

2007-08 ENGINE**Engine Electrical System - Repair Instructions - X5****00 TROUBLESHOOTING****12 00 CONTENTS OF ENGINE ELECTRICAL SYSTEM GENERAL**

General Information -> Working on ignition system. See **12 13 Notes on Checking Ignition System**.

-> Removing and installing electronic control units. See **12 00 ... Instructions for Removing And Installing Electronic Control Units**.

-> Welding work (overload protection of control units).

-> Disconnecting and connecting battery. See **12 00 ... Instructions for Disconnecting And Connecting Battery**.

-> External jump-starting aid. See **12 00 ... INSTRUCTIONS ON STARTING AID**.

12 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe safety instructions for handling vehicle battery **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.

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

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

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

- Detach terminal of battery negative lead from car battery and second battery if fitted. Cover battery negative terminal(s) and secure. See **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** .
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque 61 21 1AZ. 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:

- Vehicles with automatic engine start-stop system (MSA): MSA function is active only after learning period (vehicle must not be woken for a period of 6 hours) > if necessary, notify customer of the situation
- E46 (AWD)/ E53/ E83: Carry out steering angle sensor adjustment. See **61 31 996 CARRY 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 PANORAMA GLASS ROOF (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** .

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

Starter and equipment batteries

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

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

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

Receiving/giving starting assistance via jump start terminal

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

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

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

Charging starter and equipment batteries via jump start terminal

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

Prerequisite:

- Terminal 61 inactive
- Terminal 15 inactive

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

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

Trickle charging

The increased closed-circuit current consumption can be compensated for via the jump-start connection point with the aid of the "Acctiva easy" battery trickle charger.

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

12 00 ... INSTRUCTIONS FOR REMOVING AND INSTALLING ELECTRONIC 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.

Comply with the following when replacing the DME/DDE (Digital Motor Electronics/Digital Diesel Electronics):

- Always read out hardware/software version of the corresponding control unit with DIS tester.

Comply with the instructions of the DIS tester on the steps coding and programming.

On vehicles with electronic vehicle immobilization, comply with the instructions of the DIS tester.

- 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, for example, the DME control unit would be without current for a long time (more than an hour), its adaptive system would lose 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. Remove the control unit, install a new control unit and operate vehicle at different engine speeds.

12 13 NOTES ON CHECKING IGNITION SYSTEM

-> Spark plug faults

-> Ignition coil faults

-> Further fault patterns with evaluation

-> Additional fault notes for troubleshooting

Oscillograms -> Normal oscillogram

-> Oscillograms of ignition coils from different manufacturers

Check -> Secondary signal for stationary ignition distribution

12 IGNITION WIRES, SPARK

12 12 011 REPLACING ALL SPARK PLUGS (N42, N40, N46, N45, N52, N52K, N51)

Special tools required:

- 12 1 171
- 12 1 200. See **12 1 200 TORQUE LIMITER 30 NM**

Necessary preliminary tasks:

- Switch off ignition
- Remove ignition coils. See **12 13 511 Replacing Ignition Coil (N52, N52K, N51)**.

Unscrew spark plugs with special tool 12 1 171.

Installation:

Tighten down spark plugs with special tool 12 1 171 and special tool 12 1 200 (torque limiter). See **12 1 200 TORQUE LIMITER 30 NM**.

Without special tool 12 1 200, observe tightening torque. See **12 1 200 TORQUE LIMITER 30 NM**.

Tightening torque 12 12 1AZ0. See **12 12 SPARK PLUGS**

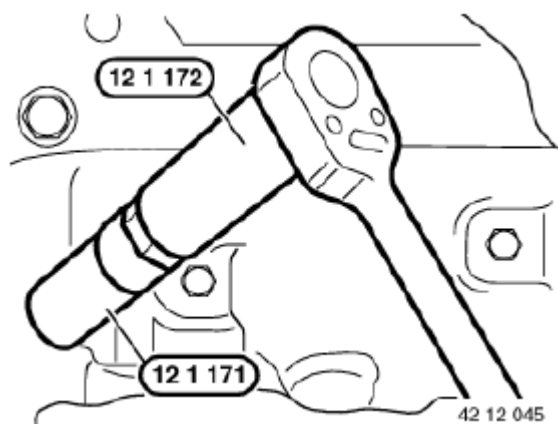


Fig. 1: Identifying Special Tool (12 1 171) And (12 1 172)
 Courtesy of BMW OF NORTH AMERICA, INC.

13 IGNITION COIL

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting -> Fault in fuel injection system

-> Spark plug faults

-> Ignition coil faults

-> Further fault patterns with evaluation

-> Additional fault notes for troubleshooting.

Oscillograms -> Normal oscillogram

-> Oscillograms of ignition coils from different manufacturers

Check -> Secondary signal for stationary ignition distribution

12 13 009 CHECKING ROD-TYPE IGNITION COILS (M54, M56, N40, N42, N43, N45, N46, N52, N62, N62TU, N73)

Special tools required:

- 12 1 301
- 12 7 050. See **12 7 050 ADAPTER LEAD**

Necessary preliminary tasks:

- Read out fault memory in DME (Digital Engine Electronics)
- N40: Remove sound absorption hood
- N42: Remove sound absorption hood
- N43: Remove sound absorption hood
- N45: Remove sound absorption hood
- N46: Remove sound absorption hood
- N52: Remove sound absorption hood
- N62/N62TU: Remove sound absorption hood
- N62/N62TU: Remove ignition coil cover

Open control unit box

- Remove M54/56 ignition coil cover

Unlock plug fastener (1) of ignition coil.

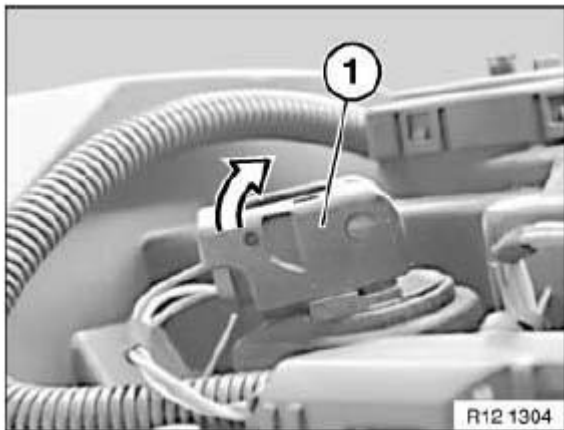


Fig. 2: Unlocking Plug Fastener Of Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Detach plug (1) in direction of arrow.

Pull out ignition coil (2) towards top.

NOTE: Procedure applies to all rod-type ignition coils.

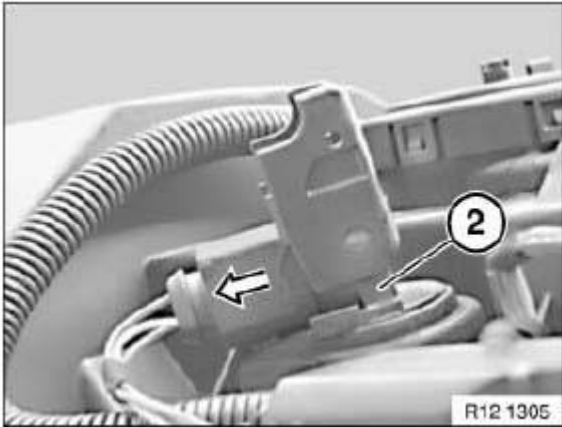


Fig. 3: Pulling Out Ignition Coil

Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 12 7 050. See **12 7 050 ADAPTER LEAD** .

Installation:

Special tool 12 7 050 is attached between spark plug and rod - type ignition coil. See **12 7 050 ADAPTER LEAD** .

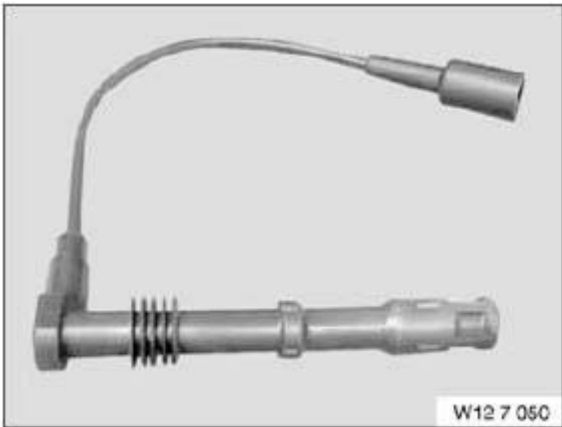


Fig. 4: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Secondary measurement:

Connect KV clip-on probe (1) of DIS Tester to special tool 12 7 050. See **12 7 050 ADAPTER LEAD**

Procedure on DIS Tester:

- Select < Measurement >.

- Select < Preset measurement >.
- Select < Secondary ignition signal >.
- Connect < TD cable to diagnostic head >.
- Select < static ignition distribution >.
- Select < Number of cylinders >.

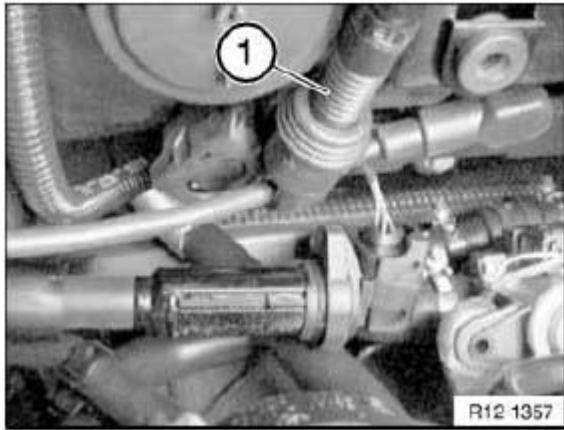


Fig. 5: Identifying KV Clip-On Probe Of DIS Tester
Courtesy of BMW OF NORTH AMERICA, INC.

For subsequent procedure, follow DIS instructions.

NOTE: Illustration shows: KV clip-on probe (1) US version

Primary measurement:

Connect 26-pin pin box with special tool 12 1 301 to connector (1) DME module 5.

Procedure on DIS Tester:

- Select < Measurement >.
- Select < Preset measurement >.
- Select < Ignition signal term.1 >.

For subsequent procedure, follow DIS instructions.

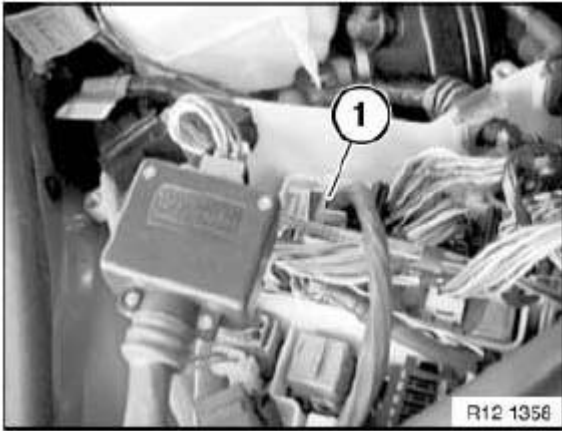


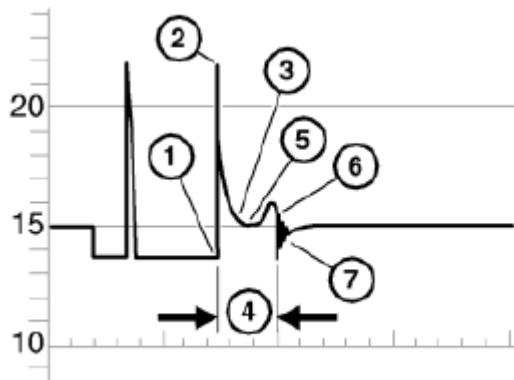
Fig. 6: Identifying Connector DME Module 5
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Pin assignment acc. to connection scheme.
 Illustration N42.

IMPORTANT: Ignition signal is a multiple spark ignition.

