This documentation refers to special tools that were not yet available when going to press.

11 13 000 Remove and install, seal or replace oil sump

WARNING

Motor vehicle may slip off the vehicle hoist where components are supported.

Danger! Life-threatening injuries!

- Secure the vehicle hoist against lowering and lifting.

WARNING

Vehicle may slip off the vehicle hoist if the vehicle hoist is handled incorrectly.

Danger! Life-threatening injuries!

- Observe safety information on raising the vehicle using a vehicle hoist.
- For additional information see: 00 ... Raising the vehicle using a vehicle hoist.

WARNING

Motor vehicle may slip off the vehicle hoist if the weight is distributed unevenly.

Danger! Life-threatening injuries!

- Ensure there is a specific weight compensation on the motor vehicle.

PRELIMINARY WORK

1 – Disconnecting all battery earth leads



- See additional information.

2 – Bring front compartment lid in the service position

Prerequisite

Engine compartment lid is open.

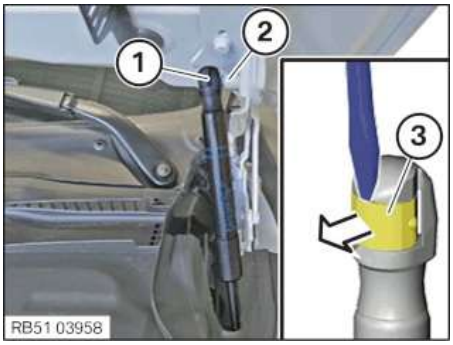
CAUTION

Shutting bonnet or tailgate.

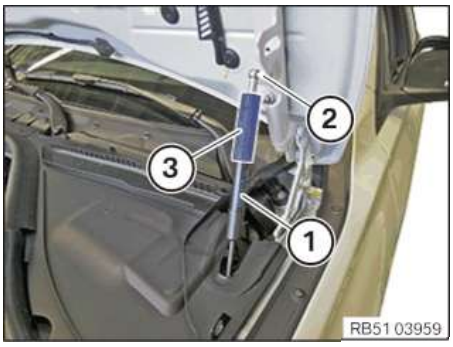
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

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- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.

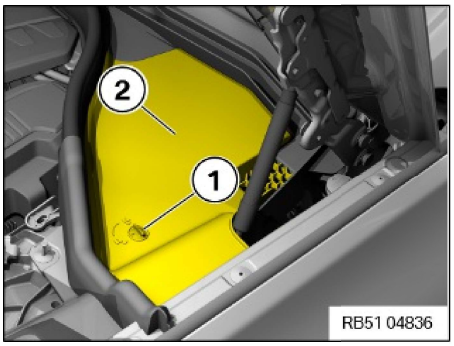


TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

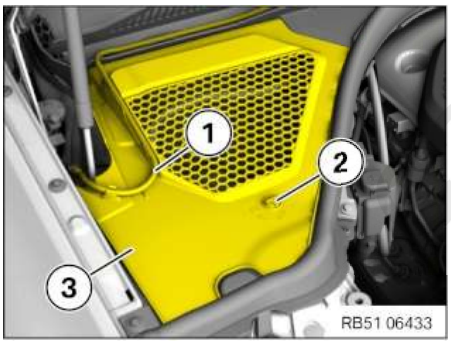
- Remove the bonnet support and open the bonnet further.
- Push special tool or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

3 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove rear left cover of engine compartment (2).

4 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover of rear right engine compartment (3).

5 – Remove the seal for the rear bonnet



- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

6 – Removing the acoustic cover

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WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Damage to the acoustic cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover.

- Disassemble or mount the acoustic cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

7 – Removing both wiper arms

NOTICE

Description is for left component only. Procedure on the right side is identical.

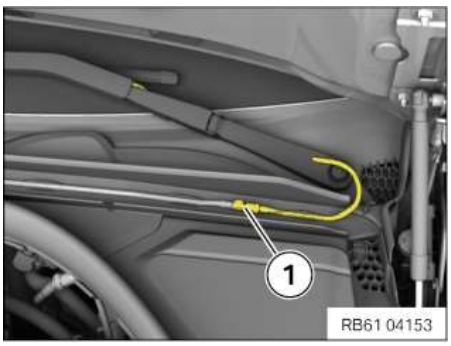
▸ **Remove the wiper arm**

RISK OF DAMAGE

Damage to wiper console

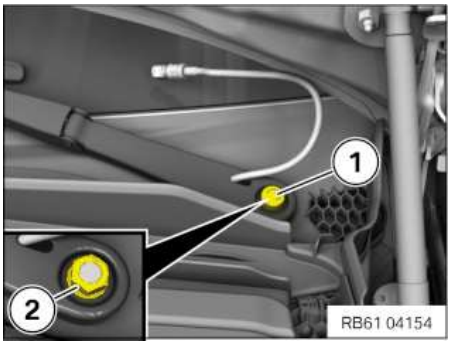
While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do not lift off wiper arm, else the wiper console may break on the predetermined breaking point for the pedestrian protection.

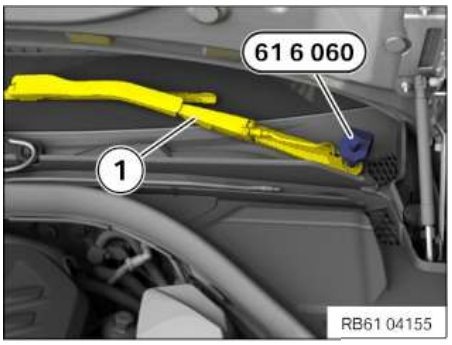


- Disconnect the windscreen wash hose(1) at the separation point and remove from the cowl guide.

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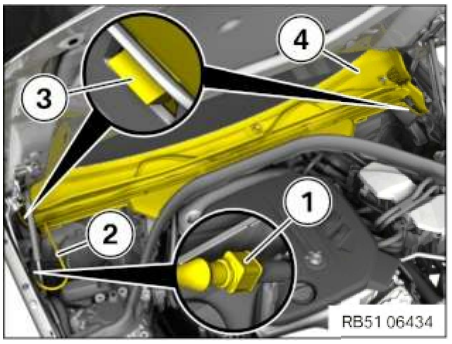


- Remove the protective cap (1).
- Loosen nut (2).

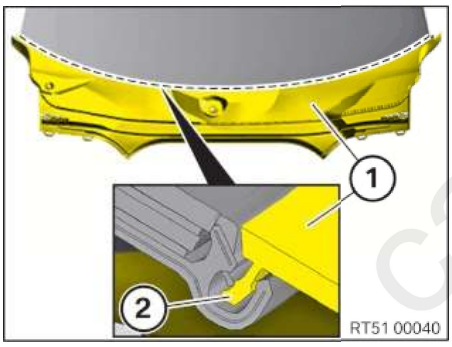


- Pull off the wiper arm (1) using special tool .

8 – Remove cowl panel cover



- Release snap fastener of the washer fluid hose (1) and put the washer fluid hose(2) to one side.
- Unclip clips (3) on the cowl panel cover (4).

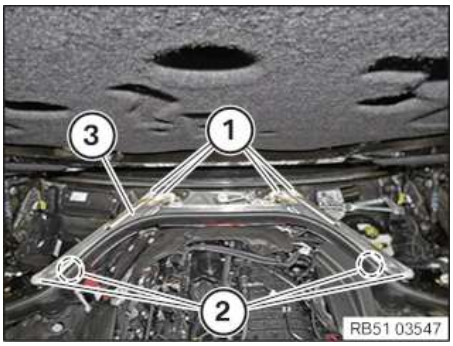


- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

9 – Removing the centre bulkhead upper part

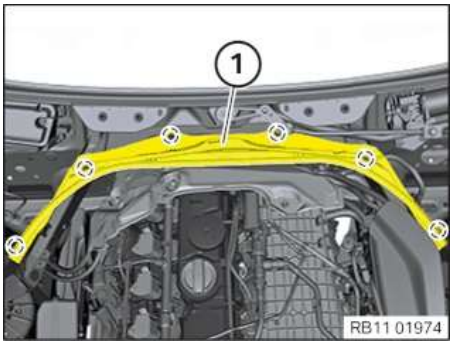
TECHNICAL INFORMATION

Driving without the strut brace/front end or tension strut is not permitted.



- **If installed:** Remove tension strut on spring strut dome.
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

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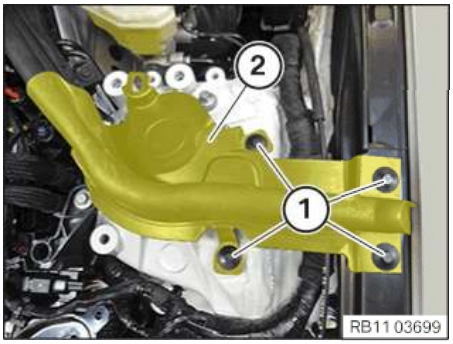


- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing side bonnet gaskets

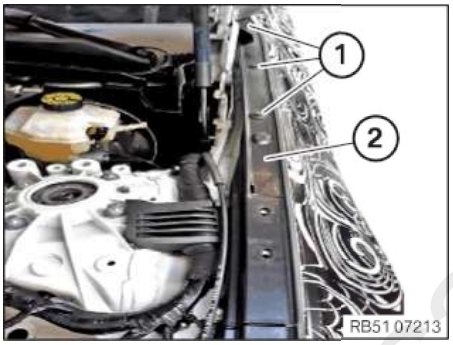
NOTICE

Perform the operations on the left and right side.



- Loosen the rivet (1).
- Remove side bonnet seal (2) from spring strut dome.

11 – Remove sealing of the side panel



NOTICE

Description is for left component only. Procedure on the right side is identical.

- Loosen the expanding rivet (1).
- Guide out seal (2) and remove.

12 – Removing acoustic cover at rear



- Unclip the acoustic cover (1) in the marked areas and remove it to the top.

13 – Remove all ignition coils.

NOTICE

The description is for one component only. The procedure is identical for all further components.

▸ **Removing the ignition coil**

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WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

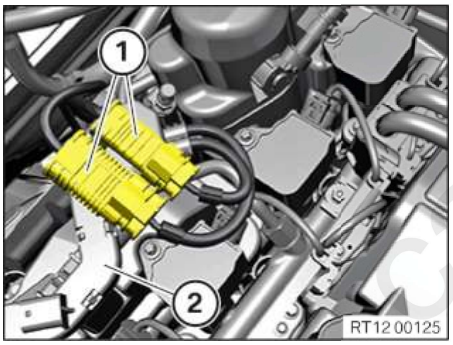
- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

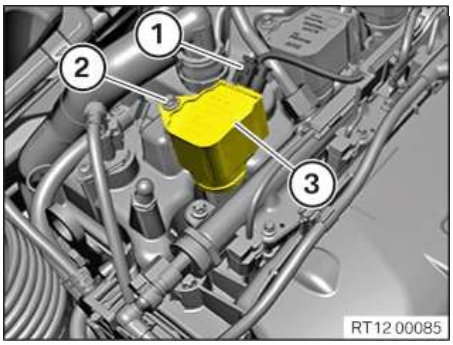
Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.



- Disconnect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor from the cable channel (2) and set aside.



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove ignition coil (3).

14 – Remove fuel delivery line

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WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

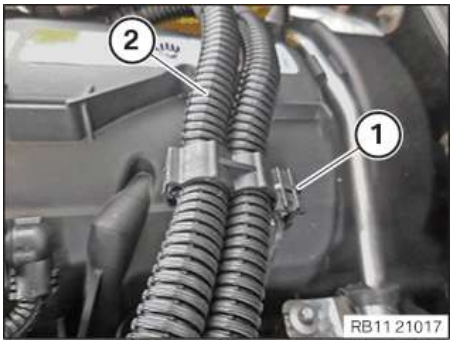
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

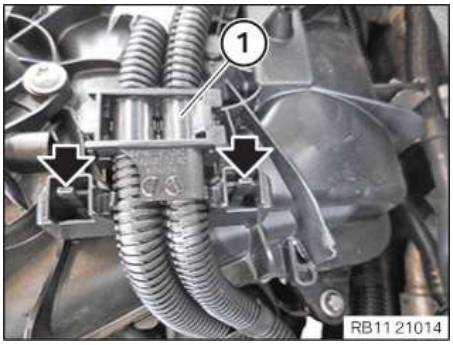
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

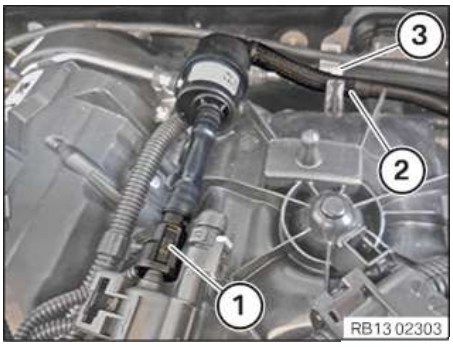


- Loosen clamp (1).
- Guide out wiring harness section (2) for the injectors and ignition coils and place it aside.

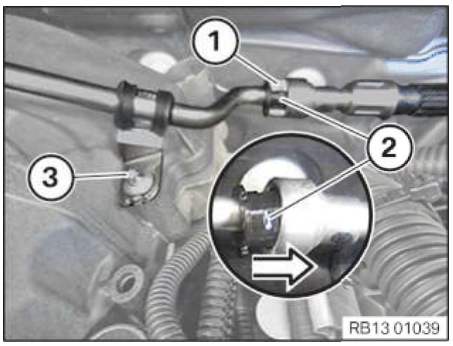
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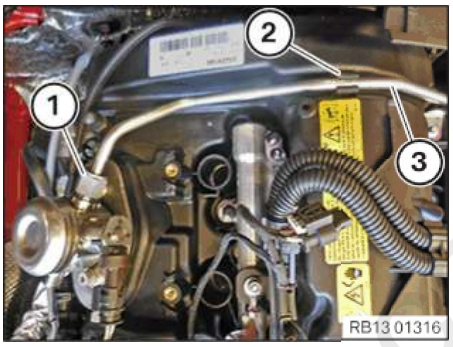
- Unlock the locks (arrows).
- Guide out wiring harness section (1) for the injectors and ignition coils and place it aside.



- Unlock and loosen lock (1).
- Guide tank ventilation line (2) out of clamp (3) and place it aside.



- Unlock and loosen clamp (1).
- Unlock and remove the snap fastener (2) in the direction of the arrow.
- Catch and dispose of escaping fuel.
- Seal the fuel lines with special tools 0 496 567 (13 5 161) and 0 496 568 (13 5 162) from the set of special tools 0 496 565 (13 5 160).
- Loosen screw (3).



- Slacken the union nut (1) on the high pressure pump.
- Catch and dispose of escaping fuel.
- Seal all openings with the special tool .
- Guide the fuel feed line (3) out and remove.
- Make sure that the rubber damper (2) is not lost.

15 – Removing intake silencer housing

RISK OF DAMAGE

Damage to the clean air line. Damage to the air filter.

For changing the air filter insert, if the upper section of intake filter housing is only raised and not completely removed, the clean air line and the air filter insert may be damaged.

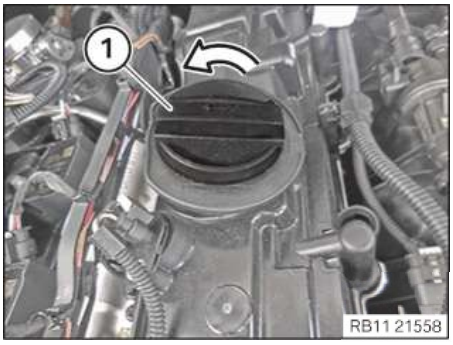
- Do not lift upper section of intake filter housing by force.
- Unfasten clamp.
- Remove upper section of intake filter housing completely.

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- Unlock plug connection (1) and disconnect.
- Unfasten clamp (2).
- Pull out and remove the intake silencer housing (3) from the rubber mounts towards the top.

16 – Removing the oil filler cap



- Open the oil filler cap (1) in the direction of arrow.

17 – Removing both front wheels

▸ **Removing the wheel**



- In vehicles with M Carbon ceramic brake: The wheel assembly jack must be used to remove the wheel (see workshop equipment).

  This process is intended to prevent damage to the brake disc.



- If several wheels are removed simultaneously: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use a suitable adapter from the tool set .

18 – Remove the rear section of the wheel arch cover on the front left and right

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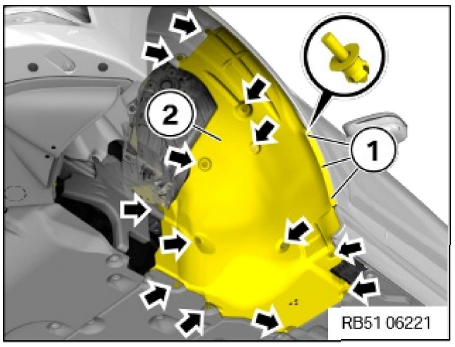
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Removing the rear section of the front wheel arch cover front**

NOTICE

To provide a better overview: Schematic diagram with partially hidden components.



- Loosen the expanding rivet (1).
- Remove screws (arrows).
- Remove the rear section of the front wheel arch cover (2).

19 – Removing the front section of the front left wheel arch cover

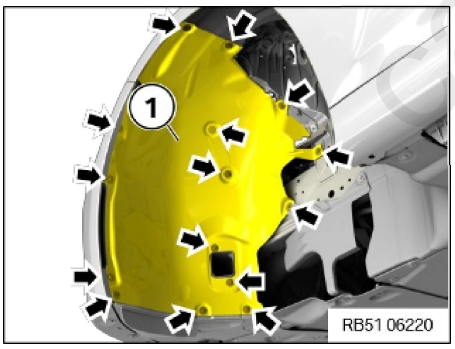
NOTICE

Perform the operations on the left and right side.

▸ **Removing the front section of the front wheel arch cover**

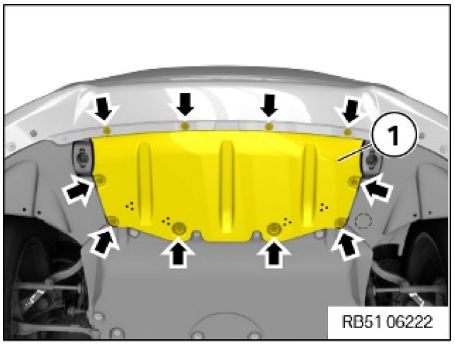
NOTICE

To provide a better overview: Schematic diagram with partially hidden components.



- Remove screws (arrows).
- Remove front section of the front wheel arch cover (1).

20 – Removing the front underbody protection

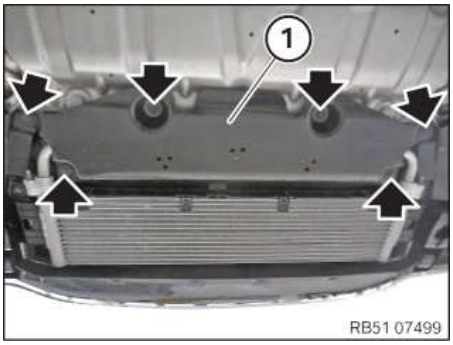


- **Version 1:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

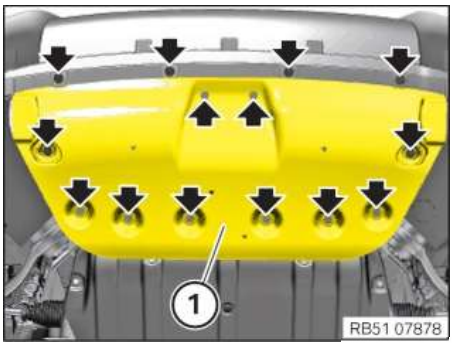
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- **Version 2:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.



- **Version 3:**

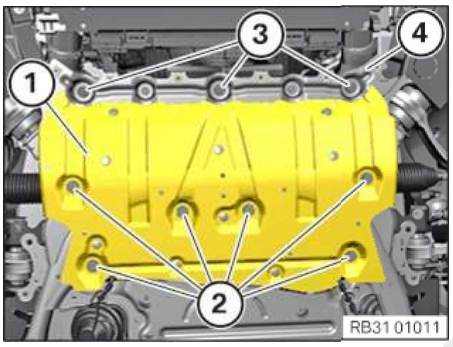
  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

21 – Removing the stiffening plate

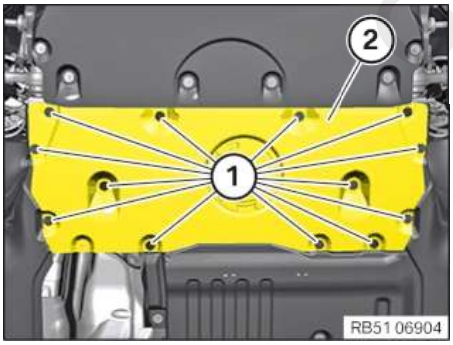
TECHNICAL INFORMATION

Driving without stiffening plate is not permissible.



- Loosen screws (3).
- Remove the holder of the underride protection (4).
- Loosen screws (2).
- Remove stiffening plate (1).

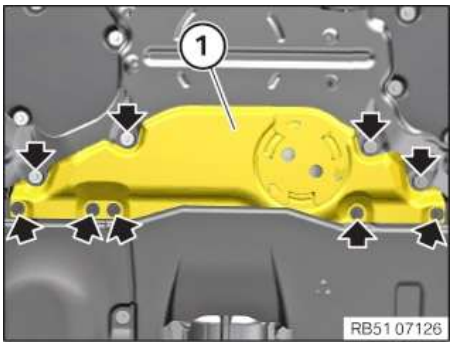
22 – Removing the centre underbody protection



- **Version with rear-wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



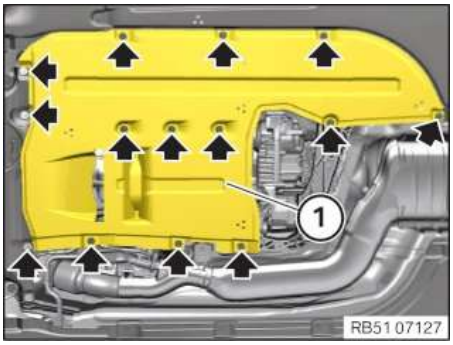
- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

23 – Remove rear underbody protection

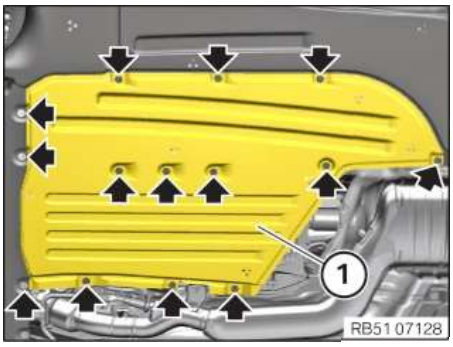
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- **Version 1:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version 2:**

  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

24 – Releasing the oil drain plug

WARNING

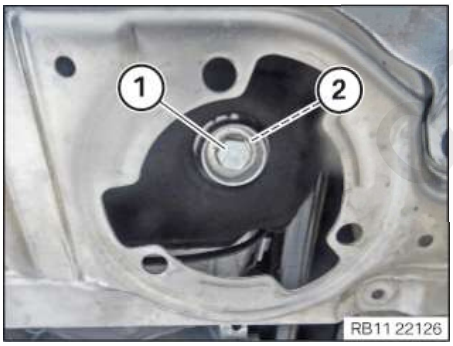
Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

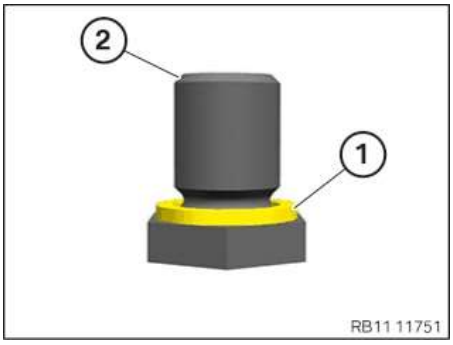
TECHNICAL INFORMATION

Catch and dispose of drained engine oil in a suitable collecting vessel. Observe country-specific waste disposal regulations.



- Release oil drain plug (1).
- Feed out the oil drain plug (1) using sealing ring (2) and remove.
- Allow the engine oil to drain out fully.

25 – Tightening the oil drain plug



- Renew sealing ring (1) on the oil drain plug (2).

  Parts: Sealing ring

- Guide in the sealing ring (1) on the oil drain plug (2) and install.

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- Feed in the oil drain plug (1) with the sealing ring (2) and install.
- Tighten oil drain plug (1).

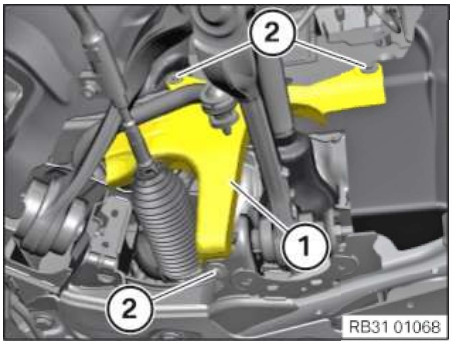
Oil drain plug

M12x16	Replace sealing ring.	Tightening torque	25 Nm

26 – Remove the cover of the steering assembly on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.



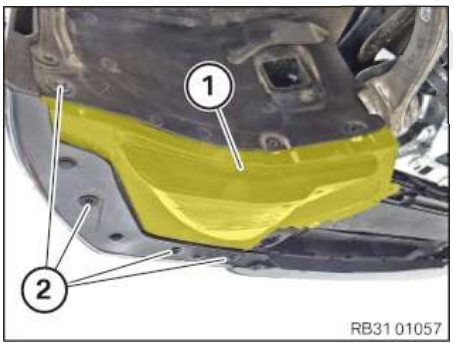
▸ **Remove the cover of the steering assembly**

- Loosen screws (2).
- Remove the cover (1).

27 – Removing the bottom left and right wheel arch cover

NOTICE

Description is for left component only. Procedure on the right side is identical.



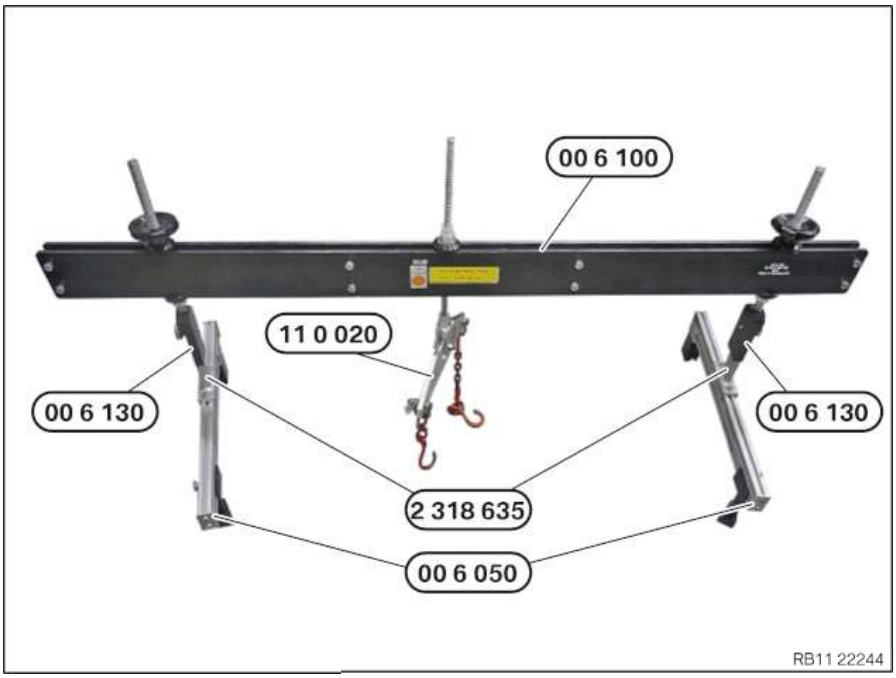
▸ **Remove bottom wheel arch cover**

- Loosen screws (2).
- Remove bottom wheel arch cover (1)

28 – Securing engine in installation position

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Overview: prepared engine bridge



CAUTION

Components connected to the engine joint or cross member.

Danger of injury!

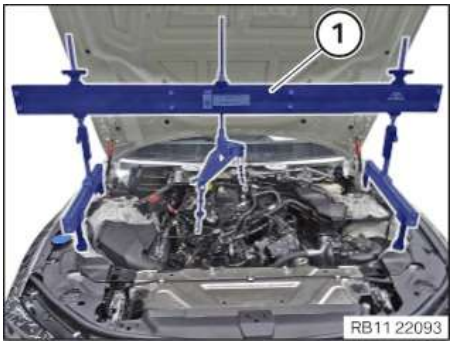
- Check lifting eyes and engine mounting brackets for damage, e.g. cracks.
- Attach the component to correctly mounted engine joints or cross members only.
- Exclusively lift the component, do not move it forwards, backwards or in transverse direction.



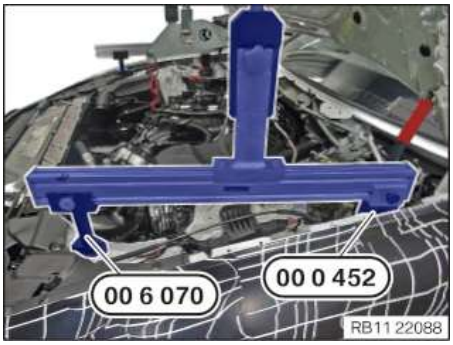
- Guide in and position special tool on cylinder head.
- Tighten the screws (1) of special tool .

Special tool to cylinder head

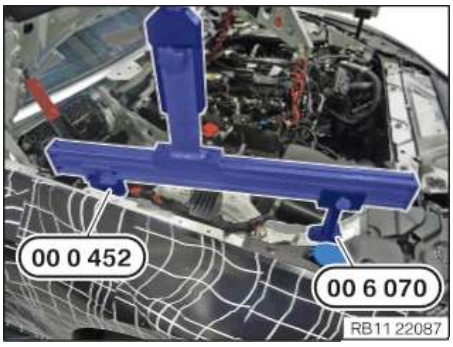
M8		Tightening torque	21,5 Nm



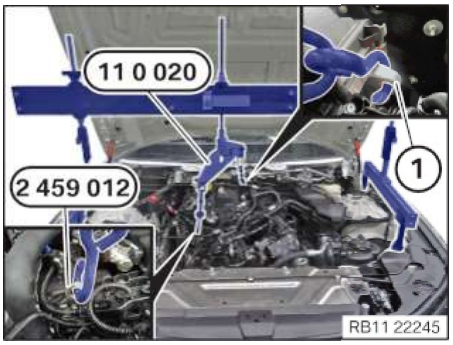
- **Carefully** position engine bridge (1) with help from an auxiliary person.



- Make sure that special tool on the left is **correctly** positioned on the front end.
- Make sure that special tool 0 495 850 (00 0 452) on the left is **correctly** positioned on the carrier support.



- Make sure that special tool on the right is **correctly** positioned on the front end.
- Make sure that special tool 0 495 850 (00 0 452) on the right is **correctly** positioned on the carrier support.



- Align the engine bridge by moving it on the profile strips of the special tool above the engine mounting bracket and screw it down.
- Connect special tool 0 490 567 (11 0 020) to special tool .
- Connect the special tool 0 490 567 (11 0 020) above the engine mounting bracket (1) at the rear.



- Check whether the special tool on the right is **correctly** positioned on the front end.



- Check whether the special tool 0 495 850 (00 0 452) on the right is **correctly** positioned on the carrier support.



- Check whether the special tool on the left is **correctly** positioned on the front end.

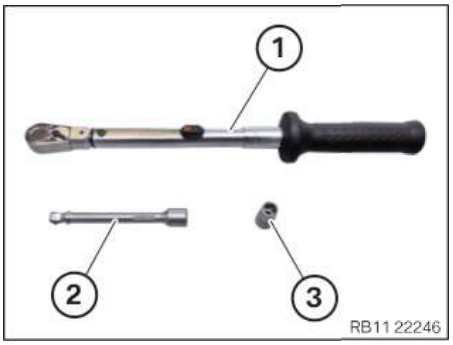
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- Check whether the special tool 0 495 850 (00 0 452) on the left is **correctly** positioned on the carrier support.

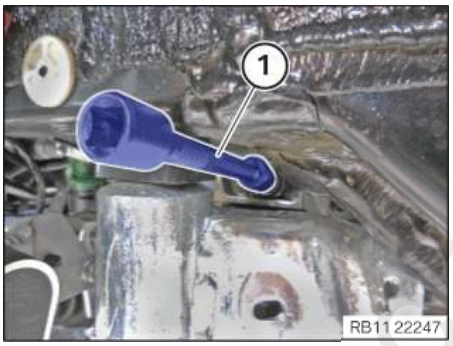


- Release screw (1) on the right engine mount from the top with a commercially available tool.

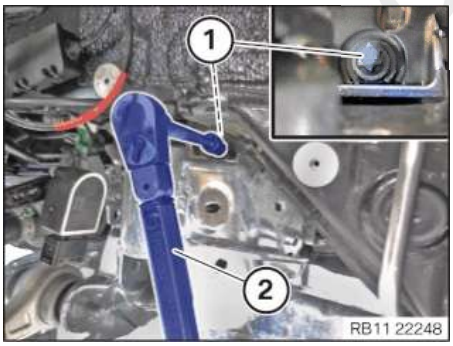


- Have all suitable tools ready.

Number	Description
1	Commercial available torque spanner
2	Swivel mounted extension
3	External Torx E14



- Position the suitable tool (1).



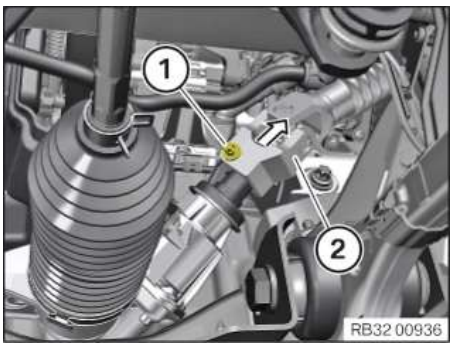
- Release screw (1) of the left engine mount with standard tool (2) sideways.



- Raise the engine by turning the special tool 2 361 506 (00 6 103) (spindle) by 10 mm.

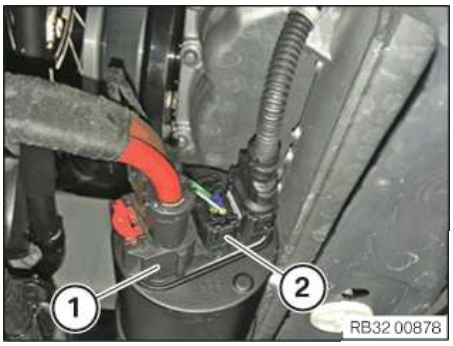
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29 – Releasing lower steering shaft from steering gear

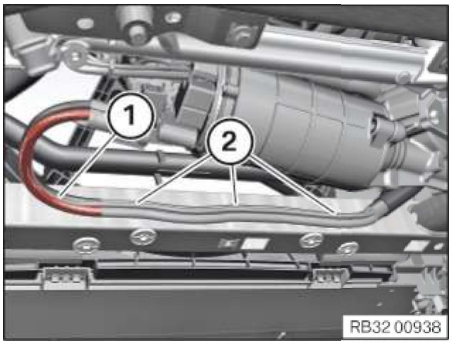


- Loosen screw (1).
- Pull off lower steering shaft (2) from steering gear in direction of arrow.

30 – Detach the wiring harness of the EPS from the front axle support

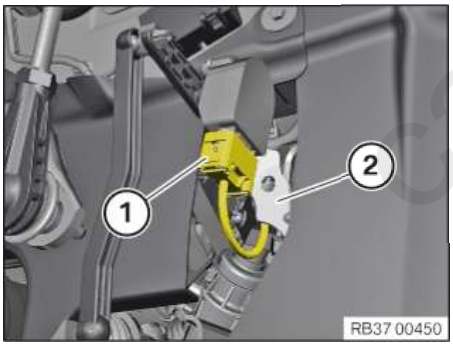


- Unlock and disconnect the plug connections (1) and (2).



- Loosen the holder (2).
- Place wiring harness (1) to one side.

31 – Detach the line connection of the ride height sensor



- Unlock plug connection (1) and disconnect.
- Unclip the line from holder (2).

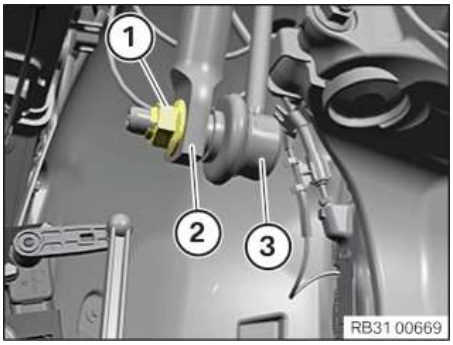
32 – Release the left and right anti-roll bar link from the anti-roll bar

NOTICE

Perform the operations on the left and right side.

▸ **Loosening the anti-roll bar link from the anti-roll bar**

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- Loosen nut (1).

Note: Use the Torx socket for counter support.

- Loosen the anti-roll bar link (3) from the anti-roll bar (2).

33 – Releasing output shaft at right and left from wheel bearing

NOTICE

Perform the operations on the left and right side.

▸ **Loosen the output shaft from the wheel bearing**



- Press brake pedal.
- Loosen the collar bolt (1).

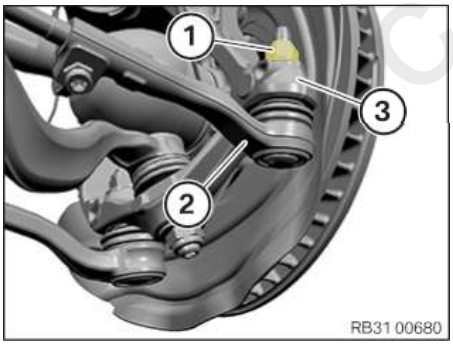
Note: Do not leave the output shaft hanging on the joint (or tie up output shaft if applicable).

34 – Loosening the track rod on the left and right from the swivel bearing

NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Loosening the track rod from the swivel bearing**



- Loosen nut (1).

Note: If necessary, counter-hold at the Torx socket.

- Detach the track rod (2) from the swivel bearing (3).

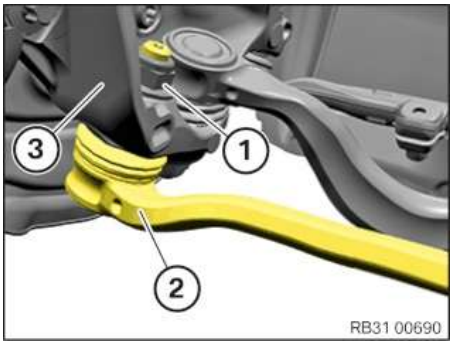
35 – Release the left and right wishbone from the swivel bearing

NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Release the wishbone from the swivel bearing**

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- Loosen nut (1).

Note: Use the Torx socket for counter support.

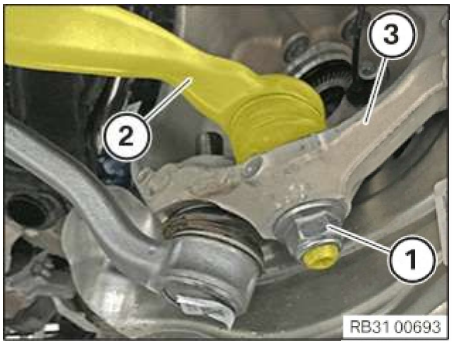
- Release wishbone (2) from swivel bearing (3).

36 – Releasing the left and right tension strut from the swivel bearing

NOTICE

Perform the operations on the left and right side.

▸ **Releasing the tension strut from the swivel bearing**



- Unfasten nut (1).

Note: Use the Torx socket for counter support.

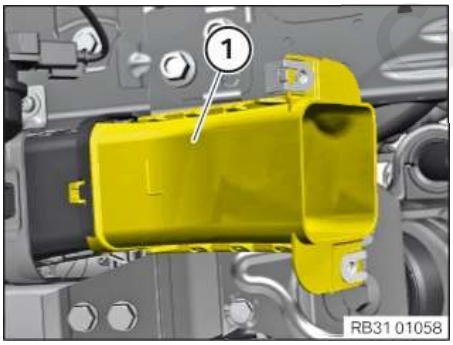
- Release the tension strut (2) from the swivel bearing (3).

37 – Removing the left and right brake air duct partially

NOTICE

Perform the operations on the left and right side.

▸ **Removing brake air duct partially**



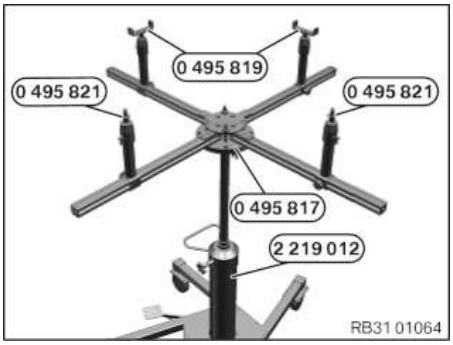
- Unclip and remove air duct (1).

38 – Preparing the special tool

TECHNICAL INFORMATION

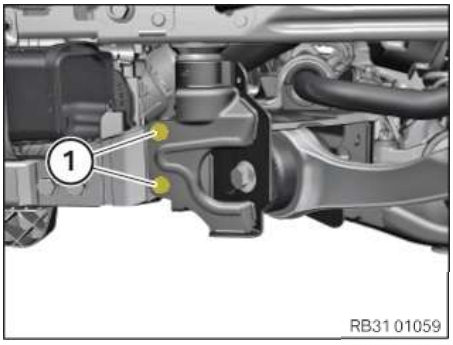
In a profile rail pair, two profile rails are connected to one another by gearing.

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- Fit the special tool completely on the universal jack 2 219 012 with the help of an auxiliary person.
- Insert special tools in telescopic supports of a profile rail pair.
- Insert special tools in telescopic supports of other profile rail pair.

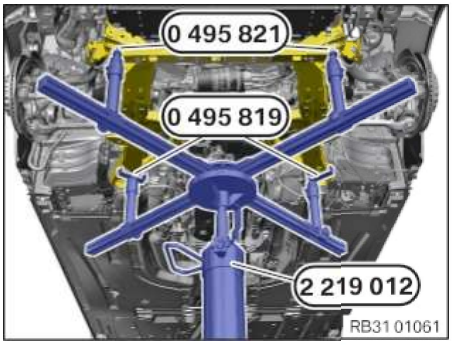
39 – Remove front axle carrier



NOTICE

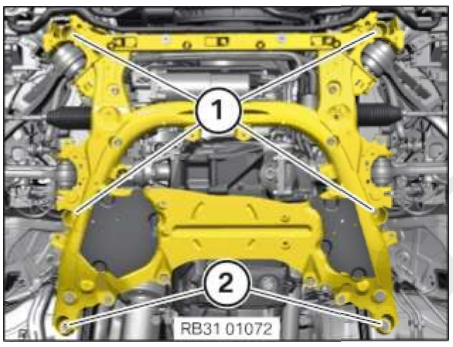
Perform the operations on the left and right side.

- Loosen screws (1).

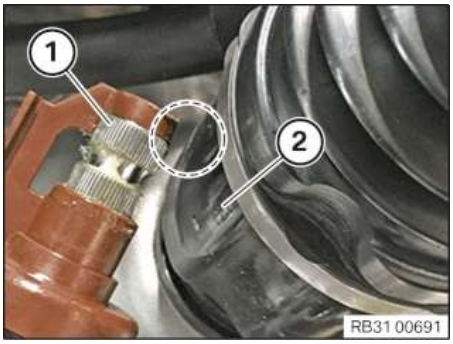


- Position the universal jack 2 219 012 with the special tools and on the front axle support.

  The centre of gravity of the front axle must be centred over the universal jack 2 219 012 !
- Support the front axle support with the universal jack 2 219 012.
- Secure the front axle support on the special tool with a tensioning strap.

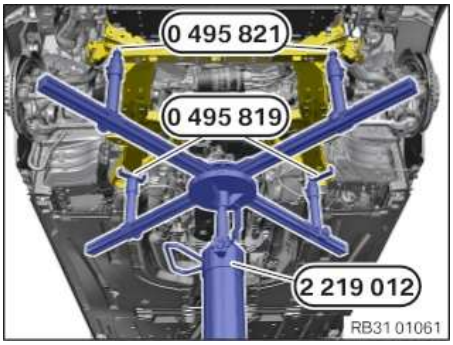


- Loosen screws (1) and (2).



- When lowering the front axle support, ensure sufficient distance between the steering gear (1) and the output shaft (2).

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- Carefully lower and remove the front axle support with the universal jack 2 219 012.

40 – Loosening front propeller shaft from front axle differential



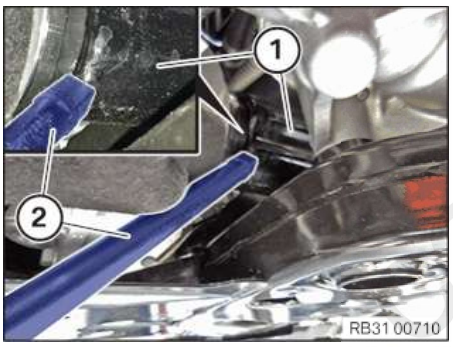
- Release screws (arrows) of the propeller shaft at the front on the front axle transmission.
- Tie up the propeller shaft at the front with special tool 2 413 317.

41 – Removing output shaft, left and right

NOTICE

Perform the operations on the left and right side.

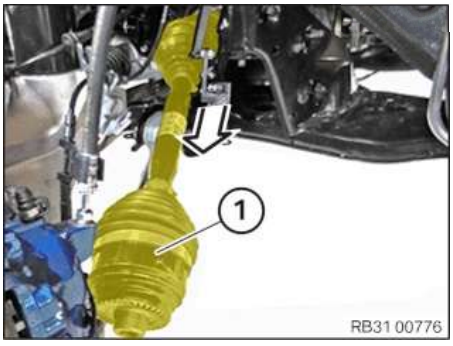
▸ **Remove output shaft**



TECHNICAL INFORMATION

Secure component against falling.

- Position aluminium drift (2) at the output shaft (1).
- Knock out the output shaft (1) out of the front axle differential or the bearing support with the aluminium drift (2).

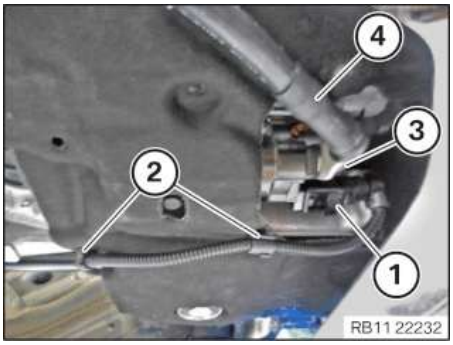


- Guide out and remove the output shaft (1) in the direction of the arrow.

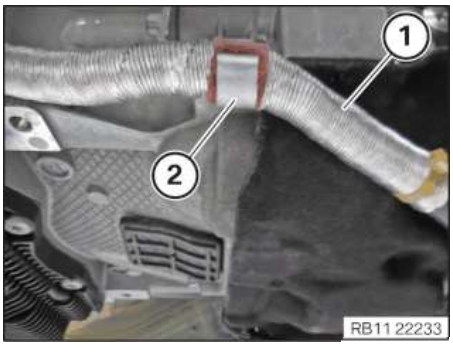
42 – Removing the acoustic cover of the oil sump

Prerequisite

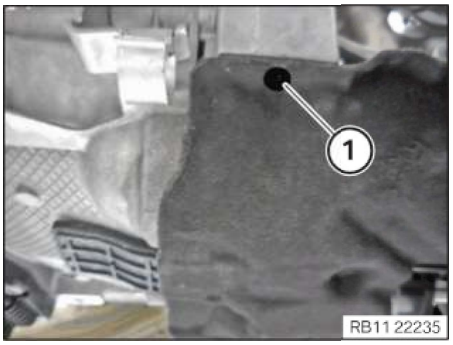
Disconnect all negative battery cables.



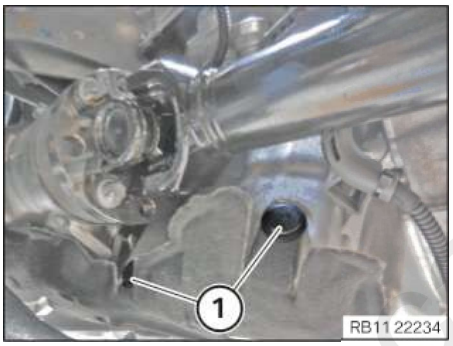
- Unlock plug connection (1) and disconnect.
- Unlock and loosen the clamps (2).
- Loosen nut (3).
- Feed out positive battery cable (4) and set it aside.



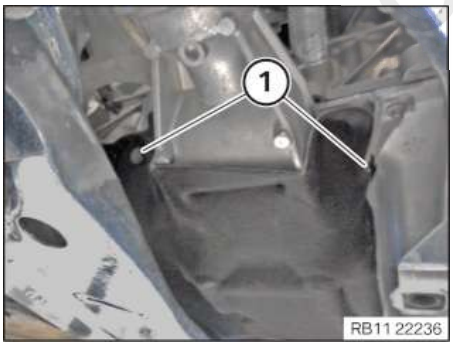
- Guide the positive battery cable (1) out of the clamp (2) and lay to one side.



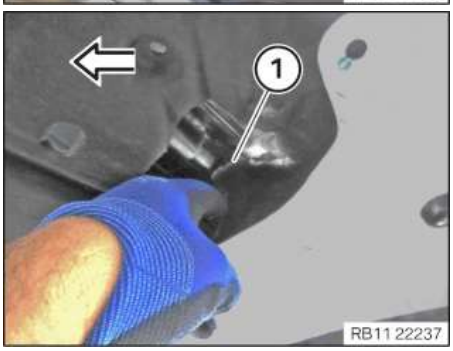
- Undo fir tree clip (1).



- Loosen the expanding rivet (1).



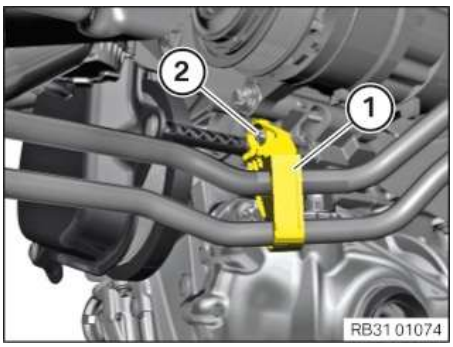
- Loosen the expanding rivet (1).



- Push the acoustic cover (1) downward.
- Feed out and remove the acoustic cover (1) in the **direction** of the arrow.

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43 – Releasing holder of the front transmission oil line

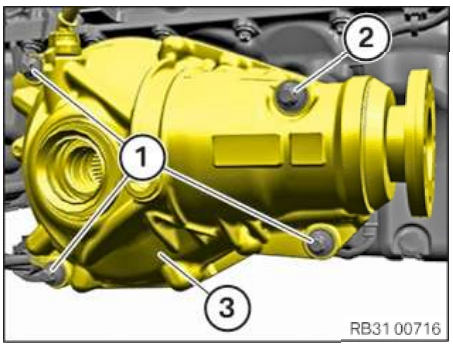


- Release the screw (2) from the bracket of the transmission oil lines (1).

44 – Remove front axle differential

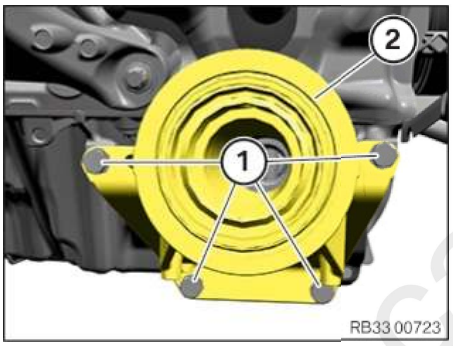
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Mark installation location of the screws (1) and (2).
  - Screws (1) M12x55
  - Screw (2) M12x105
- Loosen screws (1) and (2).
- Remove front axle differential (3).

45 – Remove bearing support



- Loosen screws (1).
- Remove the bearing support (2).

46 – Removing starter motor

Prerequisite

Oil sump acoustic cover removed.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

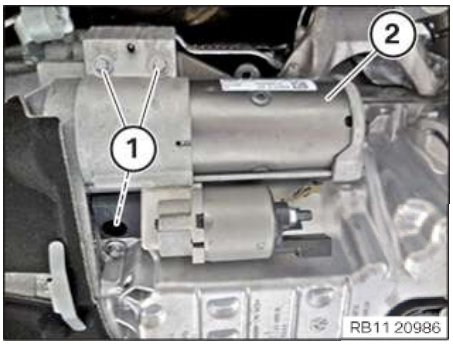
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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.



- Loosen screws (1).
- Guide out and remove starter (2).

MAIN WORK

47 – Remove oil sump

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

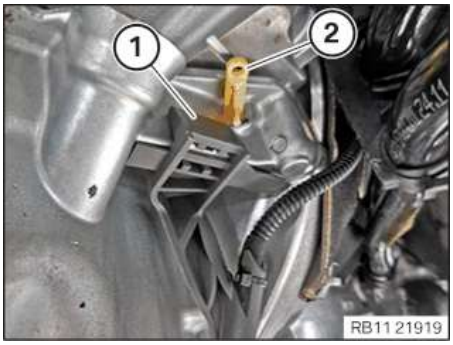
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock clamps (arrows) and disconnect.
- Unlock and loosen connector (1).

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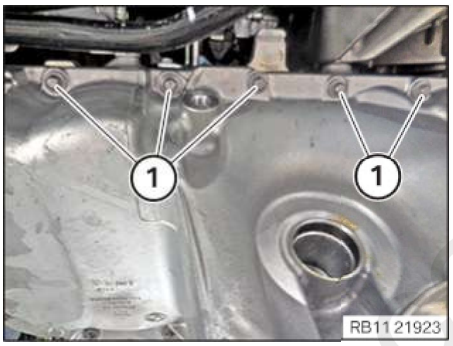
- Loosen clamp (1).
- Thread the sealing cap (2) out and remove.



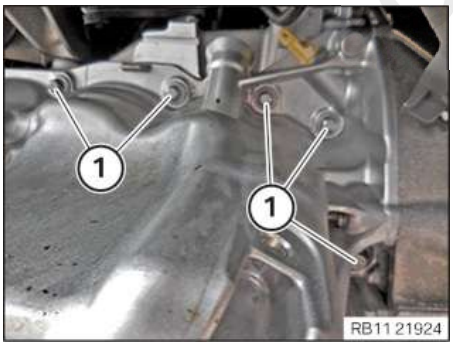
- Unscrew the transmission bolts (1).



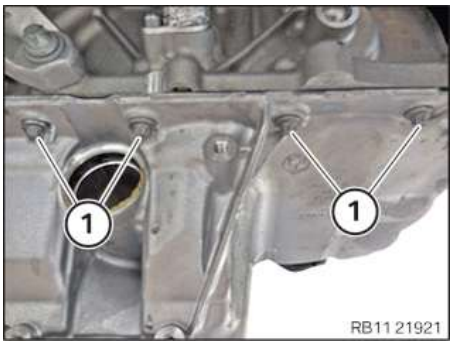
- Loosen screws (1).



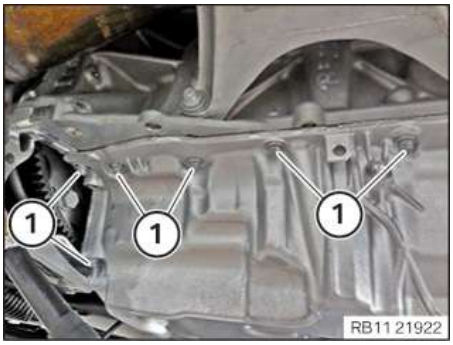
- Loosen screws (1).



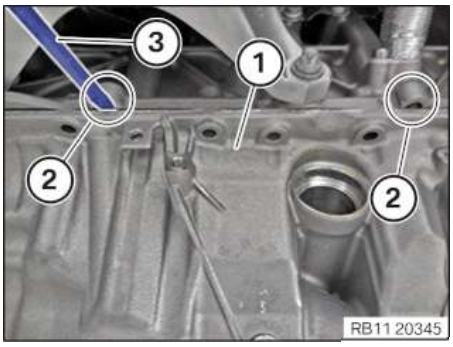
- Loosen screws (1).



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- Loosen screws (1).



TECHNICAL INFORMATION

Increased force may be necessary during disassembly because the component is bonded with liquid sealing compound.

- Release the oil sump (1) in the **marked** areas (2) using suitable tools (3).
- Guide out the oil sump (1) downwards to the rear and remove.

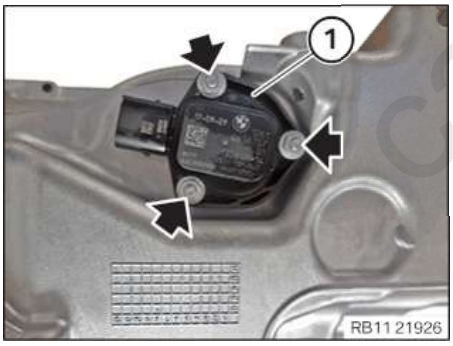
48 – Replacing oil sump: remount the oil-level sensor

RISK OF DAMAGE

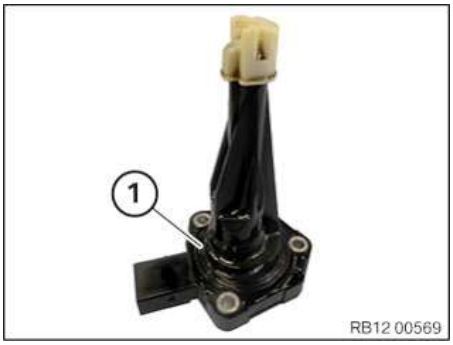
Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.



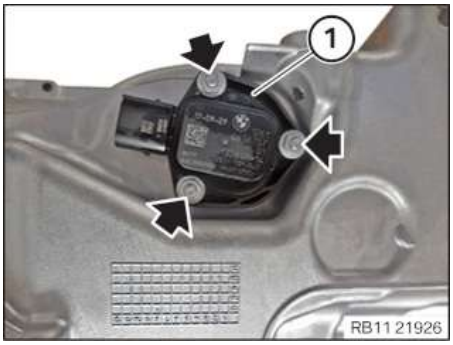
- Unscrew the nut (arrows).
- Feed out and remove the oil-level sensor (1).



- Renew O-ring (1).

  Parts: O-ring

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- Insert and install the oil-level sensor (1).
- Tighten the nuts (arrows).

Oil level sensor to oil sump

M6 hexagon nut		Jointing torque	2 Nm
		Tightening torque	8,5 Nm

49 – Refitting sump

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.



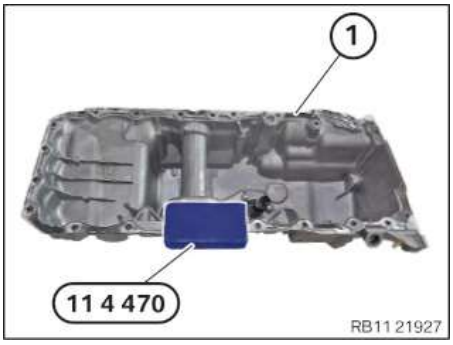
TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

- Remove the coarse sealing residue on sealing surface (1) on the crankcase with special tool 0 495 102 (11 4 470).
- Clean sealing surface (1) with brake cleaner.

Expendable materials

Brake cleaner2.0	500 ml, Spray can	83192365214
	20 , Canister	83192365215



TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

- Remove the fine seal remains on the sealing surface (1) of the oil sump with the special tool 0 495 102 (11 4 470).
- Clean sealing surface (1) with brake cleaner.

Expendable materials

Brake cleaner2.0	500 ml, Spray can	83192365214
	20 , Canister	83192365215

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- Have the special tool ready.

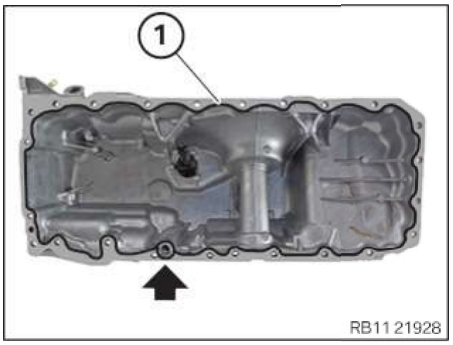


TECHNICAL INFORMATION

For more information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

- Position the sealing compound (1) on special tool as shown.

  Parts: Sealing compound



TECHNICAL INFORMATION

The maximum application time of the liquid sealing compound is 12 minutes.

- Apply sealing bead (1) with the sealing compound in the **marked** area along the inner edge.

Sealing compound

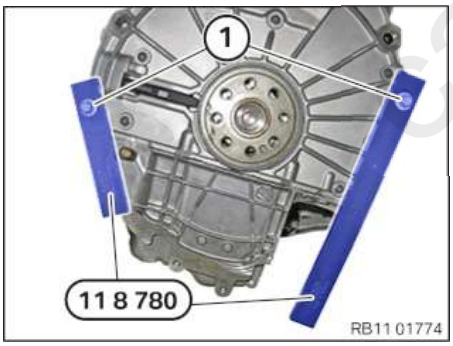
Loctite 5970 liquid sealing compound	50 ml, Cartridge	83190404517

Overview of consumables (Electronic Parts Catalogue)

Height of the sealing bead

2,0 mm ... 2,5 mm

- Completely encircle the oil return orifice (arrow) with the sealing compound.



TECHNICAL INFORMATION

The special tool 11 8 780 is only required when the transmission is removed.

- Position the special tool 0 496 120 (11 8 780) with the transmission bolts (1) so that the oil sump is exactly flush with the timing case cover.
- Renew the centring sleeves where required.



- Insert oil sump (1) upwards and forwards and position.

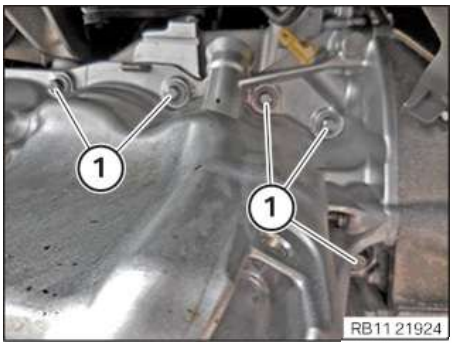
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- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm



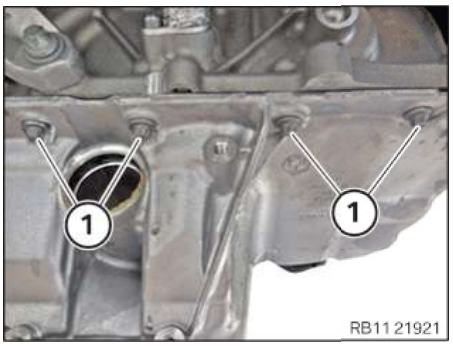
- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm

Oil sump to crankcase

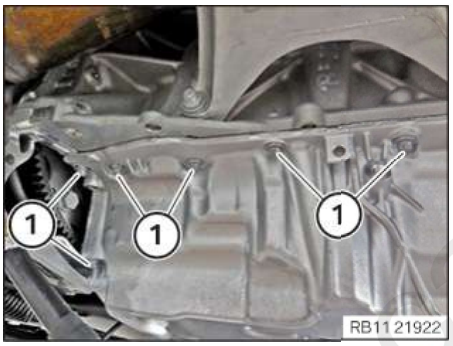
M8 x 110		Tightening torque	24 Nm



- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm



- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm

Oil sump to crankcase

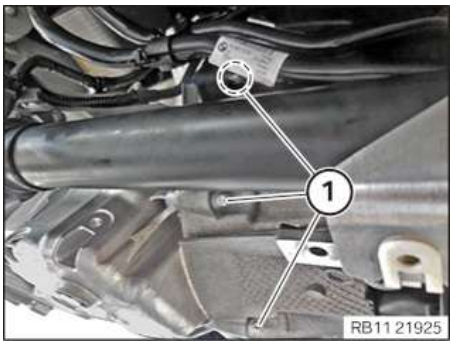
M8 x 110		Tightening torque	24 Nm



- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm



- Tighten transmission screws (1).

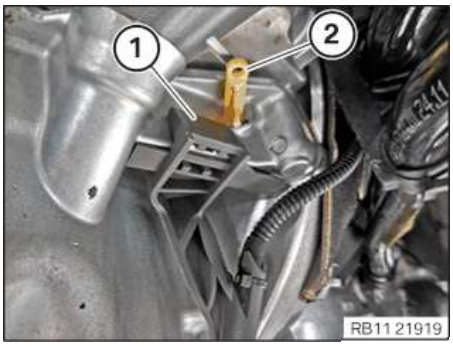
Transmission to oil sump (manual gearbox and automatic transmission)

M8 x 50		Tightening torque	19 Nm

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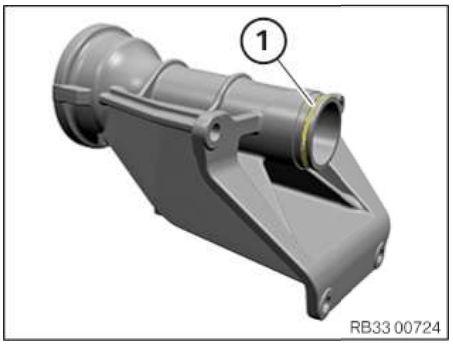
- Secure the clamps (arrows).
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.



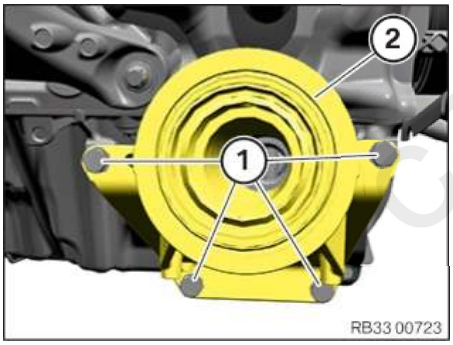
- Secure clamps (1).
- Guide in and install sealing cap (2).

POSTPROCESSES

50 – Install bearing support



- Coat the O-ring (1) with front axle transmission oil.

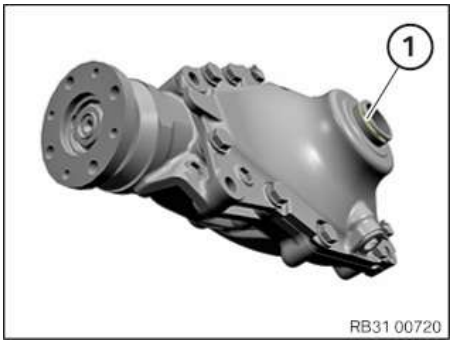


- Position the bearing support (2) at the engine oil sump.
- Tighten the screws (1).

Bearing support to oil sump

M8		Tightening torque	19 Nm

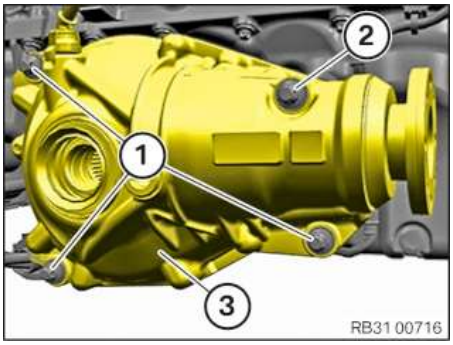
51 – Install front axle differential



- Renew O-ring (1).

  Parts: O-ring
- Coat the O-ring (1) with front axle transmission oil.

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- Position front axle differential (3).

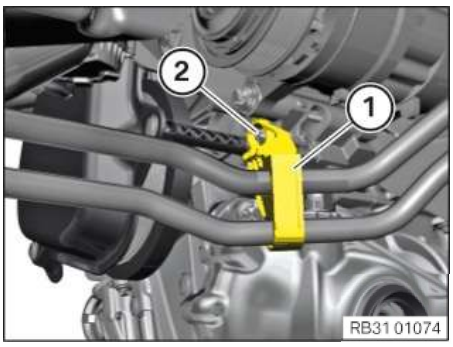
  Make sure marked screws are installed in correct installation locations:

  - Screws (1) M12x55
  - Screw (2) M12x105
- Tighten down screws (1) and (2).

Front axle final drive to engine oil pan

M12		Tightening torque	140 Nm

52 – Secure holder of front transmission oil line



- Position the holder of the transmission oil lines (1).
- Tighten down screw (2).

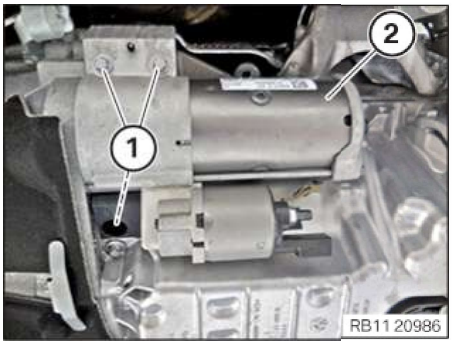
Holder for front transmission oil cooler line

M6x18		Tightening torque	12 Nm

53 – Installing starter motor

Prerequisite

Acoustic cover of oil sump removed.



- Insert and install the starter motor (2).
- Tighten the screws (1).

Starter motor to crankcase

M8x60		Tightening torque	19 Nm

54 – Renew the radial shaft seal on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Renew the radial shaft seal**

TECHNICAL INFORMATION

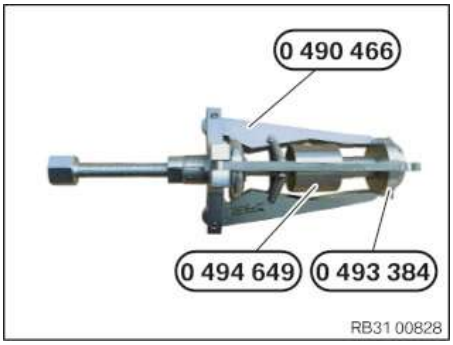
Radial shaft seal ring are equipped with an installation protection ring. The installation protection ring is used to protect the sealing lip when installing the output shaft.

NOTICE

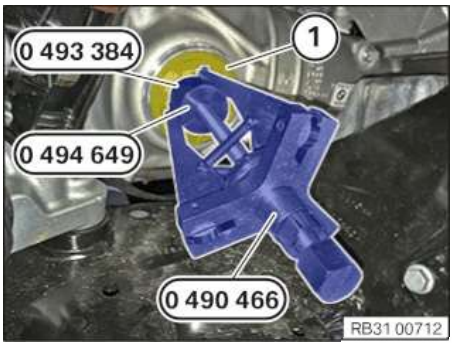
The figure shows the procedure for the front axle differential. The procedure for the bearing support is identical.

▹ **Removing the radial shaft seal**

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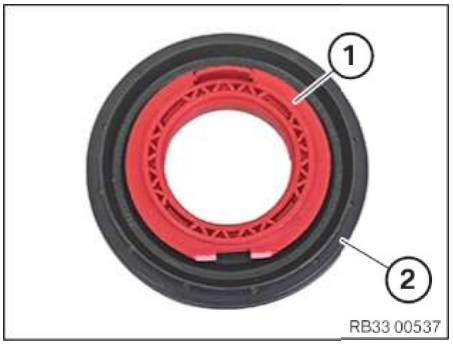


- Prepare the special tool with the special tools 0 494 649 (21 2 230) (without the screw) and .



- Pull out and remove the radial shaft seal (1) with the special tools , 0 494 649 (21 2 230)and .

◁



- Remove the installation protection ring (1) from the radial shaft seal (2).

▷ **Install the radial shaft seal**



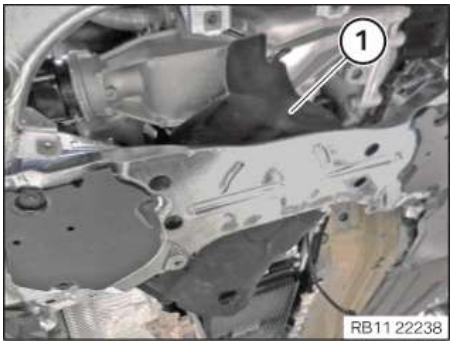
- Coat the housing sheet metal flange of the radial shaft seal with the approved front axle transmission oil.
- Drive in the radial shaft seal up to the limit position using special tool .
- Remove special tool .

◁

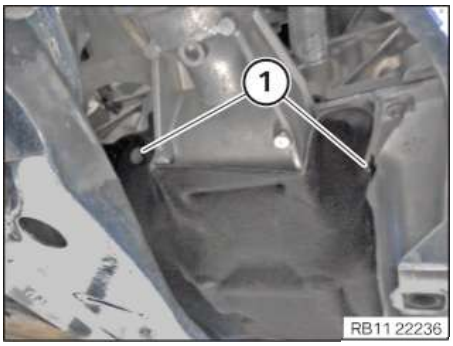


- Reinstall the installation protection ring (1) into the radial shaft seal (2).

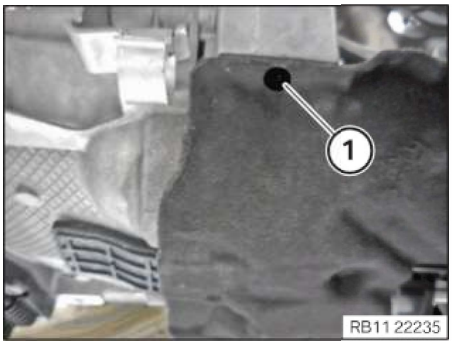
55 – Installing the acoustic cover for the oil sump



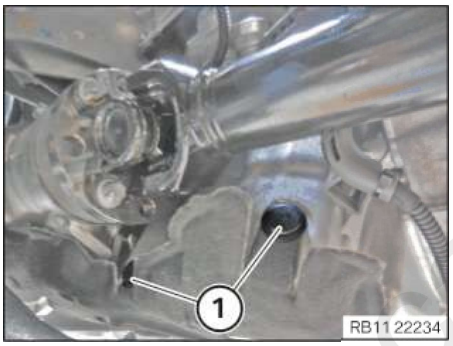
- Thread in and position the acoustic cover (1).



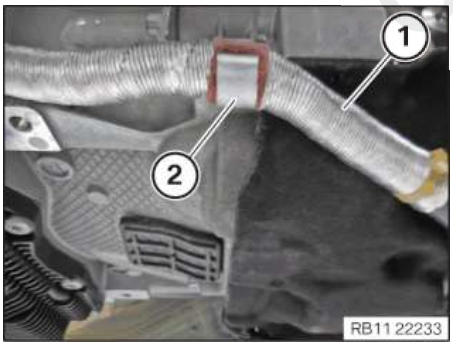
- Secure expanding rivet (1).



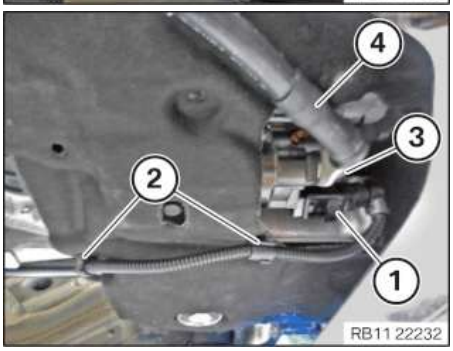
- Check the fir tree clip (1) for damage and renew if necessary.
  Parts: Fir tree clip



- Secure expanding rivet (1).

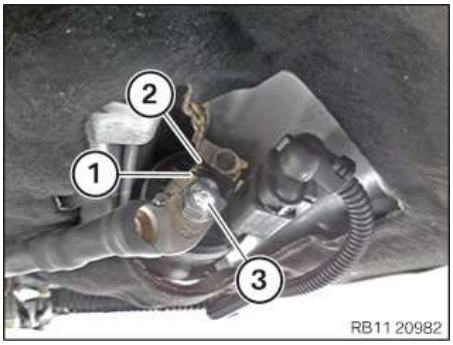


- Secure positive battery cable (1) at the clamp (2).



- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure clamps (2).
- Insert and install the positive battery cable (4).
- Tighten the nut (3) hand-tight.

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CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

56 – Installing output shaft at right and left

NOTICE

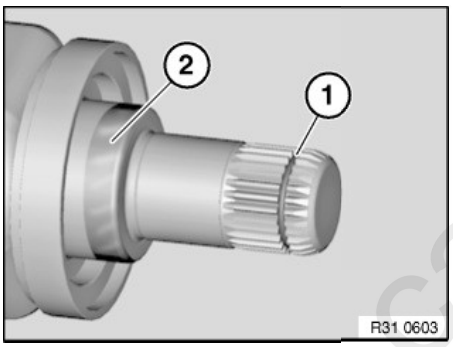
Perform the operations on the left and right side.

▸ **Installing the output shaft**

▹ **If reusing: Check the gearing of output shaft and renew circlip.**

TECHNICAL INFORMATION

It is essential to renew the circlip of the output shaft.



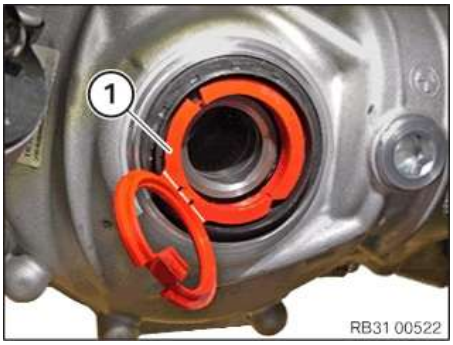
TECHNICAL INFORMATION

Extreme force being required during installation is an indication that the component is damaged or deformed. Check the component; replace if necessary.

- Check the gearing of the output shaft for damage and renew damaged parts if necessary.
- Check the gaiter for damage and replace damaged parts as needed.
- Renew the circlip (1).

  Parts: Circlip
- Coat the contact surfaces (2) using approved final drive transmission oil.

◃

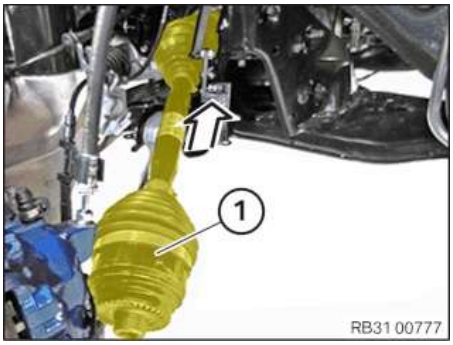


NOTICE

The figure shows the procedure for the front axle differential. The procedure for the bearing support is identical.

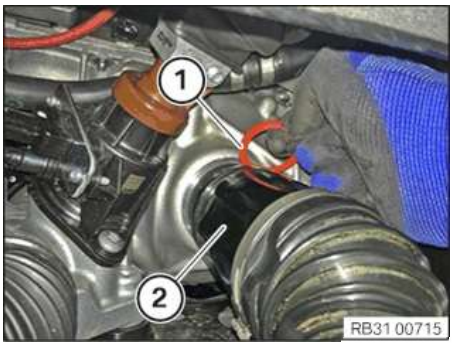
- Fold open the assembly protection ring (1).

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- Guide the output shaft (1) in direction of arrow into the front axle transmission or the bearing support.

  Do not allow the output shaft (1) to engage in the front axle transmission or the bearing support!



- Pull on the tab of the installation protection ring (1) until one of the two predetermined breaking points breaks.
- Pull out and dispose of the installation protection ring (1).
- Slide the output shaft (2) into front axle differential or bearing support up to the limit position.

  The output shaft (2) must engage noticeably and audibly.

57 – Secure the propeller shaft in front on the front axle differential



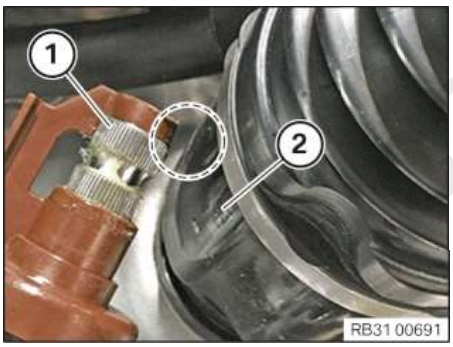
- Release special tool 2 413 317.
- Position the front propeller shaft on the front axle transmission.
- Renew screws.

  Parts: Bolts
- Tighten screws (arrows).

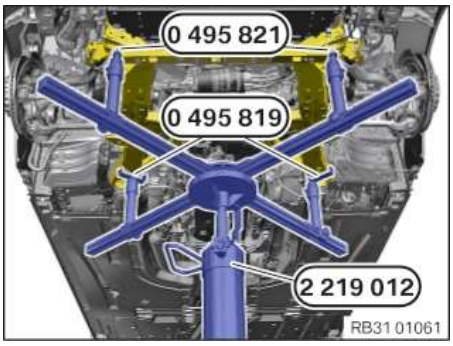
Propeller shaft before the front axle differential

Renew screws.	Tightening torque	25 Nm
Jointing torque and angle of rotation must be observed without fail.	Angle of rotation	45 °

58 – Install front axle support

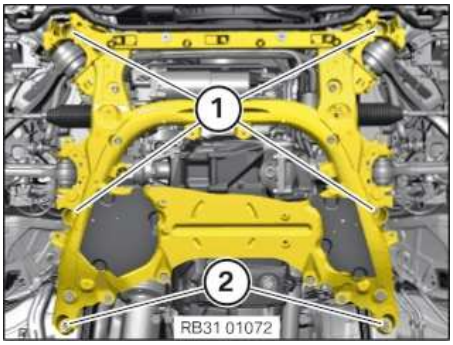


- When lifting the front axle support, ensure sufficient distance between the steering gear (1) and the output shaft (2).



- Carefully lift the front axle support with the universal jack 2 219 012 and position on the body.

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- Replace the screws (1).

  Parts: Bolts
- Tighten the screws (1).

Front axle support to front/centre of body

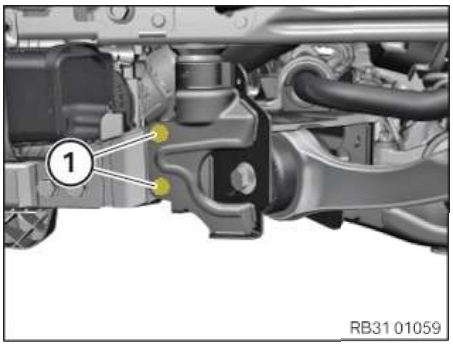
M12	Renew screws.	Jointing torque	108 Nm

- Replace the screws (2).

  Parts: Bolts
- Tighten the screws (2).

Front axle carrier to body, rear

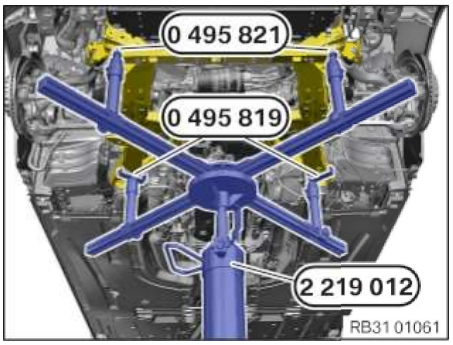
M14	Renew screws.	Tightening torque	175 Nm



- Position the adapter for the front axle support on the front axle support .
- Tighten the screws (1).

Adapter, front axle support to front axle support

M8x70		Tightening torque	19 Nm



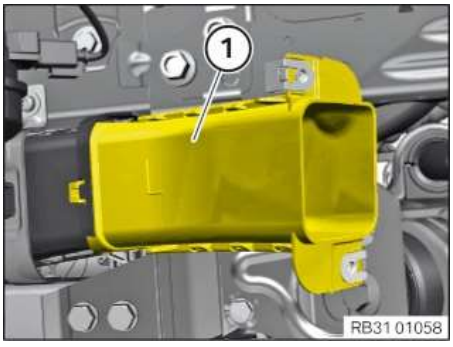
- Loosen tensioning strap.
- Lower the universal jack 2 219 012 and place to one side.

59 – Partially installing the left and right brake air duct

NOTICE

Perform the operations on the left and right side.

▸ **Installing the brake air duct partially**



- Position and clip in air duct (1).

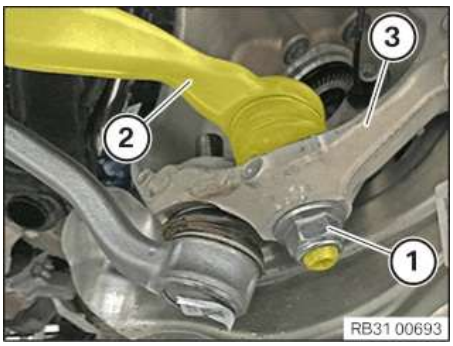
60 – Securing the left and right tension strut to the swivel bearing

NOTICE

Description is for left component only. Procedure on the right side is identical.

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▸ **Securing tension strut on swivel bearing**



- Position tension strut (2) on swivel bearing (3).
- Renew nut (1).

  Parts: Nut
- Tighten nut (1).

Note: Use the Torx socket for counter support.

Tension strut to swivel bearing

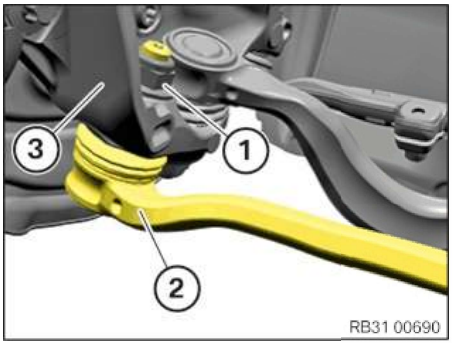
M14	Renew nut.	Tightening torque	175 Nm

61 – Secure left and right wishbone onto swivel bearing

NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Mounting the wishbone on the swivel bearing**



- Position the wishbone (2) on the swivel bearing (3).
- Renew nut (1).

  Parts: Nut
- Tighten nut (1).

Note: Use the Torx socket for counter support.

Wishbone to swivel bearing

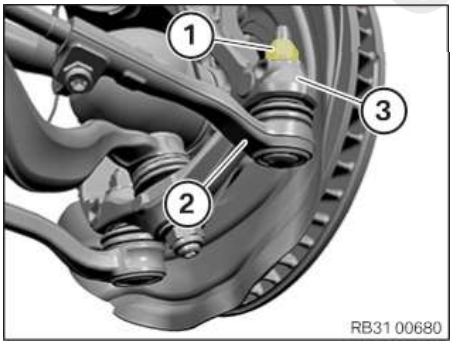
M14	Renew nut.	Tightening torque	175 Nm

62 – Securing the track rod on the left and right to the swivel bearing

NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Securing the track rod on the swivel bearing**



- Position the track rod (2) on the swivel bearing (3).
- Renew nut (1).

  Parts: Nut
- Tighten nut (1).

Note: If necessary, counter-hold at the Torx socket.

Track rod end to swivel bearing

M14	Renew nut.	Tightening torque	175 Nm

63 – Securing the right and left output shaft on the wheel bearing

NOTICE

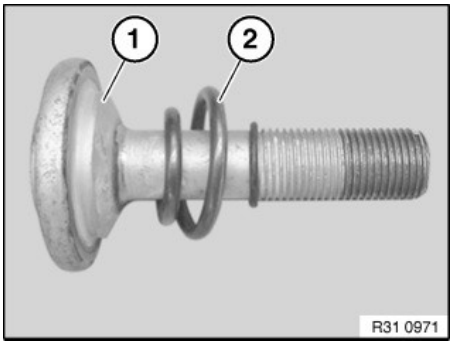
Perform the operations on the left and right side.

▸ **Securing the output shaft on the wheel bearing**

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TECHNICAL INFORMATION

The installation note for front gearing must be observed at all times.

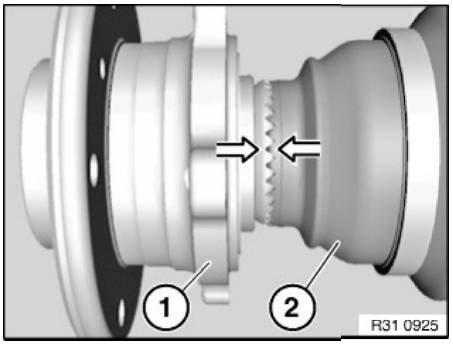


- Renew the collar bolt (2) and the compression spring (1).

  Parts: Collar bolt and compression spring
- Note installation position of compression spring (2).
- Keep the collar bolt (1) and the front gearing of the wheel bearing and the output shaft clean and free of grease.



- Hand-tighten the collar bolt (1) with the compression spring.



TECHNICAL INFORMATION

The front gearing of the wheel bearing and output shaft must be installed in an interlocking position (tooth-in-tooth).

- Check whether front gearing is locked tooth in tooth (arrows) by reciprocally rotating the wheel bearing (1) and the output shaft (2).
- Verify positive locking.
- Press brake pedal.
- Tighten the collar bolt.

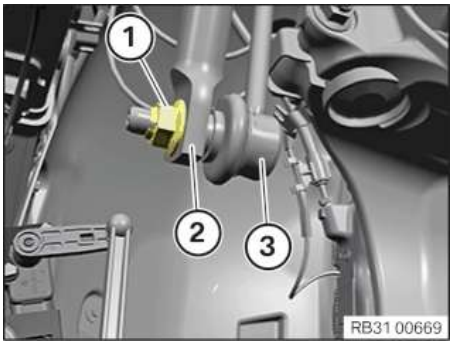
Output shaft to wheel bearing

M16	Replace collar bolt and spring.	Jointing torque	210 Nm
		Angle of rotation	90 °

64 – Securing the anti-roll bar link to the left and right anti-roll bar

NOTICE

Perform the operations on the left and right side.



▸ **Securing the anti-roll bar link to the anti-roll bar**

- Position the anti-roll bar link (3) on the anti-roll bar (2).
- Renew nut (1).

  Parts: Nut
- Tighten nut (1).

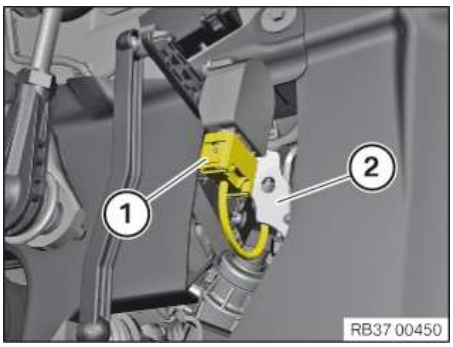
Note: Use the Torx socket for counter support.

Front anti-roll bar link to anti-roll bar/spring strut

M10	Renew nut.	Tightening torque	56 Nm

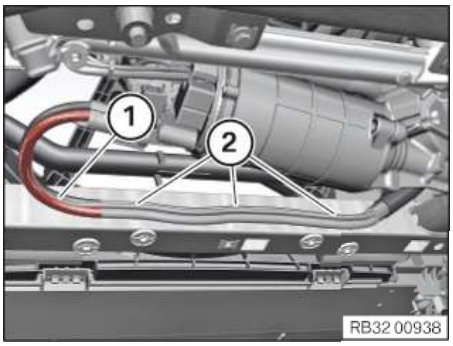
carlogic.com

65 – Attach the line connection of the ride height sensor



- Position the line .
- Clip in line on holder (2) .
- Connect connectors (1) and lock.

66 – Secure the wiring harness for the EPS on the front axle support



- Position the EPS wiring harness (1) from the front axle support.
- Secure the holder (2).

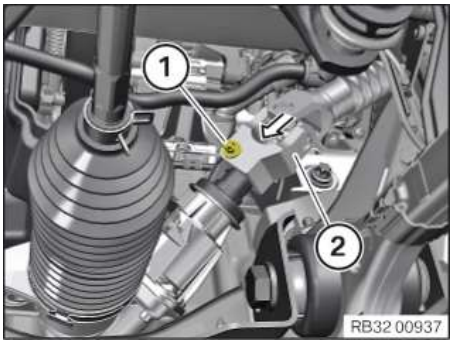


- Connect connectors (1) and (2) lock.

67 – Securing the steering shaft at the bottom on the steering gear

TECHNICAL INFORMATION

The universal joint can only be installed in one position.
The universal joint and the bottom steering gear and/or steering shaft are encoded with each other.
The clamping bolt must e positioned in the groove of the steering gear groove or the steering shaft.



- Clean the screw threads to remove all remnants of screw locking adhesive.
- Slide the lower steering shaft (2) onto the steering gear in the direction of the arrow.
- Renew the clamping bolt (1).

  Parts: Clamping bolt
- Tighten the clamping bolt (1).

Universal joint to steering box

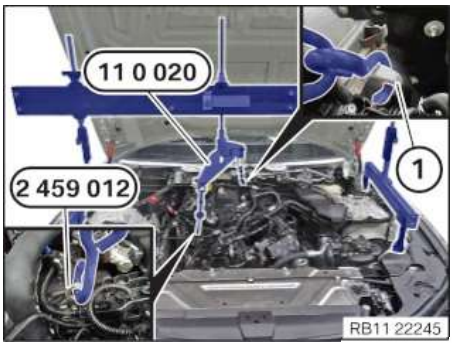
M8	Recut screw thread. Renew clamping bolt. No retorquing permitted!	Tightening torque	28 Nm

68 – Loosen the attachment of the engine in installation position

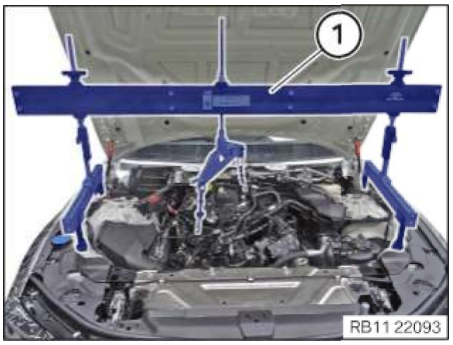
cardiagn.com



- Lower engine by turning the spindle 2 361 506 (00 6 103) until the engine lies completely on the engine supports.



- Feed out special tool 0 490 567 (11 0 020) on the special tool and set aside.
- Feed out special tool 0 490 567 (11 0 020) on the engine mounting bracket (1) and set aside.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

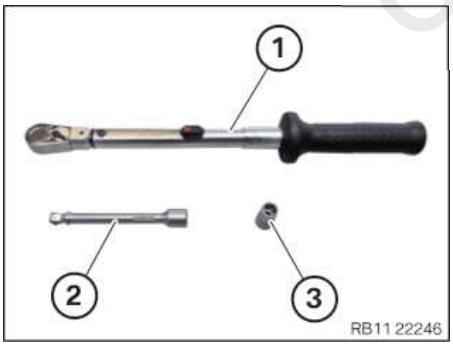
- Remove the engine bridge (1) with an auxiliary person.



- Tighten bolt (1) of the right engine mount from the top using a standard tool.

