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

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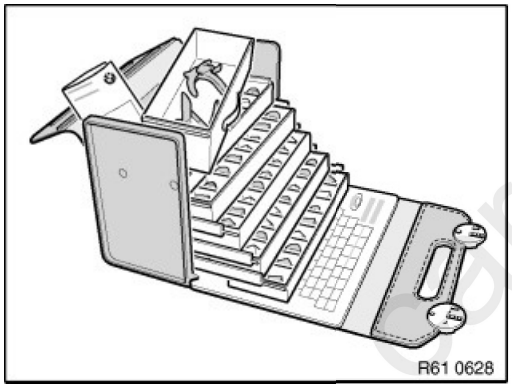
61 13 ... Butt connector for repairing a plug connection

Special tools required:

- 61 0 300
- 61 4 340
- 61 0 240

Important!

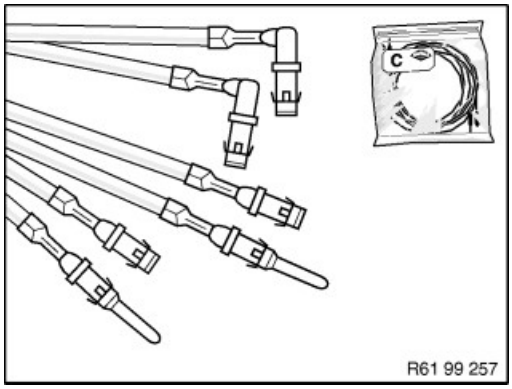
1. Identify cause of damage (e.g. sharp-edged body components, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).
2. Read out fault memory
3. Eliminate cause of damage.
4. Disconnect battery negative terminal
5. Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Department)
6. Carry out function test and read out fault memories again
7. Eliminate new faults if applicable and clear fault memories



Note:
The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Department.

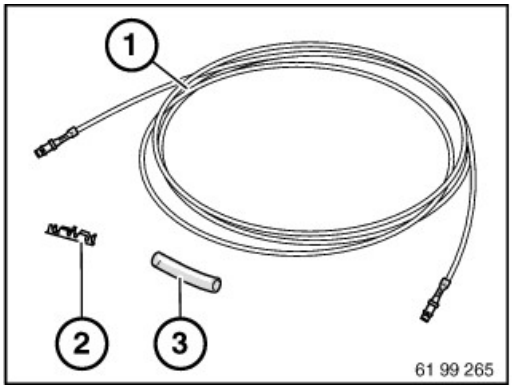
- Refer to Service Information:
  SI 02 04 07 341



Choose repair kit.

Example: Repair kit, circular connector system D 2.5.

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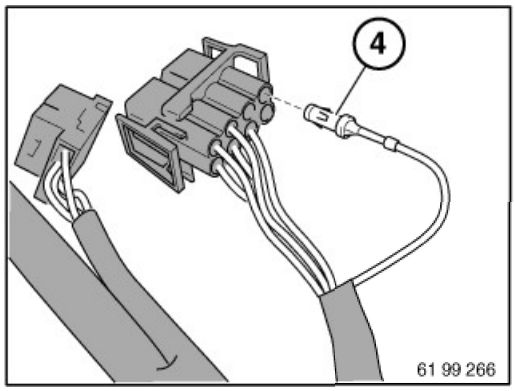


Remove following parts:

(1) Pre-packaged end of cable with requisite wire cross-section

(2) Crimp connector for selected wire cross-section

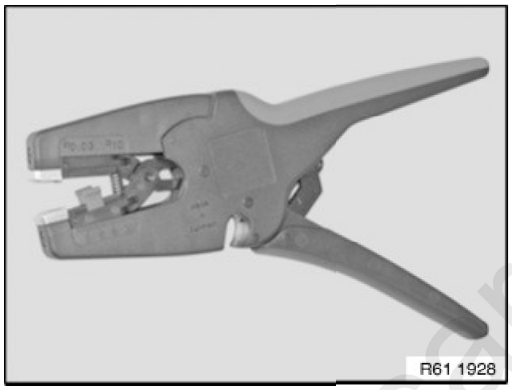
(3) Shrink-fit hose



Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool set 61 0 300).

See repair instructions
Notes for opening contacts and locks of different plug contact systems.



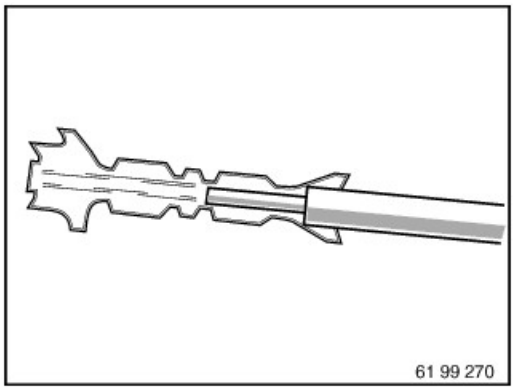
Important!

- Check maximum length of repair cable
- If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Refer also to repair instruction:
Cutting to length and stripping insulation from cables



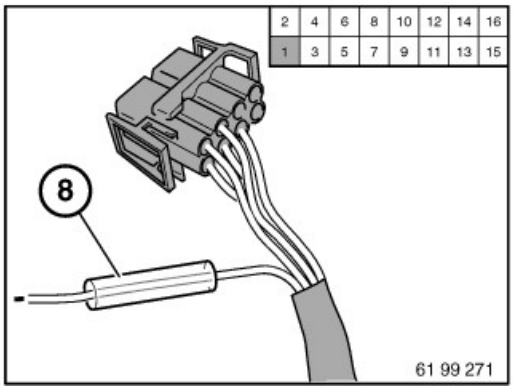
Crimp butt connector on preassembled wire end.

Special tools:

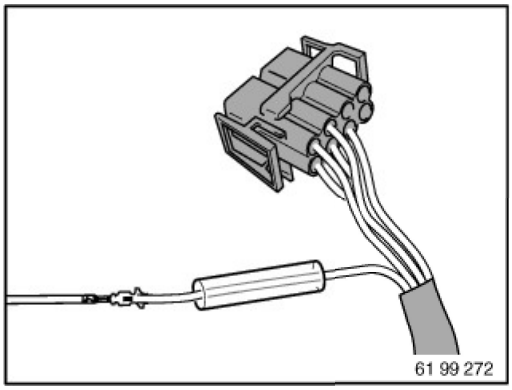
- 61 4 340 (0.35 - 2.5 sq mm)
- 61 0 240 (4.0 - 6.0 sq mm)

See repair instructions
Crimping on stop parts

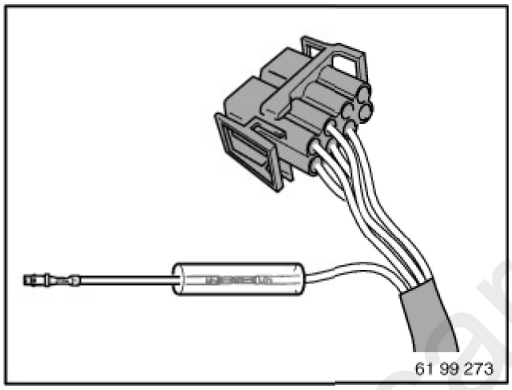
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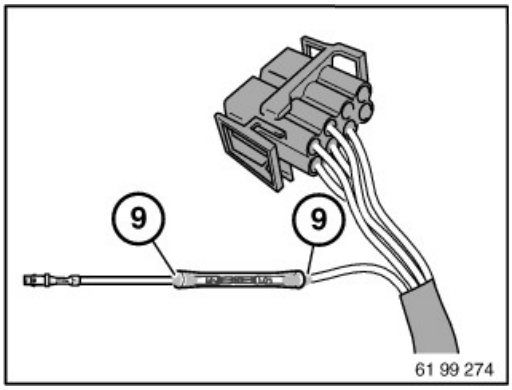
Push shrink-fit hose (8) onto free wire end.



Crimp unused wire end to butt connector.



Pull shrink-on sleeve over butt connector.



Important!

Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

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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.

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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.

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12 00 ... Instructions for working on the ignition system

Caution!

Always switch off ignition before working on ignition system.

Use only test leads which have been approved and belong to these testing instruments (e.g. DIS Tester).

Comply with operating instructions of the respective testing instrument used.

Comply with the country-specific safety regulations.

Never touch components under current with engine running!

Comply with instructions of DIS tester.

Do not connect any suppression capacitors or inspection lamps to terminal 1 on the ignition coil.

Terminal 1 of ignition coil must not be connected to ground or battery positive lead.

If an alarm system is subsequently installed, lead of terminal 1 must not be used for start prevention.

When working on ignition system, always disconnect supply leads to ignition coils.

High tension! - High tension! Important!

Hazardous voltages occur at:

- Ignition lead
- spark-plug connectors
- spark plugs
- Ignition coil (high voltage at terminal 4 is approx. 40 kV)
- Lead of terminal 1 from ignition coil to DME control unit (high voltage approx. 350 V)

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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.

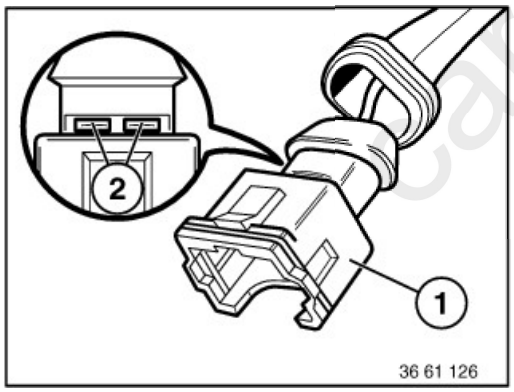
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61 13 ... Notes for opening contacts and locks of different plug contact systems

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)

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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

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61 00 ... Notes on handling wiring harnesses and cables



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 ≥ 85 °

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.

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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, repin 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):

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- 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.**

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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.

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



Warning!

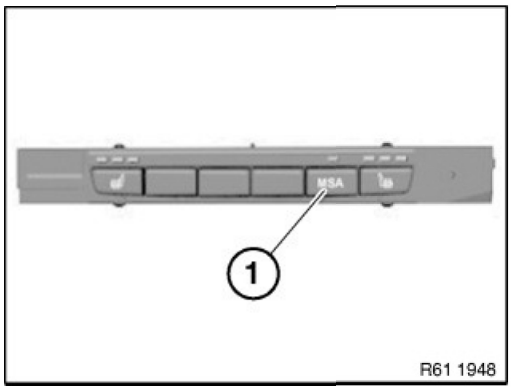
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

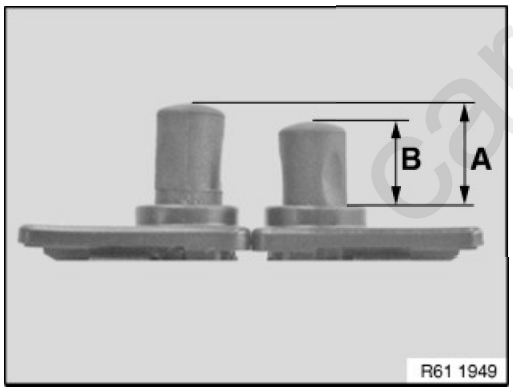
Observe safety precautions when working on MSA vehicles.