Illustration of multiple spark ignition

1. Start of ignition peak.
2. Level of ignition voltage.
3. Level of sparking voltage.
4. Spark duration.
5. Sparking voltage curve.
6. Start of decay process.
7. Decay process.



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1000 of 3160

Fig. 7: Identifying Multiple Spark Ignition Signal

Courtesy of BMW OF NORTH AMERICA, INC.

M54 / M56 / N40 / N42 / N45 / N46 / N62 / N73:

The following ignition oscillogram applies to engines with multiple spark ignition from a production date of April 2001:

Depending on engine temperature (approx. -20 ° to 100°) and engine speed (< 2000 RPM, some ignition voltage peaks (approx. 1-5 ignition peaks) can occur before the typical ignition voltage characteristic.

The additional ignition peaks play no role in diagnosis.

The last ignition peak (1) on the oscillogram is decisive.

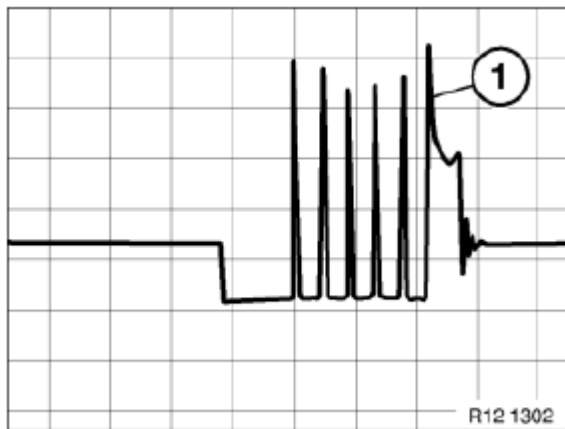


Fig. 8: Ignition Peak Oscillogram Graph

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The display of the ignition voltage peak is approx. 20-25 % lower than the real value.
It is not the height of the ignition voltage peaks but rather the uniformity of all the cylinders that is important.
Differences of 3000 to 4000 volts are permitted.

12 13 511 REPLACING IGNITION COIL (N52, N52K, N51)

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Check stored fault messages
- Switch off ignition
- Remove ignition coil cover. See **11 00 REMOVING AND INSTALLING/REPLACING IGNITION COIL COVER (N52K)**

Unlock plug retainer of ignition coil (1) and disconnect plug.

Pull ignition coil (1) up and out.

This procedure is applicable to all ignition coils.

Installation:

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

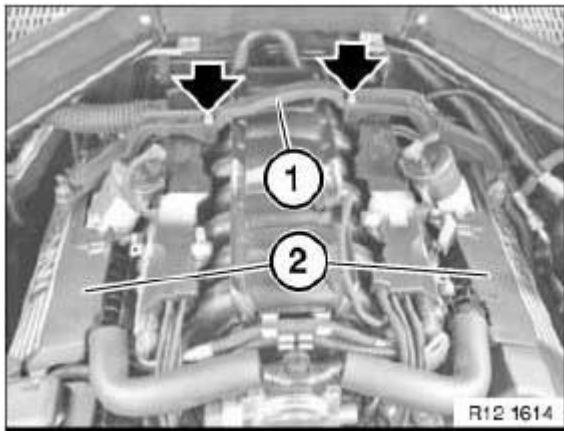


Fig. 9: Locating Ignition Coil Covers Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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

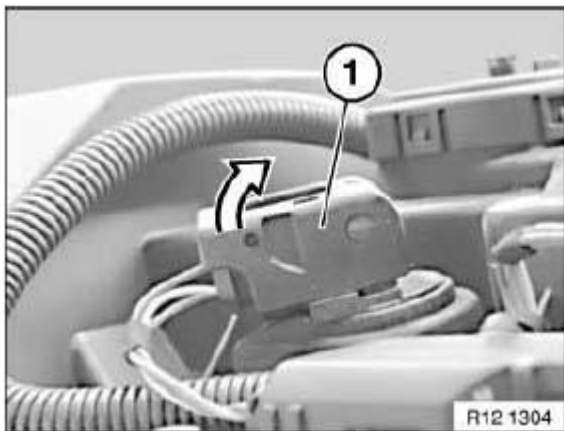


Fig. 10: Unlocking Plug Fastener Of Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The plug retainer must snap into place without great effort.

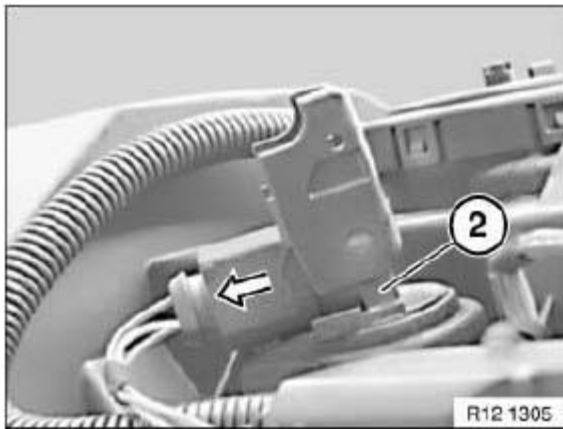


Fig. 11: Pulling Out Ignition Coil

Courtesy of BMW OF NORTH AMERICA, INC.

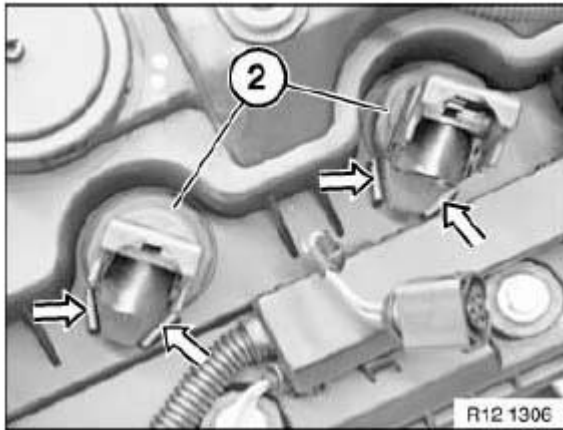


Fig. 12: Identifying Rubber Seal On Ignition Coils Between Guides

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

NOTE: Now clear the fault memory.

14 ELECTRONIC SWITCHING ON OR CONTROL UNIT

12 14 521 REPLACING CRANKSHAFT PULSE GENERATOR (N52, N52K, N51, N53)

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

DISCHARGE)

IMPORTANT: Aluminum-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

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

The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition

NOTE: Installation location of pulse generator for crankshaft is underneath starter motor.

Preparatory tasks:

- Remove intake air manifold. See **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N62)**

Detach plug (1) from crankshaft pulse generator (2).

Release screw.

Installation

Replace aluminum screws.

Tightening torque 12 14 2AZ. See **12 14 ELECTRONIC SHIFT UNITS OR CONTROL UNITS** .

Withdraw pulse generator (2) from crankcase.

Installation:

Replace sealing ring.

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

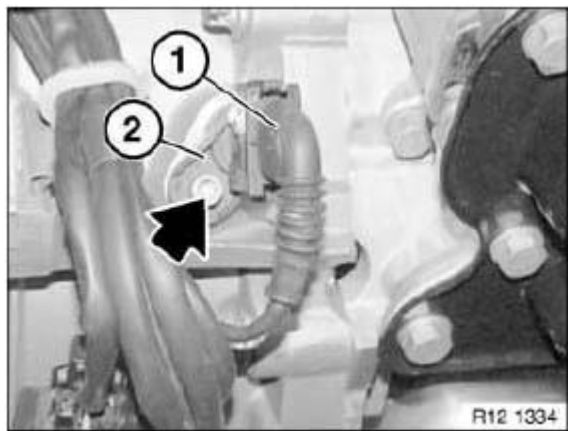


Fig. 13: Locating Pulse Generator Plug
Courtesy of BMW OF NORTH AMERICA, INC.

12 14 523 REPLACING INLET CAMSHAFT PULSE GENERATOR (N52, N52K, N51, N53)

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Switch off ignition
- Remove If necessary, remove radiator cover

Unlock plug (1) and remove.

Release bolt..

Installation:

Replace screw.

Tightening torque 12 14 3AZ12 14 ELECTRONIC SHIFT UNITS OR CONTROL UNITS .

Remove pulse generator (2).

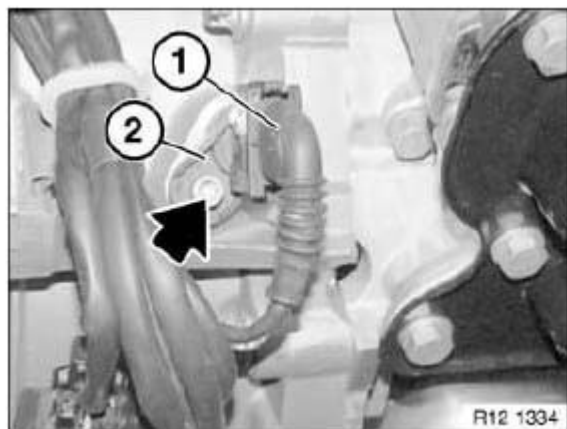


Fig. 14: Locating Pulse Generator Plug
Courtesy of BMW OF NORTH AMERICA, INC.

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

12 14 523 REPLACING PULSE GENERATOR ON INLET CAMSHAFT (N52K)

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition

Lever out expansion rivets (1).

Press lock (2) and raise intake duct (3).

Detach intake duct (3) from air filter housing and remove.

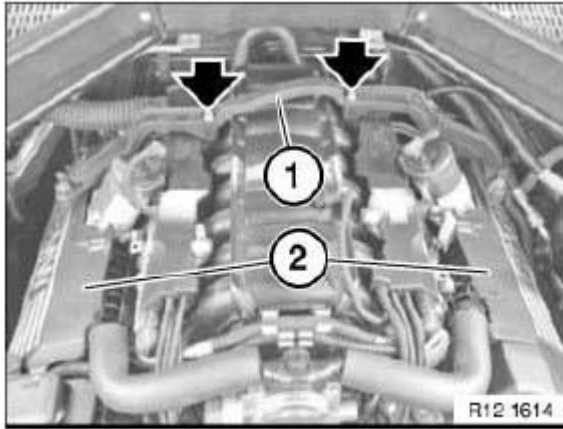


Fig. 15: Locating Ignition Coil Covers Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip Bowden cable for engine bonnet/hood actuator from transverse reinforcement (1).

Release screws on left and right sides. Tightening torque 51 71 4AZ. See **51 71 SEALS AND LOOSE BODY PARTS**

Remove cross-brace (1).

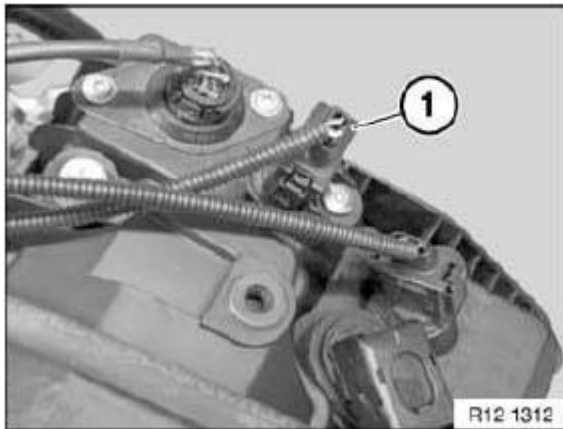


Fig. 16: Identifying Plug Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace screw.

Tightening torque 12 14 3AZ. See **12 14 ELECTRONIC SHIFT UNITS OR CONTROL UNITS**

Remove pulse generator (2).

