

## 61 20 ... Battery replacement information

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorisation and different types of equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

**If the vehicle electrical system of electric vehicles is not accessible due to a faulty 12 V battery, proceed as follows:**

### [Battery exchange in electrified vehicles](#)

Vehicles with the automatic engine start-stop function or particular engine types and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents possible short-circuiting.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

### **Vehicles with energy management systems (IBS, power module): Register battery exchange**

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

If the performance readiness drops below a defined minimum, a Check Control message will be generated to advise the driver that the battery must be replaced.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

#### *Note:*

Only this registration/logon will ensure that the corresponding Check Control message will go out again.

#### *Diagnosis system:*

##### Register battery exchange

- Service functions
- Body
- Voltage supply
- Register battery exchange

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

#### *Programming system:*

- Battery retrofitting

## 11 00 ... Handling components after flood damage

Flood damage can occur if the permissible fording depth of a vehicle is exceeded. Ingress of water can cause damage to the engine (water shock) or components.

Because dirt particles generally enter into the component with the water (e.g. starter motor, wiring harness), the components need to be thoroughly inspected.

Residual moisture in the components leads to corrosion (increased contact resistance in the component), which can lead to a component failure at a later time.

If water ingress into the electrical components cannot be ruled out, it is recommended to replace the component to ensure correct functioning through the vehicle lifetime.

## 12 00 ... Instructions for removal and replacement of control units

### **Important!**

- Disconnecting the vehicle battery will cancel the fault memories of control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories. Investigate stored faults and, once any faults have been remedied, cancel the fault memory.
- Control unit plugs should only ever be connected and disconnected while the ignition is turned off.
- The removal and installation of components, relays, fuses etc. can cause faults to be stored in fault memories capable of self diagnosis. Always interrogate the fault memories after completing work on the electrical system.
- Investigate stored faults and, once any faults have been remedied, cancel the fault memory.
- If necessary, initialise power window regulator [Initialise power window regulator](#)

On replacement of the DME/DDE control unit note the following:

- In every case use the diagnosis system to read out the hardware/software version of the corresponding control unit.  
Comply with the diagnosis system instructions for the encoding and programming work operations.  
On vehicles with an electronic immobiliser, comply with the diagnosis system instructions.
- In every control unit certain mean values are stored that are the basic values. The control unit receives different input values according to the engine condition. The teachable system compares the input values against the stored basic values and then forms the associated control commands. The control commands are forwarded to the corresponding actuators.
- When the DME control unit is de-energized for a long period (over one hour), the teachable system then loses the stored values. When a deleted control unit is returned to service or a new control unit is installed, the teachable system itself must read in and store the input value of the associated engine as new basic values.
- This process may cause uneven idle and faults in coasting mode after starting. Depending on the engine characteristics, it may take some time until all values have been compared with the engine condition.
- Therefore, comply with the following procedure before replacement or reinstallation of a DME/ DDE control unit is carried out:
  1. If possible, bring the engine up to its operating temperature prior to replacement of the control unit.
  2. Change control units and drive the vehicle with changing engine speeds.

## 61 00 ... Notes for disconnecting and connecting the vehicle battery

Observe [safety informations for handling vehicle battery](#).

### Before disconnecting vehicle battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

#### Note:

If the ignition is not switched off when the vehicle battery is disconnected, fault memories may be set in some control units.

#### Attention!

- There is a danger of mixing up battery cables: if the positive battery cable and battery earth lead are the same colour and you are in doubt, follow the polarity to the vehicle battery, then mark and cover the leads
- The on-board computer and clock may lose your data.

### General notes on disconnecting the vehicle battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Disconnect terminal of [battery earth lead](#) from the battery. Cover battery negative terminal(s) and secure.
- Disconnect [both battery earth leads](#) in version with auxiliary battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the vehicle battery is connected.
- When installing battery terminal: Tightening torque [61 21 1AZ](#).

Only lead AGM battery:

- On vehicles with IBS at negative battery terminal:  
**Do not under any circumstances pull/lever off pole shoes by force.**  
**Do not under any circumstances release the hexagon socket screw of the IBS.**

### Note the following after having connected the vehicle battery:

#### Attention!

The scope of application of some systems may be restricted after an open circuit.

Personal Profiles may also be lost.

Settings or activations must be carried out, depending on the equipment specification.

For example:

- Activate [slide/tilt sunroof](#), if necessary
- Activate [power window](#), if necessary

Refer to the diagnosis system for further vehicle-specific information.

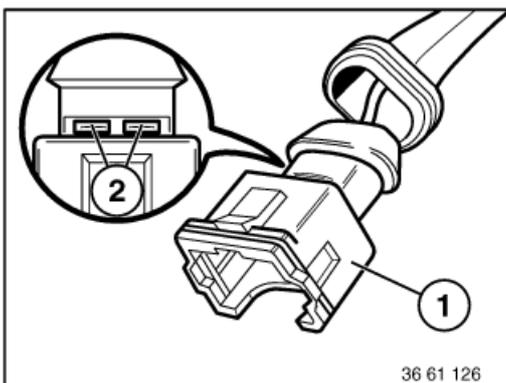


**Special tools required:**

- [61 0 300](#)
- [61 0 400](#)
- [61 1 100](#)

**Abbreviations of contacts and what they mean:**

ELA	Strand seal
D 1.5 / 2.5 / 3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
MDK	Miniature double flat spring contact
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact



**Important!**

The contacts can be changed on ultrasonically welded connectors (1).

Ultrasonically welded connectors (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



**Note:**

Special tools referred to in the repair instructions below are contained in the following special tool sets:

- Unlocking and pressing-off tool 61 1 150 is replaced as of 09/2005 by [61 0 300](#) (BMW) and [61 0 400](#) (MINI)
- Release and pressing-off tool [61 1 100](#) (engine)

## Repair instructions for opening connector housings and removing contacts of different connector systems:

### Connector system D 1.5/D 2.5:

- [Circular connectors, 7- or 8-pin, system D 2.5](#)
- [Circular connectors, 13-pin, system D 2.5](#)
- [Circular connectors, 20-pin, system D 2.5](#)
- [Circular connectors, 4-, 7-, 10-, 12- or 25-pin, system D 1.5/D 2.5](#)
- [In-line connectors, 15-pin, system D 2.5](#)
- [In-line connectors, 8-, 12-pin, system D 2.5](#)
- [In-line connectors, 30-pin, system D 2.5](#)
- [In-line connectors, 20-pin, system D 2.5](#)

### Connector system JPT/MDK/DFK:

- [In-line connectors, 2-pin, System JPT ELA](#)
- [In-line plugs, 2-pin, System MDK 3 plus 2.8](#)
- [In-line plugs, 4-pin, System DFK ELA](#)

### Connector system Elo/Elo Power:

- [Inline plugs, 4-, 10-pin, System Elo](#)
- [In-line connectors, 6- to 50-pin, System Elo](#)
- [Inline plugs, 3-, 6-pin, System Elo-Power 2.8](#)

### Connector system LSK:

- [Connector housing LSK contact](#)

### Connector system MQS/MPQ:

- [Inline connectors, 6-, 8-pin, System MQS](#)
- [Inline plugs, 2-pin, System MPQ 2.8](#)
- [Control unit connectors, 25-, 35-, 55-, 83-, 88-pin](#)
- [In-line plugs, 24-pin, Hybrid System MQS/MPQ](#)
- [Socket housing 42-, 43-pin, Hybrid System MQS / MPQ](#)
- [Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo Power](#)
- [In-line connectors, 30-pin, Hybrid System MQS/MPQ](#)
- [Socket housings, 5-, 8-pin, System MQS/MPQ](#)
- [Socket housing \(radio connector\), Hybrid System MQS/MPQ](#)

### For connector contact systems not listed, refer to Service Information:

[SI 2 05 05 217](#)

[SI 2 05 06 294](#)

[SI 2 03 08 440](#)

[SI 2 08 06 312](#)

[SI 2 02 08 439](#)

[SI 2 01 08 438](#)

**The following applies in general:**

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

**The following additionally applies:**Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with a special [crimping tool](#).
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:*Note:*

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (**M**edia **O**riented **S**ystems **T**ransport) optical fibres
- Yellow = **ISIS** (**I**ntelligent **S**afety and **I**ntegration **S**ystem) optical fibres
- Orange=repair fibre-optic cables

**Attention!**

- Optical fibres are permitted to show only one junction point (bridge). Replace optical fibres if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat  $\geq 85^\circ$

[Treating cables and fibre-optic cables](#)FlexRay (twisted cables):

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional [butt connectors and heat-shrink tubing](#).

*Note:*

- FlexRay lines may only reveal one separation point (bride); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

[Repairing airbag cables](#)

Ribbon cables:

[Repairing ribbon cables](#)

### **Replacing wiring harnesses**

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.
- [If necessary, re-pin the connector of the repair wiring harness.](#)

*Note:*

**Repair wiring harnesses** can be equipped with an **additional socket housing** (30-pin, for example), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

#### Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**

## 12 00 ... Notes/information on start assistance (jump starting)

Do not start the engine with help of starting sprays.

### Preparation:

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

### Important!

Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

### Operation:

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

### Important!

Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

### Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

## 00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



### Warning!

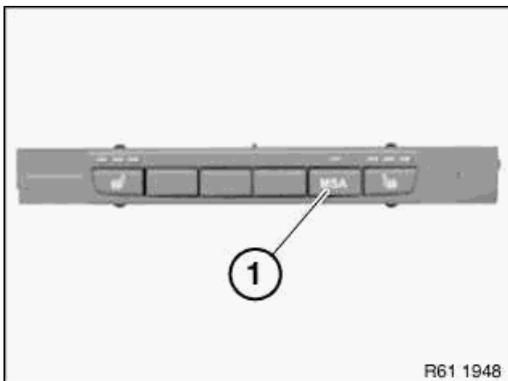
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

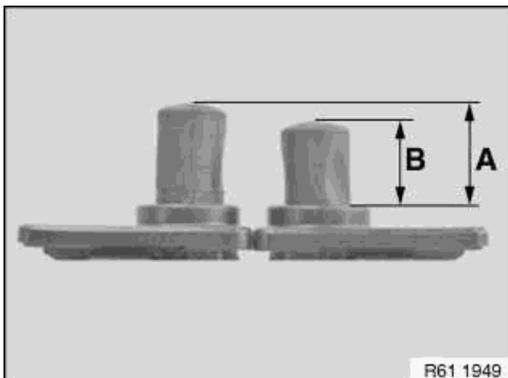
### Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

### MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode  
A = 10 mm
  - Basic setting (engine hood/bonnet open)  
B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



### When working with diagnosis tools:

- Observe instructions in diagnosis tool



*Note:*

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) [Service Information \(bulletin\) 61 01 07 335](#)
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) [Service Information \(bulletin\) 61 01 10 629](#)

## 61 00 ... Safety information on handling hybrid cars

### 1. Qualification:

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently safe vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

### 2. Identification:

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

### 3. Rules of conduct/protective measures:

- Note operating instructions for handling high-voltage battery units.
- Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.
- In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.  
Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

- Prevent escaping substances from entering drains, pits and the sewer system.
- Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.
- Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger (suitable extinguishant: water and water foam).
- A cut 2nd emergency separation point must be repaired with a butt connector.

### 4. Measures before starting work:

- Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**
- It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.
- The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:
  1. seat belt buckle unlocked **and**
  2. the driver's door is open **and**
  3. no brake activated **and**
  4. the accelerator pedal is not activated **and**
  5. speed < 3 km/h (2 mph)
- Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).
- After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.
- Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.  
Work is only permitted to begin if:
  1. Corresponding display in the KOMBI **High-voltage system deactivated** or  
When a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.  
**If it cannot be definitively established that the equipment is de-energised**, work is not permitted to begin. **Danger to life!** Before work begins, a qualified electrician (1000 V AC) must verify that the

system is de-energised using appropriate measuring devices and procedures.

**=> In this case, Technical Support must be contacted!**

- Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.  
Battery charging may result in heating of the high-voltage battery unit. This heating may lead to sporadic launches of the electric fan (switch-on request from the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

5. *Measures during/after activities:*

- Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.
- When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).
- *E72 only:* When the "Power Electronic Box Cover" is removed, the high-voltage system is not permitted to be activated. The high-voltage service disconnect must only be used when the "Power Electronics Box Cover" is completely installed.
- High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.
- When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.
- The specified work steps in the repair instructions must be adhered to exactly.
- High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.
- Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/potential equalisation measurement) are performed automatically by the vehicle. Manual measurement is not therefore necessary.  
For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Follow further [painting notes](#).
- Removed high-voltage battery units must be stored in a manner that protects them from misuse and damage.
- Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

6. *Potential compensation:*

Equipotential bonding lines, high-voltage cables and the battery negative lead to the EME are fitted with safety screws.

- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.

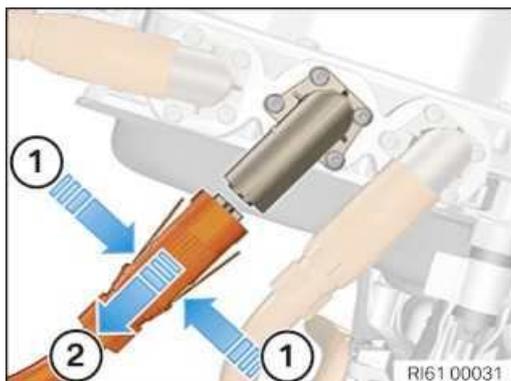
## 61 13 ... Unlocking and disconnecting various plug connections in electrical and hybrid vehicles



### Attention!

Observe the following instructions for handling high-voltage plug connections:

- Damaged high-voltage plug connections must be replaced completely. Repair is not permitted.
- Dirt contamination must be removed before opening the plug connection.



### Disconnect the Hirschmann high-voltage connector:

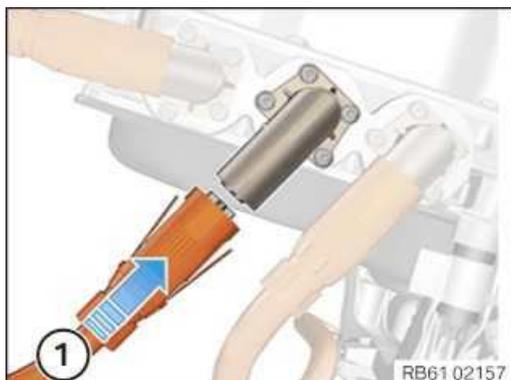
Press the lock (1) on the left and right on the connector in the direction of the arrow.

Pull off connector (2) in direction of arrow.

### Attention!

Connector (2) is difficult to pull off.

In the event of damage to high-voltage connector (2), the complete high-voltage cable must be replaced!

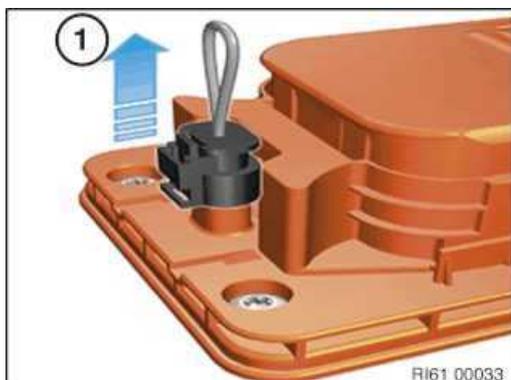


### Connect the Hirschmann high-voltage connectors:

Slide the connector (1) on in the direction of the arrow.

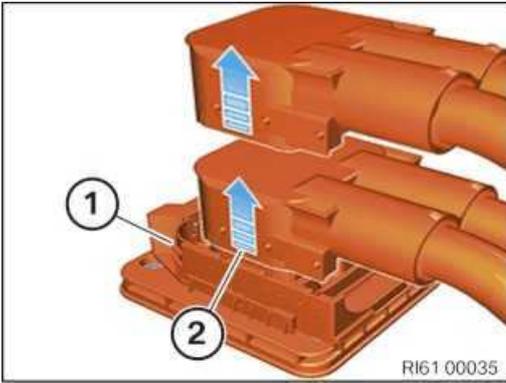
*Note:*

Connector (2) must lock audibly.



### Disconnect the Kostal high-voltage connector:

Unlock and disconnect high-voltage interlock loop (1).



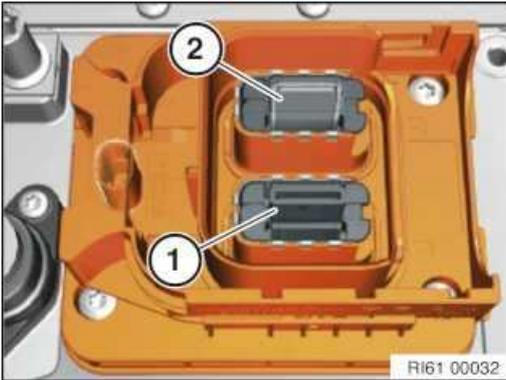
Push the lock (1) fully to the front.

Lift the connector (2) and remove it entirely.

**Attention!**

Plug connection (3) is difficult to pull off.

The connector (2) must be completely pulled off the opposite housing in one step. Damage may be caused to contact protection if connector is only partly pulled off and then closed again!



**Check the Kostal high-voltage connector and connection for damage:**

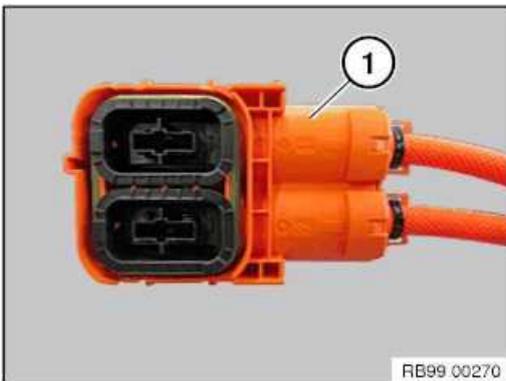
Check the touch protection for damage and correct positioning (1).

**Warning!**

Do not touch unprotected connector (2)!

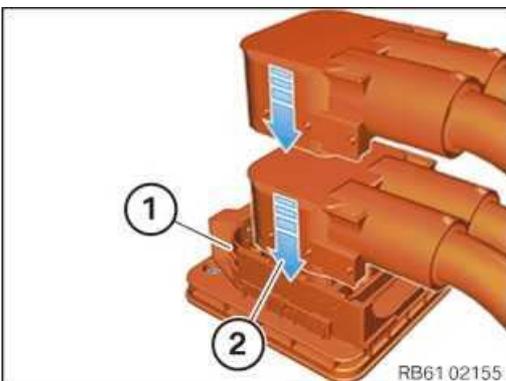
If the contact protection (1) has been pushed to the bottom (2), the high-voltage connector must be refitted.

If contact protection (1) remains in bottom position (2) after reinstallation, the contact protection is faulty and the component must be replaced!



Check the high-voltage connector (1) for damage. **Warning!**

In the event of damage to the high-voltage connector (1), the complete high-voltage cable must be replaced!



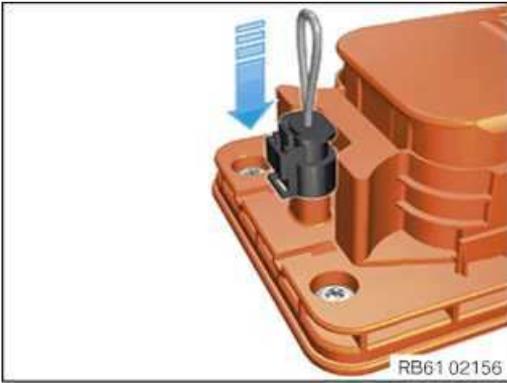
**Connect the Kostal high-voltage connector:**

Connect the connector (2) in one single movement to the counter-housing.

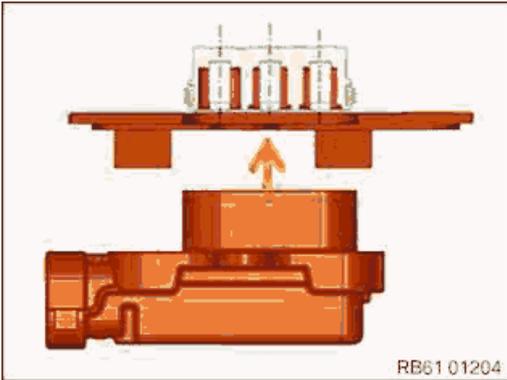
Push the lock (1) fully to the rear.

**Attention!**

Plug connection (3) must be correctly locked by lock (2), otherwise there is a risk of damage.

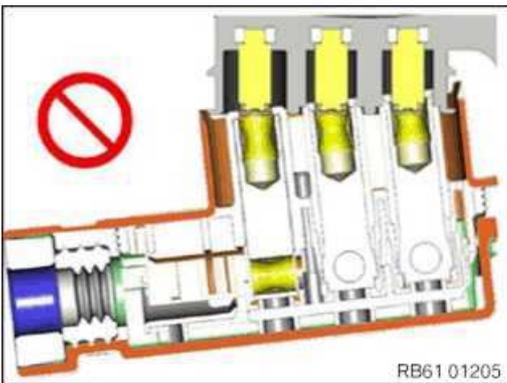


Connect the connector for the high-voltage interlock.



**Three-phase high-voltage connector:**

Connect and disconnect the connector straight.



**Attention!**

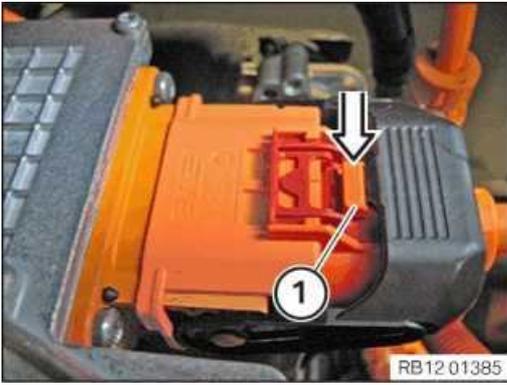
The system is designed to only offer limited protection against damage caused by connectors that are inserted at an angle.

Increased tilted connections will increase the connecting force and the risk of danger.

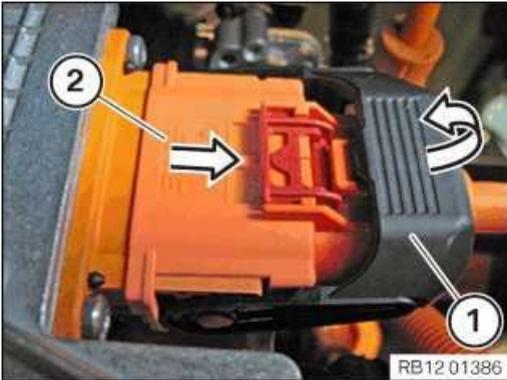


**Disconnect the high-voltage connector from the high-voltage connection of the KLE:**

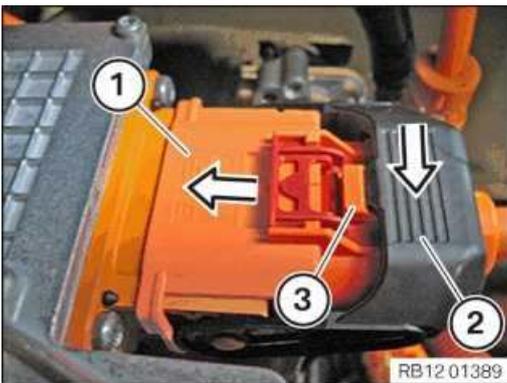
Slide lock (1) in direction of arrow up to stop.



Press lock (1).



Open the lock (1) completely and disconnect the connector (2).



**Connect the high-voltage connector to the high-voltage connection of the KLE:**

Connect the connector (1) to the limit position and close the lock (2).

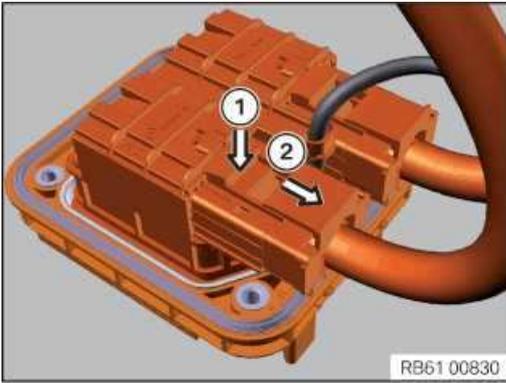
**Attention!**

Lock (2) must snap audibly into place.

The retaining lug of the lock (2) must be positioned completely under the lock (1).



Slide the lock (1) on to the stop in the direction of the arrow.



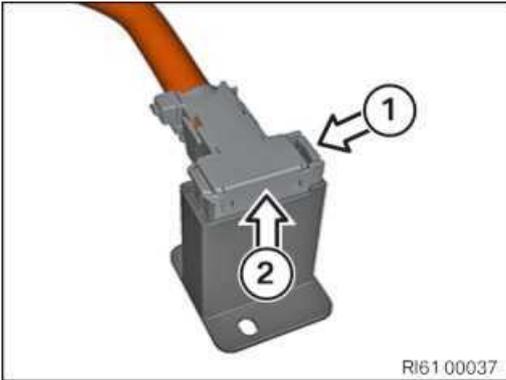
**High-voltage connector on the high-voltage connection of the high-voltage battery unit:**

Press down unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

**Attention!**

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



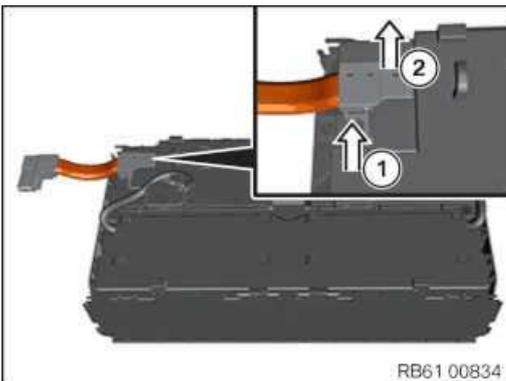
**High-voltage connector on the cell module I01:**

Press unlocking device (1) together and pull off connector upwards (2).

**Attention!**

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



**High-voltage connector on the cell module (cell module connecting line):**

Press unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

**Attention!**

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.

Switch off ignition.



Connect diagnosis system.

Switch the ignition on.

Select "Programming".

Follow the instructions in the diagnosis system.

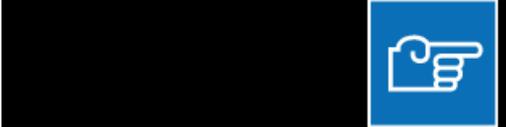
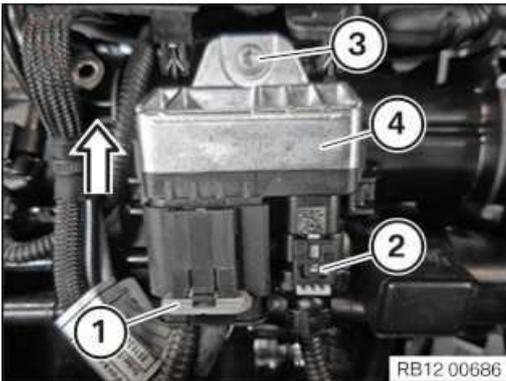
Adjust the following control units:

- EWS (electronic immobiliser)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

Follow Service Information "Diagnosis and Encoding" on the topic of programming.

**Necessary preliminary tasks:**

- Remove [acoustic cover](#)

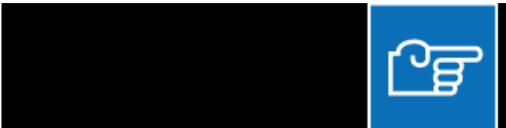
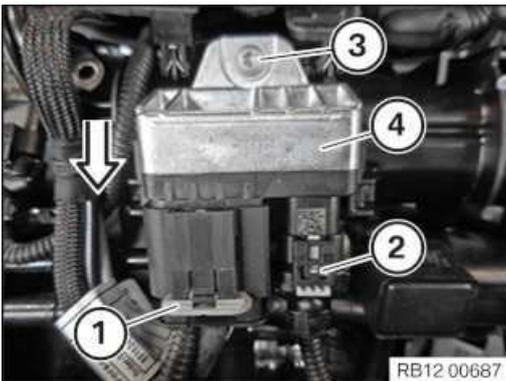
**Removal:**

Detach connector (1) from preheating control unit.

Detach plug (2) from preheating control unit.

Release screw (3).

Remove preheating control unit (4) in direction of arrow.

**Installation:**

Remove preheating control unit (4) in direction of arrow.

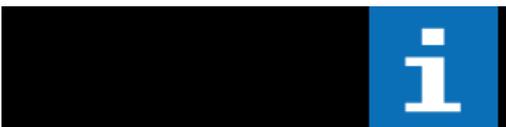
Tighten screw (3).

Tightening torque [12 23 2AZ](#).

Attach connector (1) to preheating control unit.

Attach connector (2) to preheating control unit.

Connectors must engage audibly.

**Required follow-up work:**

- Install [acoustic cover](#)

# 12 23 505 Replace all glow elements

## 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

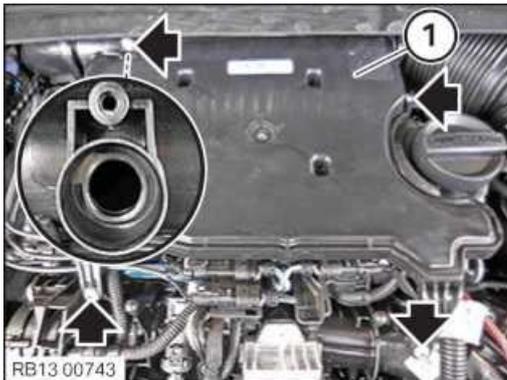
**Damage to the acoustic cover.**

**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  $>20\text{ }^{\circ}\text{C}$ .
- Use only distilled water as an auxiliary material during installation, no lubricants.

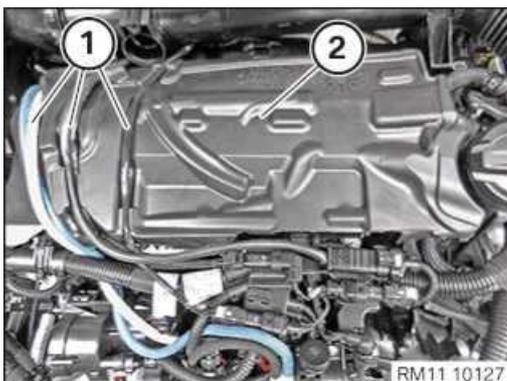
- Unclip the acoustic cover from the marked areas towards the top.

### 2 – Remove resonator



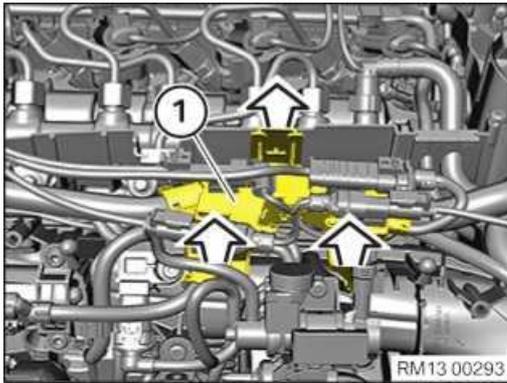
- Remove screws (arrows).
- Guide out and remove the resonator (1).

### 3 – Remove the acoustic cover for the injectors



- Release the wiring harness (1) from the brackets.
- Guide the acoustic cover (2) out and remove.

#### 4 – Removing the cable clips from the intake plenum



- Detach the cable clip (1) in the direction of the arrow.
- Guide out the cable clip (1) in direction of arrow and set it aside.

#### MAIN WORK

#### 5 – Removing glow elements



#### WARNING

**Hot surfaces.**

**Risk of burning!**

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



#### RISK OF DAMAGE

**Damage to the glow elements.**

**Excessive force may damage the glow elements and they may then have to be renewed.**

- Handle glow elements with care and do not drop.
- Do not rest the cylinder head on glow elements. Glow elements protrude from the sealing surface of the cylinder head.



#### 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.



#### 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.



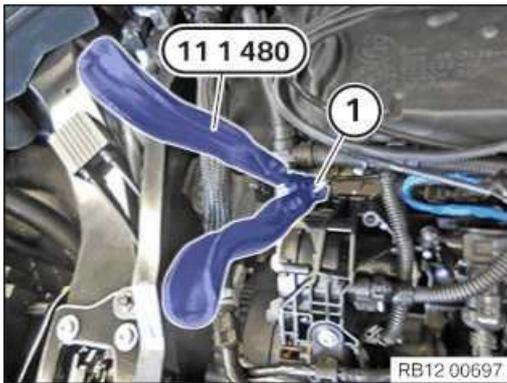
## RISK OF DAMAGE



### 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.

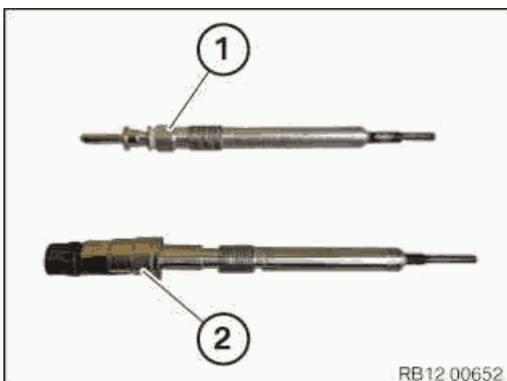


- Unlock and disconnect plug connection (1) using special tool **0 490 796 (11 1 480)**.



- Release the glow elements with the special tool or conventional tools.
- Feed out preheating elements and remove.

### 6 – Install glow elements



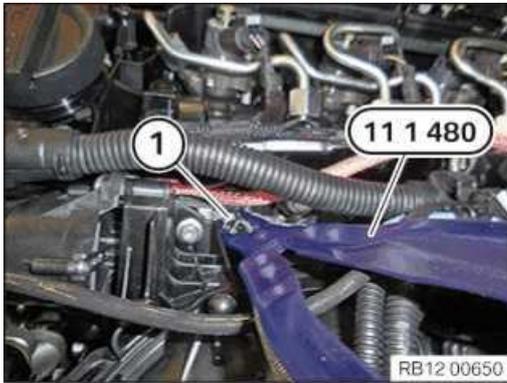
- Install glow elements (1) in cylinders 1, 2, 3 and 4.
- If fitted: Glow element (2) with the **combustion chamber pressure sensor** must be installed in cylinder 2.



- Tighten the glow element with the special tool or conventional tools.

#### Glow elements to cylinder head

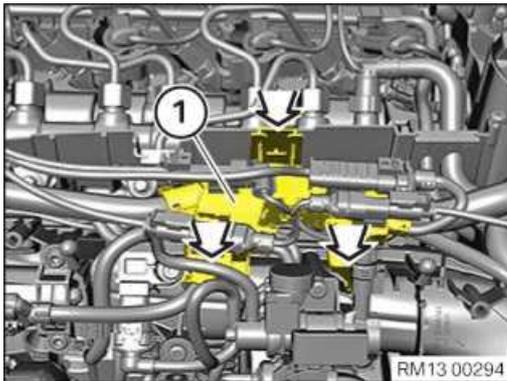
Glow element	Tightening torque
	13 Nm



- Connect connectors (1) and lock.  
The connector (1) must engage audibly.

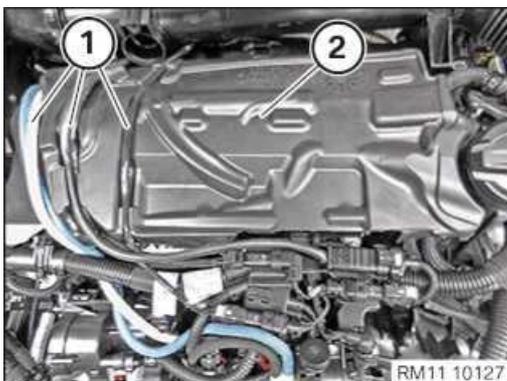
## POSTPROCESSES

### 7 – Installing the cable clip for the intake plenum



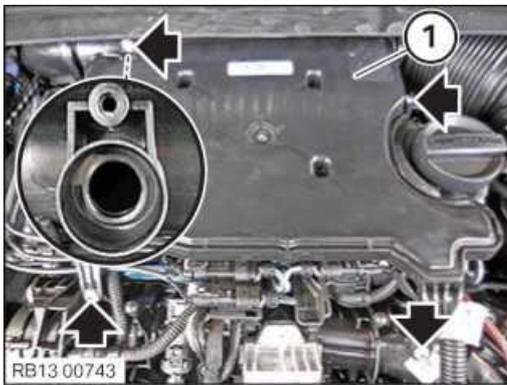
- Insert and install the cable clip (1) in the direction of the arrow.
- Make sure the cable clip (1) is fitted correctly.

### 8 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- Fasten the vehicle wiring harness (1) in the brackets.

### 9 – Install resonator



- Insert and install the resonator (1).
  - Renew the bolts (arrows).
- Parts:** Bolts
- Tighten screws (arrows).

**Resonator to manifold and clean air pipe**

Screw TS6	Renew screw.	Tightening torque	5 Nm
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**10 – 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 for correct installation of all rubber mounts in the acoustic cover (1).



- Clip in the acoustic cover into the holders in the indicated areas.
- Make sure that the acoustic cover engages audibly.

**Additional Information**

**Overview of Tightening Torques**

**Glow elements to cylinder head**

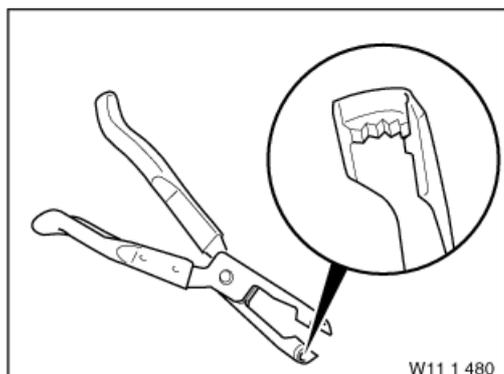
Used in step 6

Glow element	Tightening torque	13 Nm
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Screw TS6	Renew screw.	Tightening torque	5 Nm
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## Overview of Special Tools

### 0 490 796 (11 1 480) Pliers



#### Common

Used in step 5

Usage	For removing valve stem seal
-------	------------------------------

Included in the tool or work	
------------------------------	--

Storage location	A10
------------------	-----

Replaced by	
-------------	--

In connection with	
--------------------	--

SI-Number	01 01 93 (621)
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## Links

### Repair instructions

Used in step

<a href="#">61 35 ... Notes on ESD protection (Electro Static Discharge)</a>	5
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## 12 23 505 Replacing all glow elements (B47)



### Special tools required:

- [11 1 480](#)
- [11 6 050](#)



### Note:

If malfunctions have occurred at the glow elements, it is essential to check the safety fuse.

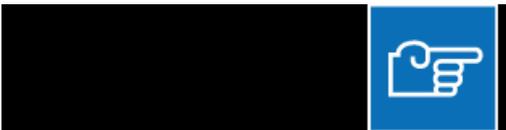
For further troubleshooting information refer to the BMW diagnosis system.

Switch off ignition.



### Necessary preliminary tasks:

- Read out the fault memory of the DDE control unit.
- Switch off ignition.
- Remove [resonator](#).

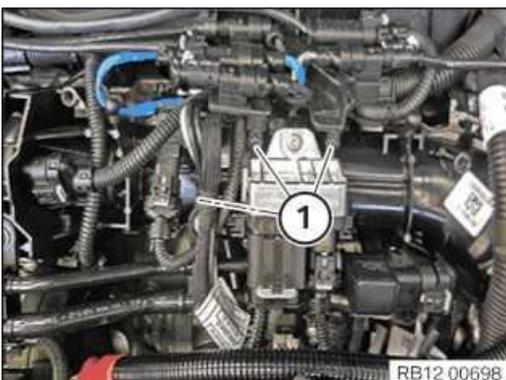


### Removal:



Release cable (1) from sound insulation (2).

Remove sound insulation (2) upwards.



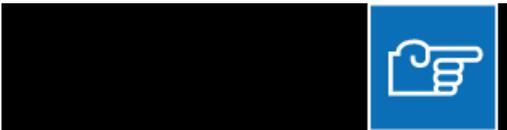
Release clamp (1) and lay cable clip to one side.



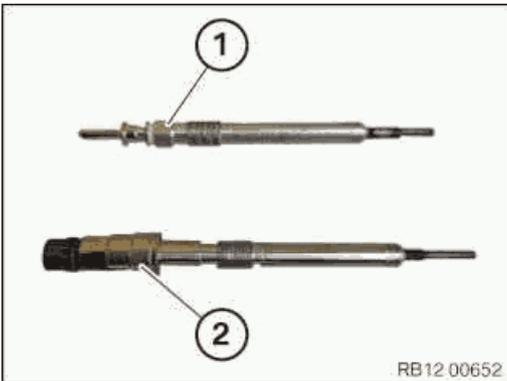
Unlock and remove connector (1) with special tool [11 1 480](#) .



Unscrew the glow elements with the special tool [11 6 050](#) or conventional tools.



#### Installation:



**Note:** Install glow element (1) for cylinders 1,2,3,4.

**Attention:** Install glow element (2) with **combustion chamber pressure sensor**, if fitted, in cylinder **2**.

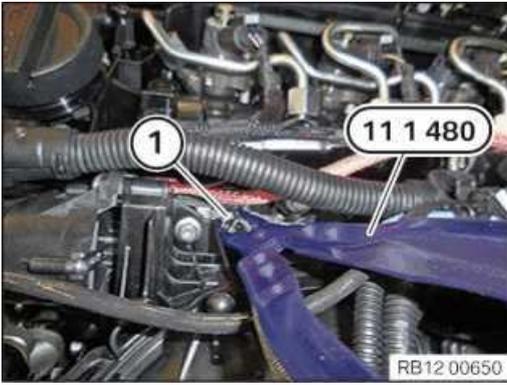


Screw in and tighten glow elements for cylinders **1,3,4** with special tool [11 6 050](#) .

Tightening torque [12 23 1AZ](#).

Screw in the glow element with combustion chamber pressure sensor for cylinder **2** and tighten using commercially available tools.

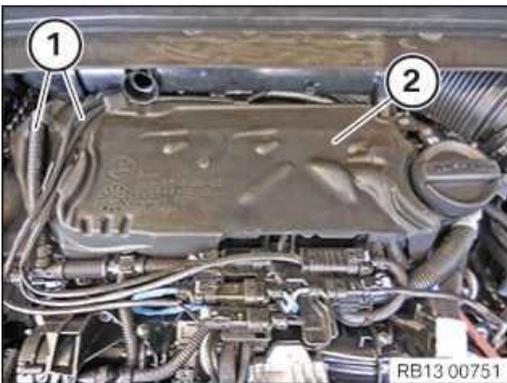
Tightening torque [12 23 1AZ](#)



Attach and lock connector (1).  
Connector (1) must engage audibly.



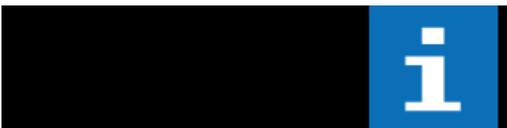
Feed in cable clip and secure clamp (1).



Install sound insulation (2).  
Secure cable (1) to sound insulation (2).



*Note:*  
Follow the diagnosis instructions.  
Teach the glow elements in as needed.

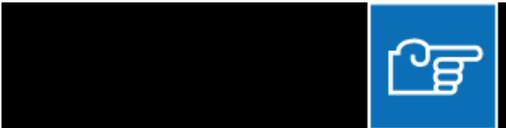


**Required follow-up work:**

- Install [resonator](#).

**Necessary preliminary tasks:**

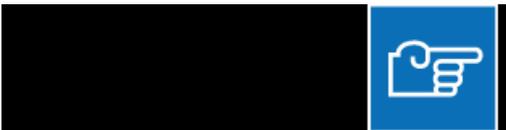
- Disconnect [battery negative lead](#).
- Remove [acoustic cover](#)
- Remove [fan cowl](#).
- Loosen [drive belt for alternator](#), **do not** remove.
- Remove the [washer fluid reservoir](#) for the window washer system.

*Note:*

In order to remove the alternator, it is necessary to [remove](#) the **air conditioning compressor**.

In so doing:

- Do **not** draw off air conditioning refrigerant.
- Do **not** detach refrigerant lines from A/C compressor.
- Do **not** remove air conditioning compressor; instead, release from bracket only and place to one side.

**Removal:**

Release screw (1) on bottom of alternator. *Note:*

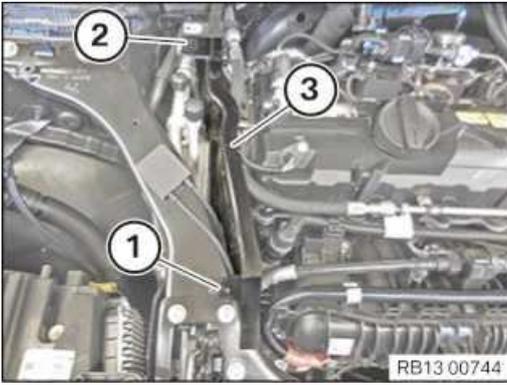
Screw (1) cannot be removed. The screw (1) is to be removed along with the alternator.



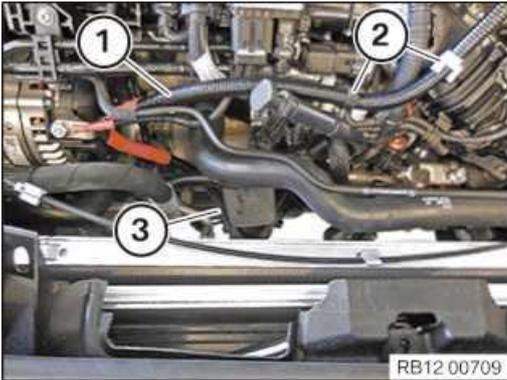
Release expanding rivet (1).

Release screw (2).

Remove cover (3).



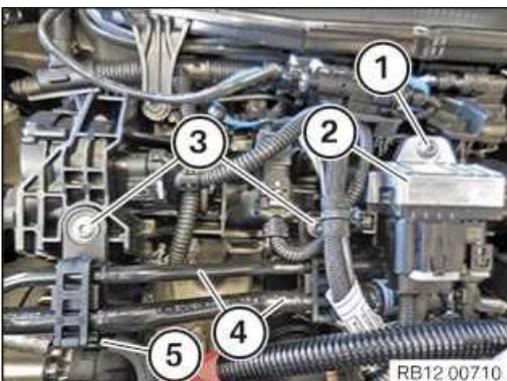
Release expanding rivet (1).  
Release screw (2).  
Remove partition wall (3).



Release positive battery cable (1) from the clamps (2).  
Release positive battery cable (1) from clamp (3).



Unlock connector (1) and pull off.  
Undo nut (2) and place positive battery cable to one side.



Undo screw (1) and set preheating control unit (2) aside.  
Unlock coolant line (5) and release.  
Release screws (3) and lay fuel lines (4) aside.



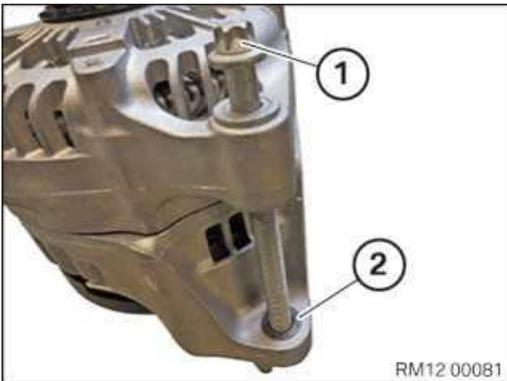
Release screw (1) on top of alternator.



Feed out alternator along with the screw (1) on the bottom of the alternator through the slot on the support and remove.



#### Preparation for installation:



Slightly push back the threaded support sleeve (2) in order to facilitate the installation of the alternator.

Screw in screw (1) into the threaded support sleeve (2). Push back the threaded support sleeve (2) with the aid of the screw (1).

Unscrew the screw (1) from the threaded support sleeve (2) again.



Insert the screw (1) into the alternator before installing the alternator.



## Installation:



Feed in the alternator with the screws through the slot (1) on the support and install.

Join both screws.



Tighten screw (1).

Tightening torque [12 31 1AZ](#).



Tighten screw (1).

Tightening torque [12 31 1AZ](#).



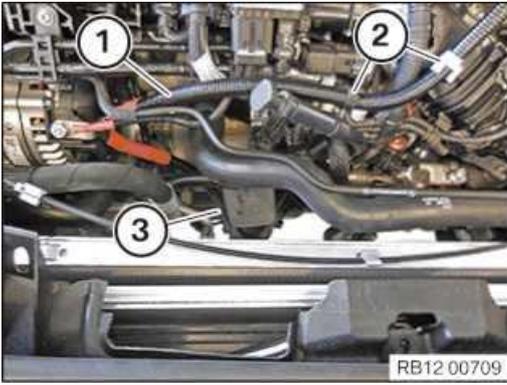
Attach connector (1).

Connector (1) must engage audibly.

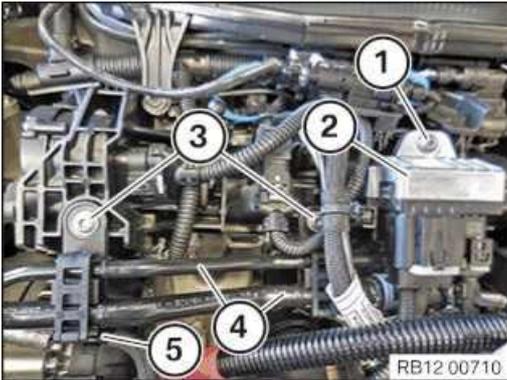
Connect positive battery cable to alternator.

Tighten nut (2).

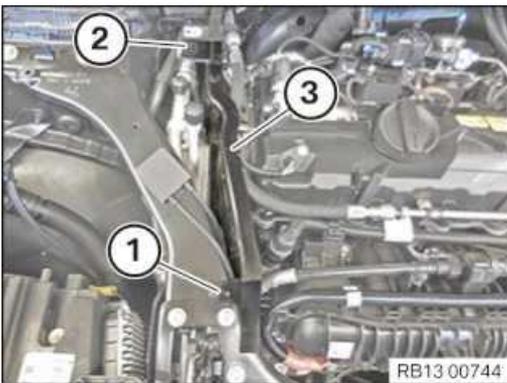
Tightening torque [12 52 2AZ](#).



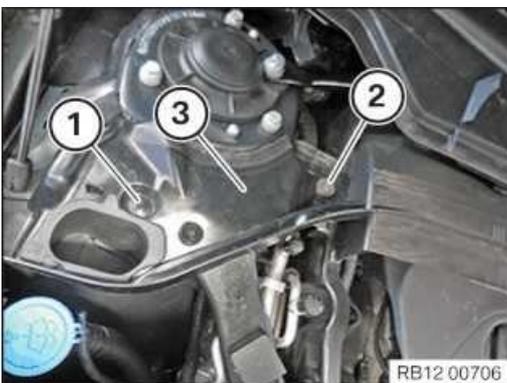
Secure positive battery cable (1) in the clamps (2).  
Secure positive battery cable (1) in the clamp (3).



Install preheating control unit (2).  
Tighten screw (1).  
Tightening torque [12 23 2AZ](#).  
Feed in fuel lines (4) and install.  
Tighten screw (3).  
Tightening torque [13 53 7AZ](#)  
Connect coolant line (5) and lock.  
Coolant line (5) must audibly engage.



Release expanding rivet (1).  
Release screw (2).  
Remove partition wall (3).  
Tightening torque [17 10 10AZ](#).



Install cover (3).  
Fasten the expanding rivet (1).  
Tighten screw (2).  
Tightening torque [17 10 10AZ](#).



**Required reworking:**

- [Stretch drive belt for alternator.](#)
- Install the [washer fluid reservoir](#) for the window washer system.
- Install [fan cowl](#).
- Connect [battery earth lead](#).
- Install [acoustic cover](#).

# 12 31 020 Removing and installing/replacing alternator

## 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.



#### RISK OF DAMAGE

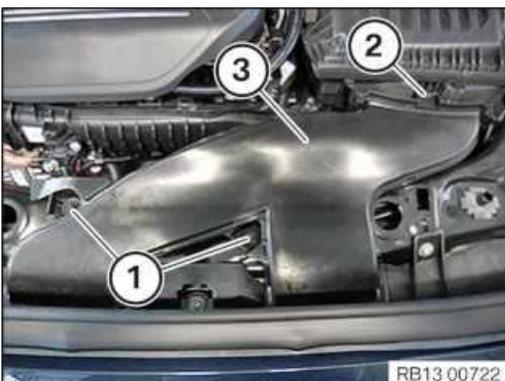
**Damage to the acoustic cover.**

**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  $>20\text{ }^{\circ}\text{C}$ .
- Use only distilled water as an auxiliary material during installation, no lubricants.

- Unclip the acoustic cover from the marked areas towards the top.

### 3 – Remove the intake neck for intake silencer housing



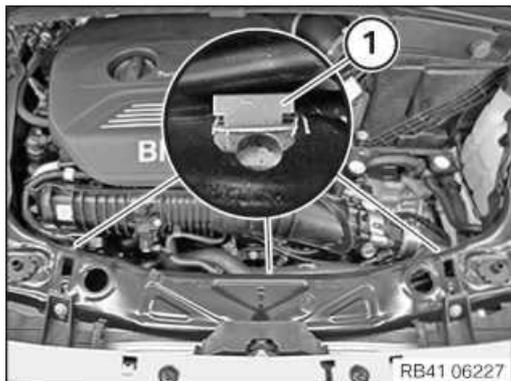
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

#### 4 – Removing intake silencer housing

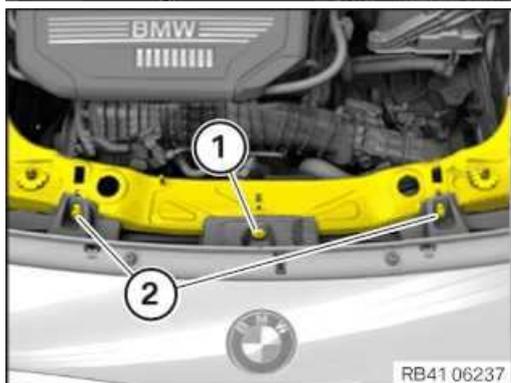


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

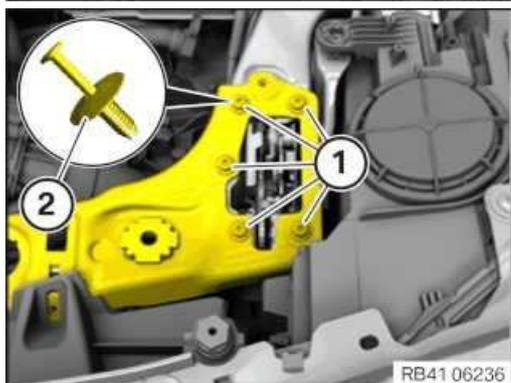
#### 5 – Remove front cross connection



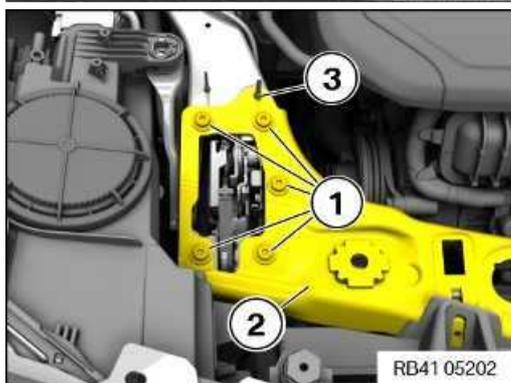
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



- Loosen screw (1).
- Loosen screws (2).



- Loosen screws (1).
- Lever out expanding rivet (2).



- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

## 6 – Remove front right wheel



### ► Removing the wheel

- 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.
- Unscrew the wheel bolts (arrows) and remove the wheel.

Use the matching adapter from tool set (wheel bolt adapter set) to loosen and tighten down the wheel bolt with security code.

## 7 – Removing the front right wheel arch cover

### ► Remove the front wheel arch trim



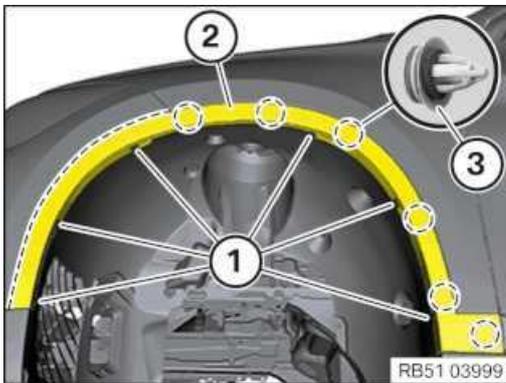
#### NOTICE

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

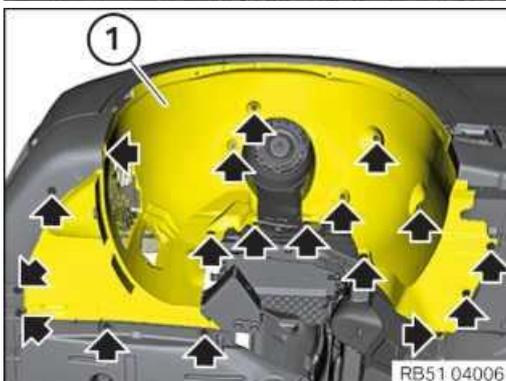


#### NOTICE

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



- Remove the blind rivets (1).
- Release the wheel arch trim (2) in the area of the side panel from the clips (3).
- Release the wheel arch trim (2) from the latch mechanisms on the bumper and remove.

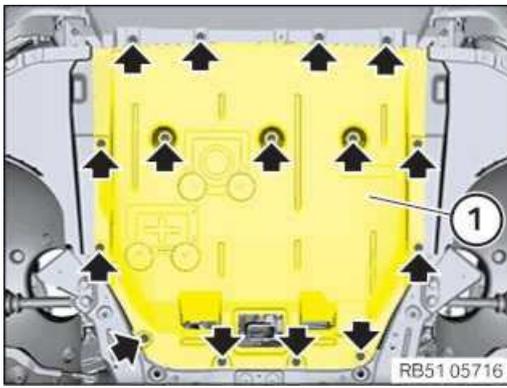


#### NOTICE

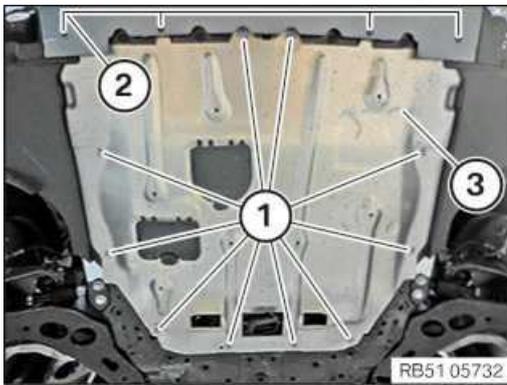
Description is for left component only. Procedure on the right side is identical.

- Unscrew all bolts and nuts (arrows).
- Guide the wheel arch cover (1) out.

## 8 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

## 9 – 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.

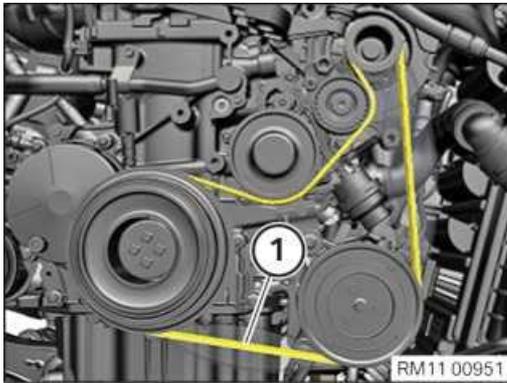


### TECHNICAL INFORMATION

The drive belt must be replaced if contaminated with coolant- and oil residues.



- Increase the preload on the belt tensioner in the direction of arrow.
- Secure the belt tensioner with the special tool **0 496 268 (11 0 390)**.



- Guide out the drive belt for the alternator (1) and remove it.

## MAIN WORK

### 10 – Removing the alternator

#### Prerequisite

Battery earth lead is disconnected.



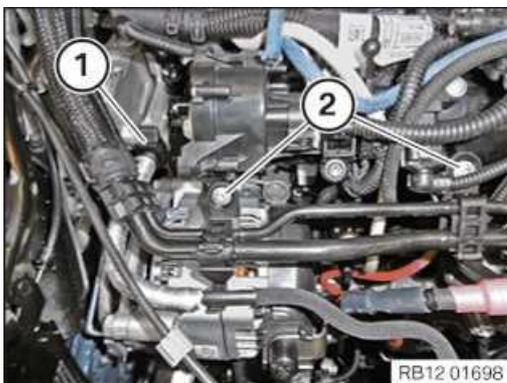
**i**

#### TECHNICAL INFORMATION

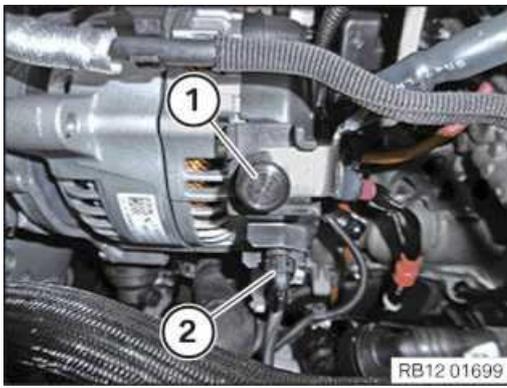
Secure component against falling.

- Loosen screws (1).
- Detach the air conditioning compressor (2) from the component carrier and protect it from falling.

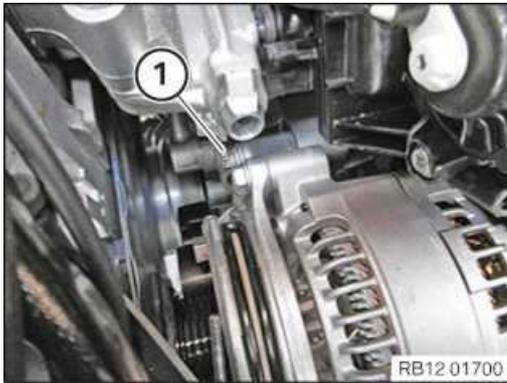
**Note:** Tie the air conditioning compressor up.



- Unlock the coolant ventilation line (1) and pull it off the cylinder head.
- Catch and dispose of escaping coolant.
- Loosen screws (2).
- Place fuel feed and return line to one side.



- Remove the cover (1) and loosen the nut below.
- Disconnect positive battery cable from alternator.
- Unlock and disconnect the connector (2) from the alternator.



- Detach screw (1) on top on the alternator.



- Detach screw (1) below on the alternator.



- Feed out alternator (1) along with the screw (2) on the bottom of the alternator through the slot on the support and remove.

## 11 – Renew alternator

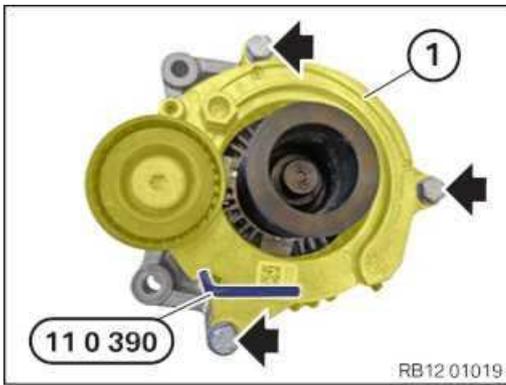


### CAUTION

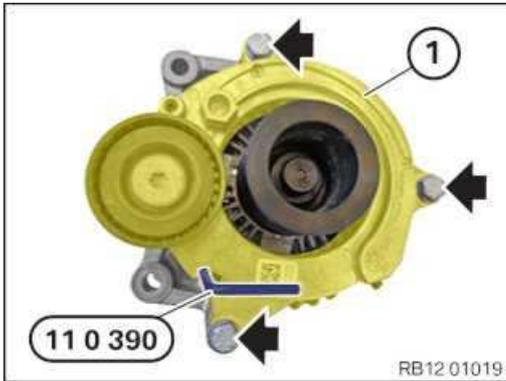
**Component with preload.**

#### **Danger of injury!**

- Reduce preload as far as possible before disassembly. Relieve component.



- Remove screws (arrows).
- Feed out and remove the tensioning device for the drive belt for alternator (1) on the alternator.



- Feed in and install the tensioning device for the drive belt for alternator (1) on the alternator.
- Make sure that the special tool **0 496 268 (11 0 390)** is fitted correctly.
- Tighten screws (arrows).

#### Belt tensioner to alternator

M8X30		Tightening torque	28 Nm
-------	--	-------------------	-------

## 12 – Installing the alternator

### Prerequisite

Battery earth lead is disconnected.



### 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 alternator (1) along with the screw (2) on the bottom of the alternator through the slot on the support.



- Tighten the screw (1) below on the alternator.

#### Alternator to component carrier

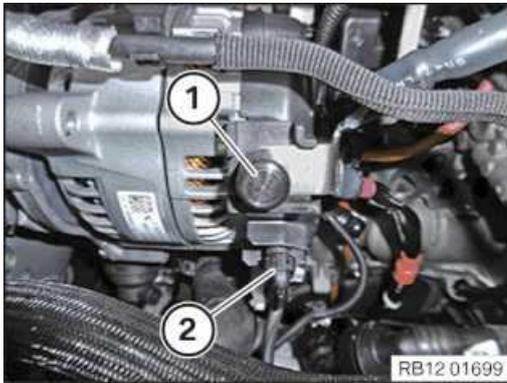
M10x75 / M10x125		Tightening torque	38 Nm
---------------------	--	-------------------	-------



- Tighten the bolt (1) on top on the alternator.

#### Alternator to component carrier

M10x75 / M10x125		Tightening torque	38 Nm
---------------------	--	----------------------	-------

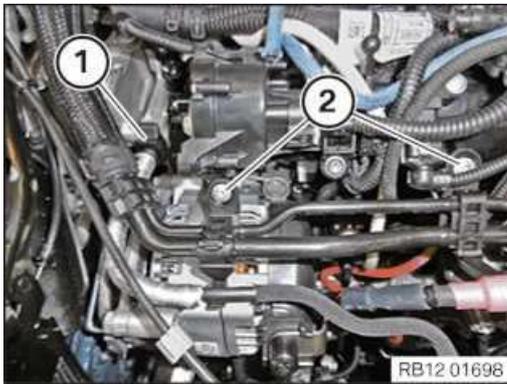


- Mount positive battery cable to the alternator.
- Tighten nut.

#### Positive battery cable to alternator

M8		Tightening torque	19 Nm
----	--	----------------------	-------

- Mount the cover (1).
- Connect the connector (2) to the alternator and lock audibly.



- Mount fuel supply and return line.
- Tighten down screws (2).

#### Fuel line to intake plenum

TS6x20		Tightening torque	5 Nm
--------	--	----------------------	------

- Connect the coolant ventilation line (1) to the cylinder head and audibly lock.



- Correctly position the air conditioning compressor (2).
- Tighten the screws (1).

#### Air conditioning compressor in component carrier

M10		Tightening torque	38 Nm
-----	--	----------------------	-------

## POSTPROCESSES

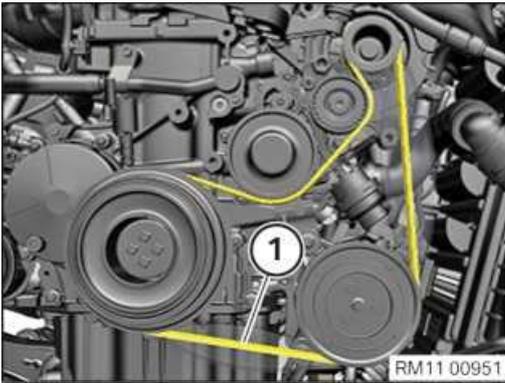
### 13 – Installing the drive belt for alternator



#### TECHNICAL INFORMATION

If the drive belt is reused: Mark direction of travel and reinstall drive belt in same direction of travel.

The drive belt must be replaced if contaminated with coolant- and oil residues.

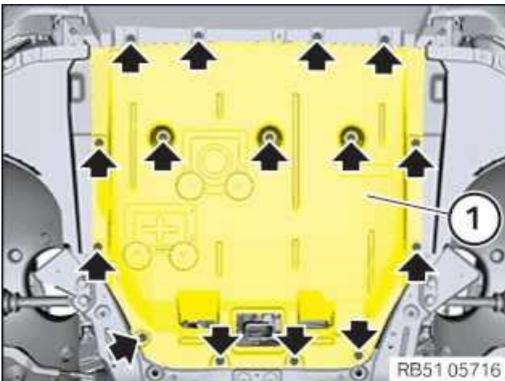


- Feed in the drive belt for the alternator (1) and install it.



- Increase the preload on the belt tensioner in the direction of arrow.
- Feed the special tool **0 496 268 (11 0 390)** out of the belt tensioner and remove it.

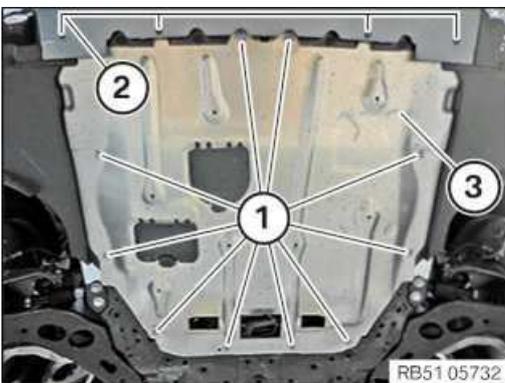
**14 – Installing the front underbody protection**



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

**Underbody protection front**

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



**Equipment specification with metal underride guard:**

- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

**Underbody protection front**

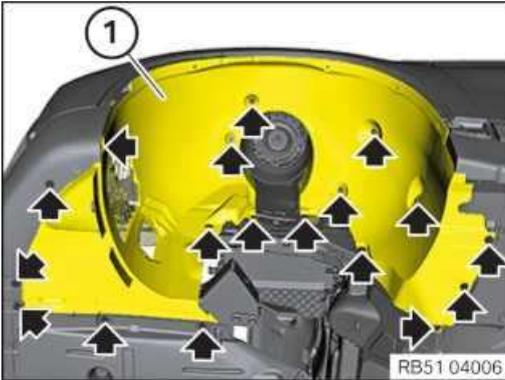
Screw for thermoplastic plastic	Tightening torque	2,6 Nm
Hexagon screw M6x20	Tightening torque	8 Nm

**15 – Installing the front right wheel arch cover**



## NOTICE

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



- Guide the wheel arch cover (1) in.
- Tighten all bolts and nuts (arrows).

### Wheel arch cover to body

Screw		Tightening torque	2,5 Nm
-------	--	-------------------	--------

### Wheel arch cover to body

Plastic nut		Tightening torque	3 Nm
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### ► Installing front wheel arch trim



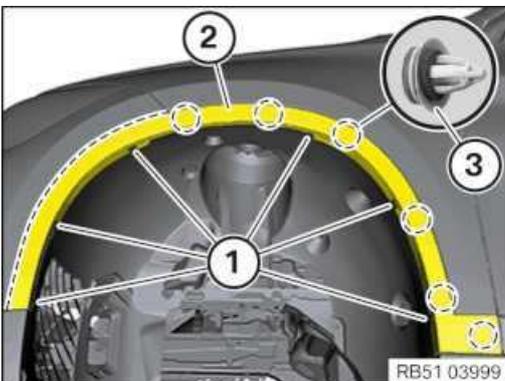
## NOTICE

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



## NOTICE

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



- Check the clips (3) for damage and renew where required.  
The clips (3) must not be damaged or missing.
- Feed in wheel arch trim (2) and engage on the clips (3).
- Engage wheel arch trim (2) into the latch mechanisms on the bumper panel.
- Mount blind rivet (1) using the special tool **0 496 521 (00 2 230)**.

## 16 – Installing the front right wheel

### ► Mounting the wheel

- Clean the contact surfaces between the brake disc and the wheel rim



## 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.

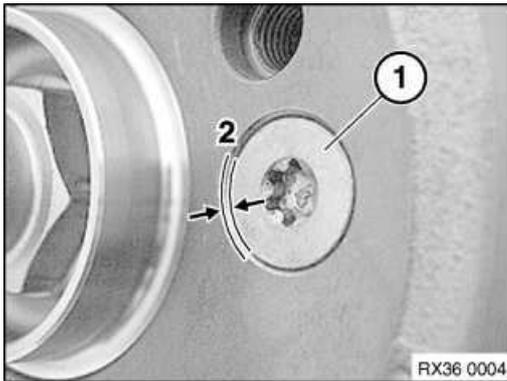
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- 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).



- Renew mounting bolt (1).

**Parts:** Mounting bolt

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

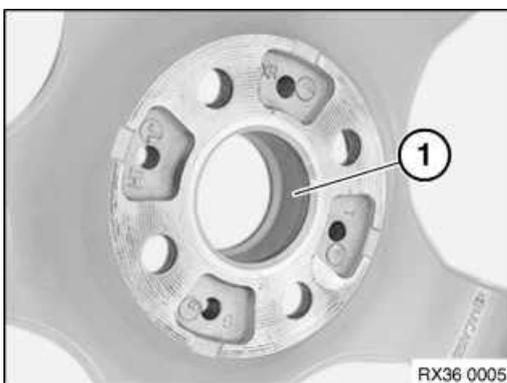
The mounting bolt (1) for the brake disc may not protrude under any circumstances on the contact surface (2) between the brake disc and the wheel rim.

### Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------

### Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------



- Lightly grease the wheel centring (1) in the wheel rim; refer to additional information for grease for the wheel centring (1).



## 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 the wheel bolts and threads for damage, renew the wheel bolts if necessary.
- Join and tighten the wheel bolts (arrows).

### Wheel bolts

M 14/AF 17	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	140 Nm
		Check	140 Nm

## 17 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

### Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
-------	--	-------------------	------

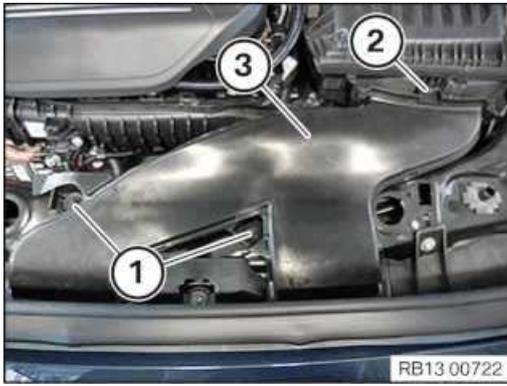
- Tighten clamp (4).

### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

- Connect and lock the connector (3).  
The connector (3) must engage audibly.
- Insert and install the holder (1).

## 18 – Install the intake neck for the intake filter housing



- Insert and install the intake neck (3).  
The lock (2) must audibly engage.
- Tighten nuts (1).

#### Intake neck to cross connection

M6		Tightening torque	8 Nm
----	--	-------------------	------

### 19 – 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 for correct installation of all rubber mounts in the acoustic cover (1).



- Clip in the acoustic cover into the holders in the indicated areas.
- Make sure that the acoustic cover engages audibly.

### 20 – Disconnecting all battery earth leads



- See additional information.

