐ Only during event
☐ Every _____ to _____ miles ☐ Unknown
☐ Other (explain): _____
☐ Just started ☐ Getting better ☐ Getting worse
☐ Since new

WHEN DOES IT OCCUR? (Engine and/or Transmission)
When Engine Temperature is:

- ☐ Cold ☐ Warm ☐ Hot
☐ All the time ☐ Only during warmup

Weather Conditions:

- ☐ Very cold - below 0°F ☐ Cold - 0 to 32°F
☐ Cool - 32 to 60°F ☐ Warm - 60 to 80°F
☐ Hot - above 80°F ☐ Any environment
☐ Raining ☐ Dry ☐ Humid
☐ Snow/Ice ☐ Wet roads
☐ Other (explain): _____

Driving Conditions:

- ☐ Light throttle ☐ Medium throttle ☐ Hard throttle
☐ Starting ☐ At idle ☐ Decelerating
☐ Over bumps ☐ When shifting ☐ While turning
☐ Cruising - steady at _____ MPH ☐ While braking
☐ Anytime ☐ Uphill ☐ Downhill
☐ Highway ☐ City/town ☐ Stop and go
☐ Between _____ MPH and _____ MPH
☐ Only with A/C or Defrost on

What Type of Fuel?

- ☐ Regular UL ☐ Midrange UL ☐ Premium UL
☐ Gasohol ☐ Ethanol ☐ Methanol
☐ Diesel #1 ☐ Diesel #2 ☐ Various brands

What Brand?

- ☐ Premium UL
☐ Methanol
☐ Various brands

When Gear Selector is in:

- ☐ Park/Neutral ☐ Reverse ☐ Overdrive
☐ Drive/3 ☐ Drive/2 ☐ Drive/1

Between Gears:

- ☐ Park to R or D ☐ Reverse/Drive ☐ First/Second
☐ Second/Third ☐ Third/Overdrive

CUSTOMER NAME:

PHONE NO.:

REPAIR ORDER NO:

SHOP USE ONLY:

VIN#:

MILES:

TECHNICIAN:

ADVISOR#:

50H15054

Fig. 6: Engine Driveability & Automatic Transmission

BRAKES - STEERING - SUSPENSION

SYMPTOM

- ☐ Vehicle pulls right - When _____
☐ Vehicle pulls left - When _____
☐ Steering wheel vibrates at _____ MPH
☐ Excessive play in steering
☐ Erratic steering when braking
☐ Poor steering wheel return after cornering
- ☐ Suspension bottoms out
☐ Leans or sways in corners
☐ Brake light on
☐ Traction control light on
☐ Uneven tire wear
- ☐ Sits uneven
☐ "Dog" tracks
☐ ABS light on
☐ Soft ride

Hard to steer

- ☐ Effort
☐ Steering wheel off center
- ☐ Wanders

Shimmy/vibration (check box below for location)

- ☐ Front
☐ Rear
☐ Don't know
- ☐ Seat
☐ Floor
☐ Other _____

Brake pedal

- ☐ Noise
☐ Pulses
☐ Squeaks
☐ Hard
☐ Mushy
☐ Excessive travel

WHEN DOES IT OCCUR?

- ☐ Cold days
☐ Hot days
☐ Wet/rain
☐ All the time
☐ Intermittent
- ☐ Parking maneuvers
☐ At road speed
☐ Accelerating
☐ Decelerating

EXPLAIN:

CUSTOMER NAME:

PHONE NO.:

REPAIR ORDER NO:

SHOP USE ONLY:

VIN#:

MILES:

TECHNICIAN:

ADVISOR#:

50C15059

Fig. 7: Brakes, Steering, & Suspension

AIR CONDITIONING - HEATER - VENTILATION**SYSTEM OR AREA AFFECTED**

- | | | | | | |
|--|--|------------------------------------|----------------------------------|-----------------------------------|-------------------------------------|
| <input type="checkbox"/> Air conditioner | <input type="checkbox"/> Heater | <input type="checkbox"/> Defroster | <input type="checkbox"/> Vent | <input type="checkbox"/> Bi-Level | <input type="checkbox"/> Fan/blower |
| <input type="checkbox"/> Max A/C | <input type="checkbox"/> Automatic Temperature Control | <input type="checkbox"/> Mix/blend | <input type="checkbox"/> Economy | <input type="checkbox"/> All | |

SYMPTOM

- | | | | |
|--|---|---|--|
| <input type="checkbox"/> Does not work | <input type="checkbox"/> Blows wrong temperature air | <input type="checkbox"/> No air comes out of vents | <input type="checkbox"/> Rapid cycling |
| <input type="checkbox"/> Noisy (explain) | <input type="checkbox"/> Broken <input type="checkbox"/> Odor | <input type="checkbox"/> Air comes from wrong outlets | <input type="checkbox"/> Blows fuse |
| <input type="checkbox"/> Leaks | <input type="checkbox"/> Insufficient heat or cool | <input type="checkbox"/> Other (explain below) | |

WHEN DOES IT OCCUR?

- | | | | | |
|--|--|--|---------------------------------------|--|
| <input type="checkbox"/> All the time | <input type="checkbox"/> Hot | <input type="checkbox"/> Cold | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Right after startup |
| <input type="checkbox"/> When change controls only | <input type="checkbox"/> Other (explain below) | <input type="checkbox"/> Fan blower speed High / Med / Low | | |

EXPLAIN: _____

CUSTOMER NAME:

PHONE NO.:

REPAIR ORDER NO:

SHOP USE ONLY:

VIN#:

MILES:

TECHNICIAN:

ADVISOR#:

50A15057

Fig. 8: Air Conditioning, Heater & Ventilation

ELECTRICAL - RADIO - TAPE/CD PLAYER**SYMPTOM - MUSIC SYSTEM**

- ☐ Does not work ☐ Noisy ☐ Static ☐ Won't load ☐ Won't eject ☐ Poor reception
☐ Controls do not work ☐ Blows fuse ☐ Other (explain below)

SYSTEM AFFECTED

- ☐ Radio only ☐ AM ☐ FM ☐ FM stereo ☐ Graphic equalizer
☐ Tape player ☐ CD player ☐ Whole system ☐ Steering wheel buttons ☐ Phone
☐ Speakers ☐ Front ☐ Rear ☐ Left ☐ Right
☐ Antenna ☐ Clock ☐ Radio or player controls ☐ Rear seat controls

ALL OTHER ELECTRICAL ITEMS OR ACCESSORIES

Please list the complaint accessory or item and check any applicable symptom(s) from the list that follows:

- _____ ☐ Inoperable ☐ Noisy ☐ No control ☐ Erratic
 ☐ Check light on or flashing ☐ Works improperly (explain below)
 ☐ Blows fuse ☐ Intermittent ☐ Related system affected (explain below)
- _____ ☐ Inoperable ☐ Noisy ☐ No control ☐ Erratic
 ☐ Check light on or flashing ☐ Works improperly (explain below)
 ☐ Blows fuse ☐ Intermittent ☐ Related system affected (explain below)
- _____ ☐ Inoperable ☐ Noisy ☐ No control ☐ Erratic
 ☐ Check light on or flashing ☐ Works improperly (explain below)
 ☐ Blows fuse ☐ Intermittent ☐ Related system affected (explain below)

WHEN DOES IT OCCUR?

- ☐ All the time ☐ Hot ☐ Cold ☐ Just after starting - malfunctions for a while
☐ Intermittent ☐ After runs for _____ minutes ☐ Rough roads or bumps only
☐ Other (explain below)

EXPLAIN: _____

CUSTOMER NAME:

PHONE NO.:

REPAIR ORDER NO:

SHOP USE ONLY:

VIN#:

MILES:

TECHNICIAN:

ADVISOR#:

50B15058

Fig. 9: Electrical, Radio & Tape/CD Player

MANUAL TRANSMISSION - CLUTCH

SYMPTOM - MANUAL GEAR SHIFT

- ☐ Hard to shift ☐ Doesn't shift
☐ Grinds going into _____ gear
☐ Noisy when in _____ gear or neutral _____
☐ Slips/pops out of gear
☐ Noise (describe): _____

☐ Upshift light stays on
☐ Upshift light doesn't light

WHEN DOES IT OCCUR?

- ☐ All the time ☐ Light load
☐ Heavy load

EXPLAIN: _____

SYMPTOM - CLUTCH

- ☐ Hard to push ☐ Fail to release
☐ Noise when pressing pedal down (describe): _____

☐ Slips ☐ Chattering (grabbing)
☐ Odor present ☐ Pedal stays on the floor
☐ Squealing sound

WHEN DOES IT OCCUR?

When Engine Temperature is:

- ☐ Cold ☐ Hot
☐ Accelerating ☐ Decelerating

CUSTOMER NAME:

PHONE NO.:

REPAIR ORDER NO:

SHOP USE ONLY:

VIN#:

MILES:

TECHNICIAN:

ADVISOR#:

50J15056

Fig. 10: Manual Transmission & Clutch

SQUEAK - RATTLE - NOISE CONDITIONS**AREA OF NOISE**

- | | | | | |
|--|----------------------------------|--------------------------------------|---------------------------------|-------------------------------------|
| <input type="checkbox"/> Engine Compartment | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Front Suspension | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Rear Suspension | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Passenger Compartment | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Instrument Panel | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Doors | <input type="checkbox"/> Left | <input type="checkbox"/> Right | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Rear seat area | <input type="checkbox"/> Console | <input type="checkbox"/> Other _____ | | |

NOISE SOUNDS LIKE

- | | | | | | |
|----------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|----------------------------------|--------------------------------|
| <input type="checkbox"/> Knocks | <input type="checkbox"/> Hard metal | <input type="checkbox"/> Light metal | <input type="checkbox"/> Roars | <input type="checkbox"/> Ticking | <input type="checkbox"/> Whine |
| <input type="checkbox"/> Squeaks | <input type="checkbox"/> Rattles | <input type="checkbox"/> Scraping | <input type="checkbox"/> Other _____ | | |

HOW OFTEN DOES IT OCCUR?

- | | | | | |
|-------------------------------------|--------------------------------|---------------------------------------|---------------------------------------|------------------------------------|
| <input type="checkbox"/> Continuous | <input type="checkbox"/> Often | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Just started | <input type="checkbox"/> Since new |
|-------------------------------------|--------------------------------|---------------------------------------|---------------------------------------|------------------------------------|

WHEN DOES IT OCCUR?

- | | | | | | |
|--|---|--|--|---------------------------------------|---|
| <input type="checkbox"/> All the time | <input type="checkbox"/> Speed | <input type="checkbox"/> RPM | <input type="checkbox"/> Only moving | <input type="checkbox"/> On turns | <input type="checkbox"/> Braking |
| <input type="checkbox"/> Hard throttle | <input type="checkbox"/> Light throttle | <input type="checkbox"/> Decelerate | <input type="checkbox"/> Steady speed | <input type="checkbox"/> Idle in gear | <input type="checkbox"/> Idle out of gear |
| <input type="checkbox"/> Hot days | <input type="checkbox"/> Cold days | <input type="checkbox"/> Humid or rainy | <input type="checkbox"/> Temperature _____ | | |
| <input type="checkbox"/> Heavy bumps | <input type="checkbox"/> Light bumps | <input type="checkbox"/> Smooth pavement | | | |

EXPLAIN: _____

CUSTOMER NAME:

PHONE NO.:

REPAIR ORDER NO:

SHOP USE ONLY:

VIN#:

MILES:

TECHNICIAN:

ADVISOR#:

50F15060

Fig. 11: Squeak, Rattle, & Noise Conditions

WATER LEAK - WINDNOISE**WATER LEAK****Leak Occurs When?**

- ☐ Setting level ☐ Any time it rains ☐ While driving in the rain ☐ Car wash only
☐ Back lower than front (facing uphill) ☐ Front lower than back (facing downhill)

Location of Leak (where water appears):

- ☐ LF Door ☐ RF Door ☐ LR Door ☐ RR Door ☐ Windshield ☐ Rear window
☐ LF window ☐ RF window ☐ LR window ☐ RR window ☐ Side door ☐ Sunroof/T-Top
☐ Under instrument panel ☐ Rear door/rear hatch

WINDNOISE:**Location:**

- ☐ LF Door ☐ RF Door ☐ LR Door ☐ RR Door ☐ Windshield ☐ Rear window
☐ LF window ☐ RF window ☐ LR window ☐ RR window ☐ Side door ☐ Sunroof/T-Top
☐ Under instrument panel ☐ Rear door/rear hatch

EXPLAIN: _____

CUSTOMER NAME:**PHONE NO.:****REPAIR ORDER NO:****SHOP USE ONLY:****VIN#:****MILES:****TECHNICIAN:****ADVISOR#:**

50115055

Fig. 12: Water Leak & Wind Noise

ELECTRICAL**Combox - Overview****INTRODUCTION**

Starting in 09/2010, ULF-SBX-High (option 6FL) and the TCU (option 639) will be gradually replaced by the Combox in all BMW models. The Combox provides the customer many new functions which are described in the following training material.

Some of these functions include:

- Connection of audio players via Bluetooth
- Simultaneous connection of cell phones and audio players via Bluetooth
- Contacts with images
- Direct Bluetooth profile software update by customer (via BMW website download to USB stick as of 04/2011)
- Connection of certain iPods using the original USB cable
- Album cover display (for iPod, MTP players, MP3 via USB)
- Office SMS, calendar and notes from cell phone (not available with all phones)
- Office with email from cell phone (not available with all phones)

SYSTEM WIRING DIAGRAMS**L2 (E8X/E9X) AND L4 (E7X) VEHICLES**

Combox with telematics

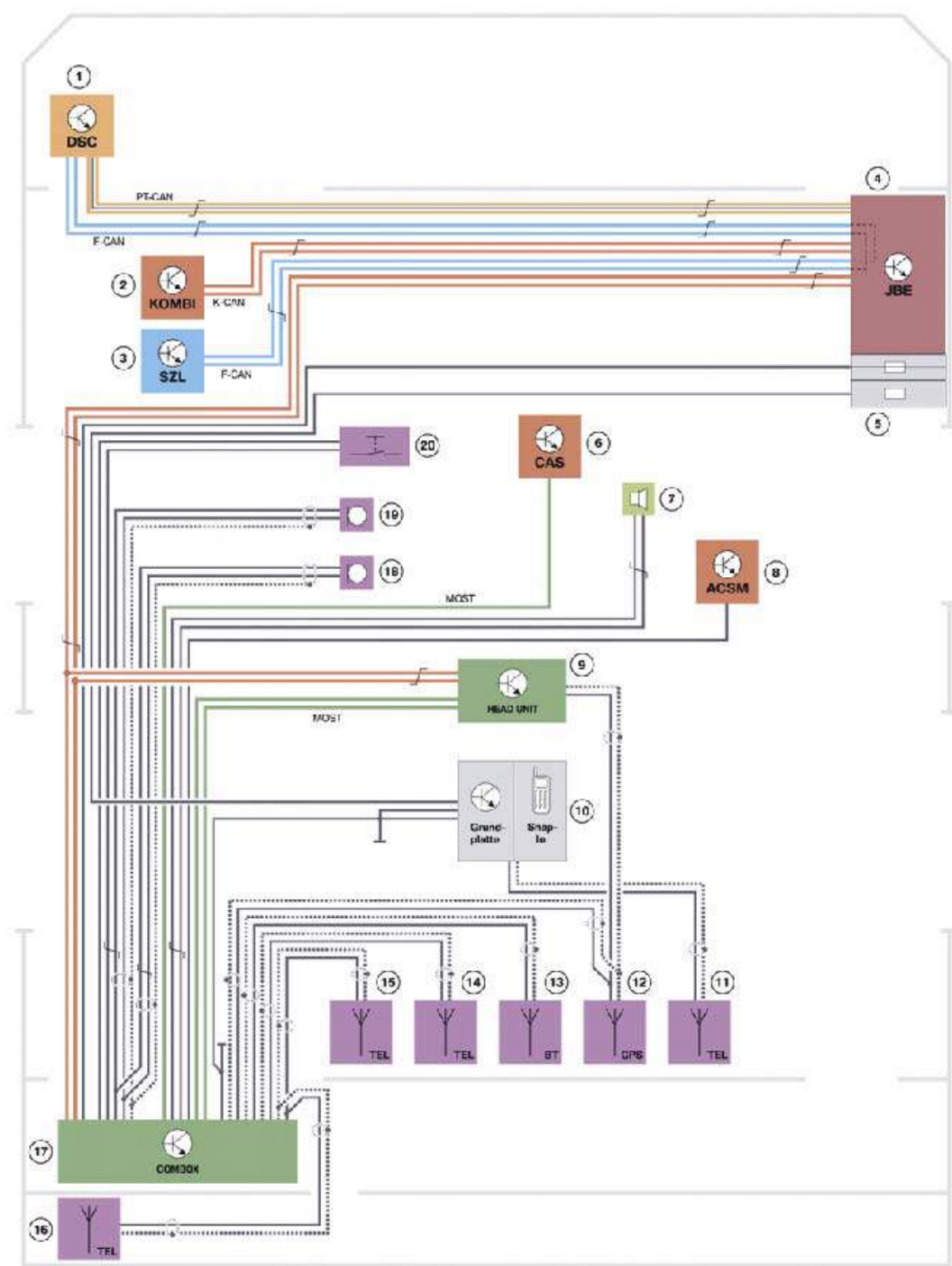


Fig. 1: Combox With Telematics System Wiring Diagram - L2 (E8x/E9x) And L4 (E7X) Vehicles
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Dynamic Stability Control (DSC)
2	Instrument cluster (KOMBI)

- 3 Steering column switch cluster (SZL)
- 4 Junction box electronics (JBE)
- 5 Front right power distribution box
- 6 Car Access System (CAS)
- 7 SOS speaker
- 8 Crash safety module (ACSM)
- 9 Head unit
- 10 Base plate in the center console and snap-in adapter
- 11 Telephone antenna 1
- 12 GPS antenna (connection to Combox only for vehicles without option 609)
- 13 Bluetooth antenna
- 14 Telephone antenna backup
- 15 Telephone antenna 2 (except E88 and E93)
- 16 Telephone antenna 2 (only for E88 and E93)
- 17 Combox
- 18 Microphone on steering column trim panel (only for E88 and E93)
- 19 Microphone in roof function center (except E88 and E93)
- 20 Emergency call button

Combox audio interface (options 6FL and 6NF)



Courtesy of BMW OF NORTH AMERICA, INC.

Index	Explanation
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- | | |
|---|--|
| 1 | Front right power distribution box |
| 2 | Head unit |
| 3 | Base plate in the center console and snap-in adapter |
| 4 | AUX In connector and USB audio interface |
| 5 | Combox |

L6 (F0X) VEHICLES

Combox with telematics

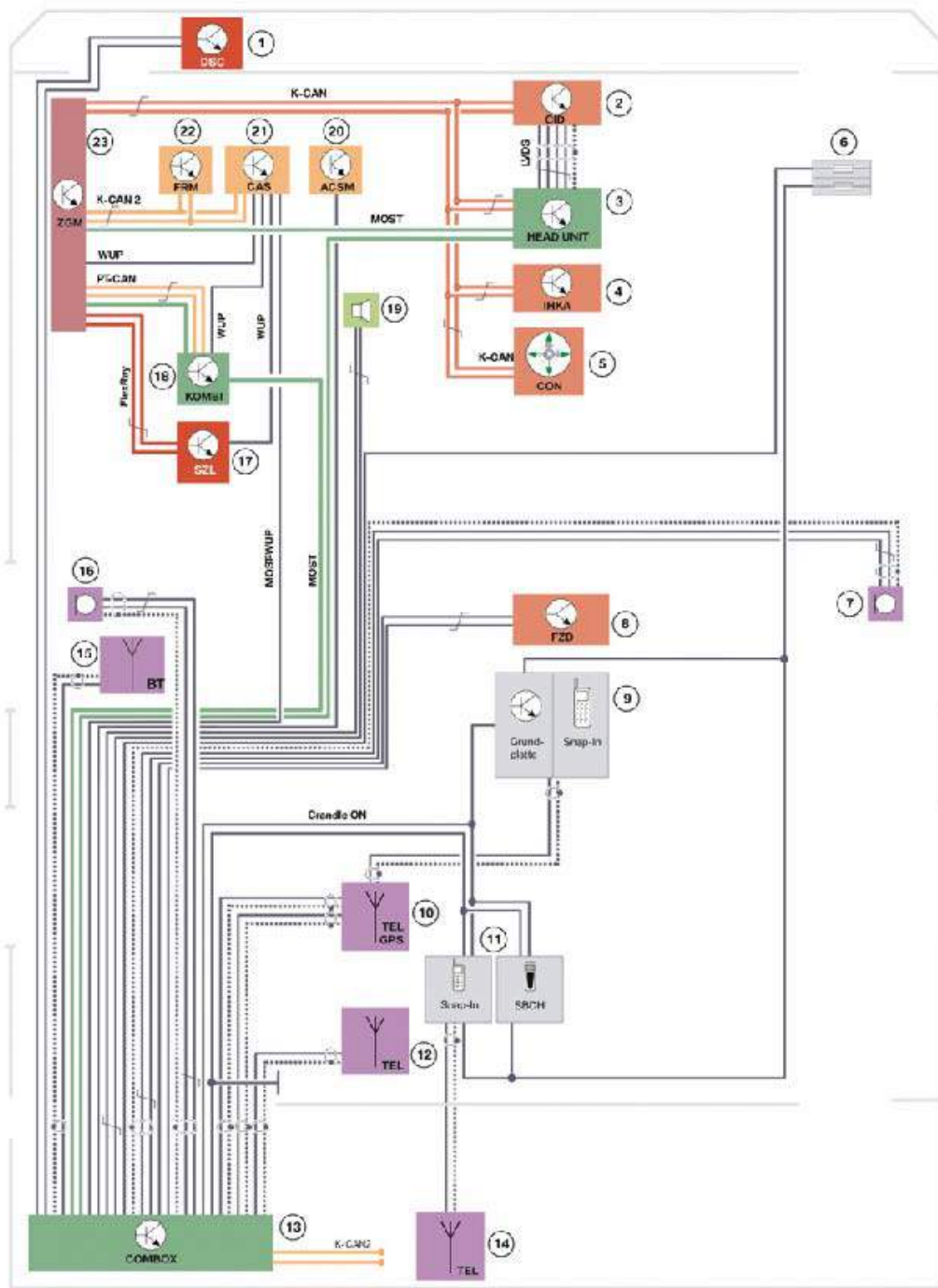


Fig. 3: Combox With Telematics System Wiring Diagram - L6 (F0X) Vehicles
 Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Dynamic Stability Control (DSC)

- 2 Central Information Display (CID)
- 3 Head unit
- 4 Integrated automatic heating and air conditioning (IHKA)
- 5 Controller (CON)
- 6 Front right power distribution box
- 7 Microphone 2
- 8 Roof functions center (FZD)
- 9 Base plate in the center console and snap-in adapter
- 10 Roof telephone antenna (telephone 1 and 2, GPS)
- 11 Snap-in adapter and rear handset (Not US)
- 12 Telephone antenna backup
- 13 Combox
- 14 Telephone antenna, bumper (Not US)
- 15 Telephone antenna, Bluetooth
- 16 Microphone 1
- 17 Steering column switch cluster SZL)
- 18 Instrument cluster (KOMBI)
- 19 SOS speaker
- 20 Crash safety module (ACSM)
- 21 Car Access System (CAS)
- 22 Footwell module (FRM)
- 23 Central Gateway Module (ZGM)

Combox audio interface (options 6FL and 6NF)

2	Steering column switch cluster (SZL)
3	Central Information Display (CID)
4	Head unit
5	Controller (CON)
6	AUX In connector and USB audio interface
7	Base plate in the center console and snap-in adapter
8	Rear right power distribution box
9	Combox
10	USB hub (F0x only)

For vehicles without USB hub (all except F0x), both the USB audio interface and the base plate are connected directly to the Combox. If a USB hub is installed, only one USB connection (USB 1) of the Combox is used.

SYSTEM COMPONENTS

COMBOX

The Combox control unit is located in a housing that has been designed for installation without a holder. Thus in certain vehicles, the Combox is installed without an additional sheet metal holder.

In the event of a collision, however, the impact energy is transmitted directly to the control unit when there is no sheet metal holder. Therefore the Combox control unit must be checked for external damage after the vehicle has been in a collision.



Fig. 5: Identifying Combox

Courtesy of BMW OF NORTH AMERICA, INC.

Versions

Although the Combox is only available in combination with the BMW Assist (option 639), different versions of the control unit are used depending on the vehicle's electrical system and optional equipment.

Therefore, there are currently four versions of the Combox:

Vehicle electrical system BN2000 (L2 [E8x, E9x] and L4 [E7x] as of 09/2010)

- Combox with telematics (With BMW Assist)
- Combox with telematics and GPS receiver (With BMW Assist and Navigation)

Vehicle electrical system BN2020 (L6 [F0x] as of 09/2010)

- Combox with telematics (With BMW Assist)
- Combox with telematics and GPS receiver (With BMW Assist and Navigation)

Interfaces and components

To make it easier to tell them apart, the system connector is white for the vehicle electrical system BN2020 and black for the vehicle electrical system BN2000. The Combox is connected in the L2 and L4 to the K-CAN and in the L6 to the K-CAN2. Because the K-CAN and K-CAN2 have different speeds, the color-coding was implemented to prevent them from being mixed up.



