

ENGINE

Engine Electrical System - Repair Instructions - X6

TROUBLESHOOTING

12 00 CONTENTS OF ENGINE ELECTRICAL SYSTEM GENERAL

General Information

Working on ignition system , see 12 00 ... Instructions for working on the ignition system.

Removing and installing electronic control units , see 12 00 ... Notes/information on removing and installing control units.

Disconnecting and connecting battery , see 12 00 ... Instructions for disconnecting and connecting battery.

External jump-starting aid , see 12 00 ... Notes/information on start assistance (jump starting).

12 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe **safety instructions for handling vehicle battery** , see 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY .

Before disconnecting battery

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

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

IMPORTANT:

- There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.
- On vehicles with radio code: After disconnecting the battery, the radio code must be re-entered. Therefore obtain the radio code card from the customer beforehand. Note stored stations and restore them after connecting the battery.
- Stored settings of the on-board computer and clock will also be lost.
- All available central keys must be recoded for cars with first generation infrared transmitter locking systems.

General notes on disconnecting battery

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

Do not under any circumstances pull/lever off pole shoes by force.

Do not under any circumstances release socket-head cap screw of IBS.

- Detach **terminal of battery negative** , see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** lead from car battery and second battery if fitted. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque, see **61 21 BATTERY WITH TERMINAL** .

After connecting battery

IMPORTANT: The scope of application of some systems may be restricted after a power supply interruption.

Likewise, individual settings may be lost.

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

Example:

- E46 (AWD)/ E53/E83: Carry out steering angle sensor adjustment , see **61 31 996 CARRYING OUT STEERING ANGLE SENSOR ADJUSTMENT** .
- If necessary, carry out adjustment of active front steering , see **32 10 005 ADJUSTMENT FOR ACTIVE FRONT STEERING** .
- If necessary, activate sliding sunroof , see **54 0 ... NOTES ON STEEL AND GLASS SLIDE/TILT SUNROOFS (INITIALIZATION/NORMALIZATION/LEARNING OF CHARACTERISTIC CURVE)** .
- If necessary, activate power windows , see **67 62 ... NOTES ON INITIALIZING POWER WINDOW UNIT IN FRONT DOOR** .
- If necessary, activate mirror with compass , see **51 16 ... CALIBRATING COMPASS IN INTERIOR REARVIEW MIRROR (FROM 09/08)** or **51 16 ... CALIBRATING COMPASS IN INTERIOR REARVIEW MIRROR (UP TO 09/08)** .

Please refer to the Program user documentation for further information on vehicle-specific activation.

Vehicles with a two-battery system

Starter and equipment batteries

A two-battery system has a starter battery circuit and an equipment battery circuit. A supplementary control unit monitors both battery circuits. Depending on the situation, the battery circuits are connected to or isolated from the supplementary control unit via an isolating relay.

Two AGM batteries, whose design and properties are described in **AGM batteries** , are used as a storage battery. See **61 20 ... AGM BATTERY** .

IMPORTANT: These batteries must not under any circumstances be charged with a voltage in excess of 14.8 V. Rapid programs must not be used either.

Receiving/giving starting assistance via jump start terminal

The engine can be jump-started with an external voltage supply via the jump start terminal on the right side of the engine compartment.

NOTE: The starter battery is isolated from the alternators when the engine hood/bonnet is open.

Giving starting assistance via the jump start terminal is thus limited by the capacity of the starter battery when the engine hood/bonnet is open.

Charging starter and equipment batteries via jump start terminal

The starter battery is charged as a matter of priority with a charger connected to the jump start terminal. The voltage at the starter battery is the decisive factor in determining whether the equipment battery is also included in the charging operation. The supplementary control unit automatically detects a charging operation at a charging voltage at the starter battery of $>$ or $=$ 13.5 V. The isolating relay is closed and thus the equipment battery is connected in parallel. Both batteries are now charged.

Prerequisite:

- Terminal 61 inactive
- Terminal 15 inactive

If terminal 15 becomes "active" during the charging operation, the isolating relay is opened immediately and again only the starter battery is charged.

NOTE: When the engine hood is open, the isolating relay is also opened in normal operation when the engine is running.
A special mode can be set by means of diagnosis for workshop/garage operation. The isolating relay is closed from terminal R in this operating mode. This mode is automatically reset once a distance of 5 km has been driven.

IMPORTANT: The cigarette lighter is isolated from the electrical system after terminal R "OFF" on a timed basis (60 mins.), thereby interrupting charging of the equipment battery via the cigarette lighter. This is prevented if the battery master switch (on the right side of the luggage compartment behind the panel) is turned on and off again twice within 2 seconds. (Cigarette light battery charging function).

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)

12 00 ... NOTES/INFORMATION ON REMOVING AND INSTALLING 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, initialize power window units , see 67 62 ... NOTES ON

INITIALIZING POWER WINDOW UNIT IN FRONT DOOR .

When replacing the DME/DDE control unit, observe the following:

- **In each case read out the hardware/software status of the relevant control unit using the BMW diagnosis system.**

Comply with the instructions of the DIS diagnosis system on the steps pertaining to coding and programming.

On vehicles with electronic vehicle immobilization, comply with the instructions of the BMW diagnosis system.

- **Each control unit is programmed with certain basic values, which serve as mean values. The control unit receives different input values, depending on engine condition, which are compared with the stored values. The adaptive system compares the input values with the stored map values. The control commands are routed to the relevant actuators.**
- **If the DME control unit is without current for a long time (more than one hour), its adaptive system loses the stored values. When a cleared control unit is restarted or a new control unit is installed, the adaptive system must read in and store the input values of the associated engine as new basic values itself.**
- **This procedure could lead to erratic idling and disturbed overrunning of the engine after starting. Depending on the engine it could require some time before all values are adapted to the engine condition.**
- **Therefore observe the following procedure before replacing or reinstalling a DME/DDE control unit:**
 - 1. If possible before exchanging control unit, run engine up to operating temperature.**
 - 2. Exchange control units and run the vehicle at alternating engine speeds.**

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.

61 00 ... NOTES ON HANDLING WIRING HARNESSSES AND CABLES

In general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use muckets if necessary
- Secure additionally laid cables/leads with cable ties

In addition

Shielded cables (coaxial cables):

IMPORTANT: Shielded cables must not be repaired!

- This may lead to indifferences in noise radiation and interference immunity at contact points in the shield
- To satisfy the requirements of the type approval, it is essential to replace shielded cables completely

Fibre-optic cables:

NOTE: Fibre-optic cables are colored differently as follows:

- Green = MOST (Media Oriented Systems Transport) fibreoptic cables
- Yellow = ISIS (Integrated Service Information Server) fibreoptic cables
- Orange=repair fibre-optic cables

IMPORTANT:

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat > or = 85°

Treating cables and fibre-optic cables , see **61 13 ... TREATING CABLES AND FIBRE-OPTIC CABLES** .

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **butt connectors** , see **61 13 ... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION** .

NOTE:

- The cable is a twisted cable. If possible, maintain twisted cable after repair.

Airbag cables:

Repairing airbag cables , see **61 00 ... REPAIRING AIRBAG CABLES** .

Ribbon cables:

Repairing ribbon cables , see **61 13 ... REPAIRING RIBBON CABLES** .

IGNITION WIRES SPARK PLUGS

12 12 011 REPLACING ALL SPARK PLUGS (N53, N54, N63)

Special tools required:

- 12 1 172

- 12 1 220 , see 12 1 220 SPARK PLUG WRENCH WAF 14 MM BIHEXAL .
- 12 1 230 , see 12 1 230 INSTALLATION AID .

Necessary preliminary tasks:

- Switch off ignition.
- **Remove ignition coils** , see 12 13 511 Replacing ignition coils (N63).

IMPORTANT: Wear protective goggles.

Oil and dirt particles may get into your eyes!

Clean spark plug slot with compressed air.

Unscrew spark plugs with special tool 12 1 220 and extension (1) with min. 8° bend.

Installation:

Screw down spark plugs with special tool 12 1 220, extension (1) with min. 8° bend and torque limiter 12 1 172.

If special tool 12 1 172 is not used, observe tightening torque 12 12 1AZ.

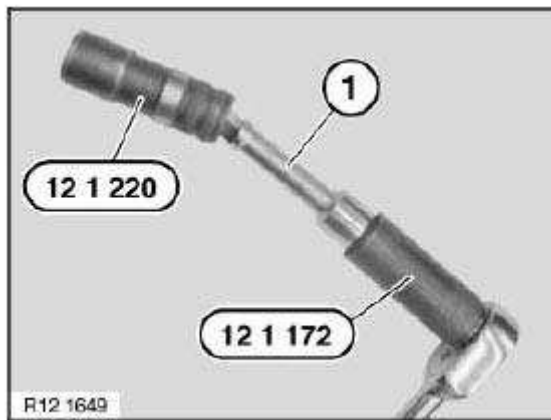


Fig. 1: Identifying Spark Plugs With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Attach new spark plug (1) to special tool 12 1 230.

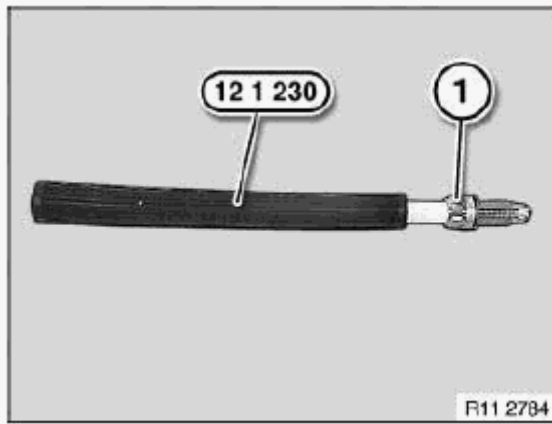


Fig. 2: Identifying Spark Plugs With Special Tool
 Courtesy of BMW OF NORTH AMERICA, INC.

Screw spark plug with special tool 12 1 230 in to cylinder head plug thread as far as it will go.

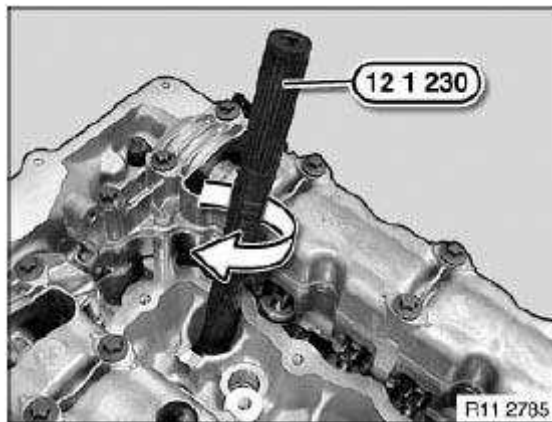


Fig. 3: Identifying Spark Plugs With Special Tool
 Courtesy of BMW OF NORTH AMERICA, INC.

IGNITION COIL

12 13 511 REPLACING IGNITION COILS (N63)

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Check stored fault messages
- Switch off ignition
- Remove **intake filter housing** , see **13 71 030 REMOVING AND INSTALLING BOTH INTAKE FILTER HOUSINGS (N63)** .

IMPORTANT: Ignition coils must not be fouled by fuel.

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

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

Pull ignition coil (2) up and out.

This procedure is applicable to all ignition coils.

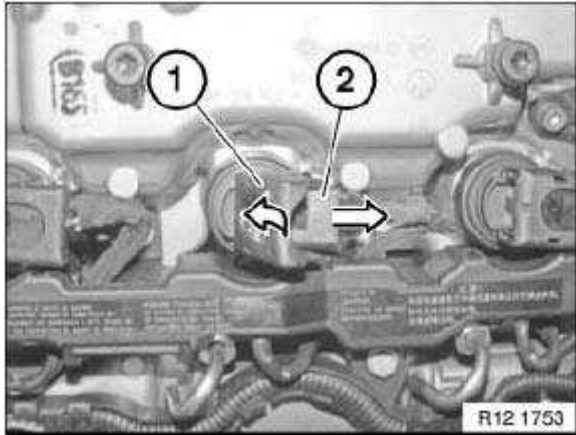


Fig. 4: Identifying Ignition Coil And Unlock Plug Catch
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check that rubber seal of ignition coil (1) is correctly seated.

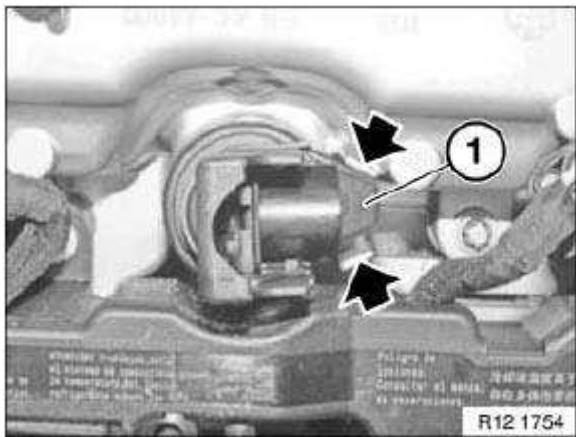


Fig. 5: Identifying Rubber Seal Of Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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

The plug catch must snap into place without great effort.

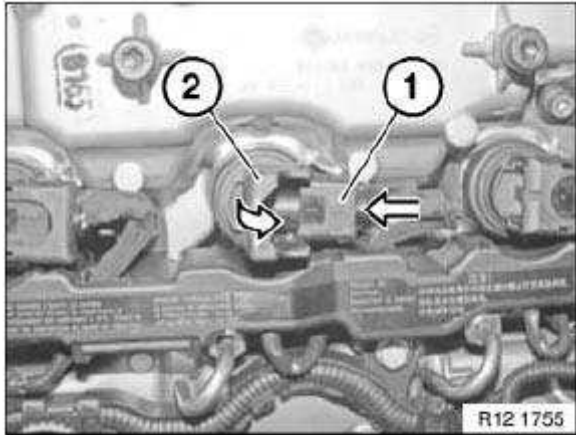


Fig. 6: Identifying Push Plug And Plug Catch
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

ELECTRONIC SWITCHING OR CONTROL UNIT

12 14 512 REPLACING PULSE GENERATOR ON LEFT EXHAUST CAMSHAFT (N63)

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition.
- Remove left **intake filter housing** , see **13 71 030 REMOVING AND INSTALLING BOTH INTAKE FILTER HOUSINGS (N63)** .

Unlock plug (1) and remove.

Release screw (2).

Tightening torque 13 32 3AZ, see **13 32 FUEL FILTER** .

Remove pulse generator (3).

Installation

Replace sealing ring and coat with antiseize agent.

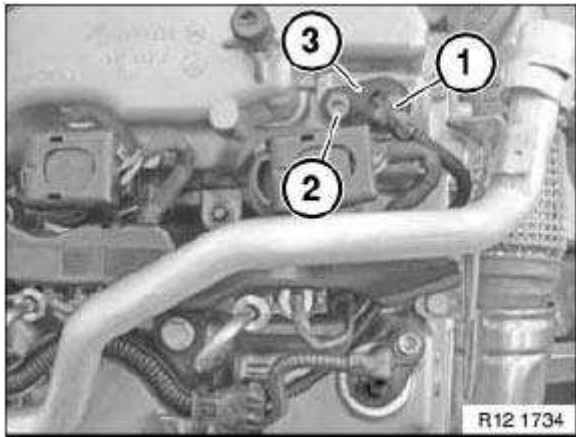


Fig. 7: Identifying Unlock Plug, Pulse Generator And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

12 14 513 REPLACING PULSE GENERATOR ON RIGHT EXHAUST CAMSHAFT (N63)

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition
- Remove right **intake filter housing** , see **13 71 030 REMOVING AND INSTALLING BOTH INTAKE FILTER HOUSINGS (N63)** .