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

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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

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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 save 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

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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-boltage 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.

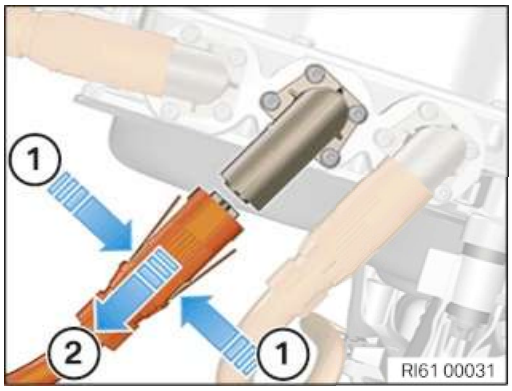
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61 13 ... Unlocking and disconnecting various plug connections in electrical and hybrid vehicles

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:

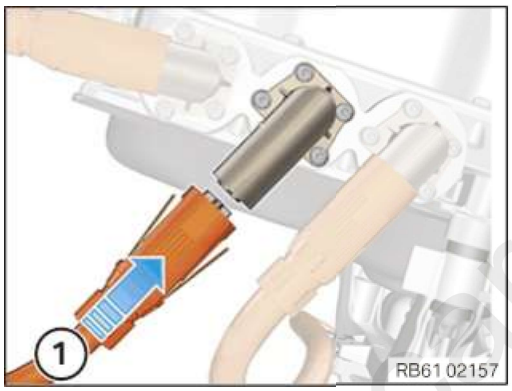
Press the lock (1) on the left and right on the connector in the direction of the arrow.

Pull off connector (2) in direction of arrow.

Attention!

Connector (2) is difficult to pull off.

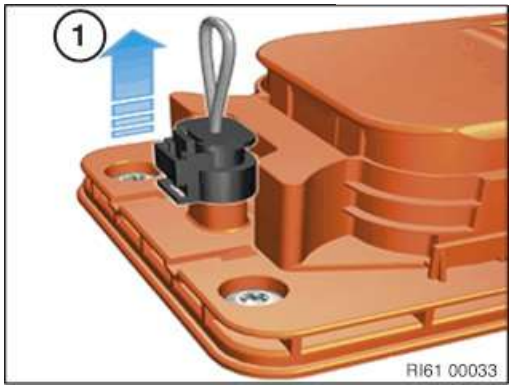
In the event of damage to high-voltage connector (2), the complete high-voltage cable must be replaced!



Connect the Hirschmann high-voltage connectors:

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

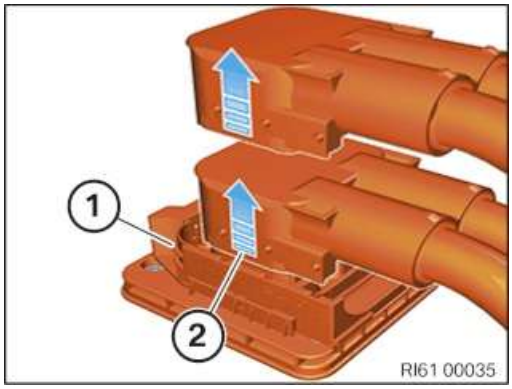
Note:
Connector (2) must lock audibly.



Disconnect the Kostal high-voltage connector:

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

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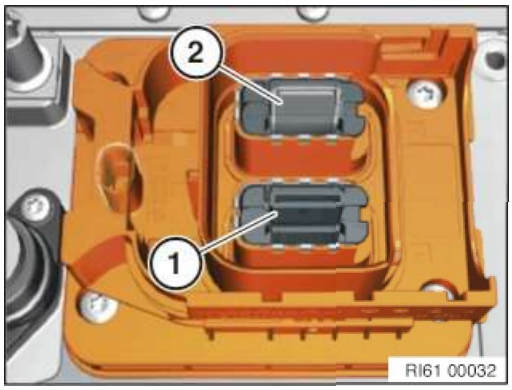
Push the lock (1) fully to the front.

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:

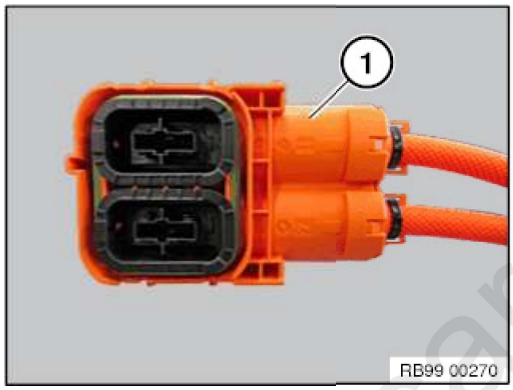
Check the touch protection for damage and correct positioning (1).

Warning!

Do not touch unprotected connector (2)!

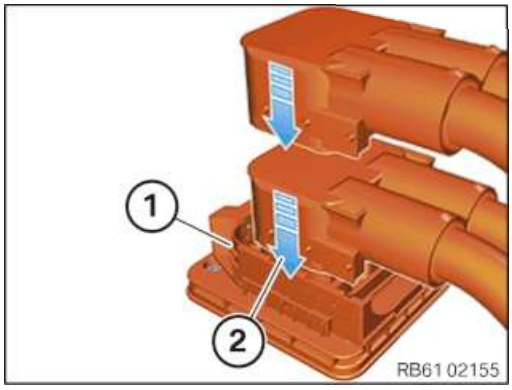
If the contact protection (1) has been pushed to the bottom (2), the high-voltage connector must be refitted.

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:

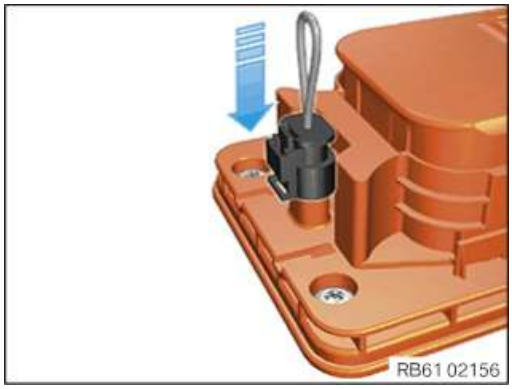
Connect the connector (2) in one single movement to the counter-housing.

Push the lock (1) fully to the rear.

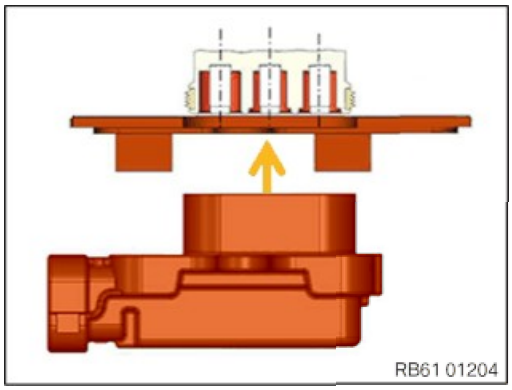
Attention!

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

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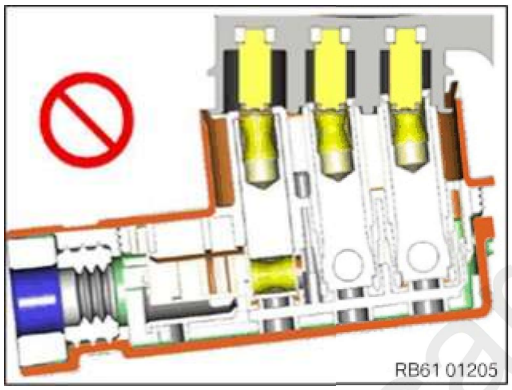


Connect the connector for the high-voltage interlock.



Three-phase high-voltage connector:

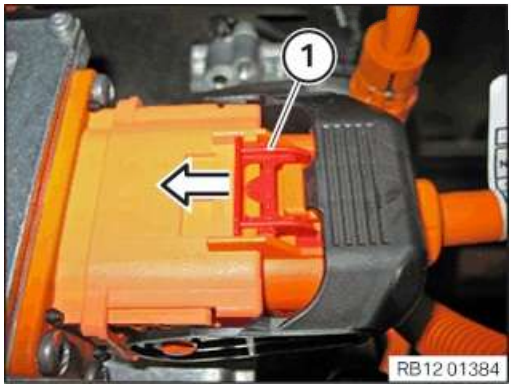
Connect and disconnect the connector straight.



Attention!

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

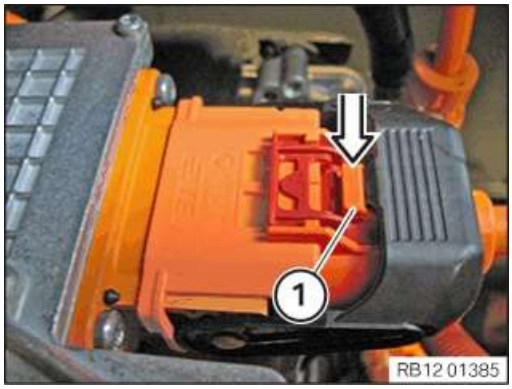
Increased tilted connections will increase the connecting force and the risk of danger.



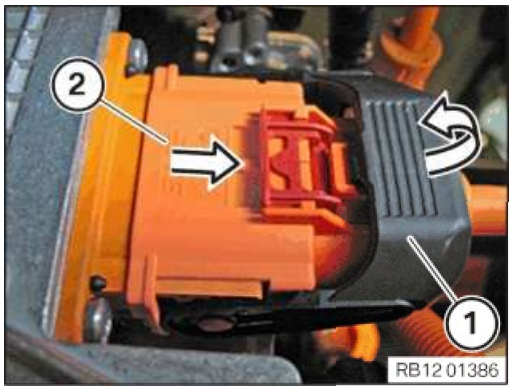
Disconnect the high-voltage connector from the high-voltage connection of the KLE:

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

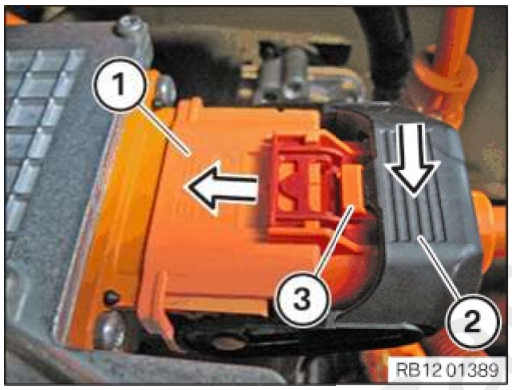
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Press lock (1).