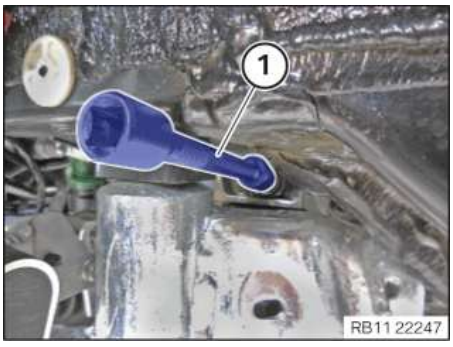
Engine mount to engine mounting bracket

M12	Tightening torque	100 Nm



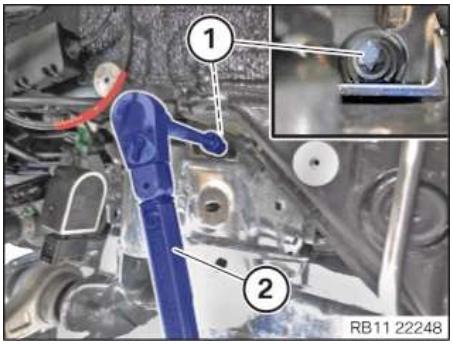
- Have all suitable tools available.

Number	Description
1	Commercial available torque spanner
2	Swivelling extension
3	External TorxE14



- Position suitable tools (1).

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- Tighten bolt (1) of the left engine mount using a standard tool (2) sideways.

Engine mount to engine mounting bracket

M12		Tightening torque	100 Nm



- Unscrew the bolts (1) of the special tool .
- Feed out the special tool at the cylinder head and remove.

69 – Check/add front axle transmission oil

RISK OF DAMAGE

Damage to the front axle differential.

Failure to comply with the oil specifications can result in serious damage to the front axle differential.

- Use only the approved front axle transmission oil.

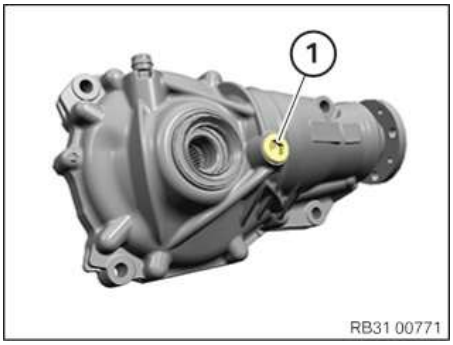
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Use special tool 0 493 337 (00 2 080) to top up the front axle transmission oil.

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- Release the screw plug (1).
- Check front axle differential oil level.
- If necessary, top up the front axle transmission oil to the lower edge of the opening for the screw plug (1).

Transmission oil

Technically suitable front axle transmission oils	

Main group 31

- Renew the screw plug (1).

  Parts: Plug
- Tighten the screw plug (1).

Screw plug to front axle transmission

M22	Renew screw plug with O-ring.	Tightening torque	60 Nm

70 – Install the rear section of the front wheel arch cover on the left and right

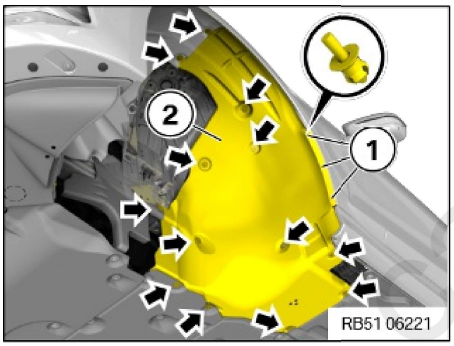
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Install the rear section of the front wheel arch cover**

NOTICE

To provide a better overview: Schematic diagram with partially hidden components.



- Install the rear section of the front wheel arch cover(2) .
- Tighten screws (arrows).

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

- Secure expanding rivet (1).

71 – Installing the front section of the wheel arch cover on the front left and right

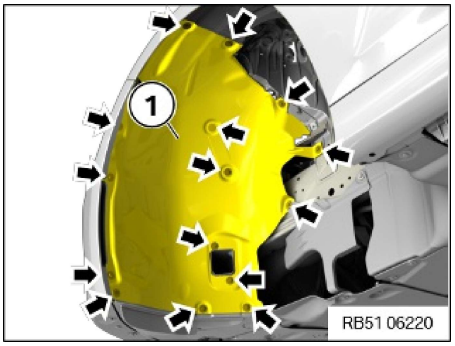
NOTICE

Perform the operations on the left and right side.

▸ **Install the front section of the front wheel arch cover**

NOTICE

To provide a better overview: Schematic diagram with partially hidden components.



- Install the front section of the front wheel arch cover (1).
- Tighten screws (arrows).

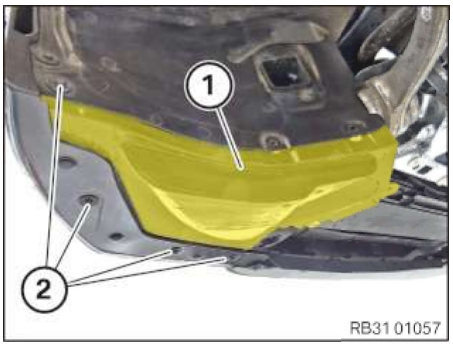
Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

72 – Installing the bottom left and right wheel arch cover

NOTICE

Description is for left component only. Procedure on the right side is identical.



▸ **Installing the bottom wheel arch cover**

- Position the bottom wheel arch cover (1).
- Tighten the screws (2).

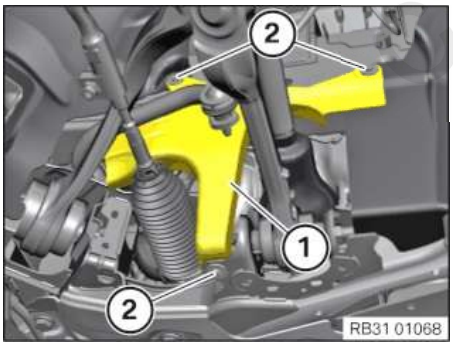
Cover, front bottom on side

Hexagon screw for thermoplastic		Tightening torque	3 Nm

73 – Install the cover of the steering assembly on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.



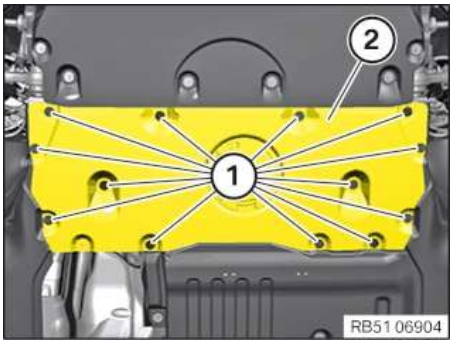
▸ **Install the cover of the steering assembly**

- Position the cover (1).
- Tighten the screws (2).

Cover, steering unit

Screw		Tightening torque	3 Nm

74 – Installing the centre underbody protection



- **Version with rear-wheel drive:**

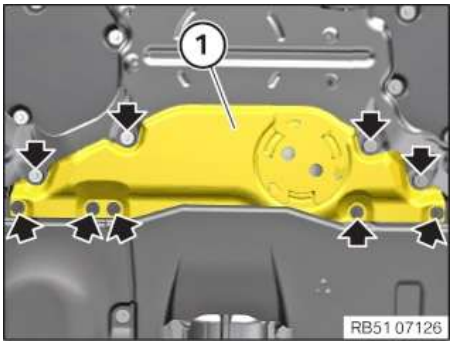
  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

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- **Version with all-wheel drive:**

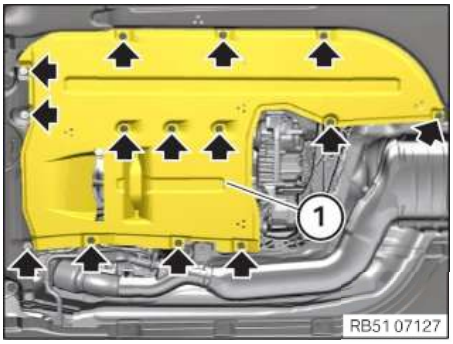
  Guide in and install the centre of underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

75 – Installing underbody protection at rear



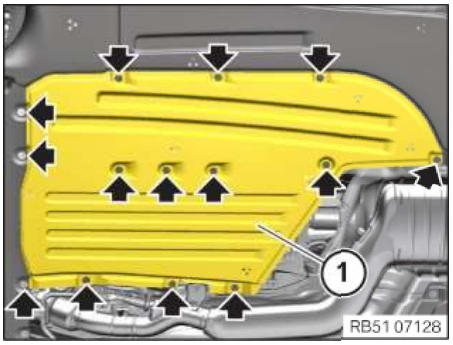
- **Version 1:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version 2:**

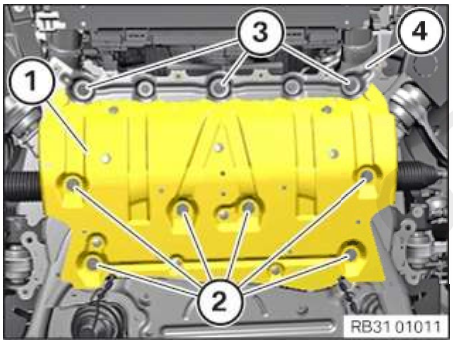
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

76 – Installing the stiffening plate

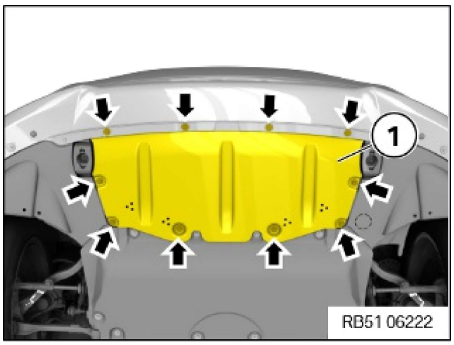


- Position stiffening plate (1).
- Screw screws (2) in.
- Position holder of underride protection (4).
- Screw screws (3) in.
- Tighten down screws (2) and (3).

Stiffening plate to front axle support

M10		Tightening torque	56 Nm

77 – Installing the front underbody protection



- **Version 1:**

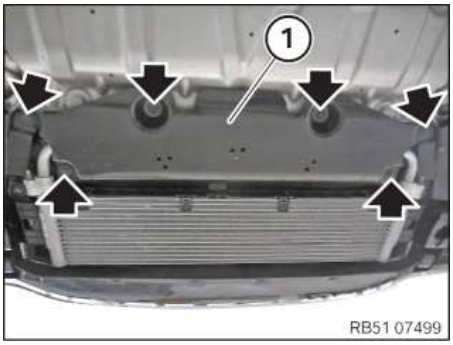
  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

ardiagn.com



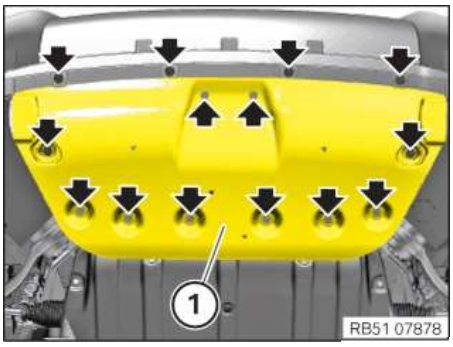
- **Version 2:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version 3:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

78 – Installing both front wheels

▸ **Mounting the wheel**



TECHNICAL INFORMATION

The contact surface between the brake disc and the wheel rim must be clean and free from oil and grease. There is otherwise a risk of the wheel becoming loose at a later time.

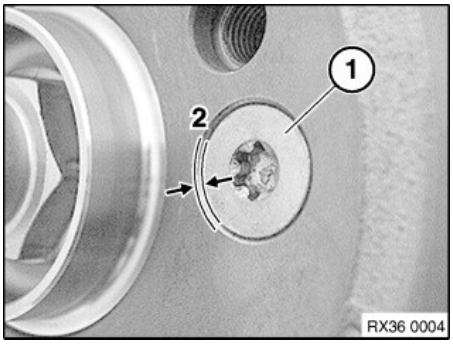
- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).



- Check that the mounting bolt (1) for the brake disc is securely seated.

  The mounting bolt (1) for the brake disc may not protrude under any circumstances on the contact surface (2) between the brake disc and the wheel rim.

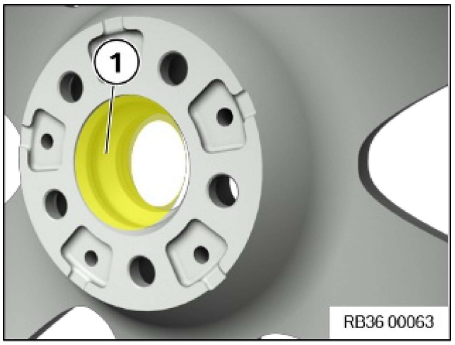
Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm

carlagr.com



- Thinly grease the wheel centring (1) in the wheel rim.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



- Lightly grease the front and rear wheel hubs in this area (1) to protect from corrosion.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



- In vehicles with M Carbon ceramic brake: The wheel assembly jack must be used to install the wheel (see workshop equipment).

  This process is intended to prevent damage to the brake disc.

carsdiagn.com



TECHNICAL INFORMATION

Never use impact screwdrivers or electric screwdrivers to screw in and tighten the wheel bolts.

The wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel bolts/wheel rims, it may be necessary to retighten the wheel bolts on account of setting properties (refer to the documentation from the manufacturer).

Do not apply oil to new wheel bolts.

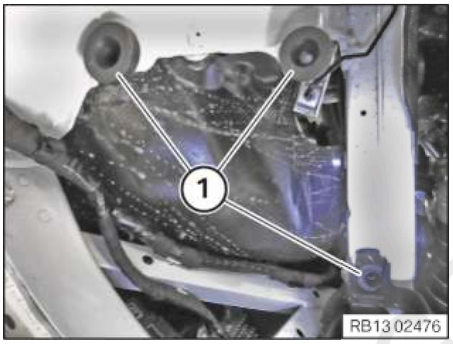
- Renew corroded wheel bolts.

  Parts: Wheel bolts
- Clean the wheel bolts.
- Check wheel bolts and threads for damage, renew the wheel bolts if necessary.
- Join and tighten the wheel bolts (arrows).

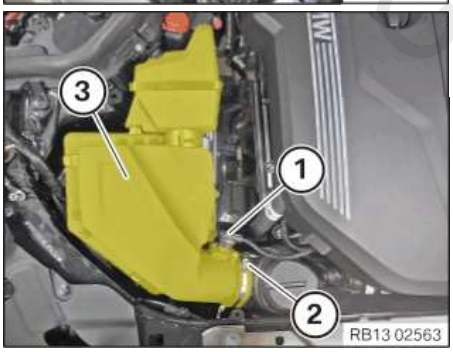
Wheel bolts

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.	Tightening torque	140 Nm
	Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence.	Check	140 Nm
	Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.		

79 – Installing intake silencer housing



- Check the rubber mount (1) for correct fit.



- Feed the intake filter housing (3) in and engage it in the rubber mounts.
- Tighten clamp (2).

Clean air pipe to upper section of intake filter housing

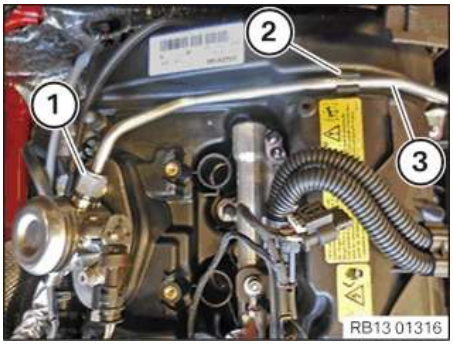
Clamp		Tightening torque	3 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

80 – Installing fuel delivery line

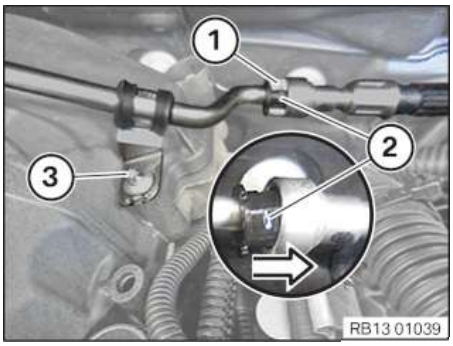
cardiagn.com



- Guide the fuel delivery line (3) in and install.
- Install rubber damper (2).
- Check the rubber damper (2) for the correct fit.
- Tighten the union nut (1) hand-tight.
- Tighten union nut (1).

Fuel delivery line to high pressure pump

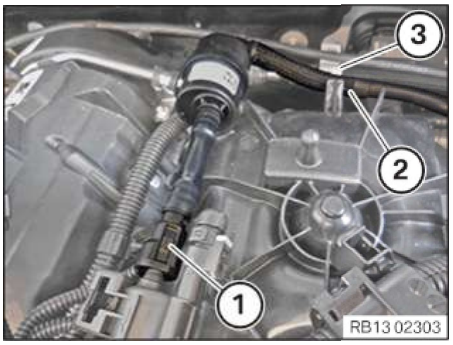
M14		Tightening torque	31 Nm



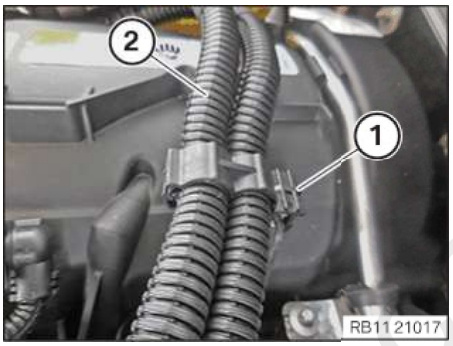
- Slide in and lock the fuel feed line in the direction of the arrow in the snap fastener (2).
  The fuel feed line must be audibly engage in the snap fastener (2).
- Secure clamps (1).
- Tighten down screw (3).

Fuel line to cylinder head cover

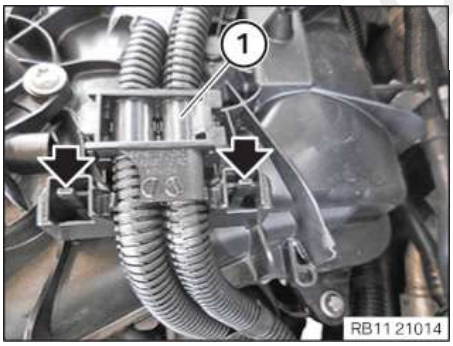
6x18		Tightening torque	6,5 Nm



- Insert and install the tank ventilation line (2).
- Lock (1) must engage audibly.
- Secure the tank ventilation line (2) to the clamp (3).



- Insert and install wiring harness section (2) for injectors and ignition coils.
- Secure clamps (1).



- Insert and install wiring harness section (1) for injectors and ignition coils.
- The locks (arrows) must engage audibly.

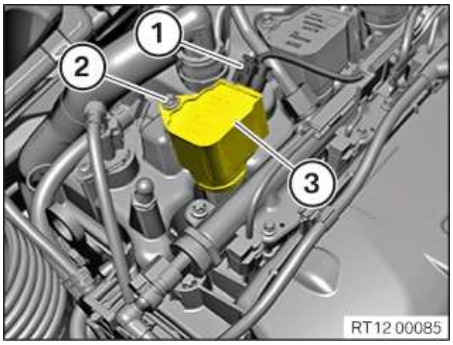
81 – Install all ignition coils

NOTICE

The description is for one component only. The procedure is identical for all further components.

▸ **Install ignition coil.**

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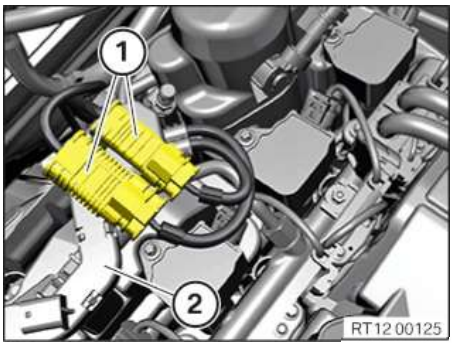
- Install ignition coil (3).
- Tighten down screw (2).

Ignition coil

Screw		Tightening torque	8 Nm

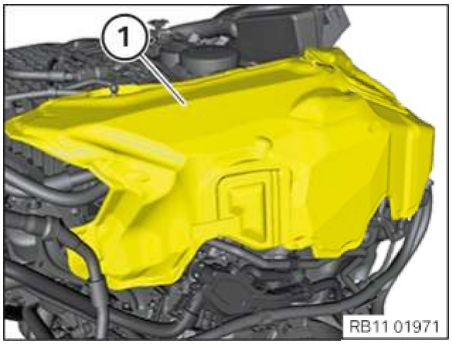
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Connect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor on the cable shaft (2).

82 – Installing acoustic cover at rear

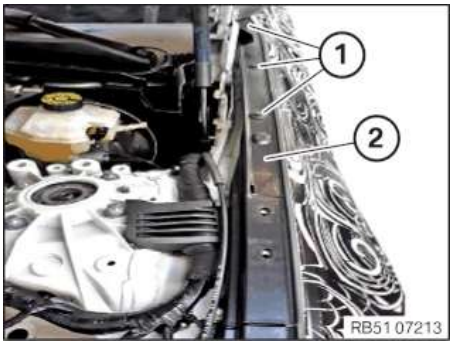


- Make sure the acoustic cover (1) is correctly positioned on the rear side of the engine.



- Install the acoustic cover (1) from the top and clip it in into the marked areas.

83 – Installation of side panel sealing.



NOTICE

Description is for left component only. Procedure on the right side is identical.

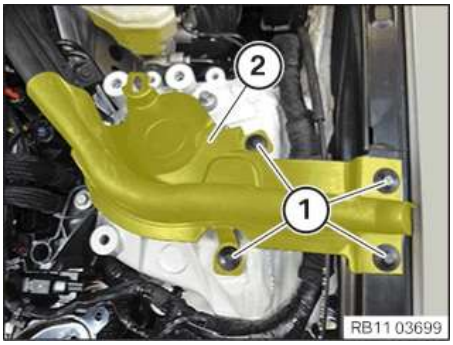
- Guide the sealing (2) in and install it.
- Mount the expanding rivets (1).

84 – Install side bonnet seals

NOTICE

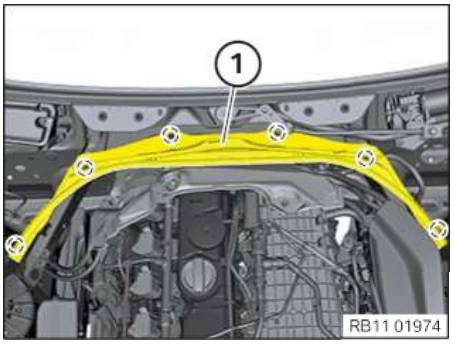
Perform the operations on the left and right side.

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- Position the side bonnet seal (2) on the spring strut dome.
- Secure the rivet (1).

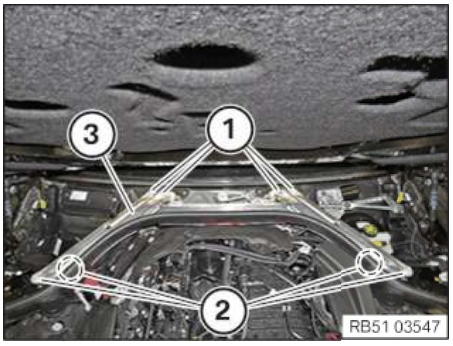
85 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

		Tightening torque	3 Nm



- **If installed:** Install tension strut on spring strut dome.
- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).
  Parts: Bolts
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

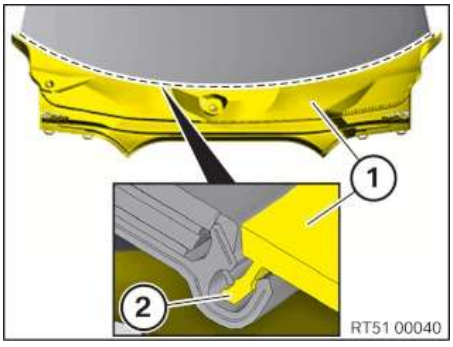
86 – Installing cowl panel cover

RISK OF DAMAGE

Damage caused by water ingress into the vehicle.

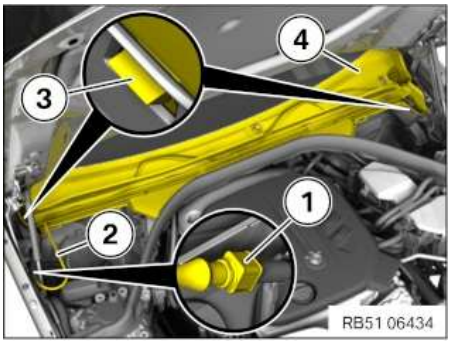
Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

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- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

87 – Installing both wiper arms

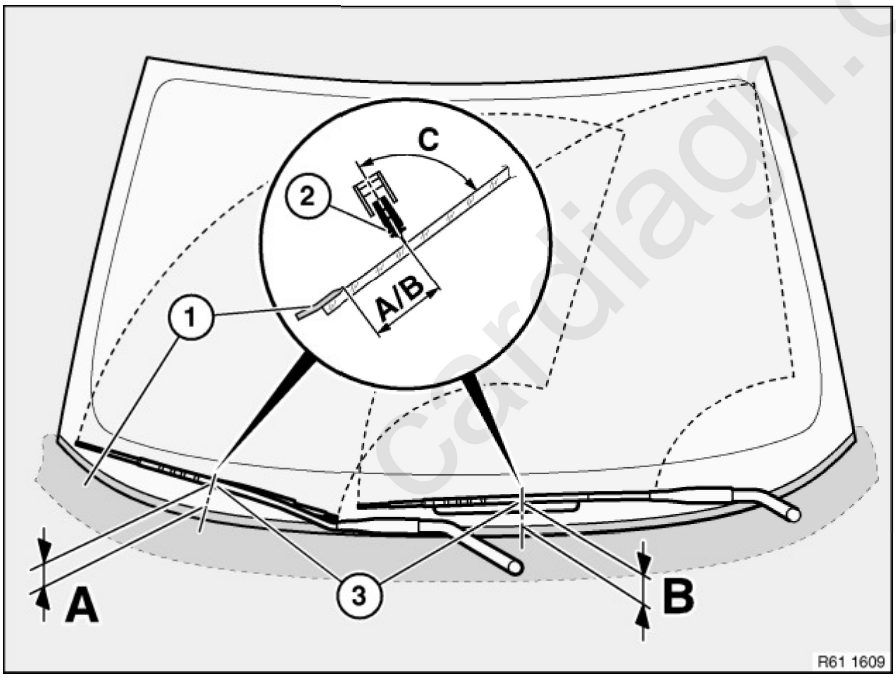
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Install the wiper arm**

TECHNICAL INFORMATION

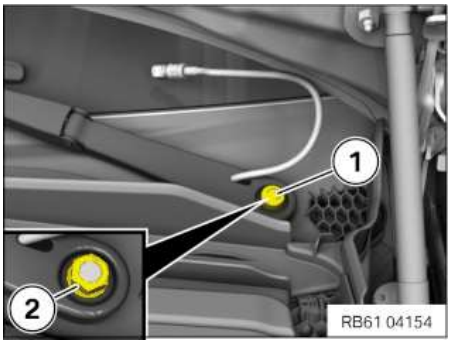
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



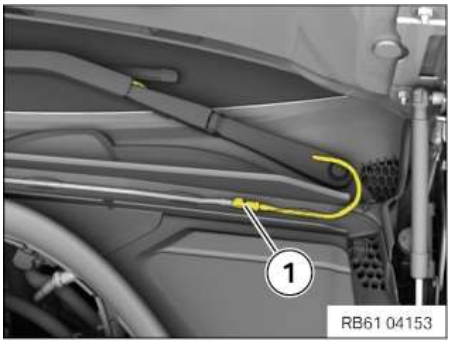
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

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- Insert windscreen wash hose (1) into the cowl and connect at the separating point.

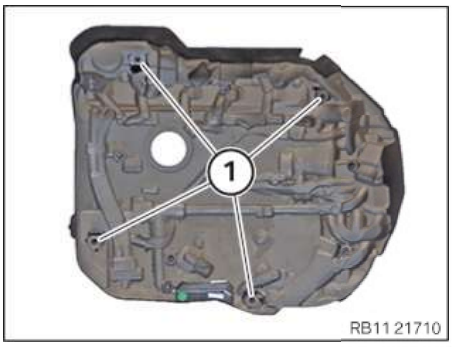
88 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover.

- Disassemble or mount the acoustic cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

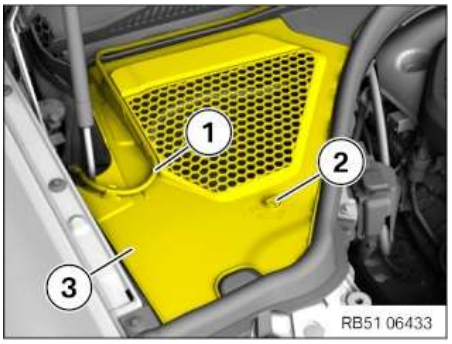
89 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

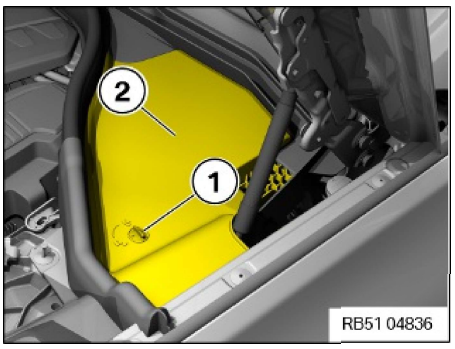
90 – Install the rear right engine compartment cover

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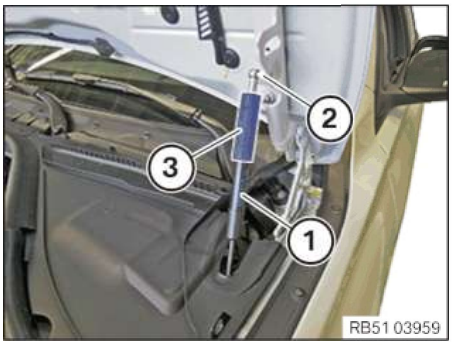
- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

91 – Install the cover of the engine compartment on the rear left

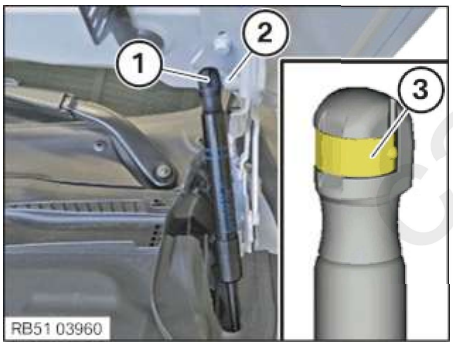


- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

92 – Take bonnet out of the service position



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



CAUTION

Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

93 – Topping up the engine oil

RISK OF DAMAGE

Damage to the petrol particulate filter.

Vehicles equipped with a petrol particulate filter must be operated with low-ash engine oil only.

- Use BMW Longlife-04 , BMW Longlife-12 FE or BMW Longlife-17 FE+ engine oils or engine oils approved by BMW matching the same specifications only.
- For additional information see: Overview of approved engine oils for BMW Group engines.

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RISK OF DAMAGE

Engine damage caused by excessively filling the engine with engine oil.

Filling an excessive quantity of engine oil may cause engine damage.

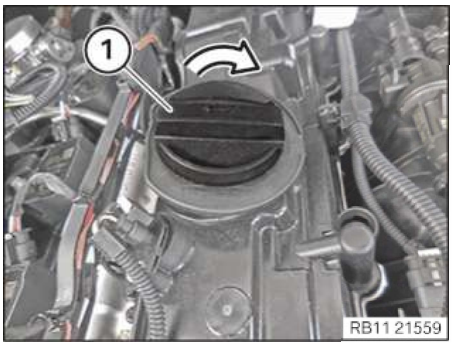
- Observe the exact engine oil filling capacity.
- Drain the engine oil.

- Pour in engine oil.

Engine oil B58B30M1/B58B30O1

Filling capacity, engine oil change with oil filter element	6,50 l
Engine oil: Technically suitable engine oils for BMW Group engines	

94 – Installing the oil filler cap



- Close oil filler cap (1) in direction of arrow.
- Make sure that the sealing cap (1) engages audibly.

95 – Disconnecting all battery earth leads



- See additional information.

Additional Information

Overview of Tightening Torques

Oil drain plug — Used in step 25

M12x16	Replace sealing ring.	Tightening torque	25 Nm

Special tool to cylinder head — Used in step 28

M8		Tightening torque	21,5 Nm

Oil level sensor to oil sump — Used in step 48

M6 hexagon nut		Jointing torque	2 Nm
		Tightening torque	8,5 Nm

Oil sump to crankcase — Used in step 49

M8 x 30		Tightening torque	24 Nm

Oil sump to crankcase — Used in step 49

M8 x 110		Tightening torque	24 Nm

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Transmission to oil sump (manual gearbox and automatic transmission) Used in step 49

M8 x 50		Tightening torque	19 Nm

Bearing support to oil sump Used in step 50

M8		Tightening torque	19 Nm

Front axle final drive to engine oil pan Used in step 51

M12		Tightening torque	140 Nm

Holder for front transmission oil cooler line Used in step 52

M6x18		Tightening torque	12 Nm

Starter motor to crankcase Used in step 53

M8x60		Tightening torque	19 Nm

Battery positive lead to starter Used in step 55

M8		Tightening torque	13,5 Nm

Propeller shaft before the front axle differential Used in step 57

Renew screws. Jointing torque and angle of rotation must be observed without fail.		Tightening torque Angle of rotation	25 Nm 45 °

Front axle support to front/centre of body Used in step 58

M12	Renew screws.	Jointing torque	108 Nm

Front axle carrier to body, rear Used in step 58

M14	Renew screws.	Tightening torque	175 Nm

Adapter, front axle support to front axle support Used in step 58

M8x70		Tightening torque	19 Nm

Tension strut to swivel bearing Used in step 60

M14	Renew nut.	Tightening torque	175 Nm

Wishbone to swivel bearing Used in step 61

M14	Renew nut.	Tightening torque	175 Nm

Track rod end to swivel bearing Used in step 62

M14	Renew nut.	Tightening torque	175 Nm

Output shaft to wheel bearing Used in step 63

M16	Replace collar bolt and spring.	Jointing torque Angle of rotation	210 Nm 90 °

Front anti-roll bar link to anti-roll bar/spring strut Used in step 64

M10	Renew nut.	Tightening torque	56 Nm

Universal joint to steering box Used in step 67

M8	Recut screw thread. Renew clamping bolt. No retorquing permitted!	Tightening torque	28 Nm

Engine mount to engine mounting bracket Used in step 68

M12		Tightening torque	100 Nm

Screw plug to front axle transmission Used in step 69

M22	Renew screw plug with O-ring.	Tightening torque	60 Nm

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Wheel arch trim panel, front — Used in step 7071

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Cover, front bottom on side — Used in step 72

Hexagon screw for thermoplastic		Tightening torque	3 Nm

Cover, steering unit — Used in step 73

Screw		Tightening torque	3 Nm

Underbody protection — Used in step 7475

Hexagon screw		Tightening torque	3 Nm

Stiffening plate to front axle support — Used in step 76

M10		Tightening torque	56 Nm

Underbody protection front — Used in step 77

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Brake disc to front wheel hub — Used in step 78

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 78

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 78

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim. Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Tightening torque Check	140 Nm 140 Nm

Clean air pipe to upper section of intake filter housing — Used in step 79

Clamp		Tightening torque	3 Nm

Fuel delivery line to high pressure pump — Used in step 80

M14		Tightening torque	31 Nm

Fuel line to cylinder head cover — Used in step 80

6x18		Tightening torque	6,5 Nm

Ignition coil — Used in step 81

Screw		Tightening torque	8 Nm

Bulkhead upper part to bottom bulkhead — Used in step 85

		Tightening torque	3 Nm

Tension strut on bulkhead — Used in step 85

M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome — Used in step 85

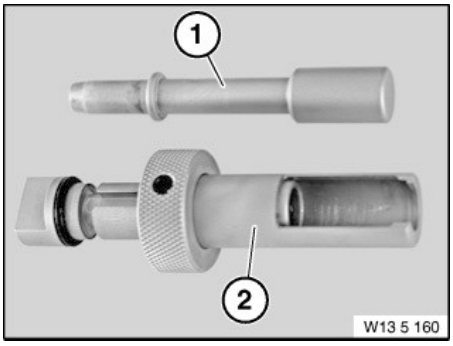
Screw	Renew screws.	Jointing torque Angle of rotation	56 Nm 90 °

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Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

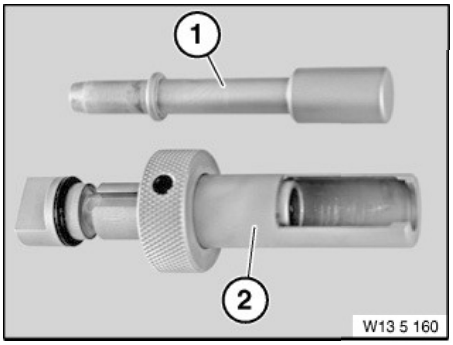
0 496 567 (13 5 161) Fastener



Common Used in step 14

Usage	(Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set
Included in the tool or work	0 496 565
Storage location	
Replaced by	
In connection with	
SI-Number	

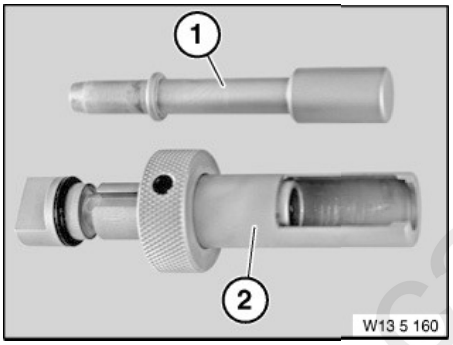
0 496 568 (13 5 162) Fastener



Common Used in step 14

Usage	(Cap (2 x)) To close off the fuel lines. Discontinued, can only be ordered using complete tool
Included in the tool or work	0 496 565
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 565 (13 5 160) Fastener



Common Used in step 14

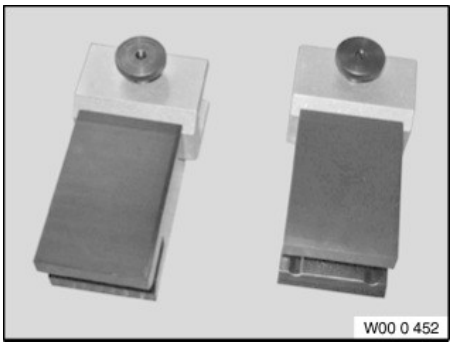
Usage	(Caps (2x)) To close off the fuel lines when removing and installing the engine.
Included in the tool or work	
Storage location	B26
Replaced by	
In connection with	
SI-Number	01 22 08 (498)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 567 (13 5 161)		**Fastener** (Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set	
2	0 496 568 (13 5 162)		**Fastener** (Cap (2 x)) To close off the fuel lines. Discontinued, can only be ordered using complete tool	

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0 495 850 (00 0 452) Upholstery



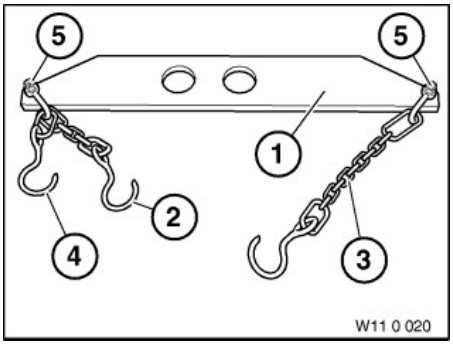
Common Used in step 28

Usage	(Pads (2 x)) Series: E70 Replaced by 00 6 042
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 22 06 (307)

0 490 567 (11 0 020) Lifting gear

Used in step 2868

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Common

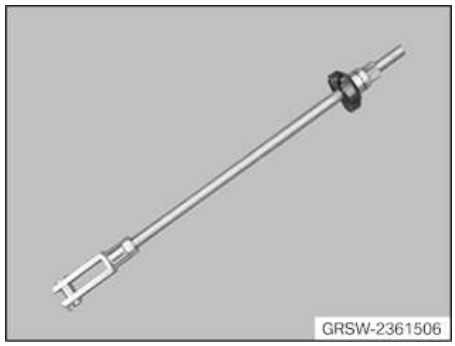
Usage	For removing and installing the engines. 08/2011 only available as a complete set. Delivered with TÜV inspection certificate and operating instructions. No delivery of separate parts.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 13 94 (888)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
5	0 490 572 (11 0 029)		**Shackle** (Shackle) 2 pieces As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	
1	0 490 568 (11 0 021)		**Lifting gear** (Cross member) As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	
2	0 490 569 (11 0 022)		**Chain** (Chain) As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	
3	0 490 570 (11 0 023)		**Chain** (Chain) Version: long As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	
4	0 490 571 (11 0 024)		**Chain** (Chain) Version: short As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	

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2 361 506 (00 6 103) Spindle



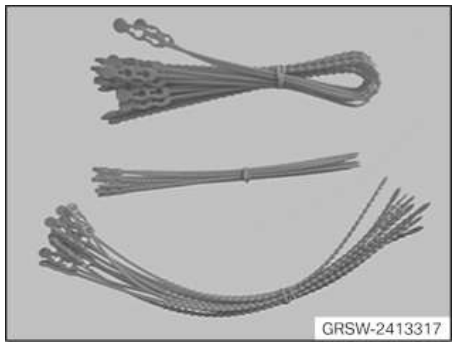
Common	Used in step 2868
Usage	Spindle (central spindle) for Traverse 00 6 100.
Included in the tool or work	0 496 852
Storage location	
Replaced by	
In connection with	
SI-Number	01 17 10 (659)

2 219 012 Hydraulic lifter



Common	Used in step 383958
Usage	For raising and lowering various vehicle components.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 90 (207)

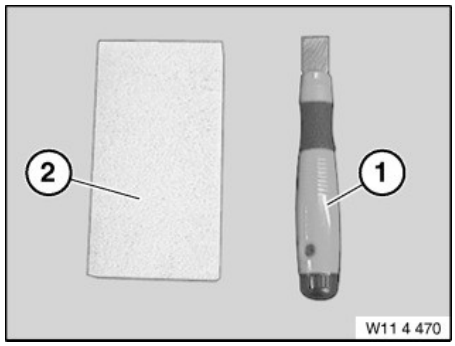
2 413 317 Cable strap



Common	Used in step 4057
Usage	The "Cable ties" parts set consists of 3 items as follows: ABV232 Length: 320 mm colour: RedABV250 Length: 500 mm colour: RedABVS270 Length: 665 mm colour: Red
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 47 15 (332)

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0 495 102 (11 4 470) Tool



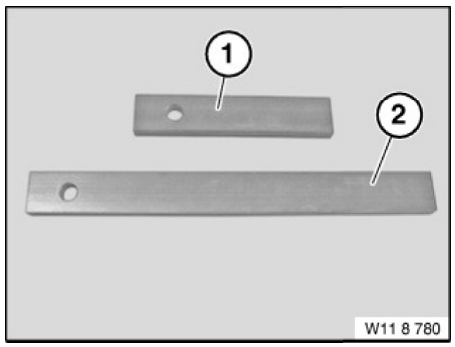
Common Used in step 49

Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 103 (11 4 471)		**Scraper**	
2	0 495 104 (11 4 472)		**Extractor** (grindstone)	

0 496 120 (11 8 780) Plate



Common Used in step 49

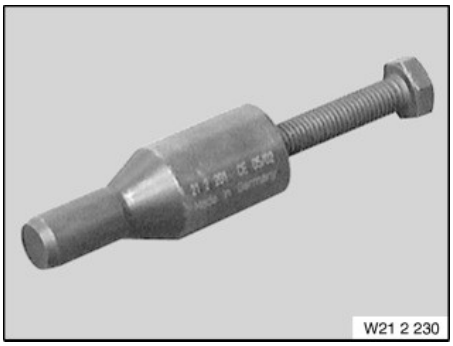
Usage	(Mounting plates) For securing transmission oil sump when gearbox is removed.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 121 (11 8 781)		**Plate** (Mounting plate, short)Discontinued; only available via set 11 8 780 = 0496120.	
2	0 496 122 (11 8 782)		**Plate** (Mounting plate, long) Discontinued; only available via set 11 8 780 = 0496120.	

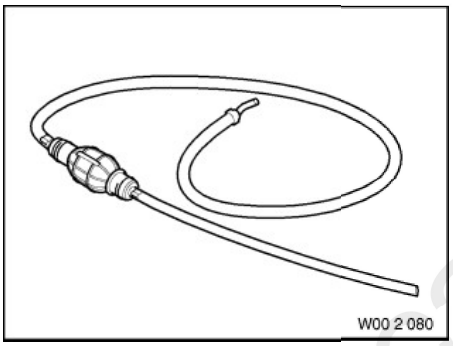
carmagn.com

0 494 649 (21 2 230) Mandrel



Common	Used in step 54
Usage	(clutch centring drift) With screw M10 (G transmission)
Included in the tool or work	
Storage location	C45
Replaced by	
In connection with	
SI-Number	01 03 03 (960)

0 493 337 (00 2 080) Pump



Common	Used in step 69
Usage	(Hand pump) For lifetime oil filling
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 01 98 (294)

2 344 011 Tool



Common	Used in step 78
Usage	Tool (wheel hub grinder) for cleaning the connection of the wheel rim (wheel contact face) to the wheel hub.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	08 08 12 (872)

Replacement tools:

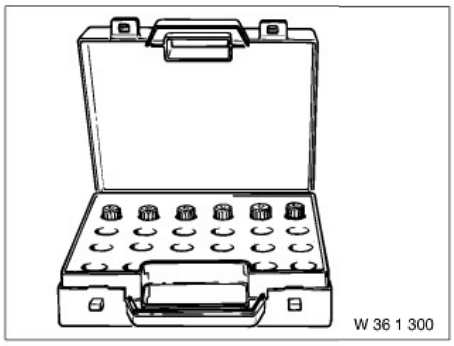
cardiagn.com

0 495 221 (36 1 323) Wheel stud



Common	Used in step 17
Usage	(Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 224 (36 1 326) Wheel stud



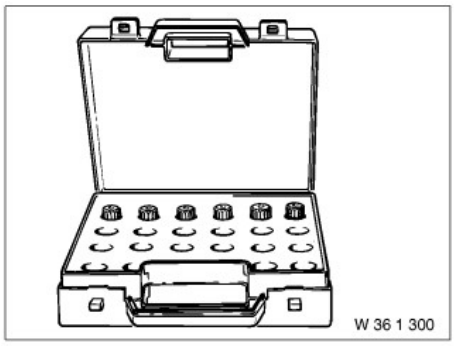
Common	Used in step 17
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 225 (36 1 327) Wheel stud



Common	Used in step 17
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 226 (36 1 328) Wheel stud



Common	Used in step 17
Usage	(Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

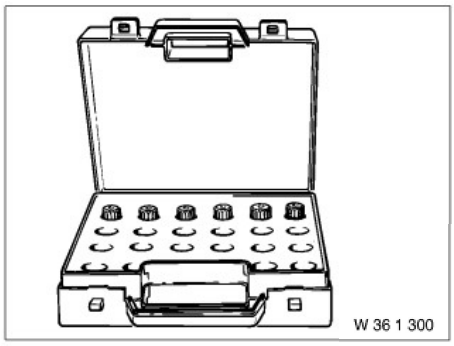
cardiagn.com

0 495 227 (36 1 329) Wheel stud



Common	Used in step 17
Usage	(Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 228 (36 1 331) Wheel stud



Common	Used in step 17
Usage	(Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 229 (36 1 332) Wheel stud



Common	Used in step 17
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 230 (36 1 333) Wheel stud



Common	Used in step 17
Usage	(Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

Overview Technical Data

Height of the sealing bead	Used in step 49
	2,0 mm ... 2,5 mm

Distance from window pane edge to wiper blade	Used in step 87
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Engine oil B58B30M1/B58B30O1	Used in step 93

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Filling capacity, engine oil change with oil filter element	6,50 l
Engine oil: Technically suitable engine oils for BMW Group engines	

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	49

Repair instructions	Used in step
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	195
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	195
61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
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61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 20 900 Disconnecting and connecting battery earth lead	195
61 35 ... Notes on ESD protection (Electro Static Discharge)	134648
00 .. ... Raising the vehicle using a vehicle hoist	

Operating materials	Used in step
3.0 Technically appropriate engine oils for BMW Group engines	93

Operating materials	Used in step
Main group 31	69

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11 14 295 Remove and install / replace the acoustic cover for the oil sump

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

PRELIMINARY WORK

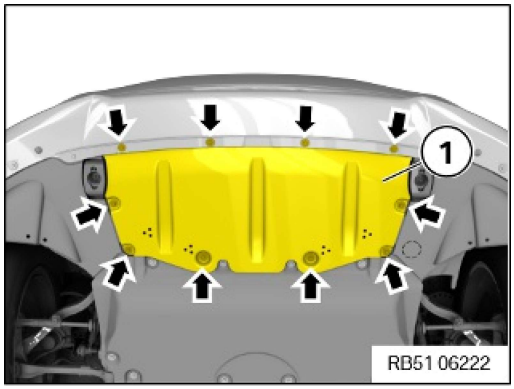
1 – Disconnecting all battery earth leads



- See additional information.

2 – Removing the front underbody protection

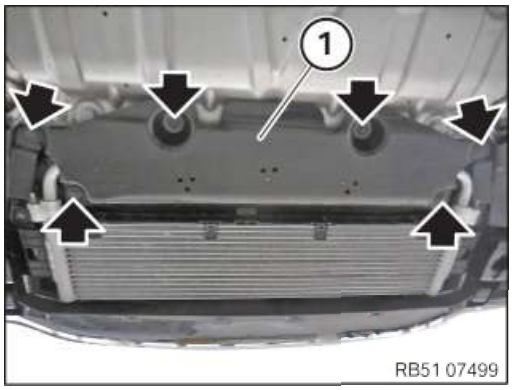
cardiagn.com



- **Version 1:**

  Remove screws (arrows).

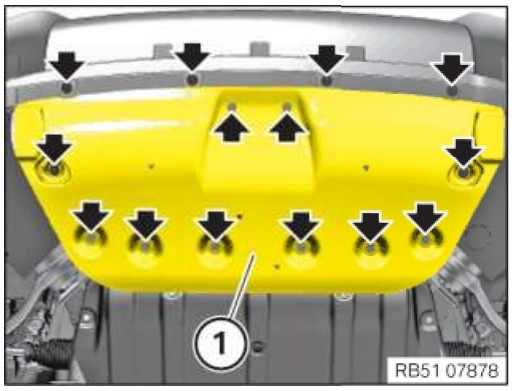
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version 2:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

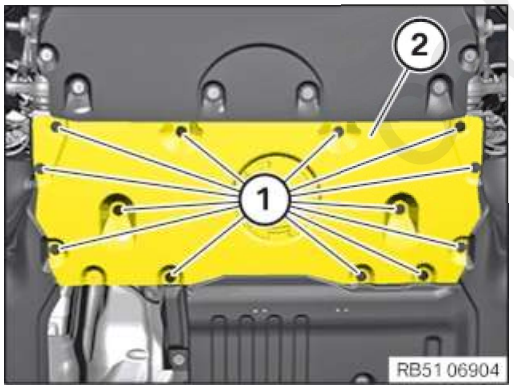


- **Version 3:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

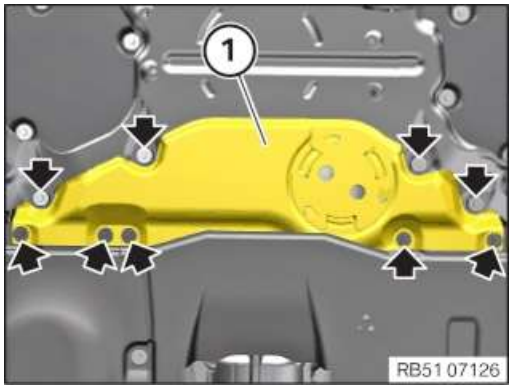
3 – Removing the centre underbody protection



- **Version with rear-wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



- **Version with all-wheel drive:**

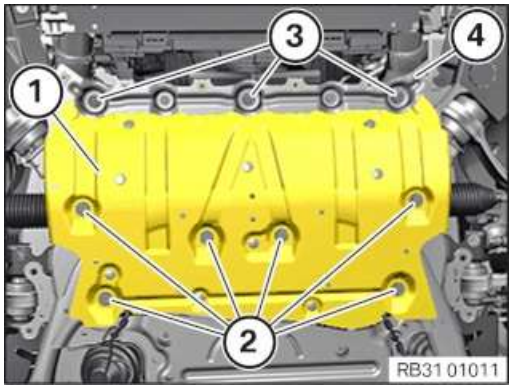
  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

4 – Removing the stiffening plate

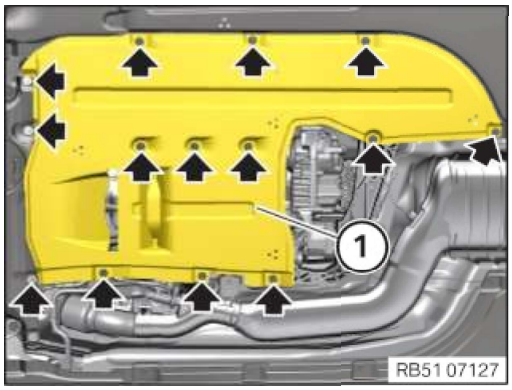
TECHNICAL INFORMATION

Driving without stiffening plate is not permissible.



- Loosen screws (3).
- Remove the holder of the underride protection (4).
- Loosen screws (2).
- Remove stiffening plate (1).

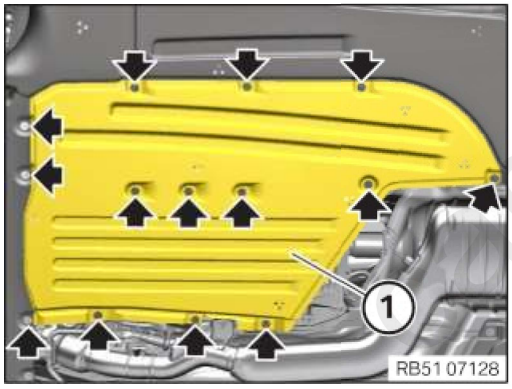
5 – Remove rear underbody protection



- **Version 1:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version 2:**

  Remove screws (arrows).

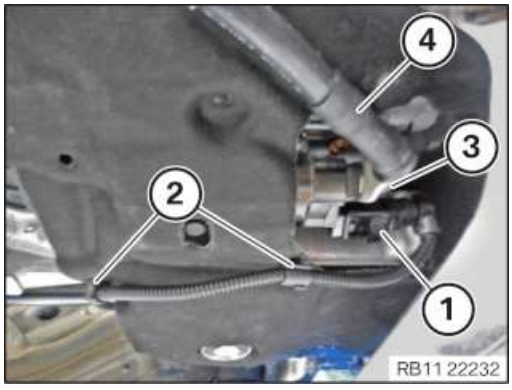
  Guide out rear underbody protection (1) and remove it.

MAIN WORK

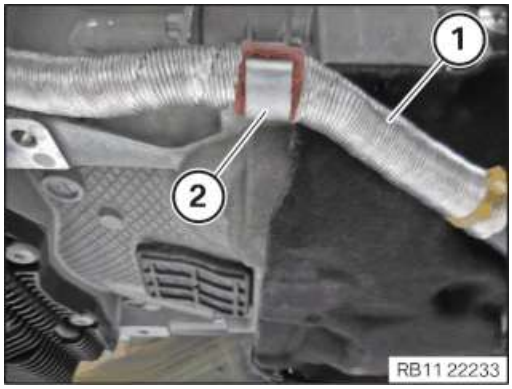
6 – Removing the acoustic cover of the oil sump

Prerequisite

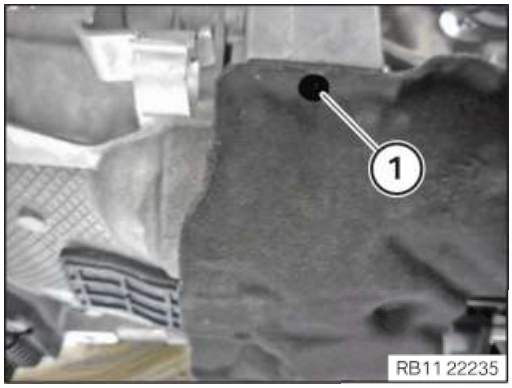
Disconnect all negative battery cables.



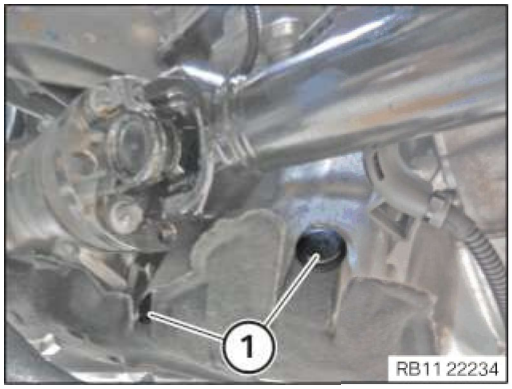
- Unlock plug connection (1) and disconnect.
- Unlock and loosen the clamps (2).
- Loosen nut (3).
- Feed out positive battery cable (4) and set it aside.



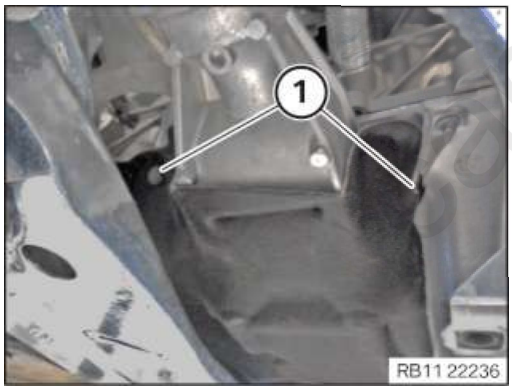
- Guide the positive battery cable (1) out of the clamp (2) and lay to one side.



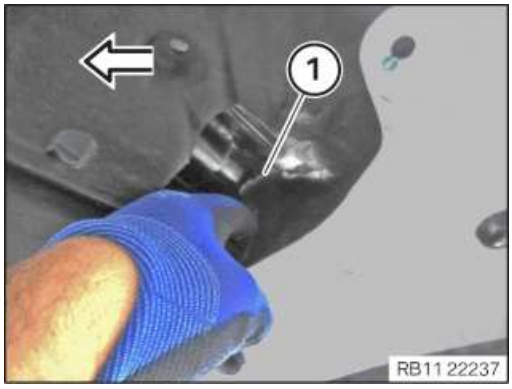
- Undo fir tree clip (1).



- Loosen the expanding rivet (1).



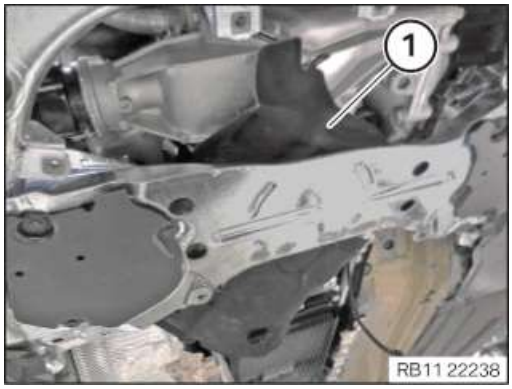
- Loosen the expanding rivet (1).



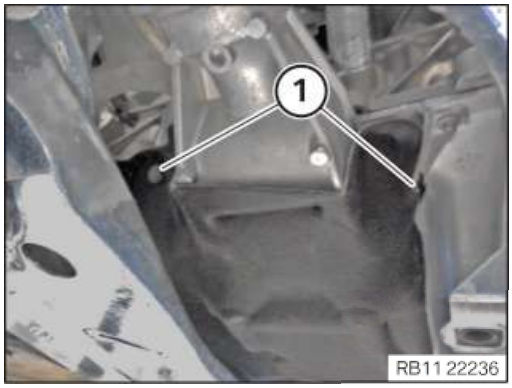
- Push the acoustic cover (1) downward.
- Feed out and remove the acoustic cover (1) in the **direction** of the arrow.

7 – Installing the acoustic cover for the oil sump

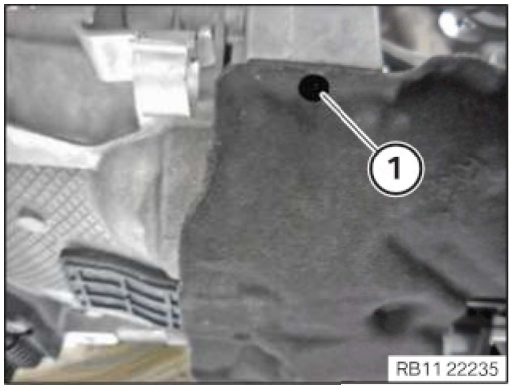
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- Thread in and position the acoustic cover (1).

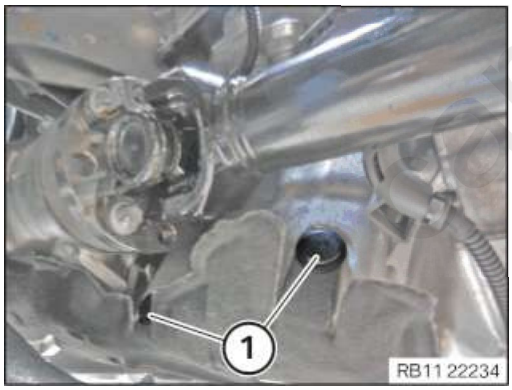


- Secure expanding rivet (1).

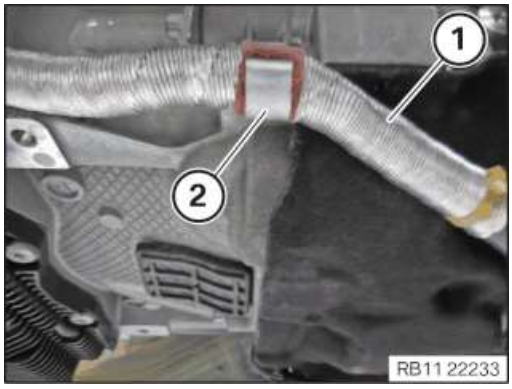


- Check the fir tree clip (1) for damage and renew if necessary.

  Parts: Fir tree clip

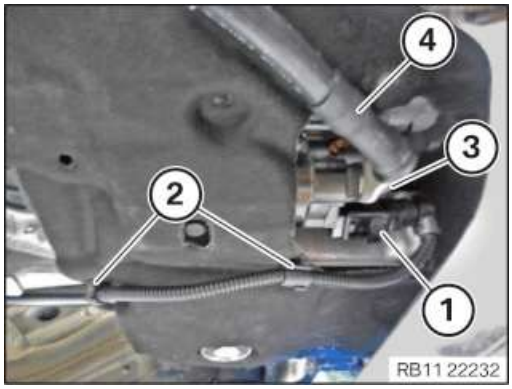


- Secure expanding rivet (1).



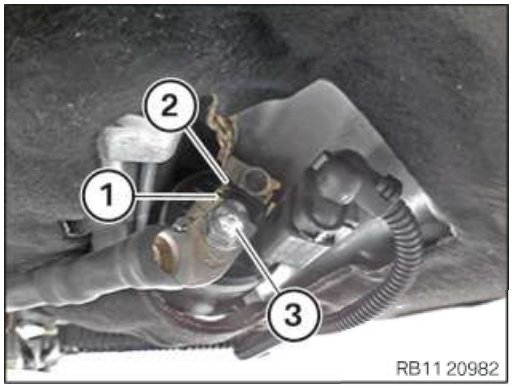
- Secure positive battery cable (1) at the clamp (2).

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- Connect connectors (1) and lock.

  The connector (1) must engage audibly.
- Secure clamps (2).
- Insert and install the positive battery cable (4).
- Tighten the nut (3) hand-tight.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

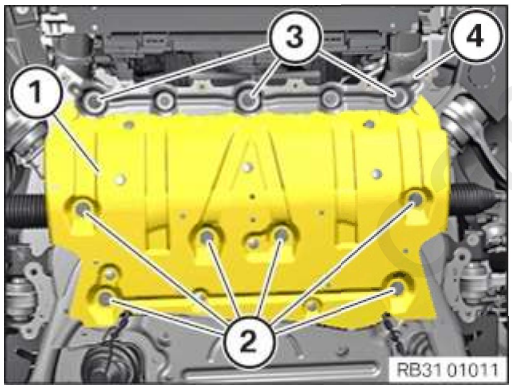
- Attach positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

POSTPROCESSES

8 – Installing the stiffening plate

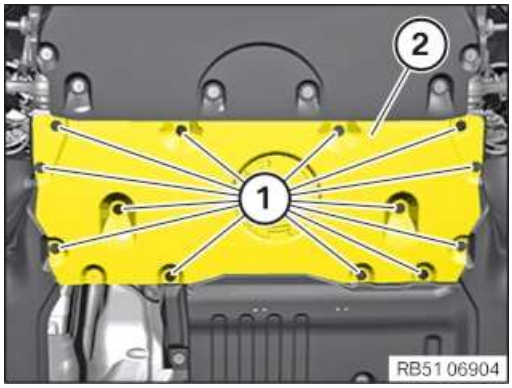


- Position stiffening plate (1).
- Screw screws (2) in.
- Position holder of underride protection (4).
- Screw screws (3) in.
- Tighten down screws (2) and (3).

Stiffening plate to front axle support

M10		Tightening torque	56 Nm

9 – Installing the centre underbody protection



- **Version with rear-wheel drive:**

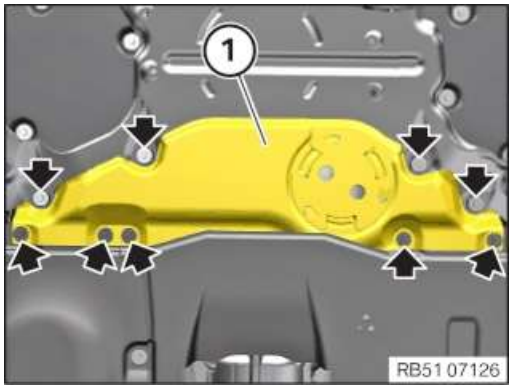
  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

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- **Version with all-wheel drive:**

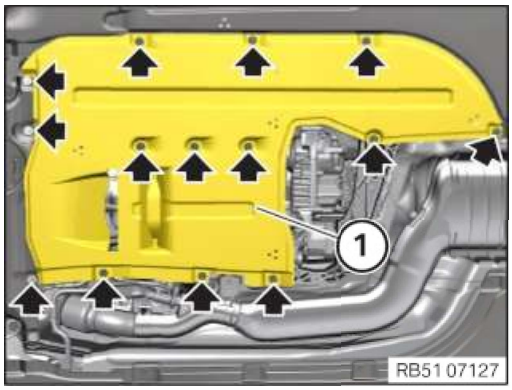
  Guide in and install the centre of underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

10 – Installing underbody protection at rear



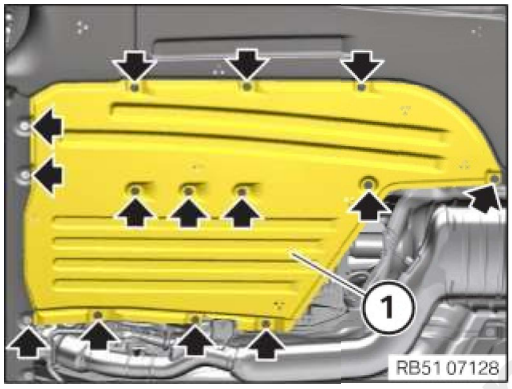
- **Version 1:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version 2:**

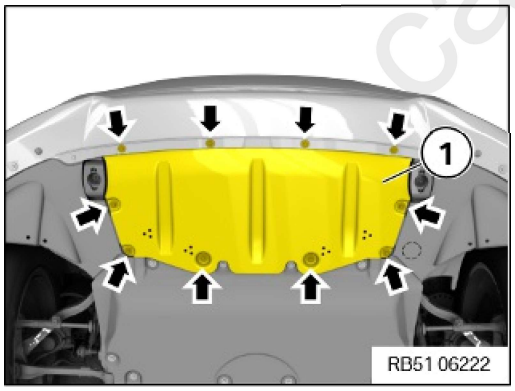
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

11 – Installing the front underbody protection



- **Version 1:**

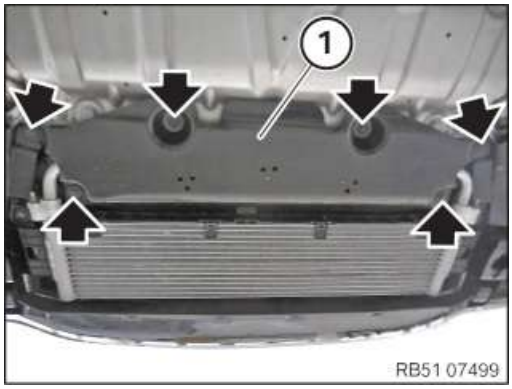
  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

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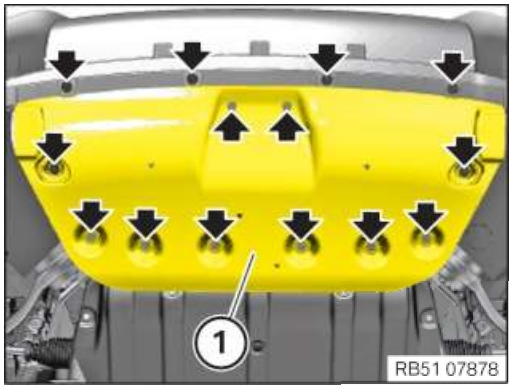
- **Version 2:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version 3:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

12 – Disconnecting all battery earth leads



- See additional information.

Additional Information

Overview of Tightening Torques

Battery positive lead to starter — Used in step 7

M8		Tightening torque	13,5 Nm

Stiffening plate to front axle support — Used in step 8

M10		Tightening torque	56 Nm

Underbody protection — Used in step 910

Hexagon screw		Tightening torque	3 Nm

Underbody protection front — Used in step 11

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Links

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Repair instructions	Used in step
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	112
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	112
61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
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61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
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11 14 270 Removing and installing/replacing the rear acoustic cover

PRELIMINARY WORK

1 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Damage to the acoustic cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover.

- Disassemble or mount the acoustic cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

2 – Remove the seal for the rear bonnet



- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

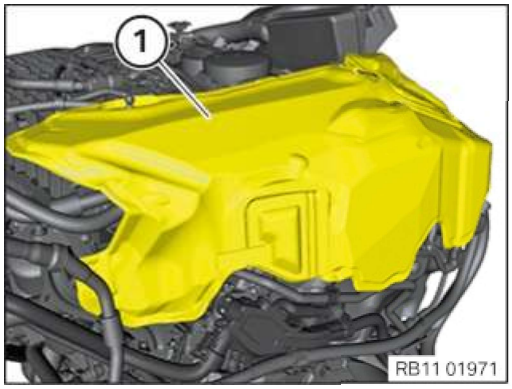
carsdiagn.com

3 – Removing acoustic cover at rear

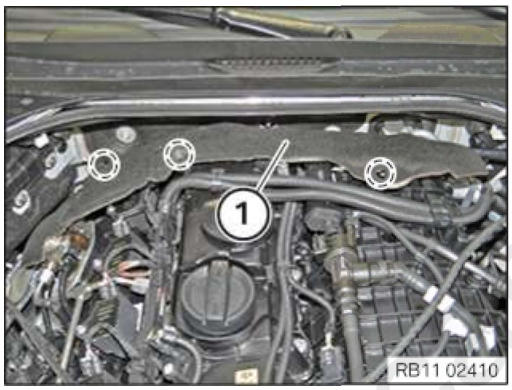


- Unclip the acoustic cover (1) in the marked areas and remove it to the top.

4 – Installing acoustic cover at rear



- Make sure the acoustic cover (1) is correctly positioned on the rear side of the engine.



- Install the acoustic cover (1) from the top and clip it in into the marked areas.

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5 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

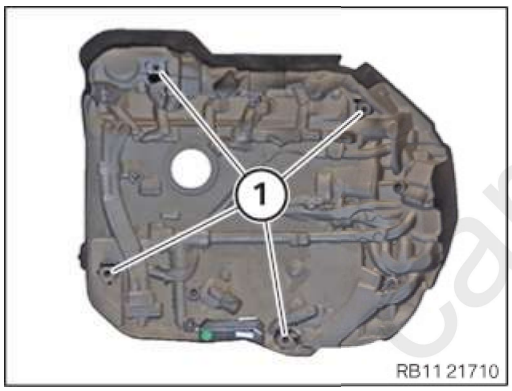
6 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover.

- Disassemble or mount the acoustic cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

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This documentation refers to special tools that were not yet available when going to press.

11 14 110 Removing and installing/sealing or replacing bottom timing case cover

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

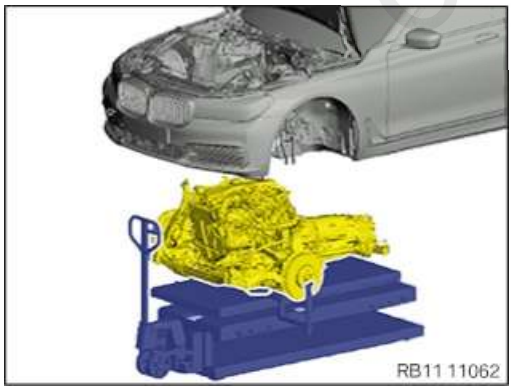
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

PRELIMINARY WORK

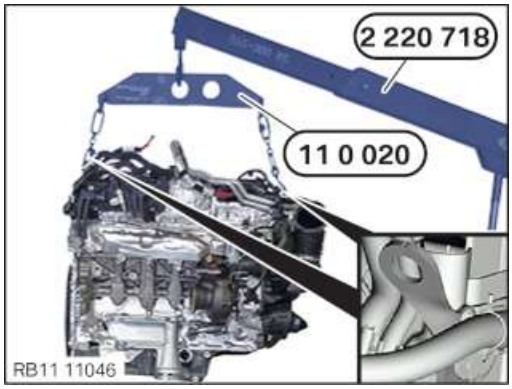
1 – Remove the front axle completely with the engine and transmission



- See additional information.

2 – Remove engine from front axle

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- See additional information.

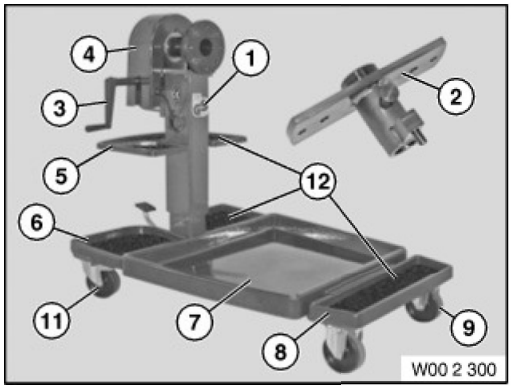
3 – Install the engine on the assembly stand

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.



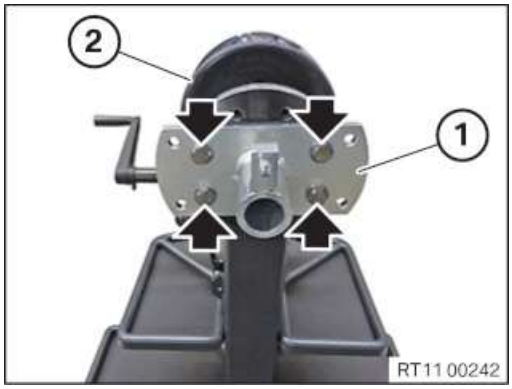
- Have the set of special tools 0 495 187 (00 2 300) ready.

Number	Description
1	Assembly stand
2	Flange
3	Crank
4	Cover
5	oddments tray
6	Shaped element rear
7	Collection pan
8	Shaped element front
9	Front wheel
10	Rear wheel with stop
11	Mat



- Have the special tool 2 411 718 ready.

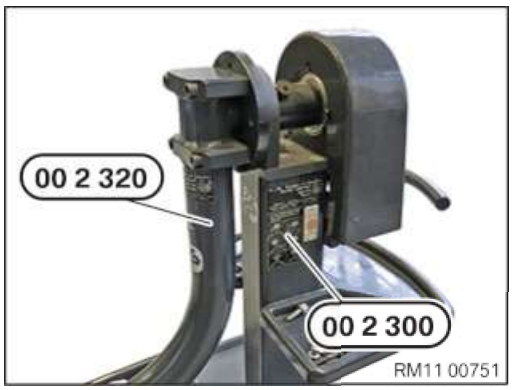
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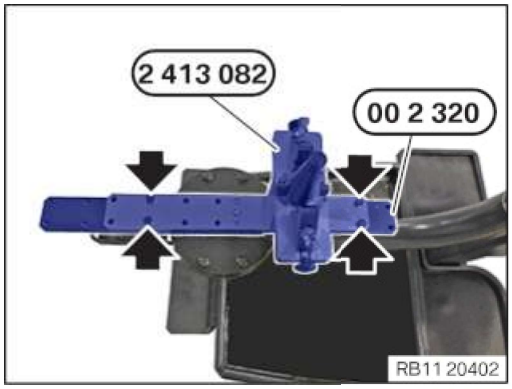
- Position flange (1) on assembly stand (2).
- Tighten screws (arrows).

Flange to assembly stand

M14X30		Tightening torque	135 Nm



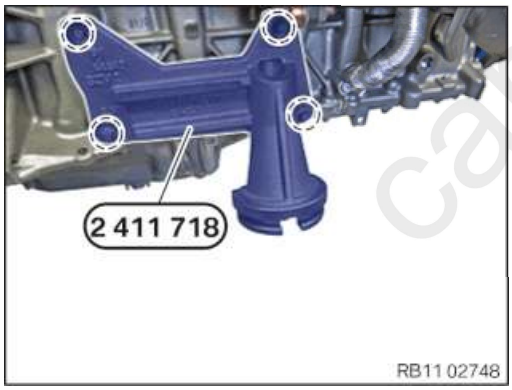
- Prepare the assembly stand 0 495 187 (00 2 300) with the special tool 0 495 196 (00 2 320).



- Screw the special tool 2 413 082 to the 0 495 196 (00 2 320) special tool.
- Tighten screws (arrows).

Special tool 11 8 930 to special tool 00 2 320

M14x35		Tightening torque	160 Nm



- Position and secure special tool (engine fixture) 2 411 718 on the engine.
- Tighten the bolts (marks).

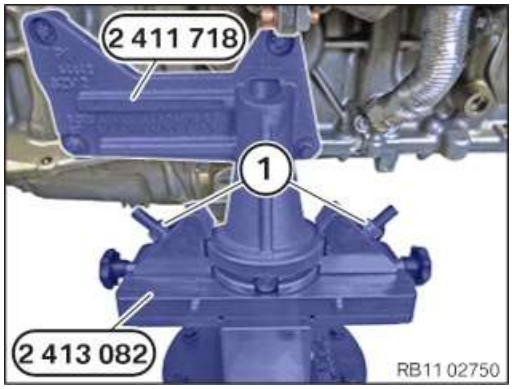
Special tool 2 411 718 to crankcase

M10x30		Tightening torque	38 Nm



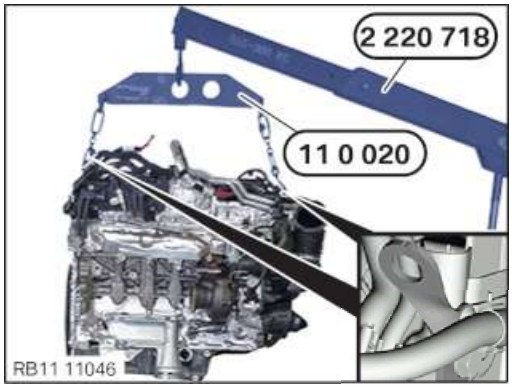
- Lower engine slowly.

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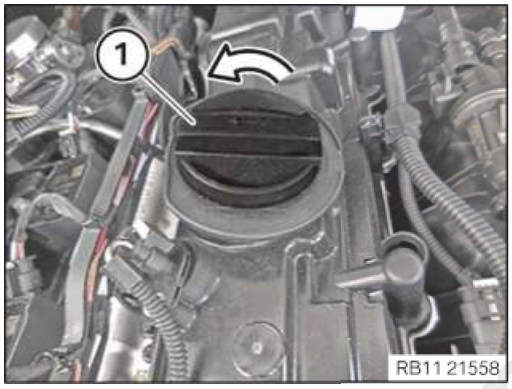
- Make sure special tool 2 411 718 engages with special tool 2 413 082.
- Tighten nuts (1) by hand.

  The clamping jaws must fit completely.



- Release both hooks of the special tool (lifting gear) 0 490 567 (11 0 020) at the front and back of the engine from the mounting brackets.
- Remove the workshop crane 2 220 718.

4 – Removing the oil filler cap



- Open the oil filler cap (1) in the direction of arrow.

5 – Releasing the oil drain plug

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

TECHNICAL INFORMATION

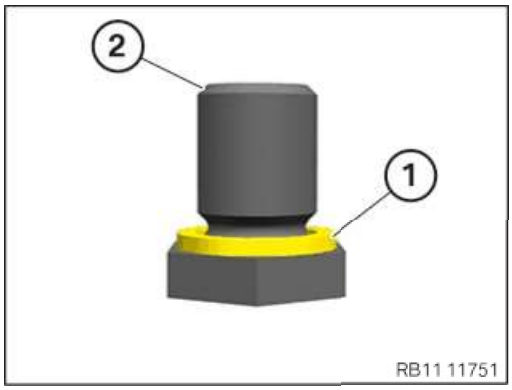
Catch and dispose of drained engine oil in a suitable collecting vessel. Observe country-specific waste disposal regulations.

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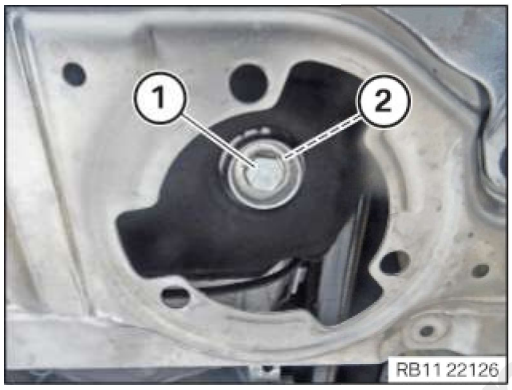
- Release oil drain plug (1).
- Feed out the oil drain plug (1) using sealing ring (2) and remove.
- Allow the engine oil to drain out fully.

6 – Tightening the oil drain plug



- Renew sealing ring (1) on the oil drain plug (2).

  Parts: Sealing ring
- Guide in the sealing ring (1) on the oil drain plug (2) and install.



- Feed in the oil drain plug (1) with the sealing ring (2) and install.
- Tighten oil drain plug (1).

Oil drain plug

M12x16	Replace sealing ring.	Tightening torque	25 Nm

7 – Removing engine ventilation line

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

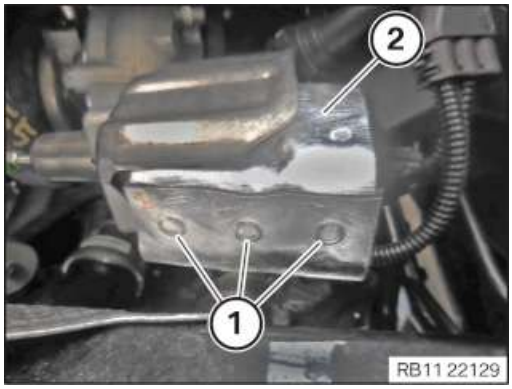
RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

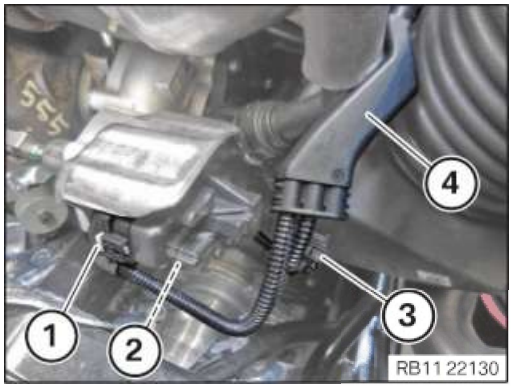
Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

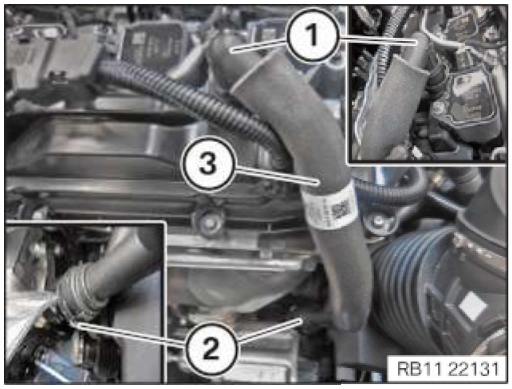
cardiagn.com



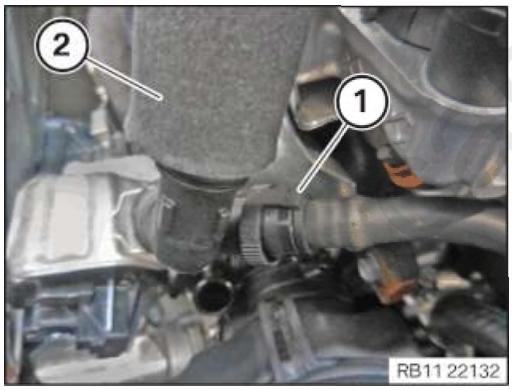
- Unlock the locks (1).
- Feed out and remove heat protection (2).



- Unlock and disconnect the plug connection (1).
- Unlock and disconnect the plug connection (2).
- Loosen clamp (3).
- Feed out wiring harness section for sensor system **2** (4) and set it aside.



- Unlock and loosen the locks (1).
- Unlock and loosen lock (2).
- Feed the engine ventilation line (3) out and set it aside.



- Unlock and release tank ventilation line (1).
- Feed out the engine ventilation line (2) and remove.

8 – Removing acoustic cover at rear



- Unclip the acoustic cover (1) in the marked areas and remove it to the top.

9 – Remove the front oxygen sensor

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WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

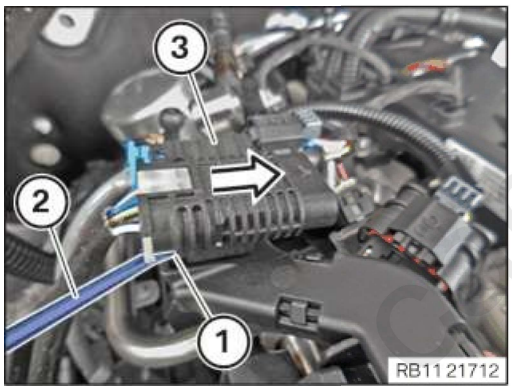
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

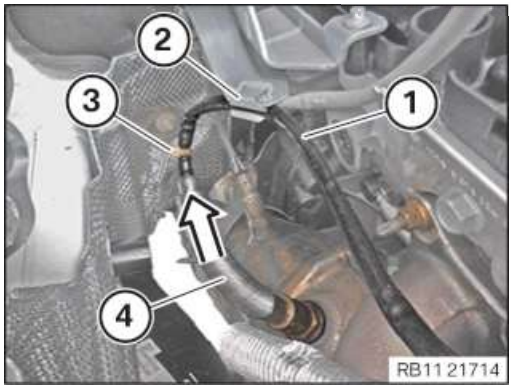
- Do not pull on the wires when disconnecting connectors and plug connections.



- Unlock and loosen connector (1).



- Unlock the locks (1) with a conventional screwdriver (2) and release.
- Feed out the connector (3) in **the direction of arrow** and set aside.



- Detach the line of the front oxygen sensor (1) from the holder (2).
- Unfasten cable strap (3).
- Feed out the heat shield (4) **in direction of arrow** and set it aside.

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- Release and remove the control sensor (1) with the special tool .

10 – Remove the monitoring oxygen sensor

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

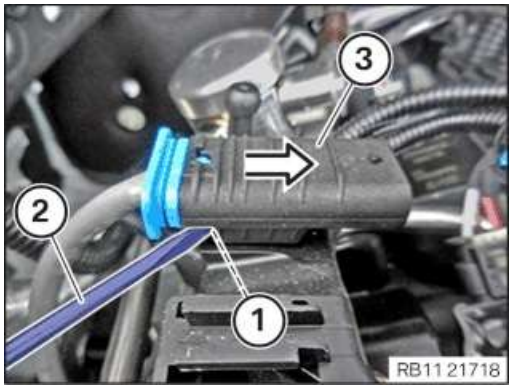
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

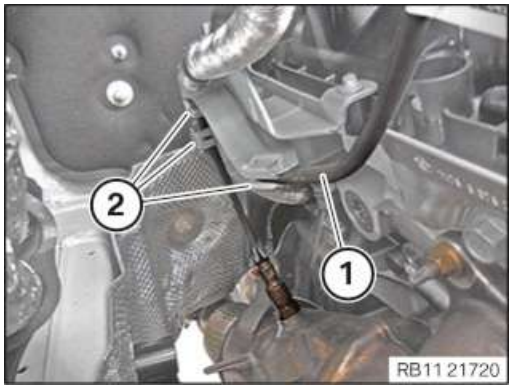


- Unlock and loosen connector (1).

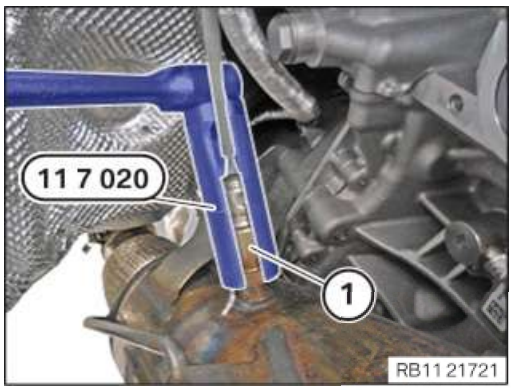


- Unlock the lock (1) with a suitable screwdriver (2).
- Feed out the connector (3) in the direction of the **arrow** and set it aside.

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- Detach the line of the monitoring oxygen sensor (1) from the holder (2).



- Release the monitoring oxygen sensor (1) using special tool .
- Remove the monitoring sensor (1).

11 – Remove catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

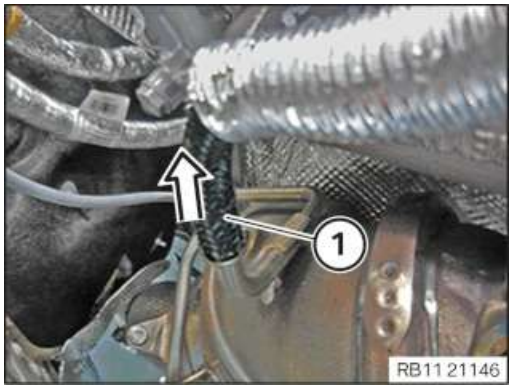
CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

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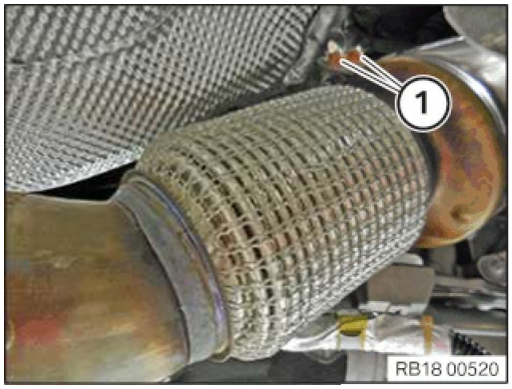


- **If installed: Disconnect pressure hose.**

  Pull off pressure hose (1) in direction of arrow and set it aside.



- Loosen V-band clamp (1).



- Loosen nuts (1).



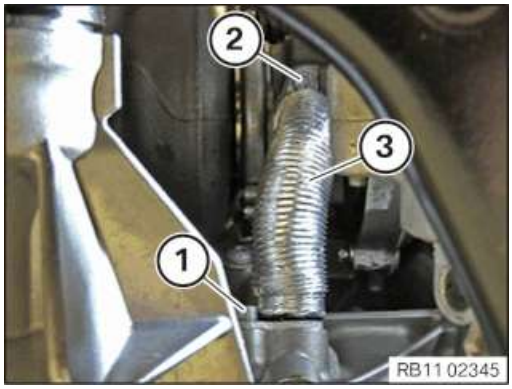
- Unlock and loosen clamp (1).
- Feed out catalytic converter and remove.

12 – Removing the oil return line for the exhaust turbocharger

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

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- Have cleaning rags ready for any escaping engine oil.
- Loosen screws (1) and (2).
- Guide out and remove the oil return line (3).

13 – Remove the coolant line between the cylinder head and the coolant pump

WARNING

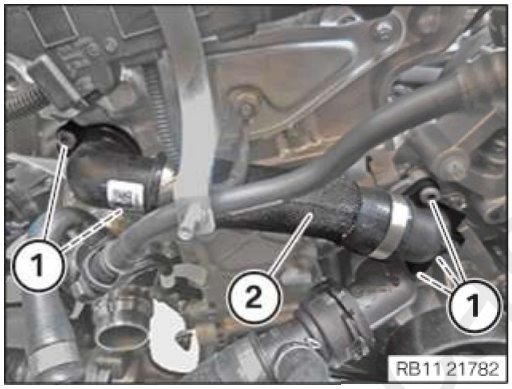
Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Remove the coolant line (2).
- Catch and dispose of escaping coolant.

14 – Remove all ignition coils.

NOTICE

The description is for one component only. The procedure is identical for all further components.

▸ **Removing the ignition coil**

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

carfdiag1.com

RISK OF DAMAGE

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

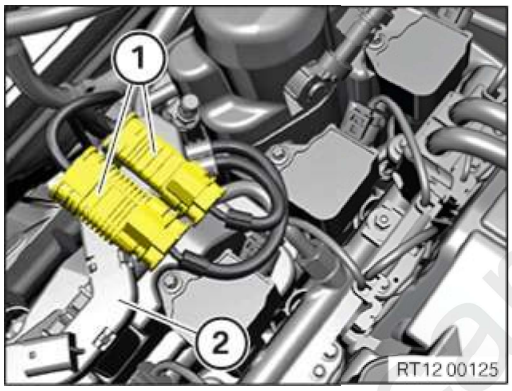
- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

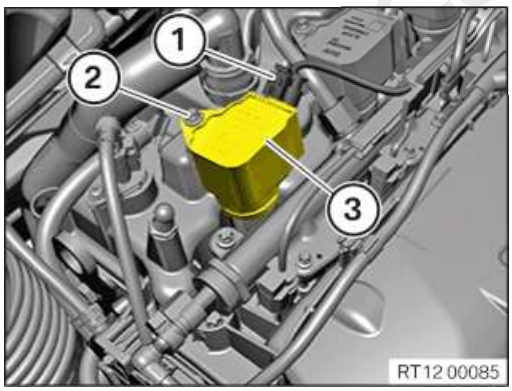
Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.