## Additional Information

### Overview of Tightening Torques

<b>Belt tensioner to alternator</b>			Used in step <a href="#">11</a>
M8X30		Tightening torque	28 Nm
<b>Alternator to component carrier</b>			Used in step <a href="#">12</a>
M10x75 / M10x125		Tightening torque	38 Nm
<b>Positive battery cable to alternator</b>			Used in step <a href="#">12</a>
M8		Tightening torque	19 Nm
<b>Fuel line to intake plenum</b>			Used in step <a href="#">12</a>
TS6x20		Tightening torque	5 Nm
<b>Air conditioning compressor in component carrier</b>			Used in step <a href="#">12</a>
M10		Tightening torque	38 Nm
<b>Underbody protection front</b>			Used in step <a href="#">14</a>
Screw for thermoplastic plastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm
<b>Wheel arch cover to body</b>			Used in step <a href="#">15</a>
Screw		Tightening torque	2,5 Nm
<b>Wheel arch cover to body</b>			Used in step <a href="#">15</a>
Plastic nut		Tightening torque	3 Nm
<b>Brake disc to rear wheel hub</b>			Used in step <a href="#">16</a>
M8	Renew screw.	Tightening torque	16 Nm
<b>Brake disc to front wheel hub</b>			Used in step <a href="#">16</a>
M8	Renew screw.	Tightening torque	16 Nm

## Wheel bolts

Used in step 16

M 14/AF 17	<p>Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.</p> <p>Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence.</p> <p>Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.</p>	Tightening torque	140 Nm
		Check	140 Nm

## Intake silencer housing to lock bridge

Used in step 17

M6X30		Tightening torque	8 Nm
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## Clean air pipe to intake silencer housing

Used in step 17

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

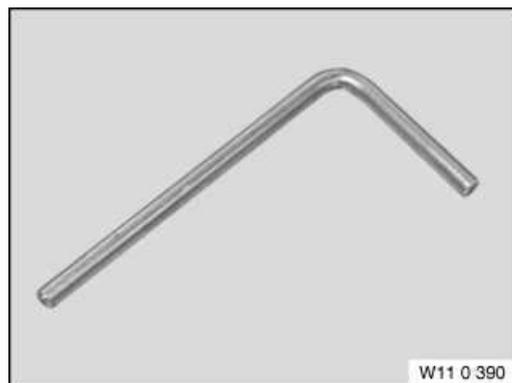
## Intake neck to cross connection

Used in step 18

M6		Tightening torque	8 Nm
----	--	-------------------	------

## Overview of Special Tools

### 0 496 268 (11 0 390) Pin

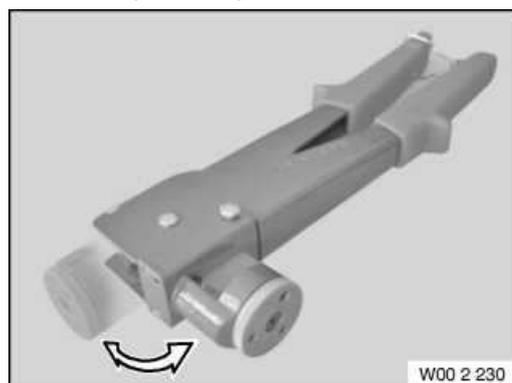


#### Common

Used in step 9 11 13

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)

### 0 496 521 (00 2 230) Pliers



#### Common

Used in step 15

Usage	(Blind rivet pliers for plastic rivets) For shaft diameters of 3.5 mm, 3.9 mm and 4.5 mm
Included in the tool or work	
Storage location	C25
Replaced by	
In connection with	
SI-Number	01 17 08 (478)

## 2 344 011 Tool



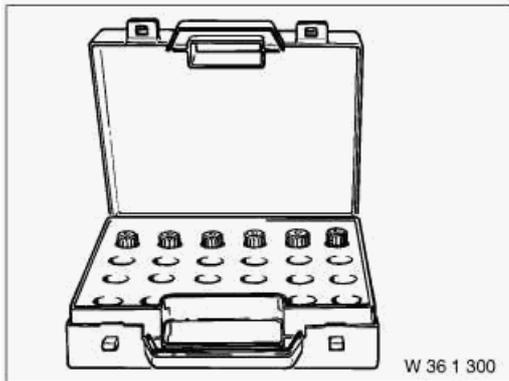
### Common

Used in step 16

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:

### 0 495 221 (36 1 323) Wheel stud

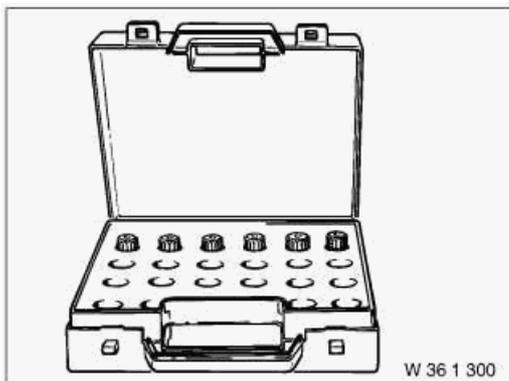


### Common

Used in step 6

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

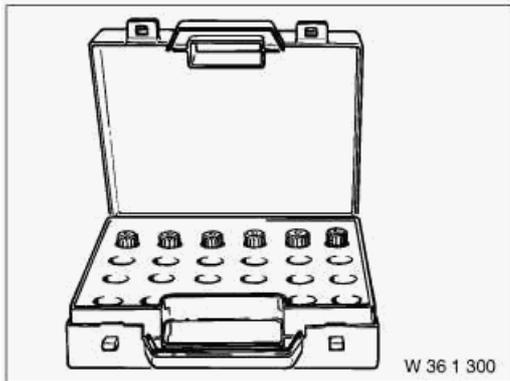


### Common

Used in step 6

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 6

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

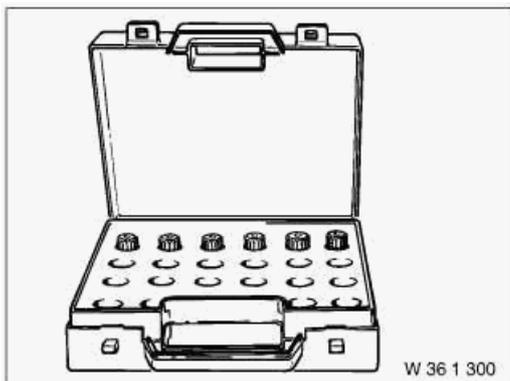
Storage location

Replaced by

In connection with

SI-Number

### 0 495 226 (36 1 328) Wheel stud



#### Common

Used in step 6

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

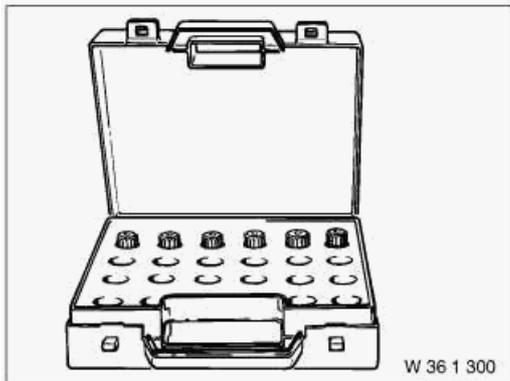
Storage location

Replaced by

In connection with

SI-Number

### 0 495 227 (36 1 329) Wheel stud



#### Common

Used in step 6

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 6

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

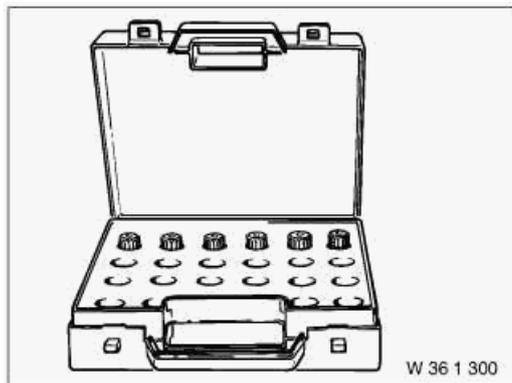
Storage location

Replaced by

In connection with

SI-Number

## 0 495 229 (36 1 332) Wheel stud



### Common

Used in step 6

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 6

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

## Links

### Repair instructions

Used in step

<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 20
<a href="#">61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20

<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
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<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
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<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20

**Operating materials**

**Used in step**

<a href="#">2.0 Grease for wheel centring</a>	16
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## 11 00 ... Handling components after flood damage

Flood damage can occur if the permissible fording depth of a vehicle is exceeded. Ingress of water can cause damage to the engine (water shock) or components.

Because dirt particles generally enter into the component with the water (e.g. starter motor, wiring harness), the components need to be thoroughly inspected.

Residual moisture in the components leads to corrosion (increased contact resistance in the component), which can lead to a component failure at a later time.

If water ingress into the electrical components cannot be ruled out, it is recommended to replace the component to ensure correct functioning through the vehicle lifetime.

# 12 41 020 Removing and installing/replacing starter motor

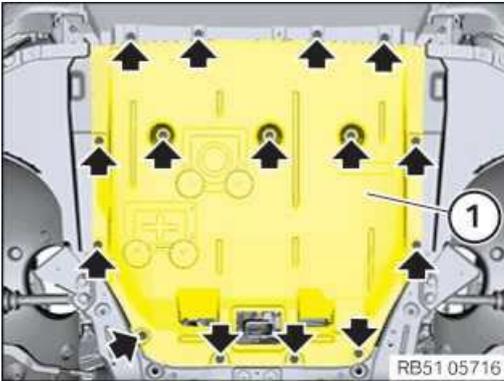
## PRELIMINARY WORK

### 1 – Disconnecting all battery earth leads

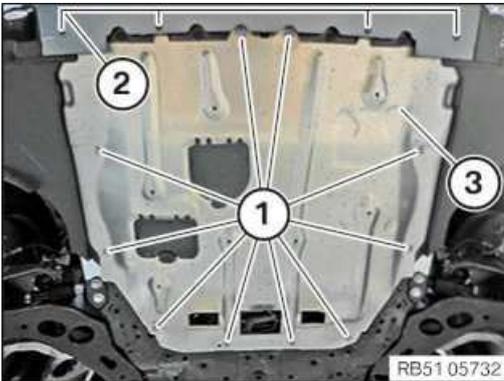


- See additional information.

### 2 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

## MAIN WORK

### 3 – Removing starter motor



#### WARNING

Hot surfaces.

**Risk of burning!**

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



## 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



**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 loosen connector (1).
- Detach the sealing cap (2) in the direction of the arrow.
- Feed out and remove the sealing cap (2).



- Unfasten nut (1).
- Feed out the positive battery cable (2) of the starter motor and set it aside.



- Loosen screws (1).
- Feed out starter motor and remove.

## 4 – Installing starter motor



### 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 starter motor .
- Tighten the screws (1).

#### Starter motor to transmission

M8x45		Tightening torque	19 Nm
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- Feed the positive battery cable (2) in on the starter and install.
- Tighten nut (1).

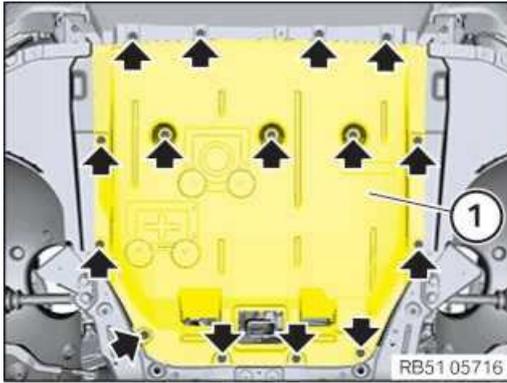
#### Battery positive lead to starter

M8		Tightening torque	13,5 Nm
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- Insert and install the new sealing cap (2).
- Secure the sealing cap (2) in the direction of the arrow.
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

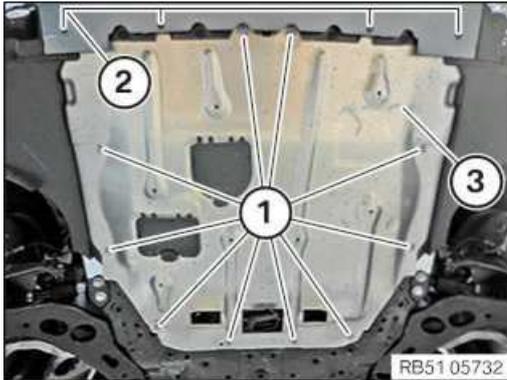
5 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

**Underbody protection front**

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



- **Equipment specification with metal underride guard:**
- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

**Underbody protection front**

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

6 – Disconnecting all battery earth leads



- See additional information.

**Additional Information**

**Overview of Tightening Torques**

**Starter motor to transmission**

Used in step 4

M8x45		Tightening torque	19 Nm
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**Battery positive lead to starter**

Used in step 4

M8		Tightening torque	13,5 Nm
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**Underbody protection front**

Used in step 5

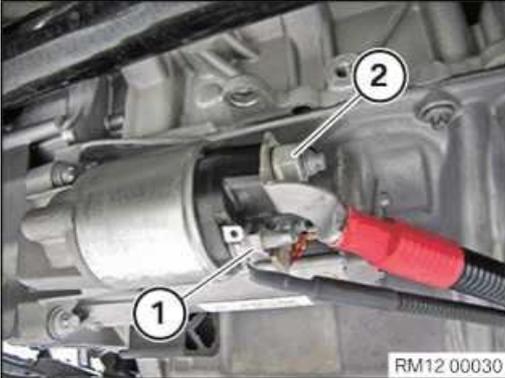
Screw for thermoplastic plastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

**Links**

<b>Repair instructions</b>	<b>Used in step</b>
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 6
<a href="#">61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 6

**Necessary preliminary work:**

- Clamp off [battery earth lead](#).
- Remove front [underbody protection](#).



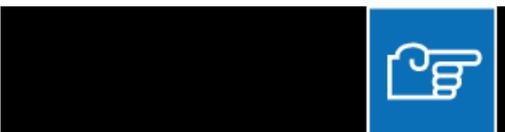
Release nut (1) and remove terminal 50 from starter motor.

Release nut (2) and disconnect positive battery cable from starter motor.



Release screws (1).

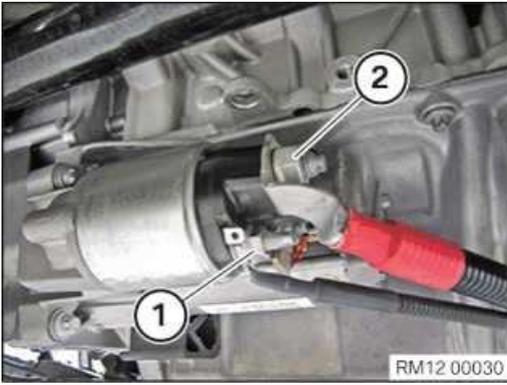
Remove starter motor.

**Installation:**

Install starter.

Screw in and tighten screws (1).

Tightening torque [12 41 1AZ](#)



Connect terminal 50 to starter motor and tighten nut (1).

Tightening torque [12 52 1AZ](#).

Connect positive battery cable to starter motor and tighten nut (2).

Tightening torque [12 52 3AZ](#).



**Required follow-up work:**

- Connect [battery earth lead](#).
- Install front [underbody protection](#).



**Only during starter replacement and on vehicles with MSA (automatic engine start-stop function):**

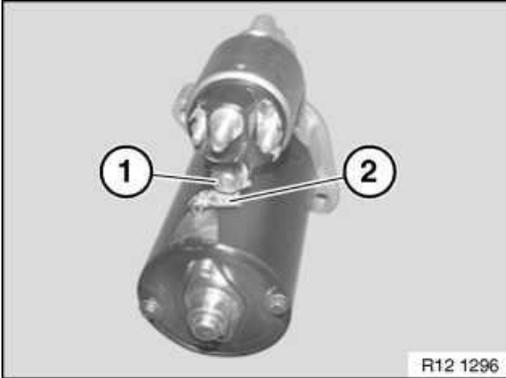
- Reset start counter using BMW diagnosis system.

## 12 41 041 Replacing the engagement solenoid switch



### Necessary preliminary work:

- Switch off ignition.
- Remove [starter motor](#).



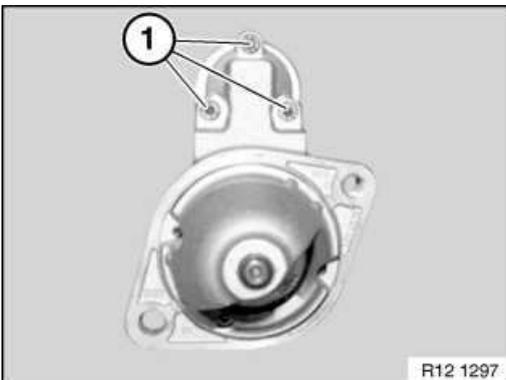
Slacken nut (1).

Remove the cable shoe (2).

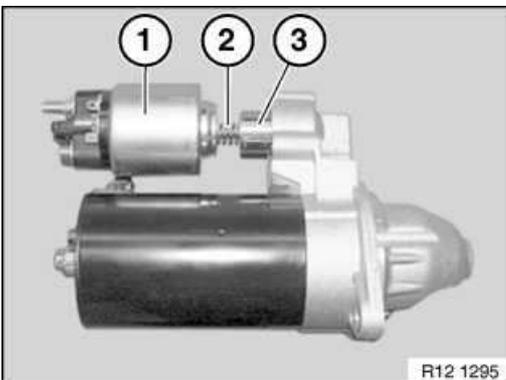
### Attention!

Do not twist the cable shoe (2) when tightening, risk of shorting to starter motor housing.

Tightening torque [12 41 1AZ](#).



Release screws (1).



Remove the solenoid switch (1) and the spring (2).

Detach the bolt (3).

*Installation note:*

Check the bolt (3) for wear and grease the bolt.

# 12 42 500 Removing and installing/replacing the positive battery cable



## 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!

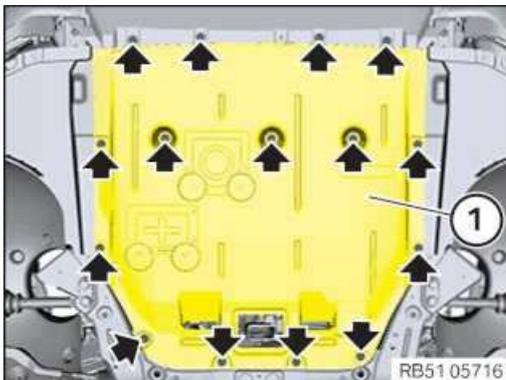
## PRELIMINARY WORK

### 1 – Disconnecting all battery earth leads

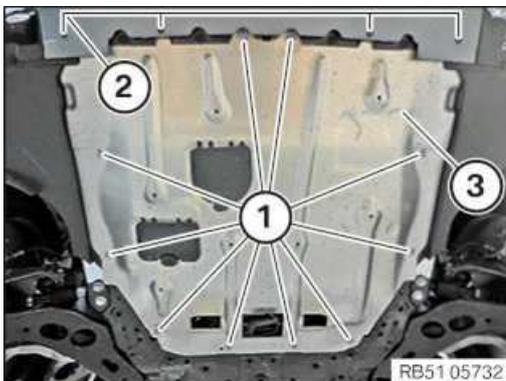


- See additional information.

### 2 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



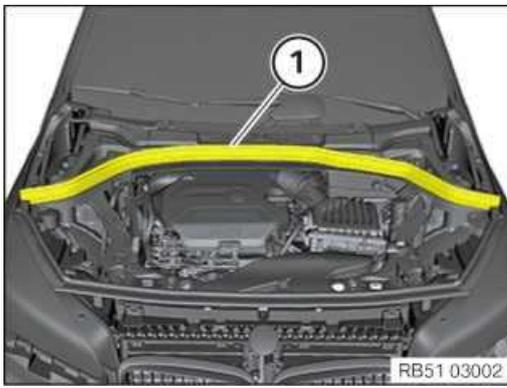
- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

### 3 – Remove the seal for the rear bonnet



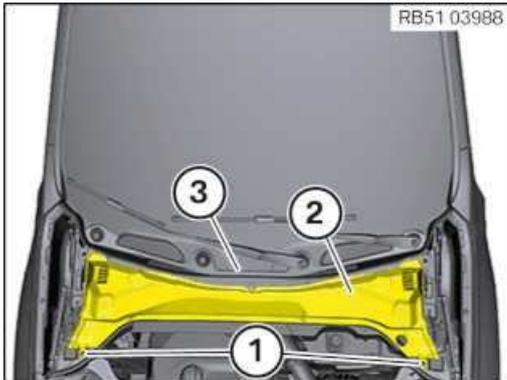
## NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



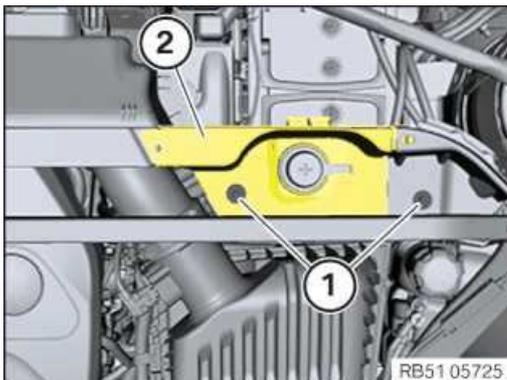
- Pull off rear bonnet seal (1) towards the top and remove.

#### 4 – Removing front cowl panel cover

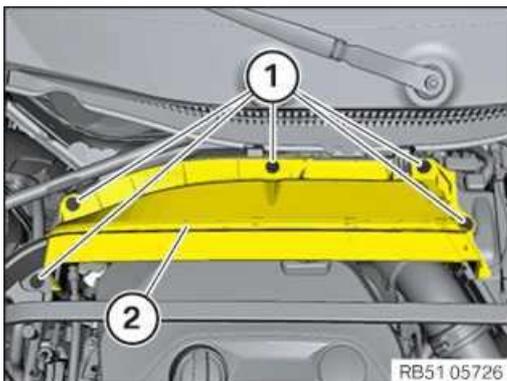


- Loosen the expanding rivet (1).
- Feed out and remove front cowl panel cover (2) from the rear cowl panel cover(3).

#### 5 – Removing the upper bulkhead cover

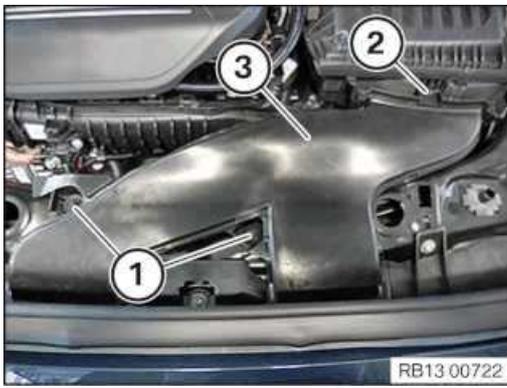


- Loosen screws (1).
- Guide out and remove the cover (2).



- Loosen screws (1).
- Feed out and remove the upper bulkhead cover (2).

#### 6 – Remove the intake neck for intake silencer housing



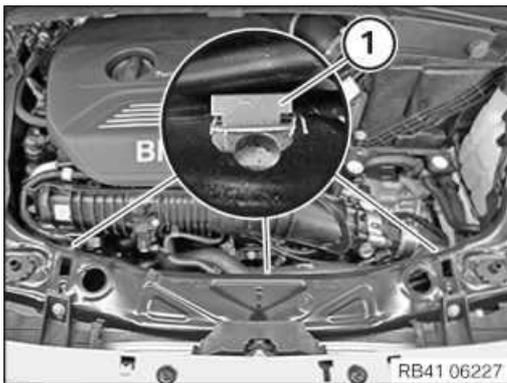
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

### 7 – Removing intake silencer housing

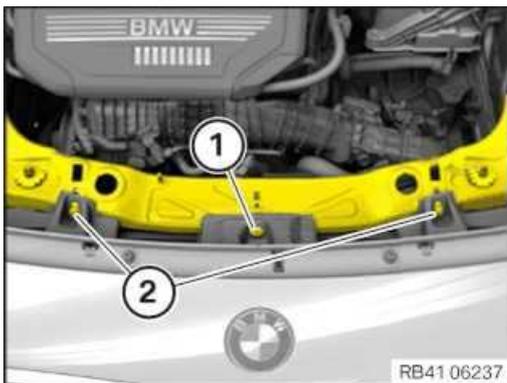


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

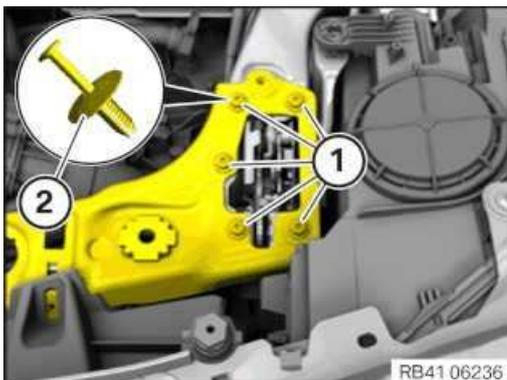
### 8 – Remove front cross connection



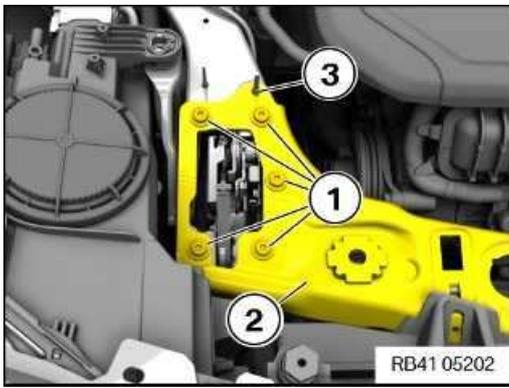
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



- Loosen screw (1).
- Loosen screws (2).



- Loosen screws (1).
- Lever out expanding rivet (2).



- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

## 9 – Removing the fan cowl with electric fan

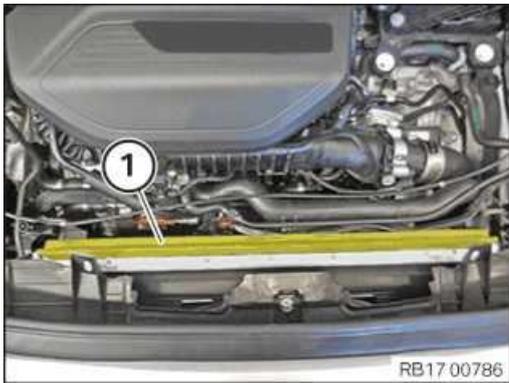


### WARNING

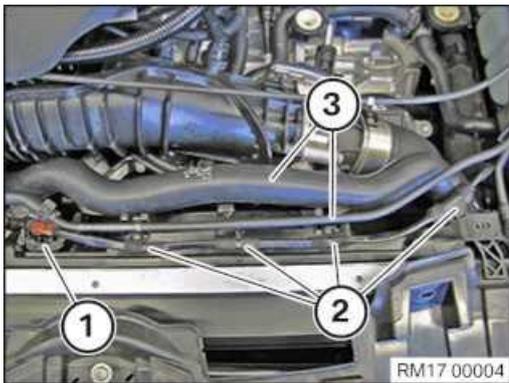
**Hot surfaces.**

**Risk of burning!**

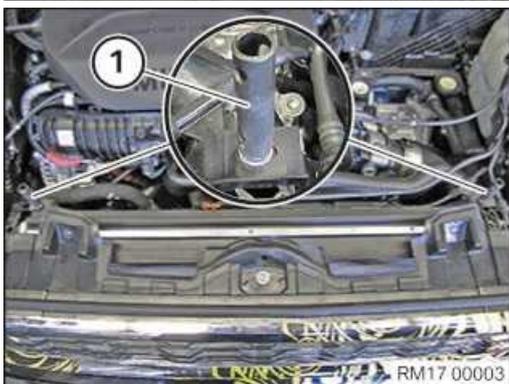
- Perform all work only on components that have cooled down.



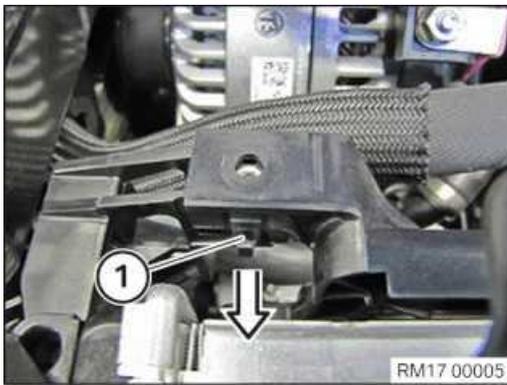
- Feed out and remove the sealing (1) from the radiator.



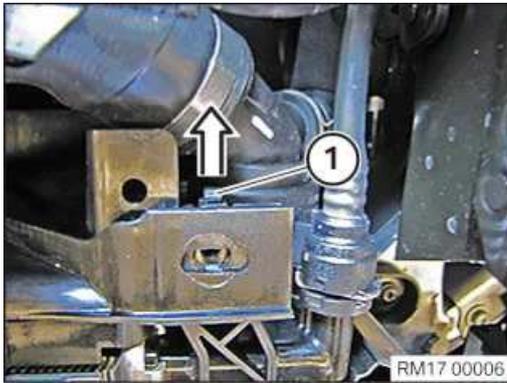
- Unlock plug connection (1) and disconnect.
- Unlock and loosen the clamps (2).
- Feed out connector (1) and place to one side.
- Thread off coolant line (3) and place to the side.



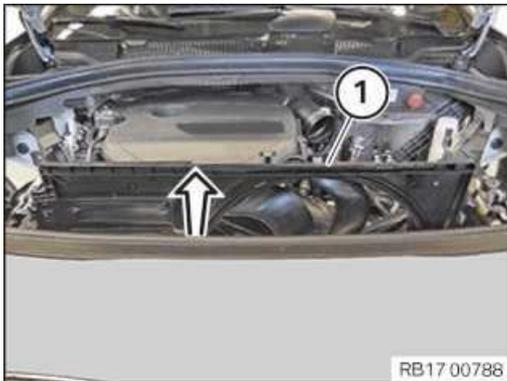
- Loosen screws (1).



- Unlock the right lock (1) on the fan cowl in the direction of the arrow.



- Unlock the left lock (1) on the fan cowl in the direction of the arrow.



- Guide out fan cowl (1) in direction of arrow and remove.

## MAIN WORK

### 10 – Removing positive battery cable from the battery to the starter motor



#### 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.

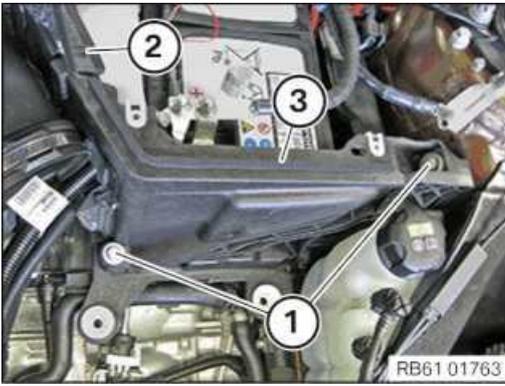


#### WARNING

**Hot surfaces.**

**Risk of burning!**

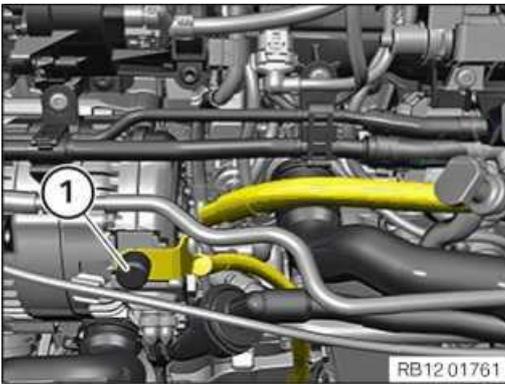
- Perform all work only on components that have cooled down.



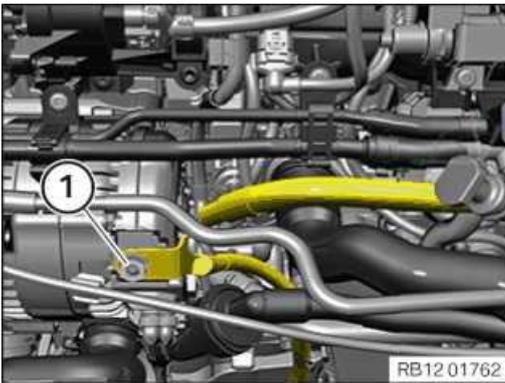
- Loosen screws (1).
- Unscrew the bolt (2) and guide the tension strut (3) out.



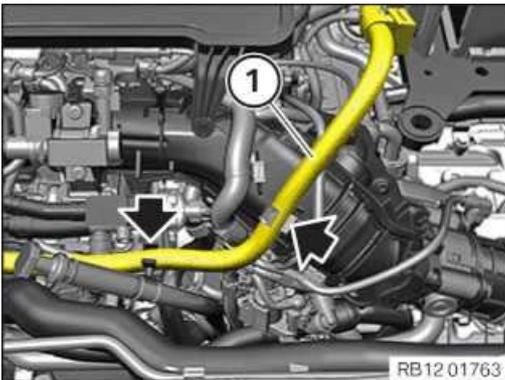
- Loosen nuts (1).
- Feed out positive battery cables (2) and place to one side.
- Undo positive battery terminal (3).
- Feed out positive battery cable (4) from the engine bulkhead (5) and place it aside.



- Remove the cover (1).



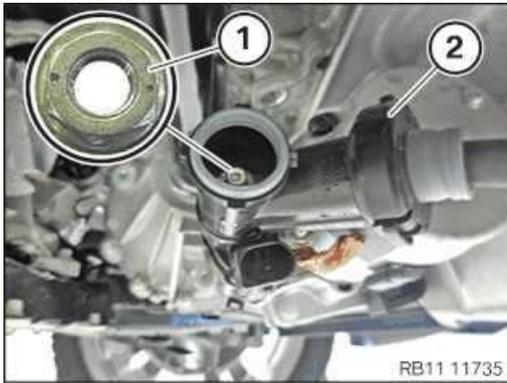
- Unfasten nut (1).



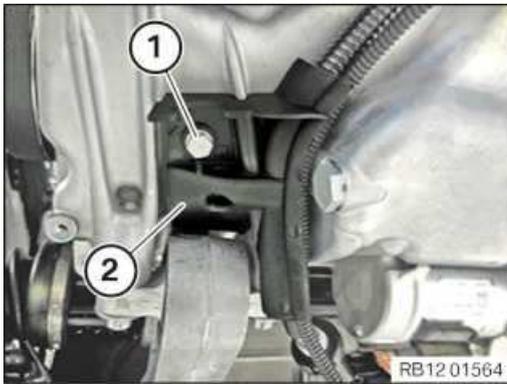
- Release the positive battery cable (1) from the clamps (arrows).



- Unlock and loosen connector (1).
- Detach the sealing cap (2) in the direction of the arrow.
- Feed out and remove the sealing cap (2).



- Unfasten nut (1).
- Feed out the positive battery cable (2) of the starter motor and set it aside.



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



- Feed out positive battery cable from the clamps (1) and remove.

## 11 – Installing positive battery cable from the battery to the starter motor



### CAUTION

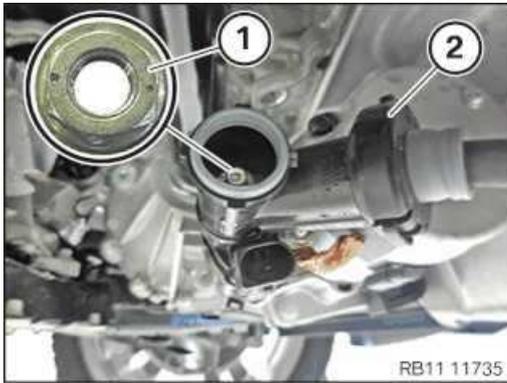
Improper routing of the positive battery cable.

#### Risk of short circuits!

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



- Feed in and install positive battery cable at the clamps (1).



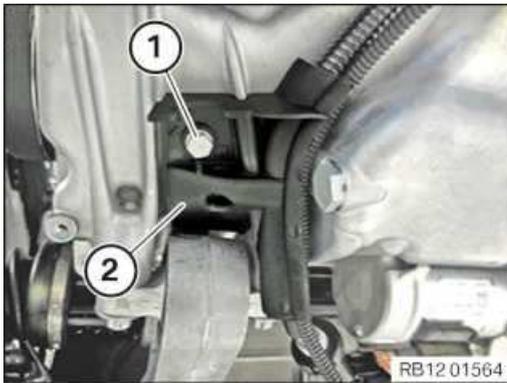
- Feed the positive battery cable (2) in on the starter and install.
- Tighten nut (1).

**Battery positive lead to starter**

M8		Tightening torque	13,5 Nm
----	--	-------------------	---------



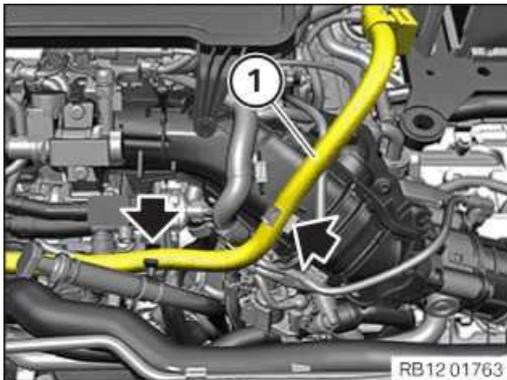
- Insert and install the new sealing cap (2).
- Secure the sealing cap (2) in the direction of the arrow.
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.



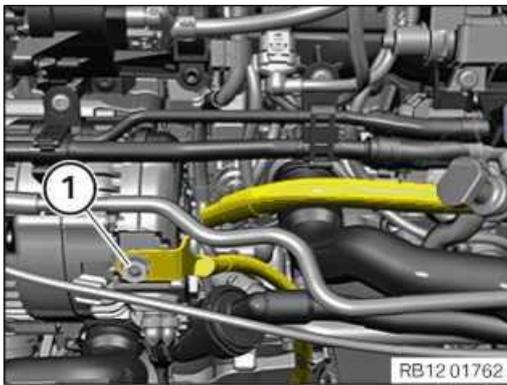
- Insert and install the holder (2).
- Tighten down screw (1).

**Bracket to oil sump**

M6		Tightening torque	8 Nm
----	--	-------------------	------



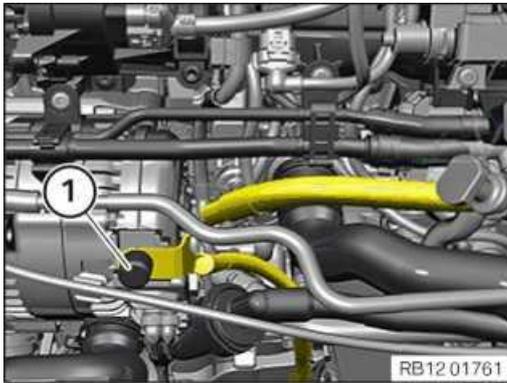
- Insert the positive battery cable (1) into the clamps (arrows).



- Tighten nut (1).

#### Positive battery cable to alternator

M8		Tightening torque	19 Nm
----	--	-------------------	-------



- Install the cover (1).



- Feed in and install positive battery cable (4) at the partition wall (5).
- Tighten positive battery terminal (3).

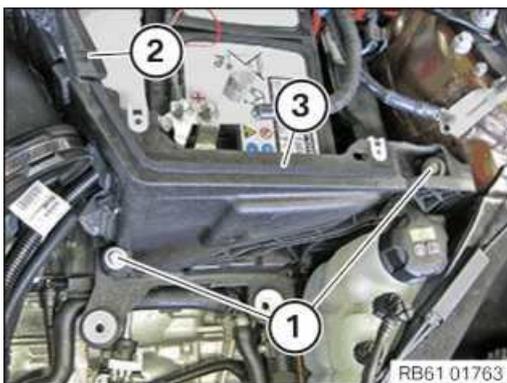
#### Positive battery terminal to battery

NutM6		Tightening torque	5 Nm
-------	--	-------------------	------

- Feed in and install the positive battery cables (2).
- Tighten nuts (1).

#### Positive battery cable to positive battery terminal

M8		Tightening torque	15 Nm
----	--	-------------------	-------



- Insert tension strut (3) and tighten with screws (1).

#### Trailing link

M8		Tightening torque	19 Nm
----	--	-------------------	-------

- Tighten down screw (2).

#### Battery cover

M8			2,8 Nm
----	--	--	--------

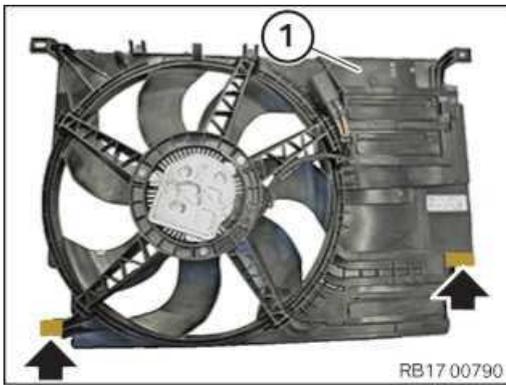
## POSTPROCESSES

### 12 – Installing fan cowl with electric fan

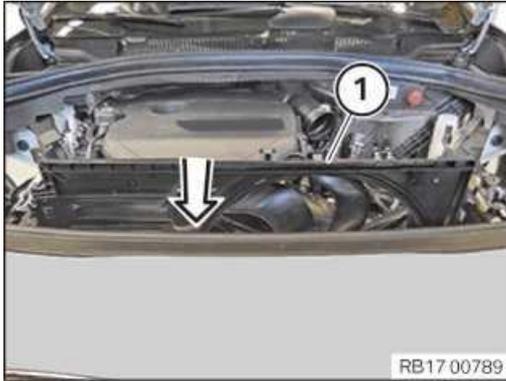


#### TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.



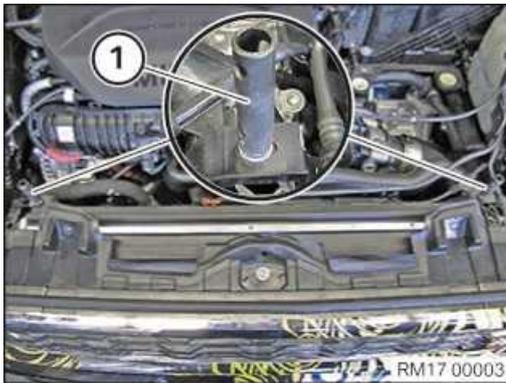
- Feed the guides (arrows) of the fan cowl (1) into the charge air cooler.



- Feed in and install the fan cowl (1) in the direction of the arrow.



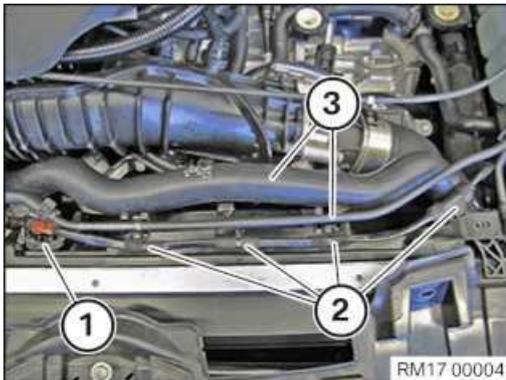
- Lock the left and right locks (arrows).



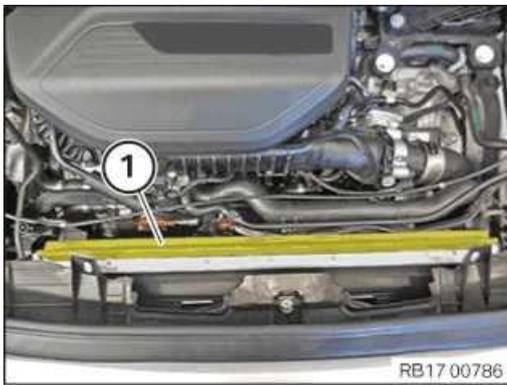
- Tighten the screws (1).

#### Fan cowl on radiator

M6X12		Tightening torque	6 Nm
-------	--	-------------------	------

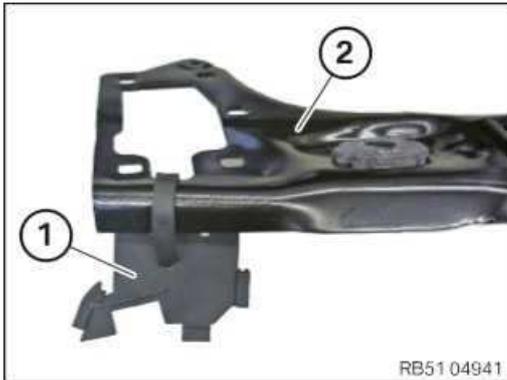


- Connect connectors (1) and lock.  
The connector (1) must engage audibly.
- Secure clamps (2).
- Thread in and install coolant line (3).

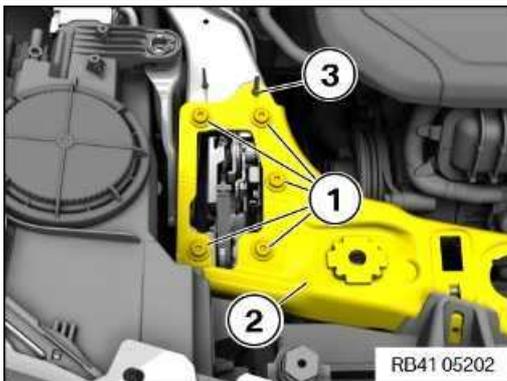


- Guide the sealing (1) on the radiator in and install it.

### 13 – Install front cross connection



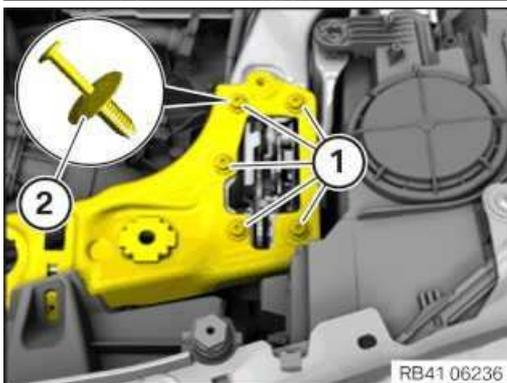
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

#### Cross connection to carrier support

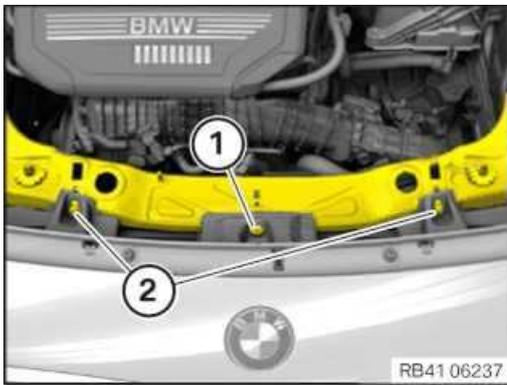
Screws M6x20	Tightening torque	11,8 Nm
--------------	-------------------	---------



- Tighten the screws (1).

#### Cross connection to carrier support

Screws M6x20	Tightening torque	11,8 Nm
--------------	-------------------	---------



- Position screws (3) on the rubber mounts for the radiator and tighten.

#### Screw connection for rubber mount of coolant radiator to coolant radiator

Bolt to rubber mount		Tightening torque	8 Nm
----------------------	--	-------------------	------

- Tighten down screws (2).

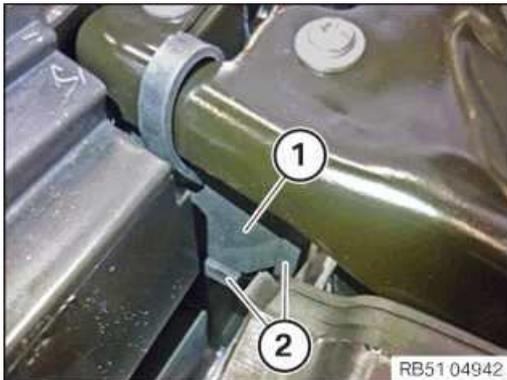
#### Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
-------------	--	-------------------	---------

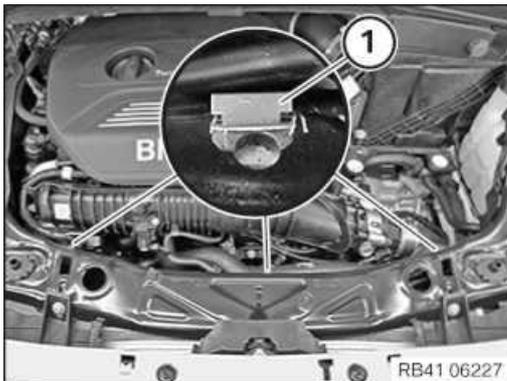
- Tighten down screw (1).

#### Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
-------------	--	-------------------	-------



- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

### 14 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

#### Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
-------	--	-------------------	------

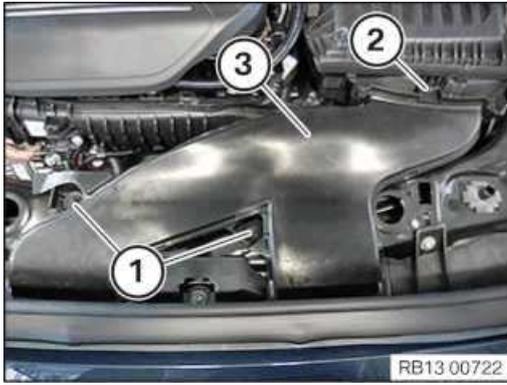
- Tighten clamp (4).

#### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

### 15 – Install the intake neck for the intake filter housing

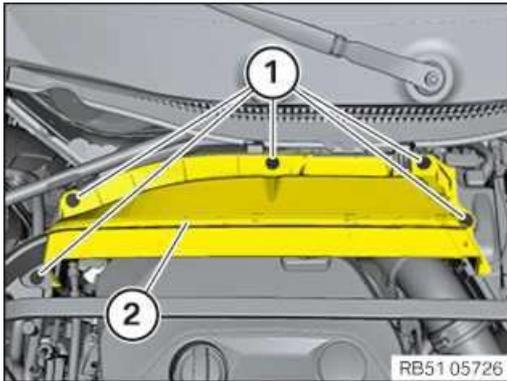


- Insert and install the intake neck (3).  
The lock (2) must audibly engage.
- Tighten nuts (1).

#### Intake neck to cross connection

M6		Tightening torque	8 Nm
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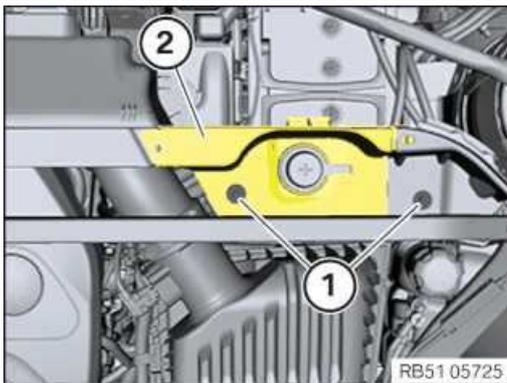
#### 16 – Installing the upper bulkhead cover



- Feed in and install cover (2) of the bulkhead at the top.
- Tighten the screws (1).

#### Cover of top bulkhead

Screw		Tightening torque	2,6 Nm
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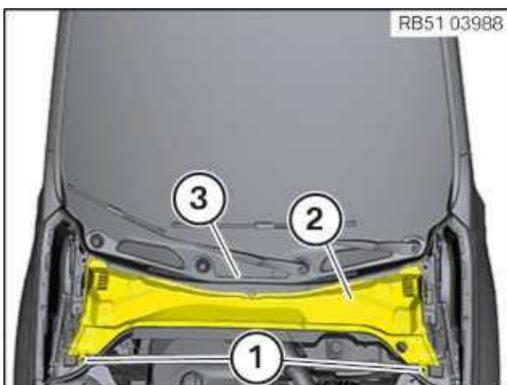


- Guide in and install cover (2).
- Tighten down screw (1).

#### Cover of remote positive terminal

Screw		Tightening torque	2,6 Nm
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#### 17 – Installing front cowl panel cover



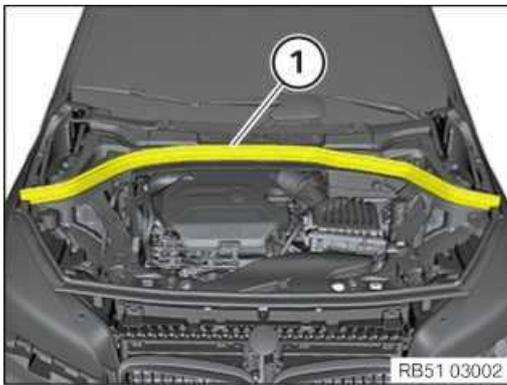
- Insert and install cowl panel cover at front (2) into cowl panel cover at rear (3).
- Check cowl panel cover at front is correctly seated (2).
- Secure expanding rivet (1).

#### 18 – Install the seal for the bonnet



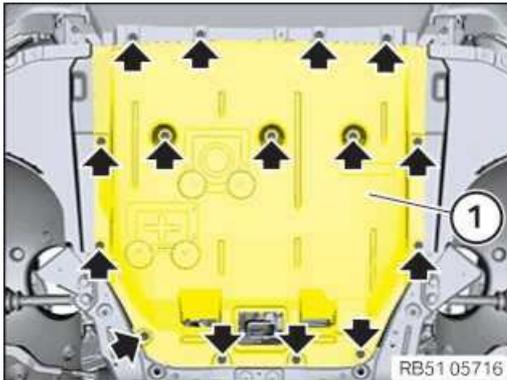
#### NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Install bonnet seal at rear (1).
- Ensure that the rear bonnet seal (1) is fitted correctly.

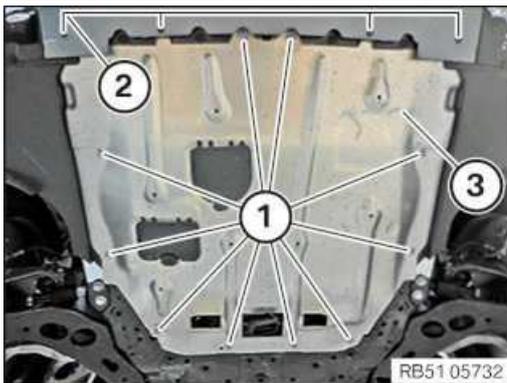
### 19 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

#### Underbody protection front

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



- **Equipment specification with metal underride guard:**
- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

#### Underbody protection front

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

### 20 – Disconnecting all battery earth leads



- See additional information.

## Additional Information

### Overview of Tightening Torques

#### Battery positive lead to starter

Used in step 11

M8		Tightening torque	13,5 Nm
----	--	-------------------	---------

<b>Bracket to oil sump</b>			Used in step <a href="#">11</a>
M6		Tightening torque	8 Nm
<b>Positive battery cable to alternator</b>			Used in step <a href="#">11</a>
M8		Tightening torque	19 Nm
<b>Positive battery terminal to battery</b>			Used in step <a href="#">11</a>
NutM6		Tightening torque	5 Nm
<b>Positive battery cable to positive battery terminal</b>			Used in step <a href="#">11</a>
M8		Tightening torque	15 Nm
<b>Trailing link</b>			Used in step <a href="#">11</a>
M8		Tightening torque	19 Nm
<b>Battery cover</b>			Used in step <a href="#">11</a>
M8			2,8 Nm
<b>Fan cowl on radiator</b>			Used in step <a href="#">12</a>
M6X12		Tightening torque	6 Nm
<b>Cross connection to carrier support</b>			Used in step <a href="#">13</a>
Screws M6x20		Tightening torque	11,8 Nm
<b>Screw connection for rubber mount of coolant radiator to coolant radiator</b>			Used in step <a href="#">13</a>
Bolt to rubber mount		Tightening torque	8 Nm
<b>Air duct to upper connection</b>			Used in step <a href="#">13</a>
M6x20 screw		Tightening torque	11,8 Nm
<b>Bracing strut to upper connection</b>			Used in step <a href="#">13</a>
M8x20 screw		Tightening torque	28 Nm
<b>Intake silencer housing to lock bridge</b>			Used in step <a href="#">14</a>
M6X30		Tightening torque	8 Nm
<b>Clean air pipe to intake silencer housing</b>			Used in step <a href="#">14</a>
Clamp		Tightening torque	3 Nm
<b>Intake neck to cross connection</b>			Used in step <a href="#">15</a>
M6		Tightening torque	8 Nm
<b>Cover of top bulkhead</b>			Used in step <a href="#">16</a>
Screw		Tightening torque	2,6 Nm
<b>Cover of remote positive terminal</b>			Used in step <a href="#">16</a>
Screw		Tightening torque	2,6 Nm
<b>Underbody protection front</b>			Used in step <a href="#">19</a>
Screw for thermoplastic plastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

## Links

Repair instructions	Used in step
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 20
<a href="#">61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
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<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
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<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 20

## 12 42 500 motor (B47)

# Replacing positive battery cable from vehicle battery for starter

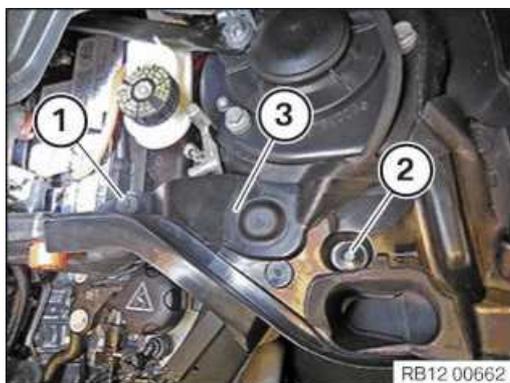


### Necessary preliminary work:

- Disconnect [negative battery cable](#).
- Remove [fan cowl](#).
- Remove front [underbody protection](#).
- Remove [upper bulkhead cover](#).



### Removal:



Loosen screw (1).  
Release expanding rivet (2).  
Remove cover (3).

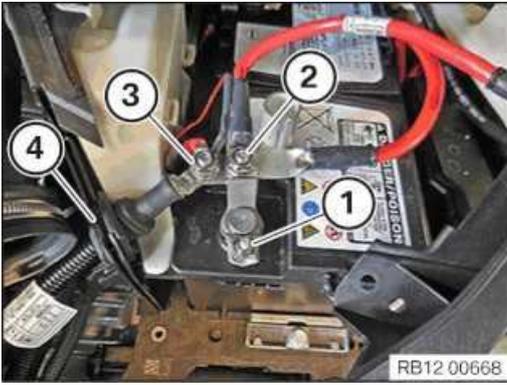


### F45, F46:

Loosen screw (1).  
Lay the cover (2) of the positive battery connection point to one side.



Release screws along the arrows and remove tension strut (1).



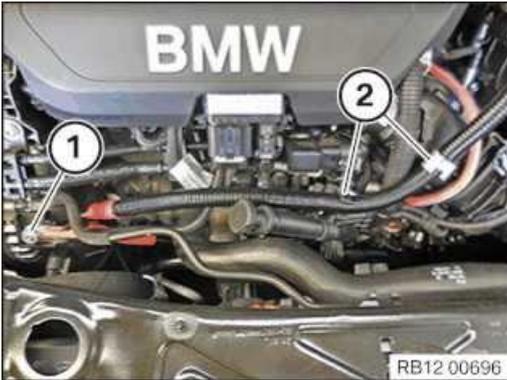
Release nuts (2) and (3).

Detach positive battery cables from positive battery terminal.

Slacken nut (1).

Detach positive battery terminals from vehicle battery.

Release positive battery cable (4) from partition wall.



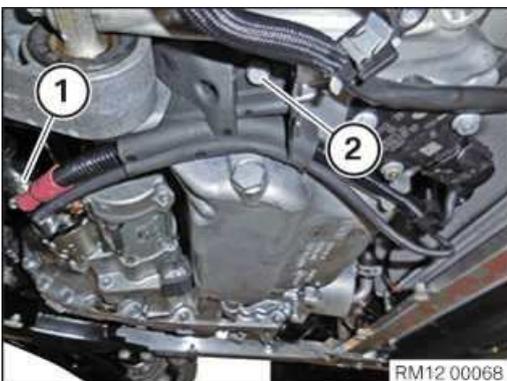
Slacken nut (1).

Detach positive battery cable from alternator.

Release positive battery cable from retainers (2).



Release positive battery cable from retainers (1).



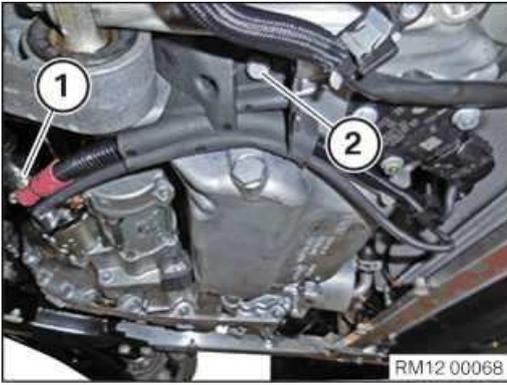
Release nut (1) on starter motor.

Release screw (2) from cable clip.

Feed out positive battery cable and remove.



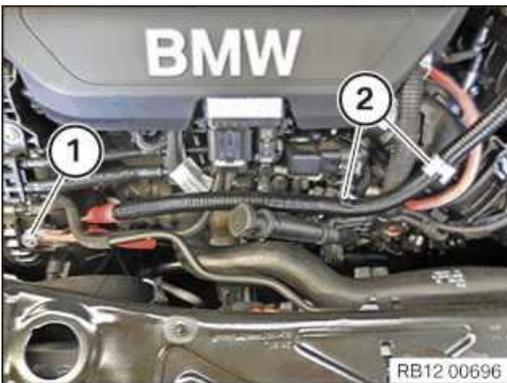
**Installation:**



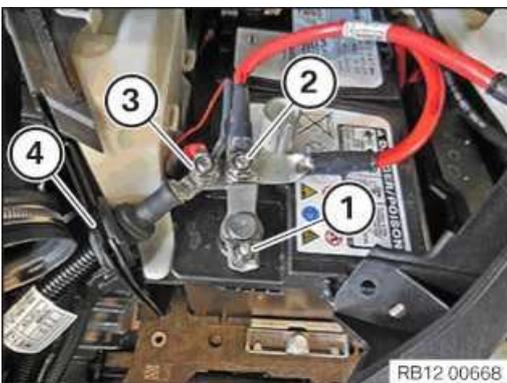
Install positive battery cable.  
Connect positive battery cable to starter motor.  
Tighten nut (1).  
Tightening torque [12 52 3AZ.](#)  
Install cable clip.  
Tighten screw (2).  
Tightening torque [12 52 4AZ.](#)



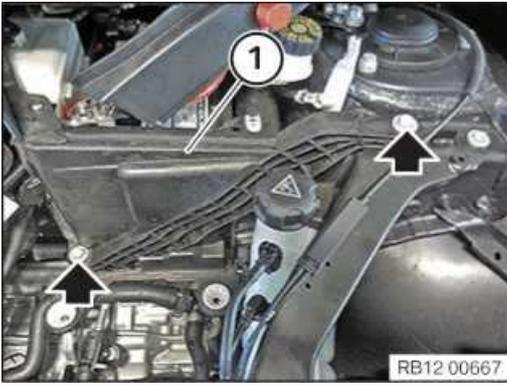
Secure positive battery cable with clamps (1).



Secure positive battery cable with clamps (2).  
Connect positive battery cable to alternator.  
Tighten nut (1).  
Tightening torque [12 52 2AZ.](#)



Install positive battery cable (4) on partition wall.  
Ensure rubber grommet is correctly fitted on partition wall.  
Connect positive battery cables to positive battery terminal.  
Tighten nuts (2) and (3).  
Tightening torque [12 52 6AZ.](#)  
Connect positive battery terminals to vehicle battery.  
Tighten nut (1).  
Tightening torque [12 52 5AZ.](#)

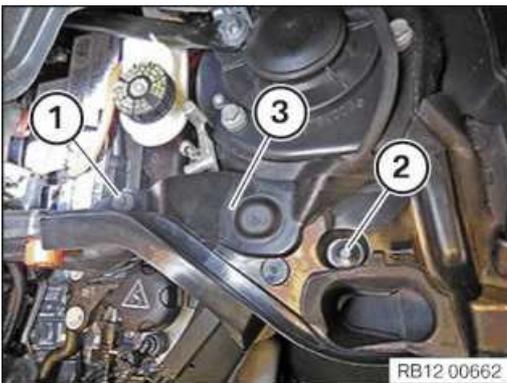


Join tension strut (1) and tighten with screws.  
Tightening torque [17 10 8AZ](#).

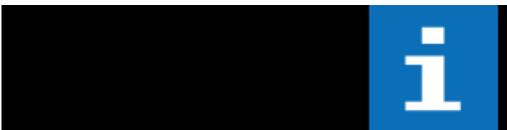


#### F45, F46

Install the cover (2) of the positive battery connection point.  
Tighten screw (1).  
Tightening torque [17 10 10AZ](#)



Install cover (3).  
Install expanding rivet (2).  
Tighten screw (1).  
Tightening torque [17 10 10AZ](#).



#### Required follow-up work:

- Install [upper bulkhead cover](#).
- Install [fan cowl](#).
- Install front [underbody protection](#).
- Connect [battery earth lead](#).

**Caution!**

Observe [safety regulations](#).

Investigate cause of triggering of safety battery terminal.

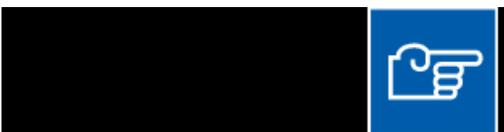
To do so, read out fault memory of airbag control unit. Note fault messages stored in memory. Rectify faults. Then clear fault memory.



Use of safety battery terminal:

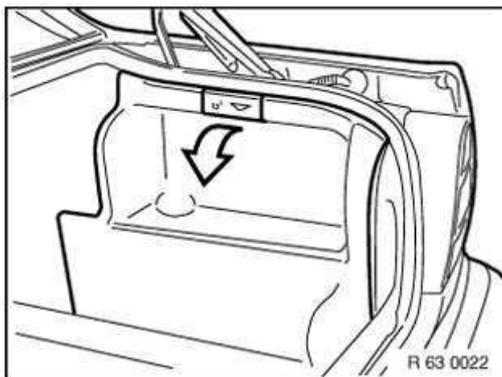
- From model year 1998 in Series E38, E39, E46
- From 4/99 in E36/Z3
- in each of following new Series

The different models have different installation locations:

**Battery in engine compartment**

Safety battery terminal is replaced with cable up to battery positive support point.

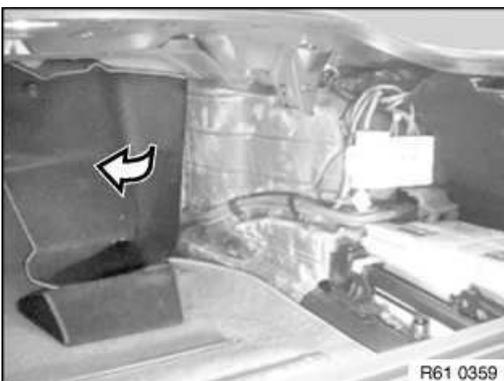
**Safety battery terminal is omitted as from 03/2002 from all E46 LHD models with 4-cylinder engines.**

**Battery in luggage compartment behind side trim panel**

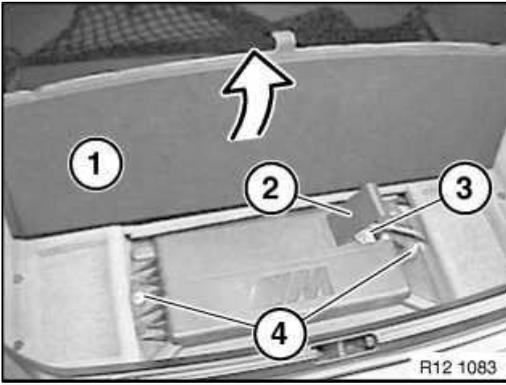
Remove side trim panel.

Follow instructions for [disconnecting and connecting battery](#).

Disconnect and cover battery negative lead.



Release front side trim panel partly and fold forward.



### Battery in luggage compartment under floor trim panel

Follow instructions for [disconnecting and connecting battery](#).

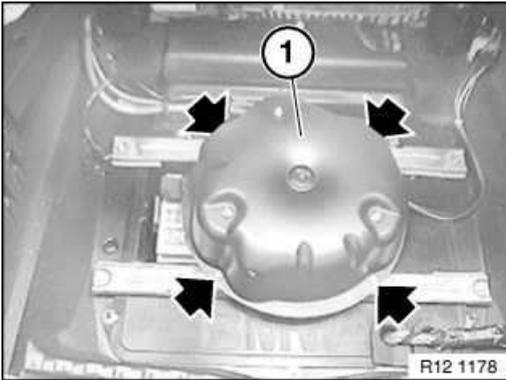
Fold back floor trim panel (1).

Lift cover (2) on battery negative lead.

Disconnect and cover battery negative lead (3).

Release nuts (4).

Remove battery cover.



### Battery in luggage compartment under spare wheel

Remove spare wheel.

Release screws.

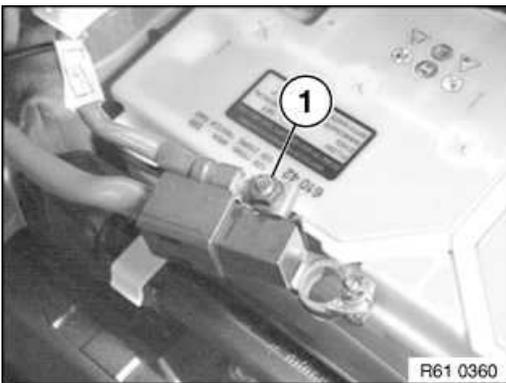
#### Caution!

Do not kink air pipes.

Set air supply system (1) to one side.

Follow instructions for [disconnecting and connecting battery](#).

Disconnect battery negative lead.



Disconnect supply cable (1) for vehicle electrical system. **Installation:**

Remove faulty fuses and carry out troubleshooting.



#### Caution!

Pay attention to interface.

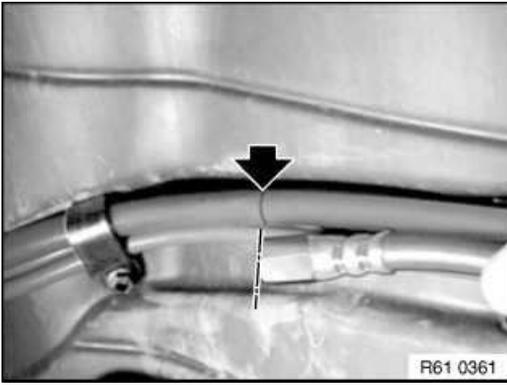
The repair cable is always a standard length.

The heavy-current connector of the repair cable has a larger diameter than the battery positive lead.

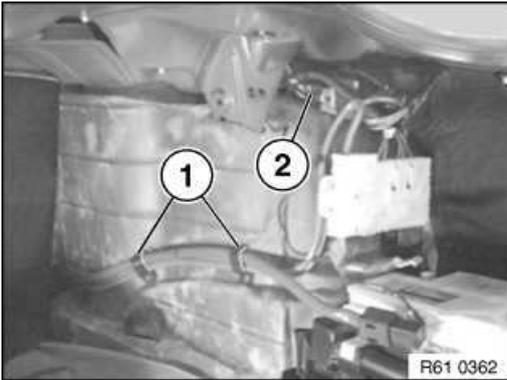
In some Series (e.g. E46 touring), the heavy-current connector of the repair cable can lead to installation problems.

This is the case when the interface is in the area of the close-fitting trim panels.

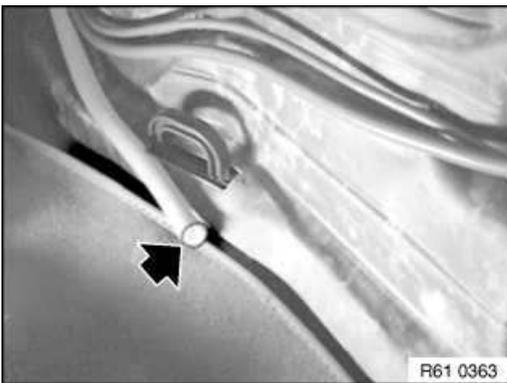
Find matching interface (e.g. approx. 10 cm behind rear seat backrest in E46 touring).



Lay repair cable parallel to battery positive lead.  
Mark interface of battery positive lead at end of repair cable.



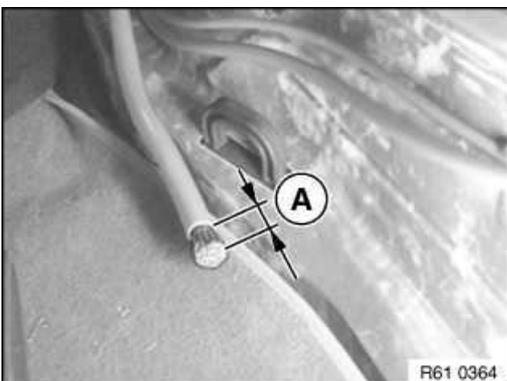
Release cable ties (1).  
Disconnect plug connection (2).



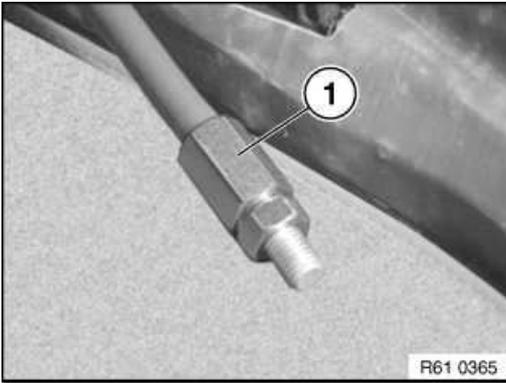
**Caution!**

Do not use bolt cutters or similar tools to cut through the cable.  
A cable end that has been squashed flat will no longer fit into the clamping sleeve.

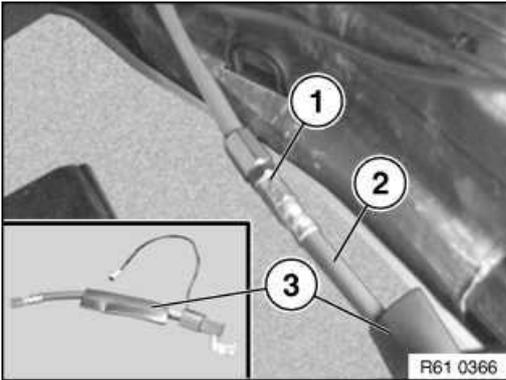
Saw through battery positive cable at marked point with an iron saw.



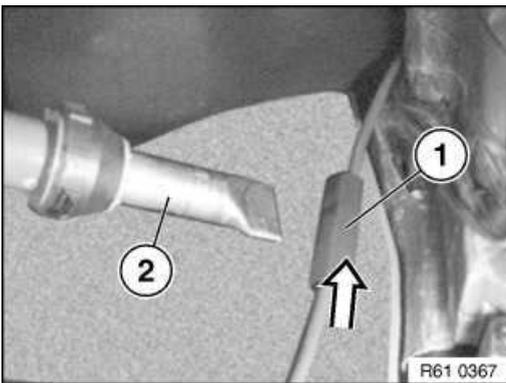
Strip insulation - length (A) - from cable end.  
Distance (A) = 15 mm.



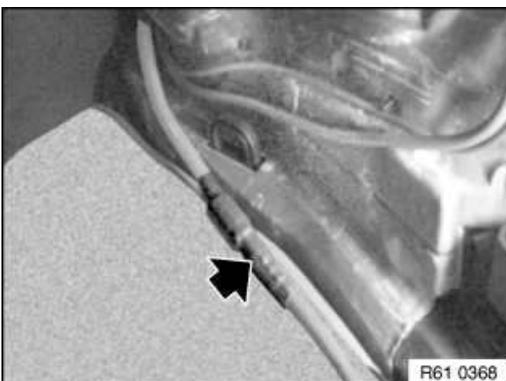
Push heavy-current connector (1) over stripped cable end and screw into position.



Push shrink-fit hose (3) over repair cable.  
Screw threaded sleeve (1) of repair cable (2) to heavy-current connector.



Push shrink-fit hose (1) over connecting point and shrink on with a hot-air blower (2).

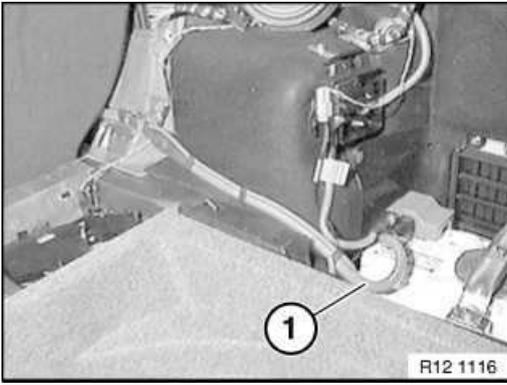


**Note:**  
Heat up shrink-fit hose until it has settled completely around the connection point.



When laying the repaired battery positive cable, observe the following:

- The shrink-fit hose must not be scuffed during any movement.
- The repair cable must not cause any disturbing noises during driving operation.



**Note:**

Offsetting cutting line by approx. 10 cm produces excess length of battery positive lead (1).

Lay battery positive lead (1) without kinks or abrasions.

(Shown on E46 touring.)

# 12 51 001 Replace wiring harness section for engine



## 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.



## 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

Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.

## PRELIMINARY WORK

### 1 – Disconnecting all battery earth leads



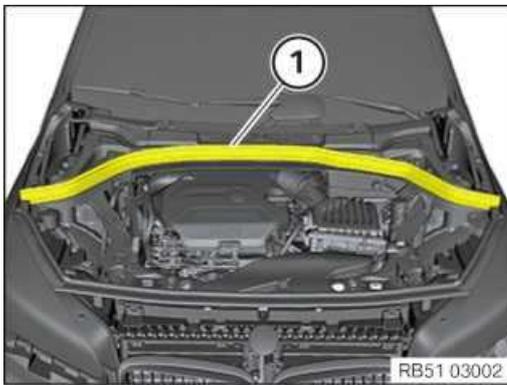
- See additional information.

### 2 – Remove the seal for the rear bonnet



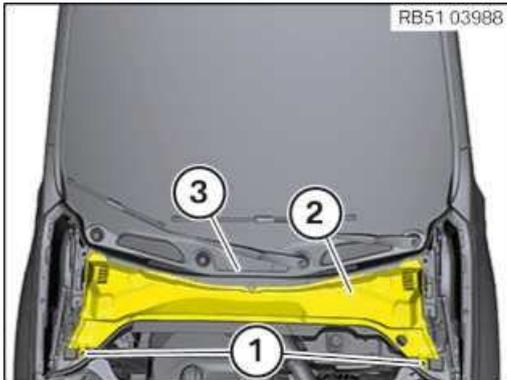
## NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



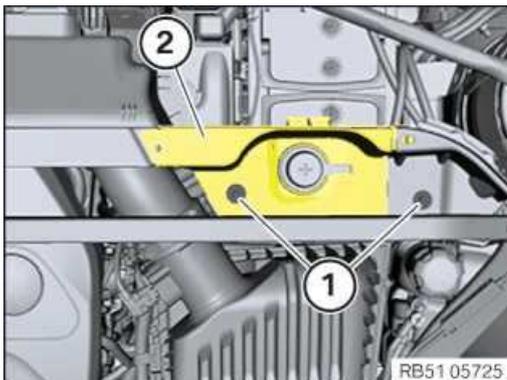
- Pull off rear bonnet seal (1) towards the top and remove.

### 3 – Removing front cowl panel cover

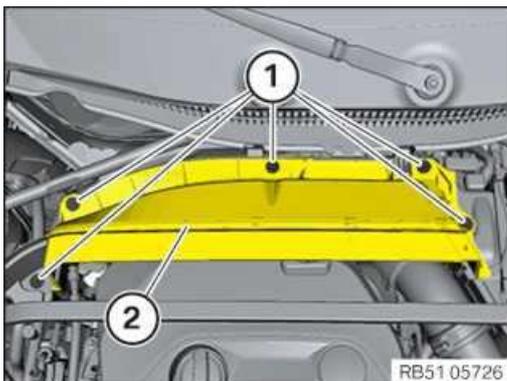


- Loosen the expanding rivet (1).
- Feed out and remove front cowl panel cover (2) from the rear cowl panel cover(3).