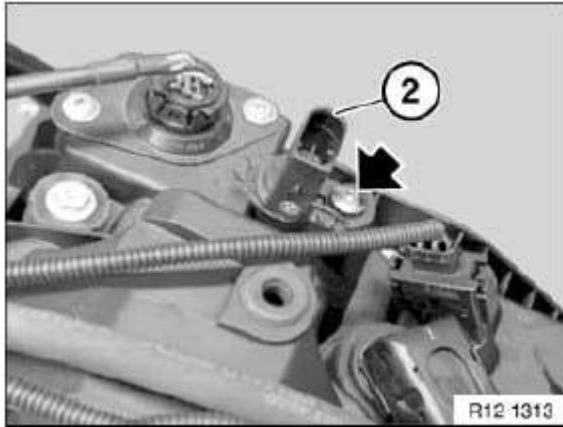


Fig. 17: Locating Pulse Generator And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

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

12 14 524 REPLACING EXHAUST CAMSHAFT PULSE GENERATOR (N52, N52K, N51, N53)

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- If necessary, remove radiator cover

Unlock plug (1) and remove. Release bolt.

Release bolt.

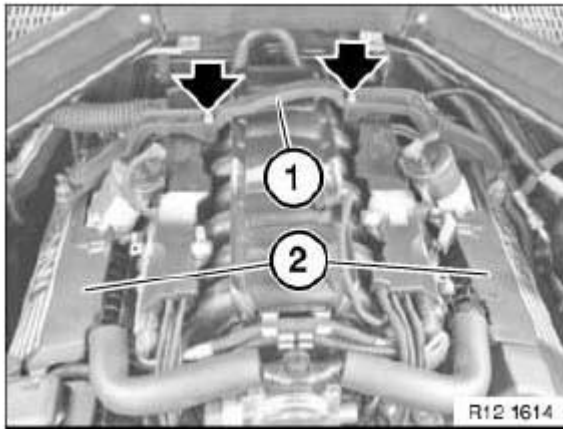


Fig. 18: Locating Ignition Coil Covers Screws And Holder
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

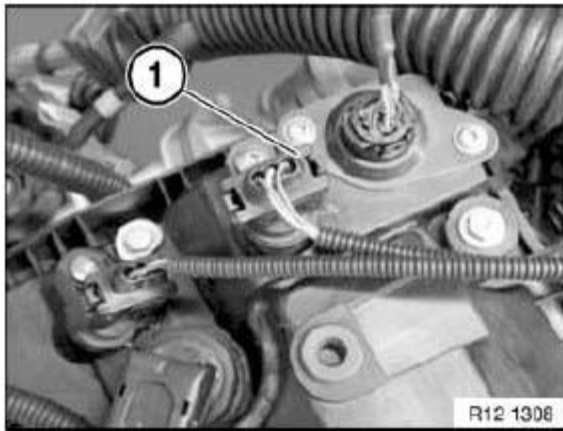


Fig. 19: Identifying Plug Connector
 Courtesy of BMW OF NORTH AMERICA, INC.

Replace screw.

Tightening torque 12 14 4AZ. See **12 14 ELECTRONIC SHIFT UNITS OR CONTROL UNITS**

Remove pulse generator (2).

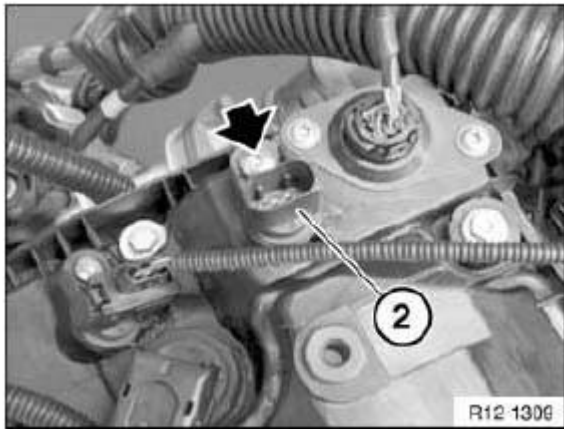


Fig. 20: Locating Pulse Generator

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.

Now clear the fault memory.

12 14 524 REPLACING PULSE GENERATOR ON EXHAUST CAMSHAFT (N52K)

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Switch off ignition

Lever out expansion rivets (1).

Press lock (2) and raise intake duct (3).

Detach intake duct (3) from air filter housing and remove.

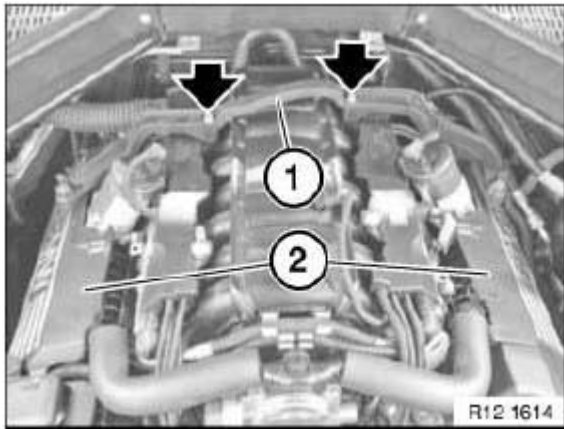


Fig. 21: Locating Ignition Coil Covers Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

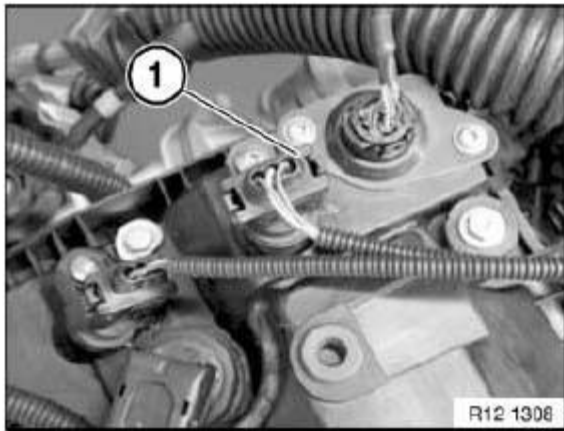


Fig. 22: Identifying Plug Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Replace screw.

Tightening torque 12 14 4AZ. See **12 14 ELECTRONIC SHIFT UNITS OR CONTROL UNITS**

Remove pulse generator (2).

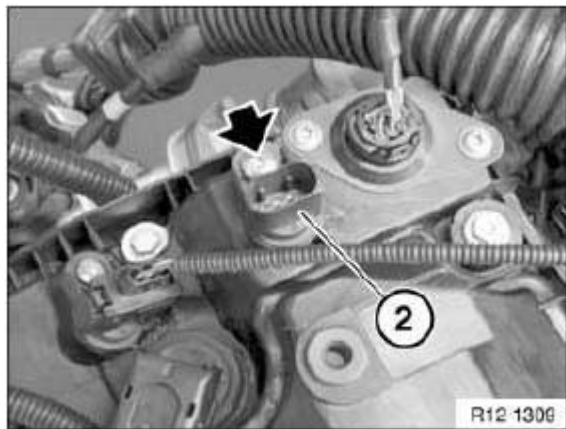


Fig. 23: Locating Pulse Generator

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.

Now clear the fault memory.

12 14 550 REPLACING CONTROL UNIT (DME)

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

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery negative lead. See 61 35... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .
- Remove microfilter housing. See 64 31 081 REMOVING AND INSTALLING/REPLACING MICROFILTER HOUSING

IMPORTANT: Follow instructions for removing and installing electronic control units.

Replacement:

- Carry out programming/coding. See CODING & PROGRAMMING

IMPORTANT: It is absolutely essential to read out the fault memory with the MoDiC or the BMW DIS 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.

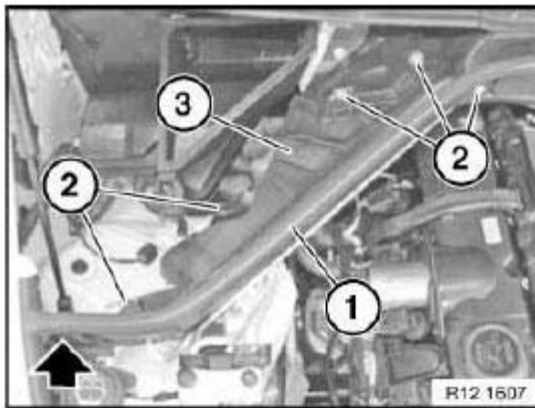


Fig. 24: Identifying Expander Rivet Gasket And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out expander rivet.

Release locks in direction of arrow.

Feed out fresh air duct (1) and remove.

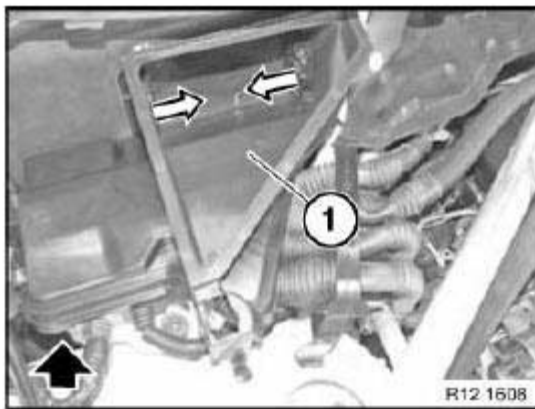


Fig. 25: Removing Fresh Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Open retainers.

Release lock (1) in direction of arrow.

Remove cover (2).

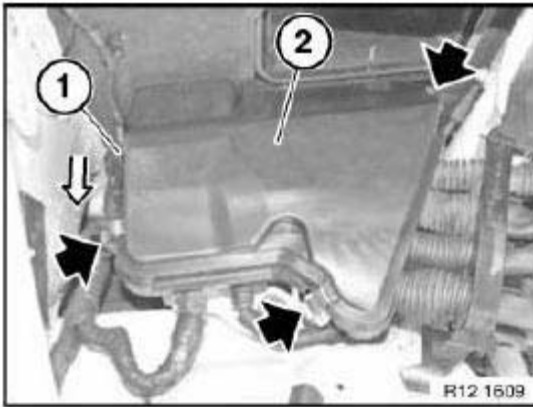


Fig. 26: Locating Retainers Lock And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

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).

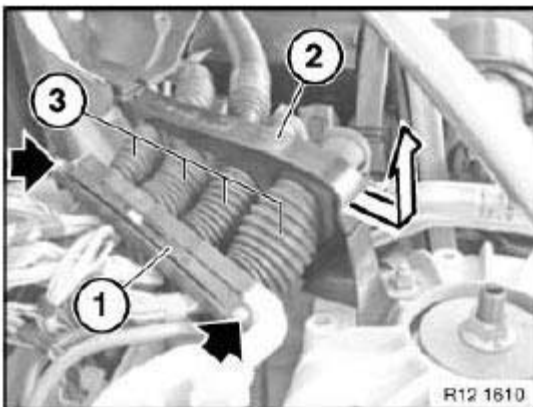


Fig. 27: Unlocking Upper Section Of Partition Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plugs (1) using slide in direction of arrow and remove. Remove control unit (2).

Installation:

Replacement: Note device identification number and coding.

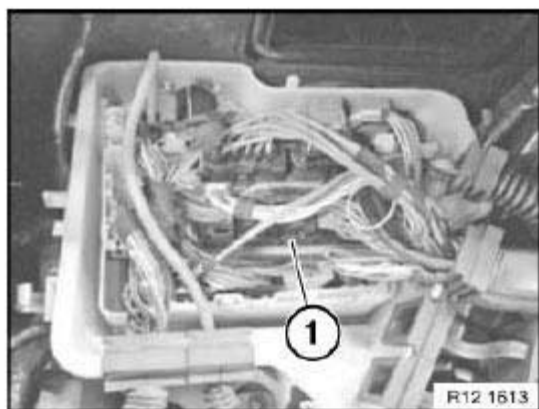


Fig. 28: Identifying DME Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

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

12 14 600 REMOVING/REPLACING KNOCK SENSORS (N52, N52K, N51)

IMPORTANT: Aluminum-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

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

The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.

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

Necessary preliminary tasks:

- 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 intake air manifold. See **11 61 050 REMOVING AND INSTALLING INTAKE AIR**

MANIFOLD (N62)

IMPORTANT: Mixing up the knock sensor plug connections will result in engine damage!
Routing of wires and plug connections must conform to the original routing.
This eliminates the risk of confusion and mix-ups.