- Disconnect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor from the cable channel (2) and set aside.



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove ignition coil (3).

15 – Removing all spark plugs

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.



- Wear safety goggles.

TECHNICAL INFORMATION

Clean spark plug slot with compressed air.

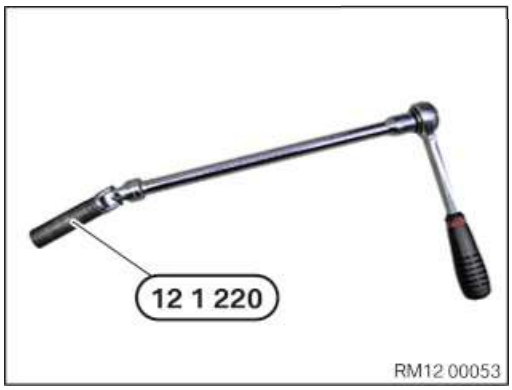
The spark plug shaft must be cleaned using compressed air after having removed the ignition coils and before removing the spark plugs. After having removed the spark plugs, once again check the sealing surface for contamination and (if necessary) clean using a moist cloth or clean using compressed air.

Deposits that are not removed according to instructions may enter the combustion chamber and lead to uncontrolled combustion. Remaining deposits on the spark plug sealing surfaces may lead to leaks and the spark plugs may come loose during engine operation.

Spark plug threads must not be greased or oiled. Insufficiently tightened spark plugs may cause leaks and the sparks plugs may come loose during engine operation.

NOTICE

The description is for one component only. The procedure is identical for all further components.



TECHNICAL INFORMATION

Exclusively swivelling extensions may be used for the reversible ratchet. Rigid mounting tool and variable plug connections with rigid option may not be used; there is a risk that the insulator breaks.

- Mount the special tool 0 495 560 (12 1 220) on a pivoting extension.

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- Unscrew spark plugs with the special tool 0 495 560 (12 1 220) and a pivoting extension.

16 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

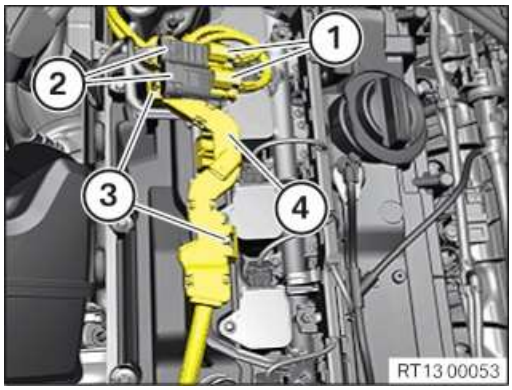
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

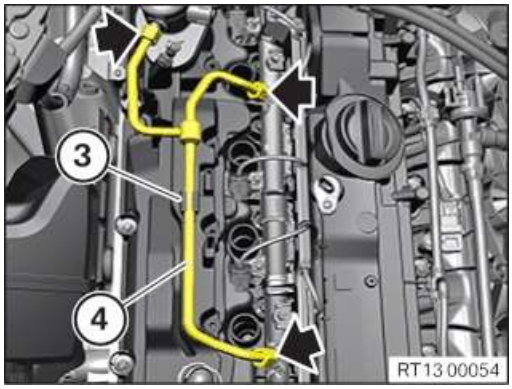
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the plug connections (1) and (2).
- Unlock the locks (3).
- Guide out the wiring harness section of the engine wiring harness (4) and set it aside.

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- Position a lint-free rag under the union nuts.
- Unscrew union nuts (arrows) with the special tool .
- Catch and dispose of escaping fuel.
- Thread out the high pressure line (4) from the bracket (3) and remove it.
- Feed out and dispose of the lint-free cleaning clothes .

17 – Remove high pressure pump

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

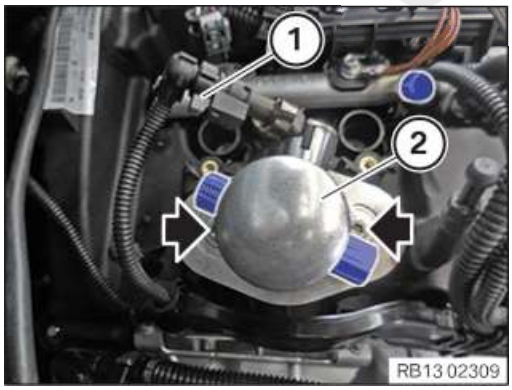
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

TECHNICAL INFORMATION

The high pressure pump can be pre-tensioned by camshaft cams. If when loosening the screws, the high pressure pump is forced out, the engine will have to be turned to bring the camshafts to a different position.

Before installing the high pressure pump, the cam of the high pressure pump drive must be turned to BDC. To do this, twist the engine if necessary in the direction of engine rotation to the central bolt of the crankshaft. Otherwise, it will not be possible to install the high-pressure pump.



- Unlock plug connection (1) and disconnect.
- Unscrew the bolts (arrows) **in alternating order**.
- Have a rag ready and catch any engine oil that may emerge.
- Feed out high pressure pump (2) and remove.

18 – Removing rail with injectors of cylinders 1 to 3

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

Damage to the injector tips and Teflon ring.

Improper handling of the injector tips and Teflon ring can lead to malfunctioning of the injector.

- Avoid mechanical contact with injector tip.
- When exchanging Teflon ring, hands and work surface must be clean and free of oil. Do not use any lubricating agents.
- Do not use fingernails to slide Teflon ring on.

RISK OF DAMAGE

Damage to injectors.

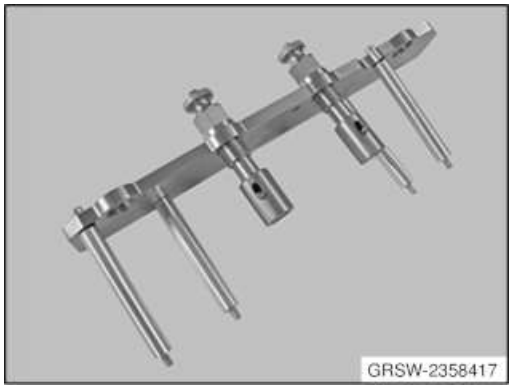
Excessive force may damage the injector and this means having to renew the injector.

- Twist the injectors with a maximum torsional movement of 13 Nm.



- Prepare special tool .

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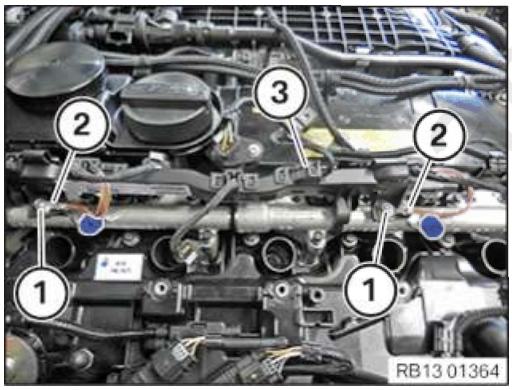
- Prepare special tool 2 358 417.



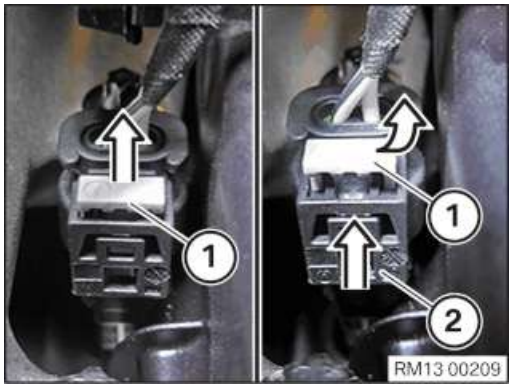
- Prepare special tool .



- Prepare special tool 0 496 106 (11 8 720).

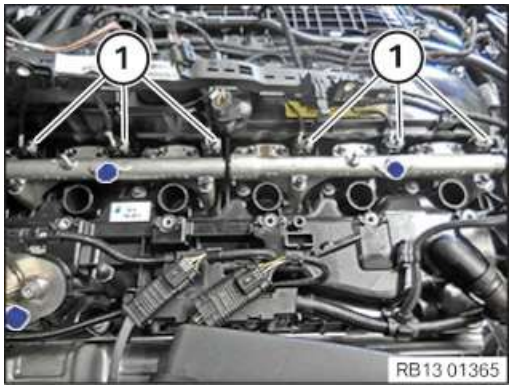


- Loosen nut (1).
- Feed out ground cable (2) and set it aside.
- Feed out cable channel (3) and set it aside.

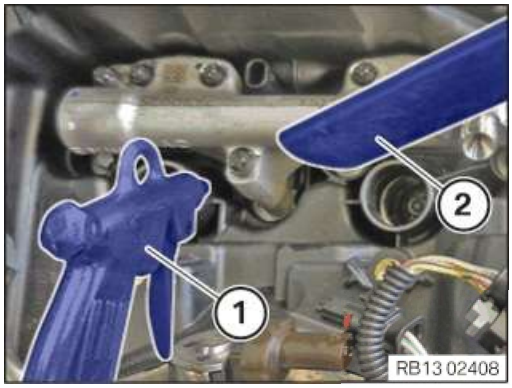


- Unlock lock (1) in direction of arrow from the top.
- Press lock (1) together and release.
- Pull out the connector (2) from the injectors.

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- Unlock and release all connectors (1) of the injectors.

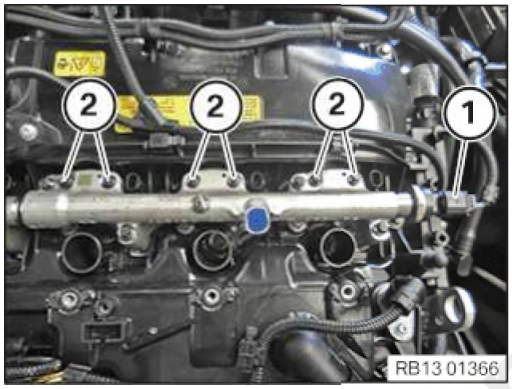


TECHNICAL INFORMATION

In case of dusty / sandy operating conditions of the vehicle, the injector shafts must be cleaned before removal.

For additional information see: 13 53 ... Cleaning the cylinder head in the area of the injectors in case of sandy / dusty contamination

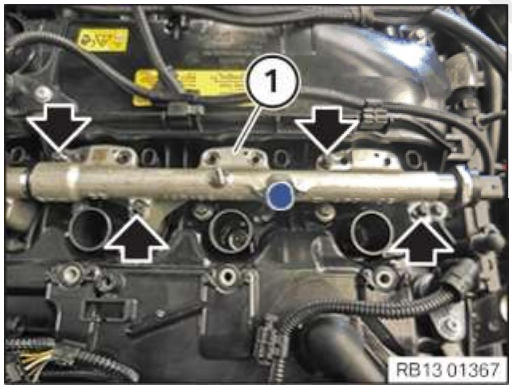
- Before releasing the high pressure lines: Blow out the injector shafts with an air gun(1) with less pressure.
- Simultaneously, draw off the dirt particles with an **explosion proof** vacuum cleaner (2).



- Unlock and loosen connector (1).
- Release screws (M5x30) (2).
- Remove screws (2).

  Do not reuse the bolts (2).

  Parts: Screws (M5x30)
- Catch and dispose of escaping fuel with suitable materials.

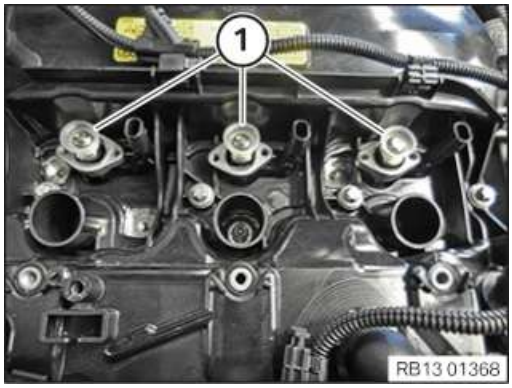


- Unscrew the screws (M6x30) (arrows).

  The screws may not be reused!
- Renew screws.

  Parts: Screws (M6x30)
- Remove rail (1) in upward direction.

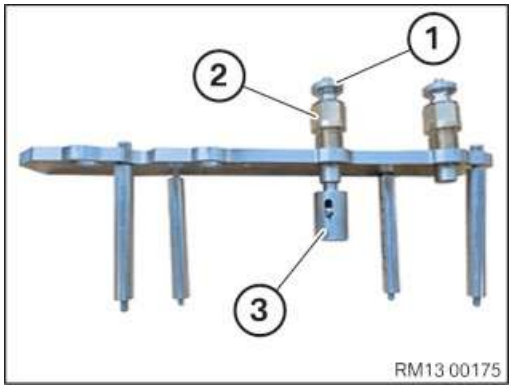
  The injectors remain in the cylinder head.



- Remove the gaskets (1).

  The seals (1) are only required during the initial assembly at the plant and will not be installed again.

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RISK OF DAMAGE

Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

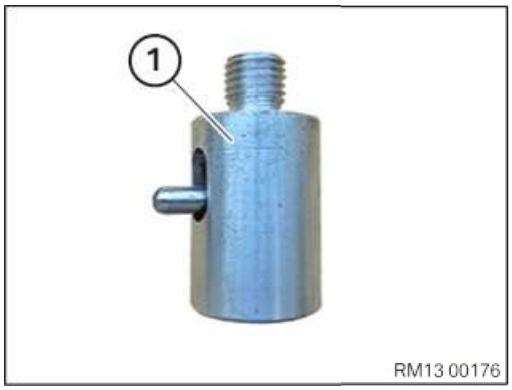
- Twist the injectors with a maximum torsional movement of 13 Nm.

- In the event that the specified value for the tensile force is exceeded: Replace injectors.
- Use the special tool 2 358 417to remove the injectors.

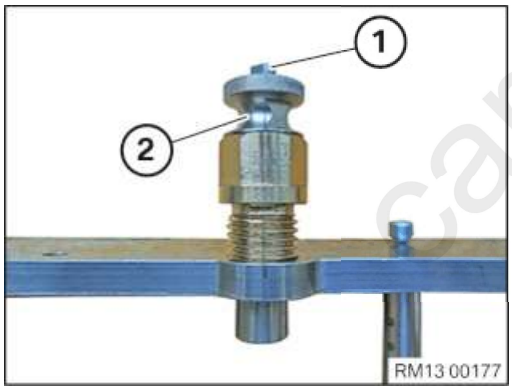
  The special tool 2 358 417 is used to ensure that the tensile force is not exceeded.

  Special tool 2 358 417 consists of:

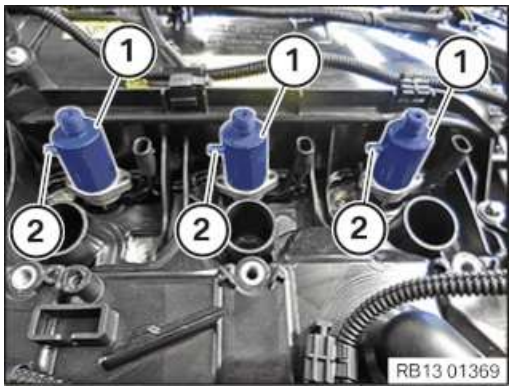
  - **(1)** Threaded sleeves
  - **(2)** Pull-out thread (left-hand thread)
  - **(3)** Mounting for the injectors



- Unscrew the fixture for the injectors (1) from the special tool 2 358 417.



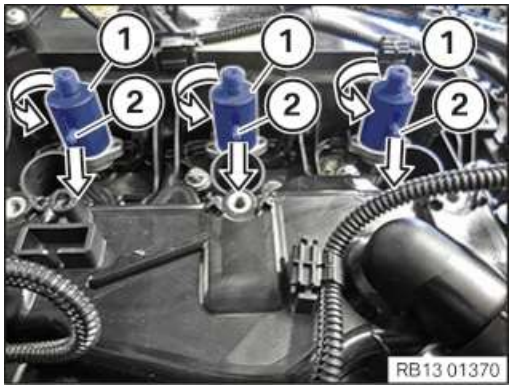
- Press the lock (1) in and remove threaded sleeve (2) from the special tool 2 358 417.



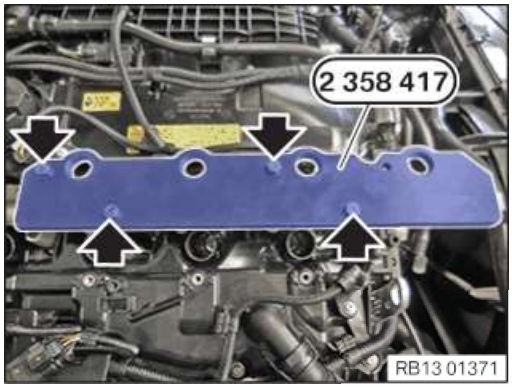
- Install all fixtures (1) for the injectors.

  The fixture (1) is not locked if the lever (2) is on the top.

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- Turn fixtures (1) by 90° and lock the lever (2) downwards.



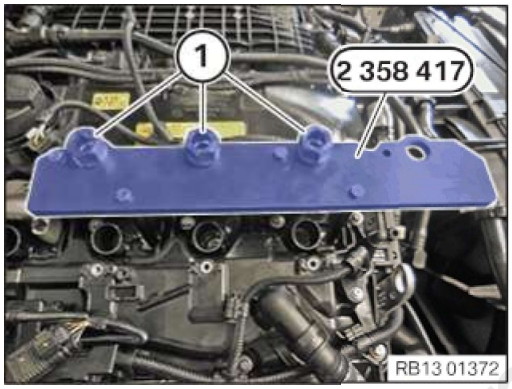
RISK OF DAMAGE

Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

- Do not use the puller plate as a support.

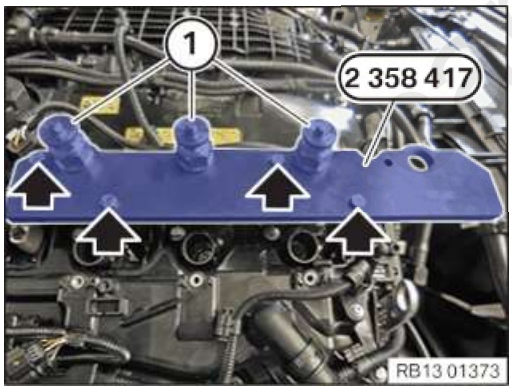
- Attach special tool 2 358 417 to cylinder head.
- Hand-tighten the bolts (arrows).



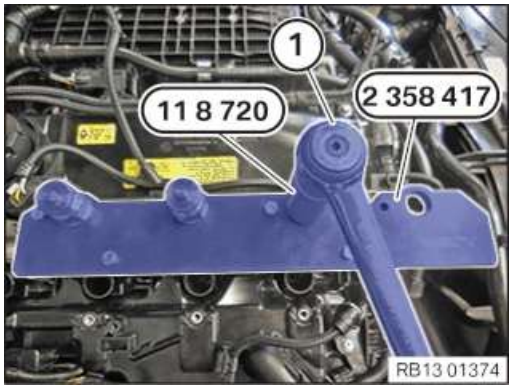
TECHNICAL INFORMATION

The extraction thread is a left-hand thread.

- Screw in pull-out thread (1) on the special tool 2 358 417fully.



- Insert threaded sleeves (1) again and screw threaded sleeves completely onto the fixtures for injectors.
- Then tighten screws (arrows) on special tool 2 358 417 to 5 Nm.



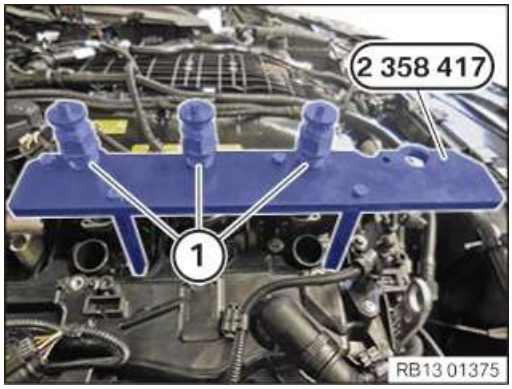
- Adjust torque wrench to 13 Nm **clockwise** .
- Turn torque wrench (1) in **clockwise** direction with special tool 0 496 106 (11 8 720)until the injector is pulled out.

TECHNICAL INFORMATION

If the torque wrench makes a cracking noise when the injector is pulled out, **the injector must be renewed.**

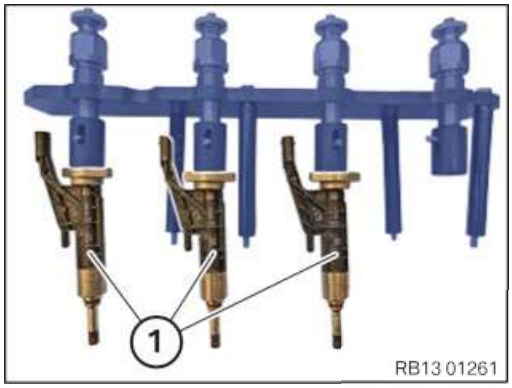
- Disassemble all injectors individually.

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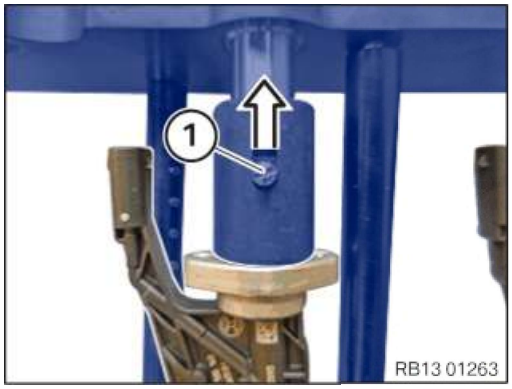


- Before removing the special tool 2 358 417 with the injectors, check if all the injectors were completely pulled out of the cylinder head.

  This can be recognised on the completely visible threads of the sleeves (1).
- Loosen screws on special tool 2 358 417.



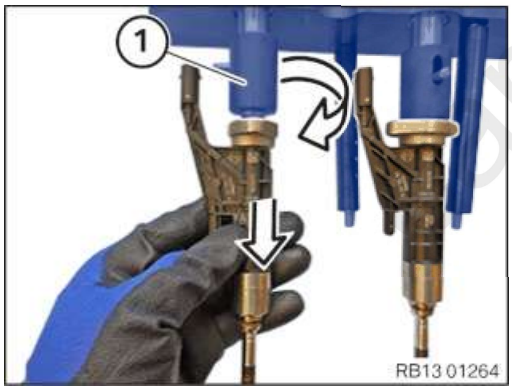
- Carefully remove the special tool 2 358 417with injectors (1) from the cylinder head vertically upwards.
- Place the combination of the special tool 2 358 417 and the injectors (1) flat on a clean table.



NOTICE

The description is for one component only. The procedure is identical for all further components.

- Unlock the fixture lock (1) from the top.



- Turn the unlocked fixture (1) by 90°.
- Release and remove the injector downwards.

19 – Removing rail with injectors of cylinders 4 to 6

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

Damage to the injector tips and Teflon ring.

Improper handling of the injector tips and Teflon ring can lead to malfunctioning of the injector.

- Avoid mechanical contact with injector tip.
- When exchanging Teflon ring, hands and work surface must be clean and free of oil. Do not use any lubricating agents.
- Do not use fingernails to slide Teflon ring on.

RISK OF DAMAGE

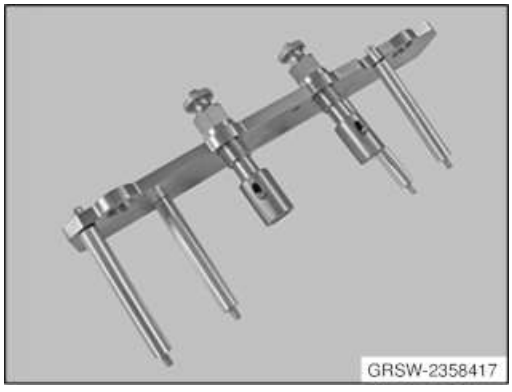
Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

- Twist the injectors with a maximum torsional movement of 13 Nm.



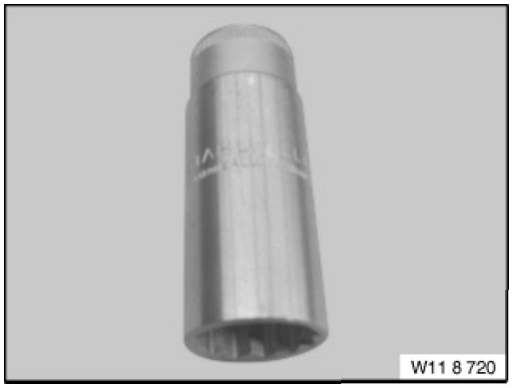
- Prepare special tool .



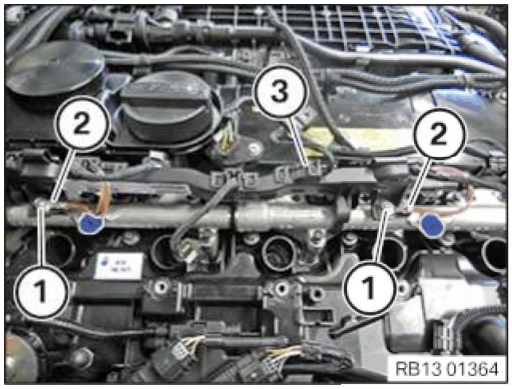
- Prepare special tool 2 358 417.



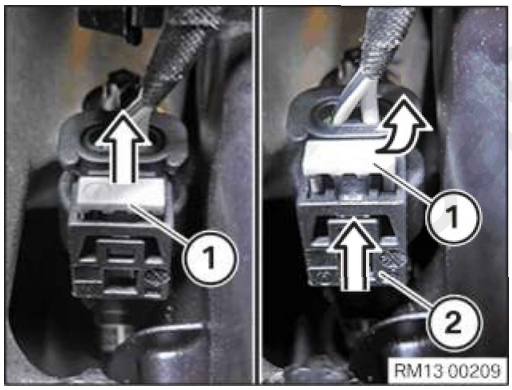
- Prepare special tool .



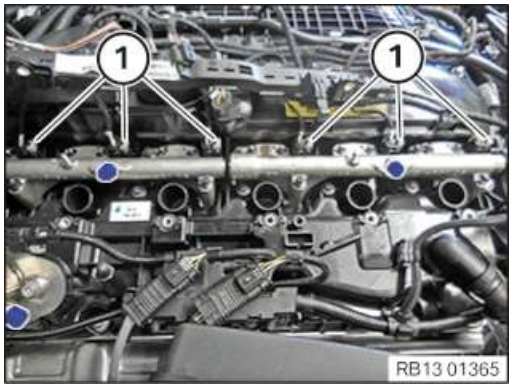
- Prepare special tool 0 496 106 (11 8 720).



- Release nuts (1) .
- Feed out ground cable (2) and set aside.
- Feed out cable channel (3) and set it aside.

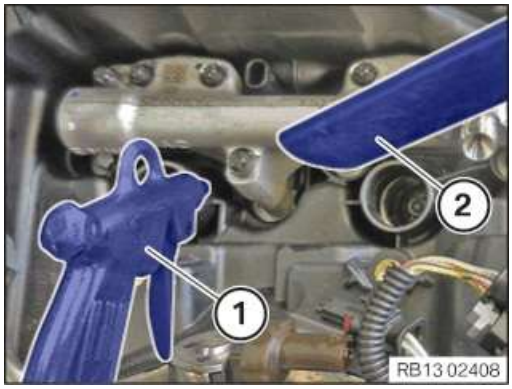


- Unlock lock (1) in direction of arrow upwards.
- Press lock (1) together and release.
- Disconnect the connector (2) from the injectors in the direction of the arrow.



- Unlock and release all connectors (1) of the injectors.

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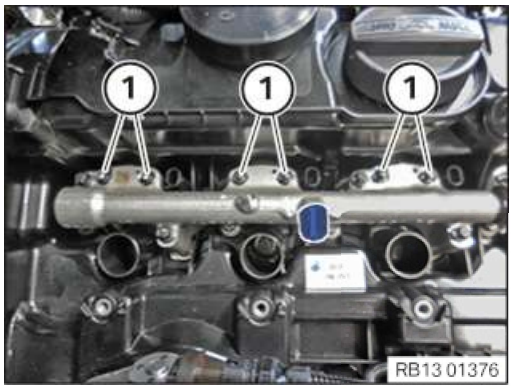


TECHNICAL INFORMATION

In case of dusty / sandy operating conditions of the vehicle, the injector shafts must be cleaned before removal.

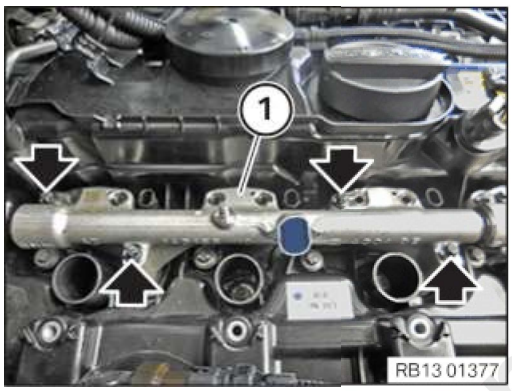
For additional information see: 13 53 ... Cleaning the cylinder head in the area of the injectors in case of sandy / dusty contamination

- Before releasing the high pressure lines: Blow out the injector shaft with an air gun (1) with less pressure.
- Simultaneously, draw the dirt particles off **using an** explosion proof (2) vacuum cleaner.



- Release screws (M5x30) (1).
- Remove screws (M5x30) (1) .

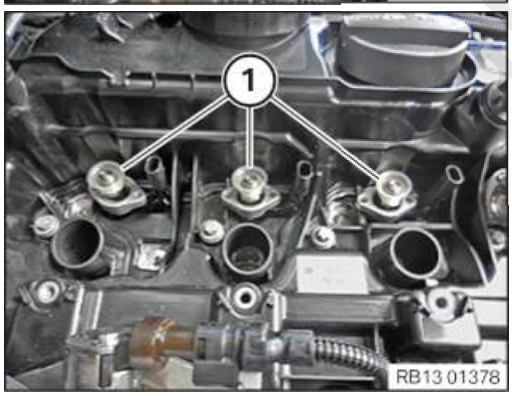
  Do **not** reuse screws (M5x30) (1).
- Catch and dispose of escaping fuel with suitable materials.



- Release screws (M6x30) (arrow).
- Remove screws (M6x30) (arrows).

  Do **not** reuse the screws (M6x30).
- Remove rail (1) upwards.

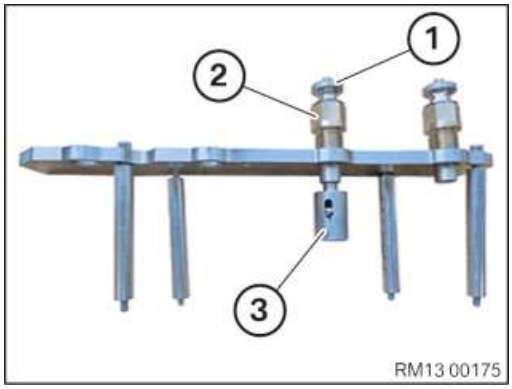
  The injectors remain in the cylinder head.



- Remove seals (1) .

  The seals (1) are required during first assembly within the plant only and will not be installed again.

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RISK OF DAMAGE

Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

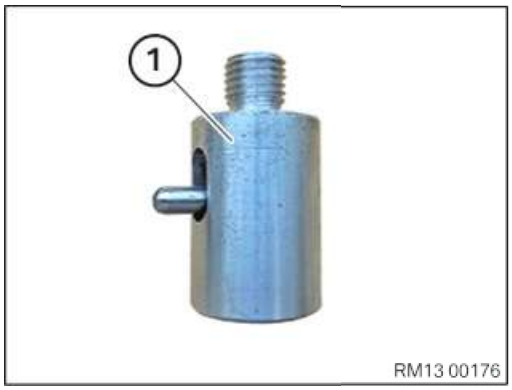
- Twist the injectors with a maximum torsional movement of 13 Nm.

- In the event that the specified value for the tensile force is exceeded: Replace injectors.
- Use the special tool 2 358 417 to remove the injectors.

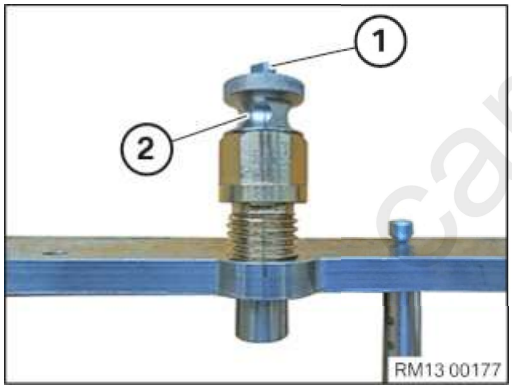
  The special tool 2 358 417 is used to ensure that the tensile force is not exceeded.

  The special tool 2 358 417 consists of:

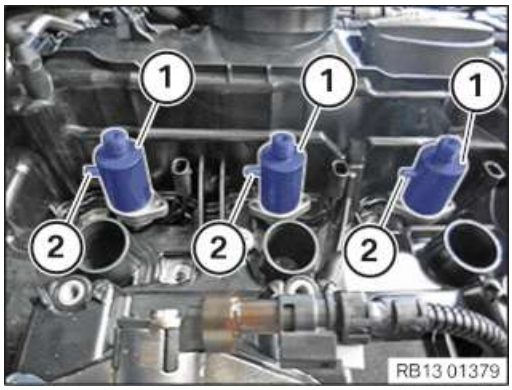
  - (1) Threaded sleeves
  - (2) Pull-out thread (left-hand thread)
  - (3) Mounting for the injectors



- Unscrew the fixture for injectors (1) from special tool 2 358 417.



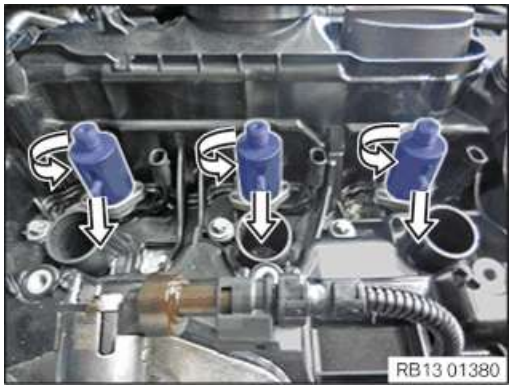
- Press lock (1) in and remove the threaded sleeve (2) from the special tool 2 358 417.



- Install all fixtures (1) for the injectors.

  The fixture (1) is not locked, if the lever is (2) on top.

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- Turn fixtures (1) by 90° and lock the lever (2) downwards.



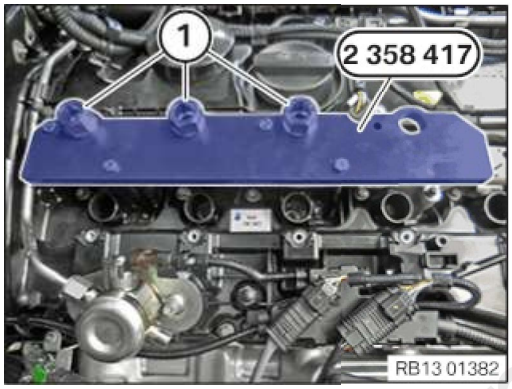
RISK OF DAMAGE

Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

- Do not use the puller plate as a support.

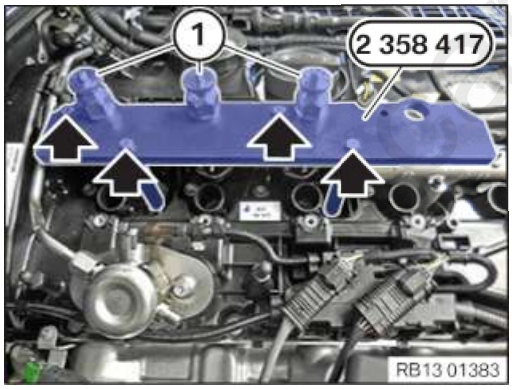
- Attach special tool 2 358 417 to cylinder head.
- Hand-tighten the bolts (arrows).



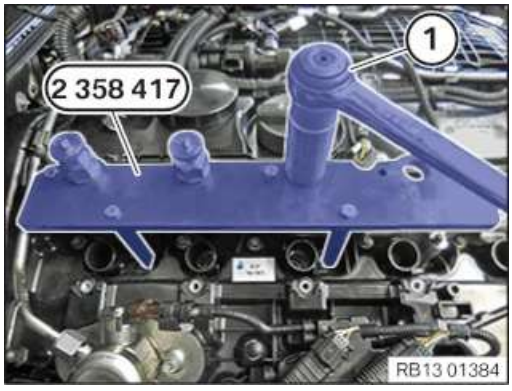
TECHNICAL INFORMATION

The extraction thread is a left-hand thread.

- Screw in pull-out thread (1) on the special tool 2 358 417 fully.



- Insert the threaded sleeves (1) again and screw threaded sleeves completely onto the fixtures for the injectors.
- Then tighten screws (arrows) on special tool 2 358 417 to 5 Nm.



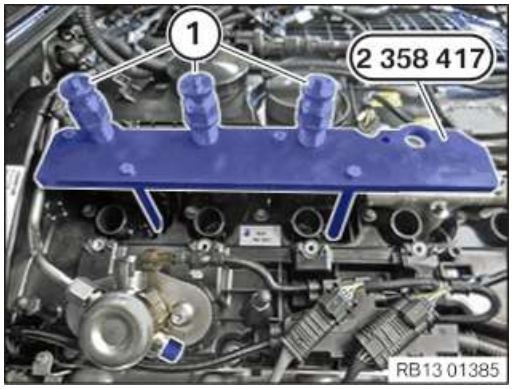
- Adjust torque wrench to 13 Nm **in clockwise** direction.
- Turn the torque wrench (1) with the special tool 0 496 106 (11 8 720) **clockwise**, until the injector is pulled out.

TECHNICAL INFORMATION

If the torque wrench makes a cracking noise when the injector is pulled out, **the injector must be renewed.**

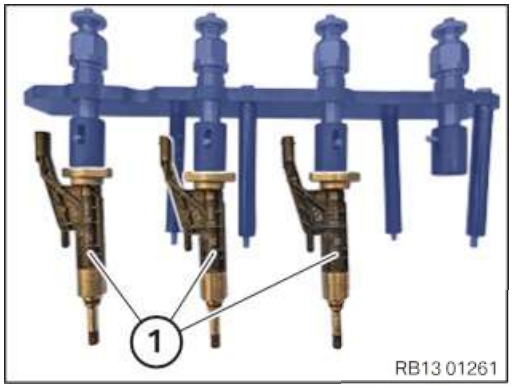
- Disassemble all injectors individually.

mandiagn.com

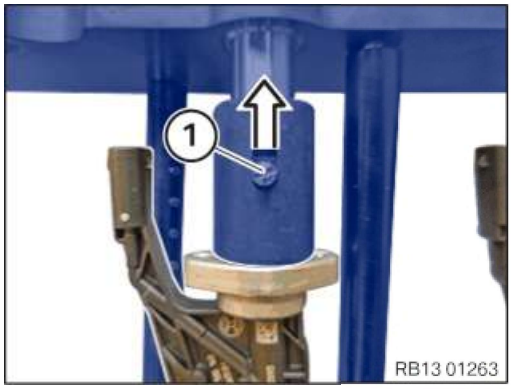


- Before removing the special tool 2 358 417 with the injectors, check if all the injectors were completely pulled out of the cylinder head.

  This can be recognised on the completely visible thread starts of the threaded sleeves (1).
- Loosen screws on special tool 2 358 417.



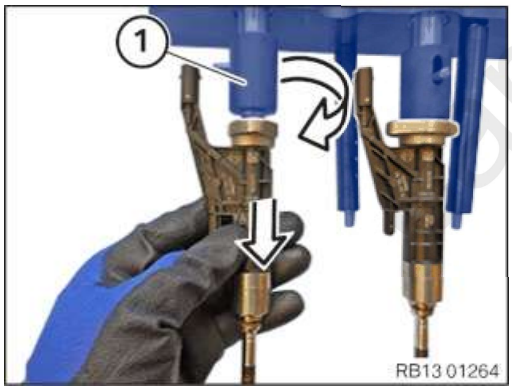
- Carefully remove the special tool 2 358 417 with the injectors (1) vertically straight up from the cylinder head.
- Place the combination of the special tool 2 358 417 and the injectors (1) flat onto a clean table.



NOTICE

The description is for one component only. The procedure is identical for all further components.

- Unlock the fixture lock (1) from the top.



- Turn the unlocked fixture(1) by 90°.
- Release and remove the injector downwards.

20 – Removing both actuators

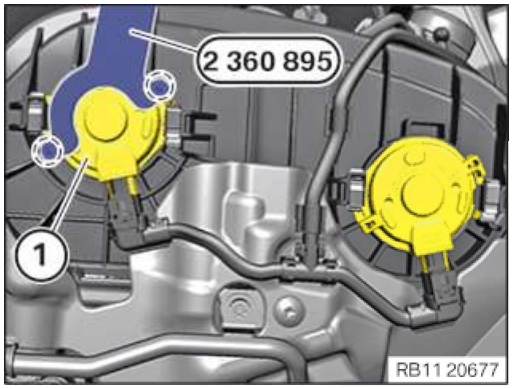
ardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

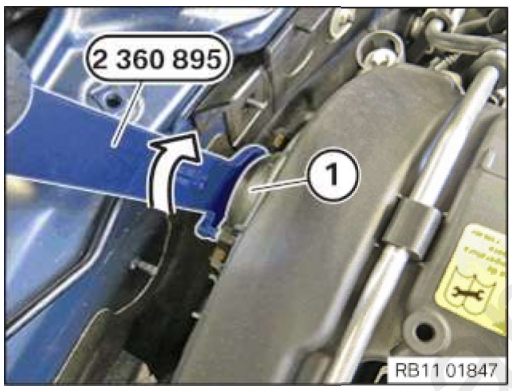
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.



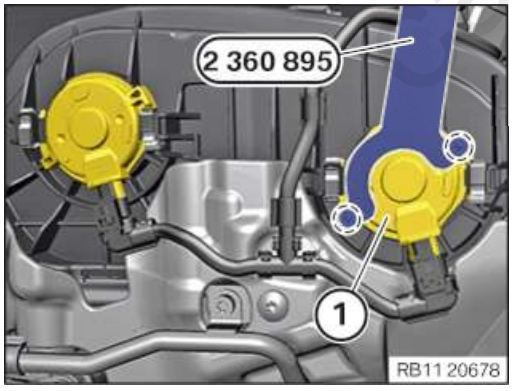
NOTICE

The figure shows the rear side of the engine.

- Position special tool 2 360 895 correctly on the actuator (1) of the intake side.



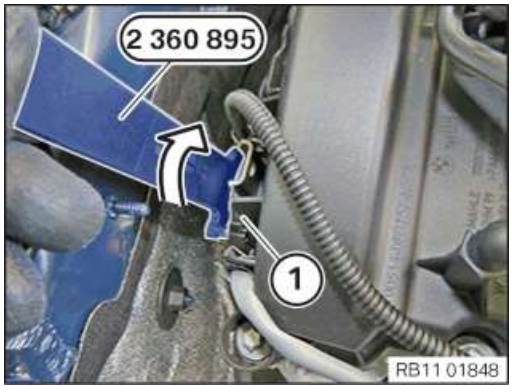
- Turn the actuator (1) on the intake side with the special tool 2 360 895 by about 50° in the direction of arrow and release it.



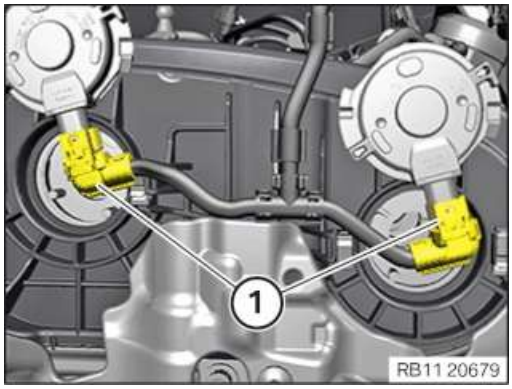
NOTICE

The figure shows the rear side of the engine.

- Position special tool 2 360 895 correctly on the actuator (1) of the exhaust side.



- Turn the actuator (1) on the exhaust side with the special tool 2 360 895 by about 50° in the direction of arrow and release it.



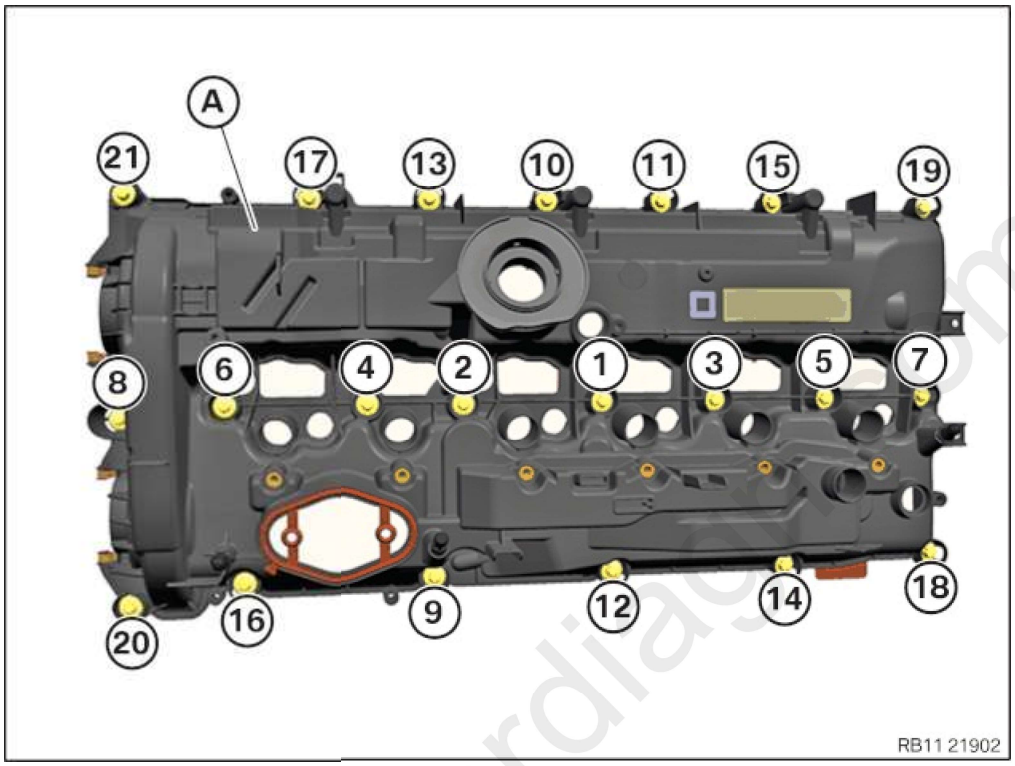
NOTICE

The figure shows the rear side of the engine.

- Unlock and disconnect both connectors (1).
- Feed out and remove both actuators.

21 – Removing the cylinder head cover

Overview: Bolts of the cylinder head cover



1 - 21 Bolts of the cylinder head cover

A Cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

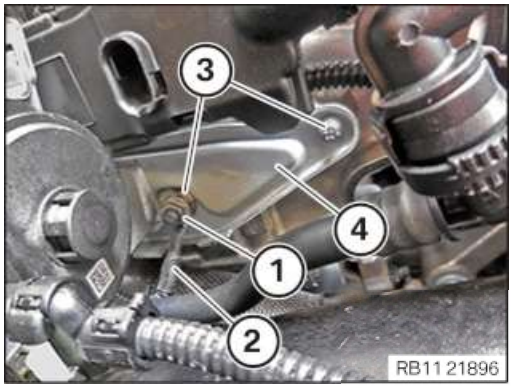
Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

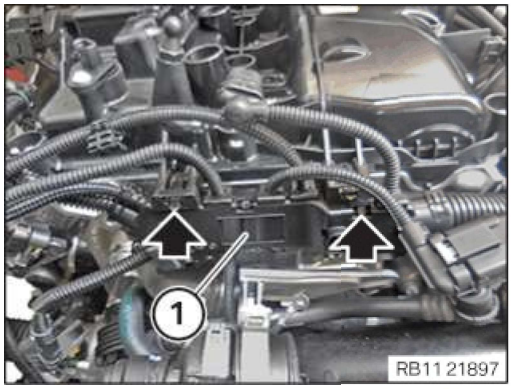
cardiagn.com



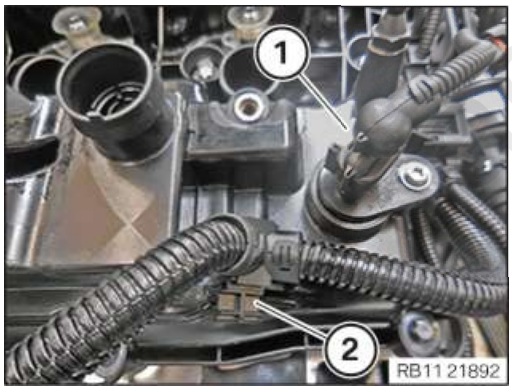
- Unlock the locks (1).
- Feed the engine ventilation line (2) out and set it aside.



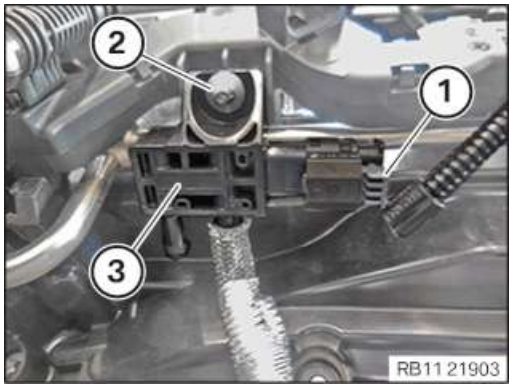
- Loosen nut (1).
- Feed out ground cable (2) and set it aside.
- Loosen screws (3).
- Thread out holder (4) and set aside.



- Unlock and detach the locks (arrows).
- Guide out the wiring harness section (1) for the sensor system **2** and place to one side.

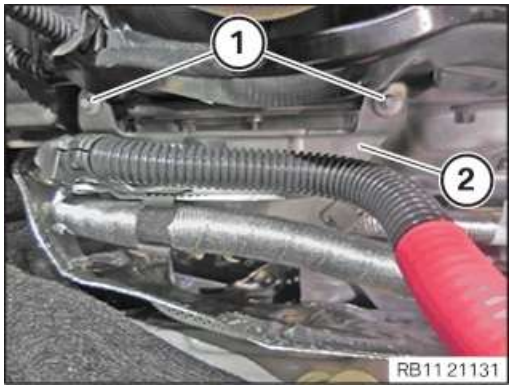


- Unlock and detach connector (1) on exhaust camshaft sensor .
- Loosen clamp (2).

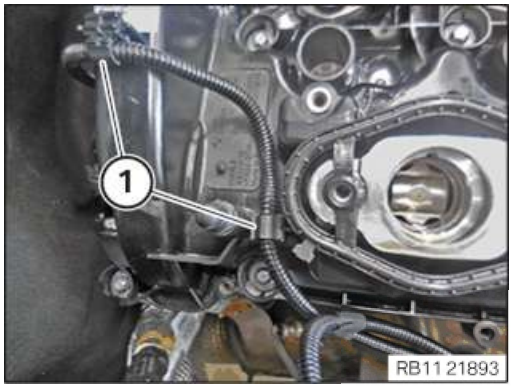


- **If installed:**
- Unlock and loosen connector (1).
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

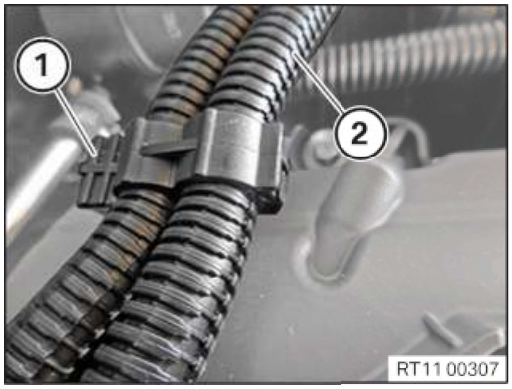
rdiagn.com



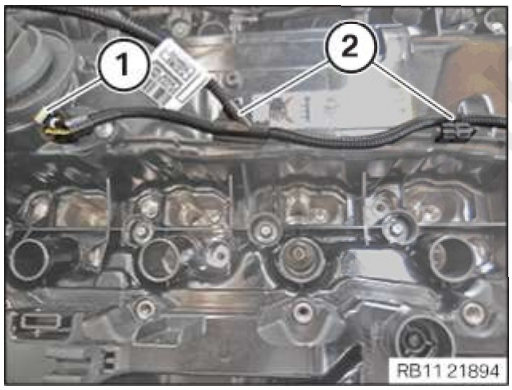
- Loosen screws (1).
- Feed out the bracket (2) of the positive battery cable and set it aside.



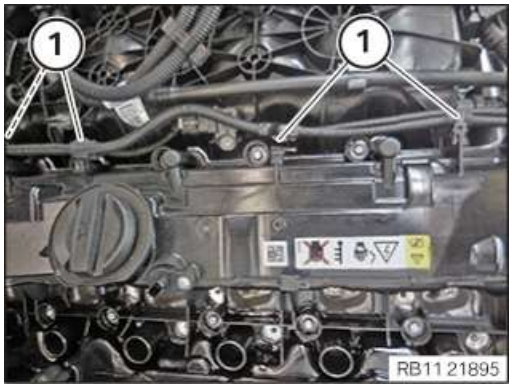
- Loosen clamps (1).



- Loosen clamp (1).
- Thread out the wiring harness section (2) for the injectors and ignition coils and set it aside.

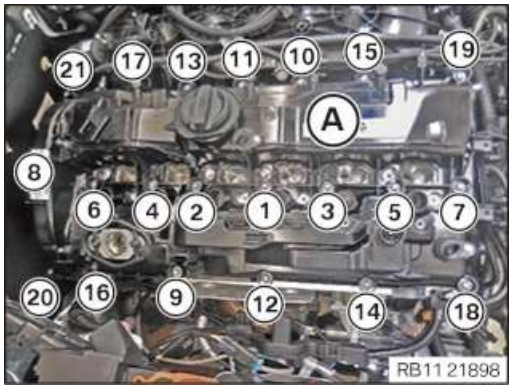


- Unlock and detach connector (1) on the intake camshaft sensor.
- Loosen clamps (2).

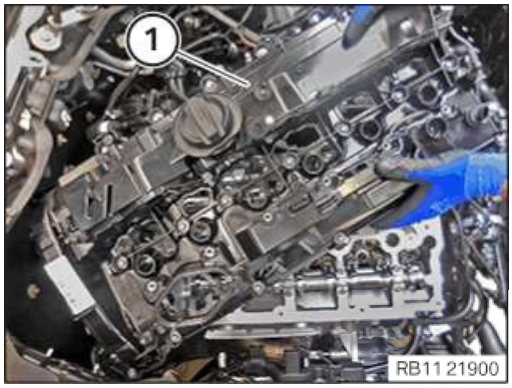


- Loosen clamps (1).

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- Release all screws on the cylinder head cover (A) in the sequence (21) to (1).



- Guide the cylinder head cover (1) out and remove it.

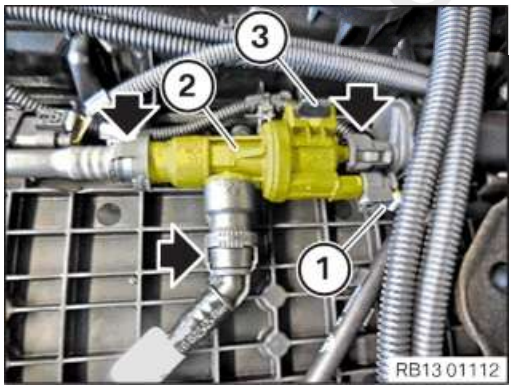
22 – Remove tank vent valve

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.



- Unlock and disconnect connector (1).
- Unlock and disconnect the tank ventilation lines (arrows).
- Detach and remove the tank vent valve (2) from the holder (3).

23 – Removing the intake plenum

carlagn.com

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

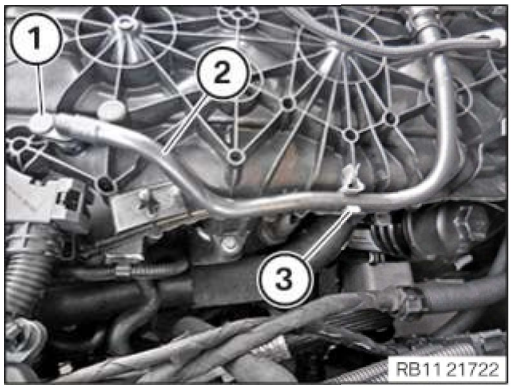
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

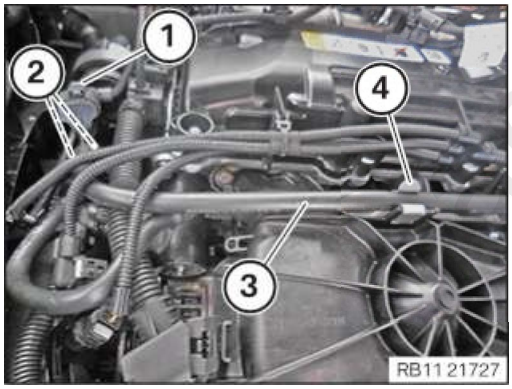
Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

TECHNICAL INFORMATION

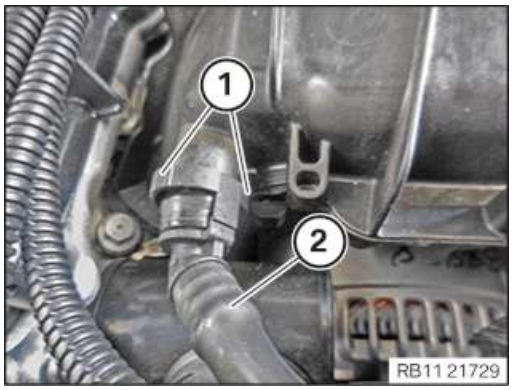
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screw (1).
- Guide tank ventilation line (2) out of clamp (3) and remove it.

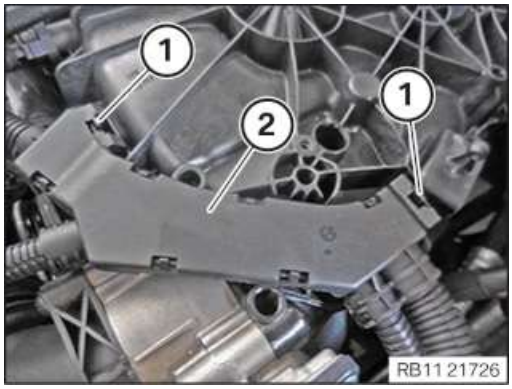


- Unlock and loosen connector (1).
- Unlock the locks (2).
- Guide tank ventilation line (3) out of clamp (4) and remove it.

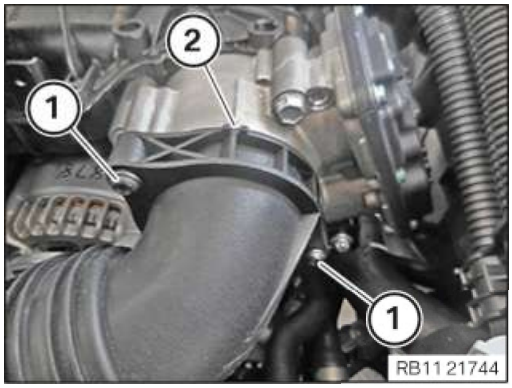


- Unlock the locks (1).
- Feed the tank ventilation line (2) out and set it aside.

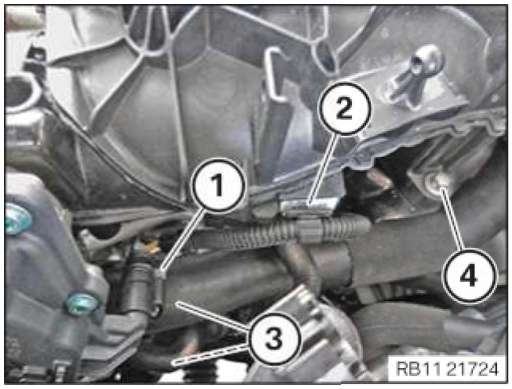
rdiagn.com



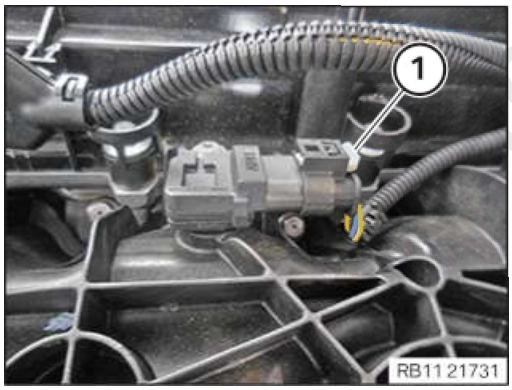
- Unlock the locks (1).
- Guide out the wiring harness section (2) for the sensor system **2** and place to one side.



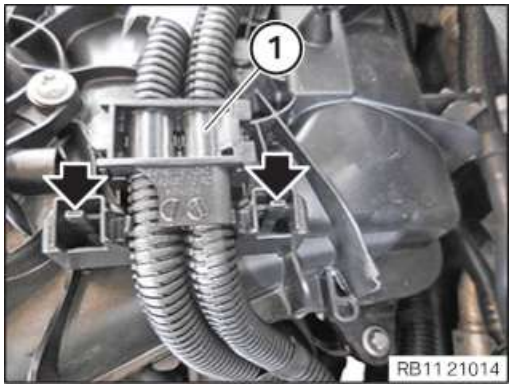
- Loosen screws (1).
- Feed out charge air line (2) and place to one side.



- Unlock and loosen connector (1).
- Loosen clamp (2).
- Thread off coolant line (3) and place to the side.
- Loosen screw (4).

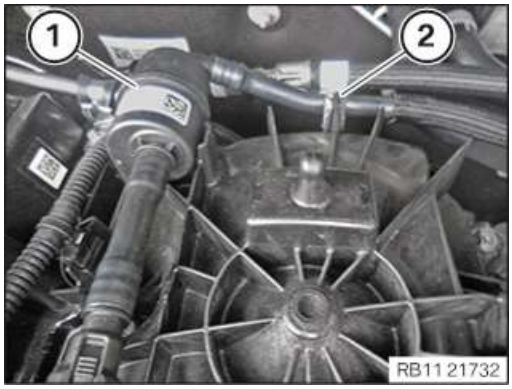


- Unlock and loosen connector (1).

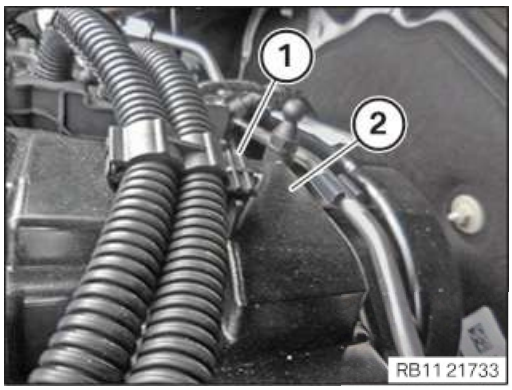


- Unlock the locks (arrows).
- Thread out the wiring harness section (1) for the injectors and ignition coils and set it aside.

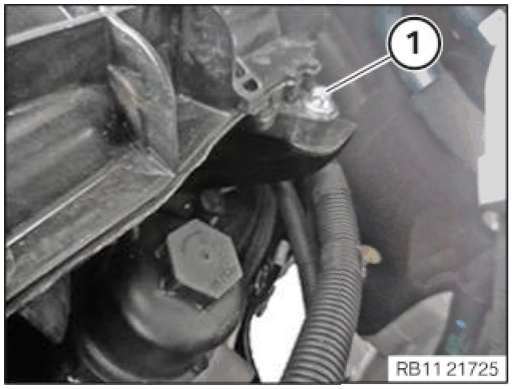
fdiagn.com



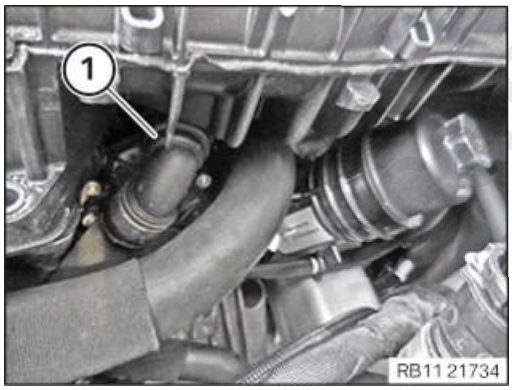
- Guide tank ventilation line (1) out of clamp (2) and place it aside.



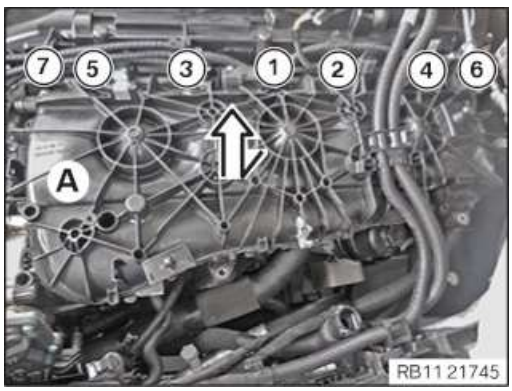
- Guide out the wiring harness section (1) for the injectors and ignition coils of the cylinder head cover (2) and set it aside.



- Loosen screw (1).

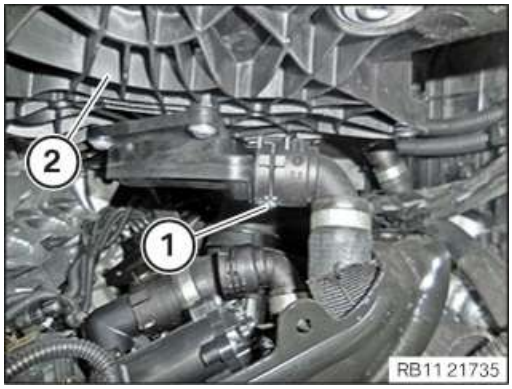


- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.



- Loosen screws in the order (7) to (1).
- Slightly raise intake plenum (A) in direction of arrow.

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TECHNICAL INFORMATION

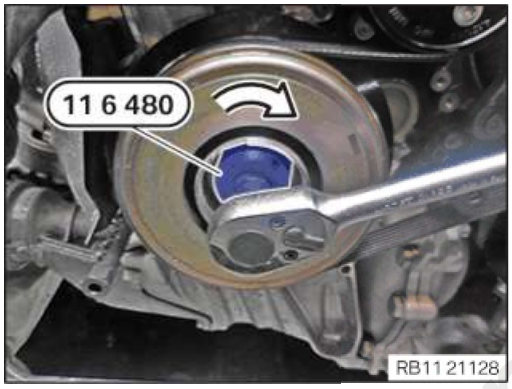
Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

- Unlock and release coolant line (1) below the intake plenum (2).
- Catch and dispose of escaping coolant.
- Thread out intake plenum (2) and remove.

24 – Block the engine with the special tool in TDC firing position



- Thread the sealing cap (1) out and remove.



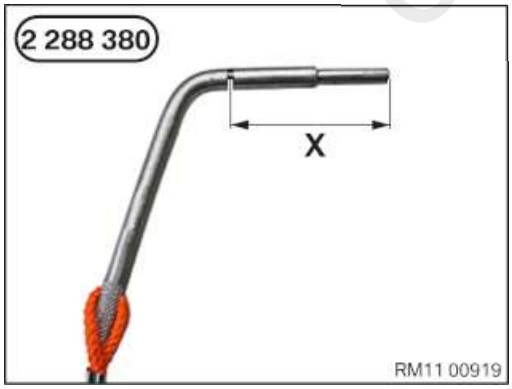
RISK OF DAMAGE

Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Always rotate the engine in the correct direction of rotation by hand: a) Clockwise, facing the vibration damper or b) Counter-clockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Turn the engine in **direction of arrow** with the special tool 0 493 380 (11 6 480) to the TDC firing position of **cylinder 1**.



- **Vehicles with automatic transmission:**

  Dimension (X) = 66 mm

  The special tool 2 288 380 must be inserted in the dowel hole to dimension (X).

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- **Vehicles with automatic transmission:**

  Special tool 2 288 380 **incorrectly** positioned.

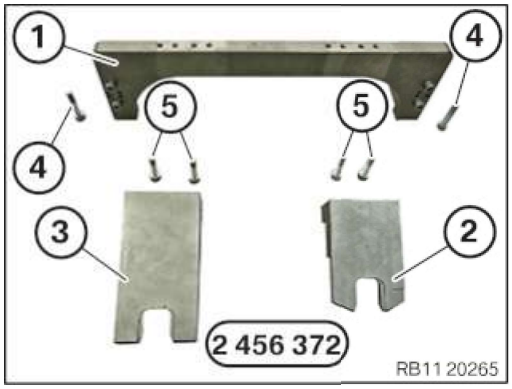
  The TDC firing position of cylinder 1 was **not** reached.



- **Vehicles with automatic transmission:**

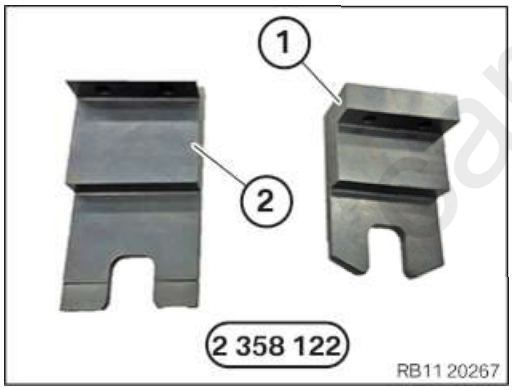
  Special tool 2 288 380 **correctly** positioned.

  The engine is in the TDC firing position of cylinder 1.



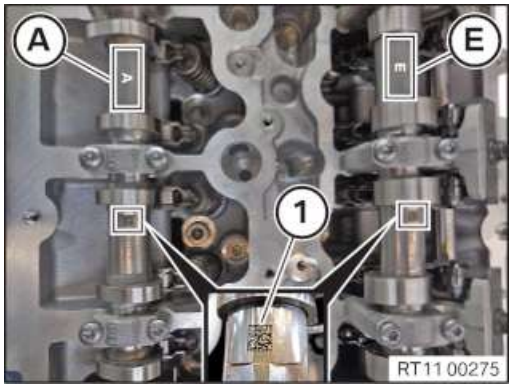
- Overview of the set of special tools 2 456 372:

Number	Description
1	Basic carrier
2	Setting gauge to adjust the intake camshaft
3	Setting gauge to adjust the exhaust camshaft
4	Basic carrier screws on cylinder head
5	Screw gauge on basic carrier



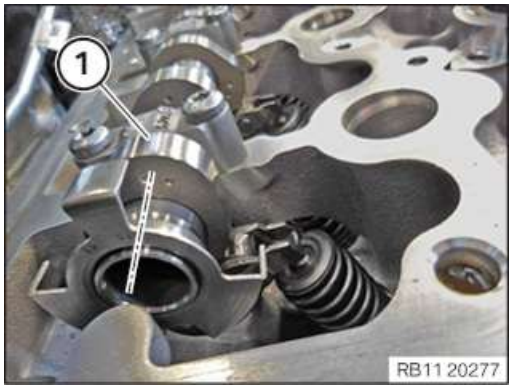
- Overview of the test gauges from the set of special tools 2 358 122:

Number	Description
1	Test gauge to fix the intake camshaft
2	Test gauge to fix the exhaust camshaft



- Turn intake camshaft (E) and exhaust camshaft (A) until marks (1) can be read from the top.

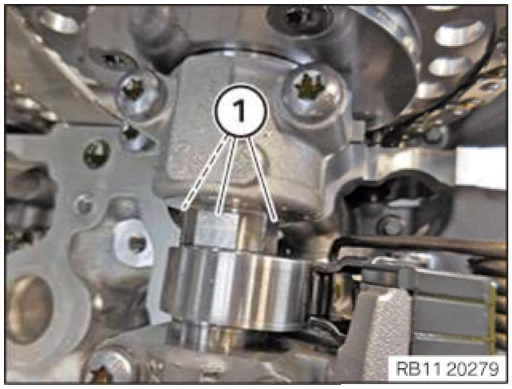
carldiag.com



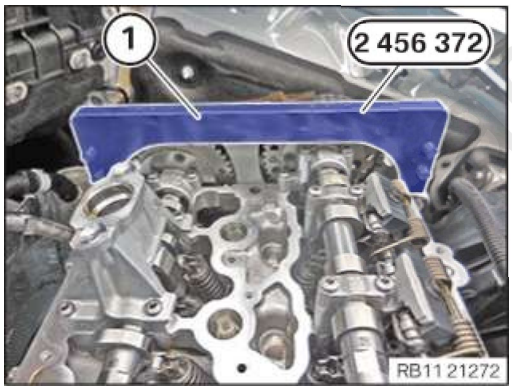
- Ensure that the cam (1) on the exhaust camshaft on **cylinder 1** points to the inside right at a slight angle.



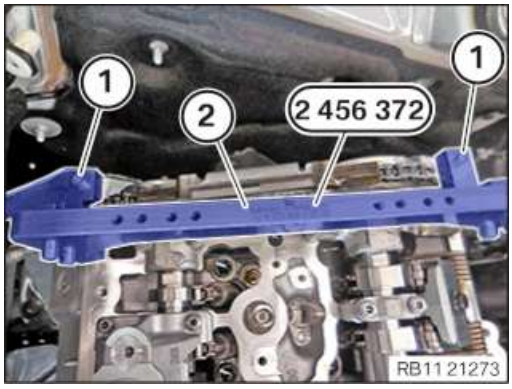
- Ensure that the cam (1) on the intake camshaft on **cylinder 1** points to the inside left at an angle.



- Ensure that the flattened areas (1) on the intake camshaft and the exhaust camshaft point upwards.



- Position basic carrier (1) from the set of special tools 2 456 372 on the cylinder head.

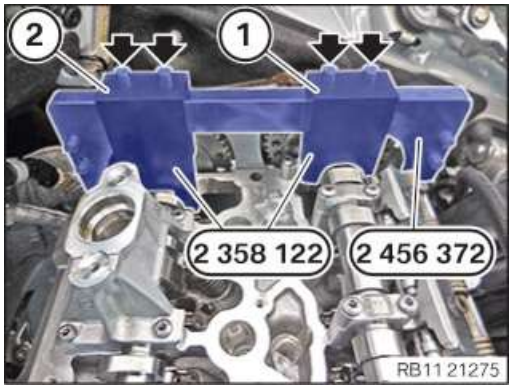


- Tighten the screws (1) from the set of special tools 2 456 372 on the basic carrier (2).

Basic carrier to cylinder head

M6		Tightening torque	8 Nm

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- Position the test gauge (1) from the set of special tools 2 358 122 between the intake camshaft and the basic carrier from the set of special tools 2 456 372.
- Position the test gauge (2) from the set of special tools 2 358 122 between the exhaust camshaft and the basic carrier from the set of special tools 2 456 372.
- Tighten screws (arrows).

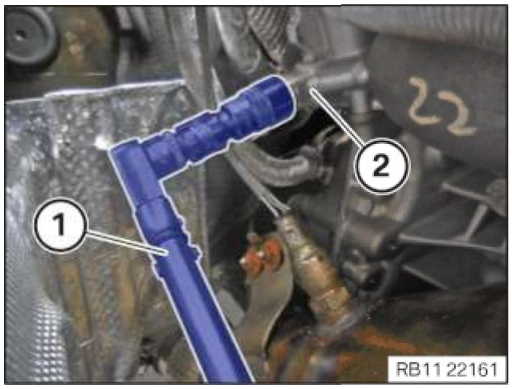
Test gauge to basic carrier

M6		Tightening torque	8 Nm

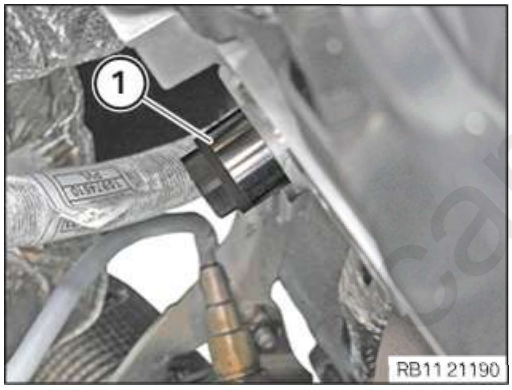
25 – Removing chain tensioner

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- A small amount on engine oil emerges when removing the chain tensioner (2), have a cleaning cloth ready.
- Release the chain tensioner (2) with conventional tools (1).



- Feed out and remove the chain tensioner (1).

26 – Releasing the VANOS central valve of the intake adjuster



- To release the VANOS central valve (1), use the reversible ratchet (2) from the special tool 0 496 855 with the special tool 2 450 487.

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NOTICE

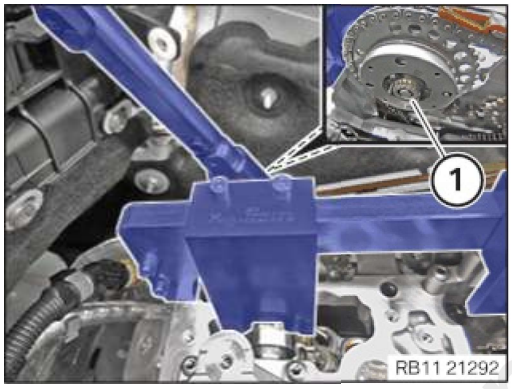
The figure shows the rear side of the engine.

- Release the VANOS central valve (1) of the intake adjuster.

27 – Releasing VANOS central valve of the exhaust camshaft adjuster



- To release the VANOS central valve (1), use the reversible ratchet (2) from the special tool 0 496 855 with the special tool 2 450 487.

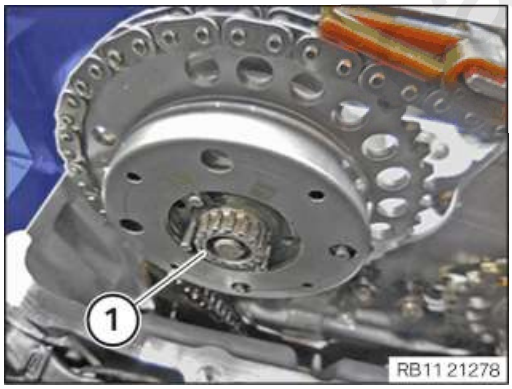


NOTICE

The figure shows the rear side of the engine.

- Release the VANOS central valve (1) of the exhaust camshaft adjuster.

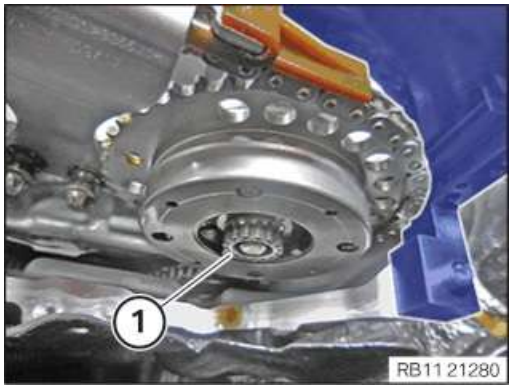
28 – Removing the VANOS central valve of the intake adjuster



- Guide out and remove the VANOS central valve (1) of the intake adjuster.

29 – Remove the VANOS central valve of the exhaust camshaft adjuster

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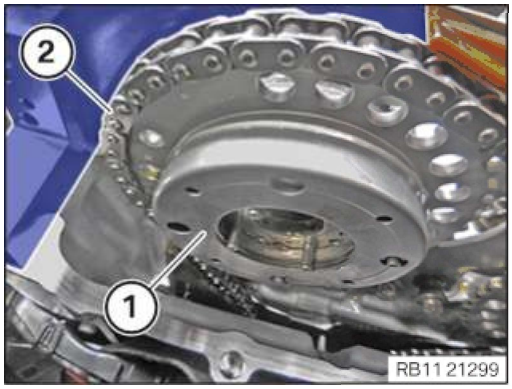


- Guide out and remove the VANOS central valve (1) of the exhaust camshaft adjuster.

30 – Removing intake adjuster

NOTICE

The figure shows the rear side of the engine.

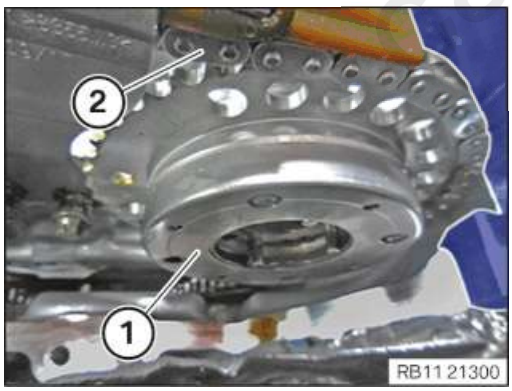


- Guide out the intake adjuster (1) from the timing chain (2) and remove.

31 – Remove exhaust camshaft adjuster

NOTICE

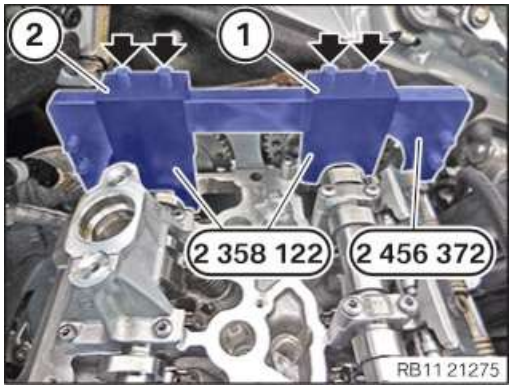
The figure shows the rear side of the engine.



- Guide out the exhaust camshaft adjuster (1) from the timing chain (2) and remove.

32 – Remove the test gauges to fix the camshafts

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- Remove screws (arrows).
- Guide out and remove test gauge (1) from the set of special tools 2 358 122 between the intake camshaft and the basic carrier of the set of special tools 2 456 372.
- Guide out and remove test gauge (2) from the set of special tools 2 358 122 between the exhaust camshaft and the basic carrier of the set of special tools 2 456 372.

33 – Remove cylinder head.

CAUTION

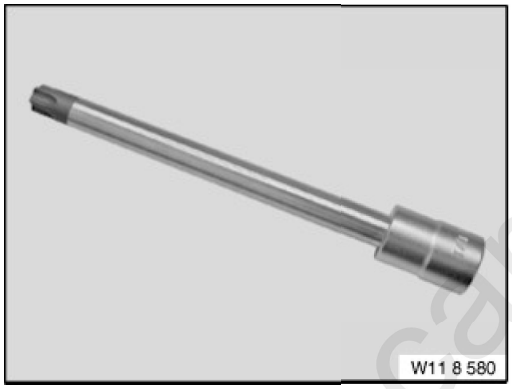
Heavy component.

Heavy components can lead to injury or damage.

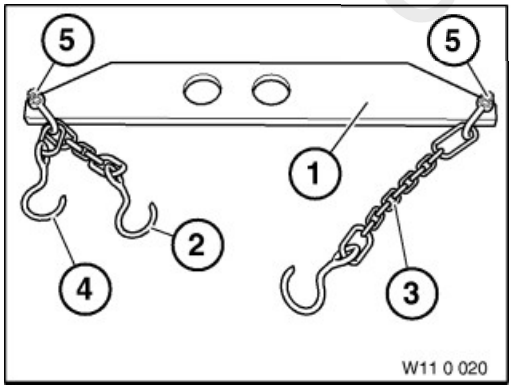
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Prepare special tool 0 495 747 (11 8 580).

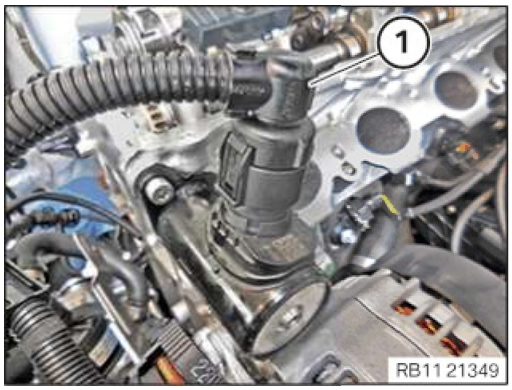


- Prepare special tool 0 490 567 (11 0 020).

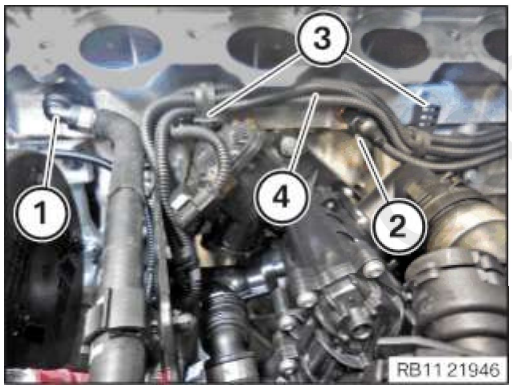
cardiagn.com



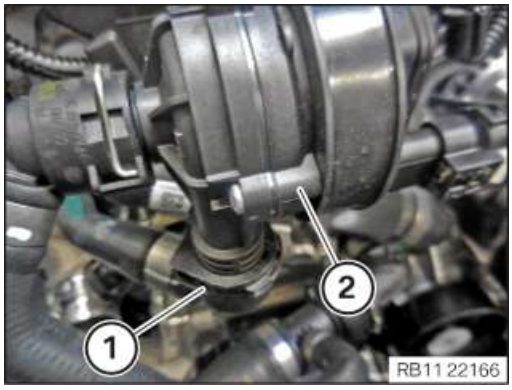
- Prepare the workshop crane 2 220 718.



- Unlock plug connection (1) and disconnect.

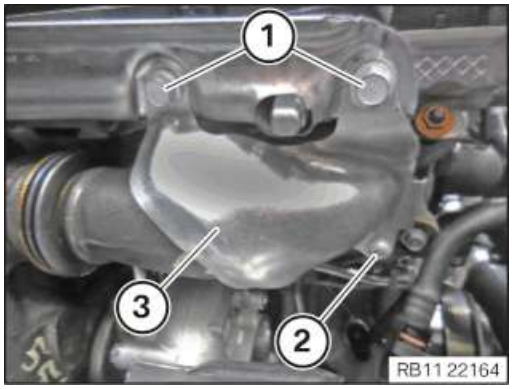


- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.
- Unlock plug connection (2) and disconnect.
- Loosen clamps (3).
- Feed out wiring harness section (4) for sensor system **1** and set it aside.



- Unlock and release coolant return line (1) on coolant pump (2) for the exhaust turbocharger.
- Catch and dispose of escaping coolant.

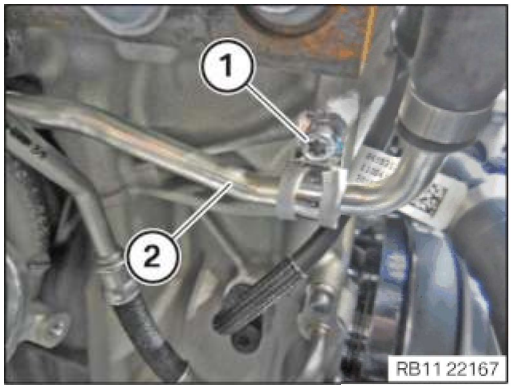
rdiagn.com



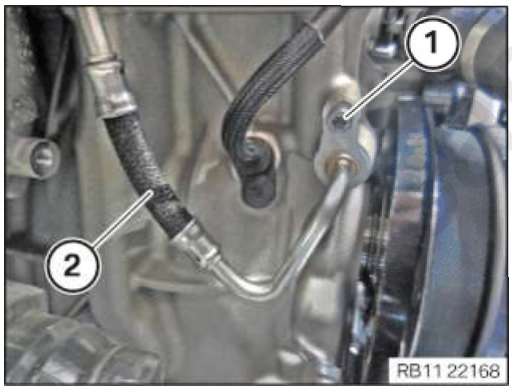
- Loosen screws (1).
- Loosen screw (2).
- Feed out and remove the heat shield (3).



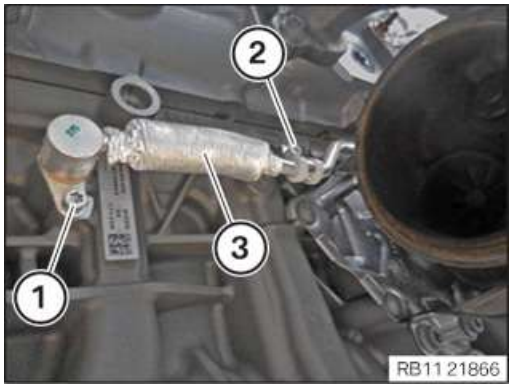
- Loosen screws (1).
- Feed out and remove the heat shield (2).



- Release screw (1) on coolant return line (2).

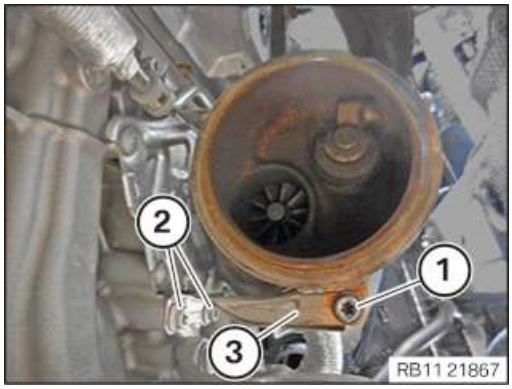


- Loosen screw (1).
- Guide out oil feed line (2) for the exhaust turbocharger and place it aside.
- Catch and dispose of emerging engine oil.

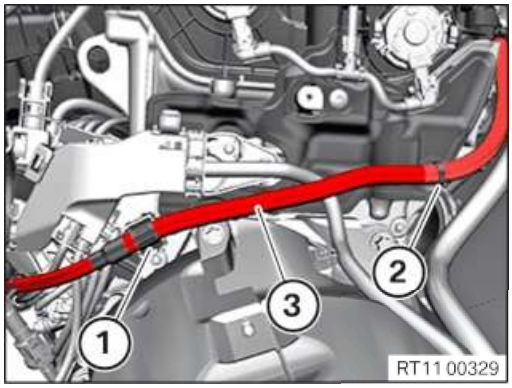


- Loosen screws (1) and (2).
- Guide the coolant feed line for exhaust turbocharger (3) from the crankcase and place it aside.
- Catch and dispose of escaping coolant.

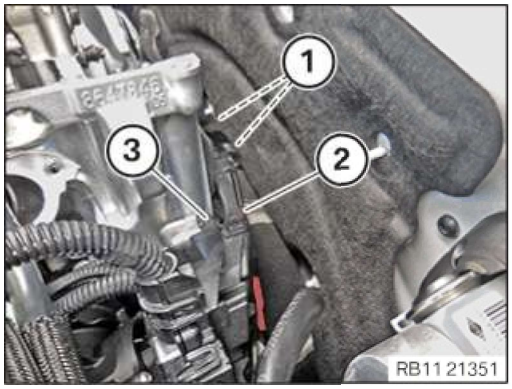
rdiagn.com



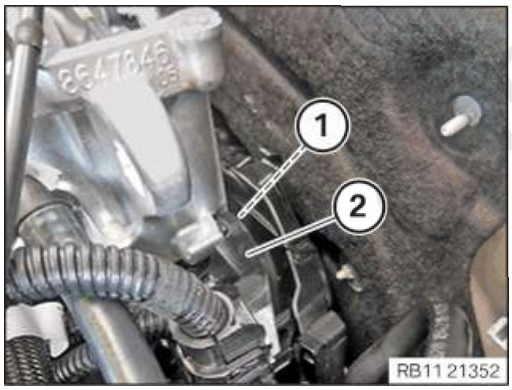
- Loosen screws (1) and (2).
- Feed the support (3) out and remove.



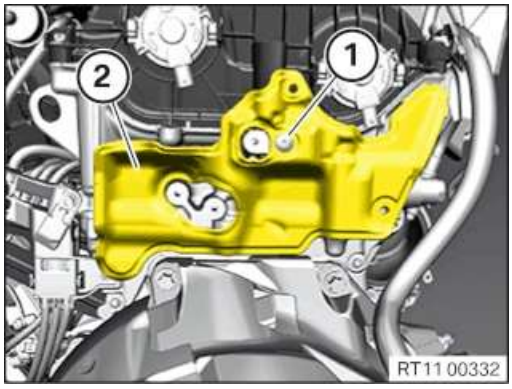
- Unlock and release clamps (1) and (2).
- Feed out positive battery cable (3) and put to one side.



- Loosen screws (1).
- Guide out transmission wiring harness (2) on wiring harness section (3) for sensor system 1 and set it aside.



- Loosen screw (1).
- Guide out the wiring harness section (2) for sensor system 1 and place to one side.

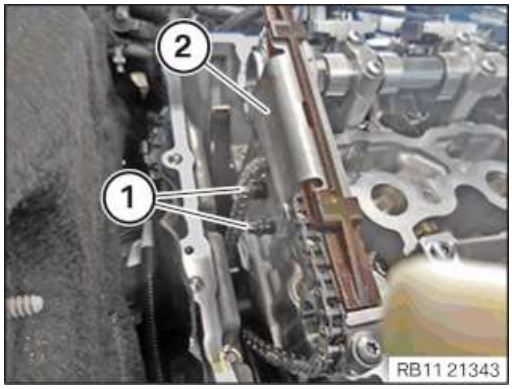


NOTICE

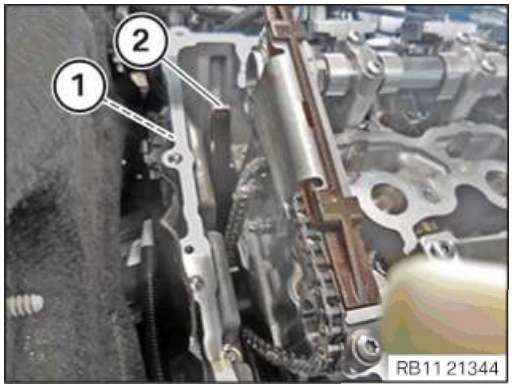
The figure shows the rear side of the engine.