Unlock plug (1) and remove.

Release screw (2).

Tightening torque 13 62 3AZ, see **13 62 SENDERS FOR CONTROL UNIT** .

Remove pulse generator (3).

Installation

Replace sealing ring and coat with antiseize agent.

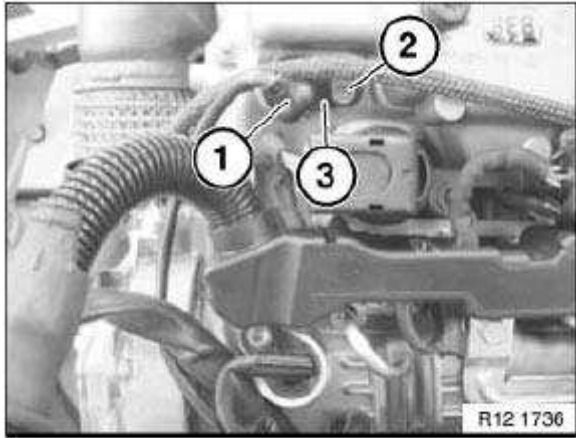


Fig. 8: Identifying Pulse Generator, Screw And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

12 14 521 REPLACING CRANKSHAFT PULSE GENERATOR (N63)

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Switch off ignition.
- Remove rear **underbody protection** , see **51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .

Installation location

On transmission housing at bottom right.

Unlock plug (1) and remove.

Release screw (2).

Tightening torque 13 62 4AZ, see **13 62 SENDERS FOR CONTROL UNIT** .

Withdraw pulse generator (3) from transmission housing.

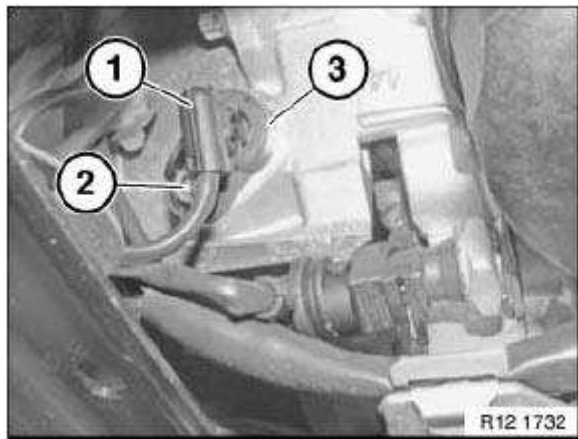


Fig. 9: Identifying Pulse Generator, Screw And Unlock Plug
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Now clear the fault memory.

12 14 522 REPLACING PULSE GENERATOR ON LEFT INLET CAMSHAFT (N63)

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition
- Remove left **intake filter housing** , see **13 71 030 REMOVING AND INSTALLING BOTH INTAKE FILTER HOUSINGS (N63)** .

Unlock plug (1) and remove.

Release screw (2).

Tightening torque 13 62 3AZ, see **13 62 SENDERS FOR CONTROL UNIT** .

Remove pulse generator (3).

Installation

Replace sealing ring and coat with antiseize agent.

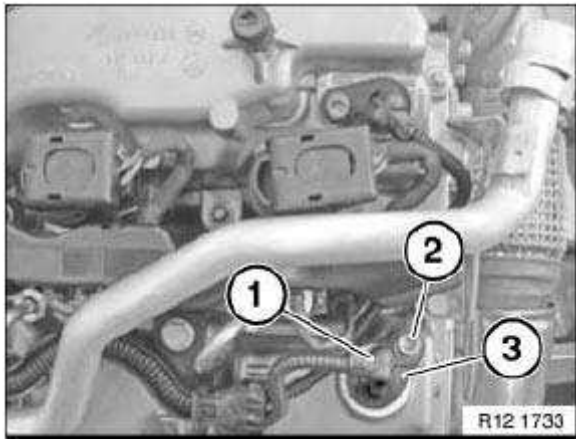


Fig. 10: Identifying Pulse Generator And Unlock Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

12 14 526 REPLACING PULSE GENERATOR ON RIGHT INLET CAMSHAFT (N63)

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition
- Remove right **intake filter housing** , see **13 71 030 REMOVING AND INSTALLING BOTH INTAKE FILTER HOUSINGS (N63)** .

Unlock plug (1) and remove.

Release screw (2).

Tightening torque 13 62 3AZ, see **13 62 SENDERS FOR CONTROL UNIT** .

Remove pulse generator (3).

Installation

Replace sealing ring and coat with antiseize agent.

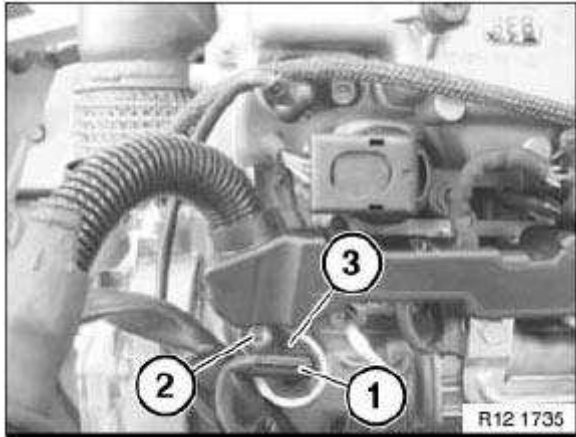


Fig. 11: Identifying Pulse Generator And Screw
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

12 14 550 REPLACING CONTROL UNIT (DME) (N63)

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

Necessary preliminary tasks:

- Switch off ignition
- Disconnect **battery negative lead** , see 61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD .
- Remove **microfilter housing** , see 64 31 081 REMOVING AND INSTALLING/REPLACING MICROFILTER HOUSING

IMPORTANT: Follow instructions for removing and installing control units, see 12 00 ... Notes/information on removing and installing control units.

Replacement:

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

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.

Lever out expander rivet.

Remove gasket (1).

Release screws (2).

Feed out partition (3) and remove.

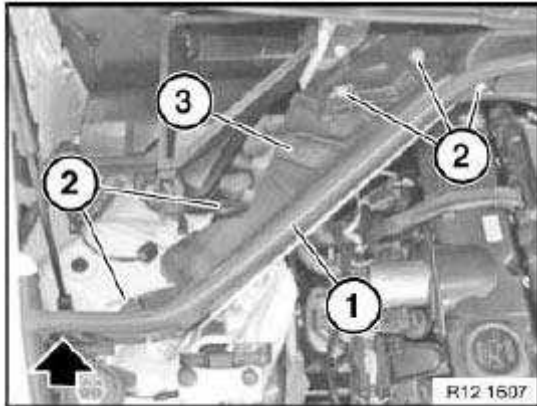


Fig. 12: Identifying Gasket And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out expander rivet.

Release locks in direction of arrow.

Feed out fresh-air duct (1) and remove.

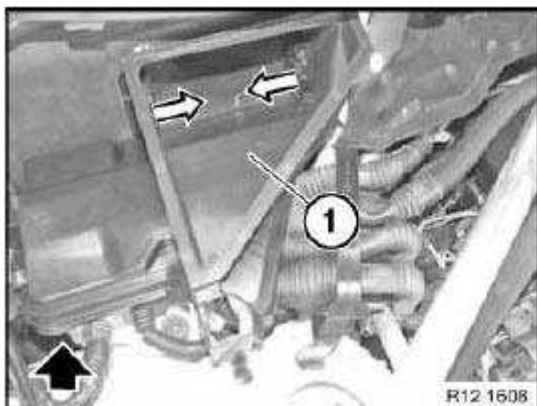


Fig. 13: Identifying Fresh-Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Open retainers.

Release lock (1) in direction of arrow.

Remove cover (2).

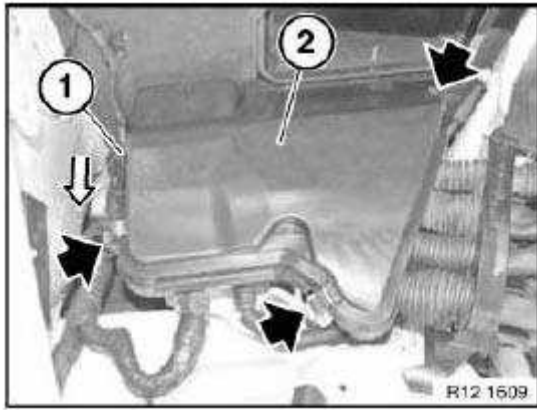


Fig. 14: Identifying Cover And Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove retaining bar (1).

Unlock upper section (2) of partition seal in direction of arrow and remove.

Release grommets (3) for wiring harnesses from lower section of partition seal and from electronics box.

Installation:

Make sure grommets are is correctly seated (watertightness).

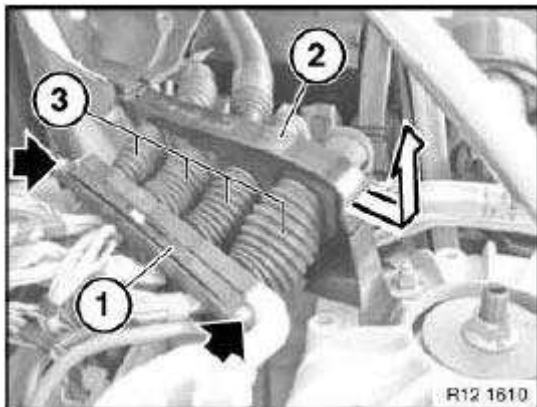


Fig. 15: Identifying Retaining Bar And Grommets
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) on control unit and disconnect.

Remove control unit.

Installation:

Replacement:

Note device identification number and coding.

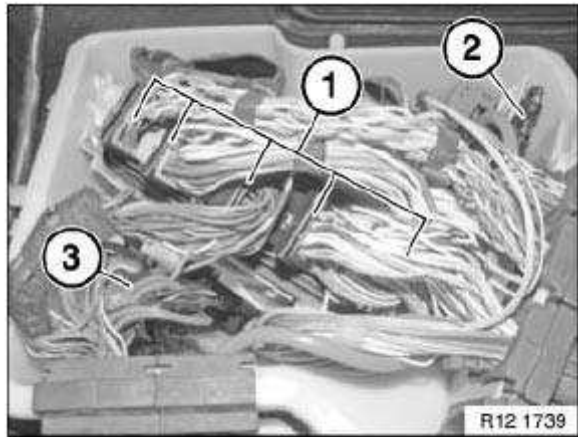


Fig. 16: Identifying Unlock Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Injector adjustment

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

Injector adjustment is carried out with the aid of so-called adjustment values.

The adjustment values are printed in two blocks of three digits on each injector.

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

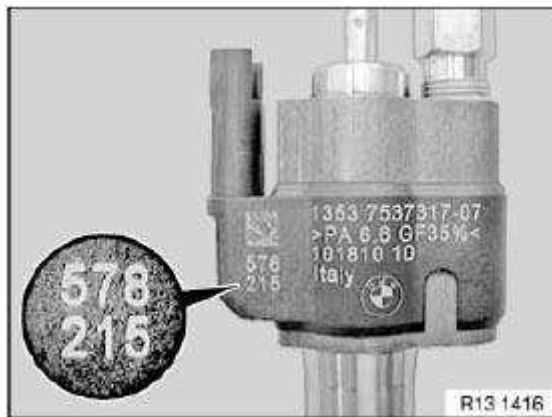


Fig. 17: Identifying Adjustment Values Printed In Blocks Of Injector
Courtesy of BMW OF NORTH AMERICA, INC.

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



Fig. 18: Identifying Adjustment Values Printed Area Location
Courtesy of BMW OF NORTH AMERICA, INC.

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

- Connect DIS Tester
- Identify car
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment programs"
- Select "Adjust injectors"
- Change "Test schedule"
- The adjustment value must be entered for each cylinder.

NOTE: **Check stored fault message.**
 Now clear the fault memory.

12 14 610 REMOVING/REPLACING RIGHT KNOCK SENSORS (N63)

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition
- Disconnect **battery negative lead** , see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** .

- Remove **right intake manifold** , see **11 61 068 REMOVING AND INSTALLING/REPLACING RIGHT INTAKE MANIFOLD (N63) .**

Picture shows the left side, the procedure for the right side is identical.

Unlock and disconnect plugs (1) on both knock sensors.

Release screws on both knock sensors (2).

Tightening torque **E13 62 5AZ** , see **13 62 SENDERS FOR CONTROL UNIT .**

Remove knock sensors (3).

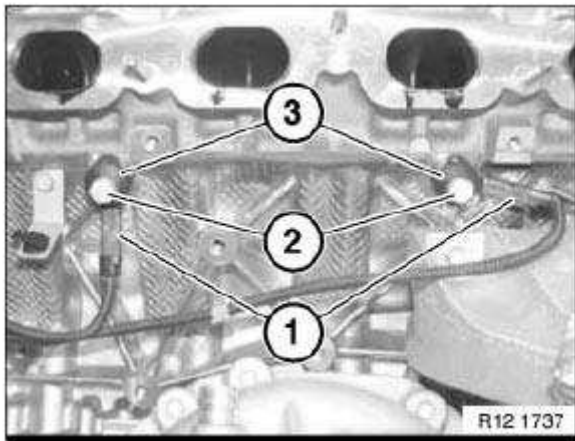


Fig. 19: Identifying Knock Sensors And Knock Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean support face of knock sensors on engine block.

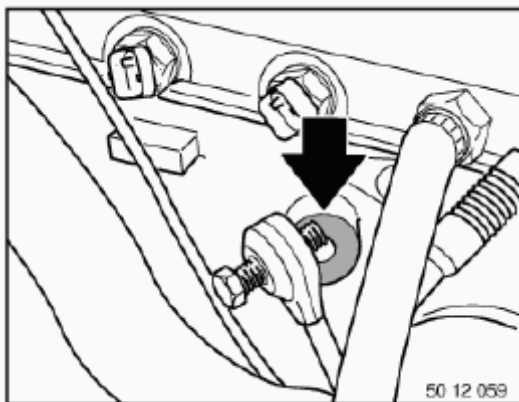


Fig. 20: Identifying Knock Sensors On Engine Block

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Now clear the fault memory.

12 14 611 REMOVING/REPLACING LEFT KNOCK SENSORS (N63)

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition
- Disconnect **battery negative lead** , see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** .
- Remove **left intake manifold** , see **11 61 065 REMOVING AND INSTALLING/REPLACING LEFT INTAKE MANIFOLD (N63)** .

Unlock and disconnect plugs (1) on both knock sensors.

Release screws on both knock sensors (2).

Tightening torque 13 62 5AZ, see **13 62 SENDERS FOR CONTROL UNIT** . .

Remove knock sensors (3).