### 4 – Removing the upper bulkhead cover



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



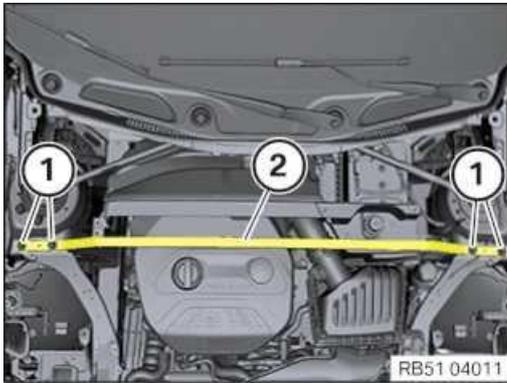
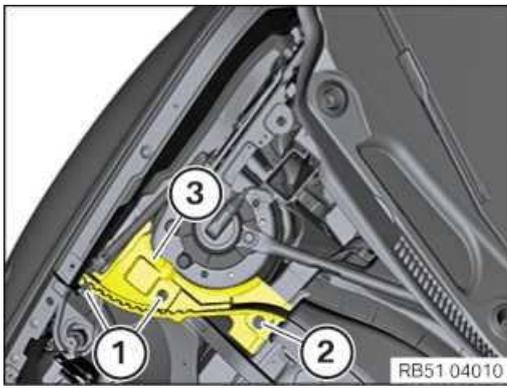
- Loosen screws (1).
- Feed out and remove the upper bulkhead cover (2).

### 5 – Remove suspension cross-brace



#### TECHNICAL INFORMATION

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



#### NOTICE

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

- Loosen expanding rivet (1).
- Loosen screw (2).
- Remove the cover (3).
- Loosen screws (1).
- Remove strut brace (2).

### 6 – Removing the acoustic cover



#### WARNING

**Hot surfaces.**

**Risk of burning!**

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



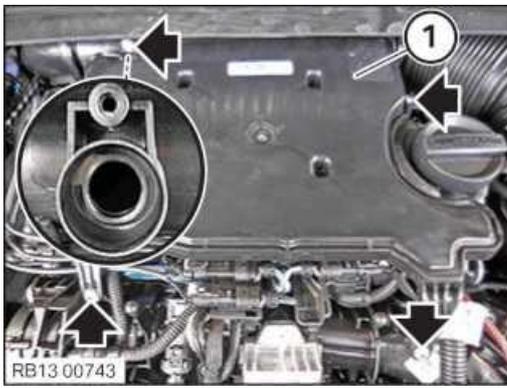
#### RISK OF DAMAGE

**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  $>20\text{ }^{\circ}\text{C}$ .
  - Use only distilled water as an auxiliary material during installation, no lubricants.
- Unclip the acoustic cover from the marked areas towards the top.

### 7 – Remove resonator

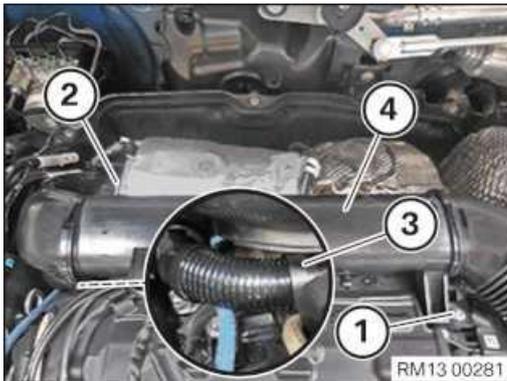


- Remove screws (arrows).
- Guide out and remove the resonator (1).

### 8 – Removing clean air pipe

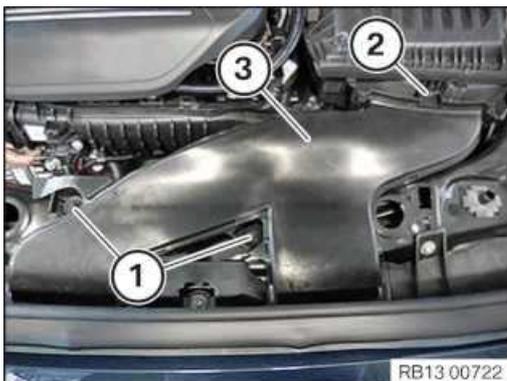


- Detach clamp (1) on the clean air pipe.
- Pull off the clean air pipe from the intake silencer housing.



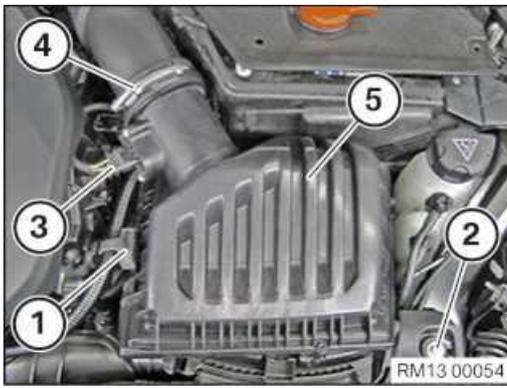
- Loosen screw (1).
- Loosen clamp (2).
- Unlock the ventilation line (3) and pull it off the cylinder head cover.
- Feed out clean air pipe and remove.

### 9 – Remove the intake neck for intake silencer housing



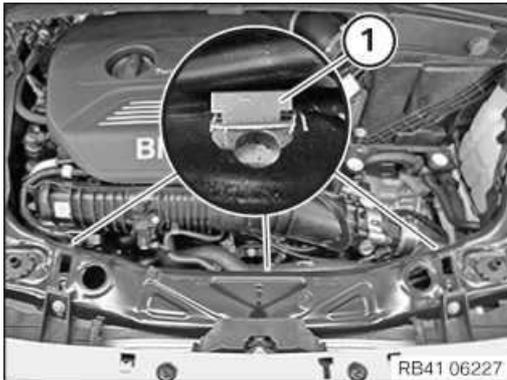
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

### 10 – Removing intake silencer housing

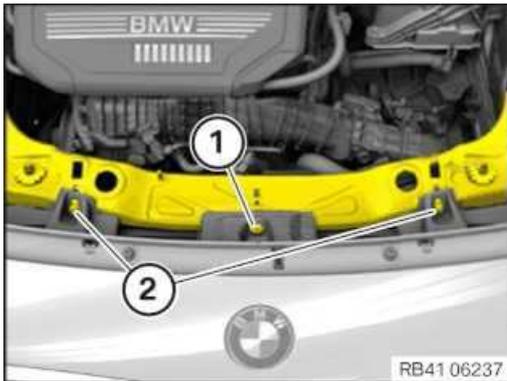


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

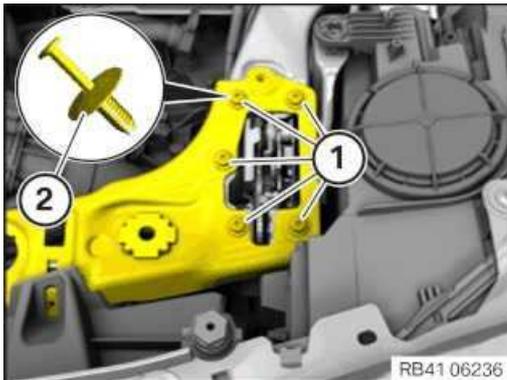
### 11 – Remove front cross connection



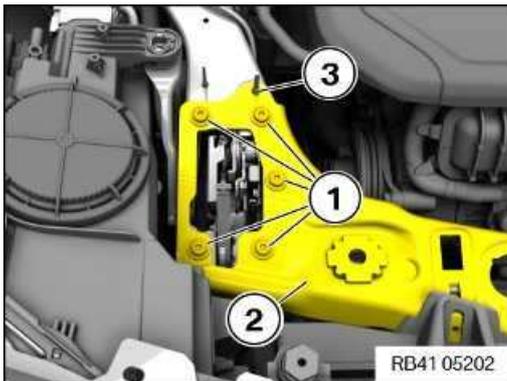
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



- Loosen screw (1).
- Loosen screws (2).



- Loosen screws (1).
- Lever out expanding rivet (2).



- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

### 12 – Removing the fan cowl with electric fan

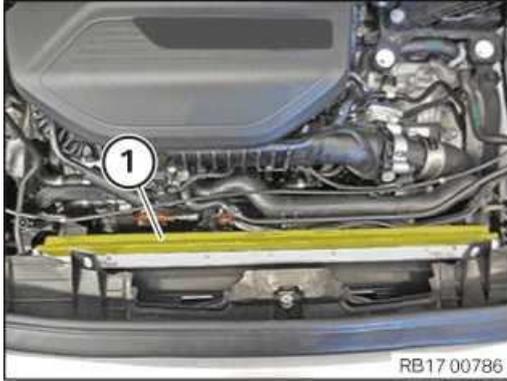


## WARNING

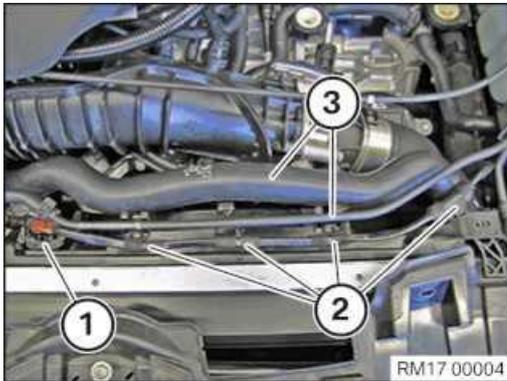
**Hot surfaces.**

**Risk of burning!**

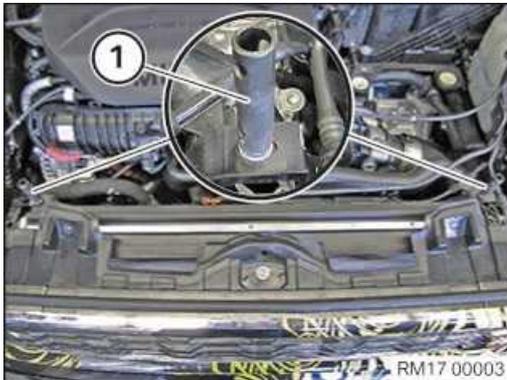
- Perform all work only on components that have cooled down.



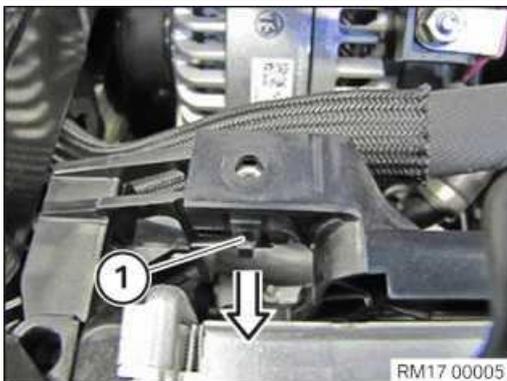
- Feed out and remove the sealing (1) from the radiator.



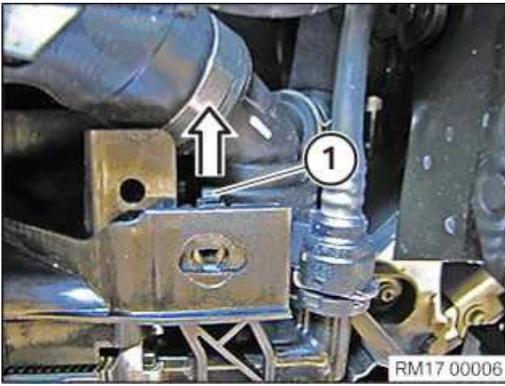
- Unlock plug connection (1) and disconnect.
- Unlock and loosen the clamps (2).
- Feed out connector (1) and place to one side.
- Thread off coolant line (3) and place to the side.



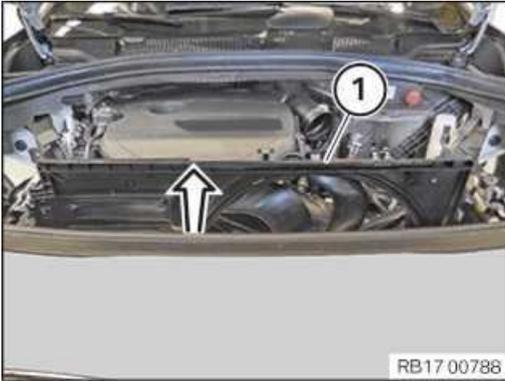
- Loosen screws (1).



- Unlock the right lock (1) on the fan cowl in the direction of the arrow.

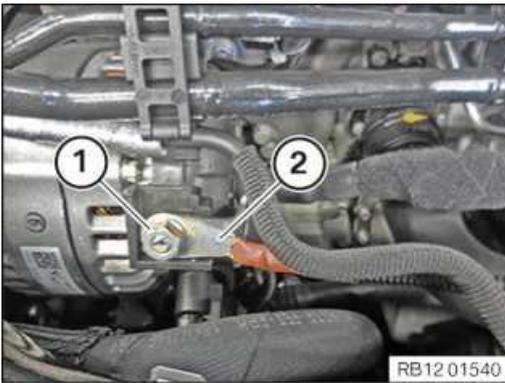


- Unlock the left lock (1) on the fan cowl in the direction of the arrow.



- Guide out fan cowl (1) in direction of arrow and remove.

### 13 – Detach positive battery cable from alternator



- Unfasten nut (1).
- Feed out the positive battery cable (2) from the alternator and place aside.

### 14 – Remove front right wheel

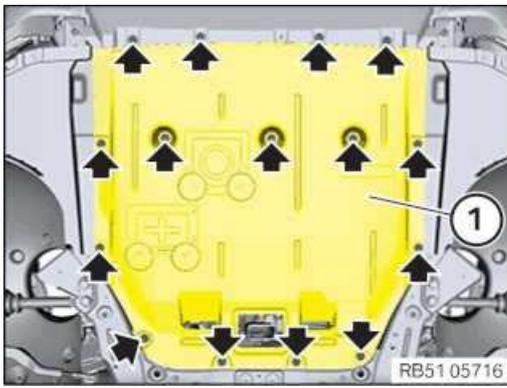


#### ► Removing the wheel

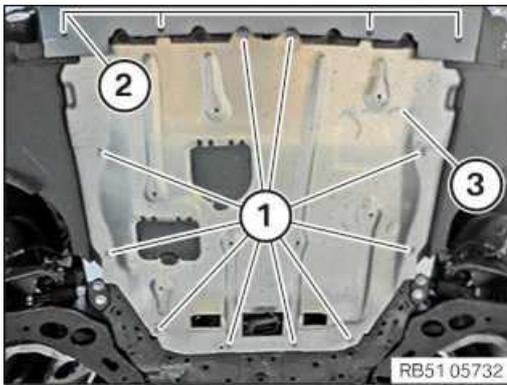
- If several wheels are removed simultaneously: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Unscrew the wheel bolts (arrows) and remove the wheel.

Use the matching adapter from tool set (wheel bolt adapter set) to loosen and tighten down the wheel bolt with security code.

### 15 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

## 16 – Removing the front right wheel arch cover

### ► Remove the front wheel arch trim



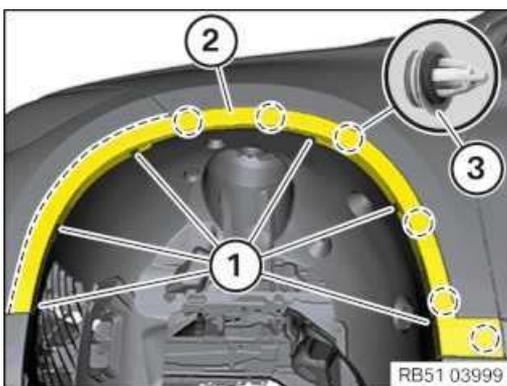
#### NOTICE

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

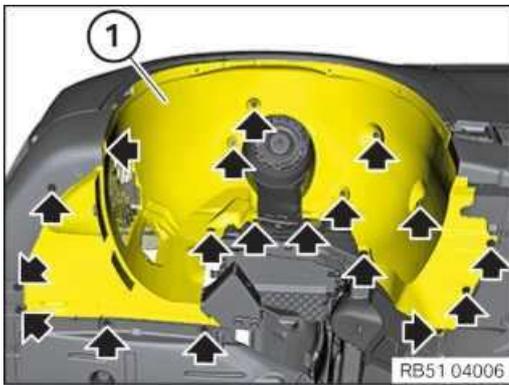


#### NOTICE

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



- Remove the blind rivets (1).
- Release the wheel arch trim (2) in the area of the side panel from the clips (3).
- Release the wheel arch trim (2) from the latch mechanisms on the bumper and remove.



#### NOTICE

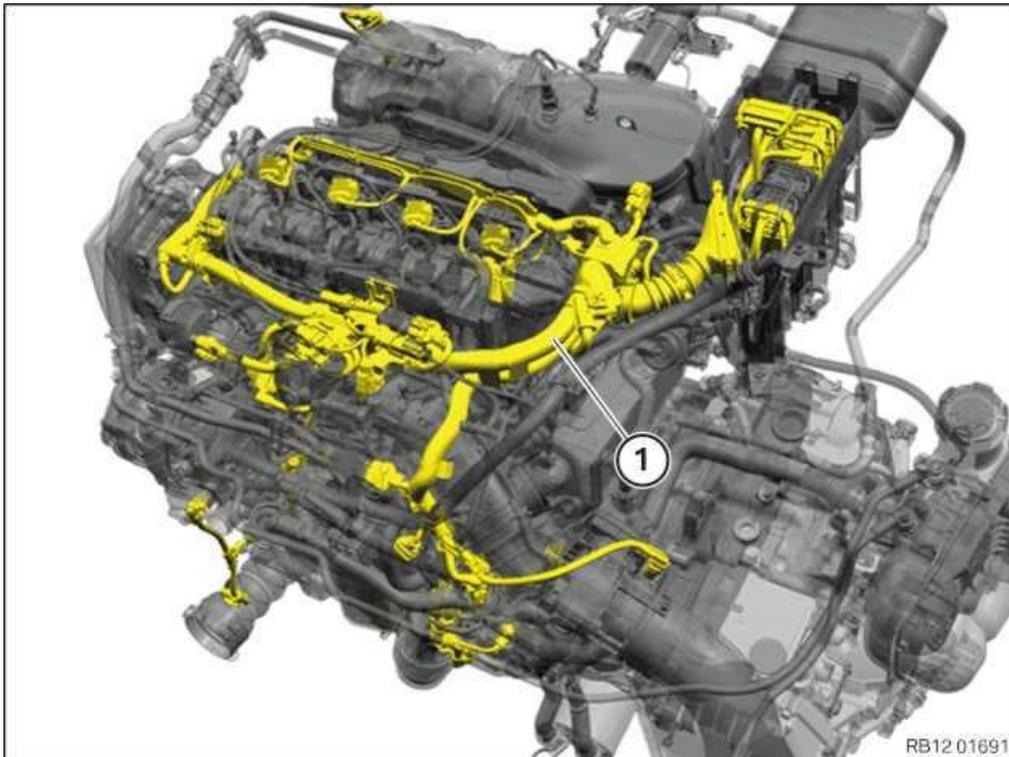
Description is for left component only. Procedure on the right side is identical.

- Unscrew all bolts and nuts (arrows).
- Guide the wheel arch cover (1) out.

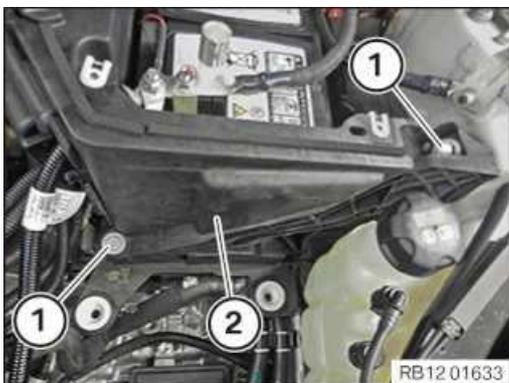
## MAIN WORK

### 17 – Removing wiring harness section for engine

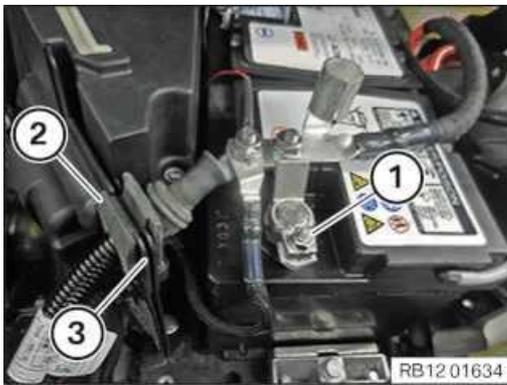
Overview: Wiring harness section for the engine



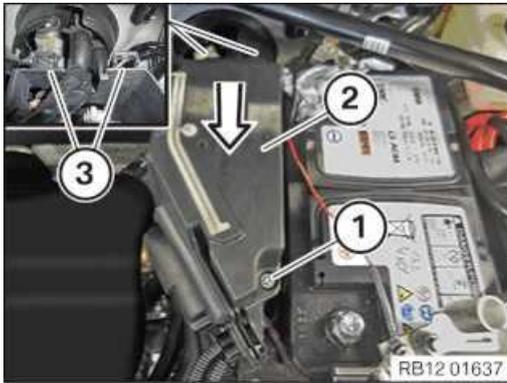
1 Wiring harness section for the engine



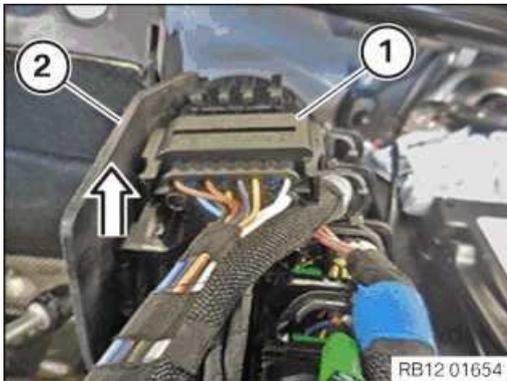
- Loosen screws (1).
- Guide out the tension strut (2) toward the top and remove it.



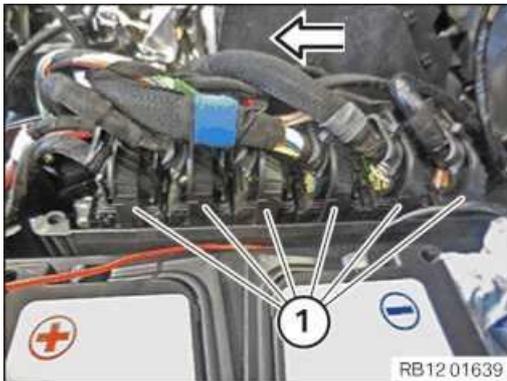
- Undo positive battery terminal (1).
- Feed out positive battery terminal (1) and set aside.
- Guide the positive battery cable (2) out of the holder (3) and lay to one side.



- Loosen screw (1).
- Unlock cover (2) and feed out and remove from the guides (3) in the direction of arrow.



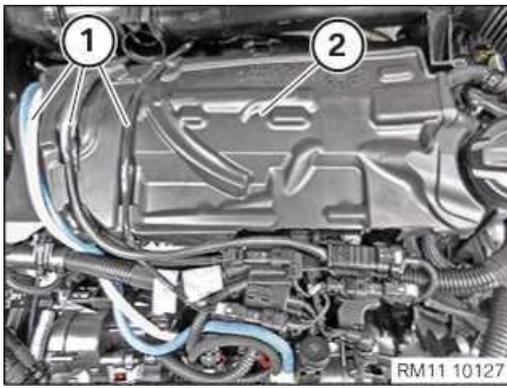
- Feed out connector (1) from the electronics box (2) and remove in the direction of arrow.
- Unlock and loosen connector (1).



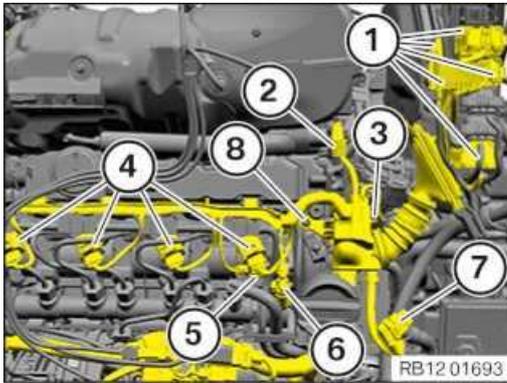
- Unlock and remove the connector (1) in the direction of the arrow.
- Feed out connector (1) and place to one side.



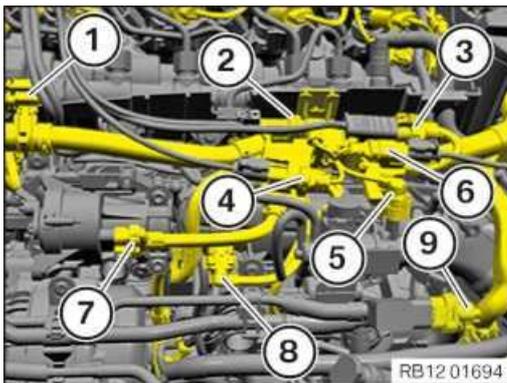
- Unlock and loosen connector (1).



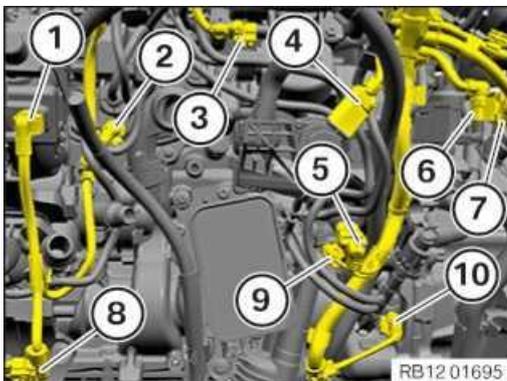
- Release the wiring harness (1) from the brackets.
- Guide the acoustic cover (2) out and remove.



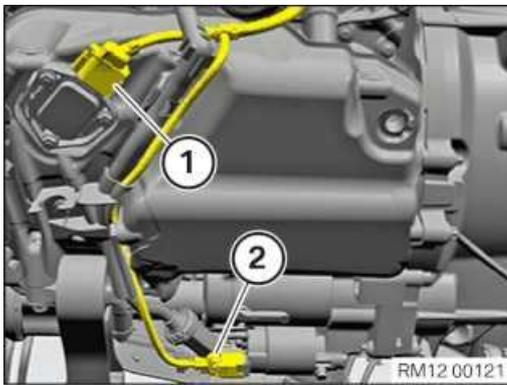
- Disconnect all connectors (1) from the DME control unit and remove the integrated supply module (PDM).
- Unlock the connector (2) and disconnect it from the differential pressure sensor.
- Unlock the connector (3) and disconnect it from the exhaust-gas recirculation valve.
- Unlock the connector (4) and pull off from the injectors.
- Unlock the connector (5) and disconnect it from the camshaft sensor.
- Unlock the connector (6) and disconnect it from the fuel pressure regulator.
- Unlock connector (7) and pull off from hot film air mass meter.
- Loosen screw (8).



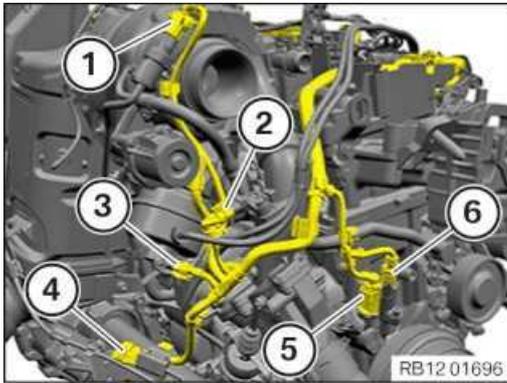
- Unlock connector (1) and pull off from the rail pressure sensor.
- Unlock the connector (2) and disconnect it from the exhaust temperature sensor before the diesel particulate filter.
- Unlock and disconnect the connector (3) from the front oxygen sensor.
- Unlock the connector (4) and disconnect it from the exhaust temperature sensor after the diesel particulate filter.
- Unlock and disconnect the connector (5) from the electric changeover valve.
- Unlock the connector (6) and disconnect it from the exhaust temperature sensor for the exhaust-gas recirculation cooler.
- Unlock the connector (7) and disconnect it from the servomotor for the swirl flaps.
- Unlock the connector (8) and pull it off the charging pressure sensor.
- Unlock the connector (9) and disconnect from the fuel pressure and temperature sensor.



- Unlock and disconnect the connector (1) from the alternator.
- Unlock and disconnect the connector (2) from the electric changeover valve.
- Unlock and disconnect the connector (3) from the electric changeover valve.
- Unlock the connector (4) and pull it off the high pressure pump.
- Unlock the connector (5) and disconnect it from the oil pressure sensor.
- Unlock connector (6) and pull off from throttle body.
- Unlock the connector (7) and disconnect it from the intake air temperature sensor.
- Unlock the connector (8) and disconnect it from the air conditioning compressor.
- Unlock and disconnect the connector (9) from the solenoid valve.
- Unlock the connector (10) and pull it off the crankshaft sensor.



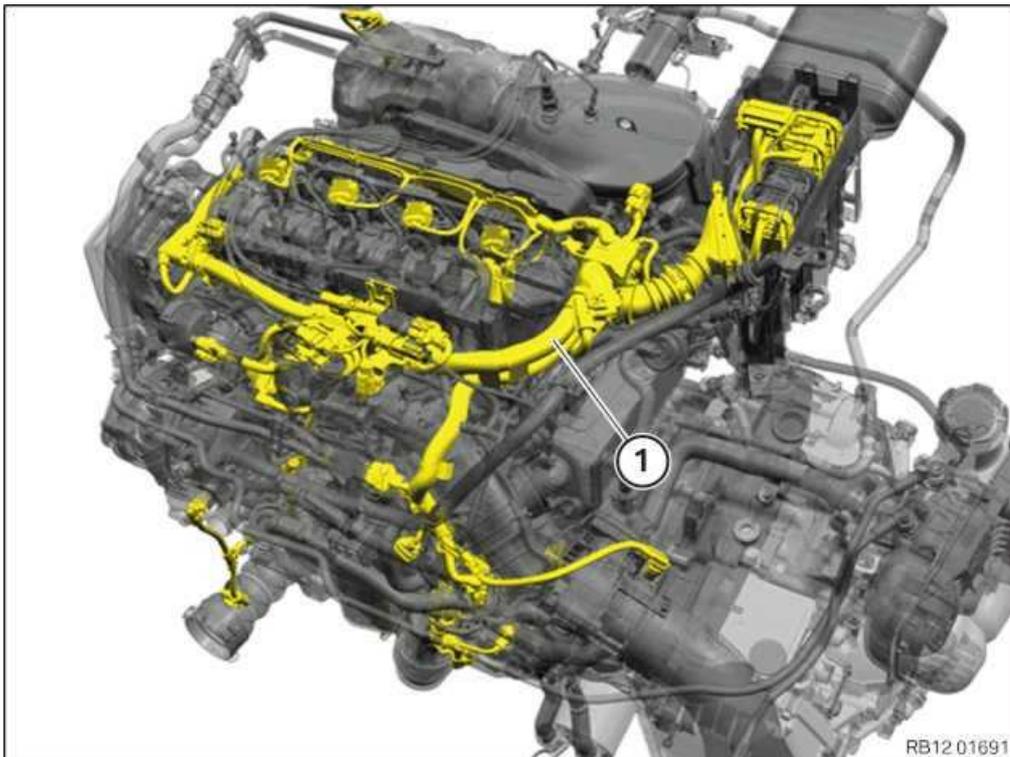
- Unlock the connector (1) and pull off of the oil-level sensor.
- Unlock connector (2) and remove from starter motor.



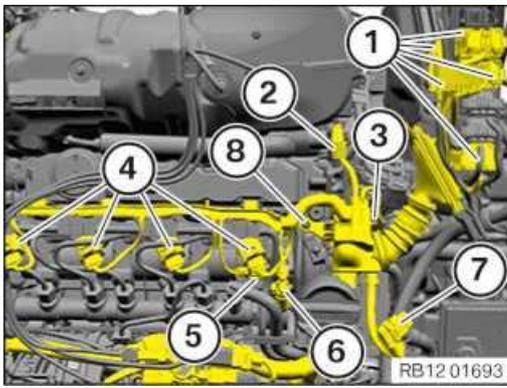
- Unlock the connector (1) and disconnect it from the exhaust gas pressure sensor.
- Unlock the connector (2) and pull it off the charging pressure sensor.
- Unlock the connector (3) and pull it off the exhaust turbocharger.
- Unlock connector (3) and disconnect from differential pressure sensor.
- Unlock and disconnect the connector (4) from the monitoring oxygen sensor.
- Unlock the connector (5) and pull it off the oil pressure switch .
- Unlock connector (6) and disconnect from switching valve.
- Detach, feed out and remove the wiring harness from the clamps.

## 18 – Installing wiring harness section for engine

Overview: Wiring harness section for the engine



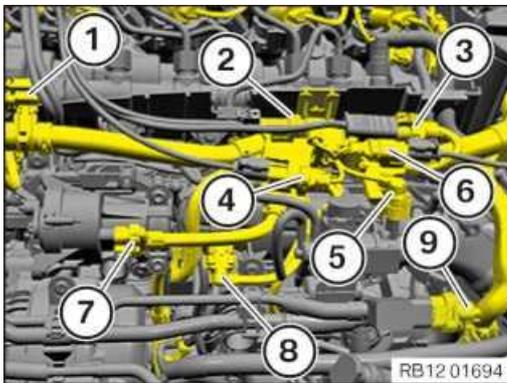
1 Wiring harness section for the engine



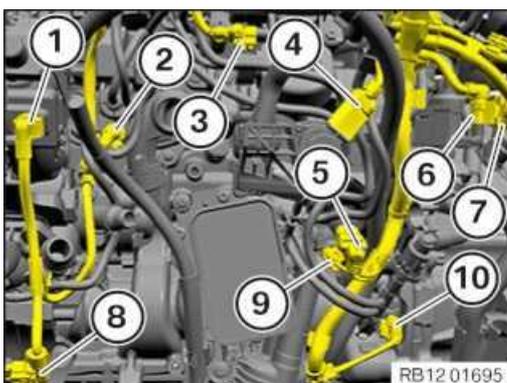
- Route the wiring harness section for the engine and fasten it with the clamps.
- Route all connectors (1) to the DME control unit and remove the integrated supply module (PDM).
- Attach connector (2) to the differential pressure sensor and lock it audibly.
- Attach connector (3) to the exhaust-gas recirculation valve and lock audibly.
- Attach connector (4) to the injectors and lock it audibly.
- Attach connector (5) to the camshaft sensor and lock it audibly.
- Attach connector (6) to the fuel pressure regulator and lock it audibly.
- Connect and audibly lock the connector (7) to the hot film air mass meter.
- Tighten down screw (8).

#### Wiring harness to cylinder head cover

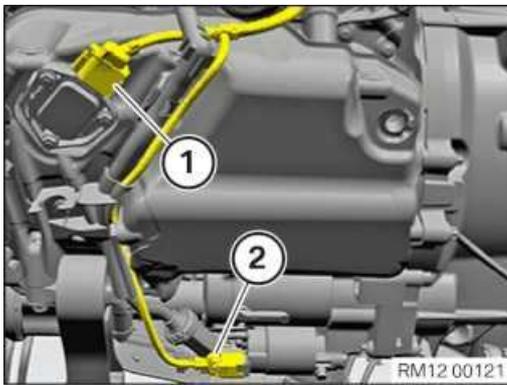
TS5x20		Tightening torque	3,5 Nm
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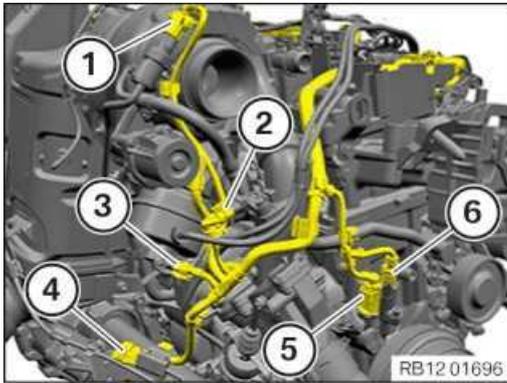
- Connect the connector (1) to the rail pressure sensor and lock it audibly.
- Attach connector (2) to the exhaust temperature sensor upstream from the diesel particulate filter and lock it audibly.
- Connect the connector (3) to the front oxygen sensor and lock audibly.
- Attach connector (4) to the exhaust temperature sensor downstream from the diesel particulate filter and lock it audibly.
- Connect the connector (5) to the electric changeover valve and lock audibly.
- Attach connector (6) to the exhaust temperature sensor for the exhaust-gas recirculation cooler and lock it audibly.
- Attach connector (7) to the servomotor for the swirl flaps and lock it audibly.
- Connect the connector (8) to the charging pressure sensor and lock it audibly.
- Attach connector (9) to the fuel pressure and temperature sensor and lock it audibly.



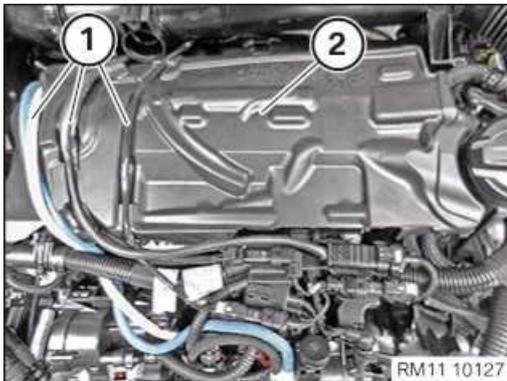
- Connect the connector (1) to the alternator and lock audibly.
- Connect the connector (2) to the electric changeover valve and lock audibly.
- Connect the connector (3) to the electric changeover valve and lock audibly.
- Connect the connector (4) to the high pressure pump and lock audibly.
- Connect the connector (5) to the oil pressure sensor and lock it audibly.
- Attach connector (6) to the throttle bodies and lock it audibly.
- Attach connector (7) to the intake air temperature sensor and lock it audibly.
- Connect the connector (8) to the air conditioning compressor and lock audibly.
- Connect the connector (9) to the solenoid valve and lock audibly.
- Connect the connector (10) to the crankshaft sensor and lock it audibly.



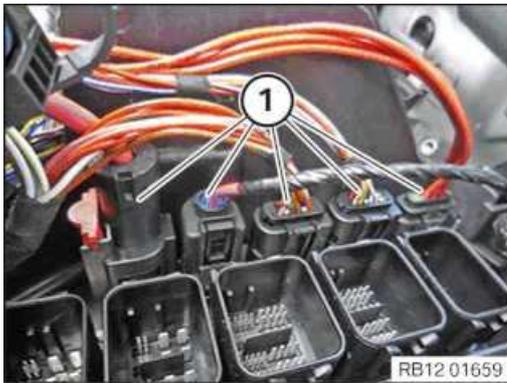
- Connect the connector (1) to the oil-level sensor and lock it audibly.
- Connect connector (2) to the starter motor and lock audibly.



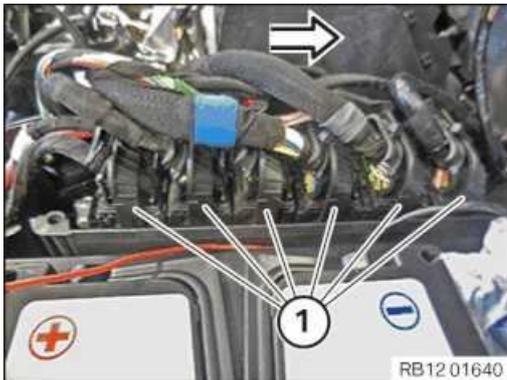
- Attach connector (1) to the exhaust turbocharger and lock it audibly.
- Connect the connector (2) to the charging pressure sensor and lock it audibly.
- Attach connector (3) to the exhaust gas pressure sensor and lock it audibly.
- Connect the connector (4) to the monitoring oxygen sensor and lock audibly.
- Attach connector (5) to the oil pressure switch and lock it audibly.
- Attach connector (6) to the switching valve and lock it audibly.



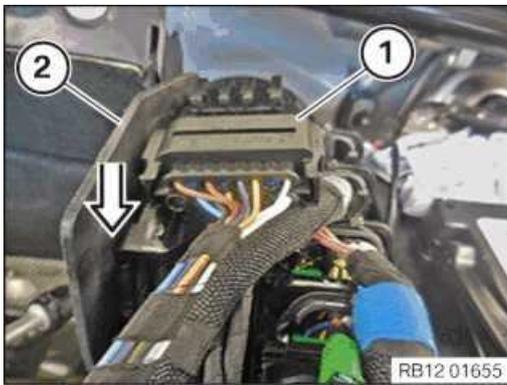
- Feed the acoustic cover (2) in and install.
- Fasten the vehicle wiring harness (1) in the brackets.



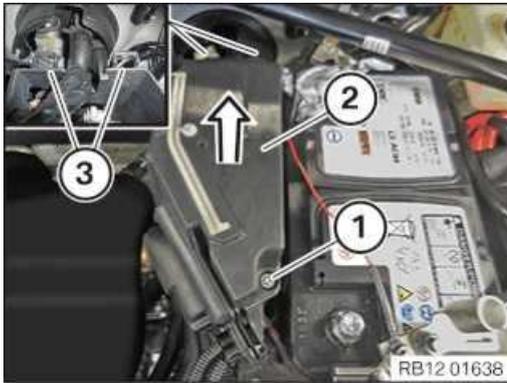
- Connect and lock the connector (1).
- Make sure the connectors (1) engage audibly.



- Connect connector (1) in direction of arrow and lock.
- Make sure the connectors (1) engage audibly.



- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.
- Insert the connector (1) in the direction of arrow at the electronics box (2) and install.



- Insert the cover (2) into the guides (3) in the direction of arrow and install.
- Make sure the cover audibly engages (2) in the guides (3).
- Tighten down screw (1).

#### Cover to electronics box

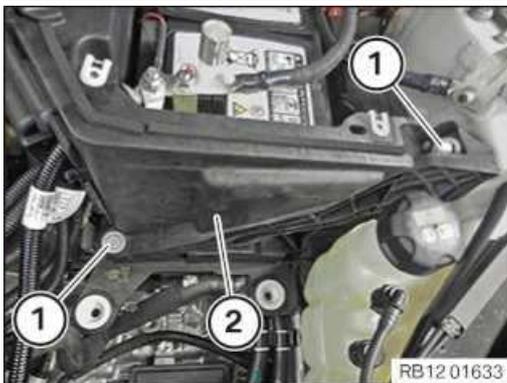
RF5x26.5		Tightening torque	2,5 Nm
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- Thread in positive battery cable (2) on holder (3) and install.
- Feed in and install positive battery terminal (1).
- Tighten positive battery terminal (1).

#### Positive battery terminal to battery

NutM6		Tightening torque	5 Nm
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- Feed in and install tension strut (2).
- Tighten the screws (1).

#### Tension strut to spring strut dome/battery tray

M8		Tightening torque	19 Nm
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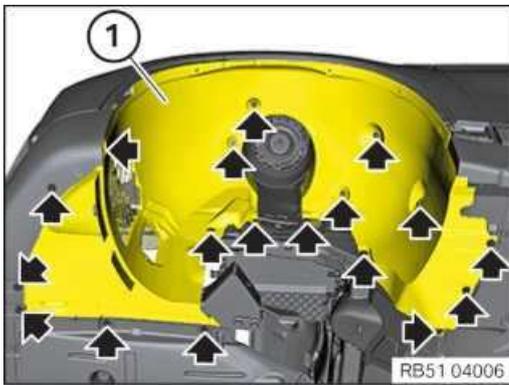
## POSTPROCESSES

### 19 – Installing the front right wheel arch cover



#### NOTICE

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



- Guide the wheel arch cover (1) in.
- Tighten all bolts and nuts (arrows).

#### Wheel arch cover to body

Screw		Tightening torque	2,5 Nm
-------	--	-------------------	--------

#### Wheel arch cover to body

Plastic nut		Tightening torque	3 Nm
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### ► Installing front wheel arch trim



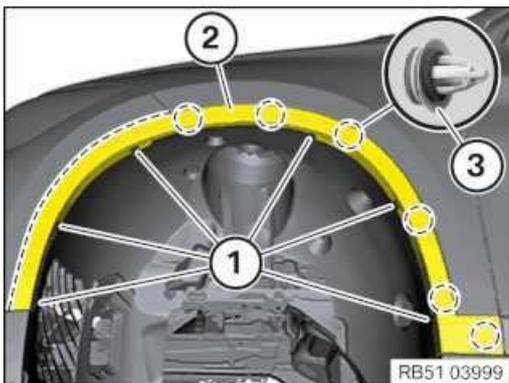
#### NOTICE

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



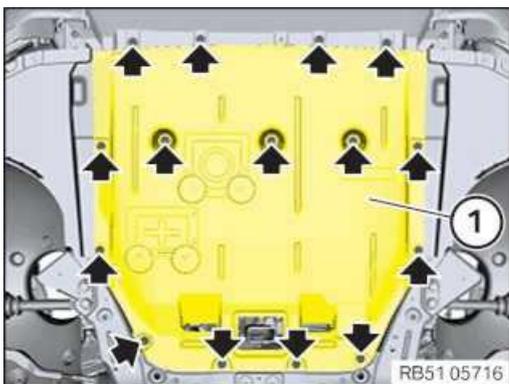
#### NOTICE

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



- Check the clips (3) for damage and renew where required.  
The clips (3) must not be damaged or missing.
- Feed in wheel arch trim (2) and engage on the clips (3).
- Engage wheel arch trim (2) into the latch mechanisms on the bumper panel.
- Mount blind rivet (1) using the special tool **0 496 521 (00 2 230)**.

### 20 – Installing the front underbody protection

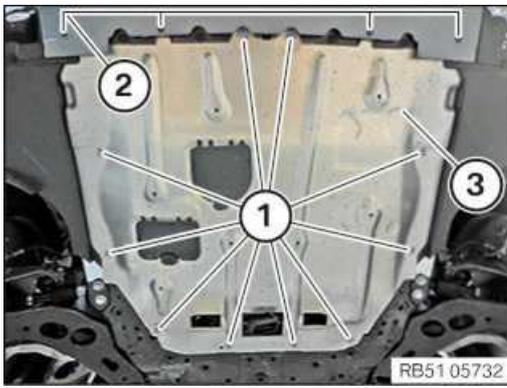


- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

#### Underbody protection front

Screw for thermoplastic plastic		Tightening torque	2,6 Nm
---------------------------------	--	-------------------	--------

Hexagon screw M6x20		Tightening torque	8 Nm
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• **Equipment specification with metal underride guard:**

- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

**Underbody protection front**

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

**21 – Installing the front right wheel**

► **Mounting the wheel**

► **Clean the contact surfaces between the brake disc and the wheel rim**



**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).

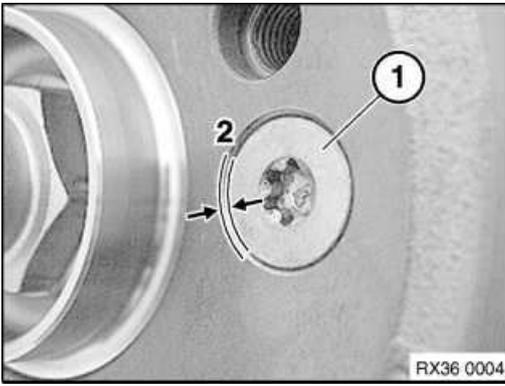
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.

- 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).





- Renew mounting bolt (1).

**Parts:** Mounting bolt

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

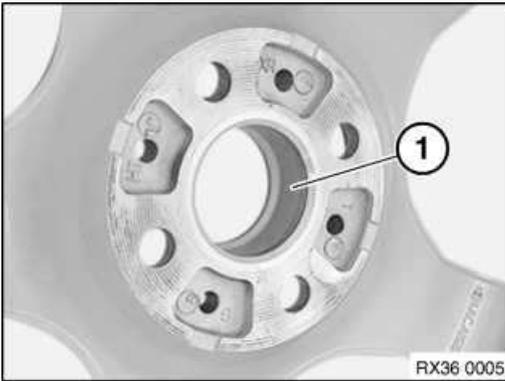
The mounting bolt (1) for the brake disc may not protrude under any circumstances on the contact surface (2) between the brake disc and the wheel rim.

**Brake disc to rear wheel hub**

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------

**Brake disc to front wheel hub**

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------



- Lightly grease the wheel centring (1) in the wheel rim; refer to additional information for grease for the wheel centring (1).



## 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.

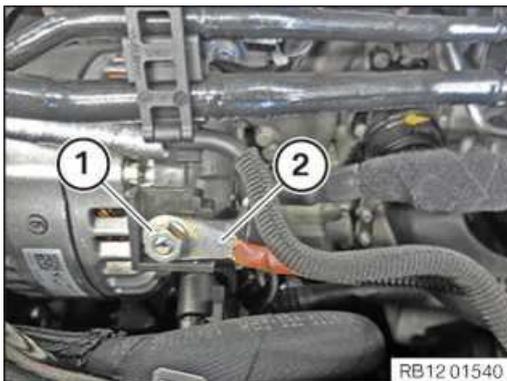
**Parts:** Wheel bolts

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

### Wheel bolts

M 14/AF 17	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	140 Nm
		Check	140 Nm

## 22 – Fasten the positive battery cable on the alternator



- Insert and install the positive battery cable (2) at the alternator.
- Tighten nut (1).

### Positive battery cable to alternator

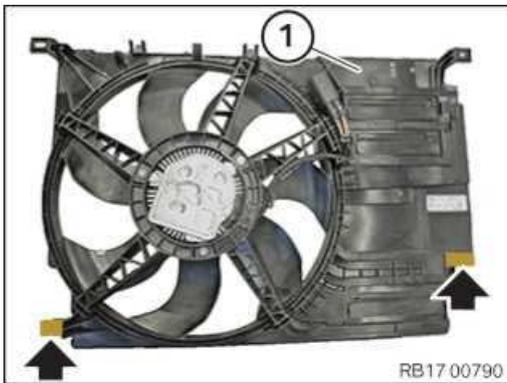
M8		Tightening torque	19 Nm
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## 23 – Installing fan cowl with electric fan

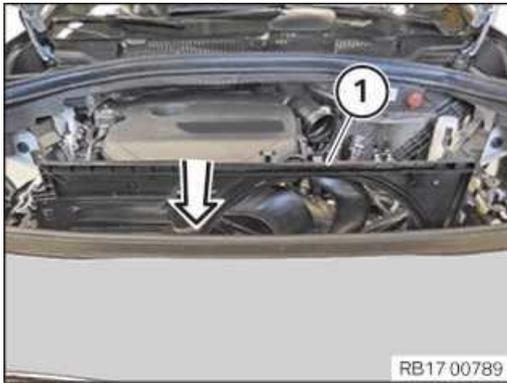


## TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.



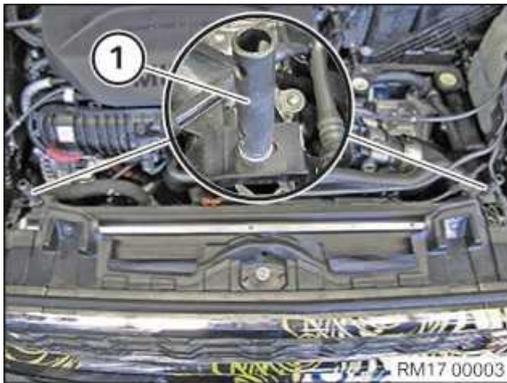
- Feed the guides (arrows) of the fan cowl (1) into the charge air cooler.



- Feed in and install the fan cowl (1) in the direction of the arrow.



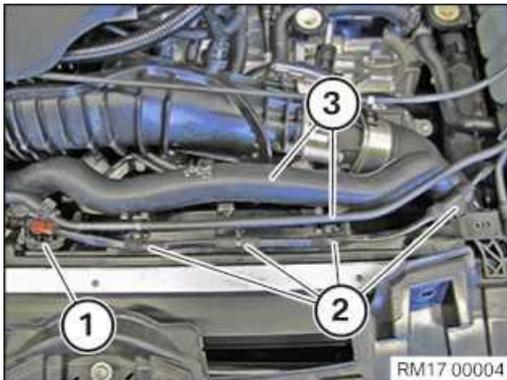
- Lock the left and right locks (arrows).



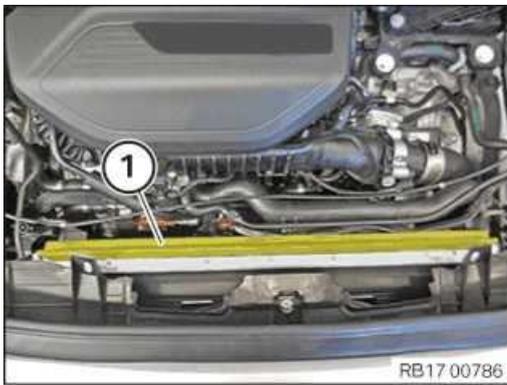
- Tighten the screws (1).

#### Fan cowl on radiator

M6X12		Tightening torque	6 Nm
-------	--	-------------------	------



- Connect connectors (1) and lock.  
The connector (1) must engage audibly.
- Secure clamps (2).
- Thread in and install coolant line (3).

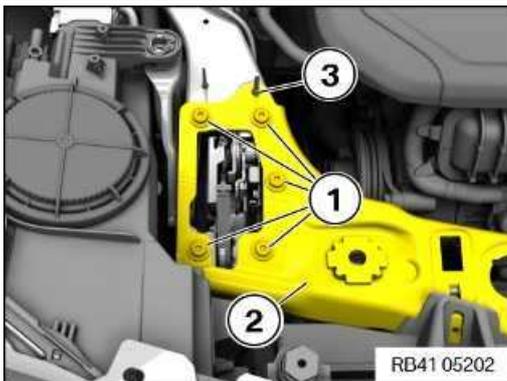


- Guide the sealing (1) on the radiator in and install it.

## 24 – Install front cross connection



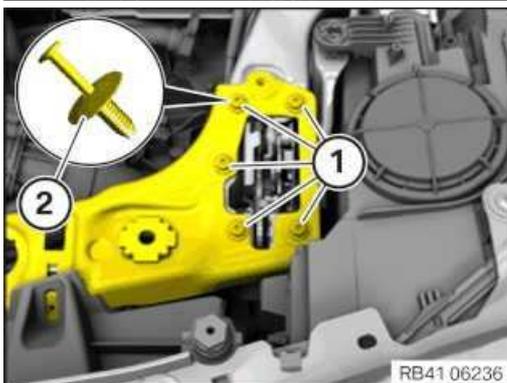
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

### Cross connection to carrier support

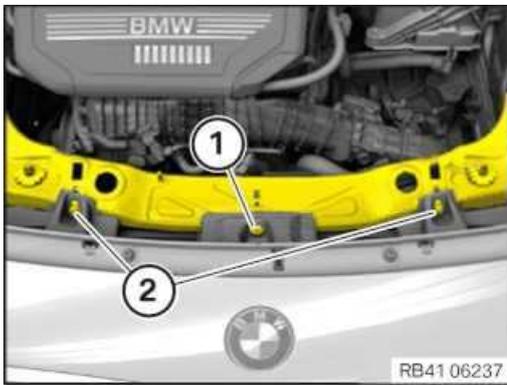
Screws M6x20	Tightening torque	11,8 Nm
--------------	-------------------	---------



- Tighten the screws (1).

### Cross connection to carrier support

Screws M6x20	Tightening torque	11,8 Nm
--------------	-------------------	---------



- Position screws (3) on the rubber mounts for the radiator and tighten.

#### Screw connection for rubber mount of coolant radiator to coolant radiator

Bolt to rubber mount		Tightening torque	8 Nm
----------------------	--	-------------------	------

- Tighten down screws (2).

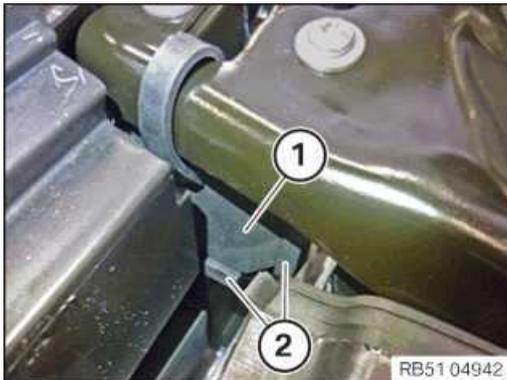
#### Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
-------------	--	-------------------	---------

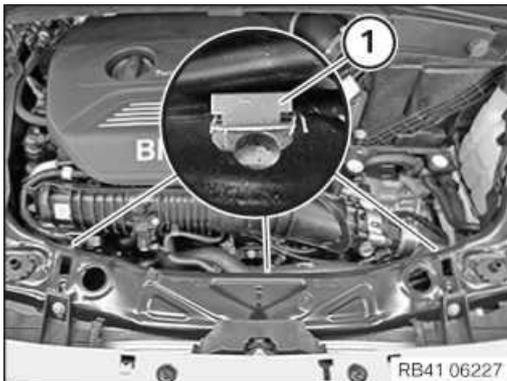
- Tighten down screw (1).

#### Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
-------------	--	-------------------	-------



- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

### 25 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

#### Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
-------	--	-------------------	------

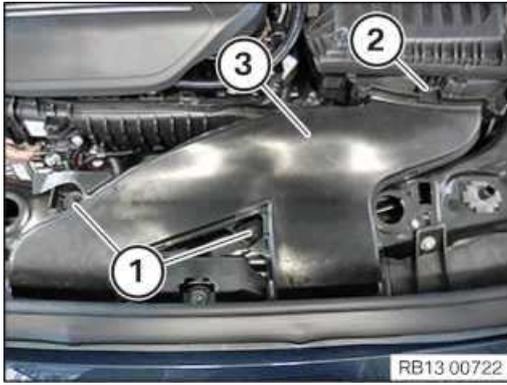
- Tighten clamp (4).

#### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

### 26 – Install the intake neck for the intake filter housing

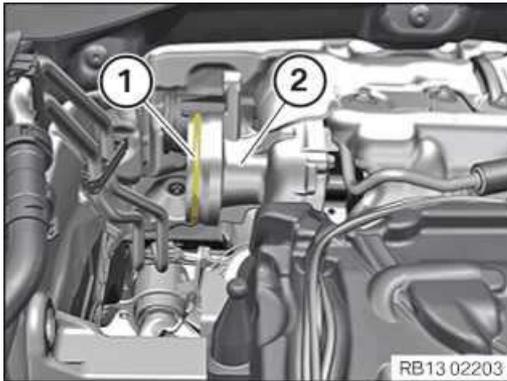


- Insert and install the intake neck (3).  
The lock (2) must audibly engage.
- Tighten nuts (1).

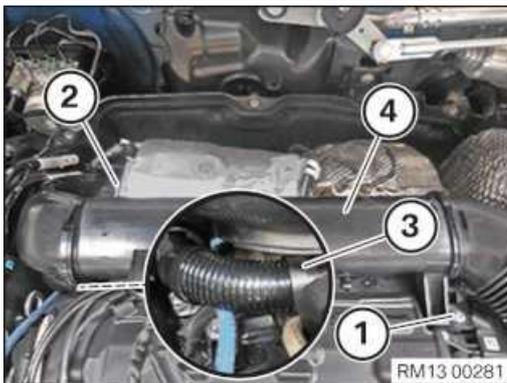
#### Intake neck to cross connection

M6		Tightening torque	8 Nm
----	--	-------------------	------

### 27 – Installing clean air pipe



- Check the sealing ring (1) of the exhaust turbocharger (2) for damage and renew it if necessary.



- Feed in clean air pipe and install.
  - Connect clean air pipe to the exhaust turbocharger and lock audibly in the clamps (2).
  - Renew the screw (1).
- Parts:** Screw
- Tighten down screw (1).

#### Clean air pipe to cylinder head cover

Oval-head screw	Renew screw.	Tightening torque	8 Nm
-----------------	--------------	-------------------	------

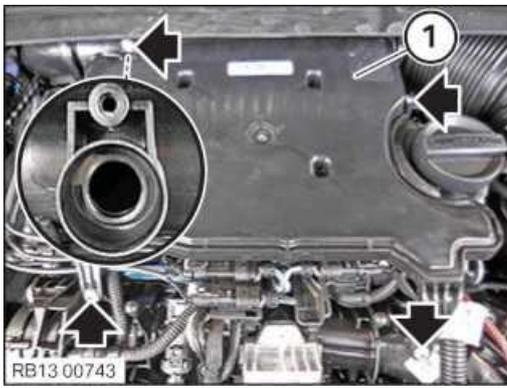
- Connect ventilation line (3) to the cylinder head cover and lock audibly.
- Mount clean air pipe onto the intake filter housing.
- Tighten clamp (1) on the clean air pipe.

#### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------



### 28 – Install resonator



- Insert and install the resonator (1).
  - Renew the bolts (arrows).
- Parts:** Bolts
- Tighten screws (arrows).

**Resonator to manifold and clean air pipe**

Screw TS6	Renew screw.	Tightening torque	5 Nm
-----------	--------------	-------------------	------

**29 – 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 for correct installation of all rubber mounts in the acoustic cover (1).



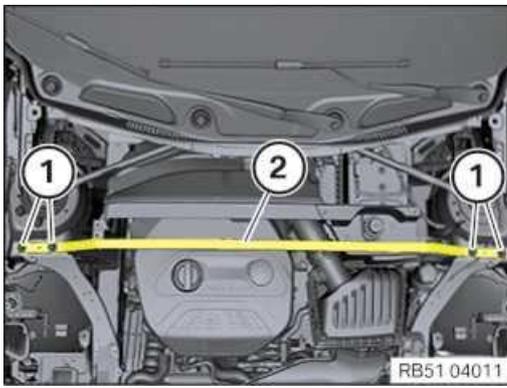
- Clip in the acoustic cover into the holders in the indicated areas.
- Make sure that the acoustic cover engages audibly.

**30 – Install strut brace**



**TECHNICAL INFORMATION**

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



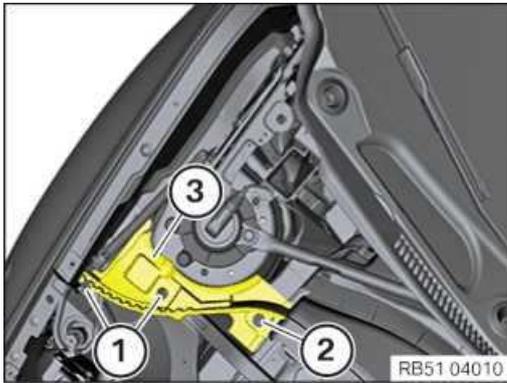
- Install the strut brace (2).
- Renew screws (1).

**Parts:** Bolts

- Tighten the screws (1).

**Cross-brace to spring strut dome**

Renew screw.	Jointing torque	28 Nm
	Angle of rotation	180 °



- Install the cover (3).
- Tighten down screw (2).

**Cover on body**

Hexagon screw	Tightening torque	3 Nm
---------------	-------------------	------

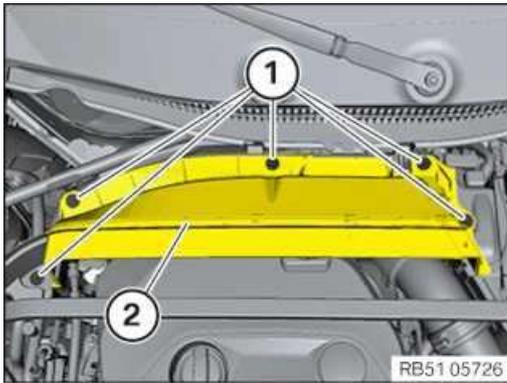
- Install the expanding rivet (1).



**NOTICE**

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

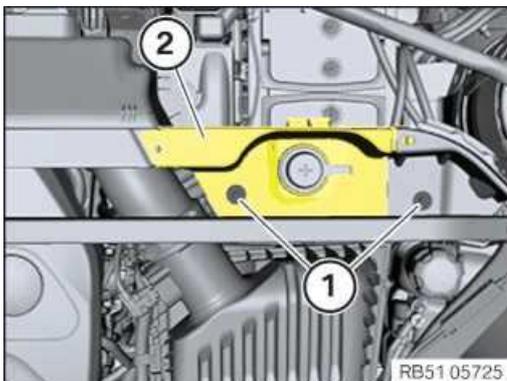
**31 – Installing the upper bulkhead cover**



- Feed in and install cover (2) of the bulkhead at the top.
- Tighten the screws (1).

**Cover of top bulkhead**

Screw	Tightening torque	2,6 Nm
-------	-------------------	--------

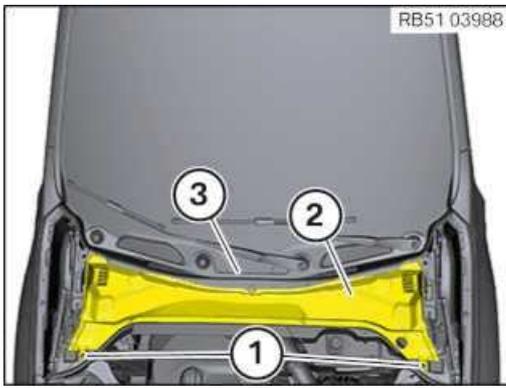


- Guide in and install cover (2).
- Tighten down screw (1).

**Cover of remote positive terminal**

Screw	Tightening torque	2,6 Nm
-------	-------------------	--------

**32 – Installing front cowl panel cover**



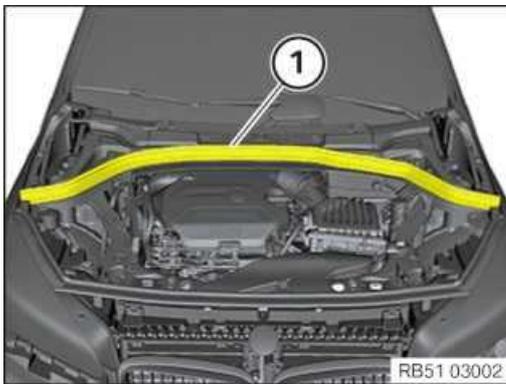
- Insert and install cowl panel cover at front (2) into cowl panel cover at rear (3).
- Check cowl panel cover at front is correctly seated (2).
- Secure expanding rivet (1).

### 33 – Install the seal for the bonnet



#### NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Install bonnet seal at rear (1).
- Ensure that the rear bonnet seal (1) is fitted correctly.

### 34 – Disconnecting all battery earth leads



- See additional information.

## Additional Information

### Overview of Tightening Torques

#### Wiring harness to cylinder head cover

Used in step [18](#)

TS5x20	Tightening torque	3,5 Nm
--------	-------------------	--------

#### Cover to electronics box

Used in step [18](#)

RF5x26.5	Tightening torque	2,5 Nm
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#### Positive battery terminal to battery

Used in step [18](#)

NutM6	Tightening torque	5 Nm
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**Tension strut to spring strut dome/battery tray**Used in step [18](#)

M8		Tightening torque	19 Nm
----	--	-------------------	-------

**Wheel arch cover to body**Used in step [19](#)

Screw		Tightening torque	2,5 Nm
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**Wheel arch cover to body**Used in step [19](#)

Plastic nut		Tightening torque	3 Nm
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**Underbody protection front**Used in step [20](#)

Screw for thermoplastic plastic		Tightening torque	2,6 Nm
---------------------------------	--	-------------------	--------

Hexagon screw M6x20		Tightening torque	8 Nm
---------------------	--	-------------------	------

**Brake disc to rear wheel hub**Used in step [21](#)

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------

**Brake disc to front wheel hub**Used in step [21](#)

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------

**Wheel bolts**Used in step [21](#)

M 14/AF 17	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	140 Nm
		Check	140 Nm

**Positive battery cable to alternator**Used in step [22](#)

M8		Tightening torque	19 Nm
----	--	-------------------	-------

**Fan cowl on radiator**Used in step [23](#)

M6X12		Tightening torque	6 Nm
-------	--	-------------------	------

**Cross connection to carrier support**Used in step [24](#)

Screws M6x20		Tightening torque	11,8 Nm
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**Screw connection for rubber mount of coolant radiator to coolant radiator**Used in step [24](#)

Bolt to rubber mount		Tightening torque	8 Nm
----------------------	--	-------------------	------

**Air duct to upper connection**Used in step [24](#)

M6x20 screw		Tightening torque	11,8 Nm
-------------	--	-------------------	---------

**Bracing strut to upper connection**Used in step [24](#)

M8x20 screw		Tightening torque	28 Nm
-------------	--	-------------------	-------

**Intake silencer housing to lock bridge**Used in step [25](#)

M6X30		Tightening torque	8 Nm
-------	--	-------------------	------

## Clean air pipe to intake silencer housing

Used in step 25 27

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

## Intake neck to cross connection

Used in step 26

M6		Tightening torque	8 Nm
----	--	-------------------	------

## Clean air pipe to cylinder head cover

Used in step 27

Oval-head screw	Renew screw.	Tightening torque	8 Nm
-----------------	--------------	-------------------	------

## Resonator to manifold and clean air pipe

Used in step 28

Screw TS6	Renew screw.	Tightening torque	5 Nm
-----------	--------------	-------------------	------

## Cross-brace to spring strut dome

Used in step 30

	Renew screw.	Jointing torque	28 Nm
		Angle of rotation	180 °

## Cover on body

Used in step 30

Hexagon screw		Tightening torque	3 Nm
---------------	--	-------------------	------

## Cover of top bulkhead

Used in step 31

Screw		Tightening torque	2,6 Nm
-------	--	-------------------	--------

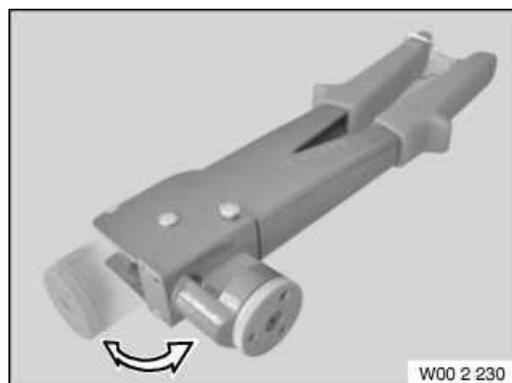
## Cover of remote positive terminal

Used in step 31

Screw		Tightening torque	2,6 Nm
-------	--	-------------------	--------

## Overview of Special Tools

### 0 496 521 (00 2 230) Pliers



#### Common

Used in step 19

Usage (Blind rivet pliers for plastic rivets) For shaft diameters of 3.5 mm, 3.9 mm and 4.5 mm

Included in the tool or work

Storage location C25

Replaced by

In connection with

SI-Number 01 17 08 (478)

### 2 344 011 Tool



#### Common

Used in step 21

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

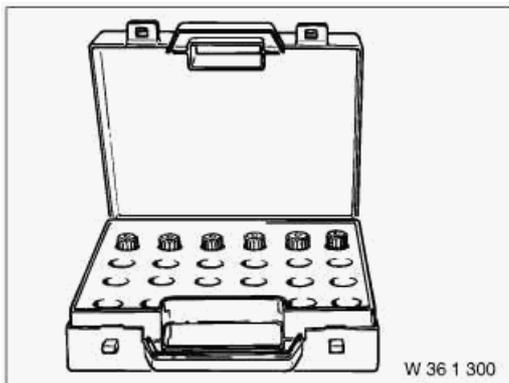
Replaced by

In connection with

SI-Number 08 08 12 (872)

## Replacement tools:

### 0 495 221 (36 1 323) Wheel stud



#### Common

Used in step 14

Usage (Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259

Included in the tool or work 0 492 518

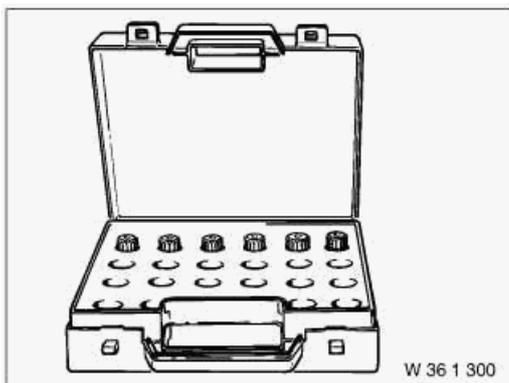
Storage location

Replaced by

In connection with

SI-Number

### 0 495 224 (36 1 326) Wheel stud



#### Common

Used in step 14

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 14

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 14

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

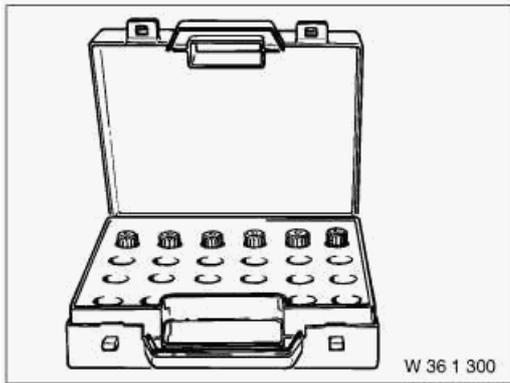
Storage location

Replaced by

In connection with

SI-Number

### 0 495 227 (36 1 329) Wheel stud



#### Common

Used in step 14

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

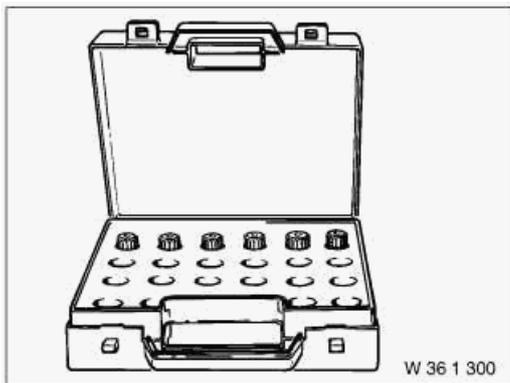
Storage location

Replaced by

In connection with

SI-Number

### 0 495 228 (36 1 331) Wheel stud



#### Common

Used in step 14

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 14

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

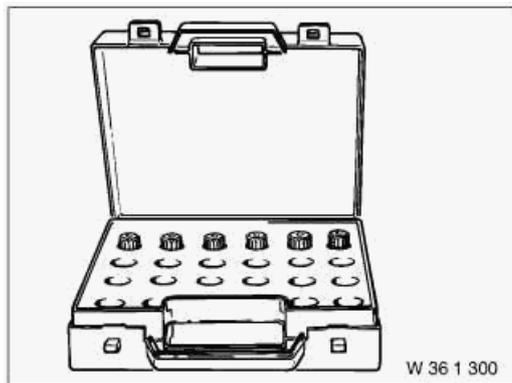
Storage location

Replaced by

In connection with

SI-Number

## 0 495 230 (36 1 333) Wheel stud



### Common

Used in step 14

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

## Links

### Repair instructions

Used in step

<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 34
<a href="#">61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34

<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 34
<a href="#">61 35 ... Notes on ESD protection (Electro Static Discharge)</a>	

## **Operating materials**

## **Used in step**

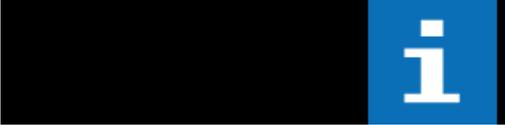
<a href="#">2.0 Grease for wheel centring</a>	21
---	----

## 12 51 001 Replacing wiring harness section for engine (B47)



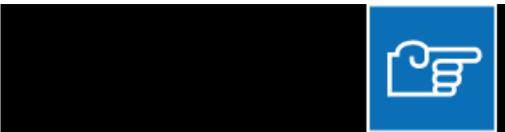
### Attention!

[Read and comply with notes on protection against electrostatic damage \(ESD protection\).](#)

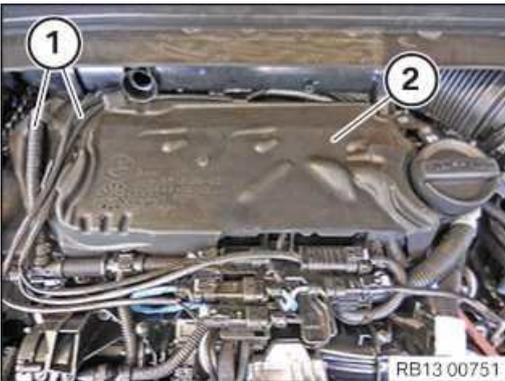


### Necessary preliminary work:

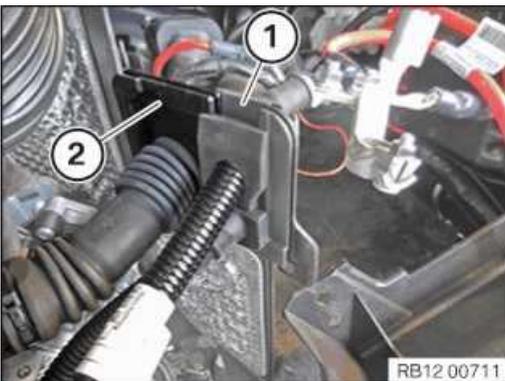
- Remove [vehicle battery](#).
- Remove [clean air pipe](#).
- Remove [fan cowl](#).
- Remove front [underbody protection](#).



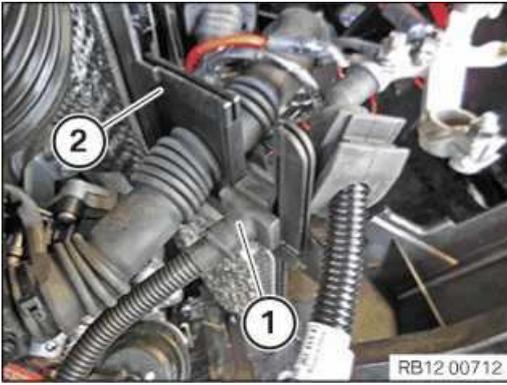
### Removal:



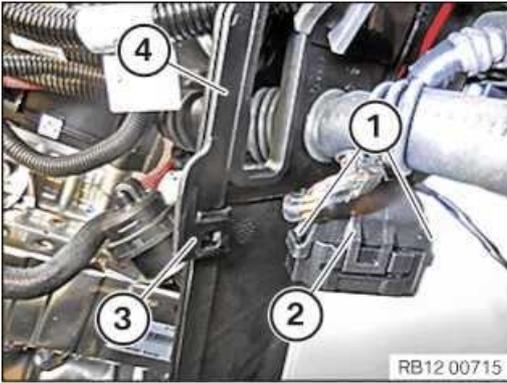
Release cable (1) from sound insulation (2).  
Remove sound insulation (2) upwards.