Fig. 6: Identifying Pin Assignment

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	GSM antenna and GSM backup antenna
2	GPS antenna
3	USB 2 (option 6NF for vehicles with USB hub connection of option 6NF via USB hub)
4	USB 1 (option 6FL or USB hub for vehicles with USB hub)
5	Bluetooth antenna
6	MOST
7	System connector

Use of the Combox in L2 vehicles as of 09/2010

The following optional equipment is available in conjunction with the Combox in the L2 vehicles:

- Radio Professional (option 663)
- BMW Assist with Bluetooth (option 639)
- iPod and USB adapter (option 6FL)
- Smartphone Integration (option 6NF)
- Navigation system (option 609)

As of 09/2010, the ULF-SBX High and TCU control units will be replaced by the Combox.

Currently, to get Bluetooth and USB audio interface functions we must order BMW Assist with Bluetooth (option 639), which includes the Combox controller. (See the table below)

NOTE: BMW Assist (SA639) is currently standard equipment only on the X5 M, X6 M, 5, 6 & 7 Series. It is part of the Premium Package on all other models as of 9/2010.

The following table provides an overview of which options are combined with the Combox:

COMBOX REFERENCE CHART

Optional extra	Combox installed
Option 663	No
Option 663 + option 639	Yes
Option 663 + option 639 + option 6NF	Yes
Option 663 + option 639 + option 6NF + option 6FL	Yes

Use in L4 and L6

A Combox is installed in L4 and L6 vehicles in combination with one of the following optional equipment packages:

- BMW Assist w/Bluetooth option 639)
- USB audio interface (option 6FL)

BLUETOOTH DEVICES

Cell phones and audio players can be connected to the Combox via Bluetooth. To provide the customer with a simpler, easy-to-understand overview of the currently "tested" devices, the website at <http://www.bmwusa.com/bluetooth> is being constantly updated. Customers are able to use the website to determine which devices and functions work and which do not with their specific BMW model.

The following information is available:

- The tested phones are organized based on BMW model and wireless carrier.
- Detailed information regarding individual functions is organized based on phone manufacture and on

which functions the specific phone can perform

- Information about how to improve cell phone to vehicle compatibility (by means of a downloadable Bluetooth profile software updates will be available 04/2011)

At first, only phones will be included in the device database, they will be followed by audio players and other devices that can be connected with the Combox via Bluetooth.

FUNCTIONS

AUDIO PLAYER VIA BLUETOOTH

The Combox makes it possible to stream audio signals wirelessly via Bluetooth from a corresponding source. To do so, the source must support the A2DP (Advanced Audio Distribution Profile). A source can be a cell phone or MP3 player, for example. The A2DP profile is used to transmit the audio signal only.

The AVRCP (Audio Video Remote Control Profile) is used for remote control of the source. The range of functions of the remote control depends on the version of AVRCP supported in the source. Initially the Combox will support Version 1.0 and 1.3 of AVRCP. As of 03/2011 version 1.4 of AVRCP will be implemented.

NOTE: For optimum functionality of the audio player via Bluetooth, use only BMW recommended devices. For a list of these devices, please visit <http://www.bmwusa.com/bluetooth>



Fig. 7: Display - Coupling Of Audio Player Or Mobile Phone
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 8: Display - Playback Of Music Track Via Bluetooth
Courtesy of BMW OF NORTH AMERICA, INC.

MULTIPLE BLUETOOTH COUPLING

With the introduction of the Combox, multiple devices can be coupled via Bluetooth simultaneously. Thus the audio player of one device and the telephone function of another device can be used at the same time.

Another benefit of having two phones paired at the same time is that one will have full functionality through the iDrive while the additional one is used just for incoming calls.

The respective function used appears in the form of a symbol behind the device name in the "Add new device" display.



Fig. 9: Display - Coupling Of Audio Player Or Mobile Phone

Courtesy of BMW OF NORTH AMERICA, INC.

CONTACTS WITH IMAGES

With the introduction of the Combox images can now be stored in contacts. These are transmitted from a supported mobile phone via Bluetooth and stored temporarily on the Combox.

NOTE: This feature is not currently supported by all phones. For a detailed list of BMW tested phones and their features, please visit <http://www.bmwusa.com/bluetooth>.

The contacts from the mobile phone are displayed only if the mobile phone supports this function. Contacts can be created and edited using the iDrive.

The addresses can be taken over as a destination for the Navigation system and the phone numbers can be dialled.

When calling someone from the address book, his or her image appears in the central information display.



Fig. 10: Display - Calling Person From Address Book With Image
Courtesy of BMW OF NORTH AMERICA, INC.

If another party joins a call, a list of participants with image is shown in the central information display.



Fig. 11: Display - Multiple Callers From Address Book With Image
Courtesy of BMW OF NORTH AMERICA, INC.

OFFICE

The Combox enables customers to access the SMS messages, calendar, notes, email, tasks and reminders stored on a supported cell phone. The "Office" menu item replaces the "Contacts" item in the central information display.

Although access to the cell phone is always read-only and the Combox does not modify existing data on the phone, once you open a new email via the iDrive, the status of the email on the phone will change to "read".

The "Current Office" menu item informs the user about the number of new messages, active tasks and upcoming appointments.

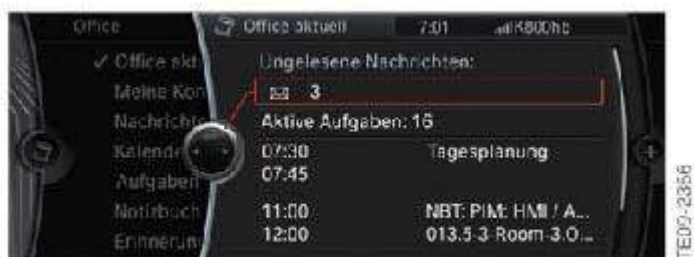


Fig. 12: Display - Current Office
Courtesy of BMW OF NORTH AMERICA, INC.

Appointments of the last 30 and the next 90 days can be shown in the calendar.

If an appointment includes phone numbers or email addresses, they can be used directly or stored in the contacts.



Fig. 13: Display - Appointment View

Courtesy of BMW OF NORTH AMERICA, INC.

Emails, SMS messages, calendar appointments, tasks and notes can be read aloud with the text to speech function available in combination with Voice Command (option 620).

NOTE: This feature is not currently supported by all phones. For a detailed list of BMW tested phones and their features, please visit <http://www.bmwusa.com/bluetooth>.

USB AUDIO INTERFACE

With the Combox, an iPhone or iPod can now be connected using the customer's "original" white USB cable. This feature still requires the optional equipment iPod and USB adapter (option 6FL). In this case all data and other information, including the audio data, are transmitted via the USB cable. Because the device is now also charged via this cable the familiar Y cable is no longer needed.

NOTE: Non-compatible iPods (e.g. first-generation iPod Nanos) still have to be connected using the familiar Y cable.

ALBUM COVERS

For MP3 players, USB sticks, MTP players, iPhones and iPods, album covers are displayed if the MP3 file contains the album cover. For iPhones and iPods, the album cover is not displayed if the connection is made via the Y cable. The album covers are displayed for a connection via USB (option 6FL) and the "original" white USB cable only.



Fig. 14: Display - Album Covers

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When iPods are connected via the familiar Y cable the display of the album cover function is not supported.

SOFTWARE UPDATES

The Combox will enable the customer for the first time to update the software of a system component. To update the Combox, the Bluetooth profile software update must be downloaded from the BMW website <http://www.bmw.com/bluetooth> and stored on a USB stick. For this purpose, any conventional USB stick with sufficient storage capacity can be used. The software is then transferred from the USB stick to the Combox via the USB audio interface (option 6FL) in the center console.

NOTE: This function is still under development and is expected by 4/2011. Please check the <http://www.bmw.com/bluetooth> website for availability.



Fig. 15: Display - Software Update By Customer

Courtesy of BMW OF NORTH AMERICA, INC.

The Service Advisor/parts salesperson will be able to use a USB stick to carry out a one-off software update for the customer. The customer can then carry out additional updates on his or her own via USB stick.

TELEMATICS

With the introduction of the Combox the Telematic Control Unit (TCU) is no longer needed nor installed.

All BMW vehicle telematics functions are enabled by the Combox with no additional control units required.

EMERGENCY CALL

In BMW vehicles with Combox, the emergency call is carried out using NGTP (Next Generation Telematics Protocol). The customer will not notice any difference from the existing emergency call system. With the Combox, the emergency call is always placed via the backup speaker.

TIRE PRESSURE MONITOR SYSTEMS

BMW - 5-Series (F07 & F10) - 2010-13

DESCRIPTION & OPERATION

MODEL COVERAGE

NOTE: Models in this article belong to the F07 and F10 groups.

Models Covered

Model	Year(s)
528i	2011-13
528xi	2012-13
535i	2011-13
535i GT	2010-13
535xi	2011-13
535xi GT	2011-13
550i	2011-13
550i GT	2010-13
550xi	2011-13
550xi GT	2010-13

TIRE PRESSURE MONITOR (TPM) SYSTEM

NOTE: If a tire pressure has been adjusted, or a wheel or tire has been replaced, the TPM system must be reinitialized. See **RESET PROCEDURES**.

NOTE: The current status of the TPMS can be displayed on the Control Display anytime, whether or not the system is active.

CAUTION: When a low inflation pressure is indicated, DSC (Dynamic Stability Control) is switched on, if necessary.

Vehicles are equipped with one of either of two types of tire pressure monitor system:

The Flat Tire Monitor (FTM) system, which uses the ABS system to measure each tire's rolling radius changes and with it, the rotational speed of the wheels. Changes are detected and signaled as a flat tire. The Flat Tire Monitor (FTM) system does not use tire pressure sensors in the tires.

In the following situations, the system could be delayed or malfunction:

When the system has not been initialized.

When driving on snow-covered or slippery road surfaces.

Sporty driving style: slip in the drive wheels, high lateral acceleration.

When driving with snow chains.

The Tire Pressure Monitor (TPM) system, uses tire pressure sensors installed in the tires to check the tire inflation pressure in the four mounted tires. The system indicates if the tire inflation pressure has dropped considerably in one or several tires.

The system is inactive and cannot indicate a flat tire:

For a mounted wheel without TPM electronics.

When the TPM is disturbed by other systems or devices with the same radio frequency.

TIRE PRESSURE MONITOR WARNING INDICATORS

The Flat Tire Monitor (FTM)

If a significant drop in tire pressure is detected, the system will turn on a yellow TPMS warning light, display a warning message on the iDrive Control Display, and sound an acoustic warning signal.

NOTE: **The current status of the Flat Tire Monitor can be displayed on the Control Display anytime, whether or not FTM is active.**

Tire Pressure Monitor (TPM)

CAUTION: The system is inactive and cannot display a flat tire if a wheel has been mounted without TPM electronics or if TPM experiences temporary interference from other systems or devices that use the same radio frequency.

When a flat tire is detected, the yellow TPMS warning lamp lights up, a message appears on the iDrive Control Display, and signal sounds. If a system malfunction occurs, the yellow warning light flashes and then lights up continuously. The tires are shown in gray on the Control Display and a message is displayed.

Status display on iDrive Control Display: The tire and system status is indicated by the color of the tires. TPM takes the fact that the tire pressure changes during driving into account. A correction is only required if the color of the TPM display indicates that it is necessary.

Wheels are Green: The tire pressure matches the learned set state. "Status: TPM active" is displayed on the Control Display.

One Wheel is Yellow: There is a flat tire or a major drop in inflation pressure in the indicated tire. A message appears on the Control Display.

All Wheels are Yellow: There is a flat tire or a major drop in inflation pressure in several tires, system was not reset after a wheel change, or a flat tire in one or more tires while the system is being reset. A message appears on the Control Display.

Wheels are Gray: The system cannot detect a flat tire. Reasons for this can include:

TPM is being reset.

Temporary interference due to systems or devices that use the same radio frequency.

System malfunction.

RESET PROCEDURES

NOTE: If a tire pressure has been adjusted, or a wheel or tire has been replaced, the TPM system must be reinitialized.

TIRE PRESSURE MONITOR SYSTEM REINITIALIZATION

CAUTION: When driving with snow chains, DO NOT reset the system.

The Flat Tire Monitor (FTM)

NOTE: The resetting process finishes during driving, which can be interrupted at any time. When driving resumes, resetting is continued automatically.

1. Set the tire pressure of all wheels to specification.
2. On iDrive Control Center, select "VEHICLE INFO", then "VEHICLE STATUS".
3. Select "RESET". The initialization menu appears.
4. Start the engine, but do not begin to drive.
5. Start the Initialization with "RESET".
6. Drive vehicle. The initialization is completed during driving. "Status: active" is displayed.

Tire Pressure Monitor (TPM)

CAUTION: The system is inactive and cannot display a flat tire if a wheel has been mounted without TPM electronics or if TPM experiences temporary interference from other systems or devices that use the same radio frequency.

NOTE: The reset process finishes during driving, which can be interrupted at any time. When driving resumes, resetting is continued automatically.

1. Set the tire pressure of all wheels to specification.
2. On iDrive Control Center, select "SETTINGS", then "TPM".
3. Select "Reset TPM".
4. Start the engine, but do not begin to drive.

5. Select "RESET".
6. Drive vehicle. The tires are shown in gray and "Resetting TPM..." is displayed.
7. After a few minutes of driving, the set tire inflation pressures in the tires are applied as the set values to be monitored. Resetting process is completed automatically while driving. When resetting is completed, the tires in the display turn to green and "TPM Active" is displayed.

NOTE: If there is a problem resetting and applying the tire inflation pressures, all tires are shown in yellow on the Control Display, and a message is displayed.

DISMOUNTING/MOUNTING PROCEDURES

CAUTION: The tire should be dismounted from the wheel using the tire changer manufacturer's instructions. Use the following information to avoid damage during the dismounting/mounting procedures.

NOTE: If a tire pressure has been adjusted, or a wheel or tire has been replaced, the TPM system must be reinitialized. See TIRE PRESSURE MONITOR SYSTEM REINITIALIZATION under RESET PROCEDURES.

TORQUE SPECIFICATIONS

SPECIFICATIONS TABLE

Component	Ft. Lbs. (N.m)
Wheel Nut	89 (120)
	INCH Lbs. (N.m)
Tire Pressure Sensor Nut	35 (4)

TRACTION CONTROL, 4WD, & AWD

BMW - 1980-13

*** PLEASE READ THIS FIRST ***

Placing a non-compatible vehicle on a single-axle dynamometer could result in a safety hazard to technicians and damage to vehicle. Vehicles which use All-Wheel Drive (AWD) or traction control may not be clearly marked. Use common sense and take all necessary precautions when placing any vehicle on the dynamometer. Determine between full-time 4WD and All-Wheel Drive (AWD) for testing purposes. The following tables include information related to full-time 4WD and AWD vehicles, and how to disable the traction control system (if disengageable).

WARNING: DO NOT operate vehicle on a 2-wheel dynamometer if the DO NOT TEST column is marked.

BMW

Application	FWD	RWD	Part Time 4WD	Full Time 4WD	AWD	TCS	Do Not Test
128i & 135i							
2008-13	...	X	X ⁽⁶⁾	...
1M							
2011	...	X	X ⁽⁶⁾	...
318i							
1994-98	...	X	X ⁽¹⁾	...
318is							
1994-97	...	X	X ⁽¹⁾	...
318ti							
1995-99	...	X	X ⁽¹⁾	...
323is							
1998-99	...	X	X ⁽¹⁾	...
323i							
1998-00	...	X	X ⁽¹⁾	...
323Ci							
2000	...	X	X ⁽¹⁾	...
325is							
1994-95	...	X	X ⁽¹⁾	...
325i							
1994-95	...	X	X ⁽¹⁾	...
2001-06	...	X	X ⁽³⁾	...

2011 BMW 535xi

TRACTION CONTROL, 4WD, & AWD BMW - 1980-13

325Ci							
2001-06	...	X	X ⁽³⁾	...
325iX							
1988-91	X	...	X
325Xi							
2001-06	X	...	X
328is							
1996-99	...	X	X ⁽¹⁾	...
328i							
1996-00	...	X	X ⁽¹⁾	...
2007-13	...	X	X ⁽⁶⁾	...
328xi							
2007-12	X	...	X
328Ci							
2000	...	X	X ⁽¹⁾	...
330Ci & 330i							
2001-06	...	X	X ⁽³⁾	...
330xi							
2001-06	X	...	X
335i, 335is & 335d							
2007-13	...	X	X ⁽³⁾	...
335xi							
2008-13	X	...	X
525i							
1991-95	...	X	X ⁽¹⁾	...
2001-07	...	X	X ⁽¹⁾	...
525iT							
1993-95	...	X	X ⁽¹⁾	...
525xi							
2006-07	X	...	X
528i							
1997-00	...	X	X ⁽¹⁾	...
2008-13	...	X	X ⁽⁶⁾	...
528xi							
2008-13	X	...	X
530i & 530iT							
1994-95	...	X	X ⁽¹⁾	...
2001-07	...	X	X ⁽¹⁾	...

2011 BMW 535xi

TRACTION CONTROL, 4WD, & AWD BMW - 1980-13

530xi

2008-10	X	...	X
---------	-----	-----	-----	-----	---	-----	---

535i

1991-93	...	X	X ⁽¹⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

2008-13	...	X	X ⁽⁶⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

535xi (& GT)

2008-13	X	...	X
---------	-----	-----	-----	-----	---	-----	---

540i

1994-03	...	X	X ⁽¹⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

545i

2004-05	...	X	X ⁽¹⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

550i (& GT)

2006-13	...	X	X ⁽⁶⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

550xi (& GT)

2010-13	X	...	X
---------	-----	-----	-----	-----	---	-----	---

640i

2012-13	...	X	X ⁽⁷⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

645Ci

2004-06	...	X	X ⁽³⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

650i

2006-10	...	X	X ⁽⁵⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

2012-13	...	X	X ⁽⁷⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

650xi

2012-13	X	...	X
---------	-----	-----	-----	-----	---	-----	---

735i

1991-92	...	X	X ⁽¹⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

735iL

1991-92	...	X	X ⁽¹⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

740i

1993-01	...	X	X ⁽¹⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

2011-13	...	X	X ⁽⁷⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

740iL

1993-01	...	X	X ⁽¹⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

740Li

2011-13	...	X	X ⁽⁷⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

745i

2002-06	...	X	X ⁽⁵⁾	...
---------	-----	---	-----	-----	-----	------------------	-----

745Li

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2011 BMW 535xi

TRACTION CONTROL, 4WD, & AWD BMW - 1980-13

2002-05	...	X	X ⁽⁵⁾	...
750i & 750Li							
2006-13	...	X	X ⁽⁷⁾	...
750xi & 750Lxi							
2010-13	X	...	X
760i & 760Li							
2003-13	...	X	X ⁽⁷⁾	...
840Ci							
1994-97	...	X	X ⁽¹⁾	...
850i							
1991-92	...	X	X ⁽¹⁾	...
850Ci							
1993-97	...	X	X ⁽¹⁾	...
850Csi							
1994-95	...	X	X ⁽¹⁾	...
Alpina							
2007-08	...	X	X ⁽¹⁾	...
2010-13 (AWD)	X	...	X
2010-13 (RWD)	...	X	X ⁽⁷⁾	...
M Roadster							
1998-08	...	X	X ⁽¹⁾	...
M Coupe							
1999-08	...	X	X ⁽¹⁾	...
M3							
1995-06	...	X	X ⁽¹⁾	...
2008-09	...	X	X ⁽⁸⁾	...
2010-13	...	X	X ⁽⁶⁾	...
M5 & M6							
1991-93	...	X	X ⁽¹⁾	...
2000-03	...	X	X ⁽¹⁾	...
2006-10	...	X	X ⁽⁵⁾	...
2013	...	X	X ⁽⁷⁾	...
X1 28i & 35i							
2013	X	...	X
X1 28is							
2013	...	X	X ⁽⁷⁾	...
X3							

2011 BMW 535xi

TRACTION CONTROL, 4WD, & AWD BMW - 1980-13

2004-13	X	...	X
X5 & X5 M							
2000-13	X	...	X
X6 & X6 M							
2008-13	X	...	X
Z3							
1996-00	...	X	X ⁽¹⁾	...
2001-02	...	X	X ⁽¹⁾	...
Z4							
2003-05	...	X	X ⁽¹⁾	...
2006-13	...	X	X ⁽⁶⁾	...
Z8							
2000-03	...	X	X ⁽¹⁾	...

- (1) The Automatic Stability Control (ASC) or Dynamic Stability Control (DSC) switch is located on center console. Indicator/warning light on instrument panel will illuminate when system is disabled.
- (2) The ASC switch is located on left side of dash. Indicator/warning light on instrument panel will illuminate when system is disabled.
- (3) The ASC or Dynamic Stability Control (DSC) switch is located on center console. Indicator/warning light on instrument panel will illuminate when system is disabled. On models with DSC and Automatic Differential Braking (ADB), depress and hold DSC switch button for 3 seconds. The DSC and Yellow brake warning lights will stay illuminated the entire time the ADB, DSC and the Dynamic Brake Control (DBC) systems are switched off.
- (4) Cannot be shifted into 2WD.
- (5) Deactivating DSC automatically deactivates DTC as well. Select "Settings" with controller on control panel. Select "DSC" and confirm. Indicator lamp in Info Display remains on. To reactivate, select "Settings". Select "DSC" and confirm. Indicator lamp goes out.
- (6) Press the DTC button, at the center console, for at least 3 seconds; the indicator lamps for DSC in the instrument cluster light up. Dynamic Traction Control DTC and DSC have been simultaneously deactivated. Push button again to activate.
- (7) Press and hold the DSC OFF button, for not longer than 10 seconds, until the indicator lamp for the DSC lights up in the instrument cluster and DSC OFF is displayed in the tachometer. Push button again to activate.
- (8) Press and hold the DSC OFF button (to the right of the shift lever), for longer than 1 second, until the indicator lamp for the DSC lights up in the instrument cluster. Push button again to activate.

TRANSMISSION**Transfer Box - Repair Instructions - 528xi, 535xi****TRANSFER CASE, GENERAL****00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN****Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN**Danger of injury!**

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN!
RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN!

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

27 00... REPLENISHING/CHANGING TRANSFER CASE OIL (ATC 300)

IMPORTANT: Use only the approved gear oil in the transfer case. See TRANSFER CASE - OPERATING FLUIDS .
Failure to comply with this requirement will result in serious damage to the transfer case!

NOTE: Only change the oil when the transfer case is at normal operating temperature.

Necessary preliminary tasks:

- Remove underbody protection
- If necessary, remove exhaust system
- Remove heat shield

Checking/correcting transfer case oil level:

Undo oil filler plug (1).

Check transfer case oil level.

If necessary, pour in gear oil up to lower edge of opening for oil filler plug (1).

Installation:

Tightening torque, 60 N.m.

Replace sealing ring.

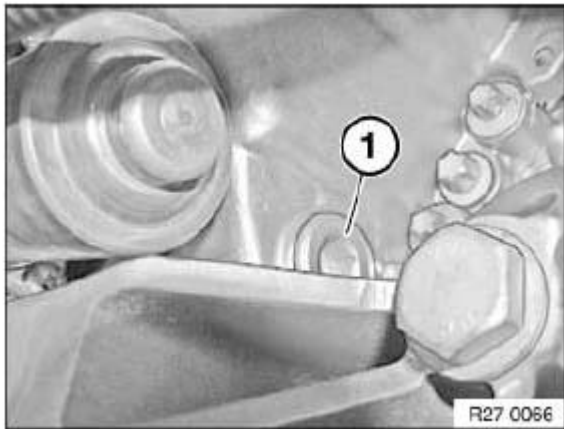


Fig. 1: Locating Oil Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Changing transfer case oil:

Place oil collecting apparatus underneath.

Remove oil drain plug (1).

Drain and dispose of gear oil.

NOTE: Observe country-specific waste-disposal regulations Replace sealing ring, screw in oil drain plug (1) and tighten down.

Tightening torque, 60 N.m.

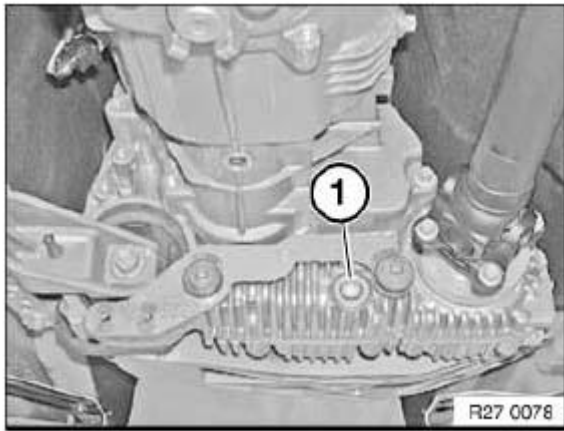


Fig. 2: Locating Oil Drain Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Undo oil filler plug (1).

Pour in gear oil up to lower edge of opening for oil filler plug (1).

Tightening torque, 60 N.m.

Replace sealing ring.