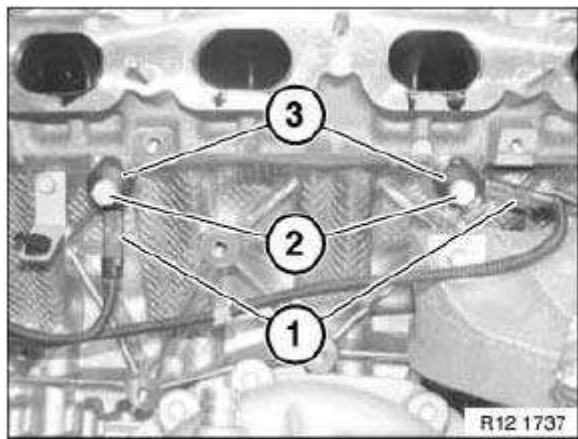


Fig. 21: Identifying Knock Sensors And Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean support face of knock sensors on engine block.

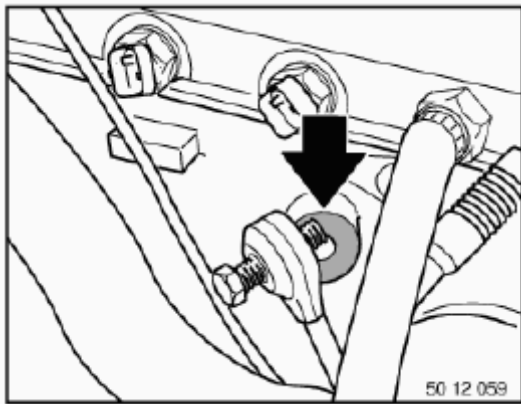


Fig. 22: Identifying Knock Sensors On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Check stored fault message.**
 Now clear the fault memory.

12 14 700 CODING CONTROL MODULE (DME / DDE)

Switch off ignition.

Connect MoDiC or DIS/GT1 Tester.

Switch on ignition.

Select "Coding" program.

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

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

Refer to "Diagnosis and Coding" service information bulletins on subject of coding.

12 14 705 PROGRAMMING CONTROL UNIT (DME / DDE)

Switch off ignition.

Connect MoDiC or DIS/GT1 Tester.

Switch on ignition.

Select "Programming".

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

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

Refer to "Diagnosis and Coding" service information bulletins on subject of programming.

12 90 ... REMOVING AND INSTALLING/REPLACING ELECTRONICS BOX

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

NOTE: Follow instructions for removing and installing electronic control units

Necessary preliminary tasks:

- Read fault memory.
- Disconnect **battery negative lead** , see 61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD .
- Remove **electronics box fan** , see 12 90 100 Replacing fan for electronics box.
- Remove **distribution box (passenger compartment)** , see 61 13 050 REMOVING AND INSTALLING/REPLACING FUSE BOX IN PASSENGER COMPARTMENT .
- Release control unit holder

Pull rubber grommets out of electronics box. Disconnect all plug connections.

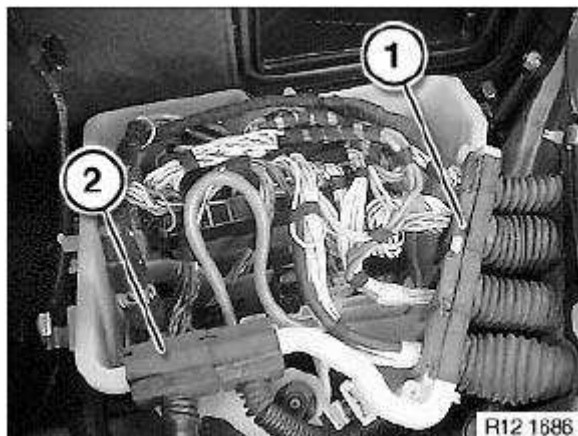


Fig. 23: Identifying Rubber Grommets Out Of Electronics Box
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (arrows).

Disconnect wiring harness on engine compartment side on right.

Remove electronics box.

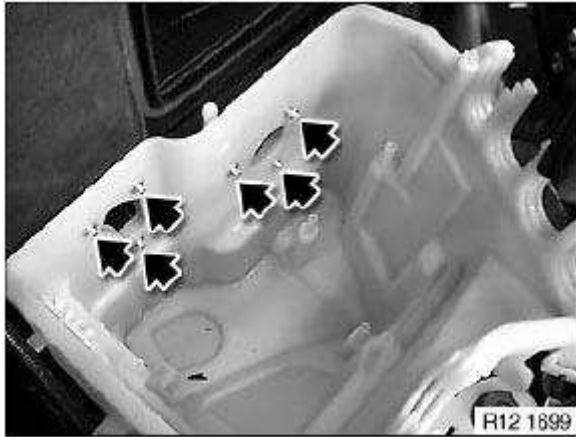


Fig. 24: Identifying Electronics Box And Engine Compartment Side
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure gasket (1) is correctly seated on electronics box.

Add final details to vehicle.

Read fault memory.

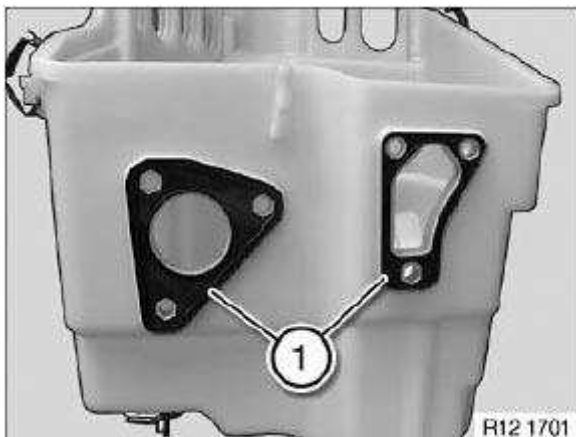


Fig. 25: Identifying Electronics Box Gasket

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement (E70 - Security):

Pay attention to **engine compartment protective features** .

ALTERNATOR WITH DRIVE AND MOUNT

12 31 ... REPLACING ALTERNATOR BELT PULLEY

Special tools required:

- 12 7 110 , see ENGINE ELECTRICAL SYSTEM - SPECIAL TOOLS (N54, N63) .

Remove and install alternator drive belt.

Depending on alternator type, grip shaft with:

- hexagon socket
- multi-tooth socket or
- Torx socket wrench

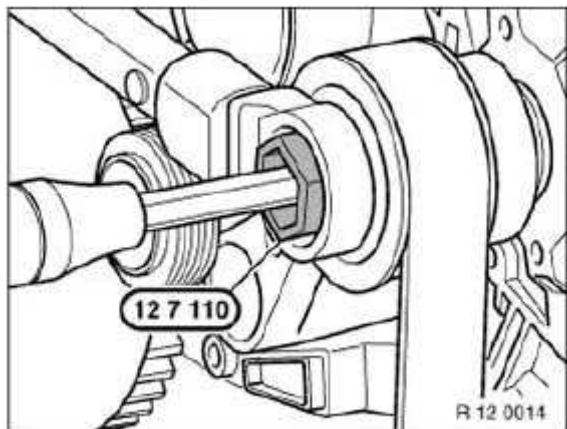


Fig. 26: Installing Alternator Drive Belt
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut with special tool 12 7 110.

Installation:

Tightening torque, 12 31 2AZ / 12 31 3AZ , see 12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS .

12 31 ... REPLACING ALTERNATOR BELT PULLEY (WITH OVERRUNNING CLUTCH)

Special tools required:

- 12 7 120 , see ENGINE ELECTRICAL SYSTEM - SPECIAL TOOLS (N54, N63) .

Remove and install alternator drive belt.

Grip alternator shaft with:

- internal serration

Release nut with special tools 12 7 120.

Installation:

Tightening torque 12 31 3AZ , see 12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS .

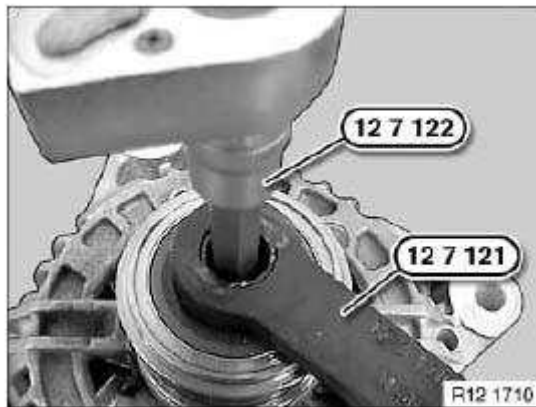


Fig. 27: Installing Alternator Drive Belt
Courtesy of BMW OF NORTH AMERICA, INC.

12 31 009 CHECKING ALTERNATOR (BSD)

Necessary preliminary tasks:

- Correct connections on charged battery
- Correct connections on alternator and starter motor
- Good ground connection between engine and body
- Tensioned ribbed V-belt
- Read out DME/DDE fault memory.

NOTE: **The alternator with BSD interface can communicate with the engine control unit (DME/DDE).**
 The alternator is not connected to the charge telltale light.
 The alternator can identify various faults.

BSD alternator can be recognized by the plug connection on the alternator.

Connect diagnosis tester.

- Function selection
- Complete vehicle
- Drive
- Voltage and current regulation
- Voltage and current generation
- Alternator
- Follow instruction in diagnostic program

Oscillogram for a fault-free alternator

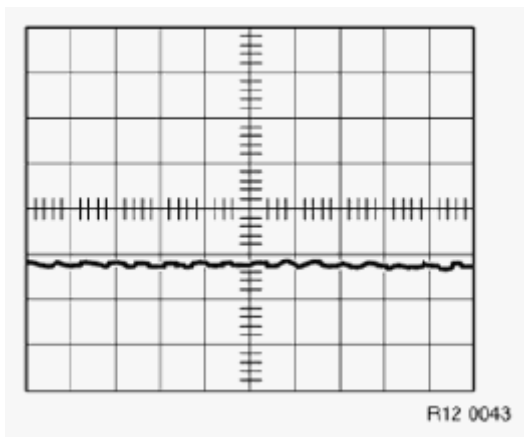


Fig. 28: Oscillogram Fault-Free Alternator Voltage Graph
Courtesy of BMW OF NORTH AMERICA, INC.

Oscillogram for a faulty alternator

One phase interrupted.

Repair/exchange alternator.

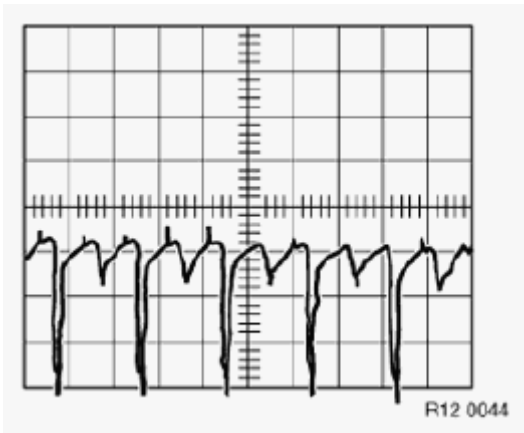


Fig. 29: Oscillogram Faulty Alternator Voltage Graph
Courtesy of BMW OF NORTH AMERICA, INC.

Interturn fault.

Repair/exchange alternator.

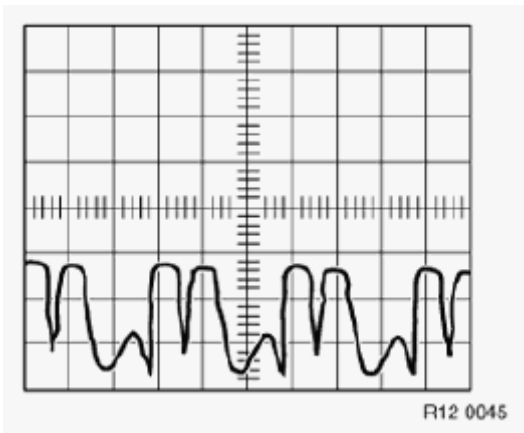


Fig. 30: Oscillogram Alternator Voltage Graph (Interturn Fault)
Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in negative diode.

Repair/exchange alternator.

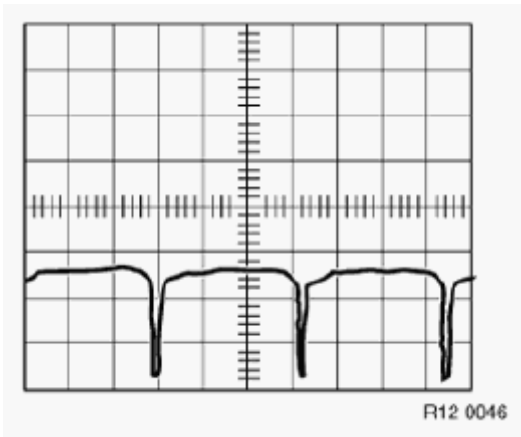


Fig. 31: Oscilloscope Alternator Voltage Graph (Open Circuit)
 Courtesy of BMW OF NORTH AMERICA, INC.

Short circuit in positive diode.

Repair/exchange alternator.

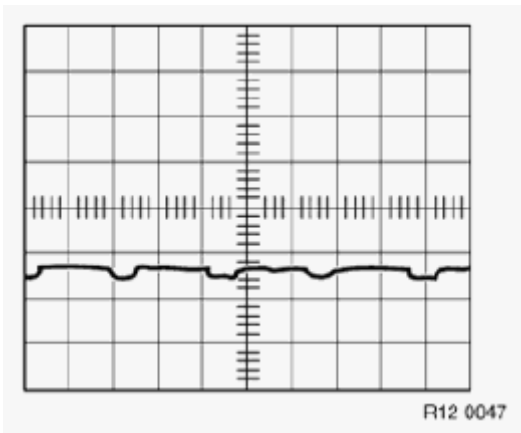


Fig. 32: Oscilloscope Alternator Voltage Graph (Short Circuit)
 Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in positive diode.

Repair/exchange alternator.

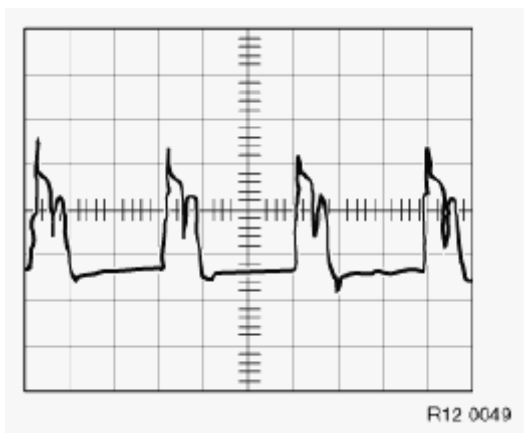


Fig. 33: Oscillogram Alternator Voltage Graph (Open Circuit)
Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in exciter diode.

Repair/exchange alternator.

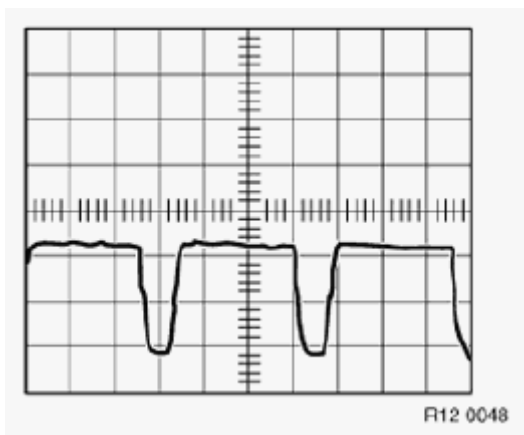


Fig. 34: Oscillogram Alternator Voltage Graph (Open Circuit)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME/DDE.