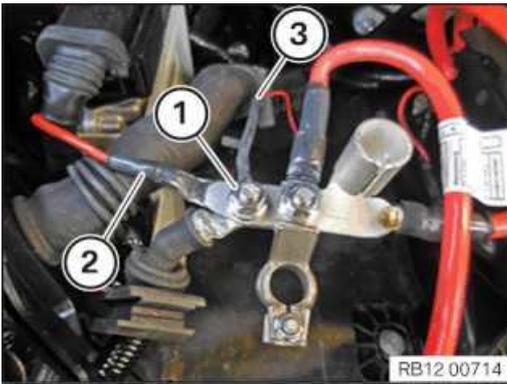
Remove cable (1) from cable clip (2).



Remove cable (1) from cable clip (2).



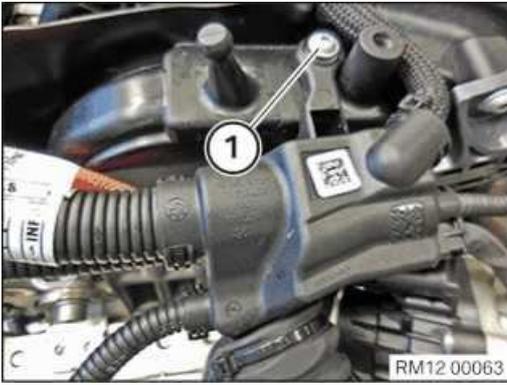
Release lock (1).  
Remove connector (2).  
Release lock (3).  
Remove cable clip (4) with connector.



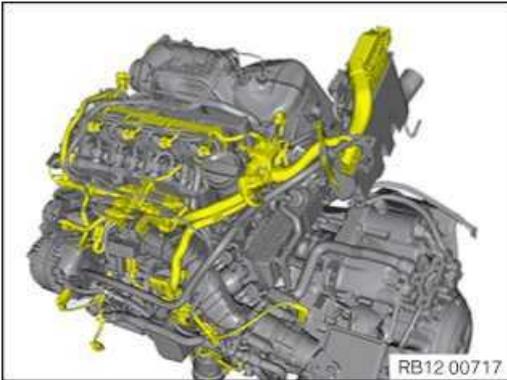
Slacken nut (1).  
Feed out cables (2) and (3) and lay to one side.



Undo lock (1) as shown by arrow.  
Remove connector (2).



Release screw (1). Remove the wiring harness from the cylinder head cover.



Overview of the wiring harness section for the engine.

<b>Unlock and disconnect following connectors and lines</b>	Note
Release and unplug connector from DDE control unit.	
Unlock connector on differential pressure sensor and disconnect	
Unlock connector on exhaust-gas recirculation valve and disconnect	
Release and pull off connector from injectors	
Unlock connector on fuel pressure sensor and remove	
Unlock connector on fuel pressure controller and remove	
Unlock and pull off connectors of camshaft sensors	
Unlock connector on exhaust-gas recirculation temperature sensor and disconnect	
Unlock connector on fuel pressure sensor and remove	
Unlock connector on preheating control unit and remove	
Unlock connector on pressure converter and disconnect	
Unlock connector on oil pressure switch and disconnect	
Release connector on fuel measuring unit (high-pressure pump) and pull off	
Release and pull off connector for oil pump solenoid valve	
Unlock connector on coolant temperature sensor and disconnect	
Release and pull off connector from exhaust-gas temperature sensors	
Release and pull off connector from lambda sensors	
Release connector on swirl-flap controller and remove	
Unlock connector on air conditioning compressor and disconnect	
Unlock connector on alternator and disconnect.	
Unlock and pull off connector of charging pressure sensor	

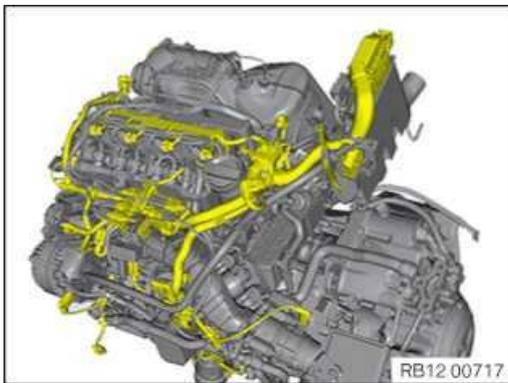
Unlock connector on throttle body and disconnect	
Release nut on starter motor, detach cable (terminal 50)	
Release and pull off connector from exhaust turbocharger adjustment	
Release and unplug connector from exhaust gas pressure sensor	
Unlock connector on oil level sensor and disconnect	



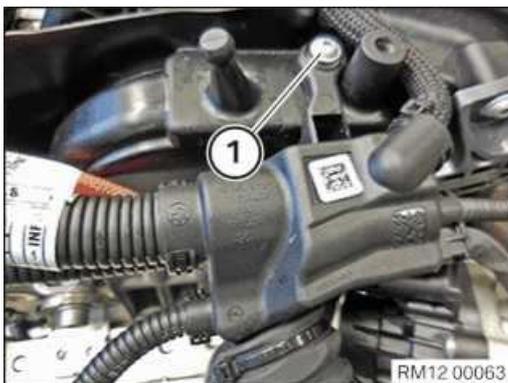
Release wiring harness from clips and retainers.  
Feed out wiring harness and remove.



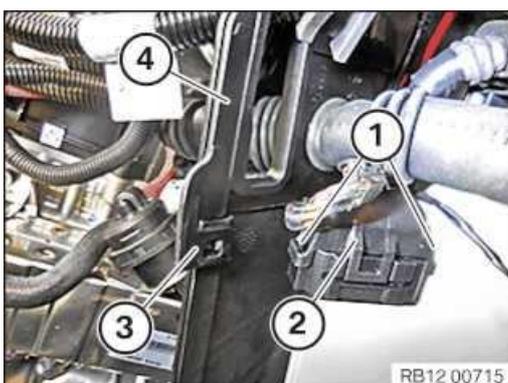
**Installation:**



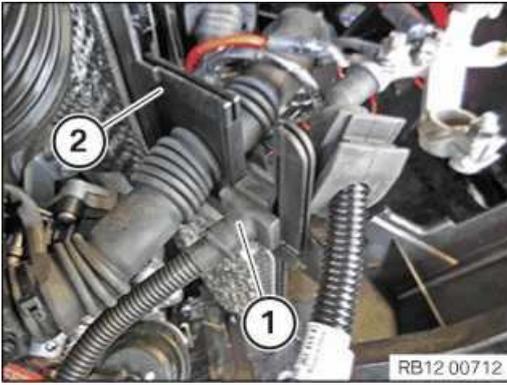
Route and install wiring harness.  
Plug in all connectors as specified in table.  
All connectors must audibly engage.



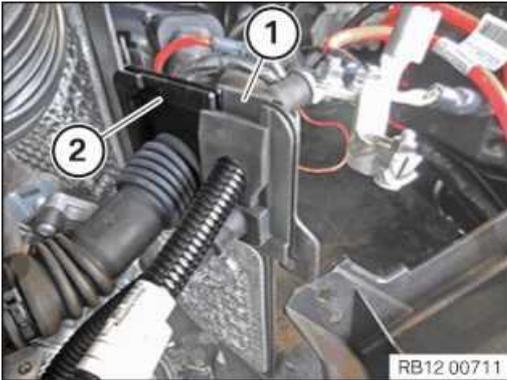
Install wiring harness on cylinder head cover.  
Tighten screw (1).



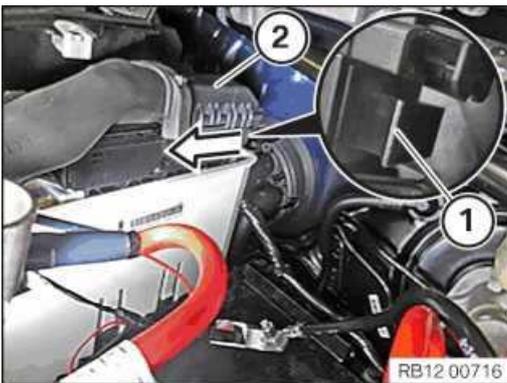
Connect connector (2) and lock.  
Lock (1) must snap audibly into place.  
Install cable clip (4) with connector.  
Lock (3) must snap audibly into place.



Feed cable (1) into the cable clip (2) and install.



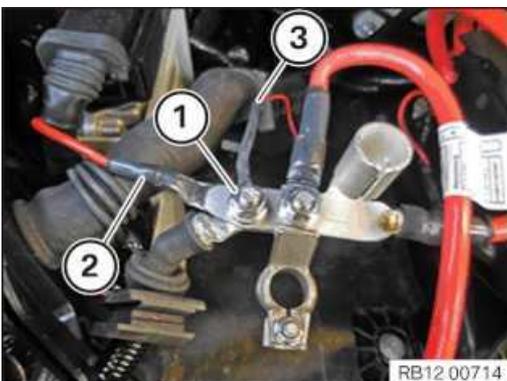
Feed cable (1) into the cable clip (2) and install.



Fit connector (2).

Engage the lock (1) as shown by arrow.

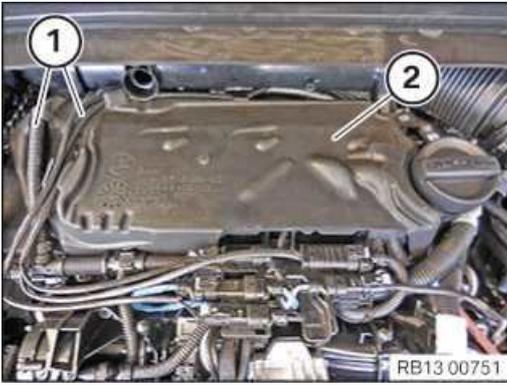
Lock (1) must snap audibly into place.



Feed in and install cables (2) and (3).

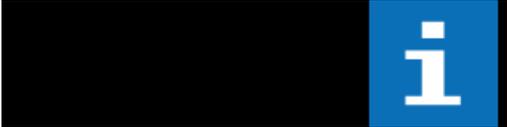
Tighten nut (1).

Tightening torque [12 52 6AZ](#).



Install sound insulation (2).

Secure cable (1) to sound insulation (2).



**Required follow-up work:**

- Install [clean air pipe](#).
- Install [fan cowl](#).
- Install [vehicle battery](#).
- Install front [underbody protection](#).

# 12 51 010 Replacing wiring harness section for preheating system



## 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



### 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.



## TECHNICAL INFORMATION

Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.

## PRELIMINARY WORK

### 1 – Disconnecting all battery earth leads



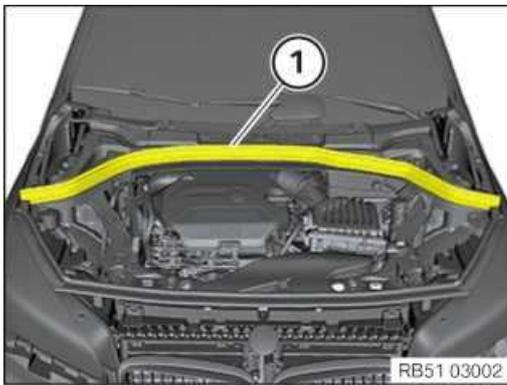
- See additional information.

### 2 – Remove the seal for the rear bonnet



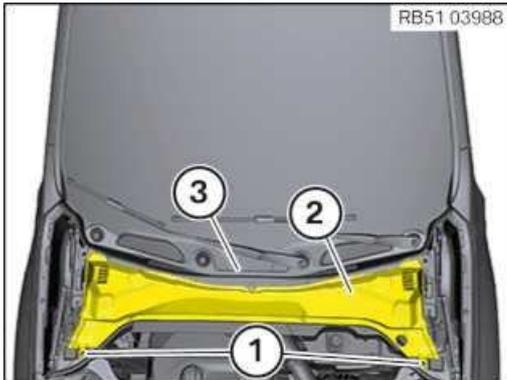
## NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Pull off rear bonnet seal (1) towards the top and remove.

### 3 – Removing front cowl panel cover



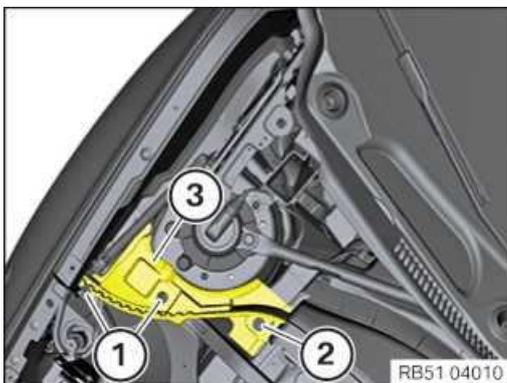
- Loosen the expanding rivet (1).
- Feed out and remove front cowl panel cover (2) from the rear cowl panel cover(3).

### 4 – Remove suspension cross-brace



#### TECHNICAL INFORMATION

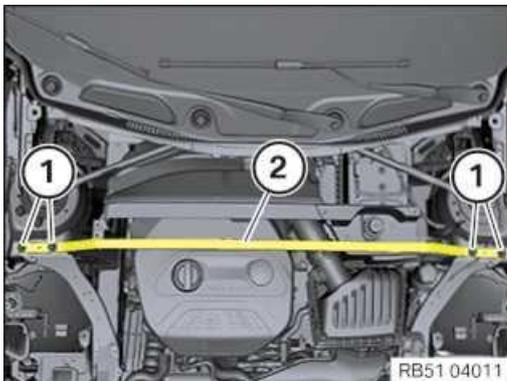
Driving without the strut brace/front end or tension strut is not permitted.



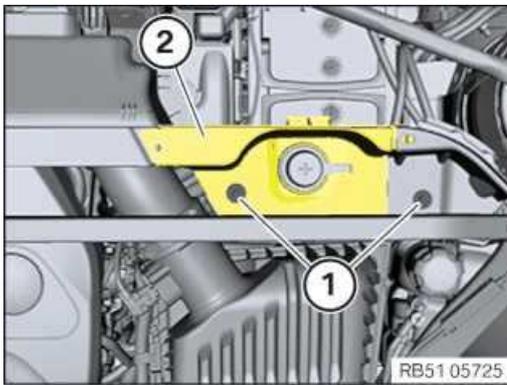
#### NOTICE

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

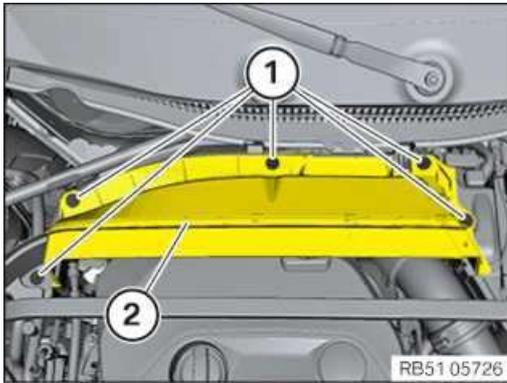
- Loosen expanding rivet (1).
- Loosen screw (2).
- Remove the cover (3).
- Loosen screws (1).
- Remove strut brace (2).



### 5 – Removing the upper bulkhead cover

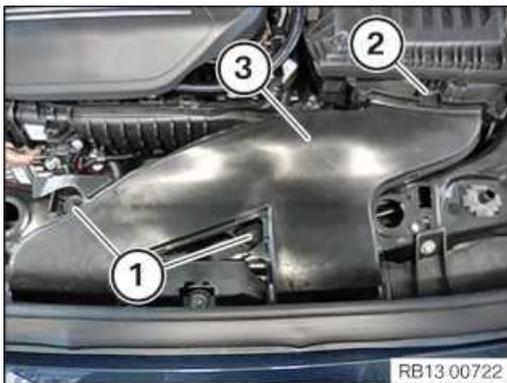


- Loosen screws (1).
- Guide out and remove the cover (2).



- Loosen screws (1).
- Feed out and remove the upper bulkhead cover (2).

#### 6 – Remove the intake neck for intake silencer housing



- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

#### 7 – Removing intake silencer housing



- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

#### 8 – Removing the acoustic cover



#### WARNING

Hot surfaces.

Risk of burning!

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



#### RISK OF DAMAGE

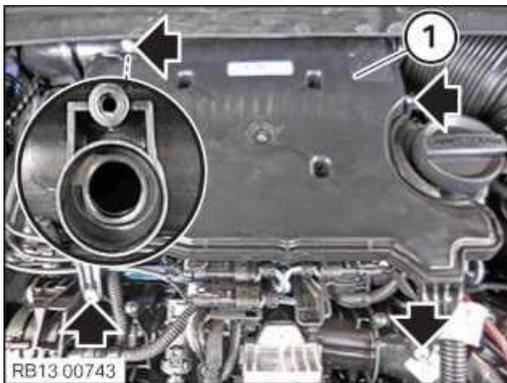
**Damage to the acoustic cover.**

**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  $>20\text{ }^{\circ}\text{C}$ .
- Use only distilled water as an auxiliary material during installation, no lubricants.

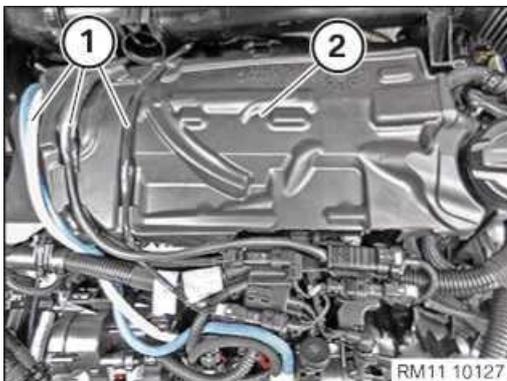
- Unclip the acoustic cover from the marked areas towards the top.

#### 9 – Remove resonator



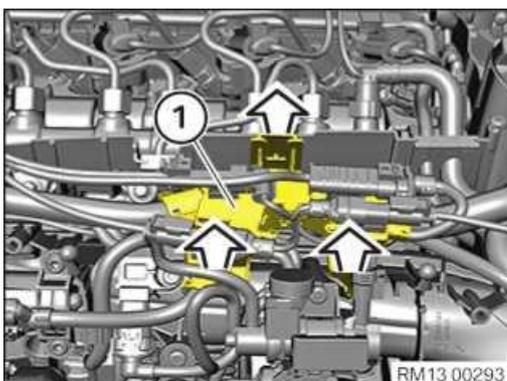
- Remove screws (arrows).
- Guide out and remove the resonator (1).

#### 10 – Remove the acoustic cover for the injectors



- Release the wiring harness (1) from the brackets.
- Guide the acoustic cover (2) out and remove.

#### 11 – Removing the cable clips from the intake plenum

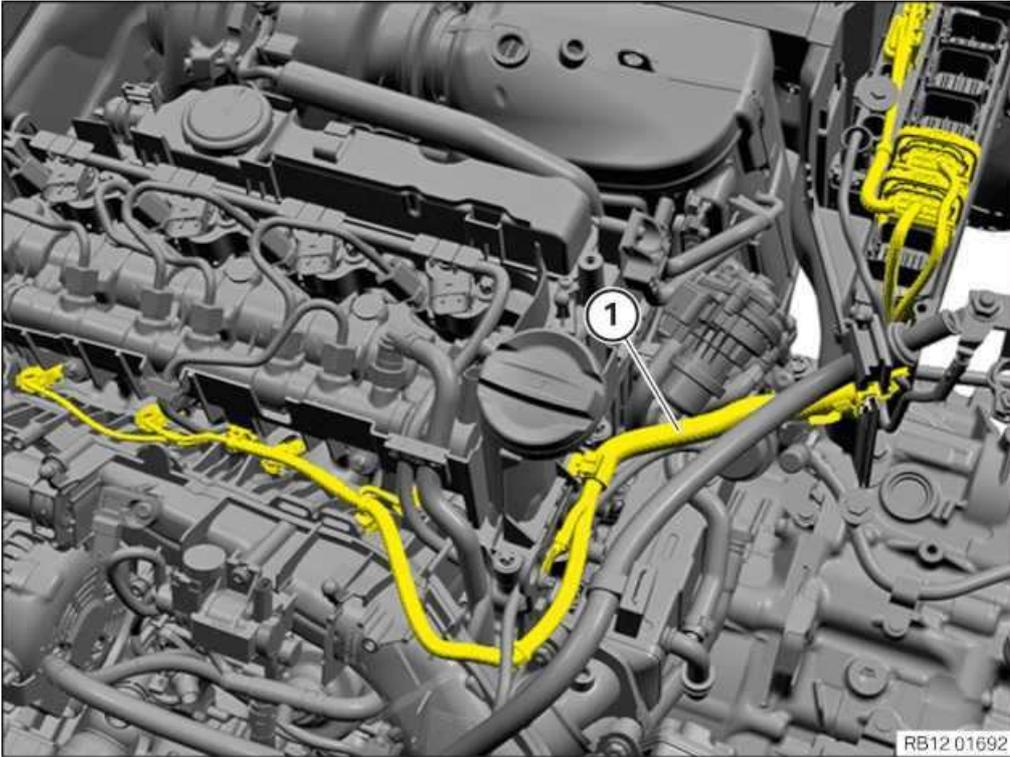


- Detach the cable clip (1) in the direction of the arrow.
- Guide out the cable clip (1) in direction of arrow and set it aside.

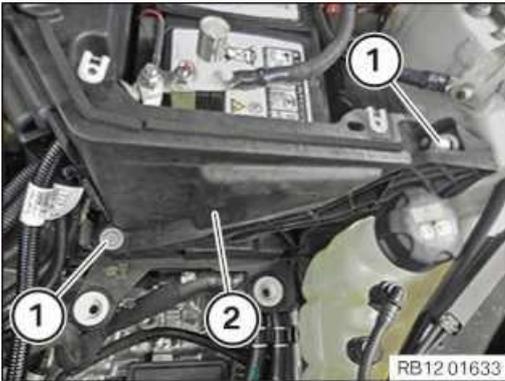
#### MAIN WORK

## 12 – Removing vehicle wiring harness for glow elements

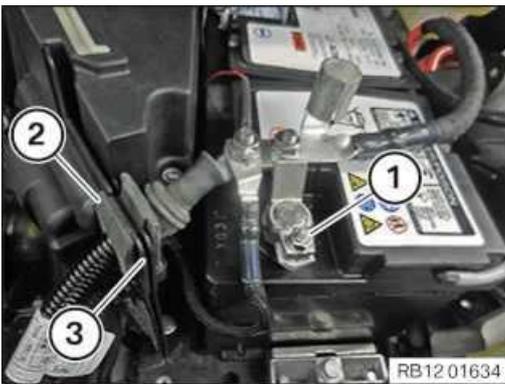
### Overview of the wiring harness for the glow elements



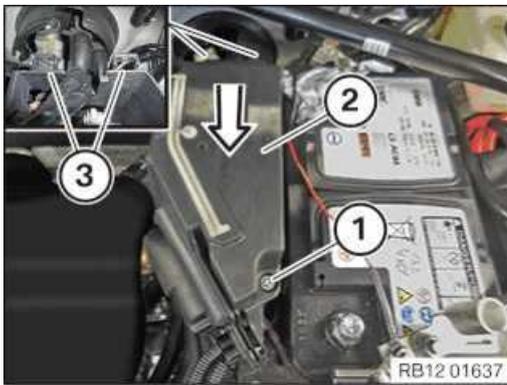
### 1. Wiring harness for the glow elements



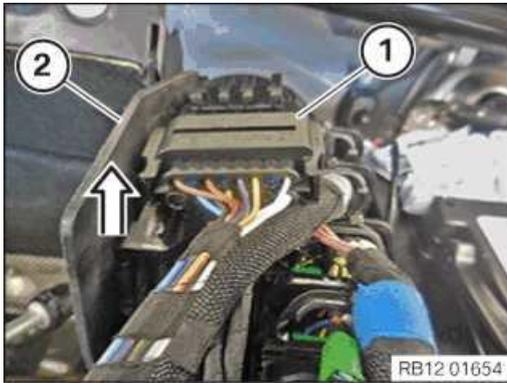
- Loosen screws (1).
- Guide out the tension strut (2) toward the top and remove it.



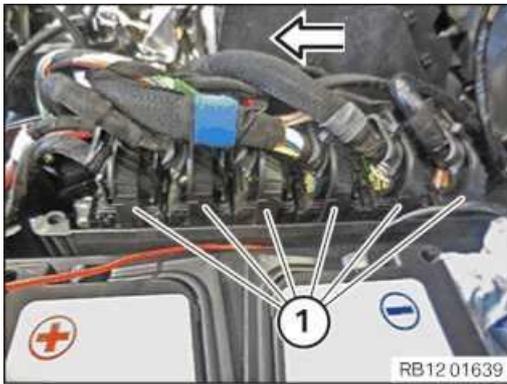
- Undo positive battery terminal (1).
- Feed out positive battery terminal (1) and set aside.
- Guide the positive battery cable (2) out of the holder (3) and lay to one side.



- Loosen screw (1).
- Unlock cover (2) and feed out and remove from the guides (3) in the direction of arrow.



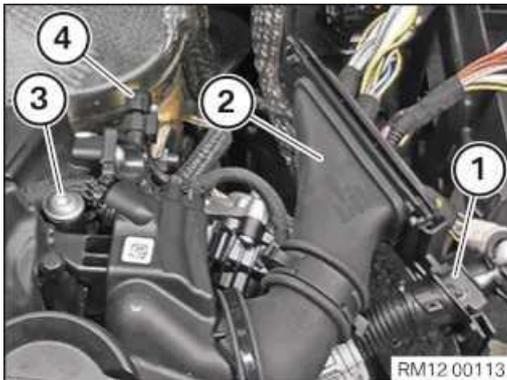
- Feed out connector (1) from the electronics box (2) and remove in the direction of arrow.
- Unlock and loosen connector (1).



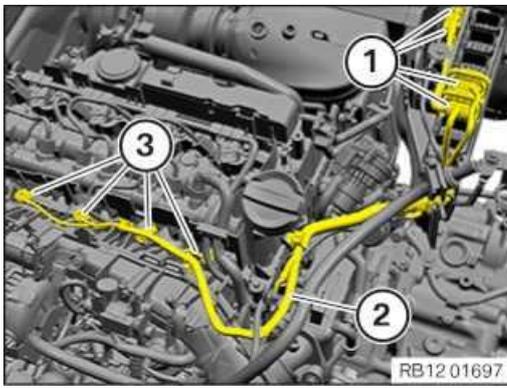
- Unlock and remove the connector (1) in the direction of the arrow.
- Feed out connector (1) and place to one side.



- Unlock and loosen connector (1).

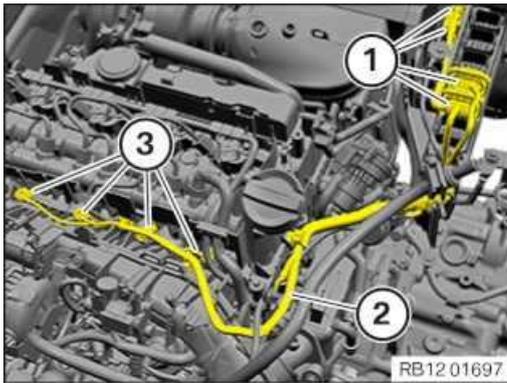


- Detach the wiring harness (1) from the electronics box.
- Detach the wiring harnesses (2) from electronics box.
- Loosen screw (3).
- Set wiring harnesses (1) and (2) aside.
- Unlock the connector (4) and disconnect it from the differential pressure sensor.



- Disconnect all connectors (1) from the DME control unit and remove the integrated supply module (PDM).
- Pull off all connectors (3) from glow element using special tool **0 490 796 (11 1 480)**.
- Loosen screw (2) and remove the ground strap.
- Detach, feed out and remove the wiring harness from the clamps.

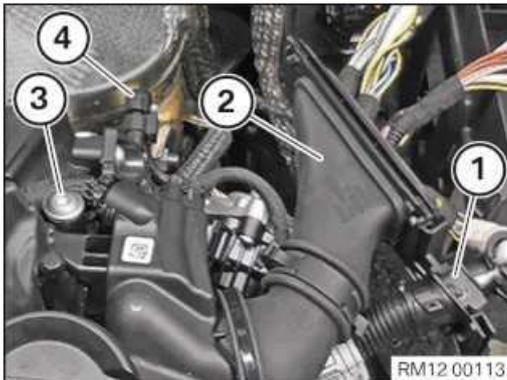
### 13 – Installing vehicle wiring harness for glow elements



- Lay vehicle wiring harness and fasten with clamps.
- Route all connectors (1) to the DME control unit and remove the integrated supply module (PDM).
- Connect all connectors (3) to the glow elements and engage them audibly.
- Mount ground strap and tighten screw (2).

#### Ground cable to cylinder head

M6x12		Tightening torque	8 Nm
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- Lay vehicle wiring harnesses (1) and (2) and mount on electronics box.
- Tighten down screw (3).

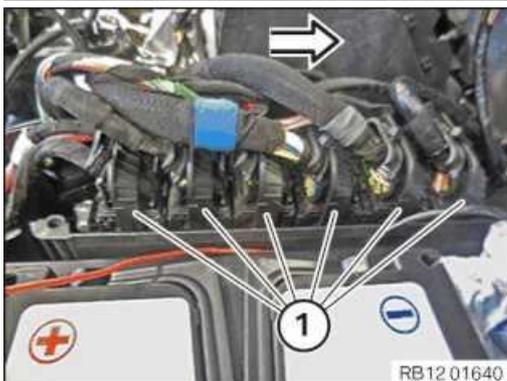
#### Wiring harness to cylinder head cover

TS5x20		Tightening torque	3,5 Nm
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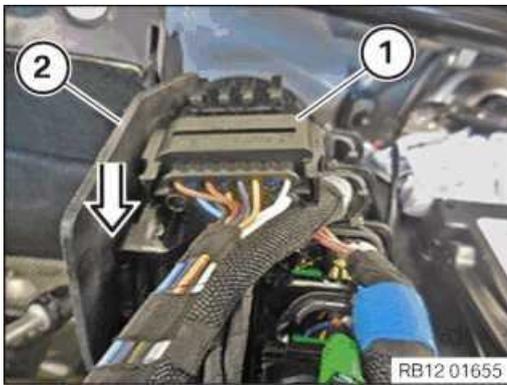
- Attach connector (4) to the differential pressure sensor and lock it audibly.



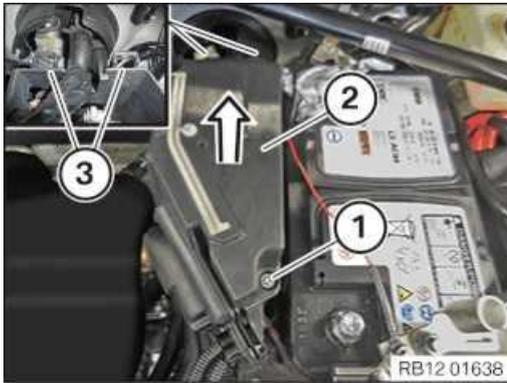
- Connect and lock the connector (1).
- Make sure the connectors (1) engage audibly.



- Connect connector (1) in direction of arrow and lock.
- Make sure the connectors (1) engage audibly.



- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.
- Insert the connector (1) in the direction of arrow at the electronics box (2) and install.



- Insert the cover (2) into the guides (3) in the direction of arrow and install.
- Make sure the cover audibly engages (2) in the guides (3).
- Tighten down screw (1).

**Cover to electronics box**

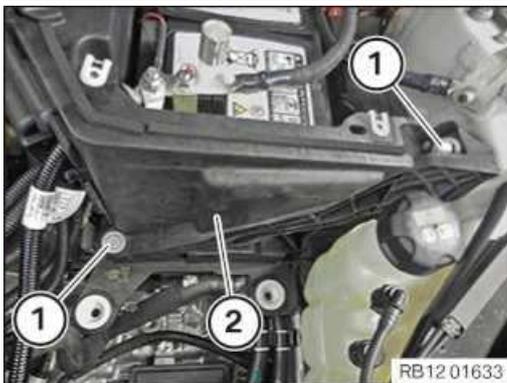
RF5x26.5		Tightening torque	2,5 Nm
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- Thread in positive battery cable (2) on holder (3) and install.
- Feed in and install positive battery terminal (1).
- Tighten positive battery terminal (1).

**Positive battery terminal to battery**

NutM6		Tightening torque	5 Nm
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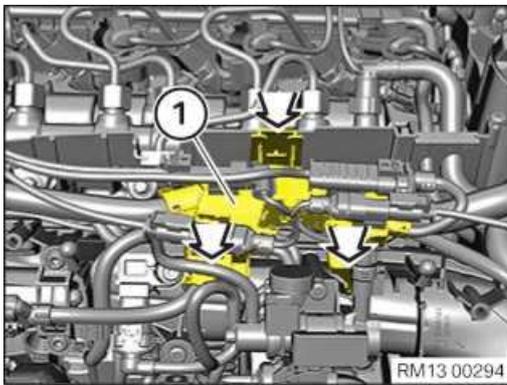
- Feed in and install tension strut (2).
- Tighten the screws (1).

**Tension strut to spring strut dome/battery tray**

M8		Tightening torque	19 Nm
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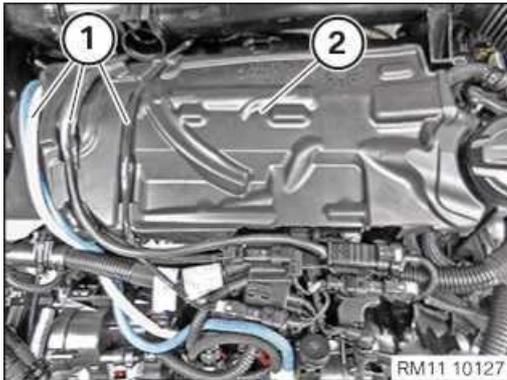
**POSTPROCESSES**

**14 – Installing the cable clip for the intake plenum**



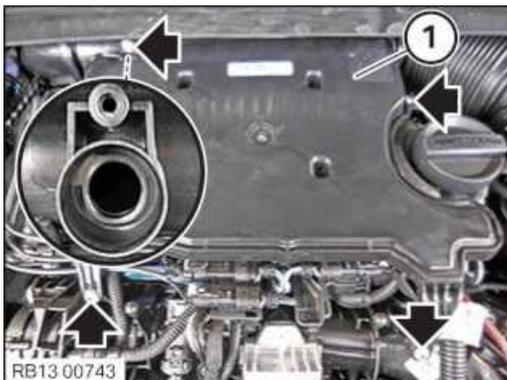
- Insert and install the cable clip (1) in the direction of the arrow.
- Make sure the cable clip (1) is fitted correctly.

#### 15 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- Fasten the vehicle wiring harness (1) in the brackets.

#### 16 – Install resonator



- Insert and install the resonator (1).
  - Renew the bolts (arrows).
- Parts:** Bolts
- Tighten screws (arrows).

#### Resonator to manifold and clean air pipe

Screw TS6	Renew screw.	Tightening torque	5 Nm
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#### 17 – 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.



RM11 00932

- Check for correct installation of all rubber mounts in the acoustic cover (1).



RB11 03455

- Clip in the acoustic cover into the holders in the indicated areas.
- Make sure that the acoustic cover engages audibly.

### 18 – Installing intake silencer housing



RM13 00054

- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

#### Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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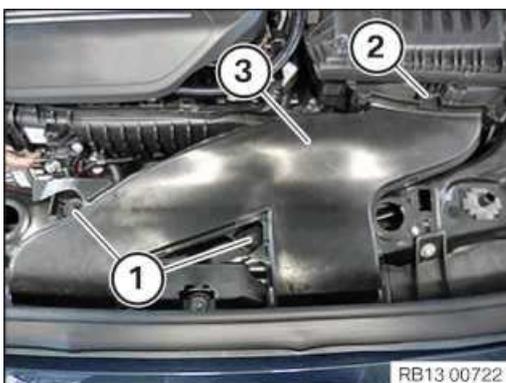
- Tighten clamp (4).

#### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
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- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

### 19 – Install the intake neck for the intake filter housing



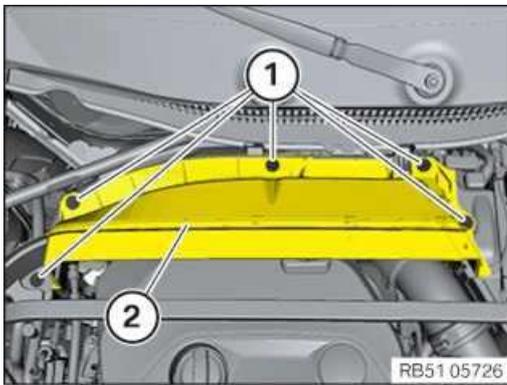
RB13 00722

- Insert and install the intake neck (3). The lock (2) must audibly engage.
- Tighten nuts (1).

#### Intake neck to cross connection

M6		Tightening torque	8 Nm
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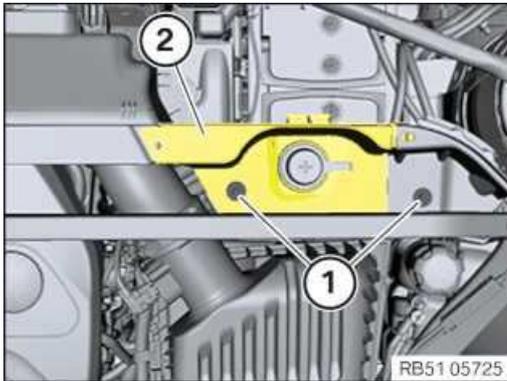
### 20 – Installing the upper bulkhead cover



- Feed in and install cover (2) of the bulkhead at the top.
- Tighten the screws (1).

#### Cover of top bulkhead

Screw		Tightening torque	2,6 Nm
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- Guide in and install cover (2).
- Tighten down screw (1).

#### Cover of remote positive terminal

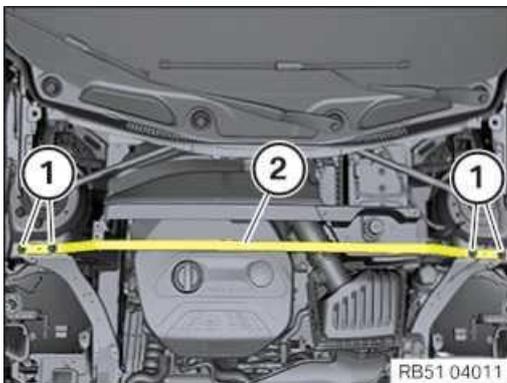
Screw		Tightening torque	2,6 Nm
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### 21 – Install strut brace



#### TECHNICAL INFORMATION

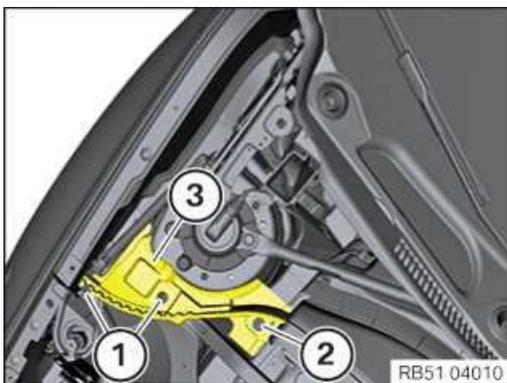
Driving without the strut brace/front end or tension strut is not permitted.



- Install the strut brace (2).
  - Renew screws (1).
- Parts:** Bolts
- Tighten the screws (1).

#### Cross-brace to spring strut dome

	Renew screw.	Jointing torque	28 Nm
		Angle of rotation	180 °



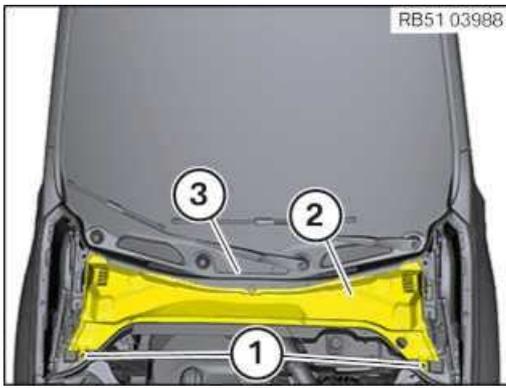
- Install the cover (3).
- Tighten down screw (2).

#### Cover on body

Hexagon screw		Tightening torque	3 Nm
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- Install the expanding rivet (1).

### 22 – Installing front cowl panel cover



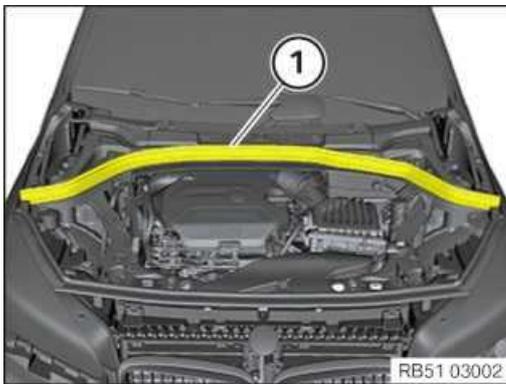
- Insert and install cowl panel cover at front (2) into cowl panel cover at rear (3).
- Check cowl panel cover at front is correctly seated (2).
- Secure expanding rivet (1).

## 23 – Install the seal for the bonnet



### NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Install bonnet seal at rear (1).
- Ensure that the rear bonnet seal (1) is fitted correctly.

## 24 – Disconnecting all battery earth leads



- See additional information.

## Additional Information

### Overview of Tightening Torques

#### Ground cable to cylinder head

Used in step [13](#)

M6x12	Tightening torque	8 Nm
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#### Wiring harness to cylinder head cover

Used in step [13](#)

TS5x20	Tightening torque	3,5 Nm
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#### Cover to electronics box

Used in step [13](#)

RF5x26.5	Tightening torque	2,5 Nm
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**Positive battery terminal to battery**

Used in step 13

NutM6		Tightening torque	5 Nm
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**Tension strut to spring strut dome/battery tray**

Used in step 13

M8		Tightening torque	19 Nm
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**Resonator to manifold and clean air pipe**

Used in step 16

Screw TS6	Renew screw.	Tightening torque	5 Nm
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**Intake silencer housing to lock bridge**

Used in step 18

M6X30		Tightening torque	8 Nm
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**Clean air pipe to intake silencer housing**

Used in step 18

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

**Intake neck to cross connection**

Used in step 19

M6		Tightening torque	8 Nm
----	--	-------------------	------

**Cover of top bulkhead**

Used in step 20

Screw		Tightening torque	2,6 Nm
-------	--	-------------------	--------

**Cover of remote positive terminal**

Used in step 20

Screw		Tightening torque	2,6 Nm
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**Cross-brace to spring strut dome**

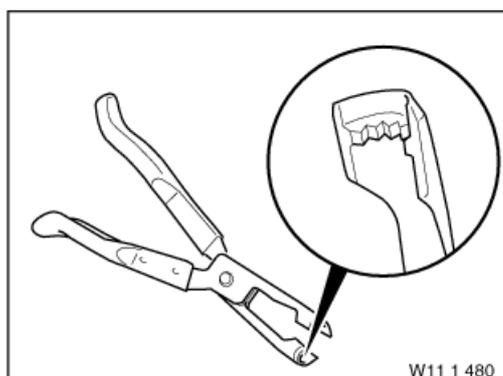
Used in step 21

	Renew screw.	Jointing torque	28 Nm
		Angle of rotation	180 °

**Cover on body**

Used in step 21

Hexagon screw		Tightening torque	3 Nm
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**Overview of Special Tools****0 490 796 (11 1 480) Pliers****Common**

Used in step 12

Usage For removing valve stem seal

Included in the tool or work

Storage location A10

Replaced by

In connection with

SI-Number 01 01 93 (621)

**Links****Repair instructions**

Used in step

<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
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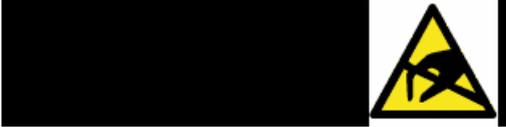
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
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<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
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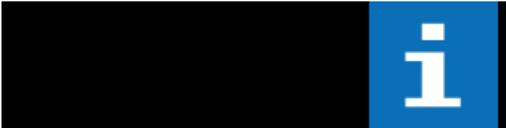
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 24
<a href="#">61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
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<a href="#">61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
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<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
<a href="#">61 20 900 Disconnecting and connecting battery earth lead</a>	1 24
<a href="#">61 35 ... Notes on ESD protection (Electro Static Discharge)</a>	

**Special tools required:**

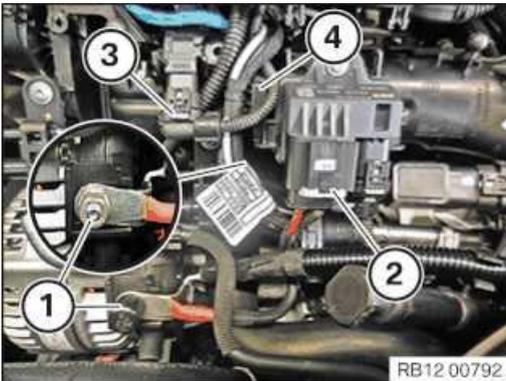
- [11 1 480](#)

**Important!**

[Read and comply with notes on protection against electrostatic damage \(ESD protection\).](#)

**Necessary preliminary tasks:**

- Disconnect [battery negative lead](#).
- Remove [resonator](#).

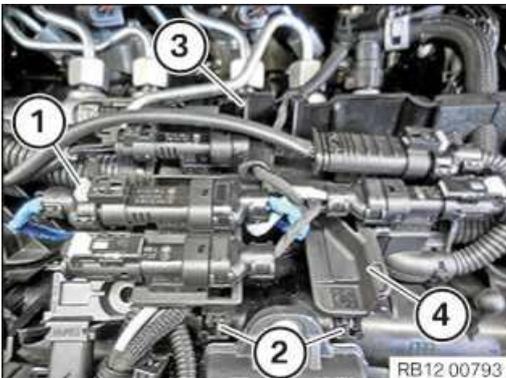
**Removal:**

Slacken nut (1).

Unlock connector (2) on preheating control unit and release.

Unlock connector (3) on charging pressure sensor and release.

Release clamp (4).

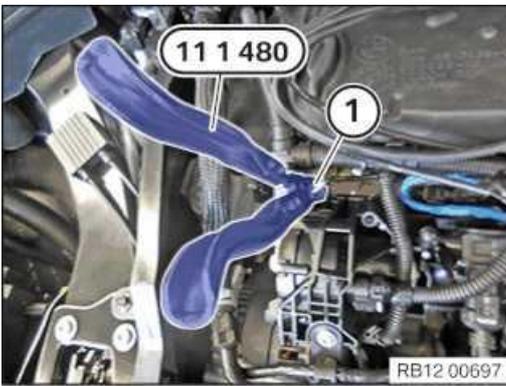


Unlock and disconnect plugs (1).

Release clamp (2).

Release cable clip (4) from guide (3).

Feed out the cable clip (4) and lay to one side.

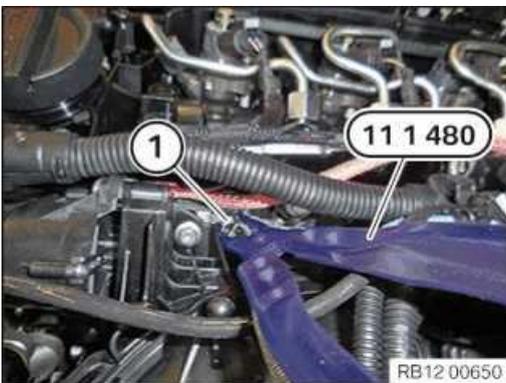


Unlock and remove connector (1) for glow elements with special tool [11 1 480](#) .

Feed out and remove the wiring harness section for the preheating system.

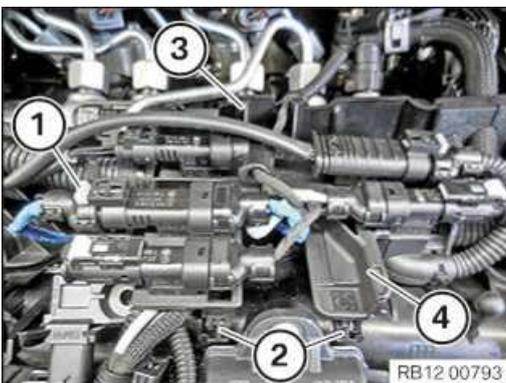


### Installation:



Feed in the wiring harness section for the preheating system and install. Attach and lock connector (1) for glow elements.

All connectors (1) for glow elements must engage audibly.



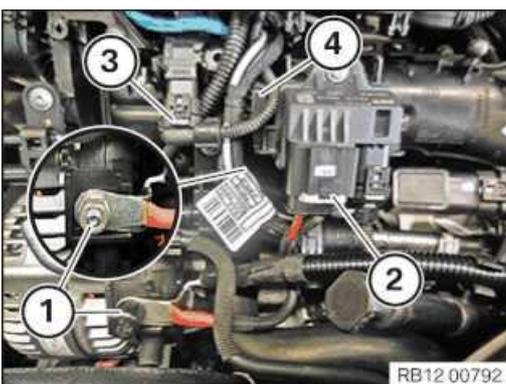
Insert cable clip (4) into the guide (3).

Feed in and install the cable clip (4).

Secure clamp (2).

Attach and lock connector (1).

Connector (1) must engage audibly.



Secure clamp (4).

Connect and lock connector (2) on preheating control unit.

Connect and lock connector (3) on charging pressure sensor.

All connectors must audibly engage.

Tighten nut (1).

Tightening torque [12 52 2AZ](#).



**Required follow-up work:**

- Install [resonator](#).
- Connect [battery earth lead](#).

## 61 00 ... Safety information on handling hybrid cars

### 1. Qualification:

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently safe vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

### 2. Identification:

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

### 3. Rules of conduct/protective measures:

- Note operating instructions for handling high-voltage battery units.
- Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.
- In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.  
Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

- Prevent escaping substances from entering drains, pits and the sewer system.
- Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.
- Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger (suitable extinguishant: water and water foam).
- A cut 2nd emergency separation point must be repaired with a butt connector.

### 4. Measures before starting work:

- Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**
- It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.
- The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:
  1. seat belt buckle unlocked **and**
  2. the driver's door is open **and**
  3. no brake activated **and**
  4. the accelerator pedal is not activated **and**
  5. speed < 3 km/h (2 mph)
- Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).
- After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.
- Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.  
Work is only permitted to begin if:
  1. Corresponding display in the KOMBI **High-voltage system deactivated** or  
When a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.  
**If it cannot be definitively established that the equipment is de-energised**, work is not permitted to begin. **Danger to life!** Before work begins, a qualified electrician (1000 V AC) must verify that the

system is de-energised using appropriate measuring devices and procedures.

**=> In this case, Technical Support must be contacted!**

- Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.  
Battery charging may result in heating of the high-voltage battery unit. This heating may lead to sporadic launches of the electric fan (switch-on request from the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

5. *Measures during/after activities:*

- Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.
- When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).
- *E72 only:* When the "Power Electronic Box Cover" is removed, the high-voltage system is not permitted to be activated. The high-voltage service disconnect must only be used when the "Power Electronics Box Cover" is completely installed.
- High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.
- When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.
- The specified work steps in the repair instructions must be adhered to exactly.
- High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.
- Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/potential equalisation measurement) are performed automatically by the vehicle. Manual measurement is not therefore necessary.  
For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Follow further [painting notes](#).
- Removed high-voltage battery units must be stored in a manner that protects them from misuse and damage.
- Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

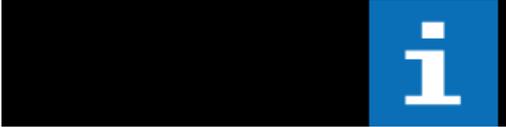
6. *Potential compensation:*

Equipotential bonding lines, high-voltage cables and the battery negative lead to the EME are fitted with safety screws.

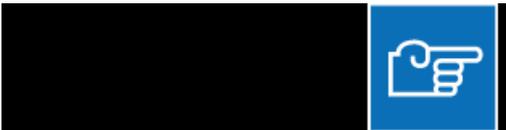
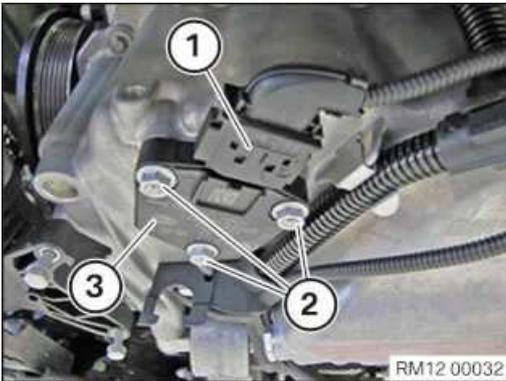
- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.

**Attention!**

Read and comply with notes on [protection against electrostatic discharge \(ESD protection\)](#)!

**Necessary preliminary tasks:**

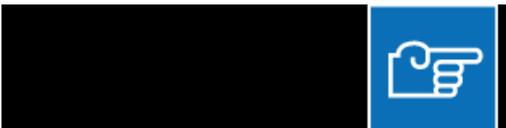
- Remove front [underbody protection](#).
- Drain [engine oil](#).

**Removal:**

Unlock connector (1) and pull off.

Unscrew nuts (2).

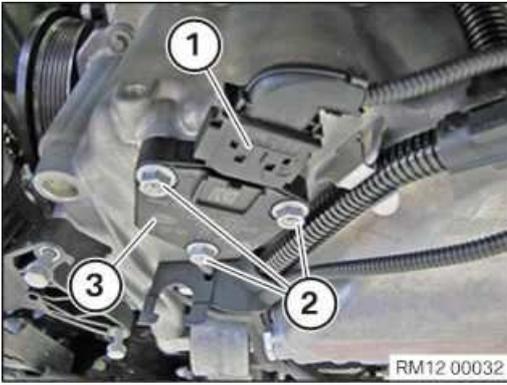
Remove oil level sensor (3).

**Preparation for installation:**

Replace sealing ring (1).

**Part:** Sealing ring

**Installation:**



Install oil-level sensor (3).

Tighten down nuts (2).

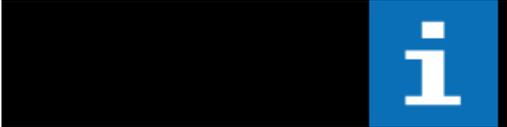
If tightening torque value is too low oil leaks will result.

If tightening torque value is too high damage to the oil-level sensor will result.

Tightening torque [12 61 1AZ](#).

Connect connector (1) on oil-level sensor.

Connector (1) must engage audibly.



**Required follow-up work:**

- Install front [underbody protection](#).
- Top up [engine oil](#).
- Check stored error/fault messages.
- Delete the fault memory.

## 12 61 280 Removing and installing/replacing oil pressure switch



### 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 where components are supported.

**Danger! Life-threatening injuries!**

- Secure the vehicle hoist against lowering and lifting.



### 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.

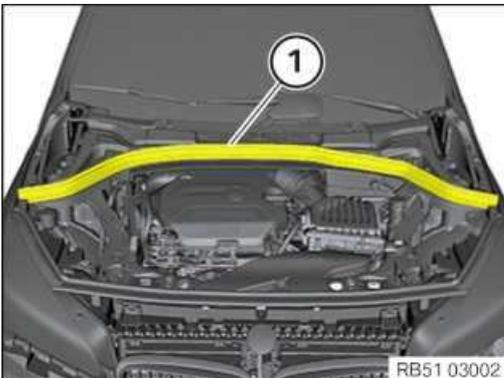
## PRELIMINARY WORK

### 1 – Remove the seal for the rear bonnet



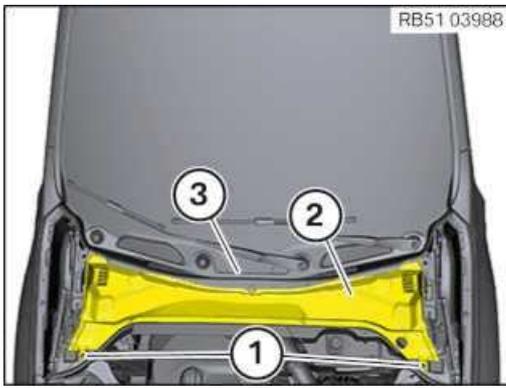
### NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Pull off rear bonnet seal (1) towards the top and remove.

### 2 – Removing front cowl panel cover



- Loosen the expanding rivet (1).
- Feed out and remove front cowl panel cover (2) from the rear cowl panel cover(3).

### 3 – Disconnecting the battery earth lead



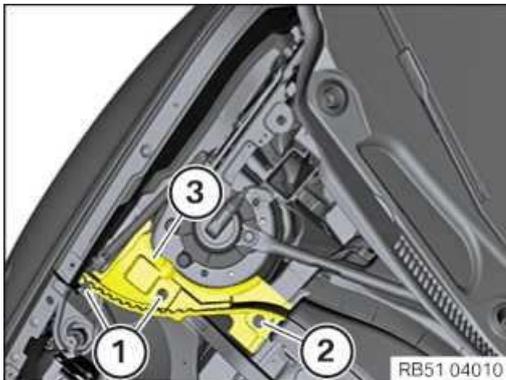
- Unlock plug connection (1) and disconnect.
- Unfasten nut (2).
- Remove the battery earth lead (3) and secure to one side.

### 4 – Remove suspension cross-brace



#### TECHNICAL INFORMATION

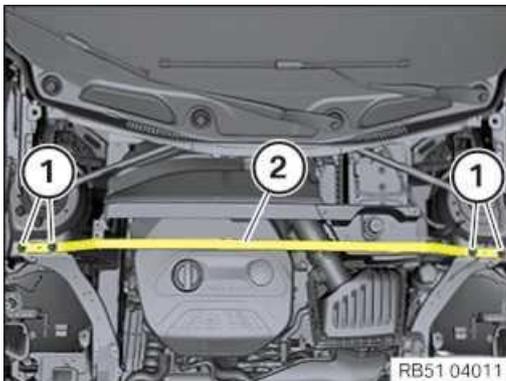
Driving without the strut brace/front end or tension strut is not permitted.



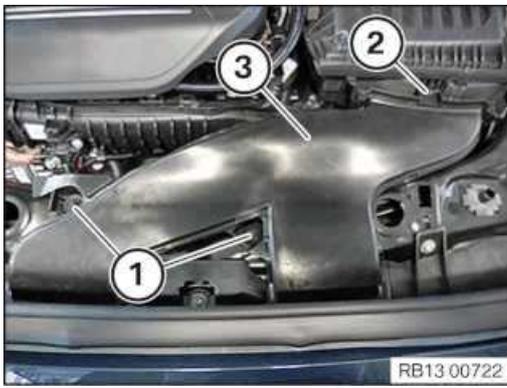
#### NOTICE

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

- Loosen expanding rivet (1).
- Loosen screw (2).
- Remove the cover (3).
- Loosen screws (1).
- Remove strut brace (2).



### 5 – Remove the intake neck for intake silencer housing



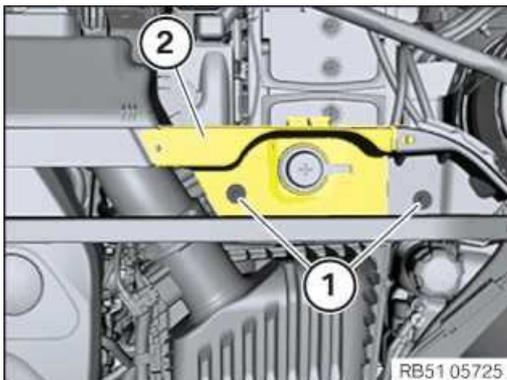
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

#### 6 – Removing intake silencer housing

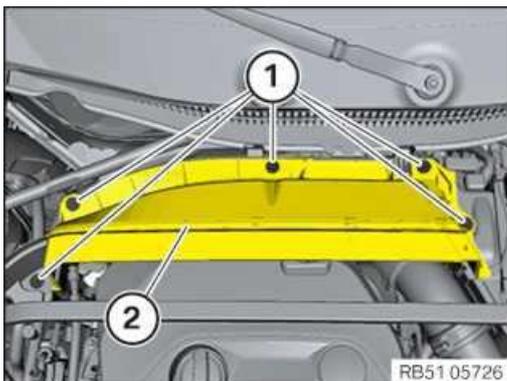


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

#### 7 – Removing the upper bulkhead cover



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



- Loosen screws (1).
- Feed out and remove the upper bulkhead cover (2).

#### 8 – Remove vehicle battery

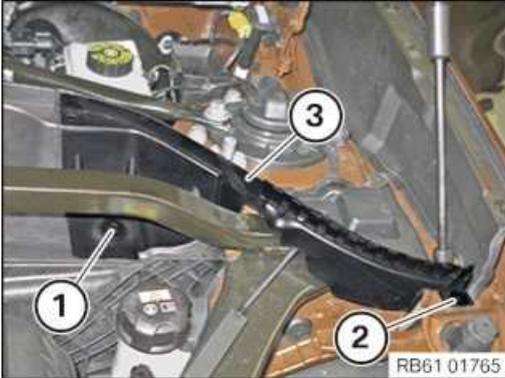


## WARNING

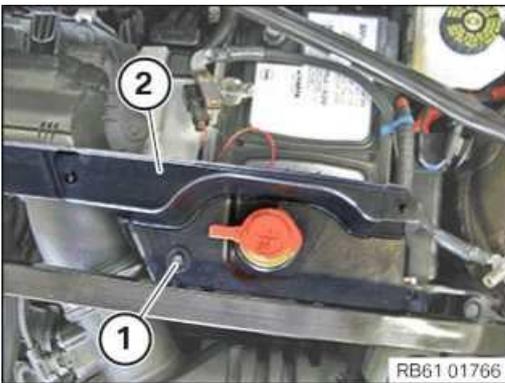
Working on 12 V vehicle electrical system.

**Risk of short circuits! Risk of fire!**

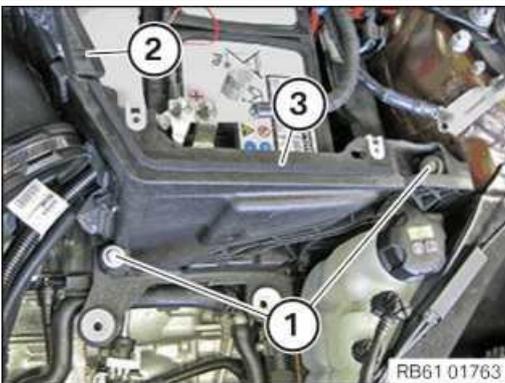
- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



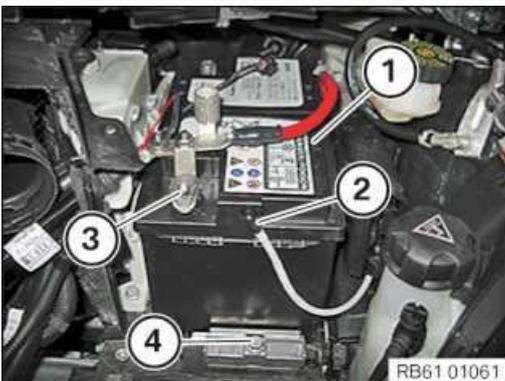
- Release the screw (1) and the expanding rivet (2).
- Remove the fixture for the gasket (3).



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



- Loosen screws (1).
- Unscrew the bolt (2) and guide the tension strut (3) out.



- Pull off the vent hose (2).
- Slacken the nut (3) on the positive battery terminal and remove the positive battery terminal.



## WARNING

**Unprotected battery terminals.**

**Risk of short circuits! Risk of fire!**

- Cover the vehicle battery.
- Loosen the screw (4) and remove the holder.
- Remove vehicle battery (1).

## 9 – Removing the acoustic cover



### WARNING

Hot surfaces.

**Risk of burning!**

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



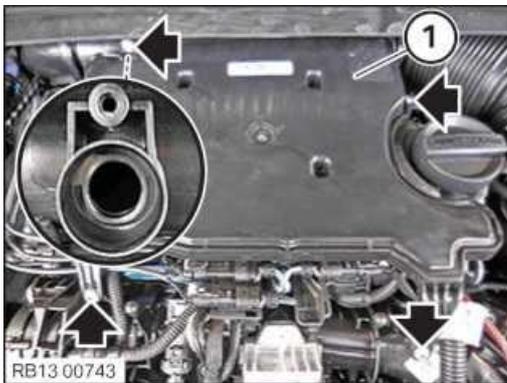
### RISK OF DAMAGE

**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  $>20\text{ }^{\circ}\text{C}$ .
  - Use only distilled water as an auxiliary material during installation, no lubricants.
- Unclip the acoustic cover from the marked areas towards the top.

## 10 – Remove resonator

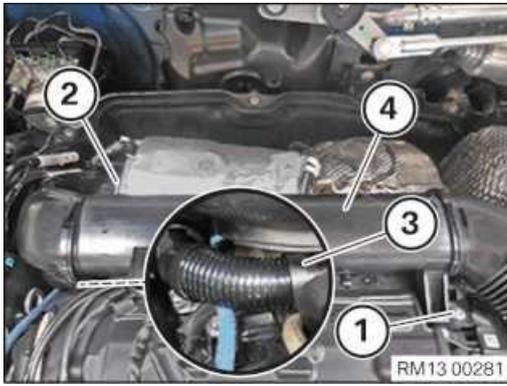


- Remove screws (arrows).
- Guide out and remove the resonator (1).

## 11 – Removing clean air pipe



- Detach clamp (1) on the clean air pipe.
- Pull off the clean air pipe from the intake silencer housing.



- Loosen screw (1).
- Loosen clamp (2).
- Unlock the ventilation line (3) and pull it off the cylinder head cover.
- Feed out clean air pipe and remove.

## 12 – Remove electronics box

### Prerequisite

Battery earth lead is disconnected.



### 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.



### 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

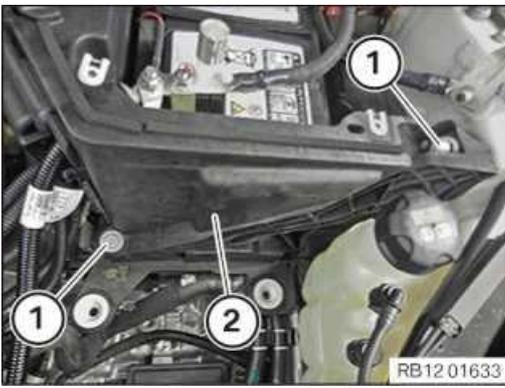
Follow instructions for removing and installing control units.

For additional information see: 12 00 ... Notes on removal and installation of control units

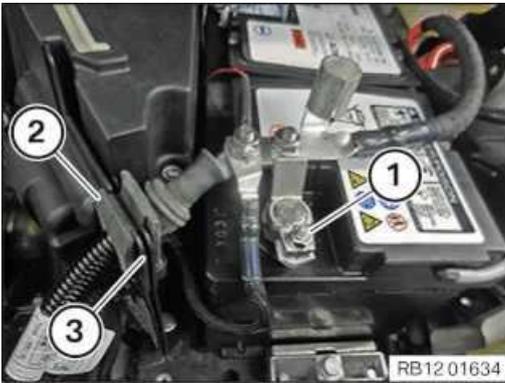


### TECHNICAL INFORMATION

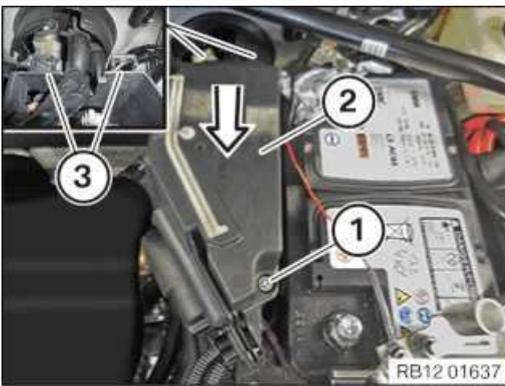
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



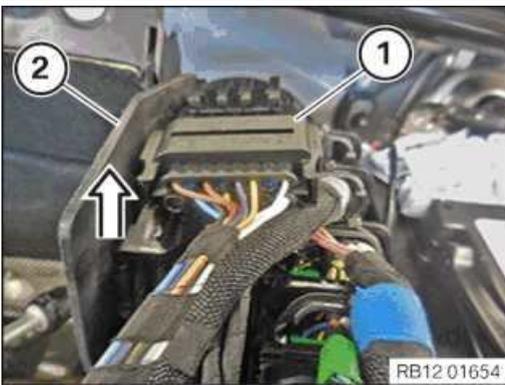
- Loosen screws (1).
- Guide out the tension strut (2) toward the top and remove it.



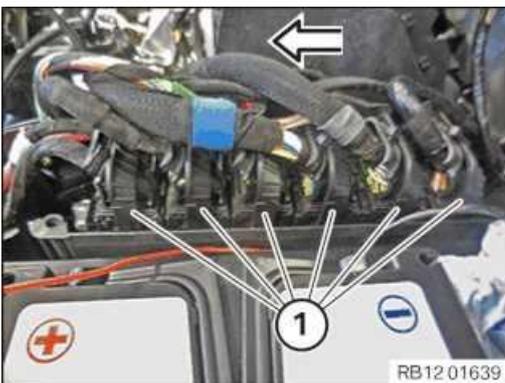
- Undo positive battery terminal (1).
- Feed out positive battery terminal (1) and set aside.
- Guide the positive battery cable (2) out of the holder (3) and lay to one side.



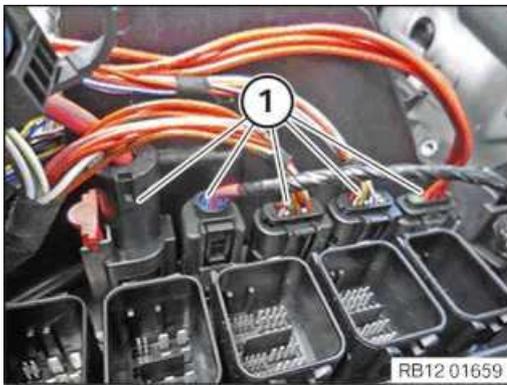
- Loosen screw (1).
- Unlock cover (2) and feed out and remove from the guides (3) in the direction of arrow.



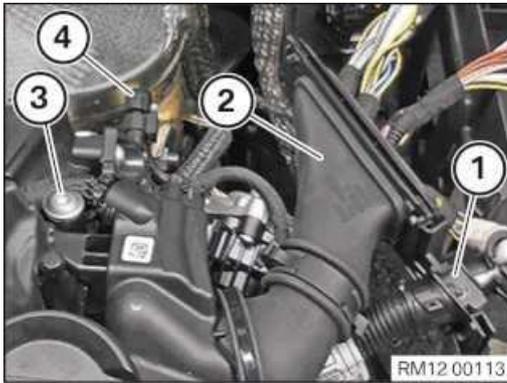
- Feed out connector (1) from the electronics box (2) and remove in the direction of arrow.
- Unlock and loosen connector (1).



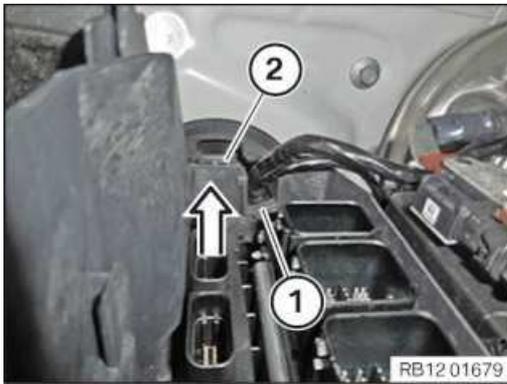
- Unlock and remove the connector (1) in the direction of the arrow.
- Feed out connector (1) and place to one side.



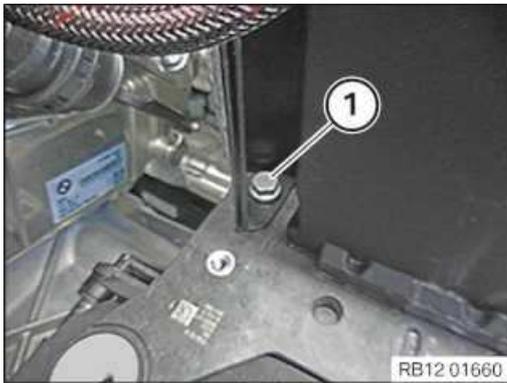
- Unlock and loosen connector (1).



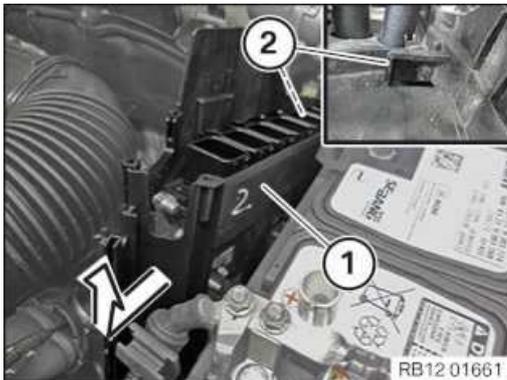
- Detach the wiring harness (1) from the electronics box.
- Detach the wiring harnesses (2) from electronics box.
- Loosen screw (3).
- Set wiring harnesses (1) and (2) aside.
- Unlock the connector (4) and disconnect it from the differential pressure sensor.



- Unlock and loosen holder (1).
- Guide the holder (1) out of the electronics box (2) in direction of arrow and set it aside.

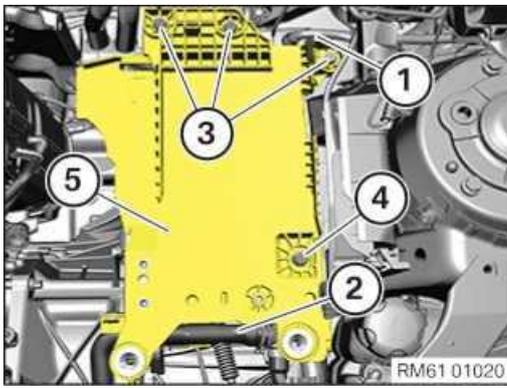


- Loosen screw (1).



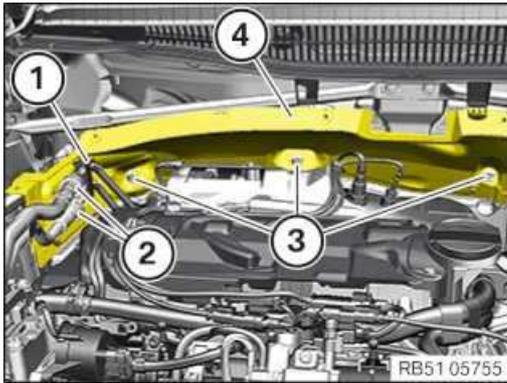
- Guide the electronics box (1) out of the guide (2) in direction of arrow and remove.

### 13 – Remove battery holder



- Detach the cable clip (1) from the battery holder (5).
- Detach the coolant line (2) from the battery holder (5).
- Loosen screws (3).
- Loosen screw (4).
- Thread out and remove the battery holder (5).

#### 14 – Remove the rear bulkhead upper part



- Unlock the holder (1) and disconnect.
- Guide out and remove the fuel lines (2).
- Loosen screws (3).
- Guide out the rear bulkhead upper part (4) and remove.

#### 15 – Removing heat shield from top exhaust turbocharger

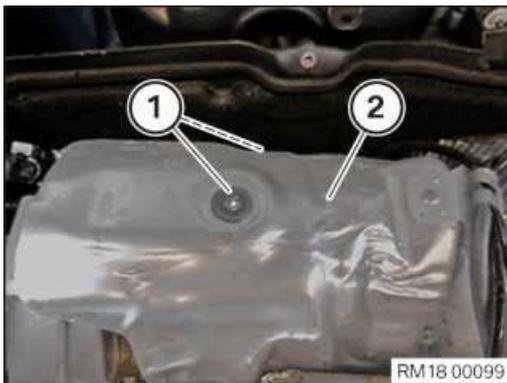


#### WARNING

Hot surfaces.

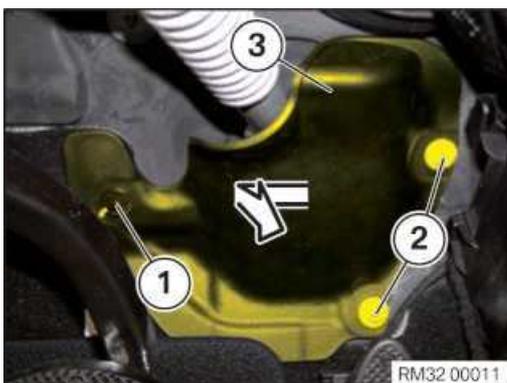
Risk of burning!

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

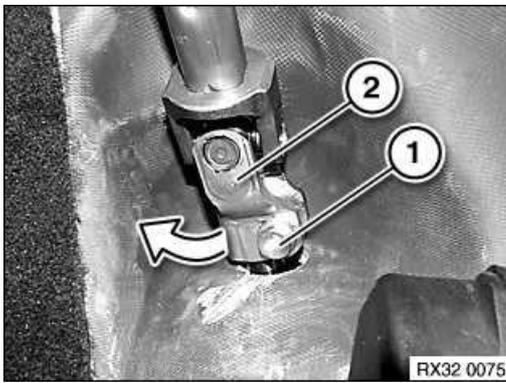


- Release cable from holders.
- Release the screws (1) at the top and bottom of the heat shield.
- Feed out and remove the heat shield (2).

#### 16 – Releasing lower steering shaft from steering gear

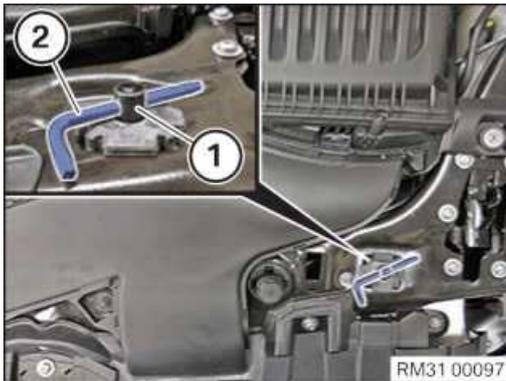


- **If installed:**
- Unfasten nut (1).
- Unscrew the nuts (2) by 1 rotation.  
Do not remove the nuts (2) !
- Remove the cover (3) on the steering column in the direction of the arrow.  
The side footwell trim must not be disassembled!