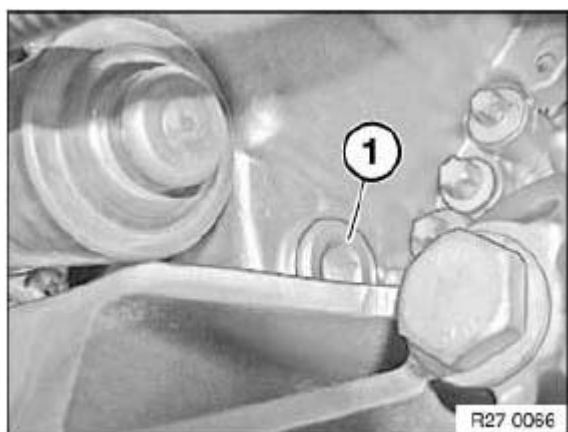


Fig. 3: Locating Oil Filler Plug

Courtesy of BMW OF NORTH AMERICA, INC.

10 TRANSFER CASE

27 10... CHECKING FUNCTION OF FRONT DIFFERENTIAL AND TRANSFER CASE

NOTE: Fault diagnosis with DIS Tester.
Adhere to specified repair sequence in DIS (BMW scan tool).

27 10 010 REMOVING AND INSTALLING TRANSFER CASE (ATC 300)

Special tools required:

- 00 2 030. See MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS .
- 23 4 050. See MANUAL TRANSMISSION - SPECIAL TOOLS .

IMPORTANT: After replacement, the REPAIR service function must be carried out with GT1 (BMW scan tool).

IMPORTANT: After completing work, check gear oil level and top up if necessary.

Filler plug (1):

Tightening torque, 60 N.m.

Gear oil level up to filler edge of filler plug (1).

Use only the approved transmission fluid. See TRANSFER CASE - OPERATING FLUIDS .

Failure to comply with this requirement will result in serious damage to the transfer box!

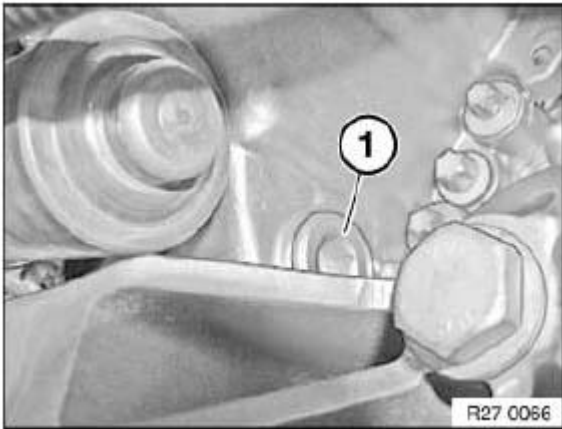


Fig. 4: Locating Oil Filler Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove complete exhaust system. See **EXHAUST SYSTEM - REPAIR INSTRUCTIONS** .
- Remove underbody protection
- Remove heat shields

Release screws.

Remove front propeller shaft at output flange of transfer case and tie to one side.

Installation:

Replace screws.

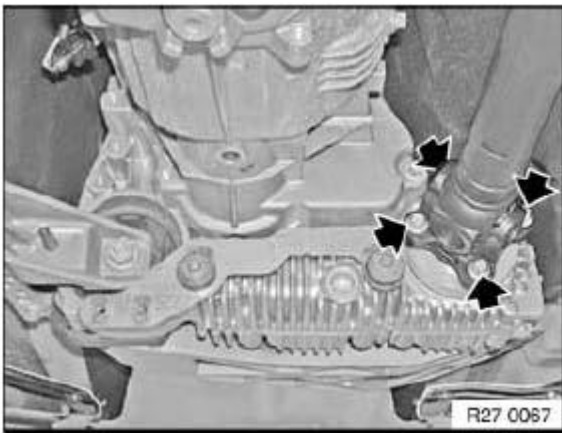


Fig. 5: Identifying Front Propeller Shaft Screws

Courtesy of BMW OF NORTH AMERICA, INC.

- Remove propeller shaft from transmission.
- Release center bearing.
- Tie propeller shaft to one side.

Tasks are described in removing propeller shaft. See **26 11 000 REMOVING AND INSTALLING COMPLETE PROPELLER SHAFT (CONSTANT-VELOCITY JOINT)** .

NOTE: Support transmission with special tool 00 2 030/23 4 050.

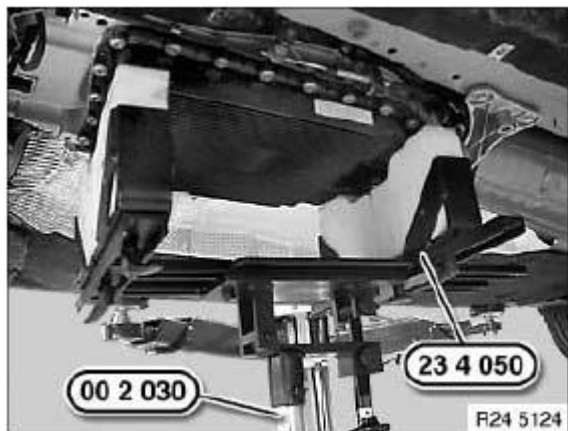


Fig. 6: Identifying Special Tool (00 2 030) And (23 4 050)
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary

Release bolts and remove metal plate (1).

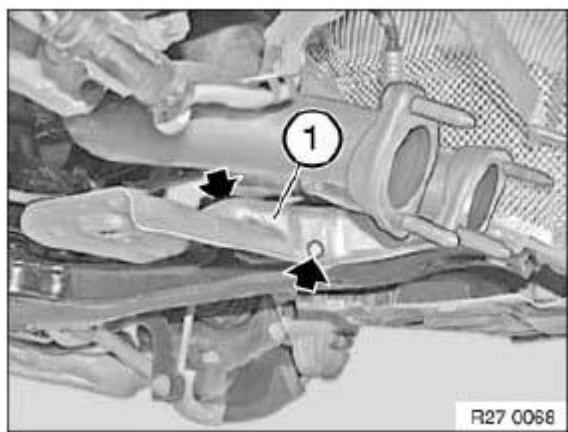


Fig. 7: Identifying Metal Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plugs (1) and (2) from servomotor.

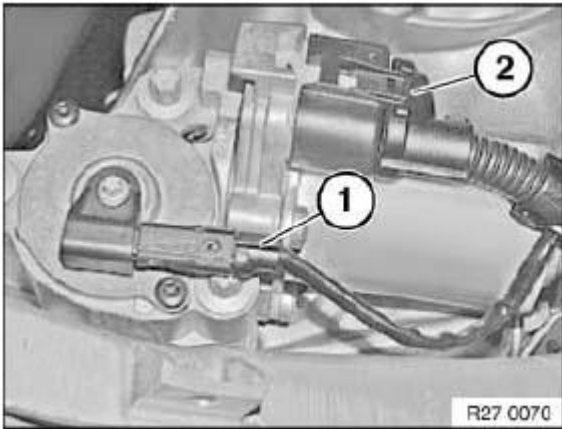


Fig. 8: Identifying Plugs And Servomotor
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Remove transmission crossmember.

Tightening torque, 19 N.m.

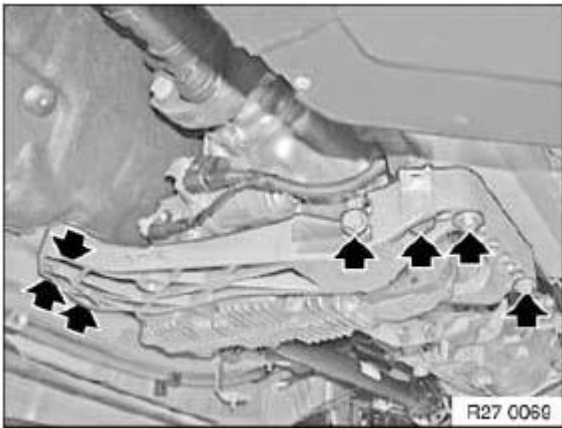


Fig. 9: Identifying Transmission Crossmember Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw connection of transfer case.

Tightening torque, 43 N.m.

Remove transfer case.

Installation:

Pay attention to dowel pin (1).

Grease dowel pin (1).

Apply a thin coat of grease to splines.

Grease: WEICON ANTI-SEIZE.

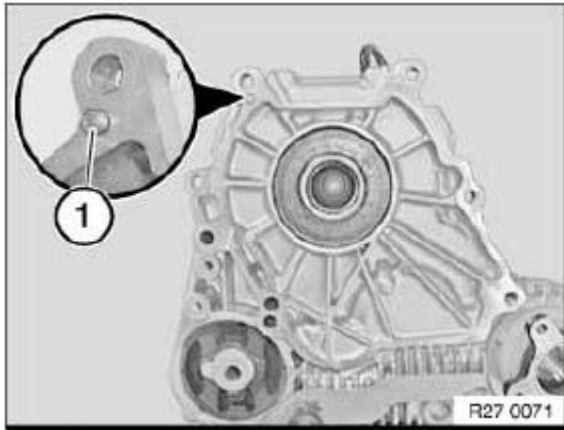


Fig. 10: Identifying Dowel Pin

Courtesy of BMW OF NORTH AMERICA, INC.

27 10 020 INSTALLING REPLACEMENT TRANSFER CASE (ATC 300)

IMPORTANT: After replacement, the "Repair" service function must be carried out with GT1.

Recycling:

Catch and dispose of escaping transmission oil. Observe country-specific waste-disposal regulations.

IMPORTANT: After completing work, check transmission oil level and top up if necessary.

Release filler plug (1).

Check oil level.

Tightening torque, 60 N.m.

Pour in transmission oil up to lower edge of opening for filler plug (1).

Use only the approved transmission oil.

Failure to comply with this requirement will result in serious damage to the transfer case!

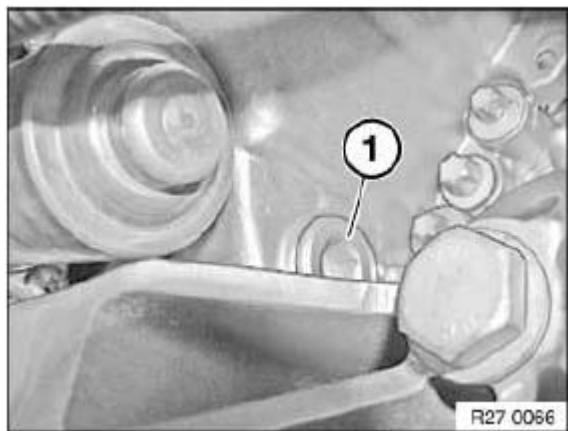


Fig. 11: Locating Oil Filler Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Drain transmission oil at oil drain plug
- Tightening torque, 60 N.m.
- Remove transfer case

27 10 050 REPLACING OUTPUT FLANGE FOR FRONT AXLE OUTPUT (ATC 300)

IMPORTANT: Do not move vehicle with drive power once propeller shaft has been removed.
Replace output flange only in conjunction with a new radial shaft seal.
After completion of work, check transmission fluid level.
Use only the approved transmission fluid. See TRANSFER CASE - OPERATING FLUIDS .
Failure to comply with this requirement will result in serious damage to the transfer box!

Operation is identical to Replacing radial shaft seal for front axle output.

27 10 070 REPLACING OUTPUT FLANGE ON TRANSFER CASE AT REAR (ATC300)

IMPORTANT: After completing work, check gear oil level and top up if necessary.
Use only the approved gear oil in this transfer case. See TRANSFER CASE - OPERATING FLUIDS .

NOTE: Operations for removing output flange are identical to replacing radial shaft seal (M/T) or 27 21 020 REPLACING RADIAL SHAFT SEAL FOR OUTPUT FLANGE, AUTOMATIC (ATC 300)

Installation:

- Thickness of new shim must be determined before output flange is installed

Determine and note down measurement A of output flange (previous and new).

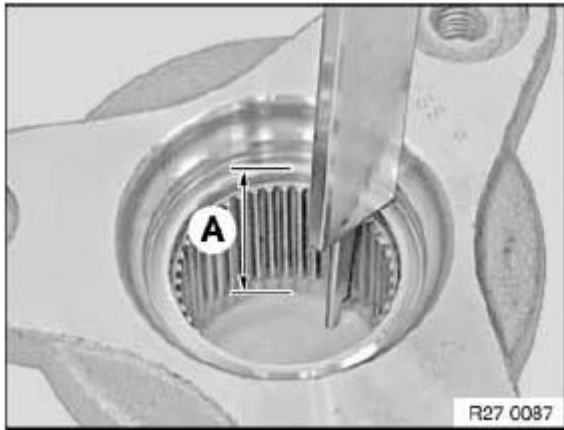


Fig. 12: Identifying Output Flange Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Determine and note down measurement B of output flange (previous and new).

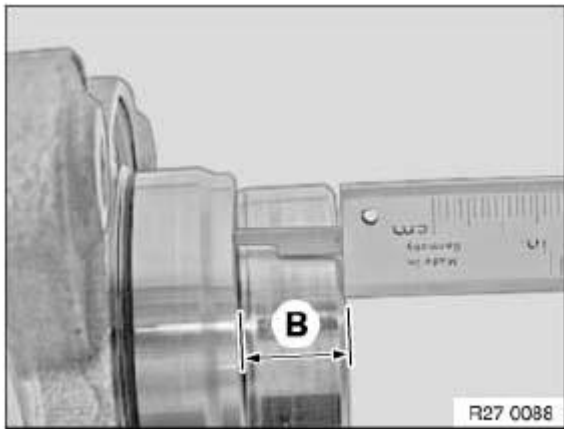


Fig. 13: Identifying Output Flange Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Determine measurement C, thickness of shim.

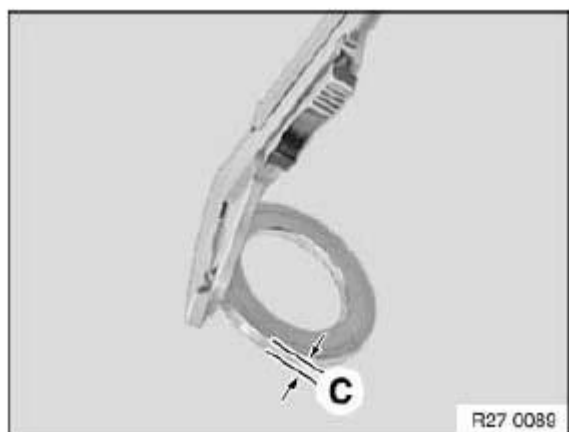


Fig. 14: Identifying Shim Thickness

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Calculate thickness of new shim:

1. Add measurement A of output flange (previous) and measurement C of shim (previous)

Then subtract measurement B (previous) from result A+C (previous)

2. Subtract measurement B from measurement A of output flange (new)
3. Then subtract result of step 2 from result of step 1.

27 10 700 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR TRANSFER BOX (ATC 300)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection). See 61 35... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Replacement:

Before and after replacement, execute the "Repair" service function with the BMW diagnosis system.

Necessary preliminary tasks:

- Remove trim for instrument panel, bottom right. See **51 45 181 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT TRIM FOR INSTRUMENT PANEL** .

Remove side trim panel (1) and entrance strip trim (2).

Pull back floor trim (carpet) towards rear.

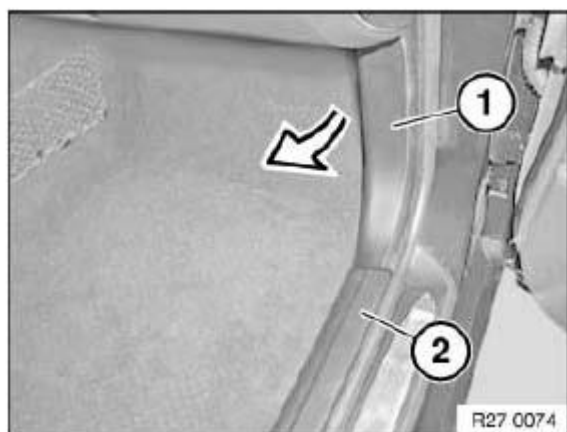


Fig. 15: Identifying Side Trim Panel And Entrance Strip Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Remove inlay (1).

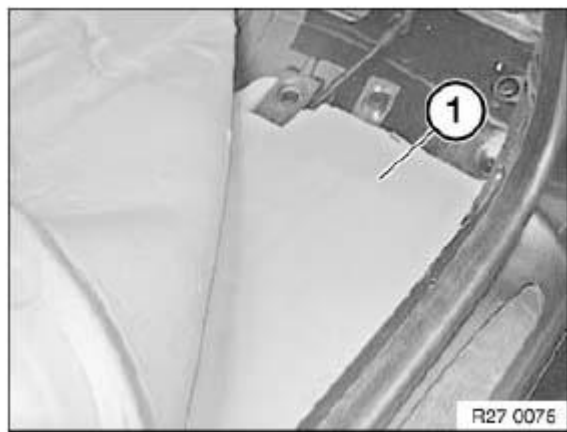


Fig. 16: Identifying Inlay
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque, 8 N.m.

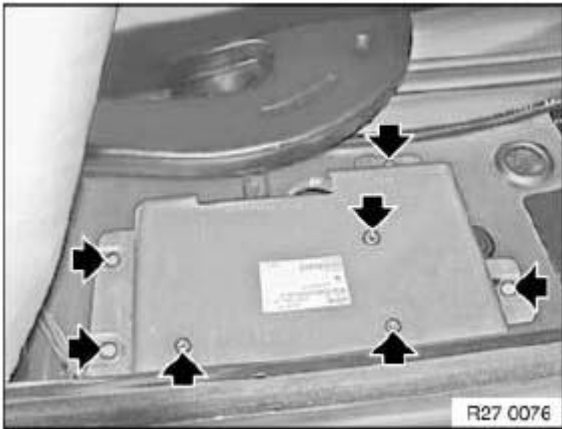


Fig. 17: Locating Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect connector (1).

Modify control unit.

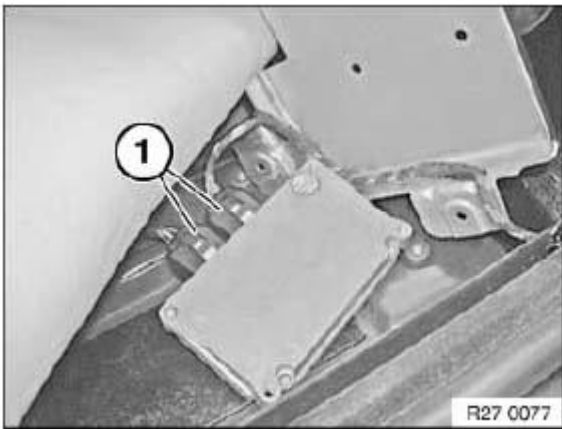


Fig. 18: Identifying Control Unit Connector

Courtesy of BMW OF NORTH AMERICA, INC.

27 10 710 REPLACING CLASSIFICATION RESISTOR FOR SERVOMOTOR (ATC 300)

IMPORTANT: Delete previous resistance values when replacing the resistor.
Using BMW diagnosis system, work through test program in accordance with instructions.

Disconnect connector (1).

Release screw (3) and remove resistor.

Tightening torque, 5 N.m.

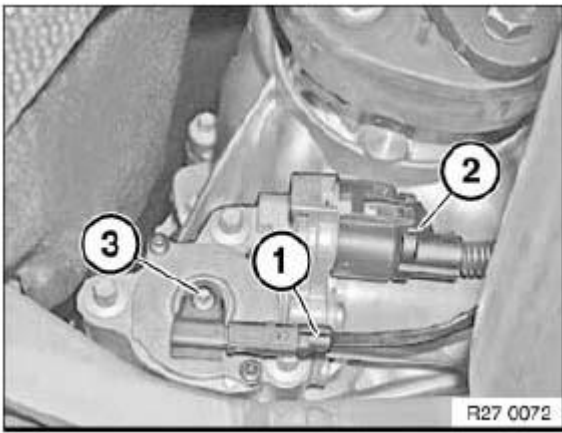


Fig. 19: Identifying Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

27 10 720 REPLACING SERVOMOTOR (ATC 300)

IMPORTANT: After replacement, the "Repair" service function must be carried out with GT1.

Disconnect plugs (1 and 2).

Release screw (3) and turn resistor counterclockwise.

Tightening torque, 5 N.m.

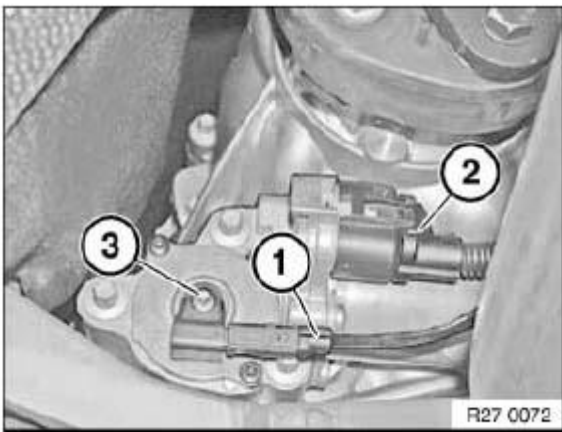


Fig. 20: Identifying Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove servomotor from transfer case.

Tightening torque, 22 N.m.

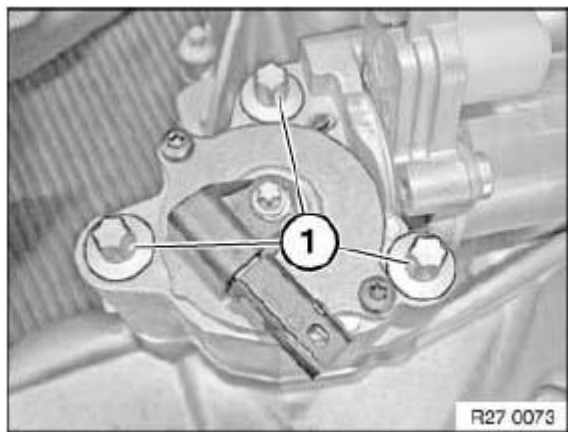


Fig. 21: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

21 TRANSMISSION SHAFTS

27 10 070 REPLACING OUTPUT FLANGE ON TRANSFER CASE AT REAR (ATC300)

IMPORTANT: After completing work, check gear oil level and top up if necessary.
Use only the approved gear oil in this transfer case. See TRANSFER CASE - OPERATING FLUIDS .

NOTE: Operations for removing output flange are identical to replacing radial shaft seal or 27 21 020 REPLACING RADIAL SHAFT SEAL FOR OUTPUT FLANGE, AUTOMATIC (ATC 300).

Installation:

Thickness of new shim must be determined before output flange is installed

Determine and note down measurement A of output flange (previous and new).



Fig. 22: Identifying Output Flange Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Determine and note down measurement B of output flange (previous and new).

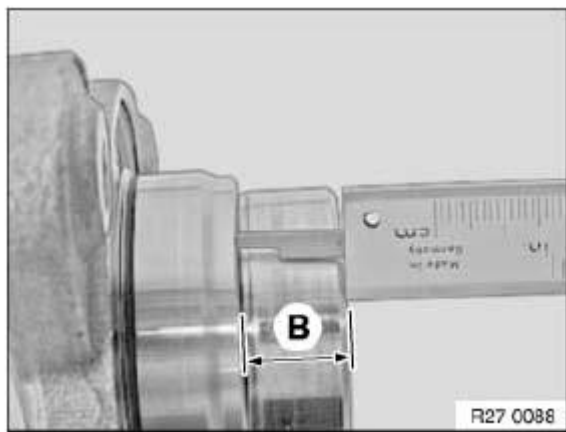


Fig. 23: Identifying Output Flange Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Determine measurement C, thickness of shim.

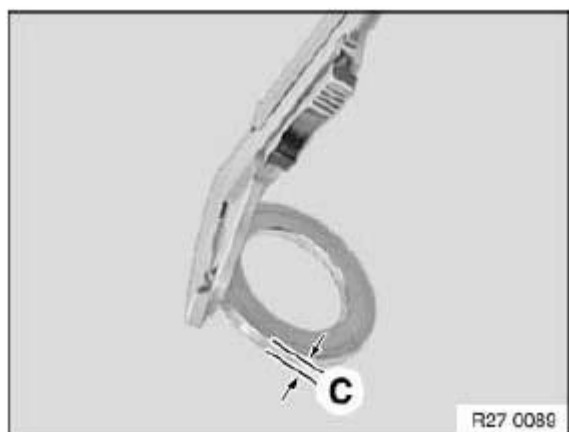


Fig. 24: Identifying Shim Thickness

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Calculate thickness of new shim:

1. Add measurement A of output flange (previous) and measurement C of shim (previous)

Then subtract measurement B (previous) from result A+C (previous)

2. Subtract measurement B from measurement A of output flange (new)
3. Then subtract result of step 2 from result of step 1.

27 21 010 REPLACING RADIAL SHAFT SEAL FOR DRIVE FLANGE (ATC 300)

Special tools required:

- 23 0 490. See MANUAL TRANSMISSION - SPECIAL TOOLS .
- 27 1 430. See Fig. 27.

IMPORTANT: After completion of work, check gear oil level and top up if necessary.
Use only approved gear oil in this transfer box. See TRANSFER CASE - OPERATING FLUIDS .

Necessary preliminary tasks:

- Remove transfer box.

Drive a hole into radial shaft seal (1) using a center punch (2).

IMPORTANT: Do not use a drill as drillings may result in transmission malfunction.