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N63)

Necessary preliminary tasks:

- Switch off ignition.
- Clamp off **battery negative lead** , see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** .
- Remove **acoustic cover** , see **REMOVING ENGINE COVER (N63)**

- Remove **suction filter housing** , see 61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD and 13 71 030 REMOVING AND INSTALLING/REPLACING BOTH INTAKE FILTER HOUSINGS (N63) .
- Remove **fan cowl** with electric fan, see 61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD and 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N63) .
- Remove alternator **drive belt** , see 61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD and 11 28 010 REPLACING ALTERNATOR DRIVE BELT (N63) .
- Remove intercooler **expansion tank** , see 61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD and 17 13 020 REMOVING AND INSTALLING/REPLACING INTERCOOLER EXPANSION TANK (N63) .
- Remove **fuel feed line** , see 13 53 332 REMOVING AND INSTALLING/REPLACING FEED LINE (N63) .

IMPORTANT: Risk of damage!
Cover radiator.

Release clamps (1) and (2).

Replace clamps (2).

Detach both charge-air ducts (3) and remove.

Check gaskets on turbocharger, replacing if necessary.

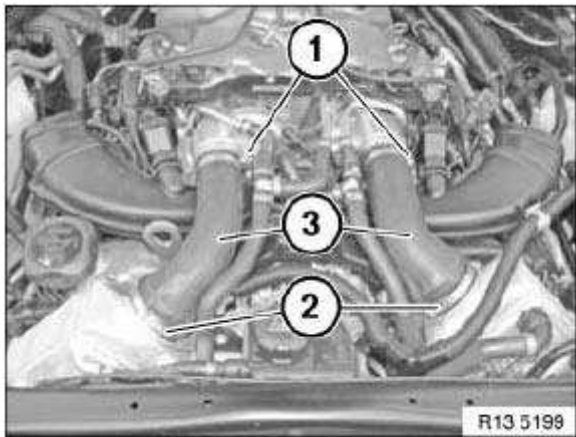


Fig. 35: Identifying Charge-Air Ducts And Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Detach hoses (1) from clean-air pipe.

Release screw (2).

Tightening torque 13 71 1AZ, see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** and **13 71 AIR INTAKE DUCT** .

Detach clean-air pipe (3) in direction of travel from turbocharger.

Check seals on clean-air pipe, replacing if necessary.

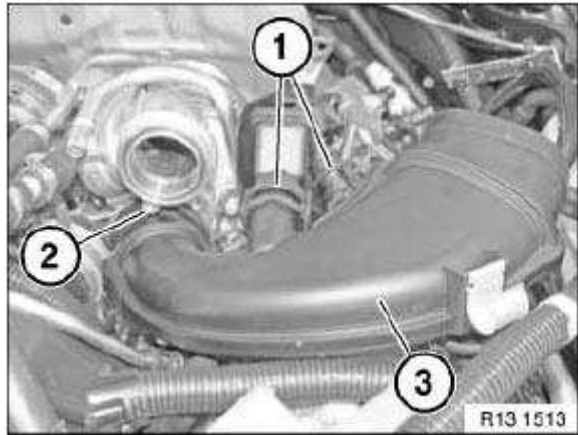


Fig. 36: Identifying Clean-Air Pipe, Screw And Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off cable duct (1) from cable holder (2) in upward direction.

Release cable (3) from holder.

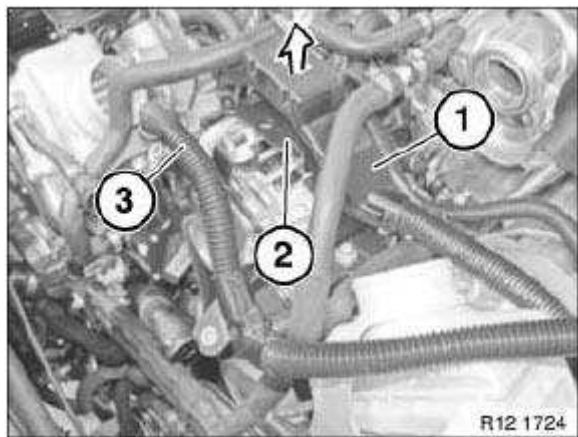


Fig. 37: Identifying Cable Duct And Cable Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off plug (1).

Detach cover (2) and release nut underneath.

Tightening torque 12 42 1AZ, see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** and **12 42 WIRES TO STARTER** .

Installation:

Reinstall cover (2) without fail **risk of short circuiting!**

Disconnect battery positive lead (3) from alternator.

Remove **fuel feed line** (4), see **13 53 332 REMOVING AND INSTALLING/REPLACING FEED LINE (N63)** .

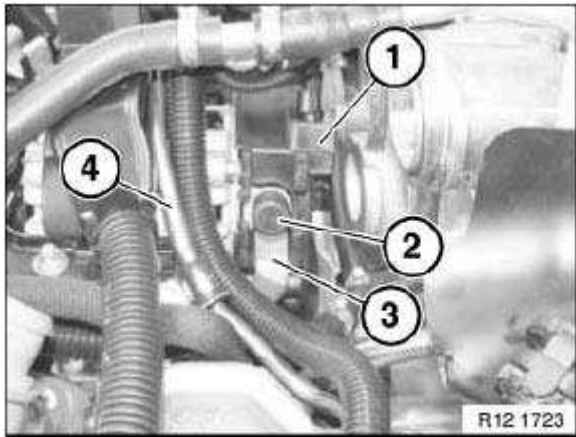


Fig. 38: Identifying Fuel Feed Line, Plug And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on turbocharger coolant pump (2).

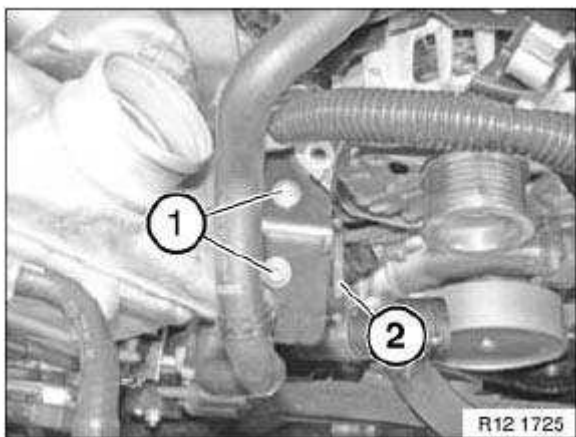


Fig. 39: Identifying Turbocharger Coolant Pump And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Release screws (1).

Tightening torque 12 31 1AZ, see 12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS .

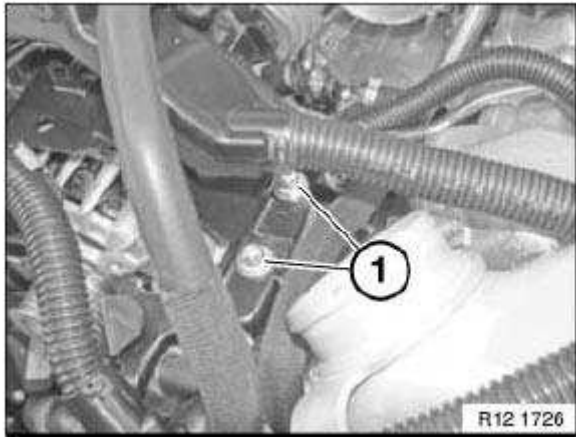


Fig. 40: Identifying Battery Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Remove alternator (1) together with bracket (2) in direction of travel.

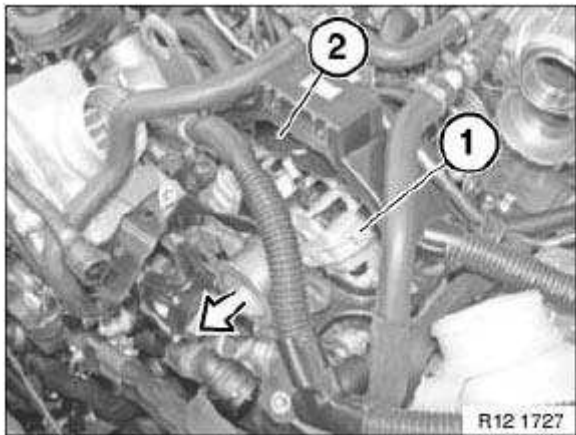


Fig. 41: Identifying Alternator And Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
 Add final details to vehicle.
 Now clear the fault memory.

REGULATOR

12 32 501 REPLACING VOLTAGE REGULATOR

Necessary preliminary tasks:

- Switch off ignition
- Disconnect **battery negative lead** , see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** .
- **Notes** on removing and installing electronic control units, see **12 00 ... Notes/information on removing and installing control units**.
- Remove alternator, see **12 31 020 Removing and installing or replacing alternator (N63)**.

Bosch:

Release protective caps (1).

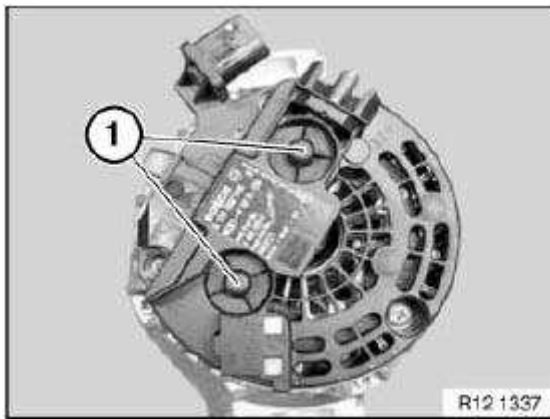


Fig. 42: Releasing Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

Release screw (1) and nuts (2), remove cover.

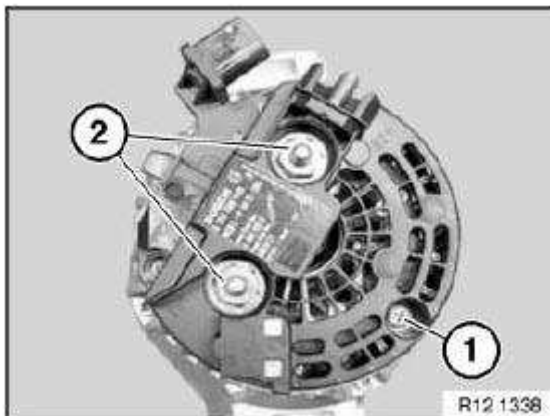


Fig. 43: Identifying Screw, Nuts And Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

Release screws and remove regulator switch (1) in direction of arrow.

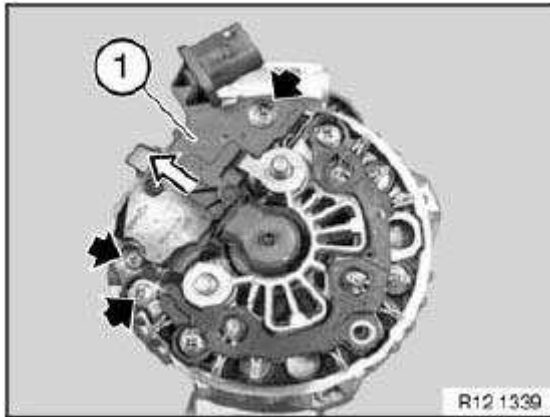


Fig. 44: Removing Regulator Switch

Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

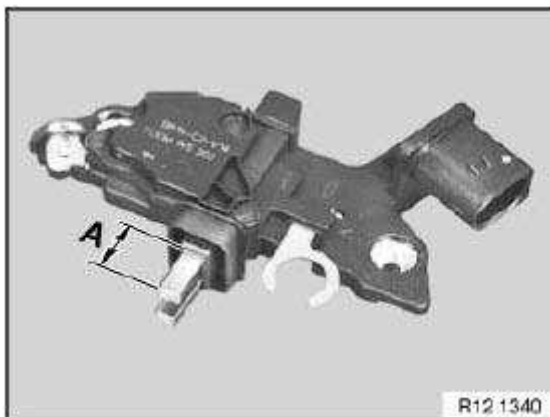


Fig. 45: Checking Collector Ring For Wear And Recondition

Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Slacken nut (1).

Slacken nut (2).

Release screws (3).

Release cover (4).

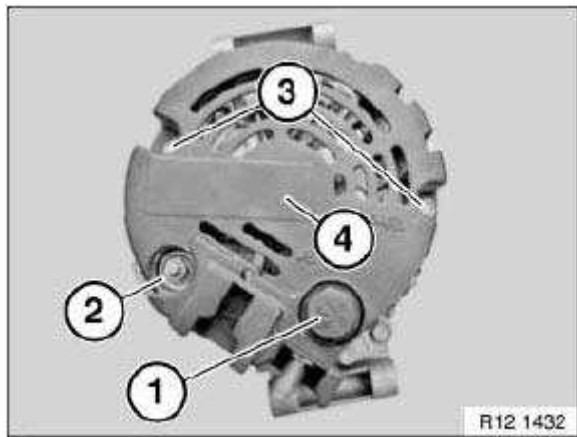


Fig. 46: Identifying Cover, Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Release screws.

Remove regulator switch (1) towards top.

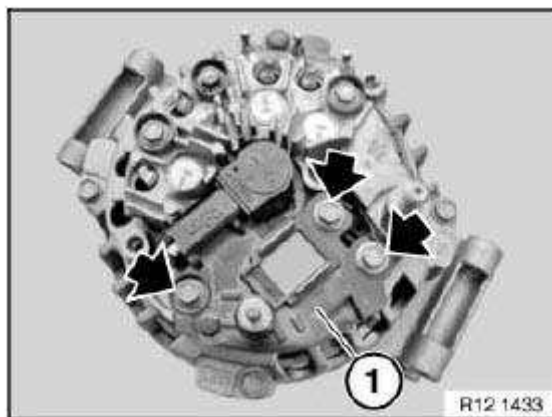


Fig. 47: Identifying Regulator Switch And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

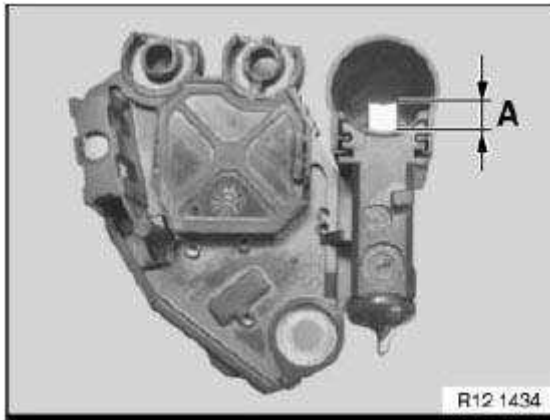


Fig. 48: Identifying Collector Ring Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit new regulator (1) with attached mounting sleeve (2) or locked carbon brush.

Pull off mounting sleeve (2) and replace with cover (3).

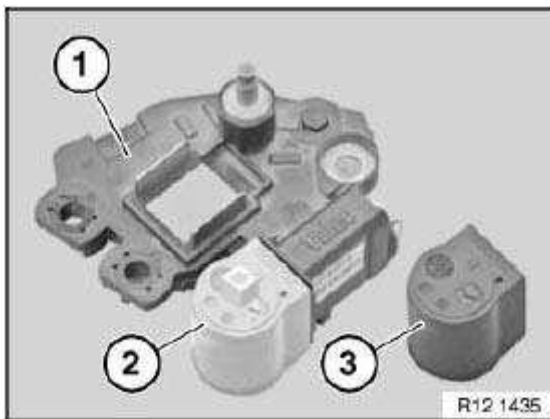


Fig. 49: Identifying Regulator And Mounting Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

STARTER WITH MOUNTING

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER (N63)

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery negative lead, see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** .
- Remove right **engine support arm** , see **22 11 100 REPLACING RIGHT ENGINE SUPPORT ARM (N63)** .