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



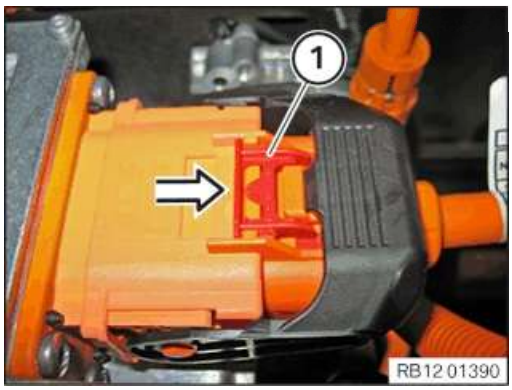
Connect the high-voltage connector to the high-voltage connection of the KLE:

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

Attention!

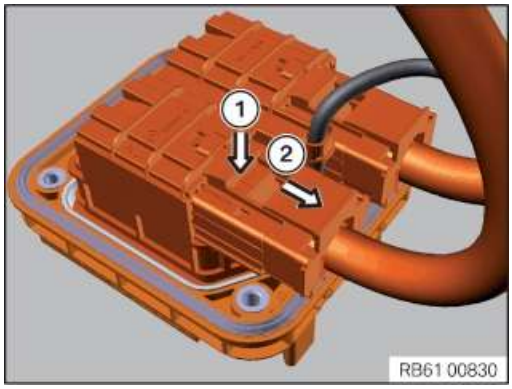
Lock (2) must snap audibly into place.

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



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

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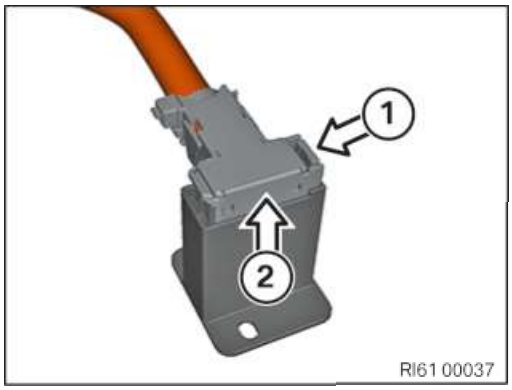
High-voltage connector on the high-voltage connection of the high-voltage battery unit:

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.



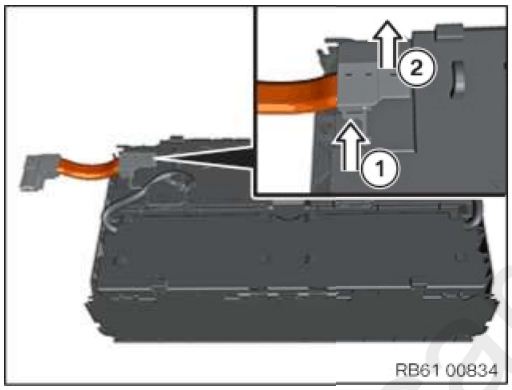
High-voltage connector on the cell module I01:

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.

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12 12 011 Remove and install / replace all spark plugs (N55)

Special tools required:

- 12 1 220
- 12 1 230

Necessary preliminary work:

- Switch off ignition.
- Remove ignition coils.

Caution!

Wear safety goggles.

Oil and dirt particles may get into your eyes!

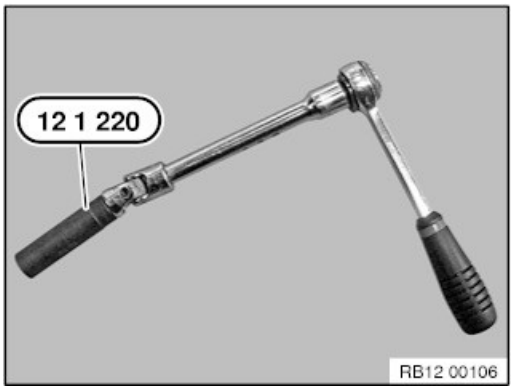
Clean spark plug slot with compressed air.

1. Remove dirt contamination from the spark plug shaft. The plug shaft must be cleaned with compressed air after the ignition coils have been removed but before the spark plugs have been dismounted. After removing the spark plugs, check the sealing surface again for dirt contamination and if necessary, clean with a damp cloth or again with compressed air.

   Note: Deposits that are not removed according to instructions may enter the combustion chamber and lead to uncontrolled combustion. Remaining deposits in the area of the spark plug seal can lead to leaks and to the spark plugs coming loose during engine operation.

2. Do not grease/oil thread or use any graphite or copper grease. Adhere to the torque values of the packaging information or regulation.

   Note: If these instructions are not followed, especially with regard to greasing, this may result in mechanical damage to the spark plug housing/thread. Spark plugs that are not tightened sufficiently lead to leaks and to the spark plugs coming loose during engine operation.

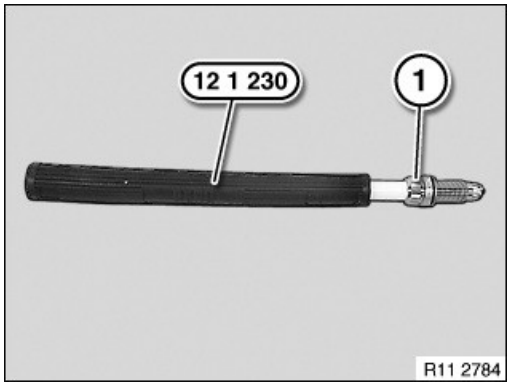


Unscrew spark plugs with special tool 12 1 220 and extension with minimum 8° bend.

Flexible ratchet extensions must always be used. If rigid mounting tools are used, there is a risk of insulator breakages.

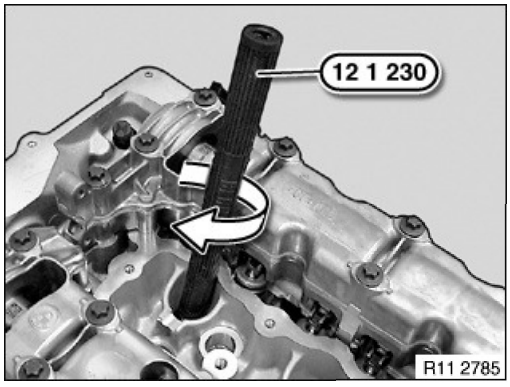
Note: Also do not use a variable plug connection with locking capability as this also poses a risk of insulator breakages.

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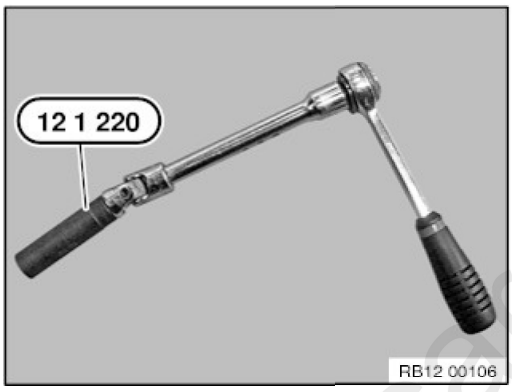


Installation note:
Attach new spark plug (1) to special tool 12 1 230 .
Caution!

Do not let spark plugs fall into the spark plug shaft. This can lead to a reduction of the electrode gap and so impair the smooth running of the engine, especially in idle mode.



Installation note:
Screw spark plug with special tool 12 1 230 hand-tight into cylinder head plug thread as far as it will go.



Installation note:
Tighten spark plugs with torque wrench, special tool 12 1 220 and extension with min. 8° bend.

Flexible ratchet extensions must always be used. If rigid mounting tools are used, there is a risk of insulator breakages.

Note: Also do not use a variable plug connection with locking capability as this also poses a risk of insulator breakages.

Observe tightening torque.

Tightening torque 12 12 1AZ.

Assemble engine.

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12 13 511 Replacing ignition coils (N55)

Necessary preliminary tasks:

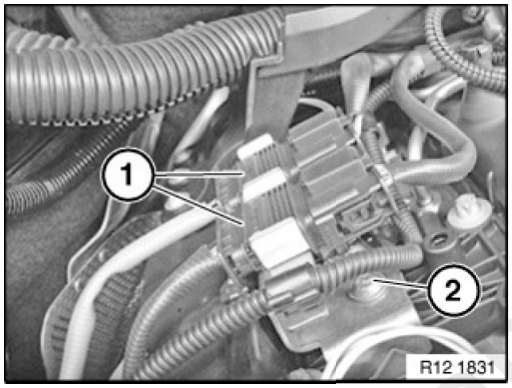
- Read out the fault memory of the DME control unit.
- Check stored fault messages and process procedure.
- Switch off ignition
- Remove ignition coil cover.
- Remove sound insulation of bulkhead upper section, centre.
- Remove rear ignition coil cover.

Important!

Ignition coils must not be contaminated by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

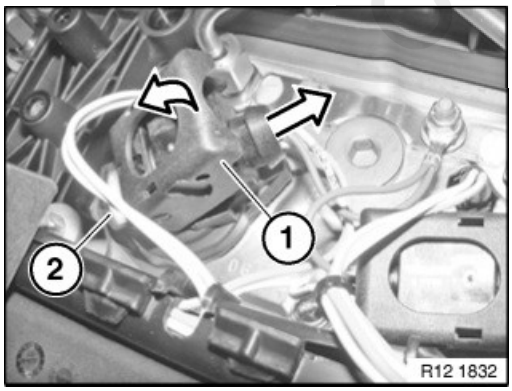
The silicone tube of the spark plug connector is coated with talc to reduce the pulling forces. The silicone tube must NOT be oiled or greased. This would greatly reduce the durability of the silicone material, which can lead to a malfunction of the ignition coil.



Release oxygen sensor connector (1) from bracket.

Release screw (2).

Put cable clip aside.



Unlock plug catch (1) of ignition coil (2) and disconnect plug.

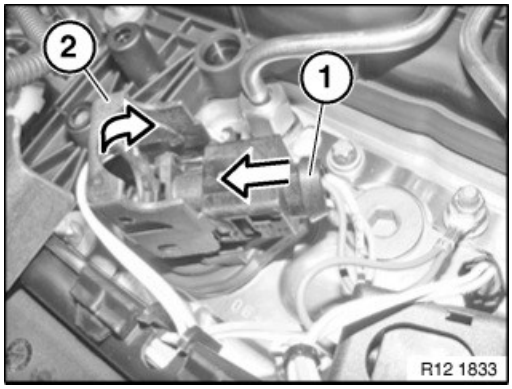
Ensure that cables are not crushed or damaged.

Repair damaged cable.

Pull out the ignition coil (2) slowly in a smooth upwards movement.

Note: There is a possibility that the silicone tube will tear and therefore be destroyed.

This procedure is applicable to all ignition coils.



Installation note:
Position the ignition coil and gently push it to the limit position, if necessary by twisting it back and forth slightly. Then check anti-twist lock.

The rubber cap must completely surround the sealing collar of the cylinder head cover.

Note: If rubber parts are squashed, the ignition coil can slip out again during engine operation.

Push connector (1) with connector catch (2) open onto ignition coil.

Carefully close connector catch (2) in direction of arrow.

The connector catch must snap into place without great effort.

Ensure that cables are not crushed or damaged.

Repair damaged cable.