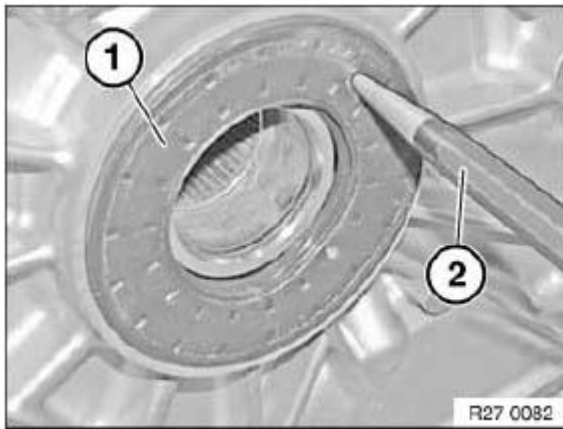


Fig. 25: Identifying Radial Shaft Seal And Center Punch
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 23 0 490 into radial shaft seal.

Drive out radial shaft seal (1) with impact weight (2).

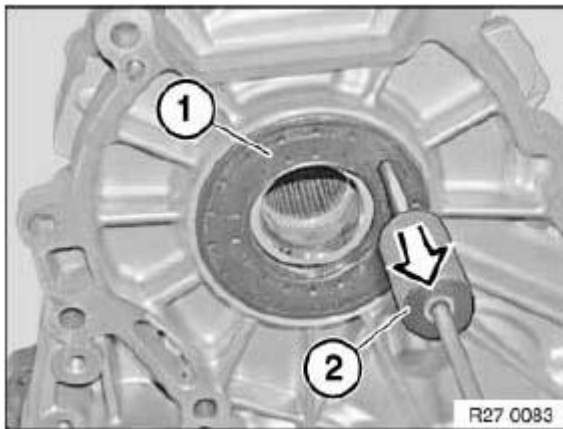


Fig. 26: Identifying Radial Shaft Seal And Impact Weight
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of new radial seal with clean transmission oil.

Drive in radial shaft seal with special tool 27 1 430.

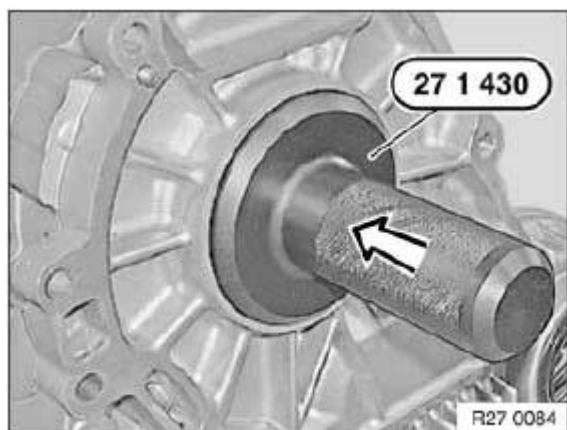


Fig. 27: Identifying Special Tool (27 1 430)

Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Check oil level.

Check transmission for leaks.

27 21 020 REPLACING RADIAL SHAFT SEAL FOR OUTPUT FLANGE (ATC 300)

IMPORTANT: After completion of work, check transmission oil level and top up if necessary. Use only the approved gear oil in this transfer box. See TRANSFER CASE - OPERATING FLUIDS .

NOTE: Operations are identical for removed transfer case.

27 21 020 REPLACING RADIAL SHAFT SEAL FOR OUTPUT FLANGE, AUTOMATIC (ATC 300)

Special tools required:

- 27 1 440. See Fig. 31.

IMPORTANT: After completing work, check gear oil level and top up if necessary. Use only the approved transmission oil in this transfer case. See TRANSFER CASE - OPERATING FLUIDS .

Necessary preliminary tasks:

- Remove transfer case.

Release retaining ring (1).

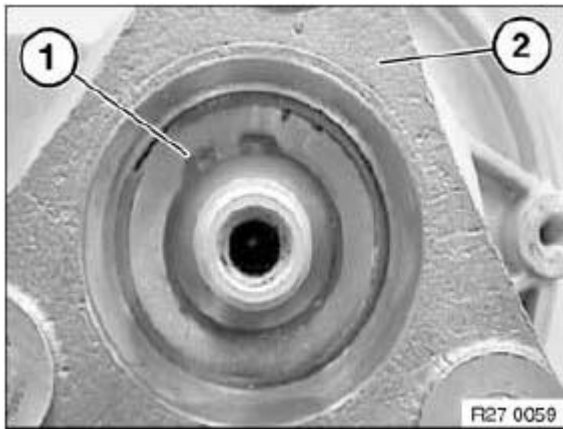


Fig. 28: Identifying Retaining Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Release output flange with three-claw extractor tool.

Lever radial shaft seal out of housing with a suitable tool.

IMPORTANT: Do not damage housing.

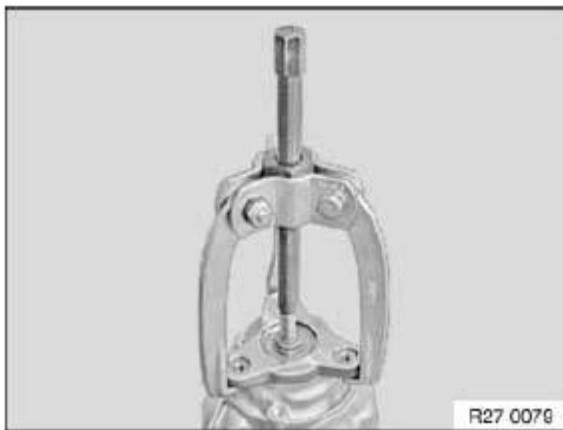


Fig. 29: Identifying Three-Claw Extractor Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace O-ring in output flange.

Check that O-ring is in correct position.

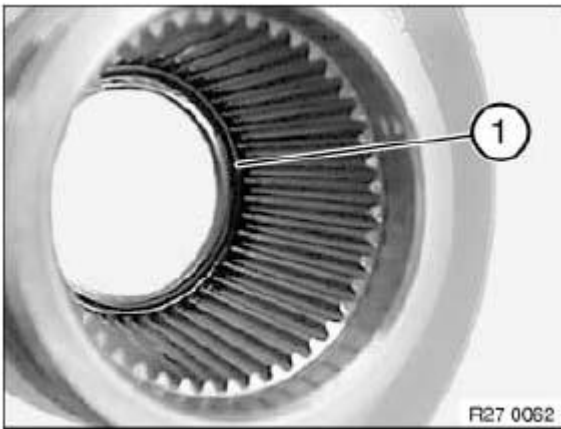


Fig. 30: Identifying O-Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of new radial seal with clean transmission oil.

Drive in radial shaft seal with special tool 27 1 440.



Fig. 31: Identifying Special Tool (27 1 440)

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Push on output flange
- Press down output flange using 2 screwdrivers
- Fit washer
- Continue pressing output flange down until retaining groove is completely visible
- Fit retaining ring

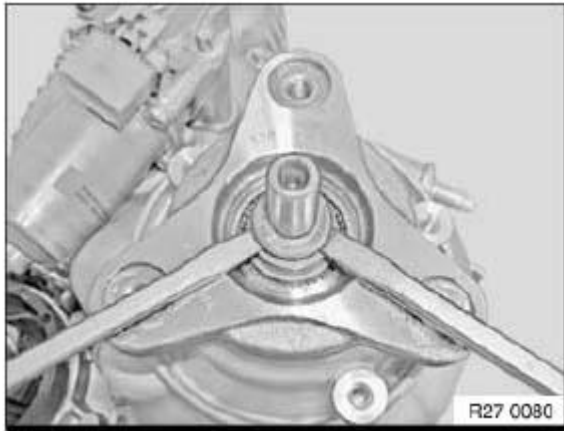


Fig. 32: Pressing Output Flange

Courtesy of BMW OF NORTH AMERICA, INC.

27 21 030 REPLACING RADIAL SHAFT SEAL FOR FRONT AXLE OUTPUT (ATC 300)

Special tools required:

- 27 1 450. See **Fig. 34**.

IMPORTANT: After completion of work, check transmission oil level.

Use only the approved gear oil in this transfer case. See TRANSFER CASE - OPERATING FLUIDS .

Necessary preliminary tasks:

- Remove front propeller shaft. See **26 11 000 REMOVING AND INSTALLING COMPLETE PROPELLER SHAFT (CONSTANT-VELOCITY JOINT)** .

Lever output flange (1) out of housing with screwdriver (2).

Lever radial shaft seal out of housing with a suitable tool.

IMPORTANT: Do not damage housing.

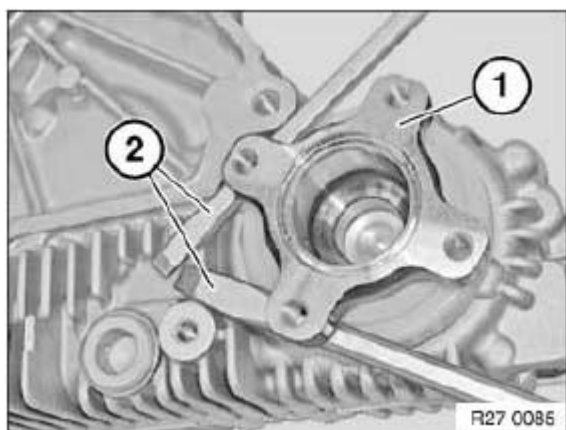


Fig. 33: Identifying Output Flange And Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Drive in radial shaft seal with special tool 27 1 450.

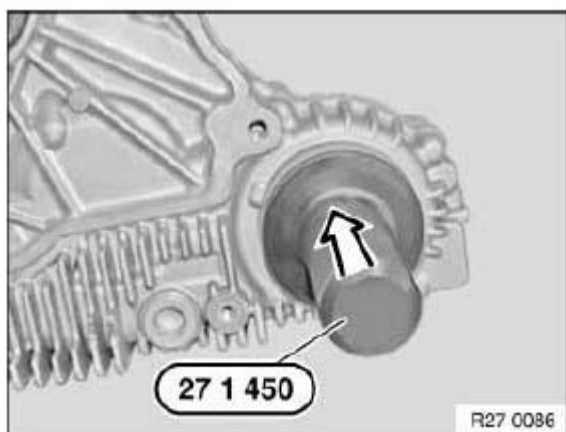


Fig. 34: Identifying Special Tool (27 1 450)
Courtesy of BMW OF NORTH AMERICA, INC.

GENERAL INFORMATION

Trouble Shooting - Basic Procedures

*** PLEASE READ THIS FIRST ***

NOTE: This is **GENERAL** information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to **SUBJECT**, **DIAGNOSTIC**, or **TESTING** articles available in the section(s) you are accessing.

ACCESSORIES & ELECTRICAL**CHARGING SYSTEM TROUBLE SHOOTING**

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BASIC CHARGING SYSTEM TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Vehicle Will Not Start	
Dead battery	Check battery cells, alternator belt tension and alternator output
Loose or corroded battery connections	Check all charging system connections
Ignition circuit or switch malfunction	Check and replace as necessary
Alternator Light Stays On With Engine Running	
Loose or worn alternator drive belt	Check alternator drive tension and condition, See Belt Adjustment in TUNE-UP article in the TUNE-UP section
Loose alternator wiring connections	Check all charging system connections

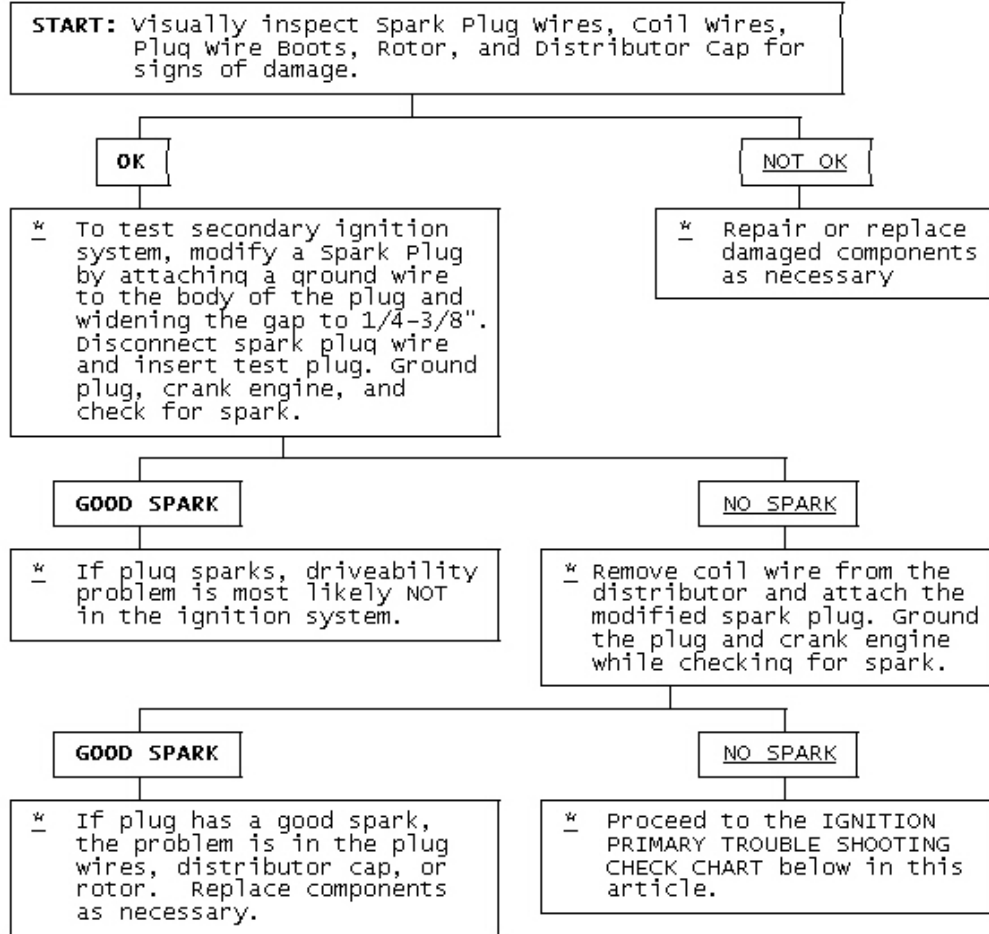
Short in alternator light wiring	See Indicator Warning Lights in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section
Defective alternator stator or diodes	See Bench Tests in ALTERNATOR article
Defective regulator	See Regulator Check in ALTERNATOR article
Alternator Light Stays Off With Ignition Switch ON	
Blown fuse	See WIRING DIAGRAMS
Defective alternator	See Testing in ALTERNATOR article
Defective indicator light bulb or socket	See Indicator Warning Lights in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section
Alternator Light Stays OFF With Ignition Switch ON	
Short in alternator wiring	See On-Vehicle Tests in ALTERNATOR article
Defective rectifier bridge	See Bench Tests in ALTERNATOR article
Lights or Fuses Burn Out Frequently	
Defective alternator wiring	See On-Vehicle Tests in ALTERNATOR article
Defective regulator	See Regulator Check in ALTERNATOR article
Defective battery	Check and replace as necessary
Ammeter Gauge Shows Discharge	
Loose or worn drive belt	Check alternator drive belt tension and condition. See Belt Adjustment in TUNE-UP article in the TUNE-UP section
Defective wiring	Check all wires and wire connections
Defective alternator or regulator	See Bench Tests and On-Vehicle Tests in ALTERNATOR article
Defective ammeter, or improper ammeter wiring connection	See Testing in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section
Noisy Alternator	
Loose drive pulley	Tighten drive pulley attaching nut

Loose mounting bolts	Tighten all alternator mounting bolts
Worn or dirty bearings	See Bearing Replacement ALTERNATOR article
Defective diodes or stator	See Bench Test in ALTERNATOR article
Battery Does Stay Charged	
Loose or worn drive belt	Check alternator drive belt tension and condition. See Belt Adjustment in appropriate TUNE-UP article in the TUNE-UP section
Loose or corroded battery connections	Check all charging system connections
Loose alternator connections	Check all charging system connections
Defective alternator or battery	See On-Vehicle Tests and Bench Tests in ALTERNATOR article
Add-on electrical accessories exceeding alternator capacity	Install larger alternator
Battery Overcharged-Uses Too Much Water	
Defective battery	Check alternator output and repair as necessary
Defective alternator	See On-Vehicle Test and Bench Tests in ALTERNATOR article
Excessive alternator voltage	Check alternator output and repair as necessary

IGNITION SYSTEM TROUBLE SHOOTING

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Ignition Secondary Trouble shooting Chart

**Fig. 1: Ignition Secondary Trouble Shooting Chart**

Ignition Primary Trouble Shooting Chart

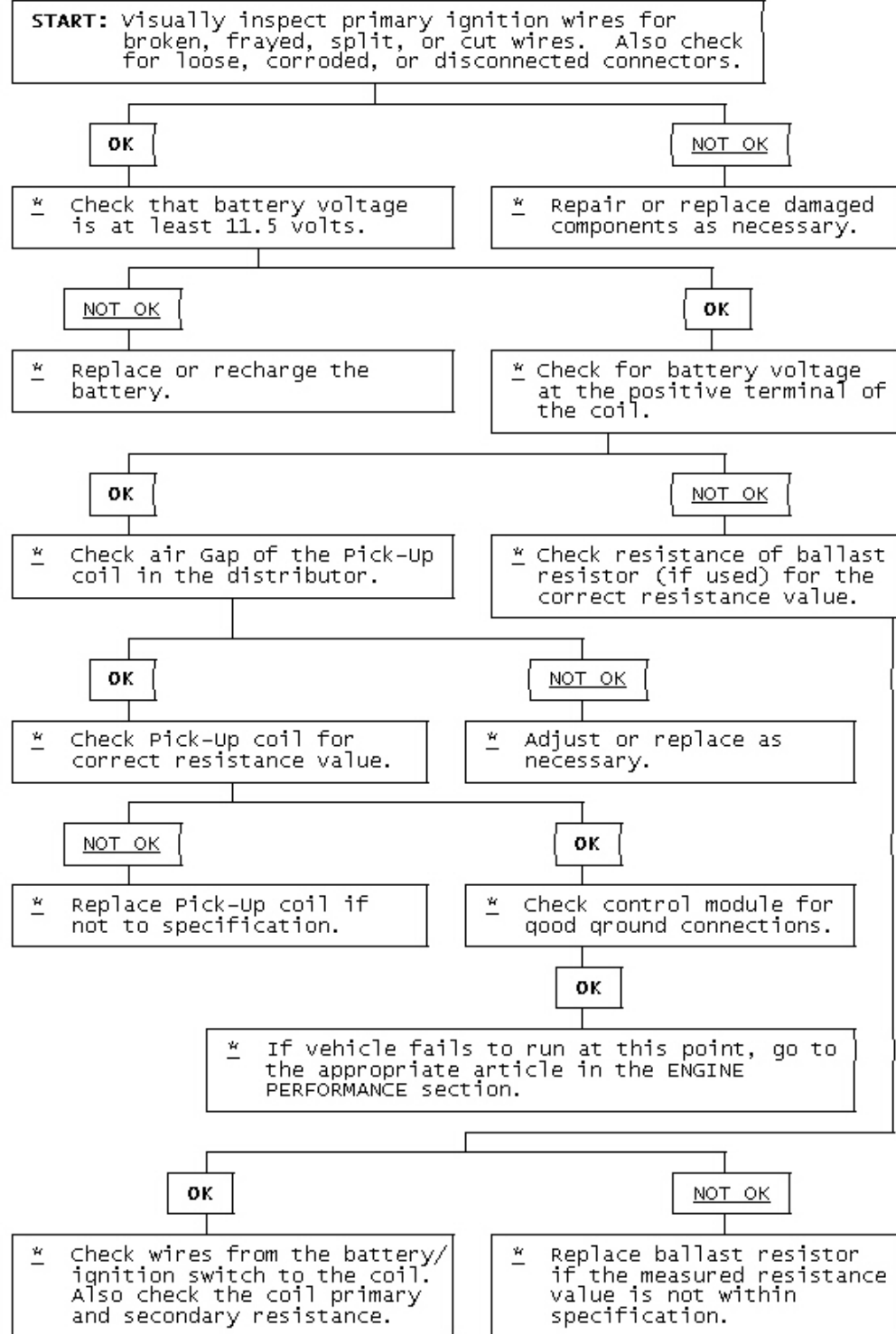


Fig. 2: Ignition Primary Trouble Shooting Chart**STARTER TROUBLE SHOOTING**

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BASIC STARTER TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Starter Fails to Operate	
Dead battery or bad connections between starter and battery	Check battery charge and all wires and connections to starter
Ignition switch faulty or misadjusted	Adjust or replace ignition switch
Open circuit between starter switch ignition terminal on starter relay	Check and repair wires and connections as necessary
Starter relay or starter defective	See Testing in STARTER article
Open solenoid pull-in wire	Testing in STARTER article
Starter Does Not Operate and Headlights Dim	
Weak battery or dead cell	Charge or replace battery as necessary
Loose or corroded battery connections	Check that battery connections are clean and tight
Internal ground in starter windings	See Testing in STARTER article
Grounded starter fields	See Testing in STARTERS
Armature rubbing on pole	See STARTER article shoes
Starter Turns but Engine Does Not Rotate	
Starter clutch slipping	See STARTER article
Broken clutch housing	See STARTER article
Pinion shaft rusted or dry	See STARTER article
Engine basic timing incorrect	See Ignition Timing in TUNE-UP article
Broken teeth on engine flywheel	Replace flywheel and check for starter pinion gear damage
Starter Will Not Crank Engine	
Faulty overrunning clutch	See STARTER article
Broken clutch housing	See STARTER article

Broken flywheel teeth	Replace flywheel and check for starter pinion gear damage
Armature shaft sheared or reduction gear teeth stripped	See STARTER article
Weak battery	Charge or replace battery as necessary
Faulty solenoid	See On-Vehicle Tests in STARTER article
Poor grounds	Check all ground connections for tight and clean connections
Ignition switch faulty or misadjusted	Adjust or replace ignition switch as necessary
Starter Cranks Engine Slowly	
Battery weak or defective	Charge or replace battery as necessary
Engine overheated	See ENGINE COOLING SYSTEM article
Engine oil too heavy	Check that proper viscosity oil is used
Poor battery-to-starter connections	Check that all between battery and starter are clean and tight
Current draw too low or too high	See Bench Tests in STARTER article
Bent armature, loose pole shoes screws or worn bearing	See STARTER article
Burned solenoid contacts	Replace solenoid
Faulty starter	Replace starter
Starter Engages Engine Only Momentarily	
Engine timing too far advanced	See Ignition Timing in TUNE-UP article
Overrunning clutch not engaging properly	Replace overrunning clutch. See STARTER article
Broken starter clutch	See STARTER article
Broken teeth on engine flywheel	Replace flywheel and check starter pinion gear for damage
Weak drive assembly thrust spring	See STARTER article
Weak hold-in coil	See Bench Tests in STARTER article
Starter Drive Will Not Engage	
Defective point assembly	See Testing in STARTER article
Poor point assembly ground	See Testing in STARTER article
Defective pull-in coil	Replace starter solenoid
Starter Relay Does Not Close	

Dead battery	Charge or replace battery as necessary
Faulty wiring	Check all wiring and connections leading to relay
Neutral safety switch faulty	Replace neutral safety switch
Starter relay faulty	Replace starter relay
Starter Drive Will Not Disengage	
Starter motor loose on mountings	Tighten starter attach bolts
Worn drive end bushing	See STARTER article
Damaged engine flywheel teeth	Replace flywheel and starter pinion gear for damage
Drive yolk return spring broken or missing	Replace return spring
Faulty ignition switch	Replace ignition switch
Insufficient clearance between winding leads to solenoid terminal and main contact in solenoid	Replace starter solenoid
Starter clutch not disengaging	Replace starter clutch
Ignition starter switch	Replace ignition switch contacts sticking
Starter Relay Operates but Solenoid Does Not	
Faulty solenoid switch, switch connections or relay	Check all wiring between relay and solenoid or replace relay or solenoid as necessary
Broken lead or loose soldered connections	Repair wire or wire connections as necessary
Solenoid Plunger Vibrates When Switch is Engaged	
Weak battery	Charge or replace battery as necessary
Solenoid contacts corroded	Clean contacts or replace solenoid
Faulty wiring	Check all wiring leading to solenoid
Broken connections inside switch cover	Repair connections or replace solenoid
Open hold-in wire	solenoid
Low Current Draw	
Worn brushes or weak brush springs	Replace brushes or brush springs as necessary
High Pitched Whine During Cranking Before Engine Fires but Engine Fires and Cranks Normally	
Distance too great between starter pinion and flywheel	Align starter or check that correct starter and flywheel are being used
High Pitched Whine After Engine Fires With Key released. Engine Fires and Cranks Normally	
Distance too small between starter pinion and flywheel	Flywheel runout contributes to

the intermittent nature

AIR CONDITIONING & HEAT

AIR CONDITIONING TROUBLE SHOOTING

WARNING: This is **GENERAL** information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to **SUBJECT, DIAGNOSTIC, or TESTING** articles available in the section(s) you are accessing.

BASIC AIR CONDITIONING TROUBLE SHOOTING CHART

CONDITION	POSSIBLE CAUSE
Compressor Not Working	Compressor clutch circuit open.
.....	Compressor clutch coil inoperative.
.....	Poor clutch ground connection.
.....	Fan belts loose.
.....	Thermostatic switch inoperative.
.....	Thermostatic switch not adjusted.
.....	Ambient temperature switch open.
.....	Superheat fuse blown.
Excessive Noise or Vibration	Missing or loose mounting bolts.
.....	Bad idler pulley bearings.
.....	Fan belts not tightened correctly.
.....	Compressor clutch contacting body.
.....	Excessive system pressure.
.....	Compressor oil level low.
.....	Damaged clutch bearings.
.....	Damaged reed valves.
.....	Damaged compressor.
Insufficient or No Cooling; Compressor Working	Expansion valve inoperative.
.....	Heater control valve stuck open.
.....	Low system pressure.
.....	Blocked condenser fins.
.....	Blocked evaporator fins.
.....	Vacuum system leak.
.....	Vacuum motors inoperative.
.....	Control cables improperly adjusted.
.....	Restricted air inlet.