Unlock plug (1) and remove.

Slacken nut (2).

Tightening torque 12 42 2AZ, see **12 42 WIRES TO STARTER** .

Detach starter positive cable.

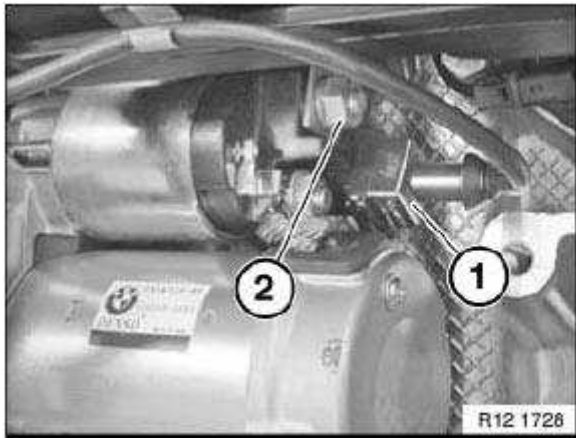


Fig. 50: Identifying Unlock Plug And Slacken Nut Location
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque 12 41 1AZ, see **12 41 STARTER MOTOR WITH MOUNTING** .

Disengage cable (2) from holder.

Pull out starter in direction of travel, feed out and remove.

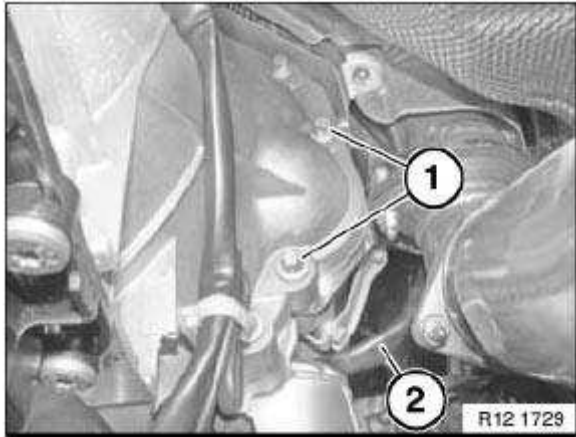


Fig. 51: Identifying Starter Cable And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check starter pinion and ring gear for damage. Replace damaged parts if necessary.

Add final details to vehicle.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition.

Remove starter motor.

Release nut (1).

Remove cable lug (2).

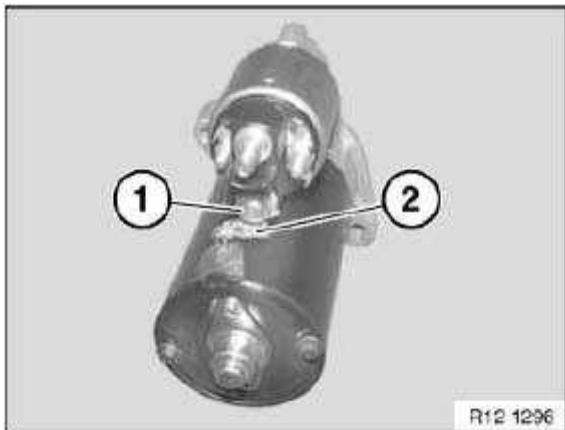


Fig. 52: Identifying Starter Motor Nut And Cable Lug
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not turn cable lug (2) while tightening down - risk of short circuit to starter motor housing.
Tightening torque, 12 41 4AZ , see 12 41 STARTER MOTOR WITH MOUNTING .

Release screws (1).

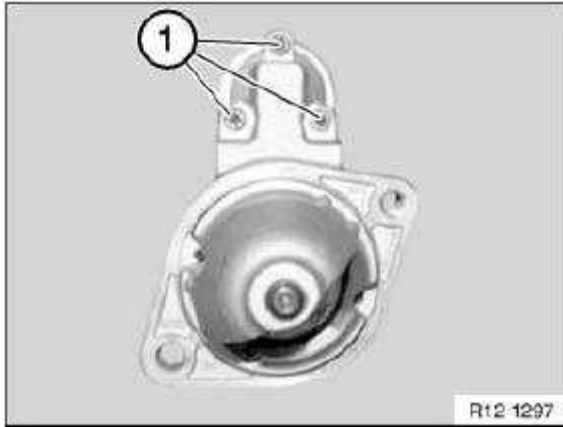


Fig. 53: Identifying Cable Lug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

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

Unhook pin (3).

Installation:

Check pin (3) for wear and apply grease.



Fig. 54: Identifying Solenoid Switch, Spring And Unhook Pin
Courtesy of BMW OF NORTH AMERICA, INC.

STARTER LEAD

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** , see 12 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

Disconnect and cover battery negative lead, see 61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD .

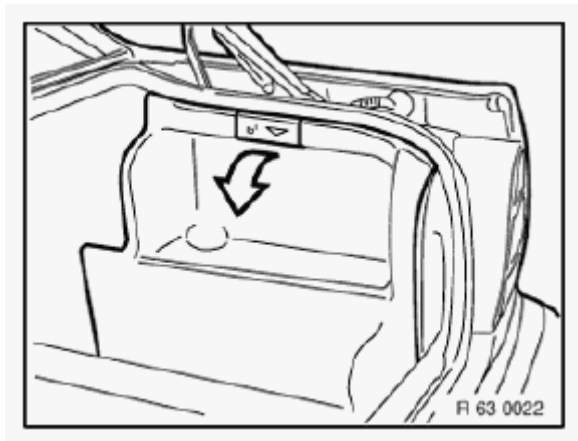


Fig. 55: Removing Side Trim Panel

Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.



Fig. 56: Releasing Front Side Trim Panel Partly
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under floor trim panel

Follow instructions for **disconnecting and connecting battery** , see **12 00 ... 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.

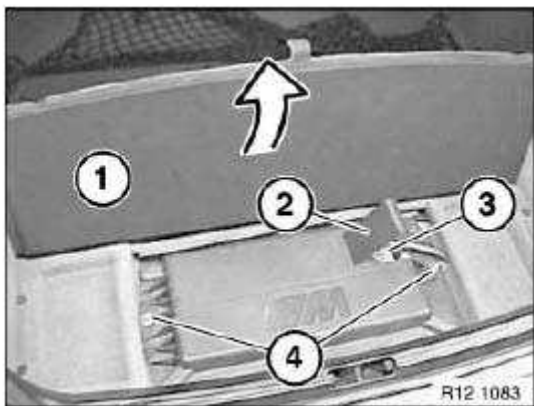


Fig. 57: Identifying Cover Battery Negative Lead And Back Floor Trim Panel

Courtesy of BMW OF NORTH AMERICA, INC.

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, see **12 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .

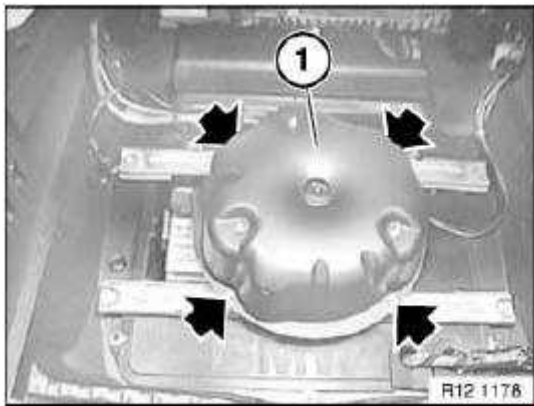


Fig. 58: Disconnecting Battery Negative Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect supply cable (1) for vehicle electrical system.

Installation:

Remove faulty fuses and carry out troubleshooting.

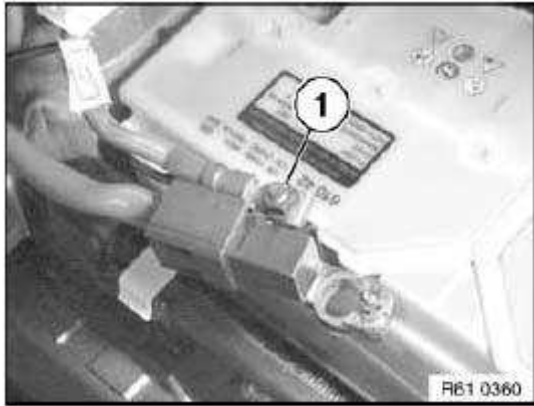


Fig. 59: Disconnecting Battery Negative Lead
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Pay attention to interface.

The repair cable is always a standard length.

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

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

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

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

Lay repair cable parallel to battery positive lead.

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

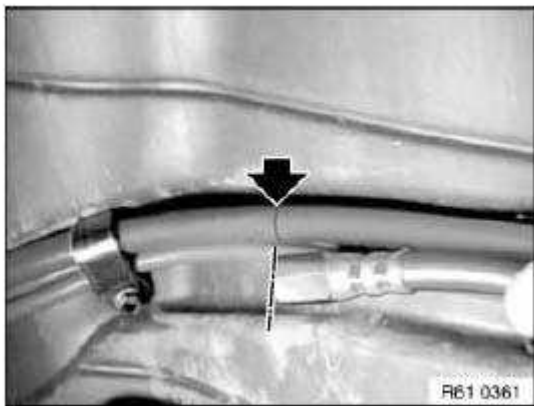


Fig. 60: Laying Repair Cable Parallel To Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable ties (1).

Disconnect plug connection (2).

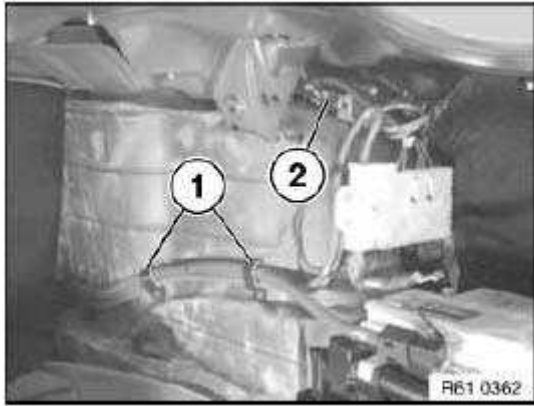


Fig. 61: Disconnecting Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

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.

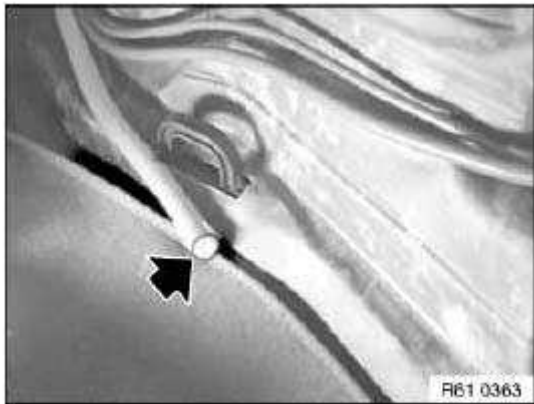


Fig. 62: Identifying Battery Positive Cable
Courtesy of BMW OF NORTH AMERICA, INC.

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

Distance (A) = 15 mm.

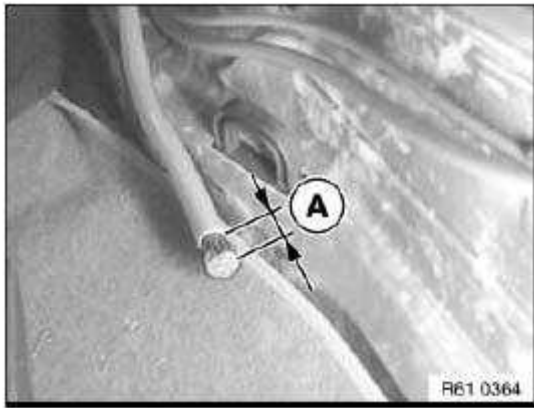


Fig. 63: Identifying Battery Cable Distance
 Courtesy of BMW OF NORTH AMERICA, INC.

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

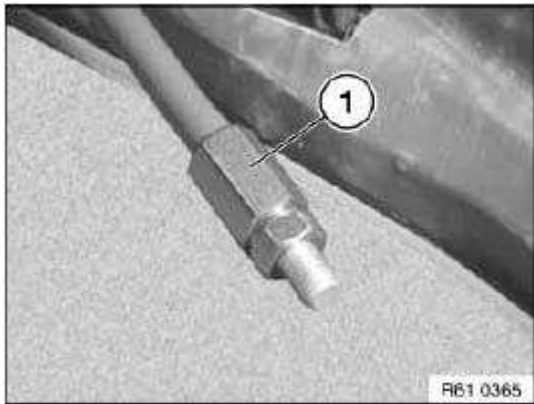


Fig. 64: Identifying Heavy-Current Connector
 Courtesy of BMW OF NORTH AMERICA, INC.

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

Screw threaded sleeve (1) of repair cable (2) to heavy-current connector.

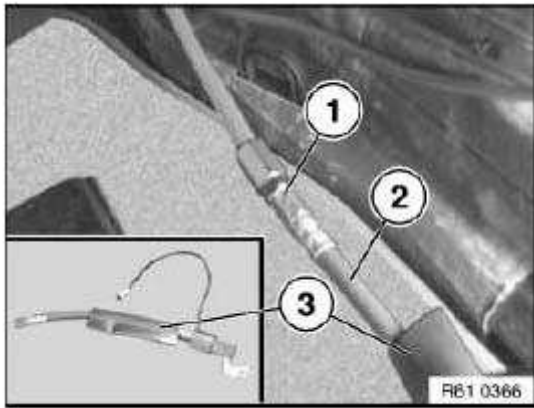


Fig. 65: Identifying Shrink-Fit Hose And Screw Threaded Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

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

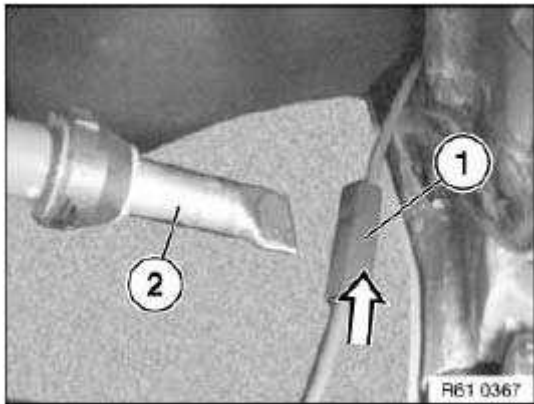


Fig. 66: Pushing Shrink-Fit Hose And Hot-Air Blower
Courtesy of BMW OF NORTH AMERICA, INC.

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

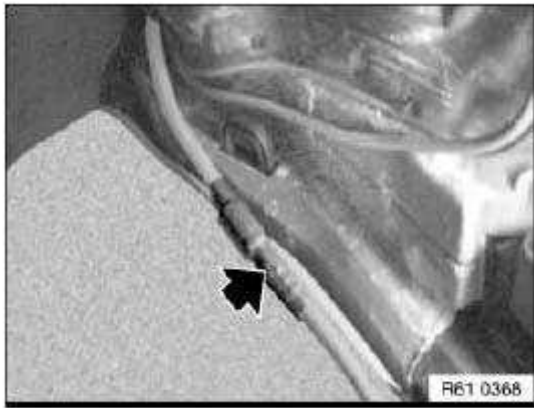


Fig. 67: Identifying Shrink-Fit Hose
 Courtesy of BMW OF NORTH AMERICA, INC.