- Loosen screw (1).
- Swivel out the universal joint (2) of the bottom steering shaft from the steering gear in the direction of the arrow.

### 17 – Securing radiator on left and right



#### NOTICE

Perform the operations on the left and right side.

- Fasten radiator at centring pin (1) with suitable tool (2).

### 18 – Removing both front wheels

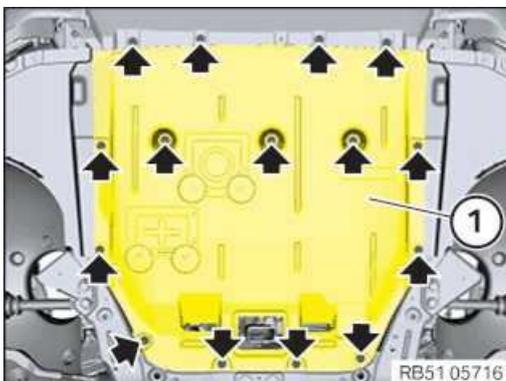


#### ► Removing the wheel

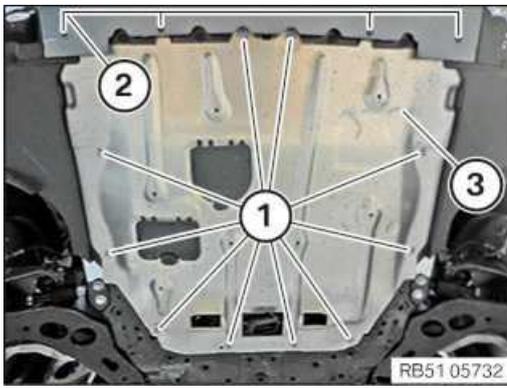
- If several wheels are removed simultaneously: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Unscrew the wheel bolts (arrows) and remove the wheel.

Use the matching adapter from tool set (wheel bolt adapter set) to loosen and tighten down the wheel bolt with security code.

### 19 – Removing the front underbody protection

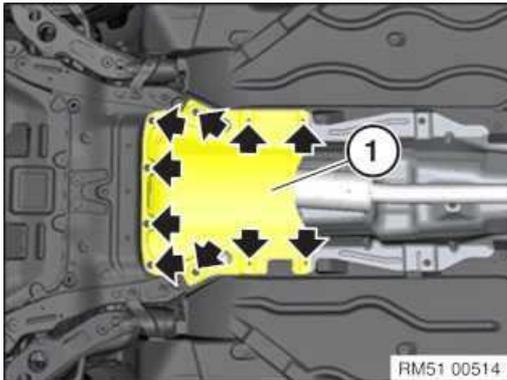


- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



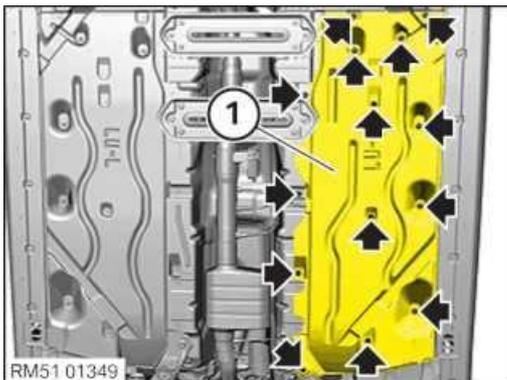
- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

## 20 – If installed: Removing rear underbody protection



- Remove screws (arrows).
- Remove the rear underbody protection (1).

## 21 – Removing right underbody panelling



- Unscrew all bolts and nuts (arrows).
- Remove the underbody panelling (1).

## 22 – Removing front left and right wheel arch cover



### NOTICE

Perform the operations on the left and right side.

### ► Remove the front wheel arch trim



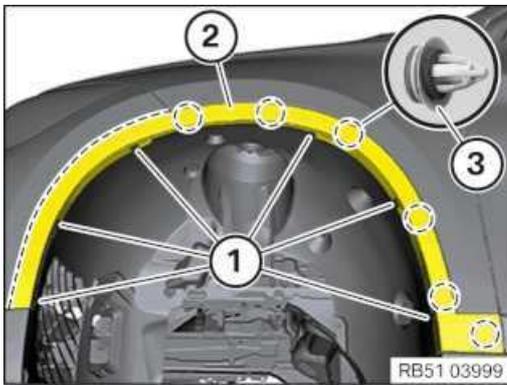
### NOTICE

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



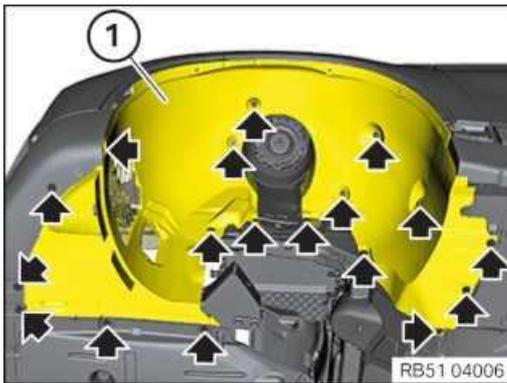
### NOTICE

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



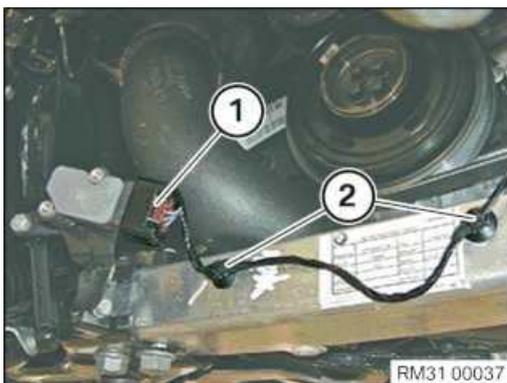
- Remove the blind rivets (1).
- Release the wheel arch trim (2) in the area of the side panel from the clips (3).
- Release the wheel arch trim (2) from the latch mechanisms on the bumper and remove.

► **Remove front wheel arch cover**



- Unscrew all bolts and nuts (arrows).
- Guide the wheel arch cover (1) out.

**23 – With right installation: Detaching ride height sensor cable**



- Unlock plug connection (1) and disconnect.
- Release cable clip (2) from deformation element adapter.

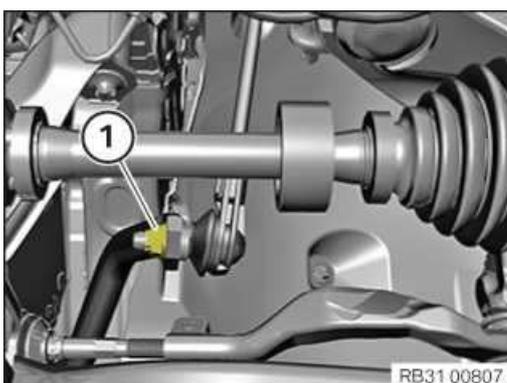
**24 – Releasing anti-roll bar on left and right from anti-roll bar link**



**NOTICE**

Perform the operations on the left and right side.

► **Detach the anti-roll bar from the anti-roll bar link**



- Unfasten nut (1).
- Note:** Use the Torx socket for counter support.
- Loosen the anti-roll bar link from the anti-roll bar .

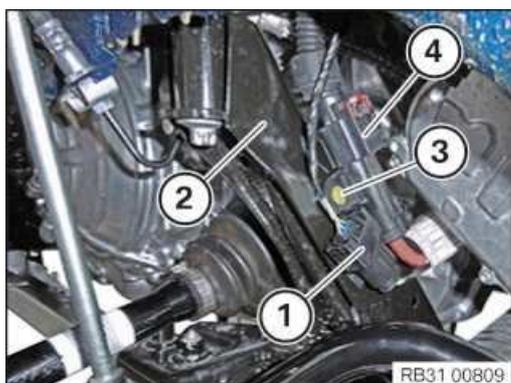
## 25 – Detaching rubber mount from front axle support



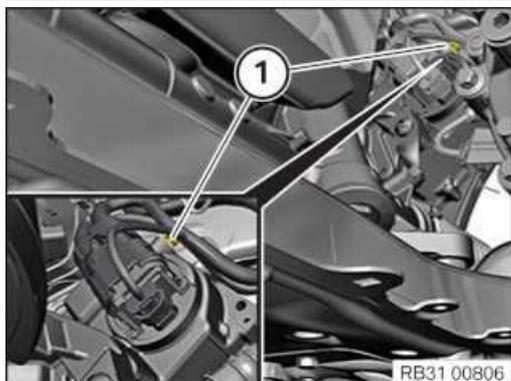
- Spray rubber mount (1) with lubricant and release from holder on front axle support.

## 26 – Disconnecting plug connections from steering gear

### ► If installed: Detach connectors from the front axle carrier



- Release the plug connection (1) from the front axle support (2).
- Loosen screw (3).
- Release the plug connection (4) from the front axle support (2).

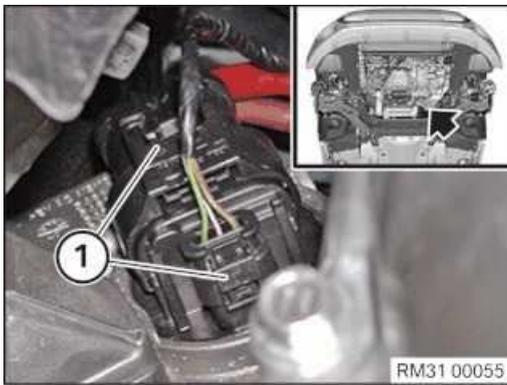


- Disconnect wiring harness (1) from steering gear.



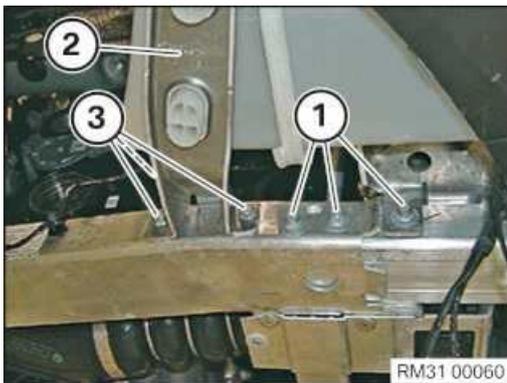
- To unlock the plug connections (see the following work step): unlock plug connections (arrow) with the right hand.

The plug connections can be reached via the left-hand output shaft.



- Unlock plug connections (arrow) (1) and disconnect from the steering gear.
- Make sure when lowering the front axle that the cables are not damaged!

## 27 – Releasing the mounted part from the front axle support



- **Only on right side:** Loosen screws (3) and remove holder for washer fluid reservoir (2).



### NOTICE

Perform the operations on the left and right side.

- Loosen screws (1).



### NOTICE

Perform the operations on the left and right side.

- Unlock safety catch (1) of the lock (2) from the holder for the charge air cooler.
- Completely remove locks (2).



- Loosen screw (2) of the engine support (3) on the front axle (1).

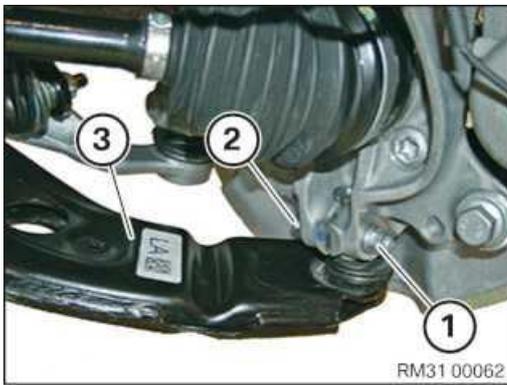


### NOTICE

Perform the operations on the left and right side.

- Loosen screws (1).

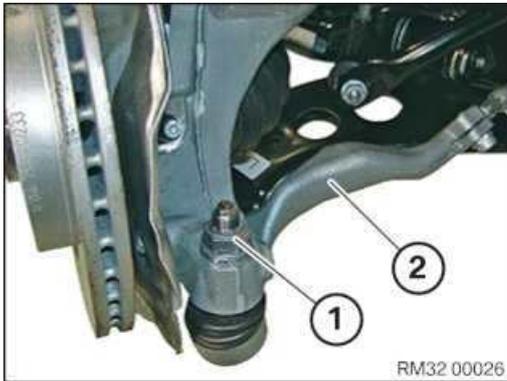
## 28 – Detaching and removing front axle completely



#### NOTICE

Perform the operations on the left and right side.

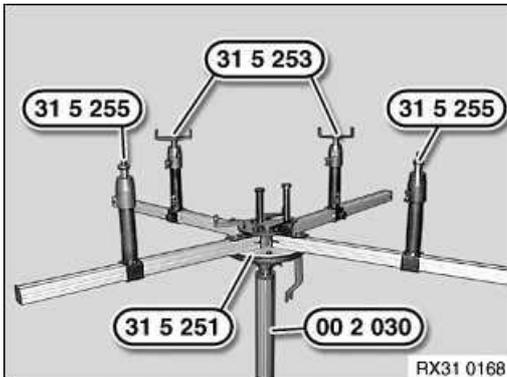
- Unfasten nut (1).
- (2) Pull out screw.
- Detach the wishbone (3) from the swivel bearing .



#### NOTICE

Perform the operations on the left and right side.

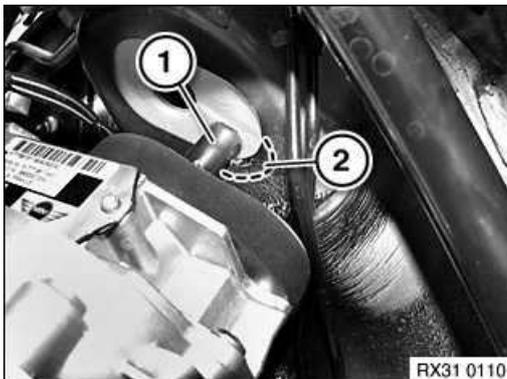
- Unfasten nut (1).
- Detach the track rod (2) from the swivel bearing.



- Fit the special tool completely onto the workshop jack **0 490 133 (00 2 030)** with 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.
- Note:** In a profile rail pair, two profile rails are connected to one another by gearing.



- Align special tools and to front axle support.
  - Support front axle support by operating workshop jack **0 490 133 (00 2 030)**.
- Note:** The centre of gravity of the front axle support must be positioned centrally over the workshop jack!
- Secure front axle support with special tool to special tool .

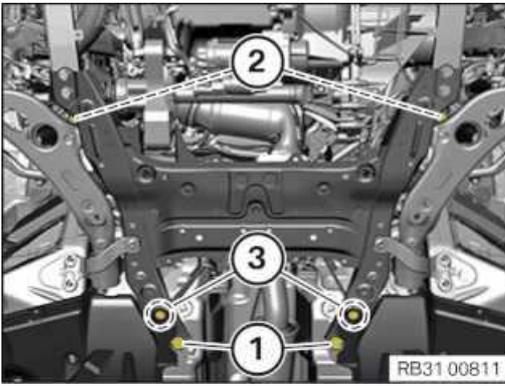


#### TECHNICAL INFORMATION

Non-compliance with the regulations for installation and disassembly may result in component damage. All work must be performed with care and in compliance with the regulations.

- When raising and lowering the front axle support, make sure that the torsion bar (1) of the electromechanical steering gear (EPS) in area (2) does not collide with the bulkhead!

**Note:** Collision with the bulkhead may result in damage to the electromechanical steering gear (EPS)!



- If applicable, release the screws in area (3).
- Release screws (1) (front axle support, rear).
- Release screws (2) (front axle support, front).
- Bend the underbody panelling to the side in area (3).
- When lowering, release charge air cooler from its rubber mounts.
- Completely lower and remove the front axle.

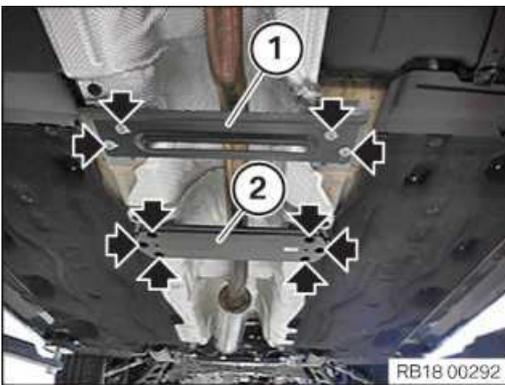


#### TECHNICAL INFORMATION

Note the information on thread repairs using Helicoil thread inserts.  
For more information see: 41 00 ... Notes on repairing threads

- Check threads for damage; if necessary, repair with Helicoil thread inserts.

### 29 – Removing the connecting support from the tunnel in front and back



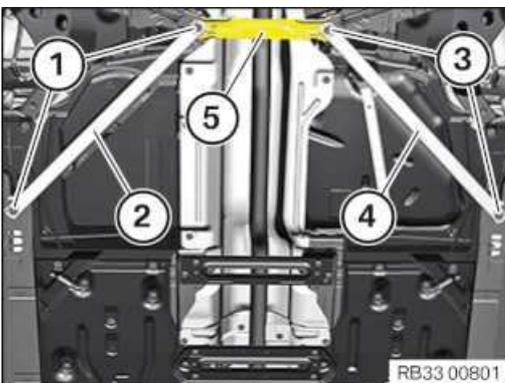
- Unscrew the bolts (arrows) from the connecting support (1).
- Feed out and remove the crossbeam (1).
- Unscrew the bolts (arrows) from the connecting support (2).
- Feed out and remove the crossbeam (2).

### 30 – Remove the cross strut with the torsion strut



#### TECHNICAL INFORMATION

Driving without a torsion strut is not permitted.



- Loosen screws (1).
- Thread out torsion strut (2) at left and remove.
- Loosen screws (3).
- Thread out torsion strut (4) at right and remove.
- Feed out and remove the cross-member (5).

### 31 – Remove exhaust system



## WARNING

**Hot surfaces.**

**Risk of burning!**

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

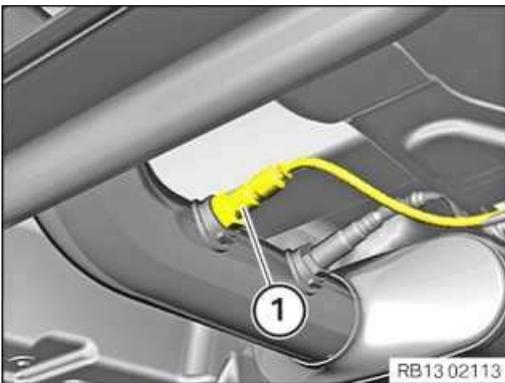


## CAUTION

**Heavy component.**

**Heavy components can lead to injury or damage.**

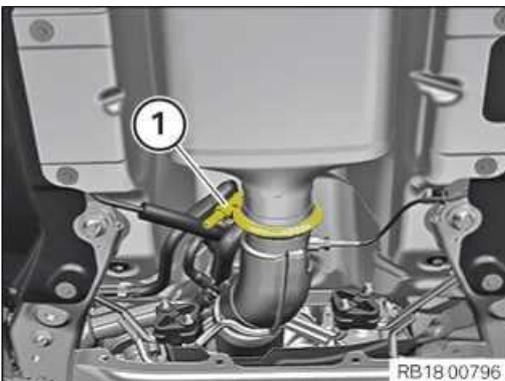
- Remove and install heavy components with the aid of another person/other persons.



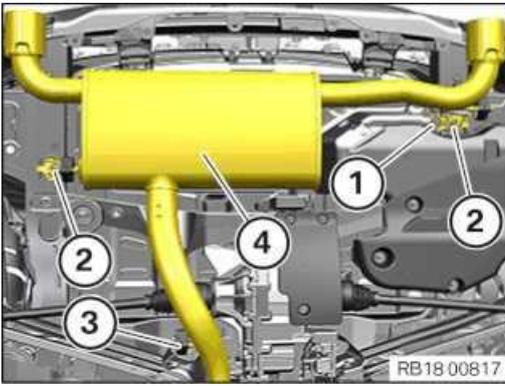
- Release the nitrogen oxide sensor (1) downstream of the SCR catalytic converter, guide it out and set it aside.



- Release the diesel particulate sensor (1), guide it out and set it aside.

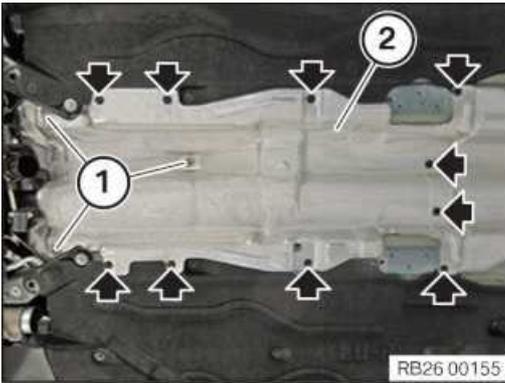


- Loosen V-band clamp (1).



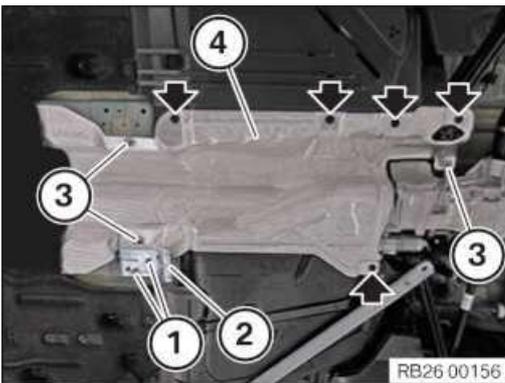
- Loosen screw (1).
- Loosen nuts (2).
- Release the rubber mount (3) of the exhaust system (4).
- Lower and guide out the exhaust system (4) with assistance of a second person and remove it.

### 32 – Remove front heat shield



- Remove screws (arrows).
- Loosen nuts (1).
- Guide the heat shield (2) out and remove it.

### 33 – Remove heat shield at rear.



- Loosen screws (1).
- Guide out and remove holder (2).
- Remove screws (arrows).
- Loosen nuts (3).
- Guide the heat shield (4) out and remove it.

### 34 – Remove propeller shaft



#### 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.



## 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.



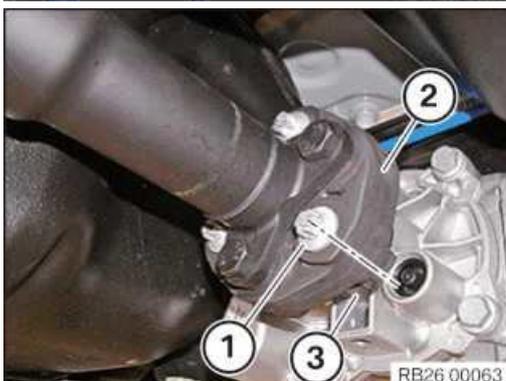
- Install the special tool between the front and rear propeller shaft.
- Make sure that the arrows on the special tool point forward in the direction of travel.



- Always support the propeller shaft (1) with a conventional jack.



- Protect the propeller shaft (1) with the special tools **0 495 554 (33 5 070)** and from twisting.



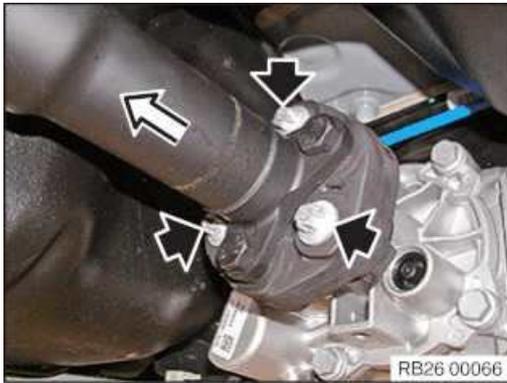
## TECHNICAL INFORMATION

Compliance with the following instructions is required to avoid a humming noise from the propeller shaft after refitting the propeller shaft.

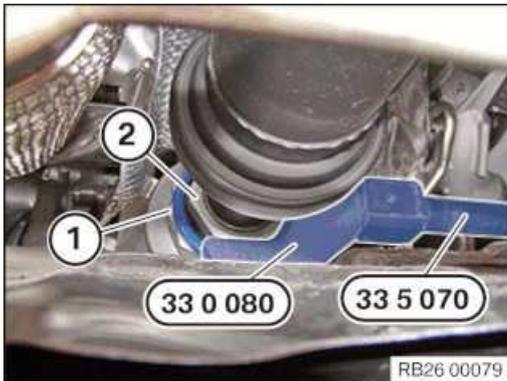
- Mark the installation position of the screw connection (1), the flexible disc (2) and the three-hole flange (3) on the same level.
- Loosen the screw connection (1).



- Loosen screws (1).



- Remove screws (arrows).
- Guide the propeller shaft out in the direction of the arrow and set it aside.



#### RISK OF DAMAGE

**Damage to the transfer box.**

**Non-observance of the removal and installation guidelines may cause severe damage to the transfer box.**

- Do not use the double hexagon head flange nut as counter support.

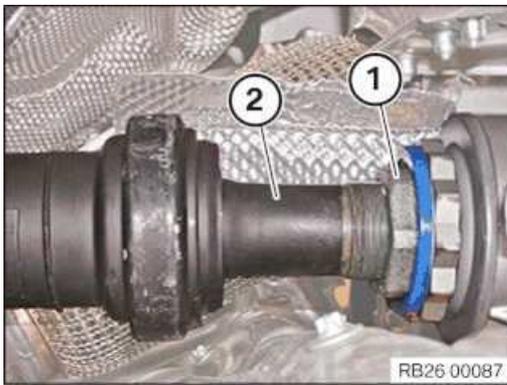
- Protect the recessed nut (2) on the transfer box from twisting with the special tools **0 495 554 (33 5 070)** and .

The recessed nut (2) on the transfer box must **not** be used to detach the propeller shaft.

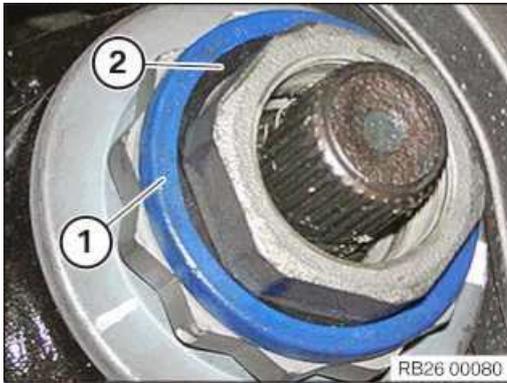
The double hexagon flange nut (1) must **not** be used for counter support.

- Release the front propeller shaft with the special tools **0 495 554 (33 5 070)** and in the direction of the arrow.

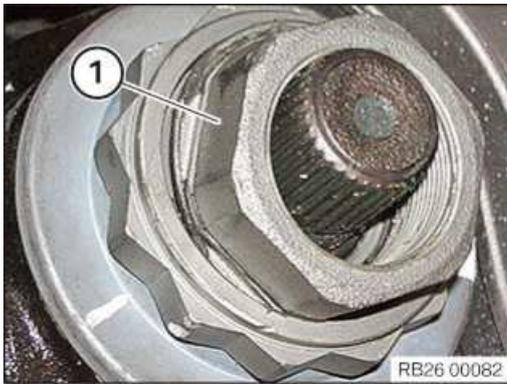




- Thread the propeller shaft (2) out of the recessed nut (1) and remove.



- Thread the retaining clip (1) and the seal (2) out and remove.



- Thread out and remove the recessed nut (1).

### 35 – Removing starter motor



#### WARNING

**Hot surfaces.**

**Risk of burning!**

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



#### 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



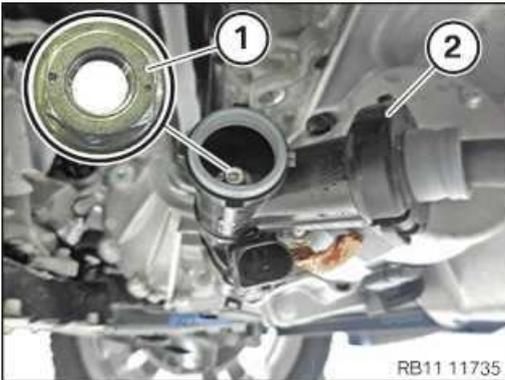
### Electrostatic discharge.

#### 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 loosen connector (1).
- Detach the sealing cap (2) in the direction of the arrow.
- Feed out and remove the sealing cap (2).

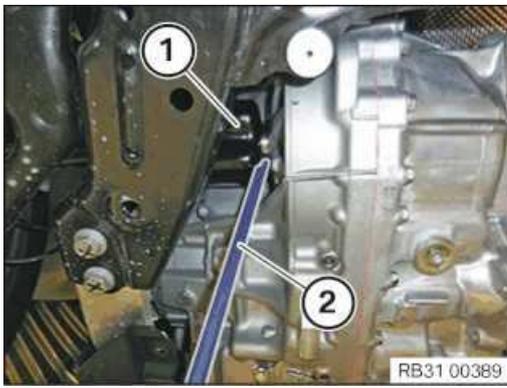


- Unfasten nut (1).
- Feed out the positive battery cable (2) of the starter motor and set it aside.



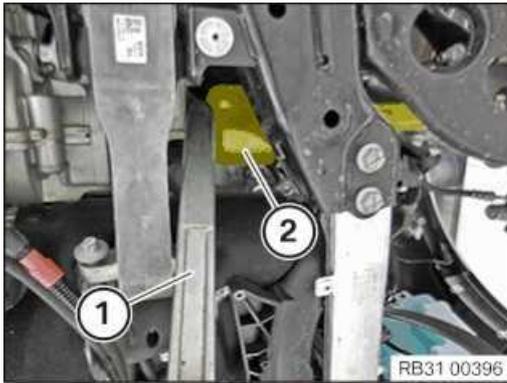
- Loosen screws (1).
- Feed out starter motor and remove.

## 36 – Partially removing the left output shaft



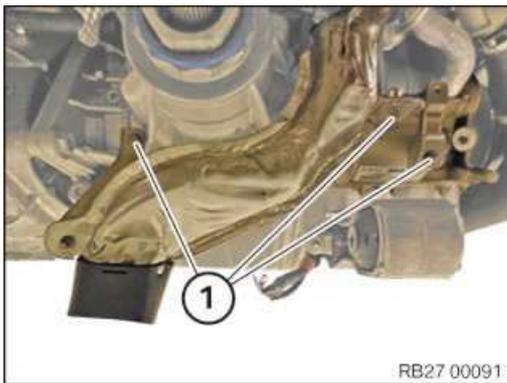
- Protect the output shaft (1) from falling.
- Lever out the output shaft (1) with a mounting lever (2) from the transmission.
- Tie up output shaft (1).

### 37 – Partially removing right output shaft



- Lever out the output shaft (2) with a mounting lever (1).
- Tie up output shaft (1).

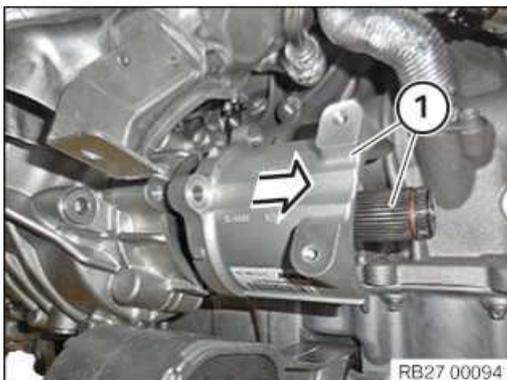
### 38 – Remove the intermediate shaft with the support tube



- With air duct installation: Loosen screws (1).
- Remove air duct

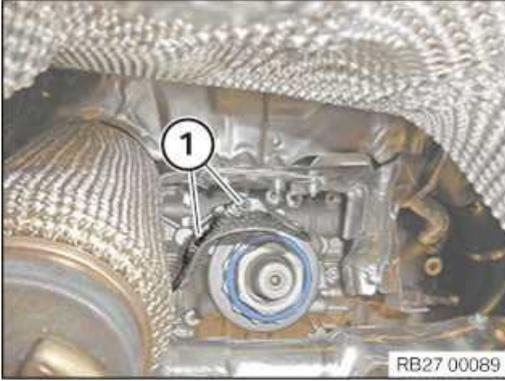


- Loosen screws (1).

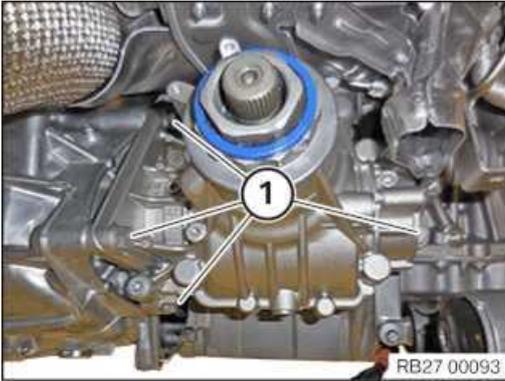


- Pull the intermediate shaft with the support tube (1) out of the transfer box.

### 39 – Remove transfer box (VTG)



- Loosen screws (1).
- Remove heat shield.



- Loosen screws (1).
- Remove the transfer box (VTG).

### 40 – Remove the monitoring oxygen sensor



#### WARNING

**Hot surfaces.**

**Risk of burning!**

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



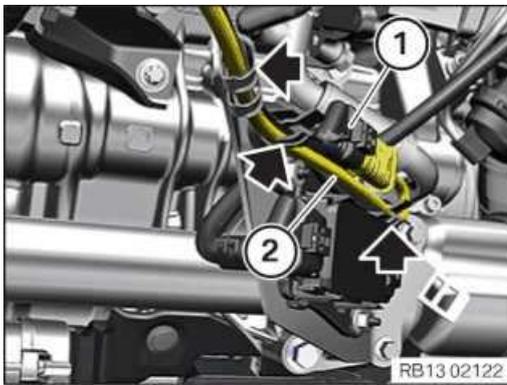
#### RISK OF DAMAGE



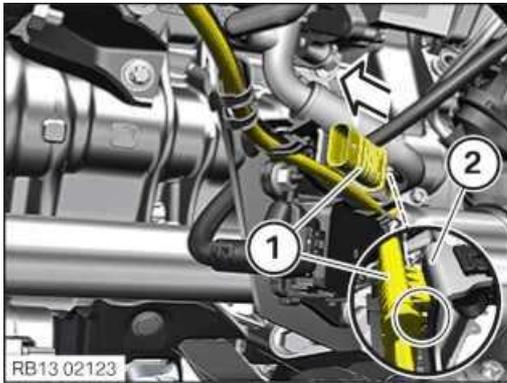
**Electrostatic discharge.**

**Damage to or destruction of electrical components.**

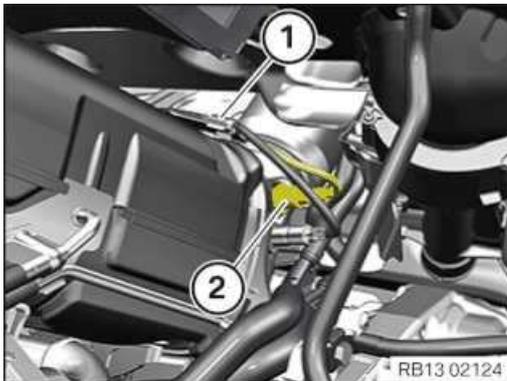
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.



- Unlock plug connection (1) and disconnect.
- Feed oxygen monitor sensor cable (1) out of the clamps (arrows).



- Unlock the connector (1) in the marked area and disconnect it from the holder (2) in the direction of arrow.



- Guide the cable of the monitoring oxygen sensor (2) out of the clamp (1).
- Release the monitoring oxygen sensor (2) using special tool **0 491 074 (11 7 020)**.
- Remove the monitoring oxygen sensor (2).

#### 41 – Removing the nitrogen oxide sensor before SCR catalytic converter



#### WARNING

**Hot surfaces.**

**Risk of burning!**

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



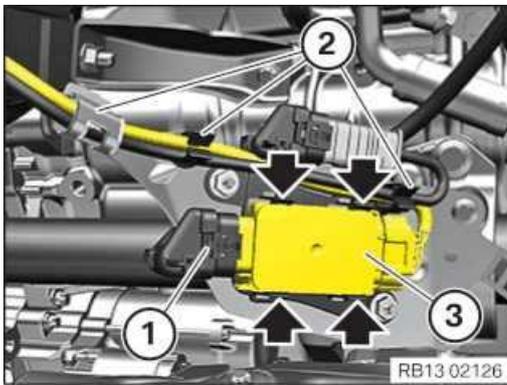
#### RISK OF DAMAGE



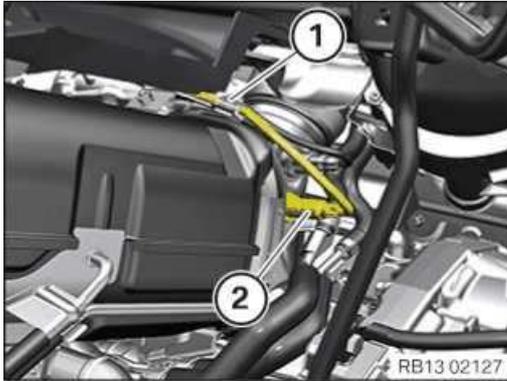
**Electrostatic discharge.**

**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.

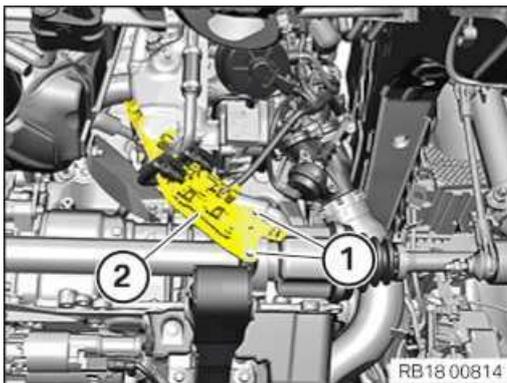


- Unlock plug connection (1) and disconnect.
- Slide the cable of the nitrogen oxide sensor evaluation electronics (3) out of the clamps (2) and remove.
- Unlock (arrows) and remove the evaluation electronics for the nitrogen oxide sensor (3).



- Slide the cable of the nitrogen oxide sensor before the SCR catalytic converter (2) out of the clamps (1) and remove.
- Detach the nitrogen oxide sensor before the SCR catalytic converter (2) using the special tool **0 491 074 (11 7 020)**.
- Guide out and remove the nitrogen oxide sensor upstream of the SCR catalytic converter (2).

#### 42 – Remove holder for oxygen sensor



- Loosen screws (1).
- Thread out the holder (2) for the oxygen sensor and remove.

#### 43 – Remove the exhaust temperature sensor on the catalytic converter



#### WARNING

**Hot surfaces.**

**Risk of burning!**

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



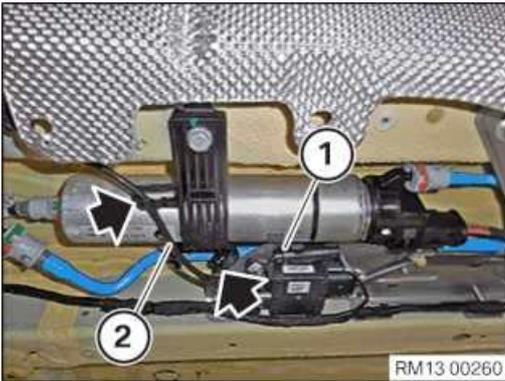
## RISK OF DAMAGE



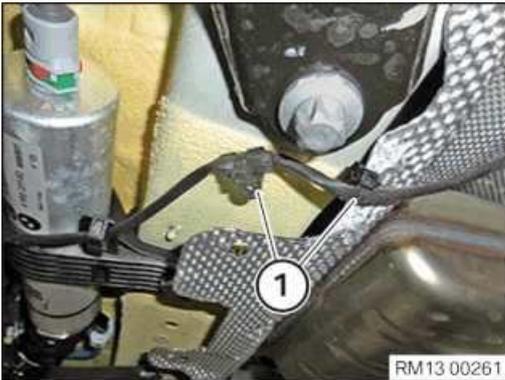
### Electrostatic discharge.

#### Damage to or destruction of electrical components.

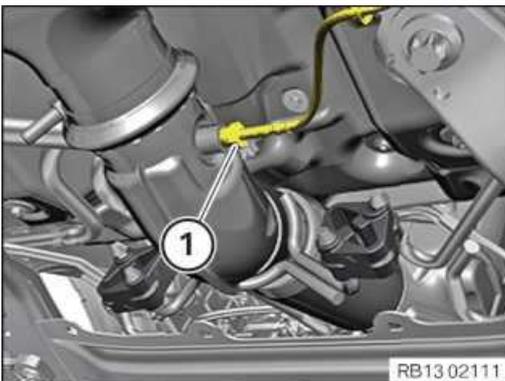
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.



- Unlock and loosen connector (1).
- Feed out the cable (2) of the exhaust temperature sensor from the clamps (arrows) and remove.



- Loosen the cable clip (1).



- Loosen exhaust temperature sensor (1).
- Feed out and remove exhaust temperature sensor (1).

## 44 – Removing the exhaust temperature sensor downstream from the catalytic converter on the diesel particulate filter



## WARNING

**Hot surfaces.**

**Risk of burning!**

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



## RISK OF DAMAGE



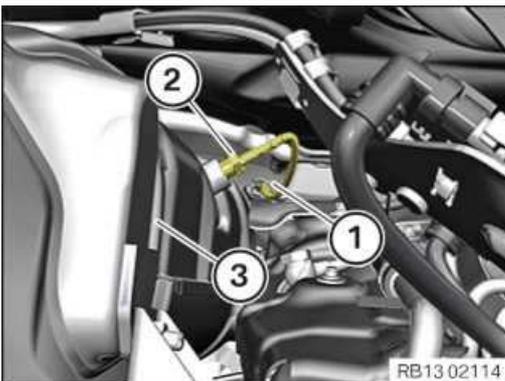
**Electrostatic discharge.**

**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.



- Unlock and loosen connector (1).
- Uncover the exhaust temperature sensor cable.



- Guide the exhaust temperature sensor cable (2) out of the clamp (1) and place it to one side.
- Release the exhaust temperature sensor (2) with conventional tools .
- Feed out and remove the exhaust temperature sensor (2) from the diesel particulate filter (3).

### 45 – Remove the exhaust temperature sensor on the diesel particulate filter



## WARNING

**Hot surfaces.**

**Risk of burning!**

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



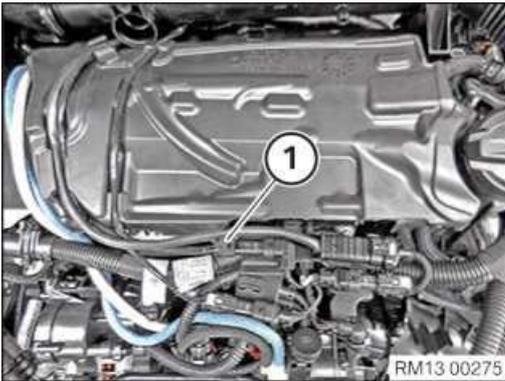
## RISK OF DAMAGE



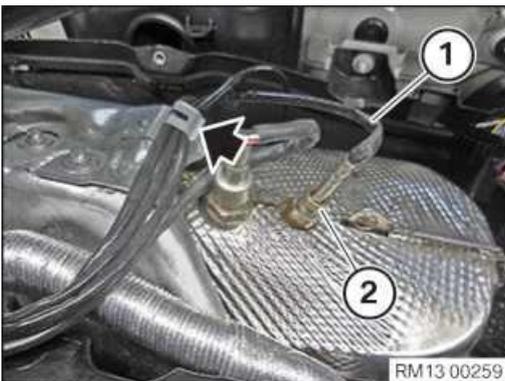
### Electrostatic discharge.

#### 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.



- Unlock and disconnect connector (1).
- Put the cable of the exhaust temperature sensor to one side.



- Guide cable (1) of the exhaust temperature sensor out of the clamp (arrow) and remove it.
- Loosen exhaust temperature sensor (2).
- Feed out and remove exhaust temperature sensor (2).

## 46 – Remove the control sensor



### 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.



- Unlock plug connection (1) and disconnect.
- Detach the connector (2) from the holder .
- Release the front oxygen sensor cable.



- Detach the control sensor (1) with the special tool .
- Feed out and remove the control sensor (1).

## 47 – Removing the diesel particulate filter



### WARNING

#### Hot surfaces.

#### Risk of burning!

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

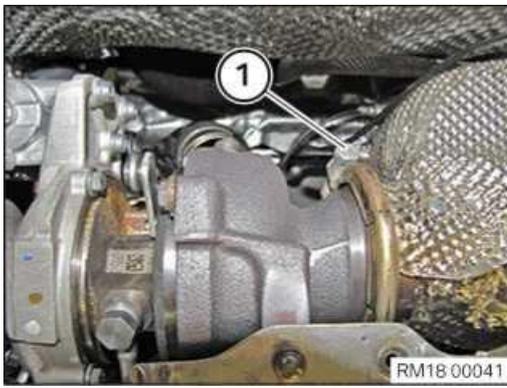


### CAUTION

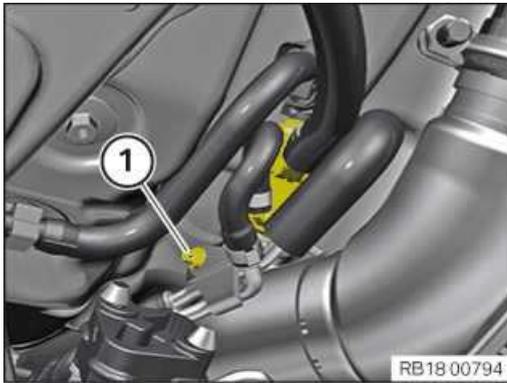
#### Heavy component.

#### Heavy components can lead to injury or damage.

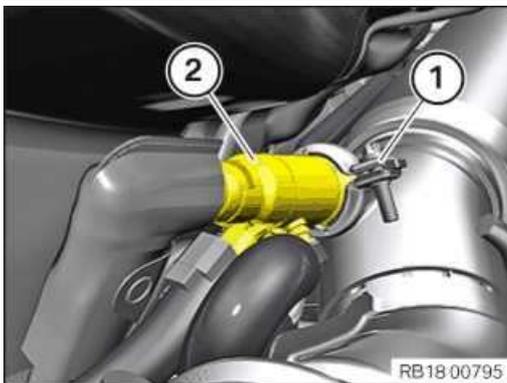
- Remove and install heavy components with the aid of another person/other persons.



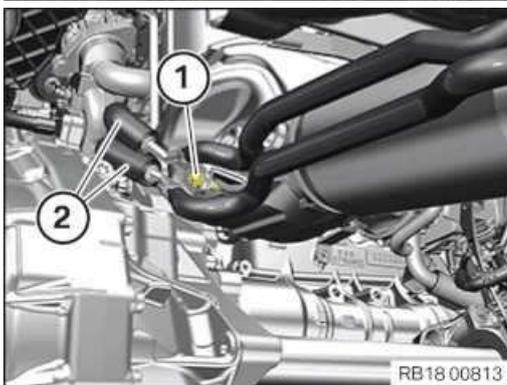
- Loosen V-band clamp (1).
- Feed out V-band clamp (1) and remove.



- Loosen screw (1).



- Loosen V-band clamp (1).
- Remove the SCR metering module (2) and set it aside.



- Loosen screw (1).
- Thread out the coolant lines (2) of the SCR metering module and set aside.

► **Remove differential pressure sensor**



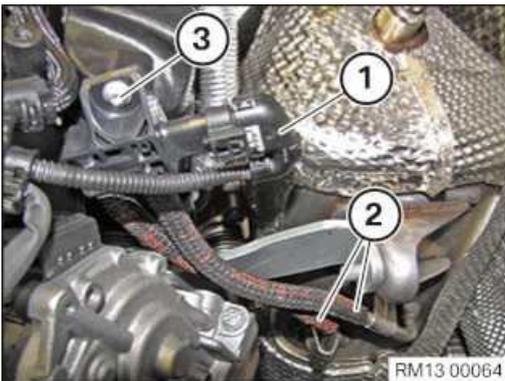
## RISK OF DAMAGE



### 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.



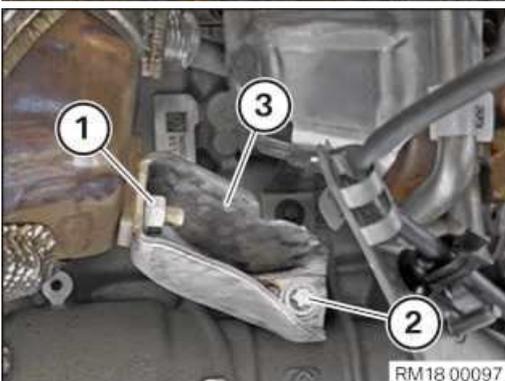
- Unlock and disconnect connector (1).
- Pull off pressure hose (2).
- Loosen screw (3).
- Feed out differential pressure sensor and remove.



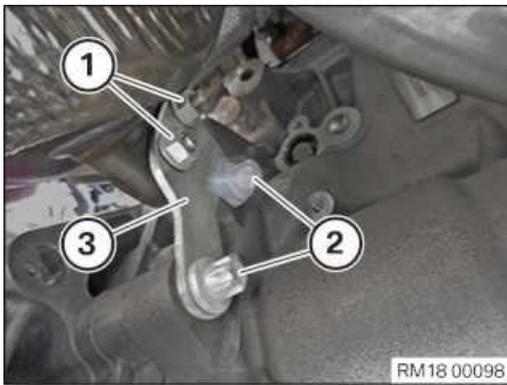
- Loosen nuts (1).



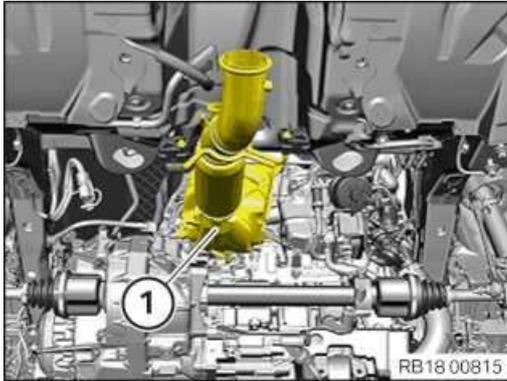
- Mount fitting aid (2).
- Make sure that the fitting aid is correctly position on the edges (1) of the flexible tube.



- Unfasten nut (1).
- Loosen screw (2).
- Remove holder (3).

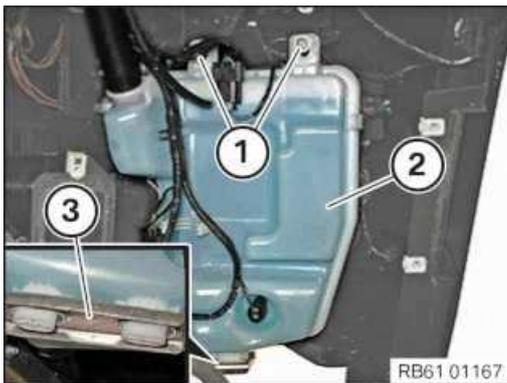


- Loosen nuts (1).
- Loosen screws (2).
- Remove holder (3).



- Feed out diesel particulate filter (1) toward the bottom and remove.

#### 48 – Remove the washer fluid reservoir from the fixture



- Loosen screws (1).
- Guide the washer fluid reservoir (2) up and out of the fixture (3) and set it aside.

#### 49 – Removing the right charge air duct between the exhaust turbocharger and the charge air cooler

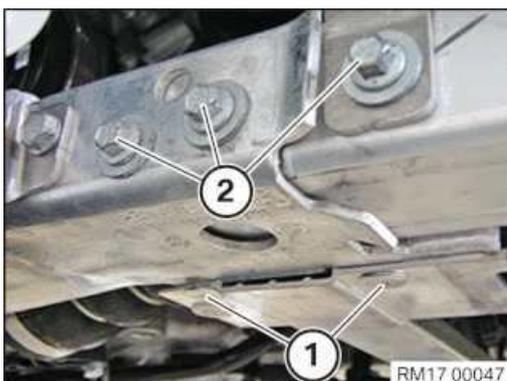


#### WARNING

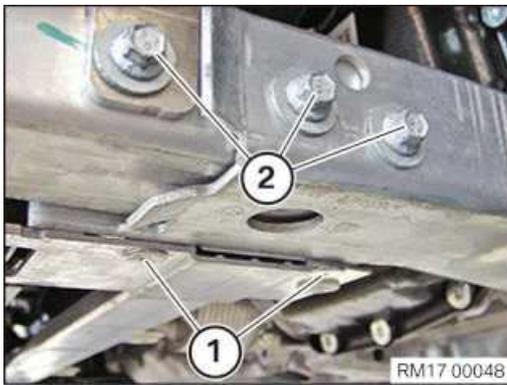
**Hot surfaces.**

**Risk of burning!**

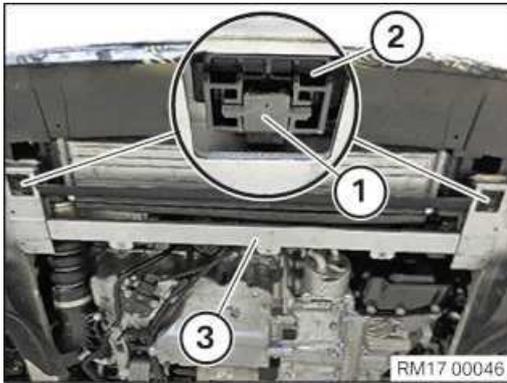
- Perform all work only on components that have cooled down.



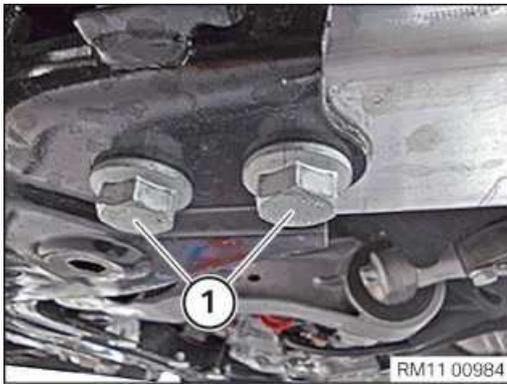
- Undo screws (2) at front left.
- Drill out blind rivets (1) at front left.



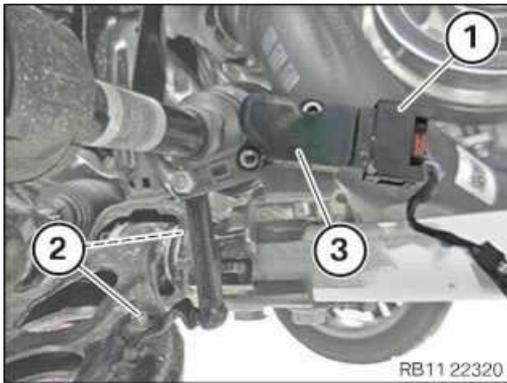
- Undo screws (2) at front right.
- Drill out blind rivets (1) at front right.



- Unlock locking pins (1).
- Thread out and remove locks (2).
- Thread out and remove cross connection (3).



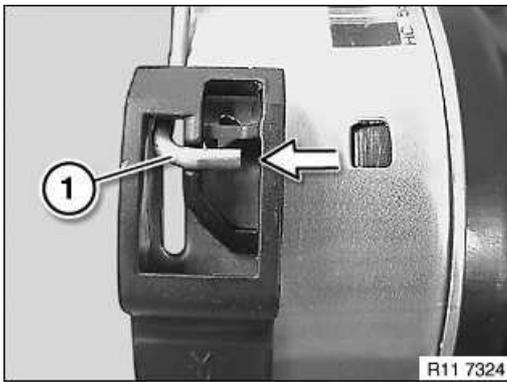
- Release the screws (1) on the right front axle support.



- **If installed:**
- Unlock and release plug connection (1).
- Loosen screws (2).
- Feed out the ride height sensor (3) and remove.



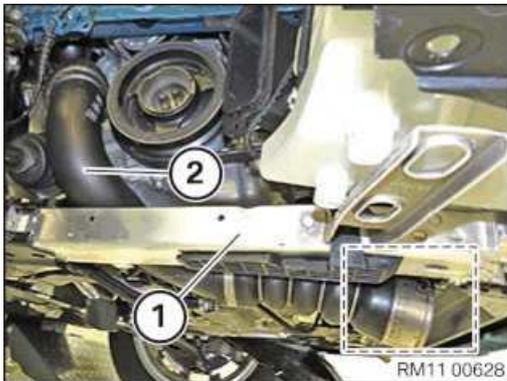
- Release screws (1) of charge air duct on right oil sump.



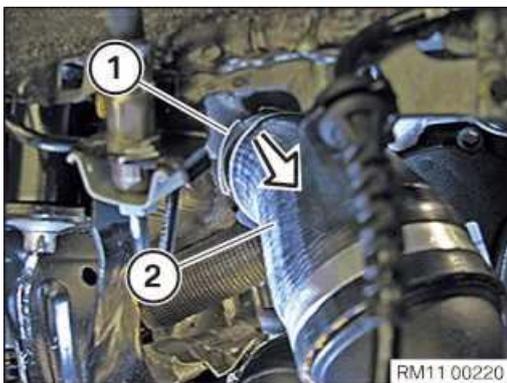
- Unlock lock (1).  
The lock (1) must engage in the bracket during unlocking (arrow).



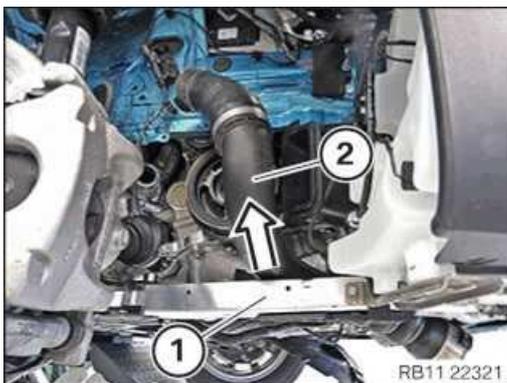
- Unlock and release the charge air duct (1) on the charge air cooler.



- Pull the adapter of the front axle support (1) downwards to the front right.
- Feed out the charge air duct (2) in the **marked** area towards the bottom and set it aside.



- Unlock and detach the locks (1) on both sides.
- Feed out the charge air duct (2) on the exhaust turbocharger in the direction of the arrow and set it aside.



- Pull the adapter of the front axle support (1) downwards to the front right.
- Feed out the charge air duct (1) in the direction of arrow between the side member and the deformation element and remove.

**50 – Remove the heat shield from the exhaust turbocharger at the bottom**

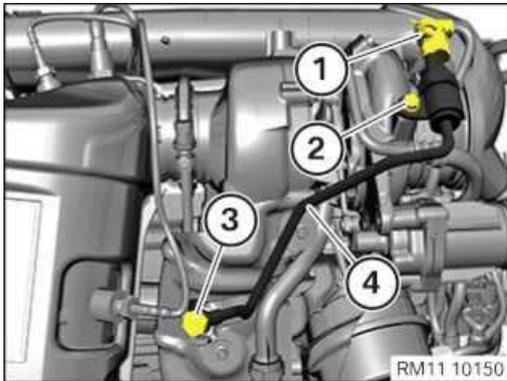


## WARNING

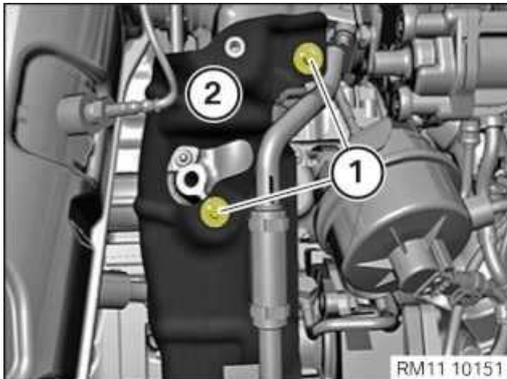
**Hot surfaces.**

**Risk of burning!**

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



- Unlock and disconnect connector (1).
- Unscrew the banjo bolt (3).
- The seals of the banjo bolt (3) must be renewed.
- Loosen screw (2).
- Remove the exhaust gas pressure pipe (4).



- Unscrew the bolts (1) on the heat shield .
- Feed out and remove the heat shield (2).

## 51 – Removing the low-pressure stage turbocharger

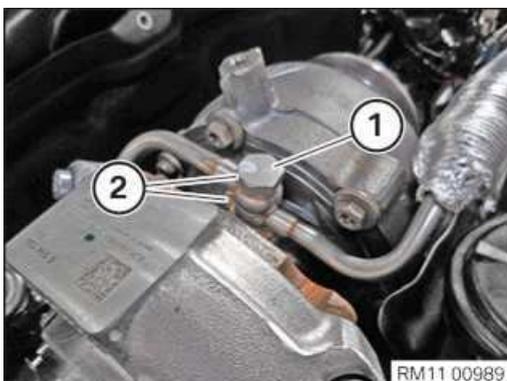


## WARNING

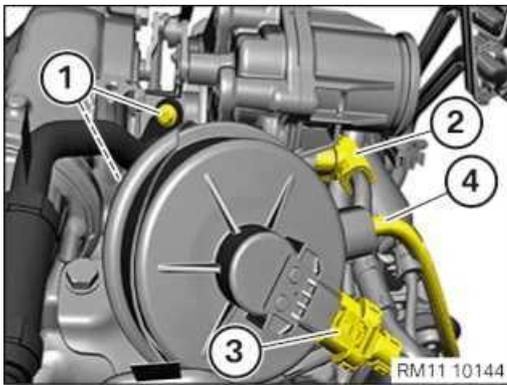
**Hot surfaces.**

**Risk of burning!**

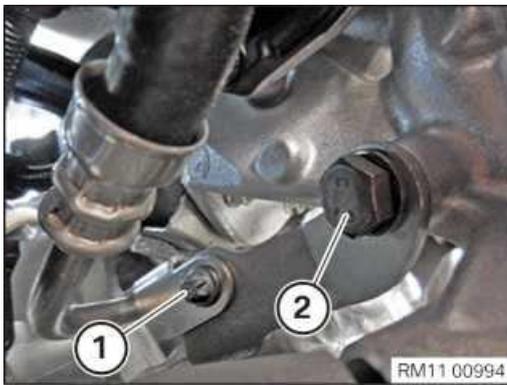
- Perform all work only on components that have cooled down.



- Release the banjo bolt (1) of the oil feed lines.
- Remove sealing rings (2).
- Place oil feed lines to one side.



- Release the screws (1) of the oil return line.
- Unlock and disconnect the plug connections (2) and (3).
- Pull off the vacuum hose (4) carefully.



- Undo the bolt (1) of the oil feed line.
- Loosen screw (2).



- Loosen screw (1).
- Remove the V hose clamp.
- Guide the low-pressure stage turbocharger out towards the top and remove.



- Remove seals (1), (2) and (3).



- Remove the spacer ring (1).

## 52 – Removing the high-pressure stage exhaust turbocharger



## WARNING

**Hot surfaces.**

**Risk of burning!**

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

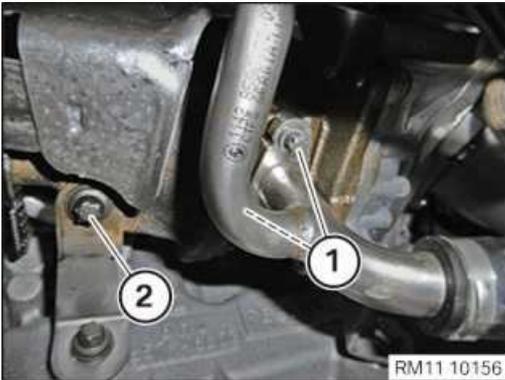


## CAUTION

**Heavy component.**

**Heavy components can lead to injury or damage.**

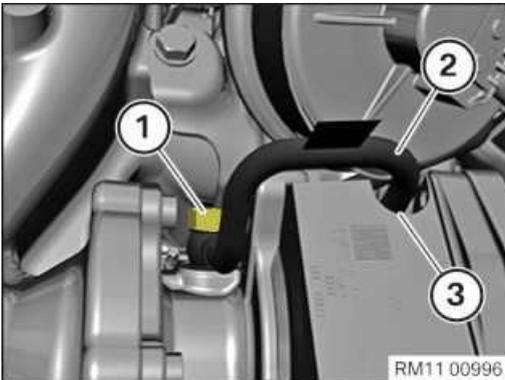
- Remove and install heavy components with the aid of another person/other persons.



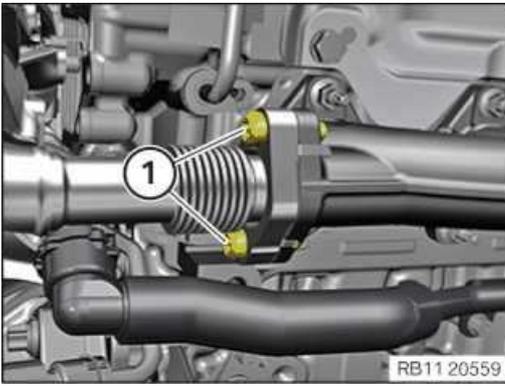
- Unscrew the bolts (1) on the oil return line .
- Loosen screw (2).



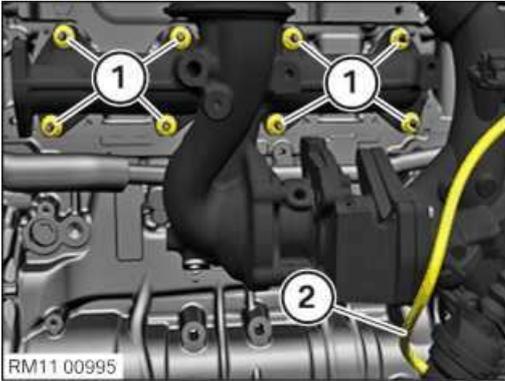
- Release screw (1) from the right wheel arch.



- Unscrew the banjo bolt (1).
- Guide out oil feed line (2) from holder (3).



- Loosen screws (1).



- Pull off the vacuum hose (2).
- Loosen nuts (1).
- Guide out the exhaust manifold and the high-pressure stage exhaust turbocharger to the top and remove them.

## MAIN WORK

### 53 – Removing the oil pressure switch



#### WARNING

**Hot fluids.**

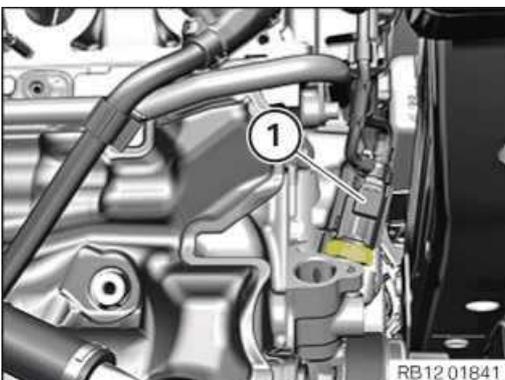
**Risk of scalding!**

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

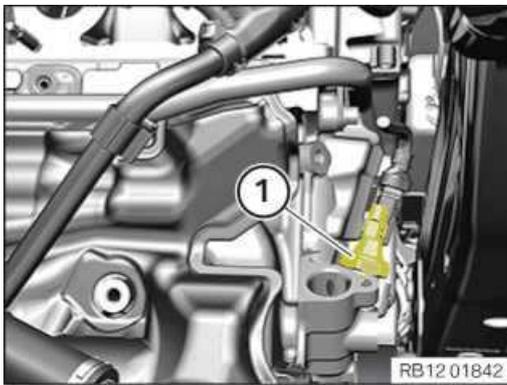


#### TECHNICAL INFORMATION

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

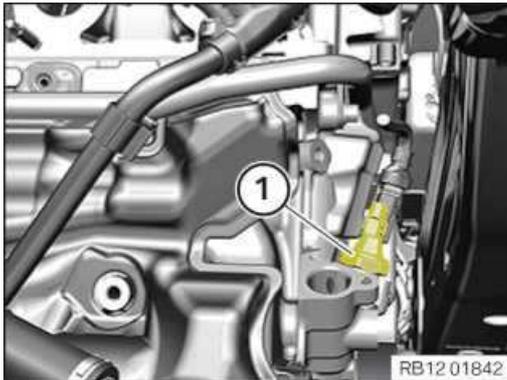


- Unlock plug connection (1) and disconnect.



- Loosen oil pressure switch (1).
- Feed out and remove the oil pressure switch (1).
- Catch and dispose of emerging engine oil.

#### 54 – Installing the oil pressure switch

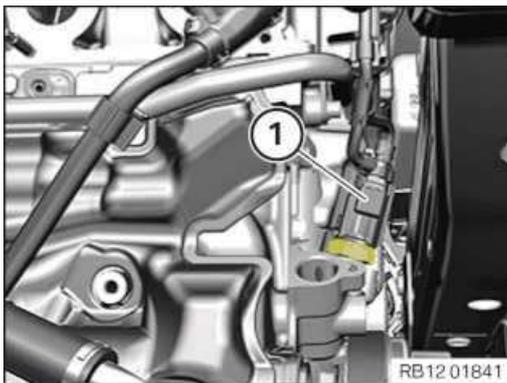


- Replace oil pressure switch (1) .
- Guide in and install oil pressure switch (1).
- Tighten oil pressure switch (1).

**Parts:** Oil pressure switch

#### Oil pressure switch to crankcase

Sensor	Replace oil pressure switch.	Tightening torque	22 Nm
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- Connect connectors (1) and lock.  
The connector (1) must engage audibly.

### POSTPROCESSES

#### 55 – Prepare for the installation of the exhaust turbocharger

- Check the oil feed lines and the oil return lines for contamination or obstruction, clean or renew if necessary.
- If the oil feed lines and/or oil return lines are heavily contaminated, we recommend changing the engine oil and the oil filter.
- If installed: Check the coolant feed lines and the coolant return lines for the exhaust turbocharger for contamination or obstruction, clean or renew if necessary.
- Check that the screw connections and the plug connections of all the lines are correct.
- Check air cleaner for contamination and clean or renew as needed.
- Check correct functioning of crankcase ventilation.
- Replace all gaskets.

**Parts:** Seals

#### 56 – Installing the high-pressure stage exhaust turbocharger



## 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

**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.**

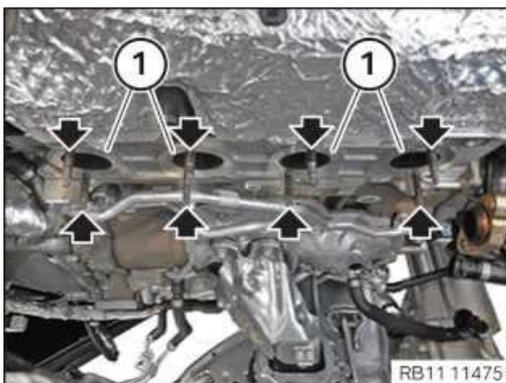
**The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.**

- Do not use any metal-cutting tools.



## TECHNICAL INFORMATION

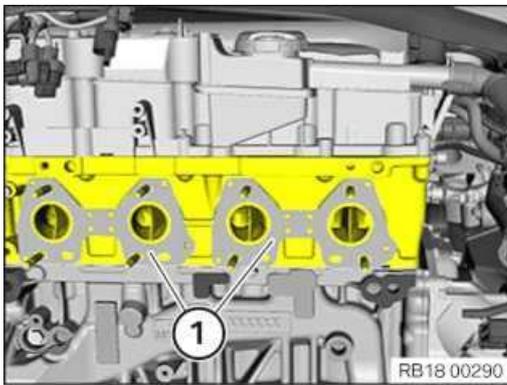
The sealing surfaces must be free from oils, grease and cleaning agents.



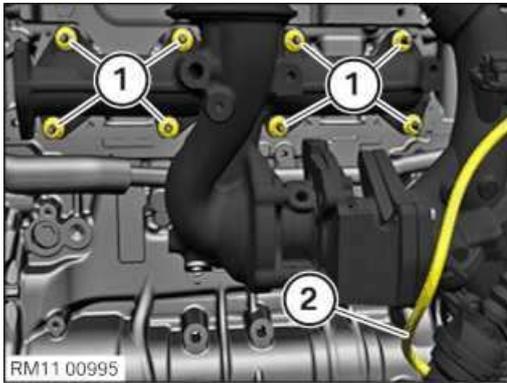
- Clean the sealing surfaces (1) on the cylinder head using special tool **0 495 102 (11 4 470)**.
- Check the stud bolts (arrows) on the cylinder head for correct fit.



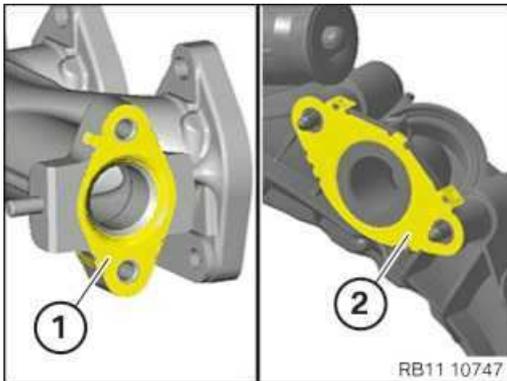
- Clean the sealing surfaces on the exhaust manifold using special tool **0 495 102 (11 4 470)**.



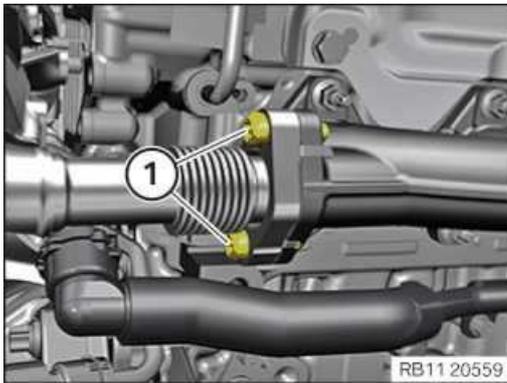
- Renew gasket (1).
- Parts:** Gasket
- Install new gasket (1).



- Feed in and install the exhaust manifold and the high-pressure stage exhaust turbocharger.
  - Tighten nuts (1).
- Parts:** Nuts
- Connect vacuum hose(2).



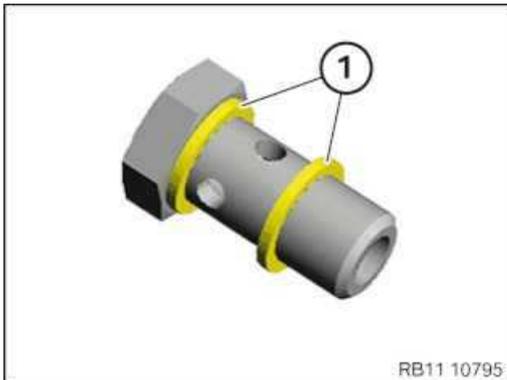
- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.
- Parts:** Gasket
- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.
- Parts:** Gasket



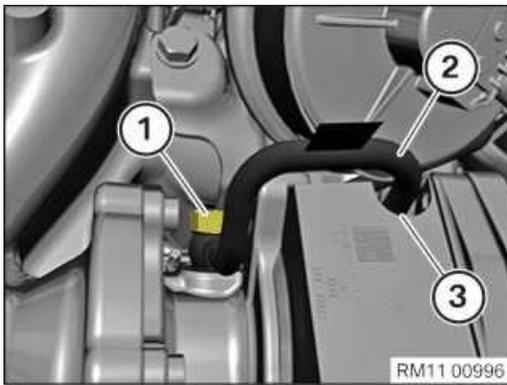
- Tighten the screws (1).

**Exhaust-gas recirculation cooler to exhaust manifold**

M8x28	Replace screws	Tightening torque	32 Nm
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- Renew sealing rings (1) of banjo bolt.
- Parts:** Sealing ring



- Guide the oil feed line into the holder (3) and install it.
- Tighten down screw (1).

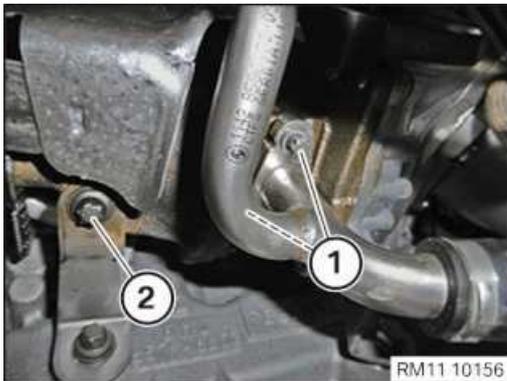


- Tighten bolt (1) from the right wheel arch.



- Renew seal (1) of oil return line.

**Parts:** Gasket



- Position the oil return line with the seal.
- Tighten the screws (1).

**Oil return line to turbocharger**

M6x12		Tightening torque	8 Nm
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- Tighten down screw (2).

**Holder to exhaust turbocharger and crankcase**

M8x16		Tightening torque	22 Nm
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**57 – Installing the low-pressure stage turbocharger**



**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.

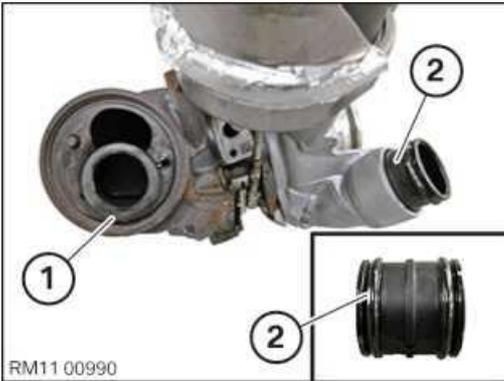
The sealing surfaces must be free from oils, grease and cleaning agents.



- Check the spacer plug (1) for damage, renew if necessary.

**Parts:** Spacer ring

- Insert and install the spacer ring (1).
- Position spacer ring (1) correctly.

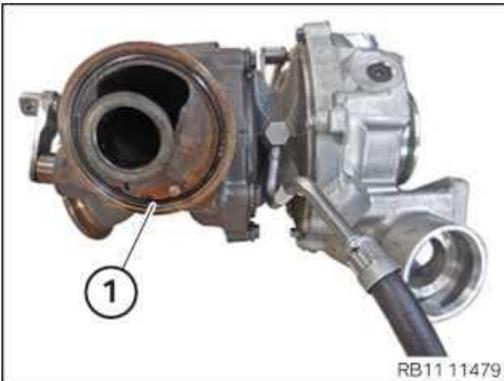


- Renew gasket (1).