The connector must be positioned on the counter piece with hardly any gaps when the locking lever is being closed. In the process, the cheeks of the lever are positioned inside the counter piece.

Note: The locking lever can become deformed if it is not installed correctly. This means that there is no longer a safety lock on the plug connection. As a result, the connector can slip out during engine operation (loose contact, misfiring).

Note:
Clear diagnostic fault entries from fault memory.

Assemble engine.

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12 14 700 Encoding the control unit (DME/DDE)

Switch off ignition.



Connect diagnosis system.

Switch the ignition on.

Select "encoding" program.

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 encoding.

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12 14 705 Programming the control unit (DME/DDE)

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.

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12 14 600 Removing/replacing knock sensors (N55)

Necessary preliminary tasks:

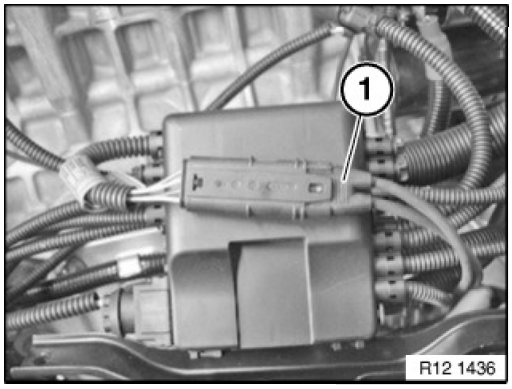
- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove high pressure pump.

Recycling:

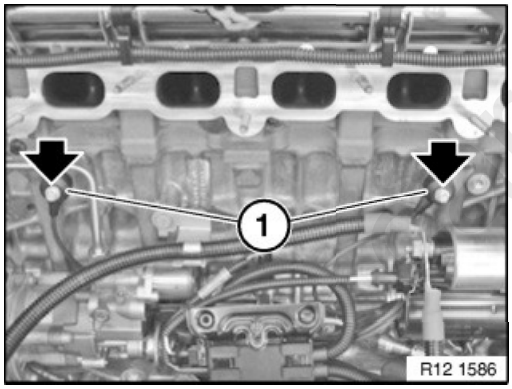
Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

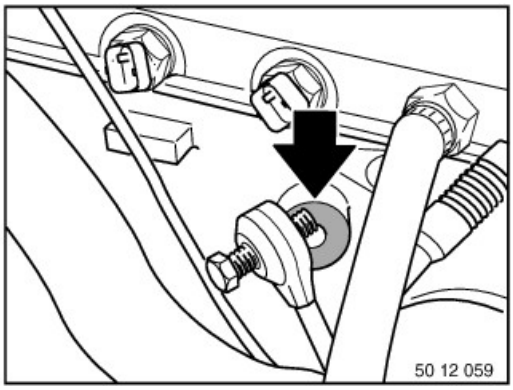
Observe country-specific waste disposal regulations.



Unlock connector (1) and remove.



Release screws on both knock sensors (1) and remove knock sensors (1).*Installation note:*
Tightening torque 13 62 3AZ.



Installation note:
Clean contact surface of knock sensors on engine block.

Note:

Reassemble the vehicle.

Check stored fault messages.

Clear diagnostic fault entries from fault memory.

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12 14 550 Replacing control unit (DME) (N55)

Important!
Read and comply with notes on protection against electrostatic damage (ESD protection).

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect battery negative lead.
- Remove intake plenum.

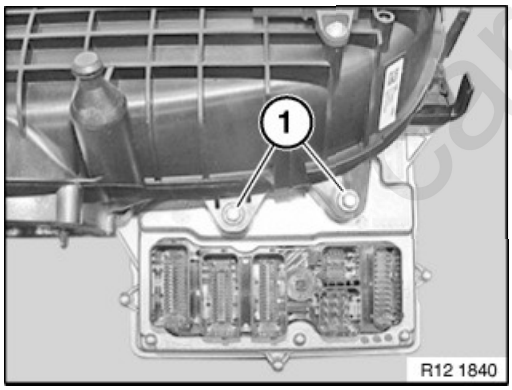
Important!
Follow instructions for removing and installing control units

Replacement:

- Carry out programming/encoding
- If no data can be read out from the previous control unit, carry out injection quantity compensation (description at end of instructions).

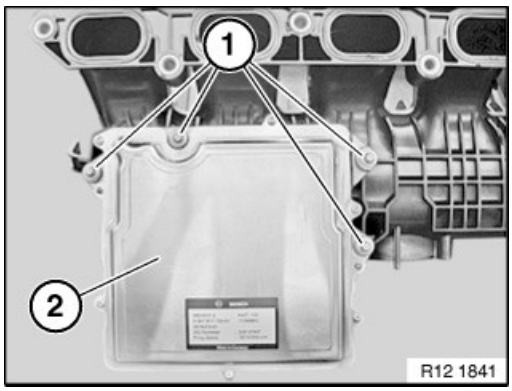
Important!
It is absolutely essential to read out the fault memory with the BMW diagnosis system and to create a fault memory printout.

Switch off ignition.



Release screws (1).

Tightening torque 12 14 2AZ.



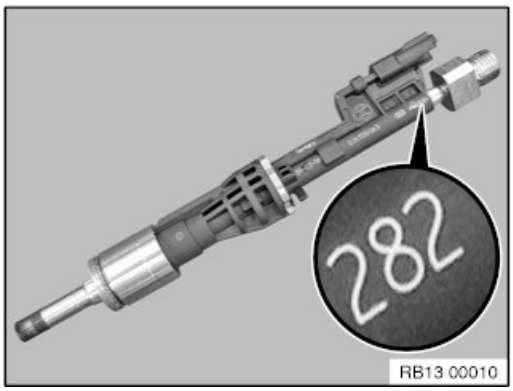
Release screws (1).

Tightening torque 12 14 1AZ.

Remove control unit from intake plenum.

Installation note:
Renew gasket between intake plenum and control unit.

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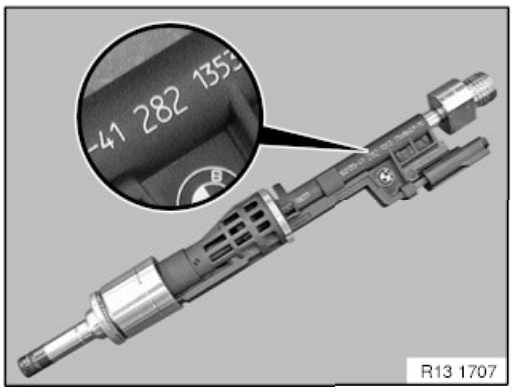
Injection quantity compensation:

If the DME control unit has been replaced, it will also be necessary to carry out adjustment of the injectors!

Injection quantity compensation is carried out with the aid of so-called adjustment values.

The adjustment value is printed with three digits - depending on the version - on the injector body.

The adjustment values must be stored in the new control unit!



If injector quantity compensation is not carried out, the engine may run roughly or fail to start.

Read off the adjustment values and enter according to the installation location (cylinder) of the injectors:

- Connect BMW diagnosis system
- Identify vehicle
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment function"
- Select "Adjust injectors"
- Select "Test plan"
- The adjustment value must be entered for each cylinder.

Note:
Check stored fault message.

Delete fault memory.

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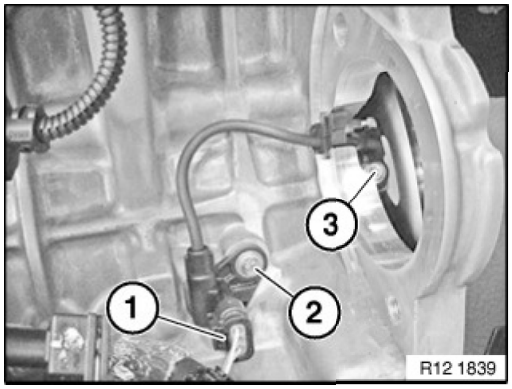
12 14 521 Replacing crankshaft pulse sensor (N55)

Important!

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

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove starter motor.



Unlock connector (1) and remove.

Release screw (2).

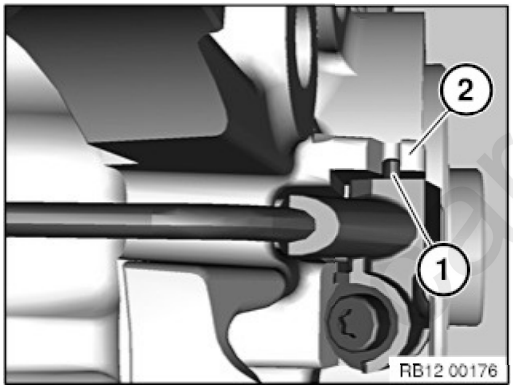
Tightening torque 13 62 2AZ.

Remove connector housing from crankcase.

Release screw (3).

Tightening torque 13 62 8AZ.

Pull pulse sensor from crankcase and remove.



Installation note:

During installation of pulse sensor make sure that guide pin (1) of pulse sensor is inserted in guiding groove (2) of crankcase.

Note:

Assemble engine.

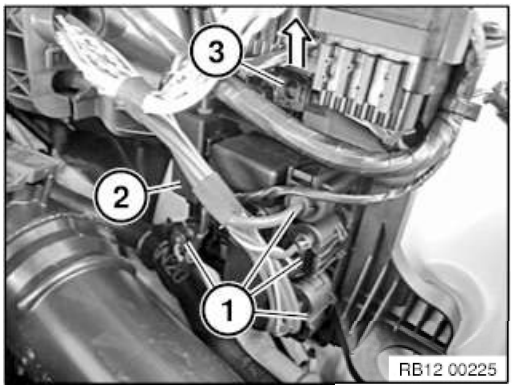
Check stored fault message.

Delete fault memory.

12 63 586 Replacing power distribution module (N20, N26, N55)

Necessary preliminary work:

- Switch off ignition.
- Disconnect battery negative lead.

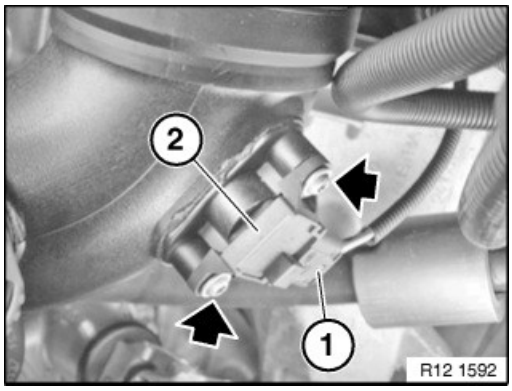


Unlock and pull off all connectors (1) from power distribution module.
Remove cover (2).
Release nut beneath it and set positive battery cable aside.
Tightening torque 12 52 7AZ.
Release lock (3) in direction of arrow.
Feed out and remove power distribution module.

Reassemble the vehicle.