- Loosen screw (1).
- Guide out and remove the cover (2).

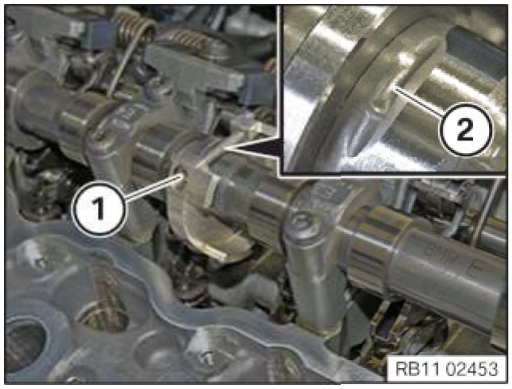
mdiagn.com



- Loosen screws (1).
- Guide out the slide rail (2) and remove.

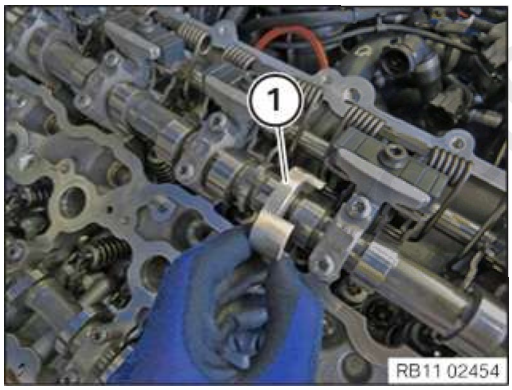


- Release the bearing journal (1) from the guide rail (2).



- Rotate intake camshaft, if necessary in the position shown.

  The recess (2) must point upwards.
- Loosen screw (1).



- Slide camshaft sensor wheel (1) in the direction of cylinder 1 and guide it out from the intake camshaft.

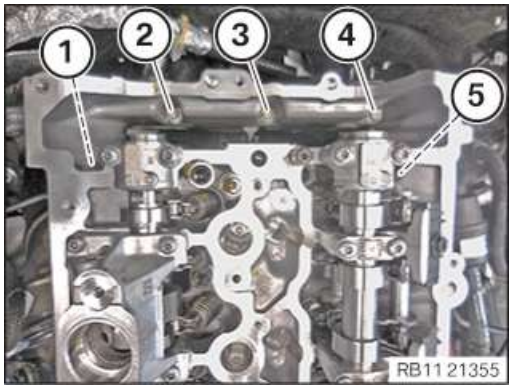


- Guide in and position special tool on the cylinder head.
- Tighten the screws (1) of special tool .

Special tool to cylinder head

M8		Tightening torque	21,5 Nm

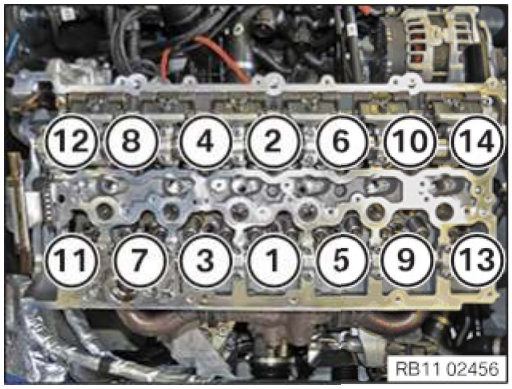
rdiagn.com



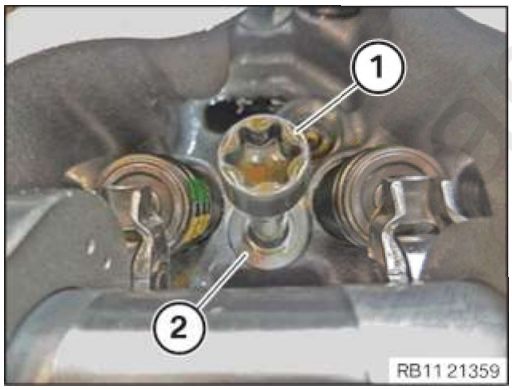
- Loosen the cylinder head bolts in the sequence from (5) to (1).



- Release cylinder head bolts with the special tool 0 495 747 (11 8 580).

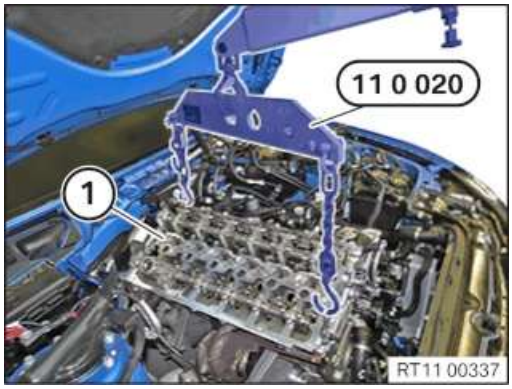


- Undo the screws using the special tool 0 495 747 (11 8 580) in the order (14) to (1) .



- Feed out and remove all the cylinder head bolts (1).
- Feed out and remove all the washers (2).

erdiagn.com



CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

RISK OF DAMAGE

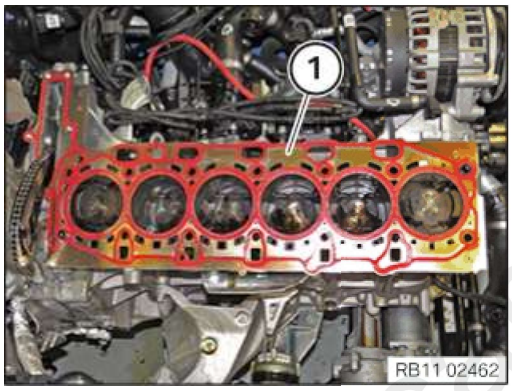
Damage to the guide rails.

Large amounts of force may damage the guide rails of the timing chain.

- Make sure not to damage the guide rail with the cylinder head when removing and installing the cylinder head.

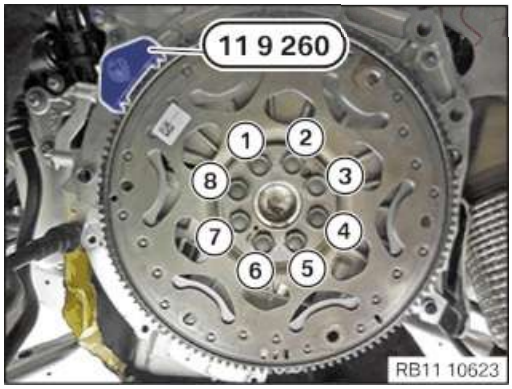
- Attach special tool 0 490 567 (11 0 020) to workshop crane.
- Lift out cylinder head (1) and the exhaust turbocharger with an auxiliary person, the workshop crane and special tool 0 490 567 (11 0 020).

34 – Removing the cylinder head gasket



- Thread out and remove cylinder head gasket (1).

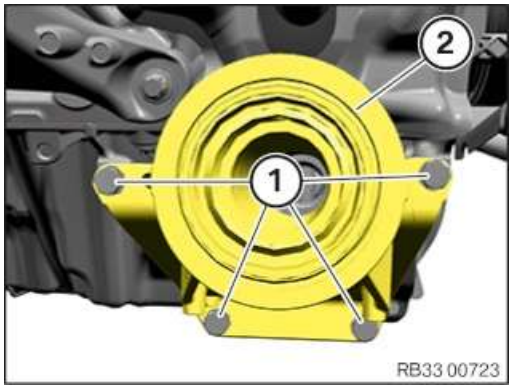
35 – Removing flywheel



- Fasten the flywheel with the special tool 0 493 938 (11 9 260) and tighten with the special tool 0 494 130 (11 9 264).
- Loosen screws (1-8).

36 – Remove bearing support

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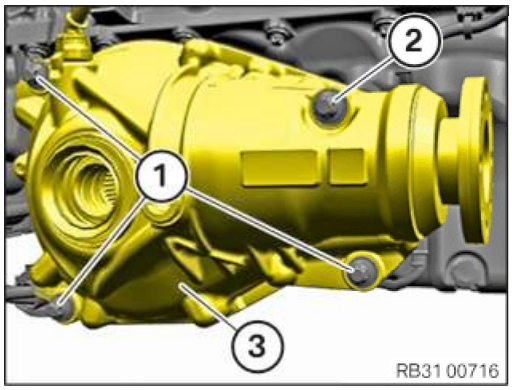


- Loosen screws (1).
- Remove the bearing support (2).

37 – Remove front axle differential

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Mark installation location of the screws (1) and (2).
  - Screws (1) M12x55
  - Screw (2) M12x105
- Loosen screws (1) and (2).
- Remove front axle differential (3).

38 – Remove oil sump

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

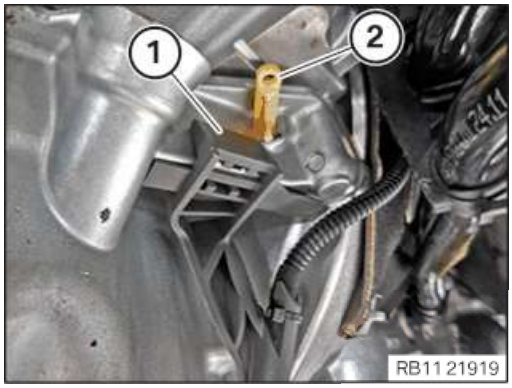
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

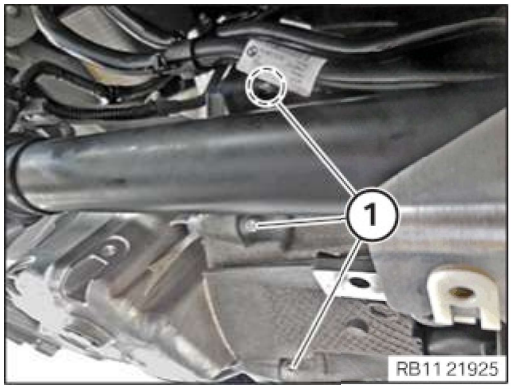
cardiagn.com



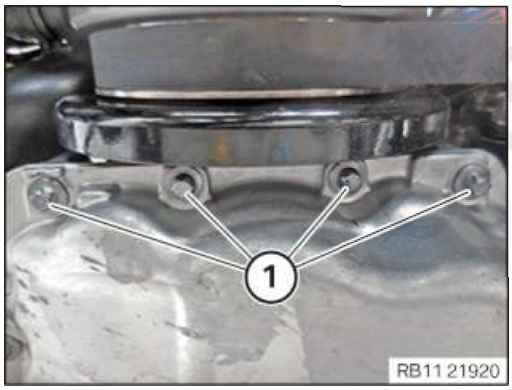
- Unlock clamps (arrows) and disconnect.
- Unlock and loosen connector (1).



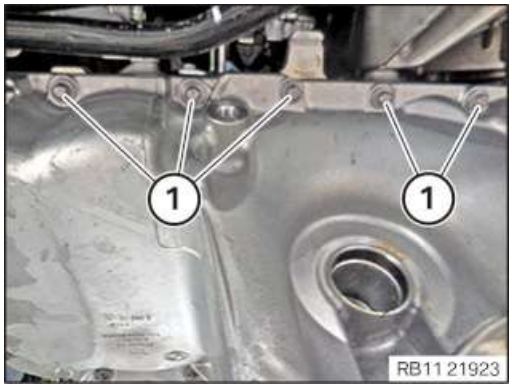
- Loosen clamp (1).
- Thread the sealing cap (2) out and remove.



- Unscrew the transmission bolts (1).

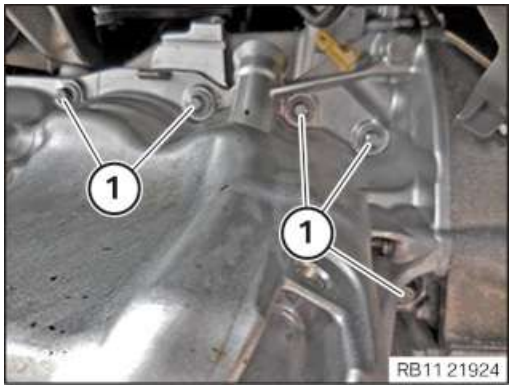


- Loosen screws (1).

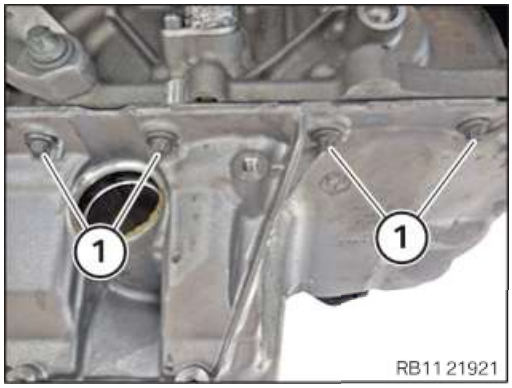


- Loosen screws (1).

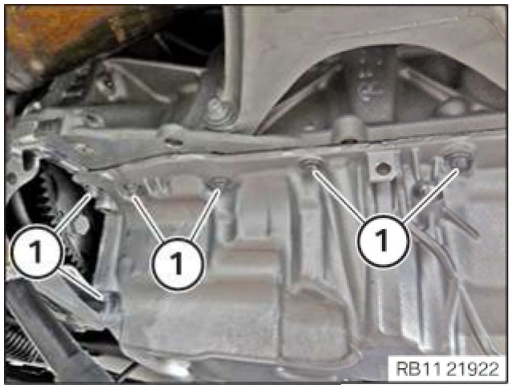
rdiagn.com



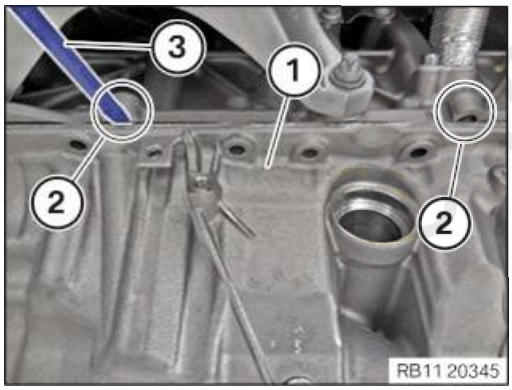
- Loosen screws (1).



- Loosen screws (1).



- Loosen screws (1).



TECHNICAL INFORMATION

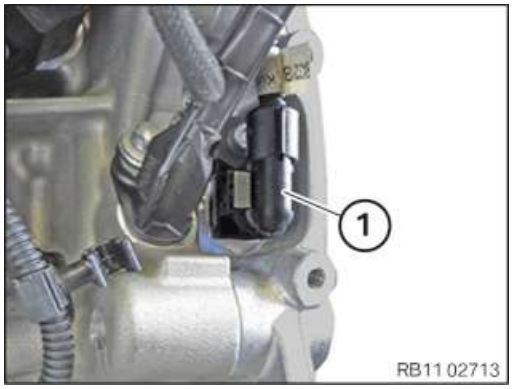
Increased force may be necessary during disassembly because the component is bonded with liquid sealing compound.

- Release the oil sump (1) in the **marked** areas (2) using suitable tools (3).
- Guide out the oil sump (1) downwards to the rear and remove.

MAIN WORK

39 – Remove rear timing case cover

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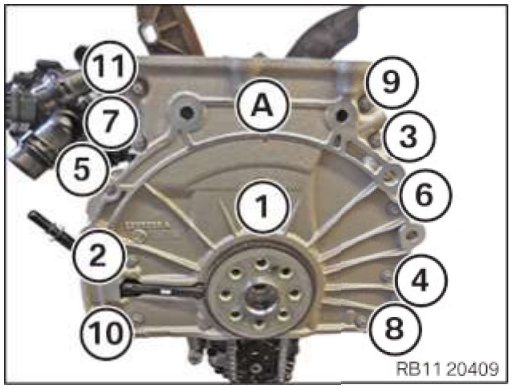
- Unlock the connector (1) and pull it off the crankshaft sensor.



TECHNICAL INFORMATION

Increment wheel is magnetic. Protect the increment wheel from contact with metallic swarf after disassembly.

- Remove the magnet wheel (1) from the crankshaft.



- Loosen screws in the order (11) to (1).

TECHNICAL INFORMATION

Increased force may be necessary during disassembly because the component is bonded with liquid sealing compound.

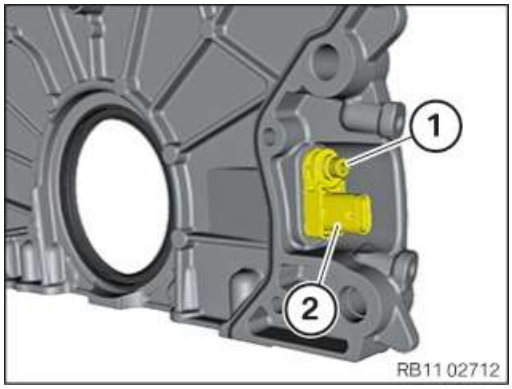
- Release and remove timing case cover (A) carefully.

40 – Replacement: Remount crankshaft sensor

- **For timing case cover replacements:**

  Remount crankshaft sensor.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

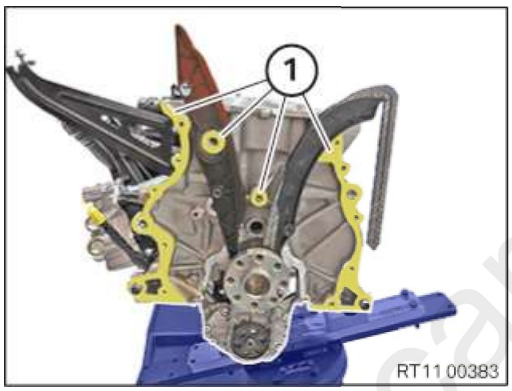
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.

- Loosen the screw (1) and remount the crankshaft sensor (2).
- Tighten down screw (1).

Crankshaft sensor to timing case cover

	4.6 Nm

41 – Install the rear timing case cover



TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

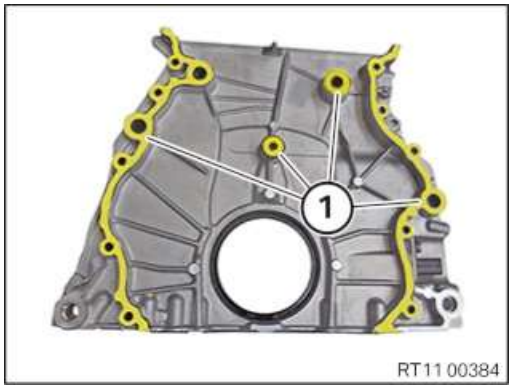
- Do not use any metal-cutting tools.

- Clean sealing surfaces (1) with special tool 0 495 102 (11 4 470).
- Clean sealing surface (1) with brake cleaner.

Expendable materials

Brake cleaner2.0	500 ml, Spray can	83192365214
	20 , Canister	83192365215

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RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

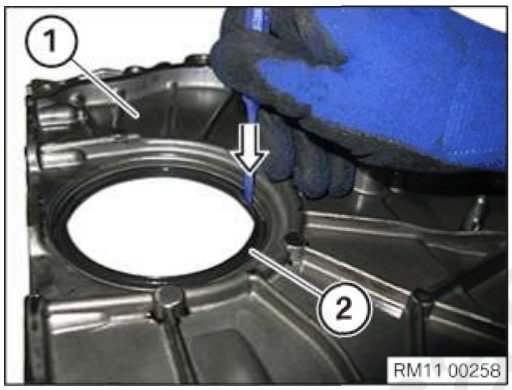
TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

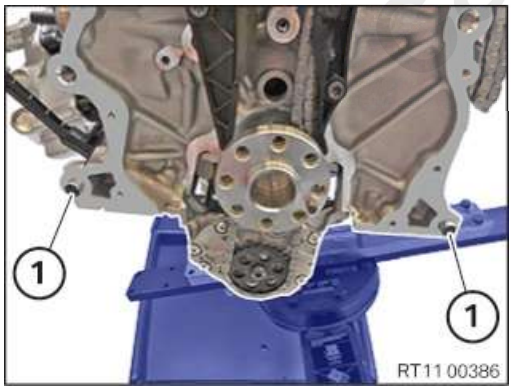
- Clean sealing surfaces (1) with special tool 0 495 102 (11 4 470).
- Clean sealing surface (1) with brake cleaner.

Expendable materials

Brake cleaner2.0	500 ml, Spray can	83192365214
	20 , Canister	83192365215



- Position the timing case cover (1) underneath.
- Position the inner punch in the crankshaft sealing ring (2).
- Remove the crankshaft sealing ring (2) outward in the direction of the arrow.



- Check the fitting sleeves (1) for damage and renew if necessary.
- Check for correct fit of fitting sleeves(1).

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- Have the special tool ready.

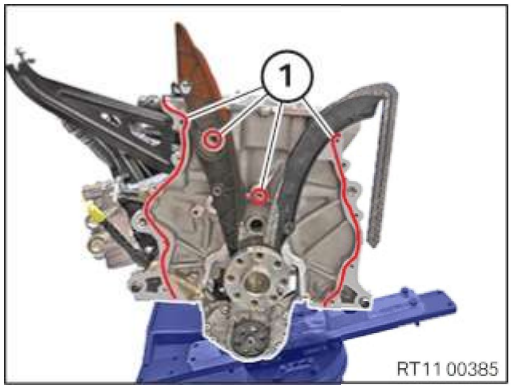


TECHNICAL INFORMATION

For more information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

- Position the sealing compound (1) on special tool as shown.

  Parts: Sealing compound



TECHNICAL INFORMATION

The maximum application time of the liquid sealing compound is 12 minutes.

- Apply the sealing compound in area (1)along the inner edge.

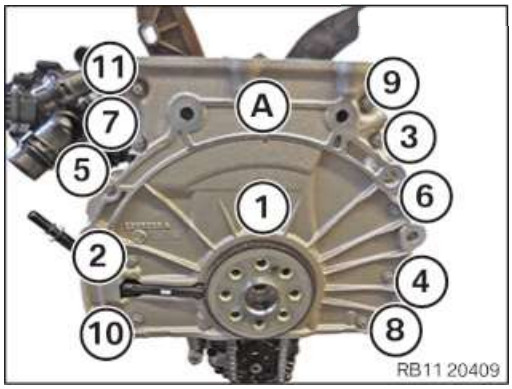
Sealing compound

Loctite 5970 liquid sealing compound	50 ml, Cartridge	83190404517

Overview of consumables (Electronic Parts Catalogue)

Height of the sealing bead

2,0 mm ... 2,5 mm



- Renew screws (1) to (11).

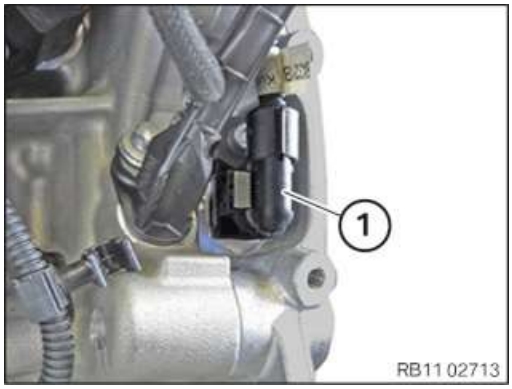
  Parts: Bolts

- Carefully mount the timing case cover (A).
- Tighten the bolts in sequence (1) to (11) with the special tool 0 490 504 (00 9 120).

Rear timing case cover to crankcase

M6 x 31	Renew screws.	Jointing torque	8 Nm
		Angle of rotation	90 °

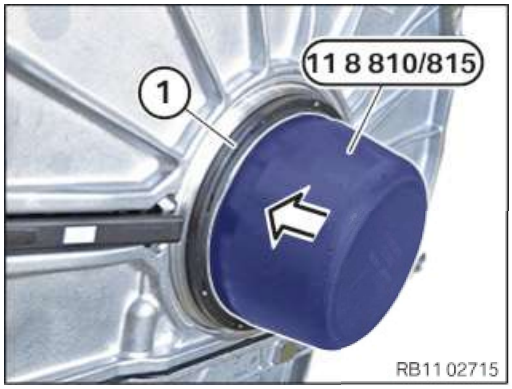
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- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

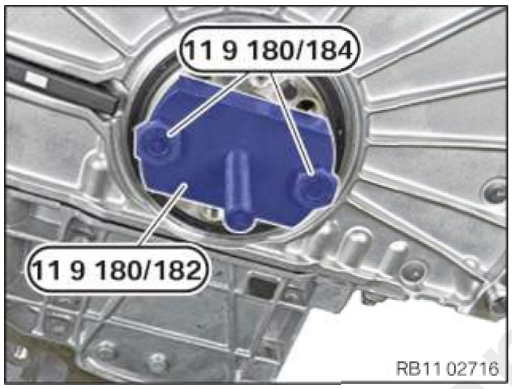
▸ **Installing the rear crankshaft seal**



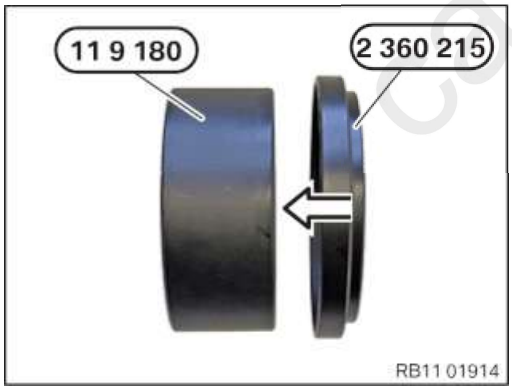
TECHNICAL INFORMATION

The radial shaft seal must be installed dry. Do not use engine oil or lubricant.

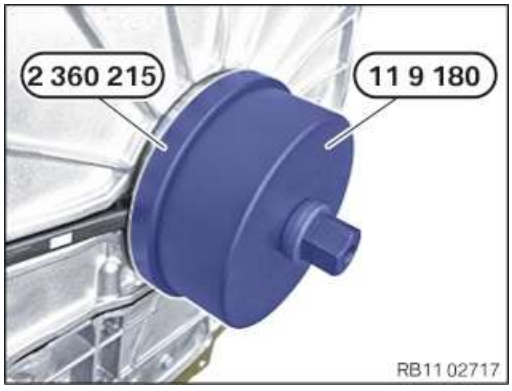
- Install special tool 0 496 137 (11 8 815) on the crankshaft.
- Slide off the crankshaft seal (1) over special tool 0 496 137 (11 8 815) so that it is fully in contact with the timing case cover.
- Guide the special tool 0 496 137 (11 8 815) out and remove.



- Secure special tool 0 494 029 (11 9 182) to the crankshaft using special tool 0 494 031 (11 9 184).



- Connect special tool 2 360 215 to special tool 0 494 028 (11 9 181).



- Position special tools 0 494 028 (11 9 181) and 2 360 215 and move them combined with special tool 0 494 030 (11 9 183) until they rest against the crankshaft sealing ring.
- Check the freedom of movement between the special tool 2 360 215 and the crankshaft sensor during installation.
- Screw in crankshaft seal until the limit position of the special tool 2 360 215 on the timing case cover.

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42 – Refitting sump

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.



TECHNICAL INFORMATION

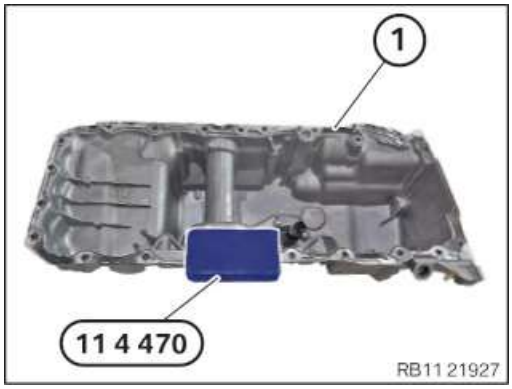
The sealing surfaces must be free from oils, grease and cleaning agents.

- Remove the coarse sealing residue on sealing surface (1) on the crankcase with special tool 0 495 102 (11 4 470).
- Clean sealing surface (1) with brake cleaner.

Expendable materials

Brake cleaner2.0	500 ml, Spray can	83192365214
	20 , Canister	83192365215

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TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

- Remove the fine seal remains on the sealing surface (1) of the oil sump with the special tool 0 495 102 (11 4 470).
- Clean sealing surface (1) with brake cleaner.

Expendable materials

Brake cleaner2.0	500 ml, Spray can	83192365214
	20 , Canister	83192365215



- Have the special tool ready.



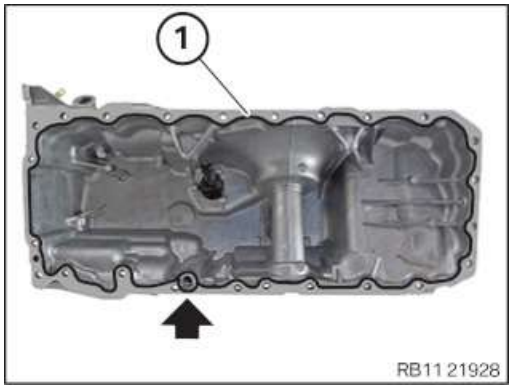
TECHNICAL INFORMATION

For more information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

- Position the sealing compound (1) on special tool as shown.

  Parts: Sealing compound

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TECHNICAL INFORMATION

The maximum application time of the liquid sealing compound is 12 minutes.

- Apply sealing bead (1) with the sealing compound in the **marked** area along the inner edge.

Sealing compound

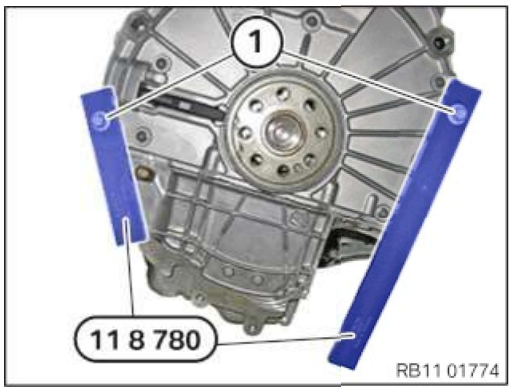
Loctite 5970 liquid sealing compound	50 ml, Cartridge	83190404517

Overview of consumables (Electronic Parts Catalogue)

Height of the sealing bead

2,0 mm ... 2,5 mm

- Completely encircle the oil return orifice (arrow) with the sealing compound.



TECHNICAL INFORMATION

The special tool 11 8 780 is only required when the transmission is removed.

- Position the special tool 0 496 120 (11 8 780) with the transmission bolts (1) so that the oil sump is exactly flush with the timing case cover.
- Renew the centring sleeves where required.



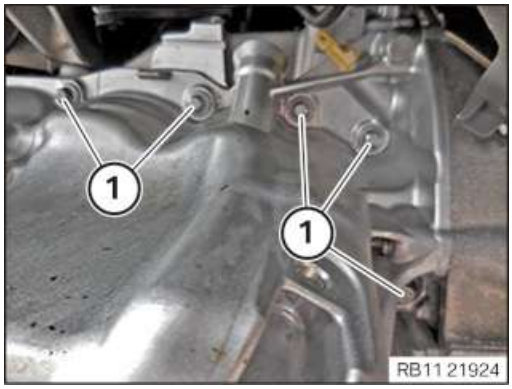
- Insert oil sump (1) upwards and forwards and position.



- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm



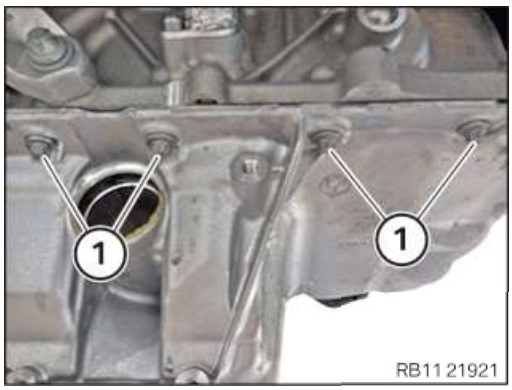
- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm

Oil sump to crankcase

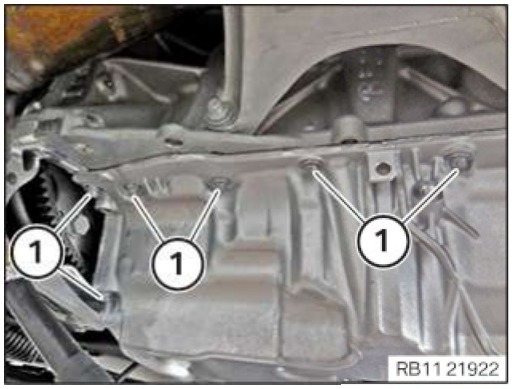
M8 x 110		Tightening torque	24 Nm



- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm



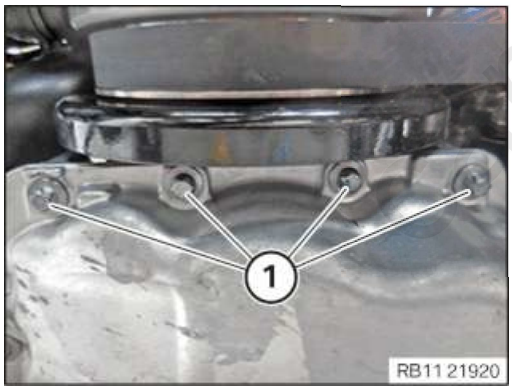
- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm

Oil sump to crankcase

M8 x 110		Tightening torque	24 Nm



- Tighten the screws (1).

Oil sump to crankcase

M8 x 30		Tightening torque	24 Nm



- Tighten transmission screws (1).

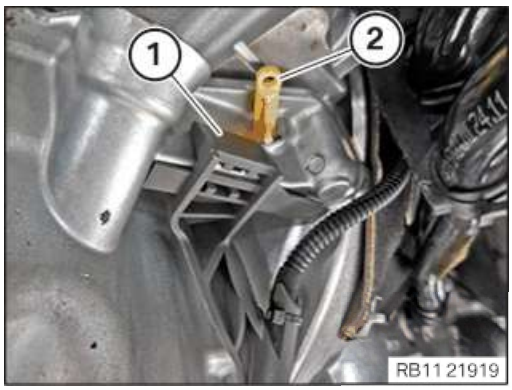
Transmission to oil sump (manual gearbox and automatic transmission)

M8 x 50		Tightening torque	19 Nm

rdiagn.com

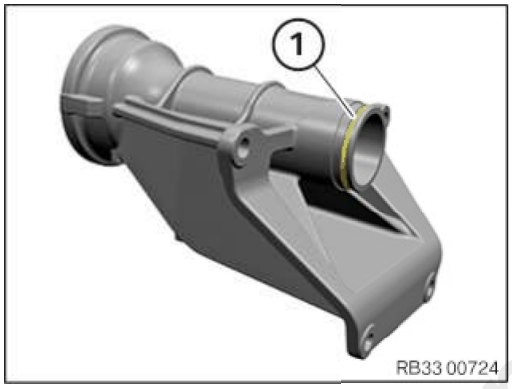


- Secure the clamps (arrows).
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

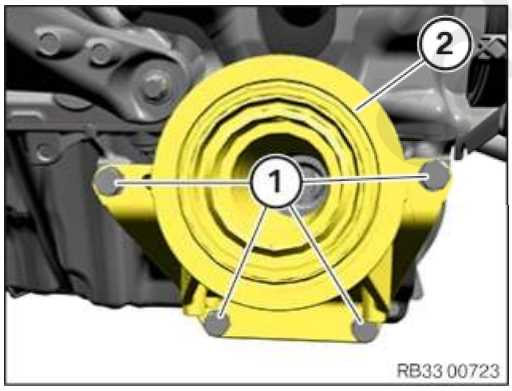


- Secure clamps (1).
- Guide in and install sealing cap (2).

43 – Install bearing support



- Coat the O-ring (1) with front axle transmission oil.

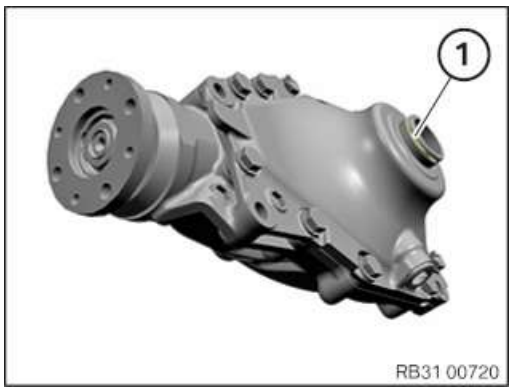


- Position the bearing support (2) at the engine oil sump.
- Tighten the screws (1).

Bearing support to oil sump

M8		Tightening torque	19 Nm

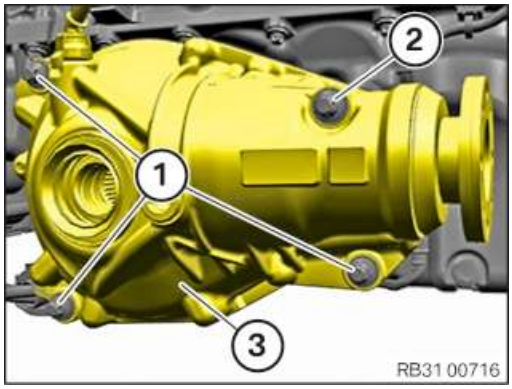
44 – Install front axle differential



- Renew O-ring (1).

  Parts: O-ring
- Coat the O-ring (1) with front axle transmission oil.

.diagn.com



- Position front axle differential (3).

  Make sure marked screws are installed in correct installation locations:

  - Screws (1) M12x55
  - Screw (2) M12x105
- Tighten down screws (1) and (2).

Front axle final drive to engine oil pan

M12		Tightening torque	140 Nm

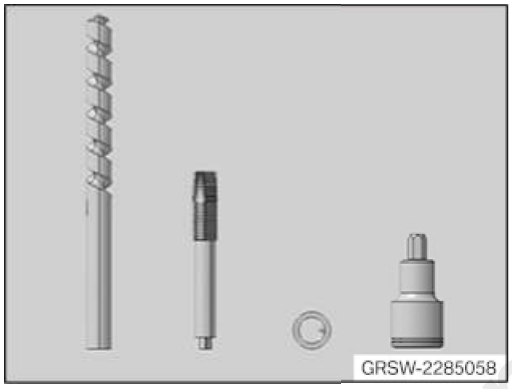
45 – Installing the flywheel



TECHNICAL INFORMATION

Clean all threads with a screw tap.

- Clean all the screw threads (1).



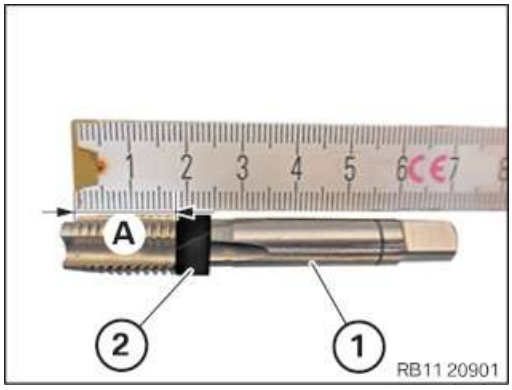
- Use the set of special tools 2 285 058.

Description
Twist drill
Thread cutter M12x1.5
Depth
Insertion tool



- Assemble tool set.

Number	Description
1	Tool holder
2	Thread cutter M12X1,5

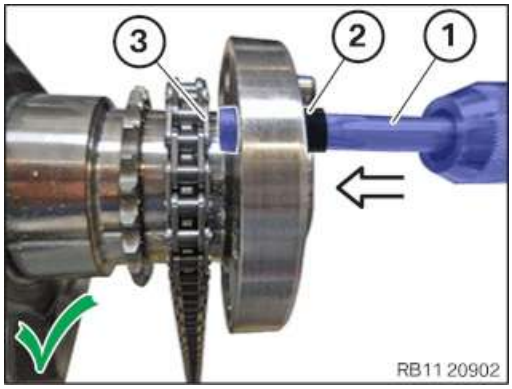


- Mark the screw-in depth (A) on thread cutter (1) from the set of special tools 2 285 058 with a standard tool (2).

Screw-in depth of thread cutter

Screw-in depth	18 mm

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NOTICE

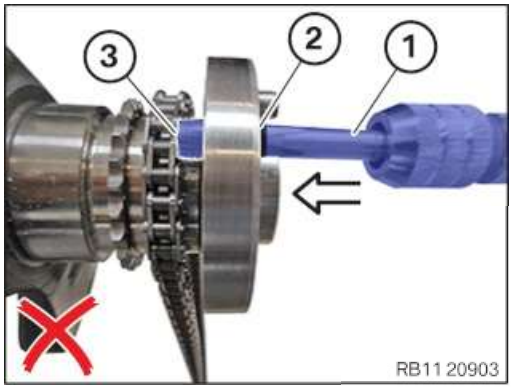
To provide a better overview: Shown with engine removed.

- Screw in the thread cutter (1) from the set of special tools 2 285 058 in direction of arrow up to the screw-in depth (2).

Screw-in depth of thread cutter

Screw-in depth	18 mm

- Make sure that the thread cutter does (1) **not** rest on the timing chain (3).

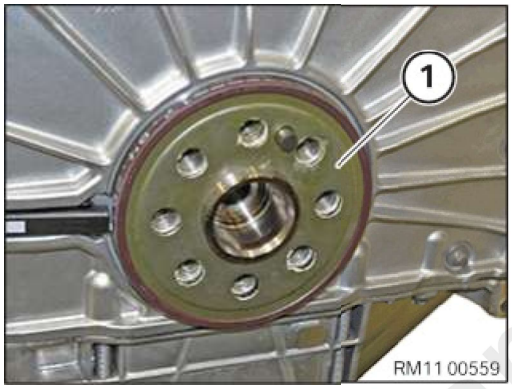


TECHNICAL INFORMATION

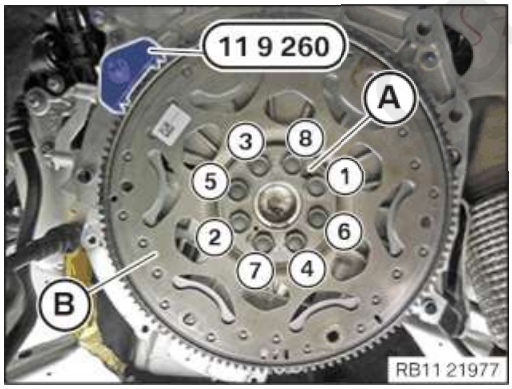
- **Carefully** handle the timing chain, to protect the timing chain and timing chain drive against damage.

- Make sure that the screw-in depth (2) of the screw tap (1) is not exceeded.

  The thread cutter (1) may not rest on the timing chain (3).



- Make sure the magnet wheel (1) is installed correctly.



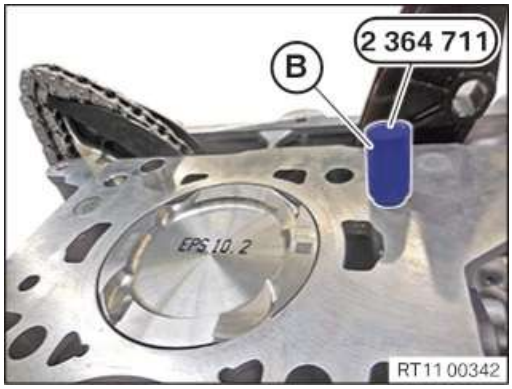
- Renew screws (1) to (8).

  Parts: Bolts
- Position flywheel (B) .
- Screw in flywheel bolt (1) to (8) by hand.
- Fix the flywheel (B) with the special tool 0 494 034 (11 9 261) and screw the special tool 0 494 130 (11 9 264) tightly.
- Make sure the tightening sequence starts at dowel pin (A).
- Tighten flywheel bolts in sequence (1) to (8).

Flywheel to crankshaft

M12x1.5	Renew screws.	Jointing torque	45 Nm
		Angle of rotation	40 °

- Remove special tool 0 493 938 (11 9 260).



- Seal the oil duct using special tool (B) from the set of special tools 2 364 711.

47 – Clean sealing surfaces

RISK OF DAMAGE

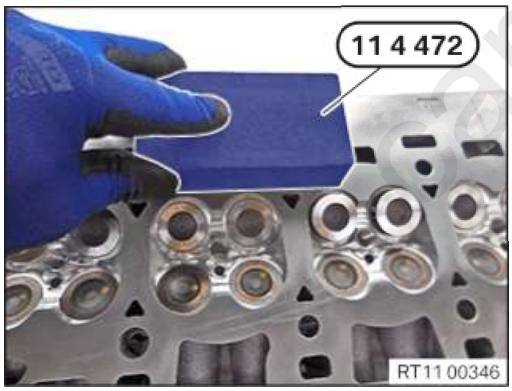
Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

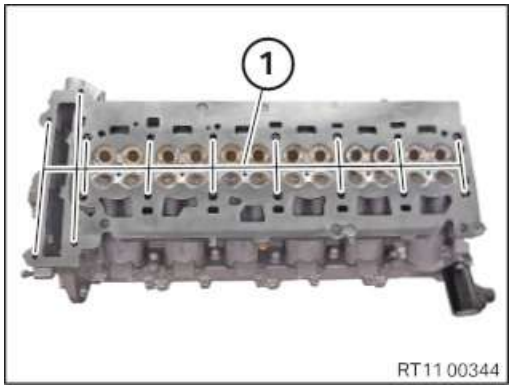
- Do not use any metal-cutting tools.



- Remove coarse backlogs from the sealing surfaces of the cylinder head using special tool 0 495 103 (11 4 471).



- Remove fine residues from the sealing surfaces of the cylinder head using special tool 0 495 104 (11 4 472).



- Clean all blind holes (1) of the cylinder head.

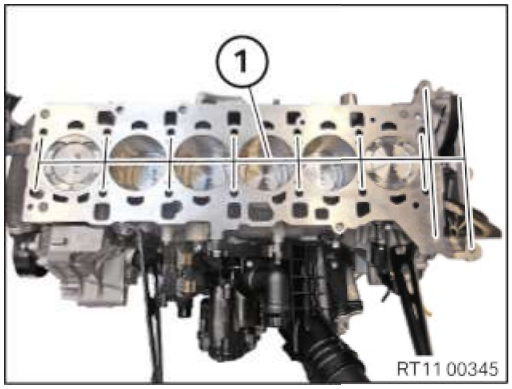
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- Remove coarse backlogs from the sealing surfaces of the crankcase using special tool 0 495 103 (11 4 471).



- Remove fine backlogs from the sealing surfaces of the crankcase using special tool 0 495 104 (11 4 472).
- Clean all blind holes of the crankcase.



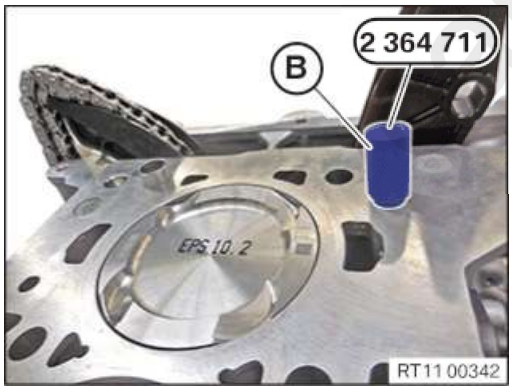
CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

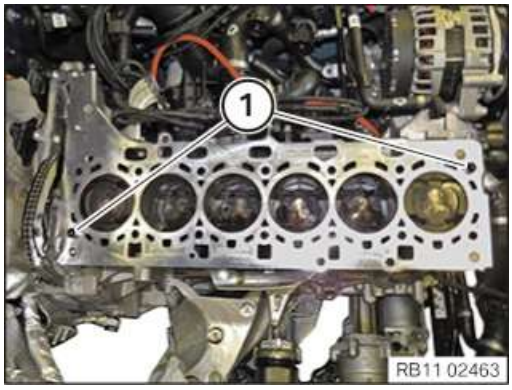
- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.
- Clean all threaded holes (1) of the crankcase with compressed air.

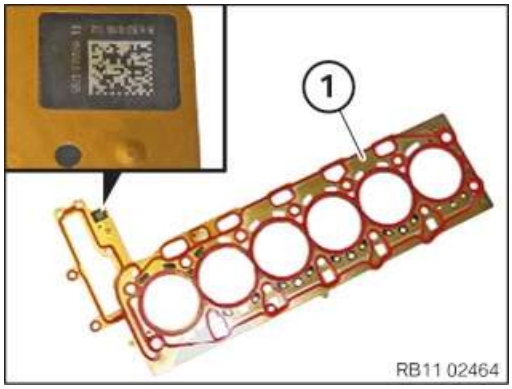


- Remove special tool (B) contained in the set of special tools 2 364 711.

48 – Installing the cylinder head gasket

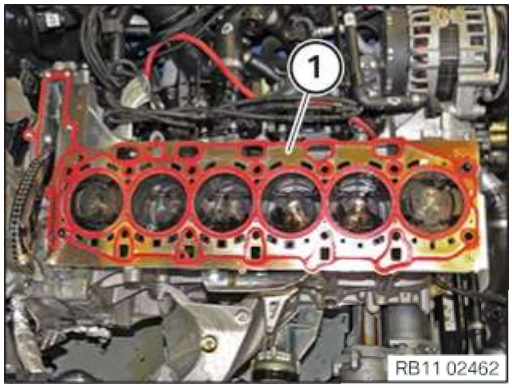


- Check the fitting sleeves (1) for damage and renew if necessary.



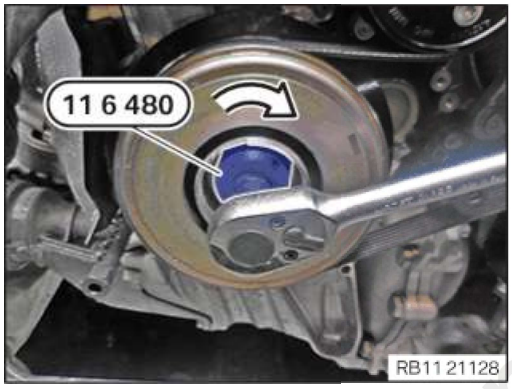
- Renew cylinder head gasket (1).

  Parts: Cylinder head gasket
- Install a thicker cylinder head gasket (1) with +0.3 mm in rebuilt cylinder heads.
- Check cylinder head gasket (1) using the part number.



- Install cylinder head gasket (1) and place it correctly on the fitting sleeves.

49 – Block the crankshaft in he TDC firing position of cylinder 1



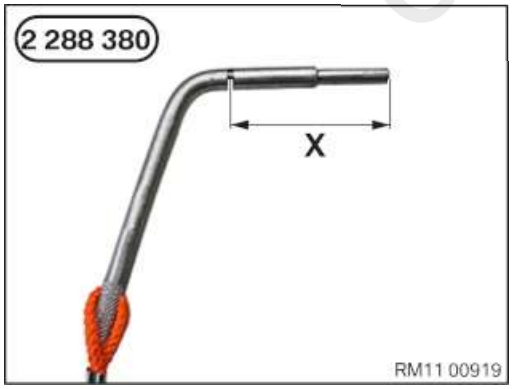
RISK OF DAMAGE

Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Always rotate the engine in the correct direction of rotation by hand: a) Clockwise, facing the vibration damper or b) Counter-clockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Turn the engine in **direction of arrow** with the special tool 0 493 380 (11 6 480) to the TDC firing position of **cylinder 1**.



- **Vehicles with automatic transmission:**

  Dimension (X) = 66 mm

  The special tool 2 288 380 must be inserted in the dowel hole to dimension (X).

carmagn.com



- **Vehicles with automatic transmission:**

  Special tool 2 288 380 **incorrectly** positioned.

  The TDC firing position of cylinder 1 was **not** reached.



- **Vehicles with automatic transmission:**

  Special tool 2 288 380 has been **correctly** positioned.

  The engine is in the TDC firing position of cylinder 1.

50 – Installing the cylinder head

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

RISK OF DAMAGE

Damage to threads.

Fluid in the threaded hole may damage the thread when screws are tightened in the threads.

- Dry threaded holes (e.g. using compressed air).

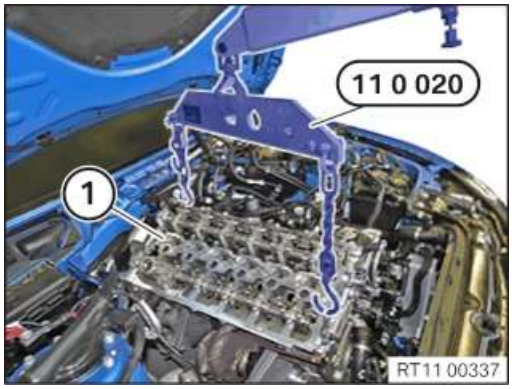
TECHNICAL INFORMATION

Do not remove bolt coating.

TECHNICAL INFORMATION

When replacing the cylinder head: The complete valve control and the Valvetronic servomotor are already pre-assembled for new cylinder heads.

cardiagn.com



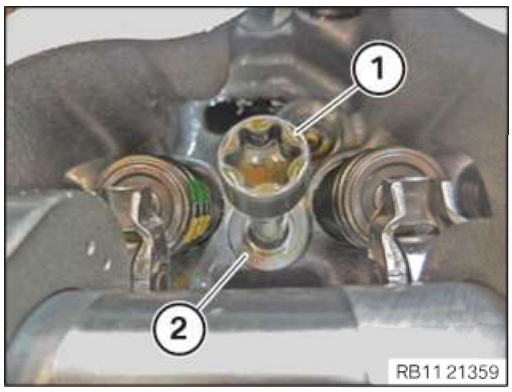
RISK OF DAMAGE

Damage to the guide rails.

Large amounts of force may damage the guide rails of the timing chain.

- Make sure not to damage the guide rail with the cylinder head when removing and installing the cylinder head.

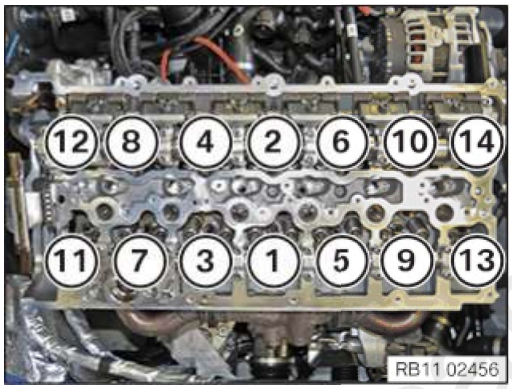
- Feed in, position and install cylinder head (1) and exhaust turbocharger with the help of an auxiliary person, the workshop crane and the special tool 0 490 567 (11 0 020).
- Ensure that the **guide rails** of the timing chain are **not** damaged.



- Insert and install washer (2).
- Renew the cylinder head bolts (1).

  Parts: Cylinder head bolts
- Do not wash off the coating (1) **of the cylinder head bolts** .
- **Lightly** oil contact surfaces of cylinder head bolt screw heads.

  No coolant, water or engine oil must be present in threaded holes of crankcase.
- Guide in and install cylinder head bolts (1).



TECHNICAL INFORMATION

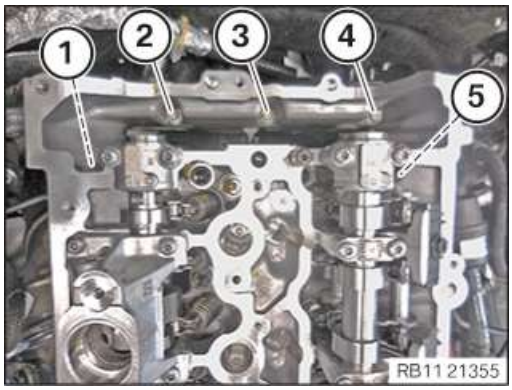
When assembling, it is essential to observe screwing sequences and tightening torques.

Non-observance of these requirements may result in leaks and damage.

- Screw in the cylinder head bolts in the sequence (1) to (14).
- Tighten the cylinder head bolts using the special tool 0 495 747 (11 8 580) and 0 490 504 (00 9 120) in the sequence (1) to (14).

Cylinder head to crankcase

M11	Observe tightening sequence. Fit new cylinder head bolts.	1. Jointing torque 2. Angle of rotation 3. Angle of rotation	30 Nm 90 ° 180 °



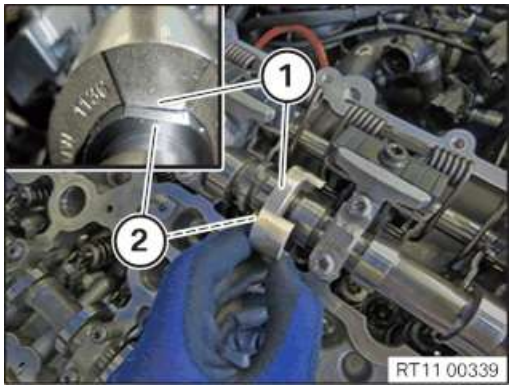
- Renew cylinder head bolts (1) to (5).

  Parts: Cylinder head bolts
- Make sure that there is **no** coolant, water or engine oil in the threaded holes of the timing case cover.
- Screw in cylinder head bolts (1) to (5).
- Tighten the cylinder head bolts in the order (1) to (5).

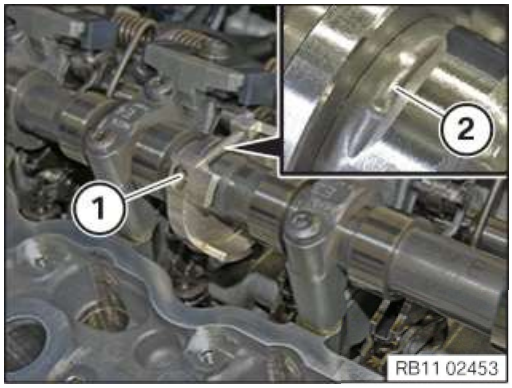
Cylinder head bolt to timing case cover

M8x40	Renew screws.	Tightening torque	19 Nm

carlogon.com



- Feed in and position camshaft sensor wheel (1) on the intake camshaft (2).



- Rotate intake camshaft, if necessary in the position shown.

  The recess (2) must point upwards.
- Tighten down screw (1).

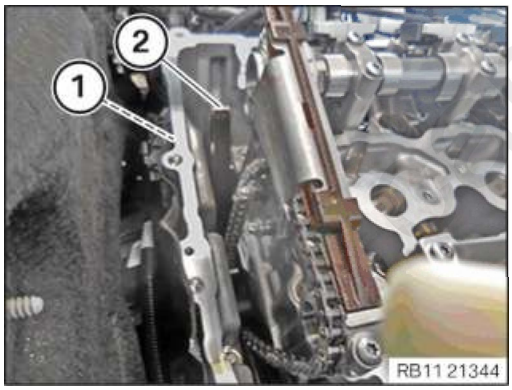
Camshaft sensor wheel to intake camshaft

M4 x35		4,5 Nm



- Renew bearing journal (1).

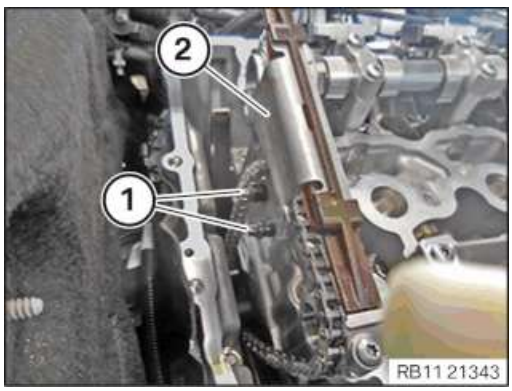
  Parts: Bearing journal



- Feed in and install bearing journal (1) on the guide rail (2).
- Tighten the bearing journals (1).

Bearing journal to cylinder head

Bearing journal	Renew the bearing journal!	Tightening torque	20 Nm

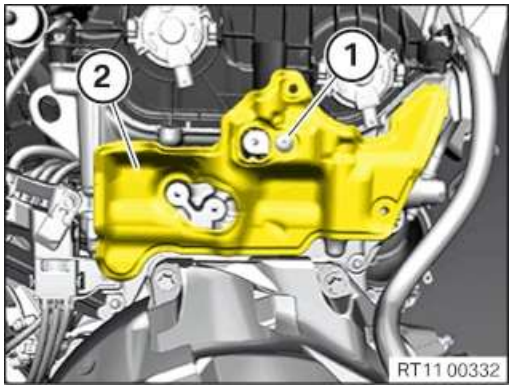


- Insert slide rail (2) and install.
- Tighten the screws (1).

Sliding rail to cylinder head

M6x16			8 Nm

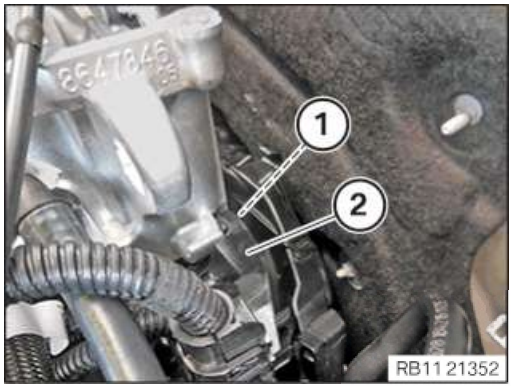
rdiagn.com



- Guide in and install cover (2).
- Tighten down screw (1).

Cover on rear cylinder head

M6		Tightening torque	8 Nm



RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

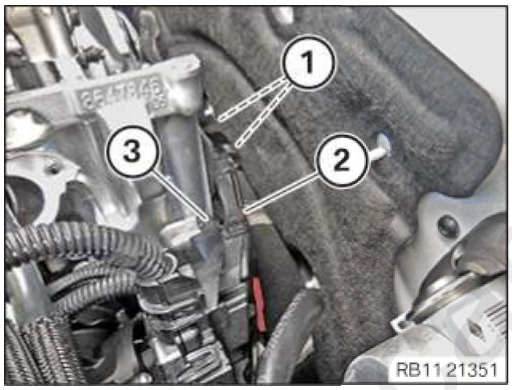
Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

- Guide in and install wiring harness section (2) for sensor system 1.
- Tighten down screw (1).

Cable routing to cylinder head, rear

M6 x 20		Tightening torque	8 Nm



RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

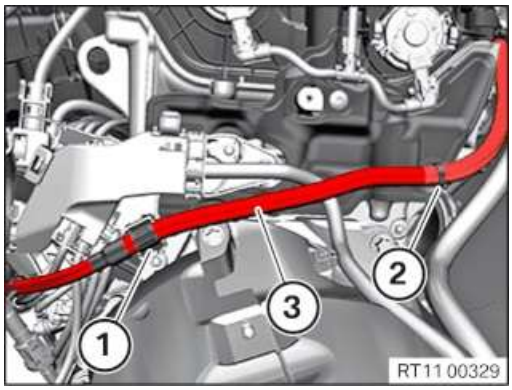
Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

- Guide in and install transmission wiring harness (2) on wiring harness section (3) for sensor system 1.
- Tighten the screws (1).

Cable routing to cylinder head, rear

M6 x 20		Tightening torque	8 Nm



CAUTION

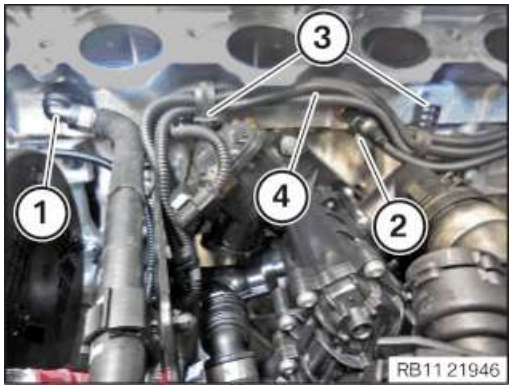
Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Insert and install the positive battery cable (3).
- Secure clamps (1) and (2).

ondiag.com



RISK OF DAMAGE

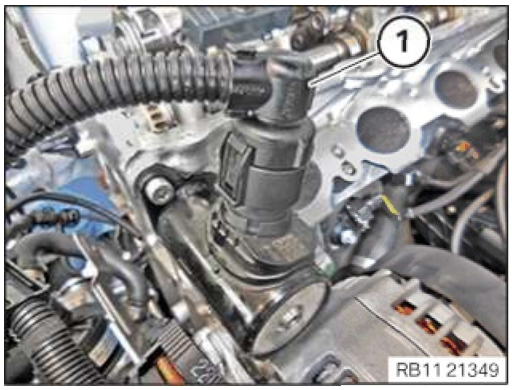
Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

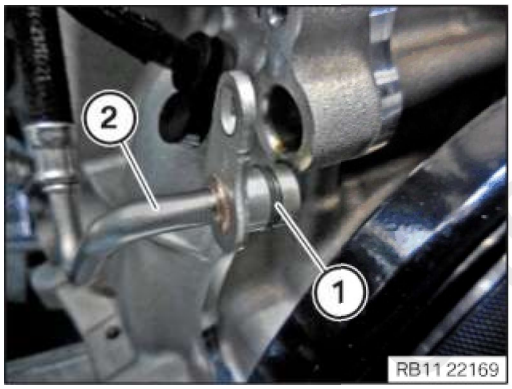
- Connect connectors (2) and lock.

  The connector must engage audibly.
- Guide in and position the wiring harness section (4) of sensor system **1**.
- Secure clamps (3).
- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.



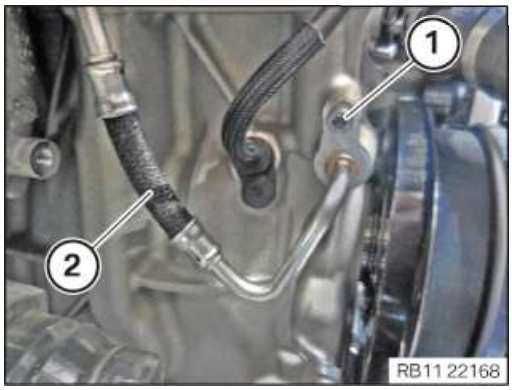
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Renew sealing ring (1) on the oil feed line (2) of the exhaust turbocharger with special tool 0 496 714 (00 9 030).

  Parts: Sealing ring

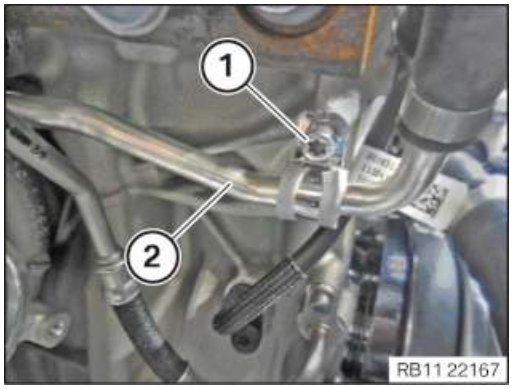


- Feed in and install the oil feed line (2) for the exhaust turbocharger.
- Tighten down screw (1).

Oil feed line for exhaust turbocharger to crankcase

M6 x 12	Replace sealing ring.	Tightening torque	8 Nm

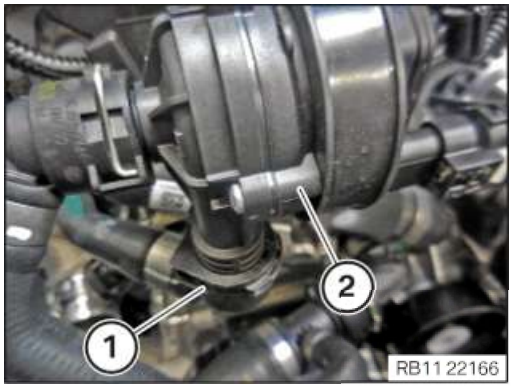
tdiagn.com



- Tighten screw (1) on the coolant return line (2).

Coolant return line holder bracket to crankcase

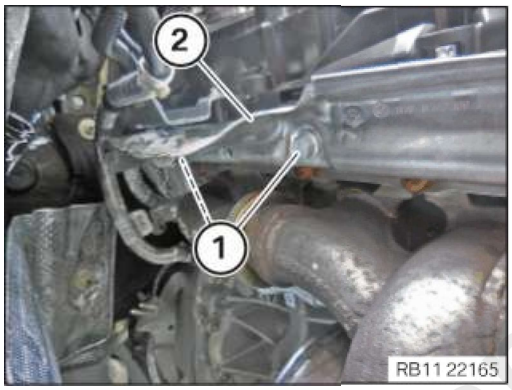
M6X12		Tightening torque	8 Nm



- Connect coolant return line (1) to the coolant pump (2) for the exhaust turbocharger and lock.

  The coolant return line (1) must engage audibly.

- Connect coolant return line (1) for the exhaust turbocharger and lock.
- Ensure the coolant return line (1) audibly engages.



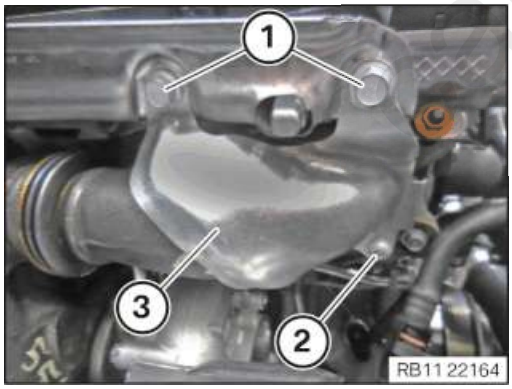
- Feed in and install the heat shield (2).
- Renew screws (1).

  Parts: Bolts

  Tighten the screws (1).

Heat shield to cylinder head

M8X12	Renew screws.	Tightening torque	19 Nm



- Feed in and install the heat shield (3).
- Renew screws (1).

  Parts: Bolts

  Tighten the screws (1).

Heat shield to cylinder head

M8X12	Renew screws.	Tightening torque	19 Nm

- Renew the screw (2).

  Parts: Screw

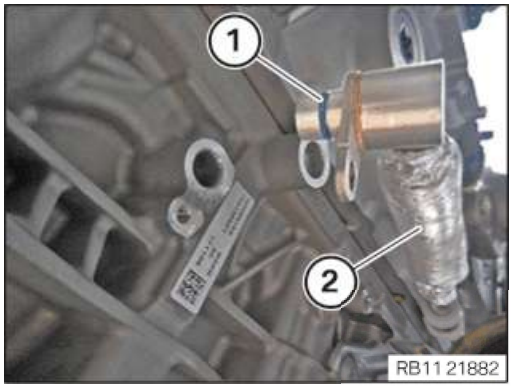
  Tighten down screw (2).

Heat shield to clamping strip

M6X16	Renew screw.	Tightening torque	8 Nm

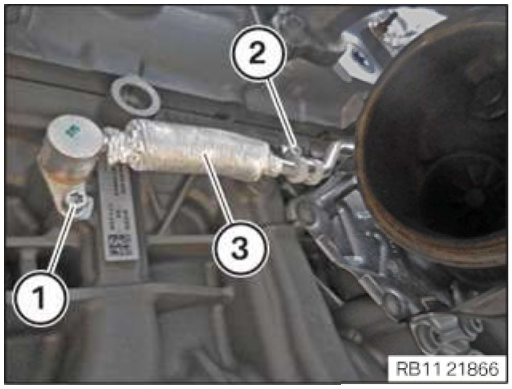


- Unscrew the bolts (1) of the special tool .
- Feed out the special tool at the cylinder head and remove.



- Renew sealing ring (1) on the coolant feed line (2) of the exhaust turbocharger with special tool 0 496 714 (00 9 030).

  Parts: Sealing ring



- Feed in and install coolant feed line for the exhaust turbocharger (3).
- Tighten down screw (1).

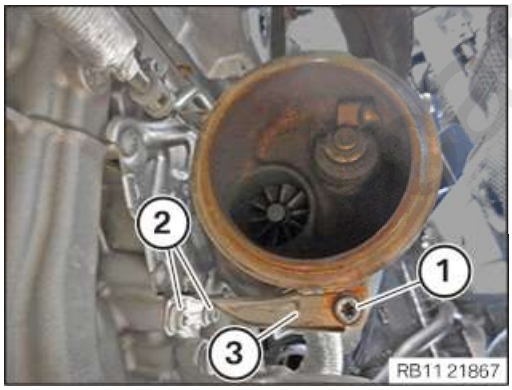
Coolant feed line to crankcase

M6X12		Tightening torque	8 Nm

- Tighten down screw (2).

Coolant feed line to crankcase

M6X12		Tightening torque	8 Nm



- Renew screws (1) and (2).

  Parts: Bolts
- Feed in and install support (3).
- Tighten the screws (2).

Exhaust turbocharger support to crankcase

M8 x 20	Renew screws.	19 Nm

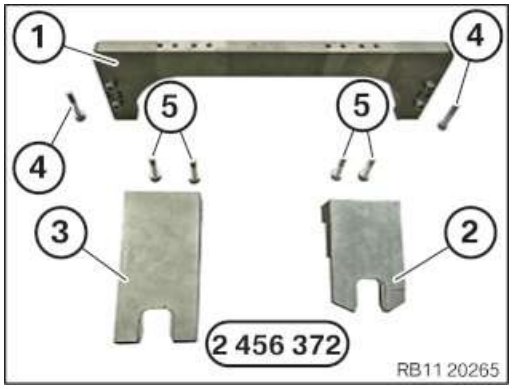
- Tighten the screws (1).

Exhaust turbocharger to support

M8 x 25	Renew screw.	19 Nm

51 – Adjust the camshafts with the special tool

manualslib.com



- Overview of the set of special tools 2 456 372:

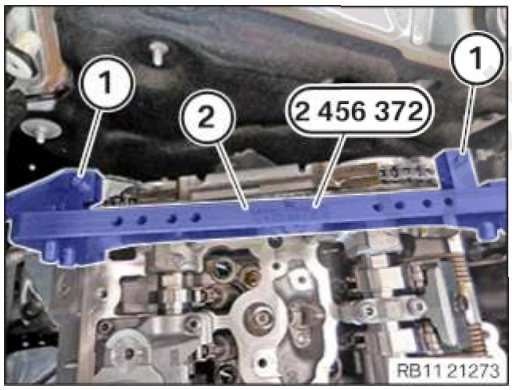
Number	Description
1	Basic carrier
2	Setting gauge to adjust the intake camshaft
3	Setting gauge to adjust the exhaust camshaft
4	Basic carrier screws on cylinder head
5	Screw gauge on basic carrier



- Use the setting gauge 0.7 ° (1) from the set of special tools 2 456 372 to adjust the intake camshaft.
- Use the setting gauge 0.5 ° (2) from the set of special tools 2 456 372 to adjust the exhaust camshaft.



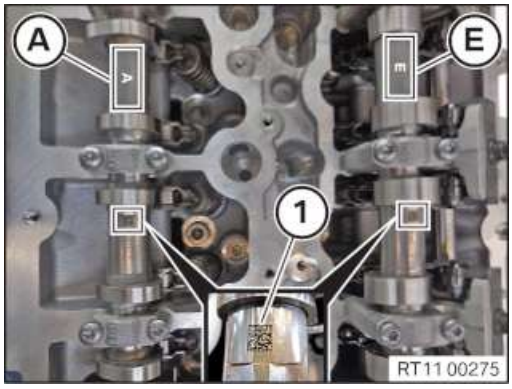
- Position the basic carrier (1) from the set of special tools 2 456 372 on the cylinder head.



- Tighten the screws (1) from the set of special tools 2 456 372 on the basic carrier (2).

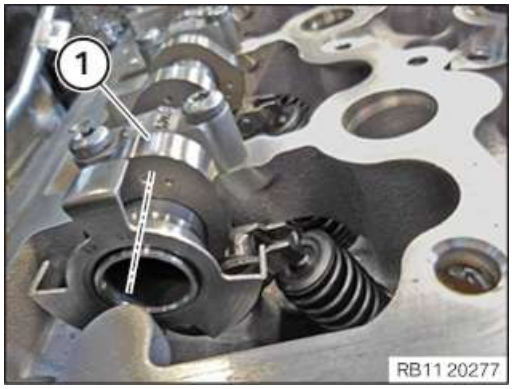
Basic carrier to cylinder head

M6		Tightening torque	8 Nm



- Turn the intake camshaft (E) and the exhaust camshaft (A) such that the marks (1) can be read from the top.

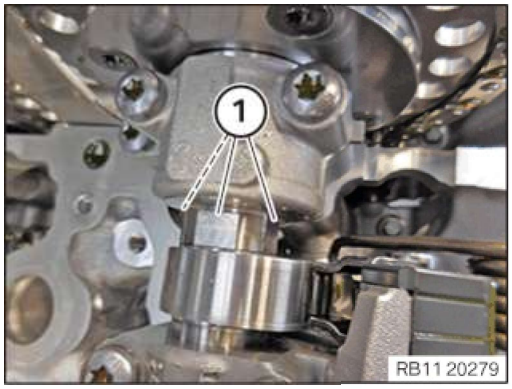
.diagn.com



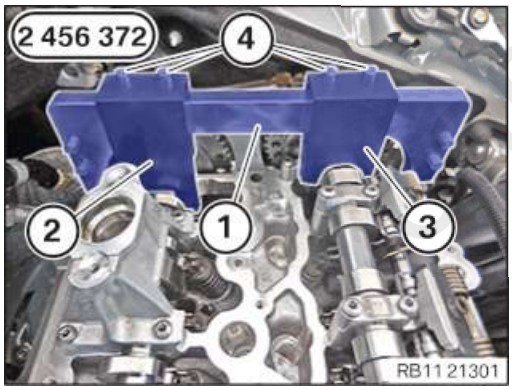
- Ensure that the cam (1) on the exhaust camshaft on **cylinder 1** points to the inside right at a slight angle.



- Ensure that the cam (1) on the intake camshaft on **cylinder 1** points to the inside left at an angle.



- Ensure that the flattened areas (1) on the intake camshaft and the exhaust camshaft point upwards.



- Position the setting gauge 0.5° (2) from the set of special tools 2 456 372 between the exhaust camshaft and the basic carrier (1) from the set of special tools 2 456 372.
- Position the setting gauge 0.7° (3) from the set of special tools 2 456 372 between the intake camshaft and the basic carrier (1) from the set of special tools 2 456 372.
- Tighten the screws (4).

Test gauge to basic carrier

M6		Tightening torque	8 Nm

52 – Installing the intake adjuster

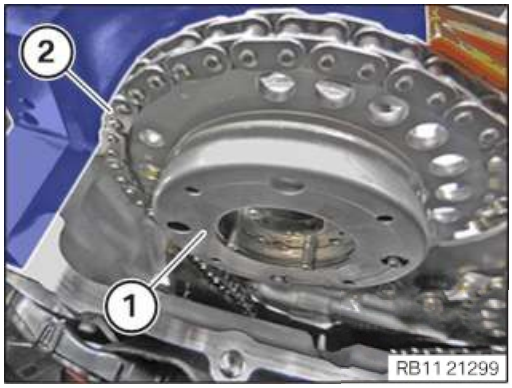
NOTICE

The figure shows the rear side of the engine.

rdiagn.com

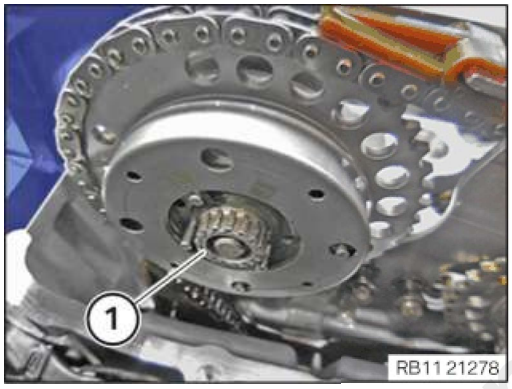


- Keep intake adjuster (1) marked IN ready.

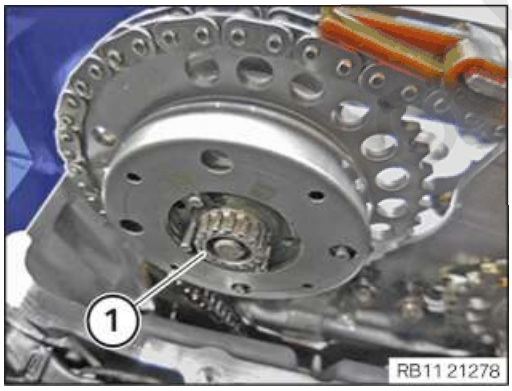


- Feed in intake adjuster (1) in the timing chain (2) and position on the intake camshaft .

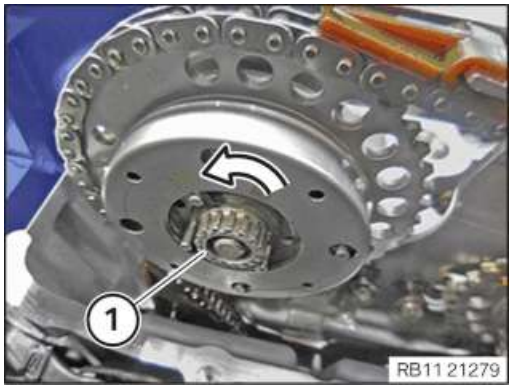
53 – Install the VANOS central valve of the intake adjuster



- Guide in the VANOS central valve (1) of the intake adjuster and install.



- Hand-tighten the VANOS central valve (1) of the intake adjuster.



- Release the VANOS central valve (1) of the intake adjuster in the **direction of the arrow** by 60 °.

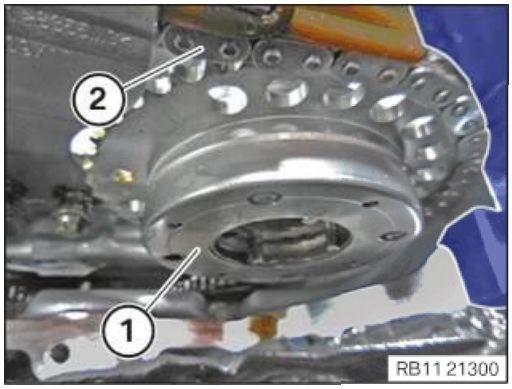
54 – Install exhaust camshaft adjuster

NOTICE

The figure shows the rear side of the engine.

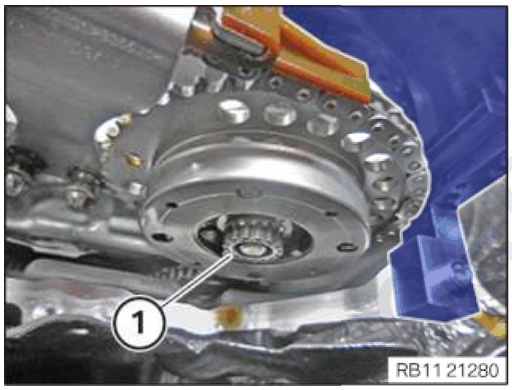


- Keep exhaust camshaft adjuster (1) marked EX ready.

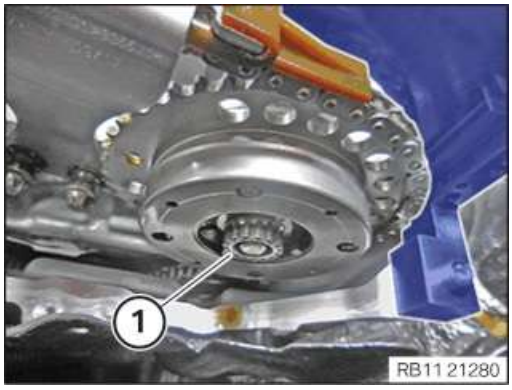


- Feed in exhaust camshaft adjuster (1) in the timing chain (2) and position on the exhaust camshaft .

55 – Installing the VANOS central valve of the exhaust camshaft adjuster

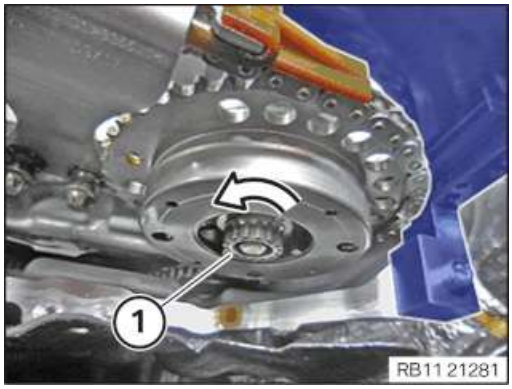


- Guide in the VANOS central valve (1) of the exhaust camshaft adjuster and install.



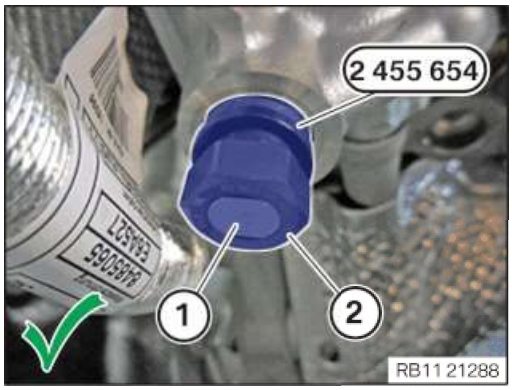
- Hand-tighten the VANOS central valve (1) of the exhaust camshaft adjuster.

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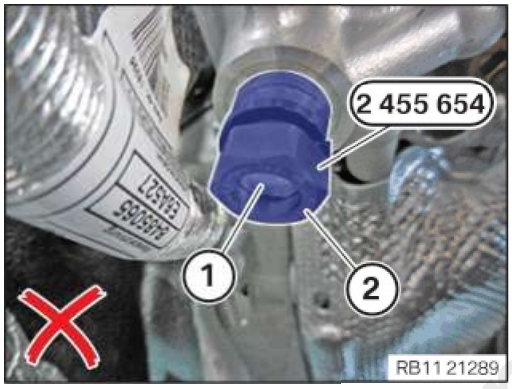
- Release the VANOS central valve (1) of the exhaust camshaft adjuster in the **direction of the arrow** by 60 °.

56 – Pretension the timing chain with the special tool



- Make sure that the timing chain is **correctly** pre-tensioned with the special tool 2 455 654.

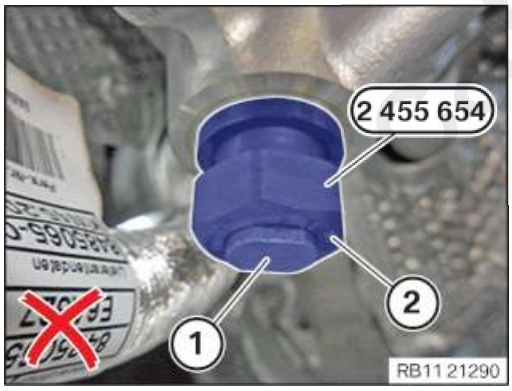
  The pin (1) must align **precisely** with housing (2).



- Make sure that the preload of the timing chain is no **insufficient**.

  The preload is insufficient when the pin (1) of the special tool 2 455 654 is not aligned flush with the housing (2).

  The timing chain is **not correctly** pre-tensioned.



- Make sure that the preload of the timing chain is not **too high**.

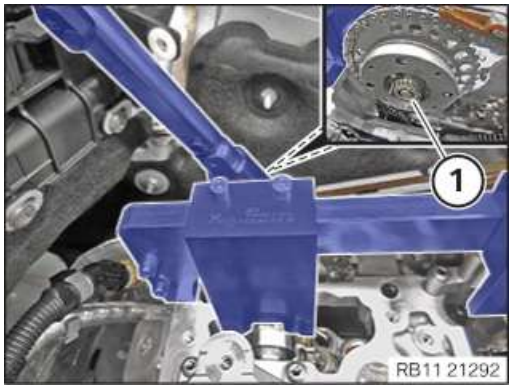
  The preload is too high when the pin (1) of the special tool 2 455 654 is not aligned flush with the housing (2).

  The timing chain is **not correctly** pre-tensioned.

57 – Tightening the VANOS central valve of the exhaust camshaft adjuster



- To tighten the VANOS central valve (1), use the reversible ratchet (2) from the special tool 0 496 855 with special tool 2 450 487.



- Tighten the VANOS central valve (1) of the exhaust camshaft adjuster.

VANOS central valve to camshaft

M20 x 1.5		1. Jointing torque	10 Nm
		2. Jointing torque	30 Nm
		3. Jointing torque	50 Nm
		4. Angle of rotation	35 °

58 – Tightening the VANOS central valve of the intake adjuster



- To tighten the VANOS central valve (1), use the reversible ratchet (2) from the special tool 0 496 855 with special tool 2 450 487.

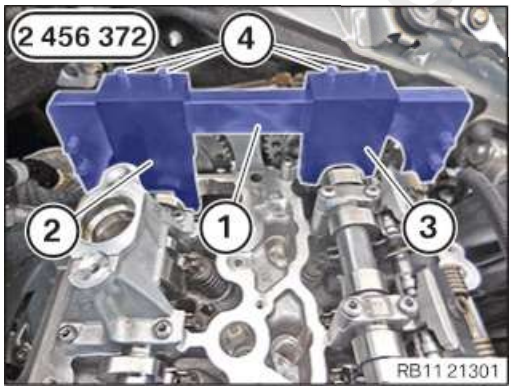


- Tighten the VANOS central valve (1) of the intake adjuster.

VANOS central valve to camshaft

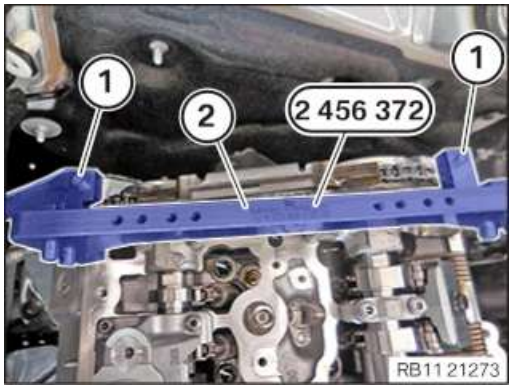
M20 x 1.5		1. Jointing torque	10 Nm
		2. Jointing torque	30 Nm
		3. Jointing torque	50 Nm
		4. Angle of rotation	35 °

59 – Disassembling all special tools

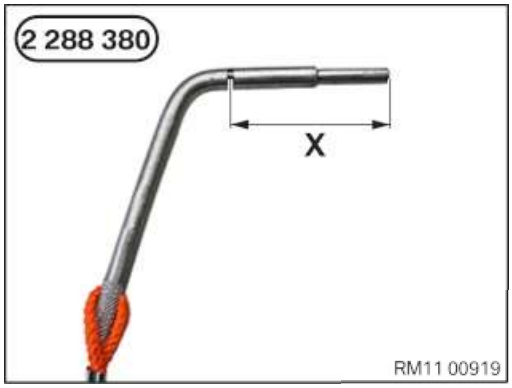


- Unscrew the bolts (4) from the set of special tools 2 456 372.
- Feed out the setting gauge 0.5 ° (2) from the set of special tools 2 456 372 between the exhaust camshaft and the basic carrier (1) and remove.
- Feed out the setting gauge 0.7 ° (3) from the set of special tools 2 456 372 between the intake camshaft and the basic carrier (1) and remove.

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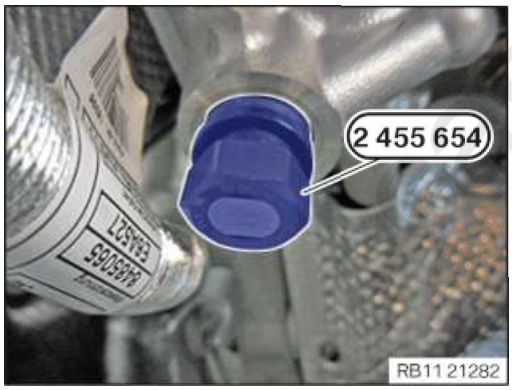
- Unscrew the bolts (1) from the set of special tools 2 456 372.
- Thread the basic carrier (2) out of the special tool 2 456 372 and remove.



- Guide the special tool 2 288 380 out and remove.



- Guide the special tool 0 493 380 (11 6 480) out and remove.



- Guide the special tool (1)2 455 654 out and remove.

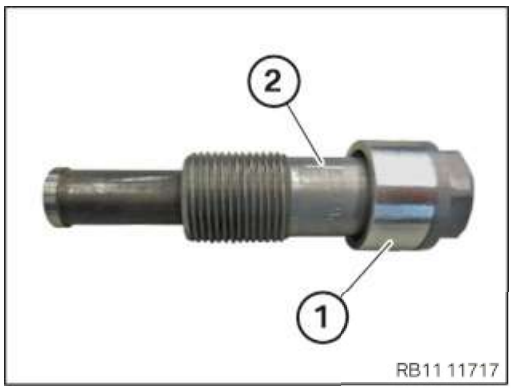
60 – Install chain tensioner

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

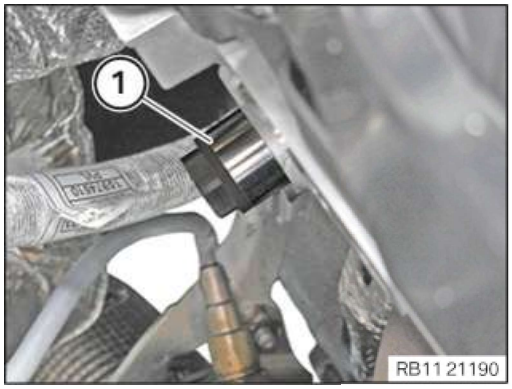


- Drain the oil chamber in the chain tensioner when reusing the chain tensioner.
- Place the chain tensioner on a level support and slowly compress and release it again in the direction of the arrow.
- Catch and dispose of emerging engine oil.
- Repeat process twice.

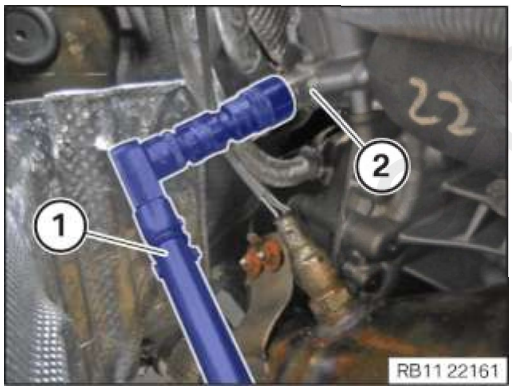


- Renew the sealing sleeve (1).

  Parts: Sealing sleeve
- Guide the sealing sleeve (1) onto the chain tensioner (2) and install.



- Insert and install the chain tensioner (1).