**Parts:** Gasket

- Position the seal (1).
- Renew the sleeve(2).

**Parts:** Holding sleeve



- Renew sealing ring (1).

**Parts:** Sealing ring

- Affix the sealing rings on the exhaust turbocharger.



- Insert and install the low-pressure stage exhaust turbocharger on the exhaust manifold .

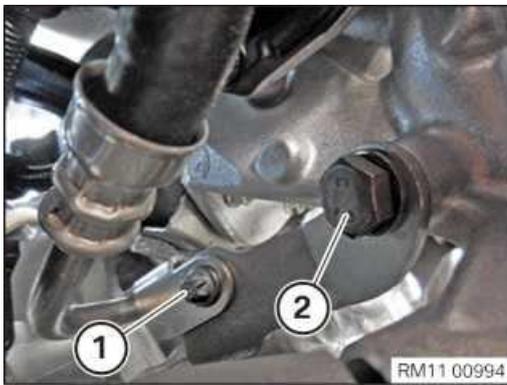
- Feed in and install V-band clamp .

- Tighten V-band clamp (2).

#### Exhaust turbocharger to exhaust manifold

V-band clamp		Tightening torque	19 Nm
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- Screw in nut (1) with 2 **revolutions**.



- Tighten down screw (1).

#### Oil feed line to bracket

Torx screw M6x12		Tightening torque	8 Nm
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- Tighten down screw (2).

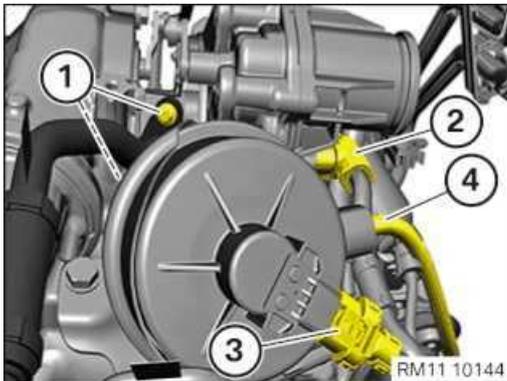
#### Holder to exhaust turbocharger and crankcase

M8x16		Tightening torque	22 Nm
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- Renew seal (1) on the oil return line.

**Parts:** Gasket

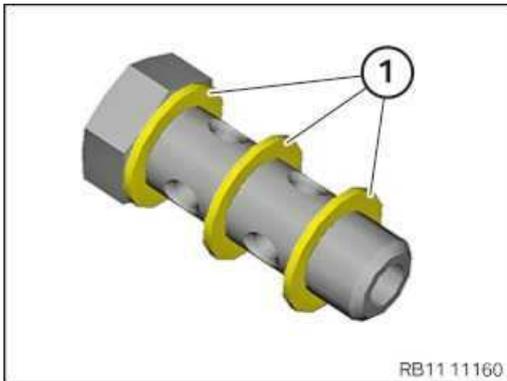


- Position the oil return line with the seal.
- Tighten the screws (1).

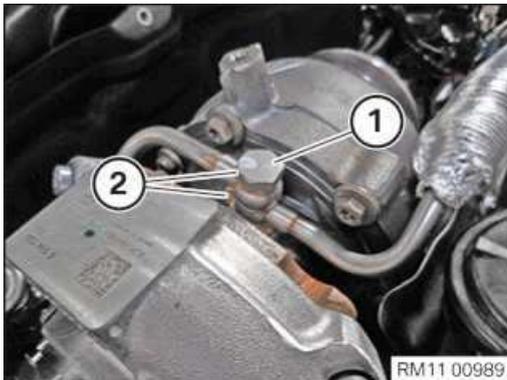
#### Oil return line to turbocharger

M6x12		Tightening torque	8 Nm
-------	--	----------------------	------

- Connect and lock connectors (2) and (3).  
The locks must engage audibly.
- Connect vacuum hose (4).



- Renew banjo bolt and sealing rings (1).
- **Parts:** Banjo bolt, sealing rings



- Install sealing rings (1).
- Tighten the banjo bolt (1).
- Ensure that the lines do not rest against the adjacent components.

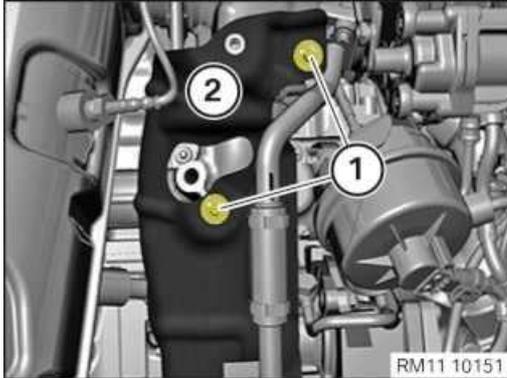


## WARNING

Hot surfaces.

### Risk of burning!

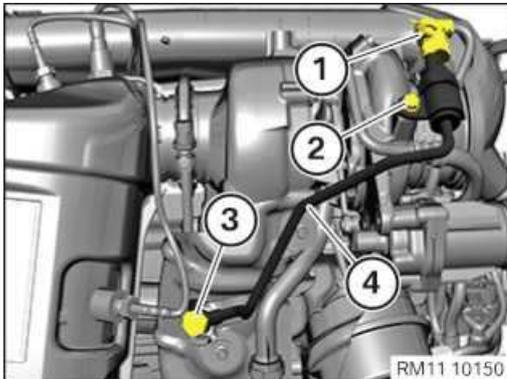
- Perform all work only on components that have cooled down.



- Feed in and install the heat shield (2).
- Tighten the bolts (1) on the heat shield .

### Heat shield for exhaust turbocharger

Torx screw BM 6x12		Tightening torque	10 Nm
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- Position the exhaust gas pressure pipe (4).
- Hand-tighten the bolt (2).
- Renew sealing rings on the banjo bolt (3).

**Parts:** Sealing ring

- Tighten the banjo bolt (3).

### Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm
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- Tighten down screw (2).

### Standard screw connection M6

M6			8 Nm
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- Connect connectors (1) and lock.  
Lock must audibly engage.

## 59 – Installing the right charge air duct between the exhaust turbocharger and the charge air cooler

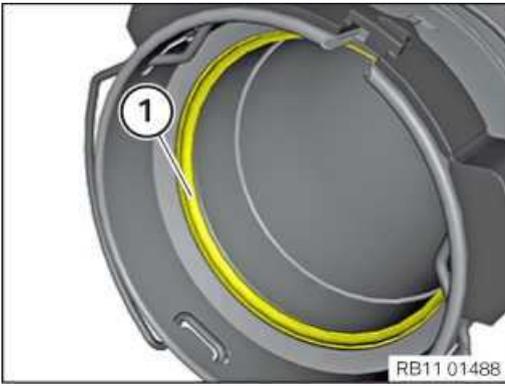


### RISK OF DAMAGE

Damage to the exhaust turbocharger.

A leak at the pressure pipe can damage the exhaust turbocharger.

- Replace the gaskets and pressure pipe if necessary.



- Check the sealing ring (1) for damage and renew the sealing ring (1) as needed.

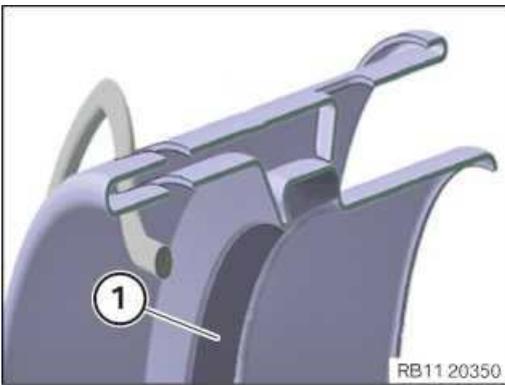
**Parts:** Gasket

► **Replace damaged gasket**

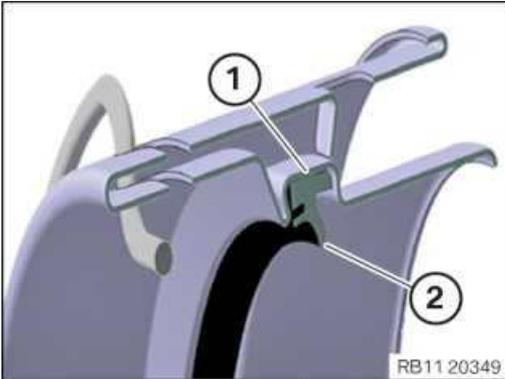


**TECHNICAL INFORMATION**

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.  
The gasket groove (1) must be clean.



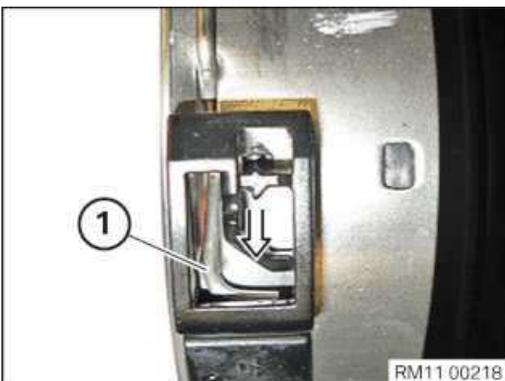
- Renew gasket.
- Parts:** Gasket
- Install seal dry without lubricant or mounting agent.

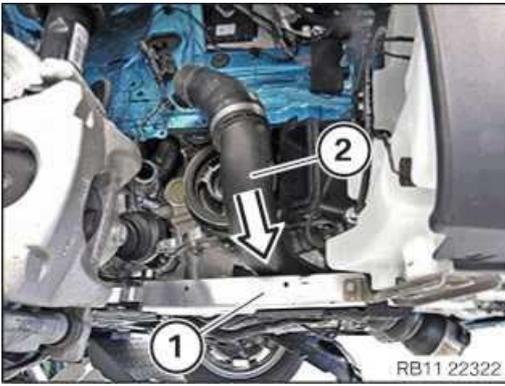


**TECHNICAL INFORMATION**

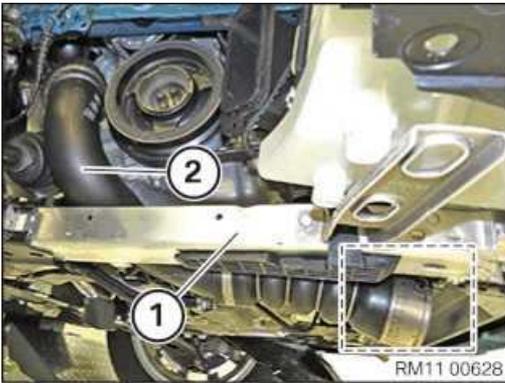
Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is pointing downwards (see figure).
- Detach the locks (1) in the direction of the arrow from the brackets.
- Ensure that the locks (1) engage audibly.

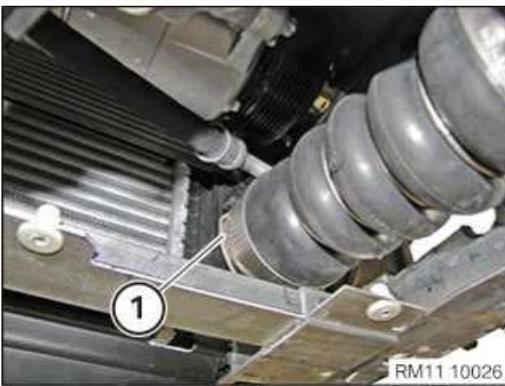




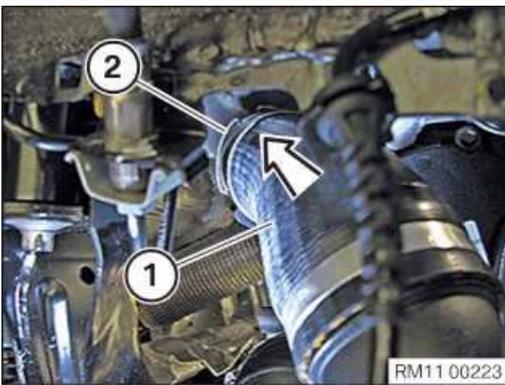
- Pull the adapter of the front axle support (1) downwards to the front right.
- Feed in the charge air duct (1) in the **direction** of arrow between the side member and the deformation element and position.



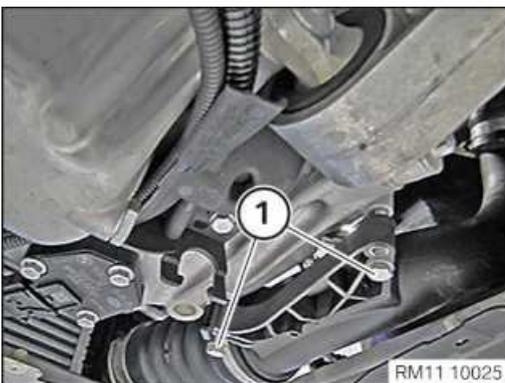
- Pull the adapter of the front axle support (1) downwards to the front right.
- Position the charge air duct (2) in **marked** area on the charge air cooler.



- Feed in and install the charge air duct (1) on the charge air cooler .
- Make sure the charge air duct (1) engages audibly on the charge air cooler.



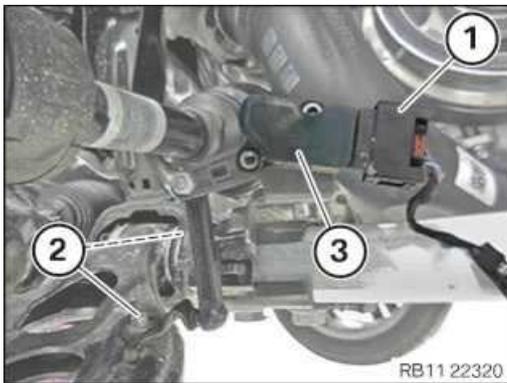
- Feed in and install charge air duct (1) in the **direction** of the arrow on exhaust turbocharger.
- The locks (2) must engage audibly.



- Tighten the screws (1).

#### Charge air duct to oil sump

M6		Tightening torque	8 Nm
----	--	-------------------	------

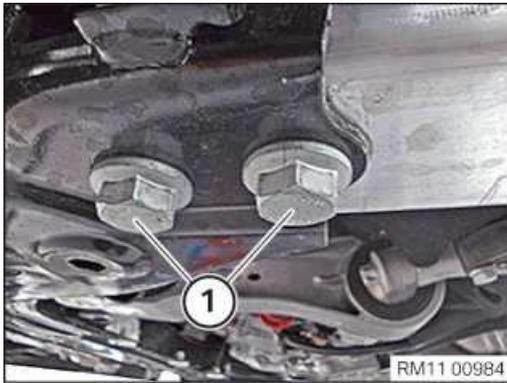


- **If installed:**
- Feed in and install the ride height sensor (3).
- Tighten the screws (2).

#### Ride height sensor holder to front axle support

M6		Tightening torque	8 Nm
----	--	-------------------	------

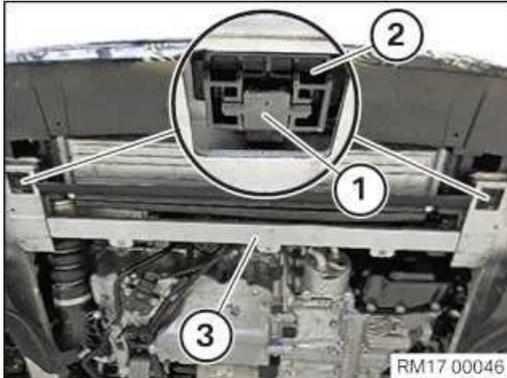
- Connect and lock the connector (1).  
The connector (1) must engage audibly.



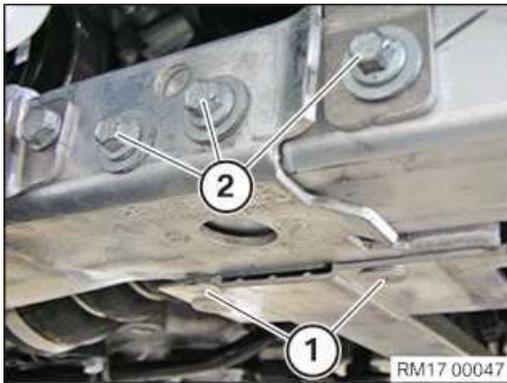
- Tighten the screws (1) on the adapter of the front axle support.

#### Adapter, front axle support to front axle support

		Tightening torque	100 Nm
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- Guide in cross connection (3) and install.
- Guide in locks (2) and install.
- Lock the locking pins (1).
- Ensure that the locking pins (1) audibly engage.

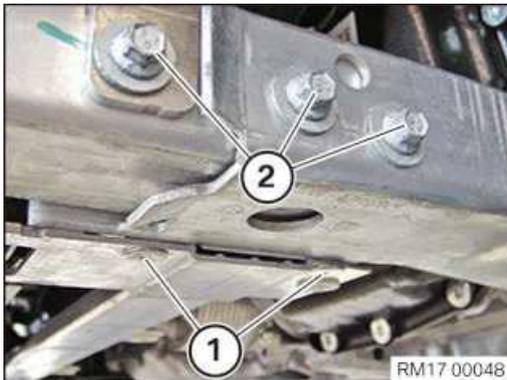


- Tighten the bolts (2) at the front left.

#### Cross connection to front axle support

M6		Tightening torque	12 Nm
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- Renew the blind rivet (1).  
**Parts:** Blind rivet
- Mount the blind rivets (1) at the front left.

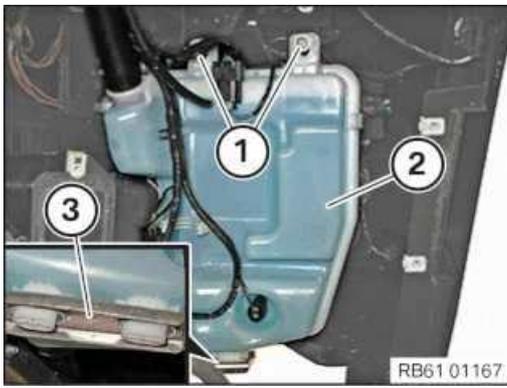


- Tighten the bolts (2) at the front right.

#### Cross connection to front axle support

M6		Tightening torque	12 Nm
----	--	-------------------	-------

- Renew the blind rivet (1).  
**Parts:** Blind rivet
- Mount the blind rivets (1) at the front right.



- Feed washer fluid reservoir (2) into the mounting (3) and install.
- Tighten the screws (1).

#### Washer fluid reservoir to body

M6x20		Tightening torque	8 Nm
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### 61 – Installing the diesel particulate filter

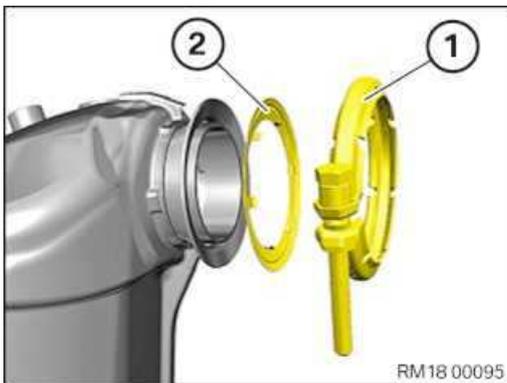


#### CAUTION

Heavy component.

Heavy components can lead to injury or damage.

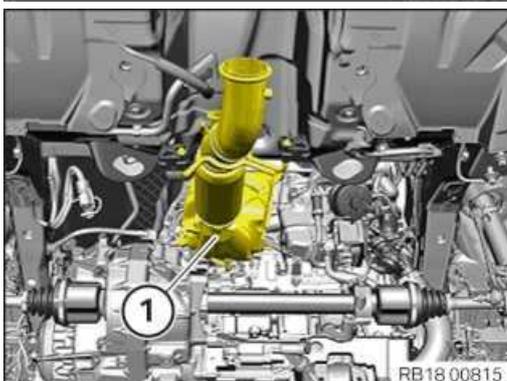
- Remove and install heavy components with the aid of another person/other persons.



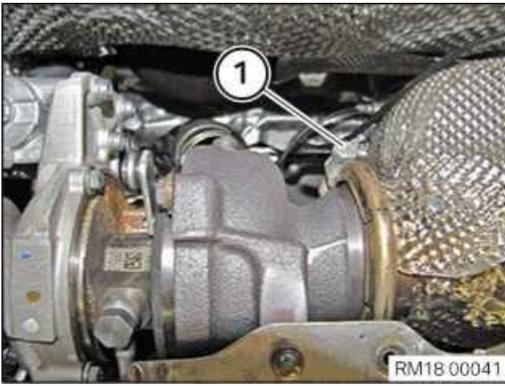
- Renew the V-clip (1).  
**Parts:** V-band clamp
- Renew the gasket (2).  
**Parts:** Gasket



- Before installing the diesel particulate filter: Mount fitting aid (1) for the flexible tube.



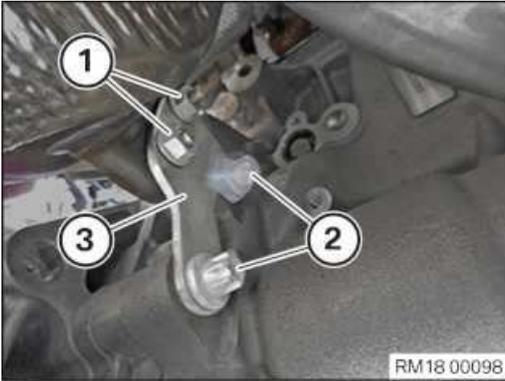
- Carefully insert and install the diesel particulate filter (1).



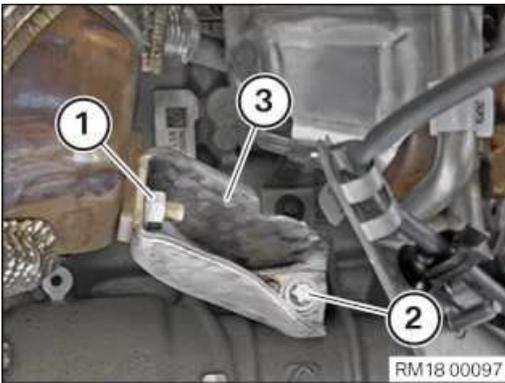
- Feed in and install V-band clamp (1).
- Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.
- Align the diesel particulate filter on the exhaust turbocharger.
- Position V-clip (1).
- Hand-tighten the V-clip (1).



- Tighten nuts (1) by hand.



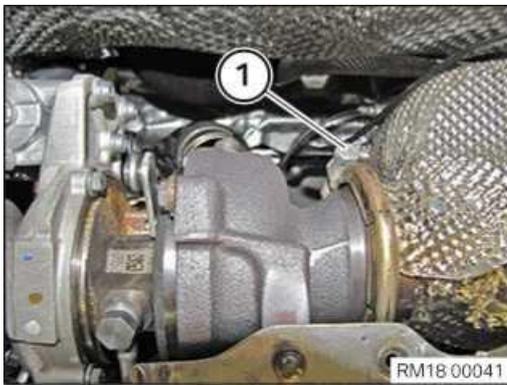
- Install holder (3).
- Hand-tighten the bolts (2).
- Tighten nuts (1) by hand.



- Install holder (3).
- Tighten the nut (1) hand-tight.
- Hand-tighten the bolt (2).



- Remove fitting aid (1) for the flexible tube.



- Tighten V-band clamp (1).

#### Diesel particulate filter V-clip to exhaust turbocharger

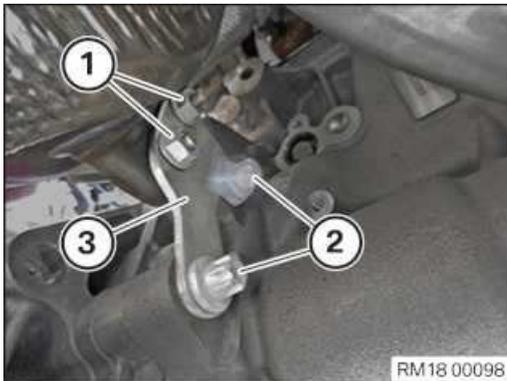
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm
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- Tighten nuts (1).

#### Diesel particle filter to holder

M8 hexagon nut		Tightening torque	19 Nm
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- Tighten down screws (2).

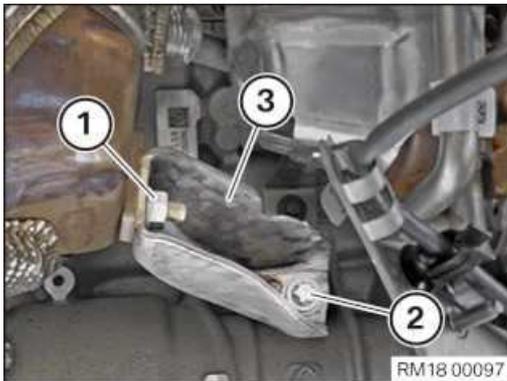
#### Diesel particulate filter holder to gearbox

M12x75		Tightening torque	66 Nm
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- Tighten nuts (1).

#### Diesel particle filter to holder

M8 hexagon nut		Tightening torque	19 Nm
----------------	--	-------------------	-------



- Tighten down screw (2).

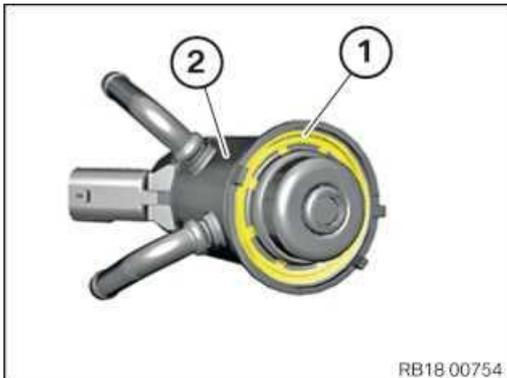
#### Diesel particulate filter bracket to crankcase

M10x35		Tightening torque	38 Nm
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- Tighten nut (1).

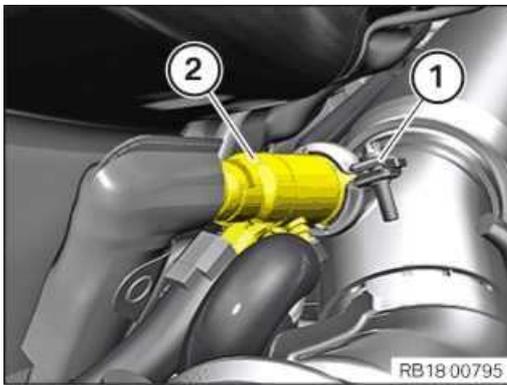
#### Diesel particle filter to holder

M8 hexagon nut		Tightening torque	19 Nm
----------------	--	-------------------	-------



- Renew sealing ring (1) of the SCR metering module (2).

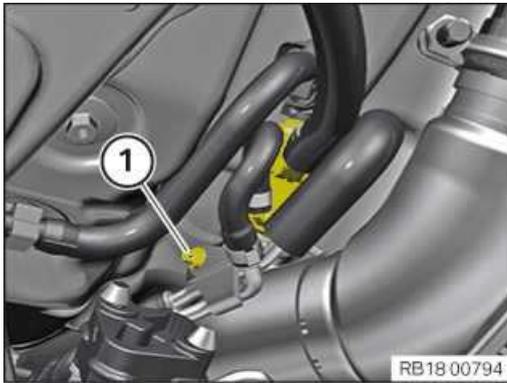
**Parts:** Sealing ring



- Insert and install the SCR metering module (2).
  - Renew the V-clip (1).
- Parts:** V-band clamp
- Tighten V-band clamp (1).

#### SCR metering module V-clip to exhaust system

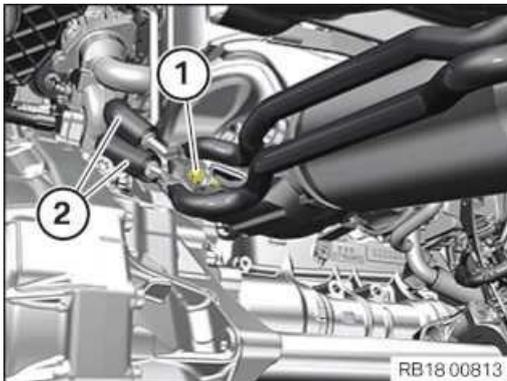
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm
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- Tighten down screw (1).

#### Holder for coolant lines to diesel particulate filter

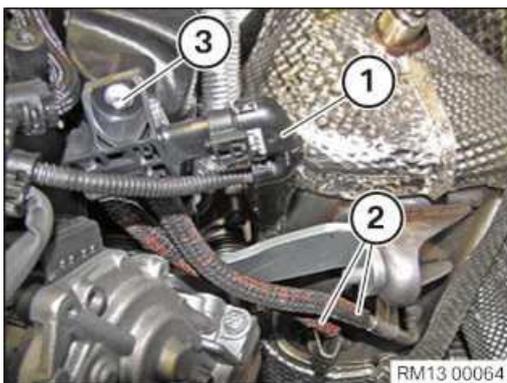
Torx bolt BM6x16		Tightening torque	8 Nm
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- Thread in and install coolant line (2) of the SCR metering module.
- Tighten down screw (1).

#### Holder for coolant lines to diesel particulate filter

Torx bolt BM6x16		Tightening torque	8 Nm
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#### ► Installing differential pressure sensor

- Feed in and install the differential pressure sensor .
- Tighten down screw (3).

#### Differential pressure sensor to holder

Screw		Tightening torque	4 Nm
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- Check pressure hoses (2).
- Renew any hardened pressure hoses (2).

**Parts:** Pressure hoses

- Connect the pressure hoses (2) and secure them using 15 mm to 19 mm screw clamps.

#### Clamp for the pressure hose on the differential pressure sensor

Clamp 15– 19mm		Tightening torque	3 Nm
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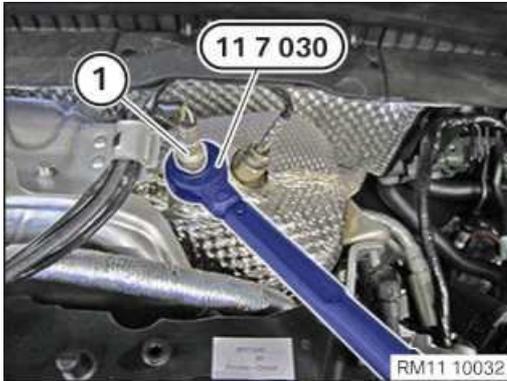
- Connect and lock the connector (1).  
The connector (1) must engage audibly.

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).

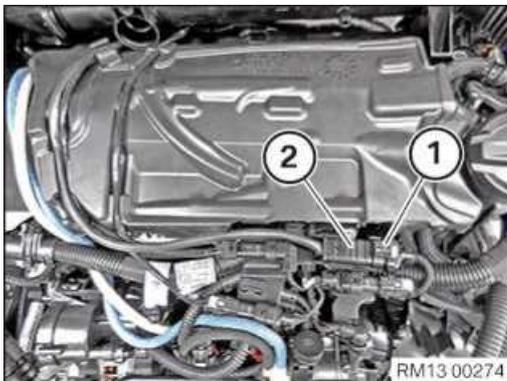
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Feed in front oxygen sensor (1) and install.
- Tighten front oxygen sensor (1) using special tool .

#### Control sensor

Control sensor		Tightening torque	50 Nm
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- Lay and secure cable of oxygen control sensor.
- Secure the connector (2) to the holder.
- Connect connectors (1) and lock.  
The connector (1) must engage audibly.

### 63 – Install the exhaust-gas temperature sensor on the diesel particulate filter



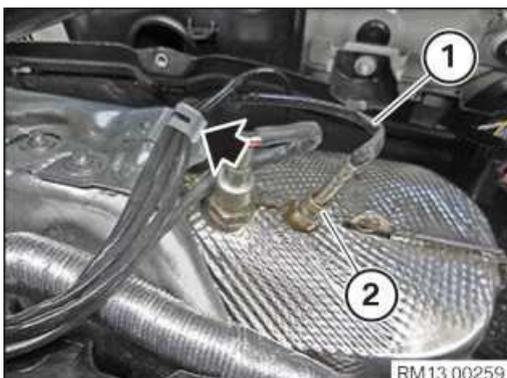
#### RISK OF DAMAGE

**Damage of exhaust temperature sensor.**

**Damage to exhaust temperature sensors leads to malfunctions.**

- Make sure that the gauge tip is not damaged.

- Check the gauge tip (1) for damage and renew the exhaust temperature sensor as needed.



- Feed in and install the exhaust temperature sensor (2).
- Tighten the exhaust temperature sensor (2).

#### Exhaust temperature sensor to diesel particulate filter

Exhaust-gas temperature sensor		Tightening torque	28 Nm
--------------------------------	--	-------------------	-------

- Insert and install cable (1) of the exhaust temperature sensor in the clamp (arrow).



- Lay and fasten the cable of the exhaust gas temperature sensor.
  - Connect connectors (1) and lock.
- The connector (1) must engage audibly.

## 64 – Installing the exhaust temperature sensor downstream from the catalytic converter on the diesel particulate filter

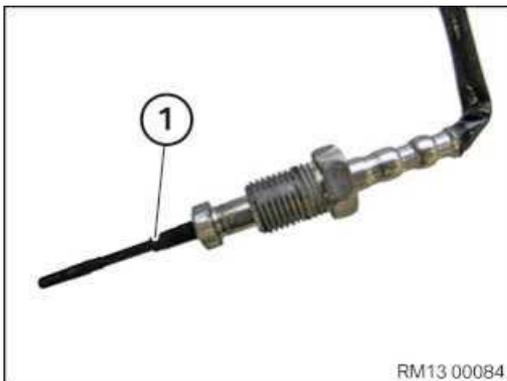


### RISK OF DAMAGE

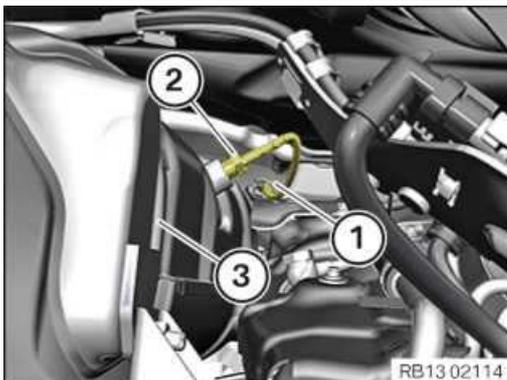
**Damage of exhaust temperature sensor.**

**Damage to exhaust temperature sensors leads to malfunctions.**

- Make sure that the gauge tip is not damaged.



- Make sure the gauge tip (1) is not damaged during installation.



- Guide the exhaust temperature sensor (2) into diesel particulate filter (3) and install.
- Tighten the exhaust temperature sensor (2) with conventional tools .

### Exhaust temperature sensor to diesel particulate filter

Exhaust-gas temperature sensor	Tightening torque	28 Nm

- Insert and install the cable of the exhaust temperature sensor (2) in the clamps (1).



- Lay and fasten the cable of the exhaust gas temperature sensor.
  - Connect connectors (1) and lock.
- The connector (1) must engage audibly.

## 65 – Installing exhaust temperature sensor on catalytic converter



### RISK OF DAMAGE

**Damage of exhaust temperature sensor.**

**Damage to exhaust temperature sensors leads to malfunctions.**

- Make sure that the gauge tip is not damaged.

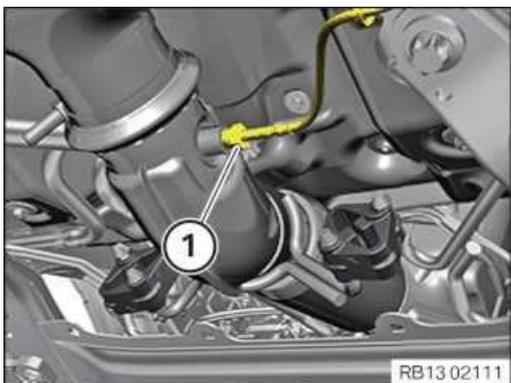
- Check the gauge tip (1) for damage and replace the exhaust temperature sensor as needed.

- Feed in and install the exhaust temperature sensor (1).

- Tighten the exhaust temperature sensor (1).

### Exhaust-gas temperature sensor to exhaust system

Exhaust-gas temperature sensor		Tightening torque	28 Nm
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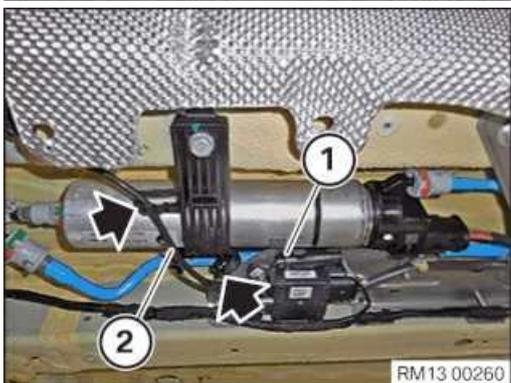
- Secure the cable clips (1).



- Feed cable (2) from exhaust temperature sensor into the clamps (arrows) and install.

- Connect and lock the connector (1).

The connector (1) must engage audibly.



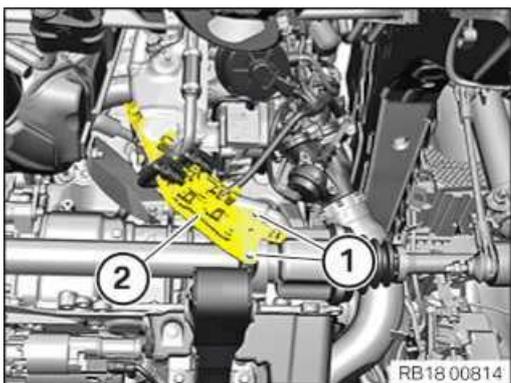
### 66 – Install holder for oxygen sensor

- Insert and install the holder (2).

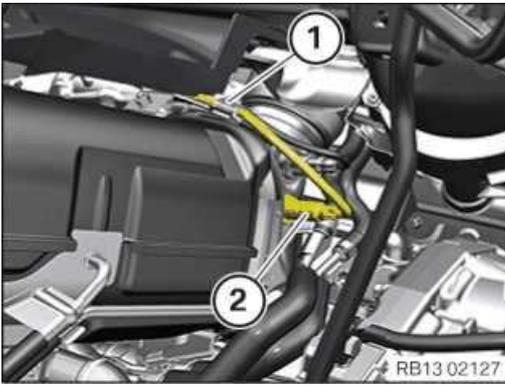
- Tighten the screws (1).

### Oxygen sensor holder to intermediate shaft

Hexagon screw M6x16		Tightening torque	8 Nm
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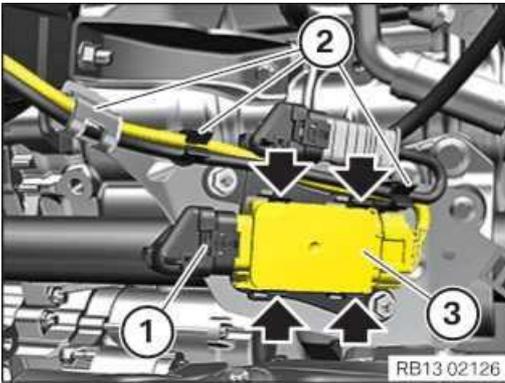
### 67 – Installing the nitrogen oxide sensor before SCR catalytic converter



- Insert nitrogen oxide sensor before the SCR catalytic converter (2) and install.
- Tighten the nitrogen oxide sensor upstream of the SCR catalytic converter (2).

#### Nitrogen oxide sensor before SCR catalytic converter

Sensor	Tightening torque
	50 Nm



- Install and lock the evaluation electronics for the nitrogen oxide sensor (3) (arrows).
- Insert the evaluation electronics cable for the nitrogen oxide sensor (3) into the clamps (2) and install.
- Connect connectors (1) and lock.  
The connector (1) must engage audibly.

### 68 – Install the monitoring sensor



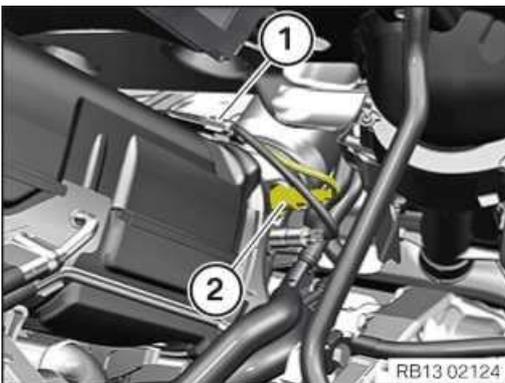
#### TECHNICAL INFORMATION

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

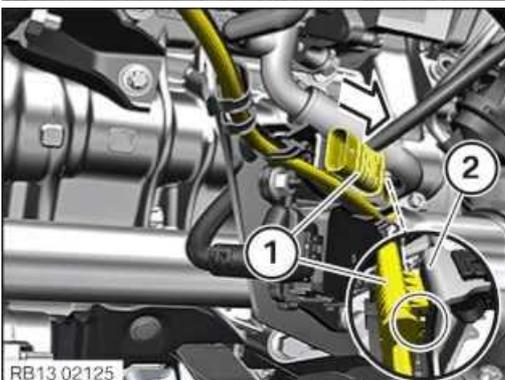


- Feed in the monitoring oxygen sensor (2) and install.
- Tighten the monitoring oxygen sensor (2) with special tool **0 491 074 (11 7 020)**.

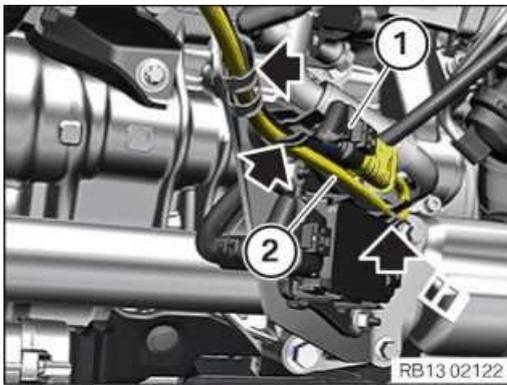
#### Monitoring sensor

Sensor	Tightening torque
	50 Nm

- Insert the cable of the monitoring oxygen sensor (2) into the clamp (1) and secure it.

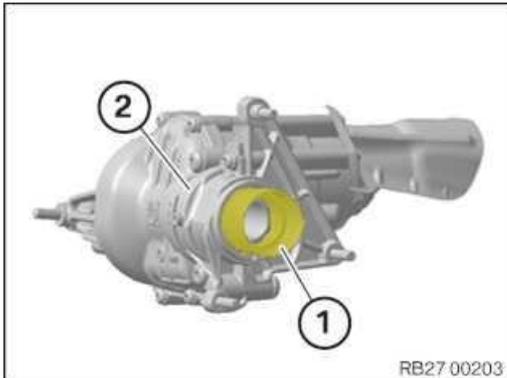


- Connect the connector (1) with the bracket (2) in the direction of arrow.
- Make sure that the connector (1) is locked correctly in the marked area.  
The connector (1) must engage audibly.



- Insert and attach the cable of the monitoring oxygen sensor (2) to the clamps (arrows).
- Connect connectors (1) and lock.  
The connector (1) must engage audibly.

## 69 – Install the transfer box (VTG)



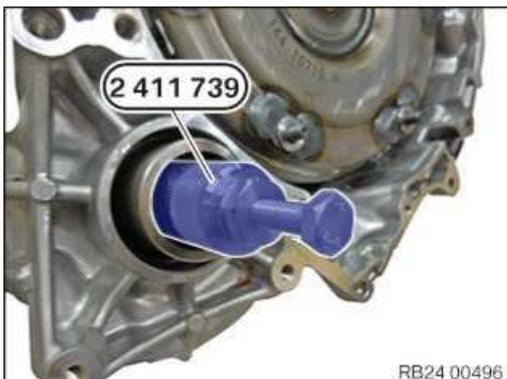
- If intermediate shaft (1) gets caught on transfer box (VTG) (2), renew intermediate shaft (1) and the radial shaft seals in the automatic or manual transmission.



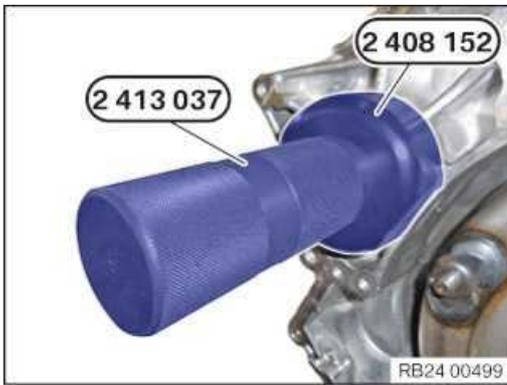
- Screw special tool **2 409 025** into the outer radial shaft seal.
- Turn the screw on the special tool **2 409 025** until the outer radial shaft seal has been pulled out.



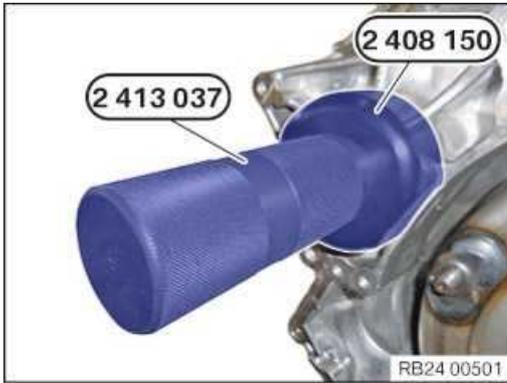
- Insert special tool **2 411 739** into the inner radial shaft seal.



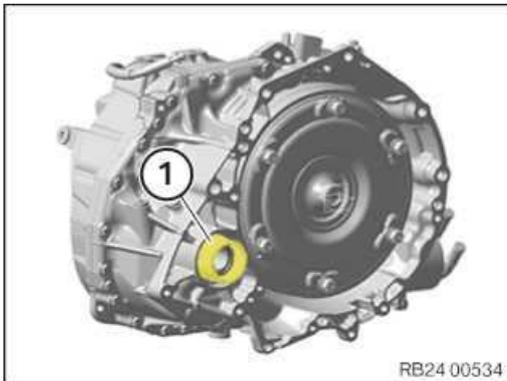
- Screw special tool **2 411 739** into the inner radial shaft seal.
- Turn the screw on the special tool **2 411 739** until the inner radial shaft seal has been pulled out.



- Drive in the inner radial shaft seal using special tools **2 408 152** and **2 413 037** up to the limit position.



- Drive in the outer radial shaft seal using special tools **2 413 037** and **2 408 150** up to the limit position.



- If necessary, connect the new intermediate shaft (1) to the output flange of the automatic transmission or manual transmission.



- Coat the inside of the output flange (arrows) evenly with approx. 5 g of grease.

#### Expendable materials

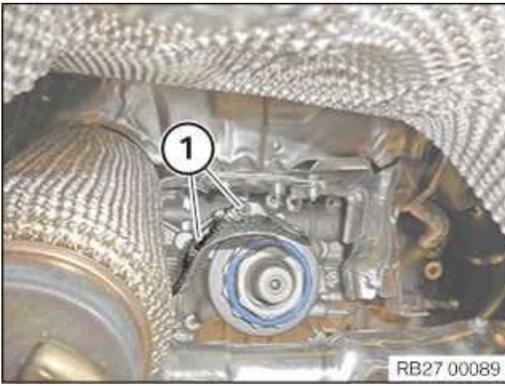
Lubricating grease Optitemp HT 1 LF	50 g, Tube	83230417754
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- Install the transfer box (VTG).
- Tighten the screws (1).

#### Transfer box to transmission

M10		Tightening torque	56 Nm
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- Install heat shield.
- Renew screws (1).

**Parts:** Bolts

- Tighten the screws (1).

**Heat shield to transfer box**

M6	Renew screws.	Tightening torque	6 Nm
----	---------------	-------------------	------

► **Check the transfer box oil level**



**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.



- Check transfer case oil level, correct:
- Open the oil filler plug (1).
- Check transfer box oil level.
- If necessary, top up transmission oil up to the lower edge of the oil filler plug opening (1).

**Transmission oil**

Technically suitable transfer box and electrical transmission oils

[Main group 27](#)

- Tighten the oil filler plug (1).

**Oil filler plug on transfer box (VTG)**

M18x1.5		Tightening torque	35 Nm
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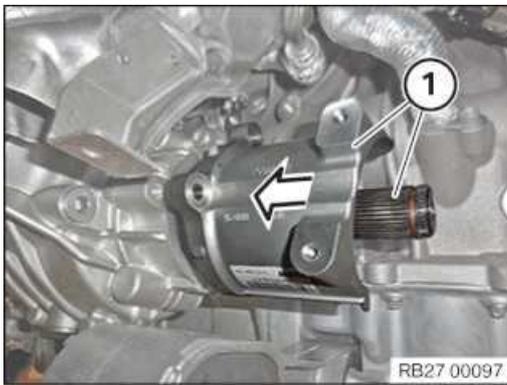
**70 – Install the intermediate shaft with the support tube**



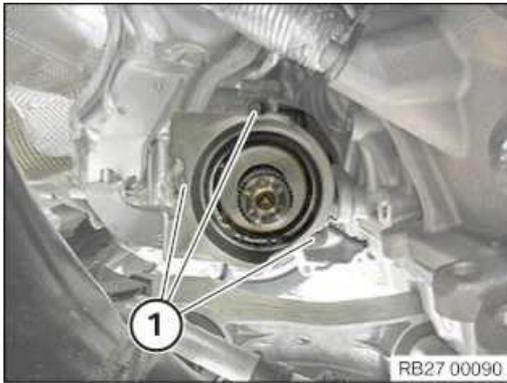
- Coat gearing of the intermediate shaft uniformly with 5 g of grease.

**Expendable materials**

Lubricating grease Optitemp HT 1 LF	50 g, Tube	83230417754
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- Install the intermediate shaft with support tube (1) in the transfer box.



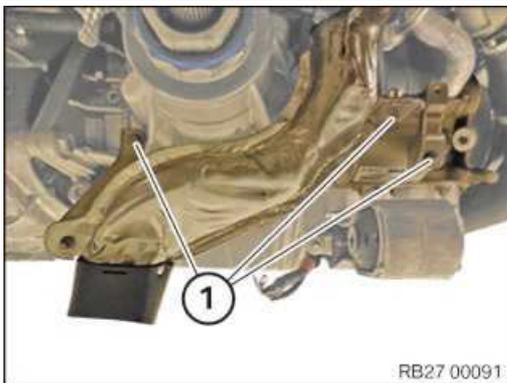
- Position screws (1).

**Note:** Check for correct screw length! Bolt M8x35 8.8

- Tighten the screws (1).

**Intermediate shaft to transfer box**

M8x35		Tightening torque	19 Nm
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- If installed: Install air duct.
- Tighten the screws (1).

**71 – Installing starter motor**



**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 starter motor .
- Tighten the screws (1).

**Starter motor to transmission**

M8x45		Tightening torque	19 Nm
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- Feed the positive battery cable (2) in on the starter and install.
- Tighten nut (1).

#### Battery positive lead to starter

M8		Tightening torque	13,5 Nm
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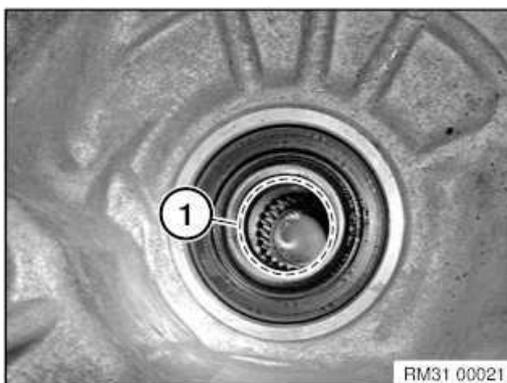
- Insert and install the new sealing cap (2).
- Secure the sealing cap (2) in the direction of the arrow.
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

#### 72 – Installing right output shaft partially

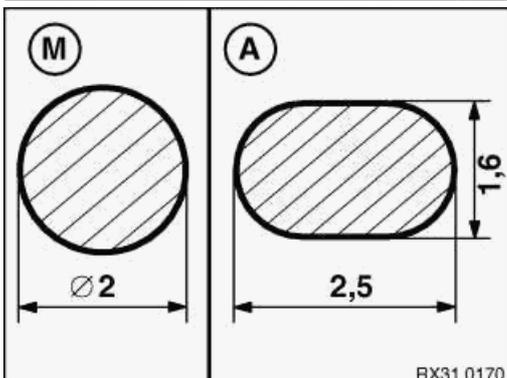


- Renew the circlip (1).
- Parts:** Circlip
- Slide output shaft into the transmission as far as the limit position.
  - Check for secure seat by levering.

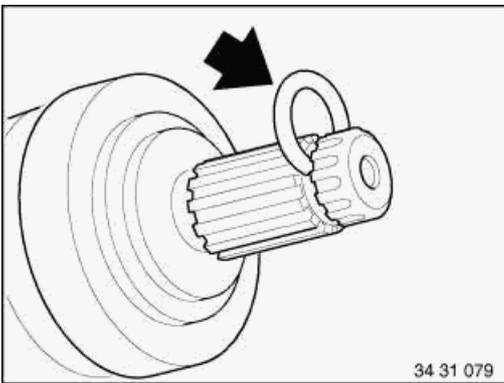
#### 73 – Partially installing the left output shaft



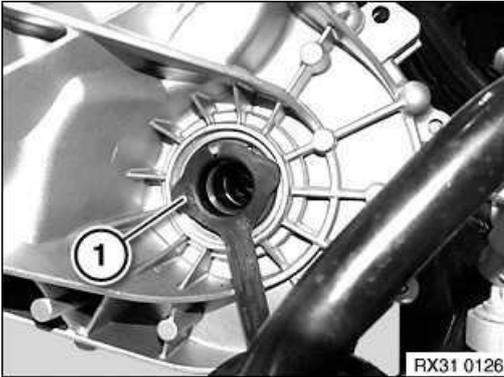
- **With automatic transmission only:**
  - Lever out O-ring (1).
  - Renew O-ring (1).
- Parts:** O-ring
- Insert new O-ring (1).



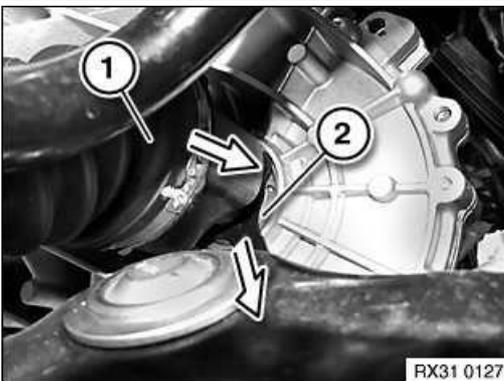
- Do not mix up circlips.
- Different types of output shafts fitted:
- **M:** Manual transmission
  - **A:** Automatic transmission



- Renew circlip (arrow).



- Insert installation protection ring (1) into the radial shaft seal.
- Make sure the tool fits over the lip of the radial shaft seal so there is no damage to sealing ring when the output shaft is inserted.



- Insert output shaft (1) into transmission.
- **Manual gearbox only:** Pull on the handle to remove the installation protection ring (2) and dispose of it.
- Slide output shaft (1) into the transmission as far as the limit position. The output shaft (1) must engage audibly.
- Check for secure seat by levering.

#### 74 – Install propeller shaft.



#### 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.



#### RISK OF DAMAGE

**Damage to the propeller shaft during installation.**

**Non-observance of the installation guidelines for the propeller shaft on the rear axle differential may cause severe damage.**

- Always renew the recessed nut on the rear axle differential. Screw locking must be available.
- Strictly observe a minimum hardening time of two hours after having screwed in the recessed nut. The hardening time may be longer at lower temperatures.

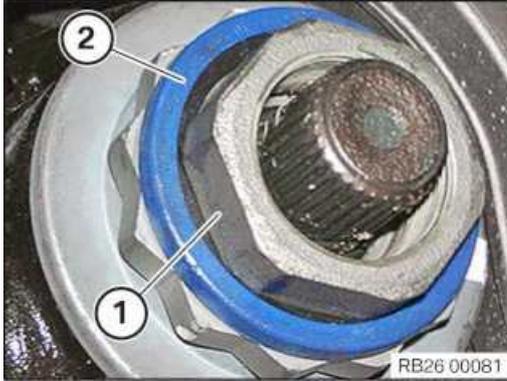


## RISK OF DAMAGE

### Damage to the transfer box.

**Non-observance of the removal and installation guidelines may cause severe damage to the transfer box.**

- Do not use the double hexagon head flange nut as counter support.



- Renew recessed nut (1).

**Parts:** Insert nut

- Renew the retaining clip (2) and the seal.

**Parts:** Retaining clip, seal

- Insert the seal with the recessed nut (1) and install.
- Insert the retaining clip (2) and install.
- Make sure that recessed nut (1) is screwed in within 5 min.
- Make sure that the hardening time of **minimum 2 h** for the recessed nut is observed.

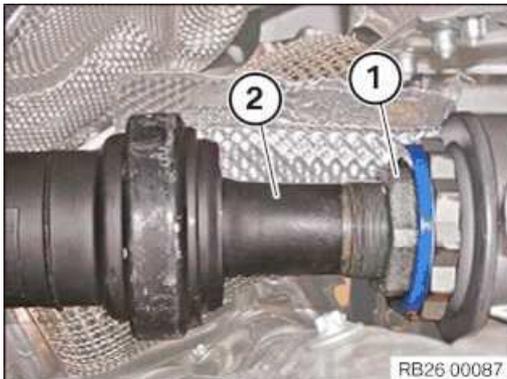
The hardening time must be extended at lower temperatures.



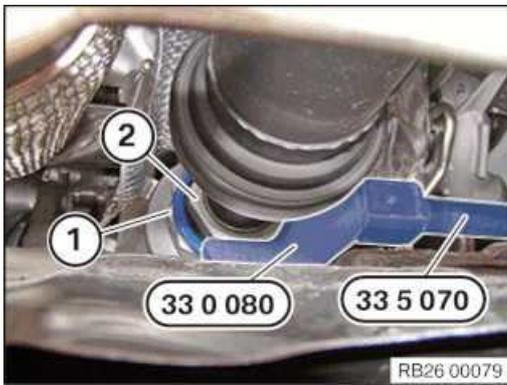
- Insert the propeller shaft (1) and install.
- Always support the propeller shaft (1) with a conventional jack.



- Hand-tighten the bolts (1).



- Push the propeller shaft (2) against the recessed nut (1) up to the limit position.
- Screw the propeller shaft (2) at least 2 thread starts onto the recessed nut (1) by hand.



## RISK OF DAMAGE

### Damage to the transfer box.

Non-observance of the removal and installation guidelines may cause severe damage to the transfer box.

- Do not use the double hexagon head flange nut as counter support.
- Protect the recessed nut (2) on the transfer box from twisting with the special tools **0 495 554 (33 5 070)** and .

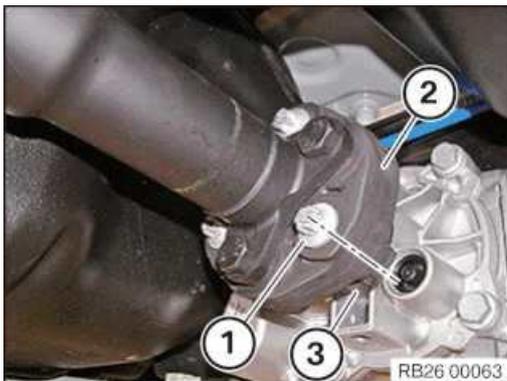
The recessed nut (2) on the transfer box must **not** be used to tighten the propeller shaft.

The double hexagon flange nut (1) must **not** be used for counter support.

- Tighten the front propeller shaft with the special tools **0 495 554 (33 5 070)** and in the direction of the arrow.

### Propeller shaft to transfer box

		Tightening torque	80 Nm
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## TECHNICAL INFORMATION

Compliance with the following instructions is required to avoid a humming noise from the propeller shaft after refitting the propeller shaft.

- Assemble the screw connection (1) of the flexible disc (2) and the three-hole flange (3) according to the mark.
- Renew screws (1).

**Parts:** Bolts

- Hand-tighten the bolts (1).
- Protect the propeller shaft (1) with the special tools **0 495 554 (33 5 070)** and from twisting.





- Tighten the bolts with the special tools **0 490 504 (00 9 120)** and .

#### Flexible disc to rear axle final drive

M12x1.5	Renew screws.	Tightening torque	55 Nm
			90 °



- Tighten the screws (1).

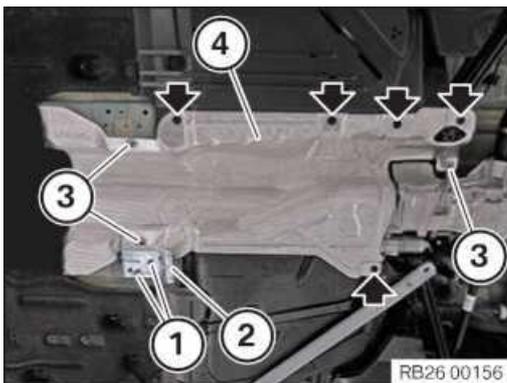
#### Centre mount to body

M8		Tightening torque	19 Nm
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- Guide the special tool out between the front and rear propeller shaft and remove.

### 75 – Installing the rear heat shield



- Insert and install the heat shield (4).
- Tighten screws (arrows).

#### Heat shield to body

Bolts/nut		Tightening torque	3 Nm
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- Tighten nuts (3).

#### Heat shield to body

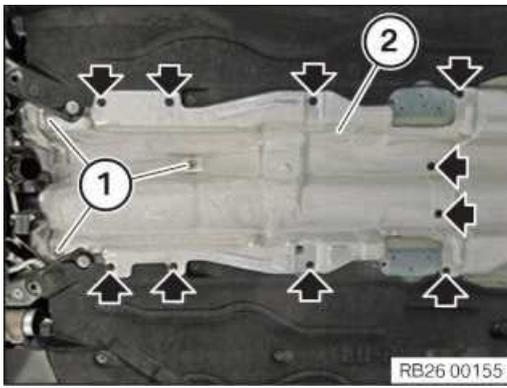
Bolts/nut		Tightening torque	3 Nm
-----------	--	-------------------	------

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

#### Bracket to body

M8		Tightening torque	21 Nm
----	--	-------------------	-------

### 76 – Install the front heat shield



- Insert and install the heat shield (2).
- Tighten screws (arrows).

#### Heat shield to body

Bolts/nut		Tightening torque	3 Nm
-----------	--	-------------------	------

- Tighten nuts (1).

#### Heat shield to body

Bolts/nut		Tightening torque	3 Nm
-----------	--	-------------------	------

## 77 – Install 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.

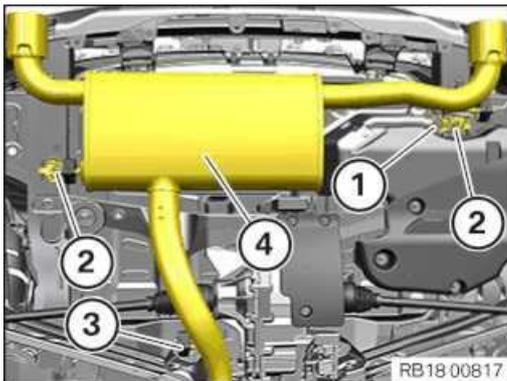


### CAUTION

#### Heavy component.

#### Heavy components can lead to injury or damage.

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



- Feed in and install the exhaust system (4) with a second person.
- Renew nuts (2).

#### Parts: Nuts

- Tighten nuts (2).

#### Exhaust system to body

M8	Replace nuts.	Tightening torque	19 Nm
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- Tighten down screw (1).

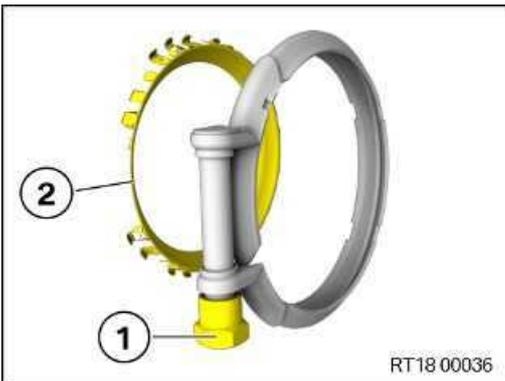
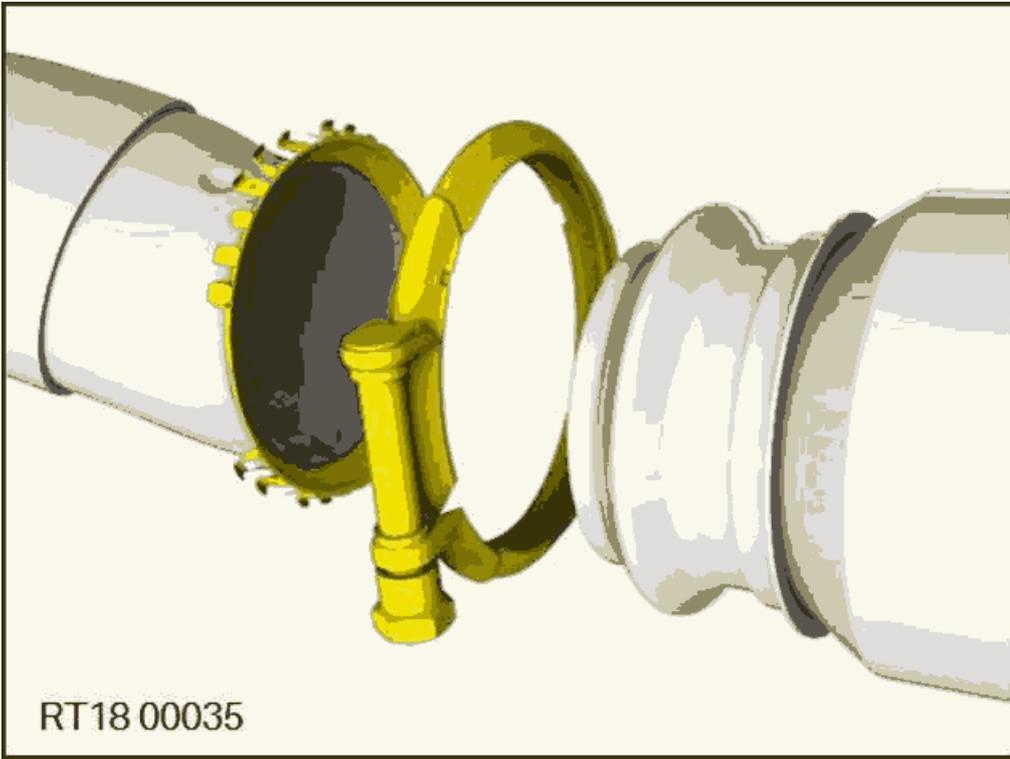
#### Exhaust bracket on body

Hexagon screw M8x30		Tightening torque	19 Nm
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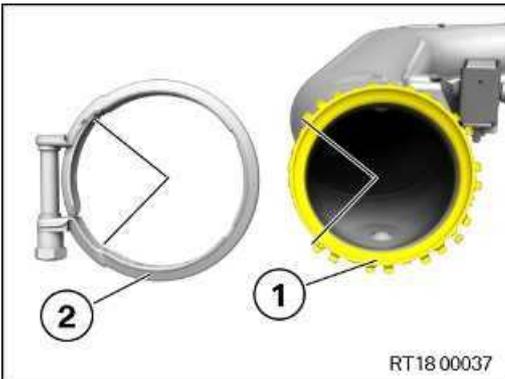
- Check the rubber mount (3) for damage and renew as needed.
- Mount rubber mount (3) on the exhaust system (4).

#### ► Install the V-clip

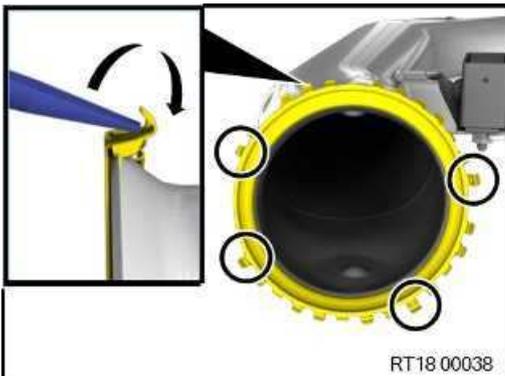
## V-band clamp



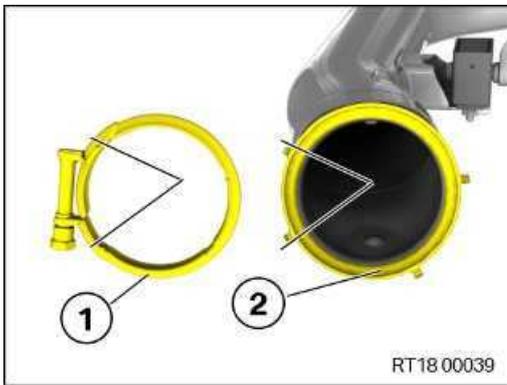
- Unscrew the nut (1) and remove the sealing ring (2).



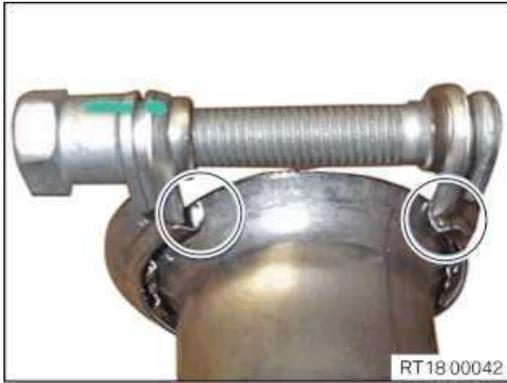
- Renew the V-clip (2).
- **Parts:** V-band clamp
- Mount the sealing ring (1) on the exhaust system.
- Ensure that the sealing ring (1) for the V-clip (2) is positioned correctly.



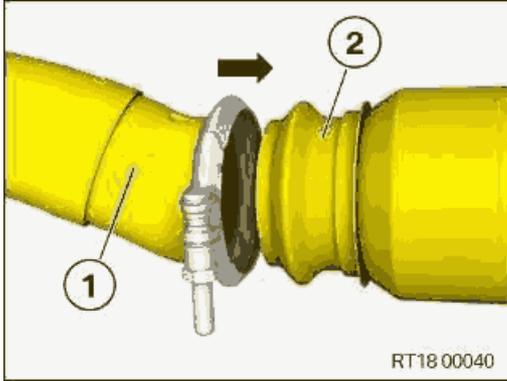
- Bend all sheet metal tabs over with a suitable tool, except those in the marked areas.



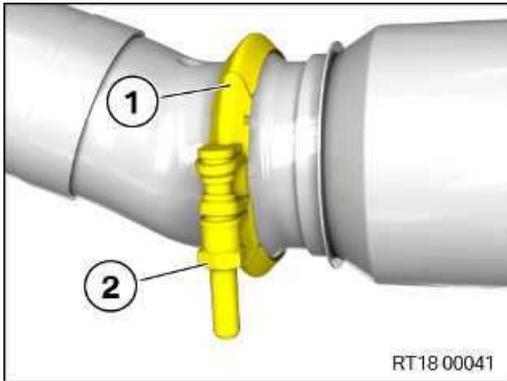
- Mount the V-clip (1) on the sealing ring (2).
- Make sure that the V-clip (1) is positioned correctly on the sealing ring (2).



- Make sure that the V-clip rests against the sheet metal tabs after mounting (marks).



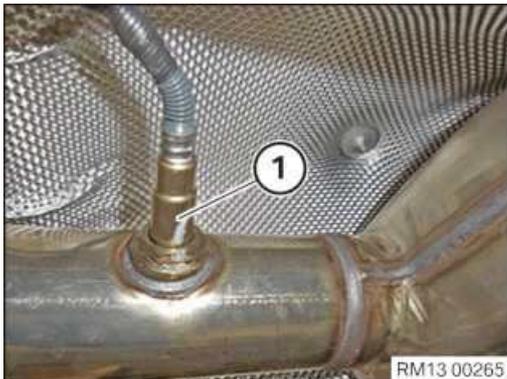
- Connect the exhaust system (1) with the catalytic converter (2) and position correctly.



- Make sure that V-clip (1) is fitted correctly.
- Tighten down screw (2).

#### V-clip to catalytic converter

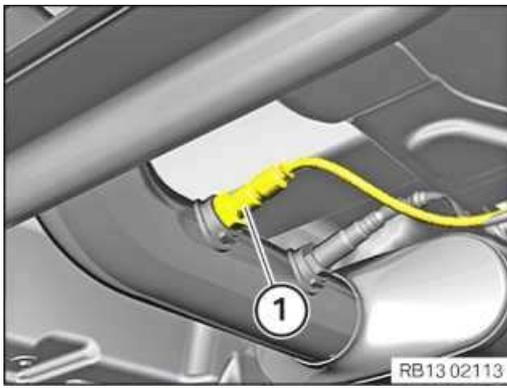
V-band clamp	Renew V-band clamp.	Tightening torque	22 Nm
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- Feed in, install and tighten diesel particulate sensor (1).

#### Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm
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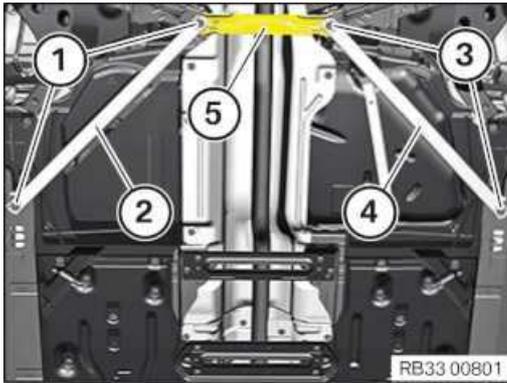


- Feed in, install and tighten nitrogen oxide sensor (1).

#### Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	50 Nm
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#### 78 – Install the cross-member with torsion struts



- Insert and install the cross-member (5).
- Thread in torsion strut (4) at right and install.
- Renew screws (3).

**Parts:** Bolts

- Tighten down screws (3).

#### Cross-member/torsion strut to axle support and mounting

M12x48	Renew screws.	Jointing torque	100 Nm
		Angle of rotation	90 °

- Guide in and install the left torsion strut (2).
- Renew screws (1).

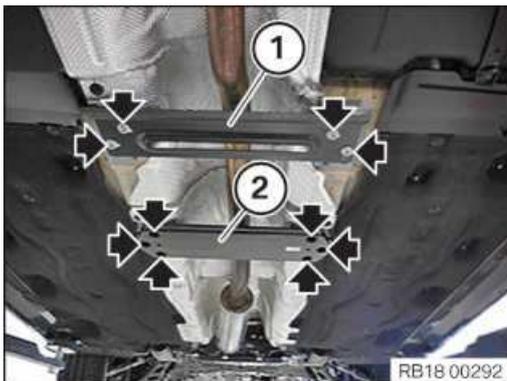
**Parts:** Bolts

- Tighten the screws (1).

#### Cross-member/torsion strut to axle support and mounting

M12x48	Renew screws.	Jointing torque	100 Nm
		Angle of rotation	90 °

#### 79 – Install the connecting support on the tunnel in front and back



- Insert and install connecting supports (2).
- Tighten the screws (arrows) from the connecting support (2).

#### Front connection carrier to body

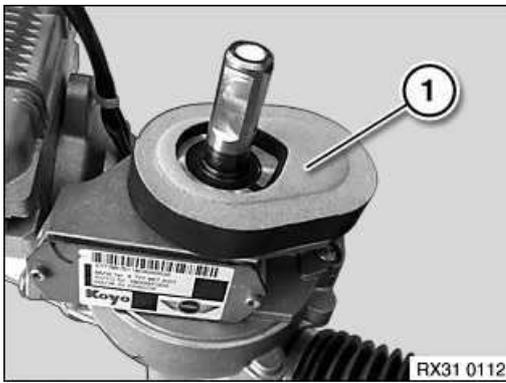
M10x18		Tightening torque	56 Nm
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- Insert and install connecting supports (1).
- Tighten the screws (arrows) from the connecting support (1).

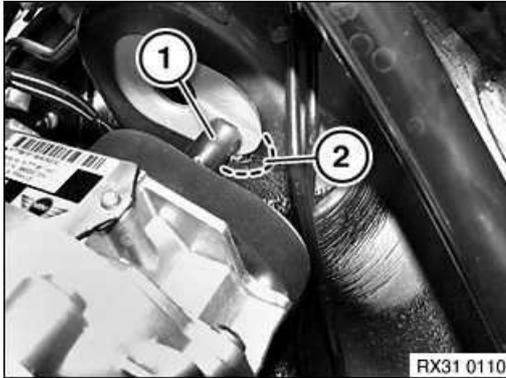
#### Rear connection carrier to body

M8x18		Tightening torque	28 Nm
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#### 80 – Mount and secure the complete front axle



- Remove the seal (1).
  - Clean surface on steering gear.
  - Renew gasket (1).
- Parts:** Gasket
- Position the seal (1) and glue it on.



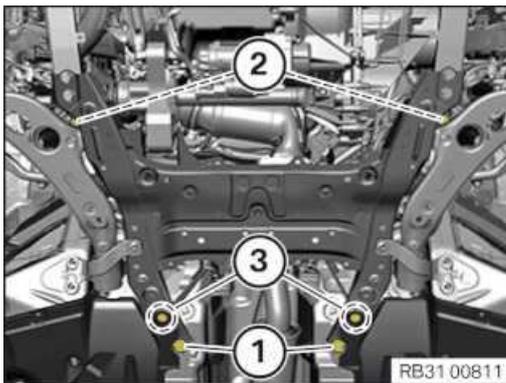
**i**

**TECHNICAL INFORMATION**

Non-compliance with the regulations for installation and disassembly may result in component damage. All work must be performed with care and in compliance with the regulations.

- When raising and lowering the front axle support, make sure that the torsion bar (1) of the electromechanical steering gear (EPS) in area (2) does not collide with the bulkhead!