.....	Mode doors binding.
.....	Blower motor inoperative.
.....	Temperature above system capacity.

HEATER SYSTEM TROUBLE SHOOTING

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BASIC HEATER SYSTEM TROUBLE SHOOTING CHART

CONDITION	POSSIBLE CAUSE
Insufficient, Erratic, or No Heat	Low Coolant Level
.....	Incorrect thermostat.
.....	Restricted coolant flow through core.
.....	Heater hoses plugged.
.....	Misadjusted control cable.
.....	Sticking heater control valve.
.....	Vacuum hose leaking.
.....	Vacuum hose blocked.
.....	Vacuum motors inoperative.
.....	Blocked air inlet.
.....	Inoperative heater blower motor.
.....	Oil residue on heater core fins.
.....	Dirt on heater core fins.
Too Much Heat	Improperly adjusted cables.
.....	Sticking heater control valve.
.....	No vacuum to heater control valve.
.....	Temperature door stuck open.
Air Flow Changes During Acceleration	Vacuum system leak.
.....	Bad check valve or reservoir.
Air From Defroster At All Times	Vacuum system leak.
.....	Improperly adjusted control cables.
.....	Inoperative vacuum motor.
Blower Does Not Operate Correctly	Blown fuse.
.....	Blower motor windings open.
.....	Resistors burned out.
.....	Motor ground connection loose.
.....	Wiring harness connections loose.

.....	Blower motor switch inoperative.
.....	Blower relay inoperative.
.....	Fan binding or foreign object in housing.
.....	Fan blades broken or bent.

BRAKES

BRAKE SYSTEM TROUBLE SHOOTING

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BRAKE SYSTEM TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Brakes Pull Left or Right	
Incorrect tire pressure	Inflate tires to proper pressure
Front end out of alignment	See WHEEL ALIGNMENT
Mismatched tires	Check tires sizes
Restricted brake lines or hoses	Check hose routing
Loose or malfunctioning caliper	See DISC BRAKES or BRAKE SYSTEM
Bent shoe or oily linings	See DRUM BRAKES or BRAKE SYSTEM
Malfunctioning rear brakes	See DRUM, DISC BRAKES or BRAKE SYSTEM
Loose suspension parts	See SUSPENSION
Noises Without Brakes Applied	
Front linings worn out	Replace linings
Dust or oil on drums or rotors	See DRUM, DISC BRAKES or BRAKE SYSTEM
Noises With Brakes Applied	
Insulator on outboard shoe damaged	See DISC BRAKES or BRAKE SYSTEM
Incorrect pads or linings	Replace pads or linings
Brake Rough, Chatters or Pulsates	
Excessive lateral runout	Check rotor runout
Parallelism not to specifications	Reface or replace rotor
Wheel bearings not adjusted	See SUSPENSION
Rear drums out-of-round	Reface or replace drums

Disc pad reversed, steel against rotor	Remove and reinstall pad
Excessive Pedal Effort	
Malfunctioning power unit	See POWER BRAKES or BRAKE SYSTEM
Partial system failure	Check fluid and pipes
Worn disc pad or lining	Replace pad or lining
Caliper piston stuck or sluggish	See DISC BRAKES or BRAKE SYSTEM
Master cylinder piston stuck	See MASTER CYLINDERS or BRAKE SYSTEM
Brake fade due to incorrect pads for linings	Replace pads or linings
Linings or pads glazed	Replace pads or linings
Worn drums	Reface or replace drums
Excessive Pedal Travel	
Partial brake system failure	Check fluid and pipes
Insufficient fluid in master cylinder	See MASTER CYLINDERS or BRAKE SYSTEM
Air trapped in system	See BRAKE BLEEDING or BRAKE SYSTEM
Rear brakes not adjusted	See Adjustments in DRUM BRAKES or BRAKE SYSTEM
Bent shoe or lining	See DRUM BRAKES or BRAKE SYSTEM
Plugged master cylinder cap	See MASTER CYLINDERS or BRAKE SYSTEM
Improper brake fluid	Replace brake fluid
Pedal Travel Decreasing	
Compensating port plugged	See MASTER CYLINDERS or BRAKE SYSTEM
Swollen cup in master cylinder	See MASTER CYLINDERS or BRAKE SYSTEM
Master cylinder piston not returning	See MASTER CYLINDERS or BRAKE SYSTEM
Weak shoe retracting springs	See DRUM BRAKES or BRAKE SYSTEM
Wheel cylinder piston sticking	See DRUM BRAKES or BRAKE SYSTEM
Dragging Brakes	
Master cylinder pistons not returning	See MASTER CYLINDERS or BRAKE SYSTEM
Restricted brake lines or hoses	Check line routing
Incorrect parking brake adjustment	See DRUM BRAKES

	BRAKE SYSTEM
Parking Brake cables frozen	See DRUM BRAKES BRAKE SYSTEM
Incorrect installation of inboard disc pad	Remove and replace correctly
Power booster output rod too long	See POWER BRAKE UNITS BRAKE SYSTEM
Brake pedal not returning freely	See DISC, DRUM BRAKES BRAKE SYSTEM
Brakes Grab or Uneven Braking Action	
Malfunction of combination valve	See CONTROL VALVE or BRAKE SYSTEM
Malfunction of power brake unit	See POWER BRAKE UNITS or BRAKE SYSTEM
Binding brake pedal	See DISC, DRUM BRAKES or BRAKE SYSTEM
Pulsation or Roughness	
Uneven pad wear caused by caliper	See DISC BRAKES or BRAKE SYSTEM
Uneven rotor wear	See DISC BRAKES or BRAKE SYSTEM
Drums out-of-round	Reface or replace drums

ENGINE MECHANICAL

COOLING SYSTEM TROUBLE SHOOTING

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COOLING SYSTEM TROUBLE SHOOTING

CONDITION & POSSIBLE CAUSE	CORRECTION
Overheating	
Coolant Leak	Fill/Pressure Test System
A/C Condenser Fins Clogged	Remove/Clean Condenser
Radiator Fins Clogged	Remove/Clean Radiator
Thermostat Stuck Closed	Replace Thermostat
Clogged Cooling System Passages	Clean/Flush Cooling System
Water Pump Malfunction	Replace Water Pump
Fan Clutch Malfunction	Replace Fan Clutch
Retarded Ignition Timing	Reset Ignition Timing

Cooling Fan Malfunction	Test Cooling Fan/Circuit
Cooling Fan Motor Malfunction	Test Fan Motor
Cooling Fan Relay Malfunction	Test Fan Relay
Faulty Radiator Cap	Replace Radiator Cap
Broken/Slipping Fan Belt	Replace Fan Belt
Restricted Exhaust	Repair Exhaust System
Corrosion	
Impurities In Coolant	Clean/Flush System
Coolant Leakage	
Damaged hose	Replace Hose
Leaky Water Pump	Replace Water Pump
Damaged Radiator Seam	Replace/Repair Radiator
Leaky Thermostat Cover	Replace Thermostat Cover
Cylinder Head Problem	Check Head/Head Gasket
Leaky Freeze Plugs	Replace Freeze Plugs
Recovery System Inoperative	
Loose and/or Defective Radiator Cap	Replace Radiator Cap
Overflow Tube Clogged and/or Leaking	Repair Tube
Recovery Bottle Vent Restricted	Clean Vent
No Heater Core Flow	
Collapsed Heater Hose	Replace Heater Hose
Plugged Heater Core	Clean/Replace Heater Core
Faulty Heater Valve	Replace Heater Valve

GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING

NOTE: This is **GENERAL** information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to **SUBJECT**, **DIAGNOSTIC**, or **TESTING** articles available in the section(s) you are accessing.

BASIC GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Lopes At Idle	
Intake manifold-to-head leaks	Replace manifold gasket, See ENGINES
Blown head gasket	Replace head gasket, See ENGINES
Worn timing gears, chain or sprocket	Replace gears, chain or sprocket
Worn camshaft lobes	Replace camshaft, See

	ENGINES
Overheated engine	Check cooling system, See COOLING
Blocked crankcase vent valve	Remove restriction
Leaking EGR valve	Repair leak and/or replace valve
Faulty fuel pump	Replace fuel pump
Engine Has Low Power	
Leaking fuel pump	Repair leak and/or replace fuel pump
Excessive piston-to-bore clearance	Install larger pistons, See ENGINES
Sticking valves or weak valve springs	Check valve train components, See ENGINES
Incorrect valve timing	Reset valve timing, See ENGINES
Worn camshaft lobes	Replace camshaft, See ENGINES
Blown head gasket	Replace head gasket. See ENGINES.
Clutch slipping	Adjust pedal and/or replace components, See ENGINES
Engine overheating	Check cooling system, See COOLING
Auto. Trans. pressure regulator valve faulty	Replace pressure regulator valve
Auto. Trans. fluid level too low	Add fluid as necessary
Improper vacuum diverter valve operation	Replace vacuum diverter valve
Vacuum leaks	Inspect vacuum system and repair as required
Leaking piston rings	Replace piston rings, See ENGINES
Faulty High Speed Operation	
Low fuel pump volume	Replace fuel pump
Leaking valves or worn	Replace valves and/or springs, See ENGINES
Incorrect valve timing	Reset valve timing, See ENGINES
Intake manifold restricted	Remove restriction
Worn distributor shaft	Replace distributor
Faulty Acceleration	
Improper fuel pump stroke	Remove pump and reset pump

	stroke
Incorrect ignition timing	Reset ignition timing, See TUNE-UP
Leaking valves	Replace valves, See ENGINES
Worn fuel pump diaphragm or piston	Replace diaphragm or piston
Intake Backfire	
Improper ignition timing	Reset ignition timing, See TUNE-UP
Faulty accelerator pump discharge	Replace accelerator pump
Improper choke operation	Check choke and adjust as required
Defective EGR valve	Replace EGR valve
Fuel mixture too lean	Reset air/fuel mixture, See TUNE-UP
Choke valve initial clearance too large	Reset choke valve initial clearance
Exhaust Backfire	
Vacuum leak	Inspect and repair vacuum system
Faulty vacuum diverter valve	Replace vacuum diverter valve
Faulty choke operation	Check choke and adjust as required
Exhaust system leak	repair exhaust system leak
Engine Detonation	
Ignition timing too far advanced	Reset ignition timing, See TUNE-UP
Faulty ignition system	Check ignition timing, See TUNE-UP
Spark plugs loose or faulty	Retighten or replace plugs
Fuel delivery system clogged	Inspect lines, pump and filter for clog
EGR valve inoperative	Replace EGR valve
PCV system inoperative	Inspect and/or replace hoses or valve
Vacuum leaks	Check vacuum system and repair leaks
Excessive combustion chamber deposits	Remove built-up deposits
Leaking, sticking or broken valves	Inspect and/or replace valves
External Oil Leakage	
Fuel pump improperly seated or worn gasket	Remove pump, replace gasket and seat properly

Oil pan gasket broken or pan bent	Straighten pan and replace gasket
Timing chain cover gasket broken	Replace timing chain cover gasket
Rear main oil seal worn	Replace rear main oil seal
Oil pan drain plug not seated properly	Remove and reinstall drain plug
Camshaft bearing drain hole blocked	Remove restriction
Oil pressure sending switch leaking	Remove and reinstall sending switch
Excessive Oil Consumption	
Worn valve stems or guides	Replace stems or guides, See ENGINES
Valve "O" ring seals damaged	Replace "O" ring seals, See ENGINES
Plugged oil drain back holes	Remove restrictions
Improper PCV valve operation	Replace PCV valve
Engine oil level too high	Remove excess oil
Engine oil too thin	Replace thicker oil
Valve stem oil deflectors damaged	Replace oil deflectors
Incorrect piston rings	Replace piston rings, See ENGINES
Piston ring gaps not staggered	Reinstall piston rings, See ENGINES
Insufficient piston ring tension	Replace rings, See ENGINES
Piston ring grooves or oil return	slots clogged Replace piston rings, See ENGINES
Piston rings sticking in grooves	Replace piston rings, See ENGINES
Piston ring grooves excessively worn	Replace piston and rings, See ENGINES
Compression rings installed upside down	Replace compression rings correctly, See ENGINES
Worn or scored cylinder walls	Rebore cylinders or replace block
Mismatched oil ring expander and rail	Replace oil ring expander and rail, See ENGINES
Intake gasket dowels too long	Replace intake gasket dowels
Excessive main or connecting rod bearing clearance	Replace main or connecting rod bearings, See ENGINES
No Oil Pressure	
Low oil level	Add oil to proper level
Oil pressure sender or gauge broken	Replace sender or gauge

Oil pump malfunction	Remove and overhaul oil pump, See ENGINES
Oil pressure relief valve sticking	Remove and reinstall valve
Oil pump passages blocked	Overhaul oil pump, See ENGINES
Oil pickup screen or tube blocked	Remove restriction
Loose oil inlet tube	Tighten oil inlet tube
Loose camshaft bearings	Replace camshaft bearings, See ENGINES
Internal leakage at oil passages	Replace block or cylinder head
Low Oil Pressure	
Low engine oil level	Add oil to proper level
Engine oil too thin	Remove and replace with thicker oil
Excessive oil pump clearance	Reduce oil pump clearance, See ENGINES
Oil pickup tube or screen blocked	Remove restrictions
Main, rod or cam bearing clearance excessive	Replace bearing to reduce clearance, See ENGINES
High Oil Pressure	
Improper grade of oil	Replace with proper oil
Oil pressure relief valve stuck closed	Eliminate binding
Oil pressure sender or gauge faulty	Replace sender or gauge
Noisy Main Bearings	
Inadequate oil supply	Check oil delivery to main bearings
Excessive main bearing clearance	Replace main bearings, See ENGINES
Excessive crankshaft end play	Replace crankshaft, See ENGINES
Loose flywheel or torque converter	Tighten attaching bolts
Loose or damaged vibration damper	Tighten or replace vibration damper
Crankshaft journals out-of-round	Re-grind crankshaft journals
Excessive belt tension	Loosen belt tension
Noisy Connecting Rods	
Excessive bearing clearance or missing bearing	Replace bearing, See ENGINES
Crankshaft rod journal out-of-round	Re-grind crankshaft journal
Misaligned connecting rod or cap	Remove rod or cap and realign

Incorrectly tightened rod bolts	Remove and re-tighten rod bolts
Noisy Pistons and Rings	
Excessive piston-to-bore clearance	Install larger pistons, See ENGINES
Bore tapered or out-of-round	Rebore block
Piston ring broken	Replace piston rings, See ENGINES
Piston pin loose or seized	Replace piston pin, See ENGINES
Connecting rods misaligned	Realign connecting rods
Ring side clearance too loose or tight	Replace with larger or smaller rings
Carbon build-up on piston	Remove carbon
Noisy Valve Train	
Worn or bent push rods	Replace push rods, See ENGINES
Worn rocker arms or bridged pivots	Replace push rods, See ENGINES
Dirt or chips in valve lifters	Remove lifters and remove dirt/chips
Excessive valve lifter leak-down	Replace valve lifters, See ENGINES
Valve lifter face worn	Replace valve lifters, See ENGINES
Broken or cocked valve springs	Replace or reposition springs
Too much valve stem-to-guide clearance	Replace valve guides, See ENGINES
Valve bent	Replace valve, See ENGINES
Loose rocker arms	Retighten rocker arms, See ENGINES
Excessive valve seat run-out	Reface valve seats, See ENGINES
Missing valve lock	Install new valve lock
Excessively worn camshaft lobes	Replace camshaft, See ENGINES
Plugged valve lifter oil holes	Eliminate restriction or replace lifter
Faulty valve lifter check ball	Replace lifter check ball, See ENGINES
Rocker arm nut installed upside down	Remove and reinstall correctly
Valve lifter incorrect for engine	Remove and replace valve lifters

Faulty push rod seat or lifter plunger	Replace plunger or push rod
Noisy Valves	
Improper valve lash	Re-adjust valve lash, See ENGINES
Worn or dirty valve lifters	Clean and/or replace lifters
Worn valve guides	Replace valve guides, See ENGINES
Excessive valve seat or face run-out	Reface seats or valve face
Worn camshaft lobes	Replace camshaft, See ENGINES
Loose rocker arm studs	Re-tighten rocker arm studs, See ENGINES
Bent push rods	Replace push rods, See ENGINES
Broken valve springs	Replace valve springs, See ENGINES
Burned, Sticking or Broken Valves	
Weak valve springs or warped valves	Replace valves and/or springs, See ENGINES
Improper lifter clearance	Re-adjust clearance or replace lifters
Worn guides or improper guide clearance	Replace valve guides, See ENGINES
Out-of-round valve seats or improper seat width	Re-grind valve seats
Gum deposits on valve stems, seats or guide	Remove deposits
Improper spark timing	Re-adjust spark timing
Broken Pistons/Rings	
Undersize pistons	Replace with larger pistons, See ENGINES
Wrong piston rings	Replace with correct rings, See ENGINES
Out-of-round cylinder bore	Re-bore cylinder bore
Improper connecting rod alignment	Remove and realign connecting rods
Excessively worn ring grooves	Replace pistons, See ENGINES
Improperly assembled piston pins	Re-assemble pin-to-piston, See ENGINES
Insufficient ring gap clearance	Install new rings, See ENGINES
Engine overheating	Check cooling system
Incorrect ignition timing	Re-adjust ignition timing, See TUNE-UP

Excessive Exhaust Noise

Leaks at manifold to head, or to pipe	Replace manifold or pipe gasket
Exhaust manifold cracked or broken	Replace exhaust manifold, See ENGINES

ENGINE PERFORMANCE**CARBURETOR TROUBLE SHOOTING:**

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BASIC COLD START SYMPTOMS TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Start	
Choke not closing	Check choke operation, see FUEL SYSTEMS
Choke linkage bent	Check linkage, see FUEL SYSTEM
Engine Starts, Then Dies	
Choke vacuum kick setting too wide	Check setting and adjust see, FUEL SYSTEMS
Fast idle RPM too low	Reset RPM to specification, see TUNE-UP
Fast idle cam index incorrect	Reset fast idle cam index, see FUEL SYSTEMS
Vacuum leak	Inspect vacuum system for leaks
Low fuel pump outlet	Repair or replace pump, see FUEL SYSTEMS
Low carburetor fuel level	Check float setting see FUEL SYSTEM
Engine Quits Under Load	
Choke vacuum kick setting incorrect	Reset vacuum kick setting, see FUEL SYSTEMS
Fast idle cam index incorrect	Reset fast idle cam index, see FUEL SYSTEM
Incorrect hot fast idle speed RPM	Reset fast idle RPM, see TUNE-UP

Engine Starts, Runs Up, Then Idles, Slowly With Black Smoke

Choke vacuum kick set too narrow	Reset vacuum kick, see FUEL SYSTEMS
Fast idle cam index incorrect	Reset fast idle cam index, see FUEL SYSTEMS
Hot fast idle RPM too low	Reset fast idle RPM, see TUNE-UP

BASIC HOT START SYMPTOMS TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Start	
Engine flooded	Allow fuel to evaporate

BASIC COLD ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Stalls in Gear	
Choke vacuum kick setting incorrect	Reset choke vacuum kick, see FUEL SYSTEMS
Fast idle RPM incorrect	Reset fast idle RPM, see TUNE-UP
Fast idle cam index incorrect	Reset fast idle cam see FUEL SYSTEMS
Acceleration Sag or Stall	
Defective choke control switch	Replace choke control switch
Choke vacuum kick setting incorrect	Reset choke vacuum kick see, FUEL SYSTEMS
Float level incorrect (too low)	Adjust float level, FUEL SYSTEMS
Accelerator pump defective	Repair or replace pump see FUEL SYSTEMS
Secondary throttles not closed	Inspect lockout adjustment, see FUEL SYSTEMS
Sag or Stall After Warmup	
Defective choke control switch	Replace choke control switch, see FUEL SYSTEMS
Defective accelerator pump	Replace pump, see FUEL SYSTEMS
Float level incorrect (too low)	Adjust float level, see FUEL SYSTEMS
Backfiring & Black Smoke	
Plugged heat crossover system	Remove restriction

BASIC WARM ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

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CONDITION & POSSIBLE CAUSE	CORRECTION
Hesitation With Small Amount of Gas Pedal Movement	
Vacuum leak	Inspect vacuum lines
Accelerator pump weak or inoperable	Replace pump, see FUEL SYSTEMS
Float level setting too low	Reset float level, see FUEL SYSTEMS
Metering rods sticking or binding	Inspect and/or replace rods, see FUEL SYSTEMS
Carburetor idle or transfer system plugged	Inspect system and remove restriction
Frozen or binding heated air inlet	Inspect heated air door for binding
Hesitation With Heavy Gas Pedal Movement	
Defective accelerator pump	Replace pump, see FUEL SYSTEMS
Metering rod carrier sticking or binding	Remove restriction
Large vacuum leak	Inspect vacuum system and repair leak
Float level setting too low	Reset float level, see FUEL SYSTEMS
Defective fuel pump, lines or filter	Inspect pump, lines and filter
Air door setting incorrect	Adjust air door setting, see FUEL

DIESEL ENGINE TROUBLE SHOOTING

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NOTE: Diesel engines mechanical diagnosis is the same as gasoline engines for items such as noisy valves, bearings, pistons, etc. The following trouble shooting covers only items pertaining to diesel engines.