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

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

NOTE: **Offsetting cutting line by approx. 10 cm produces excess length of battery positive lead (1).**
Lay battery positive lead (1) without kinks or abrasions.
(Shown on E46 touring.)

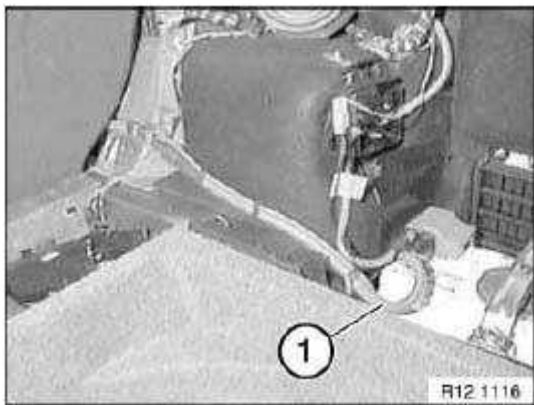


Fig. 68: Laying Battery Positive Lead
 Courtesy of BMW OF NORTH AMERICA, INC.

12 42 550 REPLACING BATTERY POSITIVE LEAD BETWEEN STARTER, ALTERNATOR AND BATTERY POSITIVE TERMINAL (N63)

Necessary preliminary tasks:

- Read out fault memory of DME control unit.

- Switch off ignition.
- Clamp off **battery negative lead** , see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** .
- Remove **right intercooler** .
- Remove **intake air manifold** , see **11 61 068 REMOVING AND INSTALLING/REPLACING RIGHT INTAKE MANIFOLD (N63)** .

Open cover.

Release screw (1).

Tightening torque 12 42 3AZ, see **12 42 WIRES TO STARTER** .

Remove battery positive lead (2) from battery positive terminal.

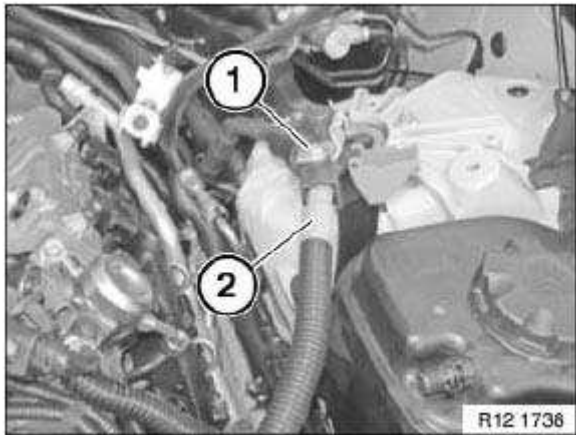


Fig. 69: Identifying Battery Positive Lead
 Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp (1).

Tightening torque 13 71 8AZ, see **13 71 AIR INTAKE DUCT** .

Release clamp (2).

Replace clamp (2).

Remove left charge-air duct (3).

Check gasket on turbocharger, replacing if necessary.

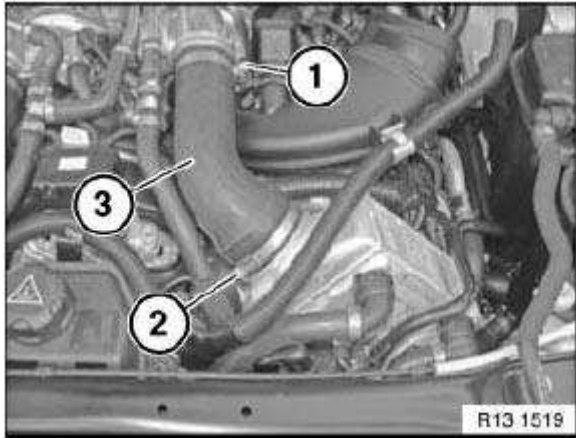


Fig. 70: Identifying Left Charge-Air Duct And Clamp
 Courtesy of BMW OF NORTH AMERICA, INC.

Detach hose (1) from clean-air pipe.

Release screw (2).

Tightening torque 13 71 1AZ, see **13 71 AIR INTAKE DUCT** .

Detach clean-air pipe (3) in direction of travel from turbocharger.

Check seal on clean-air pipe, replacing if necessary.

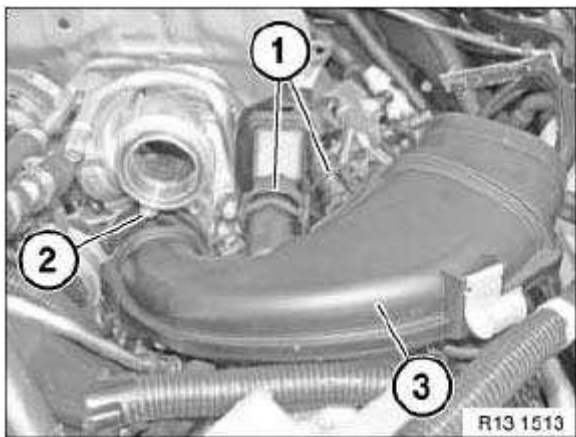


Fig. 71: Identifying Clean-Air Pipe And Screw And Hose
 Courtesy of BMW OF NORTH AMERICA, INC.

Detach cover (1) and release nut underneath.

Tightening torque 12 42 1AZ, see **12 42 WIRES TO STARTER** .

Installation:

Reinstall cover (1) without fail.

Risk of short circuits!

Disconnect battery positive lead (2) from alternator.

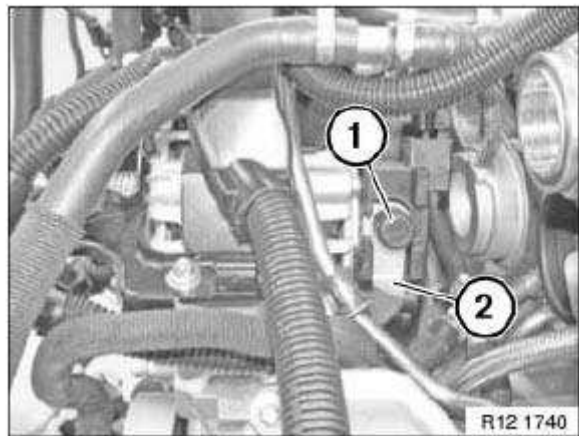


Fig. 72: Identifying Battery Positive Lead To Alternator
Courtesy of BMW OF NORTH AMERICA, INC.

Release battery positive lead (1) from retainers (2).

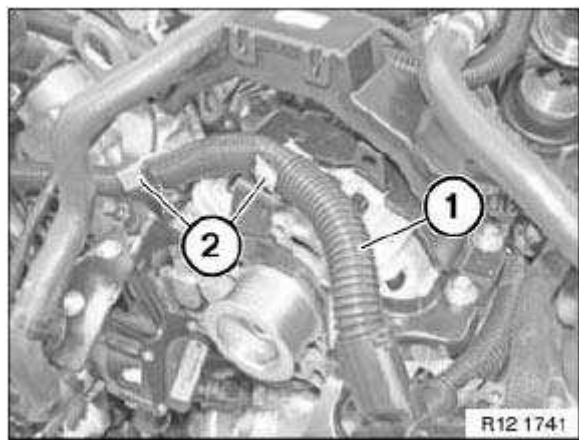


Fig. 73: Identifying Battery Positive Lead And Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Release battery positive lead (1) from retainer (2).

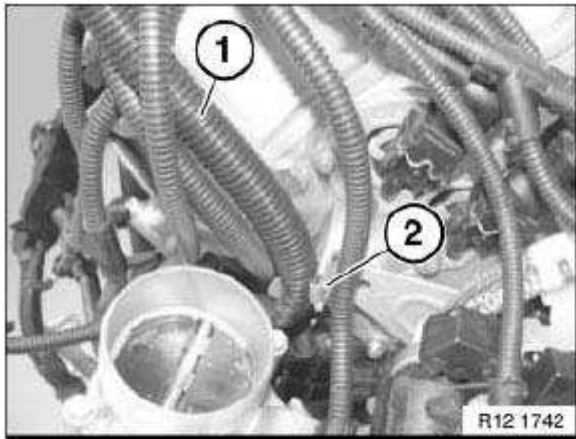


Fig. 74: Identifying Battery Positive Lead And Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque 12 42 7AZ , see **12 42 WIRES TO STARTER** .

Release nut (2) on starter.

Tightening torque 12 42 2AZ, see **12 42 WIRES TO STARTER** .

Disconnect battery positive lead (3).

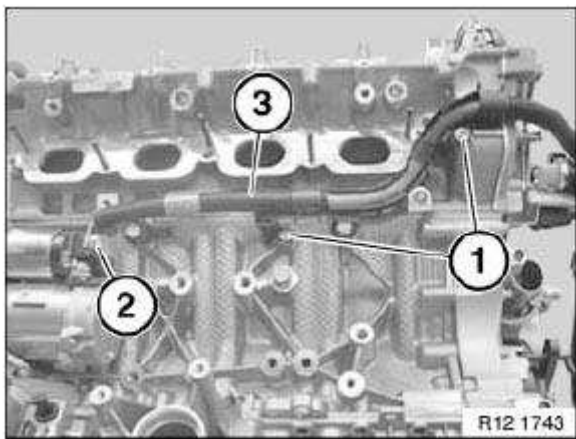


Fig. 75: Disconnecting Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle.
 Check stored fault message.
 Now clear the fault memory.

ENGINE WIRING LOOM

12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N63)

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition
- Clamp off **battery negative lead** , see 61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD .
- Remove left and right **intake filter housings** , see 13 71 030 REMOVING AND INSTALLING/REPLACING BOTH INTAKE FILTER HOUSINGS (N63) .
- Remove **intercooler** on left and right, see 17 51 001 REMOVING AND INSTALLING/REPLACING LEFT INTERCOOLER (N63) or 17 51 001 REMOVING AND INSTALLING/REPLACING RIGHT INTERCOOLER (N63)
- Remove **intake manifold** on left and right, see 11 61 068 REMOVING AND INSTALLING/REPLACING RIGHT INTAKE MANIFOLD (N63) .
- Partially remove **wiring harness** for ignition and injectors, see 12 51 100 Replacing wiring harness section for ignition and injectors (N63).
- Detach **engine oil line** from oil sump, see 17 22 080 REMOVING AND INSTALLING/REPLACING FEED AND RETURN LINES FOR ENGINE OIL COOLER (N63)

Lever out expander rivet.

Remove gasket (1).

Unscrew screws (2).

Feed out partition (3) and remove.

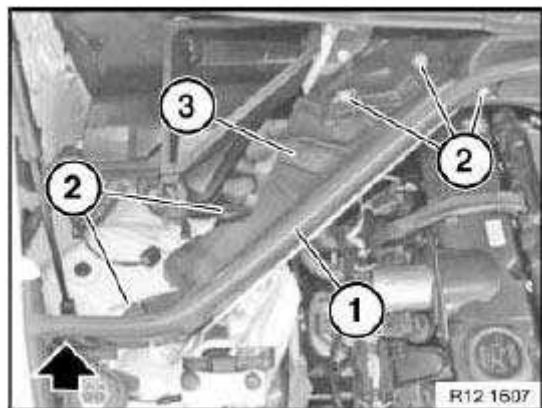


Fig. 76: Identifying Feed Out Partition, Gasket And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out expander rivet.

Release locks in direction of arrow.

Feed out fresh-air duct (1) and remove.

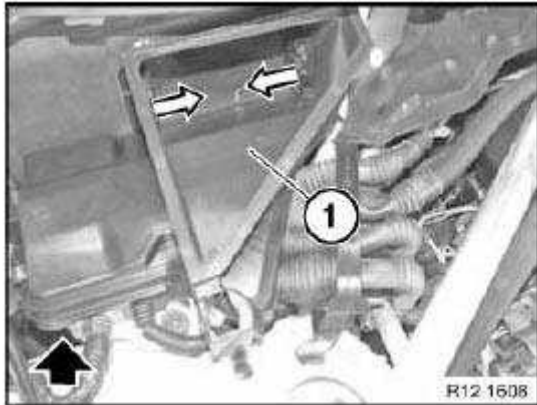


Fig. 77: Identifying Fresh-Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Open retainers.

Release lock (1) in direction of arrow.

Remove cover (2).

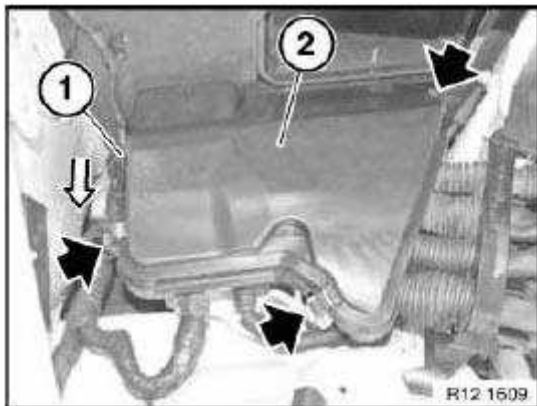


Fig. 78: Identifying Lock And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all plugs (1) of DME control unit and disconnect.

Unlock plug on electronics box fan and disconnect.

Unlock all plugs on plug strip (2) and detach.

Unlock plug strip (2) and remove towards top.

Unlock all plugs on plug strip (3) and detach.

Unlock plug strip (3) and remove towards top.

Installation:

When replacing wiring harness, modify plug strips (2) and (3) if necessary.

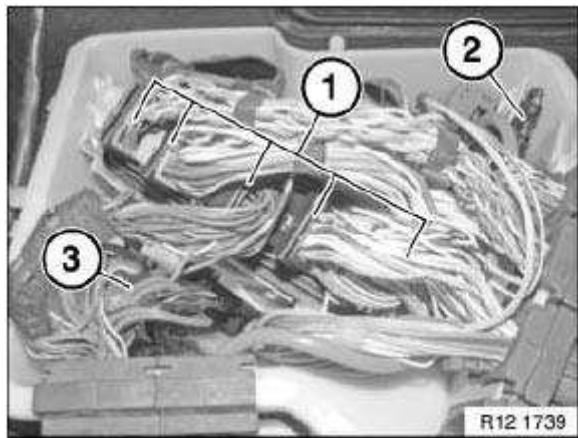


Fig. 79: Identifying Plug Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove retaining bar (1).

Unlock upper section (2) of partition seal in direction of arrow and remove.

Release grommets (3) for wiring harnesses from lower section of partition seal and from electronics box.

Installation:

Make sure grommets are is correctly seated (watertightness).

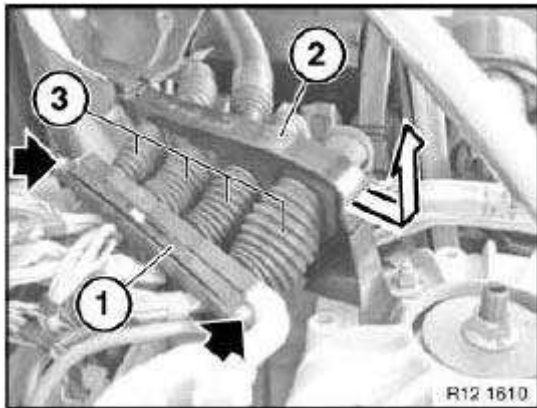


Fig. 80: Identifying Retaining Bar
 Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque 12 51 2AZ, see **12 51 ENGINE WIRING HARNESS (N63)** .