**Note:** Collision with the bulkhead may result in damage to the electromechanical steering gear (EPS)!



- Position front axle support.
  - Bend underbody panellings in the areas (3) to one side.
  - Raise front axle support.
  - When raising, insert charge air cooler into the rubber mount of the charge air cooler on cross member.
  - Renew screws (1) and (2).
- Parts:** Bolts
- Tighten the screws (1).

**Rear end of front axle support to body**

M14 screw	Renew screw.	Tightening torque	175 Nm
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- Tighten down screws (2).

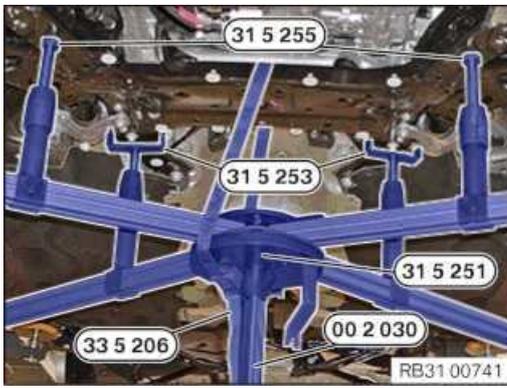
**Front axle support, front to body**

M12 screw	Renew screw.	Tightening torque	108 Nm
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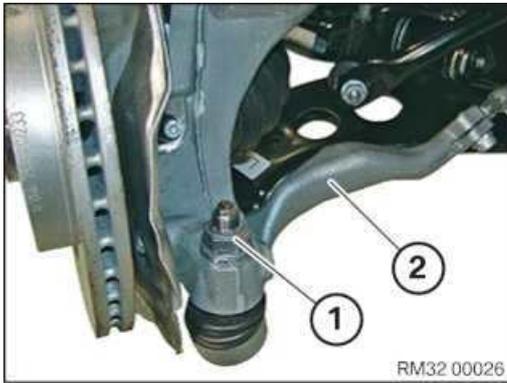
- If necessary, tighten the screws in the areas (3).

**Underbody protection to body**

Screw		Tightening torque	3 Nm
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- Remove special tool from special tool .
- Lower universal jack **0 490 133 (00 2 030)** with the special tool and place it to the side.



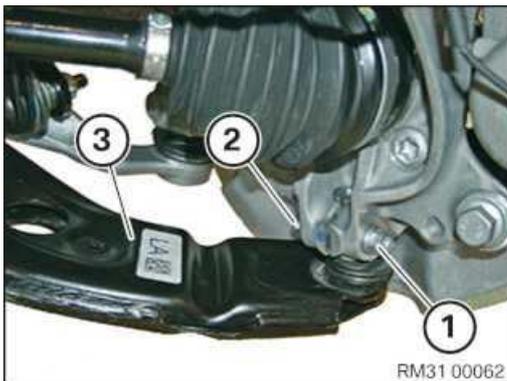
#### NOTICE

Perform the operations on the left and right side.

- Position the track rod (2) on the swivel bearing .
  - Renew nut (1).
- Parts:** Nut
- Tighten nut (1).

#### Track rod end to swivel bearing

M14	Renew nut.	Tightening torque	175 Nm
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#### NOTICE

Perform the operations on the left and right side.

- Position the wishbone (3) on the swivel bearing .
  - Renew the bolt (2) and the nut (1).
- Parts:** Bolt, nut
- Insert screw (2).
  - Tighten nut (1).

#### Wishbone to swivel bearing

M10	Exclusively use the screw to tighten! Renew screw and nut.	Tightening torque	60 Nm
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### 81 – Install the mounted parts on the front axle support



### NOTICE

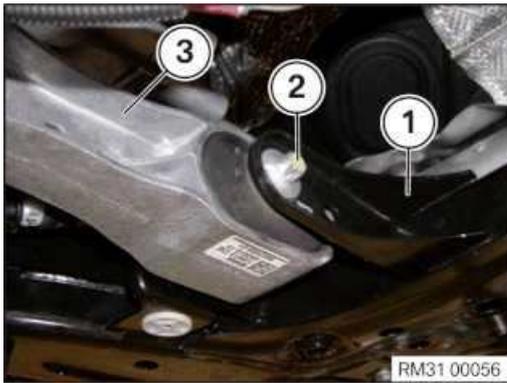
Perform the operations on the left and right side.

- Renew screws (1).
- Tighten the screws (1).

**Parts:** Bolts

#### Holder, wishbone rubber mount, to body

M10 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °



- Position the engine support (3) on the front axle support (1).
- Tighten down screw (2).

#### Holder with rubber mount to front axle support

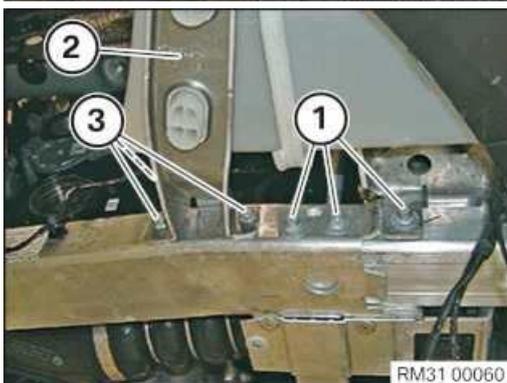
M12 screw			100 Nm
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### NOTICE

Perform the operations on the left and right side.

- Position the lock (2).
- Lock the bracket (1) of the lock (2) of the holder for the charge air cooler.



- **Only on right side:** Position the holder for the washer fluid reservoir (2).
- Tighten down screws (3).

#### Washer fluid reservoir holder to front axle support adapter plate

		Tightening torque	10 Nm
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### NOTICE

Perform the operations on the left and right side.

- Tighten the screws (1).

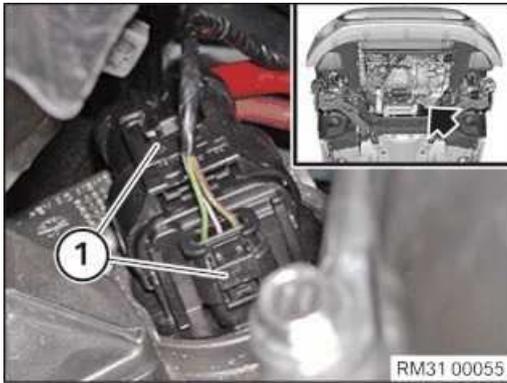
#### Deformation element, bottom, to adapter plate, front axle carrier

		Tightening torque	11,8 Nm
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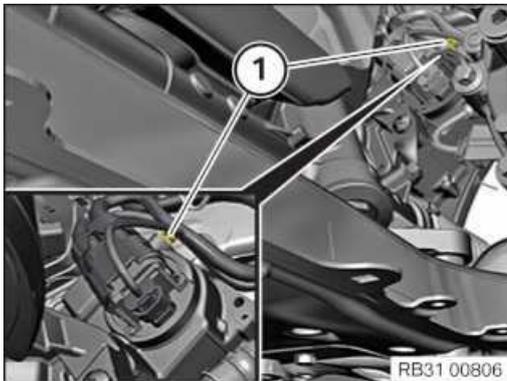


- To connect the connector (see the following step): Connect the connector with the right hand.

The connectors can be accessed via the left output shaft.

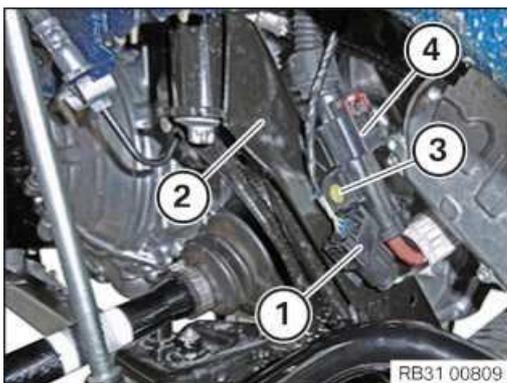


- Connect and lock connector (arrow) (1) with the steering gear.



- Fasten the wiring harness (1) on the steering gear.

► **If installed: Fasten the plug connections at the front axle support**



- Position the plug connection (4) at the front axle support (2).
- Tighten down screw (3).

**Holder to front axle support**

Oval-head screw TS5 x 16	Tightening torque	2,6 Nm
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- Fasten the plug connection (1) at the front axle support (2).

**83 – Securing rubber mount on front axle support**



- Check rubber mount (1), replace if necessary.

**Parts:** Rubber mount

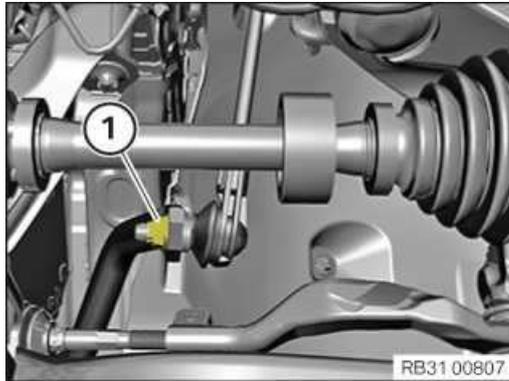
- Spray rubber mount (1) with lubricant and slide onto holder on front axle support.

## 84 – Securing anti-roll bar on left and right on the anti-roll bar link



### NOTICE

Perform the operations on the left and right side.



#### ► Fastening anti-roll bar on the anti-roll bar link

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

**Parts:** Nut

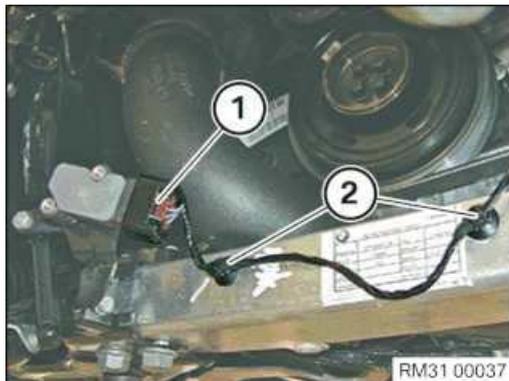
- Tighten nut (1).

**Note:** Use the Torx socket for counter support.

#### Anti-roll bar link to anti-roll bar

M10	Renew nut.	Tightening torque	56 Nm
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## 85 – With right installation: Securing the cable for the ride height sensor



- Secure the cable clip (2) on the adapter of the deformation element.
- Connect connectors (1) and lock.

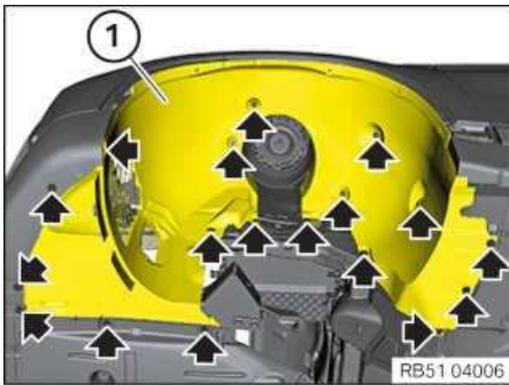
## 86 – Installing front left and right wheel arch cover



### NOTICE

Perform the operations on the left and right side.

- Installing the front wheel arch cover



- Guide the wheel arch cover (1) in.
- Tighten all bolts and nuts (arrows).

#### Wheel arch cover to body

Plastic nut		Tightening torque	2,6 Nm
Screw		Tightening torque	2,6 Nm

#### Wheel arch cover to body

Screw		Tightening torque	2,5 Nm
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#### Wheel arch cover to body

Plastic nut		Tightening torque	3 Nm
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#### ► Installing front wheel arch trim



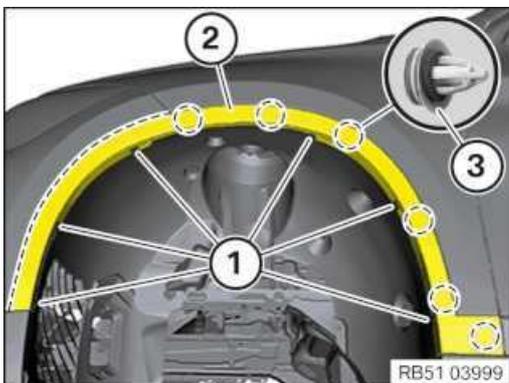
#### NOTICE

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



#### NOTICE

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



- Check the clips (3) for damage and renew where required.  
The clips (3) must not be damaged or missing.
- Feed in wheel arch trim (2) and engage on the clips (3).
- Engage wheel arch trim (2) into the latch mechanisms on the bumper panel.
- Mount blind rivet (1) using the special tool **0 496 521 (00 2 230)**.

#### 87 – Installing both front wheels

#### ► Mounting the wheel

- Clean the contact surfaces between the brake disc and the wheel rim



## 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.

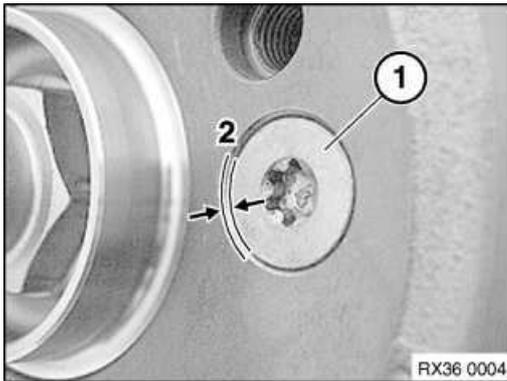
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- 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).



- Renew mounting bolt (1).

**Parts:** Mounting bolt

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

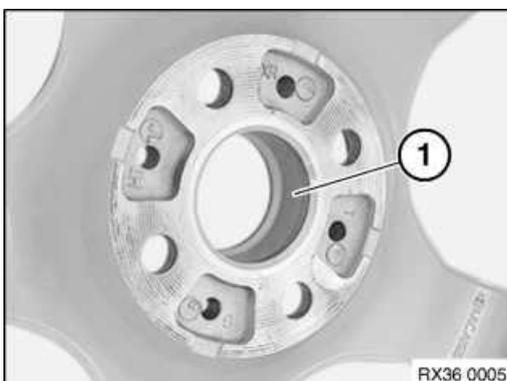
The mounting bolt (1) for the brake disc may not protrude under any circumstances on the contact surface (2) between the brake disc and the wheel rim.

### Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------

### Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------



- Lightly grease the wheel centring (1) in the wheel rim; refer to additional information for grease for the wheel centring (1).



## 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.

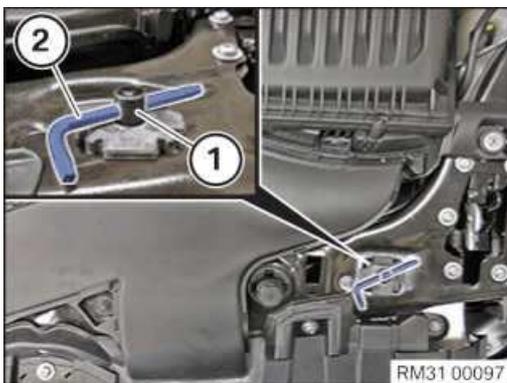
**Parts:** Wheel bolts

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

### Wheel bolts

M 14/AF 17	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	140 Nm
		Check	140 Nm

## 88 – Removing fastener for left and right radiator

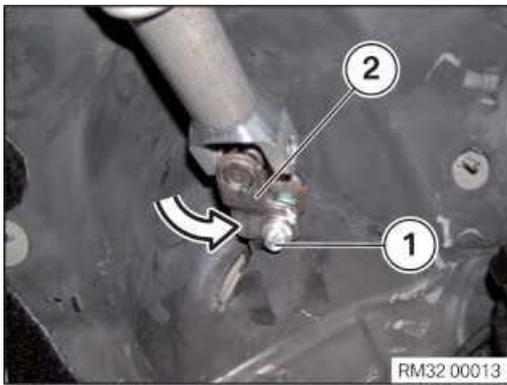


## NOTICE

Perform the operations on the left and right side.

- Remove suitable tool (2) from the centering pin (1).

## 89 – Secure the steering shaft at the bottom on the steering gear



- Clean the screw lock residue from the screw thread in the universal joint (2).
- Pivot the universal joint (2) in the direction of the arrow to the steering gear.
- Renew the screw (1).

**Parts:** Screw

- Tighten down screw (1).

#### Lower steering shaft to steering gear

M10	Clean screw thread and remove remains of screw locking agent. Renew screw.	Tightening torque	28 Nm
-----	---	-------------------	-------



- **If installed:**
- Position the cover on the steering column (2).
- Tighten nuts (1).

#### Steering column cover to bulkhead

Plastic nut		Tightening torque	3 Nm
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### 90 – Install the heat shield on the exhaust turbocharger



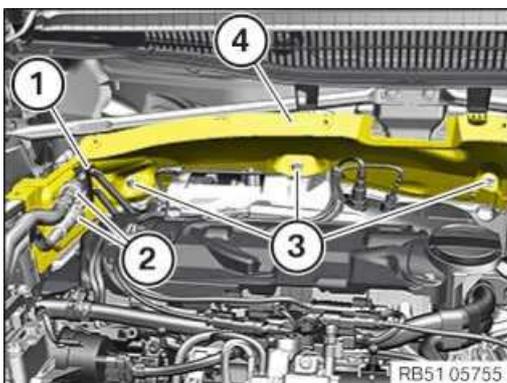
- Feed in and install the heat shield (2).
- Tighten the screws (1) at the top and bottom of the heat shield.

#### Heat shield for exhaust turbocharger

Torx screw BM 6x12		Tightening torque	10 Nm
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- Fasten the cable at the clips .

### 91 – Installing rear bulkhead upper part



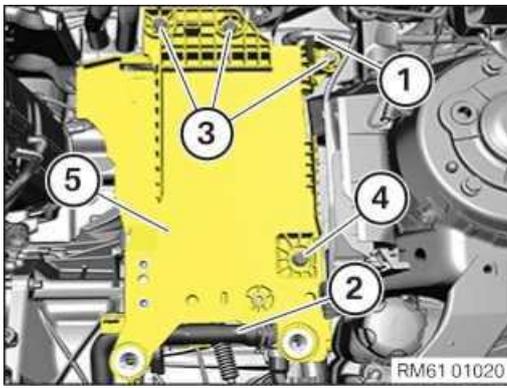
- Feed in and install the rear bulkhead upper part (4).
- Tighten down screws (3).

#### Rear bulkhead upper part to lower section of bulkhead

Oval-head screw		Tightening torque	5 Nm
-----------------	--	-------------------	------

- Feed the fuel line (2) into the holder (1) and install.
- Connect and lock the holder (1).  
The holder (1) must engage audibly.

### 92 – Install the battery holder



- Feed in and install the battery holder (5).
- Hand-tighten the bolt (4).
- Hand-tighten the bolts (3).
- Tighten down screw (4).

#### Battery holder to engine support

Hexagon screw M8x30		Tightening torque	19 Nm
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- Tighten down screws (3).

#### Battery holder to engine support

Hexagon screw M8x30		Tightening torque	19 Nm
---------------------	--	-------------------	-------

- Fasten the coolant line (2) on the battery holder (5).
- Fasten the cable clip (1) on the battery holder (5).

## 93 – Install electronics box

### Prerequisite

Battery earth lead is disconnected.

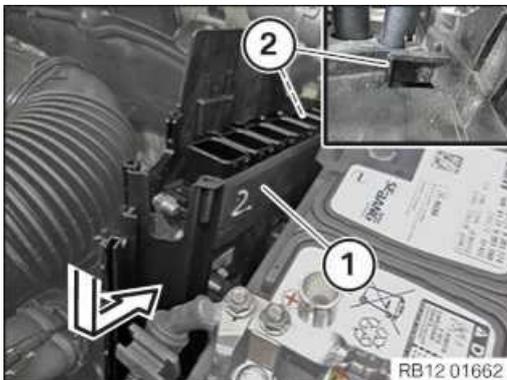


#### RISK OF DAMAGE

**Improper routing of cables and wiring harnesses.**

**Trapped, crushed or damaged cables may cause short circuits and malfunctions.**

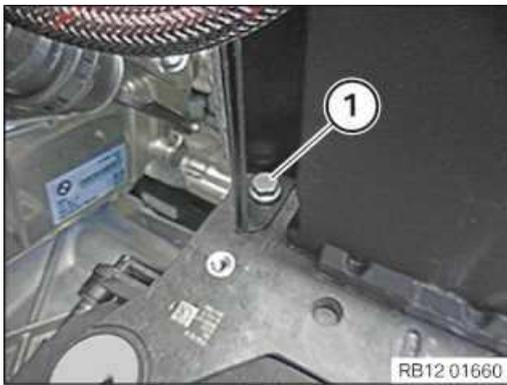
- Route all cables without abrasions, do not trap and crush.



- Guide in and install the electronics box (1) into the guide (2) in direction of arrow.



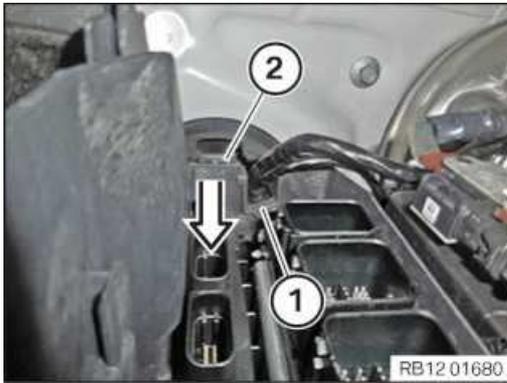
- Make sure that the electronics box (1) is positioned correctly on the bulkhead (2).



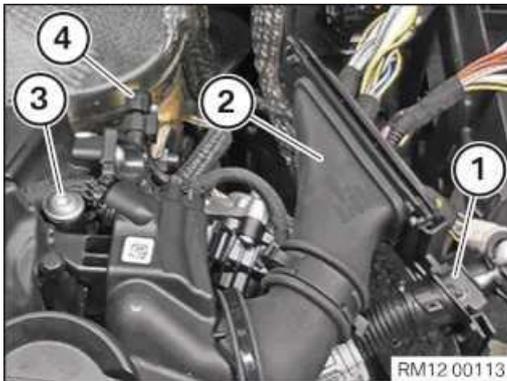
- Tighten down screw (1).

#### Electronics box to battery tray

M8X16		Tightening torque	15 Nm
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- Guide in and install the holder (1) in the electronics box (2) in direction of arrow.
- Make sure the bracket (1) engages audibly.

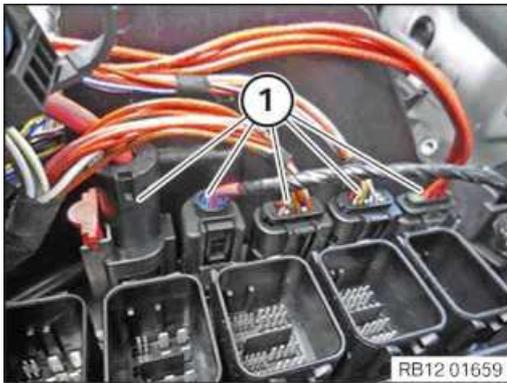


- Lay vehicle wiring harnesses (1) and (2) and mount on electronics box.
- Tighten down screw (3).

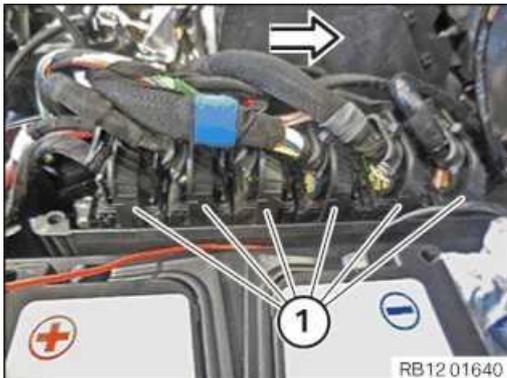
#### Wiring harness to cylinder head cover

TS5x20		Tightening torque	3,5 Nm
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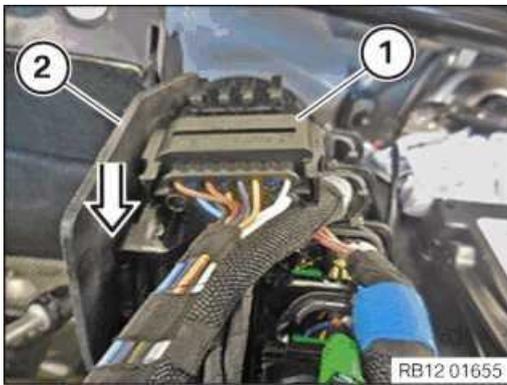
- Attach connector (4) to the differential pressure sensor and lock it audibly.



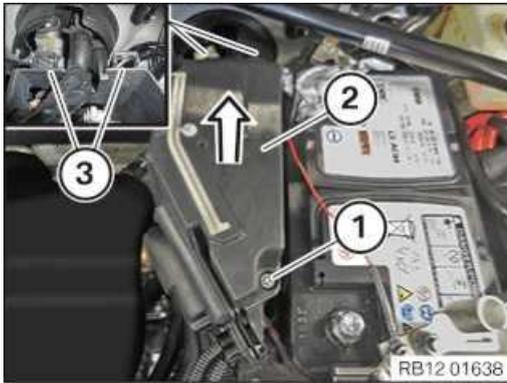
- Connect and lock the connector (1).
- Make sure the connectors (1) engage audibly.



- Connect connector (1) in direction of arrow and lock.
- Make sure the connectors (1) engage audibly.



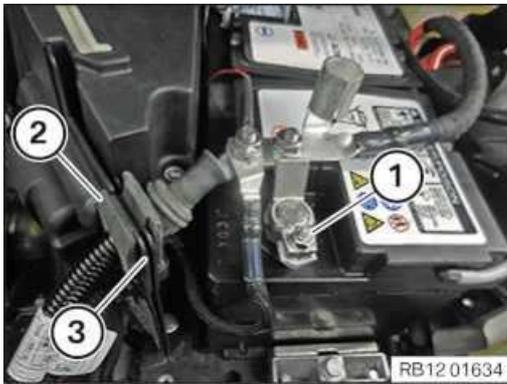
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.
- Insert the connector (1) in the direction of arrow at the electronics box (2) and install.



- Insert the cover (2) into the guides (3) in the direction of arrow and install.
- Make sure the cover audibly engages (2) in the guides (3).
- Tighten down screw (1).

#### Cover to electronics box

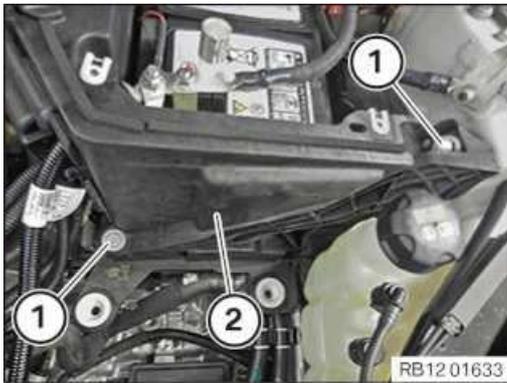
RF5x26.5		Tightening torque	2,5 Nm
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- Thread in positive battery cable (2) on holder (3) and install.
- Feed in and install positive battery terminal (1).
- Tighten positive battery terminal (1).

#### Positive battery terminal to battery

NutM6		Tightening torque	5 Nm
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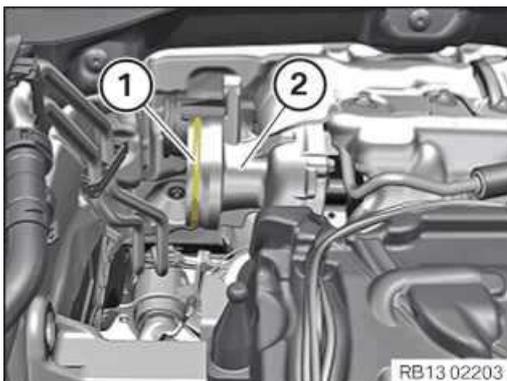


- Feed in and install tension strut (2).
- Tighten the screws (1).

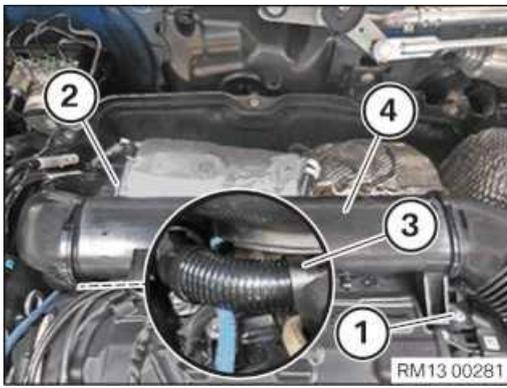
#### Tension strut to spring strut dome/battery tray

M8		Tightening torque	19 Nm
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### 94 – Installing clean air pipe



- Check the sealing ring (1) of the exhaust turbocharger (2) for damage and renew it if necessary.



- Feed in clean air pipe and install.
  - Connect clean air pipe to the exhaust turbocharger and lock audibly in the clamps (2).
  - Renew the screw (1).
- Parts:** Screw
- Tighten down screw (1).

#### Clean air pipe to cylinder head cover

Oval-head screw	Renew screw.	Tightening torque	8 Nm
-----------------	--------------	-------------------	------

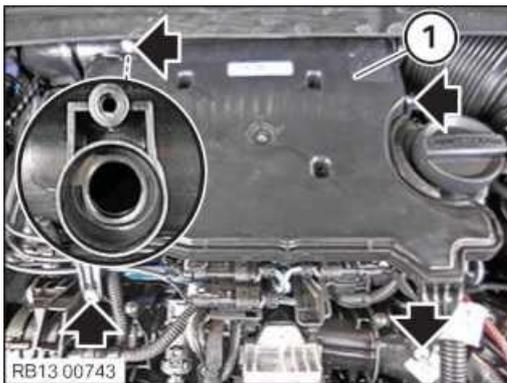
- Connect ventilation line (3) to the cylinder head cover and lock audibly.
- Mount clean air pipe onto the intake filter housing.
- Tighten clamp (1) on the clean air pipe.

#### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------



### 95 – Install resonator



- Insert and install the resonator (1).
  - Renew the bolts (arrows).
- Parts:** Bolts
- Tighten screws (arrows).

#### Resonator to manifold and clean air pipe

Screw TS6	Renew screw.	Tightening torque	5 Nm
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### 96 – 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.



RM11 00932

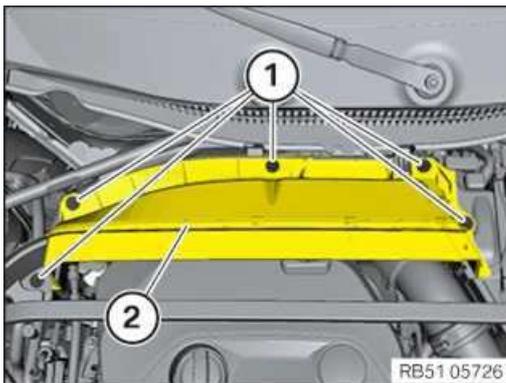
- Check for correct installation of all rubber mounts in the acoustic cover (1).



RB11 03455

- Clip in the acoustic cover into the holders in the indicated areas.
- Make sure that the acoustic cover engages audibly.

### 97 – Installing the upper bulkhead cover

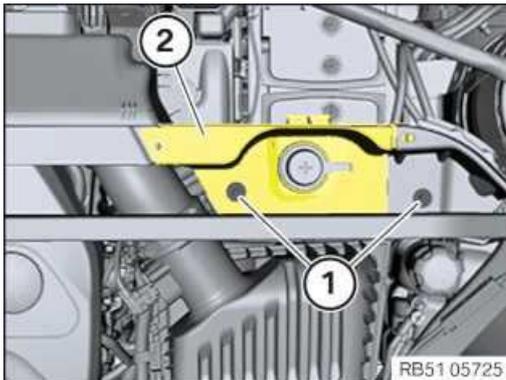


RB51 05726

- Feed in and install cover (2) of the bulkhead at the top.
- Tighten the screws (1).

#### Cover of top bulkhead

Screw		Tightening torque	2,6 Nm



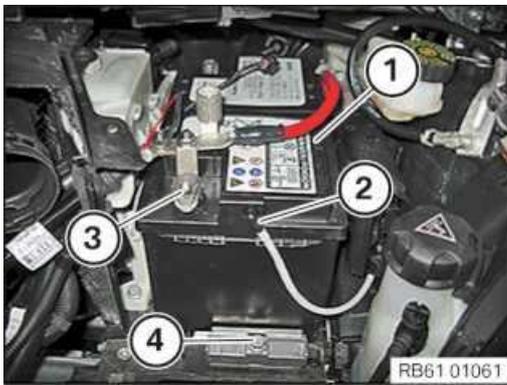
RB51 05725

- Guide in and install cover (2).
- Tighten down screw (1).

#### Cover of remote positive terminal

Screw		Tightening torque	2,6 Nm

### 98 – Install vehicle battery



- Install vehicle battery (1).
- Position the bracket and tighten with the screw (4) .

#### Battery terminal rail to battery tray

M8		19 Nm
----	--	-------

- Position the vent hose (2) and clip it in.
- Position the positive battery terminal and tighten with the nut (3) .

#### Battery terminal with IBS positive battery terminal / negative battery terminal

NutM6		5 Nm
-------	--	------

► Check the vent holes of the battery



### WARNING

Gas emission.

**Danger of injury! Danger of explosion!**

- Assign the vent holes correctly.
- Route the vent hose correctly.

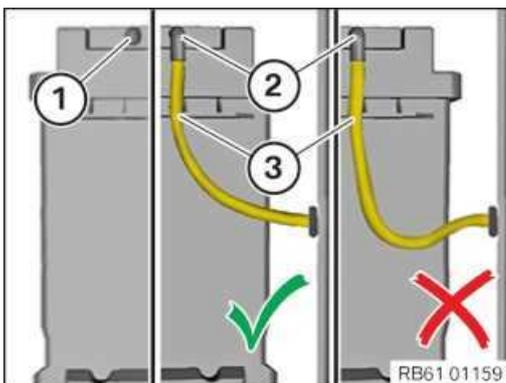


### TECHNICAL INFORMATION

The battery has two vent holes, opposite:

One vent hole (1) must be closed correctly with a dummy plug.

The vent hose (3) must be correctly connected and routed at the other vent hole (2).



#### Check

- Check if the vent hole (1) is correctly closed with a dummy plug.

#### Result

» No dummy plug.

#### Measure

- Close the vent hole (1) correctly with a dummy plug.

#### Check

- Check if the vent hole (2) has a correctly connected vent hose (3).

#### Result

» The vent hose (3) is not correctly connected.

#### Measure

- At the vent hole (2), connect the vent hose (3) correctly.

### Check

- Check if the vent hose (3) is routed to the outside with a downhill gradient (**no siphon formation!**).

### Result

» The vent hose (3) is not correctly routed as shown in the image on the right.

### Measure

- Route the vent hose (3) correctly as shown in the centre image.

- Insert tension strut (3) and tighten with screws (1).

### Trailing link

M8		Tightening torque	19 Nm
----	--	-------------------	-------

- Tighten down screw (2).

### Battery cover

M8			2,8 Nm
----	--	--	--------

- Position the cover (2).
- Tighten down screw (1).

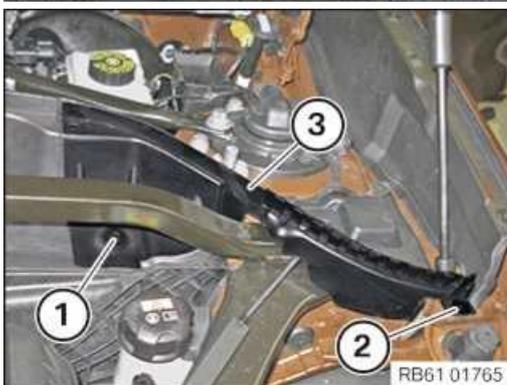
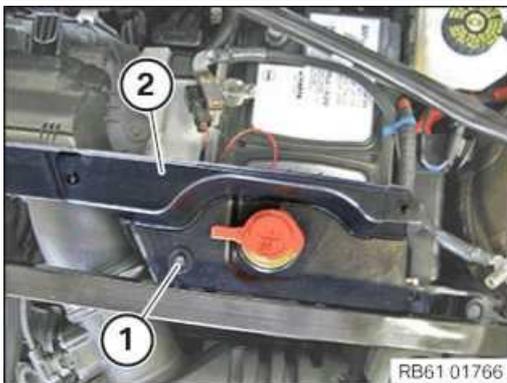
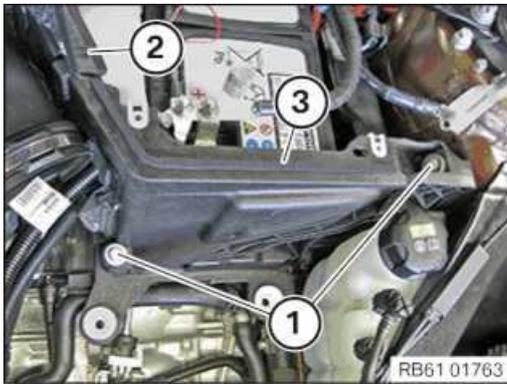
### Battery cover

M8			2,8 Nm
----	--	--	--------

- Position the fixture for the gasket (3) and secure with the expanding rivet (2).
- Tighten down screw (1).

### Battery cover

M8			2,8 Nm
----	--	--	--------



## 99 – Connecting the battery earth lead



### TECHNICAL INFORMATION

For additional information see:

61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



- Remove the protective cover of the positive battery terminal.
- Position the battery earth lead (2).
- Tighten nut (1).

#### Battery terminal with IBS positive battery terminal / negative battery terminal

NutM6			5 Nm
-------	--	--	------

- If required, connect the connector (3).

### 100 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

#### Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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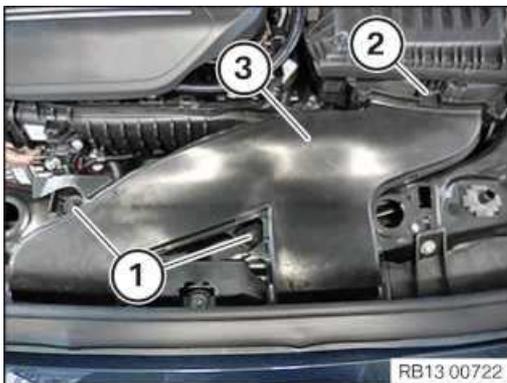
- Tighten clamp (4).

#### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

### 101 – Install the intake neck for the intake filter housing



- Insert and install the intake neck (3). The lock (2) must audibly engage.
- Tighten nuts (1).

#### Intake neck to cross connection

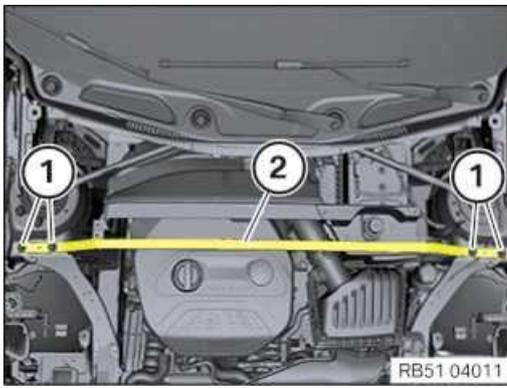
M6		Tightening torque	8 Nm
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### 102 – Install strut brace



#### TECHNICAL INFORMATION

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



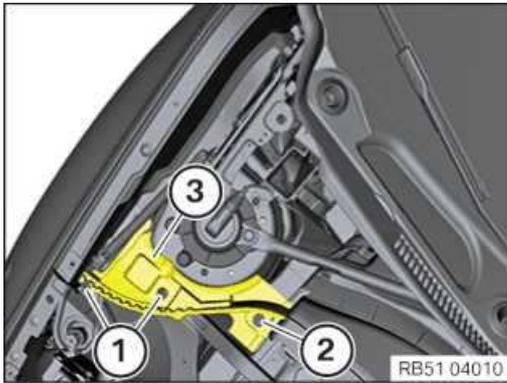
- Install the strut brace (2).
- Renew screws (1).

**Parts:** Bolts

- Tighten the screws (1).

#### Cross-brace to spring strut dome

	Renew screw.	Jointing torque	28 Nm
		Angle of rotation	180 °



#### NOTICE

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

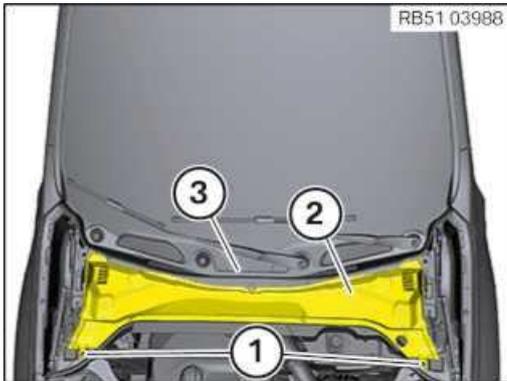
- Install the cover (3).
- Tighten down screw (2).

#### Cover on body

Hexagon screw		Tightening torque	3 Nm
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- Install the expanding rivet (1).

### 103 – Installing front cowl panel cover



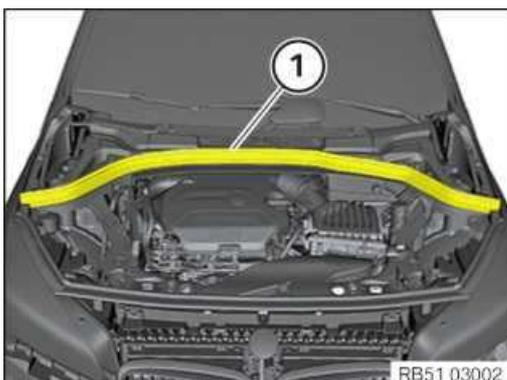
- Insert and install cowl panel cover at front (2) into cowl panel cover at rear (3).
- Check cowl panel cover at front is correctly seated (2).
- Secure expanding rivet (1).

### 104 – Install the seal for the bonnet



#### NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Install bonnet seal at rear (1).
- Ensure that the rear bonnet seal (1) is fitted correctly.

### 105 – Checking/topping up oil level in automatic gearbox (AISIN GA8G45)

## Prerequisite

Vehicle in horizontal position.

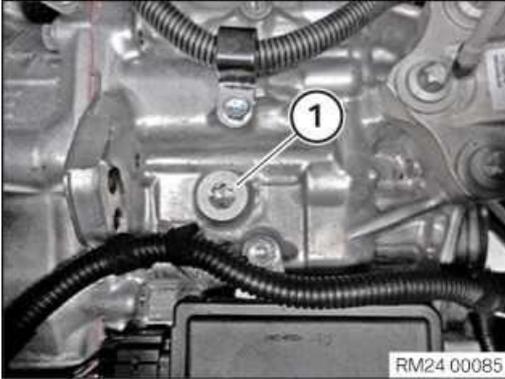


### CAUTION

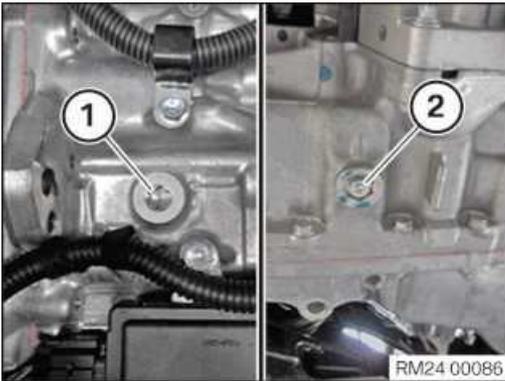
**Materials harmful to health.**

**Contact with fluids harmful to health!**

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



- Move the selector lever to the "P" position.
- Secure vehicle to prevent it rolling.
- Connect diagnosis system.
- Release the oil filler plug (1) using the Torx T55 .



• **Topping up the automatic transmission fluid (the automatic transmission fluid was drained):**

- Release oil filler plug (1) from engine compartment.
  - Loosen the overflow plug (2) below at the transmission.
  - Top up automatic transmission fluid at oil filler plug (1) until oil emerges at overflow plug (2).
  - Start engine and run at idle speed.
  - Check whether the automatic transmission fluid is leaking at the overflow plug (2) .
  - If there is no automatic transmission fluid leaking at the overflow plug (2) , fill in the automatic transmission fluid to the oil filler plug (1) .
  - Press the footbrake and, when idle, shift through all the gears from "P" to "D" 2 times for more than 2 seconds .
  - Move the selector lever to the "P" position.
  - Check again whether the automatic transmission fluid is leaking at the overflow plug(2) .
  - Read the temperature of the automatic transmission fluid with the diagnosis system.
  - Increase temperature of automatic transmission fluid to 35 °C to 45 °C.
  - Top up automatic transmission fluid until it flows over.
  - Renew sealing rings.
- Parts:** Sealing ring
- Screw in and fasten oil filler plug (1) and overflow plug (2).

#### Oil filler plug to transmission housing

M14	Renew the sealing ring.	Tightening torque	45 Nm
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### Overflow screw in oil drain plug

M6	Renew the sealing ring.		8 Nm
----	-------------------------	--	------

- **Check oil level (transmission oil temperature must be between 35 °C and 45 °C):**
  - Open the oil filler plug (1).
  - Slacken overflow plug (2).
  - Start engine and run at idle speed.
  - Unscrew and remove overflow plug (2).
  - Check whether the automatic transmission fluid is leaking at the overflow plug (2) .
  - If there is no automatic transmission fluid leaking at the overflow plug (2) , fill in the automatic transmission fluid to the oil filler plug (1) .
  - Top up the automatic transmission fluid until it overflows at the overflow plug (2) .
  - Press the footbrake and, when idle, shift through all the gears from "P" to "D" 2 times for more than 2 seconds .
  - Move the selector lever to the "P" position.
  - Check the oil level again.
  - Renew sealing rings.
- Parts:** Sealing ring
- If the oil escapes slightly from the overflow plug (2) , tighten the overflow plug (2) and the oil filler plug (1) .

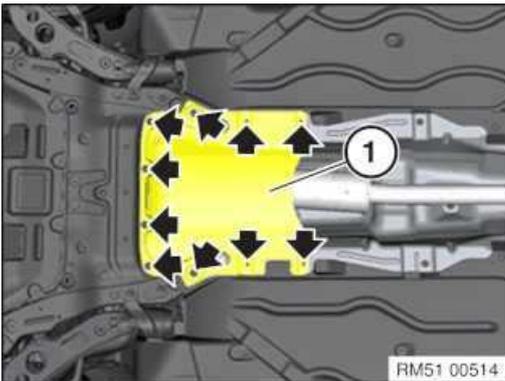
### Overflow screw in oil drain plug

M6	Renew the sealing ring.		8 Nm
----	-------------------------	--	------

### Oil filler plug to transmission housing

M14	Renew the sealing ring.	Tightening torque	45 Nm
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### 106 – If installed: Installing underbody protection at rear

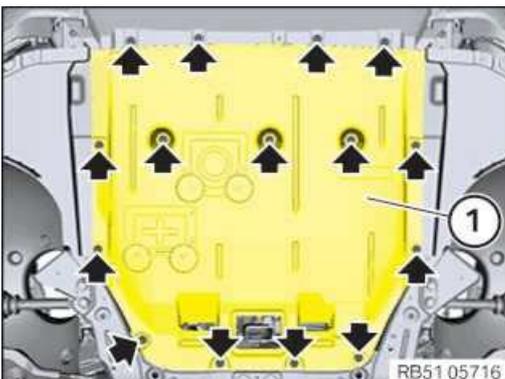


- Position rear underbody protection (1).
- Tighten screws (arrows).

### Underbody protection to body

Screw		Tightening torque	3 Nm
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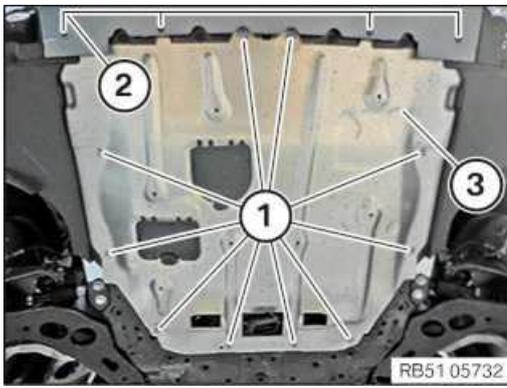
### 107 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

### Underbody protection front

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

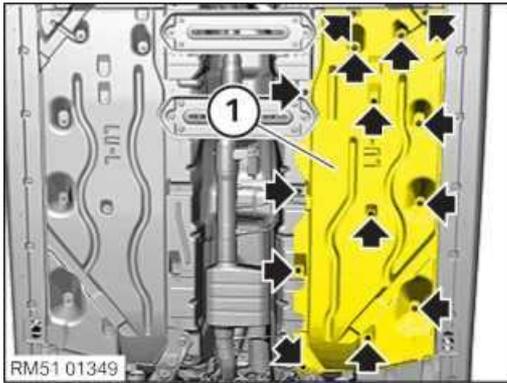


- **Equipment specification with metal underride guard:**
- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

#### Underbody protection front

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

#### 108 – Installing underbody panelling , right



- Correctly position the underbody panelling (1).
- Tighten all bolts and nuts (arrows).

#### Underbody panelling, side

Hexagon screw		Tightening torque	2,6 Nm
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#### Underbody panelling, side

Plastic nut		Tightening torque	2,6 Nm
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### Additional Information

#### Overview of Tightening Torques

##### Oil pressure switch to crankcase

Used in step [54](#)

Sensor	Replace oil pressure switch.	Tightening torque	22 Nm
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##### Exhaust-gas recirculation cooler to exhaust manifold

Used in step [56](#)

M8x28	Replace screws	Tightening torque	32 Nm
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##### Oil return line to turbocharger

Used in step [56](#) [57](#)

M6x12		Tightening torque	8 Nm
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##### Holder to exhaust turbocharger and crankcase

Used in step [56](#)

M8x16		Tightening torque	22 Nm
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##### Exhaust turbocharger to exhaust manifold

Used in step [57](#)

V-band clamp		Tightening torque	19 Nm
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##### Oil feed line to bracket

Used in step [57](#)

Torx screw M6x12		Tightening torque	8 Nm
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##### Holder to exhaust turbocharger and crankcase

Used in step [57](#)

M8x16		Tightening torque	22 Nm
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##### Heat shield for exhaust turbocharger

Used in step [58](#)

Torx screw BM 6x12		Tightening torque	10 Nm
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<b>Banjo bolt for exhaust pressure pipe to exhaust manifold</b>			Used in step <a href="#">58</a>
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm
<b>Standard screw connection M6</b>			Used in step <a href="#">58</a>
M6			8 Nm
<b>Charge air duct to oil sump</b>			Used in step <a href="#">59</a>
M6		Tightening torque	8 Nm
<b>Ride height sensor holder to front axle support</b>			Used in step <a href="#">59</a>
M6		Tightening torque	8 Nm
<b>Adapter, front axle support to front axle support</b>			Used in step <a href="#">59</a>
		Tightening torque	100 Nm
<b>Cross connection to front axle support</b>			Used in step <a href="#">59</a>
M6		Tightening torque	12 Nm
<b>Washer fluid reservoir to body</b>			Used in step <a href="#">60</a>
M6x20		Tightening torque	8 Nm
<b>Diesel particulate filter V-clip to exhaust turbocharger</b>			Used in step <a href="#">61</a>
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm
<b>Diesel particle filter to holder</b>			Used in step <a href="#">61</a>
M8 hexagon nut		Tightening torque	19 Nm
<b>Diesel particulate filter holder to gearbox</b>			Used in step <a href="#">61</a>
M12x75		Tightening torque	66 Nm
<b>Diesel particulate filter bracket to crankcase</b>			Used in step <a href="#">61</a>
M10x35		Tightening torque	38 Nm
<b>SCR metering module V-clip to exhaust system</b>			Used in step <a href="#">61</a>
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm
<b>Holder for coolant lines to diesel particulate filter</b>			Used in step <a href="#">61</a>
Torx bolt BM6x16		Tightening torque	8 Nm
<b>Differential pressure sensor to holder</b>			Used in step <a href="#">61</a>
Screw		Tightening torque	4 Nm
<b>Clamp for the pressure hose on the differential pressure sensor</b>			Used in step <a href="#">61</a>
Clamp 15–19mm		Tightening torque	3 Nm
<b>Control sensor</b>			Used in step <a href="#">62</a>
Control sensor		Tightening torque	50 Nm
<b>Exhaust temperature sensor to diesel particulate filter</b>			Used in step <a href="#">63</a> <a href="#">64</a>
Exhaust-gas temperature sensor		Tightening torque	28 Nm

**Exhaust-gas temperature sensor to exhaust system**Used in step [65](#)

Exhaust-gas temperature sensor		Tightening torque	28 Nm
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**Oxygen sensor holder to intermediate shaft**Used in step [66](#)

Hexagon screw M6x16		Tightening torque	8 Nm
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**Nitrogen oxide sensor before SCR catalytic converter**Used in step [67](#)

Sensor		Tightening torque	50 Nm
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**Monitoring sensor**Used in step [68](#)

Sensor		Tightening torque	50 Nm
--------	--	-------------------	-------

**Transfer box to transmission**Used in step [69](#)

M10		Tightening torque	56 Nm
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**Heat shield to transfer box**Used in step [69](#)

M6	Renew screws.	Tightening torque	6 Nm
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**Oil filler plug on transfer box (VTG)**Used in step [69](#)

M18x1.5		Tightening torque	35 Nm
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**Intermediate shaft to transfer box**Used in step [70](#)

M8x35		Tightening torque	19 Nm
-------	--	-------------------	-------

**Starter motor to transmission**Used in step [71](#)

M8x45		Tightening torque	19 Nm
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**Battery positive lead to starter**Used in step [71](#)

M8		Tightening torque	13,5 Nm
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**Propeller shaft to transfer box**Used in step [74](#)

		Tightening torque	80 Nm
--	--	-------------------	-------

**Flexible disc to rear axle final drive**Used in step [74](#)

M12x1.5	Renew screws.	Tightening torque	55 Nm
			90 °

**Centre mount to body**Used in step [74](#)

M8		Tightening torque	19 Nm
----	--	-------------------	-------

**Heat shield to body**Used in step [75](#) [76](#)

Bolts/nut		Tightening torque	3 Nm
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**Bracket to body**Used in step [75](#)

M8		Tightening torque	21 Nm
----	--	-------------------	-------

**Exhaust system to body**Used in step [77](#)

M8	Replace nuts.	Tightening torque	19 Nm
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<b>Exhaust bracket on body</b>			Used in step <a href="#">77</a>
Hexagon screw M8x30		Tightening torque	19 Nm
<b>V-clip to catalytic converter</b>			Used in step <a href="#">77</a>
V-band clamp	Renew V-band clamp.	Tightening torque	22 Nm
<b>Diesel particulate sensor to exhaust system</b>			Used in step <a href="#">77</a>
Sensor		Tightening torque	50 Nm
<b>Nitrogen oxide sensor downstream of SCR catalytic converter</b>			Used in step <a href="#">77</a>
Sensor		Tightening torque	50 Nm
<b>Cross-member/torsion strut to axle support and mounting</b>			Used in step <a href="#">78</a>
M12x48	Renew screws.	Jointing torque	100 Nm
		Angle of rotation	90 °
<b>Front connection carrier to body</b>			Used in step <a href="#">79</a>
M10x18		Tightening torque	56 Nm
<b>Rear connection carrier to body</b>			Used in step <a href="#">79</a>
M8x18		Tightening torque	28 Nm
<b>Rear end of front axle support to body</b>			Used in step <a href="#">80</a>
M14 screw	Renew screw.	Tightening torque	175 Nm
<b>Front axle support, front to body</b>			Used in step <a href="#">80</a>
M12 screw	Renew screw.	Tightening torque	108 Nm
<b>Underbody protection to body</b>			Used in step <a href="#">80</a> <a href="#">106</a>
Screw		Tightening torque	3 Nm
<b>Track rod end to swivel bearing</b>			Used in step <a href="#">80</a>
M14	Renew nut.	Tightening torque	175 Nm
<b>Wishbone to swivel bearing</b>			Used in step <a href="#">80</a>
M10	Exclusively use the screw to tighten! Renew screw and nut.	Tightening torque	60 Nm
<b>Holder, wishbone rubber mount, to body</b>			Used in step <a href="#">81</a>
M10 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °
<b>Holder with rubber mount to front axle support</b>			Used in step <a href="#">81</a>
M12 screw			100 Nm
<b>Washer fluid reservoir holder to front axle support adapter plate</b>			Used in step <a href="#">81</a>
		Tightening torque	10 Nm
<b>Deformation element, bottom, to adapter plate, front axle carrier</b>			Used in step <a href="#">81</a>
		Tightening torque	11,8 Nm

**Holder to front axle support**Used in step [82](#)

Oval-head screw TS5 x 16		Tightening torque	2,6 Nm
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**Anti-roll bar link to anti-roll bar**Used in step [84](#)

M10	Renew nut.	Tightening torque	56 Nm
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**Wheel arch cover to body**Used in step [86](#)

Plastic nut		Tightening torque	2,6 Nm
Screw		Tightening torque	2,6 Nm

**Wheel arch cover to body**Used in step [86](#)

Screw		Tightening torque	2,5 Nm
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**Wheel arch cover to body**Used in step [86](#)

Plastic nut		Tightening torque	3 Nm
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**Brake disc to rear wheel hub**Used in step [87](#)

M8	Renew screw.	Tightening torque	16 Nm
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**Brake disc to front wheel hub**Used in step [87](#)

M8	Renew screw.	Tightening torque	16 Nm
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**Wheel bolts**Used in step [87](#)

M 14/AF 17	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	140 Nm
		Check	140 Nm

**Lower steering shaft to steering gear**Used in step [89](#)

M10	Clean screw thread and remove remains of screw locking agent. Renew screw.	Tightening torque	28 Nm
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**Steering column cover to bulkhead**Used in step [89](#)

Plastic nut		Tightening torque	3 Nm
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**Heat shield for exhaust turbocharger**Used in step [90](#)

Torx screw BM 6x12		Tightening torque	10 Nm
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**Rear bulkhead upper part to lower section of bulkhead**Used in step [91](#)

Oval-head screw		Tightening torque	5 Nm
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**Battery holder to engine support**Used in step [92](#)

Hexagon screw M8x30		Tightening torque	19 Nm
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**Electronics box to battery tray**Used in step [93](#)

M8X16		Tightening torque	15 Nm
<b>Wiring harness to cylinder head cover</b>			Used in step <a href="#">93</a>
TS5x20		Tightening torque	3,5 Nm
<b>Cover to electronics box</b>			Used in step <a href="#">93</a>
RF5x26.5		Tightening torque	2,5 Nm
<b>Positive battery terminal to battery</b>			Used in step <a href="#">93</a>
NutM6		Tightening torque	5 Nm
<b>Tension strut to spring strut dome/battery tray</b>			Used in step <a href="#">93</a>
M8		Tightening torque	19 Nm
<b>Clean air pipe to cylinder head cover</b>			Used in step <a href="#">94</a>
Oval-head screw	Renew screw.	Tightening torque	8 Nm
<b>Clean air pipe to intake silencer housing</b>			Used in step <a href="#">94</a> <a href="#">100</a>
Clamp		Tightening torque	3 Nm
<b>Resonator to manifold and clean air pipe</b>			Used in step <a href="#">95</a>
Screw TS6	Renew screw.	Tightening torque	5 Nm
<b>Cover of top bulkhead</b>			Used in step <a href="#">97</a>
Screw		Tightening torque	2,6 Nm
<b>Cover of remote positive terminal</b>			Used in step <a href="#">97</a>
Screw		Tightening torque	2,6 Nm
<b>Battery terminal rail to battery tray</b>			Used in step <a href="#">98</a>
M8			19 Nm
<b>Battery terminal with IBS positive battery terminal / negative battery terminal</b>			Used in step <a href="#">98</a> <a href="#">99</a>
NutM6			5 Nm
<b>Trailing link</b>			Used in step <a href="#">98</a>
M8		Tightening torque	19 Nm
<b>Battery cover</b>			Used in step <a href="#">98</a>
M8			2,8 Nm
<b>Intake silencer housing to lock bridge</b>			Used in step <a href="#">100</a>
M6X30		Tightening torque	8 Nm
<b>Intake neck to cross connection</b>			Used in step <a href="#">101</a>
M6		Tightening torque	8 Nm
<b>Cross-brace to spring strut dome</b>			Used in step <a href="#">102</a>
	Renew screw.	Jointing torque	28 Nm
		Angle of rotation	180 °

**Cover on body**Used in step [102](#)

Hexagon screw		Tightening torque	3 Nm
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**Oil filler plug to transmission housing**Used in step [105](#)

M14	Renew the sealing ring.	Tightening torque	45 Nm
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**Overflow screw in oil drain plug**Used in step [105](#)

M6	Renew the sealing ring.		8 Nm
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**Underbody protection front**Used in step [107](#)

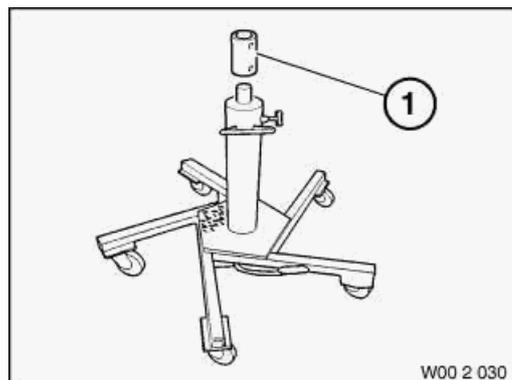
Screw for thermoplastic plastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

**Underbody panelling, side**Used in step [108](#)

Hexagon screw		Tightening torque	2,6 Nm
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**Underbody panelling, side**Used in step [108](#)

Plastic nut		Tightening torque	2,6 Nm
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**Overview of Special Tools****0 490 133 (00 2 030) Device****Common**Used in step [28](#) [80](#)

Usage	(universal hydraulic lifter base unit) Chassis and hydraulic lifter - For removing and installing rear axle supports and gearboxes. Also for soft top mounts. Is replaced by 81 22 2 219 012
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 90 (207)

**Consisting of**

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	<a href="#">0 490 134 (00 2 031)</a>		<b>Adapter</b> (adapter for gearbox holder) Model series: E30, E31, E32, E34, E36	

## 0 495 554 (33 5 070) Extension



### Common

Used in step 34 74

Usage Pull-out extension for 33 5 040, 33 5 050, 33 5 060.

Included in the tool or work

Storage location A18

Replaced by

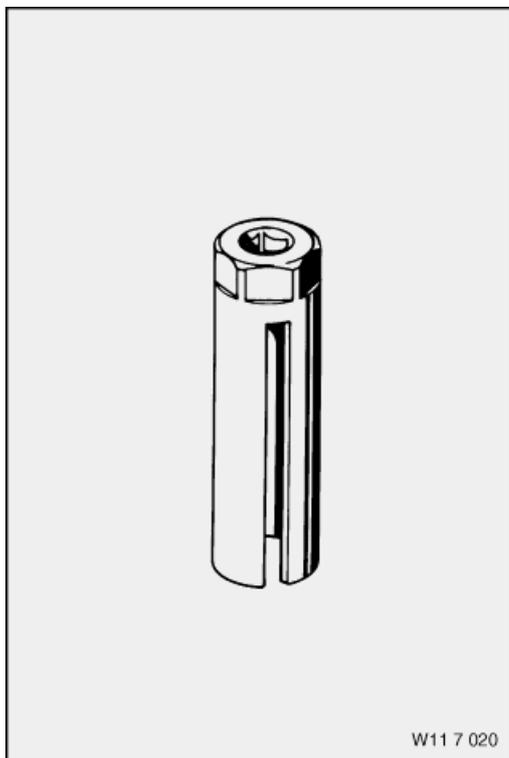
In connection with

SI-Number 01 21 06 (300)

### Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	<a href="#">0 495 592 (33 5 071)</a>		<b>Extension</b> (Extension (1 item)) discontinued, can only be ordered using complete tool	

## 0 491 074 (11 7 020) Socket wrench insert



### Common

Used in step 40 41 68

Usage (Socket wrench insert 22 mm) For loosening and tightening the oxygen sensor

Included in the tool or work

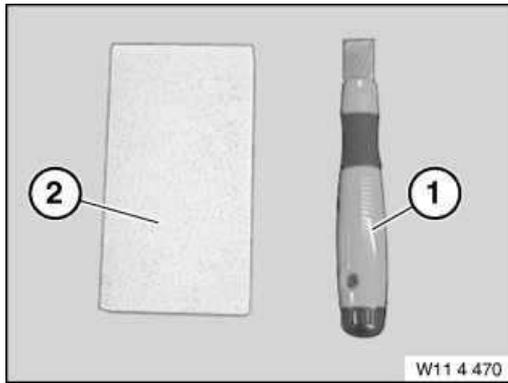
Storage location A9

Replaced by

In connection with

SI-Number

## 0 495 102 (11 4 470) Tool



### Common

Used in step 56

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	<a href="#">0 495 103 (11 4 471)</a>		<b>Scraper</b>	
2	<a href="#">0 495 104 (11 4 472)</a>		<b>Extractor (grindstone)</b>	

## 2 409 025 Puller



### Common

Used in step 69

Usage For disassembly of the outer radial shaft seal of the transmission output shaft, right. 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 A76

Replaced by

In connection with

SI-Number 01 53 14 (211)

## 2 411 739 Puller



### Common

Used in step 69

Usage For disassembly of the inner radial shaft seal of the output, right. 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 C78

Replaced by

In connection with

SI-Number 01 53 14 (211)

## 2 408 152 Striking element



### Common

Used in step 69

Usage	For installation of the right radial shaft seal transmission output shaft (inner). 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).
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Included in the tool or work

Storage location B78

Replaced by

In connection with 2413037

SI-Number 01 53 14 (211)

## 2 413 037 Handle



### Common

Used in step 69

Usage	Universal drift handle. 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).
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Included in the tool or work

Storage location C77

Replaced by

In connection with

SI-Number 01 53 14 (211)

## 2 408 150 Striking element



### Common

Used in step 69

Usage	For installing the right radial shaft seal transmission output shaft (outer). 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).
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Included in the tool or work

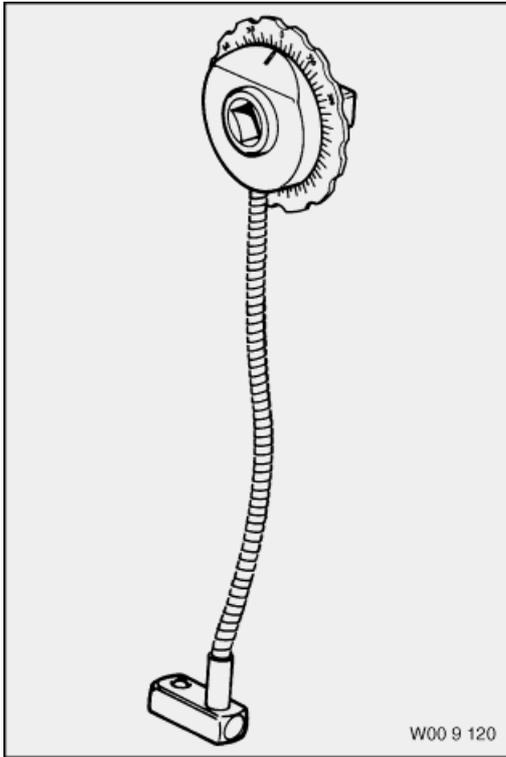
Storage location B78

Replaced by

In connection with 2413037

SI-Number 01 53 14 (211)

## 0 490 504 (00 9 120) Torque angle measuring dial



### Common

Used in step 74

Usage For torsion angle adjustment of cylinder head bolts (all engines) And reinforcement plate front axle support E46

Included in the tool or work

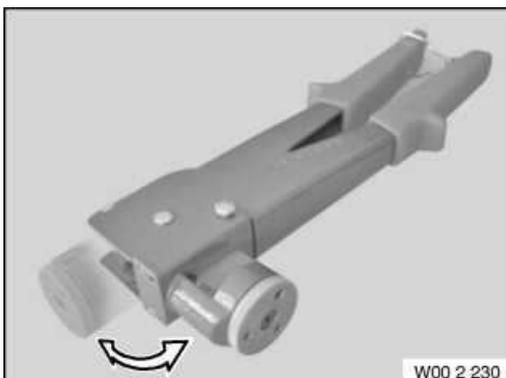
Storage location A4

Replaced by

In connection with

SI-Number

## 0 496 521 (00 2 230) Pliers



### Common

Used in step 86

Usage (Blind rivet pliers for plastic rivets) For shaft diameters of 3.5 mm, 3.9 mm and 4.5 mm

Included in the tool or work

Storage location C25

Replaced by

In connection with

SI-Number 01 17 08 (478)

## 2 344 011 Tool



### Common

Used in step [87](#)

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:

### 0 495 221 (36 1 323) Wheel stud



### Common

Used in step [18](#)

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 [18](#)

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

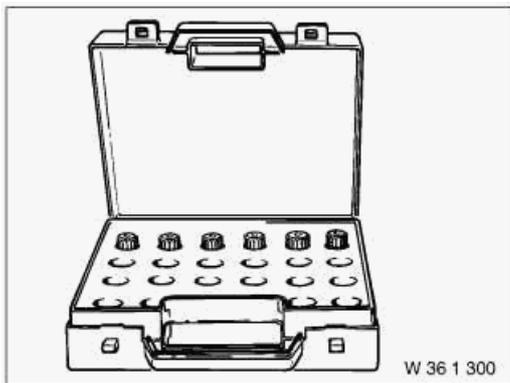
Storage location

Replaced by

In connection with

SI-Number

### 0 495 225 (36 1 327) Wheel stud



#### Common

Used in step 18

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 18

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

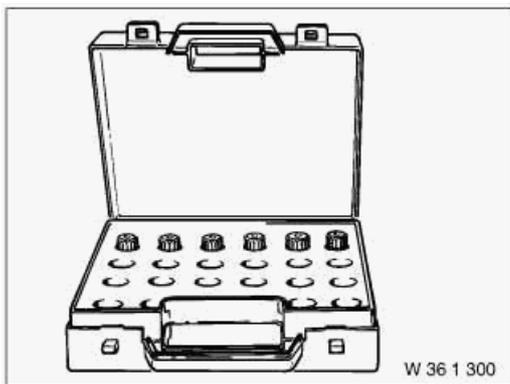
Storage location

Replaced by

In connection with

SI-Number

### 0 495 227 (36 1 329) Wheel stud



#### Common

Used in step 18

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 18

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 18

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

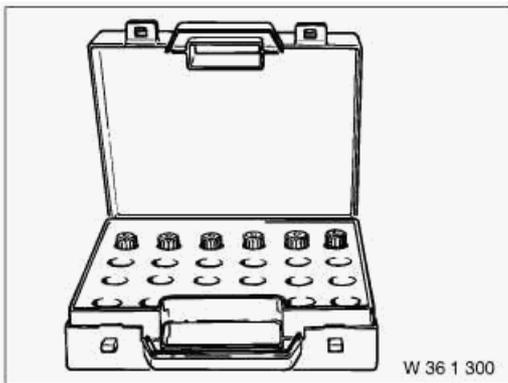
Storage location

Replaced by

In connection with

SI-Number

## 0 495 230 (36 1 333) Wheel stud



### Common

Used in step 18

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

## Links

### General repair instructions

Used in step

[61 20 ... Notes on AGM battery](#)

99

[61 12 ... Notes on intelligent battery sensor \(IBS\)](#)

99

[61 00 ... Notes for disconnecting and connecting battery](#)

99

[41 00 ... Notes on repairing threads](#)

[61 00 ... Safety information for handling vehicle battery](#)

### Repair instructions

Used in step

[61 35 ... Notes on ESD protection \(Electro Static Discharge\)](#)

12 40 41 43 44 45 46 47

[00 ... Raising the vehicle using a vehicle hoist](#)

### Operating materials

Used in step

[2.0 Grease for wheel centring](#)

87

[14.0 Automatic transmission fluid for ZF-transmission GA8HP45Z / GA8HP50Z / GA8HP70Z / GA8HP90Z / GA8P70H / GA8P75H / GA8HP75Z](#)

105

### Operating materials

Used in step

# 12 61 586 Replace oil pressure sensor



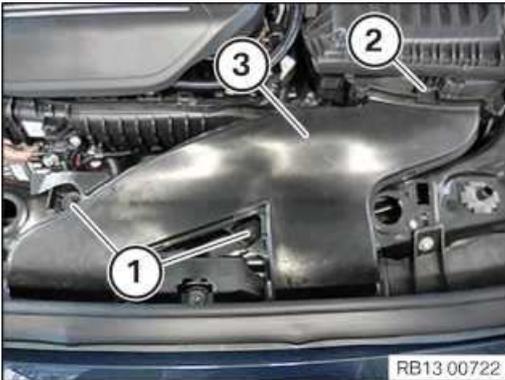
## TECHNICAL INFORMATION



- 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!

## PRELIMINARY WORK

### 1 – Remove the intake neck for intake silencer housing



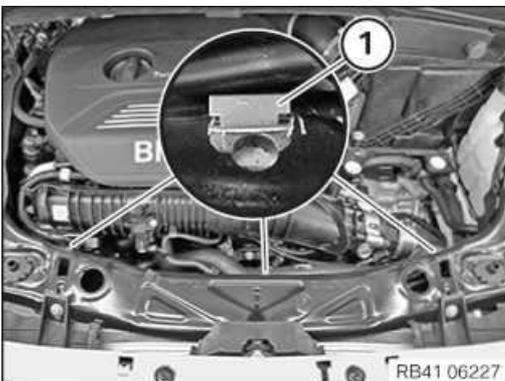
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

### 2 – Removing intake silencer housing

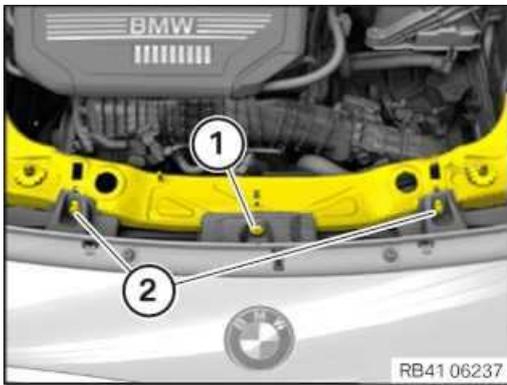


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

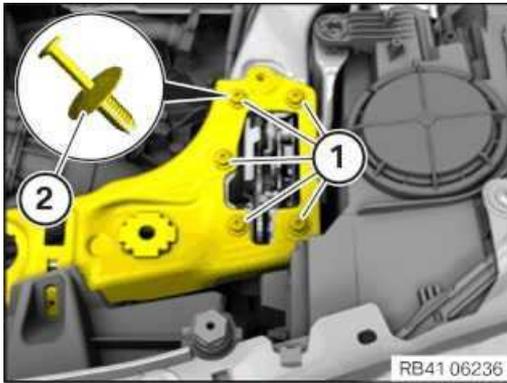
### 3 – Remove front cross connection



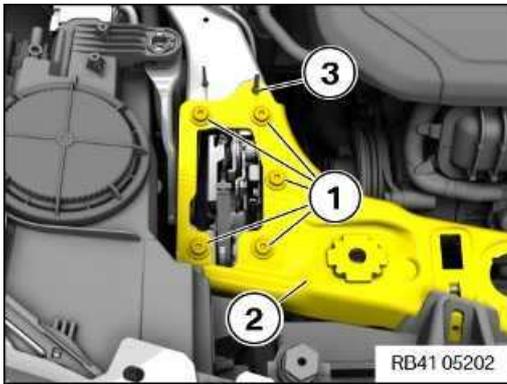
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



- Loosen screw (1).
- Loosen screws (2).



- Loosen screws (1).
- Lever out expanding rivet (2).



- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

#### 4 – Removing the fan cowl with electric fan



#### WARNING

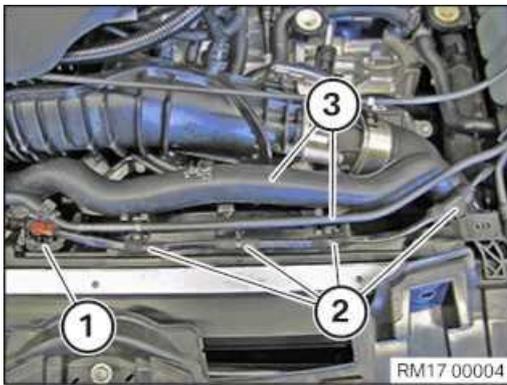
**Hot surfaces.**

**Risk of burning!**

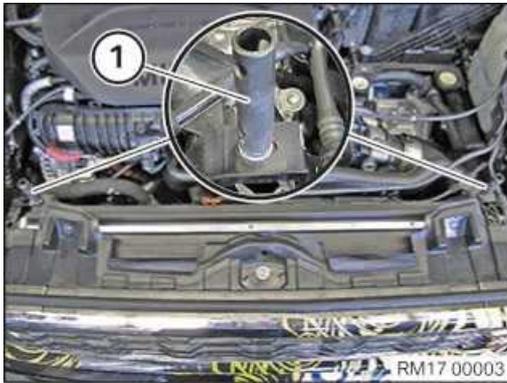
- Perform all work only on components that have cooled down.



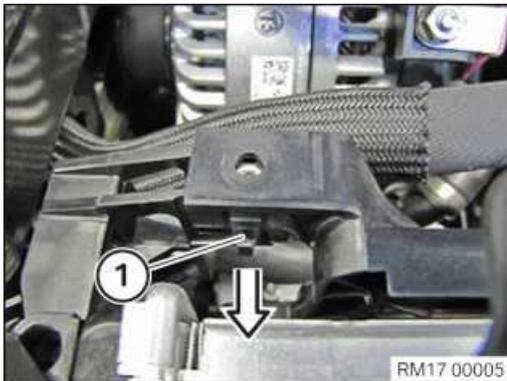
- Feed out and remove the sealing (1) from the radiator.