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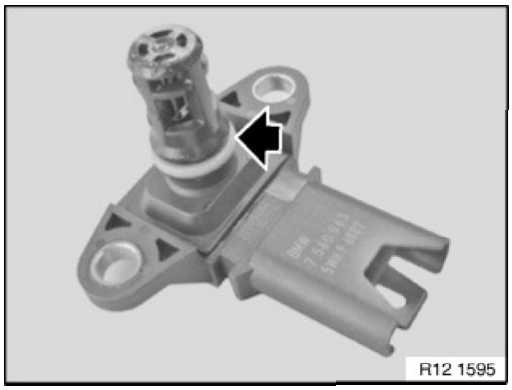
12 14 651 Replacing pressure sensor on charge air duct (N55)



Unlock connector (1) and remove.

Release screws and pull pressure sensor (2) out of charge air duct.

Tightening torque 13 62 4AZ.



Installation note:

Check sealing ring for damage, replace if necessary.

When installing, coat sealing ring with suitable lubricant.

Note:

Reassemble the vehicle.

Check stored fault messages.

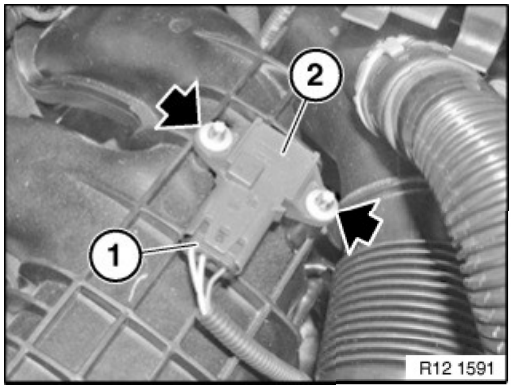
Delete fault memory.

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12 14 650 Replacing pressure sensor on intake plenum (N55)

Necessary preliminary tasks:

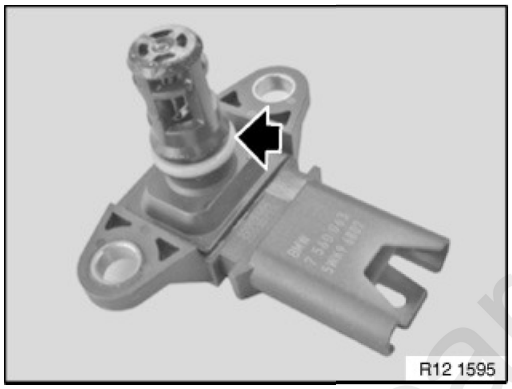
- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove ignition coil cover.
- Partially release ignition coil cover.



Unlock connector (1) and remove.

Release screws and pull differential-pressure sensor (2) out of intake plenum.

Tightening torque 13 62 4AZ.



Installation note:
Check sealing ring for damage. Replace damaged sealing ring.

When installing, coat sealing ring with suitable lubricant.

Note:
Reassemble the vehicle.

Check stored fault message.

Delete fault memory.

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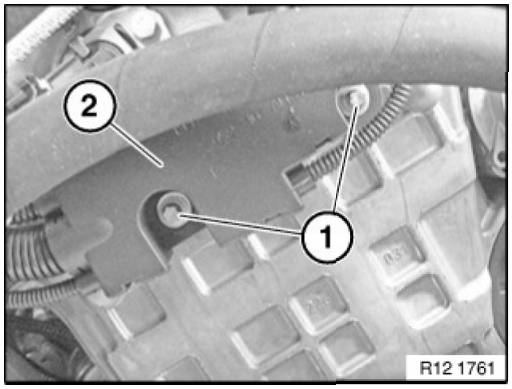
12 14 524 Replacing pulse sensor on exhaust camshaft (N55)

Important!

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

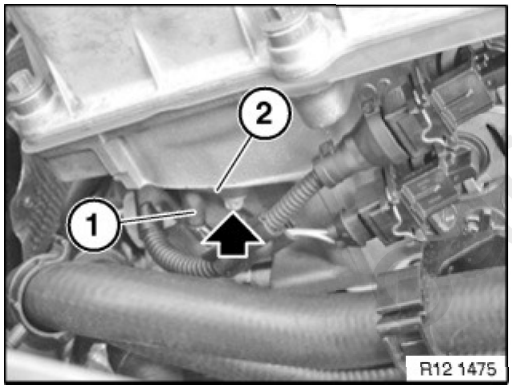
Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove intake silencer housing.



Release screws (1).

Slide cable channel (2) to one side.



Unlock connector (1) and remove.

Release screw.

Tightening torque 13 62 1AZ.

Remove pulse sensor (2).

Note:

Check stored fault messages.

Delete fault memory.

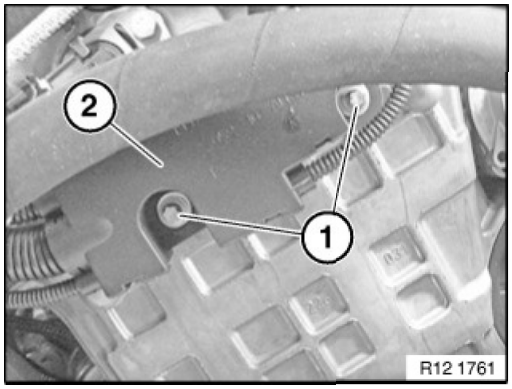
12 14 523 Replacing pulse sensor on intake camshaft (N55)

Important!

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

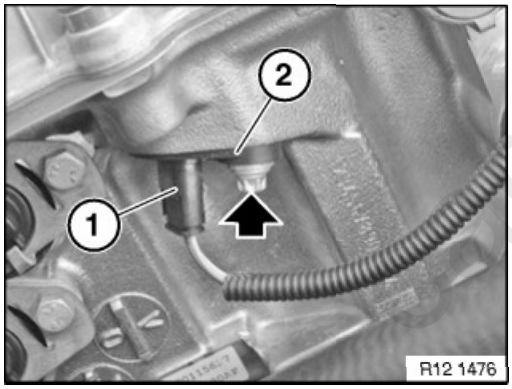
Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove intake silencer housing.



Release screws (1).

Slide cable channel (2) to one side.



Unlock connector (1) and remove.

Release screw.

Tightening torque 13 62 1AZ.

Remove pulse sensor (2).

Note:

Check stored fault messages.

Delete fault memory.

12 31 020 Removing and installing or replacing alternator (N55)

Necessary preliminary tasks:

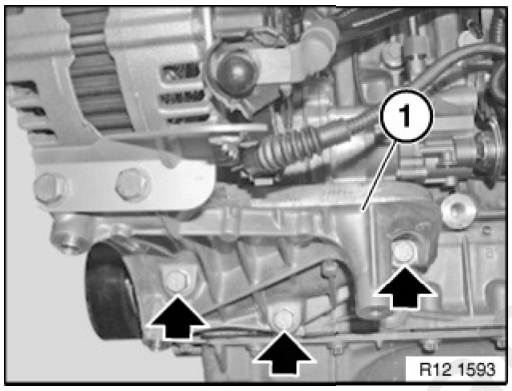
- Switch off ignition.
- Disconnect battery earth lead.
- Remove left charge air duct.
- Remove alternator drive belt.

Note:
In order to remove the alternator, it is necessary to **remove** the air-conditioning compressor for the air conditioning system.

In so doing:

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

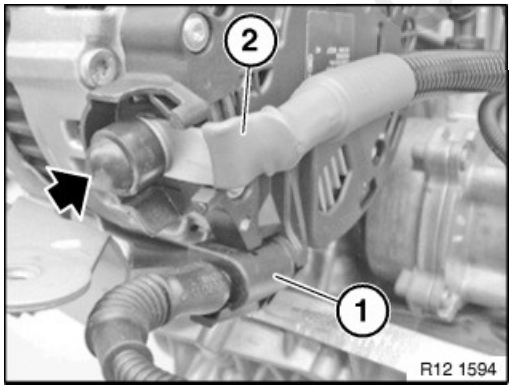
  Remove A/C compressor from bracket.



Note:
For purposes of improved clarity, illustrations and description show A/C compressor removed.

Release bolts a few turns until bracket (1) is loose. Do **not** remove bracket (1).

Tightening torque 64 52 5AZ.

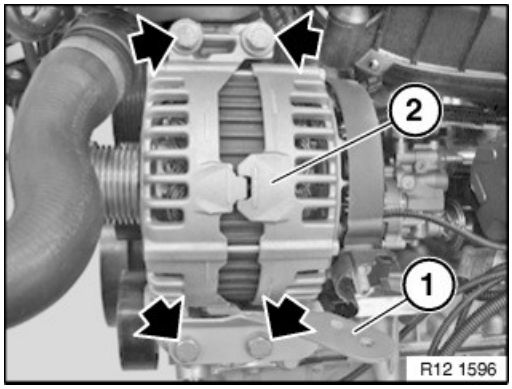


Unlock connector (1) and remove.

Remove protective cap and release nut underneath.

Tightening torque 12 42 1AZ.

Remove positive battery cable (2).



Release screws.

Remove bracket (1) and alternator (2).

Tightening torque 12 31 1AZ.

Assemble engine.

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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.

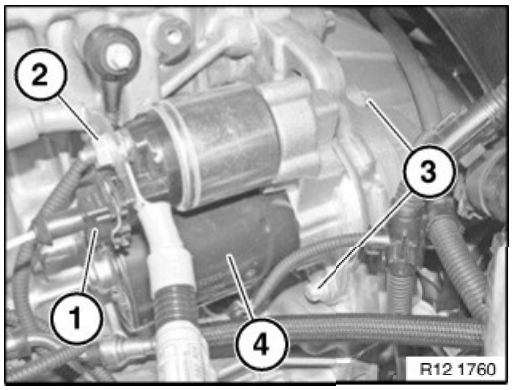
If water ingress into the electrical components cannot be ruled out, it is recommended to replace the component to ensure correct functioning through the vehicle lifetime.

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12 41 020 Removing and installing/replacing starter motor (N55)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect battery negative lead.
- Remove intake plenum.



Unlock connector (1) and remove.

Release nut (2) and disconnect positive battery cable (3).

Tightening torque 12 42 2AZ.

Release bolts (3) and remove starter.

Tightening torque 12 41 1AZ.

Installation note:
Check starter pinion and ring gear for damage, replace starter motor if necessary.

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

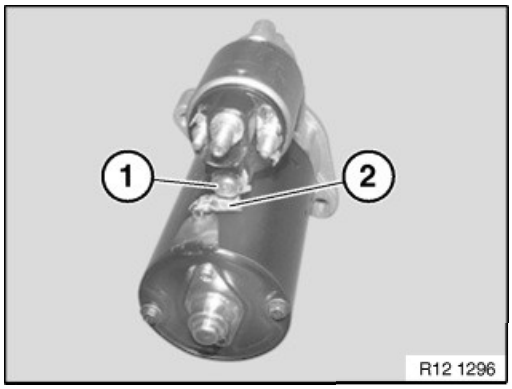
- Use BMW diagnosis system to reset the starter counter.

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12 41 041 Replacing the engagement solenoid switch

Necessary preliminary work:

- Switch off ignition.
- Remove starter motor.