Release screws on both knock sensors. Remove knock sensors (1).

Installation:

Replace aluminum screws.

Tightening torque 12 14 1AZ. See **12 14 ELECTRONIC SHIFT UNITS OR CONTROL UNITS**

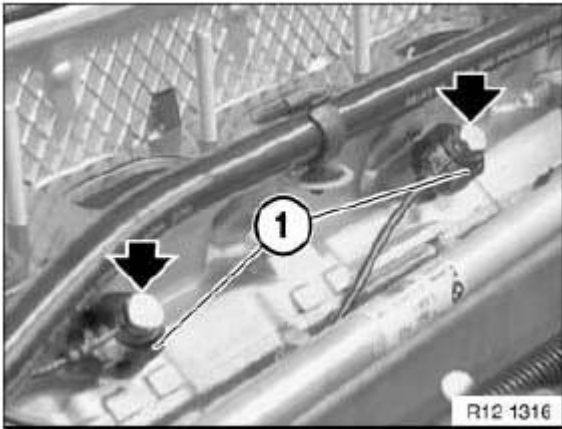


Fig. 29: Identifying Knock Sensors

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean support face of knock sensors on engine block.

NOTE: Check stored fault messages.

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

Necessary preliminary tasks:

- Read fault memory.
- Disconnect negative battery cable. 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 INTERIOR FUSE BOX**
- Release control unit holder

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

Release screws (arrows).

Disconnect wiring harness on engine compartment side on right.

Remove electronics box.

Installation:

Make sure gasket (1) is correctly seated on electronics box. Add final details to vehicle.

Read fault memory.

31 ALTERNATOR WITH DRIVE

12 31 ... REPLACING ALTERNATOR BELT PULLEY

Special tools required:

- 12 7 110. See **12 7 110 SOCKET WRENCH SOCKET WAF 24**

Remove and install alternator drive belt.

Depending on alternator type, grip shaft with:

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

Release nut with special tool 12 7 110. See **12 7 110 SOCKET WRENCH SOCKET WAF 24** .

Installation:

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

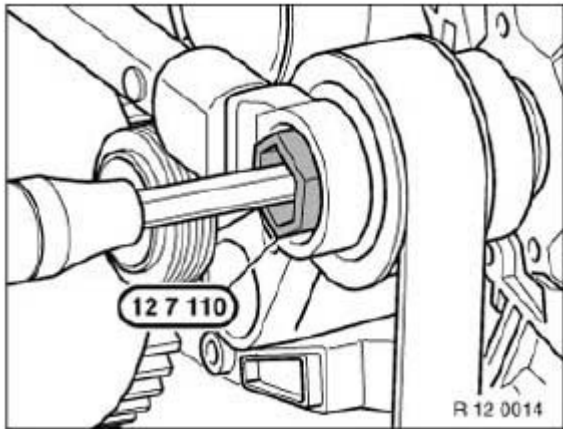


Fig. 30: Identifying Special Tool (12 7 110)
 Courtesy of BMW OF NORTH AMERICA, INC.

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

Special tools required:

- 12 7 120

Remove and install alternator drive belt.

Grip alternator shaft with:

- internal serration

Release nut with special tools 12 7 120.

Installation:

Tighten to specified torque.

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.

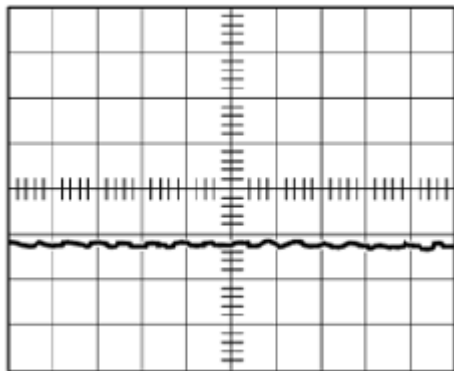
The alternator can identify various faults.

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:



R12 0043

Fig. 31: Wave Form Graph - Fault-Free Alternator
Courtesy of BMW OF NORTH AMERICA, INC.

Oscillogram for a faulty alternator:

One phase interrupted.

Repair/exchange alternator.

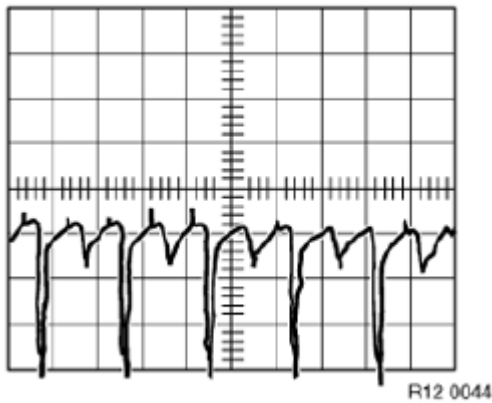


Fig. 32: Wave Form Graph - One Phase Interrupted
 Courtesy of BMW OF NORTH AMERICA, INC.

Interturn fault.

Repair/exchange alternator.

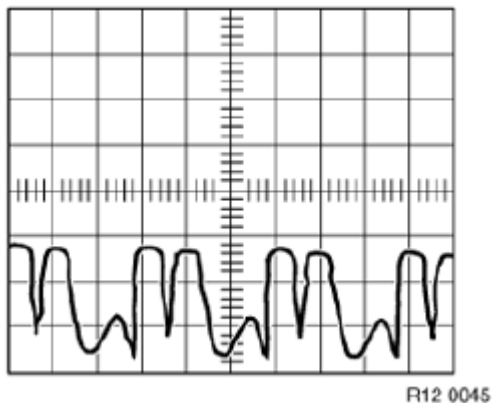


Fig. 33: Wave Form Graph - Interturn Fault
 Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in negative diode.

Repair/exchange alternator.

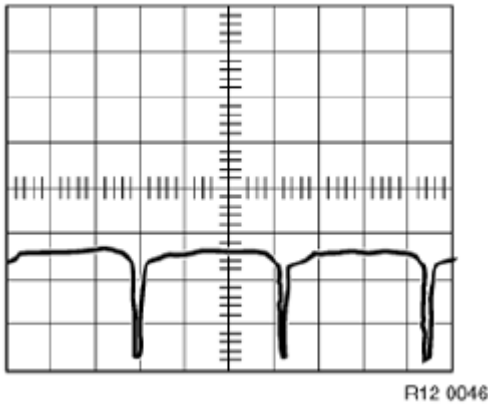


Fig. 34: Wave Form Graph - Open Circuit In Negative Diode
 Courtesy of BMW OF NORTH AMERICA, INC.

Short circuit in positive diode.

Repair/exchange alternator.

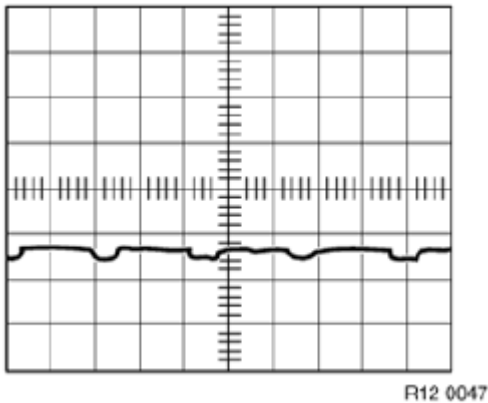
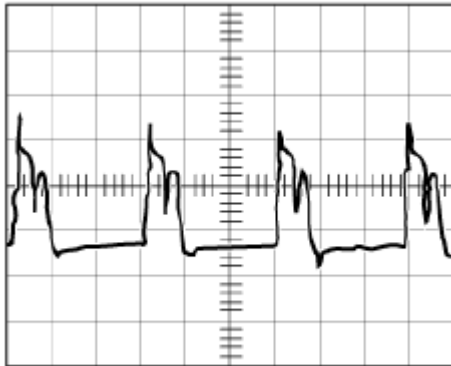


Fig. 35: Wave Form Graph - Short Circuit In Positive Diode
 Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in positive diode.

Repair/exchange alternator.

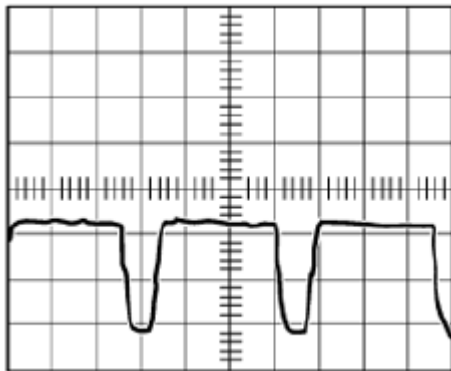


R12 0049

Fig. 36: Wave Form Graph - Open Circuit In Positive Diode
 Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in exciter diode.

Repair/exchange alternator.



R12 0048

Fig. 37: Wave Form Graph - Open Circuit In Exciter Diode
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME/DDE.

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N52K)

IMPORTANT: Aluminum-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

1023 of 3160

A magnesium crankcase requires aluminum screws/bolts exclusively.

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

The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.

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

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect battery negative lead. See **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD**
- Remove alternator drive belt. See **11 28 010 REPLACING ALTERNATOR DRIVE BELT (N62/N62TU)**

Unlock plug (1) and remove.

Slacken nut (2).

Installation:

Tightening torque 12 31 1AZ. See **12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS**

Release screws and remove alternator (3).

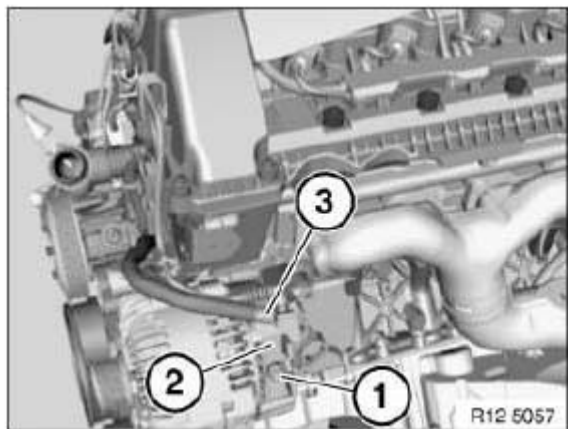


Fig. 38: Identifying Alternator Plug And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace aluminum screws.

Tightening torque 12 31 1AZ. See **12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS**

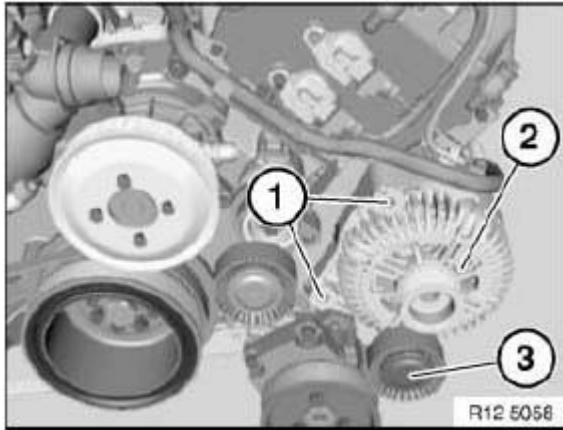


Fig. 39: Identifying Alternator Guide Pulley
Courtesy of BMW OF NORTH AMERICA, INC.

32 REGULATOR

12 32 501 REPLACING VOLTAGE REGULATOR

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery negative lead. See **12 00 ... Instructions for Disconnecting And Connecting Battery**
- Notes on removing and installing electronic control units. See **12 00 ... Instructions for Removing And Installing Electronic Control Units**.
- Remove alternator

Bosch:

Release protective caps (1).