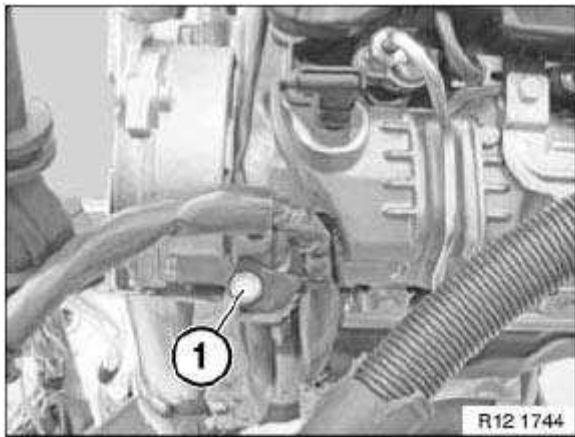


Fig. 81: Identifying Retaining Bar And Screw
 Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque 12 51 2AZ, see **12 51 ENGINE WIRING HARNESS (N63)** .

Release wiring harness (2).

Release wiring harness (3) and lay to one side.

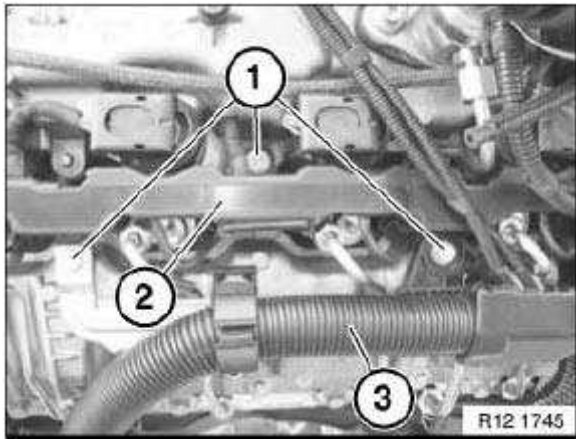


Fig. 82: Releasing Wiring Harness
 Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque 12 51 2AZ, see **12 51 ENGINE WIRING HARNESS (N63)** .

Raise cable duct (2).

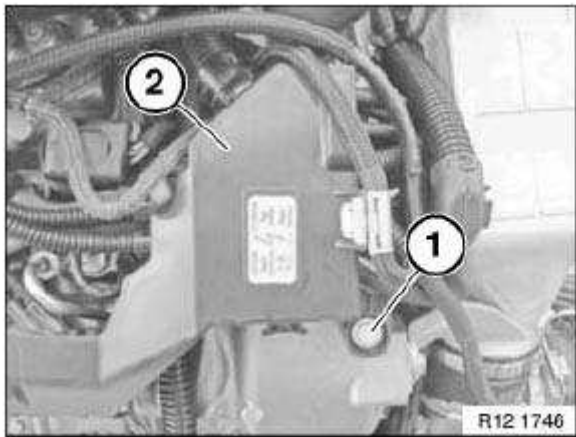


Fig. 83: Raising Cable Duct
 Courtesy of BMW OF NORTH AMERICA, INC.

Pull off cable duct (1) from cable holder (2) in upward direction.

Cable (3) does not have to be released.

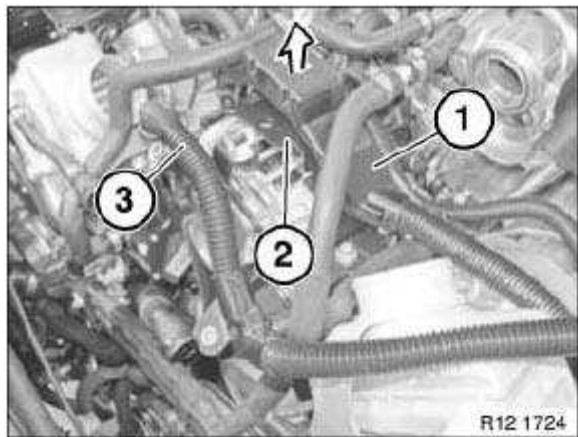


Fig. 84: Identifying Cable Duct And Cable Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque 12 51 2AZ, see **12 51 ENGINE WIRING HARNESS (N63)** .

Raise cable duct (2).

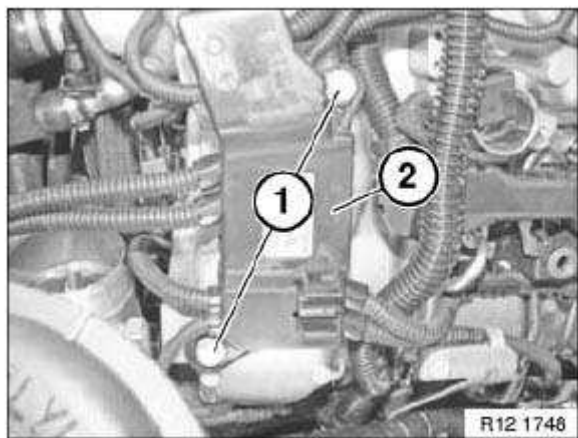


Fig. 85: Identifying Cable Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **coolant pipe** (1), see **17 00 ... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM** . .

Unfasten screws (2).

Tightening torque 12 51 2AZ, see **12 51 ENGINE WIRING HARNESS (N63)** .

Lay wiring harness (4) to one side.

Release wiring harness (3) and lay to one side.

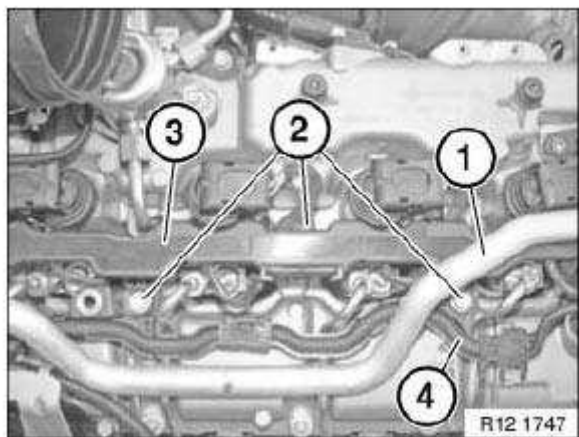


Fig. 86: Releasing Wiring Harness
 Courtesy of BMW OF NORTH AMERICA, INC.

PLUG OPERATION CHART

Unlock and disconnect following plugs and leads	
Unlock plug on crankshaft sensor and disconnect	Transmission wiring harness
Unlock plug on transmission and disconnect	Transmission wiring harness
Unlock plug on oil pressure sensor and disconnect	Transmission wiring harness
Unlock plug on right inlet camshaft pulse generator and disconnect	Transmission wiring harness
Unlock plug on right exhaust camshaft pulse generator and disconnect	Transmission wiring harness
Unlock plug on starter and disconnect	Transmission wiring harness
Unlock plug on oil level sensor and disconnect	Transmission wiring harness
Disconnect ground cable. Tightening torque 12 51 1AZ, see <u>12 51 ENGINE WIRING HARNESS (N63)</u> .	Transmission wiring harness
Unlock plug on left and right air mass sensors and disconnect	Engine wiring harness
Unlock plug on left and right high-pressure fuel pumps and disconnect	Engine wiring harness
Unlock plug on left and right control sensors and disconnect	Engine wiring harness
Unlock plug on left and right monitor sensors and disconnect	Engine wiring harness
Unlock plug on left and right high-pressure fuel sensors and disconnect	Engine wiring harness
Unlock plug on left and right intake air pressure sensors and disconnect	Engine wiring harness
Unlock plug on A/C compressor and disconnect	Engine wiring harness
Unlock plug on left and right knock sensors and disconnect	Engine wiring harness
Unlock plug on left and right charge-air pressure sensors and disconnect	Engine wiring harness
Unlock plug on coolant temperature sensor to coolant pump and disconnect	Engine wiring harness

Unlock plug on coolant thermostat and disconnect	Engine wiring harness
Unlock plug on pressure transducers and disconnect	Engine wiring harness
Unlock plug on left and right throttle valve assemblies and disconnect	Engine wiring harness
Unlock plugs on solenoid valves for camshaft adjustment on left and right and disconnect	Engine wiring harness
Unlock plug on turbocharger coolant pump and disconnect	Engine wiring harness
Unlock plug on turbochargers and disconnect	Engine wiring harness
Unlock plug on alternator and disconnect	Engine wiring harness
Unlock plug on right inlet camshaft pulse generator and disconnect	Engine wiring harness
Unlock plug on right exhaust camshaft pulse generator and disconnect	Engine wiring harness
Unlock plug on low-pressure fuel sensor and disconnect	Engine wiring harness
Unlock plug on coolant pump for intercooler and disconnect	Engine wiring harness

Release wiring harness if necessary from existing clips and retainers

Feed out wiring harness and remove.

Installation:

Check wiring harness routing.

Check plug connections for correct seating.

Check stored fault message.

Now clear the fault memory.

12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION AND INJECTORS (N63)

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Switch off ignition
- Clamp off **battery negative lead** , see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** .
- Remove left and right **intake filter housings** , see **13 71 030 REMOVING AND INSTALLING BOTH INTAKE FILTER HOUSINGS (N63)** .
- Remove **microfilter housing** , see **64 31 081 REMOVING AND INSTALLING/REPLACING MICROFILTER HOUSING** .
- Partially release **wiring harness** for engine, see **12 51 001 Replacing wiring harness section for engine (N63)**.

- Remove **coolant pipe** from cylinder head cover on left, see **17 00 ... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM** .
- Remove **fuel feed line** , see **13 53 332 REMOVING AND INSTALLING/REPLACING FEED LINE (N63)** .

Lever out expander rivet.

Remove gasket (1).

Unscrew screws (2).

Feed out partition (3) and remove.

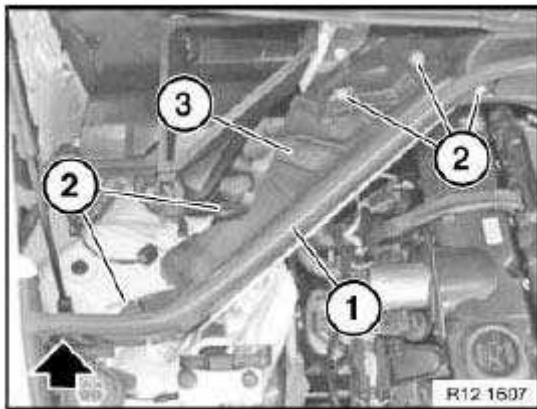


Fig. 87: Identifying Lever Out Expander Rivet, Gasket And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Lever out expander rivet.

Release locks in direction of arrow.

Feed out fresh-air duct (1) and remove.

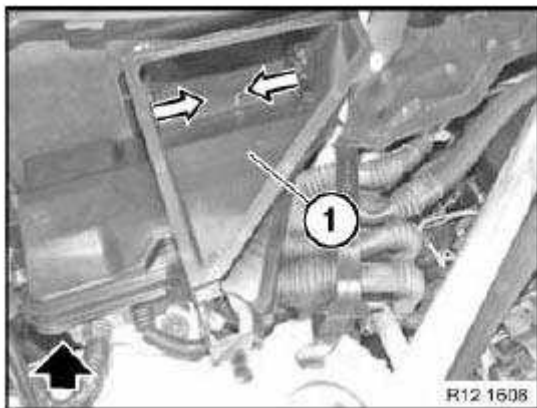


Fig. 88: Identifying Fresh-Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Open retainers.

Release lock (1) in direction of arrow.

Remove cover (2).

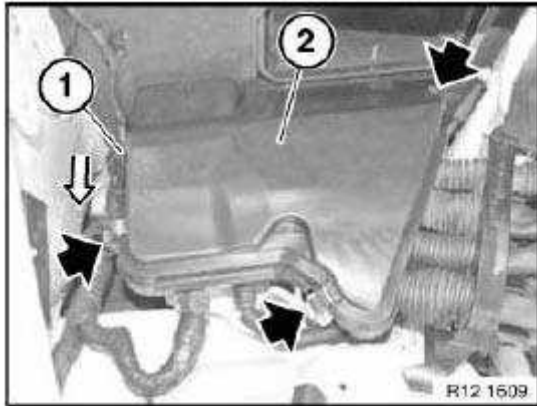


Fig. 89: Identifying Cover And Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all plugs (1) of DME control unit and disconnect.

Unlock plug on electronics box fan and disconnect.

Unlock all plugs on plug strip (2) and detach.

Unlock plug strip (2) and remove towards top.

Unlock all plugs on plug strip (3) and detach.

Unlock plug strip (3) and remove towards top.

Installation:

When replacing wiring harness, modify plug strips (2) and (3) if necessary.

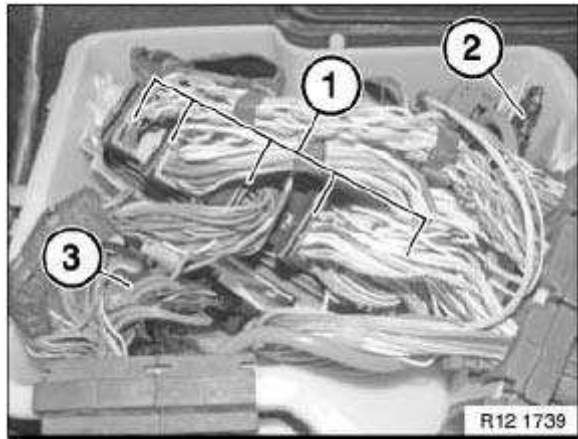


Fig. 90: Identifying Plug Strip
 Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove retaining bar (1).

Unlock upper section (2) of partition seal in direction of arrow and remove.

Release grommets (3) for wiring harnesses from lower section of partition seal and from electronics box.

Installation:

Make sure grommets are correctly seated (watertightness).

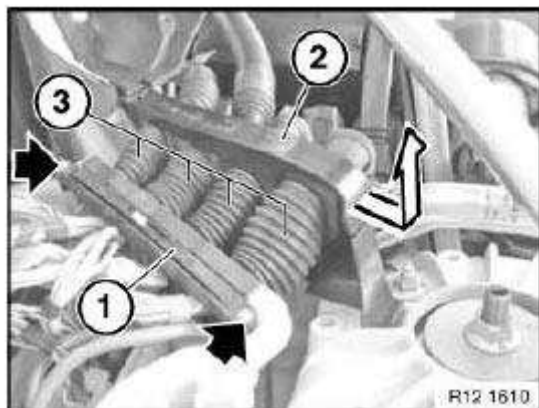


Fig. 91: Removing Retaining Bar
 Courtesy of BMW OF NORTH AMERICA, INC.

Release clamps (1) and (2).

Replace clamps (2).

Detach both charge-air ducts (3) and remove.

Check gaskets on turbocharger, replacing if necessary.