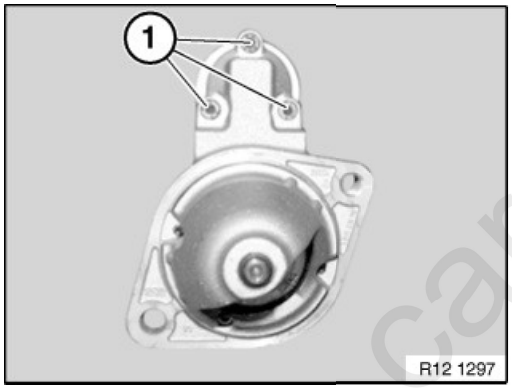


Slacken nut (1).

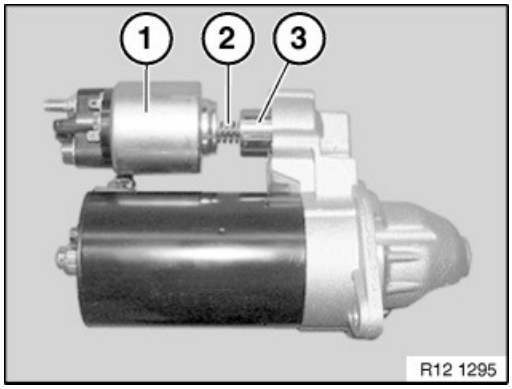
Remove the cable shoe (2).

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.

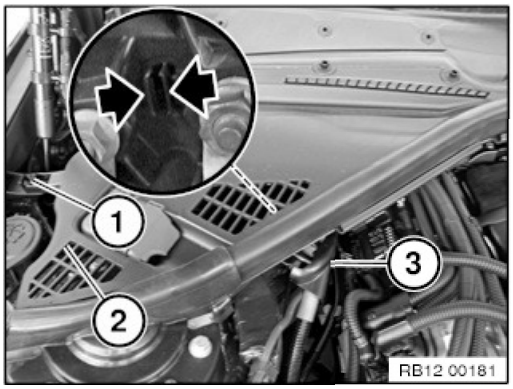
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12 42 500 Replacing positive battery cable between starter motor, alternator and positive battery connection point (N55)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect battery negative lead.
- Remove intake plenum.
- **Vehicles from 07/2014:**

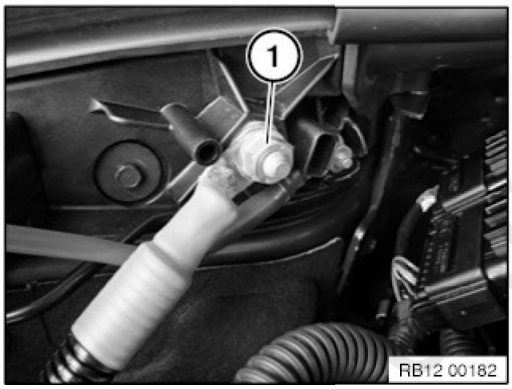
  Remove trailing link.



Vehicles up to 07/2014:

Pull off rubber mount (1) and slightly raise service cover (2) until lock of cover (3) is accessible.

Unlock lock and remove cover (3).

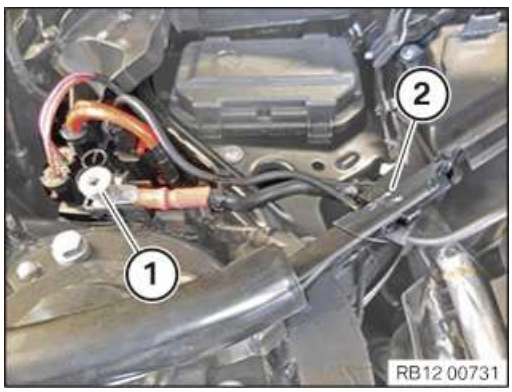


Vehicles up to 07/2014:

Slacken nut (1).

Tightening torque 12 42 3AZ.

Remove positive battery cable from battery positive terminal.



Vehicles from 07/2014:

Loosen positive battery cable (1).

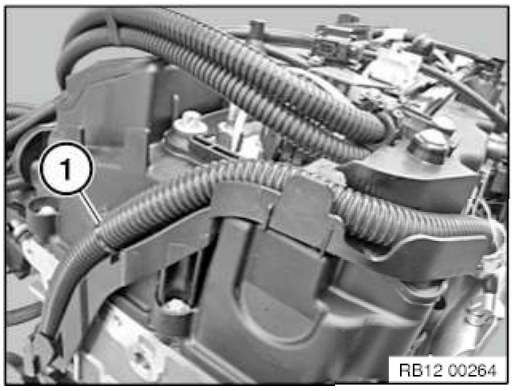
Tightening torque 12 42 3AZ.

Release clamp (2).

Feed out positive battery cable.



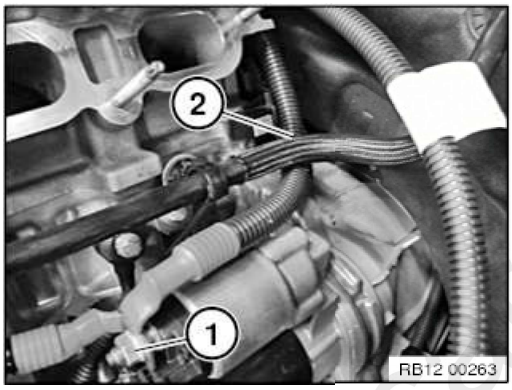
Release positive battery cable from clamp (1).



Release rear cable strap (1) on cylinder head cover.

Replace cable straps.

Note:
Graphic shows engine removed.



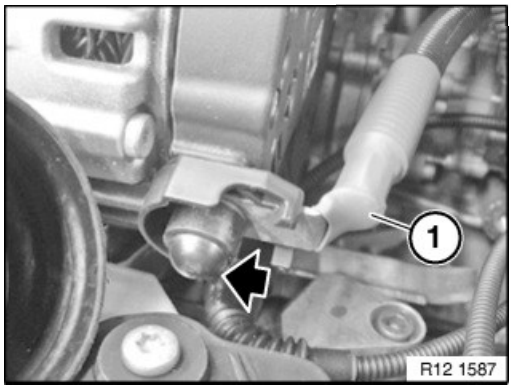
Slacken nut (1).

Tightening torque 12 42 2AZ.

Disconnect positive battery cable from starter motor.

Release cable strap (2).

Replace cable straps.

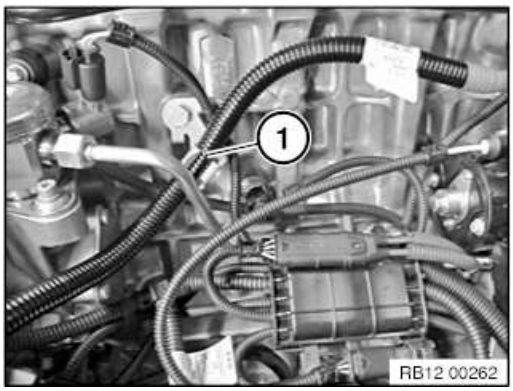


Remove protective cap and release nut underneath.

Tightening torque 12 42 1AZ.

Disconnect positive battery cable (1) from alternator.

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Unclip positive battery cable from holder (1) and remove.

Note:
Check stored fault messages.

Clear diagnostic fault entries from fault memory.

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12 42 540 Replacing safety battery terminal (SBK)

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:

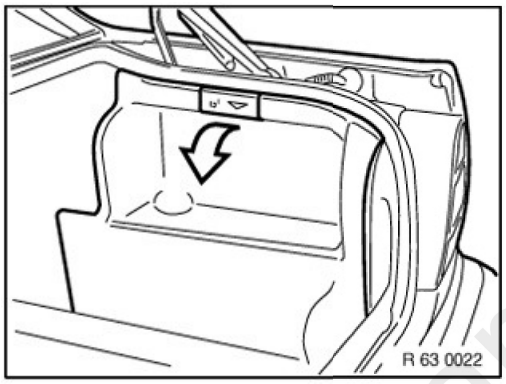
- From model year 1998 in Series E38, E39, E46
- From 4/99 in E36/Z3
- in each of following new Series

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.

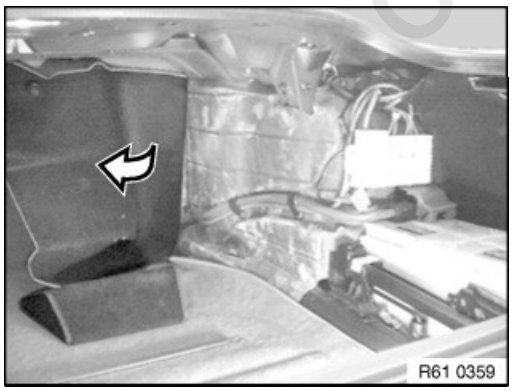


Battery in luggage compartment behind side trim panel

Remove side trim panel.

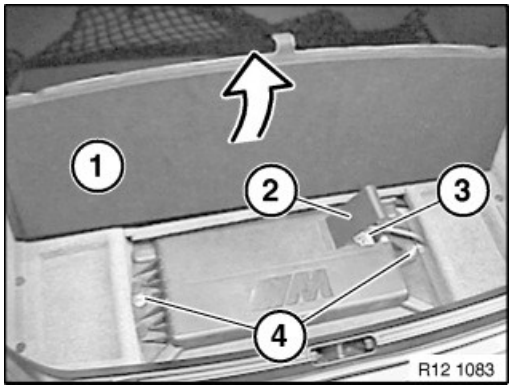
Follow instructions for disconnecting and connecting battery.

Disconnect and cover battery negative lead.



Release front side trim panel partly and fold forward.

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Battery in luggage compartment under floor trim panel

Follow instructions for disconnecting and connecting battery.

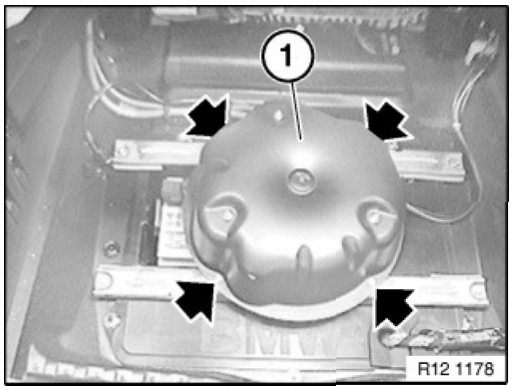
Fold back floor trim panel (1).

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.

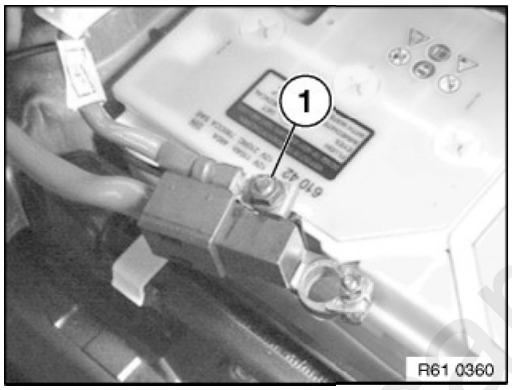
Caution!