BASIC DIESEL ENGINE TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Crank	
Bad battery connections or dead batteries	Check connections and/or replace batteries
Bad starter connections or bad starter	Check connections and/or

	replace starter
Engine Cranks Slowly, Won't Start	
Bad battery connections or dead batteries	Check connections and/or replace batteries
Engine oil too heavy	Replace engine oil
Engine Cranks Normally, But Will Not Start	
Glow plugs not functioning	Check glow plug system, see FUEL SYSTEMS
Glow plug control not functioning	Check controller, see FUEL SYSTEMS
Fuel not injected into cylinders	Check fuel injectors, see FUEL SYSTEMS
No fuel to injection pump	Check fuel delivery system
Fuel filter blocked	Replace fuel filter
Fuel tank filter blocked	Replace fuel tank filter
Fuel pump not operating	Check pump operation and/or replace pump
Fuel return system blocked	Inspect system and remove restriction
No voltage to fuel solenoid	Check solenoid and connections
Incorrect or contaminated fuel	Replace fuel
Incorrect injection pump timing	Re-adjust pump timing, see FUEL SYSTEMS
Low compression	Check valves, pistons, rings, see ENGINES
Injection pump malfunction	Inspect and/or replace injection pump
Engine Starts, Won't Idle	
Incorrect slow idle adjustment	Reset idle adjustment, see TUNE-UP
Fast idle solenoid malfunctioning	Check solenoid and connections
Fuel return system blocked	Check system and remove restrictions
Glow plugs go off too soon	See glow plug diagnosis in FUEL SYSTEMS
Injection pump timing incorrect	Reset pump timing, see FUEL SYSTEMS
No fuel to injection pump	Check fuel delivery system
Incorrect or contaminated fuel	Replace fuel
Low compression	Check valves, piston, rings, see ENGINES

Injection pump malfunction	Replace injection pump, see FUEL SYSTEMS
Fuel solenoid closes in RUN position	Check solenoid and connections
Engines Starts/Idles Rough W/out Smoke or Noise	
Incorrect slow idle adjustment	Reset slow idle, see TUNE-UP
Injection line fuel leaks	Check lines and connections
Fuel return system blocked	Check lines and connections
Air in fuel system	Bleed air from system
Incorrect or contaminated fuel	Replace fuel
Injector nozzle malfunction	Check nozzles, see FUEL SYSTEMS
Engines Starts and Idles Rough W/out Smoke or Noise, But Clears After Warm-Up	
Injection pump timing incorrect	Reset pump timing, see FUEL SYSTEMS
Engine not fully broken in	Put more miles on engine
Air in system	Bleed air from system
Injector nozzle malfunction	Check nozzles, see FUEL SYSTEMS
Engine Idles Correctly, Misfires Above Idle	
Blocked fuel filter	Replace fuel filter
Injection pump timing incorrect	Reset pump timing, see FUEL SYSTEMS
Incorrect or contaminated fuel	Replace fuel
Engine Won't Return To Idle	
Fast idle adjustment incorrect	Reset fast idle, see TUNE-UP
Internal injection pump malfunction	Replace injection pump, see FUEL SYSTEMS
External linkage binding	Check linkage and remove binding
Fuel Leaks On Ground	
Loose or broken fuel line	Check lines and connections
Internal injection pump seal leak	Replace injection pump, see FUEL SYSTEMS
Cylinder Knocking Noise	
Injector nozzles sticking open	Test injectors, see FUEL SYSTEMS
Very low nozzle opening pressure	Test injectors and/or replace
Loss of Engine Power	
Restricted air intake	Remove restriction
EGR valve malfunction	Replace EGR valve
Blocked or damaged exhaust system	Remove restriction and/or

	replace components
Blocked fuel tank filter	Replace filter
Restricted fuel filter	Remove restriction and/or replace filter
Block vent in gas cap	Remove restriction and/or replace cap
Tank-to-injection pump fuel supply blocked	Check fuel lines and connections
Blocked fuel return system	Remove restriction
Incorrect or contaminated fuel	Replace fuel
Blocked injector nozzles	Check nozzle for blockage, see FUEL SYSTEMS
Low compression	Check valves, rings, pistons, see ENGINES
Loud Engine Noise With Black Smoke	
Basic timing incorrect	Reset timing, see FUEL SYSTEMS
EGR valve malfunction	Replace EGR valve
Internal injection pump malfunction	Replace injection pump, see FUEL SYSTEMS
Incorrect injector pump housing pressure	Check pressure, see FUEL SYSTEMS
Engine Overheating	
Cooling system leaks	Check cooling system and repair leaks
Belt slipping or damaged	Check tension and/or replace belt
Thermostat stuck closed	Remove and replace thermostat, see ENGINE COOLING
Head gasket leaking	Replace head gasket
Oil Light on at Idle	
Low oil pump pressure	Check oil pump operation, see ENGINES
Oil cooler or line restricted	Remove restriction and/or replace cooler
Engine Won't Shut Off	
Injector pump fuel solenoid does not return fuel valve to OFF position	Remove and check solenoid and replace if needed

VACUUM PUMP DIAGNOSIS

CONDITION & POSSIBLE CAUSE	CORRECTION
Excessive Noise	

Loose pump-to-drive assembly screws	Tighten screws
Loose tube on pump assembly	Tighten tube
Valves not functioning properly	Replace valves
Oil Leakage	
Loose end plug	Tighten end plug
Bad seal crimp	Remove and re-crimp seal

FUEL INJECTION TROUBLE SHOOTING

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BASIC FUEL INJECTION TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Start (Crank Normally)	
Cold start valve inoperative	Test valve and circuit
Poor connection; vacuum or wiring	Check vacuum and electrical connections
Contaminated fuel	Test fuel for water or alcohol
Defective fuel pump relay or circuit	Test relay and wiring
Battery too low	Charge and test battery
Low fuel pressure	Test pressure regulator and fuel pump, check for restricted lines and filters
No distributor reference pulses	Repair ignition system as necessary
Open coolant temperature sensor circuit	Test sensor and wiring
Shorted W.O.T. switch in T.P.S.	Disconnect W.O.T. switch, engine should start
Defective ECM	Replace ECM
Fuel tank residual pressure valve leaks	Test for fuel pressure drop after shut down
Hard Starting	
Disconnected hot air tube to air cleaner	Reconnect tube and test control valve
Defective Idle Air Control (IAC) valve	Test valve operation and circuit
Shorted, open or misadjusted T.P.S.	Test and adjust or replace T.P.S.
EGR valve open	Test EGR valve and control

	circuit
Poor Oxygen sensor signal	Test for shorted or circuit
Incorrect mixture from PCV system	Test PCV for flow, check sealing of oil filter cap
Poor High Speed Operation	
Low fuel pump volume	Faulty pump or restricted fuel lines or filters
Poor MAP sensor signal	Test MAP sensor, vacuum hose and wiring
Poor Oxygen sensor signal	Test for shorted or open sensor or circuit
Open coolant temperature sensor circuit	Test sensor and wiring
Faulty ignition operation	Check wires for cracks or poor connections, test secondary voltage with oscilloscope
Contaminated fuel	Test fuel for water or alcohol
Intermittent ECM ground	Test ECM ground connection for resistance
Restricted air cleaner	Replace air cleaner
Restricted exhaust system	Test for exhaust manifold back pressure
Poor MAF sensor signal	Check leakage between sensor and manifold
Poor VSS signal	If tester for ALCL hook-up is available check that VSS reading matches speedometer
Ping or Knock on Acceleration	
Poor Knock sensor signal	Test for shorted or open sensor or circuit
Poor Baro sensor signal	Test for shorted or open sensor or circuit
Improper ignition timing	See VEHICLE EMISSION CONTROL LABEL (where applicable)
Check for engine overheating problems	Low coolant, loose belts or electric cooling fan inoperative

NOTE: For additional electronic fuel injection trouble shooting information, see the appropriate article in the ENGINE PERFORMANCE section (not all vehicles have Computer Engine Control articles). Information is provided there for diagnosing fuel system problems on vehicles with electronic fuel injection.

IGNITION SYSTEM TROUBLE SHOOTING

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Ignition Secondary Trouble shooting Chart

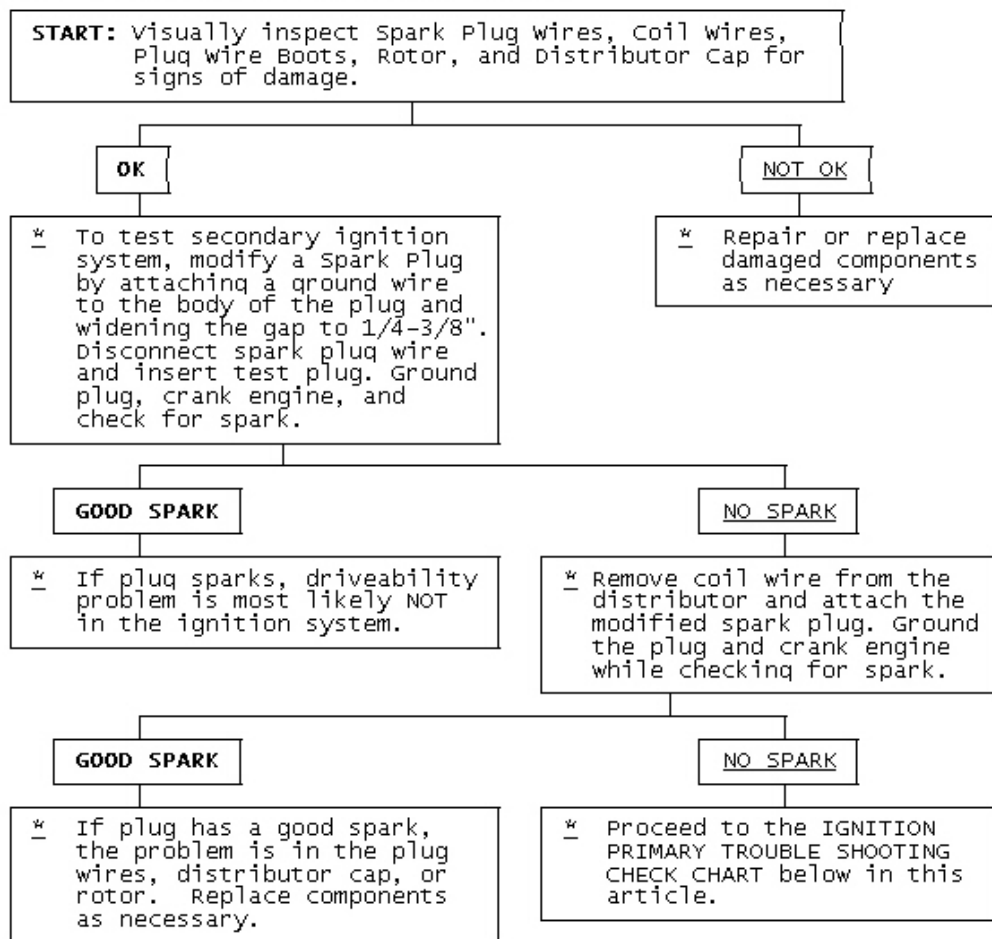


Fig. 3: Ignition Secondary Trouble Shooting Chart

Ignition Primary Trouble Shooting Chart

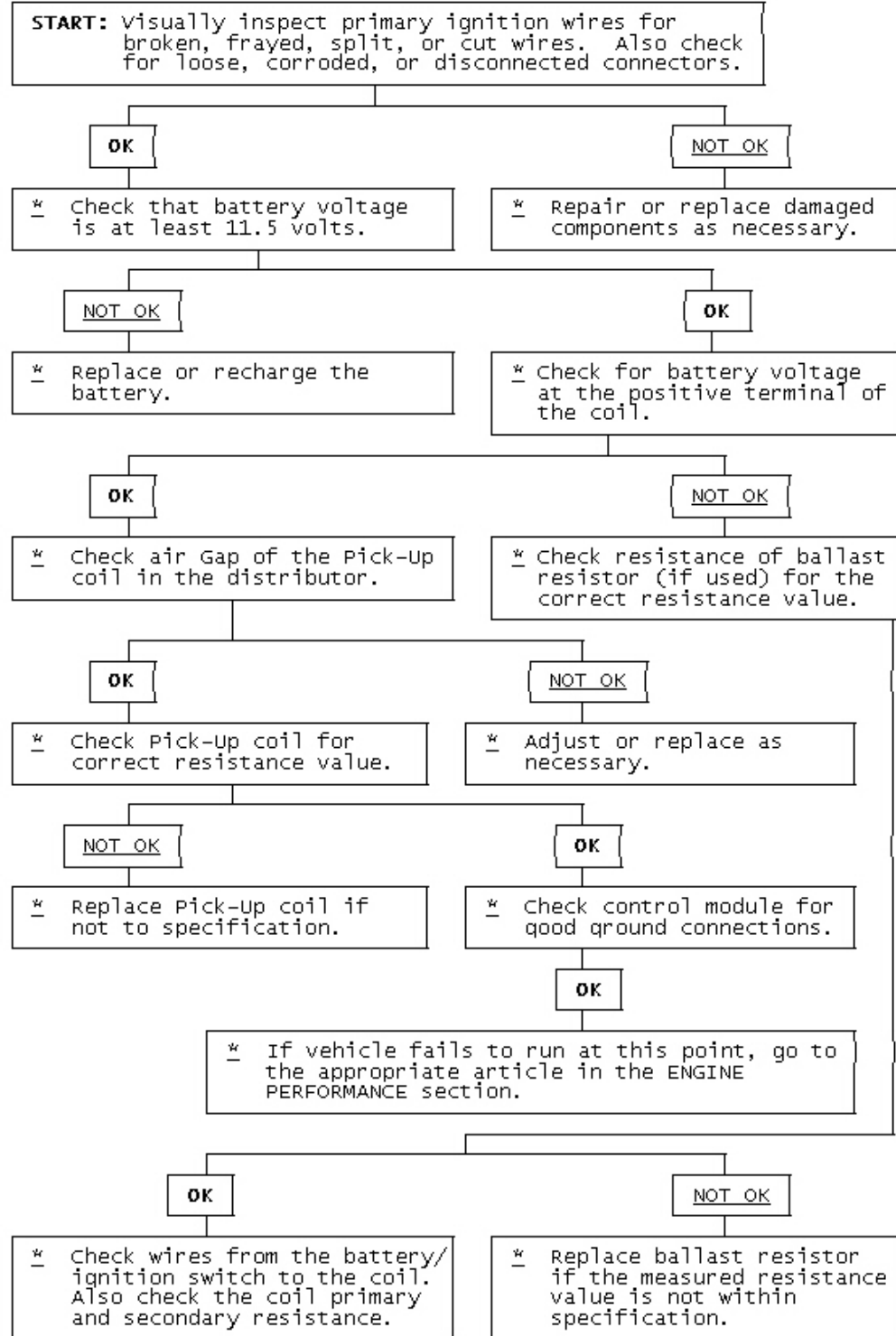


Fig. 4: Ignition Primary Trouble Shooting Chart**STARTER TROUBLE SHOOTING**

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BASIC STARTER TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Starter Fails to Operate	
Dead battery or bad connections between starter and battery	Check battery charge and all wires and connections to starter
Ignition switch faulty or misadjusted	Adjust or replace ignition switch
Open circuit between starter switch ignition terminal on starter relay	Check and repair wires and connections as necessary
Starter relay or starter defective	See Testing in STARTER article
Open solenoid pull-in wire	See Testing in STARTER article
Starter Does Not Operate and Headlights Dim	
Weak battery or dead cell	Charge or replace battery as necessary
Loose or corroded battery connections	Check that battery connections are clean and tight
Internal ground in starter windings	See Testing in STARTER article
Grounded starter fields	See Testing in STARTERS
Armature rubbing on pole shoes	See STARTER article
Starter Turns but Engine Does Not Rotate	
Starter clutch slipping	See STARTER article
Broken clutch housing	See STARTER article
Pinion shaft rusted or dry	See STARTER article
Engine basic timing incorrect	See Ignition Timing in TUNE-UP article
Broken teeth on engine flywheel	Replace flywheel and check for starter pinion gear damage
Starter Will Not Crank Engine	

Faulty overrunning clutch	See STARTER article
Broken clutch housing	See STARTER article
Broken flywheel teeth	Replace flywheel and check for starter pinion gear damage
Armature shaft sheared or reduction gear teeth stripped	See STARTER article
Weak battery	Charge or replace battery as necessary
Faulty solenoid	See On-Vehicle Tests in STARTER article
Poor grounds	Check all ground connections for tight and clean connections
Ignition switch faulty or misadjusted	Adjust or replace ignition switch as necessary
Starter Cranks Engine Slowly	
Battery weak or defective	Charge or replace battery as necessary
Engine overheated	See ENGINE COOLING SYSTEM article
Engine oil too heavy	Check that proper viscosity oil is used
Poor battery-to-starter connections	Check that all between battery and starter are clean and tight
Current draw too low or too high	See Bench Tests in STARTER article
Bent armature, loose pole shoes screws or worn bearings	See STARTER article
Burned solenoid contacts	Replace solenoid
Faulty starter	Replace starter
Starter Engages Engine Only Momentarily	
Engine timing too far advanced	See Ignition Timing in TUNE-UP article
Overrunning clutch not engaging properly	Replace overrunning clutch. See STARTER article
Broken starter clutch	See STARTER article
Broken teeth on engine flywheel	Replace flywheel and check starter pinion gear for damage
Weak drive assembly thrust spring	See STARTER article
Weak hold-in coil	See Bench Tests in STARTER article
Starter Drive Will Not Engage	

Defective point assembly	See Testing in STARTER article
Poor point assembly ground	See Testing in STARTER article
Defective pull-in coil	Replace starter solenoid
Starter Relay Does Not Close	
Dead battery	Charge or replace battery as necessary
Faulty wiring	Check all wiring and connections leading to relay
Neutral safety switch faulty	Replace neutral safety switch
Starter relay faulty	Replace starter relay
Starter Drive Will Not Disengage	
Starter motor loose on mountings	Tighten starter attach bolts
Worn drive end bushing	See STARTER article
Damaged engine flywheel teeth	Replace flywheel and starter pinion gear for damage
Drive yolk return spring broken or missing	Replace return spring
Faulty ignition switch	Replace ignition switch
Insufficient clearance between winding leads to solenoid terminal and main contact in solenoid	Replace starter solenoid
Starter clutch not disengaging	Replace starter clutch
Ignition starter switch contacts sticking	Replace ignition switch
Starter Relay Operates but Solenoid Does Not	
Faulty solenoid switch, switch connections or relay	Check all wiring between relay and solenoid or replace relay or solenoid as necessary
Broken lead or loose soldered connections	Repair wire or wire connections as necessary
Solenoid Plunger Vibrates When Switch is Engaged	
Weak battery	Charge or replace battery as necessary
Solenoid contacts corroded	Clean contacts or replace solenoid
Faulty wiring	Check all wiring leading to solenoid
Broken connections inside switch cover	Repair connections or replace solenoid
Open hold-in wire	Replace solenoid
Low Current Draw	
Worn brushes or weak	Replace brushes or brush springs as necessary
High Pitched Whine During Cranking Before Engine Fires but Engine Fires and Cranks Normally	

Distance too great between starter pinion and flywheel	Align starter or check that correct starter and flywheel are being used
High Pitched Whine After Engine Fires With Key released. Engine Fires and Cranks Normally	
Distance too small between starter pinion and flywheel	Flywheel runout contributes to the intermittent nature

TUNE-UP TROUBLE SHOOTING - GAS ENGINE VEHICLES

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BASIC SPARK PLUG TROUBLE SHOOTING CHARTS

CONDITION & POSSIBLE CAUSE	CORRECTION
Normal Spark Plug Condition	
Light Tan or Gray deposits	No Action
Electrode not burned or fouled	No Action
Gap tolerance not changed	No Action
Cold Fouling or Carbon Deposits	
Overrich air/fuel mixture	Adjust air/fuel mixture, see ENGINE PERFORMANCE section
Faulty choke	Replace choke assembly, see ENGINE PERFORMANCE section
Clogged air filter	Clean and/or replace air filter
Incorrect idle speed or dirty carburetor	Reset idle speed and/ or clean carburetor
Faulty ignition wires	Replace ignition wiring
Prolonged operation at idle	Shut engine off during long idle
Sticking valves or worn valve guide seals	Check valve train
Wet Fouling or Oil Deposits	
Worn rings and pistons	Install new rings and pistons
Excessive cylinder wear	Rebore or replace block
Excessive valve guide clearance	Worn or loose bearing
Gap Bridged	
Deposits in combustion chamber becoming fused to electrode	Clean combustion chamber of deposits
Blistered Electrode	

Engine overheating	Check cooling system
Wrong type of fuel	Replace with correct fuel
Loose spark plugs	Retighten spark plugs
Over-advanced ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Pre-Ignition or Melted Electrodes	
Incorrect type of fuel	Replace with correct fuel
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Burned valves	Replace valves
Engine Overheating	Check cooling system
Wrong type of spark plug, too hot	Replace with correct spark plug, see ENGINE PERFORMANCE
Chipped Insulators	
Severe detonation	Check for over-advanced timing or combustion
Improper gapping procedure	Re-gap spark plugs
Rust Colored Deposits	
Additives in unleaded fuel	Try different fuel brand
Water In Combustion Chamber	
Blown head gasket or cracked head	Repair or replace head or head gasket

NOTE: Before diagnosing an electronic ignition system, ensure that all wiring is connected properly between distributor, wiring connector and spark plugs. Ignition problem will show up either as: Engine Will Not Start or Engine Runs Rough.

BASIC ELECTRONIC IGNITION TROUBLE SHOOTING CHARTS

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Start	
Open circuit between distributor and bulkhead connector	Repair circuit
Open circuit between bulkhead connector and ignition switch	Repair circuit
Open circuit between ignition switch and starter solenoid	Repair circuit
Engine Runs Rough	
Fuel lines leaking or clogged	Tighten fitting, remove restriction
Initial timing incorrect	Reset ignition timing see ENGINE PERFORMANCE
Centrifugal advance malfunction	Repair distributor advance
Defective spark plugs or wiring	Replace plugs or plug wiring

Component Failure

Spark arc-over on cap, rotor or coil	Replace cap, rotor or or coil
Defective pick-up coil	Replace pick-up coil
Defective ignition coil	Replace ignition coil
Defective vacuum unit	Replace vacuum unit
Defective control module	Replace control module

BASIC ELECTRONIC IGNITION TROUBLE SHOOTING CHARTS - USING OSCILLOSCOPE PATTERNS

CONDITION & POSSIBLE CAUSE	CORRECTION
Firing Voltage Lines are the Same, but Abnormally High	
Retarded ignition timing	Reset ignition timing, see ENGINE PERFORMANCE section
Fuel mixture too lean	Readjust carburetor, see ENGINE PERFORMANCE
High resistance in coil wire	Replace coil wire
Corrosion in coil tower terminal	Clean and/or replace coil
Corrosion in distributor coil terminal	Clean and/or replace distributor cap
Firing Voltage Lines are the Same but Abnormally Low	
Fuel mixture too rich	Readjust carburetor, see ENGINE PERFORMANCE
Breaks in coil wire causing arcing	Replace coil wire
Cracked coil tower causing arcing	Replace coil
Low coil output	Replace coil
Low engine compression	Determine cause and repair
One or More, But Not All Firing Voltage Lines are Higher Than Others	
Carburetor idle mixture not balanced	Readjust carburetor, see ENGINE PERFORMANCE
EGR valve stuck open	Clean and/or replace valve
High resistance in spark plug wires	Replace spark plug wires
Cracked or broken spark plug insulator	Replace spark plugs
Intake vacuum leak	Repair leak
Defective spark plugs	Replace spark plugs
Corroded spark plug terminals	Replace spark plugs
One or More, But Not All Firing Voltage Lines Are Lower Than Others	
Curb idle mixture not balanced	Readjust carburetor, see ENGINE PERFORMANCE
Breaks in plug wires	Replace plug wires causing arcing
Cracked coil tower causing arcing	Replace coil

Low compression	Determine cause and repair
Defective spark plugs	Replace spark plugs
Corroded spark plugs	Replace spark plugs
Cylinders Not Firing	
Cracked distributor cap terminals	Replace distributor cap
Shorted spark plug wire	Determine cause and repair
Mechanical problem in engine	Determine cause and repair
Defective spark plugs	Replace spark plugs
Spark plugs fouled	Replace spark plugs

BASIC DRIVEABILITY PROBLEMS TROUBLE SHOOTING

CONDITION & POSSIBLE CAUSE	CORRECTION
Hard Starting	
Binding carburetor linkage	Eliminate binding
Binding choke linkage	Eliminate binding
Binding choke piston	Eliminate binding
Restricted choke vacuum	Check vacuum lines for blockage
Worn or dirty needle valve and seat	Clean carburetor, see ENGINE PERFORMANCE
Float sticking	Readjust or replace float see the ENGINE PERFORMANCE section
Incorrect choke adjustment	Reset choke adjustment see ENGINE PERFORMANCE
Defective coil	Replace coil
Improper spark plug gap	Regap spark plugs
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Detonation	
Over-advanced ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Defective spark plugs	Replace spark plugs
Fuel lines clogged	Clean fuel lines
EGR system malfunction	Check and repair EGR system
PCV system malfunction	Repair PCV system
Vacuum leaks	Check and repair vacuum system
Loose fan belts	Tighten or replace fan belts, see ENGINE PERFORMANCE
Restricted airflow	Remove restriction

Vacuum advance malfunction	Check distributor operation
Dieseling	
Binding carburetor linkage	Eliminate binding
Binding throttle linkage	Eliminate binding
Binding choke linkage or fast idle cam	Eliminate binding
Defective idle solenoid	Replace idle solenoid see ENGINE PERFORMANCE
Improper base idle speed	Reset idle speed, see ENGINE PERFORMANCE
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Incorrect idle mixture setting	Reset idle mixture, see ENGINE PERFORMANCE
Faulty Acceleration	
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Engine cold and choke too lean	Adjust choke and allow engine to warm-up
Defective spark plugs	Replace spark plugs
Defective coil	Replace coil
Faulty Low Speed Operation	
Clogged idle transfer slots	Clean idle transfer slots, see FUEL
Restricted idle air bleeds and passages	Disassemble and clean carburetor, see FUEL
Clogged air cleaner	Replace air filter
Defective spark plugs	Replace spark plugs
Defective ignition wires	Replace ignition wire see ENGINE PERFORMANCE
Defective distributor cap	Replace distributor cap
Faulty High Speed Operation	
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Defective distributor centrifugal advance	Replace advance mechanism
Defective distributor vacuum advance	Replace advance unit
Incorrect spark plugs or plug gap	Check gap and/or replace spark plugs
Faulty choke operation	Check choke and repair as required
Clogged vacuum passages	Remove restrictions
Improper size or clogged main jet	Check jet size and clean, see FUEL

Restricted air cleaner	Check filter and replace as necessary
Defective distributor cap, rotor or coil	Replace cap, rotor or coil
Misfire at All Speeds	
Defective spark plugs	Replace spark plugs
Defective spark plug wires	Replace spark plug wires
Defective distributor cap, rotor, or coil	Replace cap, rotor, or coil
Cracked or broken vacuum hoses	Replace vacuum hoses
Vacuum leaks	Repair vacuum leaks
Fuel lines clogged	Remove restriction
Hesitation	
Cracked or broken vacuum	Replace vacuum hoses hoses
Vacuum leaks	Repair Vacuum leaks
Binding carburetor linkage	Eliminate binding
Binding throttle linkage	Eliminate binding
Binding choke linkage or fast idle cam	Eliminate binding
Improper float setting	Readjust float setting, see FUEL
Cracked or broken ignition wires	Replace ignition wires
Rough Idle, Missing or Stalling	
Incorrect curb idle or fast idle speed	Reset idle speed, see ENGINE PERFORMANCE
Incorrect basic timing	Reset ignition timing see ENGINE PERFORMANCE
Improper idle mixture adjustment	Reset idle mixture, see ENGINE PERFORMANCE
Improper feedback system operation	Check feedback system see ENGINE PERFORMANCE
Incorrect spark plug gap	Reset spark plug gap, see ENGINE PERFORMANCE
Moisture in ignition components	Dry components
Loose or broken ignition wires	Replace ignition wires
Damaged distributor cap or or rotor	Replace distributor cap or rotor
Faulty ignition coil	Replace ignition coil
Fuel filter clogged or worn	Replace fuel filter
Damaged idle mixture screw	Replace idle mixture screw, see FUEL
Improper fast idle cam adjustment	Reset fast idle cam adjustment, see TUNE- see ENGINE PERFORMANCE
Improper EGR valve operation	Replace EGR valve

Faulty PCV valve air flow	Replace PCV valve
Choke binding or improper choke setting	Reset choke or eliminate binding
Vacuum leak	Repair vacuum leak
Improper float bowl fuel level	Reset float adjustment, see FUEL
Clogged air bleed or idle passages	Clean carburetor passages, see FUEL
Clogged or worn air cleaner filter	Replace air filter
Faulty choke vacuum diaphragm	Replace diaphragm, see ENGINE PERFORMANCE
Exhaust manifold heat valve inoperative	Replace heat valve
Improper distributor spark advance	Check distributor operation
Leaking valves or valve components	Check and repair valvetrain
Improper carburetor mounting	Remove and remount carburetor
Excessive play in distributor shaft	Replace distributor
Loose or corroded wiring connections	Repair or replace as required
Engine Surges	
Improper PCV valve airflow	Replace PCV valve
Vacuum leaks	Repair vacuum leaks
Clogged air bleeds	Remove restriction
EGR valve malfunction	Replace EGR valve
Restricted air cleaner filter	Replace air filter
Cracked or broken vacuum hoses	Replace vacuum hoses
Cracked or broken ignition wires	Replace ignition wires
Vacuum advance malfunction	Check unit and replace as necessary
Defective or fouled spark plugs	Replace spark plugs
Ping or Spark Knock	
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Distributor centrifugal or vacuum advance malfunction	Check operation and replace as necessary
Carburetor setting too lean	Readjust mixture setting, see ENGINE PERFORMANCE
Vacuum leak	Eliminate vacuum leak
EGR valve malfunction	Replace EGR valve
Poor Gasoline Mileage	
Cracked or broken vacuum	Replace vacuum hoses hoses
Vacuum leaks	Repair vacuum leaks
Defective ignition wires	Replace wires

Incorrect choke setting	Readjust setting, see ENGINE PERFORMANCE
Defective vacuum advance	Replace vacuum advance
Defective spark plugs	Replace spark plugs
Binding carburetor power piston	Eliminate binding
Dirt in carburetor jets	Clean and/or replace jets
Incorrect float adjustment	Readjust float setting, see FUEL
Defective power valve	Replace power valve, see ENGINE PERFORMANCE
Incorrect idle speed	Readjust idle speed
Engine Stalls	
Improper float level	Readjust float level
Leaking needle valve and seat	Replace needle valve and seat
Vacuum leaks	Eliminate vacuum leaks

VACUUM PUMP - DIESEL TROUBLE SHOOTING

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NOTE: Diesel engines mechanical diagnosis is the same as gasoline engines for items such as noisy valves, bearings, pistons, etc. The following trouble shooting covers only items pertaining to diesel engines.