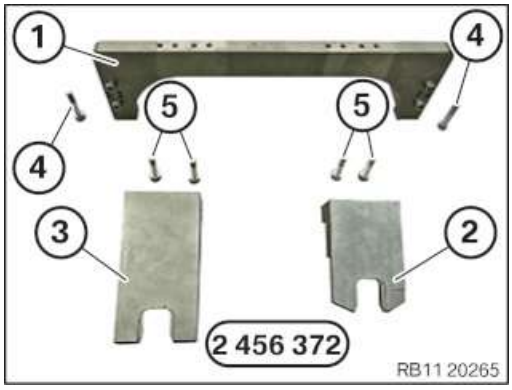


- Tighten the chain tensioner (2) using commercially available tools (1).

Chain tensioner to cylinder head

Chain tensioner		Tightening torque	20 Nm
		Angle of rotation	40 °

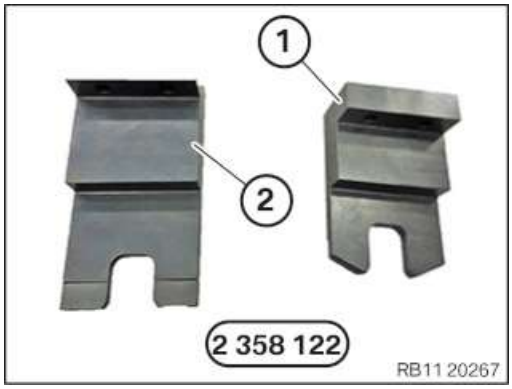
61 – Checking camshaft timing



- Have the set of special tools 2 456 372 ready.

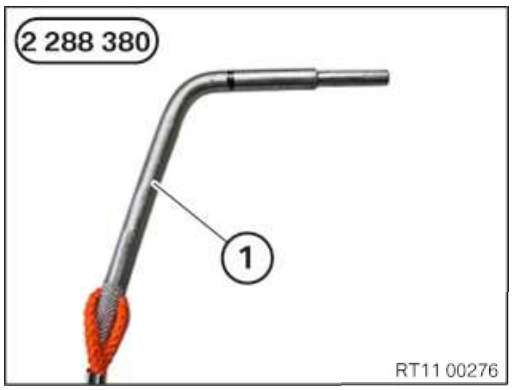
Number	Description
1	Basic carrier
2	0.7° setting gauge to adjust the intake camshaft
3	0.5° setting gauge to adjust the exhaust camshaft
4	Basic carrier screws on cylinder head
5	Screw gauge on basic carrier

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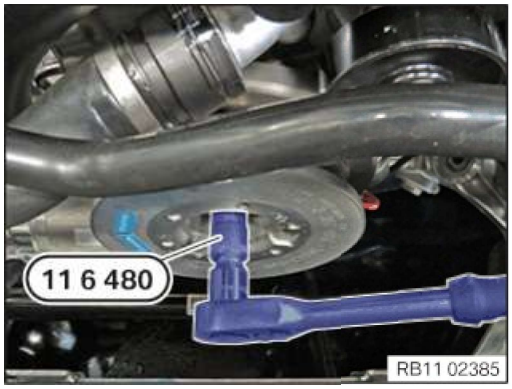
- Keep the test gauge from the set of special tools 2 358 122 ready.

Number	Description
1	Test gauge to fix the intake camshaft
2	Test gauge to fix the exhaust camshaft



- Have the special tool 2 288 380 ready.

Number	Description
1	Locating stud



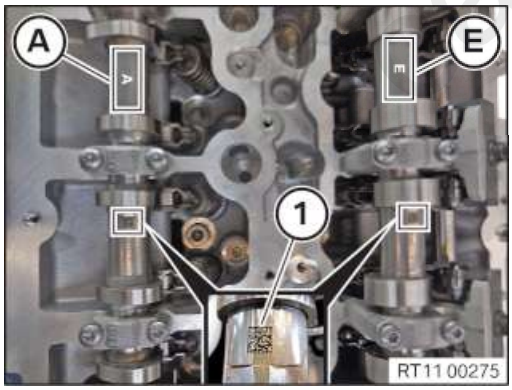
RISK OF DAMAGE

Damage to the engine.

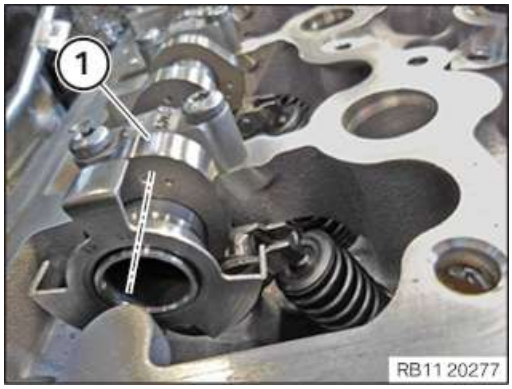
The engine may be damaged if it is manually rotated in the wrong direction.

- Always rotate the engine in the correct direction of rotation by hand: a) Clockwise, facing the vibration damper or b) Counter-clockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Turn the engine with the special tool 0 493 380 (11 6 480) to the TDC firing position of **cylinder 1**.



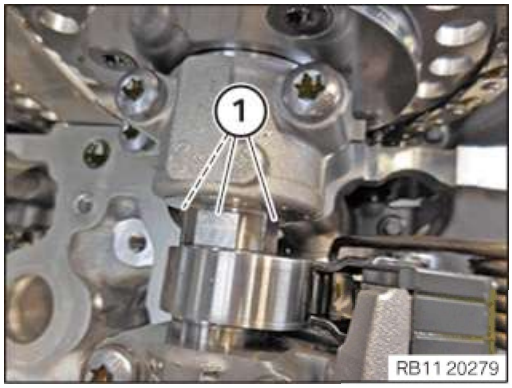
- Make sure that the marks (1) on the intake camshaft (E) and the exhaust camshaft (A) are legible from above.



- Ensure that the cam (1) on the exhaust camshaft on **cylinder 1** points to the inside right at a slight angle.



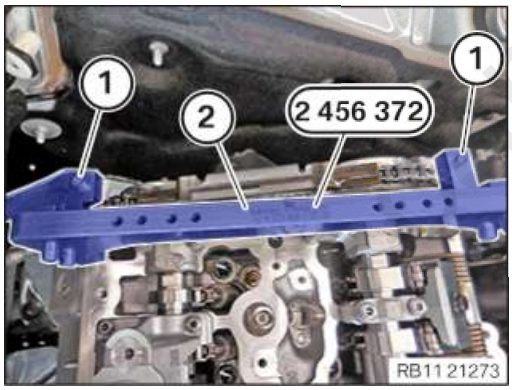
- Ensure that the cam (1) on the intake camshaft on **cylinder 1** points to the inside left at an angle.



- Ensure that the flattened areas (1) on the intake camshaft and the exhaust camshaft point upwards.



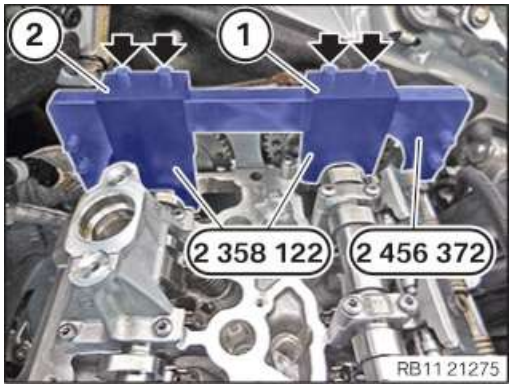
- Position the basic carrier (1) from the set of special tools 2 456 372 on the cylinder head.



- Tighten the screws (1) from the set of special tools 2 456 372 on the basic carrier (2).

Basic carrier to cylinder head

M6		Tightening torque	8 Nm



- Position the test gauge (1) from the set of special tools 2 358 122 between the intake camshaft and the basic carrier from the set of special tools 2 456 372.
- Position the test gauge (2) from the set of special tools 2 358 122 between the exhaust camshaft and the basic carrier from the set of special tools 2 456 372.
- Tighten screws (arrows).

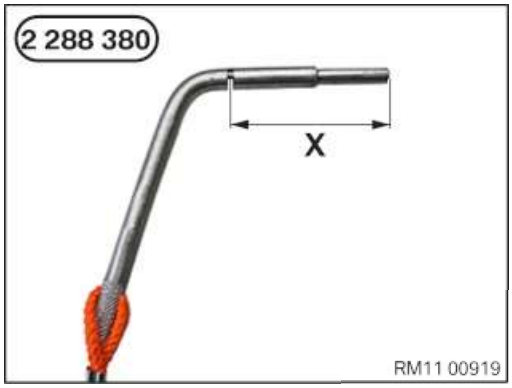
Test gauge to basic carrier

M6		Tightening torque	8 Nm

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- Thread the sealing cap (1) out and remove.



- **Vehicles with automatic transmission:**

  Dimensions (X) = 66 mm

  The special tool 2 288 380 must be inserted in the dowel hole to dimension (X).



- **Vehicles with automatic transmission:**

  Special tool 2 288 380 **incorrectly** positioned.

  The TDC firing position of cylinder 1 was **not** reached.

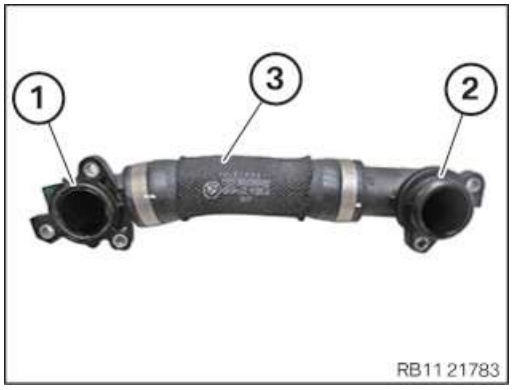


- **Vehicles with automatic transmission:**

  Special tool 2 288 380 has been **correctly** positioned.

  The engine **is in the** TDC firing position of cylinder 1.

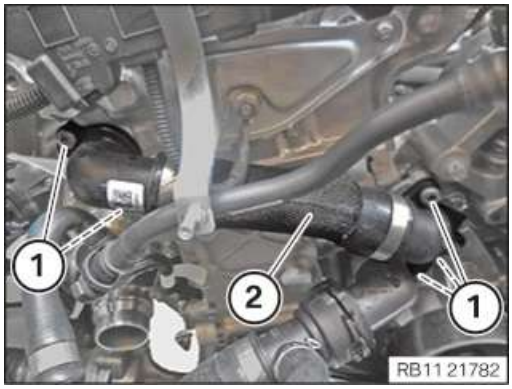
62 – Install the coolant line between the cylinder head and the coolant pump



- Check sealing rings (1) and (2) for damage; renew coolant line (3) if necessary.

  Parts: Sealing ring

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TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

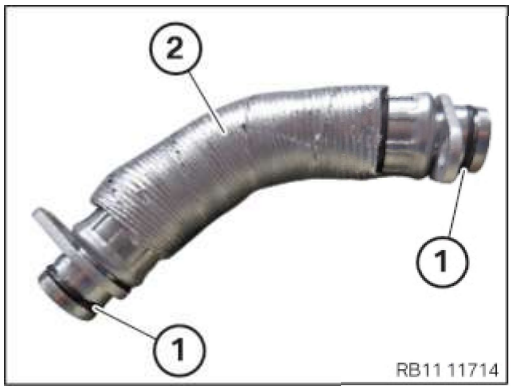
Non-observance of these requirements may result in leaks and damage.

- Feed in and install coolant line (2).
- Hand-tighten the bolts (1).
- Tighten the screws (1).

Coolant line to coolant pump/cylinder head

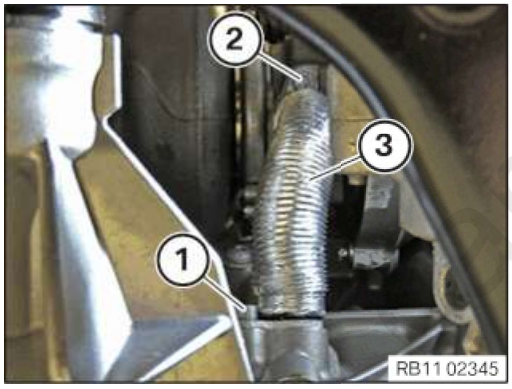
M6x20		Tightening torque	8 Nm

63 – Installing the oil return line for the exhaust turbocharger



- Renew the sealing rings (1) on the oil return line (2).

  Parts: Sealing ring



- Feed in and install the oil return line (3).
- Tighten down screw (2).

Oil return line to turbocharger

M6 x 12		8 Nm

- Tighten down screw (1).

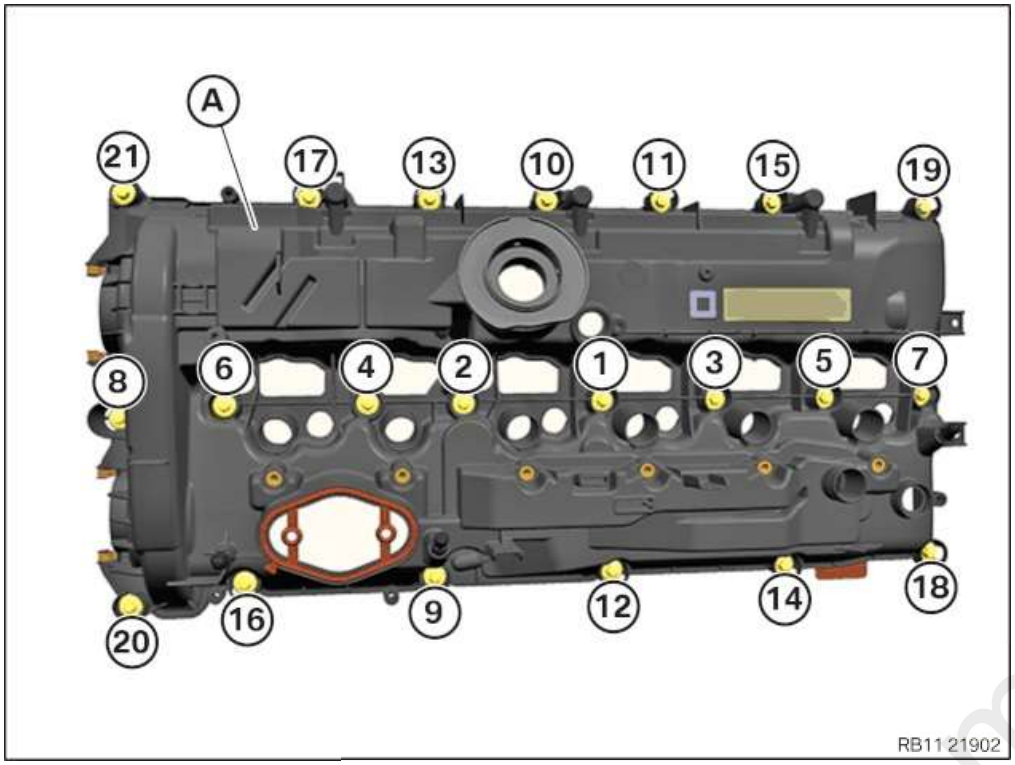
Oil return line to crankcase

M6 x 12		8 Nm

64 – Installing cylinder head cover

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Overview: Bolts of the cylinder head cover



1 - 21 Bolts of the cylinder head cover

A Cylinder head cover

RISK OF DAMAGE

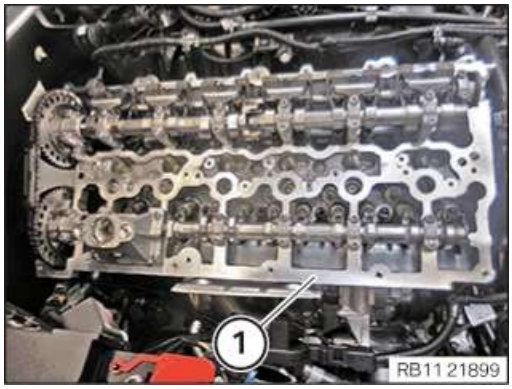
Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

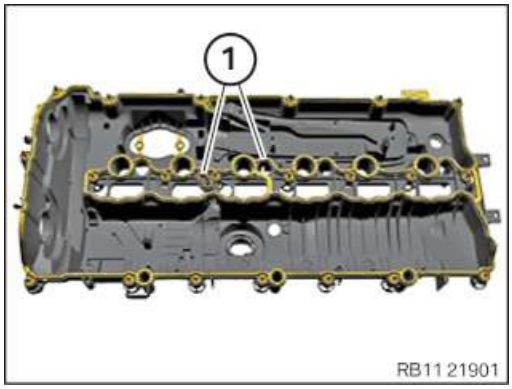
TECHNICAL INFORMATION

Latch mechanisms, guides and mounting elements must not be damaged or missing.



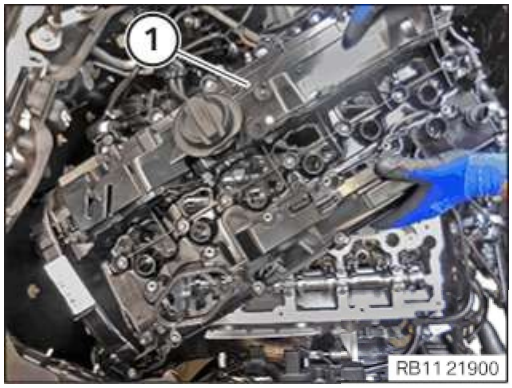
- Contact surface (1) must be free from oil and grease.

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- Replace the seals (1).

  Parts: Seals

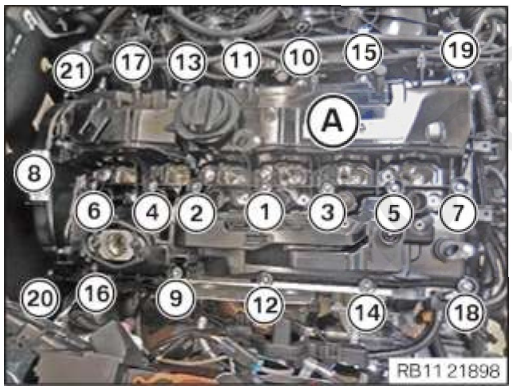


- Insert and install cylinder head cover (1).



- Ensure that the cylinder head cover (1) is installed in the **marked** area correctly on the high pressure pump bracket(2).

  The cylinder head cover (1) must not touch the high pressure pump bracket (2) in the **marked** area.



- Position the cylinder head cover (A).
- Make sure that the cylinder head cover (A) does not touch the high pressure pump bracket!
- Tighten all bolts in sequence (1) to (21).

Cylinder head cover to cylinder head

M6X30		Jointing torque	8 Nm

- Tighten all screws in a sequence from (1) to (21).

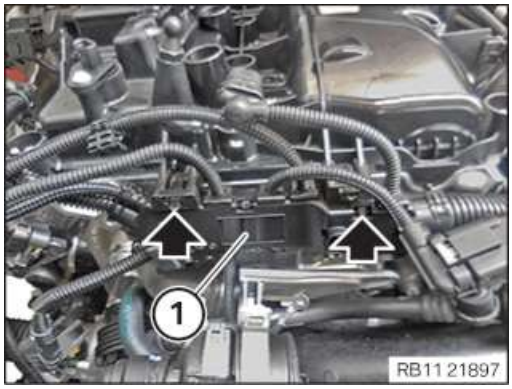
Cylinder head cover to cylinder head

M6X30		Tightening torque	11 Nm

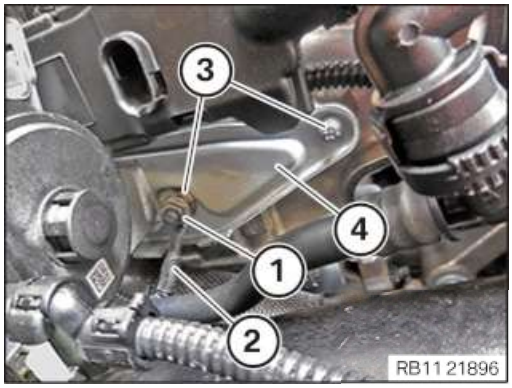


- Insert and install the engine ventilation line (2).
- Ensure that the locks (1) engage audibly.

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- Feed in and install wiring harness section (1) for sensor system **2**.
- Make sure that you can hear the locks (arrows) engage.



- Insert and position the holders (4).
- Tighten the screws (3).

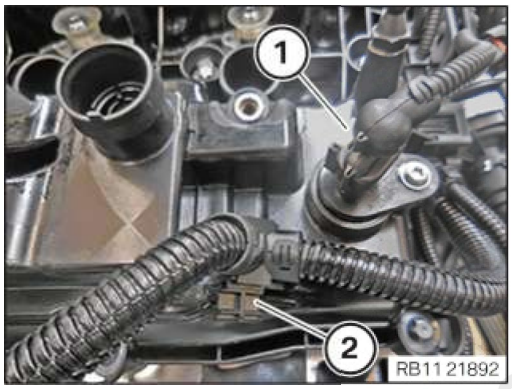
Auxiliary coolant pump holder to cylinder head

M6		Tightening torque	7 Nm

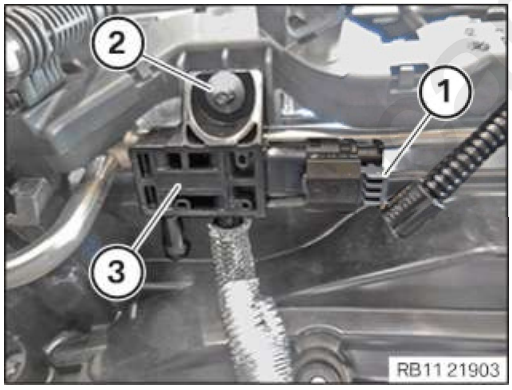
- Thread in ground cable (2) and install.
- Tighten nut (1).

Standard screw connection M6

M6			8 Nm



- Connect and lock the connector (1) on the exhaust camshaft sensor .
- Ensure that connector (1) on the exhaust camshaft sensor engages audibly.
- Secure clamps (2).



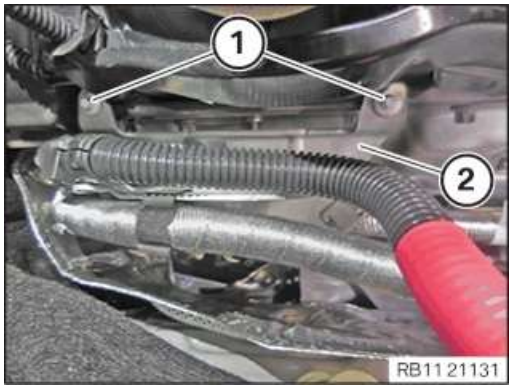
- **If installed:**
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor to holder

TS6X18		Tightening torque	3,5 Nm

- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

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CAUTION

Improper routing of the positive battery cable.

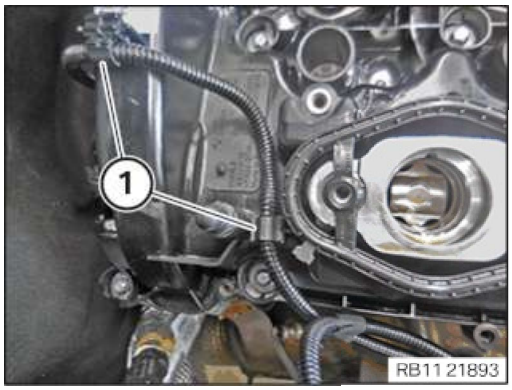
Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

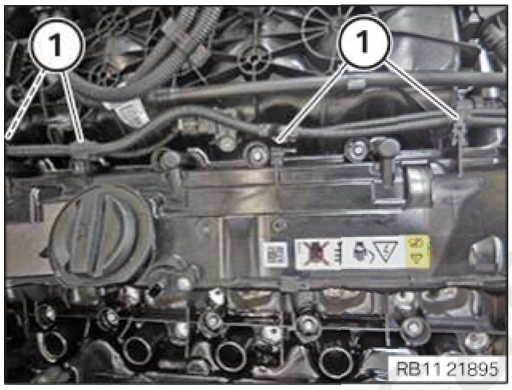
- Guide in and install holder (2) of the positive battery cable.
- Tighten the screws (1).

Holder, positive battery cable to cylinder head cover

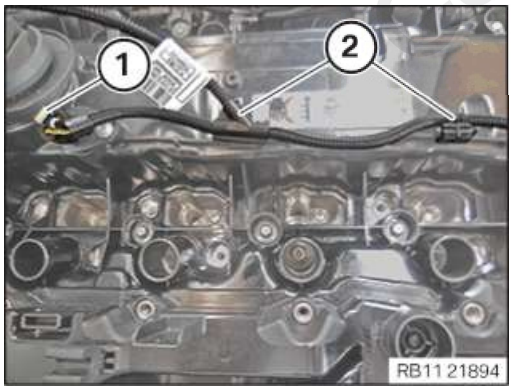
6X18		Tightening torque	6 Nm



- Secure clamps (1).



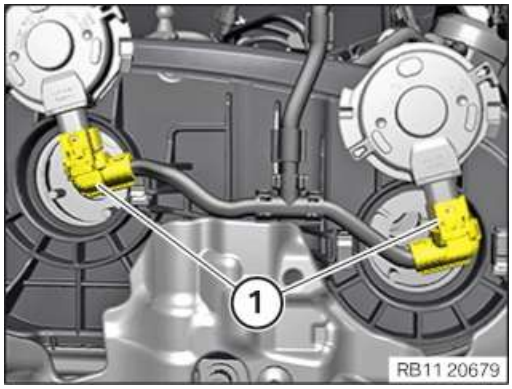
- Secure clamps (1).



- Connect connector (1) to the intake camshaft sensor and lock it.
- Make sure the connector (1) engages audibly.
- Secure clamps (2).

65 – Installing both actuators

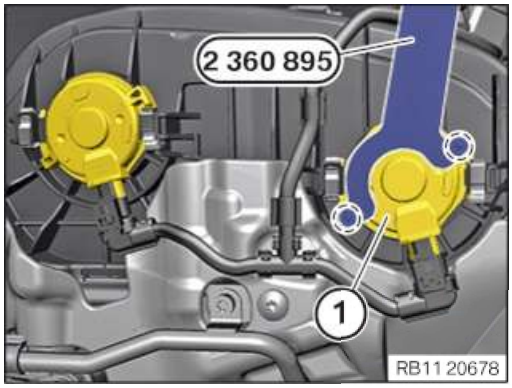
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NOTICE

The figure shows the rear side of the engine.

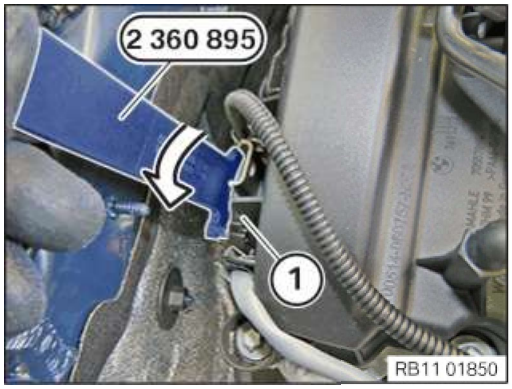
- Position both actuators.
- Connect and lock both connectors (1).
- Make sure the connectors (1) engage audibly.



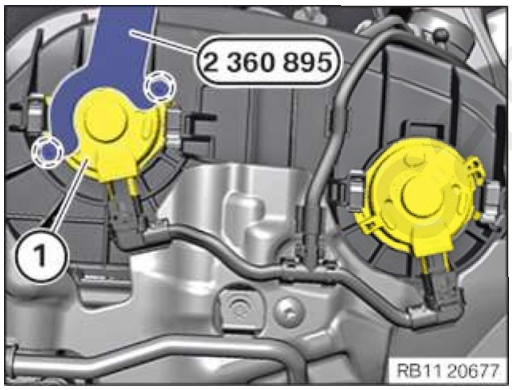
NOTICE

The figure shows the rear side of the engine.

- Position special tool 2 360 895 correctly on the actuator (1) of the exhaust side.



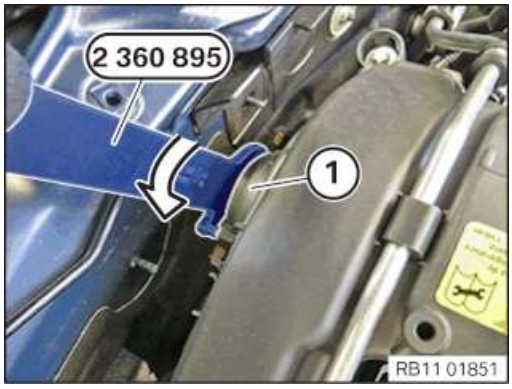
- Position the actuator (1) of the exhaust side and turn it in the direction of arrow with the special tool 2 360 895 until the limit stops touch the clamps.



NOTICE

The figure shows the rear side of the engine.

- Position special tool 2 360 895 correctly on the actuator (1) of the intake side.



- Position the actuator (1) of the intake side and turn it in the direction of arrow with the special tool 2 360 895 until the limit stops touch the clamps.

66 – Prepare the injectors for installation

RISK OF DAMAGE

Damage to the injector tips and Teflon ring.

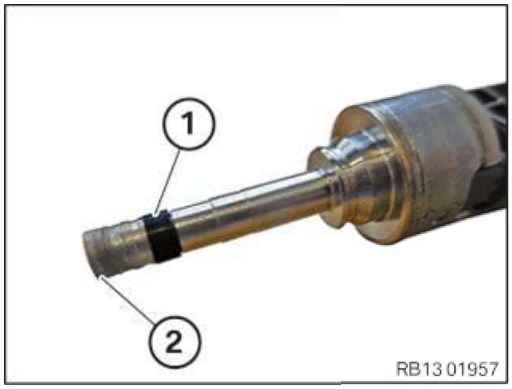
Improper handling of the injector tips and Teflon ring can lead to malfunctioning of the injector.

- Avoid mechanical contact with injector tip.
- When exchanging Teflon ring, hands and work surface must be clean and free of oil. Do not use any lubricating agents.
- Do not use fingernails to slide Teflon ring on.

TECHNICAL INFORMATION

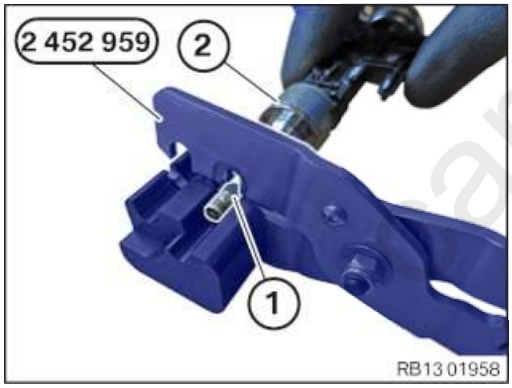
Before re-installing the injector, the Teflon ring must be renewed. Once a Teflon ring has been installed, it may not be re-used. New injectors are supplied with a new Teflon ring.

After the installation of a new Teflon ring on the injectors, the injector must be installed in the cylinder head within 10 minutes or protected with protective caps; otherwise, the Teflon ring will swell.



- Before installing the injectors: Renew the Teflon rings (1).

  Parts: Teflon rings
- Avoid mechanical contact with injector tip (2).



- Remove Teflon ring (1) by using special tool 2 452 959 from injector (2).
- If necessary, use a lint-free cloth to clean the cylindrical part of the injector tip. Do not use ultrasonic sound or other auxiliary materials.
- Do **not** clean the injector tip.



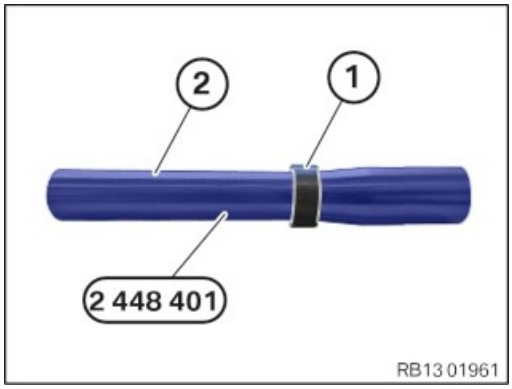
- For the installation of the new Teflon rings: Use the set of special tools 2 448 401:

  (1) Installation cone

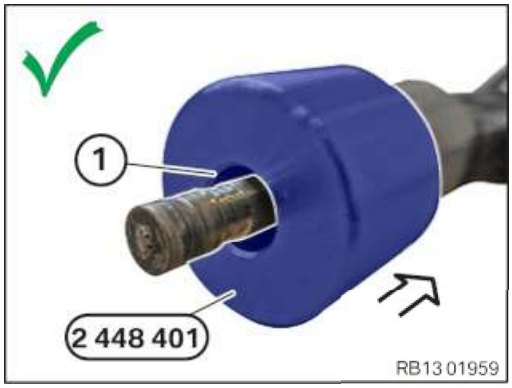
  (2) Sliding sleeve

  (3) Assembly sleeve

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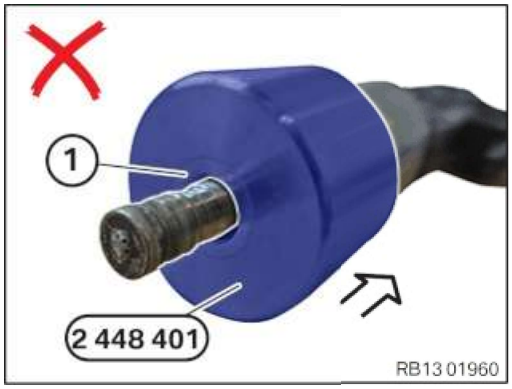


- Slide the new Teflon ring (1) onto the installation cone (2) from the set of special tools 2 448 401.



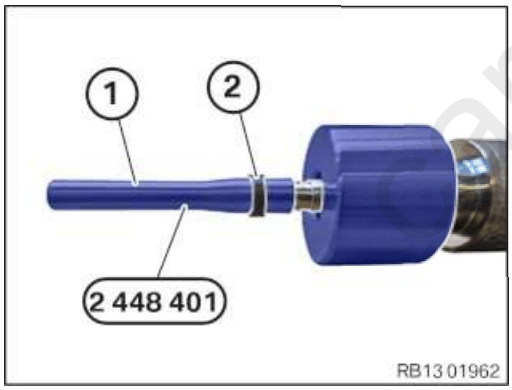
- Make sure the installation position of the assembly sleeve (1) from the set of special tools 2 448 401 is correct:

  The larger diameter of the assembly sleeve (1) must point to the injector tip.

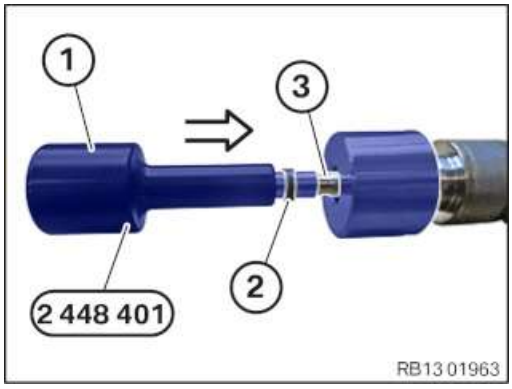


- Make sure the installation position of the assembly sleeve (1) from the set of special tools 2 448 401 is correct:

  The assembly sleeve (1) is **not** mounted correctly when the smaller diameter points to the injector tip.

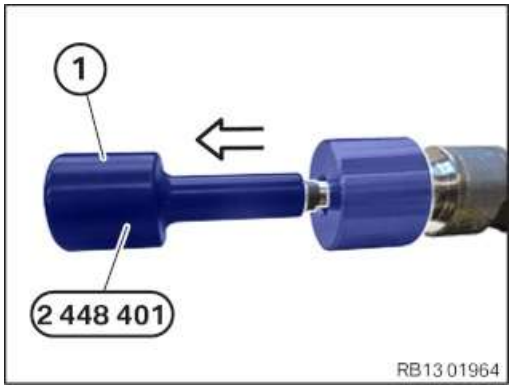


- Mount the Teflon ring (2) with the installation cone (1) from the set of special tools 2 448 401 on the injector tip .

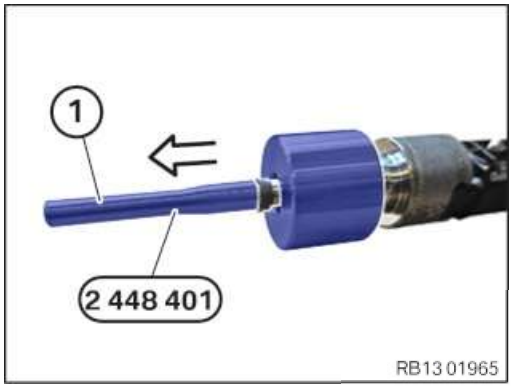


- Use the sliding sleeve (1) from the set of special tools 2 448 401 to push the Teflon ring (2) into the groove (3) on the injector in the direction of the arrow.

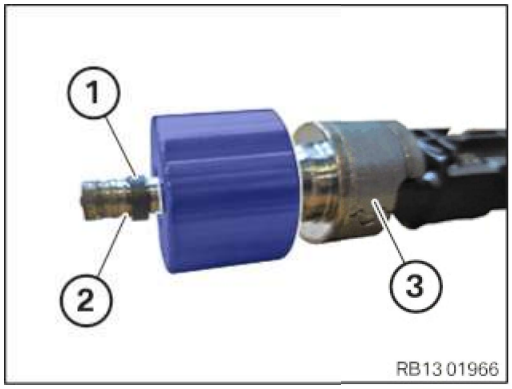
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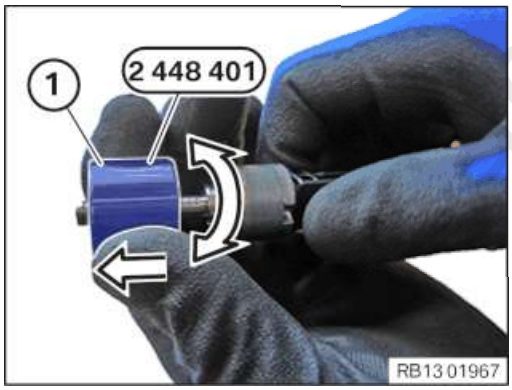
- Thread out the sliding sleeve (1) from the set of special tools 2 448 401 in the direction of the arrow and remove.



- Thread out the installation cone (1) from the set of special tools 2 448 401 in the direction of the arrow and remove.

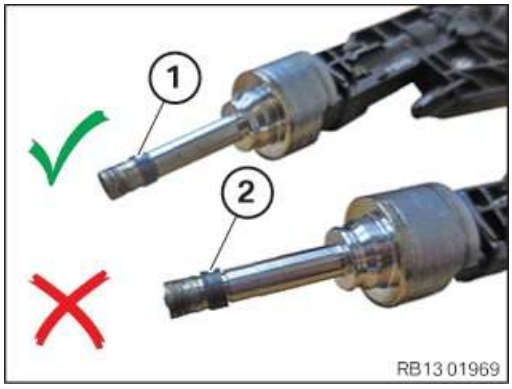


- Make sure that the expanded Teflon ring (1) is properly inserted in the groove (2) of the injector (3) and can be moved easily with your fingers.



- Calibrate the expanded Teflon ring with the assembly sleeve (1) from the set of special tools 2 448 401 to the installation dimension in the direction of the arrow.
- Perform **rotational movements** in increments of 180° synchronous to the **pull-off movement**. Perform the movements slowly and **not** jerky.

  This calibrates the Teflon ring (1) to the installation dimension.
- Thread out and remove the assembly sleeve (1).

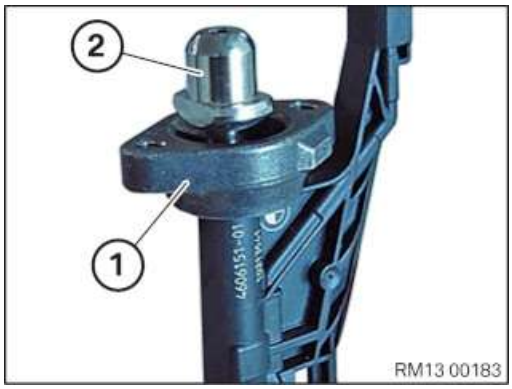


- Check the correct installation dimension of the Teflon ring (1):
  - (1) indicates a correct installation dimension of the Teflon ring.
  - (2) indicates an incorrect installation dimension of the Teflon ring.

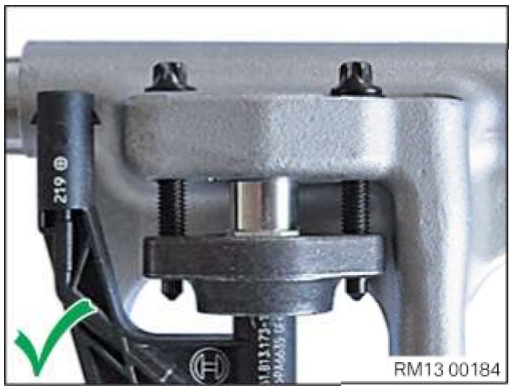
67 – Installing the high-pressure rail with injectors of the cylinders 4 to 6

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.
Non-observance of these requirements may result in leaks and damage.

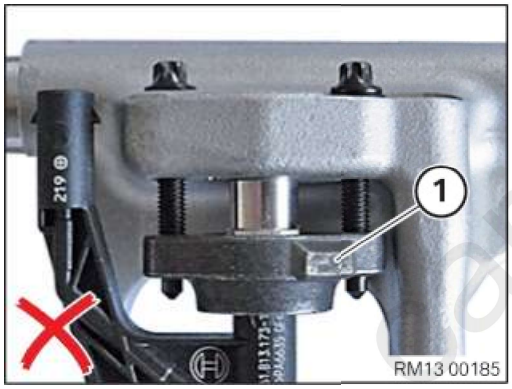


- Mount the holder (1) above the bayonet fitting (2) on the injector.
- **If the holder**(1) **has a cast lug**: Make sure that the holder is installed in the correct position.



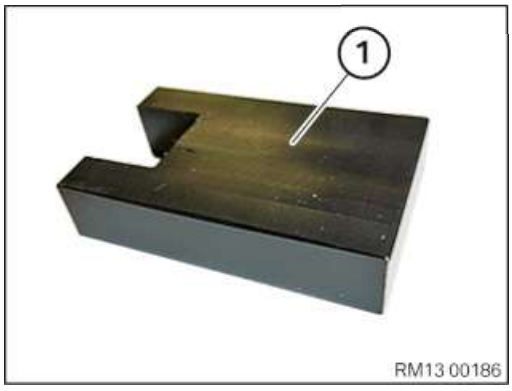
- If applicable, note the position of the cast lug:

  The holder is mounted **correctly** when the cast lug is located at the rear.



- If applicable, note the position of the cast lug:

  The holder is mounted **incorrectly** when the cast lug (1) is in front.



RISK OF DAMAGE

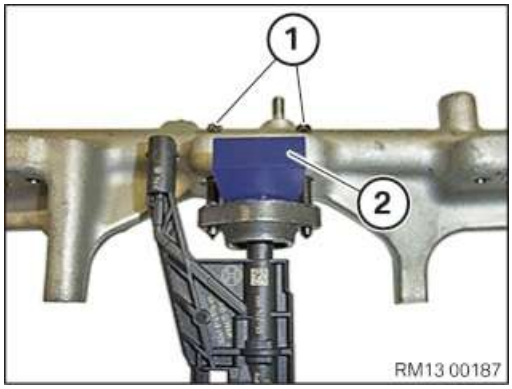
Damage to injectors.

Weld seams on the injector may tear due to incorrect distances between the rail and injector so that the injector must be renewed.

- Insertion of the distance gauge is compulsory.
- Replace distance gauge, if a thickness of 8.5 mm is no longer given in the distance gauge.

- Use the special tool (distance gauge) 2 358 022 (1).

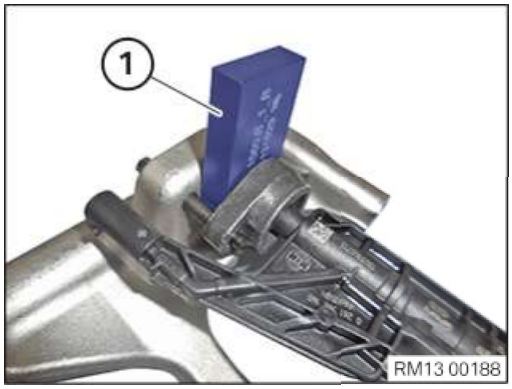
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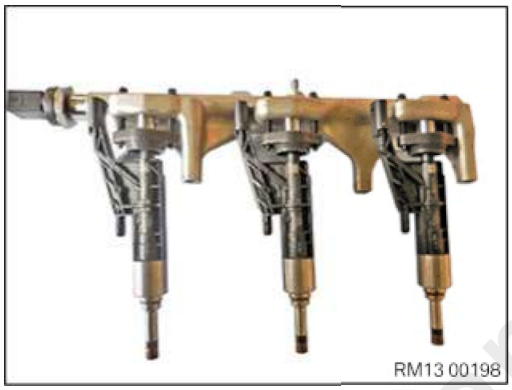
- Replace (M5x30) screws.

  Parts: Screws (M5x30)
- Mount the injectors with the holders and the bolts (M5x30) (1) on the rail.
- Keep the rail on a clean table in such a way that the openings on the rail for the injectors point upwards.

  The electrical injector connections must point to the fuel pressure sensor.
- Slide the special tool (distance gauge) 2 358 022 (2) between the holders and the rail onto the injector head.
- Make sure that the special tool (distance gauge) 2 358 022 (2) rests flat on the retaining bridge.
- Hand-tighten both screws (M5x30) (1) evenly until the special tool (distance gauge) 2 358 022 (2) rests flat against the rail and the holder.



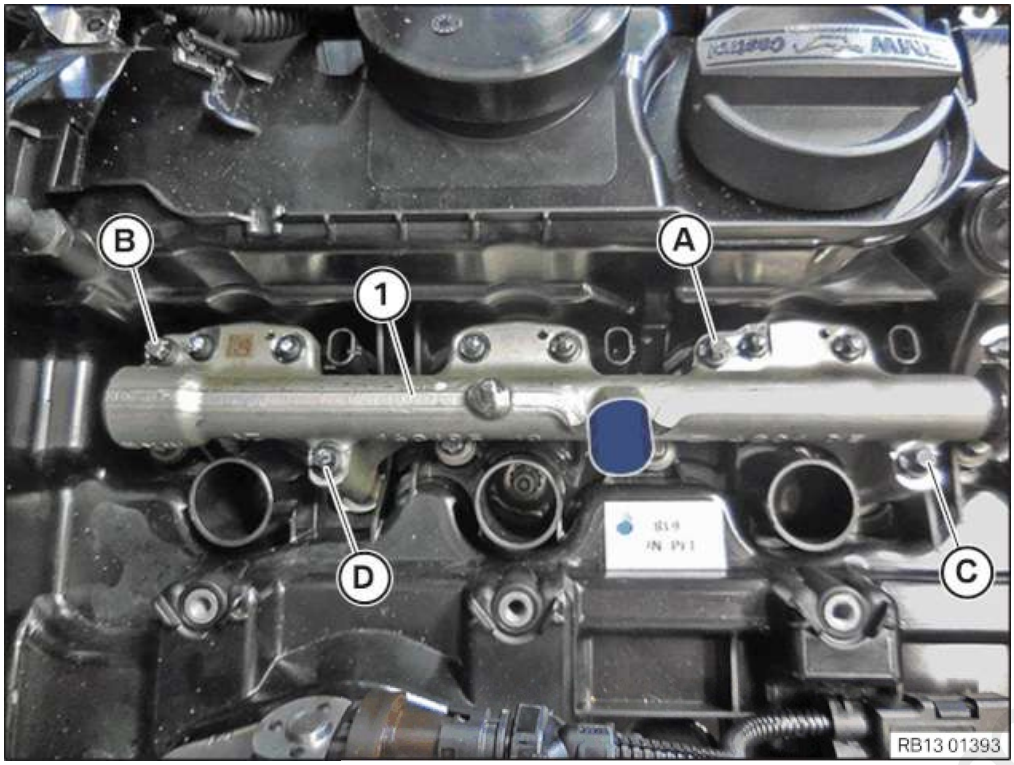
- Remove the special tool (distance gauge) 2 358 022 (1).
- Repeat this operation for all injectors.



- Check injectors for loose fit at the rail.
- Align the electrical injector connections parallel to the rail.

  The injectors must move freely.

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- Renew screws (A) to (D).

  Parts: Bolts
- Attach the rail (1) with the injectors to the cylinder head from the top.
- Make sure the injector tips catch the corresponding holes in the cylinder head.
- Make sure the guides on the injector are properly inserted into the guide bores in the cylinder head.
- Press the rail (1) down until a resistance can be felt; join and hand-tighten the bolts (M6x30) (A) and (B).
- Set the torque wrench to 2 Nm.
- Tighten the screws (A) and (B) in alternating order by **180°** each with the torque wrench until the rail is positioned flush on the cylinder head.

  The figure shows the rail resting flat against the cylinder head.
- Insert bolts (C) and (D).

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

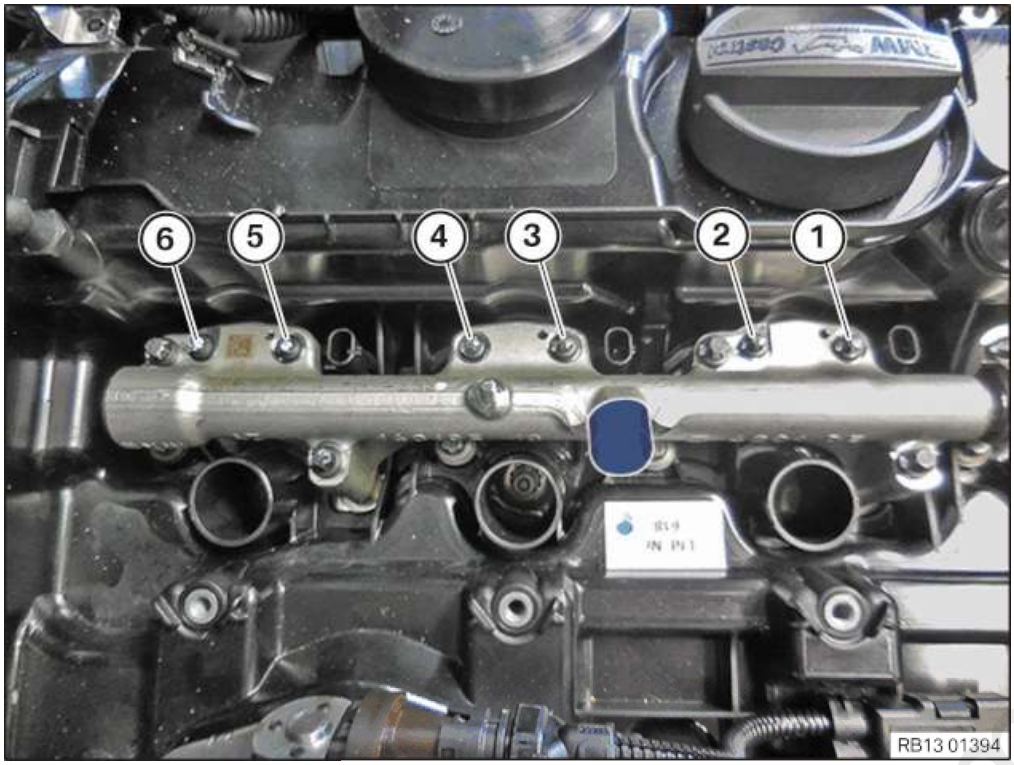
Non-observance of these requirements may result in leaks and damage.

- Tighten bolt (A) to 5 Nm.
- Tighten bolt (D) to 5 Nm.
- Tighten bolt (B) to 5 Nm.
- Tighten bolt (C) to 5 Nm.



- Make sure that the rail (1) rests flat against the cylinder head.

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- Attach a socket to an extension.

  Do not use a reversible ratchet or torque wrench.
- Tighten the bolts (M5x30) in pairs ((1) with (2), (3) with (4), (5) with (6)) in alternating order **90° hand-tight**.
- Set the torque wrench to 5 Nm.

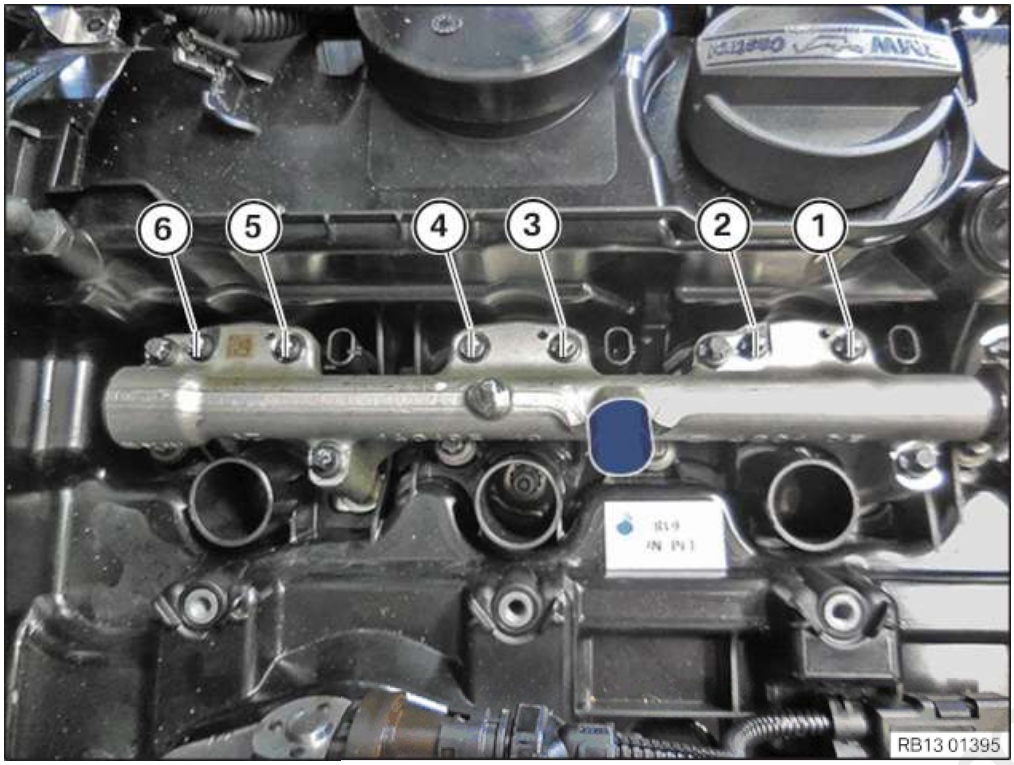
TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

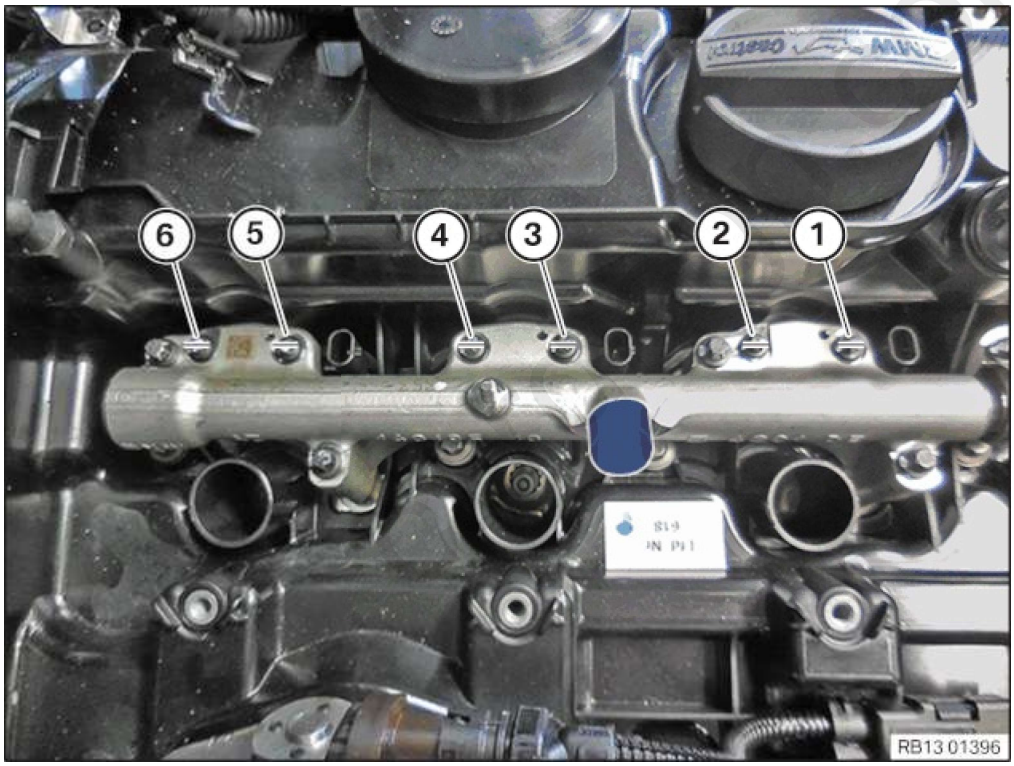
Non-observance of these requirements may result in leaks and damage.

- **Screw the (M5x30) bolts according to the following plan:**
  - **Fuel injector 4:**
  - Tighten screw (1) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (2) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (1) and (2) until both bolts reach a torque of 5 Nm.
  - **Fuel injector 5:**
  - Tighten screw (3) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (4) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (3) and (4) until both bolts reach a torque of 5 Nm.
  - **Fuel injector 6**:
  - Tighten screw (5) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (6) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (5) and (6) until both bolts reach a torque of 5 Nm.

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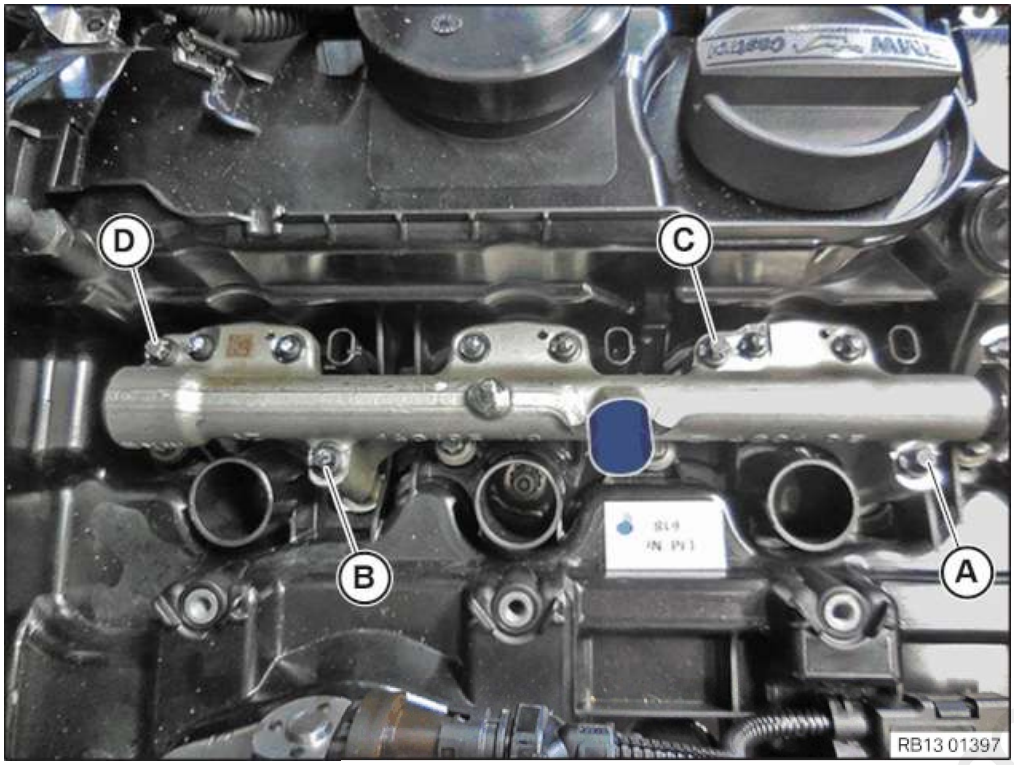


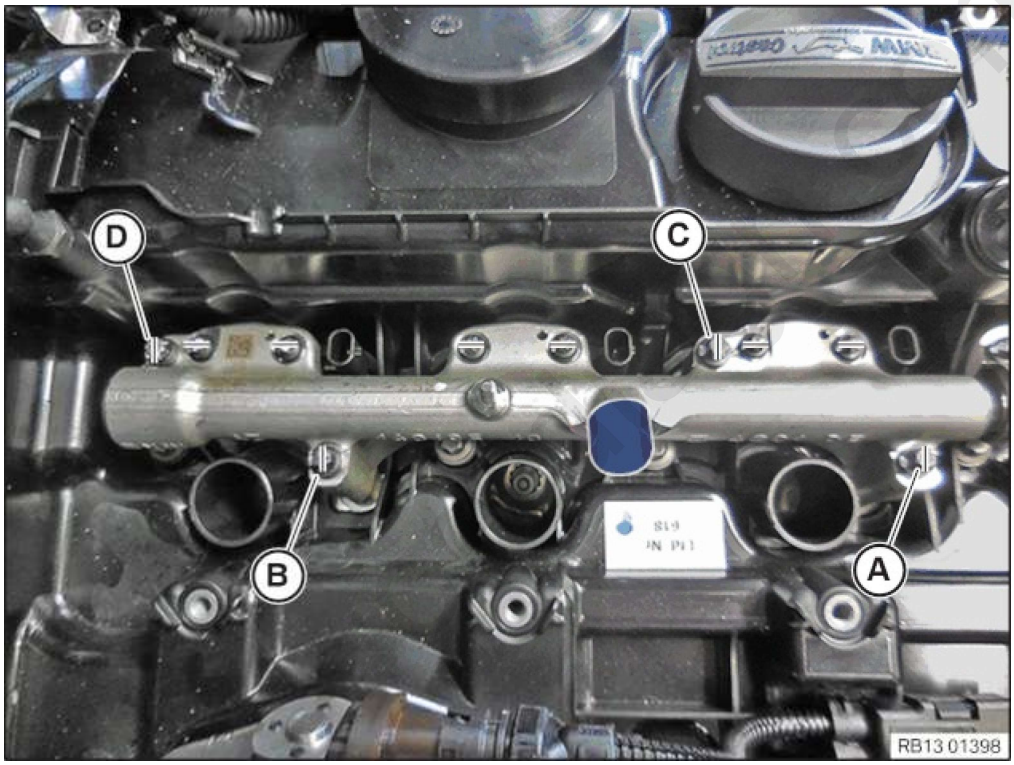
- Mark all bolts (1) to (6) with a vertical line (see figure).
- **Tighten screws using an angle of rotation.**
  - Tighten the screw (1) with an angle of rotation of 90° ±15°.
  - Tighten the screw (2) with an angle of rotation of 90° ±15°.
  - Tighten the screw (3) with an angle of rotation of 90° ±15°.
  - Tighten the screw (4) with an angle of rotation of 90° ±15°.
  - Tighten the screw (5) with an angle of rotation of 90° ±15°.
  - Tighten the screw (6) with an angle of rotation of 90° ±15°.



- Check if all bolts (1) to (6) have been tightened with a 90° ±15° angle of rotation.

  All marks (lines) must be horizontal (see figure).





- Unscrew the bolts (M6x70) (A) to (D).

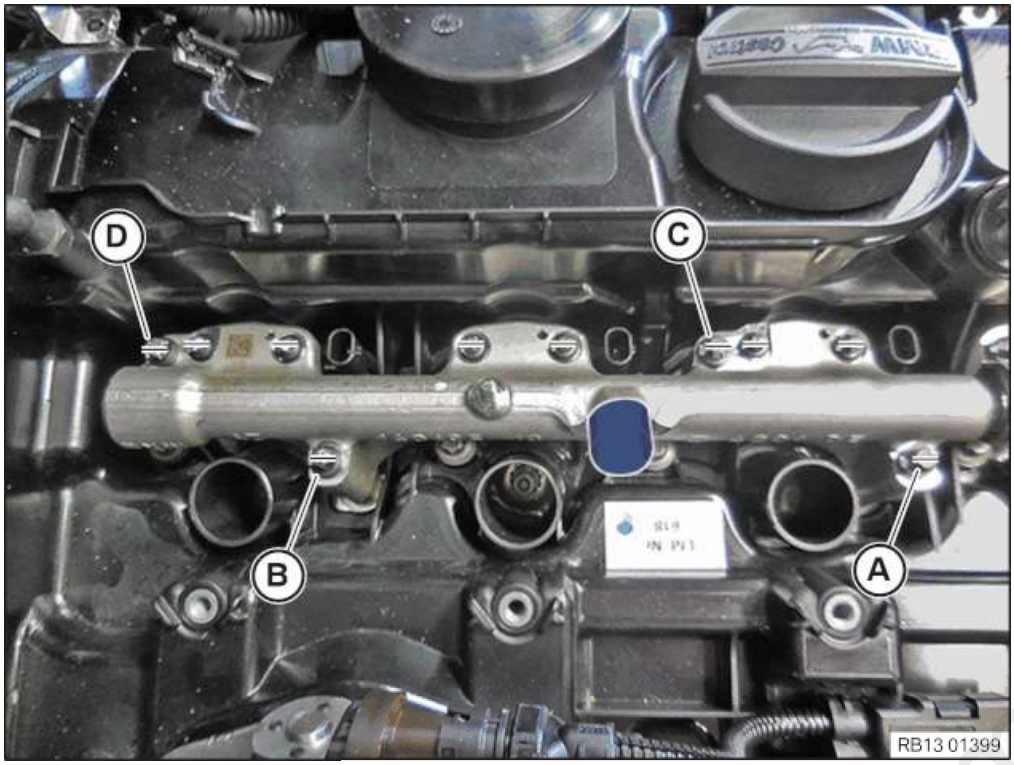
  It is imperative that the bolts are unscrewed.

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

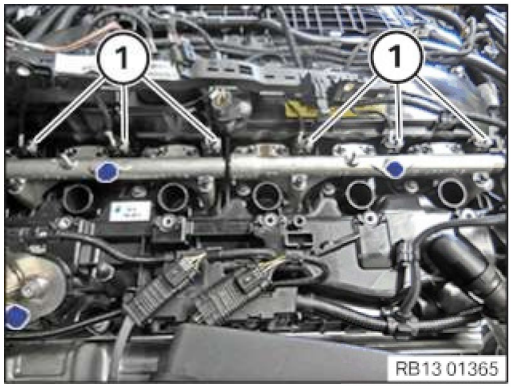
Non-observance of these requirements may result in leaks and damage.

- Tighten bolt (A) to 5 Nm.
- Tighten bolt (D) to 5 Nm.
- Tighten bolt (B) to 5 Nm.
- Tighten bolt (C) to 5 Nm.
- Mark all bolts (A) to (D) with a vertical line (see figure).
- Tighten bolts (M6x70) (A) to (D) to a 90° angle of rotation.



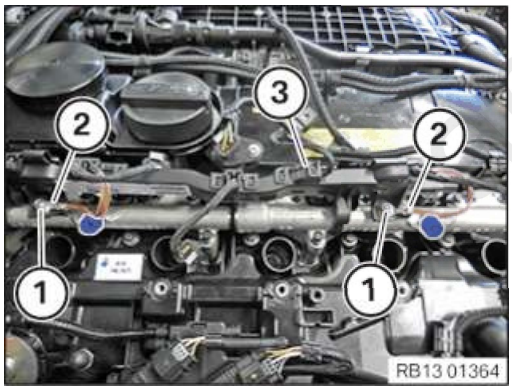
- Check if all bolts (A) to (D) have been tightened with a 90° angle of rotation.

  All marks (lines) must be horizontal (see figure).



- Connect and lock all connectors (1) to the injectors.

  All connectors (1) must engage audibly.



- Thread in cable channel (3) and install.
- Thread in ground cable (2) and install.
- Tighten nuts (1).

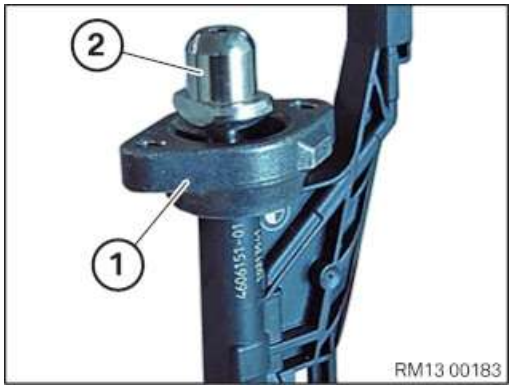
Ground cable to rail

M6			5 Nm

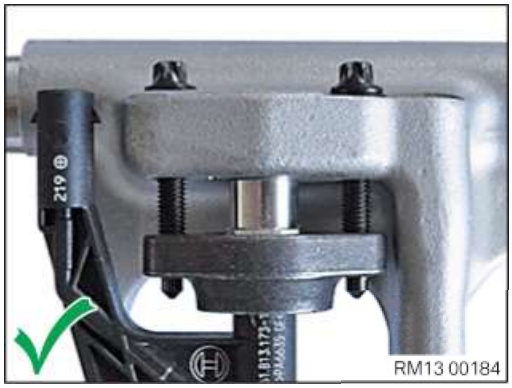
68 – Installing rail with injectors of cylinders 1 to 3

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.
Non-observance of these requirements may result in leaks and damage.

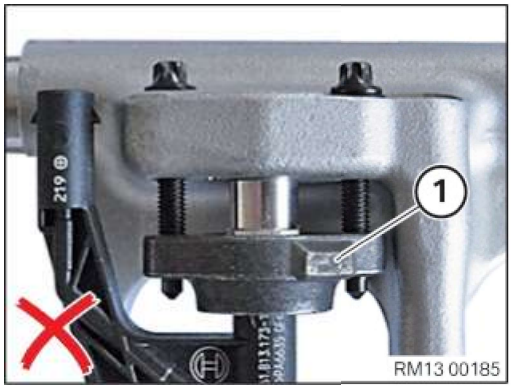


- Mount the holder (1) above the bayonet fitting (2) on the injector.
- **If there is a cast lug on the holder** (1) **:** Make sure that the holder is installed in the correct position.



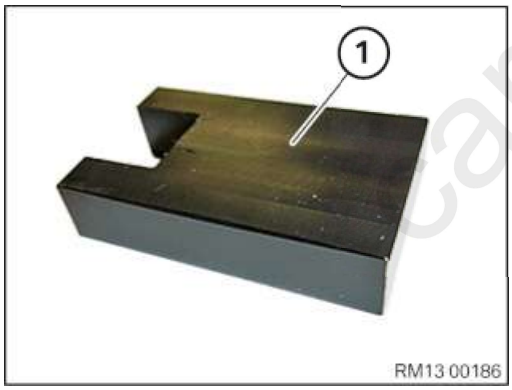
- Observe position of cast lug:

  The holder is mounted **correctly** when the cast lug is located at the rear.



- Observe position of cast lug:

  The holder is mounted **incorrectly** when the cast lug (1) is in front.



RISK OF DAMAGE

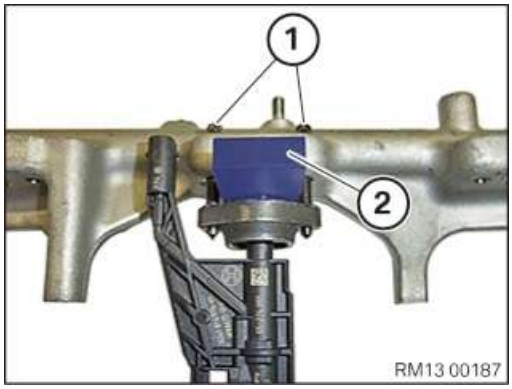
Damage to injectors.

Weld seams on the injector may tear due to incorrect distances between the rail and injector so that the injector must be renewed.

- Insertion of the distance gauge is compulsory.
- Replace distance gauge, if a thickness of 8.5 mm is no longer given in the distance gauge.

- Use special tool 2 358 022(1) .

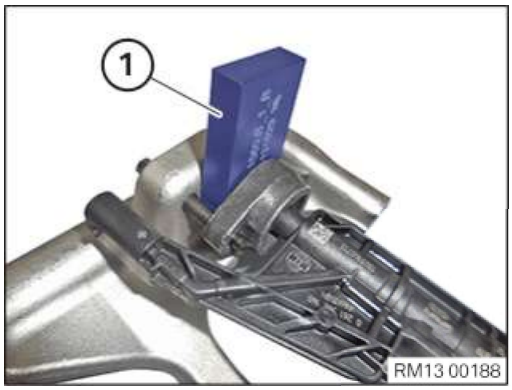
carliagn.com



- Replace (M5x30) screws.

  Parts: Screws (M5x30)
- Mount the injectors with the holders and the bolts (M5x30) (1) on the rail.
- Keep the rail on a clean table in such a way that the openings on the rail for the injectors point upwards.

  The electrical injector connections must point to the fuel pressure sensor.
- Slide special tool 2 358 022 (2) between the holders and the rail onto the injector head.
- Make sure the special tool 2 358 022 (2) rests flat on the retaining bridge.
- Hand-tighten both screws (M5x30) (1) uniformly until the special tool 2 358 022 (2) rests flat against the rail and the holder.



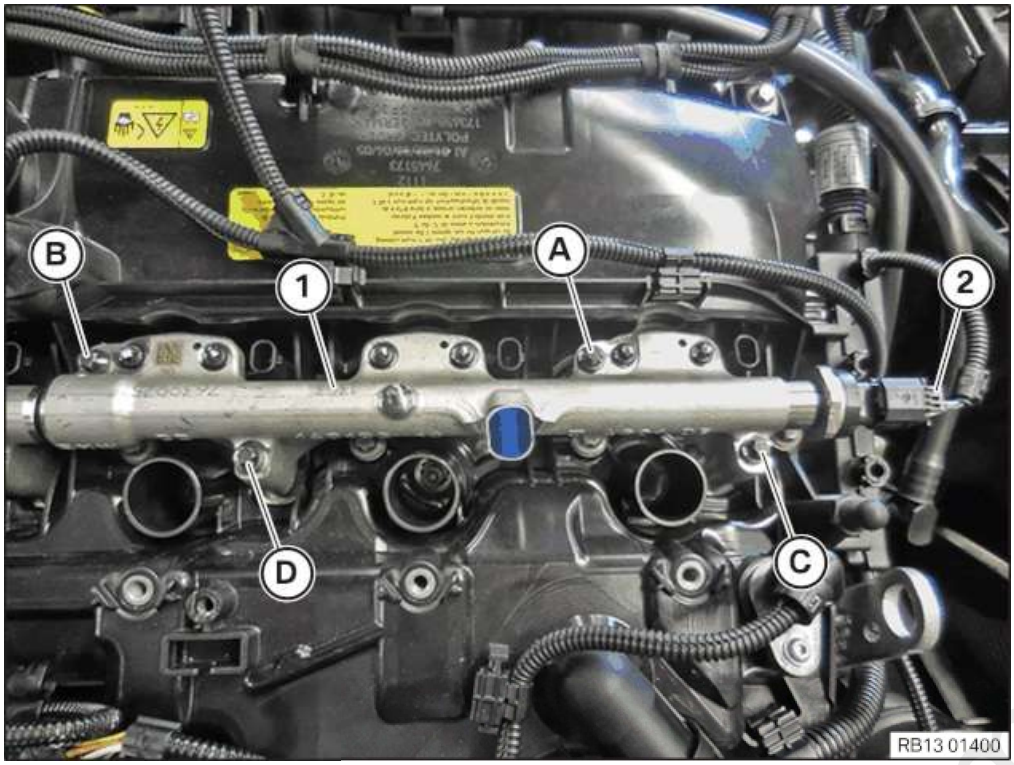
- Remove special tool 2 358 022(1) .
- Repeat this operation for all injectors.



- Check injectors for loose fit at the rail.
- Align the electrical injector connections parallel to the rail.

  The injectors must move freely.

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- Renew screws (A) to (D).

  Parts: Bolts
- Attach the rail (1) with the injectors to the cylinder head from the top.
- Make sure the injector tips catch the corresponding holes for the injectors in the cylinder head.
- Make sure the guides on the injector are properly inserted into the guide bores in the cylinder head.
- Press rail (1) down until a resistance can be felt; join and hand-tighten screws (M6x30) (A) and (B).
- Tighten screws (A) and (B) alternately by **180°** each with the torque wrench until the rail is positioned on the cylinder head.

  The figure shows the rail resting flat against the cylinder head.
- Insert screws (C) and (D).

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

Non-observance of these requirements may result in leaks and damage.

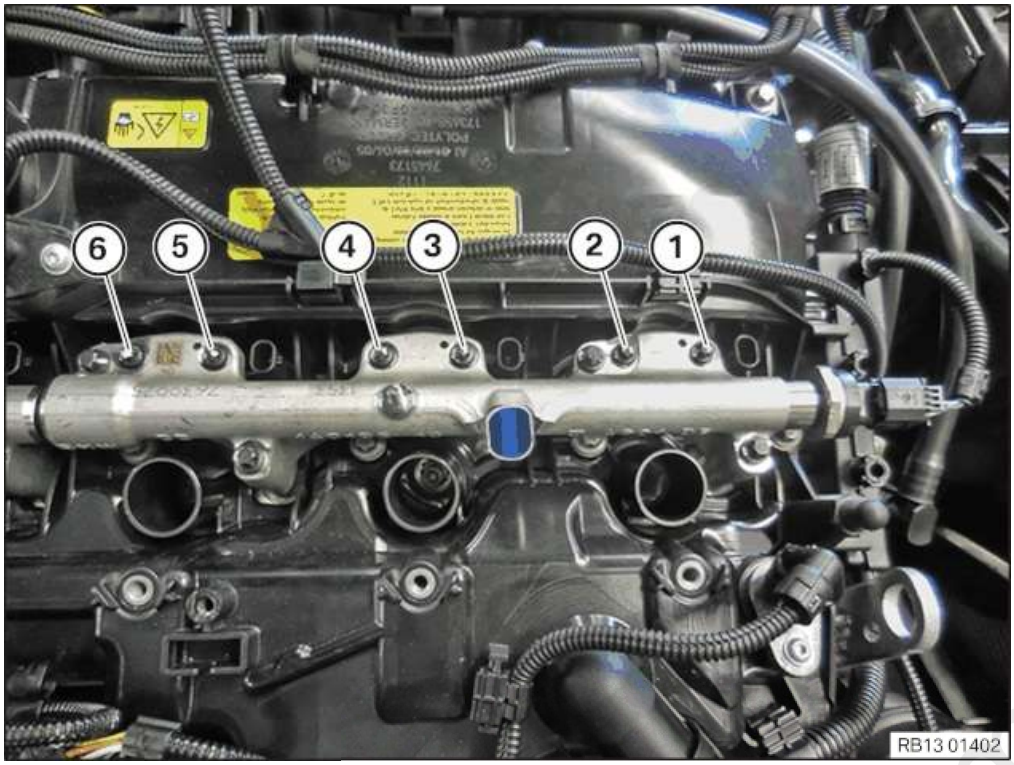
- Tighten screw (A) to 5 Nm.
- Tighten screw (D) to 5 Nm.
- Tighten screw (B) to 5 Nm.
- Tighten screw (C) to 5 Nm.
- Connect and lock the connector (2).

  The connector (2) must engage audibly.



- Make sure that the rail (1) rests flat against the cylinder head.

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- Attach a socket to an extension.

  Do not use a reversible ratchet or torque wrench.
- Hand-tighten screws (M5x30) in pairs ((1) with (2), (3) with (4), (5) with (6)) alternately by **90°**.
- Set torque wrench to 5 Nm.

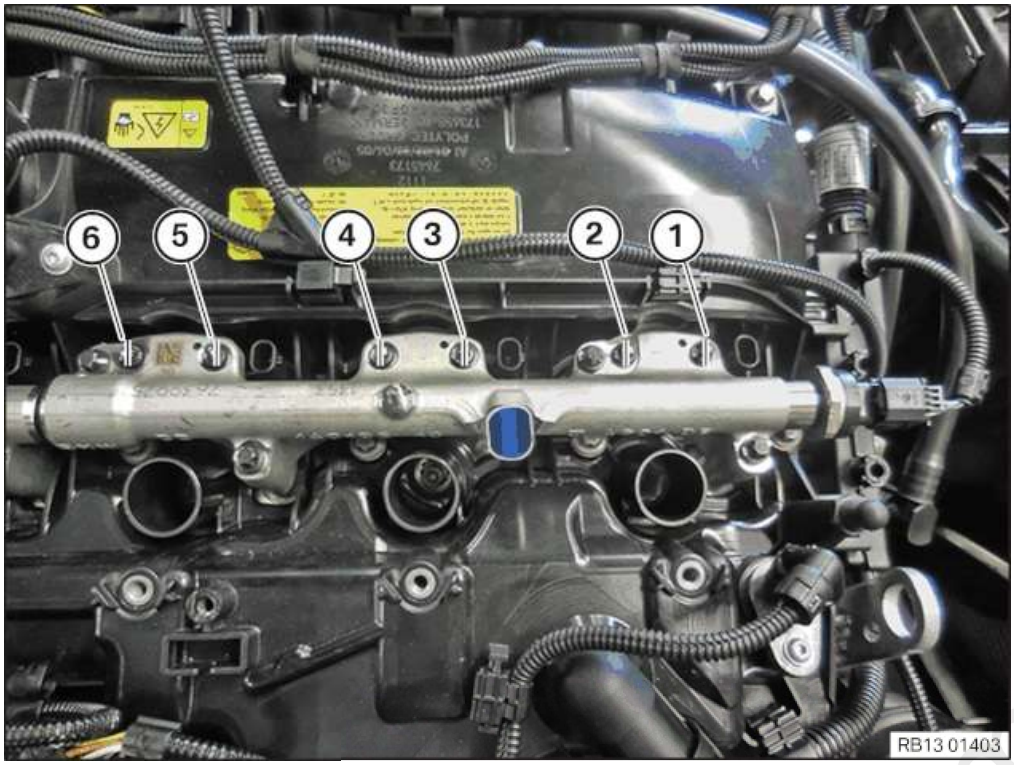
TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

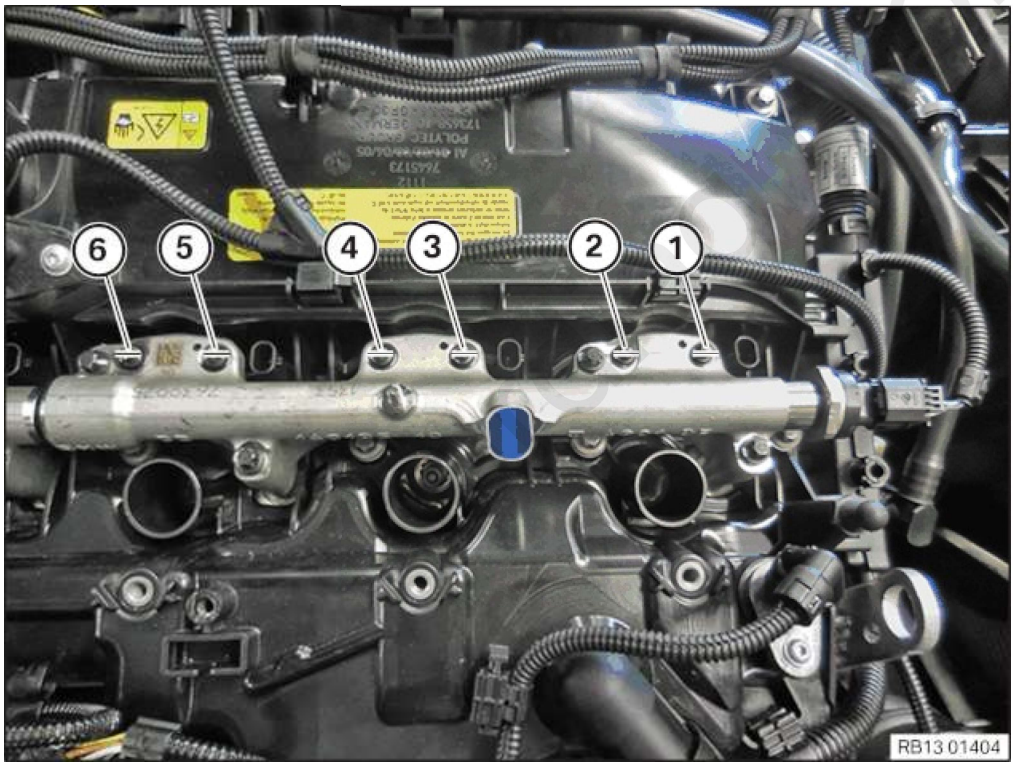
Non-observance of these requirements may result in leaks and damage.

- **Screw the (M5x30) bolts according to the following plan:**
  - **Fuel injector 1:**
  - Tighten screw (1) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (2) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (1) and (2) until both bolts reach a torque of 5 Nm.
  - **Fuel injector 2:**
  - Tighten screw (3) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (4) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (3) and (4) until both bolts reach a torque of 5 Nm.
  - **Fuel injector 3**:
  - Tighten screw (5) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (6) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (5) and (6) until both bolts reach a torque of 5 Nm.

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- Mark all bolts (1) to (6) with a line (see figure).
- **Tighten screws using an angle of rotation.**
  - Tighten the screw (1) with an angle of rotation of 90° ±15°.
  - Tighten the screw (2) with an angle of rotation of 90° ±15°.
  - Tighten the screw (3) with an angle of rotation of 90° ±15°.
  - Tighten the screw (4) with an angle of rotation of 90° ±15°.
  - Tighten the screw (5) with an angle of rotation of 90° ±15°.
  - Tighten the screw (6) with an angle of rotation of 90° ±15°.



- Check if all bolts (1) to (6) have been tightened with a 90° ±15° angle of rotation.

  All markings (lines) must be horizontal (see Figure).



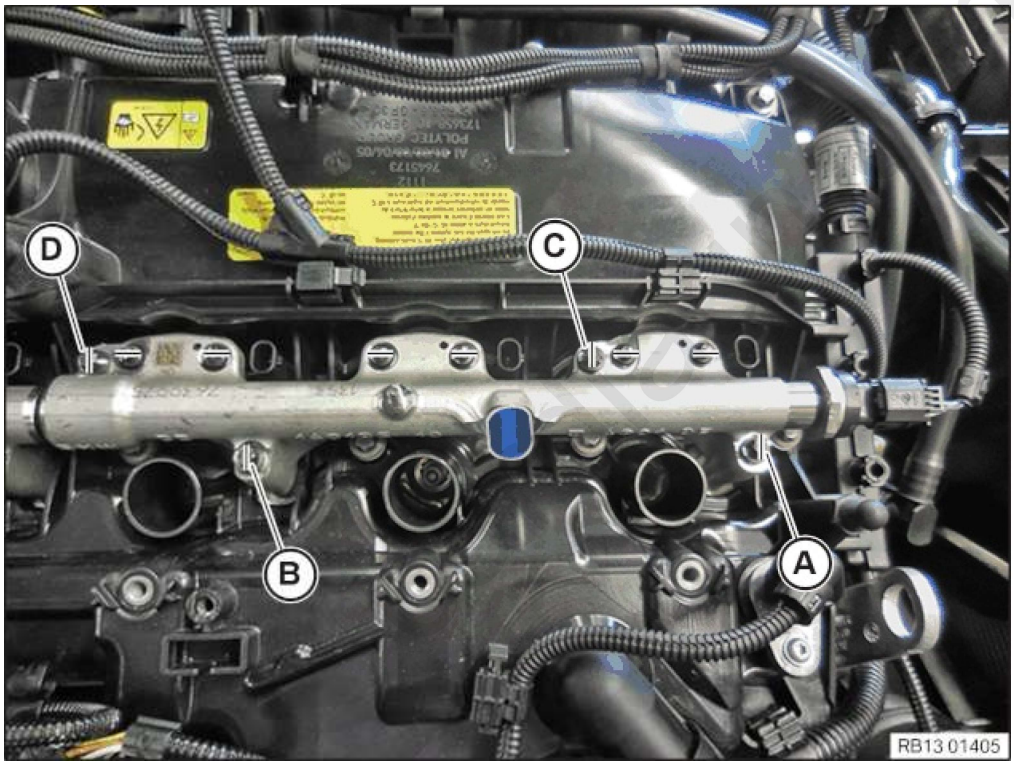
- Release screws (M6x70) (A) to (D) **without fail**.

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

Non-observance of these requirements may result in leaks and damage.

- Tighten screw (A) to 5 Nm.
- Tighten screw (D) to 5 Nm.
- Tighten screw (B) to 5 Nm.
- Tighten screw (C) to 5 Nm.

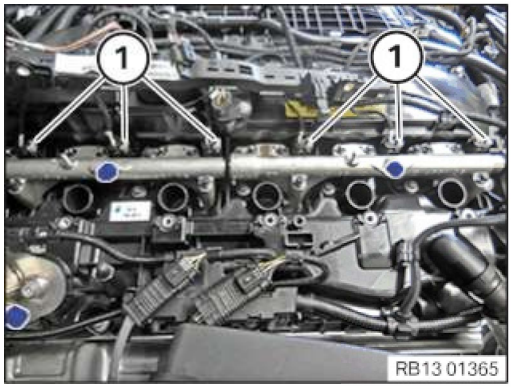


- Mark all the bolts (A) to (D) with a vertical line (see Figure).
- Tighten bolts (M6x70) (A) to (D) with an angle of rotation of 90°.



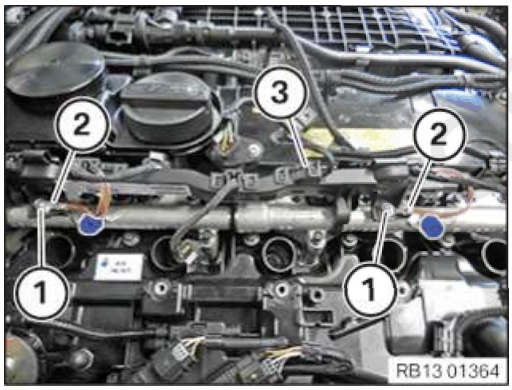
- Check whether all screws (A) to (D) have been tightened with an angle of rotation of 90°.

  All marks (lines) must be horizontal (see figure).



- Connect and lock all the connectors (1) to the injectors.

  All connectors (1) must engage audibly.

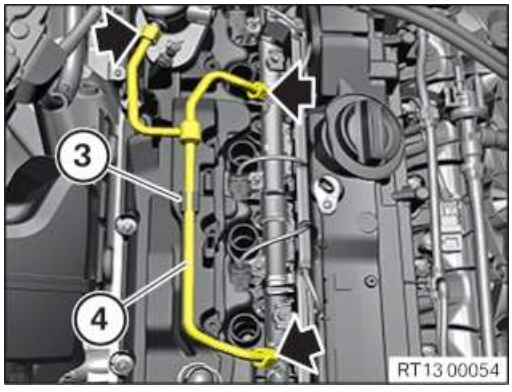


- Thread the cable channel (3) in and install.
- Thread in ground cable (2) and install.
- Tighten nuts (1).

Ground cable to rail

M6			5 Nm

69 – Installing high pressure line between rail and high pressure pump

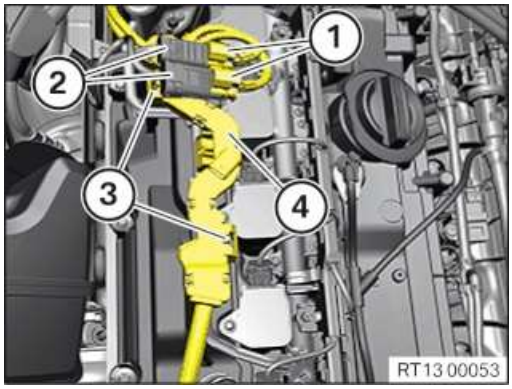


- Insert the high pressure line (4) into the holder (3) and install.
- Tighten union nuts (arrows) with the special tool .

High pressure line between rail and high pressure pump

M14x1,5		Tightening torque	33 Nm

rdiagn.com



- Insert and install the wiring harness section of the engine wiring harness (4).

  The locks (3) must engage audibly.
- Connect connectors (1) and (2) and lock.

  The connectors (1) and (2) must audibly engage.

70 – Install high pressure pump

RISK OF DAMAGE

Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Always rotate the engine in the correct direction of rotation by hand: a) Clockwise, facing the vibration damper or b) Counter-clockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

TECHNICAL INFORMATION

Only G05 and G07

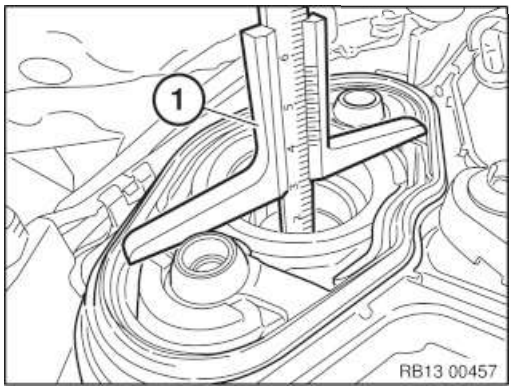
In vehicles with active anti-roll bar (ARS) the fan cowl must be removed in order to spin the engine.

For additional information see: 17 11 035 Removing and installing/replacing the fan cowl including electric fan

TECHNICAL INFORMATION

The high pressure pump can be pre-tensioned by camshaft cams. If when loosening the screws, the high pressure pump is forced out, the engine will have to be turned to bring the camshafts to a different position.

Before installing the high pressure pump, the cam of the high pressure pump drive must be turned to BDC. To do this, twist the engine if necessary in the direction of engine rotation to the central bolt of the crankshaft. Otherwise, it will not be possible to install the high-pressure pump.



- Place the depth gauge (1) flat onto the high pressure pump flange.
- Turn the engine at the central bolt in the direction of engine rotation until the BDC position of the camshaft is reached.

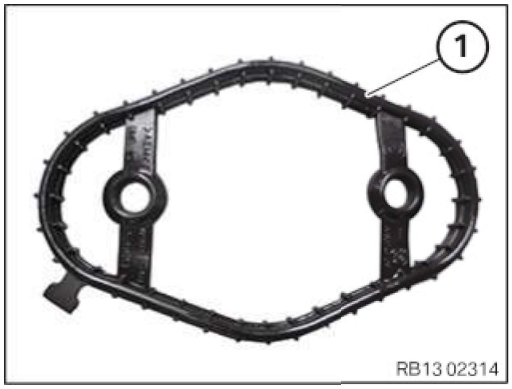
  The depth gauge (1) is in the deepest position.