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.

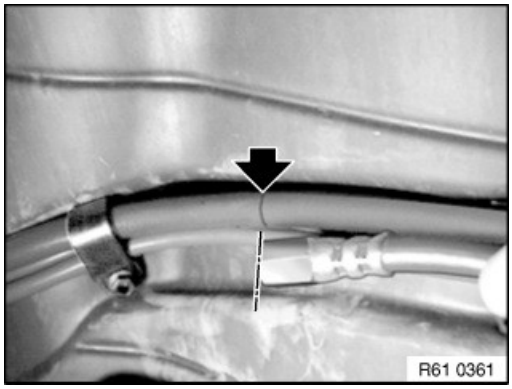
The heavy-current connector of the repair cable has a larger diameter than the battery positive lead.

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.

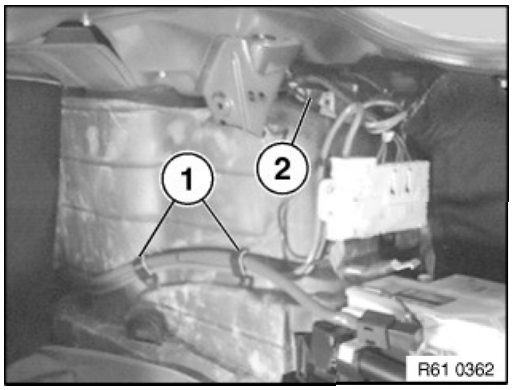
Find matching interface (e.g. approx. 10 cm behind rear seat backrest in E46 touring).

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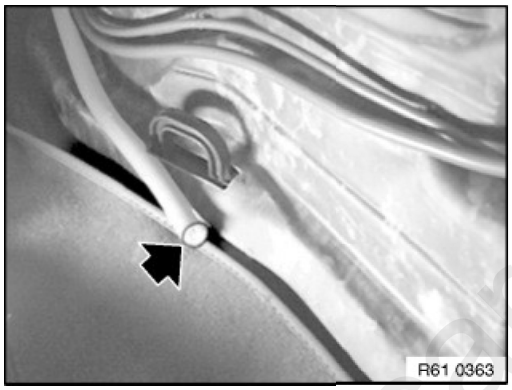
Lay repair cable parallel to battery positive lead.

Mark interface of battery positive lead at end of repair cable.



Release cable ties (1).

Disconnect plug connection (2).

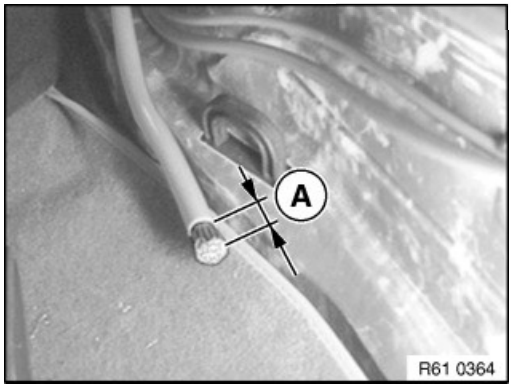


Caution!

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.

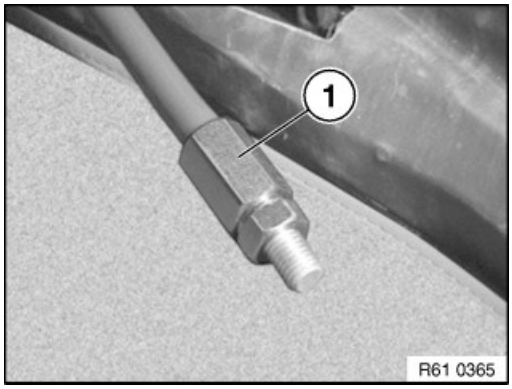
Saw through battery positive cable at marked point with an iron saw.



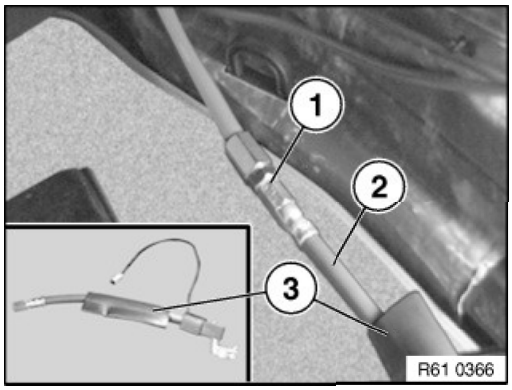
Strip insulation - length (A) - from cable end.

Distance (A) = 15 mm.

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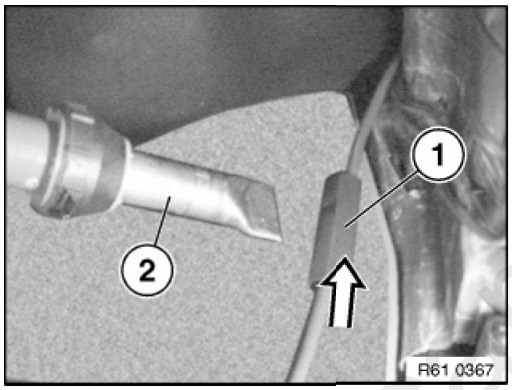


Push heavy-current connector (1) over stripped cable end and screw into position.

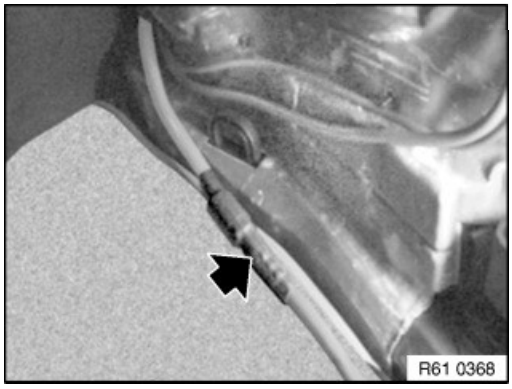


Push shrink-fit hose (3) over repair cable.

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).



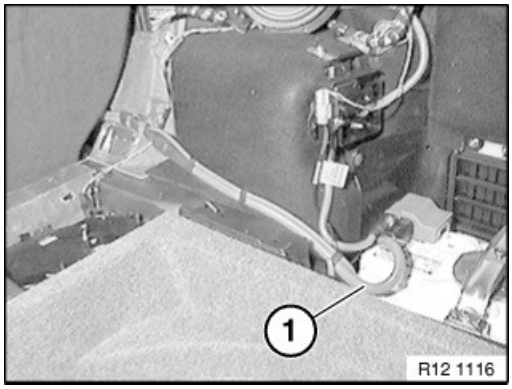
Note:

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.

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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.)

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12 51 001 Replacing wiring harness section for engine (N55)

Attention!

Aluminium screws/bolts must be replaced each time they are **released**.

Aluminium screws/bolts are permitted with and without colour coding (blue).

For reliable identification:

Jointing torque and angle of rotation must be observed without fail **(risk of damage)**.

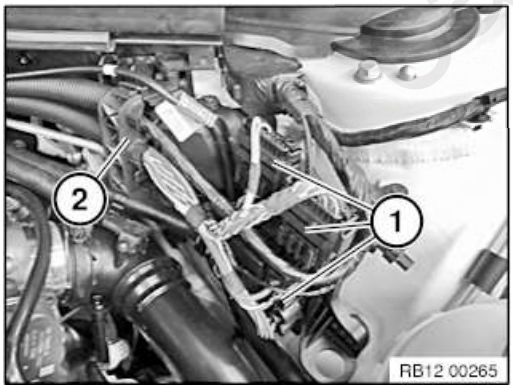
Attention!

Read and comply with notes on protection against electrostatic discharge (ESD protection)!

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect battery earth lead.
- Remove sound insulation of bulkhead upper section, centre.
- Remove intake plenum.
- Partially detach wiring harness for injectors and ignition coils.
- Remove fan cowl.
- Remove front underbody protection.
- Remove rear underbody protection
- **Do the following only F87:**

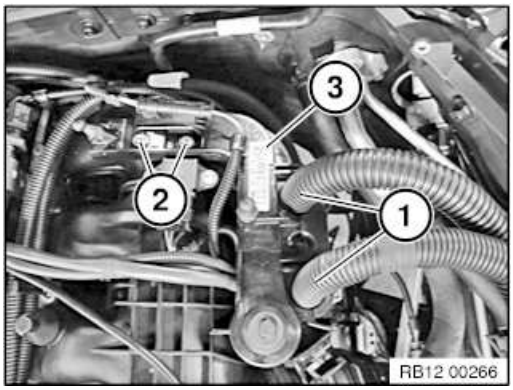
  Remove stiffening plate



Disconnect connector (1) from the power distribution box (PDM) and pull off cable clips.

Release the clamp (2) and expose the wiring harnesses.

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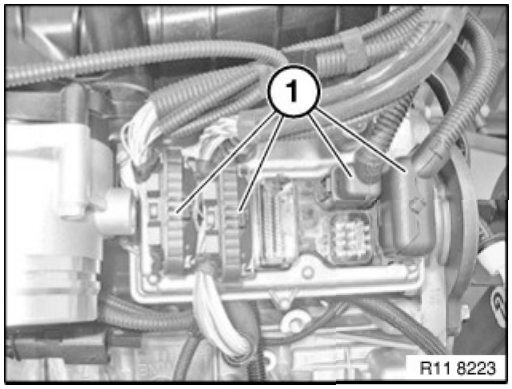


Release wiring harnesses (1) from cable clip.

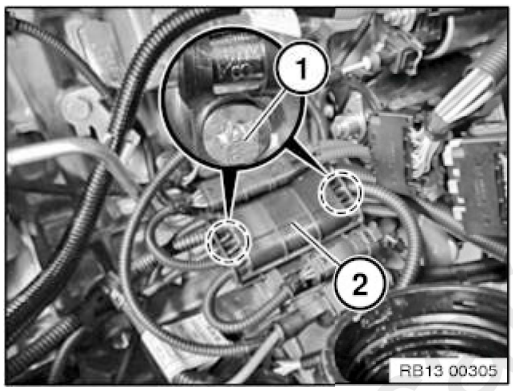
Unfasten screws (2).

Unlock and pull off connector (3) from cable clip.

Put cable clip aside.



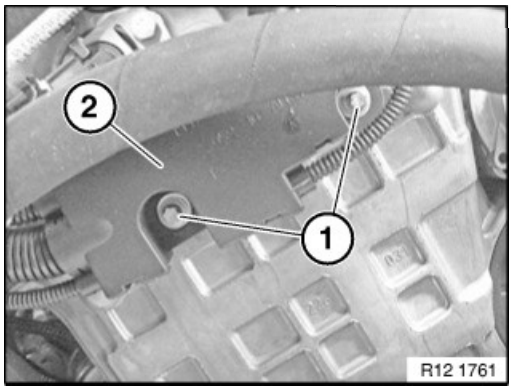
Unlock all connectors (1) from control unit and disconnect.*Installation note:*
Make sure grommets are correctly fitted (watertightness).