VACUUM PUMP (DIESEL) TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Excessive Noise	
Loose pump-to-drive assembly screws	Tighten screws
Loose tube on pump assembly	Tighten tube
Valves not functioning properly	Replace valves
Oil Leakage	
Loose end plug	Tighten end plug
Bad seal crimp	Remove and re-crimp seal

MANUAL TRANSMISSION

MANUAL TRANSMISSION TROUBLE SHOOTING

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MANUAL TRANSMISSION/TRANSAXLE TROUBLE SHOOTING

Condition	Possible Cause
Noisy In Forward Gears	Low gear oil level, Loose bell housing bolts, Worn bearings or gears
Clunk On Deceleration (FWD Only)	Loose engine mounts, Worn inboard CV joints, Worn differential pinion shaft, Side gear hub counterbore in case worn oversize
Gear Clash When Shifting Forward Gears	Clutch Out Of Adjustment, Shift linkage damaged or out of adjustment, Gears or synchronizers damaged, Low gear oil level
Transmission Noisy When Moving (RWD Only) Quiet In Neutral With Clutch Engaged	Worn rear outputshaft bearing
Gear Rattle	Worn bearings, Wrong gear oil, Low gear oil, Worn gears
Steady Ticking At Idle (Increases With RPM)	Broken tooth on gear
Gear Clash When Shifting Forward Gears	Worn or broken synchronizers
Loud Whine In Reverse	Normal condition ⁽¹⁾
Noise When Stepping On Clutch	Bad release bearing, Worn pilot bearing
Ticking Or Screeching As Clutch Is Engaged	Faulty release bearing, Uneven pressure plate fingers
Click Or Snap When Clutch Is Engaged	Worn clutch fork, Worn or broken front bearing retainer
Transmission Shifts Hard	Clutch not releasing, Shift mechanism binding, Clutch installed backwards
Will Not Shift Into One Gear, Shifts Into All Others	Bent shift fork, Worn detent balls
Locked Into Gear, Cannot Shift	Clutch adjustment, Worn detent balls
Transmission Jumps Out Of Gear	Pilot bearing worn, Bent shift fork, Worn gear teeth or face, Excessive gear train end play, Worn synchronizers, Missing detent ball spring, Shift mechanism worn or out of adjustment, Engine or transmission mount bolts loose or out of adjustment, Transmission not aligned
Shift Lever Rattle	Worn shift lever or detents, Worn shift forks, Worn synchronizers sleeve
Shift Lever Hops Under Acceleration	Worn engine or transmission mounts
(1) Most units use spur cut gears in reverse and are noisy	

POWERTRAIN

CLUTCH TROUBLE SHOOTING

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BASIC CLUTCH TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Chattering or Grabbing	
Incorrect clutch adjustment	Adjust clutch
Oil, grease or glaze on facings	Disassemble and clean or replace
Loose "U" joint flange	See DRIVE AXLES article
Worn input shaft spline	Replace input shaft
Binding pressure plate	Replace pressure plate
Binding release lever	See CLUTCH article
Binding clutch disc hub	Replace clutch disc
Unequal pressure plate contact	Replace worn/misaligned components
Loose/bent clutch disc	Replace clutch disc
Incorrect transmission alignment	Realign transmission
Worn pressure plate, disc or flywheel	Replace damaged components
Broken or weak pressure springs	Replace pressure plate
Sticking clutch pedal	Lubricate clutch pedal & linkage
Incorrect clutch disc facing	Replace clutch disc
Engine loose in chassis	Tighten all mounting bolts
Failure to Release	
Oil or grease on clutch facings	Clean or replace clutch disc
Incorrect release lever or pedal adjustment	See CLUTCH article
Worn or broken clutch facings	Replace clutch disc
Bent clutch disc or pressure plate	Replace damaged components
Clutch disc hub binding on input shaft	Clean or replace clutch disc and/or input shaft
Binding pilot bearing	Replace pilot bearing
Sticking release bearing sleeve	Replace release bearing and/or sleeve
Binding clutch cable	See CLUTCH article
Defective clutch master	Replace master cylinder

Defective clutch slave	Replace slave cylinder
Air in hydraulic system	Bleed hydraulic system
Rattling	
Weak or broken release lever spring	Replace spring and check alignment
Damaged pressure plate	Replace pressure plate
Broken clutch return spring	Replace return spring
Worn splines on clutch disc or input shaft	Replace clutch disc and/or input shaft
Worn clutch release bearing	Replace release bearing
Dry or worn pilot bearing	Lubricate or replace pilot bearing
Unequal release lever contact	Align or replace release lever
Incorrect pedal free play	Adjust free play
Warped or damaged clutch disc	Replace damaged components
Slipping	
Pressure springs worn or	Release pressure plate
Oily, greasy or worn facings	Clean or replace clutch disc
Incorrect clutch alignment	Realign clutch assembly
Warped clutch disc or pressure plate	Replace damaged components
Binding release levers or clutch pedal	Lubricate and/or replace release components
Squeaking	
Worn or damaged release	Replace release bearing
Dry or worn pilot or release bearing	Lubricate or replace assembly
Pilot bearing turning in crankshaft	Replace pilot bearing and/or crankshaft
Worn input shaft bearing	Replace bearing and seal
Incorrect transmission alignment	Realign transmission
Dry release fork between pivot	Lubricate release fork and pivot
Heavy and/or Stiff Pedal	
Sticking release bearing sleeve	Replace release bearing and/or sleeve
Dry or binding clutch pedal hub	Lubricate and align components
Floor mat interference with pedal	Lay mat flat in proper area
Dry or binding ball/fork pivots	Lubricate and align components
Faulty clutch cable	Replace clutch cable
Noisy Clutch Pedal	
Faulty interlock switch	Replace interlock switch
Self-adjuster ratchet noise	Lubricate or replace self-adjuster
Speed control interlock switch	Lubricate or replace interlock switch

Clutch Pedal Sticks Down

Binding clutch cable	See CLUTCH article
Springs weak in pressure plate	Replace pressure plate
Binding in clutch linkage	Lubricate and free linkage

Noisy

Dry release bearing	Lubricate or replace release bearing
Dry or worn pilot bearing	Lubricate or replace bearing
Worn input shaft bearing	Replace bearing

Transmission Click

Weak springs in pressure	Replace pressure plate plate
Release fork loose on ball stud	Replace release fork and/or ball stud
Oil on clutch disc damper	Replace clutch disc
Broken spring in slave cylinder	Replace slave cylinder

DRIVE AXLE - NOISE DIAGNOSIS**Unrelated Noises**

Some driveline trouble symptoms are also common to the engine, transmission, wheel bearings, tires, and other parts of the vehicle. Ensure cause of trouble actually is in the drive axle before adjusting, repairing, or replacing any of its parts.

Non-Drive Axle Noises

A few conditions can sound just like drive axle noise and have to be considered in pre-diagnosis. The 4 most common noises are exhaust, tires, CV/universal joints and wheel trim rings.

In certain conditions, the pitch of the exhaust gases may e gear whine. At other times, it may be mistaken for a wheel bearing rumble.

Tires, especially radial and snow, can have a high-pitched tread whine or roar, similar to gear noise. Also, some non-standard tires with an unusual tread construction may emit a roar or whine.

Defective CV/universal joints may cause clicking noises or excessive driveline play that can be improperly diagnosed as drive axle problems.

Trim and moldings also can cause a whistling or whining noise. Ensure none of these components are causing the noise before disassembling the drive axle.

Gear Noise

A "howling" or "whining" noise from the ring and pinion gear can be caused by an improper gear pattern, gear damage, or improper bearing preload. It can occur at various speeds and driving conditions, or it can be

continuous.

Before disassembling axle to diagnose and correct gear ke sure that tires, exhaust, and vehicle trim have been checked as possible causes.

Chuckle

This is a particular rattling noise that sounds like a stick against the spokes of a spinning bicycle wheel. It occurs while decelerating from 40 MPH and usually can be heard until vehicle comes to a complete stop. The frequency varies with the speed of the vehicle.

A chuckle that occurs on the driving phase is usually caused ive clearance due to differential gear wear, or by a damaged tooth on the coast side of the pinion or ring gear. Even a very small tooth nick or a ridge on the edge of a gear tooth is enough the cause the noise.

This condition can be corrected simply by cleaning the gear tooth nick or ridge with a small grinding wheel. If either gear is damaged or scored badly, the gear set must be replaced. If metal has broken loose, the carrier and housing must be cleaned to remove particles that could cause damage.

Knock

This is very similar to a chuckle, though it may be louder, and occur on acceleration or deceleration. Knock can be caused by a gear tooth that is damaged on the drive side of the ring and pinion gears. Ring gear bolts that are hitting the carrier casting can cause knock. Knock can also be due to excessive end play in the axle shafts.

Clunk

Clunk is a metallic noise heard when an automatic transmission is engaged in Reverse or Drive, or when throttle is applied or released. It is caused by backlash somewhere in the driveline, but not necessarily in the axle. To determine whether driveline clunk is caused by the axle, check the total axle backlash as follows:

1. Raise vehicle on a frame or twinpost hoist so that drive wheels are free. Clamp a bar between axle companion flange and a part of the frame or body so that flange cannot move.
2. On conventional drive axles, lock the left wheel to keep it from turning. On all models, turn the right wheel slowly until it is felt to be in Drive condition. Hold a chalk marker on side of tire about 12" from center of wheel. Turn wheel in the opposite direction until it is again felt to be in Drive condition.
3. Measure the length of the chalk mark, which is the total axle backlash. If backlash is one inch or less, drive axle is not the source of clunk noise.

Bearing Whine

Bearing whine is a high-pitched sound similar to a whistle. It is usually caused by malfunctioning pinion bearings. Pinion bearings operate at drive shaft speed. Roller wheel bearings may whine in a similar manner if they run completely dry of lubricant. Bearing noise will occur at all driving speeds. This distinguishes it from gear whine, which usually comes and goes as speed changes.

Bearing Rumble

Bearing rumble sounds like marbles being tumbled. It is usually caused by a malfunctioning wheel bearing. The lower pitch is because the wheel bearing turns at only about 1/3 of drive shaft speed.

Chatter On Turns

This is a condition where the entire front or rear of vehicle vibrates when vehicle is moving. The vibration is plainly felt as well as heard. Extra differential thrust washers installed during axle repair can cause a condition of partial lock-up that creates this chatter.

Axle Shaft Noise

Axle shaft noise is similar to gear noise and pinion bearing whine. Axle shaft bearing noise will normally distinguish itself from gear noise by occurring in all driving modes (Drive, cruise, coast and float), and will persist with transmission in Neutral while vehicle is moving at problem speed.

If vehicle displays this noise condition, remove suspect parts, replace wheel seals and install a new set of bearings. Re-evaluate vehicle for noise before removing any internal components.

Vibration

Vibration is a high-frequency trembling, shaking or grinding condition (felt or heard) that may be constant or variable in level and can occur during the total operating speed range of the vehicle.

The types of vibrations that can be felt in the vehicle can be divided into 3 main groups:

- z Vibrations of various unbalanced rotating parts of the vehicle.
- z Resonance vibrations of the body and frame structures caused by rotating of unbalanced parts.
- z Tip-in moans of resonance vibrations from stressed engine or exhaust system mounts or driveline flexing modes.

DRIVE AXLE - RWD TROUBLE SHOOTING

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DRIVE AXLE (RWD) TROUBLE SHOOTING

CONDITION & POSSIBLE CAUSE	CORRECTION
Knocking or Clunking	
Differential Side Gear Clearance	Check Clearance
Worn Pinion Shaft	Replace Pinion Shaft

Axle Shaft End Play	Check End Play
Missing Gear Teeth	Check Differential/Replace Gear
Wrong Axle Backlash	Check Backlash
Misaligned Driveline	Realign Driveline
Clinking During Engagement	
Side Gear Clearance	Check Clearance
Ring and Pinion Backlash	Check Backlash
Worn/Loose Pinion Shaft	Replace Shaft/Bearing
Bad "U" Joint	Replace "U" Joint
Sticking Slip Yoke	Lube Slip Yoke
Broken Rear Axle Mount	Replace Mount
Loose Drive Shaft Flange	Check Flange
Click/Chatter On Turns	
Differential Side Gear Clearance	Check Clearance
Wrong Turn On Plates ⁽¹⁾	Replace Clutch Plates
Wrong Differential Lubricant ⁽¹⁾	Change Lubricant
Knock Or Click	
Flat Spot on Rear Wheel Bearing	Replace Wheel Bearing
Low Vibration At All Speeds	
Faulty Wheel Bearing	Replace Wheel Bearing
Faulty "U" Joint	Replace "U" Joint
Faulty Drive Shaft	Balance Drive Shaft
Faulty Companion Flange	Replace Flange
Faulty Slip Yoke Flange	Replace Flange
(1) Limited slip differential only.	

FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING

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BASIC FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING CHART

CONDITION	POSSIBLE CAUSE
Grease Leaks	CV boot torn or cracked
Clicking Noise on Cornering	Damaged outer CV
Clunk Noise on Acceleration	Damaged inner CV
Vibration or Shudder on Acceleration	Sticking, damaged or worn CV Misalignment or

spring height

STEERING & SUSPENSION

MANUAL STEERING GEAR TROUBLE SHOOTING

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BASIC MANUAL STEERING GEAR TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Rattle or Chucking Noise in Rack and Pinion	
Rack and pinion mounting bracket loose	Tighten all mounting bolts
Lack of/or incorrect lubricant	Correct as necessary
Steering gear mounting bolts loose	Tighten all mounting bolts
Excessive Play	
Front wheel bearing improperly adjusted	See FRONT SUSPENSION article
Loose or worn steering linkage	See STEERING LINKAGE article
Loose or worn steering gear shift	See MANUAL STEERING GEAR article
Steering arm loose on gear shaft	See MANUAL STEERING GEAR article
Steering gear housing bolts loose	Tighten all mounting bolts
Steering gear adjustment too loose	See MANUAL STEERING GEAR article
Steering arms loose on knuckles	Tighten and check steering linkage
Rack and pinion mounting loose	Tighten all mounting bolts
Rack and pinion out of adjustment	See adjustment in STEERING article
Tie rod end loose	Tighten and check steering linkage
Excessive Pitman shaft-to-ball nut lash	Repair as necessary
Poor Returnability	
Lack of lubricant in ball joint or linkage	Lubricate and service systems
Binding in linkage or ball joints	See STEERING LINKAGE and SUSPENSION article
Improper front end alignment	See WHEEL ALIGNMENT

	article
Improper tire pressure	Inflate to proper pressure
Tie rod binding	Inflate to proper pressure
Shaft seal rubbing shaft	See STEERING COLUMN article
Excessive Vertical Motion	
Improper tire pressure	Inflate to proper pressure
Tires, wheels or rotors out of balance	Balance tires then check wheels and rotors
Worn or faulty shock absorbers	Check and replace if necessary
Loose tie rod ends or steering	Tighten or replace if necessary
Loose or worn wheel bearings	See SUSPENSION article
Steering Pulls to One Side	
Improper tire pressure	Inflate to proper pressure
Front tires are different sizes	Rotate or replace if necessary
Wheel bearings not adjusted properly	See FRONT SUSPENSION article
Bent or broken suspension components	See FRONT SUSPENSION article
Improper wheel alignment	See WHEEL ALIGNMENT article
Brakes dragging	See BRAKES article
Instability	
Low or uneven tire pressure	Inflate to proper pressure
Loose or worn wheel bearings	See FRONT SUSPENSION article
Loose or worn idler arm bushing	See FRONT SUSPENSION article
Loose or worn strut bushings	See FRONT SUSPENSION article
Incorrect front wheel alignment	See WHEEL ALIGNMENT article
Steering gear not centered	See MANUAL STEERING GEARS article
Springs or shock	Check and replace if necessary
Improper cross shaft	See MANUAL STEERING GEARS article

POWER STEERING TROUBLE SHOOTING

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symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC POWER STEERING TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Rattle or Chucking Noise	
Pressure hoses touching engine parts	Adjust to proper clearance
Loose Pitman shaft	Adjust or replace if necessary
Tie rods ends or Pitman arm loose	Tighten and check system
Rack and pinion mounts loose	Tighten all mounting bolts
Free play in worm gear	See POWER STEERING GEAR article
Loose sector shaft or thrust bearing adjustment	See POWER STEERING GEAR
Free play in pot coupling	See STEERING COLUMN article
Worn shaft serrations	See STEERING COLUMN article
Growl in Steering Pump	
Excessive pressure in hoses	Restricted hoses, see POWER STEERING GEAR article
Scored pressure plates	See POWER STEERING GEAR article
Scored thrust plates or rotor	See POWER STEERING GEAR article
Extreme wear of cam ring	See POWER STEERING GEAR article
Rattle in Steering Pump	
Vanes not installed	See POWER STEERING PUMP article
Vanes sticking in rotor	See POWER STEERING PUMP article
Swish noise in Pump	
Defective flow control valve	See POWER STEERING PUMP article
Groan in Steering Pump	
Air in fluid	See POWER STEERING PUMP article
Poor pressure hose connection	Tighten and check, replace if necessary
Squawk When Turning	
Damper "O" ring on valve spool cut	See POWER STEERING PUMP article

Moan or Whine in Pump

Pump shaft bearing scored	Replace bearing and fluid
Air in fluid or fluid level low	See POWER STEERING PUMP article
Hose or column grounded	Check and replace if necessary
Cover "O" ring missing or damaged	See POWER STEERING PUMP article
Valve cover baffle missing or damaged	See POWER STEERING PUMP article
Interference of components in pump	See POWER STEERING PUMP article
Loose or poor bracket alignment	Correct or replace if necessary

Hissing When Parking

Internal leakage in steering gear	Check valved assembly first
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Chirp in Steering Pump

Loose or worn power steering belt	Adjust or replace if necessary
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Buzzing When Not Steering

Noisy pump	See POWER STEERING PUMP article
Free play in steering shaft bearing	See STEERING COLUMN article
Bearing loose on shaft serrations	See STEERING COLUMN article

Clicking Noise in Pump

Pump slippers too long	See POWER STEERING PUMP article
Broken slipper springs	See POWER STEERING PUMP article
Excessive wear or nicked rotors	See POWER STEERING PUMP article
Damaged cam contour	See POWER STEERING PUMP article

Poor Return of Wheel

Wheel rubbing against turn signal	See STEERING COLUMN SWITCHES article
Flange rubbing steering gear adjuster	See STEERING COLUMN article
Tight or frozen steering shaft bearing	See STEERING COLUMN article
Steering gear out of adjustment	See POWER STEERING GEAR article
Sticking or plugged spool valve	See POWER STEERING

	PUMP article
Improper front end alignment	See WHEEL ALIGNMENT article
Wheel bearings worn or loose	See FRONT SUSPENSION article
Ties rods or ball joints binding	Check and replace if necessary
Intermediate shaft joints binding	See STEERING COLUMN article
Kinked pressure hoses	Correct or replace if necessary
Loose housing head spanner nut	See POWER STEERING GEAR article
Damaged valve lever	See POWER STEERING GEAR article
Sector shaft adjusted too tight	See ADJUSTMENTS in POWER STEERING GEAR article
Worm thrust bearing adjusted too tight	See ADJUSTMENTS in POWER STEERING GEAR article
Reaction ring sticking in cylinder	See POWER STEERING GEAR article
Reaction ring sticking in housing head	See POWER STEERING GEAR article
Steering pump internal leakage	See POWER STEERING PUMP article
Steering gear-to-column misalignment	See STEERING COLUMN article
Lack of lubrication in linkage	Service front suspension
Lack of lubrication in ball joints	Service front suspension
Increased Effort When Turning Wheel Fast Foaming, Milky Power Steering Fluid, Low Fluid Level or Low Pressure	
High internal pump leakage	See POWER STEERING PUMP article
Power steering pump belt slipping	Adjust or replace if necessary
Low fluid level	Check and fill to proper level
Engine idle speed too low	Adjust to correct setting
Air in pump fluid system	See POWER STEERING PUMP article
Pump output low	See POWER STEERING PUMP article
Steering gear malfunctioning	See POWER STEERING GEAR article

Wheel Surges or Jerks

Low fluid level	Check and fill to proper level
Loose fan belt	Adjust or replace if necessary
Insufficient pump pressure	See POWER STEERING PUMP article
Sticky flow control valve	See POWER STEERING PUMP article
Linkage hitting oil pan at full turn	Replace bent components

Kick Back or Free Play

Air in pump fluid system	See POWER STEERING PUMP article
Worn poppet valve in steering gear	See POWER STEERING PUMP article
Excessive over center lash	See POWER STEERING GEAR article
Thrust bearing out of adjustment	See POWER STEERING GEAR article
Free play in pot coupling	See POWER STEERING PUMP article
Steering gear coupling loose on shaft	See POWER STEERING PUMP article
Steering disc mounting bolts loose	Tighten or replace if necessary
Coupling loose on worm shaft	Tighten or replace if necessary
Improper sector shaft adjustment	See POWER STEERING GEAR article
Excessive worm piston side play	See POWER STEERING GEAR article
Damaged valve lever	See POWER STEERING GEAR article
Universal joint loose	Tighten or replace if necessary
Defective rotary valve	See POWER STEERING GEAR article

No Power When Parking

Sticking flow control valve	See POWER STEERING PUMP article
Insufficient pump pressure output	See POWER STEERING PUMP article
Excessive internal pump leakage	See POWER STEERING PUMP article
Excessive internal gear leakage	See POWER STEERING

	PUMP article
Flange rubs against gear adjust plug	See STEERING COLUMN article
Loose pump belt	Adjust or replace if necessary
Low fluid level	Check and add proper amount of fluid
Engine idle too low	Adjust to correct setting
Steering gear-to-column misaligned	See STEERING COLUMN article
No Power, Left Turn	
Left turn reaction seal "O" ring worn	See POWER STEERING GEAR article
Left turn reaction seal damaged/missing	See POWER STEERING GEAR article
Cylinder head "O" ring damaged	See POWER STEERING PUMP article
No Power, Right Turns	
Column pot coupling bottomed	See STEERING COLUMN article
Right turn reaction seal "O" ring worn	See POWER STEERING GEAR article
Right turn reaction seal damaged	See POWER STEERING GEAR article
Internal leakage through piston end plug	See POWER STEERING GEAR article
Internal leakage through side plugs	See POWER STEERING GEAR article
Lack of Effort in Turning	
Left and/or right reaction seal sticking in cylinder head	Replace, see POWER STEERING GEAR article
Wanders to One Side	
Front end alignment incorrect	See WHEEL ALIGNMENT article
Unbalanced steering gear valve	See POWER STEERING GEAR article
Low Pressure Due to Steering Pump	
Flow control valve stuck or inoperative	See POWER STEERING PUMP article
Pressure plate not flat against cam ring	See POWER STEERING PUMP article
Extreme wear of cam ring	Replace and check adjustments
Scored plate, thrust plate or rotor	See POWER STEERING

	PUMP article
Vanes not installed properly	See POWER STEERING PUMP article
Vanes sticking in rotor slots	See POWER STEERING PUMP article
Cracked/broken thrust or pressure plate	See POWER STEERING PUMP article