- Rotate the engine with the special tool 0 493 380 (11 6 480) in the **direction of the arrow** until the cam of the high pressure pump drive is at the **BDC position** .



- Guide out and remove gasket (1).



- Renew the gasket (1).

  Parts: Gasket



TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

- Check the threads (1) on the high pressure pump flange for sealing compound residue: Remove sealing compound residue as needed.
- Clean the thread (1) with a thread cutter **M6**.
- Make sure that no contamination enters the engine.
- Cover opening at the high pressure pump flange with suitable materials.



TECHNICAL INFORMATION

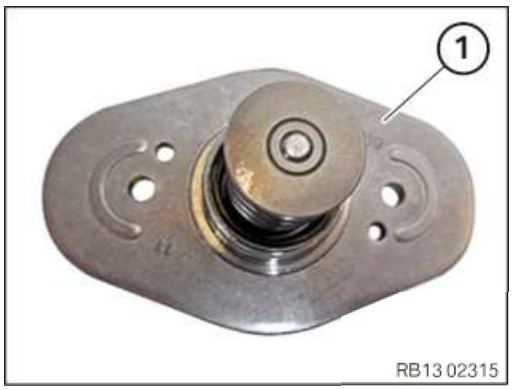
The sealing surfaces must be free from oils, grease and cleaning agents.

- Clean sealing surface (1).

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- Insert and install the gasket (1).
- Make sure the seal (1) has been correctly positioned in the **highlighted** area.



RISK OF DAMAGE

Damage to the surface.

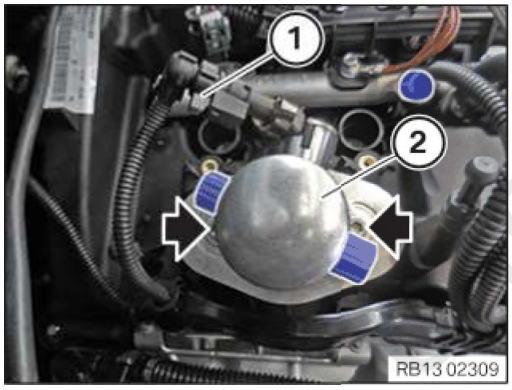
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

- Clean sealing surface (1).



- Feed in and install high pressure pump (2).
- Renew the bolts (arrows).

  Parts: Bolts
- Position screws (arrows) of the high pressure pump (2) and tighten **in alternating order** in **90°** increments.

  Compliance with this specification is imperative to make sure that the piston will not break due to twisting.

High pressure pump to high pressure pump flange

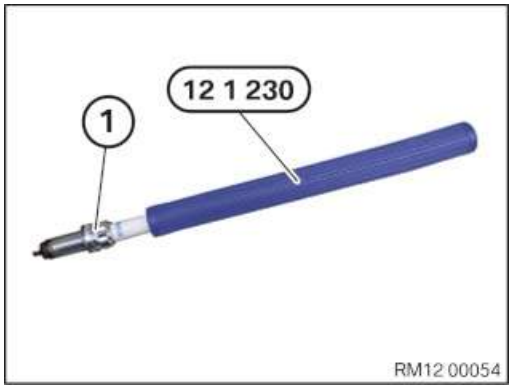
M6x25	*Renew screws.*	Jointing torque	12 Nm
		Tightening torque	90 °

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

71 – Installing all spark plugs

NOTICE

The description is for one component only. The procedure is identical for all further components.



- Insert spark plug (1) into special tool 0 496 065 (12 1 230).



TECHNICAL INFORMATION

Do not drop spark plug into spark plug shaft! This can lead to a reduction of the electrode gap and can thus impair smooth running of the engine, especially in idle position.

- Screw in the spark plugs in the engine with the special tool 0 496 065 (12 1 230) until hand-tight.



TECHNICAL INFORMATION

Exclusively swivelling extensions may be used for the reversible ratchet. Rigid mounting tool and variable plug connections with rigid option may not be used; there is a risk that the insulator breaks.

- Tighten the spark plugs with the torque wrench, the special tool 0 495 560 (12 1 220) and a swivelling extension.

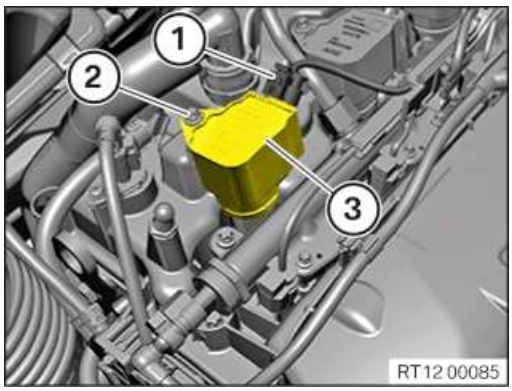
Spark plugs

M12x1.25		Tightening torque	23 Nm

72 – Install all ignition coils

NOTICE

The description is for one component only. The procedure is identical for all further components.



▸ **Install ignition coil.**

- Install ignition coil (3).
- Tighten down screw (2).

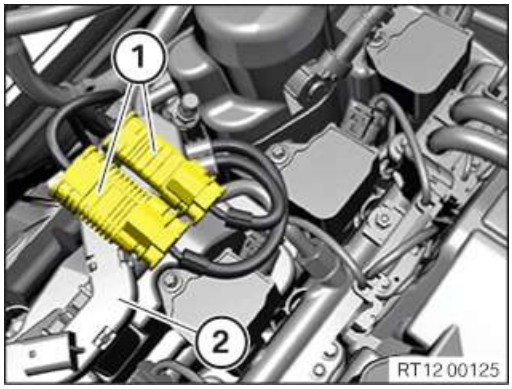
Ignition coil

Screw		Tightening torque	8 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

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- Connect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor on the cable shaft (2).

73 – Install catalytic converter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew the gasket (1).

  Parts: Gasket



- Feed in and install catalytic converter.
- Lock clamp (1).

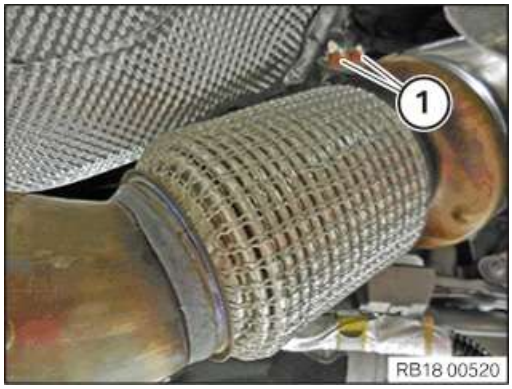
  The clamp (1) must engage audibly.



- Tighten V-band clamp (1).

Catalytic converter to turbocharger

V-band clamp	Replace V-band clamp.	Tightening torque	19 Nm



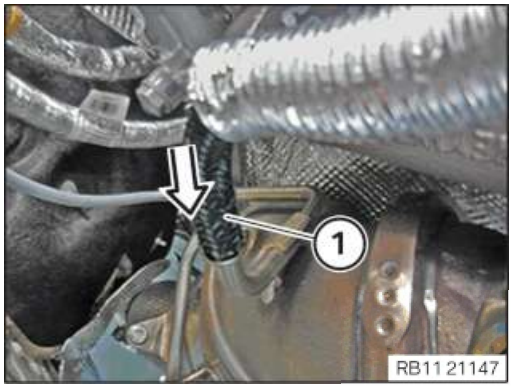
- Renew nuts (1).

  Parts: Nuts

- Tighten nuts (1).

Catalytic converter to holder

M8 nut	Renew nut.	Tightening torque	28 Nm



- **If installed: Connect pressure hose.**

  Renew pressure hose (1).

  Parts: Pressure hose

- Connect the pressure hose (1) in direction of arrow to the limit position.

74 – Install the monitoring oxygen sensor

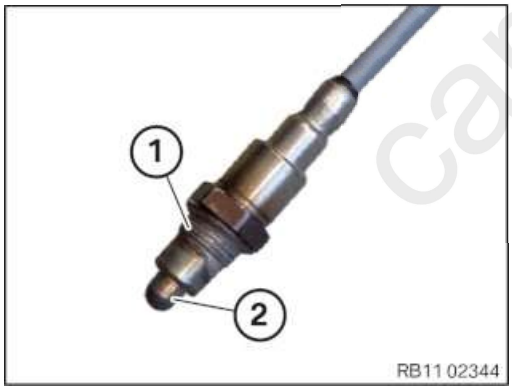
TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Prepare the oxygen sensor.

  Do not damage the sensor ceramics.

  (1) = Thread

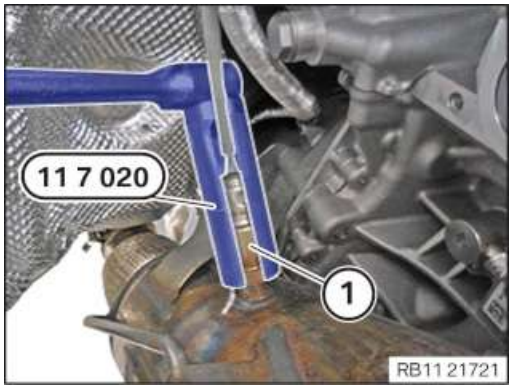
  (2) = Sensor ceramics

- Grease the thread (1) of the Lambda monitoring oxygen sensor thinly and evenly.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233

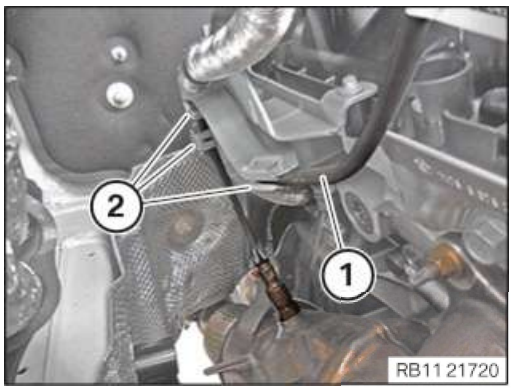
cardiagn.com



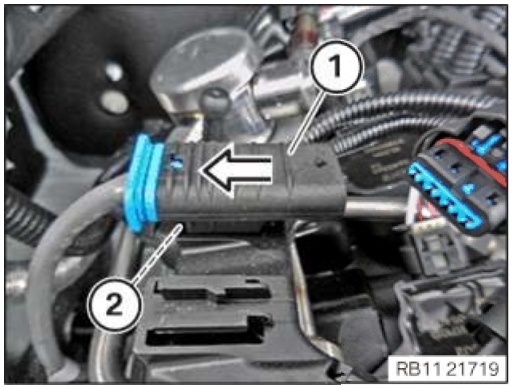
- Feed in the monitoring oxygen sensor (1) and install.
- Tighten monitoring oxygen sensor (1) using special tools 0 493 751 (11 9 150) and 0 491 075 (11 7 030) .

Monitoring oxygen sensor to catalytic converter

M18X1.5		Tightening torque	50 Nm



- Guide monitoring oxygen sensor line (1) into holder (2) and install it.



- Insert and install the connector (1) in the **direction of arrow**.
- Ensure that the lock (2)engages audibly.



- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

75 – Install the front oxygen sensor

TECHNICAL INFORMATION

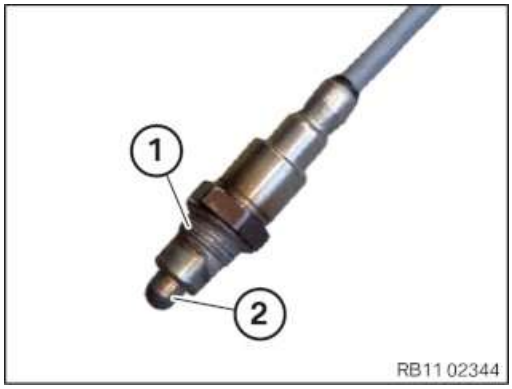
New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

fordiagn.com



- Prepare the oxygen sensor.

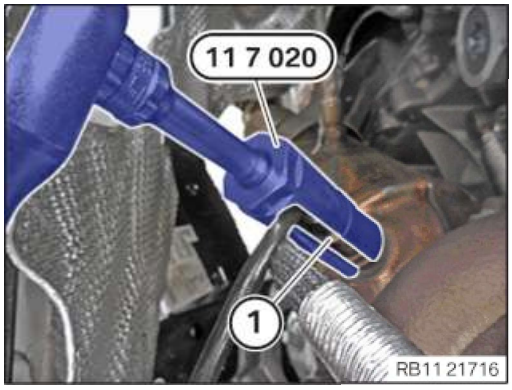
  Do not damage the sensor ceramics.

  (1) = Thread

  (2) = Sensor ceramics
- Apply a thin and even coat of grease to the thread (1) of the front oxygen sensor.

Expendable materials

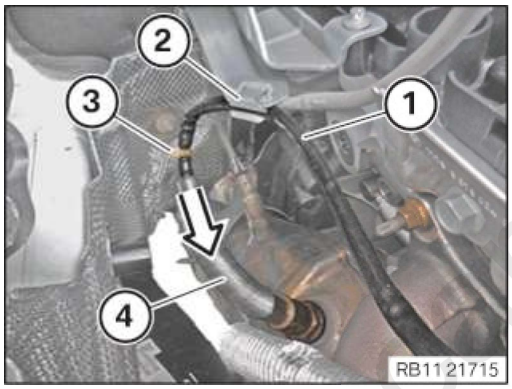
Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



- Screw the control sensor (1) in and tighten it with the special tool .

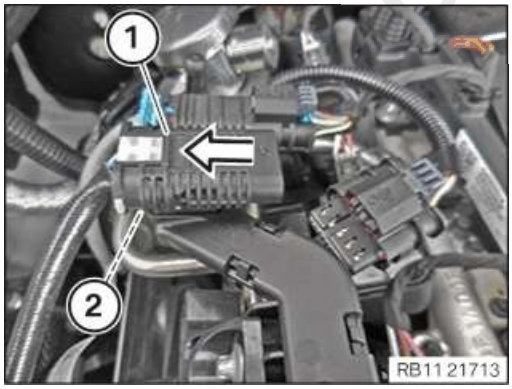
Front oxygen sensor to catalytic converter

M18X1.5		Tightening torque	50 Nm



- Guide in the heat protection (4) in the **direction of arrow** and install.
- Renew the cable straps (3).

  Parts: Cable strap
- Guide in and install the cable strap (3).
- Feed in and install the line of the front oxygen sensor (1) in the holder (2).



- Insert and install the connector (1) in the **direction of arrow**.
- Ensure that the lock (2)engages audibly.



- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

76 – Installing the intake plenum

RISK OF DAMAGE

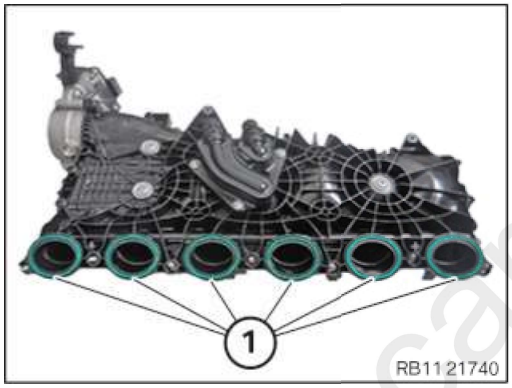
Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.



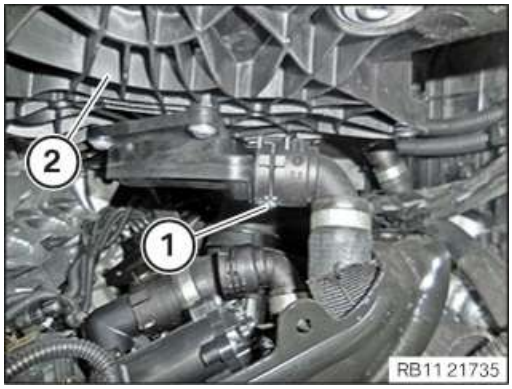
- Renew gaskets (1).

  Parts: Seals

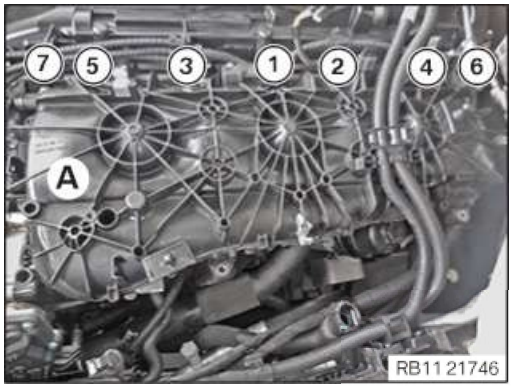


- Clean contact surface (1).

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- Feed in and position intake plenum (2).
- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.



TECHNICAL INFORMATION

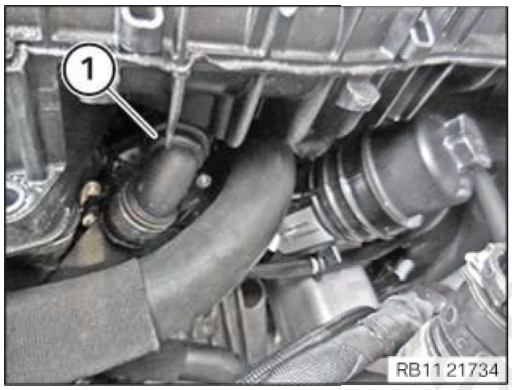
Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

- Position the intake plenum (A).
- Tighten screws in the order (1) to (7).

Note: Tighten the bolts in 360 degree steps.

Intake plenum to cylinder head

M6		Tightening torque	10 Nm



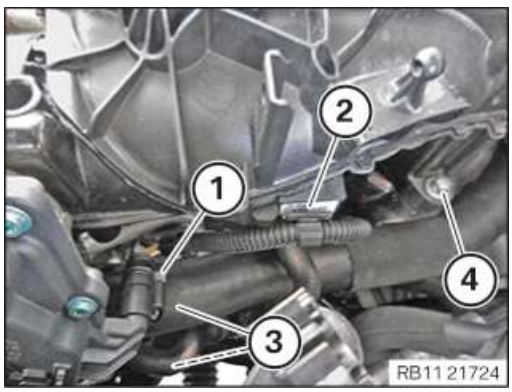
- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.



- Tighten down screw 1.

Intake plenum to support

M6X25		Tightening torque	8 Nm



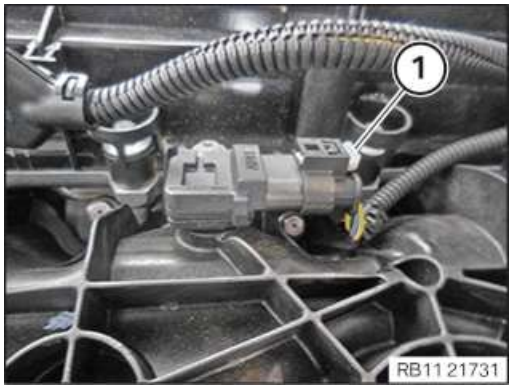
- Tighten down screw (4).

Intake plenum to support

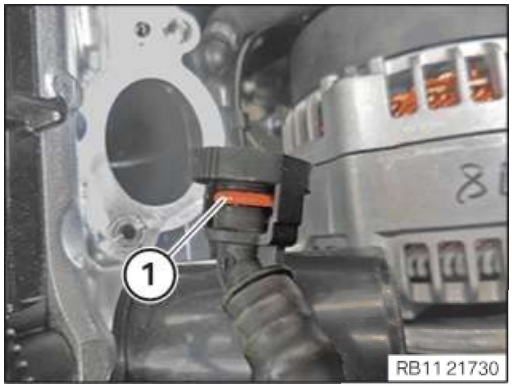
M6X25		Tightening torque	8 Nm

- Thread in and install coolant line (3).
- Secure clamps (2).
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

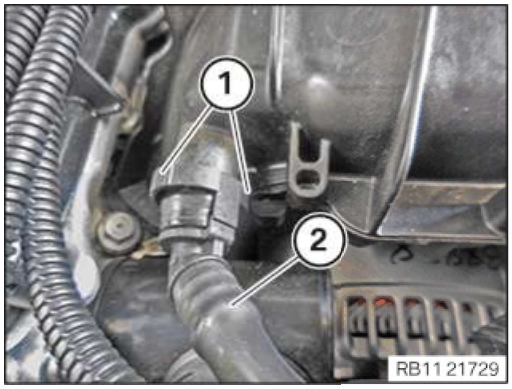
fdiagn.com



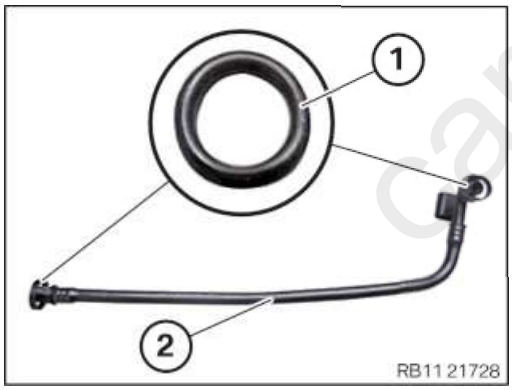
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.



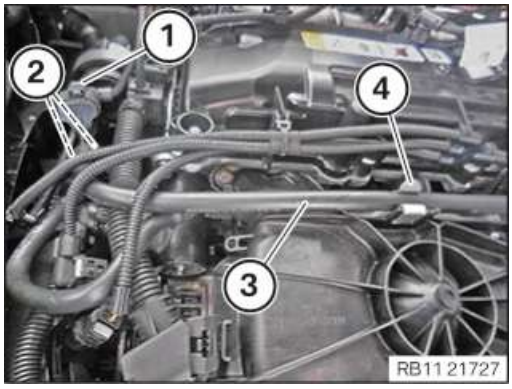
- Check sealing ring (1) for damage and renew tank ventilation line if necessary.



- Insert and install the tank ventilation line (2).
- Ensure that the locks (1) engage audibly.

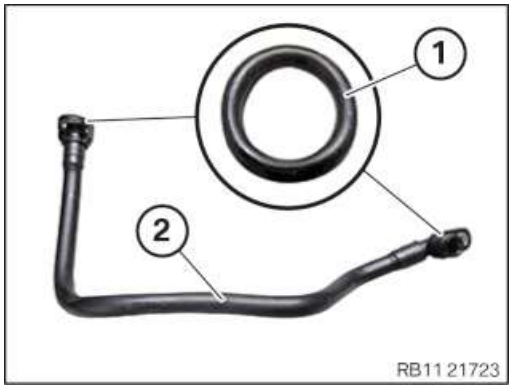


- Check sealing ring (1) for damage and renew tank ventilation line (2) if necessary.

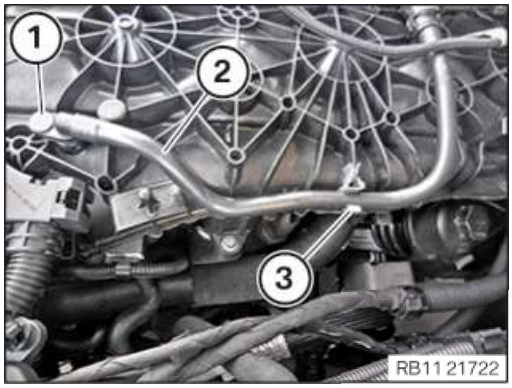


- Insert and install the tank ventilation line (3).
- Ensure that the locks (2) engage audibly.
- Secure the tank ventilation line (3) to the clamp (4).
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

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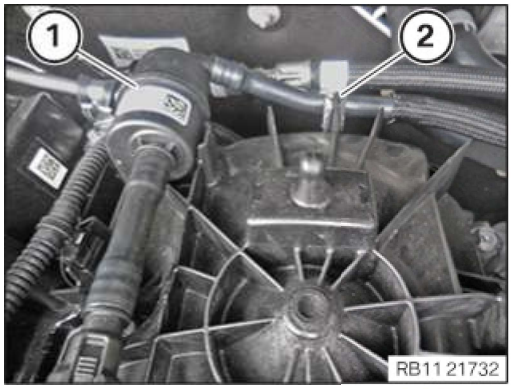
- Check sealing ring (1) for damage and renew tank ventilation line (2) if necessary.



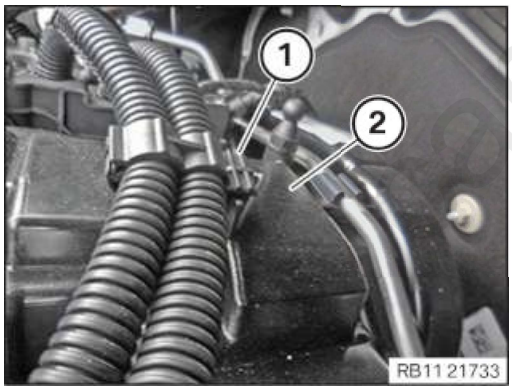
- Insert and install the tank ventilation line (2).
- Secure the tank ventilation line (2) to the clamp (3).
- Tighten down screw (1).

Tank ventilation line to intake plenum

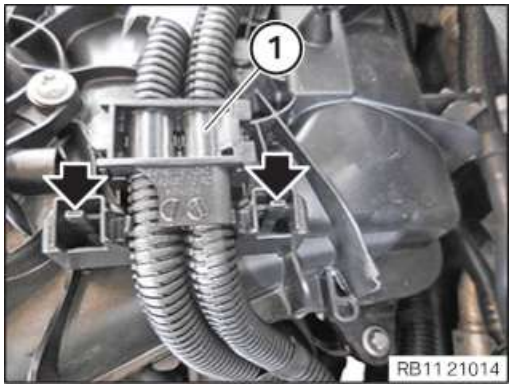
Oval-head screw		Tightening torque	3 Nm



- Insert and install the tank ventilation line (1).
- Secure the tank ventilation line (1) to the clamp (2).



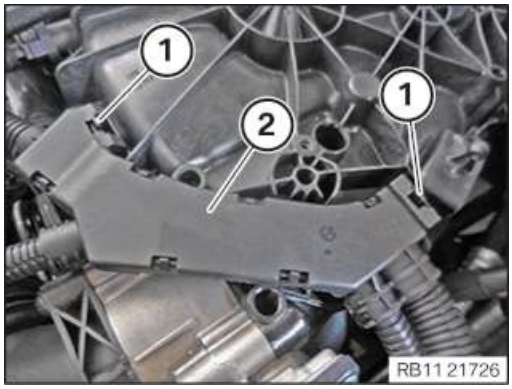
- Secure the wiring harness section(1) for the injectors and ignition coils on the cylinder head cover (2).



- Insert and install the wiring harness section (1) for the injectors and ignition coils.

  The locks (arrows) must engage audibly.

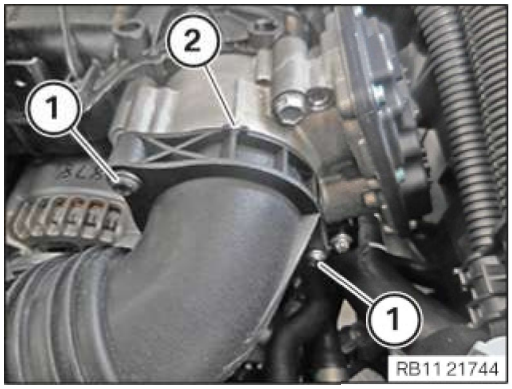
carfdiagn.com



- Feed in and install wiring harness section (2) for sensor system **2**.
- Ensure that the locks (1) engage audibly.



- Check the sealing ring (1) for damage and renew the sealing ring (1) as needed.

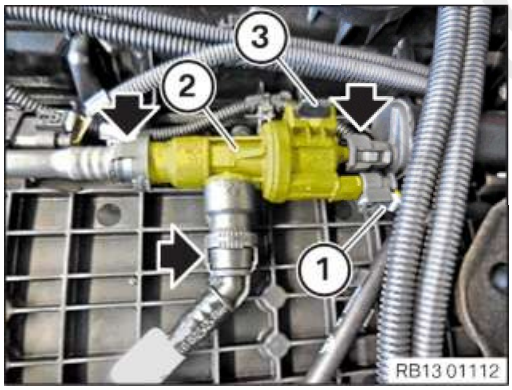


- Insert and install charge air line (2).
- Tighten the screws (1).

Charge air line to throttle valve

M6x30		Tightening torque	8 Nm

77 – Installing the tank vent valve



- Secure the tank vent valve (2) to the holder (3).
- Connect and lock the tank ventilation lines (arrows).

  The tank ventilation lines (arrows) must audibly engage.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

78 – Install engine ventilation line

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

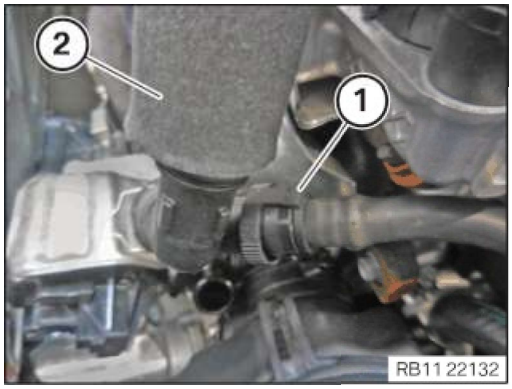
rdiagn.com

TECHNICAL INFORMATION

Check the retaining lug on the connector for damage and perform a tension check as needed.

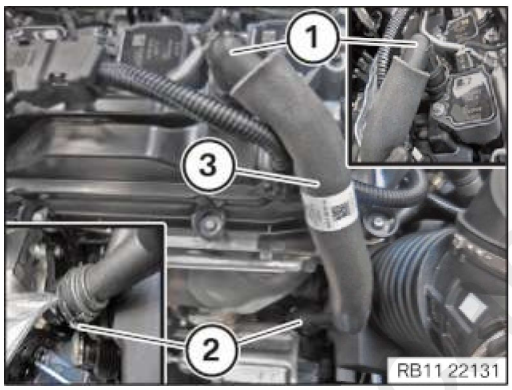


- Check sealing ring (1) for damage and renew tank ventilation line if necessary.

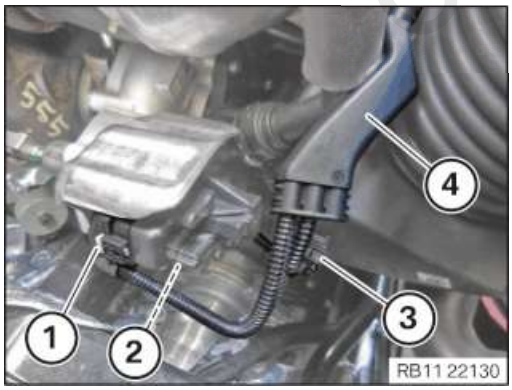


- Insert and position the engine ventilation line (2).
- Insert and install the tank ventilation line (1).

  Tank ventilation line (1) must engage audibly into place.



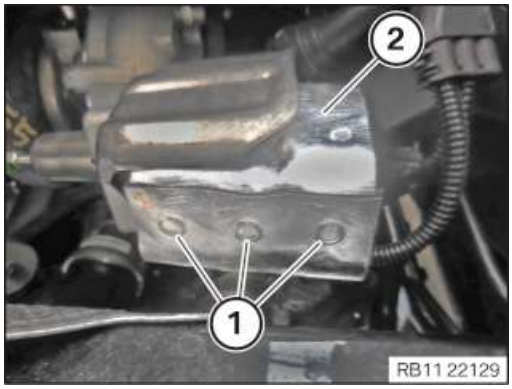
- Insert and install the engine ventilation line (3).
- Make sure you can hear the locks (1) and (2) engage.



- Feed in and position the wiring harness section of sensor system **2** (4).
- Connect connectors (2) and lock.
- Connect connectors (1) and lock.

  The connectors (1) and (2) must audibly engage.
- Secure clamps (3).

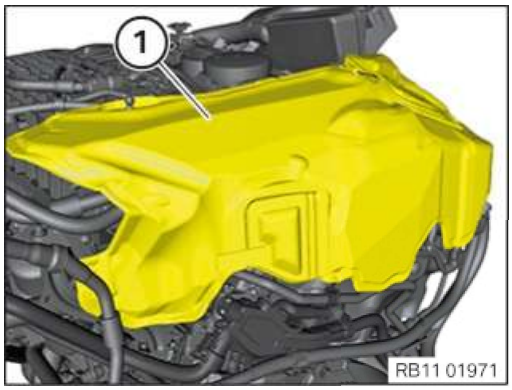
carmanualsdiag.com



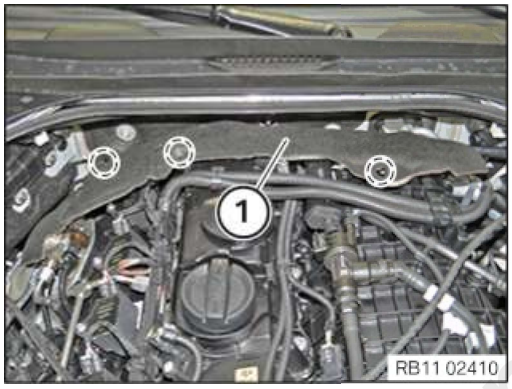
- Feed in and install heat shield (2).
- Lock the locks (1).

  Locks (1) must engage audibly.

79 – Installing acoustic cover at rear



- Make sure the acoustic cover (1) is correctly positioned on the rear side of the engine.



- Install the acoustic cover (1) from the top and clip it in into the marked areas.

80 – Topping up the engine oil

RISK OF DAMAGE

Damage to the petrol particulate filter.

Vehicles equipped with a petrol particulate filter must be operated with low-ash engine oil only.

- Use BMW Longlife-04 , BMW Longlife-12 FE or BMW Longlife-17 FE+ engine oils or engine oils approved by BMW matching the same specifications only.
- For additional information see: Overview of approved engine oils for BMW Group engines.

RISK OF DAMAGE

Engine damage caused by excessively filling the engine with engine oil.

Filling an excessive quantity of engine oil may cause engine damage.

- Observe the exact engine oil filling capacity.
- Drain the engine oil.

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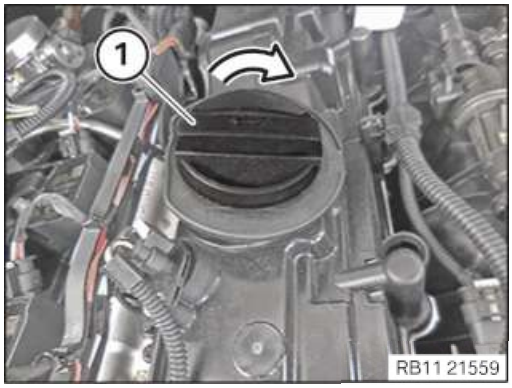
- Pour in engine oil.

Engine oil B58B30M1/B58B30O1

Filling capacity, engine oil change with oil filter element	6,50 l

Engine oil: Technically suitable engine oils for BMW Group engines

81 – Installing the oil filler cap



- Close oil filler cap (1) in direction of arrow.
- Make sure that the sealing cap (1) engages audibly.

82 – Remove engine from assembly stand

CAUTION

Heavy component.

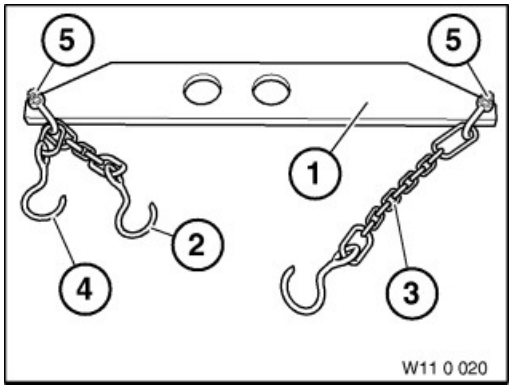
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

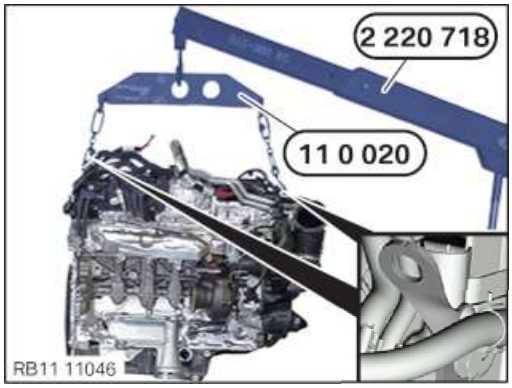


- Stage the workshop crane 2 220 718.

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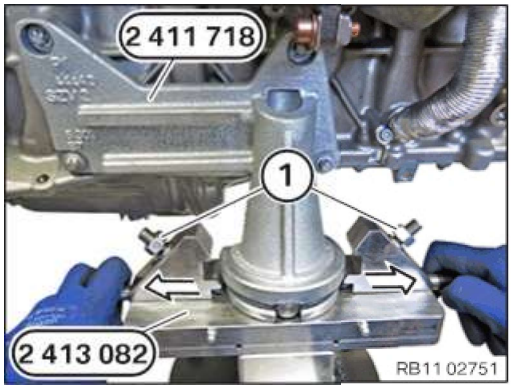
- Stage special tool (lifting gear) 0 490 567 (11 0 020).



TECHNICAL INFORMATION

The workshop crane, lifting gear and the mounting brackets on the engine must all be connected to each other so that the engine hangs straight upon lifting.

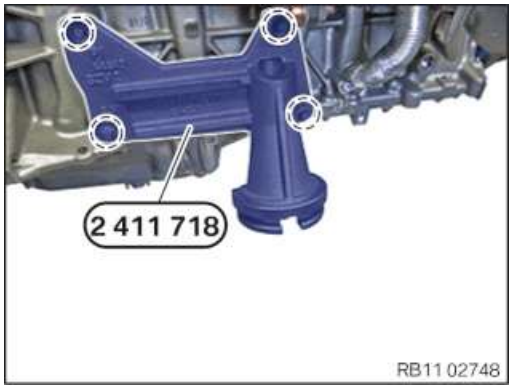
- Connect both hooks of the special tool 0 490 567 (11 0 020) to the front and back of the engine with the mounting brackets.
- Connect the workshop crane 2 220 718 to the special tool (lifting gear) 0 490 567 (11 0 020).



- Slacken nuts (1).
- Unclamp the clamping jaws of the special tool (engine fixture) 2 413 082 in the direction of arrow.



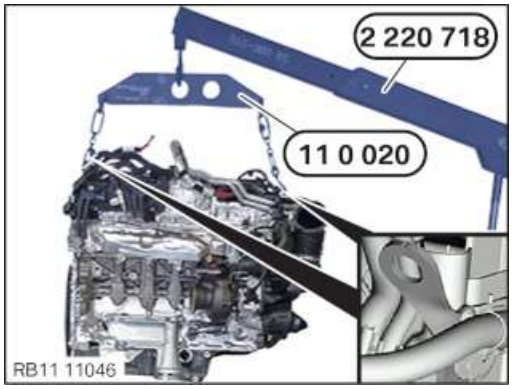
- Raise the engine slowly.



- Release the screws (marks) and remove the special tool (engine fixture) 2 411 718.

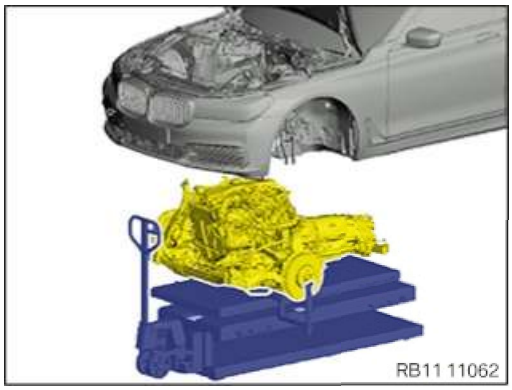
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83 – Installing the engine on the front axle



- See additional information.

84 – Installing the complete front axle including engine and transmission



- See additional information.

Additional Information

Overview of Tightening Torques

Flange to assembly stand			Used in step 3
M14X30		Tightening torque	135 Nm

Special tool 11 8 930 to special tool 00 2 320			Used in step 3
M14x35		Tightening torque	160 Nm

Special tool 2 411 718 to crankcase			Used in step 3
M10x30		Tightening torque	38 Nm

Oil drain plug			Used in step 6
M12x16	Replace sealing ring.	Tightening torque	25 Nm

Basic carrier to cylinder head			Used in step 245161
M6		Tightening torque	8 Nm

Test gauge to basic carrier			Used in step 245161
M6		Tightening torque	8 Nm

Special tool to cylinder head			Used in step 33
M8		Tightening torque	21,5 Nm

Crankshaft sensor to timing case cover			Used in step 40
			4.6 Nm

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Rear timing case cover to crankcase — Used in step 41

M6 x 31	Renew screws.	Jointing torque	8 Nm
		Angle of rotation	90 °

Oil sump to crankcase — Used in step 42

M8 x 30		Tightening torque	24 Nm

Oil sump to crankcase — Used in step 42

M8 x 110		Tightening torque	24 Nm

Transmission to oil sump (manual gearbox and automatic transmission) — Used in step 42

M8 x 50		Tightening torque	19 Nm

Bearing support to oil sump — Used in step 43

M8		Tightening torque	19 Nm

Front axle final drive to engine oil pan — Used in step 44

M12		Tightening torque	140 Nm

Flywheel to crankshaft — Used in step 45

M12x1.5	Renew screws.	Jointing torque	45 Nm
		Angle of rotation	40 °

Cylinder head to crankcase — Used in step 50

M11	Observe tightening sequence. Fit new cylinder head bolts.	1. Jointing torque	30 Nm
		2. Angle of rotation	90 °
		3. Angle of rotation	180 °

Cylinder head bolt to timing case cover — Used in step 50

M8x40	Renew screws.	Tightening torque	19 Nm

Camshaft sensor wheel to intake camshaft — Used in step 50

M4 x35			4,5 Nm

Bearing journal to cylinder head — Used in step 50

Bearing journal	Renew the bearing journal!	Tightening torque	20 Nm

Sliding rail to cylinder head — Used in step 50

M6x16			8 Nm

Cover on rear cylinder head — Used in step 50

M6		Tightening torque	8 Nm

Cable routing to cylinder head, rear — Used in step 50

M6 x 20		Tightening torque	8 Nm

Oil feed line for exhaust turbocharger to crankcase — Used in step 50

M6 x 12	Replace sealing ring.	Tightening torque	8 Nm

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Coolant return line holder bracket to crankcase — Used in step 50

M6X12		Tightening torque	8 Nm

Heat shield to cylinder head — Used in step 50

M8X12	Renew screws.	Tightening torque	19 Nm

Heat shield to clamping strip — Used in step 50

M6X16	Renew screw.	Tightening torque	8 Nm

Coolant feed line to crankcase — Used in step 50

M6X12		Tightening torque	8 Nm

Exhaust turbocharger support to crankcase — Used in step 50

M8 x 20	Renew screws.		19 Nm

Exhaust turbocharger to support — Used in step 50

M8 x 25	Renew screw.		19 Nm

VANOS central valve to camshaft — Used in step 5758

M20 x 1.5		1. Jointing torque	10 Nm
		2. Jointing torque	30 Nm
		3. Jointing torque	50 Nm
		4. Angle of rotation	35 °

Chain tensioner to cylinder head — Used in step 60

Chain tensioner		Tightening torque	20 Nm
		Angle of rotation	40 °

Coolant line to coolant pump/cylinder head — Used in step 62

M6x20		Tightening torque	8 Nm

Oil return line to turbocharger — Used in step 63

M6 x 12			8 Nm

Oil return line to crankcase — Used in step 63

M6 x 12			8 Nm

Cylinder head cover to cylinder head — Used in step 64

M6X30		Jointing torque	8 Nm

Cylinder head cover to cylinder head — Used in step 64

M6X30		Tightening torque	11 Nm

Auxiliary coolant pump holder to cylinder head — Used in step 64

M6		Tightening torque	7 Nm

Standard screw connection M6 — Used in step 64

M6			8 Nm

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Differential pressure sensor to holder — Used in step 64

TS6X18		Tightening torque	3,5 Nm

Holder, positive battery cable to cylinder head cover — Used in step 64

6X18		Tightening torque	6 Nm

Ground cable to rail — Used in step 6768

M6			5 Nm

High pressure line between rail and high pressure pump — Used in step 69

M14x1,5		Tightening torque	33 Nm

High pressure pump to high pressure pump flange — Used in step 70

M6x25	*Renew screws.*	Jointing torque	12 Nm
		Tightening torque	90 °

Spark plugs — Used in step 71

M12x1.25		Tightening torque	23 Nm

Ignition coil — Used in step 72

Screw		Tightening torque	8 Nm

Catalytic converter to turbocharger — Used in step 73

V-band clamp	Replace V-band clamp.	Tightening torque	19 Nm

Catalytic converter to holder — Used in step 73

M8 nut	Renew nut.	Tightening torque	28 Nm

Monitoring oxygen sensor to catalytic converter — Used in step 74

M18X1.5		Tightening torque	50 Nm

Front oxygen sensor to catalytic converter — Used in step 75

M18X1.5		Tightening torque	50 Nm

Intake plenum to cylinder head — Used in step 76

M6		Tightening torque	10 Nm

Intake plenum to support — Used in step 76

M6X25		Tightening torque	8 Nm

Tank ventilation line to intake plenum — Used in step 76

Oval-head screw		Tightening torque	3 Nm

Charge air line to throttle valve — Used in step 76

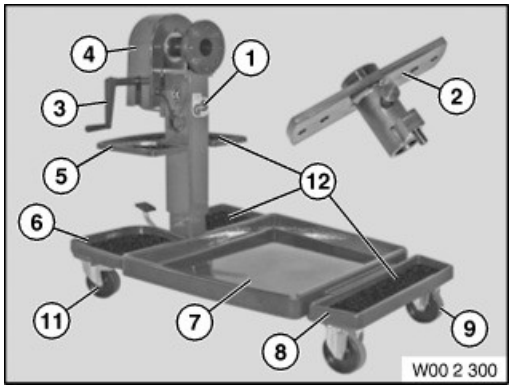
M6x30		Tightening torque	8 Nm

Overview of Special Tools

0 495 187 (00 2 300) Assembly stand

Common — Used in step 3

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Usage	Assembly stand with universal flange for mounting engines from S85
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 25 04 (155)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 188 (00 2 301)		**Assembly stand** available only as complete assembly stand 83 30 0 495 187.	
2	0 495 189 (00 2 302)	2 299 563	**Tool** (Universal flange). Do not use any more!!! Technically locked. Replaced with a new flange with material number 83 30 2 299 563. All flanges delivered until the end of 2011 will be replaced at no charge. From 2012, only the new flange will be supplied. Also applies to the complete engine mounting stand 00 2 300.	
3	0 495 200 (00 2 303)		**Crank**	
4	0 495 201 (00 2 304)		**Cover** (Protective hood)	
5	0 495 202 (00 2 305)		**oddments tray** (Oddments tray for small parts)	
6	0 495 203 (00 2 306)		**Shaped element** (Rear shaped pan)	
7	0 495 204 (00 2 307)		**Collection pan** (Oil collection pan)	
8	0 495 205 (00 2 308)		**Shaped element** (Front shaped pan)	
9	0 495 206 (00 2 309)		**Wheel** (Front wheel (without stop))	
10	0 495 207 (00 2 311)		**Wheel** (Rear wheel (with stop))	
11	0 495 208 (00 2 312)		**Mat** (Checker mat set)	
2	2 299 563		**Adapter** New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.	

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2 411 718 Engine support



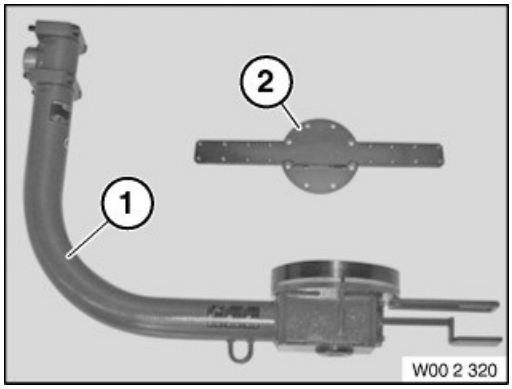
Common Used in step 382

Usage	For accommodating engine on assembly stand. Engine: B58; S58
Included in the tool or work	
Storage location	
Replaced by	
In connection with	2413082
SI-Number	01 23 15 (280)

0 495 196 (00 2 320) Support arm

Used in step 3

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Common

Usage	(Support arm with fixture) For mounting engines using the engine mounting bracket.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	002300 = 0495187
SI-Number	01 25 04 (155)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 197 (00 2 321)		**Support arm**	
2	0 495 198 (00 2 322)		**Panel** (take-up plate)	
3	0 495 380 (00 2 323)		**Panel** (fixture) Engine N73	
6	0 496 287 (00 2 326)		**Panel** (fixture) Engine: M73	
5	0 496 288 (00 2 327)	0 496 373	**Panel** (fixture) Engine: S62 Replaced by 11 5 420 (0 496 373)	
8	0 496 533 (00 2 328)		**Support** (Engine mount) Engine: N57, N57Top	
9	0 496 579 (00 2 329)	0 496 680	**Support** (Engine mount) Engine: N74 Replaced by 116160 (0 496 680)	
4	0 495 379 (00 2 324)		**Panel** (fixture) Engine M67TU	
5	0 495 381 (00 2 325)		**Panel** (fixture) Engine N62, N62TU	

2 413 082 Support

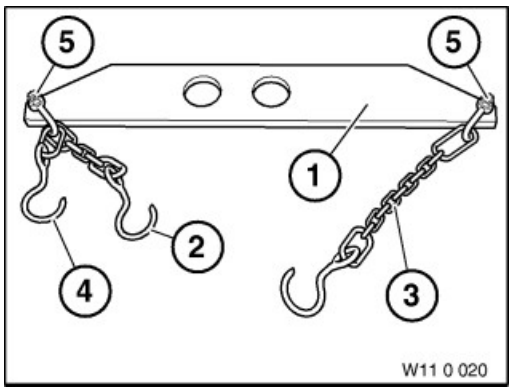


Common Used in step 382

Usage	For mounting the engines on the assembly stand.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	0495196
SI-Number	01 23 15 (280)

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0 490 567 (11 0 020) Lifting gear



Common Used in step 3335082

Usage	For removing and installing the engines. 08/2011 only available as a complete set. Delivered with TÜV inspection certificate and operating instructions. No delivery of separate parts.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 13 94 (888)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
5	0 490 572 (11 0 029)		**Shackle** (Shackle) 2 pieces As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	
1	0 490 568 (11 0 021)		**Lifting gear** (Cross member) As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	
2	0 490 569 (11 0 022)		**Chain** (Chain) As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	
3	0 490 570 (11 0 023)		**Chain** (Chain) Version: long As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	
4	0 490 571 (11 0 024)		**Chain** (Chain) Version: short As of 08/2011, only available as a complete set via 11 0 020 = 0490567. Delivered with TÜV inspection certificate and operating instructions.	

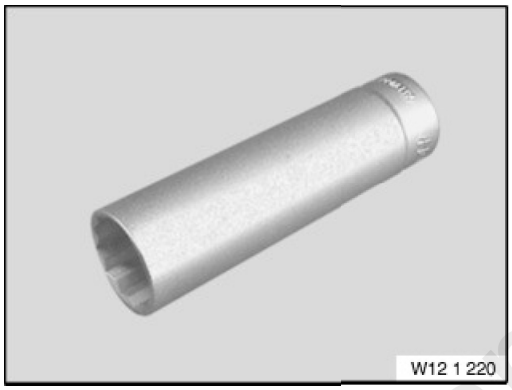
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2 220 718 Workshop crane



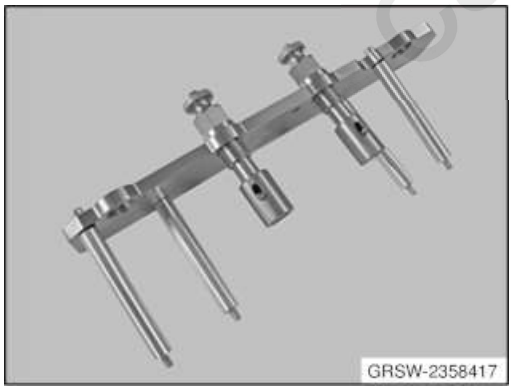
Common	Used in step	33382
Usage	WSK 1000	
Included in the tool or work		
Storage location	Individual	
Replaced by		
In connection with		
SI-Number	06 01 11 (701)	

0 495 560 (12 1 220) Socket



Common	Used in step	1571
Usage	For removing and installing the spark plugs (WAF 14 bihexal).	
Included in the tool or work		
Storage location	C18	
Replaced by		
In connection with		
SI-Number	01 20 06 (299)	

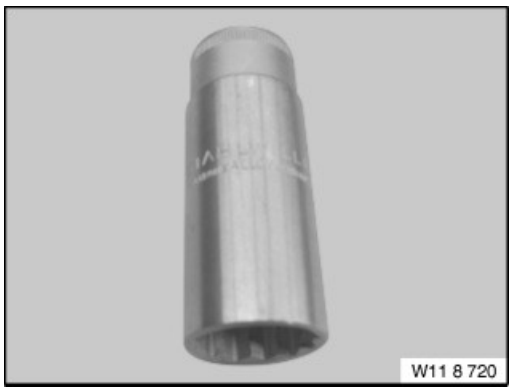
2 358 417 Device



Common	Used in step	1819
Usage	For removing and installing injectors. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).	
Included in the tool or work		
Storage location	A57	
Replaced by		
In connection with		
SI-Number	01 13 14 (098)	

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0 496 106 (11 8 720) Socket WAF 46



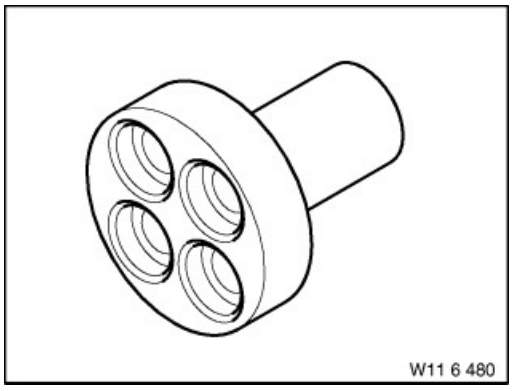
Common	Used in step 1819
Usage	(Long socket SW24) For removal and installation of oil pressure sensor. (Stahlwille or HAZET)
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	01 04 07 (352)

2 360 895 Pin wrench



Common	Used in step 2065
Usage	For removal and installation of the magnetic actuator. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 13 14 (098)

0 493 380 (11 6 480) Connector



Common	Used in step 2449596170
Usage	For turning over engine at crankshaft hub (vibration absorber) when adjusting valve timing
Included in the tool or work	
Storage location	B2
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

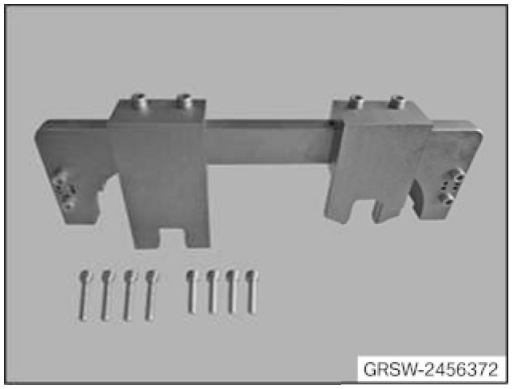
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2 288 380 Locating stud



Common	Used in step 24495961
Usage	For disconnecting the crankshaft at TDC. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

2 456 372 Gauge



Common	Used in step 2432515961
Usage	For securing camshaft at TDC. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	B57
Replaced by	
In connection with	
SI-Number	01 07 17 (487)

2 358 122 Gauge



Common	Used in step 243261
Usage	For securing camshaft at TDC. Contour-graphic silhouette foil is included in the delivery specification. Further information on the contour-graphic silhouette foil is included in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A57
Replaced by	
In connection with	
SI-Number	01 13 14 (098)

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0 496 855 Ratchet handle



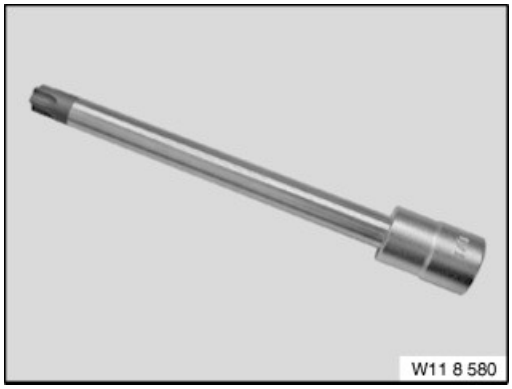
Common	Used in step 26275758
Usage	Insert reversible ratchet with nut for installation and disassembly of the VANOS- SW22. (only in longitudinal installation). Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A55
Replaced by	
In connection with	
SI-Number	01 34 15 (306)

2 450 487 Socket



Common	Used in step 26275758
Usage	For removing and installing the VANOS adjuster. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	B55
Replaced by	
In connection with	0496855
SI-Number	01 07 17 (487)

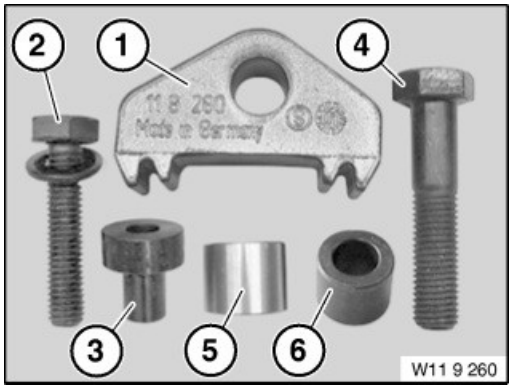
0 495 747 (11 8 580) Socket wrench



Common	Used in step 3350
Usage	(wrench socket Torx T60) For removing and installing cylinder head (outside diameter 13.5 mm).
Included in the tool or work	
Storage location	A19
Replaced by	
In connection with	
SI-Number	01 20 06 (299)

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0 493 938 (11 9 260) Holder



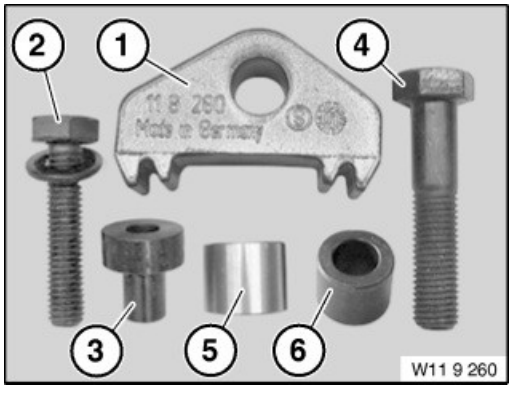
Common Used in step 3545

Usage	(Counter support with screw connection) For holding the flywheel when gearbox is removed
Included in the tool or work	
Storage location	A44
Replaced by	
In connection with	
SI-Number	01 01 01 (662)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 494 034 (11 9 261)		**Holder** (Individual counter support)	
2	0 494 035 (11 9 262)		**Screw** (Bolt (thread M10) with washer) For screwing counter support	
3	0 494 129 (11 9 263)		**Bush** (Bush for counter support) For counter support, for retaining flywheel when gearbox is removed Engine: N62, N73	
6	0 495 216 (11 9 266)		**Bush** For counter support, for retaining flywheel when gearbox is removed Engine: M57TU2	
4	0 494 130 (11 9 264)		**Screw** (Bolt (thread M12)) For counter support for retaining flywheel when gearbox is removed	
5	0 494 793 (11 9 265)		**Bush**	

0 494 130 (11 9 264) Screw

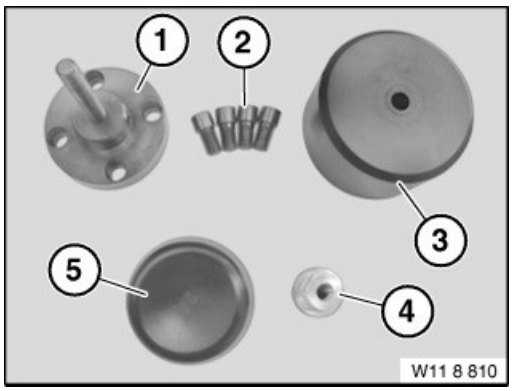


Common Used in step 3545

Usage	(Bolt (thread M12)) For counter support for retaining flywheel when gearbox is removed
Included in the tool or work	0 493 938
Storage location	A44
Replaced by	
In connection with	
SI-Number	

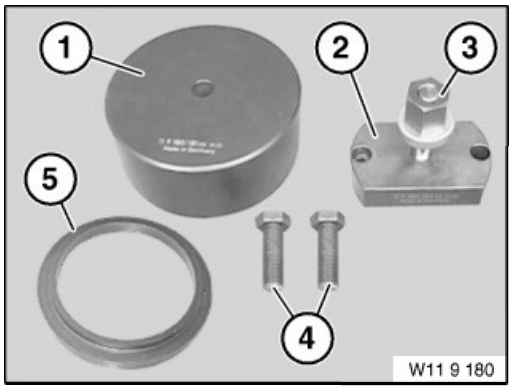
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0 496 137 (11 8 815) Holding sleeve



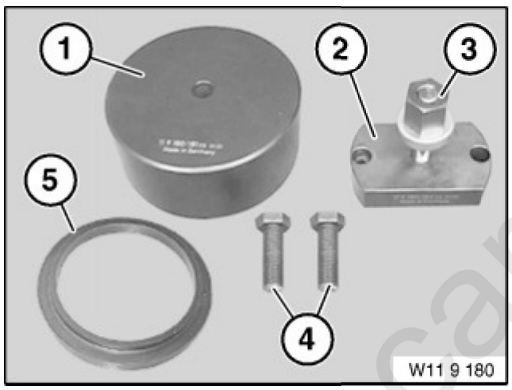
Common	Used in step 41
Usage	(Slip sleeve) Liquidation of existing inventory and then available only via complete tool set 11 8 810 = 83 30 0 496 132 - status 09.12.2011
Included in the tool or work	0 496 132
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 494 029 (11 9 182) Synchronising key



Common	Used in step 41
Usage	
Included in the tool or work	0 493 881
Storage location	C26
Replaced by	
In connection with	
SI-Number	

0 494 031 (11 9 184) Screw



Common	Used in step 41
Usage	(screws (2 x))
Included in the tool or work	0 493 881
Storage location	C26
Replaced by	
In connection with	
SI-Number	

2 360 215 Adapter



Common	Used in step 41
Usage	For installing the rear radial shaft seal. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	B56
Replaced by	
In connection with	11 9 180 = 0493881
SI-Number	01 13 14 (098)

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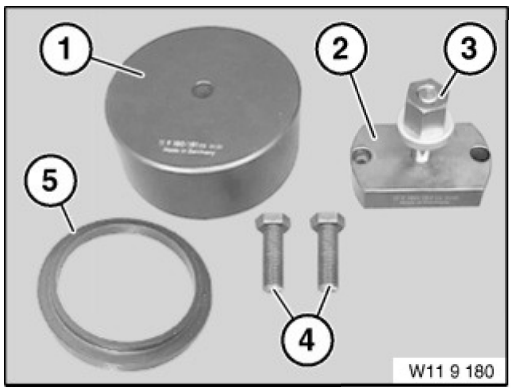
0 494 028 (11 9 181) Bush



Common Used in step 41

Usage	
Included in the tool or work	0 493 881
Storage location	C26
Replaced by	
In connection with	
SI-Number	

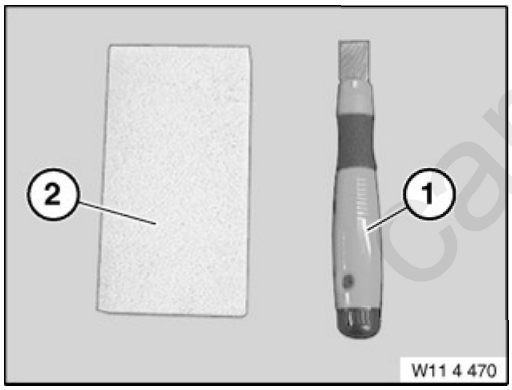
0 494 030 (11 9 183) Nut



Common Used in step 41

Usage	
Included in the tool or work	0 493 881
Storage location	C26
Replaced by	
In connection with	
SI-Number	

0 495 102 (11 4 470) Tool



Common Used in step 4142

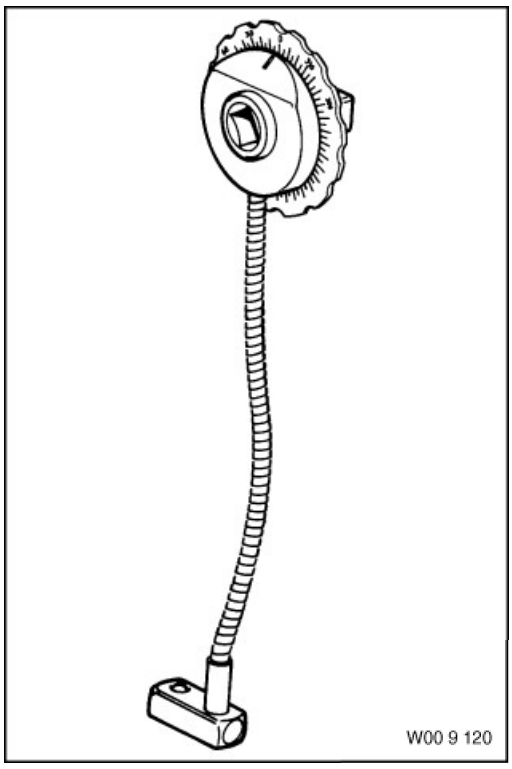
Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 103 (11 4 471)		**Scraper**	
2	0 495 104 (11 4 472)		**Extractor** (grindstone)	

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0 490 504 (00 9 120) Torque angle measuring dial

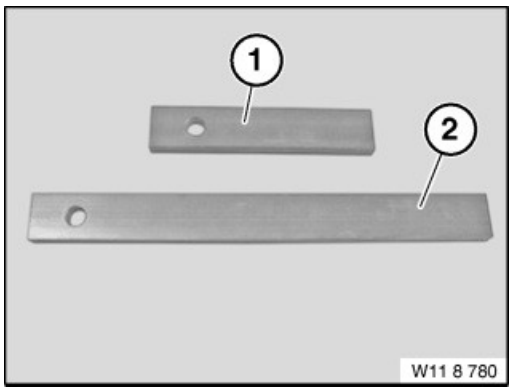


Common Used in step 4150

Usage	For torsion angle adjustment of cylinder head bolts (all engines) And reinforcement plate front axle support E46
Included in the tool or work	
Storage location	A4
Replaced by	
In connection with	
SI-Number	

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0 496 120 (11 8 780) Plate



Common

Used in step 42

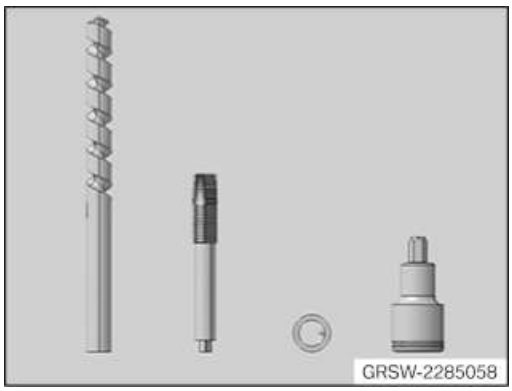
Usage	(Mounting plates) For securing transmission oil sump when gearbox is removed.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 121 (11 8 781)		**Plate** (Mounting plate, short)Discontinued; only available via set 11 8 780 = 0496120.	
2	0 496 122 (11 8 782)		**Plate** (Mounting plate, long) Discontinued; only available via set 11 8 780 = 0496120.	

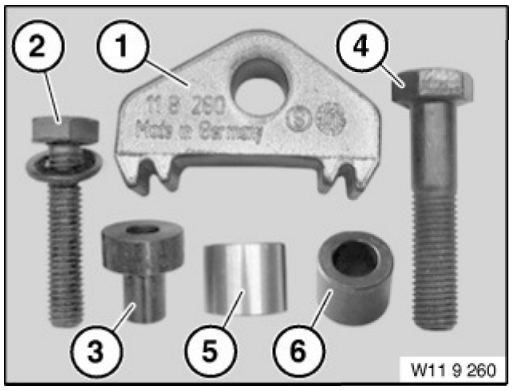
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2 285 058 Tool set



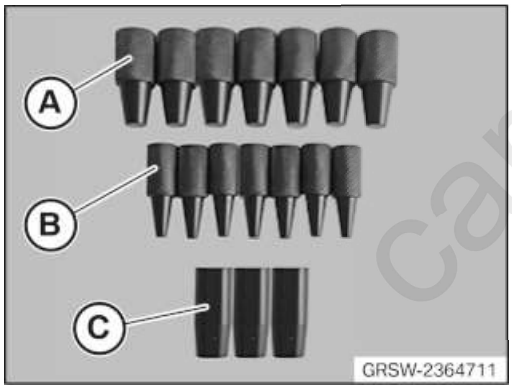
Common	Used in step 45
Usage	
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 02 14 (069)

0 494 034 (11 9 261) Holder



Common	Used in step 45
Usage	(Individual counter support)
Included in the tool or work	0 493 938
Storage location	
Replaced by	
In connection with	
SI-Number	

2 364 711 Plug



Common	Used in step 4647
Usage	For closing the pressure oil holes for cleaning the cylinder head sealing surfaces.
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	01 50 14 (203)

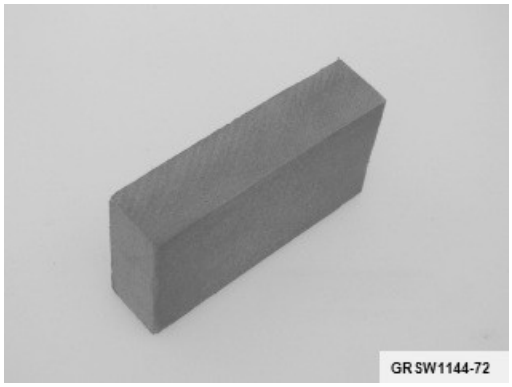
0 495 103 (11 4 471) Scraper



Common	Used in step 47
Usage	
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

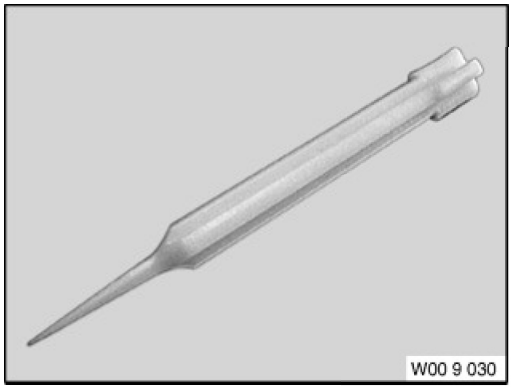
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0 495 104 (11 4 472) Extractor



Common	Used in step 47
Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 496 714 (00 9 030) Wedge



Common	Used in step 50
Usage	For dismantling O-rings, gaskets and trim panels. This special tool replaces special tool 00 9 316.
Included in the tool or work	
Storage location	A50
Replaced by	
In connection with	
SI-Number	01 20 09 (581)

2 455 654 Tensioning tool



Common	Used in step 5659
Usage	To pretension the timing chain when adjusting the timings. Contour-graphic silhouette foil is included in the delivery specification. Further information on the contour-graphic silhouette foil is included in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A58
Replaced by	
In connection with	
SI-Number	01 07 17 (487)

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2 452 959 Pliers



Common	Used in step 66
Usage	For disassembly of the PTFE sealing rings on the injector HDEV5 & HDEV6. Replaces 0495757 (SWZ number 13 0 191). Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A5
Replaced by	
In connection with	
SI-Number	01 07 17 (487)

2 448 401 Fitting aid



Common	Used in step 66
Usage	For installation of PTFE rings on injector. Contour-graphic silhouette foil is included in the delivery specification. Further information on the contour-graphic silhouette foil is included in service information 00 22 13 (969).
Included in the tool or work	
Storage location	C55
Replaced by	
In connection with	
SI-Number	01 07 17 (487)

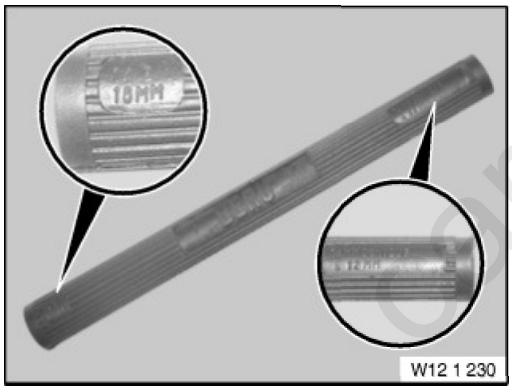
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2 358 022 Gauge



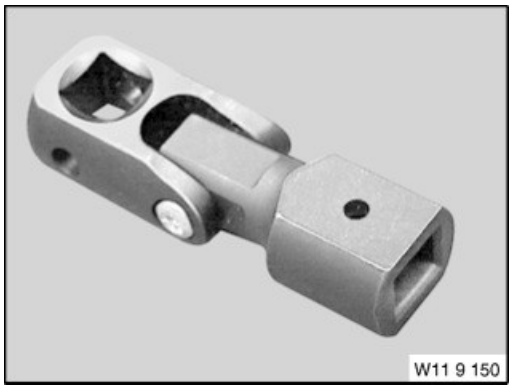
Common	Used in step 6768
Usage	To position the injector during installation. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 13 14 (098)

0 496 065 (12 1 230) Fitting aid



Common	Used in step 71
Usage	Fitting aid for spark plug installation. Original BERU ZMH 001 rubber hose 0 890 00 001.
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	01 04 07 (352)

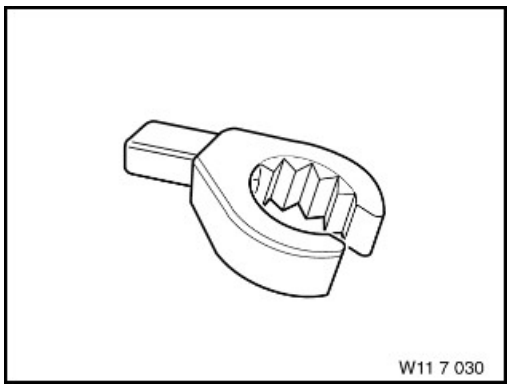
0 493 751 (11 9 150) Extension



Common	Used in step 74
Usage	(Socket wrench extension) For loosening and tightening the oxygen sensor
Included in the tool or work	
Storage location	C41
Replaced by	
In connection with	
SI-Number	01 15 00 (609)

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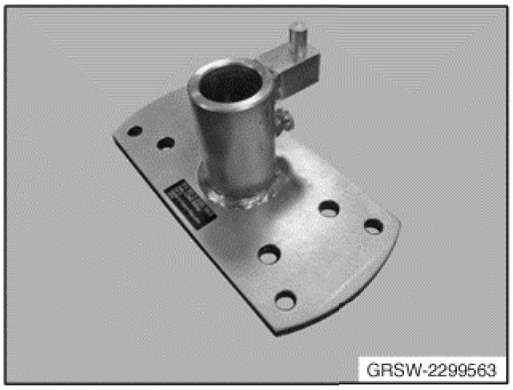
0 491 075 (11 7 030) Socket wrench insert



Common	Used in step 74
Usage	(Socket wrench insert 22 mm) For loosening and tightening the oxygen sensor
Included in the tool or work	
Storage location	A9
Replaced by	
In connection with	
SI-Number	01 06 95 (963)

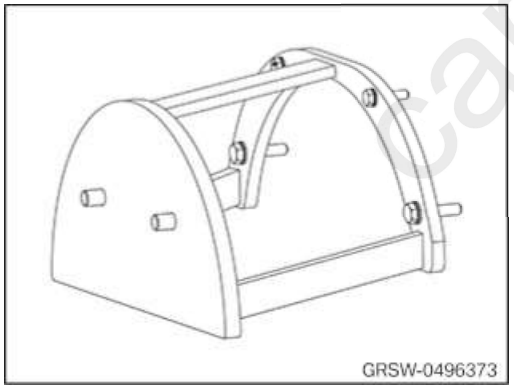
Replacement tools:

2 299 563 Adapter



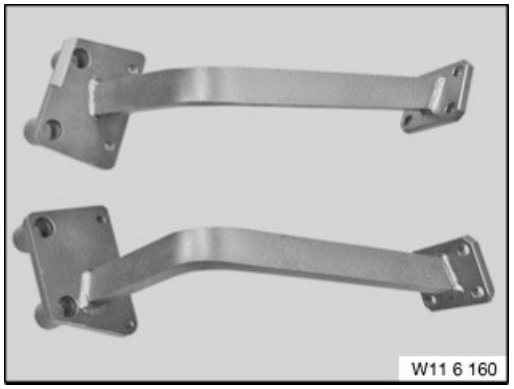
Common	Used in step 3
Usage	New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.
Included in the tool or work	0 495 187
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 373 (11 5 420) Plate



Common	Used in step 3
Usage	(Fixture) Engine S62
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	

0 496 680 (11 6 160) Support



Common	Used in step 3
Usage	For mounting N74 engine on the assembly stand. In combination with 00 2 300, 00 2 320
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	00 2 300; 00 2 320 = 0495196
SI-Number	01 31 09 (604)

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Overview Technical Data

Height of the sealing bead	Used in step 4142
	2,0 mm ... 2,5 mm

Engine oil B58B30M1/B58B30O1	Used in step 80
Filling capacity, engine oil change with oil filter element	6,50 l
Engine oil: Technically suitable engine oils for BMW Group engines	

Screw-in depth of thread cutter	Used in step 45
Screw-in depth	18 mm

Links

General repair instructions	**Used in step**
11 00 ... Overview of consumables (Electronic Parts Catalogue)	41427475

Repair instructions	**Used in step**
31 10 001 Completely removing and installing front axle with engine and transmission	184
31 10 001 Completely removing and installing front axle with engine and transmission	184
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31 10 001 Completely remove and install front axle with engine and transmission (FRU specification without wheel alignment)	184
11 00 050 Remove and install engine	184
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31 10 001 Completely removing and installing front axle with engine and transmission	184
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11 00 598 Removing and installing engine on front axle (for part no. 31 10 001/501)	283
11 00 598 Removing and installing engine on front axle (for part no. 31 10 001/501)	283
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11 00 598 Removing and installing engine on front axle (for part no. 31 10 001/501)	283
11 00 598 Removing and installing engine on front axle (for part no. 31 10 001/501)	283
11 00 598 Removing and installing engine on front axle (for part no. 31 10 001/501)	283
61 35 ... Notes on ESD protection (Electro Static Discharge)	142022
13 53 ... Clean the cylinder heads in the area of injectors to prevent sand/dust contamination.	1819
61 35 ... Notes on ESD protection (Electro Static Discharge)	20
17 11 035 Removing and installing/replacing fan cowl with electric fan	70
31 10 001 Completely removing and installing front axle with engine and transmission	84
31 10 001 Completely removing and installing front axle with engine and transmission	84
31 10 001 Completely removing and installing front axle with engine and transmission	84
31 10 001 Completely removing and installing front axle with engine and transmission	84

Operating materials	**Used in step**
3.0 Technically appropriate engine oils for BMW Group engines	80

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11 14 005 Replacing front crankshaft seal

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

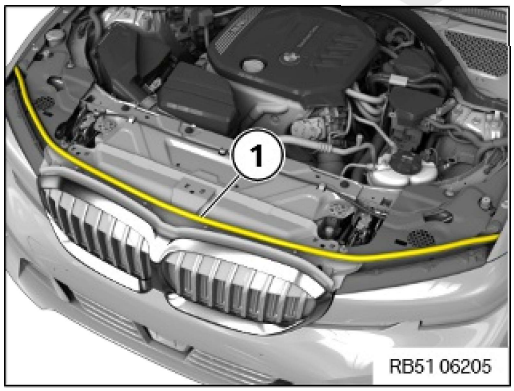
PRELIMINARY WORK

1 – Disconnecting all battery earth leads



- See additional information.

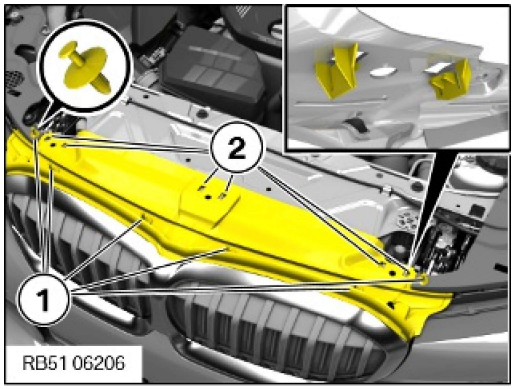
2 – Remove the seal for the bonnet in front



- Pull off front bonnet seal (1) upwards.

3 – Removing the centre engine compartment cover

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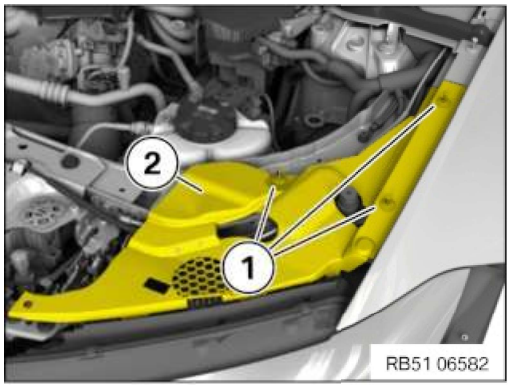
- Detach all expanding rivets (1).
- Release the cover of the centre engine compartment with the latch mechanisms (2) .
- Feed the cover for the centre engine compartment out to the rear.

4 – Partially remove the top left and right cover in the engine compartment

NOTICE

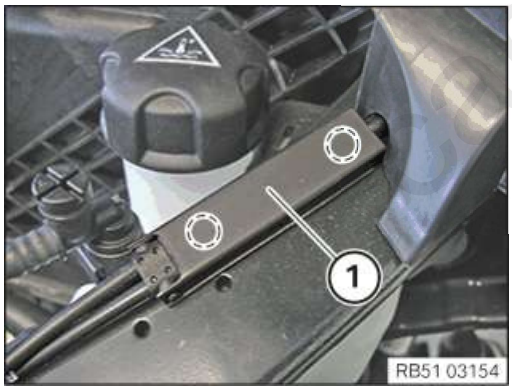
Description is for left component only. Procedure on the right side is identical.

▸ **Removing the cover in the engine compartment on top partially**

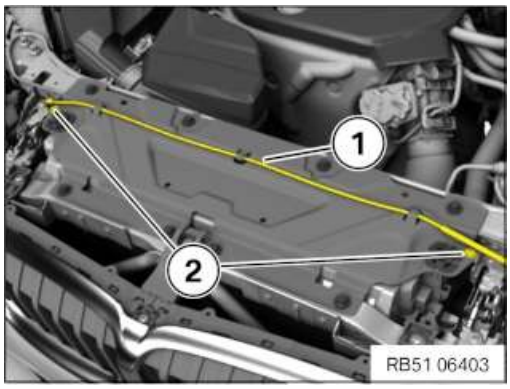


- Loosen the expanding rivet (1).
- Remove the cover in the engine compartment on top (2) partially.

5 – Removing the top cross connection

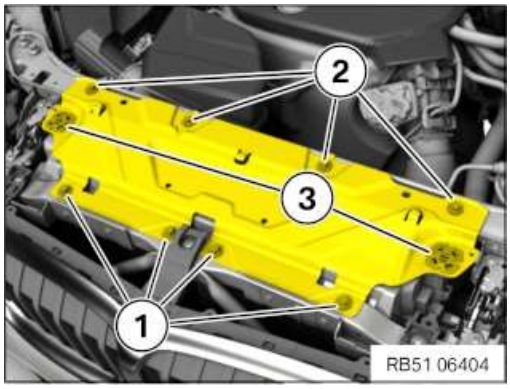


- Release the housing for the coupling of the Bowden cables (1) from the body.



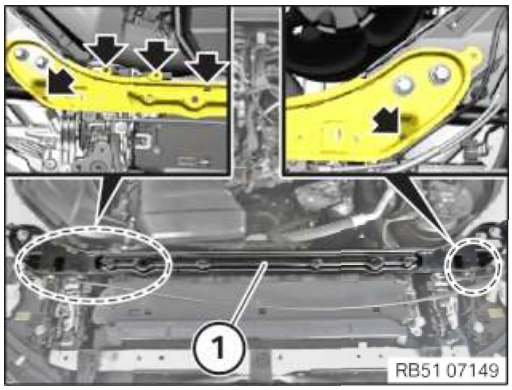
- Detach Bowden cable (1) at the top cross connection.
- Loosen screws (2).

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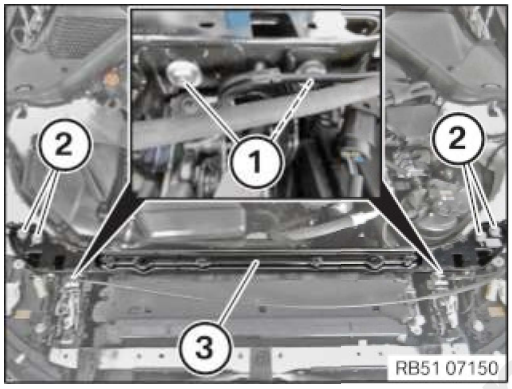


- Loosen screws (1) and (2).
- Remove the top cross connection with the holders(3) towards the top.

6 – Remove the rear top cross connection



- Release the clips (arrows) in the marked areas from the top rear cross connection (1).

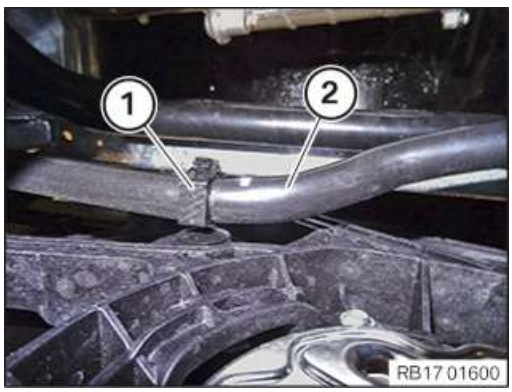


- Loosen screws (1).
- Loosen screws (2).
- Guide out and remove top rear cross connection (3).

7 – Remove fan cowl.

TECHNICAL INFORMATION

- When the engine is stopped after the end of the journey, it may be necessary to run the electric fan. In rare cases, operation of the electric fan can last up to 11 min. This protects the components. In this case, replacing the electric fan will not remedy the problem!

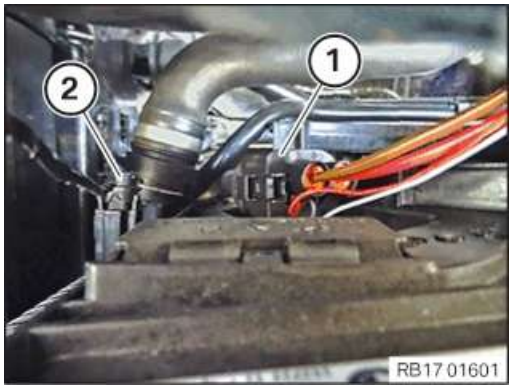


- **If installed:** Release transmission oil line (2).

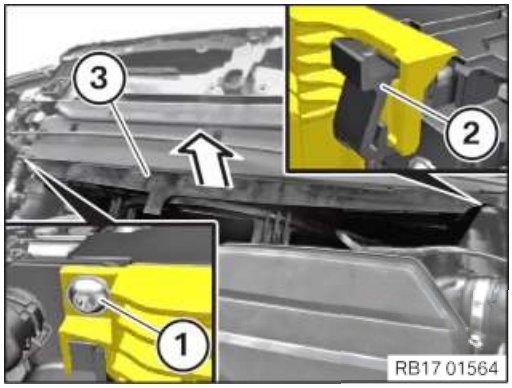
  Unlock the holder (1).

  Thread out transmission oil line (2) and set aside.

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- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.



- Loosen screw (1).
- Unlock lock (2).
- Guide out and remove fan cowl (3) **carefully** in the direction of the arrow.

8 – Removing the drive belt for alternator

CAUTION

Spring preload.

Danger of injury!

- The use of the specified special tool (tool) is mandatory.
- The described operation must be carried out properly.

CAUTION

Component with preload.

Danger of injury!

- Reduce preload as far as possible before disassembly. Relieve component.

TECHNICAL INFORMATION

If the drive belt is reused: Mark direction of travel and reinstall drive belt in same direction of travel.

TECHNICAL INFORMATION

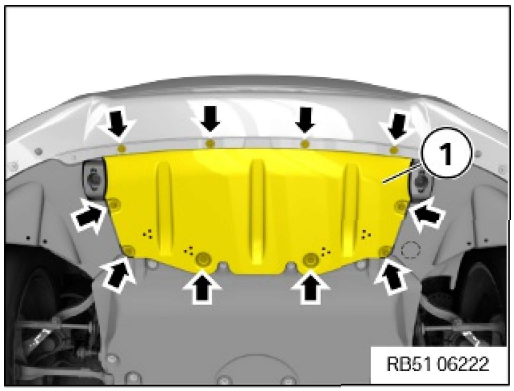
The drive belt must be replaced if contaminated with coolant- and oil residues.

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- Increase the preload on the belt tensioner in **the direction of the arrow** using standard tools (1).
- Secure the belt tensioner with the special tool 0 496 268 (11 0 390).
- Guide out the drive belt for the alternator (2) and remove it.

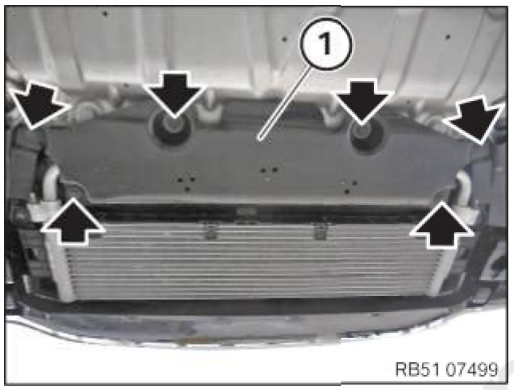
9 – Removing the front underbody protection



- **Version 1:**

  Remove screws (arrows).

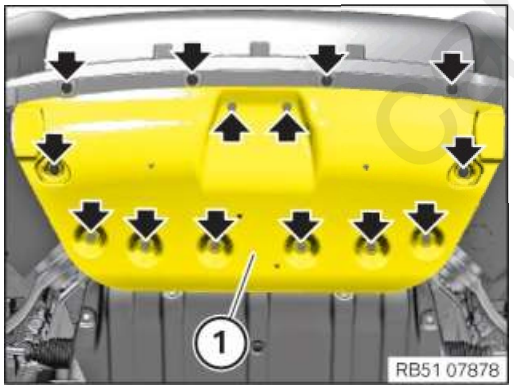
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version 2:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.



- **Version 3:**

  Remove screws (arrows).

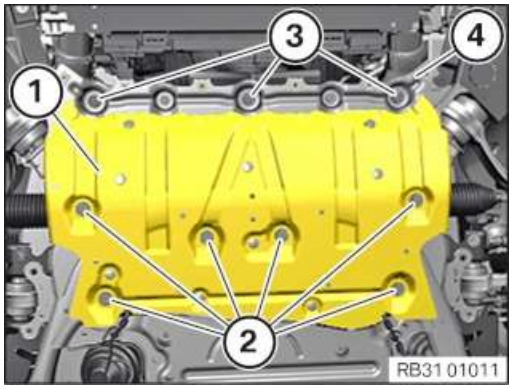
  Guide out front underbody protection (1) and remove it.

10 – Removing the stiffening plate

TECHNICAL INFORMATION

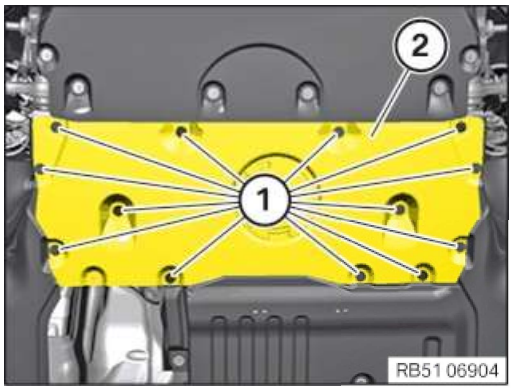
Driving without stiffening plate is not permissible.

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- Loosen screws (3).
- Remove the holder of the underride protection (4).
- Loosen screws (2).
- Remove stiffening plate (1).

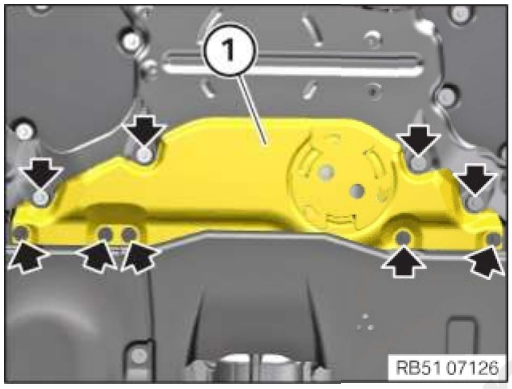
11 – Removing the centre underbody protection



- **Version with rear-wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

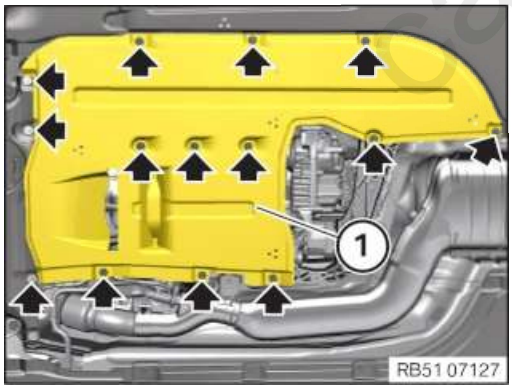


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

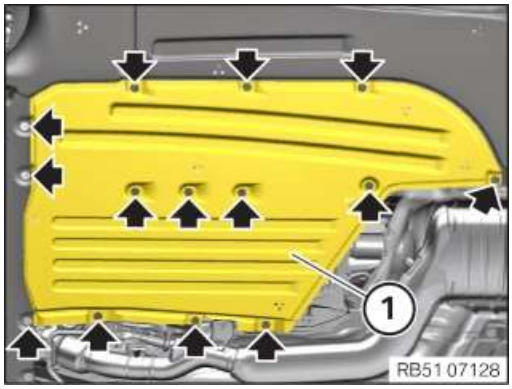
12 – Remove rear underbody protection



- **Version 1:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version 2:**

  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

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13 – Removing starter motor

WARNING

Hot surfaces.