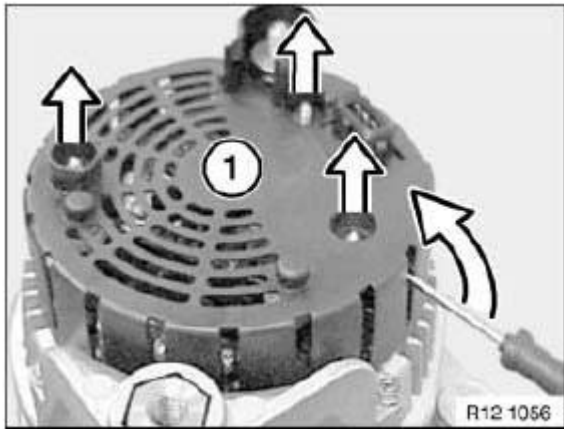


Fig. 40: Inserting Screwdriver Between Cover And Threaded Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

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

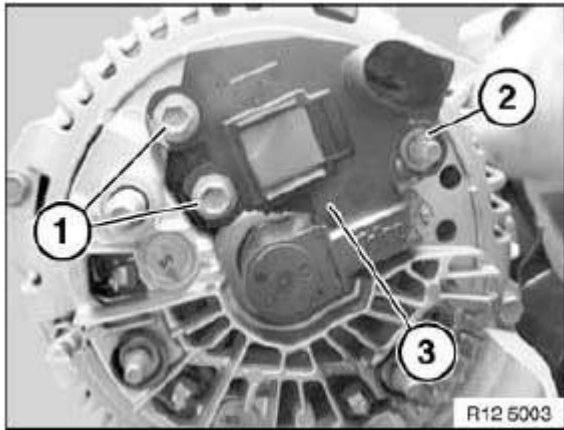


Fig. 41: Identifying Controller Switch And Contact Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

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

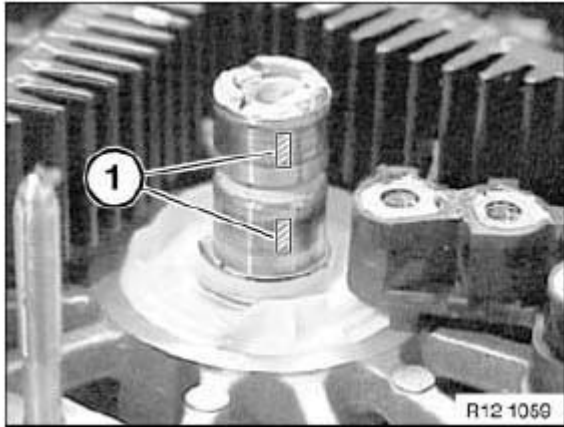


Fig. 42: Identifying Contact Surfaces Of Slip Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

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

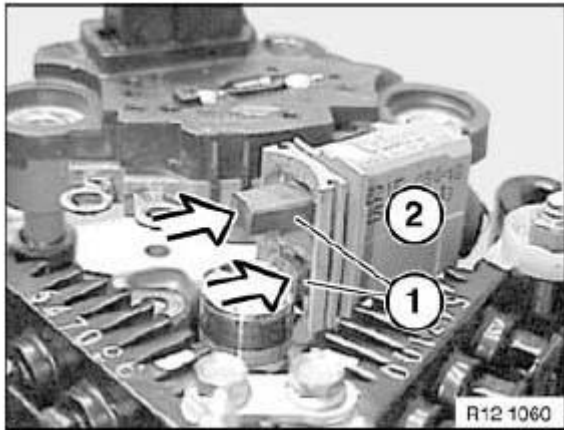


Fig. 43: Installing Controller Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Slacken nut (1).

Slacken nut (2).

Release screws (3).

Release cover (4).

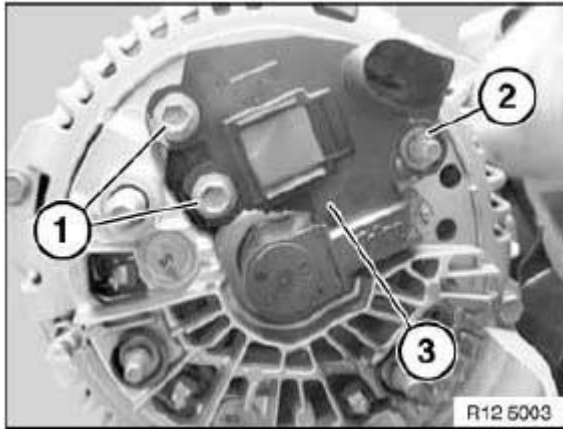


Fig. 44: Identifying Controller Switch And Contact Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Release screws

Remove regulator switch (1) towards top.

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.

Installation:

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

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

41 STARTER WITH MOUNTING

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER MOTOR (N52, N52K, N51, N53, N54)

IMPORTANT: Aluminum-magnesium materials.

1028 of 3160

No steel screws/bolts may be used due to the threat of electrochemical

corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

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

The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.

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

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery negative lead. See **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD**
- Remove intake air manifold. See **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N62)**

Unlock plug (1) and remove.

Unfasten nut.

Tightening torque 12 14 3AZ. See **12 41 STARTER MOTOR WITH MOUNTING**

Remove battery positive lead (2).

Release screws (1).

Installation:

Replace aluminum screws.

Tightening torque 12 14 1AZ. See **12 14 ELECTRONIC SHIFT UNITS OR CONTROL UNITS**

Release screws (2).

Replace aluminum screws.

Tightening torque 12 41 2AZ. See **12 41 STARTER MOTOR WITH MOUNTING**

Remove starter motor (3).

Installation:

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

N53 only : In the case of a separate term. 50 lead (with disconnecter socket), the term. 50 lead is laid parallel to knock sensor 2 behind the fuel line.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition.

Remove starter motor.

Release nut (1).

Remove cable lug (2).

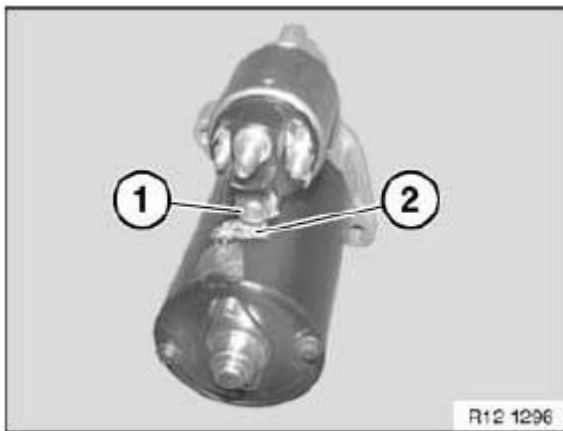


Fig. 45: Identifying Cable Lug And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not turn cable lug (2) while tightening down - risk of short circuit to starter motor housing.
Tighten to specified torque.

Release screws (1).

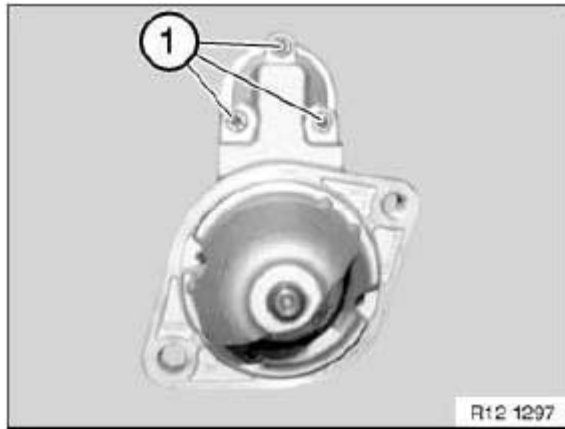


Fig. 46: Identifying Screws

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.

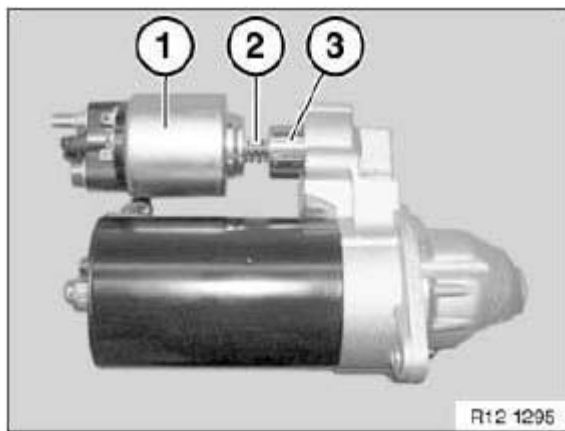


Fig. 47: Identifying Solenoid Switch And Spring

Courtesy of BMW OF NORTH AMERICA, INC.

42 STARTER LEAD

12 42 500 REMOVING AND INSTALLING OR REPLACING BATTERY POSITIVE LEAD (BETWEEN STARTER, ALTERNATOR AND BATTERY POSITIVE TERMINAL)

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition
- Disconnect battery negative lead. See **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD**
- Remove intake air manifold. See **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N62)**

Open cover.

Release nut, remove battery positive lead (1) from battery positive terminal.

Tightening torque. See **12 42 STARTER CABLE** .

Release nut and remove battery positive lead (1) from alternator. Tightening torque 12 31 1AZ. See **12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS**

Unlock plug (1) and remove.

Unfasten nut.

Tightening torque 12 41 3AZ. See **12 41 STARTER MOTOR WITH MOUNTING**

Detach battery positive lead (2) from starter motor and remove.

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

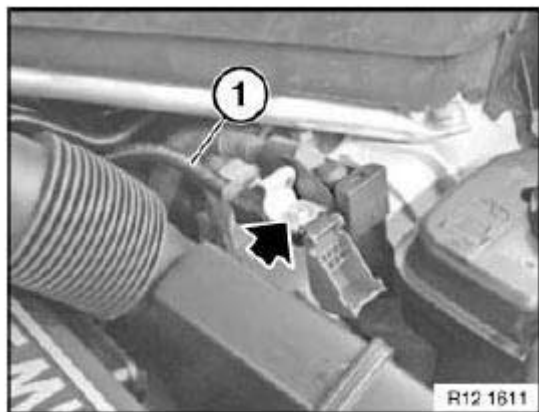


Fig. 48: Identifying Cover

Courtesy of BMW OF NORTH AMERICA, INC.

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.

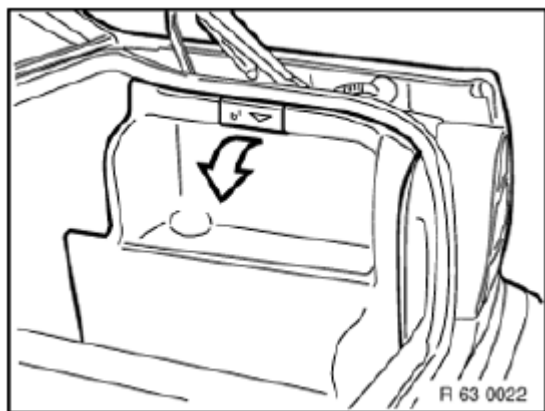


Fig. 49: Removing Side Trim Panel

Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.



Fig. 50: Releasing Front Side Trim Panel

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.

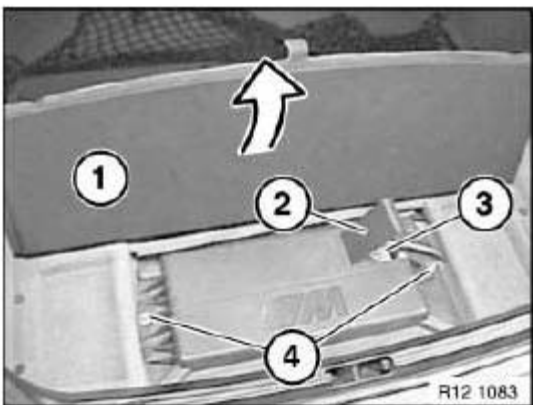


Fig. 51: Lifting Cover On Battery Negative Lead

Courtesy of BMW OF NORTH AMERICA, INC.

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. See 12 00 ... Instructions for Disconnecting And Connecting Battery.

Disconnect battery negative lead.