STEERING COLUMN TROUBLE SHOOTING

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BASIC STEERING COLUMN TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Noise in Steering	
Coupling pulled apart	See STEERING COLUMNS article
Column not correctly aligned	See STEERING COLUMNS article
Broken lower joint	Replace joint
Horn contact ring not	See STEERING COLUMN article
Bearing not lubricated	See STEERING COLUMN article
Shaft snap ring not properly seated	Reseat or replace snap ring
Plastic spherical joint not lubricated	See STEERING COLUMN article
Shroud or housing loose	Tighten holding screws
Lock plate retaining ring not seated	See STEERING COLUMN article
Loose sight shield	Tighten holding screws
High Steering Shaft Effort	
Column assembly misaligned	See STEERING COLUMN article
Improperly installed dust shield	Adjust or replace
Tight steering universal joint	See STEERING COLUMN article
High Shift Effort	
Column is out of alignment	See STEERING COLUMN

	article
Improperly installed dust shield	Adjust or replace
Seals or bearings not lubricated	See STEERING COLUMNS article
Mounting bracket screws too long	Replace with new shorter screws
Burrs on shift tube	Remove burrs or replace tube
Lower bowl bearing assembled wrong	See STEERING COLUMN article
Shift tube bent or broken	Replace as necessary
Improper adjustment of shift levers	See STEERING COLUMN article
Improper Trans. Shifting	
Sheared shift tube joint	Replace as necessary
Sheared lower shaft lever	Replace as necessary
Improper shift lever adjustment	See STEERING COLUMN article
Improper gate plate adjustment	See STEERING COLUMN article
Excess Play in Column	
Instrument panel bracket bolts loose	Tighten bolts and check bracket
Broken weld nut on jacket	See STEERING COLUMN article
Instrument bracket capsule sheared	See STEERING COLUMN article
Column bracket/jacket bolts loose	Tighten bolts and check bracket
Steering Locks in Gear	
Release lever mechanism	See STEERING COLUMN article

SUSPENSION TROUBLE SHOOTING

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BASIC SUSPENSION TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Front End Noise	

Loose or worn wheel	See Wheel Bearing Adjustment in SUSPENSION
Worn shocks or shock mountings	Replace struts or strut mountings
Worn struts or strut mountings	Replace struts or strut mountings
Loose or worn lower control arm	See SUSPENSION
Loose steering gear-to-frame bolts	See STEERING
Worn control arm bushings	See SUSPENSION
Ball joints not lubricated	Lubricate ball joints & see Ball Joint Checking in SUSPENSION
Front Wheel Shake, Shimmy, or Vibration	
Tires or wheels out of balance	Check tire balance
Incorrect wheel alignment	See WHEEL ALIGNMENT
Drive shaft unbalanced	Check drive shaft balance
Loose or worn wheel bearings	See WHEEL ALIGNMENT
Loose or worn tie rod ends	See SUSPENSION
Worn upper ball joints	See Ball Joint Checking in SUSPENSION
Worn shock absorbers	Replace shock absorbers
Worn strut bushings	Replace strut bushings
Car Pulls to One Side	
Mismatched or uneven tires	Check tire condition
Broken or sagging springs	See SUSPENSION
Loose or worn strut bushings	See SUSPENSION
Improper wheel alignment	See WHEEL ALIGNMENT
Improper rear axle alignment	Check rear axle alignment
Power steering gear unbalanced	See STEERING
Front brakes dragging	See BRAKES
Abnormal Tire Wear	
Unbalanced tires	Check tire balance & rotation
Sagging or broken springs	See SUSPENSION
Incorrect front end alignment	See WHEEL ALIGNMENT
Faulty shock absorbers	Replace shock absorbers
Scuffed Tires	
Toe-In incorrect	See WHEEL ALIGNMENT
Suspension arm bent or twisted	See appropriate SUSPENSION article
Springs Bottom or Sag	
Bent or broken springs	See SUSPENSION
Leaking or worn shock absorbers	Replace shock absorbers

Frame misalignment	Check frame for damage
Spring Noises	
Loose "U" Bolts	See SUSPENSION
Loose or worn bushings	See SUSPENSION
Worn or missing interliners	See SUSPENSION
Shock Absorber Noise	
Loose shock mountings	Check & tighten mountings
Worn bushings	Replace bushings
Air in system	Bleed air from system
Undercoating on shocks	Remove undercoating
Car Leans or Sways on Corners	
Loose stabilizer bar	See SUSPENSION
Faulty shocks or mountings	Replace shocks or mountings
Broken or sagging springs	See SUSPENSION
Shock Absorbers Leaking	
Worn seals or reservoir tube crimped	See SUSPENSION
Broken Springs	
Loose "U" bolts	See SUSPENSION
Inoperative shock absorbers	Replace shock absorbers

WHEEL ALIGNMENT TROUBLE SHOOTING

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BASIC WHEEL ALIGNMENT TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Premature Tire Wear	
Improper tire inflation	Check tire pressure
Front alignment out of tolerance	See ALIGNMENT SPECS in WHEEL ALIGNMENT section
Suspension components worn	See SUSPENSION section
Steering system components worn	See STEERING section
Improper standing height	See WHEEL ALIGNMENT
Uneven or sagging springs	See SUSPENSION section
Bent wheel	See WHEEL ALIGNMENT
Improper torsion bar adjustment	See SUSPENSION section
Loose or worn wheel bearings	See WHEEL BEARING ADJ.

	in SUSPENSION section
Worn or defective shock	Replace shock absorbers
Tires out of balance	Check tire balance
Pulls to One Side	
Improper tire inflation	Check tire pressure
Brake dragging	See BRAKE section
Mismatched tires	See WHEEL ALIGNMENT
Broken or sagging spring	See SUSPENSION section
Broken torsion bar	See SUSPENSION section
Power steering valve not centered	See STEERING section
Front alignment out of tolerance	See WHEEL ALIGNMENT section
Defective wheel bearing	See WHEEL BEARINGS in SUSPENSION section
Uneven sway bar links	See SUSPENSION section
Frame bent	Check for frame damage
Steering system bushing worn	See STEERING section
Hard Steering	
Idler arm bushing too tight	See STEERING LINKAGE in STEERING section
Ball joint tight or seized	See SUSPENSION section
Steering linkage too tight	See STEERING LINKAGE in STEERING section
Power steering fluid low	Add proper amount of fluid
Power steering drive belt loose	See STEERING section
Power steering pump defective	See STEERING section
Steering gear out of adjustment	See STEERING section
Incorrect wheel alignment	See WHEEL ALIGNMENT
Damaged steering gear	See STEERING section
Damaged suspension	See SUSPENSION section
Bent steering knuckle or supports	See SUSPENSION section
Vehicle "Wanders"	
Strut rod or control arm bushing worn	See SUSPENSION section
Loose or worn wheel bearings	See WHEEL BEARINGS in SUSPENSION section
Improper tire inflation	Check tire pressure
Stabilizer bar missing or defective	See SUSPENSION section
Wheel alignment out of tolerance	See Adjustment in WHEEL ALIGNMENT section
Broken spring	See SUSPENSION section
Defective shock absorber	Replace shock absorbers

Worn steering & suspension components	See SUSPENSION section
Front End Shimmy	
Tire out of balance/round	Check tire balance
Excessive wheel runout	See WHEEL ALIGNMENT
Insufficient or improper caster	See WHEEL ALIGNMENT section
Worn suspension or steering components	See SUSPENSION section
Defective shock absorbers	Replace shock absorber
Wheel bearings worn or loose	See WHEEL BEARING ADJ. in SUSPENSION section
Power steering reaction Bracket loose	See STEERING section
Steering gear box (rack) mounting loose	See STEERING section
Steering gear adjustment loose	See STEERING section
Worn spherical joints	See SUSPENSION section
Toe-In Not Adjustable	
Lower control arm bent	See SUSPENSION section
Frame bent	Check frame for damage
Camber Not Adjustable	
Control arm bent	See SUSPENSION section
Frame bent	Check frame for damage
Hub & bearing not seated properly	See SUSPENSION section

GENERAL INFORMATION**Wheel Alignment Theory & Operation***** PLEASE READ THIS FIRST ***

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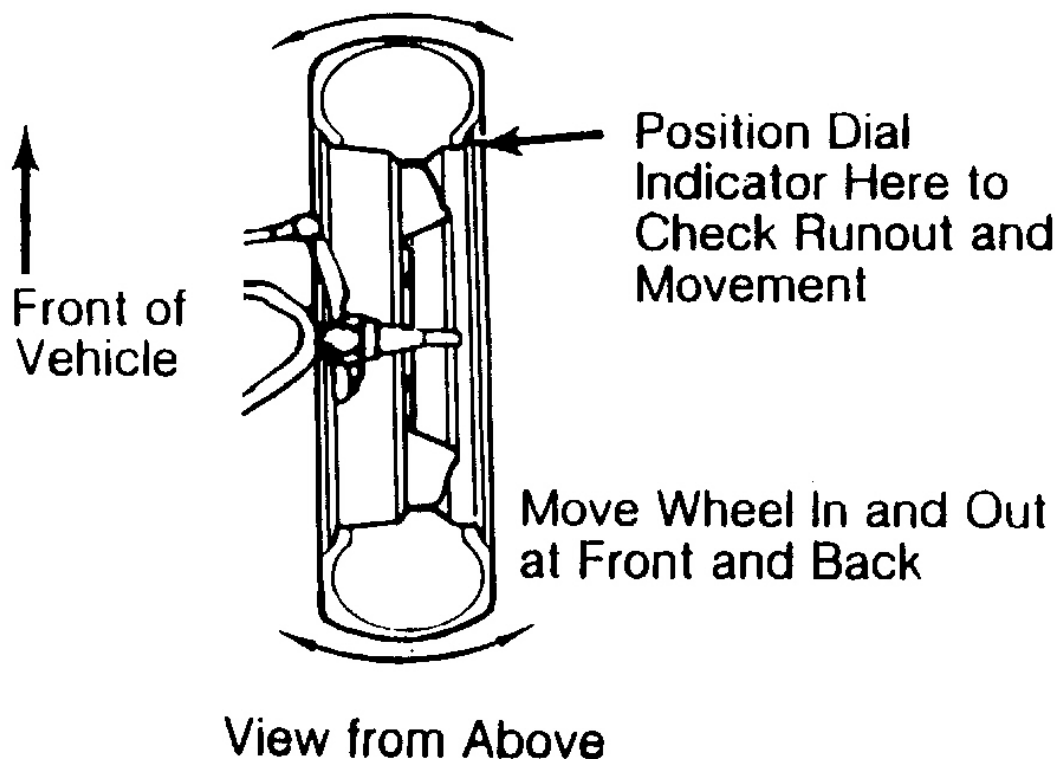
PRE-ALIGNMENT INSTRUCTIONS

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GENERAL ALIGNMENT CHECKS

Before adjusting wheel alignment, check the following:

- z Each axle uses tires of same construction and tread style, equal in tread wear and overall diameter. Verify that radial and axial runout is not excessive. Inflation should be at manufacturer's specifications.
- z Steering linkage and suspension must not have excessive play. Check for wear in tie rod ends and ball joints. Springs must not be sagging. Control arm and strut rod bushings must not have excessive play. See **Fig. 1**.



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Fig. 1: Checking Steering Linkage

- z Vehicle must be on level floor with full fuel tank, no passenger load, spare tire in place and no load in trunk. Bounce front and rear end of vehicle several times. Confirm vehicle is at normal riding height.
- z Steering wheel must be centered with wheels in straight ahead position. If required, shorten one tie rod adjusting sleeve and lengthen opposite sleeve (equal amount of turns). See **Fig. 2**.
- z Wheel bearings should have the correct preload and lug nuts must be tightened to manufacturer's specifications. Adjust camber, caster and toe-in using this sequence. Follow instructions of the alignment equipment manufacturer.

CAUTION: DO NOT attempt to correct alignment by straightening parts. Damaged parts MUST be replaced.

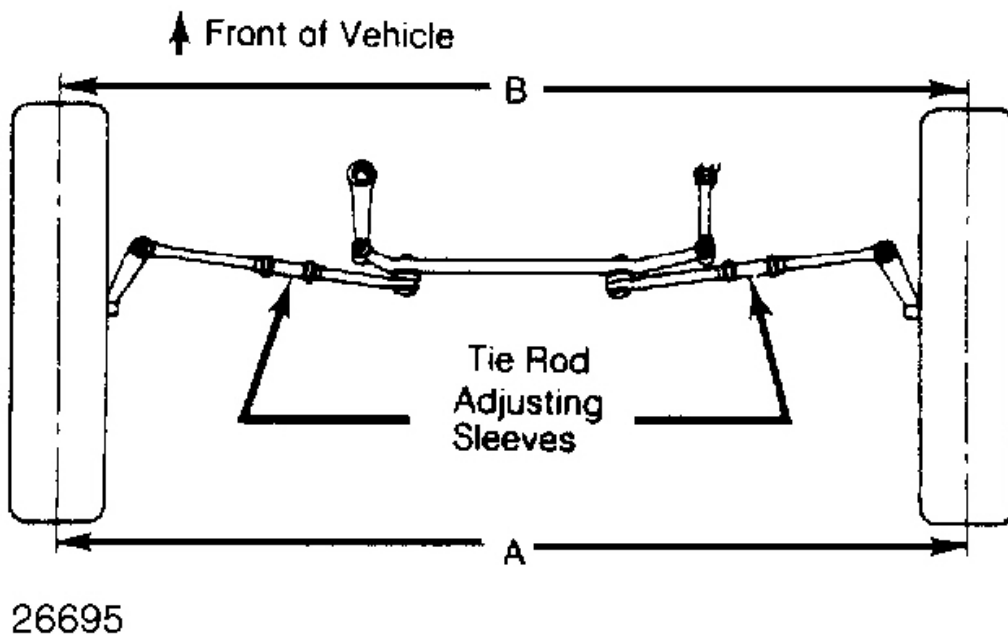


Fig. 2: Adjusting Tie Rod Sleeves (Top View)

ADJUSTMENTS

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CAMBER

1. Camber is the tilting of the wheel, outward at either top or bottom, as viewed from front of vehicle. See **Fig. 3**.
2. When wheels tilt outward at the top (from centerline of vehicle), camber is positive. When wheels tilt inward at top, camber is negative. Amount of tilt is measured in degrees from vertical.

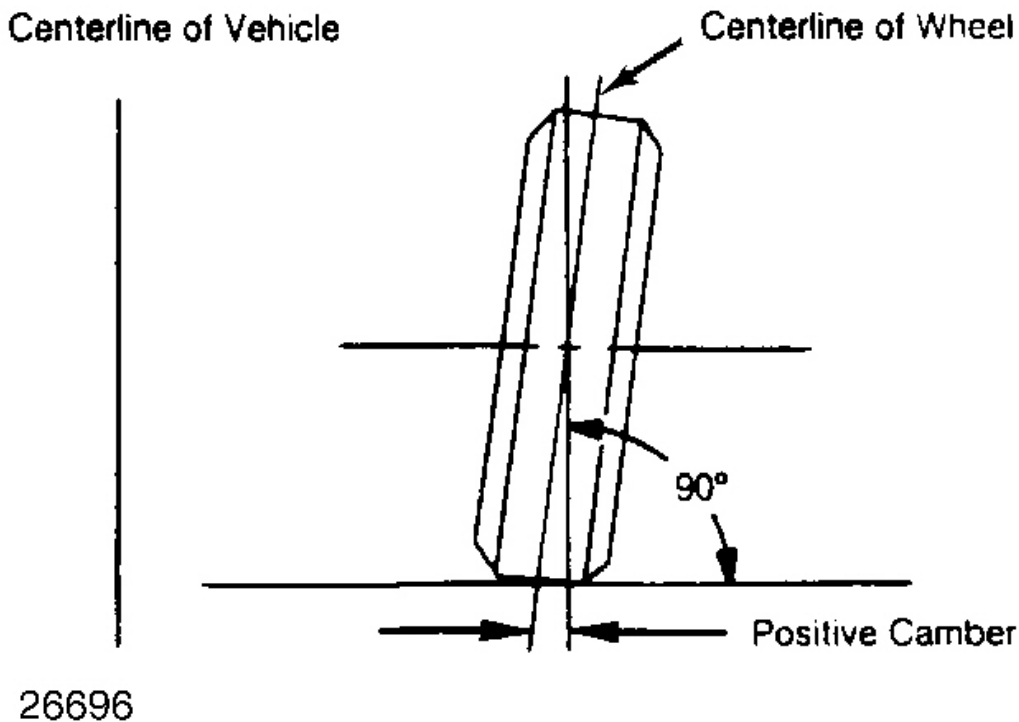
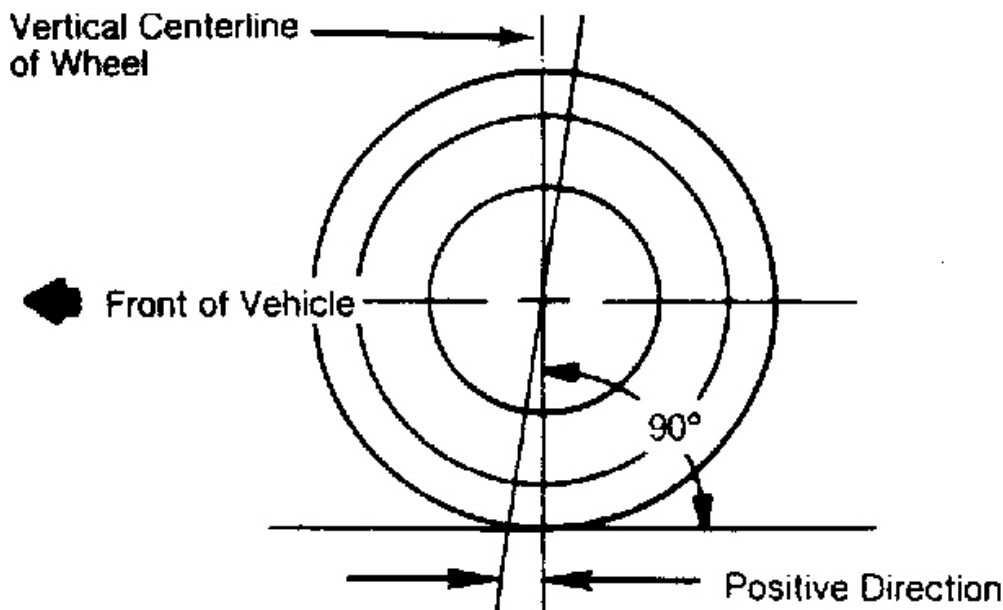


Fig. 3: Determining Camber Angle

CASTER

1. Caster is tilting of front steering axis either forward or backward from vertical, as viewed from side of vehicle. See **Fig. 4**.
2. When axis is tilted backward from vertical, caster is positive. This creates a trailing action on front wheels. When axis is tilted forward, caster is negative, causing a leading action on front wheels.



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Fig. 4: Determining Caster Angle**TOE-IN ADJUSTMENT**

Toe-in is the width measured at the rear of the tires subtracted by the width measured at the front of the tires at about spindle height. A positive figure would indicate toe-in and a negative figure would indicate toe-out. If the distance between the front and rear of the tires is the same, toe measurement would be zero. To adjust:

- 1) Measure toe-in with front wheels in straight ahead position and steering wheel centered. To adjust toe-in, loosen clamps and turn adjusting sleeve or adjustable end on right and left tie rods. See **Fig. 2** and **Fig. 5**.
- 2) Turn equally and in opposite directions to maintain steering wheel in centered position. Face of tie rod end must be parallel with machined surface of steering rod end to prevent binding.
- 3) When tightening clamps, make certain that clamp bolts are positioned so there will be no interference with other parts throughout the entire travel of linkage.

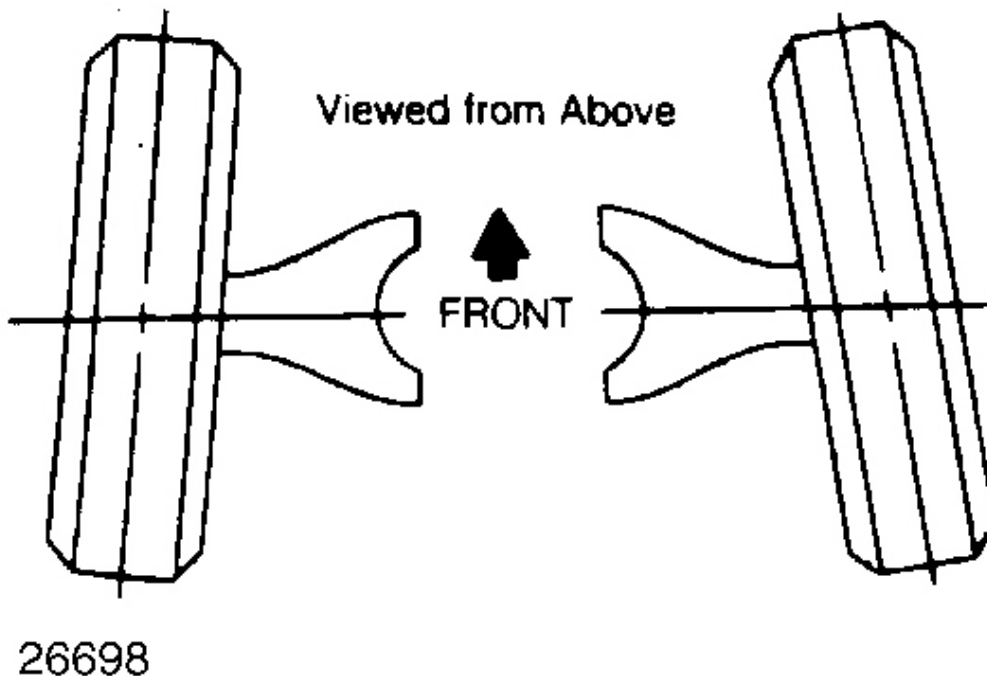


Fig. 5: Wheel Toe-In (Dimension A Less Dimension B)

TOE-OUT ON TURNS

1. Toe-out on turns (turning radius) is a check for bent or damaged parts, and not a service adjustment. With caster, camber, and toe-in properly adjusted, check toe-out with weight of vehicle on wheels.
2. Use a full floating turntable under each wheel, repeating test with each wheel positioned for right and left turns. Incorrect toe-out generally indicates a bent steering arm. Replace arm, if necessary, and recheck wheel alignment.

STEERING AXIS INCLINATION

1. Steering axis inclination is a check for bent or damaged parts, and not a service adjustment. Vehicle must be level and camber should be properly adjusted. See **Fig. 6**.
2. If camber cannot be brought within limits and steering axis inclination is correct, steering knuckle is bent. If camber and steering axis inclination are both incorrect by approximately the same amount, the upper and lower control arms are bent.

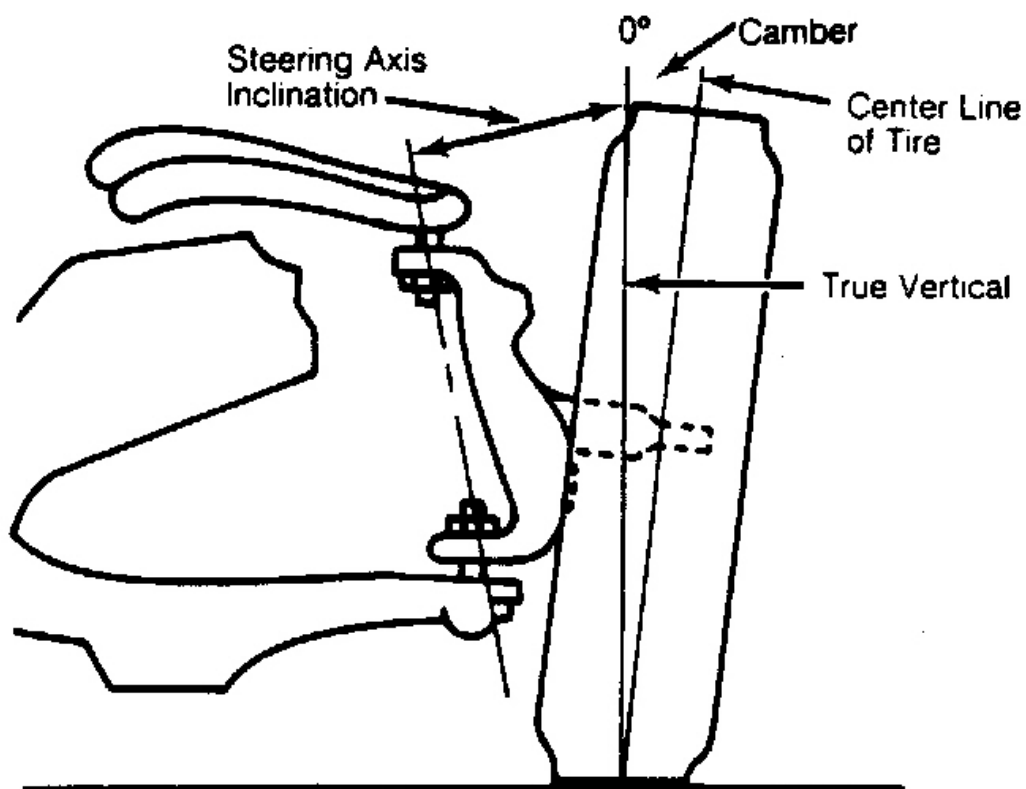


Fig. 6: Checking Steering Axis Inclination