Risk of burning!

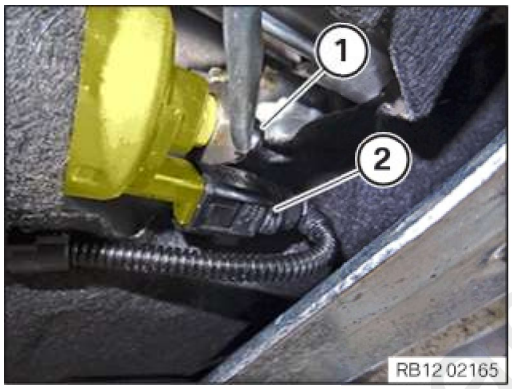
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

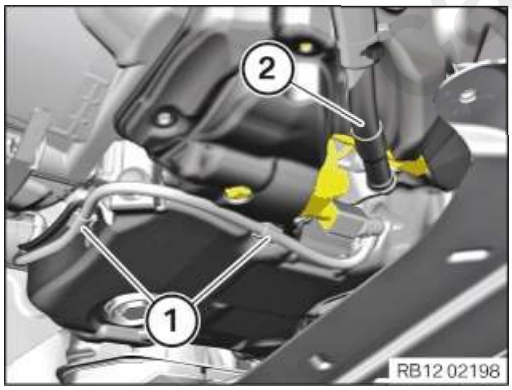
Electrostatic discharge.

Damage to or destruction of electrical components.

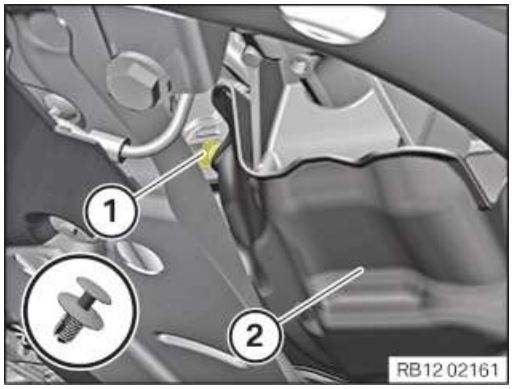
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.



- Loosen nut (1).
- Unlock plug connection (2) and disconnect.

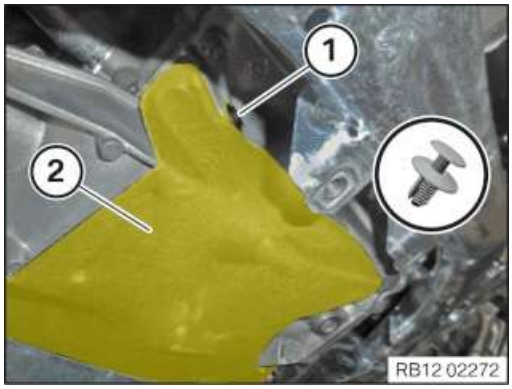


- Loosen clamps (1).
- Feed out positive battery cable (2) and put to one side.

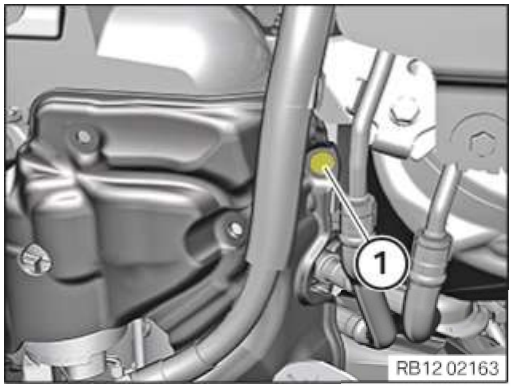


- Release the expanding rivet (1) for the acoustic cover (2) for oil sump.

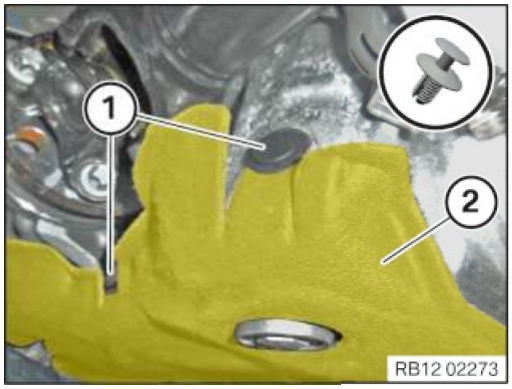
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- Loosen expanding rivet (1).



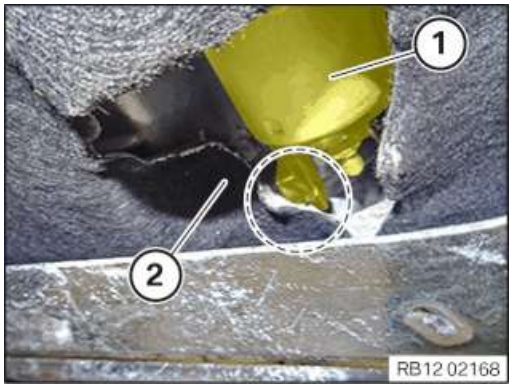
- Undo fir tree clip (1).



- Loosen the expanding rivet (1).
- Release acoustic cover (2) for the oil sump and store it below.



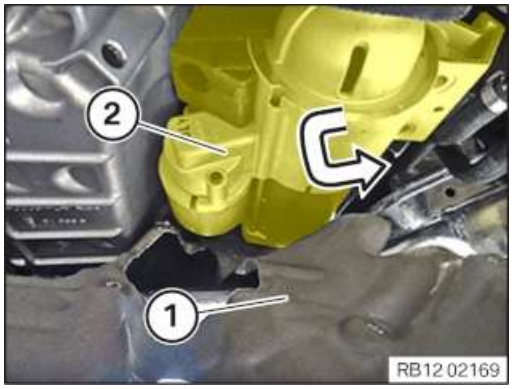
- Loosen screws (1).



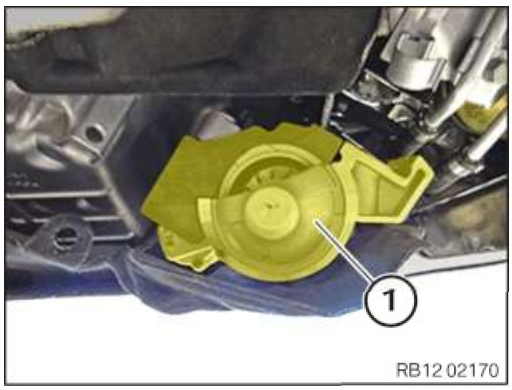
- Position the starter (1) **carefully** in the marked area above the acoustic cover (2) as shown.

  An evaluation cannot be performed without positioning the starter.

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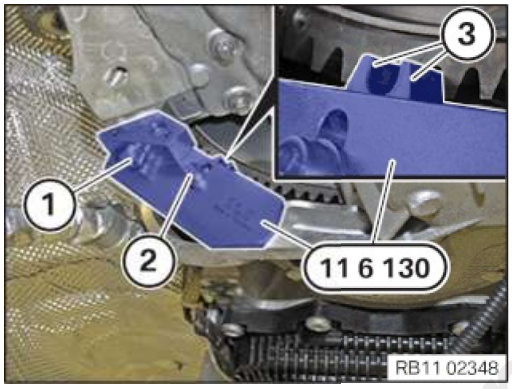


- Make sure that the acoustic cover (1) **is not damaged.**
- Carefully fold the acoustic cover (1) down.
- Feed out the starter (2) **carefully** in the direction of arrow to the rear and below.

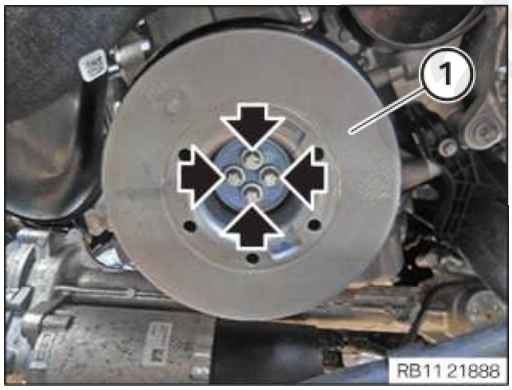


- Remove starter motor (1).

14 – Removing the vibration damper



- Position special tool 0 496 595 (11 6 130) and fasten with screw (1).
- Slide counter support on the bolt (2) in direction of flywheel and turn the engine on the vibration damper until the gearing (3) engages in the flywheel.
- Tighten the bolt (2).



- Remove screws (arrows).
- Pull vibration damper (1) out upwards and remove.

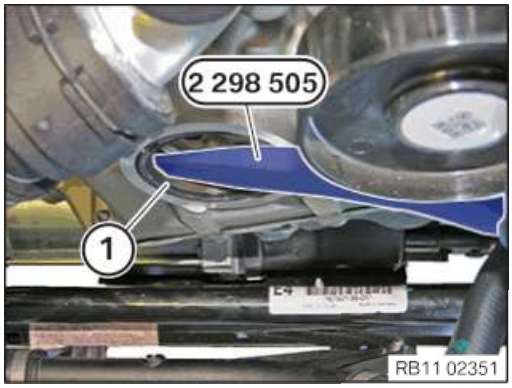
MAIN WORK

15 – Renewing the front crankshaft seal

▸ **Removing the front crankshaft seal**

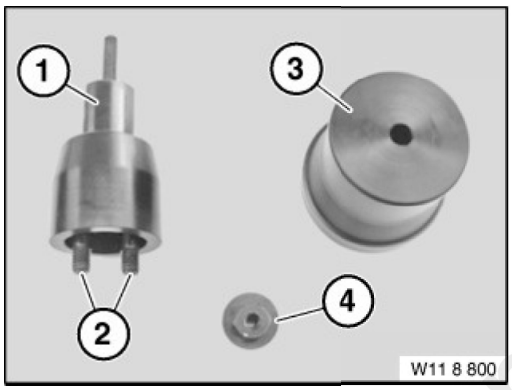


- Drive in the crankshaft seal (1) in the marked area with a punch to approx. 1 cm deep.



- Lever out the crankshaft seal (1) with the special tool 2 298 505.
- Make sure that the sealing surface on the crankcase is **not** scratched.

▸ **Installing the front crankshaft seal**

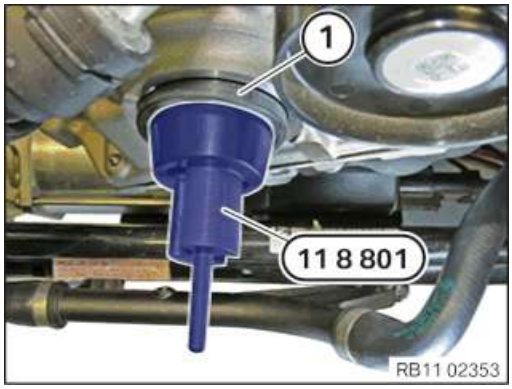


- Prepare special tool 0 496 130 (11 8 803).



- Clean the special tool 0 496 128 (11 8 801) from the set of special tools 0 496 127 (11 8 800) and coat it with fresh engine oil.
- Secure special tool 0 496 128 (11 8 801) using special tool 0 496 129 (11 8 802) from the set of special tools 0 496 127 (11 8 800) to the crankshaft.

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RISK OF DAMAGE

Radial shaft seal damage.

Touching the sealing lip (inner) and applying oil to the radial shaft seal will lead to its destruction.

- Do not touch the sealing lip (inner) of the radial shaft seal.
- Do not apply oil to the radial shaft seal.
- Install the radial shaft seal dry.

- Carefully slide crankshaft sealing ring (1) straight **in a rotational movement** onto special tool 0 496 128 (11 8 801) from the set of special tools 0 496 127 (11 8 800) until the crankshaft sealing ring (1) rests against the crankcase.



- Mount special tool 0 496 130 (11 8 803) on special tool 0 496 128 (11 8 801) from the set of special tools0 496 127 (11 8 800) in the direction of the arrow.



- Screw in special tool (sleeve) 0 496 130 (11 8 803) using special tool 0 496 131 (11 8 804) from the set of special tools 0 496 127 (11 8 800) and a suitable tool until the sleeve rests flush against crankcase (1).



- Release and remove special tool 0 496 131 (11 8 804).

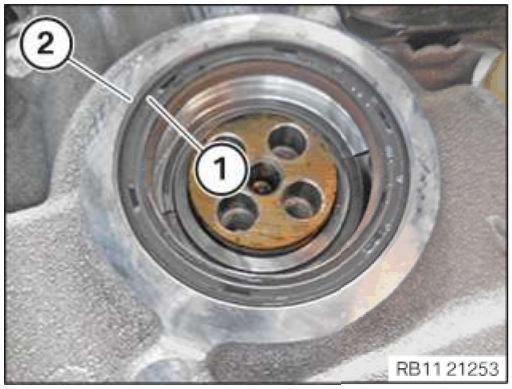
mdiag.com



- Guide out and remove special tool 0 496 130 (11 8 803) in the direction of the arrow from special tool 0 496 128 (11 8 801) from the set of special tools 0 496 127 (11 8 800).



- Release special tool 0 496 129 (11 8 802).
- Guide out and remove special tool 0 496 128 (11 8 801) I 0 496 129 (11 8 802) on the crankshaft.



- Ensure that crankshaft sealing ring (1) is fitted correctly on crankcase (2).

POSTPROCESSES

16 – Installing the vibration damper

RISK OF DAMAGE

Radial shaft seal damage.

When installing the vibration damper, the rotary shaft seal can be damaged.

- The special tool must be used to install the vibration damper.

TECHNICAL INFORMATION

When removing and installing or replacing the vibration damper, the rotary shaft seal must be replaced.

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- Clean the sealing surface (1) from oil and contamination.



- Screw special tool 2 466 729 into the crankshaft by hand.

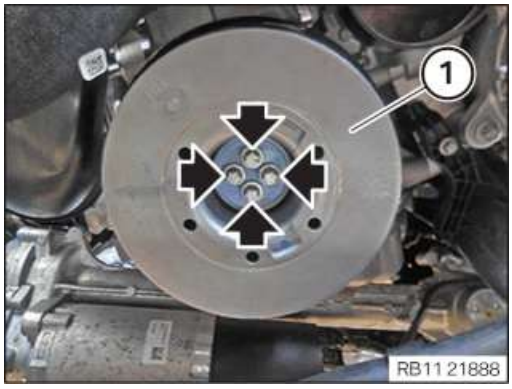


- Insert vibration damper (1) into the special tool 2 466 729 and install.



- Replace screws (arrows).

  Parts: Bolts
- Hand-tighten the bolt (1).
- Guide the special tool 2 466 729 out and remove.

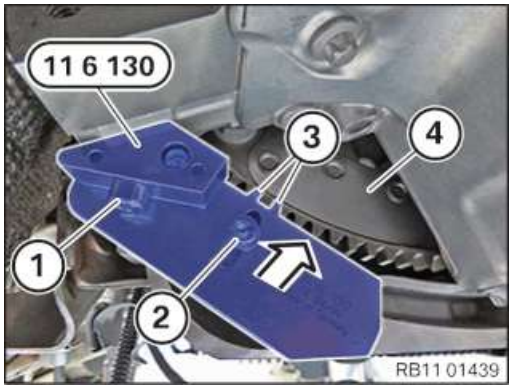


- Tighten screws (arrows).

Vibration damper to crankshaft

M10 x 65	Renew screws.	Jointing torque	40 Nm
		Angle of rotation	120 °

rdiagn.com



- Loosen screw (2).
- Slide the counter support with the bolt (2) down until the teeth (3) are no longer engaged in the gearing of the flywheel (4).
- Release the screw (1) and feed out and remove special tool 0 496 595 (11 6 130).

17 – Installing the drive belt for alternator

Overview of drive belt for alternator



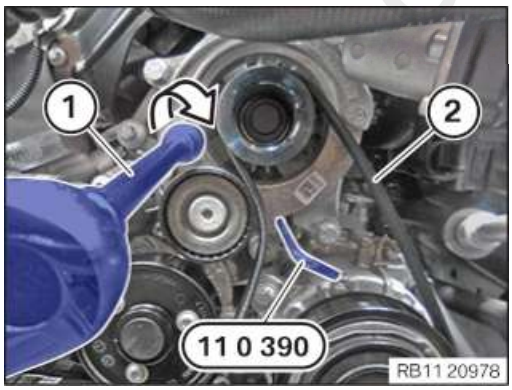
1. Drive belt for alternator

TECHNICAL INFORMATION

If the drive belt is reused: Mark direction of travel and reinstall drive belt in same direction of travel.

TECHNICAL INFORMATION

The drive belt must be replaced if contaminated with coolant- and oil residues.



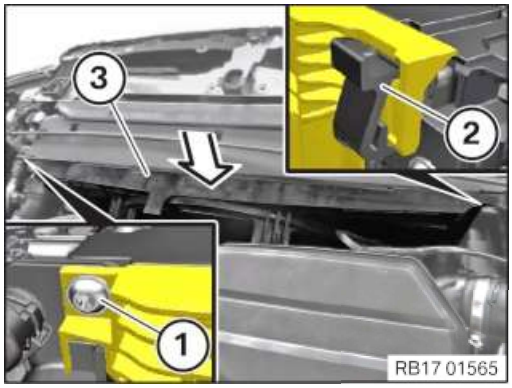
- Position the drive belt for alternator (2) on the ancillary components.
- Increase the preload on the belt tensioner in **the direction of the arrow** using standard tools (1).
- Feed the special tool 0 496 268 (11 0 390) out of the belt tensioner and remove it.

18 – Install fan cowl

cardiagn.com



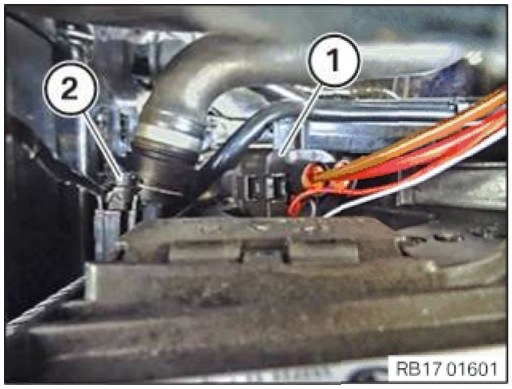
- Feed guides (1) into the radiator.
- Feed guides (2) into the charge air cooler.



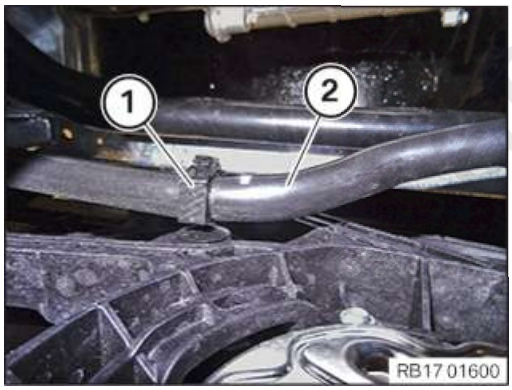
- Guide in and install fan cowl (3) **carefully** in the direction of the arrow.
- Ensure that the lock (2)engages audibly.
- Tighten down screw (1).

Fan cowl with electric fan on radiator

TS6x20		Tightening torque	6,5 Nm



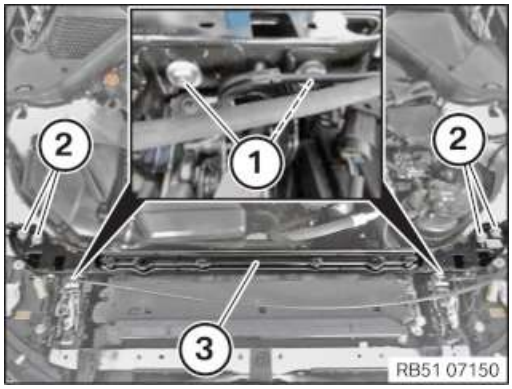
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.



- **If installed:** Secure the transmission oil line (2).
  Insert and install the transmission oil line (2).
  Lock holder (1).

19 – Install the rear top cross connection

rdiagn.com



- Guide in and position the top rear cross connection (3).
- Tighten the screws (1).

Top rear cross connection to bonnet catch support

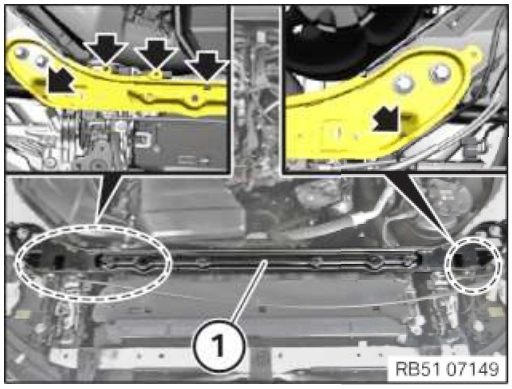
Flat-head screw M6x20		Tightening torque	11,8 Nm

- Renew screws (2).

  Parts: Bolts
- Tighten the screws (2).

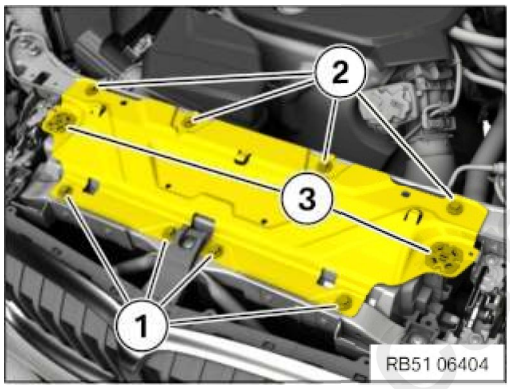
Rear top cross connection to wheel arch carrier support

M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °



- Secure the clips (arrows) in the marked areas to the top rear cross connection (1).

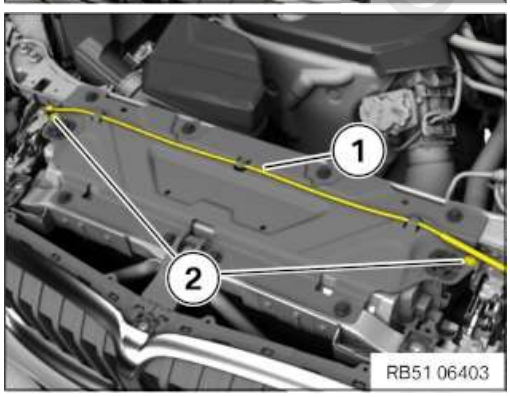
20 – Installing the top cross connection



- Set and position upper cross connection with holders (3) from above.
- Tighten down screws (1) and (2).

Cross connection, top

M8x20		Tightening torque	28 Nm



- Tighten down screws (2).

Cross connection, top

M6x20		Tightening torque	11,8 Nm

- Attach Bowden cable (1) on the upper cross connection.

autodiagn.com



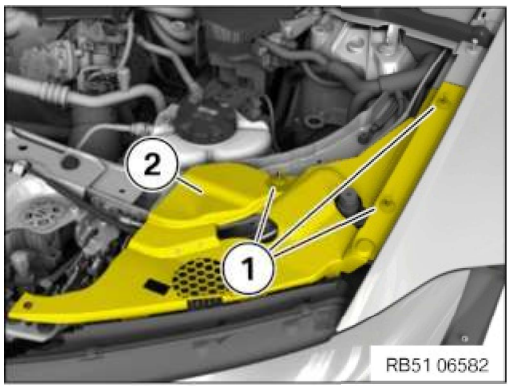
- Clip in the housing for the coupling of the Bowden cables (1).

21 – Install the cover in the engine compartment at top left and right partially

NOTICE

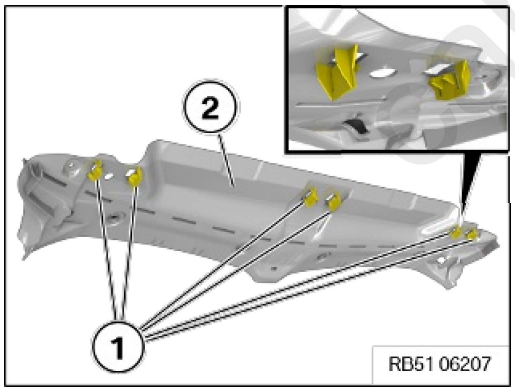
Description is for left component only. Procedure on the right side is identical.

▸ **Installing the cover in the engine compartment on top partially**



- Install the cover in the engine compartment on top (2).
- Secure expanding rivet (1).

22 – Installing cover for engine compartment centre



Check

- Check latch mechanisms (1) of cover for engine compartment centre (2) for damage.

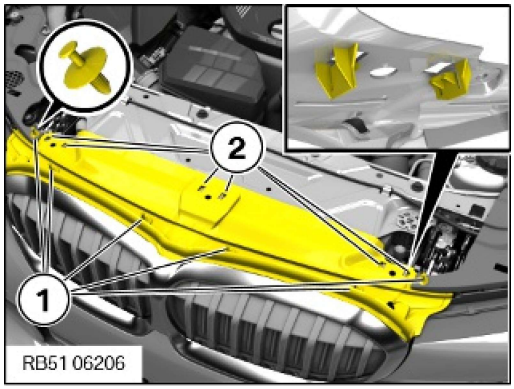
Result

» The latch mechanism (1) is damaged.

Measure

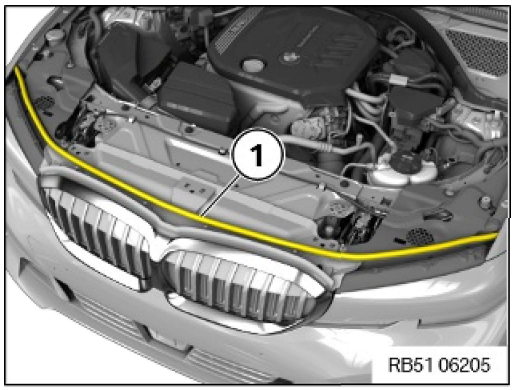
- Renew cover for engine compartment centre (2).

carldiagn.com



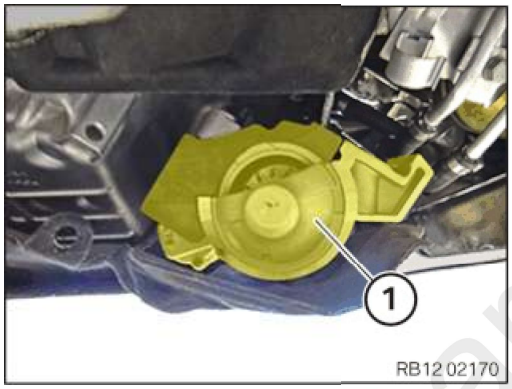
- Guide in the cover for the engine compartment centre from the rear and position it.
- Clip in the cover for the engine compartment centre with latch mechanisms (2).
- Mount all expanding rivets (1).

23 – Install the seal for the front bonnet

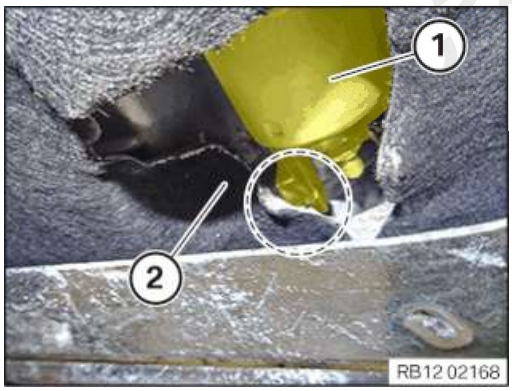


- Position the bonnet seal(1) and connect it on the mounting on the bumper and on the headlights.

24 – Installing starter motor

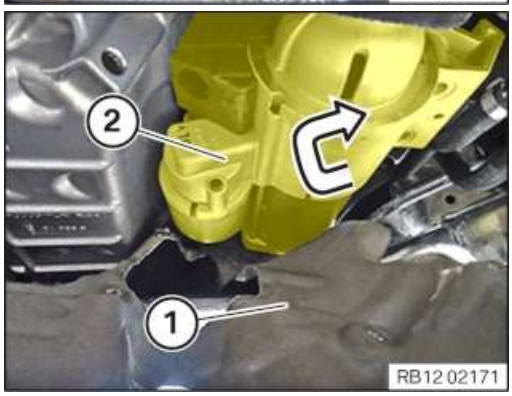


- Guide in the starter motor (1).



- Position the starter motor (1) carefully in the marked area over the acoustic cover (2) as shown.

  An installation cannot be performed without positioning the starter motor.



- Make sure that the acoustic cover (1) **is not damaged.**
- Fold the acoustic cover (1) **carefully** downwards.
- Install and position the starter motor (2) in direction of arrow.

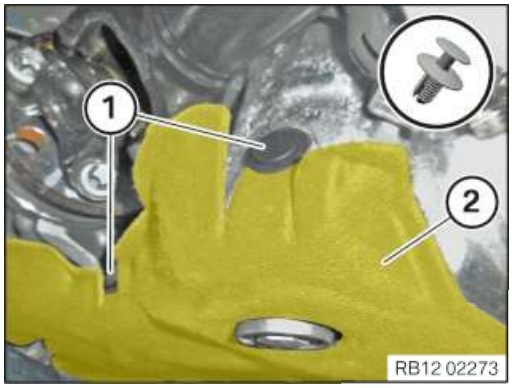
ardiagn.com



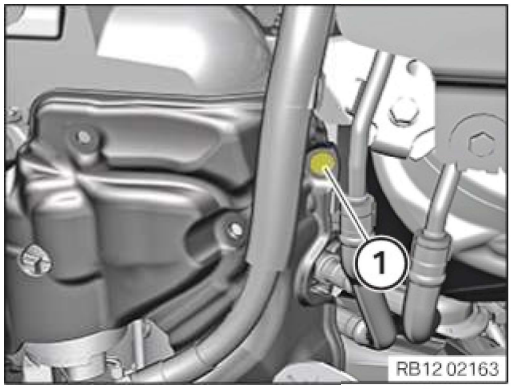
- Tighten the screws (1).

Starter motor to engine

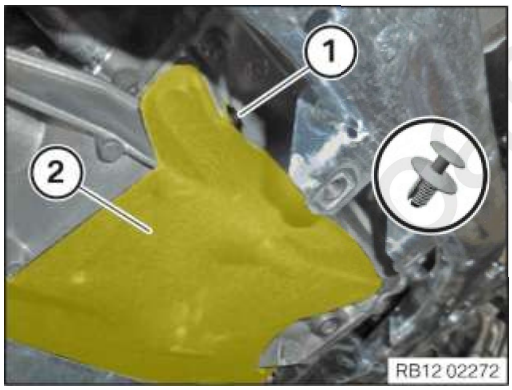
M8X60		Tightening torque	19 Nm



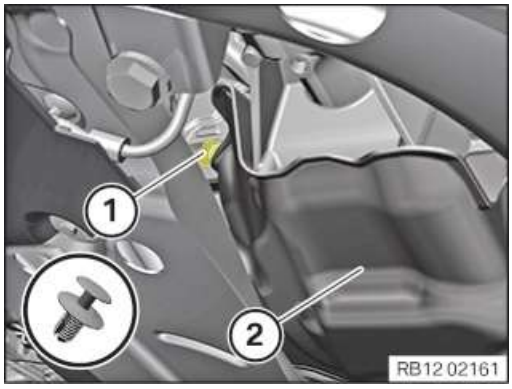
- Position the acoustic cover (2).
- Secure expanding rivet (1).



- Secure fir tree clip (1).

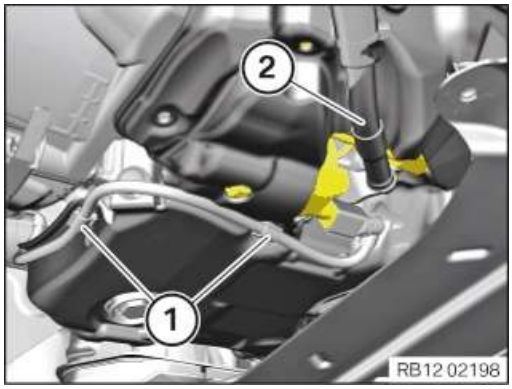


- Fasten expanding rivet (1).

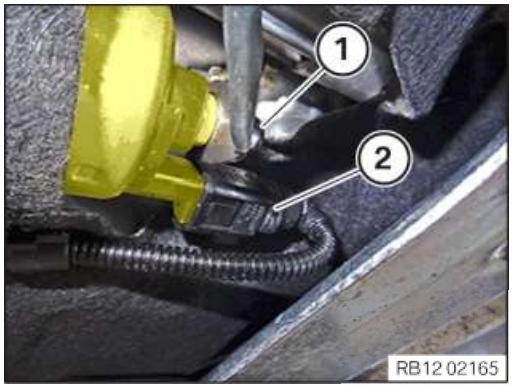


- Fasten expanding rivet (1).

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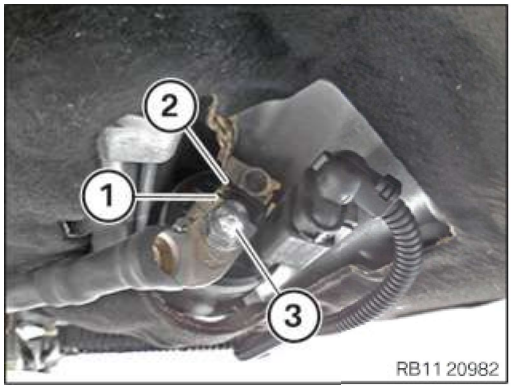


- Insert and position the positive battery cable (2).
- Secure clamps (1).



- Connect connectors (2) and lock.

  The connector (2) must engage audibly.
- Tighten the nut (1) hand-tight.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

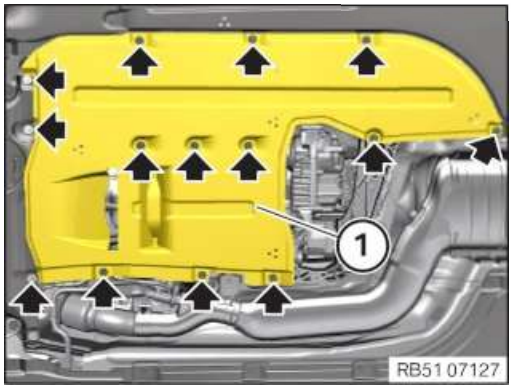
- Route the positive battery cable without abrasions and do not trap.

- Attach positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

25 – Installing underbody protection at rear



- **Version 1:**

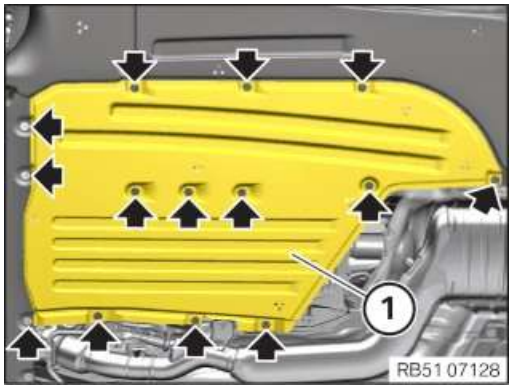
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

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- **Version 2:**

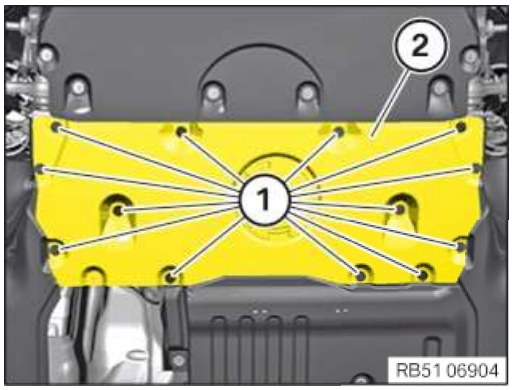
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

26 – Installing the centre underbody protection



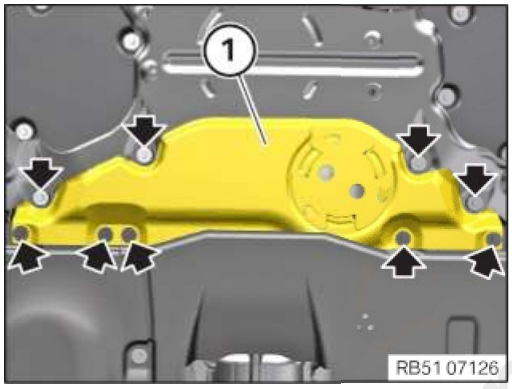
- **Version with rear-wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

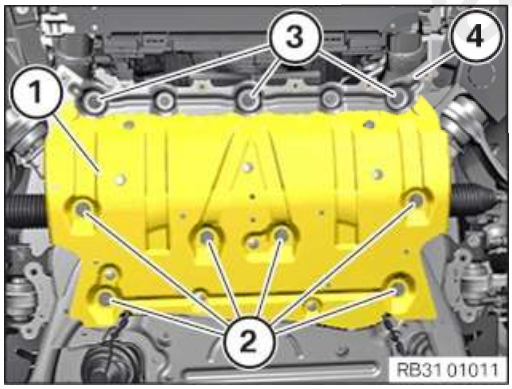
  Guide in and install the centre of underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

27 – Installing the stiffening plate

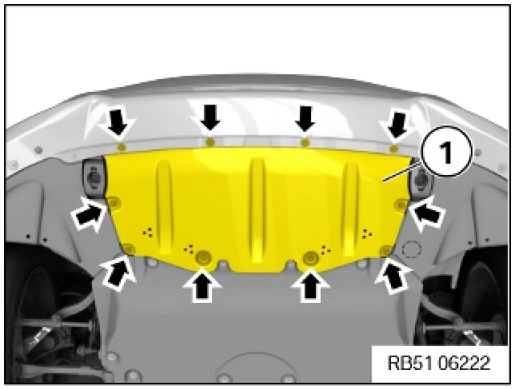


- Position stiffening plate (1).
- Screw screws (2) in.
- Position holder of underride protection (4).
- Screw screws (3) in.
- Tighten down screws (2) and (3).

Stiffening plate to front axle support

M10		Tightening torque	56 Nm

28 – Installing the front underbody protection



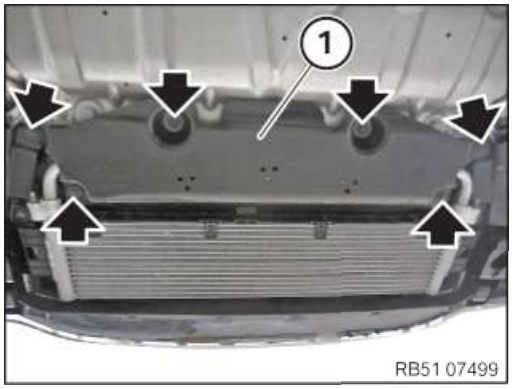
- **Version 1:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



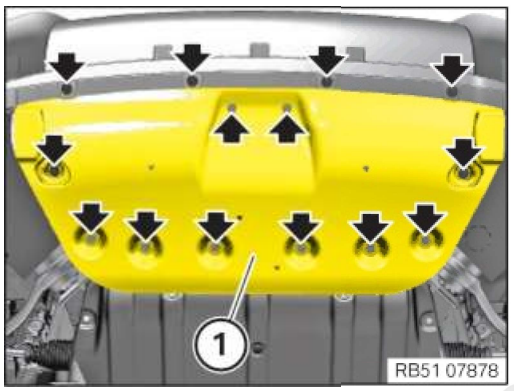
- **Version 2:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version 3:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

29 – Disconnecting all battery earth leads



- See additional information.

30 – Check engine oil level

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- Park vehicle on a horizontal surface.
- In the case of automatic transmission, shift to selector lever position N or P.
- Accelerator pedal is not pressed.
- Engine is running and is at operating temperature.
- Read off the engine oil level in the instrument cluster (KOMBI) or on the control display.
- Top up engine oil if necessary.

Additional Information

Overview of Tightening Torques

Vibration damper to crankshaft — Used in step 16

M10 x 65	Renew screws.	Jointing torque	40 Nm
		Angle of rotation	120 °

Fan cowl with electric fan on radiator — Used in step 18

TS6x20		Tightening torque	6,5 Nm

Top rear cross connection to bonnet catch support — Used in step 19

Flat-head screw M6x20		Tightening torque	11,8 Nm

Rear top cross connection to wheel arch carrier support — Used in step 19

M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °

Cross connection, top — Used in step 20

M8x20		Tightening torque	28 Nm

Cross connection, top — Used in step 20

M6x20		Tightening torque	11,8 Nm

Starter motor to engine — Used in step 24

M8X60		Tightening torque	19 Nm

Battery positive lead to starter — Used in step 24

M8		Tightening torque	13,5 Nm

Underbody protection — Used in step 2526

Hexagon screw		Tightening torque	3 Nm

Stiffening plate to front axle support — Used in step 27

M10		Tightening torque	56 Nm

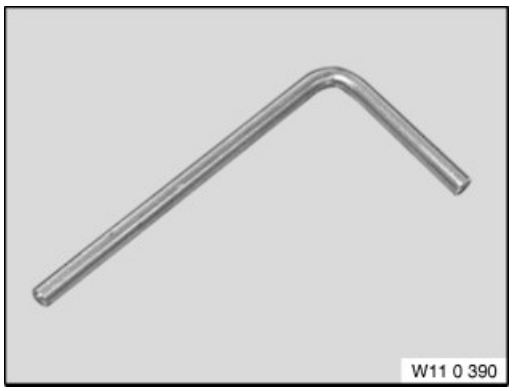
Underbody protection front — Used in step 28

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Overview of Special Tools

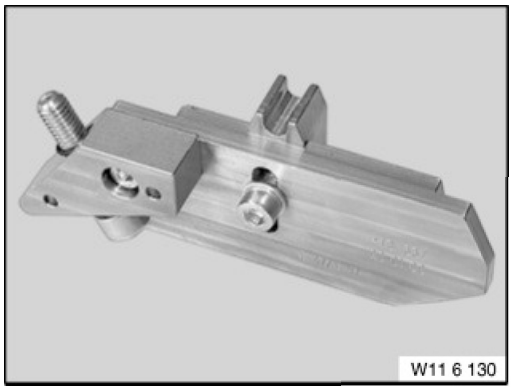
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0 496 268 (11 0 390) Pin



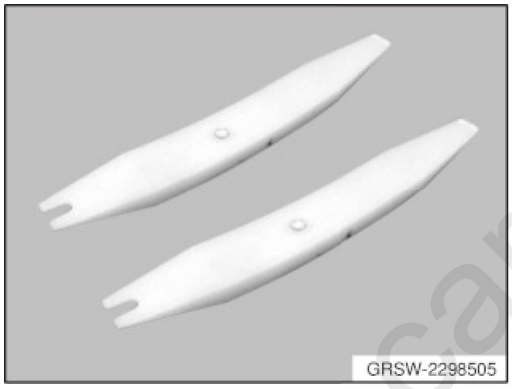
Common	Used in step 817
Usage	(roll pin) For securing new tensioning pulley (poly-V belt)
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 15 07 (390)

0 496 595 (11 6 130) Holder



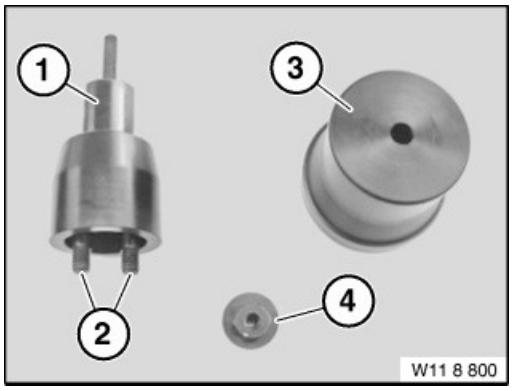
Common	Used in step 1416
Usage	(counter support) For securing flywheel when releasing and tightening down screw connection of vibration absorber. Series: E90, E91, E92 with 4WD.
Included in the tool or work	
Storage location	B26
Replaced by	
In connection with	
SI-Number	01 05 09 (519)

2 298 505 Wedge



Common	Used in step 15
Usage	Set (delivery of 2 pieces)
Included in the tool or work	
Storage location	C34
Replaced by	
In connection with	
SI-Number	01 03 12 (792)

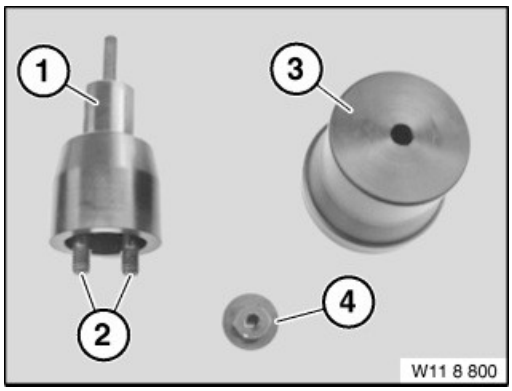
0 496 130 (11 8 803) Holding sleeve



Common	Used in step 15
Usage	(Thrust piece) sale of existing inventory and then available as part of complete tool set 11 8 800 = 83 30 0 496 127 only - as of 30.11.2011
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

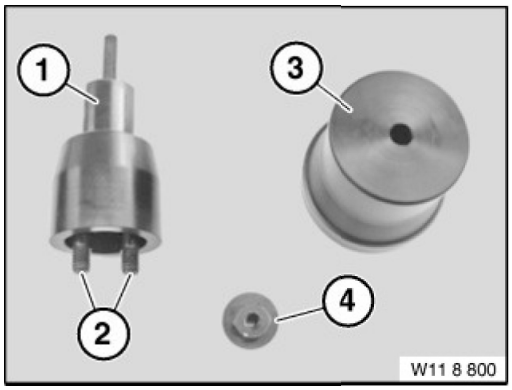
cardiagn.com

0 496 128 (11 8 801) Basic body



Common	Used in step 15
Usage	Available only as a complete tool set 11 8 800 = 83 30 0 496 127 - as of 30.11.2011
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 496 127 (11 8 800) Device



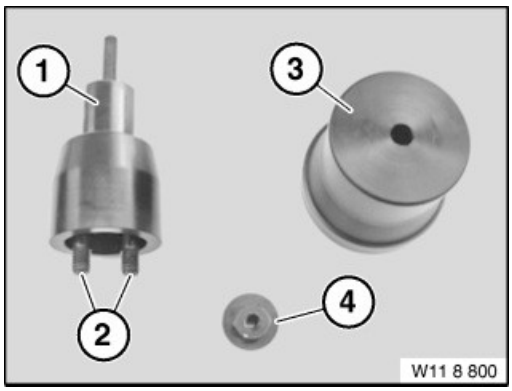
Common	Used in step 15
Usage	(Pulling device) For installing front radial shaft seal.
Included in the tool or work	
Storage location	B23
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
3	0 496 130 (11 8 803)		**Holding sleeve** (Thrust piece) sale of existing inventory and then available as part of complete tool set 11 8 800 = 83 30 0 496 127 only - as of 30.11.2011	
1	0 496 128 (11 8 801)		**Basic body** Available only as a complete tool set 11 8 800 = 83 30 0 496 127 - as of 30.11.2011	
2	0 496 129 (11 8 802)		**Screw** (Set of screws) Can only be ordered as part of complete tool 11 9 660 = 0495955	
4	0 496 131 (11 8 804)		**Nut** (Nut with collar) available as part of set of tools 11 8 800 = 83 30 0 496 127 only - as of 30.11.2011	

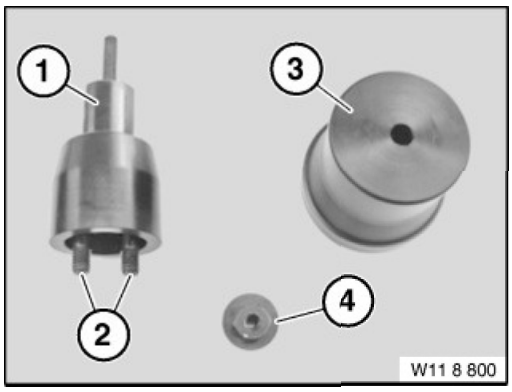
cardiagn.com

0 496 129 (11 8 802) Screw



Common	Used in step 15
Usage	(Set of screws) Can only be ordered as part of complete tool 11 9 660 = 0495955
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 496 131 (11 8 804) Nut



Common	Used in step 15
Usage	(Nut with collar) available as part of set of tools 11 8 800 = 83 30 0 496 127 only - as of 30.11.2011
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 466 729 Fitting aid



Common	Used in step 16
Usage	For the installation of the vibration damper. Engine: B48, B58. Contour-graphic silhouette foil is included in the delivery specification.
Included in the tool or work	
Storage location	B55
Replaced by	
In connection with	
SI-Number	01 07 18 (545)

Overview Technical Data

Links

Repair instructions	Used in step
61 20 900 Disconnecting and connecting battery earth lead	129
61 20 900 Disconnecting and connecting battery earth lead	129
61 20 900 Disconnecting and connecting battery earth lead	129
61 20 900 Disconnecting and connecting battery earth lead	129
61 20 900 Disconnecting and connecting battery earth lead	129
61 20 900 Disconnecting and connecting battery earth lead	129
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	129
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	129
61 20 900 Disconnecting and connecting battery earth lead	129

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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 129
61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle) 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
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61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 20 900 Disconnecting and connecting battery earth lead 129
61 35 ... Notes on ESD protection (Electro Static Discharge) 13

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11 14 151 Replacing the crankshaft seal

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

PRELIMINARY WORK

1 – Disconnecting all battery earth leads



- See additional information.

2 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

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RISK OF DAMAGE

Damage to the acoustic cover.

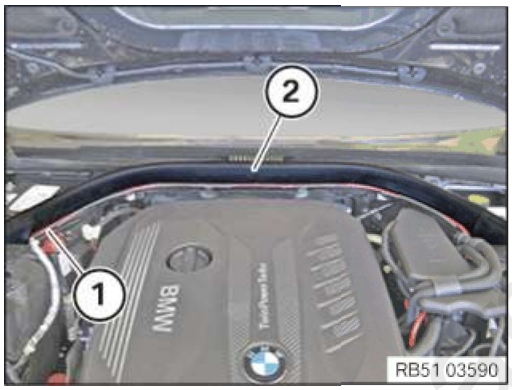
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover.

- Disassemble or mount the acoustic cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

3 – Remove the seal for the rear bonnet



- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

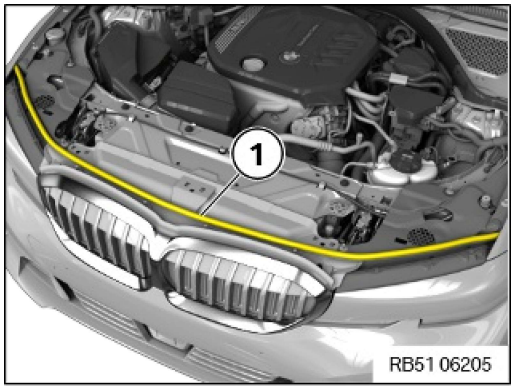
4 – Removing acoustic cover at rear



- Unclip the acoustic cover (1) in the marked areas and remove it to the top.

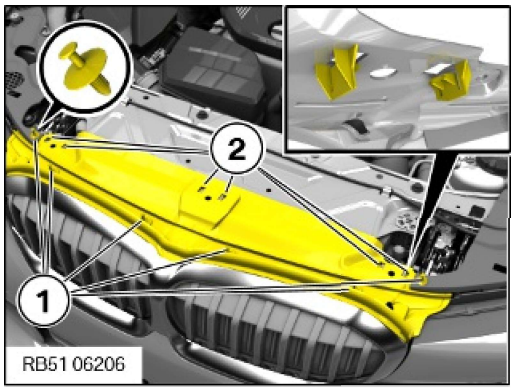
5 – Remove the seal for the bonnet in front

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- Pull off front bonnet seal (1) upwards.

6 – Removing the centre engine compartment cover



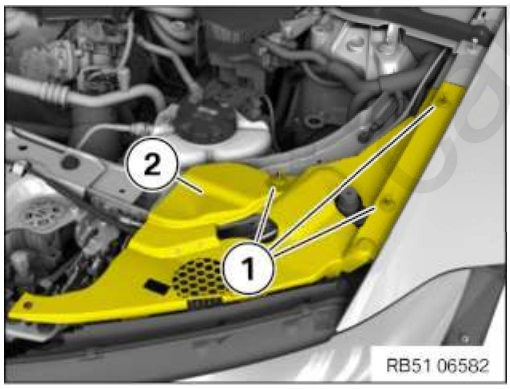
- Detach all expanding rivets (1).
- Release the cover of the centre engine compartment with the latch mechanisms (2) .
- Feed the cover for the centre engine compartment out to the rear.

7 – Partially remove the top left and right cover in the engine compartment

NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Removing the cover in the engine compartment on top partially**



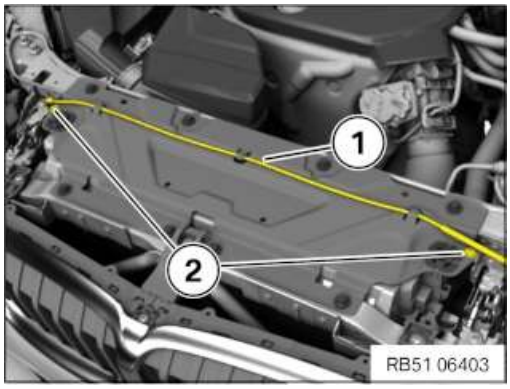
- Loosen the expanding rivet (1).
- Remove the cover in the engine compartment on top (2) partially.

8 – Removing the top cross connection

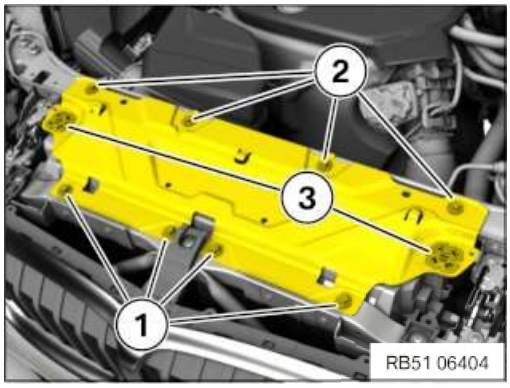


- Release the housing for the coupling of the Bowden cables (1) from the body.

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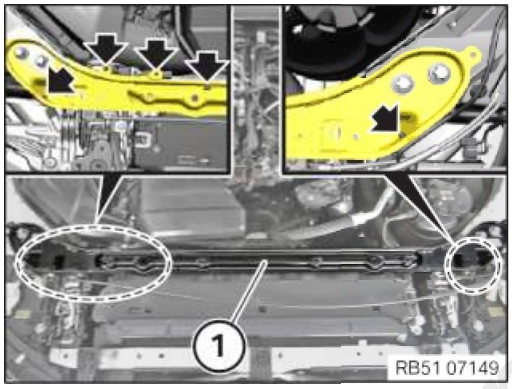


- Detach Bowden cable (1) at the top cross connection.
- Loosen screws (2).

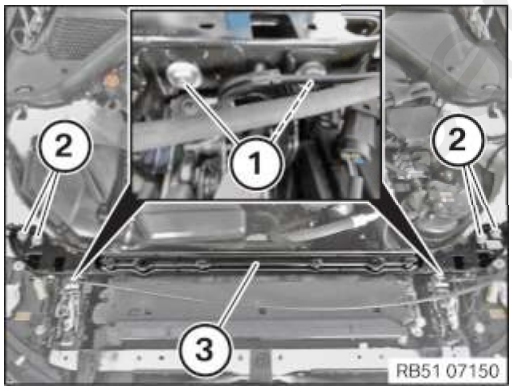


- Loosen screws (1) and (2).
- Remove the top cross connection with the holders(3) towards the top.

9 – Remove the rear top cross connection



- Release the clips (arrows) in the marked areas from the top rear cross connection (1).



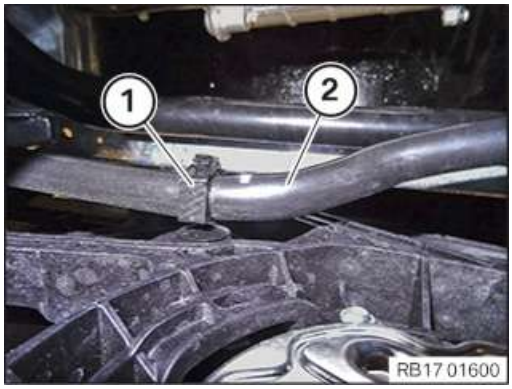
- Loosen screws (1).
- Loosen screws (2).
- Guide out and remove top rear cross connection (3).

10 – Remove fan cowl.

TECHNICAL INFORMATION

- When the engine is stopped after the end of the journey, it may be necessary to run the electric fan. In rare cases, operation of the electric fan can last up to 11 min. This protects the components. In this case, replacing the electric fan will not remedy the problem!

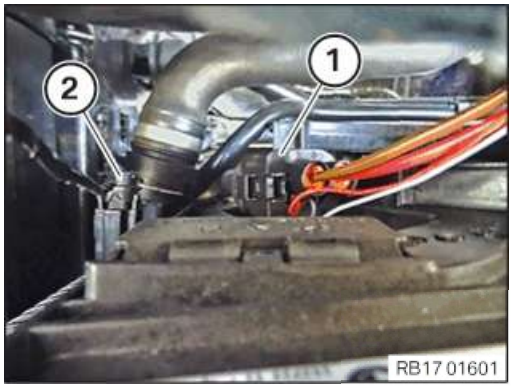
.diagn.com



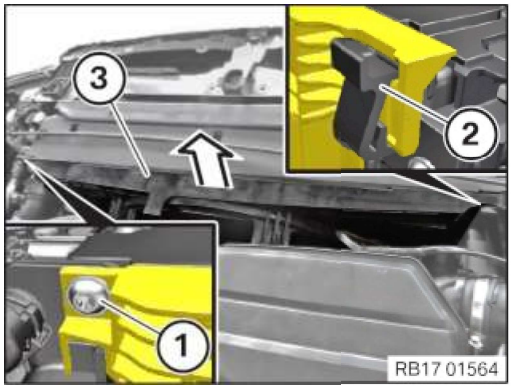
- **If installed:** Release transmission oil line (2).

  Unlock the holder (1).

  Thread out transmission oil line (2) and set aside.

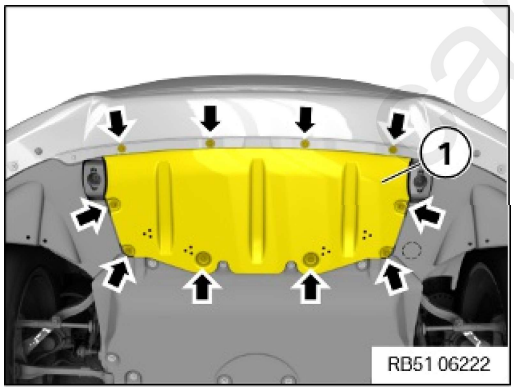


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.



- Loosen screw (1).
- Unlock lock (2).
- Guide out and remove fan cowl (3) **carefully** in the direction of the arrow.

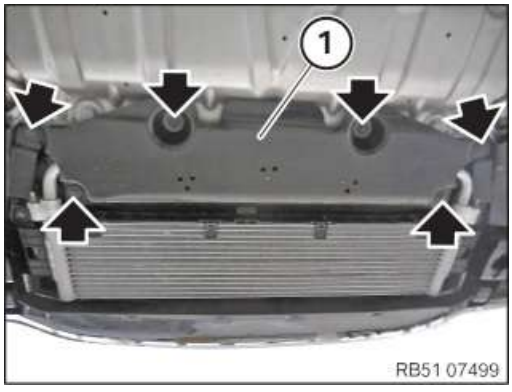
11 – Removing the front underbody protection



- **Version 1:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

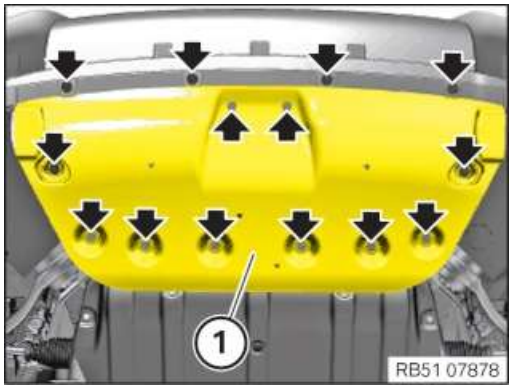


- **Version 2:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

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- **Version 3:**

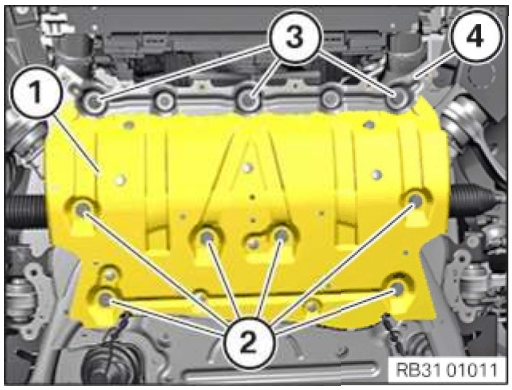
  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

12 – Removing the stiffening plate

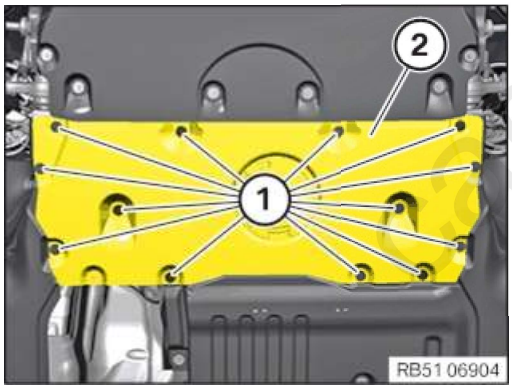
TECHNICAL INFORMATION

Driving without stiffening plate is not permissible.



- Loosen screws (3).
- Remove the holder of the underride protection (4).
- Loosen screws (2).
- Remove stiffening plate (1).

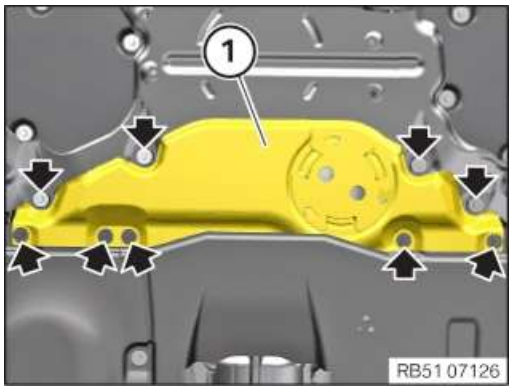
13 – Removing the centre underbody protection



- **Version with rear-wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



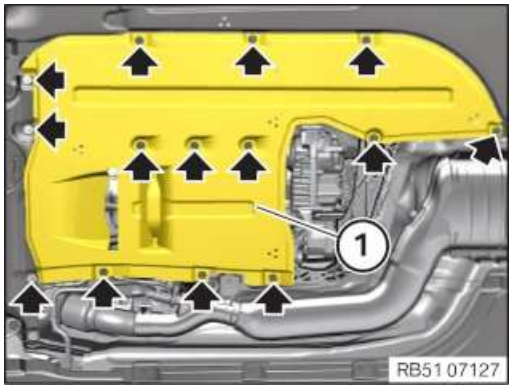
- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

14 – Remove rear underbody protection

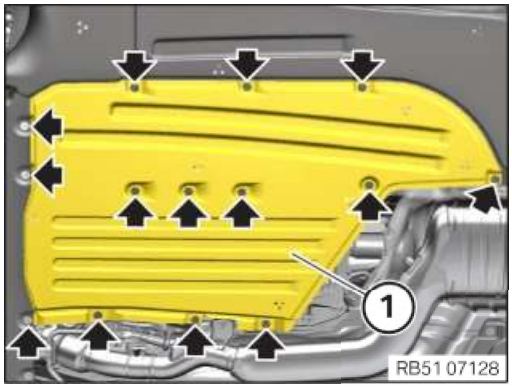
cardiagn.com



- **Version 1:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version 2:**

  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

15 – If installed: Partially release the engine oil cooler

WARNING

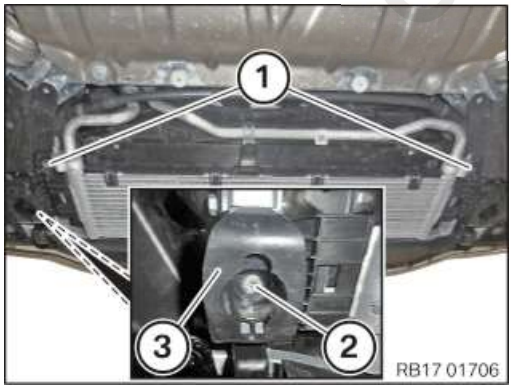
Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

TECHNICAL INFORMATION

The work must be performed with care to prevent component damage.

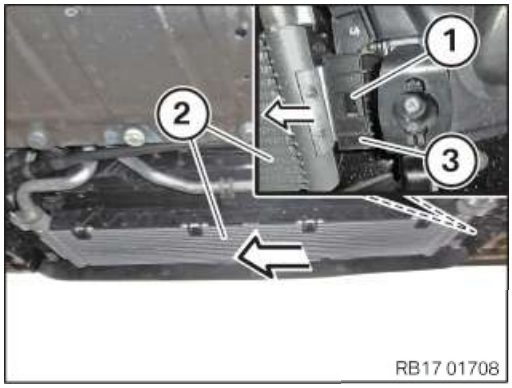


- Loosen screws (1).
- Drill out rivet on the left (2).
- Remove the left-hand damper (3).

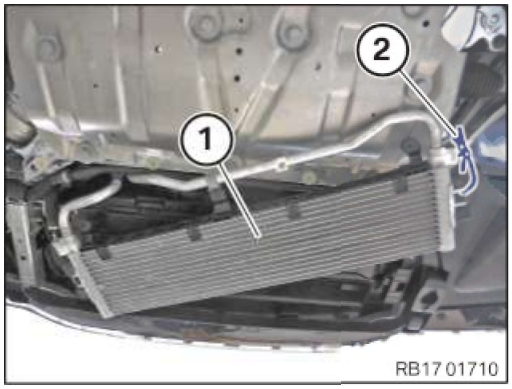
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- Loosen screw (1).

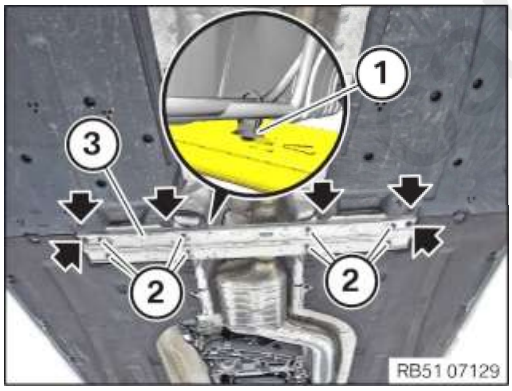


- Unlock lock (1).
- Feed out engine oil cooler (2) from the holder in the direction of arrow (3) and place to one side.



- Affix the engine oil cooler (1) with a cable strap (2) as shown.

16 – Remove the connecting support from the tunnel



- Remove screws (arrows).
- **If installed:** Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

17 – Remove complete exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

mdiagn.com

CAUTION

Component with heavy weight.

Danger of injury!

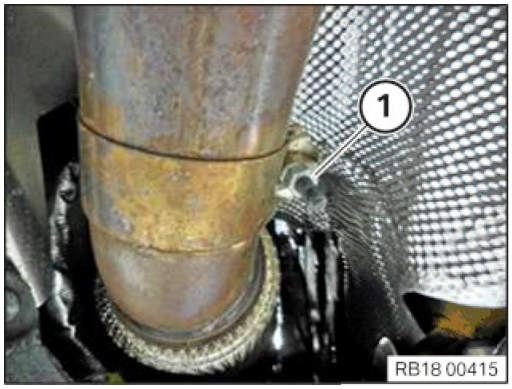
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

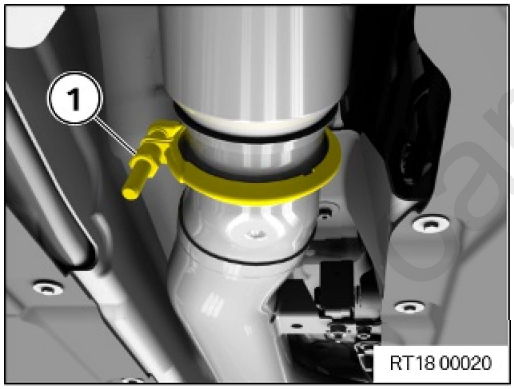
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.



- **Equipment specification 1 (ribbon clamp)**

  Detach the ribbon clamp (1).



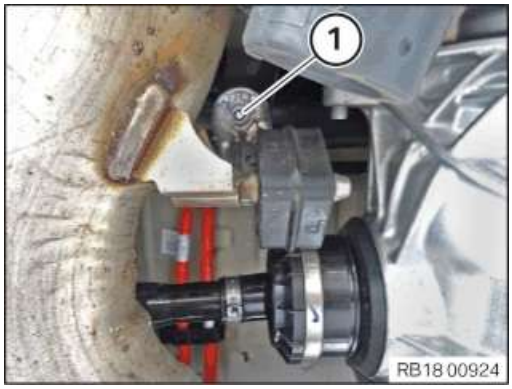
- **Equipment specification 2 (V-clips)**

  Unfasten clamp (1).

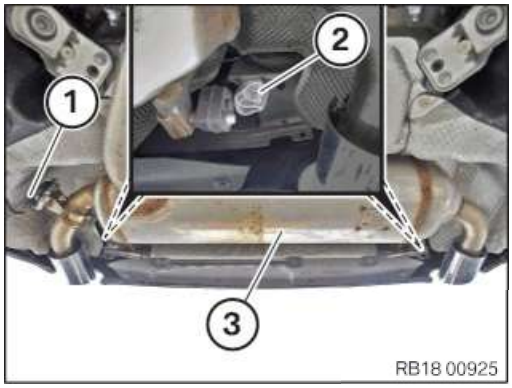


- Loosen nut (1).

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- Release nut (1) on the rear axle support.



- Unlock plug connection (1) and disconnect.
- Loosen nuts (2).
- Lower and remove the exhaust system (3) with the assistance of a second person.

18 – Removing starter motor

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

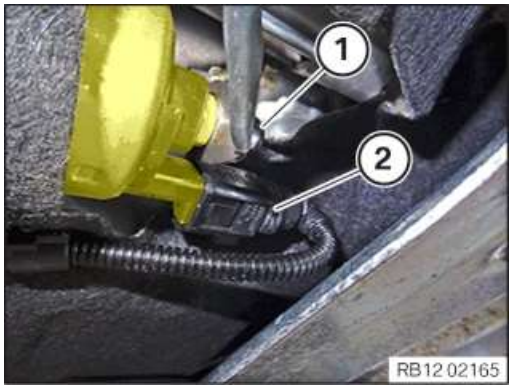
RISK OF DAMAGE

Electrostatic discharge.

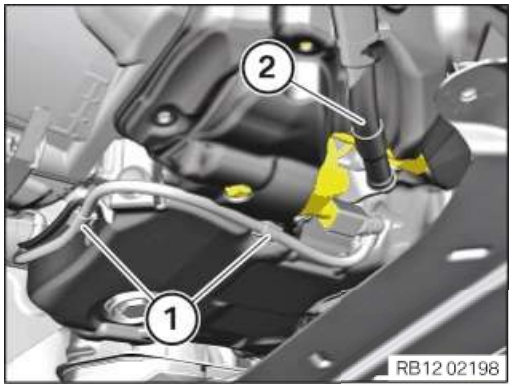
Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 Information on electrostatic discharge (ESD) protection.

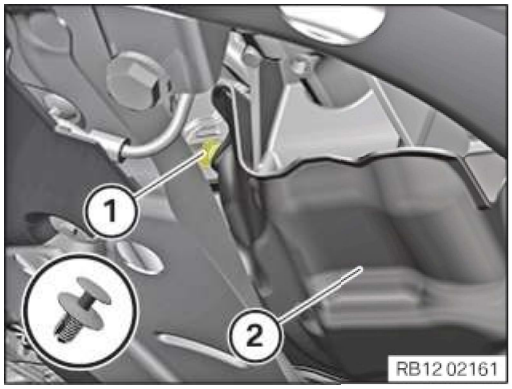
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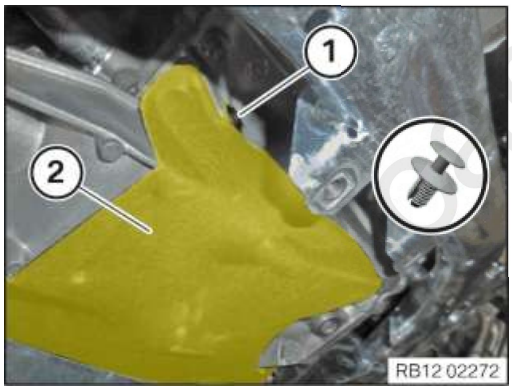
- Loosen nut (1).
- Unlock plug connection (2) and disconnect.



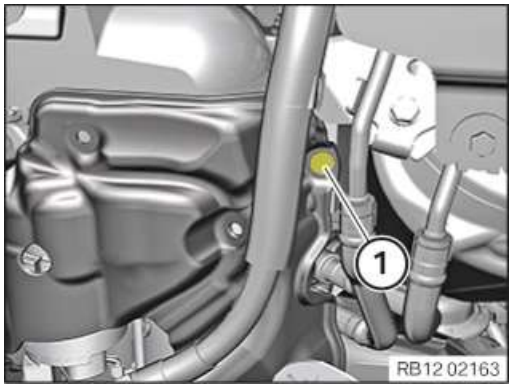
- Loosen clamps (1).
- Feed out positive battery cable (2) and put to one side.



- Release the expanding rivet (1) for the acoustic cover (2) for oil sump.

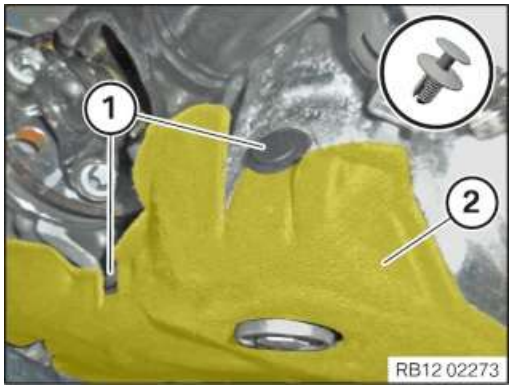


- Loosen expanding rivet (1).



- Undo fir tree clip (1).

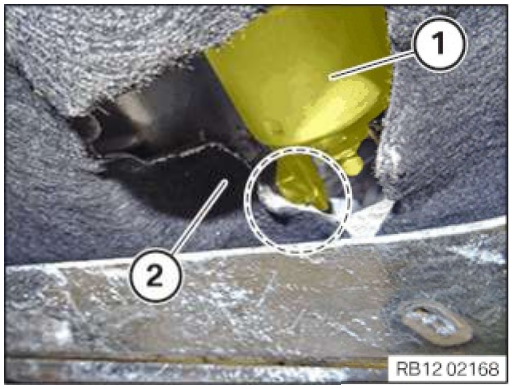
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- Loosen the expanding rivet (1).
- Release acoustic cover (2) for the oil sump and store it below.

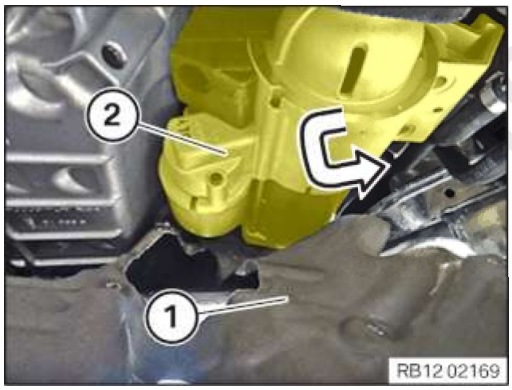


- Loosen screws (1).

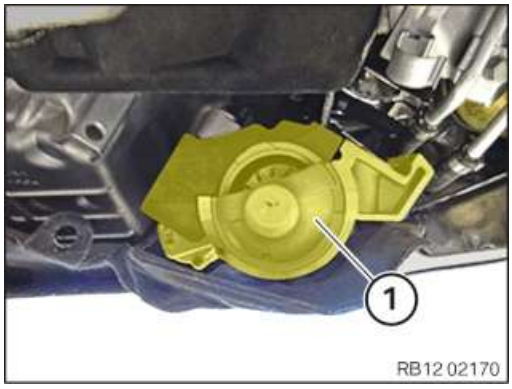


- Position the starter (1) **carefully** in the marked area above the acoustic cover (2) as shown.

  An evaluation cannot be performed without positioning the starter.



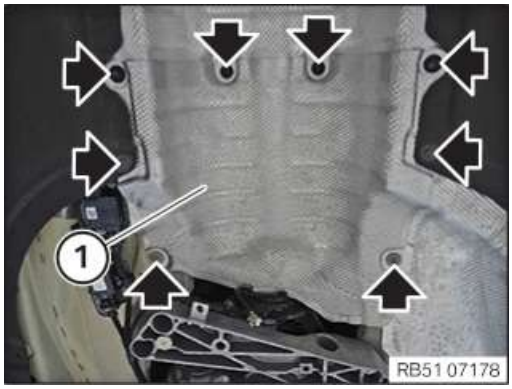
- Make sure that the acoustic cover (1) **is not damaged.**
- Carefully fold the acoustic cover (1) down.
- Feed out the starter (2) **carefully** in the direction of arrow to the rear and below.



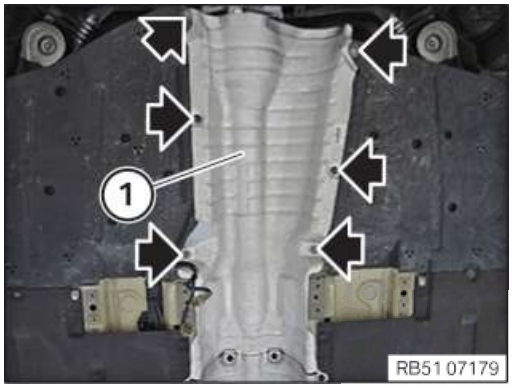
- Remove starter motor (1).

19 – Remove heat shields

rdiagn.com



- Loosen bolts and nuts (arrows).
- Remove heat shield (1).



- Loosen bolts and nuts (arrows).
- Remove heat shield (1).

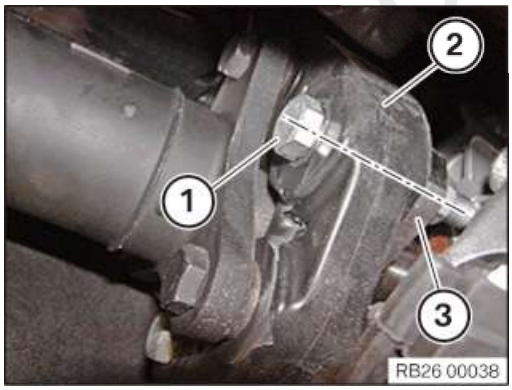
20 – Partially release propeller shaft

RISK OF DAMAGE

Damage to propeller shaft during removal.

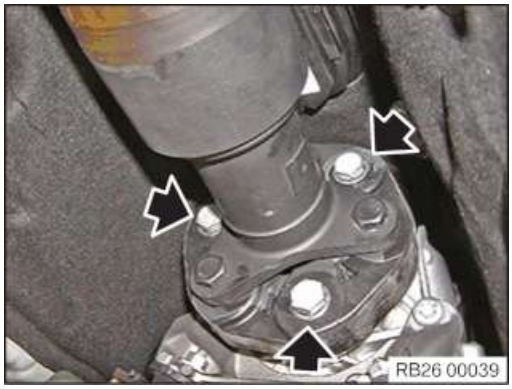
Non-observance of the removal guidelines for the propeller shaft on the rear axle differential may cause severe damage.

- Do not disassemble the three-hole flange, flexible disc and propeller shaft. The three-hole flange to the rear axle differential is balanced with the flexible disc and propeller shaft.
- Loosen the recessed nut against the direction of travel in clockwise direction. The propeller shaft must be loosened on the recessed nut only and exclusively in the direction of rotation otherwise the anti-twist lock of the bi-hexagonal flange nut is damaged.
- In the event of a damaged anti-twist lock on the bi-hexagonal flange nut: Replace the rear axle differential.

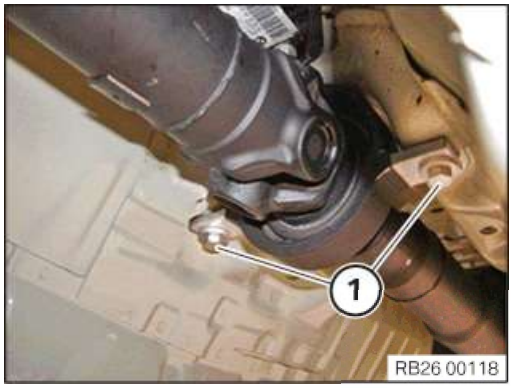


- Mark the installation position of the screw connection (1) of the flexible disc (2) and the three-hole flange (3).

  The mark makes it possible for the propeller shaft to be installed again in the same position. This should prevent a humming noise from the drive train during driving.



- Remove screws (arrows).



- Unscrew the bolts (1) on the centre mount and hold down the propeller shaft.

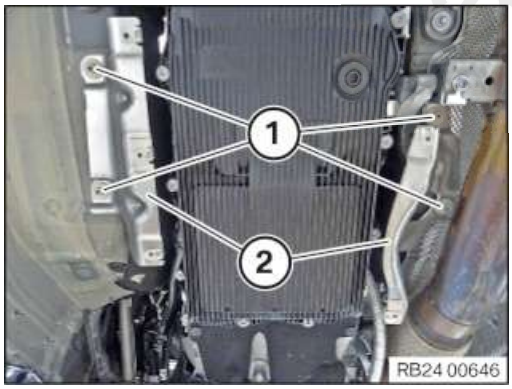
  Major deflection angles of the propeller shaft may damage the propeller shaft and/or the joints.
- Tie up propeller shaft to underbody.

21 – Releasing front propeller shaft on front axle differential



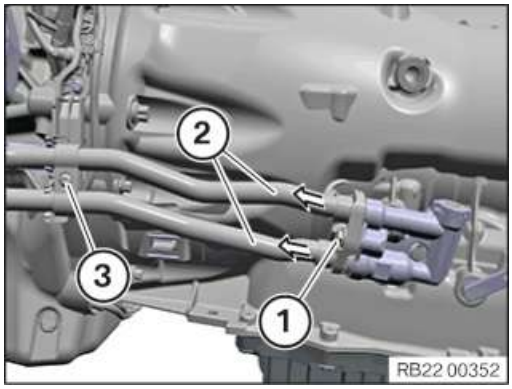
- Remove screws (arrows).
- Secure the propeller shaft on the transmission with a belt.

22 – Remove the retaining plates



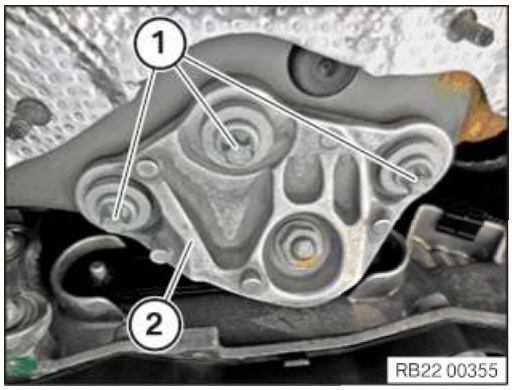
- Loosen nuts (1).
- Feed out retaining plates (2) and remove.

23 – Disconnect hydraulic lines on the transmission



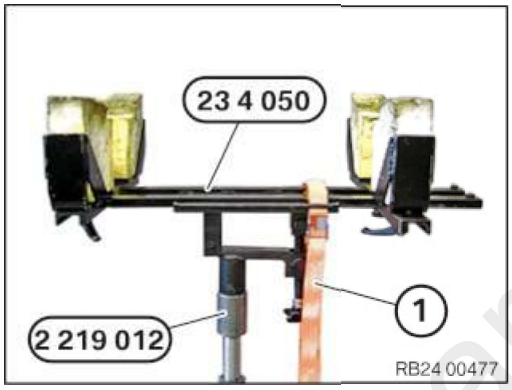
- Loosen screw (1).
- Loosen screw (3).
- Disconnect hydraulic lines (2) to transmission oil cooler.

24 – Removing the transmission bearing support

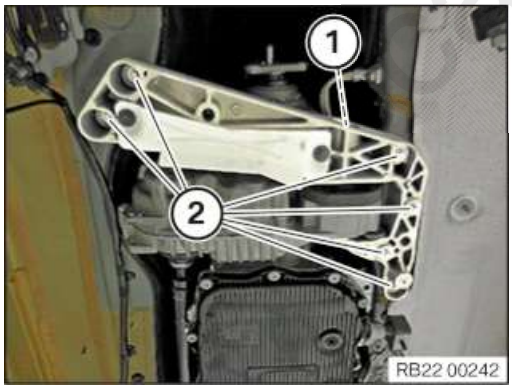


- Unscrew the bolts (1) on the transmission bearing support (2).

25 – Remove transmission cross-member.



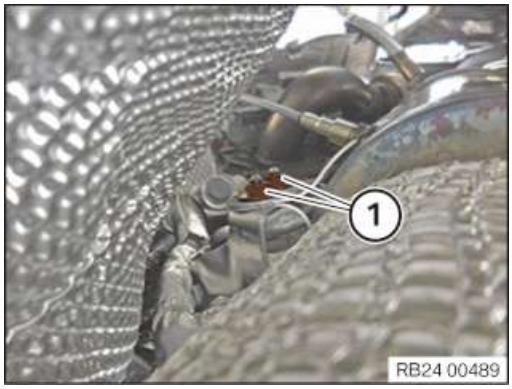
- Support the transmission using special tools 0 495 498 (23 4 050) and 2 219 012.
- Secure the transmission with the tensioning strap (1).



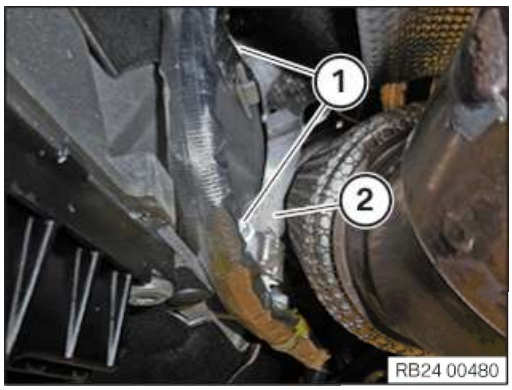
- Loosen screw (1).
- Loosen screws (2).
- Remove transmission cross-member.

26 – Remove exhaust system holder

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- Loosen nuts (1).



- Loosen screws (1).
- Remove the exhaust bracket (2).

27 – Remove automatic transmission (all-wheel drive vehicle) (GA8HP51Z)

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

RISK OF DAMAGE

Damage to the engine block.

Damaged and corroded bolts will lead to major damage in the engine block and the transmission.

- It is imperative that protruding threads of the transmission bolts are checked for corrosion and damage prior to removal.
- It is imperative that all rust is removed from corroded threads and that they are cleaned prior to removal.
- Renew rusted and damaged bolts.

RISK OF DAMAGE

Damage of components in the engine compartment.

When removing the transmission, tilting of the engine may damage components in the engine compartment.

- Before removing the transmission: Support engine.
- Secure the engine against tilt movements.
- Follow the specifications of the repair instructions.

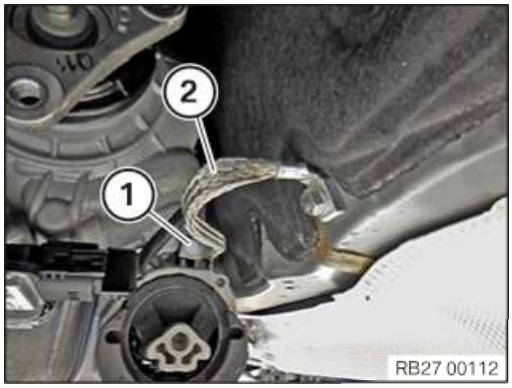
cardiagn.com

RISK OF DAMAGE

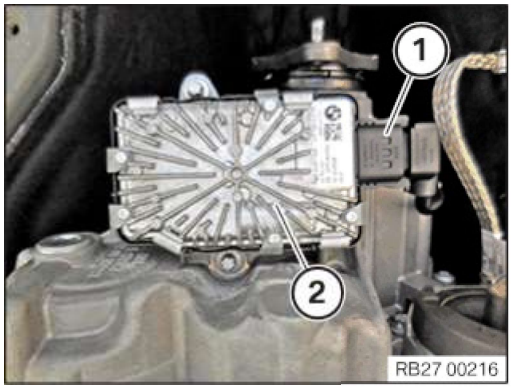
Damage to the transmission.

Damage to the transmission through unapproved transmission oil.

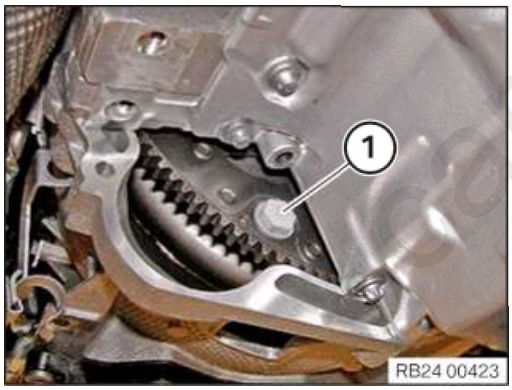
- Use only the approved transmission oil.
- After completion of repair work, check transmission oil level.



- Unscrew the bolt (1) and disconnect the ground strap (2).



- Disconnect connector (1) from transfer box control unit (longitudinal torque distribution) (2).



TECHNICAL INFORMATION

Only G05 and G07

In vehicles with active anti-roll bar (ARS) the fan cowl must be removed in order to spin the engine.

For additional information see: 17 11 035 Removing and installing/replacing the fan cowl including electric fan

- Turn the engine on the vibration damper with the special tool 0 493 380 (11 6 480) in the direction of rotation until the bolt (1) becomes visible in the recess.
- Undo all 6 screws (1) on the torque converter.

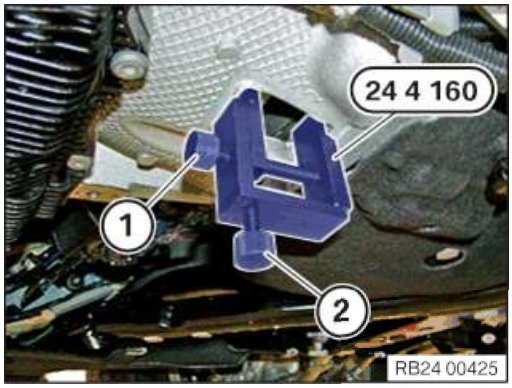


- Prepare special tool 0 494 451 (24 4 160) with the shaped element 0 494 622 (24 4 164) as shown.

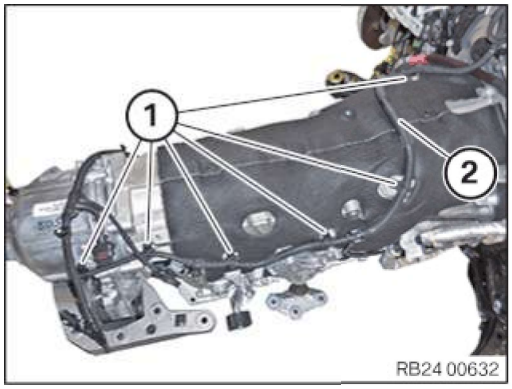
carmagn.com



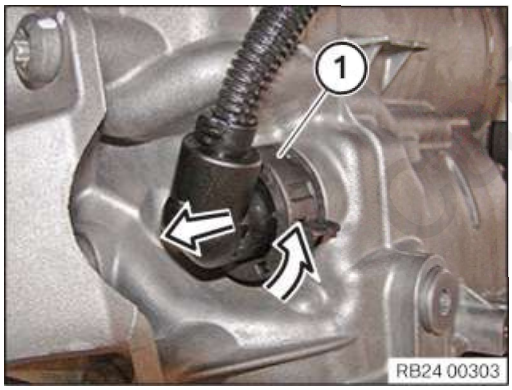
- Remove the sealing cap (1).



- Insert special tool 0 494 451 (24 4 160) into the recess of the transmission housing and apply slight tension using the screw (1).
- Screw the bolt (2) in to the stop.
- Tighten down screw (1).



- Loosen clamps (1).
- Hang line (2) on one side.

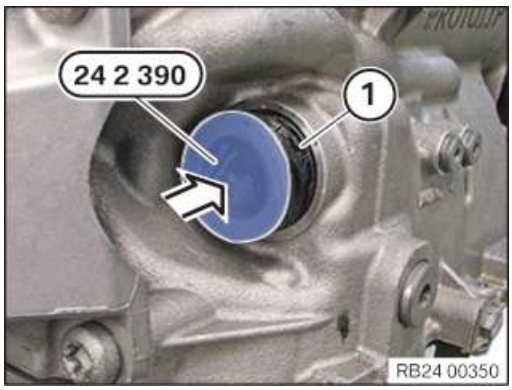


TECHNICAL INFORMATION

Notes on mechatronics are a fundamental requirement for these repair instructions and must be complied with at all times.

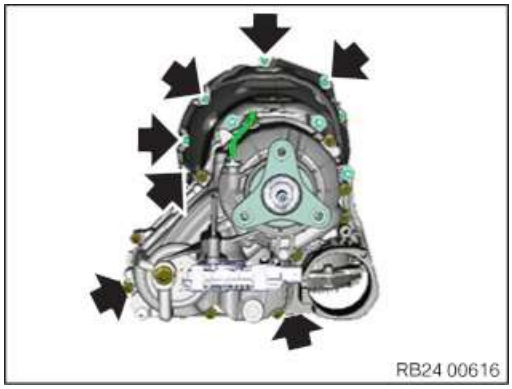
For additional information see: 24 34 ... Notes on mechatronics (GA8HP50Z/GA8HP51Z/GA8HP75Z/GA8HP76Z/GA8HP95Z)

- Unlock connector (1) by turning and pull off.
- Do not touch pins.
- Loosen all cable clips.