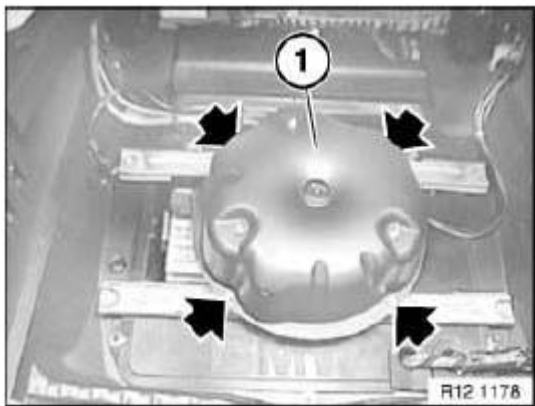


Fig. 52: Locating Spare Wheel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect supply cable (1) for vehicle electrical system.

Installation:

Remove faulty fuses and carry out troubleshooting.

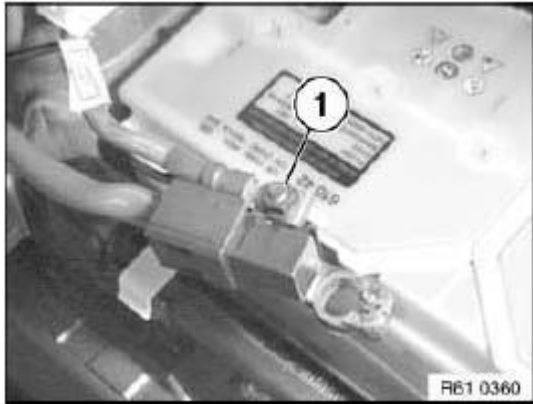


Fig. 53: Identifying Supply Cable

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.

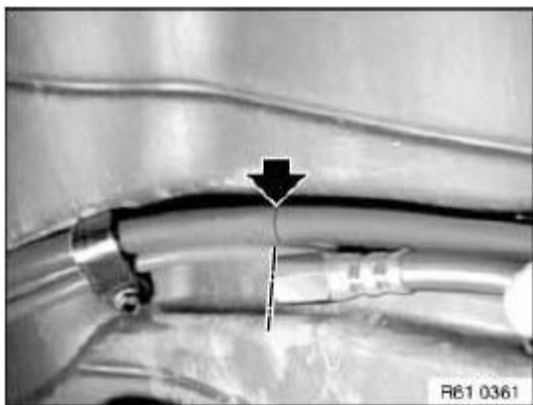


Fig. 54: Locating Mark Interface Of Battery Positive Lead

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (2).

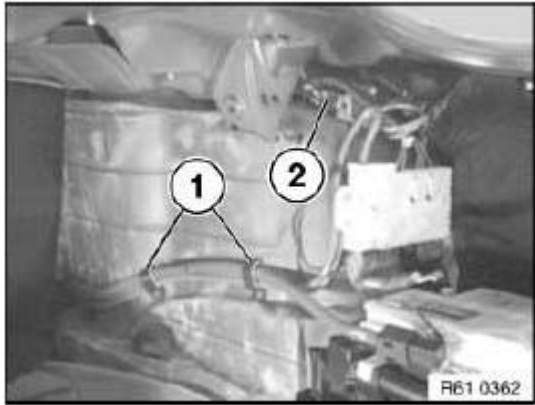


Fig. 55: Identifying Plug Connection And Cable Ties
Courtesy of BMW OF NORTH AMERICA, INC.

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.

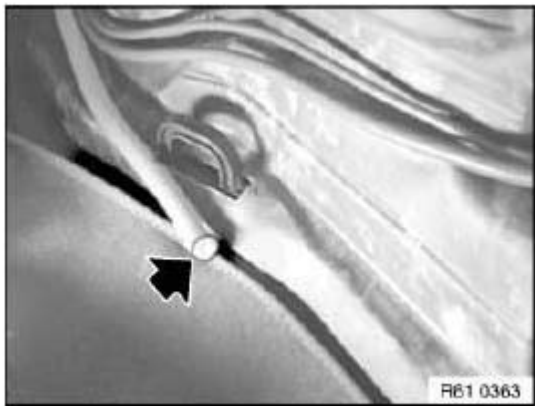


Fig. 56: Locating Battery Cable
Courtesy of BMW OF NORTH AMERICA, INC.

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

Distance (A) = 15 mm.

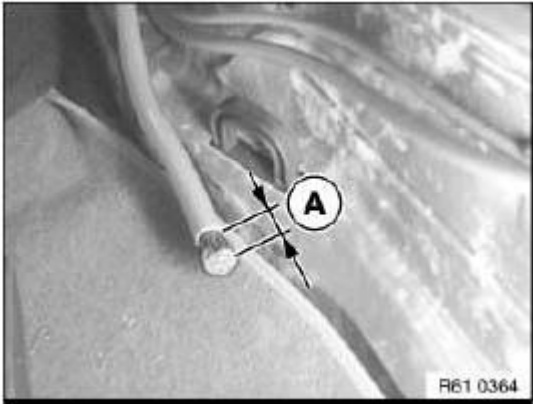


Fig. 57: Identifying Strip Insulation - Length
Courtesy of BMW OF NORTH AMERICA, INC.

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

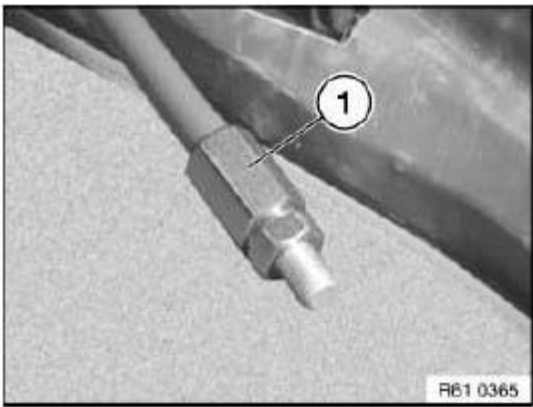


Fig. 58: Identifying Heavy-Current Connector
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

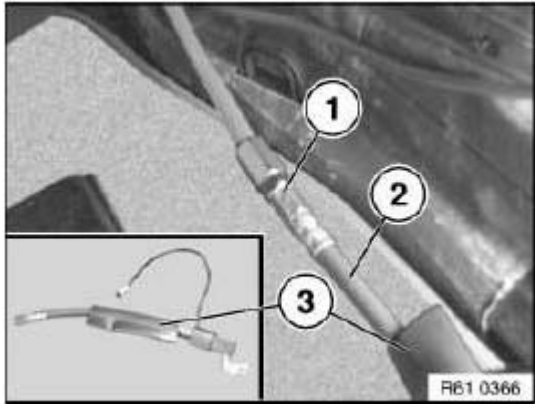


Fig. 59: Identifying Shrink-Fit Hose And Threaded Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

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

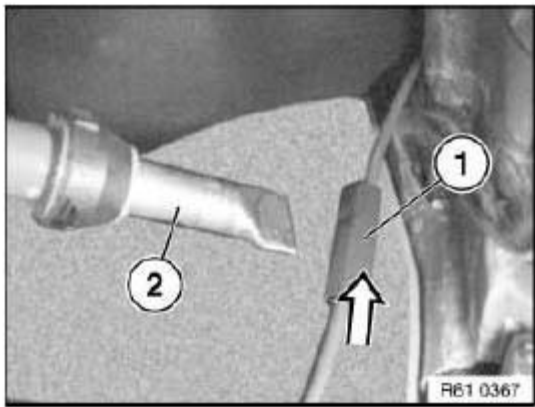


Fig. 60: Pushing Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

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

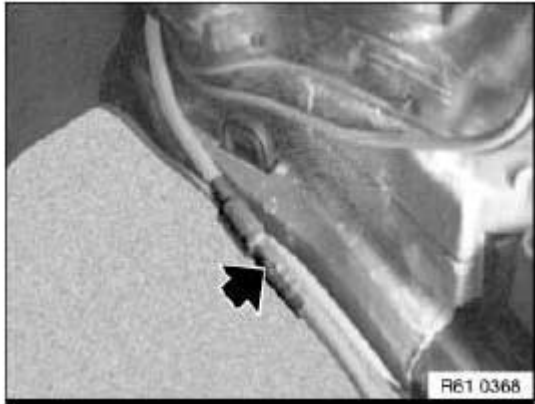


Fig. 61: Locating Shrink-Fit Hose

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.)**

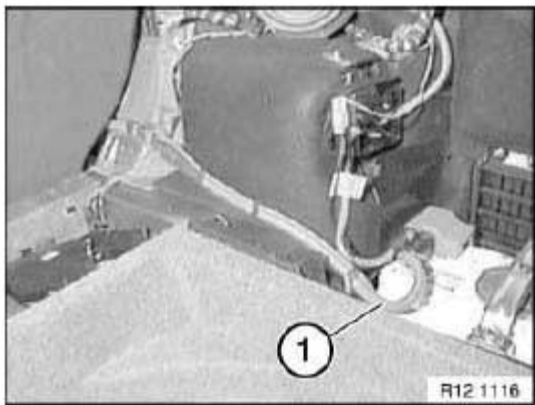


Fig. 62: Identifying Excess Length Of Battery Positive Lead

Courtesy of BMW OF NORTH AMERICA, INC.

51 ENGINE WIRING LOOM

12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N52K)

Special tools required:

- 24 2 390. See **24 2 390 COVERING CAP**

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

Necessary preliminary tasks:

- Read out DME fault memory
- 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**
- Remove intake air manifold. See **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N62)**

Unclip Bowden cable for engine bonnet/hood actuator from transverse reinforcement (1).

Release screws on left and right sides. Tightening torque 51 71 4AZ. See **51 71 SEALS AND LOOSE BODY PARTS**

Remove cross-brace (1).

Lever out expander rivet.

Remove gasket (1).

Feed out partition (3) and remove.

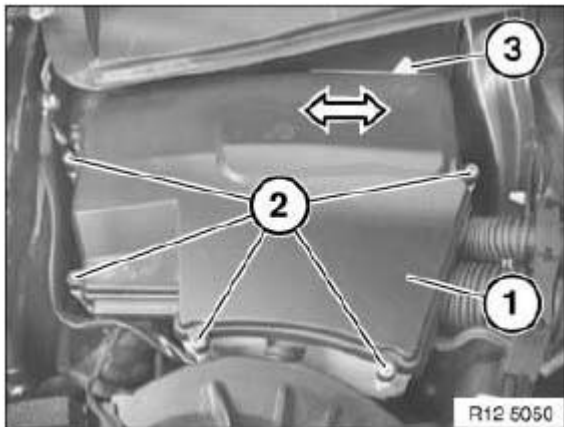
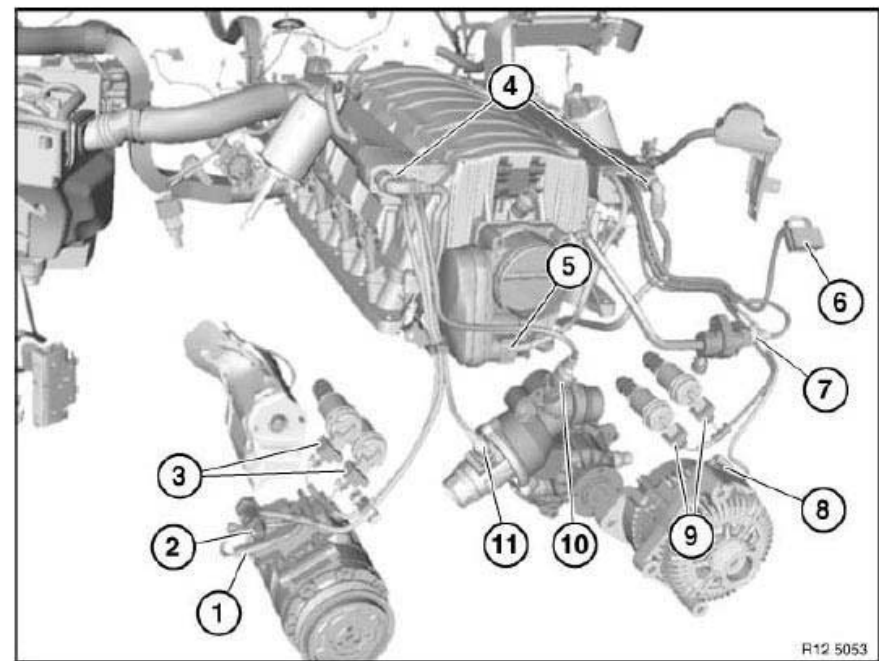


Fig. 63: Detaching Electronics Box Cover From Fixtures
Courtesy of BMW OF NORTH AMERICA, INC.