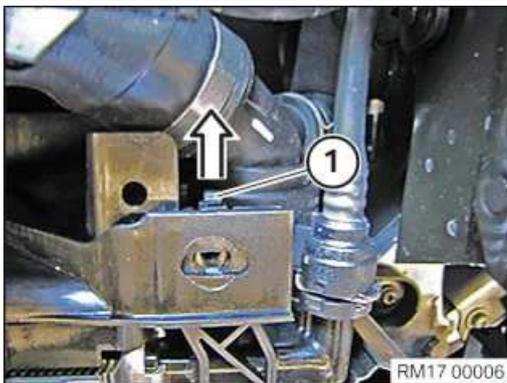
- Unlock plug connection (1) and disconnect.
- Unlock and loosen the clamps (2).
- Feed out connector (1) and place to one side.
- Thread off coolant line (3) and place to the side.



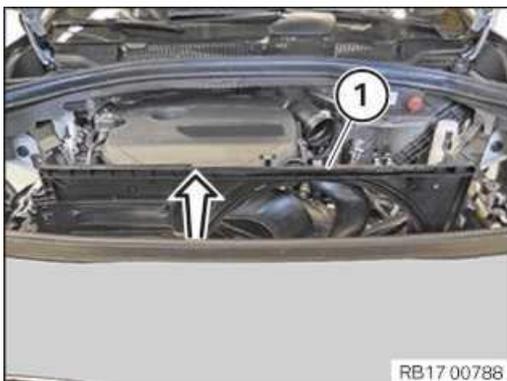
- Loosen screws (1).



- Unlock the right lock (1) on the fan cowl in the direction of the arrow.



- Unlock the left lock (1) on the fan cowl in the direction of the arrow.



- Guide out fan cowl (1) in direction of arrow and remove.

## MAIN WORK

### 5 – Remove oil pressure sensor



#### WARNING

Hot fluids.

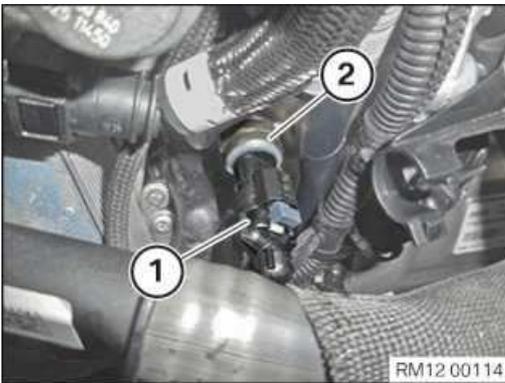
#### Risk of scalding!

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



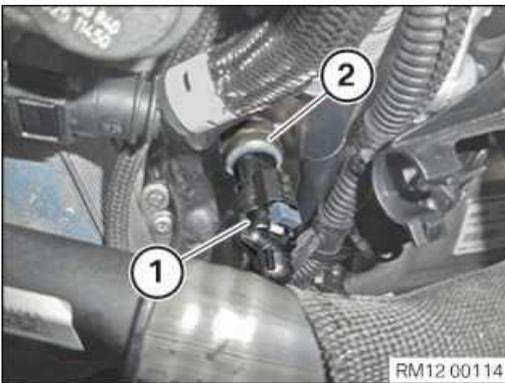
#### TECHNICAL INFORMATION

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



- Unlock and disconnect the plug connection (1).
- Release and remove oil pressure sensor (2) under the high pressure pump.
- Catch and dispose of emerging engine oil.

### 6 – Install oil pressure sensor



- Guide in and install the oil pressure sensor (2).
- Tighten the oil pressure sensor (2).

#### Oil pressure sensor on crankcase

Sensor	Tightening torque
	15 Nm

- Connect connectors (1) and lock.  
The connector (1) must engage audibly.

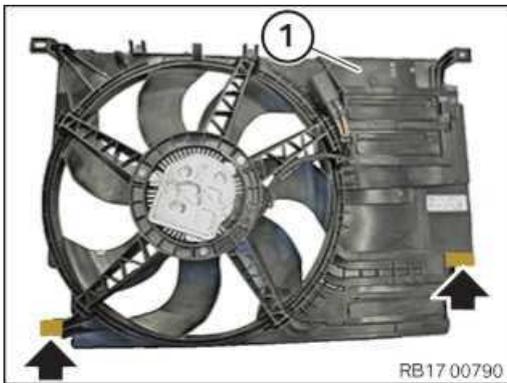
## POSTPROCESSES

### 7 – Installing fan cowl with electric fan

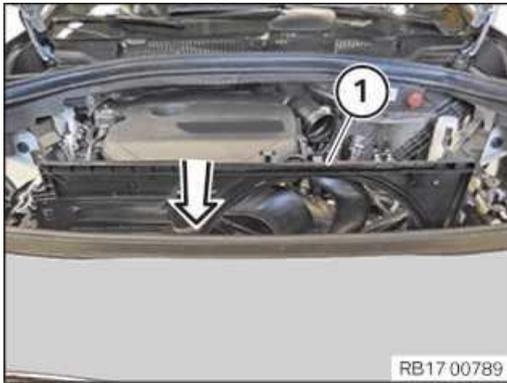


#### TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.



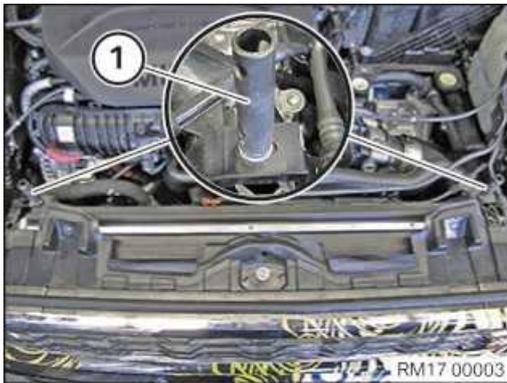
- Feed the guides (arrows) of the fan cowl (1) into the charge air cooler.



- Feed in and install the fan cowl (1) in the direction of the arrow.



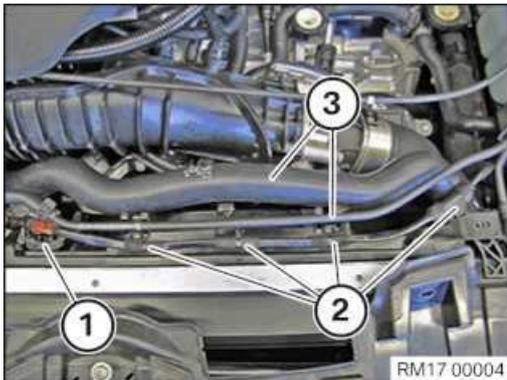
- Lock the left and right locks (arrows).



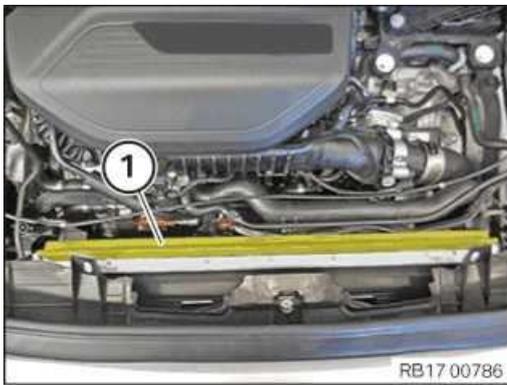
- Tighten the screws (1).

#### Fan cowl on radiator

M6X12		Tightening torque	6 Nm
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- Connect connectors (1) and lock.  
The connector (1) must engage audibly.
- Secure clamps (2).
- Thread in and install coolant line (3).

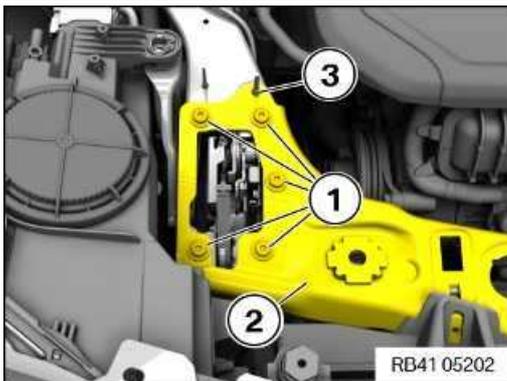


- Guide the sealing (1) on the radiator in and install it.

## 8 – Install front cross connection



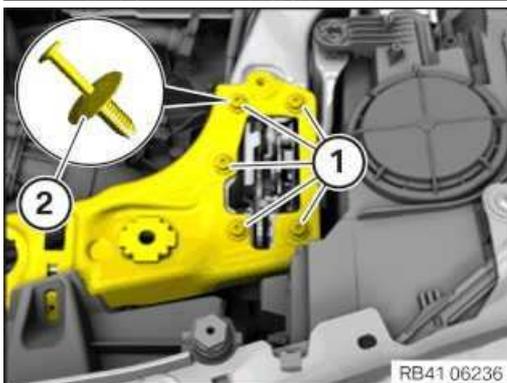
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

### Cross connection to carrier support

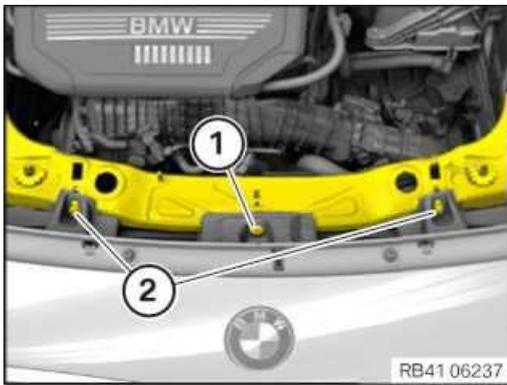
Screws M6x20	Tightening torque	11,8 Nm
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- Tighten the screws (1).

### Cross connection to carrier support

Screws M6x20	Tightening torque	11,8 Nm
--------------	-------------------	---------



- Position screws (3) on the rubber mounts for the radiator and tighten.

#### Screw connection for rubber mount of coolant radiator to coolant radiator

Bolt to rubber mount		Tightening torque	8 Nm
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- Tighten down screws (2).

#### Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
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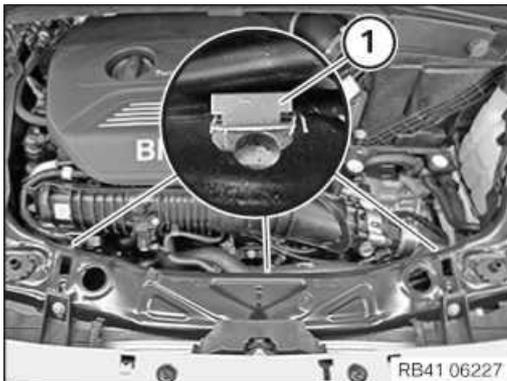
- Tighten down screw (1).

#### Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
-------------	--	-------------------	-------



- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

### 9 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

#### Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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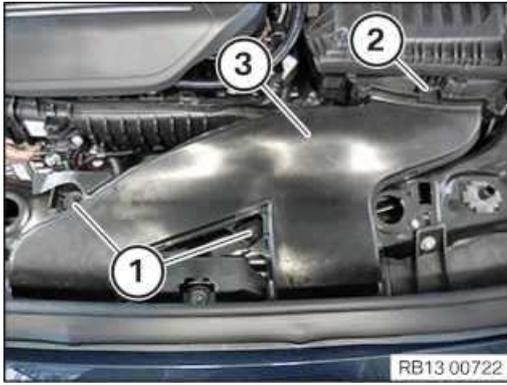
- Tighten clamp (4).

#### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
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- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

### 10 – Install the intake neck for the intake filter housing



- Insert and install the intake neck (3).  
The lock (2) must audibly engage.
- Tighten nuts (1).

#### Intake neck to cross connection

M6		Tightening torque	8 Nm
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## 11 – Check engine oil level

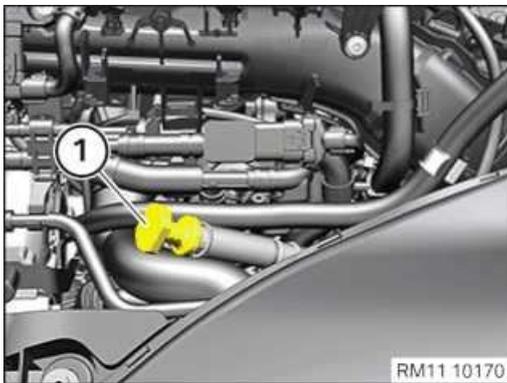
- Park vehicle on a horizontal surface.
- In the case of automatic transmission, shift to selector lever position N or P.
- Accelerator pedal is not pressed.
- Engine is running and is at operating temperature.
- Read off the engine oil level in the instrument cluster (KOMBI) or on the control display.
- Top up engine oil if necessary.

### ► Check engine oil level



#### TECHNICAL INFORMATION

Always check the engine oil level when the engine is at operating temperature (engine oil temperature > 70°C).



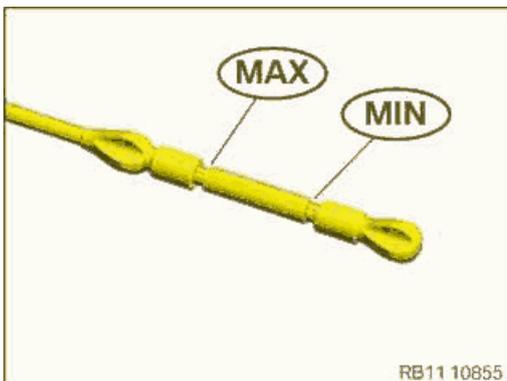
- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick (1) and wipe off using a lint-free cloth.



#### TECHNICAL INFORMATION

Do not pull out or insert the oil dipstick into the guide tube too quickly or slowly.

- Push the oil dipstick (1) into the guide tube up to the limit position and pull it out again.



#### TECHNICAL INFORMATION

The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- Read the engine oil level on the oil dipstick.
- Top up engine oil if necessary.

## Additional Information

## Overview of Tightening Torques

<b>Oil pressure sensor on crankcase</b>			Used in step <a href="#">6</a>
Sensor		Tightening torque	15 Nm
<b>Fan cowl on radiator</b>			Used in step <a href="#">7</a>
M6X12		Tightening torque	6 Nm
<b>Cross connection to carrier support</b>			Used in step <a href="#">8</a>
Screws M6x20		Tightening torque	11,8 Nm
<b>Screw connection for rubber mount of coolant radiator to coolant radiator</b>			Used in step <a href="#">8</a>
Bolt to rubber mount		Tightening torque	8 Nm
<b>Air duct to upper connection</b>			Used in step <a href="#">8</a>
M6x20 screw		Tightening torque	11,8 Nm
<b>Bracing strut to upper connection</b>			Used in step <a href="#">8</a>
M8x20 screw		Tightening torque	28 Nm
<b>Intake silencer housing to lock bridge</b>			Used in step <a href="#">9</a>
M6X30		Tightening torque	8 Nm
<b>Clean air pipe to intake silencer housing</b>			Used in step <a href="#">9</a>
Clamp		Tightening torque	3 Nm
<b>Intake neck to cross connection</b>			Used in step <a href="#">10</a>
M6		Tightening torque	8 Nm

## Overview Technical Data

# 12 61 285 Replacing engine oil level sensor

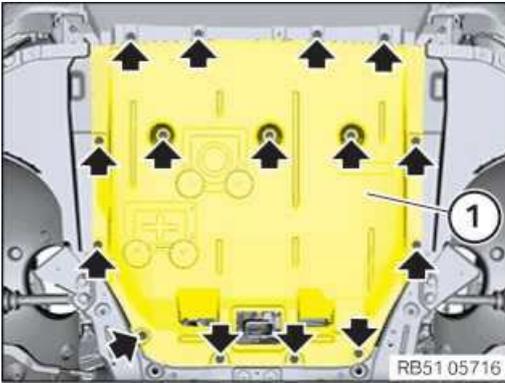
## PRELIMINARY WORK

### 1 – Removing the oil filler cap

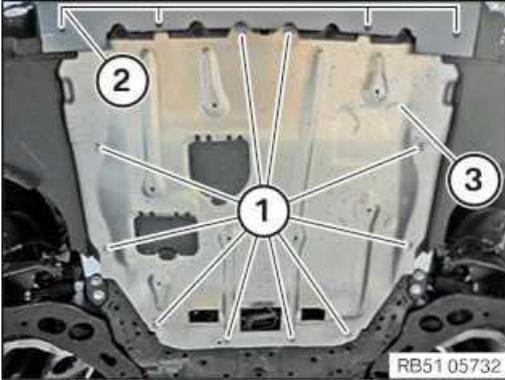


- Open oil filler cap (1).

### 2 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

### 3 – 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).
- Drain engine oil.

## MAIN WORK

### 4 – Removing the engine oil-level sensor



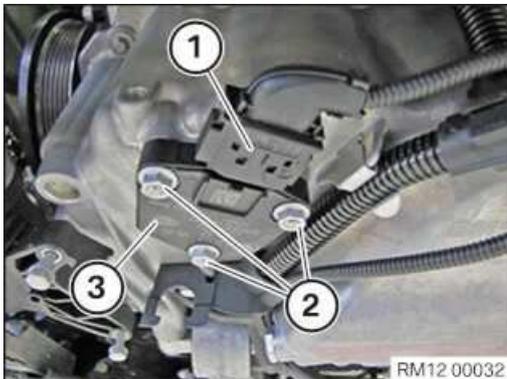
#### RISK OF DAMAGE



**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.



- Unlock connector (1) and pull off.
- Loosen nuts (2).
- Feed out and remove the oil-level sensor (3).

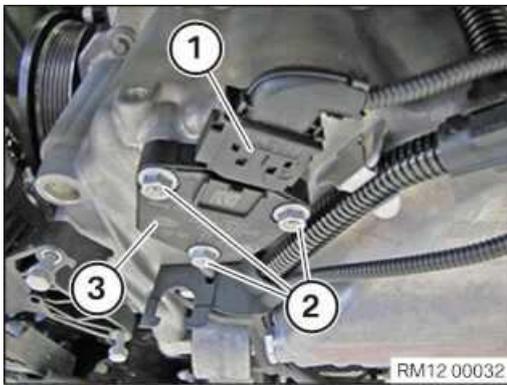
### 5 – Installing the oil-level sensor for engine oil



#### ► Prepare the oil-level sensor

- Renew sealing ring (1).

**Parts:** Sealing ring



- Clean sealing surface on oil sump.
- Insert and install the oil-level sensor (3).
- Tighten nuts (2).

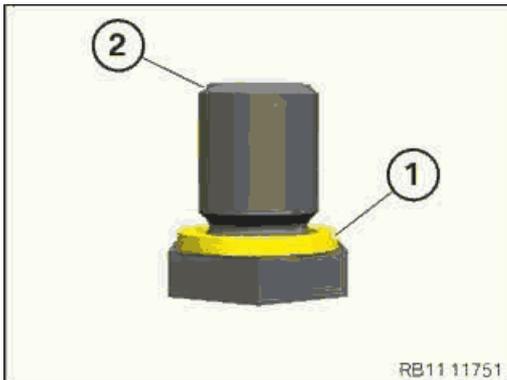
#### Oil level sensor to oil sump

M6		Jointing torque	2 Nm
		Tightening torque	8 Nm

- Connect and lock the connector (1).  
The connector (1) must engage audibly.

## POSTPROCESSES

### 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.

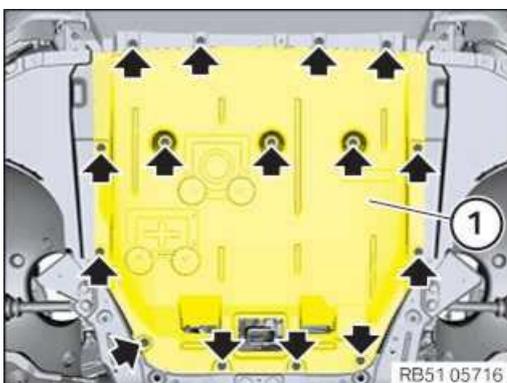


- Renew the sealing ring.  
**Parts:** Sealing ring
- Position oil drain plug (1) on the oil sump and tighten.

#### Oil drain plug on oil sump

M12x1.5	Renew the sealing ring.	Tightening torque	25 Nm
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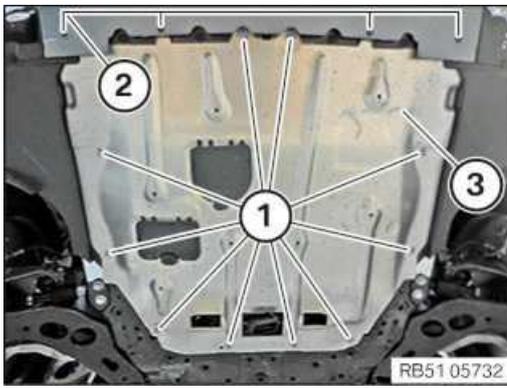
### 7 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

#### Underbody protection front

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



- **Equipment specification with metal underdrive guard:**
- Guide in and attach the underdrive guard (3).
- Tighten down screws (1) and (2).

#### Underbody protection front

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

## 8 – 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.

- Pour in engine oil.

#### Engine oilB47TÜ1

Capacity of engine oil	5,5 l
Engine oil: Technically suitable engine oils for BMW Group engines	

## 9 – Installing the oil filler cap



- Close oil filler cap (1).

## 10 – Check engine oil level

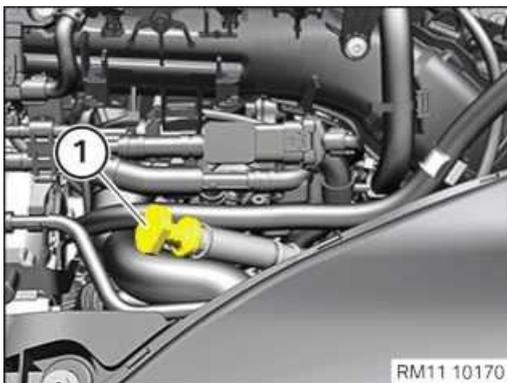
- Park vehicle on a horizontal surface.
- In the case of automatic transmission, shift to selector lever position N or P.
- Accelerator pedal is not pressed.
- Engine is running and is at operating temperature.
- Read off the engine oil level in the instrument cluster (KOMBI) or on the control display.
- Top up engine oil if necessary.

► **Check engine oil level**



**TECHNICAL INFORMATION**

Always check the engine oil level when the engine is at operating temperature (engine oil temperature > 70°C).



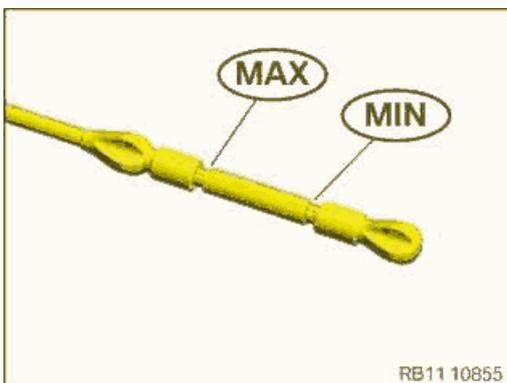
- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick (1) and wipe off using a lint-free cloth.



**TECHNICAL INFORMATION**

Do not pull out or insert the oil dipstick into the guide tube too quickly or slowly.

- Push the oil dipstick (1) into the guide tube up to the limit position and pull it out again.



**TECHNICAL INFORMATION**

The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- Read the engine oil level on the oil dipstick.
- Top up engine oil if necessary.

**Additional Information**

**Overview of Tightening Torques**

**Oil level sensor to oil sump**

Used in step 5

M6	Jointing torque	2 Nm
	Tightening torque	8 Nm

**Oil drain plug on oil sump**

Used in step 6

M12x1.5	Renew the sealing ring.	Tightening torque	25 Nm
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## Underbody protection front

Used in step 7

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

## Overview Technical Data

### Engine oilB47TÜ1

Used in step 8

Capacity of engine oil	5,5 l
Engine oil: Technically suitable engine oils for BMW Group engines	

## Links

### Repair instructions

Used in step

<a href="#">61 35 ... Notes on ESD protection (Electro Static Discharge)</a>	4
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### Operating materials

Used in step

<a href="#">3.0 Technically appropriate engine oils for BMW Group engines</a>	8
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# 12 63 586 Replacing power distribution box



## 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.

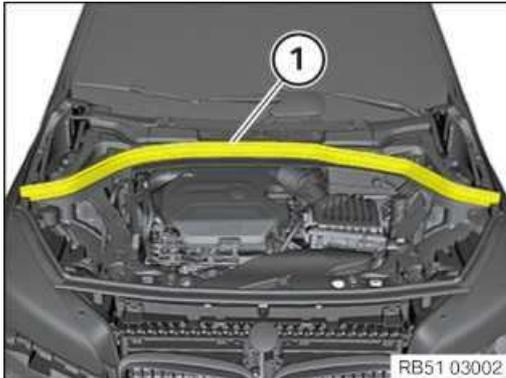
## PRELIMINARY WORK

### 1 – Remove the seal for the rear bonnet



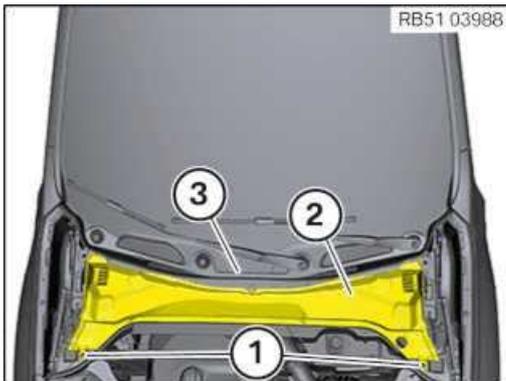
## NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Pull off rear bonnet seal (1) towards the top and remove.

### 2 – Removing front cowl panel cover



- Loosen the expanding rivet (1).
- Feed out and remove front cowl panel cover (2) from the rear cowl panel cover(3).

### 3 – Disconnecting all battery earth leads



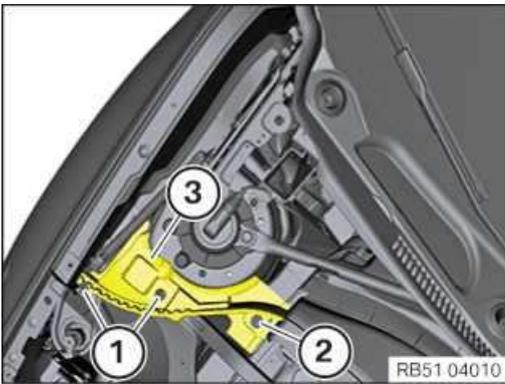
- See additional information.

#### 4 – Remove suspension cross-brace



#### TECHNICAL INFORMATION

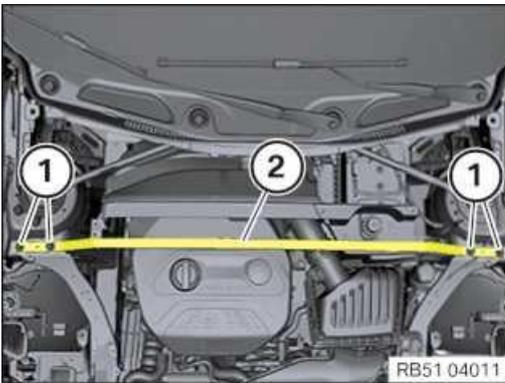
Driving without the strut brace/front end or tension strut is not permitted.



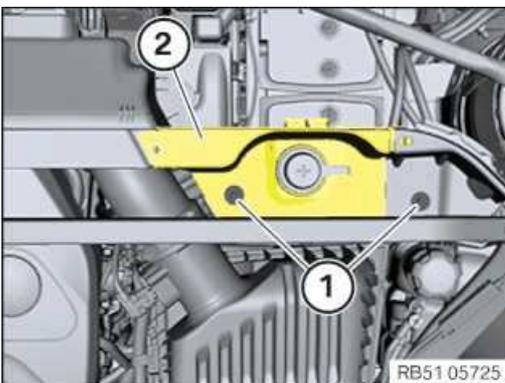
#### NOTICE

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

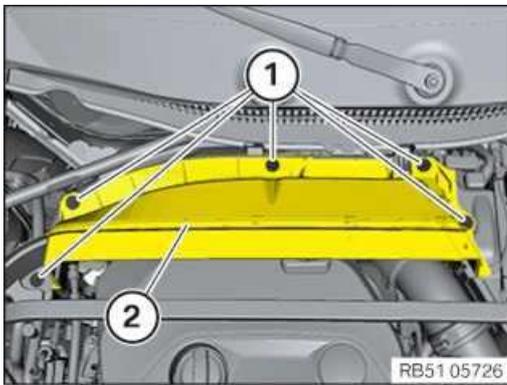
- Loosen expanding rivet (1).
- Loosen screw (2).
- Remove the cover (3).
- Loosen screws (1).
- Remove strut brace (2).



#### 5 – Removing the upper bulkhead cover

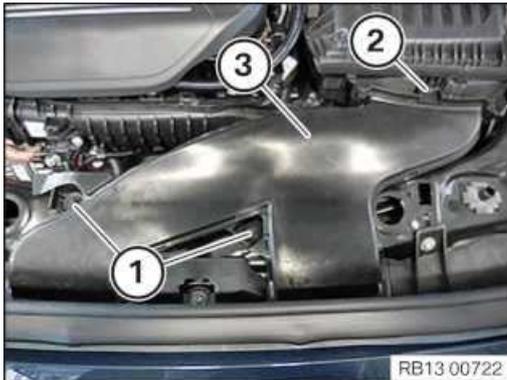


- Loosen screws (1).
- Guide out and remove the cover (2).



- Loosen screws (1).
- Feed out and remove the upper bulkhead cover (2).

#### 6 – Remove the intake neck for intake silencer housing



- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

#### 7 – Removing intake silencer housing



- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

#### 8 – Remove DDE control unit

##### Prerequisite

Disconnect battery.



#### 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.



## 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

Follow instructions for removing and installing control units.

For additional information see: 12 00 ... Notes on removal and installation of control units



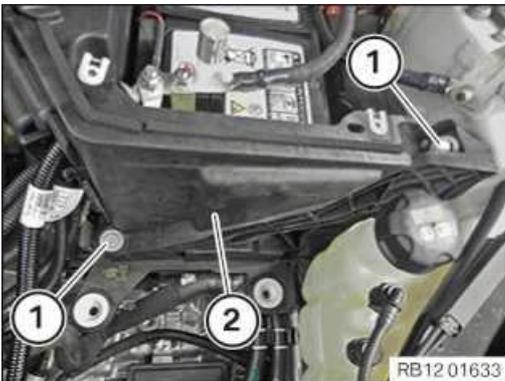
## TECHNICAL INFORMATION

In a warranty case, you must always provide a fault memory printout with the defective part, even if the fault memory does not contain an entry.



## TECHNICAL INFORMATION

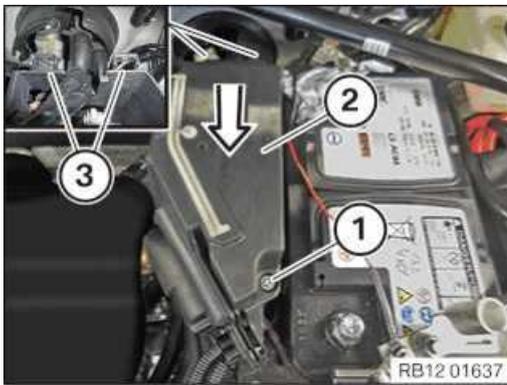
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



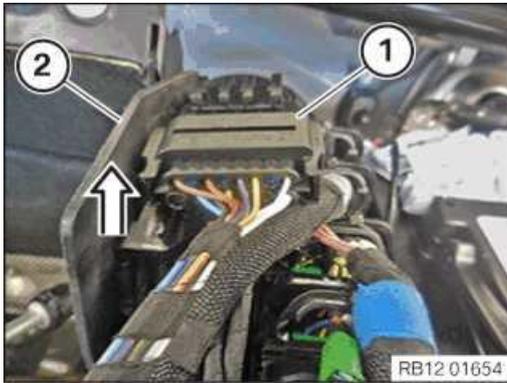
- Loosen screws (1).
- Guide out the tension strut (2) toward the top and remove it.



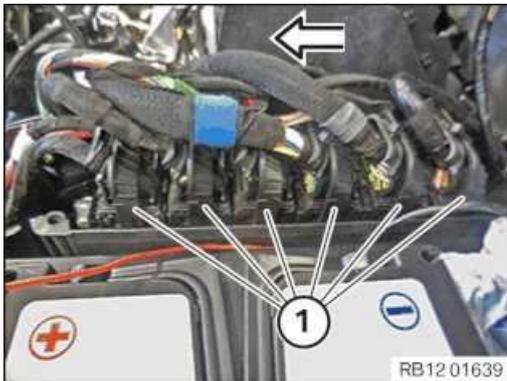
- Undo positive battery terminal (1).
- Feed out positive battery terminal (1) and set aside.
- Guide the positive battery cable (2) out of the holder (3) and lay to one side.



- Loosen screw (1).
- Unlock cover (2) and feed out and remove from the guides (3) in the direction of arrow.



- Feed out connector (1) from the electronics box (2) and remove in the direction of arrow.
- Unlock and loosen connector (1).



- Unlock and remove the connector (1) in the direction of the arrow.
- Feed out connector (1) and place to one side.



- Thread out and remove DDE control unit (1) toward the top.

## MAIN WORK

### 9 – Removing integrated supply module (PDM)



## 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.

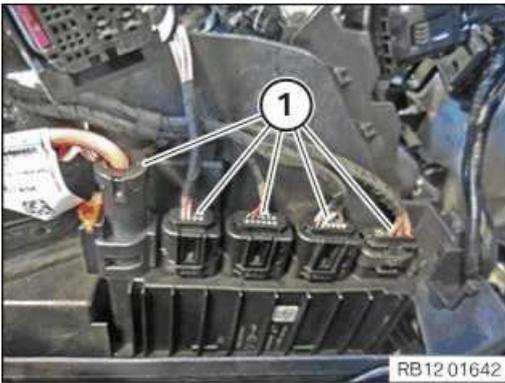


## RISK OF DAMAGE

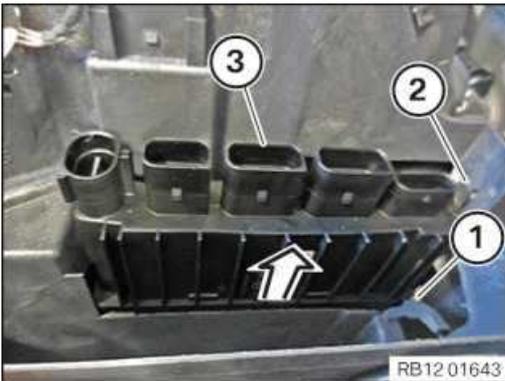
### Damage to wires when disconnecting connectors and plug connections.

#### Sheared wires can cause a short circuit.

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



- Unlock and disconnect the plug connection (1).



- Disengage locks (1) and (2).
- Guide out and remove the integrated supply module (3) in the direction of the arrow.

## 10 – Installing the integrated supply module (PDM)

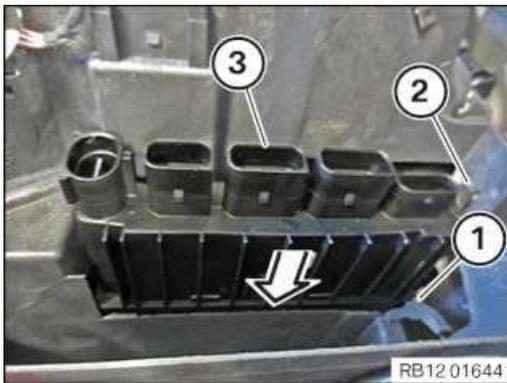


## RISK OF DAMAGE

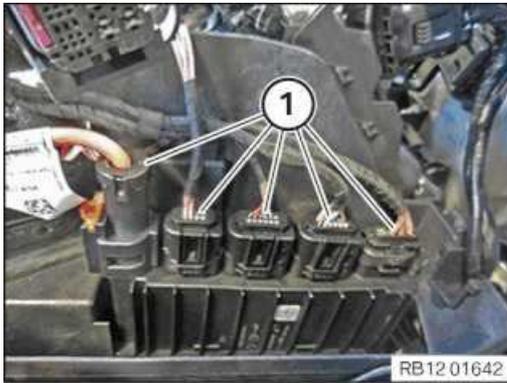
### Improper routing of cables and wiring harnesses.

#### Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.



- Insert and install the integrated supply module (3) in the direction of the arrow.
- Make sure you can hear the locks (1) and (2) engage.



- Connect connectors (1) and lock.
- Make sure the connectors (1) engage audibly.

## POSTPROCESSES

### 11 – Install DDE control unit

#### Prerequisite

Disconnect battery.



#### 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.

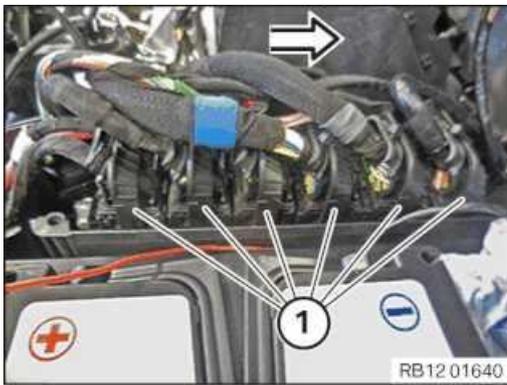


#### TECHNICAL INFORMATION

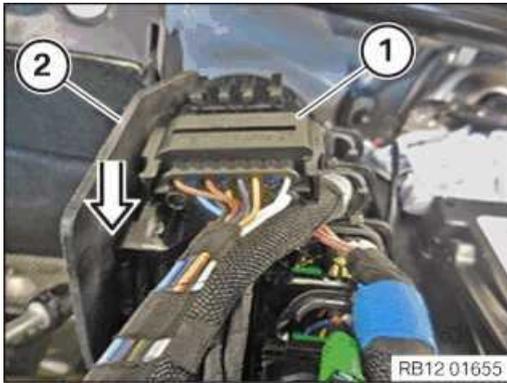
In a warranty case, you must always provide a fault memory printout with the defective part, even if the fault memory does not contain an entry.



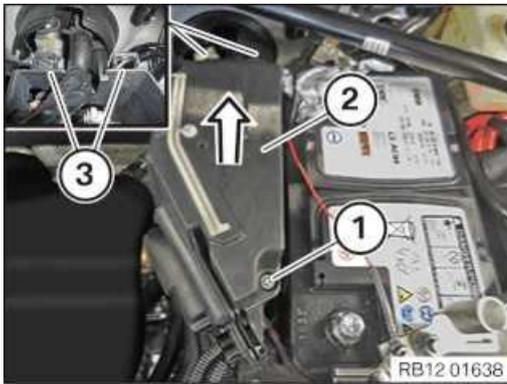
- Install DDE control unit(1).



- Connect connector (1) in direction of arrow and lock.
- Make sure the connectors (1) engage audibly.



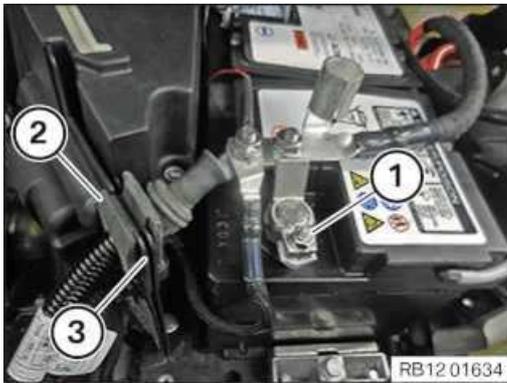
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.
- Insert the connector (1) in the direction of arrow at the electronics box (2) and install.



- Insert the cover (2) into the guides (3) in the direction of arrow and install.
- Make sure the cover audibly engages (2) in the guides (3).
- Tighten down screw (1).

#### Cover to electronics box

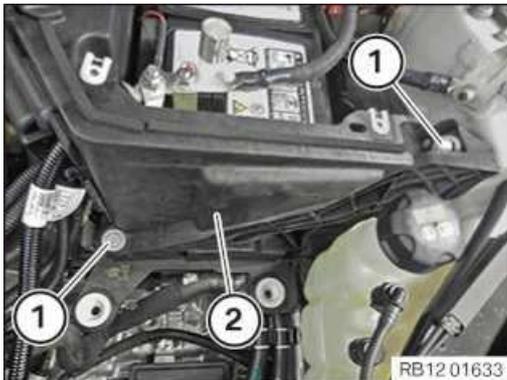
RF5x26.5		Tightening torque	2,5 Nm
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- Thread in positive battery cable (2) on holder (3) and install.
- Feed in and install positive battery terminal (1).
- Tighten positive battery terminal (1).

#### Positive battery terminal to battery

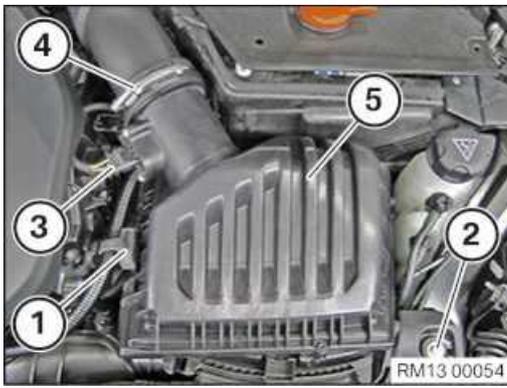
NutM6		Tightening torque	5 Nm
-------	--	-------------------	------



- Feed in and install tension strut (2).
- Tighten the screws (1).

#### Tension strut to spring strut dome/battery tray

M8		Tightening torque	19 Nm
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- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

#### Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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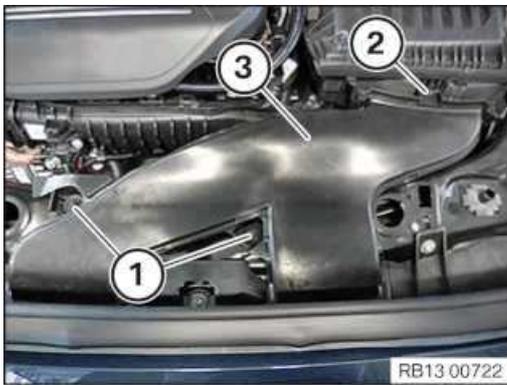
- Tighten clamp (4).

#### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

### 13 – Install the intake neck for the intake filter housing

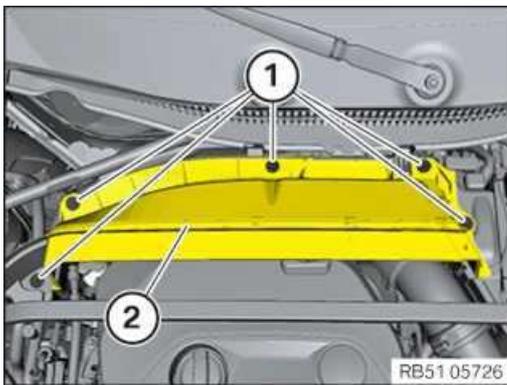


- Insert and install the intake neck (3). The lock (2) must audibly engage.
- Tighten nuts (1).

#### Intake neck to cross connection

M6		Tightening torque	8 Nm
----	--	-------------------	------

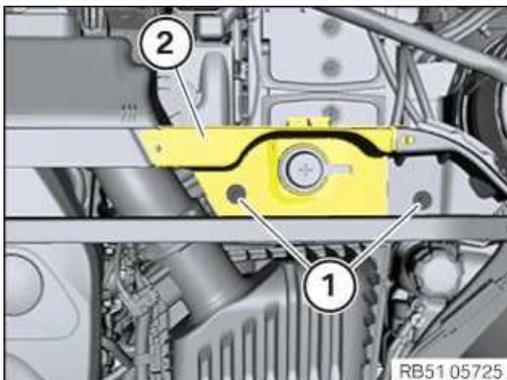
### 14 – Installing the upper bulkhead cover



- Feed in and install cover (2) of the bulkhead at the top.
- Tighten the screws (1).

#### Cover of top bulkhead

Screw		Tightening torque	2,6 Nm
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- Guide in and install cover (2).
- Tighten down screw (1).

#### Cover of remote positive terminal

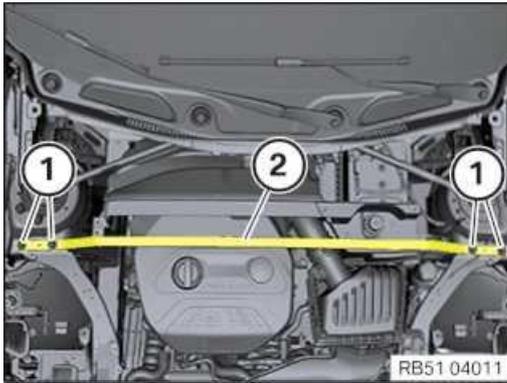
Screw		Tightening torque	2,6 Nm
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### 15 – Install strut brace



## TECHNICAL INFORMATION

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



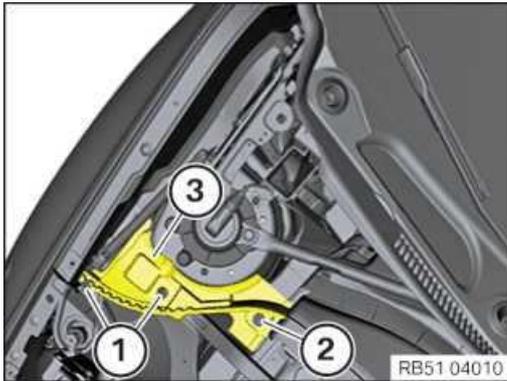
- Install the strut brace (2).
- Renew screws (1).

**Parts:** Bolts

- Tighten the screws (1).

### Cross-brace to spring strut dome

Renew screw.	Jointing torque	28 Nm
	Angle of rotation	180 °



### NOTICE

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

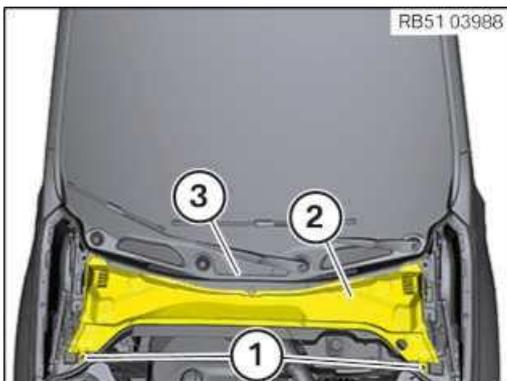
- Install the cover (3).
- Tighten down screw (2).

### Cover on body

Hexagon screw	Tightening torque	3 Nm
---------------	-------------------	------

- Install the expanding rivet (1).

## 16 – Installing front cowl panel cover



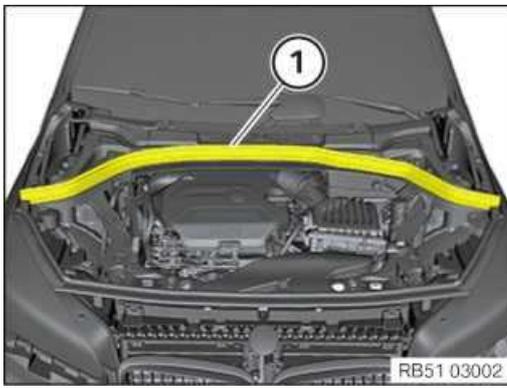
- Insert and install cowl panel cover at front (2) into cowl panel cover at rear (3).
- Check cowl panel cover at front is correctly seated (2).
- Secure expanding rivet (1).

## 17 – Install the seal for the bonnet



### NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Install bonnet seal at rear (1).
- Ensure that the rear bonnet seal (1) is fitted correctly.

## 18 – Disconnecting all battery earth leads



- See additional information.

## Additional Information

### Overview of Tightening Torques

			Used in step
<b>Cover to electronics box</b>			<a href="#">11</a>
RF5x26.5	Tightening torque		2,5 Nm
<b>Positive battery terminal to battery</b>			Used in step <a href="#">11</a>
NutM6	Tightening torque		5 Nm
<b>Tension strut to spring strut dome/battery tray</b>			Used in step <a href="#">11</a>
M8	Tightening torque		19 Nm
<b>Intake silencer housing to lock bridge</b>			Used in step <a href="#">12</a>
M6X30	Tightening torque		8 Nm
<b>Clean air pipe to intake silencer housing</b>			Used in step <a href="#">12</a>
Clamp	Tightening torque		3 Nm
<b>Intake neck to cross connection</b>			Used in step <a href="#">13</a>
M6	Tightening torque		8 Nm
<b>Cover of top bulkhead</b>			Used in step <a href="#">14</a>
Screw	Tightening torque		2,6 Nm
<b>Cover of remote positive terminal</b>			Used in step <a href="#">14</a>
Screw	Tightening torque		2,6 Nm



## 12 90 120 Removing and installing/replacing control unit holder



### 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.

### PRELIMINARY WORK

#### 1 – Disconnecting all battery earth leads



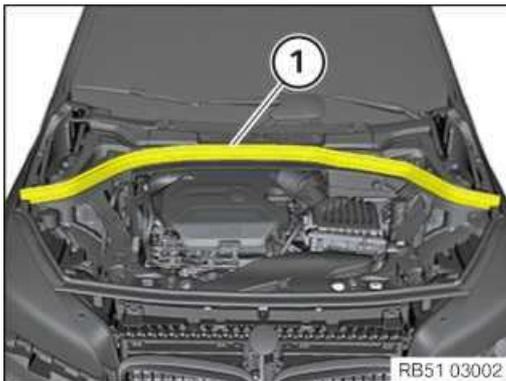
- See additional information.

#### 2 – Remove the seal for the rear bonnet



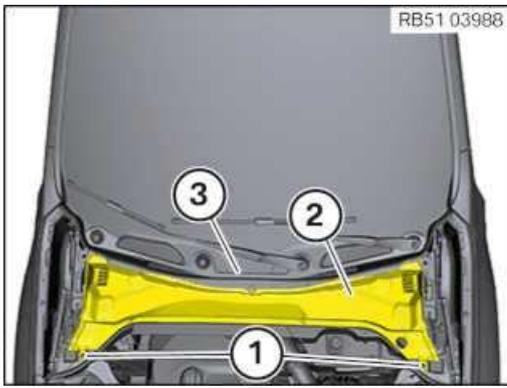
### NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Pull off rear bonnet seal (1) towards the top and remove.

#### 3 – Removing front cowl panel cover



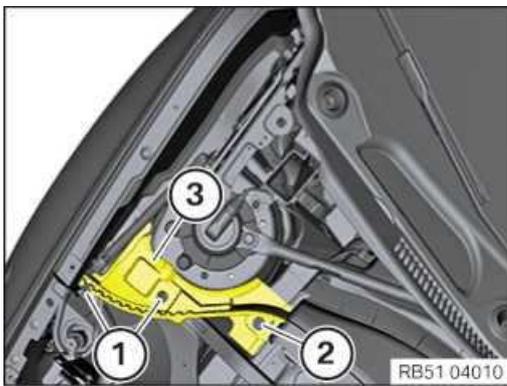
- Loosen the expanding rivet (1).
- Feed out and remove front cowl panel cover (2) from the rear cowl panel cover(3).

#### 4 – Remove suspension cross-brace



#### TECHNICAL INFORMATION

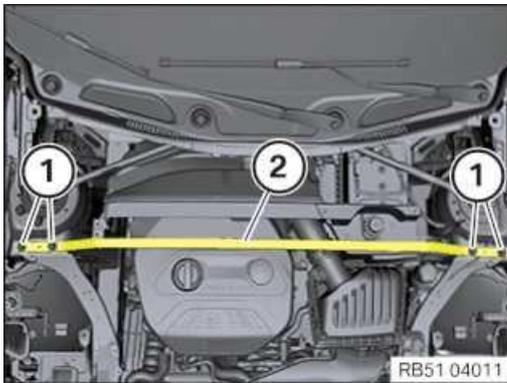
Driving without the strut brace/front end or tension strut is not permitted.



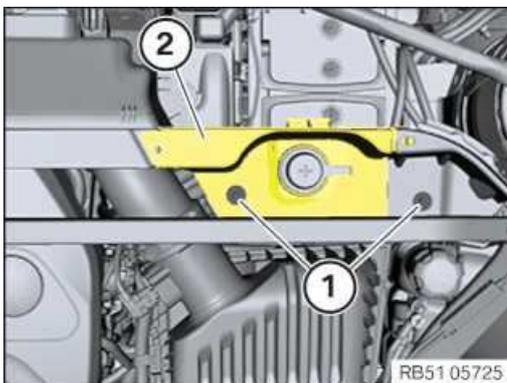
#### NOTICE

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

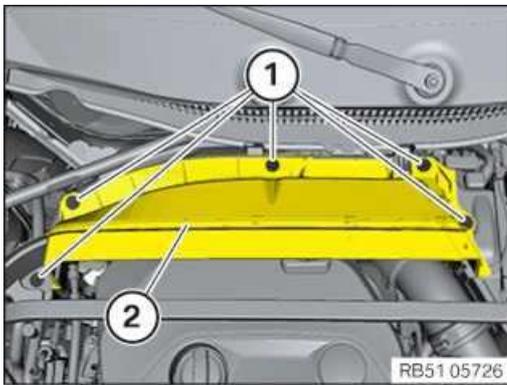
- Loosen expanding rivet (1).
- Loosen screw (2).
- Remove the cover (3).
- Loosen screws (1).
- Remove strut brace (2).



#### 5 – Removing the upper bulkhead cover

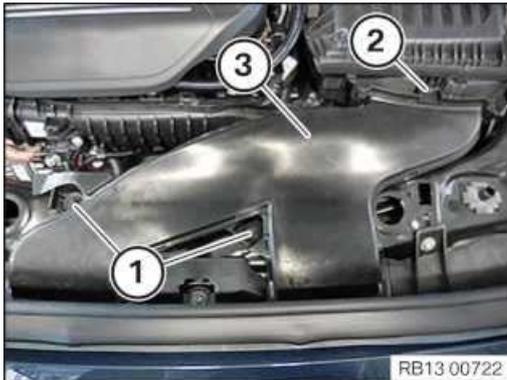


- Loosen screws (1).
- Guide out and remove the cover (2).



- Loosen screws (1).
- Feed out and remove the upper bulkhead cover (2).

#### 6 – Remove the intake neck for intake silencer housing



- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

#### 7 – Removing intake silencer housing



- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

### MAIN WORK

#### 8 – Remove electronics box

##### Prerequisite

Battery earth lead is disconnected.



#### 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.



## 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

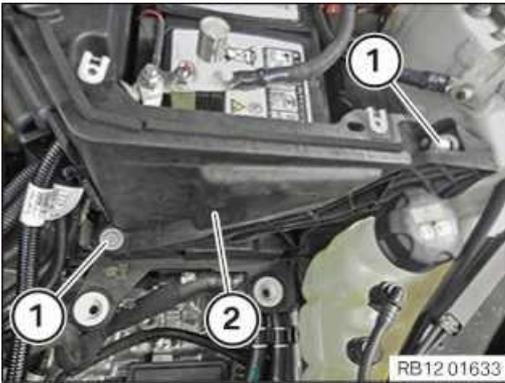
Follow instructions for removing and installing control units.

For additional information see: 12 00 ... Notes on removal and installation of control units



## TECHNICAL INFORMATION

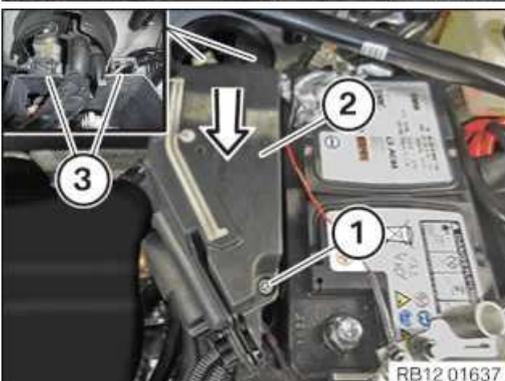
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



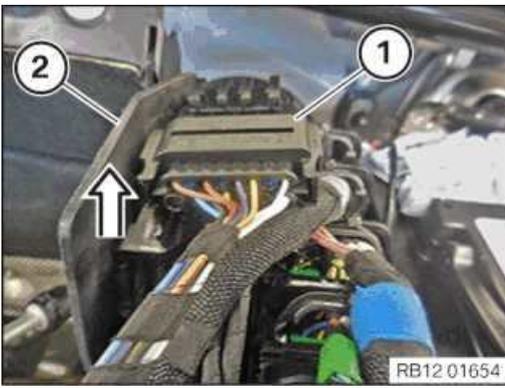
- Loosen screws (1).
- Guide out the tension strut (2) toward the top and remove it.



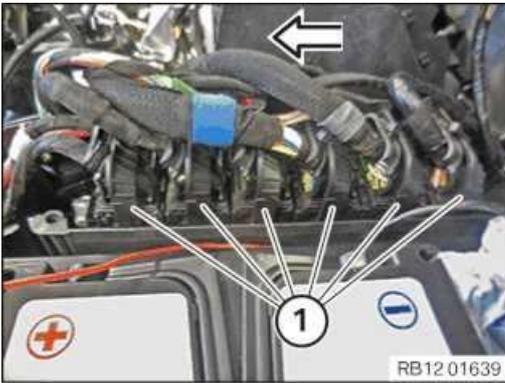
- Undo positive battery terminal (1).
- Feed out positive battery terminal (1) and set aside.
- Guide the positive battery cable (2) out of the holder (3) and lay to one side.



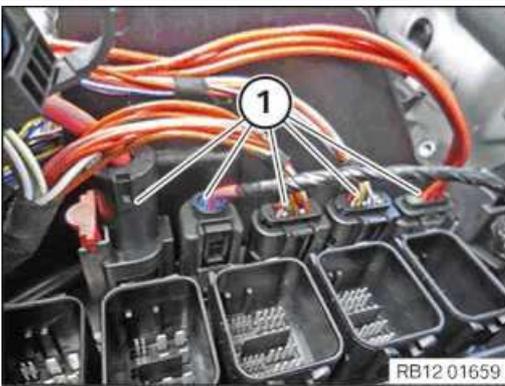
- Loosen screw (1).
- Unlock cover (2) and feed out and remove from the guides (3) in the direction of arrow.



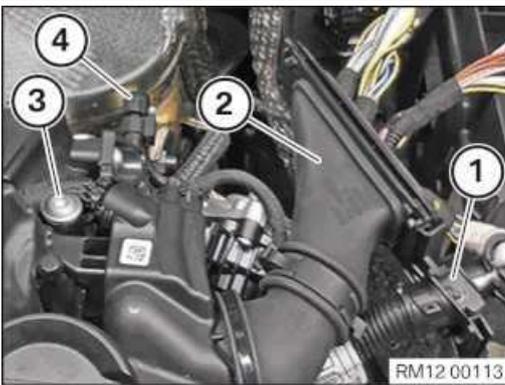
- Feed out connector (1) from the electronics box (2) and remove in the direction of arrow.
- Unlock and loosen connector (1).



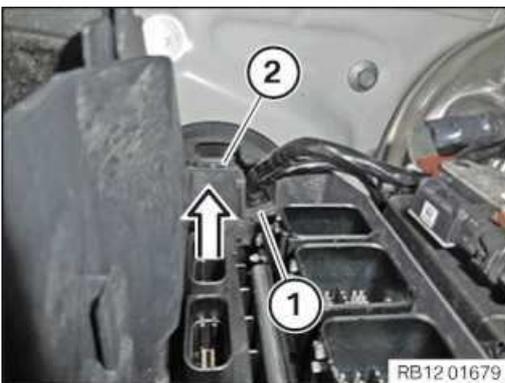
- Unlock and remove the connector (1) in the direction of the arrow.
- Feed out connector (1) and place to one side.



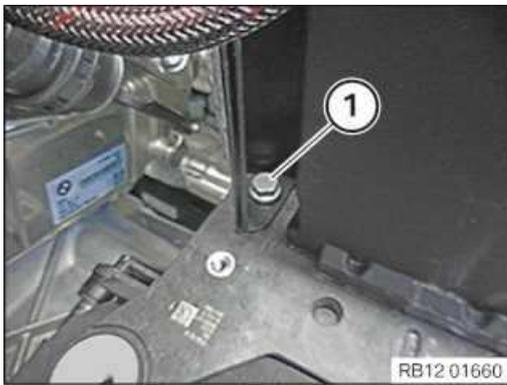
- Unlock and loosen connector (1).



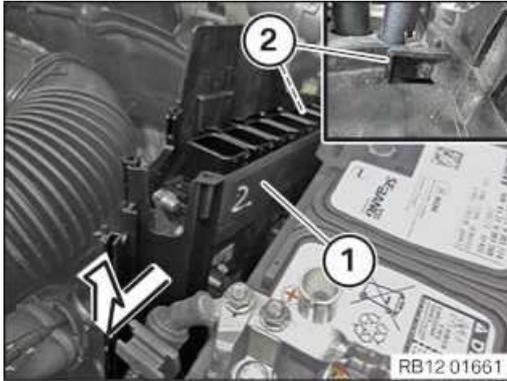
- Detach the wiring harness (1) from the electronics box.
- Detach the wiring harnesses (2) from electronics box.
- Loosen screw (3).
- Set wiring harnesses (1) and (2) aside.
- Unlock the connector (4) and disconnect it from the differential pressure sensor.



- Unlock and loosen holder (1).
- Guide the holder (1) out of the electronics box (2) in direction of arrow and set it aside.

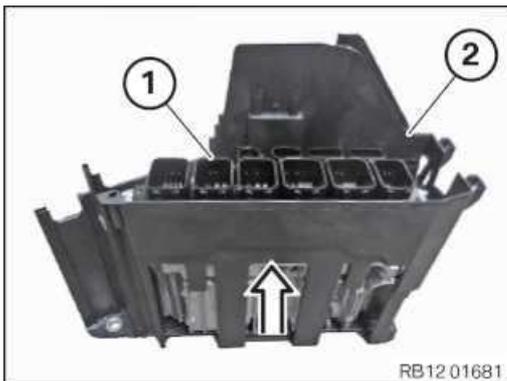


- Loosen screw (1).



- Guide the electronics box (1) out of the guide (2) in direction of arrow and remove.

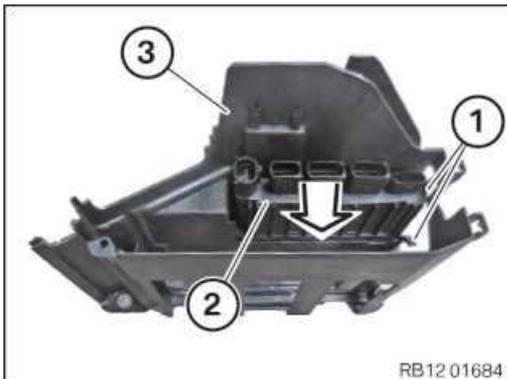
### 9 – Replacement: Remount DDE control unit and integrated supply module (PDM)



- Feed out DDE control unit (1) from the electronics box (2) and remove in direction of arrow.



- Unlock the locks (1).
- Feed out integrated supply module (2) from the electronics box (3) and remove in direction of arrow.



- Guide in and install integrated supply module (2) in the electronics box (3) in direction of arrow.
- Ensure that the locks (1) engage audibly.



- Guide in and install DDE control unit (1) in the electronics box (2) in direction of arrow.

## 10 – Install electronics box

### Prerequisite

Battery earth lead is disconnected.

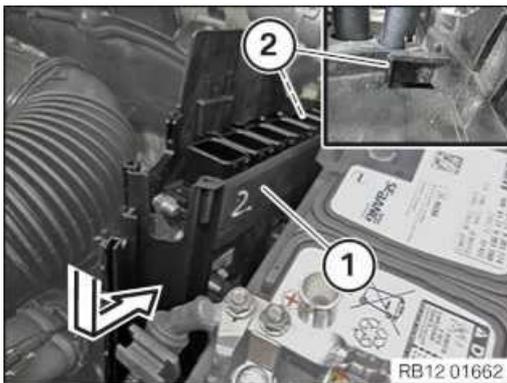


### RISK OF DAMAGE

**Improper routing of cables and wiring harnesses.**

**Trapped, crushed or damaged cables may cause short circuits and malfunctions.**

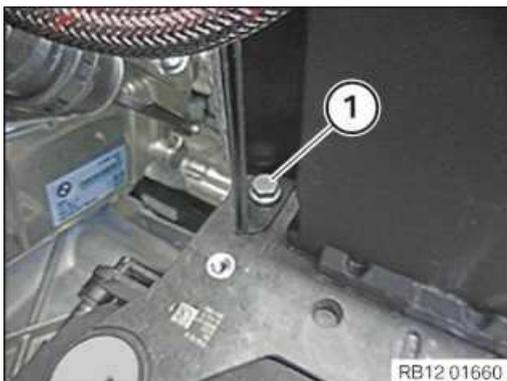
- Route all cables without abrasions, do not trap and crush.



- Guide in and install the electronics box (1) into the guide (2) in direction of arrow.



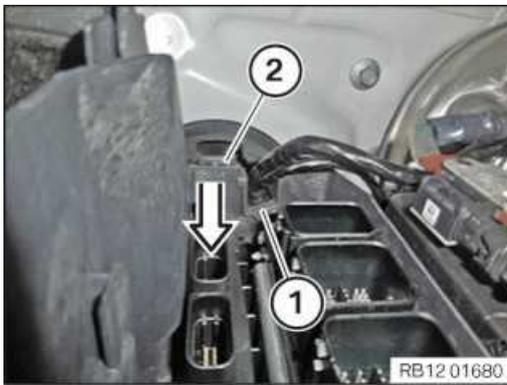
- Make sure that the electronics box (1) is positioned correctly on the bulkhead (2).



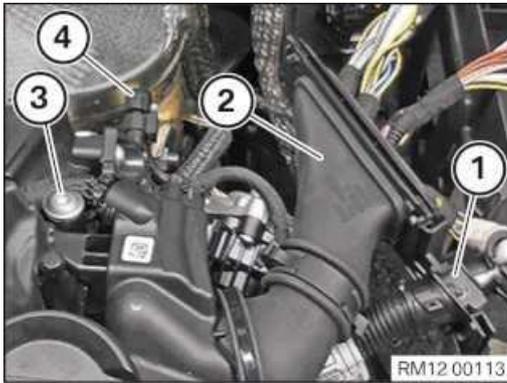
- Tighten down screw (1).

### Electronics box to battery tray

M8X16		Tightening torque	15 Nm
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- Guide in and install the holder (1) in the electronics box (2) in direction of arrow.
- Make sure the bracket (1) engages audibly.



- Lay vehicle wiring harnesses (1) and (2) and mount on electronics box.
- Tighten down screw (3).

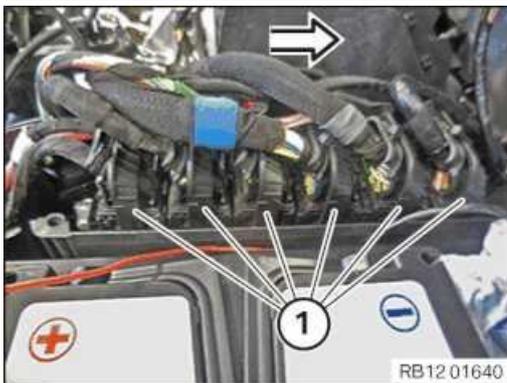
#### Wiring harness to cylinder head cover

TS5x20		Tightening torque	3,5 Nm
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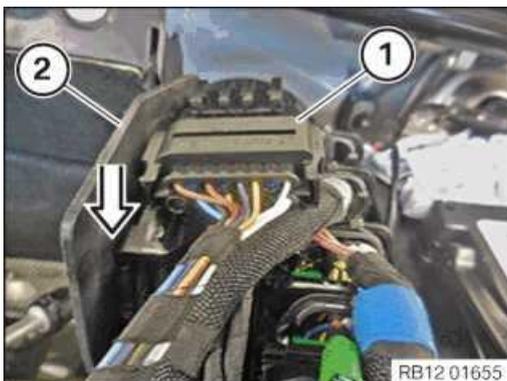
- Attach connector (4) to the differential pressure sensor and lock it audibly.



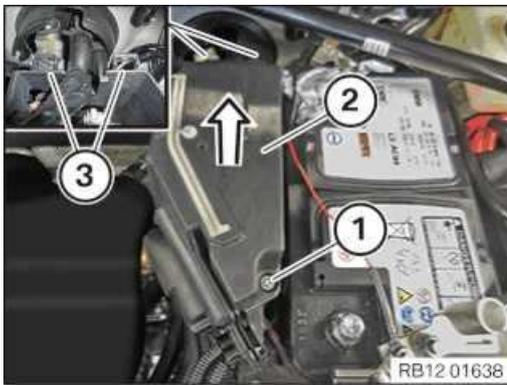
- Connect and lock the connector (1).
- Make sure the connectors (1) engage audibly.



- Connect connector (1) in direction of arrow and lock.
- Make sure the connectors (1) engage audibly.



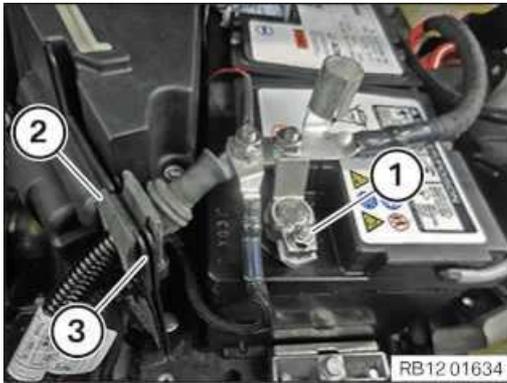
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.
- Insert the connector (1) in the direction of arrow at the electronics box (2) and install.



- Insert the cover (2) into the guides (3) in the direction of arrow and install.
- Make sure the cover audibly engages (2) in the guides (3).
- Tighten down screw (1).

#### Cover to electronics box

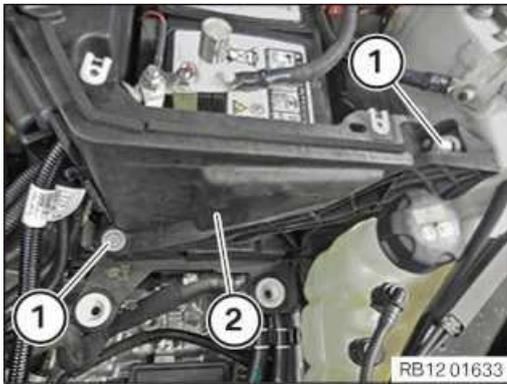
RF5x26.5		Tightening torque	2,5 Nm
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- Thread in positive battery cable (2) on holder (3) and install.
- Feed in and install positive battery terminal (1).
- Tighten positive battery terminal (1).

#### Positive battery terminal to battery

NutM6		Tightening torque	5 Nm
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- Feed in and install tension strut (2).
- Tighten the screws (1).

#### Tension strut to spring strut dome/battery tray

M8		Tightening torque	19 Nm
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## POSTPROCESSES

### 11 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

#### Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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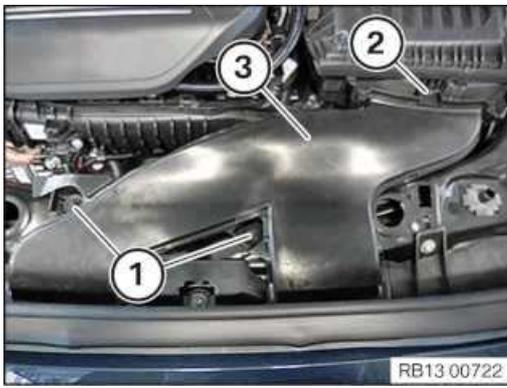
- Tighten clamp (4).

#### Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
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- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

### 12 – Install the intake neck for the intake filter housing

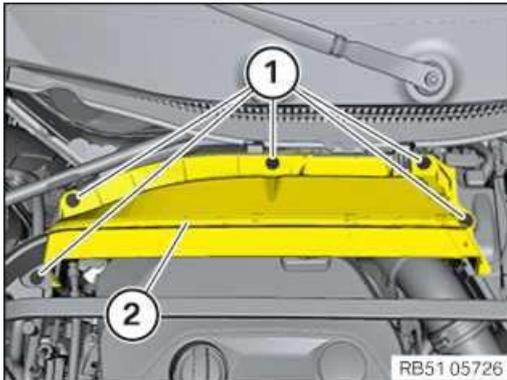


- Insert and install the intake neck (3).  
The lock (2) must audibly engage.
- Tighten nuts (1).

#### Intake neck to cross connection

M6		Tightening torque	8 Nm
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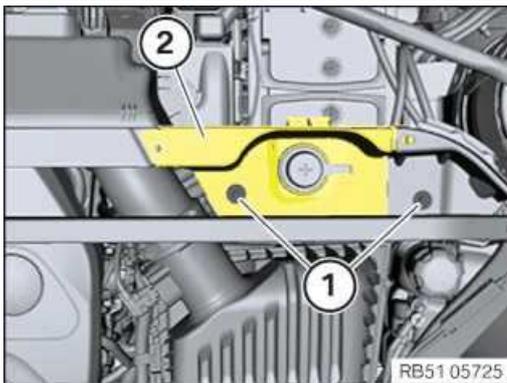
### 13 – Installing the upper bulkhead cover



- Feed in and install cover (2) of the bulkhead at the top.
- Tighten the screws (1).

#### Cover of top bulkhead

Screw		Tightening torque	2,6 Nm
-------	--	-------------------	--------



- Guide in and install cover (2).
- Tighten down screw (1).

#### Cover of remote positive terminal

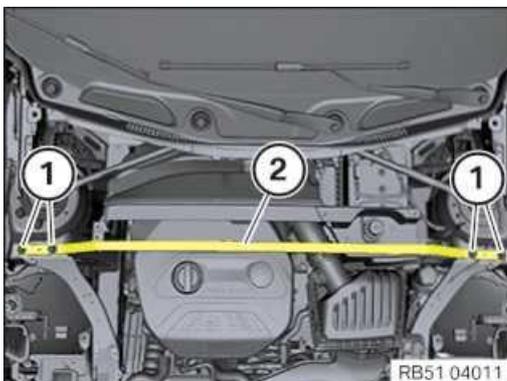
Screw		Tightening torque	2,6 Nm
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### 14 – Install strut brace



#### TECHNICAL INFORMATION

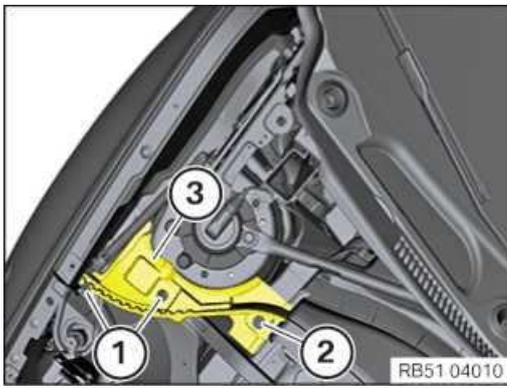
Driving without the strut brace/front end or tension strut is not permitted.



- Install the strut brace (2).
  - Renew screws (1).
- Parts:** Bolts
- Tighten the screws (1).

#### Cross-brace to spring strut dome

	Renew screw.	Jointing torque	28 Nm
		Angle of rotation	180 °



## NOTICE

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

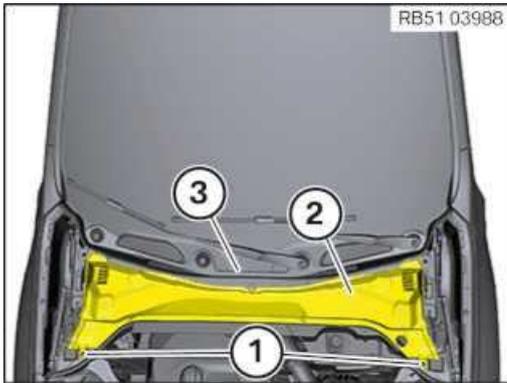
- Install the cover (3).
- Tighten down screw (2).

### Cover on body

Hexagon screw		Tightening torque	3 Nm
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- Install the expanding rivet (1).

## 15 – Installing front cowl panel cover



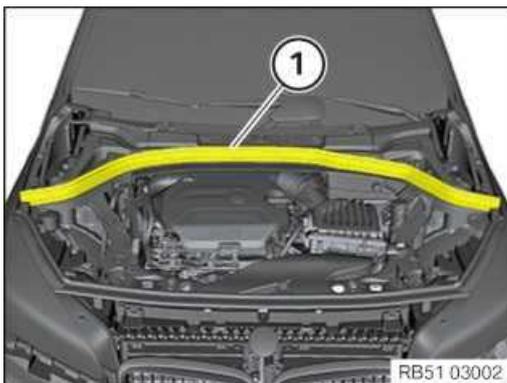
- Insert and install cowl panel cover at front (2) into cowl panel cover at rear (3).
- Check cowl panel cover at front is correctly seated (2).
- Secure expanding rivet (1).

## 16 – Install the seal for the bonnet



## NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.



- Install bonnet seal at rear (1).
- Ensure that the rear bonnet seal (1) is fitted correctly.

## 17 – Disconnecting all battery earth leads



- See additional information.

## Additional Information

### Overview of Tightening Torques

Electronics box to battery tray			Used in step 10
M8X16		Tightening torque	15 Nm
Wiring harness to cylinder head cover			Used in step 10
TS5x20		Tightening torque	3,5 Nm
Cover to electronics box			Used in step 10
RF5x26.5		Tightening torque	2,5 Nm
Positive battery terminal to battery			Used in step 10
NutM6		Tightening torque	5 Nm
Tension strut to spring strut dome/battery tray			Used in step 10
M8		Tightening torque	19 Nm
Intake silencer housing to lock bridge			Used in step 11
M6X30		Tightening torque	8 Nm
Clean air pipe to intake silencer housing			Used in step 11
Clamp		Tightening torque	3 Nm
Intake neck to cross connection			Used in step 12
M6		Tightening torque	8 Nm
Cover of top bulkhead			Used in step 13
Screw		Tightening torque	2,6 Nm
Cover of remote positive terminal			Used in step 13
Screw		Tightening torque	2,6 Nm
Cross-brace to spring strut dome			Used in step 14
	Renew screw.	Jointing torque	28 Nm
		Angle of rotation	180 °
Cover on body			Used in step 14
Hexagon screw		Tightening torque	3 Nm