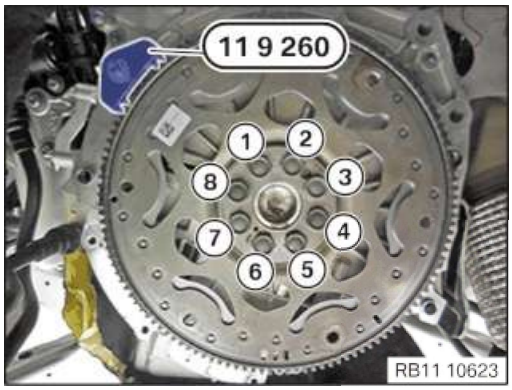
- Insert the special tool 0 494 213 (24 2 390) in the sealing sleeve (1) in direction of arrow.

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- Support engine.
- Release remaining screws.
- Remove the transmission with the transfer box and the front propeller shaft.

28 – Removing flywheel

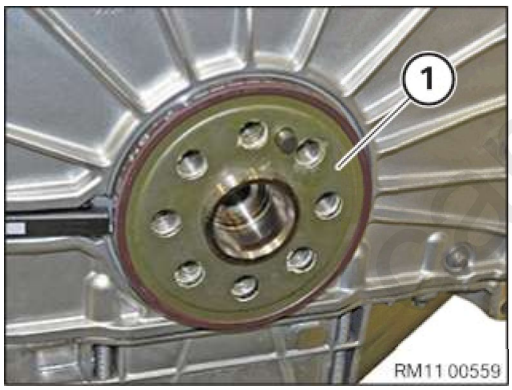


- Fasten the flywheel with the special tool 0 493 938 (11 9 260) and tighten with the special tool 0 494 130 (11 9 264).
- Loosen screws (1-8).

MAIN WORK

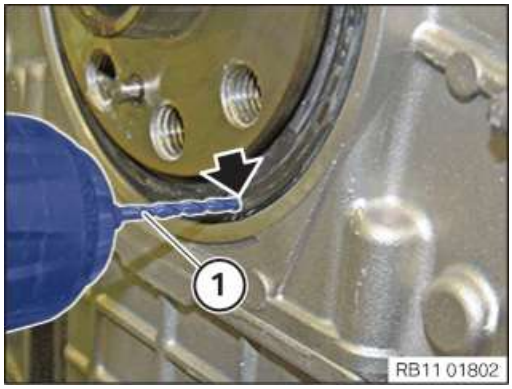
29 – Renewing the rear crankshaft seal

▸ **Removing the rear crankshaft seal**

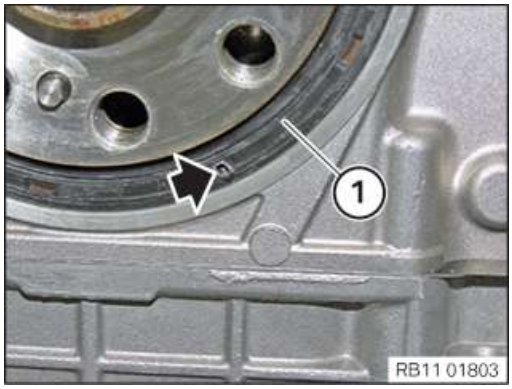


- Remove the magnet wheel (1).
- Protect the magnet wheel from swarf with a plastic bag.

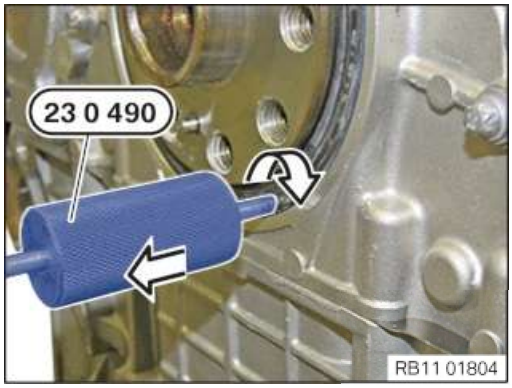
  The magnet wheel is magnetic.



- Provide a vacuum cleaner.
- Drill a hole into the crankshaft seal using a 2.5 mm drill (1).

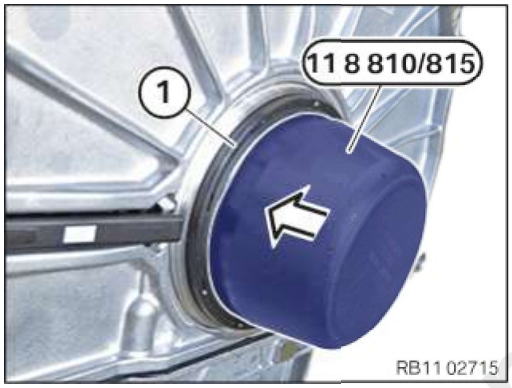


- Immediately remove the swarf from the crankshaft seal (1) carefully using a vacuum cleaner.



- Screw in the special tool 0 491 454 (23 0 490) into the crankshaft seal.
- Drive out the crankshaft seal using the special tool 0 491 454 (23 0 490).

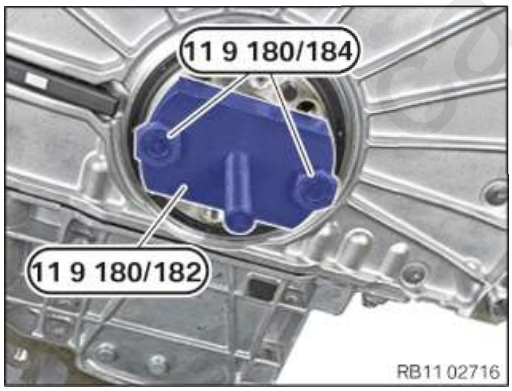
▸ Installing the rear crankshaft seal



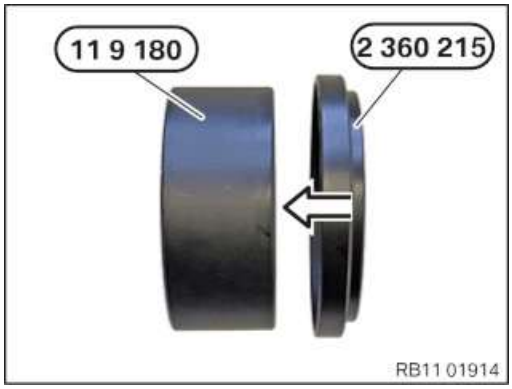
TECHNICAL INFORMATION

The radial shaft seal must be installed dry. Do not use engine oil or lubricant.

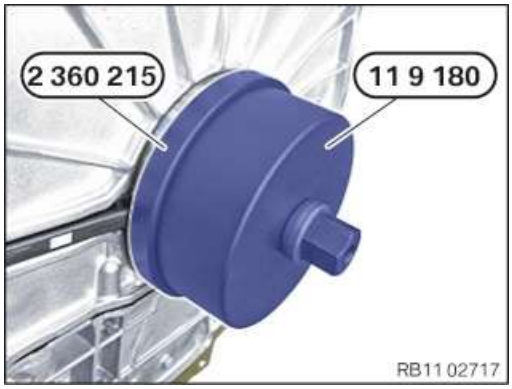
- Install special tool 0 496 137 (11 8 815) on the crankshaft.
- Slide off the crankshaft seal (1) over special tool 0 496 137 (11 8 815) so that it is fully in contact with the timing case cover.
- Guide the special tool 0 496 137 (11 8 815) out and remove.



- Secure special tool 0 494 029 (11 9 182) to the crankshaft using special tool 0 494 031 (11 9 184).



- Connect special tool 2 360 215 to special tool 0 494 028 (11 9 181).



- Position special tools 0 494 028 (11 9 181) and 2 360 215 and move them combined with special tool 0 494 030 (11 9 183) until they rest against the crankshaft sealing ring.
- Check the freedom of movement between the special tool 2 360 215 and the crankshaft sensor during installation.
- Screw in crankshaft seal until the limit position of the special tool 2 360 215 on the timing case cover.

POSTPROCESSES

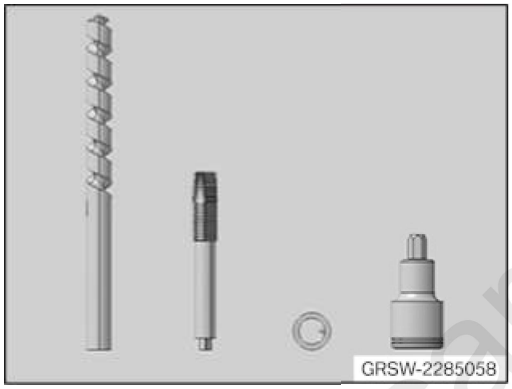
30 – Installing the flywheel



TECHNICAL INFORMATION

Clean all threads with a screw tap.

- Clean all the screw threads (1).



- Use the set of special tools 2 285 058.

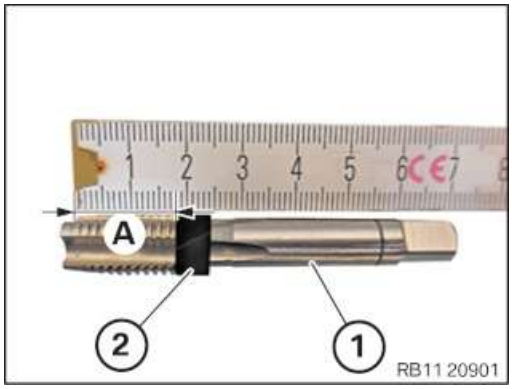
Description
Twist drill
Thread cutter M12x1.5
Depth
Insertion tool



- Assemble tool set.

Number	Description
1	Tool holder
2	Thread cutter M12X1,5

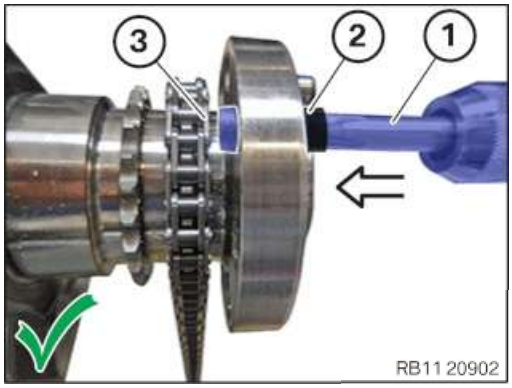
cardiagn.com



- Mark the screw-in depth (A) on thread cutter (1) from the set of special tools 2 285 058 with a standard tool (2).

Screw-in depth of thread cutter

Screw-in depth	18 mm



NOTICE

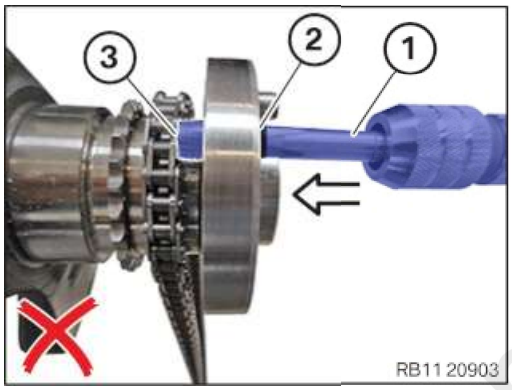
To provide a better overview: Shown with engine removed.

- Screw in the thread cutter (1) from the set of special tools 2 285 058 in direction of arrow up to the screw-in depth (2).

Screw-in depth of thread cutter

Screw-in depth	18 mm

- Make sure that the thread cutter does (1) **not** rest on the timing chain (3).



TECHNICAL INFORMATION

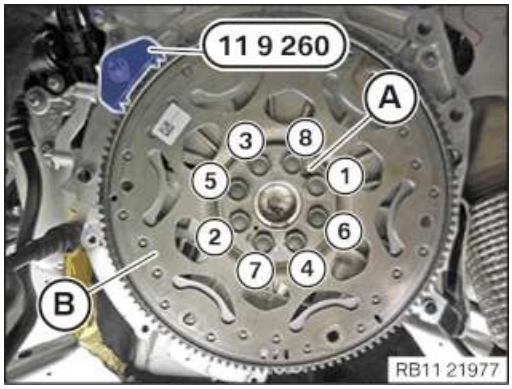
- **Carefully** handle the timing chain, to protect the timing chain and timing chain drive against damage.

- Make sure that the screw-in depth (2) of the screw tap (1) is not exceeded.

  The thread cutter (1) may not rest on the timing chain (3).



- Make sure the magnet wheel (1) is installed correctly.



- Renew screws (1) to (8).

  Parts: Bolts
- Position flywheel (B) .
- Screw in flywheel bolt (1) to (8) by hand.
- Fix the flywheel (B) with the special tool 0 494 034 (11 9 261) and screw the special tool 0 494 130 (11 9 264) tightly.
- Make sure the tightening sequence starts at dowel pin (A).
- Tighten flywheel bolts in sequence (1) to (8).

Flywheel to crankshaft

M12x1.5	Renew screws.	Jointing torque	45 Nm
		Angle of rotation	40 °

- Remove special tool 0 493 938 (11 9 260).

31 – Install automatic transmission (all-wheel drive vehicle) (GA8HP51Z)

RISK OF DAMAGE

Damage to the transmission.

Damage to the transmission through unapproved transmission oil.

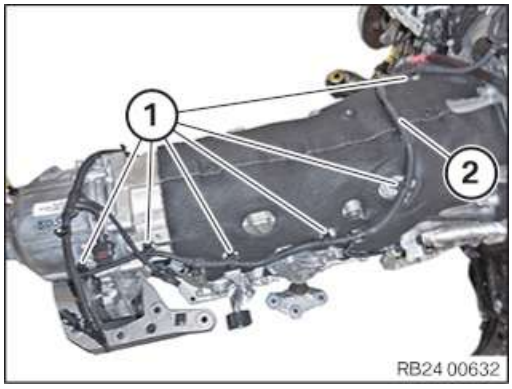
- Use only the approved transmission oil.
- After completion of repair work, check transmission oil level.

TECHNICAL INFORMATION

After completion of the work, program the control unit for the electronic transmission control (EGS).

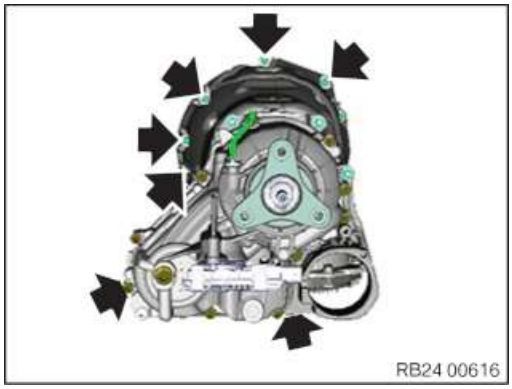


- Check the fitting sleeves (1) for correct fit and damage and renew as needed.

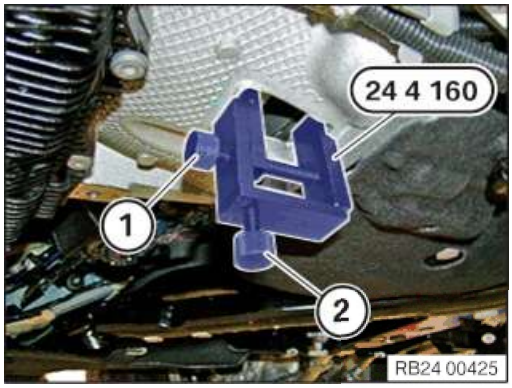


- Install the line (2).
- Secure clamps (1).

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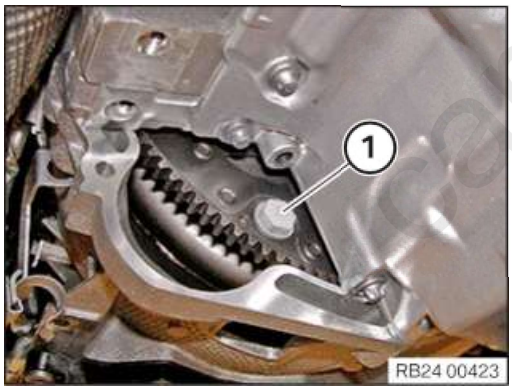
- Flange-mount the transmission on the transfer box (VTG).
- Rotate the torque converter until the bore hole of the torque converter is flush with bore hole in drive plate.
- Fit the transmission bolts (arrows) and apply lightly.



- Release screw (1) and screw (2).
- Remove special tool 0 494 451 (24 4 160).



- Install the sealing cap (1).



TECHNICAL INFORMATION

Only G05 and G07

In vehicles with active anti-roll bar (ARS) the fan cowl must be removed in order to spin the engine.

For additional information see: 17 11 035 Removing and installing/replacing the fan cowl including electric fan

- Renew screws.

  Parts: Bolts
- Crank the engine on the vibration damper in the direction of rotation using special tool 0 493 380 (11 6 480) to tighten all six screws (1).
- Tighten all 6 screws (1) of the torque converter using special tool 0 491 667 (24 1 110) .

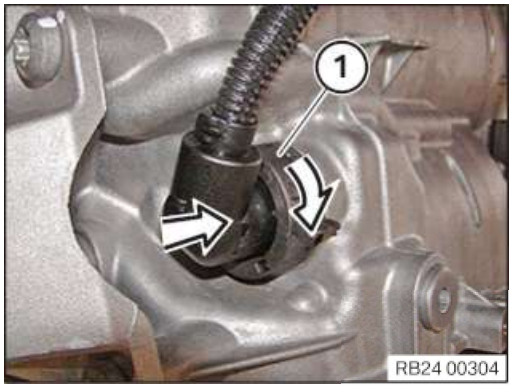
Torque converter to flywheel

M10	Renew screws.	Tightening torque	56 Nm

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- Remove the special tool 0 494 213 (24 2 390) from the sealing sleeve in direction of arrow.

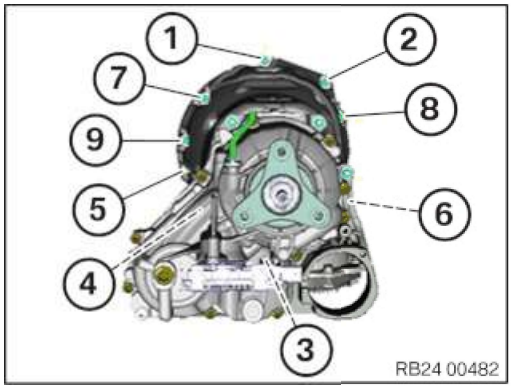


TECHNICAL INFORMATION

Notes on mechatronics are a fundamental requirement for these repair instructions and must be complied with at all times.

For additional information see: 24 34 ... Notes on mechatronics (GA8HP50Z/GA8HP51Z/GA8HP75Z/GA8HP76Z/GA8HP95Z)

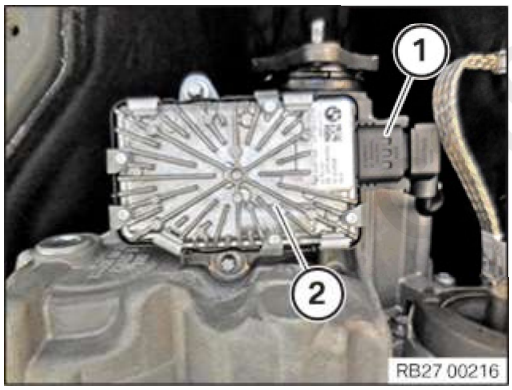
- Slide the connector (1) on and turn it to lock.



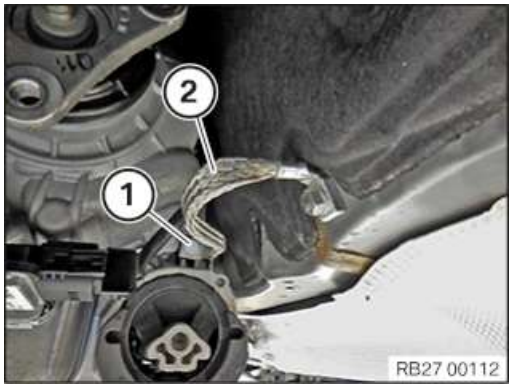
- Tighten the transmission bolts in sequence (1) to (9).

Transmission to engine

M8		Tightening torque	19 Nm
M12		Tightening torque	66 Nm



- Connect the connector (1) to the VTG control unit for the longitudinal torque distribution (2).

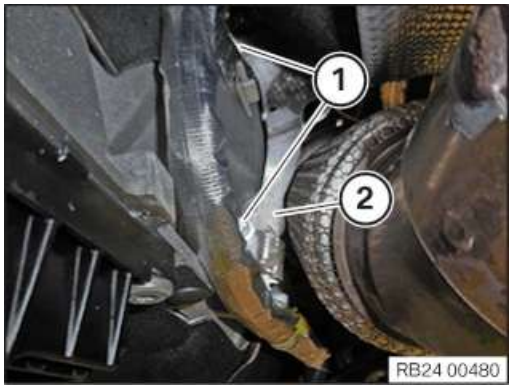


- Install the ground strap (2).
- Tighten down screw (1).

Ground strap to transmission or body

M8		Tightening torque	19 Nm

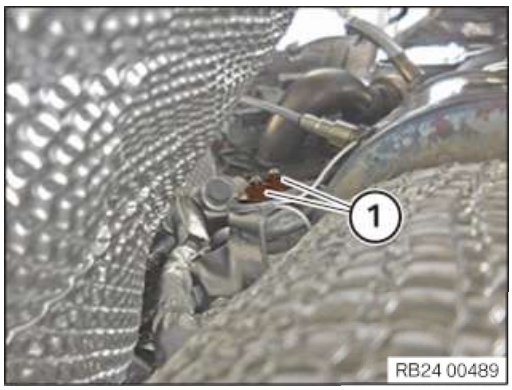
32 – Install the exhaust bracket



- Install the exhaust bracket (2).
- Tighten the screws (1).

Transmission to engine

M8		Tightening torque	19 Nm
M12		Tightening torque	66 Nm

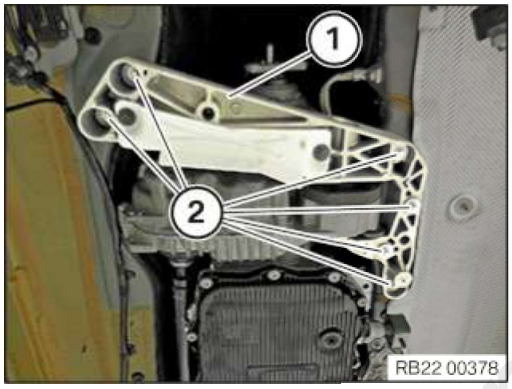


- Tighten nuts (1).

Catalytic converter to holder

M8 nut	Renew nut.	Tightening torque	28 Nm

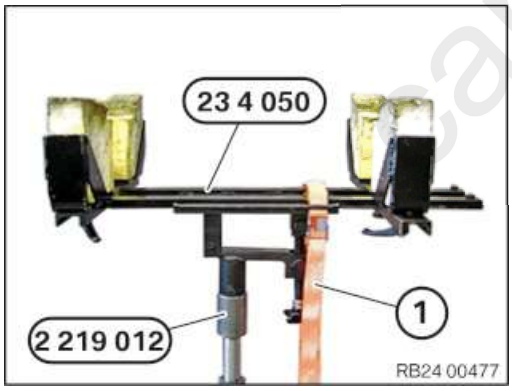
33 – Install transmission cross member.



- Install the transmission cross member (1).
- Tighten the screws (2).

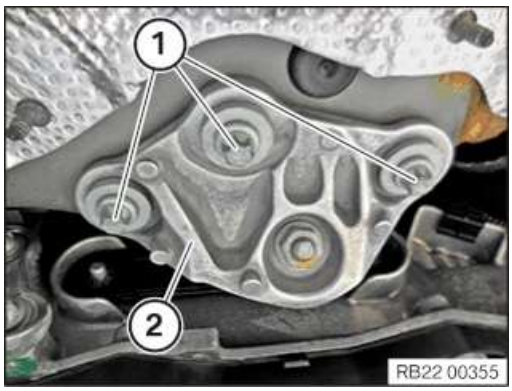
Transmission cross member to body

M8	Renew screws.	Tightening torque	19 Nm



- Loosen the tensioning strap (1) from the transmission.
- Remove the special tools 0 495 498 (23 4 050) and 2 219 012 from the transmission.

34 – Installing the transmission bearing support



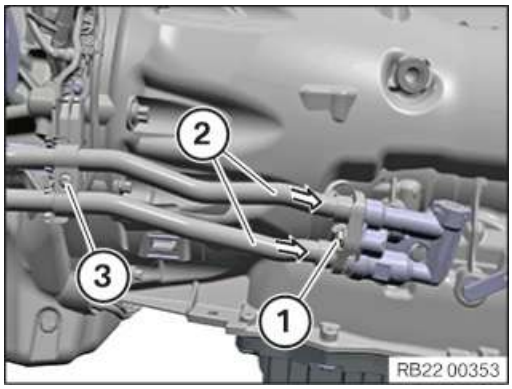
- Position transmission bearing support (2).
- Tighten the screws (1).

Transmission bearing support to body

M8	Renew screws.	Tightening torque	19 Nm

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35 – Fix hydraulic lines



- Renew sealing rings.

  Parts: Sealing ring
- Install hydraulic lines (2) on transmission.
- Position and tighten the screw (1).

Transmission oil line to transmission

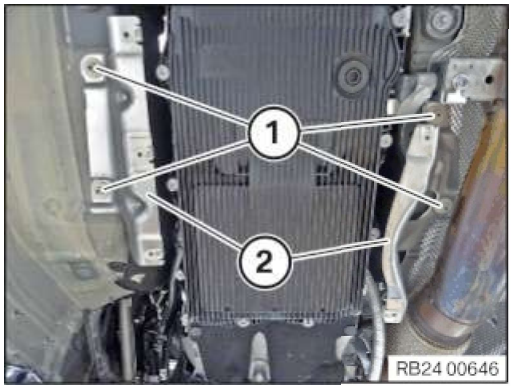
M6x25	Renew the sealing ring.	Tightening torque	8 Nm

- Position and tighten the screw (3).

Transmission oil line on holder

M6		Tightening torque	8 Nm

36 – Install the retaining plates

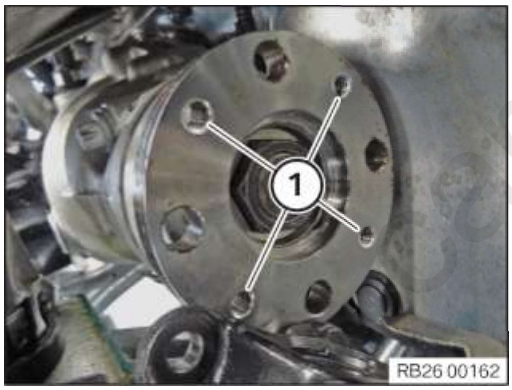


- Feed in retaining plate (2) and install.
- Tighten nuts (1).

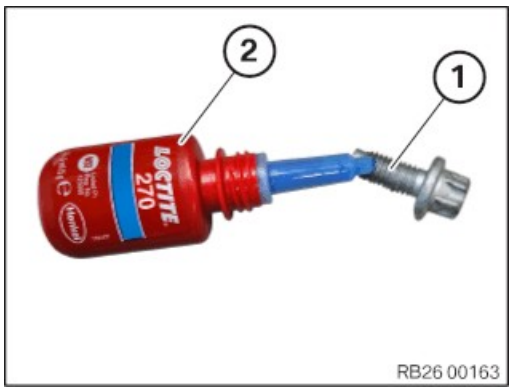
Retaining plates for vehicle underbody cover

Sheet metal nut	Replace nuts.	Tightening torque	3 Nm

37 – Installing front propeller shaft at the front axle transmission



- Before fitting the propeller shaft to the front axle transmission, all the 4 threads (1) must be cleaned and free from possible residues and contaminations in the front axle transmission flange.



- Renew screws.

  Parts: Bolts
- A drop of Loctite 270 (2) must be given before the screw connection on each thread at the end of the respective screw (1).

Expendable materials

High-strength screw lock, Loctite 270	10 ml, Tube	83 19 2 210 337

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TECHNICAL INFORMATION

A 30-minute hardening time must be ensured after screwing the front propeller shaft before the vehicle is driven again.

- Tighten screws (arrows).

Propeller shaft before the front axle differential

Renew screws. Jointing torque and angle of rotation must be observed without fail.	Tightening torque Angle of rotation	25 Nm 45 °

38 – Partially installing the propeller shaft



- Check centring (1) for damage; renew if necessary.

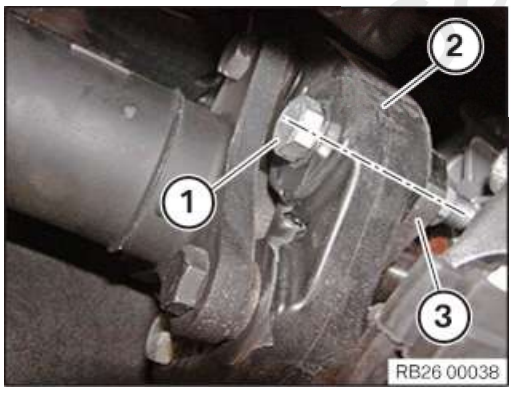


- Apply a thin coat of grease to the soft centring (1), if necessary.

  Do not grease the hard centring (2).

Expendable materials

Lubricating grease Olistamoly 2 LN 584 LO	100 g, Tube	83 19 0 447 919

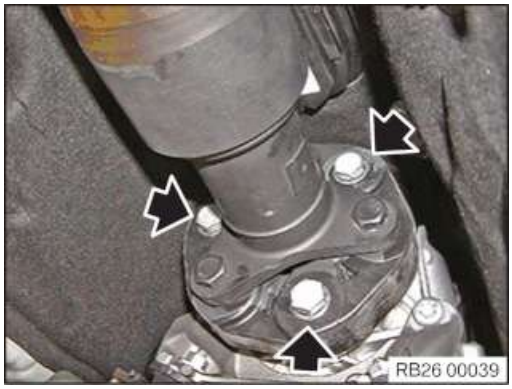


- Renew screws and the self-locking nuts.

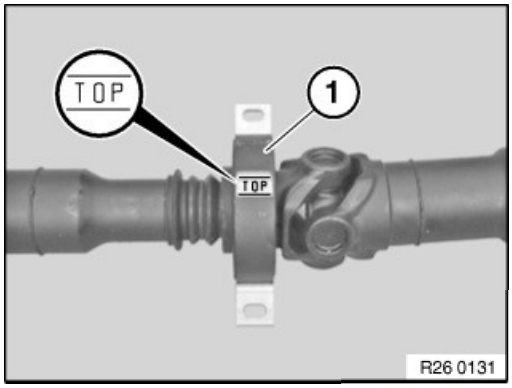
  Parts: Screws, self-locking nuts

- Assemble the screw connections (1) of the flexible disc (2) and the three-hole flange (3) according to the self-affixed identification.

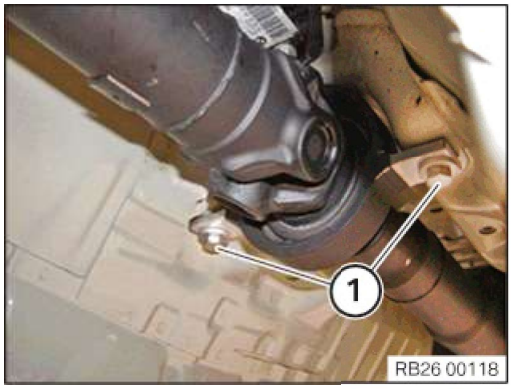
  This should prevent a humming noise from the drive train during driving.



- Hand-tighten the screws and nuts (arrows), but do not tighten fully.



- **Centre mount with TOP marking:**
- The centre mount (1) must be installed with the TOP marking at the top in the gearbox tunnel.



- Position centre mount.
- Hand-tighten the bolts (1), but do not tighten fully.



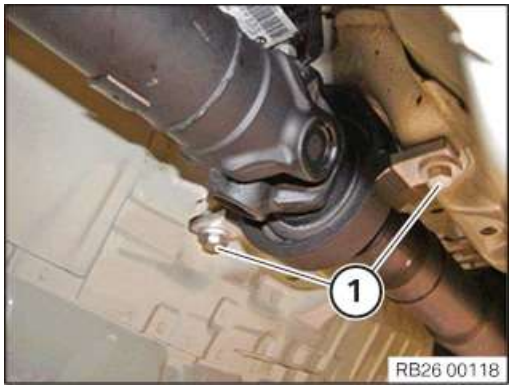
- Renew screws.

  Parts: Bolts
- Provide counter support for the bolts of the flexible disc on the nut and tighten with the bolts.

Front flexible disc to propeller shaft

M12	Renew screws. Comply with jointing torque and angle of rotation. Tightening via screw.	Jointing torque Angle of rotation	55 Nm 90 °

- Secure the special tool 0 490 504 (00 9 120) with the special tool on the vehicle underbody and continue to screw it in according to the angle of rotation.



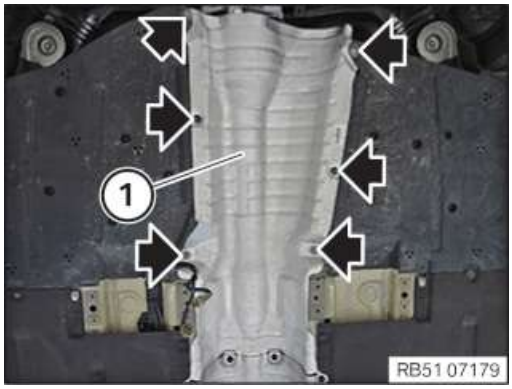
- Tighten the screws (1).

Centre mount to body

M8		Tightening torque	19 Nm

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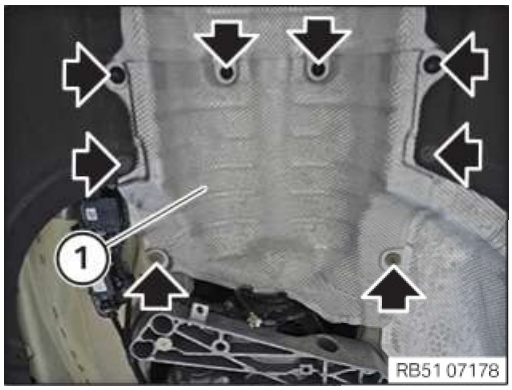
39 – Install the heat shields



- Install heat shield (1).
- Tighten the nuts and bolts (arrows).

Heat shield to vehicle underbody

Screws and nuts		Tightening torque	3 Nm



- Install heat shield (1).
- Tighten the nuts and bolts (arrows).

Heat shield to vehicle underbody

Screws and nuts		Tightening torque	3 Nm

40 – Installing the complete exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

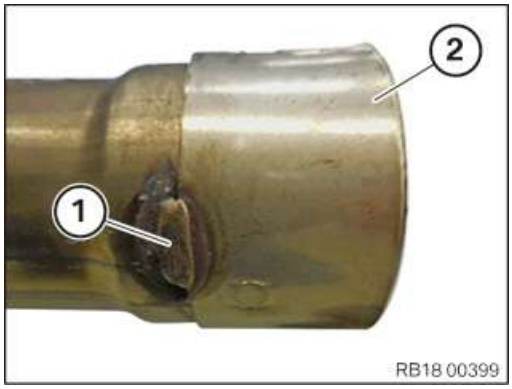
CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

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CAUTION

Swarf resulting from sawing or grinding components.

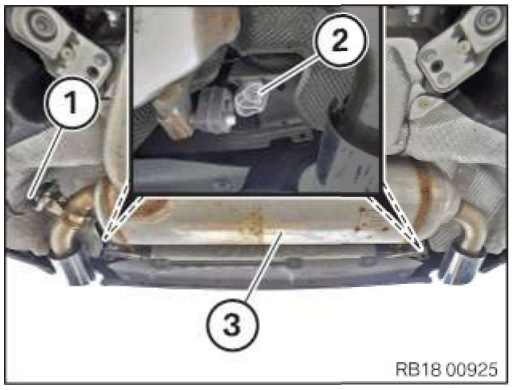
Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- **Equipment specification 1 (ribbon clamp)**

  Open the weld seam (1) with a conventional tool.
- Remove ribbon clamp (2).
- Renew the (2) ribbon clamp.

  Parts: Ribbon cable clamp



- Feed in and install the exhaust system (3) with a second person.
- Renew nuts (2).

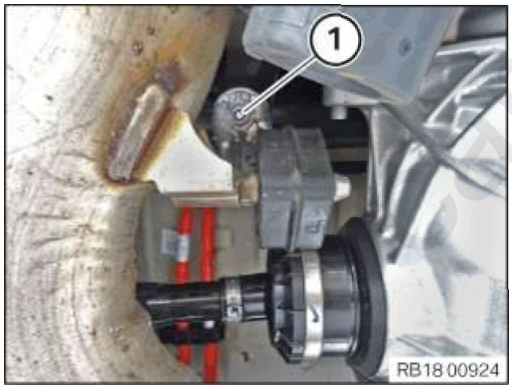
  Parts: Nuts
- Tighten nuts (2).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Renew nut (1).

  Parts: Nut
- Tighten the bolt (1) on the rear axle support.

Exhaust system to rear axle carrier

Nut M8	Renew nut.	Tightening torque	19 Nm



- Renew nut (1).

  Parts: Nut
- Tighten nut (1).

Front pipe / petrol particulate filter on transmission holder

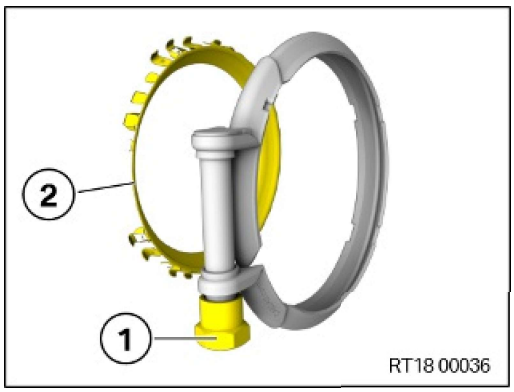
M8	Renew nut.	Tightening torque	19 Nm



- Tighten the ribbon clamp (1).

Exhaust system to catalytic converter

Ribbon cable clamp	Renew flat band clip.	Tightening torque	26 Nm

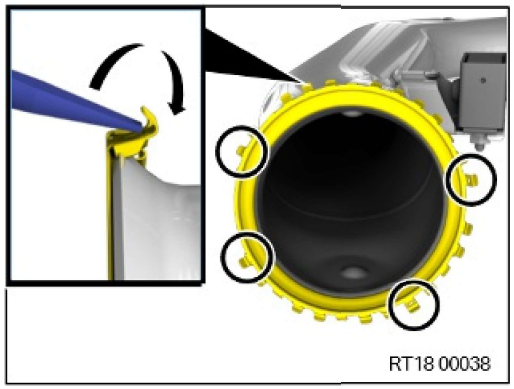


- **Equipment specification 2 (V-clips)**

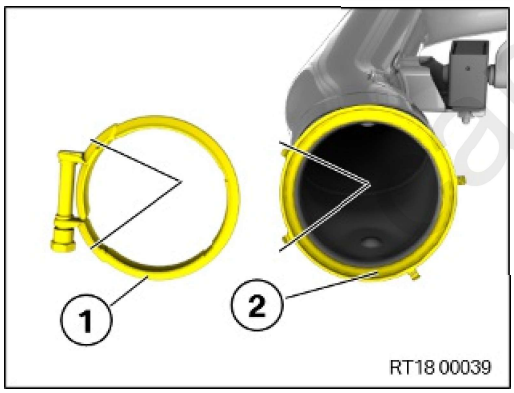
  Renew V-band clamp.

  Parts: V-band clamp

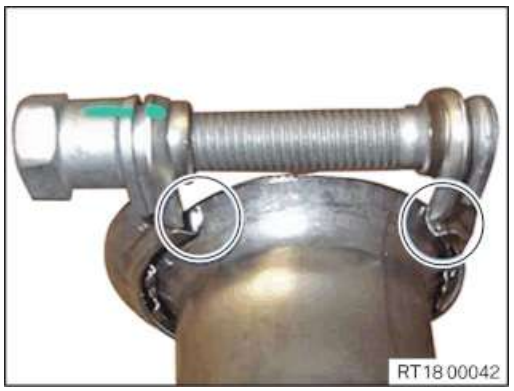
  Unscrew the nut (1) and remove the sealing ring (2).



- Bend all sheet metal tabs over with a suitable tool, except those in the marked areas.

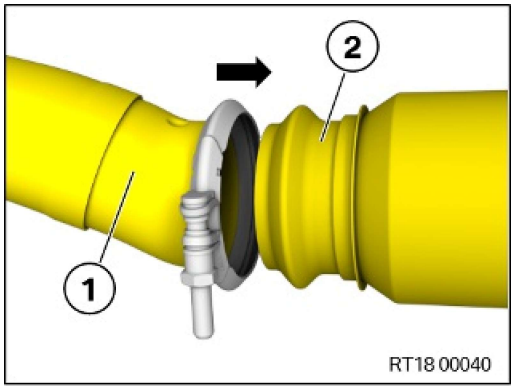


- Mount the V-clip (1) on the sealing ring (2).
- Make sure that the V-clip (1) is positioned correctly on the sealing ring (2).

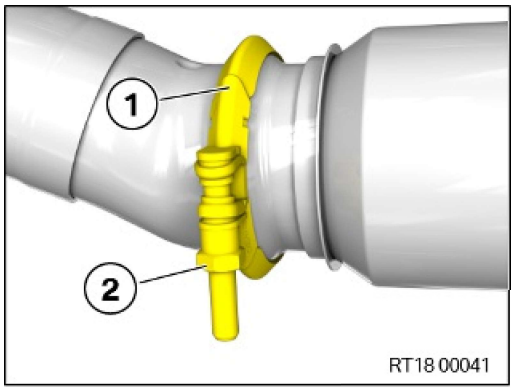


- Ensure that the V-clip rests against the sheet metal tabs in the marked areas after mounting.

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- Connect the exhaust system (1) with the catalytic converter (2) and position it correctly (arrow).

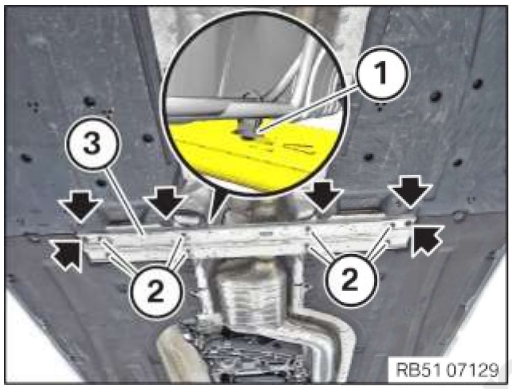


- Make sure that V-clip (1) is fitted correctly.
- Tighten down screw (2).

V-clip to catalytic converter

V-band clamp	Renew V-band clamp.	Tightening torque	22 Nm

41 – Install the connecting supports on the tunnel



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).

Connecting support to tunnel

M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

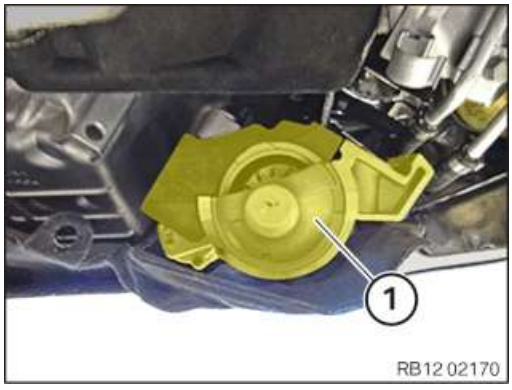
- Tighten screws (arrows).

Connecting support to tunnel

M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

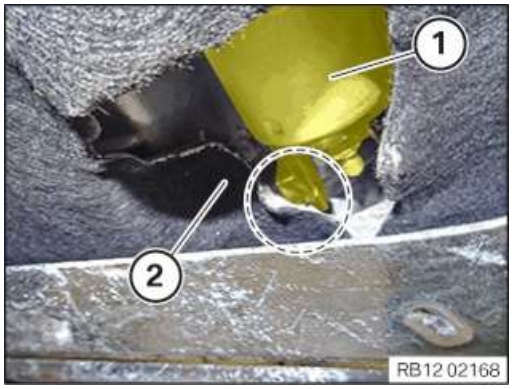
- **If installed:** Secure clamps (1).

42 – Installing starter motor



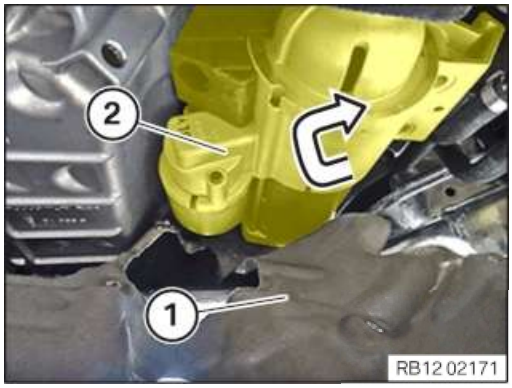
- Guide in the starter motor (1).

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- Position the starter motor (1) carefully in the marked area over the acoustic cover (2) as shown.

  An installation cannot be performed without positioning the starter motor.



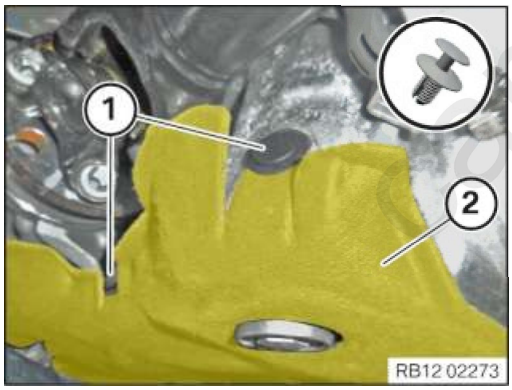
- Make sure that the acoustic cover (1) **is not damaged.**
- Fold the acoustic cover (1) **carefully** downwards.
- Install and position the starter motor (2) in direction of arrow.



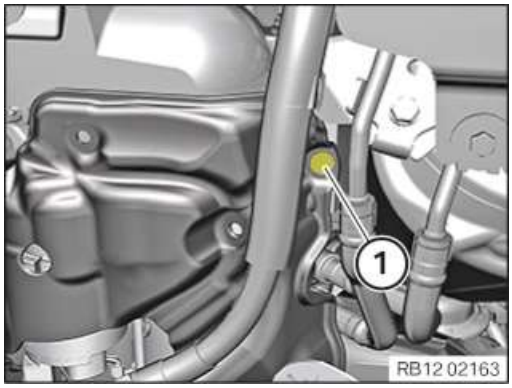
- Tighten the screws (1).

Starter motor to engine

M8X60		Tightening torque	19 Nm

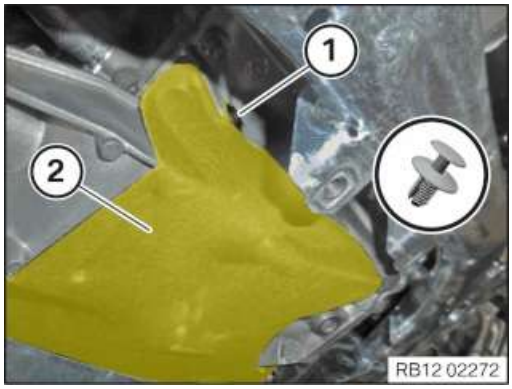


- Position the acoustic cover (2).
- Secure expanding rivet (1).

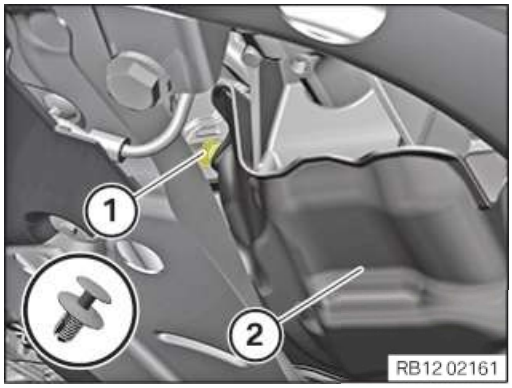


- Secure fir tree clip (1).

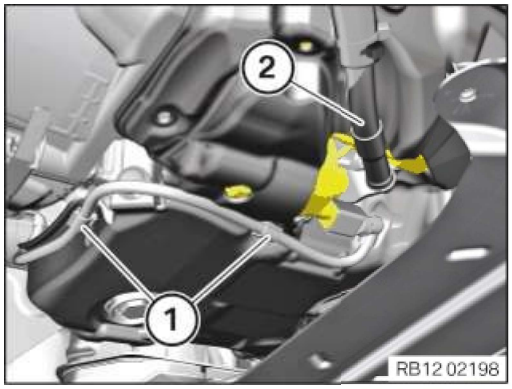
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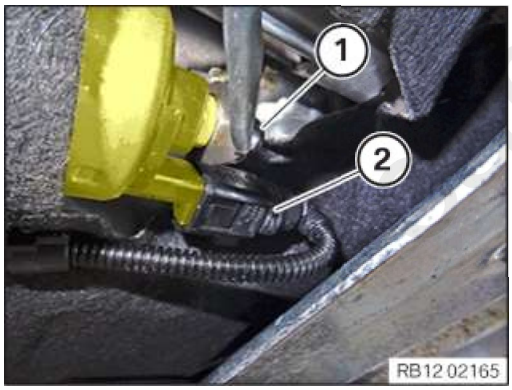
- Fasten expanding rivet (1).



- Fasten expanding rivet (1).



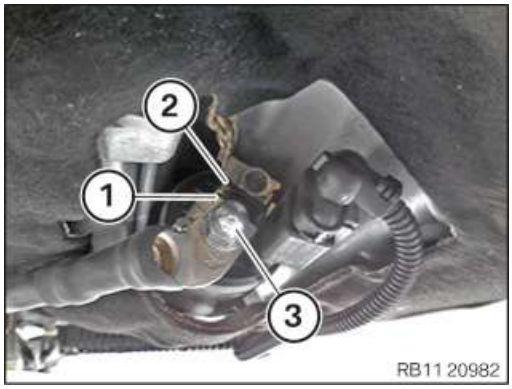
- Insert and position the positive battery cable (2).
- Secure clamps (1).



- Connect connectors (2) and lock.

  The connector (2) must engage audibly.
- Tighten the nut (1) hand-tight.

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CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

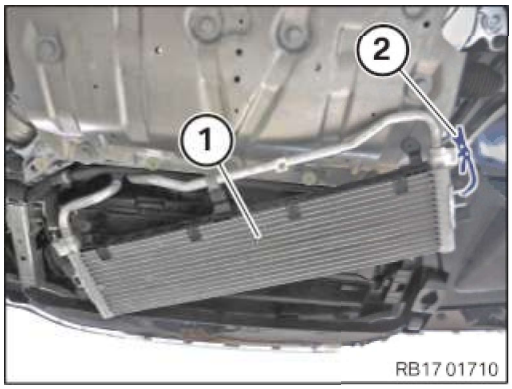
- Route the positive battery cable without abrasions and do not trap.

- Attach positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

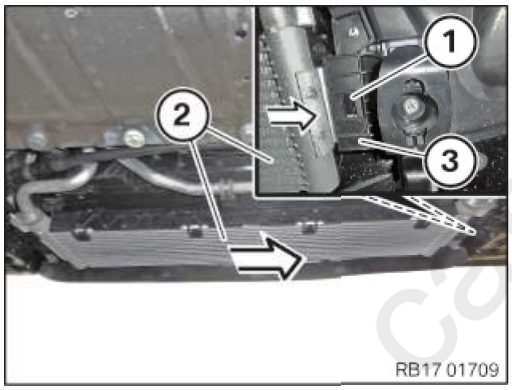
Battery positive lead to starter

M8		Tightening torque	13,5 Nm

43 – If installed: Secure engine oil cooler



- Remove the cable straps (2).
- Position engine oil cooler (1).



- Feed in and install the engine oil cooler (2) on the holder (3) in the direction of the arrow.
- Ensure that the lock (1)engages audibly.

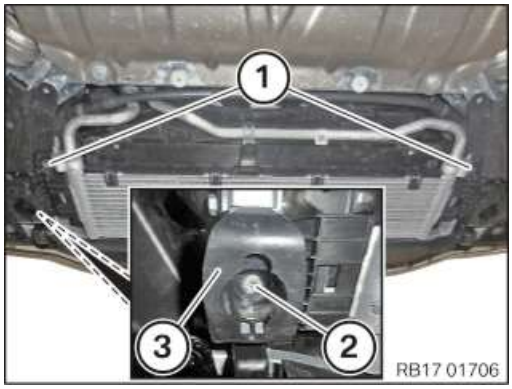


- Tighten down screw (1).

Engine oil cooler to bumper support

M6X25		Tightening torque	8 Nm

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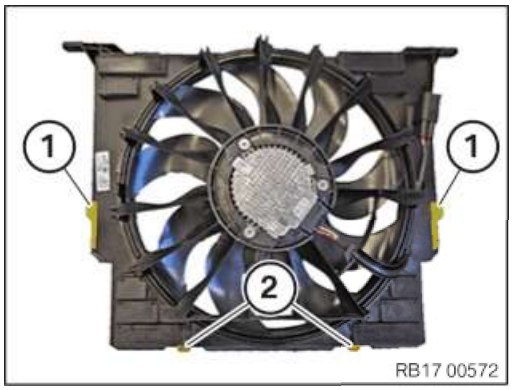
- Renew rivet (2).

  Parts: Rivet
- Install and rivet damper (3).
- Tighten the screws (1).

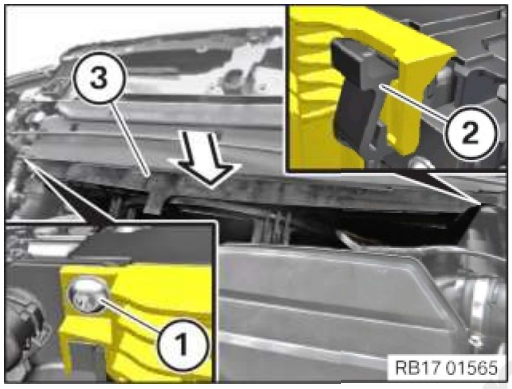
Cover, front bottom on side

Hexagon screw for thermoplastic		Tightening torque	3 Nm

44 – Install fan cowl



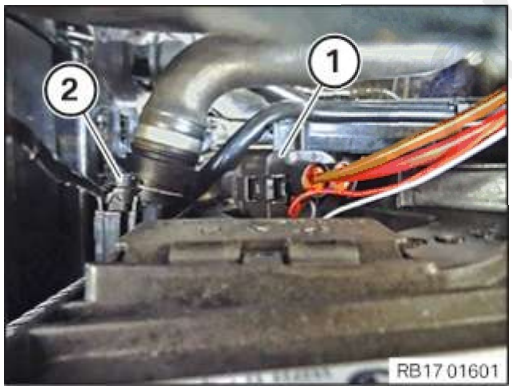
- Feed guides (1) into the radiator.
- Feed guides (2) into the charge air cooler.



- Guide in and install fan cowl (3) **carefully** in the direction of the arrow.
- Ensure that the lock (2)engages audibly.
- Tighten down screw (1).

Fan cowl with electric fan on radiator

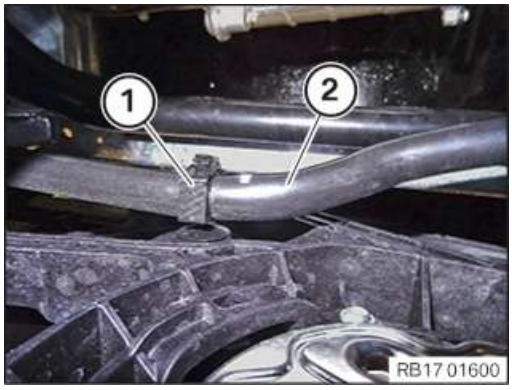
TS6x20		Tightening torque	6,5 Nm



- Connect connectors (2) and lock.

  The connector (2) must engage audibly.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

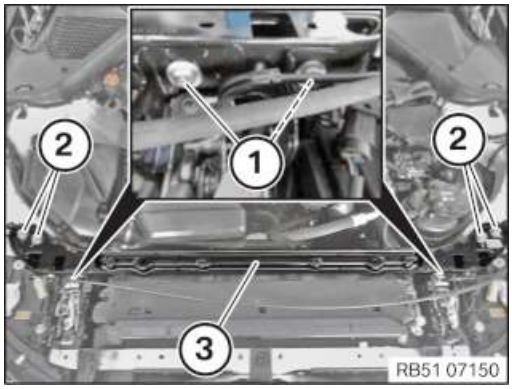


- **If installed:** Secure the transmission oil line (2).

  Insert and install the transmission oil line (2).

  Lock holder (1).

45 – Install the rear top cross connection



- Guide in and position the top rear cross connection (3).
- Tighten the screws (1).

Top rear cross connection to bonnet catch support

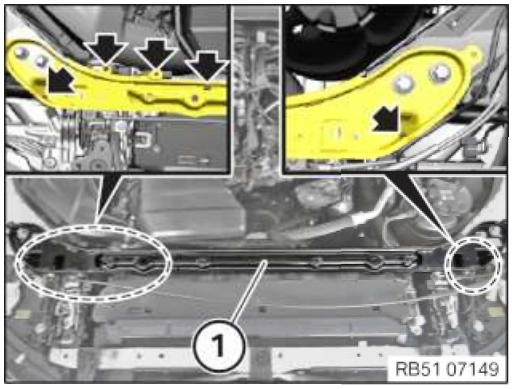
Flat-head screw M6x20		Tightening torque	11,8 Nm

- Renew screws (2).

  Parts: Bolts
- Tighten the screws (2).

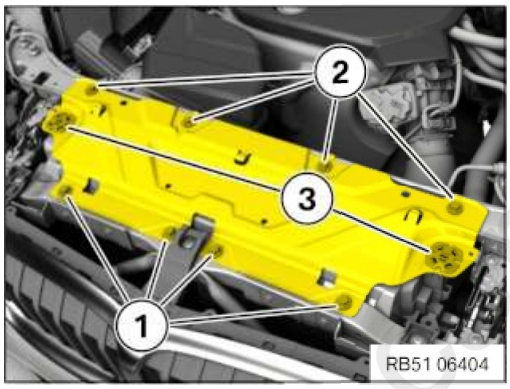
Rear top cross connection to wheel arch carrier support

M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °



- Secure the clips (arrows) in the marked areas to the top rear cross connection (1).

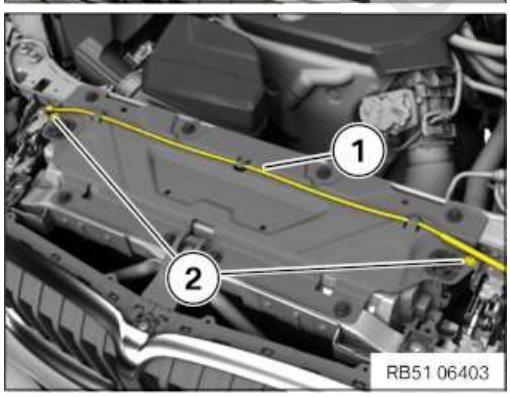
46 – Installing the top cross connection



- Set and position upper cross connection with holders (3) from above.
- Tighten down screws (1) and (2).

Cross connection, top

M8x20		Tightening torque	28 Nm



- Tighten down screws (2).

Cross connection, top

M6x20		Tightening torque	11,8 Nm

- Attach Bowden cable (1) on the upper cross connection.

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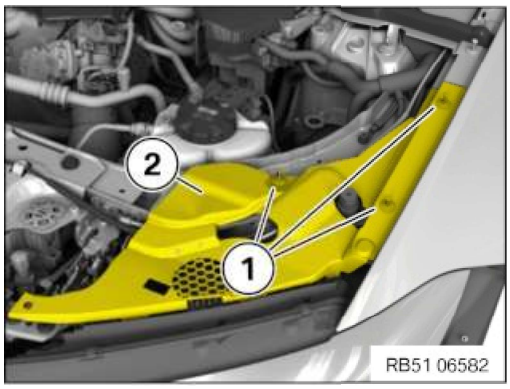
- Clip in the housing for the coupling of the Bowden cables (1).

47 – Install the cover in the engine compartment at top left and right partially

NOTICE

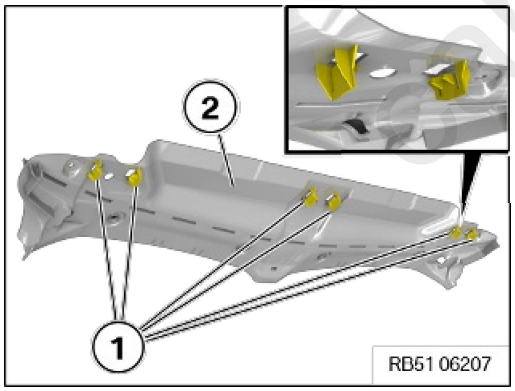
Description is for left component only. Procedure on the right side is identical.

▸ **Installing the cover in the engine compartment on top partially**



- Install the cover in the engine compartment on top (2).
- Secure expanding rivet (1).

48 – Installing cover for engine compartment centre



Check

- Check latch mechanisms (1) of cover for engine compartment centre (2) for damage.

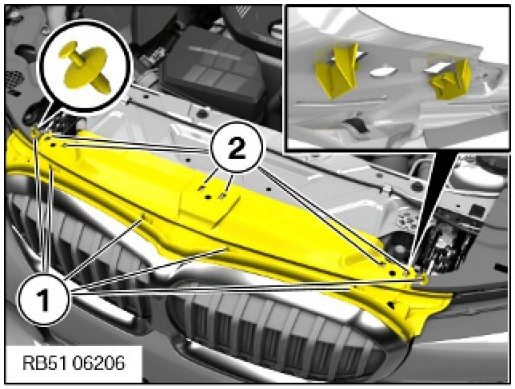
Result

» The latch mechanism (1) is damaged.

Measure

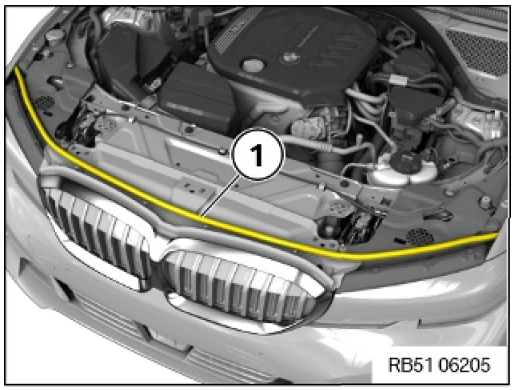
- Renew cover for engine compartment centre (2).

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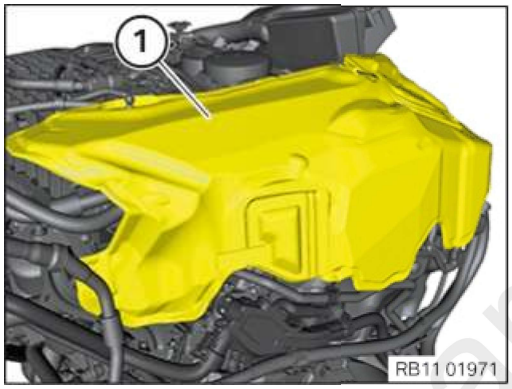
- Guide in the cover for the engine compartment centre from the rear and position it.
- Clip in the cover for the engine compartment centre with latch mechanisms (2).
- Mount all expanding rivets (1).

49 – Install the seal for the front bonnet



- Position the bonnet seal(1) and connect it on the mounting on the bumper and on the headlights.

50 – Installing acoustic cover at rear



- Make sure the acoustic cover (1) is correctly positioned on the rear side of the engine.



- Install the acoustic cover (1) from the top and clip it in into the marked areas.

51 – Install the seal for the bonnet

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- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

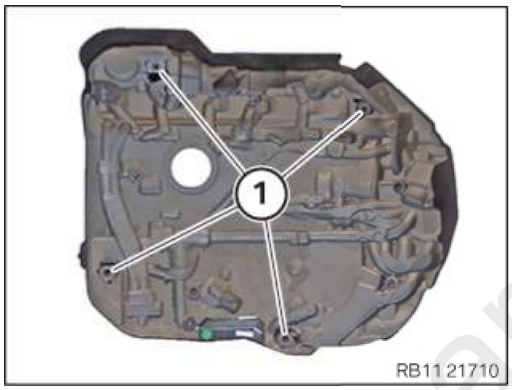
52 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover.

- Disassemble or mount the acoustic cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

53 – Disconnecting all battery earth leads

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- See additional information.

54 – Checking/topping up oil level in automatic transmission

Prerequisite

Vehicle in horizontal position.

The vehicle is secured against rolling away.

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

TECHNICAL INFORMATION

To set the correct oil level, it is mandatory that the service function "Transmission control unit: Oil-level adjustment" is carried out with the diagnosis system.

TECHNICAL INFORMATION

Performing oil-level adjustment:

Certain fault memory entries may require an oil-level adjustment in the automatic transmission and after repairs have been completed (e.g. exchange of mechatronics, exchange of the converter, exchange of the transmission, servicing of automatic transmission oil).

TECHNICAL INFORMATION

The automatic transmission fluid specified by BMW must be used for the automatic transmission.

For additional information see: SBS-ANL-SBS1996-240596143_A14 (automatic transmission fluid for ZF transmissions, etc.)

- Connect diagnosis system.
- Observe preconditions for the oil-level adjustment with the diagnosis system:
  - Precondition for beginning: Transmission oil temperature 30°C to 40°C.
  - Precondition for ending: Transmission oil temperature 40°C to 50°C.
- Call up service function (drive).
- Carry out oil-level adjustment in accordance with instructions.

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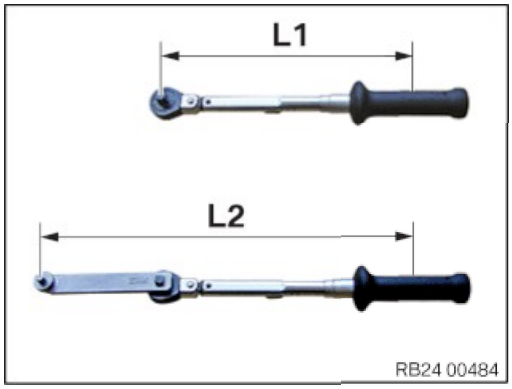
- **Top up the automatic transmission fluid:**
- Loosen the oil filler plug (1) using the special tool 2 405 614.
- Top up automatic transmission fluid according to the instructions in the diagnosis system.

GA8HP51Z transmission capacity

	min. 9,28 l
Transmission oil:	Automatic transmission fluid ATF 3+

GA8HP76Z transmission capacity

	min. 9,35 l
Transmission oil:	Automatic transmission fluid ATF 3+



TECHNICAL INFORMATION

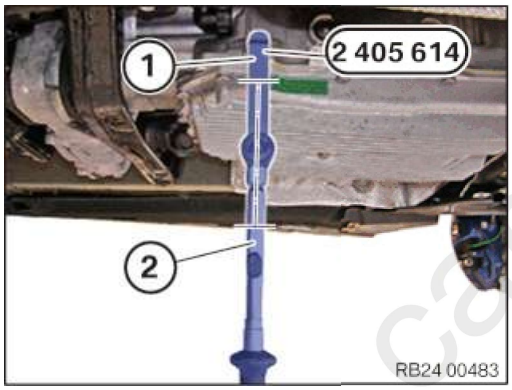
The setpoint torque deviates from the torque to be set when using special tool 2 405 614.

- **Converting the setpoint torque into the torque to be set:**

  (setpoint torque x L1) : L2 =torque to be set.

  L1 = Length from the centre of the handle to the reversible ratchet head

  L2 = Length from the centre of the handle to the engaging of the special tool in the bolt.



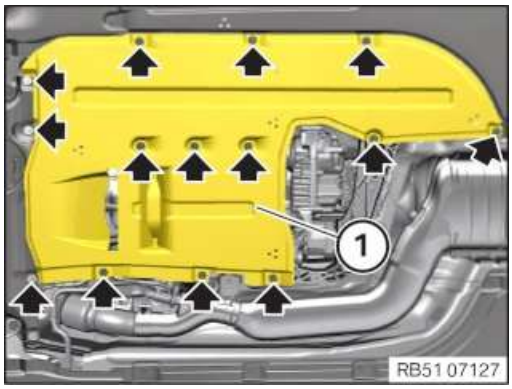
- Renew the oil filler plug (1) and the sealing ring.

  Parts: Oil filler plug, sealing ring
- Make sure that the special tool 2 405 614 and the torque wrench (2) align while tightening the oil filler plug (1).
- Tighten the oil filler plug (1) with the special tool 2 405 614 and the torque wrench (2).

Oil filler plug

M18x1.5		Tightening torque	35 Nm

55 – Installing underbody protection at rear



- **Version 1:**

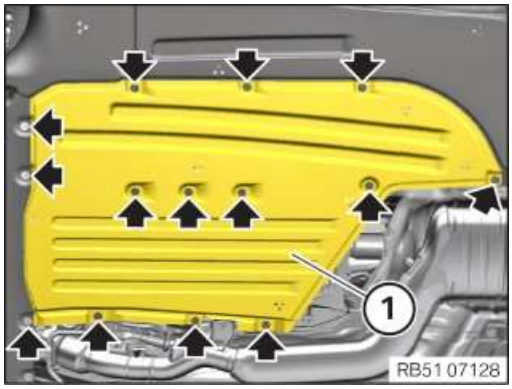
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

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- **Version 2:**

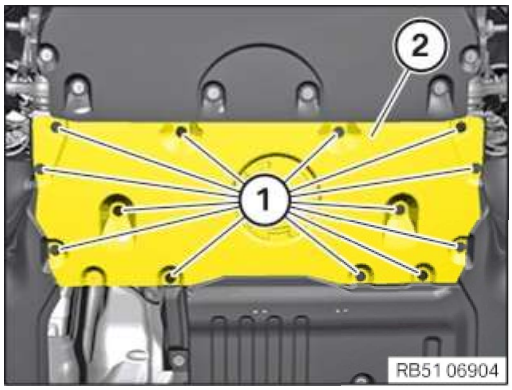
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

56 – Installing the centre underbody protection



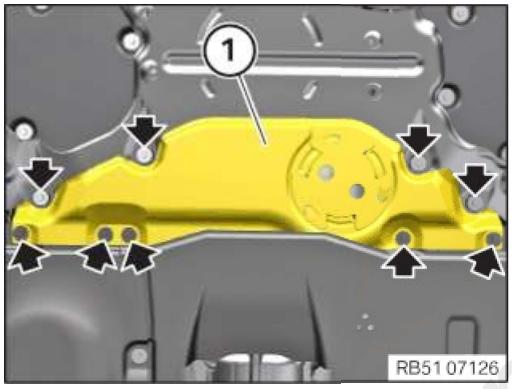
- **Version with rear-wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

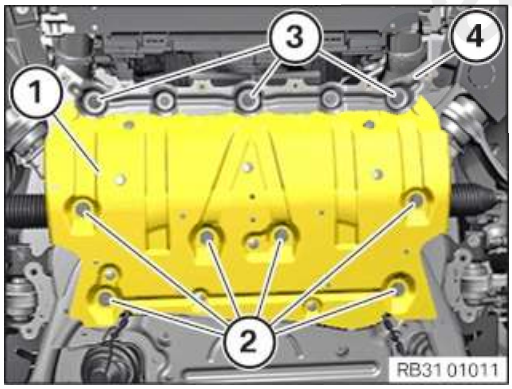
  Guide in and install the centre of underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

57 – Installing the stiffening plate

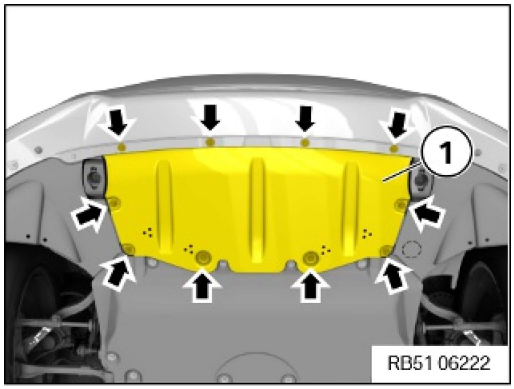


- Position stiffening plate (1).
- Screw screws (2) in.
- Position holder of underride protection (4).
- Screw screws (3) in.
- Tighten down screws (2) and (3).

Stiffening plate to front axle support

M10		Tightening torque	56 Nm

58 – Installing the front underbody protection



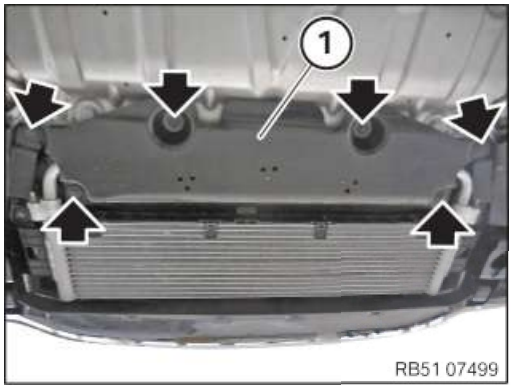
- **Version 1:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



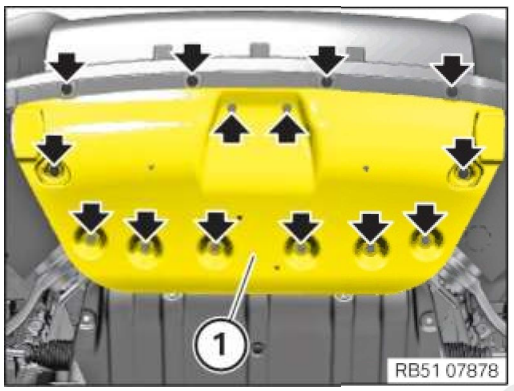
- **Version 2:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version 3:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Additional Information

Overview of Tightening Torques

Flywheel to crankshaft — Used in step 30

M12x1.5	Renew screws.	Jointing torque	45 Nm
		Angle of rotation	40 °

Torque converter to flywheel — Used in step 31

M10	Renew screws.	Tightening torque	56 Nm

Transmission to engine — Used in step 3132

M8		Tightening torque	19 Nm
M12		Tightening torque	66 Nm

Ground strap to transmission or body — Used in step 31

M8		Tightening torque	19 Nm

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Catalytic converter to holder — Used in step 32

M8 nut	Renew nut.	Tightening torque	28 Nm

Transmission cross member to body — Used in step 33

M8	Renew screws.	Tightening torque	19 Nm

Transmission bearing support to body — Used in step 34

M8	Renew screws.	Tightening torque	19 Nm

Transmission oil line to transmission — Used in step 35

M6x25	Renew the sealing ring.	Tightening torque	8 Nm

Transmission oil line on holder — Used in step 35

M6		Tightening torque	8 Nm

Retaining plates for vehicle underbody cover — Used in step 36

Sheet metal nut	Replace nuts.	Tightening torque	3 Nm

Propeller shaft before the front axle differential — Used in step 37

Renew screws. Jointing torque and angle of rotation must be observed without fail.		Tightening torque Angle of rotation	25 Nm 45 °

Front flexible disc to propeller shaft — Used in step 38

M12	Renew screws. Comply with jointing torque and angle of rotation. Tightening via screw.	Jointing torque Angle of rotation	55 Nm 90 °

Centre mount to body — Used in step 38

M8		Tightening torque	19 Nm

Heat shield to vehicle underbody — Used in step 39

Screws and nuts		Tightening torque	3 Nm

Rear silencer to body / bumper support — Used in step 40

M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier — Used in step 40

Nut M8	Renew nut.	Tightening torque	19 Nm

Front pipe / petrol particulate filter on transmission holder — Used in step 40

M8	Renew nut.	Tightening torque	19 Nm

Exhaust system to catalytic converter — Used in step 40

Ribbon cable clamp	Renew flat band clip.	Tightening torque	26 Nm

V-clip to catalytic converter — Used in step 40

V-band clamp	Renew V-band clamp.	Tightening torque	22 Nm

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Connecting support to tunnel — Used in step 41

M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Starter motor to engine — Used in step 42

M8X60		Tightening torque	19 Nm

Battery positive lead to starter — Used in step 42

M8		Tightening torque	13,5 Nm

Engine oil cooler to bumper support — Used in step 43

M6X25		Tightening torque	8 Nm

Cover, front bottom on side — Used in step 43

Hexagon screw for thermoplastic		Tightening torque	3 Nm

Fan cowl with electric fan on radiator — Used in step 44

TS6x20		Tightening torque	6,5 Nm

Top rear cross connection to bonnet catch support — Used in step 45

Flat-head screw M6x20		Tightening torque	11,8 Nm

Rear top cross connection to wheel arch carrier support — Used in step 45

M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °

Cross connection, top — Used in step 46

M8x20		Tightening torque	28 Nm

Cross connection, top — Used in step 46

M6x20		Tightening torque	11,8 Nm

Oil filler plug — Used in step 54

M18x1.5		Tightening torque	35 Nm

Underbody protection — Used in step 5556

Hexagon screw		Tightening torque	3 Nm

Stiffening plate to front axle support — Used in step 57

M10		Tightening torque	56 Nm

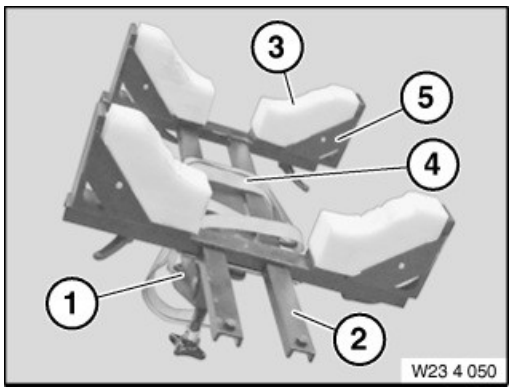
Underbody protection front — Used in step 58

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Overview of Special Tools

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0 495 498 (23 4 050) Support



Common

Used in step 2533

Usage	(universal gearbox holder) Support for removing and installing manual gearboxes and automatic transmissions for BMW & RR.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 07 06 (256)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
3	0 495 549 (23 4 053)		**Insert** (Foam material insert (1 set = 4 pieces)) deleted, can be ordered only via tool set	
1	0 495 547 (23 4 051)		**Joint** Available only as a complete tool set 23 4 050 (83 30 0 495 498) - as of 16.07.12.	
2	0 495 548 (23 4 052)		**Frame** (Basic frame) Available only as a complete tool set 23 4 050 (83 30 0 495 498) - as of 16.07.12.	
4	0 495 550 (23 4 054)		**Belt** (Tensioning strap) Available only as a complete tool set 23 4 050 (83 30 0 495 498) - as of 16.07.12.	
5	0 496 018 (23 4 055)		**Support** (Fixture for foam insert) Available only as a complete tool set 23 4 050 (83 30 0 495 498) - as of 16.07.12.	

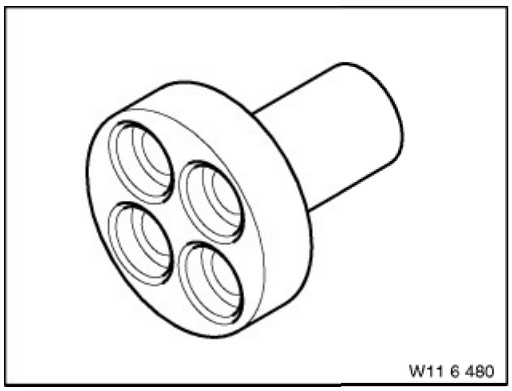
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2 219 012 Hydraulic lifter



Common	Used in step 2533
Usage	For raising and lowering various vehicle components.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 90 (207)

0 493 380 (11 6 480) Connector

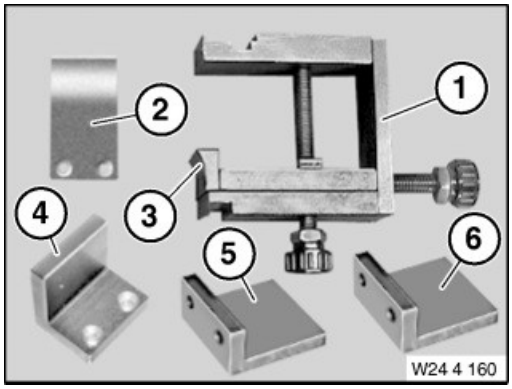


Common	Used in step 2731
Usage	For turning over engine at crankshaft hub (vibration absorber) when adjusting valve timing
Included in the tool or work	
Storage location	B2
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 494 451 (24 4 160) Holder

Used in step 2731

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Common

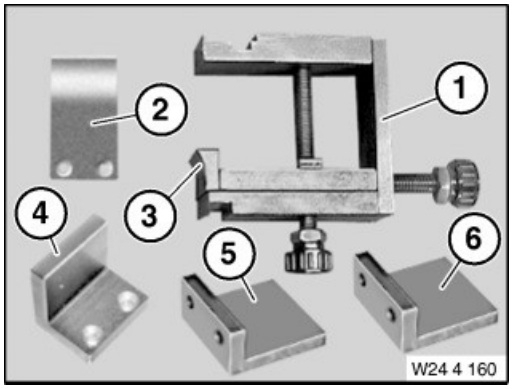
Usage	For securing converter during removal and installation of transmission
Included in the tool or work	
Storage location	B45
Replaced by	
In connection with	
SI-Number	01 11 02 (908)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
2	0 494 479 (24 4 162)		**Shaped element** For converter version N73 discontinued, available as part of set of special tools only	
5	0 494 965 (24 4 165)		**Shaped element** Transmission: GA6 HP19 in E87, E90 Discontinued, available as part of set of special tools only	
3	0 494 477 (24 4 163)		**Shaped element** For converter version M57TU discontinued, available as part of set of special tools only	
1	0 494 478 (24 4 161)		**Basic body**	
4	0 494 622 (24 4 164)		**Shaped element** For converter version M54 discontinued, available as part of set of special tools only	
6	0 496 061 (24 4 166)		**Shaped element** Transmission: GA6L45R (GM6) in E83 / N52K Discontinued, available as part of set of special tools only	

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0 494 622 (24 4 164) Shaped element



Common Used in step 27

Usage	For converter variant M54 Deletion, only available via tool set
Included in the tool or work	0 494 451
Storage location	C46
Replaced by	
In connection with	
SI-Number	

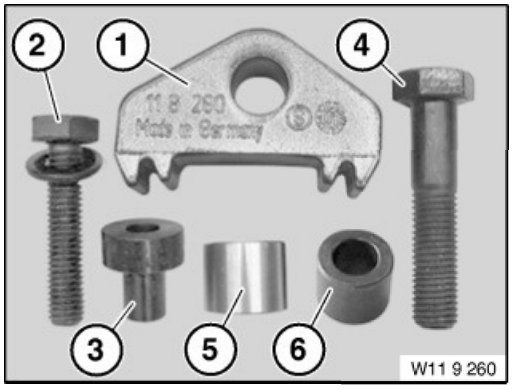
0 494 213 (24 2 390) Cap



Common Used in step 2731

Usage	(protective cap) For sealing off the guide sleeve of the transmission connector
Included in the tool or work	
Storage location	C49
Replaced by	
In connection with	
SI-Number	01 14 01 (766)

0 493 938 (11 9 260) Holder



Common Used in step 2830

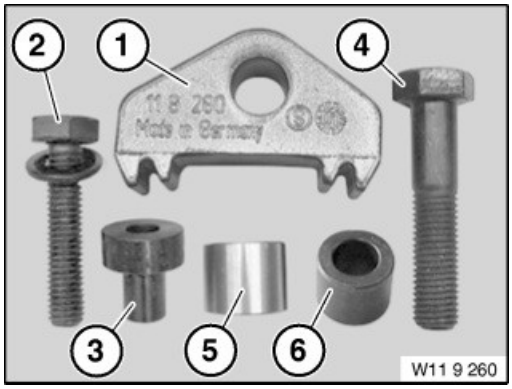
Usage	(Counter support with screw connection) For holding the flywheel when gearbox is removed
Included in the tool or work	
Storage location	A44
Replaced by	
In connection with	
SI-Number	01 01 01 (662)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 494 034 (11 9 261)		**Holder** (Individual counter support)	
2	0 494 035 (11 9 262)		**Screw** (Bolt (thread M10) with washer) For screwing counter support	
3	0 494 129 (11 9 263)		**Bush** (Bush for counter support) For counter support, for retaining flywheel when gearbox is removed Engine: N62, N73	
6	0 495 216 (11 9 266)		**Bush** For counter support, for retaining flywheel when gearbox is removed Engine: M57TU2	
4	0 494 130 (11 9 264)		**Screw** (Bolt (thread M12)) For counter support for retaining flywheel when gearbox is removed	
5	0 494 793 (11 9 265)		**Bush**	

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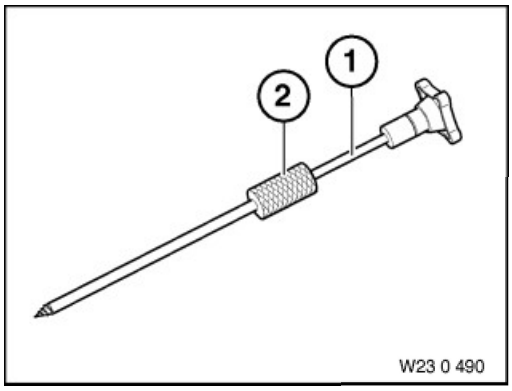
0 494 130 (11 9 264) Screw



Common Used in step 2830

Usage	(Bolt (thread M12)) For counter support for retaining flywheel when gearbox is removed
Included in the tool or work	0 493 938
Storage location	A44
Replaced by	
In connection with	
SI-Number	

0 491 454 (23 0 490) Puller



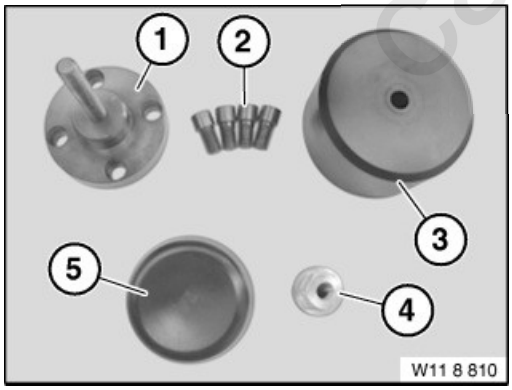
Common Used in step 29

Usage	For removing shaft seal
Included in the tool or work	
Storage location	A13
Replaced by	
In connection with	
SI-Number	01 15 96 (106)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 491 455 (23 0 491)		**Rod** With self-tapping screw Deletion, only available via tool set	
2	0 491 456 (23 0 492)		**Weight** (Weight)	

0 496 137 (11 8 815) Holding sleeve

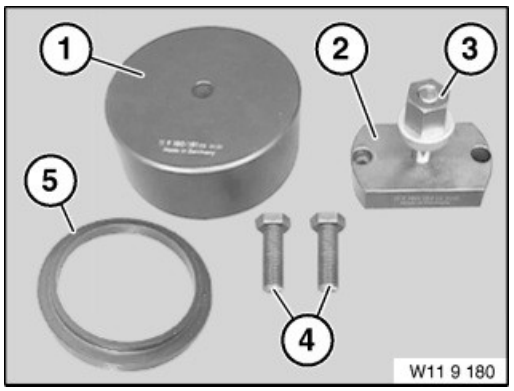


Common Used in step 29

Usage	(Slip sleeve) Liquidation of existing inventory and then available only via complete tool set 11 8 810 = 83 30 0 496 132 - status 09.12.2011
Included in the tool or work	0 496 132
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

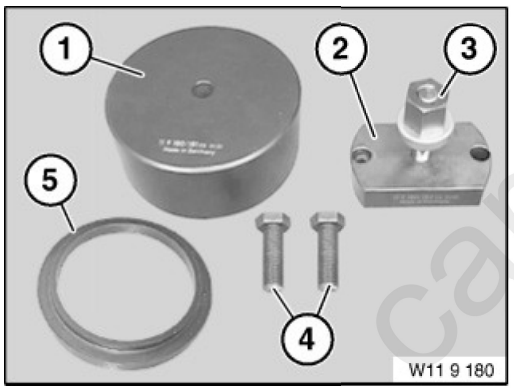
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0 494 029 (11 9 182) Synchronising key



Common	Used in step 29
Usage	
Included in the tool or work	0 493 881
Storage location	C26
Replaced by	
In connection with	
SI-Number	

0 494 031 (11 9 184) Screw



Common	Used in step 29
Usage	(screws (2 x))
Included in the tool or work	0 493 881
Storage location	C26
Replaced by	
In connection with	
SI-Number	

2 360 215 Adapter



Common	Used in step 29
Usage	For installing the rear radial shaft seal. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	B56
Replaced by	
In connection with	11 9 180 = 0493881
SI-Number	01 13 14 (098)

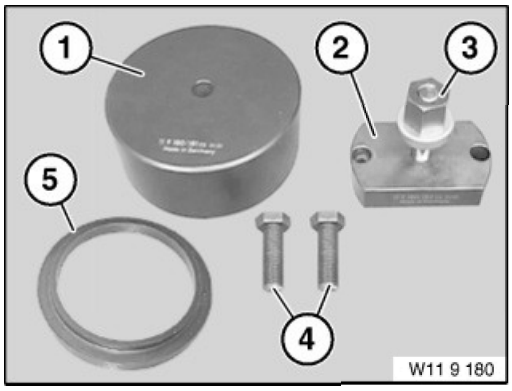
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0 494 028 (11 9 181) Bush



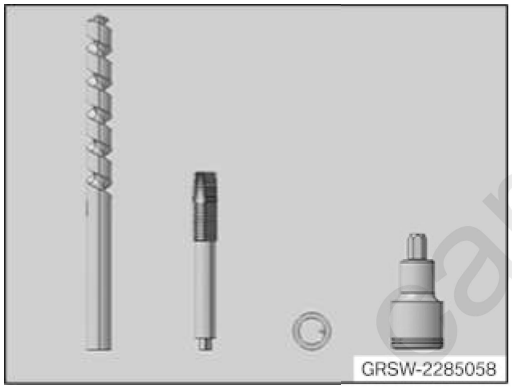
Common	Used in step 29
Usage	
Included in the tool or work	0 493 881
Storage location	C26
Replaced by	
In connection with	
SI-Number	

0 494 030 (11 9 183) Nut



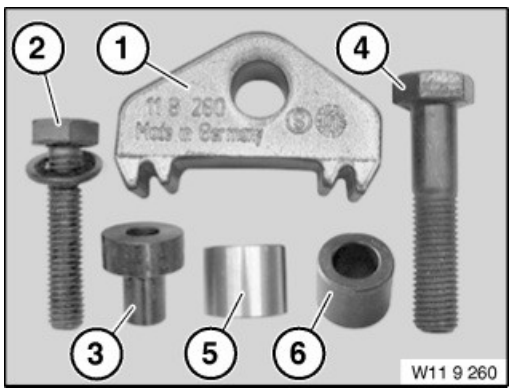
Common	Used in step 29
Usage	
Included in the tool or work	0 493 881
Storage location	C26
Replaced by	
In connection with	
SI-Number	

2 285 058 Tool set



Common	Used in step 30
Usage	
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 02 14 (069)

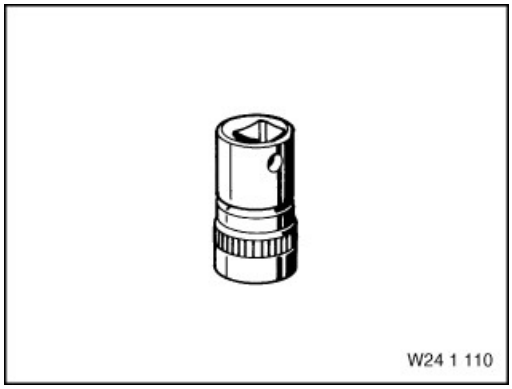
0 494 034 (11 9 261) Holder



Common	Used in step 30
Usage	(Individual counter support)
Included in the tool or work	0 493 938
Storage location	
Replaced by	
In connection with	
SI-Number	

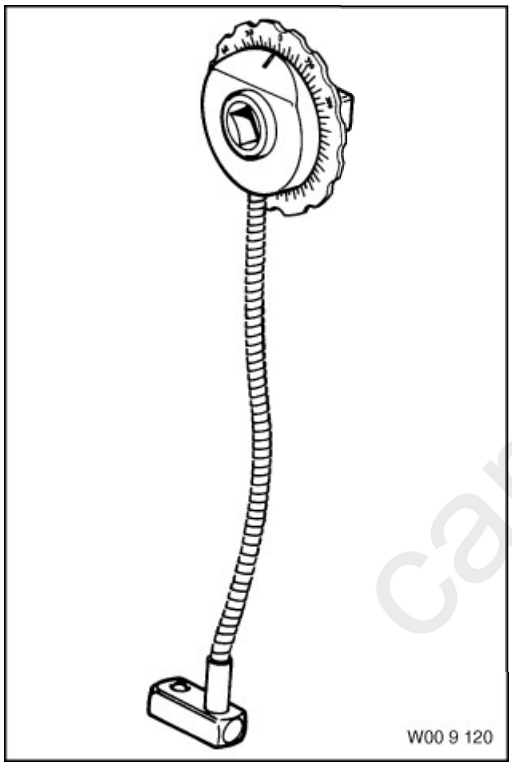
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0 491 667 (24 1 110) Socket wrench insert



Common	Used in step 31
Usage	Loosening and fastening the converter fastener
Included in the tool or work	
Storage location	A14
Replaced by	
In connection with	
SI-Number	01 04 86 (566)

0 490 504 (00 9 120) Torque angle measuring dial



Common	Used in step 38
Usage	For torsion angle adjustment of cylinder head bolts (all engines) And reinforcement plate front axle support E46
Included in the tool or work	
Storage location	A4
Replaced by	
In connection with	
SI-Number	

2 405 614 Socket wrench



Common	Used in step 54
Usage	For opening and closing the oil filler plug. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969). Replaced by 2455997
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 33 15 (305)

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Overview Technical Data

GA8HP51Z transmission capacity Used in step 54

	min. 9,28 l

Transmission oil: Automatic transmission fluid ATF 3+

GA8HP76Z transmission capacity Used in step 54

	min. 9,35 l

Transmission oil: Automatic transmission fluid ATF 3+

Screw-in depth of thread cutter Used in step 30

Screw-in depth	18 mm

Links

Repair instructions	Used in step
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Operating materials	Used in step
14.0 Automatic transmission fluid for ZF-transmission GA8HP45Z / GA8HP50Z / GA8HP70Z / GA8HP90Z / GA8P70H / GA8P75H / GA8HP75Z	54

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