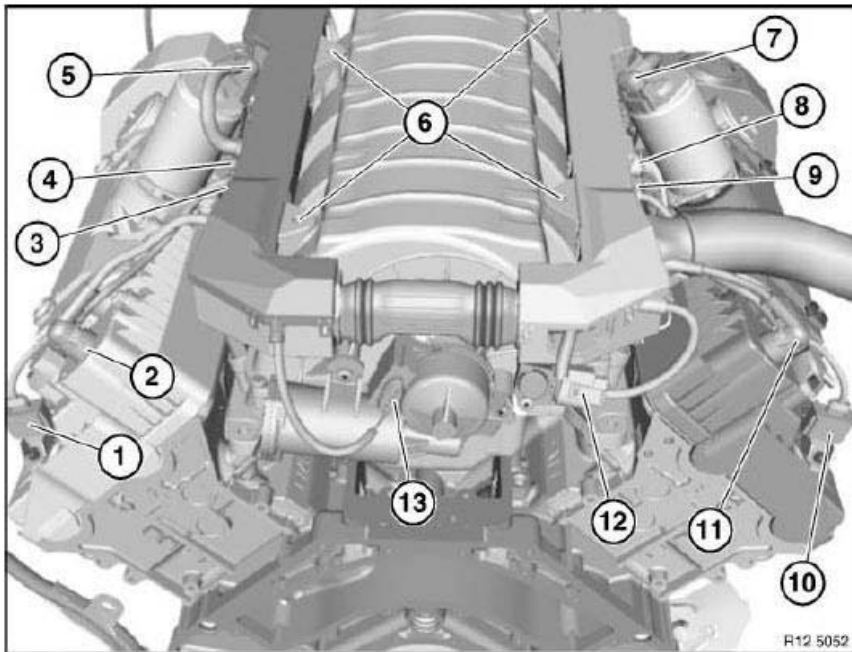
- Lever out expander rivet.
- Release locks in direction of arrow.
- Feed out fresh air duct (1) and remove.



1	Air conditioner compressor	7	Tank venting valve
2	Oil-pressure switch	8	Plug connection BSD alternator
3	VANOS solenoid valves 1-4	9	VANOS solenoid valves 5-8
4	Knock sensor, right and left	10	Coolant temperature sensor
5	Throttle-valve actuator	11	Map thermostat
6	Air-mass sensor		

Fig. 64: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

- Open retainers.
- Release lock (1) in direction of arrow.
- Remove cover (2).



1	Exhaust camshaft sensor	8	Injection wiring harness (1 to 4)
2	VVT sensor (5 to 8)	9	Inlet camshaft sensor
3	Inlet camshaft sensor	10	Exhaust camshaft sensor
4	Injection wiring harness (5 to 8)	11	VVT sensor (1 to 4)
5	VVT servodrive (5 to 8)	12	Differential pressure sensor
6	Release screws.	13	DISA gear
7	VVT servodrive (1 to 4)		

Fig. 65: Identifying Plug Connections

Courtesy of BMW OF NORTH AMERICA, INC.

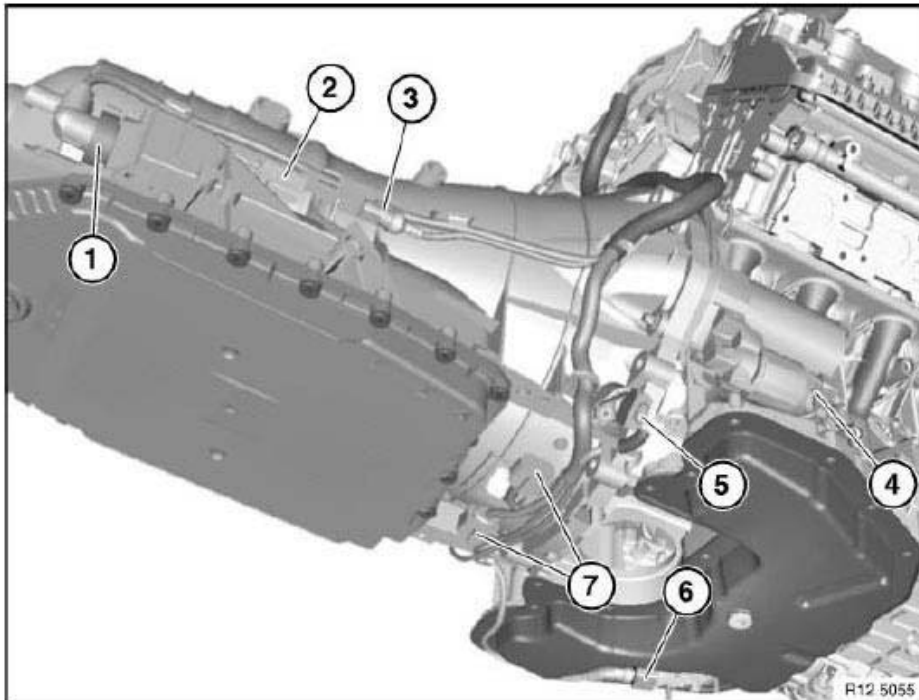
Release screws and remove retaining bar (1).

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).



1	Automatic transmission	5	Crankshaft sensor
2	Not used	6	Oil level sensor
3	Monitor sensor, left and right	7	Control sensors (oxygen sensors)
4	Term. 50 starter motor		

Fig. 66: Identifying Plug Connections

Courtesy of BMW OF NORTH AMERICA, INC.

Raise control unit (2) slightly.

Unlock plugs (1) using slide in direction of arrow and remove.

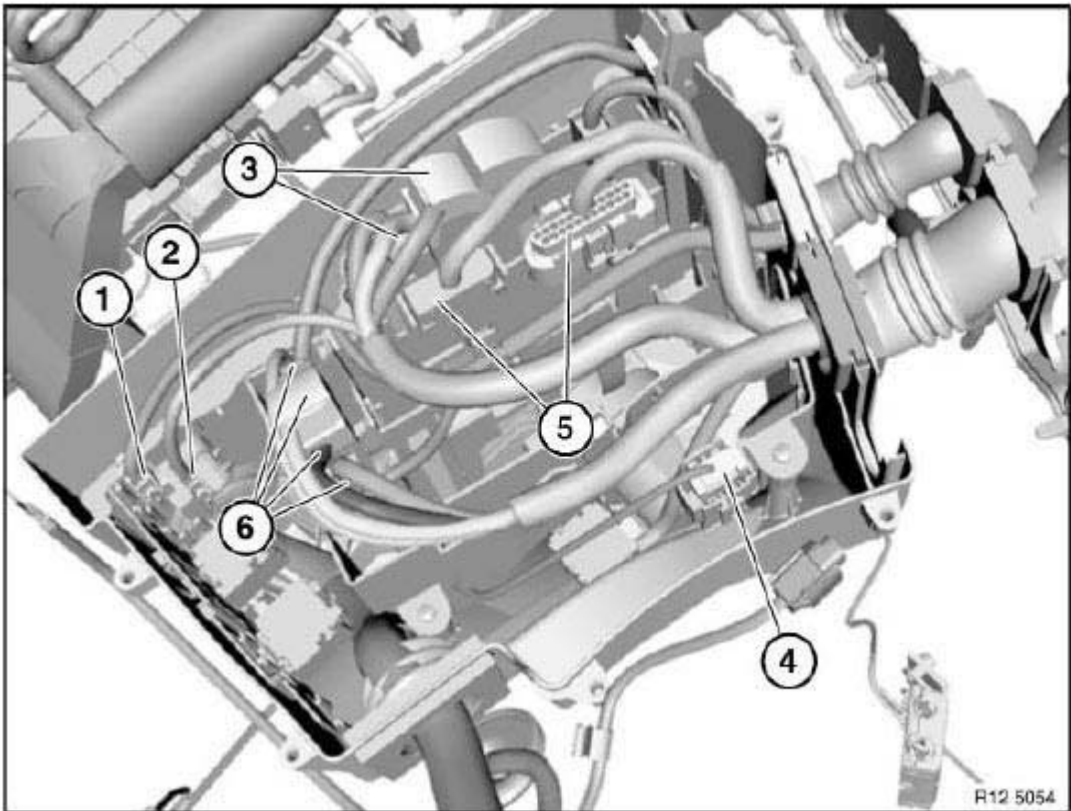


Fig. 67: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Long plug:

Unlock plug on control unit and disconnect.

Unlock tab (1), pull contact carrier (2) in direction of arrow out of housing.

Short plug:

Unlock slide (2) in bore holes (1) and pull out of housing.

Unlock tab (3), pull contact carrier (4) in direction of arrow out of housing.

Unlock and disconnect all plug connections of engine wiring harness section in electronics box.

Unlock tabs (1) and pull contact carrier (2) out of housing.

REFERENCE CHART

Work step	Note:
Unlock plug connections on control sensors and disconnect	1045 of 3160

Unlock plug on alternator and disconnect	
Unlock plug connection on knock sensors and disconnect	
Unlock plug on crankshaft sensor and disconnect	
Unlock plug on starter motor and disconnect	
Remove rear underbody protection. See <u>51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION</u>	
Unlock plug connections on monitor sensors and disconnect	
Unlock plug on oil condition sensor and disconnect	

Unlock and disconnect plug (1) by turning.

Release wiring harness from holders.

Insert special tool 24 2 390 in sealing sleeve. See **24 2 390 COVERING CAP**

These tasks are described in Notes on mechatronics. See **24 34 ... NOTES ON MECHATRONICS (GA6HP26Z/GA6HP32Z/GA6HP19Z)**

(Important: Observe important note)

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

12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION COIL (N52K)

IMPORTANT: Aluminum-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

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

The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.

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

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

DISCHARGE) .

Necessary preliminary tasks:

- Read out DME fault memory
- Switch off ignition
- Disconnect battery negative lead. See **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD.**
- Remove ignition coil cover. See **11 00 REMOVING AND INSTALLING/REPLACING IGNITION COIL COVER (N52K)**
- Remove control unit plug. See **12 14 550 Replacing Control Unit (DME)**

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).

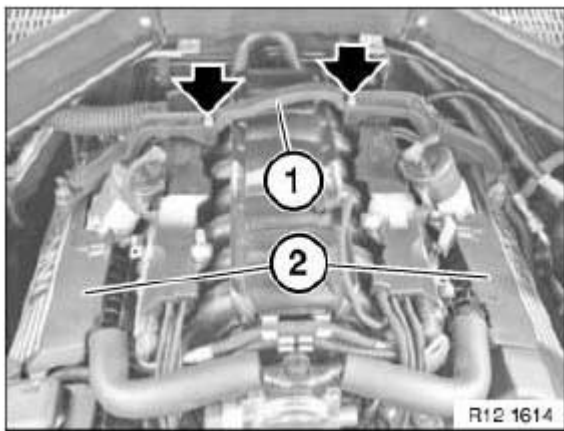


Fig. 68: Locating Ignition Coil Covers Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock tab (1), pull contact carrier (2) in direction of arrow out of housing.

Unlock and disconnect all plug connections of ignition coil wiring harness section in electronics box.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

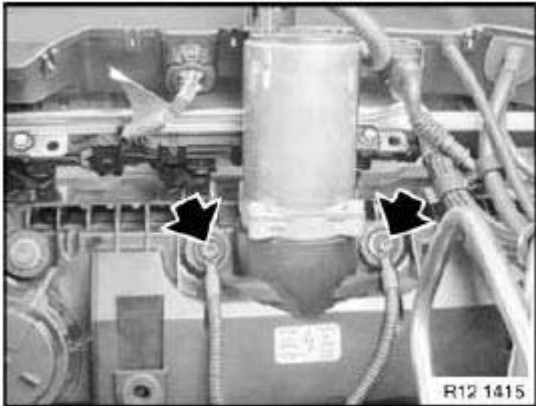


Fig. 69: Locating Grounding Cable And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tab (1) in direction of arrow and pull contact carrier (2) out of housing.