Release screws (1) below cable channel (2).

Replace aluminium screws.

Tightening torque 13 53 10AZ.



Release screws (1).

Tightening torque 12 90 4AZ.

Release cable channel (2).

Installation note:
Reconnect the earth connection.

Replace aluminium screws.

Unlock and disconnect following connectors and lines	
Unlock connector on charging pressure sensor and disconnect	
Unlock connector on hot film air mass meter and disconnect	
Pull off and disconnect the connector from the pressure sensor on the intake plenum.	

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Unlock connector on oxygen sensor and disconnect	
Unlock connector on monitoring sensor and disconnect	
Unlock connector on pressure converter and disconnect	
Unlock connector on rail pressure sensor and disconnect	
Unlock connector on tank vent valve and disconnect	
Unlock connector on starter motor and disconnect	
Unlock connector on the knock sensors and disconnect	
Unlock connector on oil temperature sensor and disconnect	
Unlock connector on fuel low-pressure sensor and disconnect	
Unlock connector on throttle body and disconnect	
Unlock connector on high pressure pump and disconnect	
Unlock connector on alternator and disconnect	
Unlock connector on air conditioning compressor and disconnect	
Unlock connector on oil level sensor and disconnect	
Unlock connector on crankshaft sensor and disconnect	
Unlock connector on heating element for air duct and disconnect	
Unlock connector on coolant thermostat and disconnect	
Unlock connector on hydraulic valve and disconnect	
Unlock connector on the coolant pump and disconnect	
Unlock connector on exhaust turbocharger and disconnect	
Unlock and pull off the connector from both the solenoid valves for camshaft adjustment	
Release earth cable on crankcase lower section Tightening torque 12 90 2AZ.	
Release earth cable at rear of cylinder head Tightening torque 12 90 3AZ.	
Unlock connector on intake camshaft pulse sensor and disconnect	
Unlock connector on exhaust camshaft pulse sensor and disconnect	
Unlock connector on oil pressure switch and disconnect	
Unlock connector on switching motor for eccentric shaft and disconnect	

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Release wiring harness if necessary from existing clips and clamps.

Feed out wiring harness and remove.



Installation note:

Check the wiring harness installation arrangement.

Check that the plug connections are correctly fitted.

Check saved fault code entry.

Delete the fault memory.

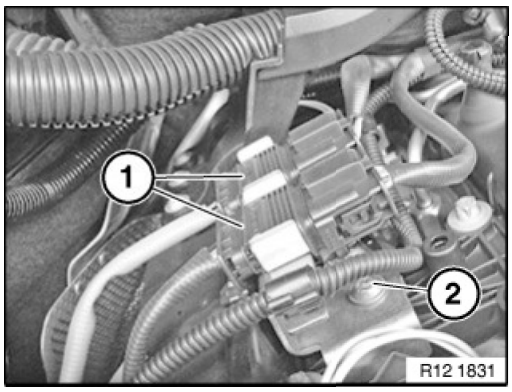
12 51 100 Replacing wiring harness section for ignition and injectors (N55)

Important!

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

Necessary preliminary tasks:

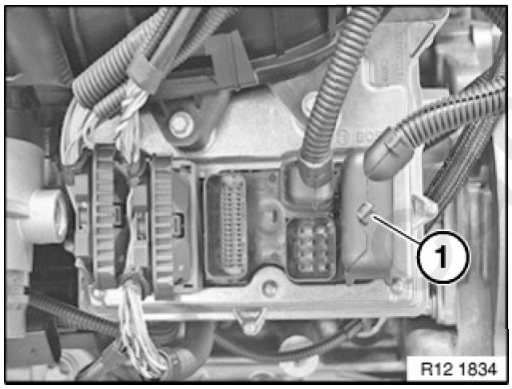
- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect battery earth lead.
- Remove rear ignition coil cover.



Release oxygen sensor connector (1) from bracket.

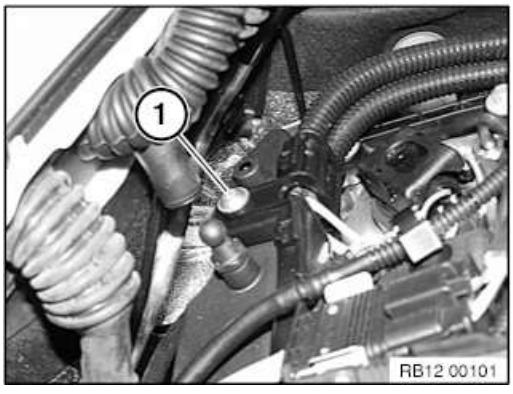
Release screw (2).

Put cable clip aside.



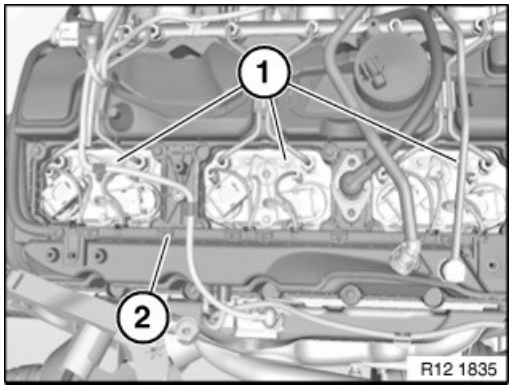
Unlock rear plug (1) from the control unit and disconnect.

Release rear wiring harness from intake plenum.



Release bolt (1) at rear of cable channel.

Tightening torque 12 90 1AZ.



Release nuts (1) and remove earth cable.

Tightening torque 12 90 5AZ.

Unlock all connectors from ignition coils and injectors and detach.

Unclip, feed out and remove wiring harness (2).

Note:
Check stored fault messages.

Delete fault memory.

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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 save 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

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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-boltage 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.

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12 61 285 Removing and installing/renewing oil level sensor for engine oil (N55)

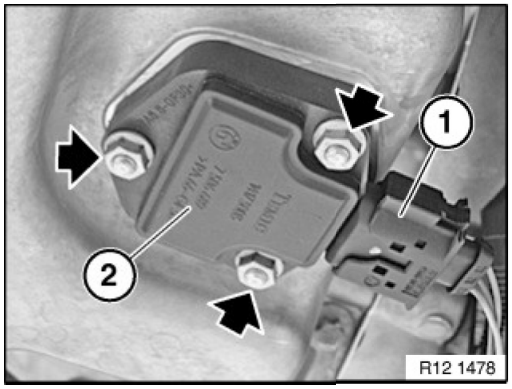
Important!

Read and comply with notes on protection against electrostatic discharge (ESD protection)!

Necessary preliminary tasks:

- Switch off ignition.
- Remove front underbody protection.
- Drain engine oil.
- **Do the following only F87:**

  Remove stiffening plate



Unlock connector (1) and pull off.

Loosen nuts.

Tightening torque 12 61 2AZ.

Remove oil level sensor (2).

Installation note:
Clean sealing surface on oil sump.

Replace seal on oil level sensor.

An excessively low torque value will result in oil leaks.

An excessively high torque value will result in damage to the oil level sensor.

Top up engine oil.

Note:
Check saved fault code entry.

Delete the fault memory.

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12 61 280 Removing and installing/replacing oil pressure sensor (N55)

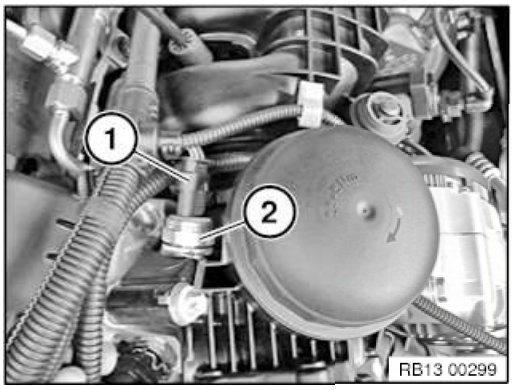
Necessary preliminary tasks:

- Switch off ignition.
- Remove ignition coil cover.

Warning!

Risk of burning!

Only perform this repair work on an engine that has cooled down.



Unlock connector (1) and remove.

Release oil pressure sensor (2).

Tightening torque 12 61 1AZ.

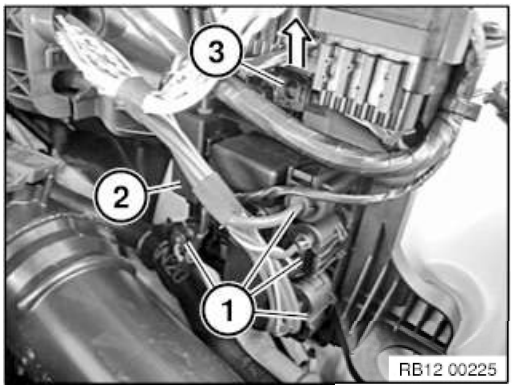
Installation note:
Check engine oil level, top up engine oil if necessary.

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12 63 586 Replacing power distribution module (N20, N26, N55)

Necessary preliminary work:

- Switch off ignition.
- Disconnect battery negative lead.

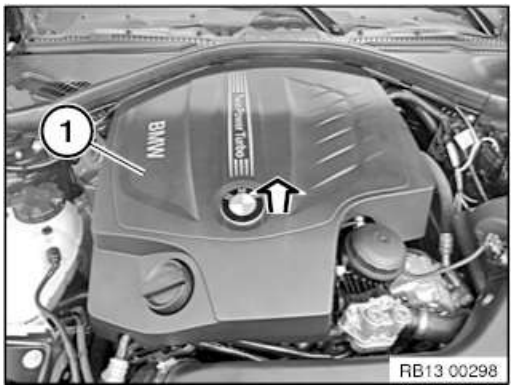


Unlock and pull off all connectors (1) from power distribution module.
Remove cover (2).
Release nut beneath it and set positive battery cable aside.
Tightening torque 12 52 7AZ.
Release lock (3) in direction of arrow.
Feed out and remove power distribution module.

Reassemble the vehicle.

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12 .. ... Removing and installing/replacing ignition coil cover (N55)



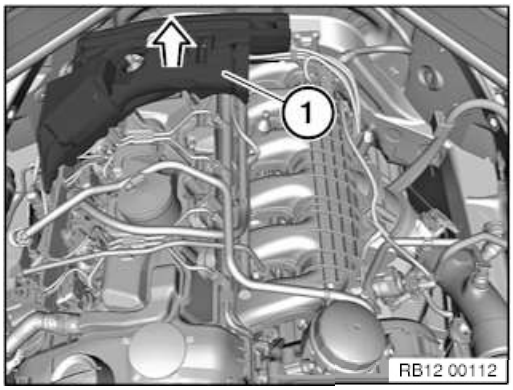
Pull ignition coil coverÂ (1) upward off of rubber mount.

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12 .. ... Removing and installing/replacing rear ignition coil cover (N55)

Necessary preliminary tasks:

- Remove sound insulation bulkhead upper part, centre.



Pull off ignition coil coverÂ (1) upward and remove.

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