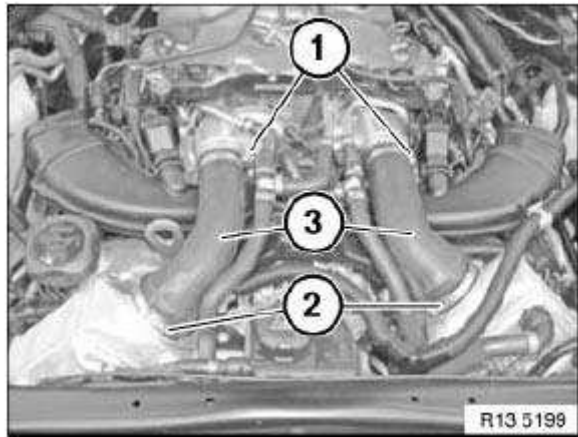


Fig. 92: Identifying Charge-Air Ducts And Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Detach hoses (1) from clean-air pipe.

Release screw (2).

Tightening torque 13 71 1AZ, see **13 71 AIR INTAKE DUCT** .

Detach clean-air pipe (3) in direction of travel from turbocharger.

Check seal on clean-air pipe, replacing if necessary.

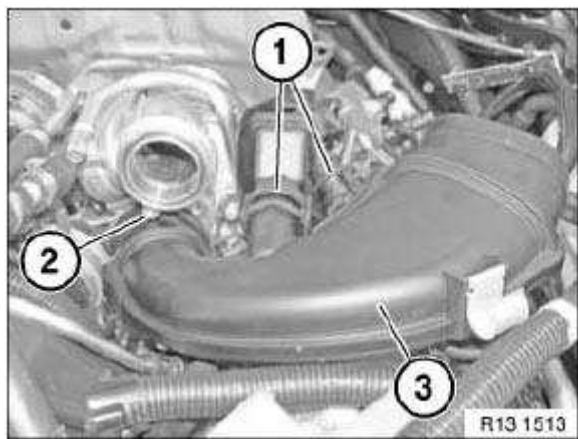


Fig. 93: Checking Seal On Clean-Air Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Tightening torque 12 51 2AZ, see **12 51 ENGINE WIRING HARNESS (N63)** .

Unlock plugs on injectors and ignition coils and detach.

Release wiring harness (2).

Release wiring harness (3) and lay to one side.

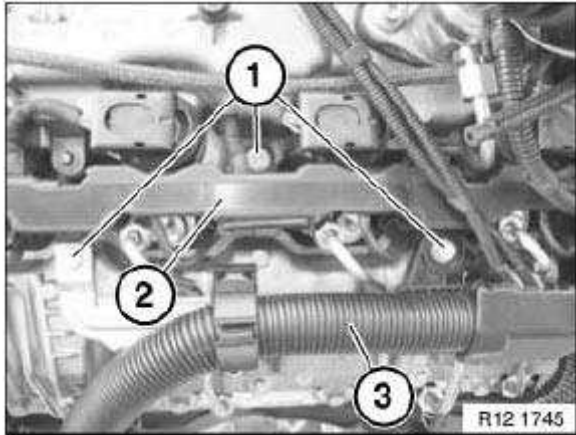


Fig. 94: Releasing Wiring Harness

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque 12 51 2AZ, see **12 51 ENGINE WIRING HARNESS (N63)** .

Raise cable duct (2).

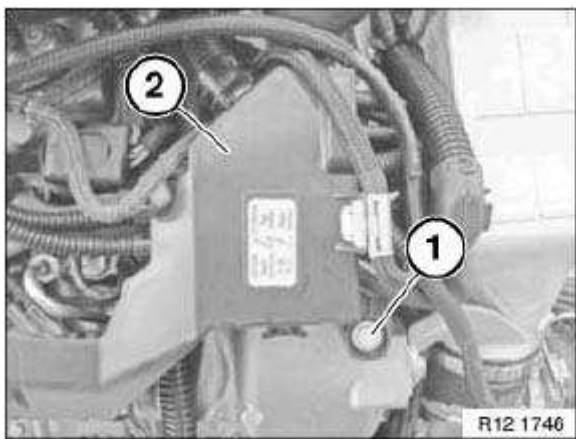


Fig. 95: Identifying Cable Duct And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Pull off cable duct (1) from cable holder (2) in upward direction.

Cable (3) does not have to be released.

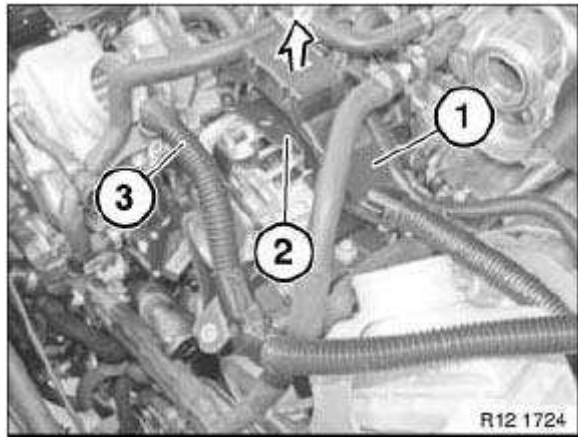


Fig. 96: Pulling Cable Duct

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Tightening torque 12 51 2AZ, see 12 51 ENGINE WIRING HARNESS (N63) .

Raise cable duct (2).

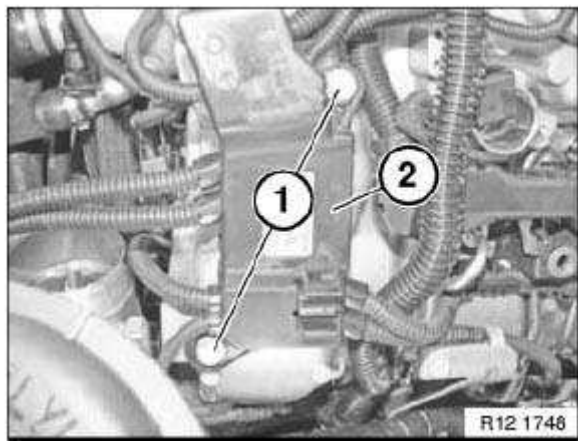


Fig. 97: Raising Cable Duct

Courtesy of BMW OF NORTH AMERICA, INC.

Remove coolant pipe (1), see 17 00 ... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM .

Release screws (2).

Tightening torque 12 51 2AZ, see 12 51 ENGINE WIRING HARNESS (N63) .

Unlock plugs on injectors and ignition coils and detach.

Lay wiring harness (4) to one side.

Feed out air wiring harness (3) and remove.

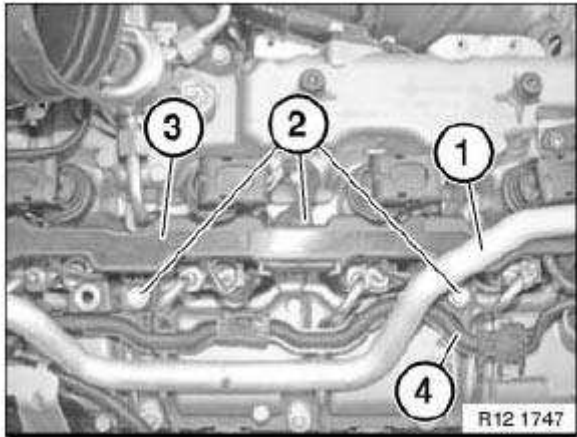


Fig. 98: Laying Wiring Harness

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check wiring harness routing.
Check plug connections for correct seating.
Check stored fault message.
Now clear the fault memory.

OIL PRESSURE OIL TEMPERATURE

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N63)

Necessary preliminary tasks:

- Switch off ignition.
- Remove **reinforcement plate** , see **31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE** .

WARNING: Scalding hazard!

Only perform this task on an engine that has cooled down.

Installation location

Oil pressure sensor is located next to the oil filter housing.

Engine oil may emerge when oil pressure sensor is replaced; have a cleaning cloth ready.

Unlock plug (1) and remove.

Release oil pressure sensor (2).

Tightening torque 12 61 1AZ, see **12 61 ENGINE OIL PRESSURE, OIL CONDITION DISPLAY** .

Installation:

Check engine oil level. Top up engine oil if level is too low.

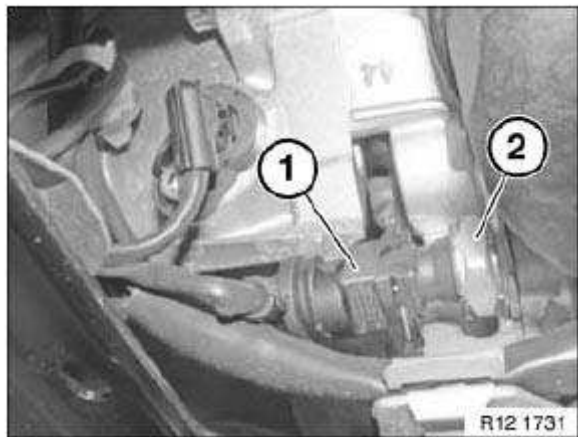


Fig. 99: Identifying Unlock Plug And Oil Pressure Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

12 61 285 REPLACING ENGINE OIL LEVEL SENSOR (N63)

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

Necessary preliminary tasks:

- Switch off ignition.
- Remove **reinforcement plate** , see **31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE** .
- Drain **engine oil** , see **11 00 ... SERVICE - ENGINE OIL (N63)** .

Unlock plug (1) and remove.

Unscrew nuts (2).

Tightening torque 12 61 2AZ, see **12 61 OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY** .

Remove oil level sensor (3).

Installation:

Clean sealing face 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.

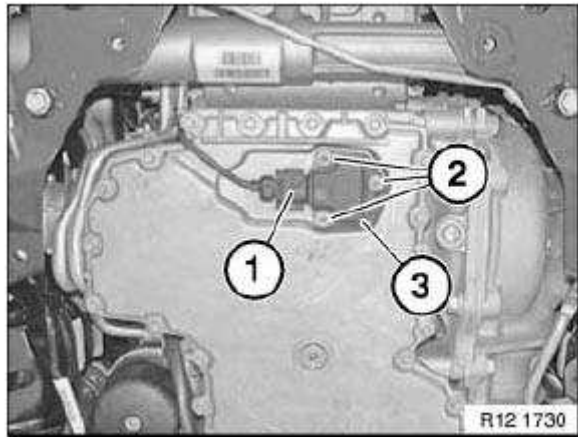


Fig. 100: Identifying Oil Level Sensor And Unlock Plug
Courtesy of BMW OF NORTH AMERICA, INC.

CONTROL UNIT BOX

12 90 ... REMOVING AND INSTALLING/REPLACING ELECTRONICS BOX

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

NOTE: Follow instructions for removing and installing electronic control units

Necessary preliminary tasks:

- Read fault memory.
- Disconnect **battery negative lead** , see **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** .
- Remove **electronics box fan** , see **12 90 100 Replacing fan for electronics box.**
- Remove **distribution box (passenger compartment)** , see **61 13 050 REMOVING AND INSTALLING/REPLACING FUSE BOX IN PASSENGER COMPARTMENT** .
- Release control unit holder

Pull rubber grommets out of electronics box. Disconnect all plug connections.

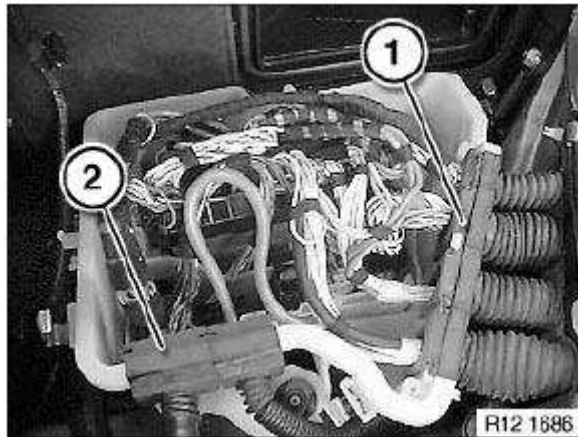


Fig. 101: Pulling Rubber Grommets Of Electronics Box
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (arrows).

Disconnect wiring harness on engine compartment side on right.

Remove electronics box.

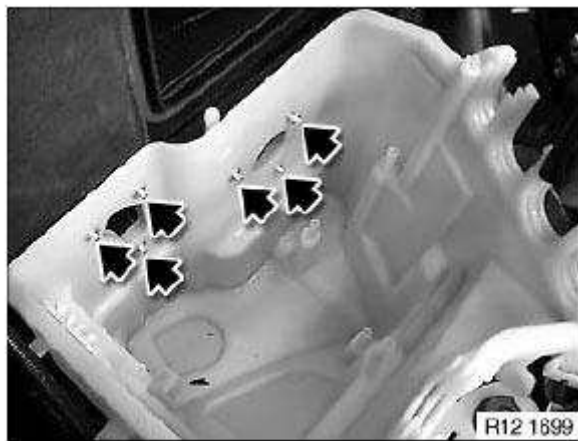


Fig. 102: Disconnecting Wiring Harness On Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure gasket (1) is correctly seated on electronics box.

Add final details to vehicle.

Read fault memory.

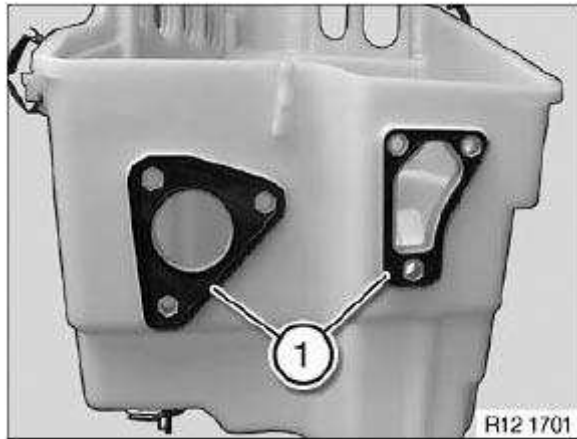


Fig. 103: Identifying Gasket On Electronics Box
 Courtesy of BMW OF NORTH AMERICA, INC.

Replacement (E70 - Security):

12 90 100 REPLACING FAN FOR ELECTRONICS BOX

NOTE: Follow instructions for removing and installing electronic control units , see **12 00 ... Notes/information on removing and installing control units.**

Necessary preliminary tasks:

- Remove **control unit** , see **12 14 550 Replacing control unit (DME) (N63).**
- Read fault memory.

Switch off ignition.

Unclip plug (1).

Remove DDE control unit (3).

Remove relay plug-in (5) towards top.

Release screws (4).

Lift out device carrier (2).

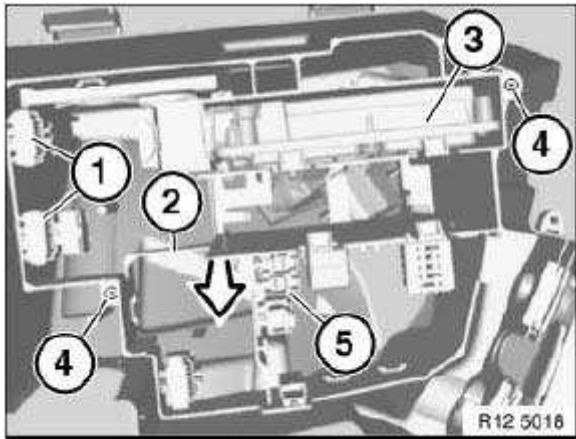


Fig. 104: Identifying DDE Control Unit, Screw And Unclip Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection and disconnect.

Release air cowl (1).

Remove electric fan (2) with bracket.



Fig. 105: Identifying Electric Fan And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Read fault memory.