REFERENCE CHART

Work step	Note
Disconnect positive lead at jump-start connection point	
Disconnect ground cables	
Unlock plug connections on ignition coils and disconnect	
Unlock cable duct on cylinder head cover and detach	
Unlock plug on eccentric shaft sensor and disconnect	
Unlock plug on positioning motor for eccentric shaft and disconnect	
Unlock plug on both solenoid valves and disconnect	
Unlock plug on inlet and exhaust camshaft sensors and disconnect	
Unlock plug on A/C compressor and disconnect	
Unlock plug on oil pressure switch and disconnect	
Unlock plug on coolant temperature sensor and disconnect	
Disconnect connector strip from fuel rail	
Remove front underbody protection. See 51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION	
Unlock plug on electric coolant pump and disconnect	
Unlock plug on coolant thermostat and disconnect	
Disconnect engine ground connection	Tightening torque 12 52 3AZ. Replace screw.

NOTE: Check stored fault messages.

Now clear the fault memory.

61 OIL PRESSURE_OIL TEMPE

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N52, N52K, N51, N54, N53)

Necessary preliminary tasks:

- Switch off ignition
- **N52, N52K, N51, N53 only:**
 - Remove ignition coil cover.
- **N54 only:**
 - Remove intake filter housing

WARNING: Scalding hazard!

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

Installation location:

Oil filter housing, front left.

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 OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY** .

Installation:

Check engine oil level, top up engine oil if necessary.

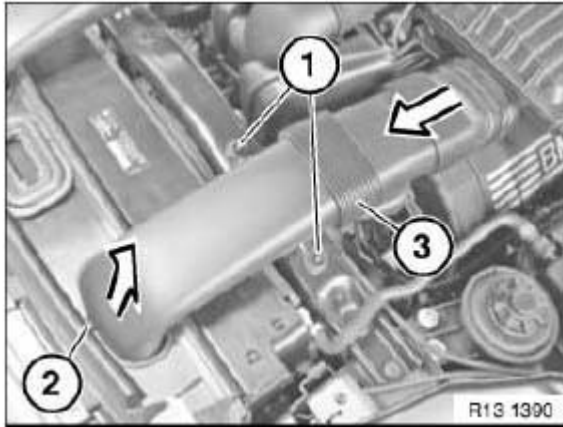


Fig. 70: Pressing Lock

Courtesy of BMW OF NORTH AMERICA, INC.

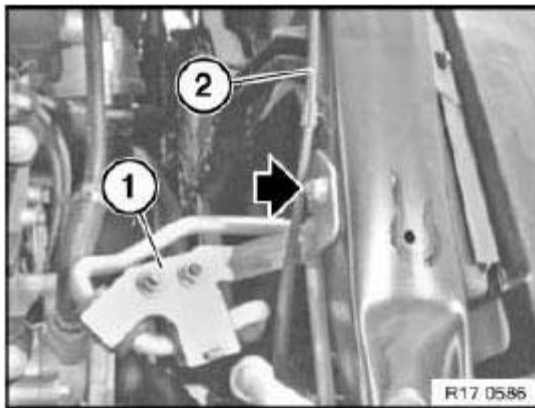


Fig. 71: Unclipping Pull Cable

Courtesy of BMW OF NORTH AMERICA, INC.

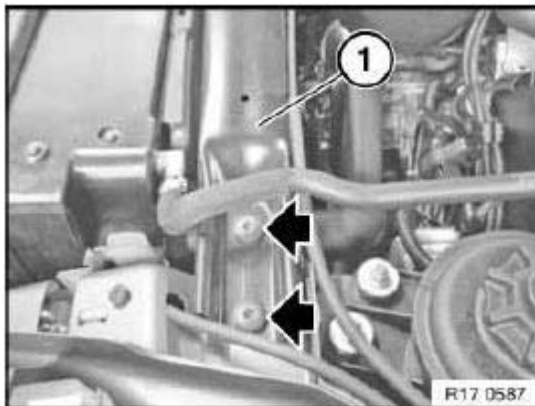


Fig. 72: Locating Cross-Brace

Courtesy of BMW OF NORTH AMERICA, INC.

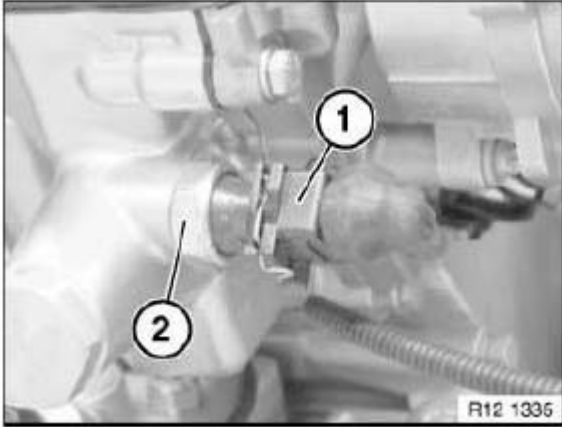


Fig. 73: Locating Plug Connector And Oil Pressure Switch
Courtesy of BMW OF NORTH AMERICA, INC.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N52K)

WARNING: Scalding hazard!

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

Necessary preliminary tasks:

- Remove ignition coil cover. See **11 00 REMOVING AND INSTALLING/REPLACING IGNITION COIL COVER (N52K)**

Installation location:

Oil filter housing, front left.

Engine oil may emerge when oil pressure sensor is replaced;

have a cleaning cloth ready.

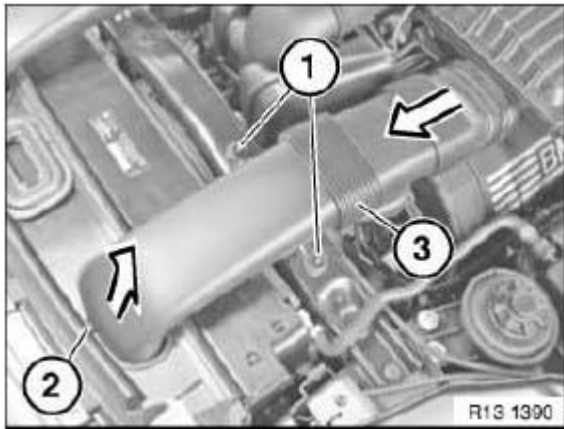


Fig. 74: Pressing Lock

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

Release oil pressure sensor (2).

Tightening torque, 12 61 1AZ. See **12 61 OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY**

Installation:

Check engine oil level, top up engine oil if necessary.

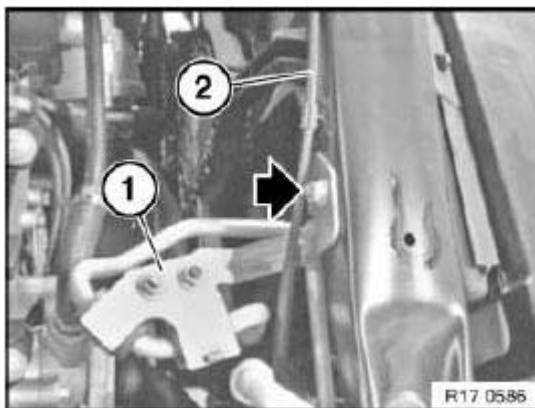


Fig. 75: Unclipping Pull Cable

Courtesy of BMW OF NORTH AMERICA, INC.

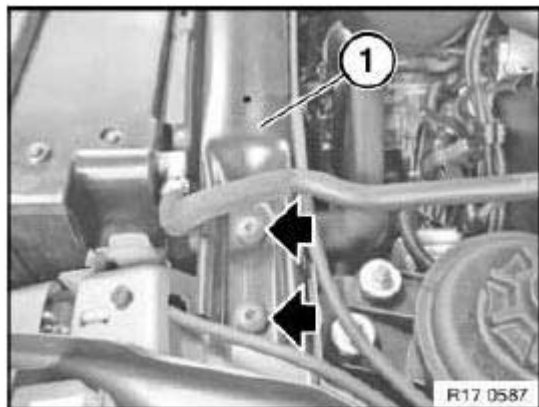


Fig. 76: Locating Cross-Brace

Courtesy of BMW OF NORTH AMERICA, INC.

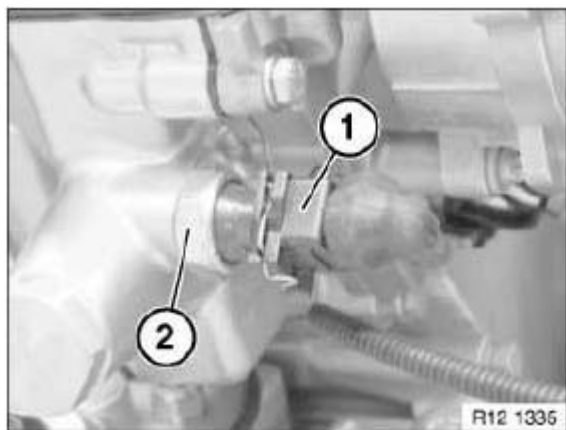


Fig. 77: Locating Plug Connector And Oil Pressure Switch

Courtesy of BMW OF NORTH AMERICA, INC.

12 61 285 REPLACING ENGINE OIL LEVEL SENSOR (N52, N52K, N51, N46, N54, N53)

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

Necessary preliminary tasks:

- Switch off ignition
- E60 / E63 / E64 / E83 / E85 / E86 / E70 only: Remove reinforcement plate. See 31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE .
- E70 / E81 / E87 / E90 / E91 / E92 / E93 only: Remove underbody protection. See 51 47 490 REMOVING AND INSTALLING / REPLACING FRONT ASSEMBLY UNDERSIDE PROTECTION .

- Drain off engine oil. See **00 00 610 ENGINE OIL SERVICE (N52K)** .

Unlock plug (1) and remove.

Unscrew nuts.

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

Remove level switch (2).

Installation:

Clean sealing face on oil sump.

Replace seal on level switch.

An excessively low torque value will result in oil leaks.

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

Top up engine oil.

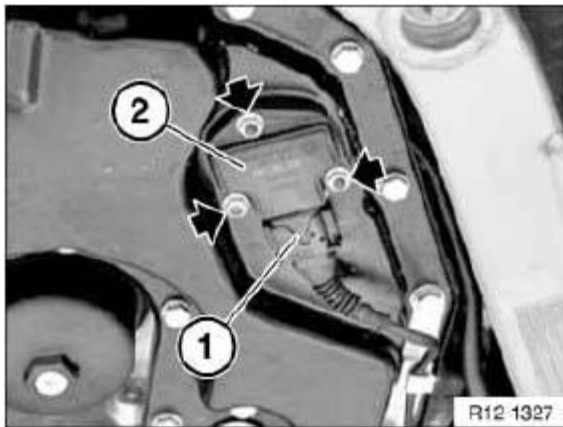


Fig. 78: Identifying Level Switch And Plug Connector
Courtesy of BMW OF NORTH AMERICA, INC.

90 CONTROL UNIT BOX

12 90 100 REPLACING FAN FOR ELECTRONICS BOX

NOTE: Follow instructions for removing and installing electronic control units. See **12 00 ... Instructions for Removing And Installing Electronic Control Units**

- Remove control unit. See **12 14 550 Replacing Control Unit (DME)**
- 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).

Unfasten plug connection and disconnect.

Release air cowl (1).

Remove electric fan (2) with bracket.

Add final details to vehicle.

Read fault memory.

12 13 ... ADDITIONAL FAULT NOTES FOR TROUBLESHOOTING

Necessary preliminary tasks:

- Connect diagnosis system



Fig. 79: Identifying DIS

Courtesy of BMW OF NORTH AMERICA, INC.