

**2001-2003 ENGINE****Ignition System - Repair Instructions - X5 (3.0i) M54****TROUBLESHOOTING****12 00 CONTENTS OF ENGINE ELECTRICAL SYSTEM GENERAL****General Information:**

-> Working on ignition system. Refer to **12 00 ... INFORMATION ON WORKING ON IGNITION SYSTEM** .

-> Removing and installing electronic control units. Refer to **12 00 ... INSTRUCTIONS FOR REMOVING AND INSTALLING ELECTRONIC CONTROL UNITS** .

-> Welding work (overload protection of control units). Refer to **12 00 ... INSTRUCTIONS FOR WELDING WORK (OVERLOAD PROTECTION OF CONTROL UNITS)** .

-> Disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .

-> Disconnecting and connecting test equipment. Refer to **12 00 ... INSTRUCTIONS FOR CONNECTING AND DISCONNECTING TEST UNITS** .

-> Component inspection: Refer to **12 00 ... INSTRUCTIONS ON COMPONENT TESTING** .

-> External jump-starting aid. Refer to **12 00 ... INSTRUCTIONS ON EXTERNAL STARTING AID** .

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

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

**Before Disconnecting Battery:**

Switch off ignition.

**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 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 fitting terminal for battery negative lead: Tightening torque, (5 N.m.).

**After Connecting Battery:**

**IMPORTANT: After a power supply interruption some equipment is disabled and must be reactivated.**

Likewise, individual settings are lost and must be activated.

Example:

- Activate sliding sunroof. Refer to **54 0 ... NOTES ON PANORAMA GLASS ROOF (INITIALIZATION/NORMALIZATION/LEARNING OF CHARACTERISTIC CURVE)** or **54 0 ... NOTES ON STEEL AND GLASS SLIDE/TILT SUNROOFS (INITIALIZATION/NORMALIZATION/LEARNING OF CHARACTERISTIC CURVE)** .
- If necessary, activate mirror with compass. Refer to **51 16 ... CALIBRATING COMPASS IN INTERIOR REARVIEW MIRROR** .

For further information and instructions on vehicle specific activation, please refer to the point PROCEDURE FOR INITIALIZATION under the "SI INSTRUCTIONS" from the IDC.

**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 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 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  $\geq 13.5$  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.

### **Trickle Charging:**

Increased closed-circuit current consumption can be compensated with the aid of the battery trickle charger (special tool 61 2 410) via the jump start terminal.

**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 ... INFORMATION ON WORKING ON IGNITION SYSTEM**

### **Safety Instructions:**

Always switch off ignition before working on ignition system.

Use only test leads which have been approved and belong to the 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 conducting 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 Voltage! - Mortal Danger!**

#### **CAUTION: Hazardous voltages occur at:**

- Ignition lead.
- Spark-plug connector.
- Spark plug.
- 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 ... INSTRUCTIONS FOR REMOVING AND INSTALLING ELECTRONIC CONTROL UNITS**

### **CAUTION:**

- 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 were 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 00 ... INSTRUCTIONS FOR WELDING WORK (OVERLOAD PROTECTION OF CONTROL UNITS)**

**CAUTION: Follow instructions for body repairs.**

When performing welding work on installed control units, to avoid any defects in the electronic control units, observe the following steps:

- Observe instructions for disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .
- Detach terminal of battery negative lead from car battery and second battery if fitted. Cover negative terminal posts.
- If welding is to be performed near the battery/batteries, first remove battery/batteries from vehicle (flying sparks - combustion of explosive gas).
- Fit return clamp on welding unit as close as possible to welding point (maximum distance approx. 1 m).
- Never connect return clamp to ground pin on body which has ground wires attached!

## **12 00 ... INSTRUCTIONS FOR CONNECTING AND DISCONNECTING TEST UNITS**

When connecting and disconnecting:

- Service Tester.
- Testing devices
- Test leads.
- When replacing control units.

It is essential to turn off the ignition!

Follow instructions for removing and installing electronic control units. Refer to **12 00 ... INSTRUCTIONS FOR REMOVING AND INSTALLING ELECTRONIC CONTROL UNITS** .

Follow operating instructions for testing devices.

Make sure that connected test leads cannot make contact with rotating parts (e.g.: fans, ribbed V-belts, etc.).

## **12 00 ... INSTRUCTIONS ON COMPONENT TESTING**

**NOTE:**        **During all inspections and work on engine electrics and electronics, always observe safety regulations and accident prevention specifications. Always disconnect connectors of control units or components before checking electric wires.**

### **Testing Aids:**

- Schematics, refer to Diagnosis Information System (DIS).
- Only ever use test lines, adapters, terminals and test tips manufactured by specialists, refer to Diagnosis Information System.

- The inspection values for component testing are located in the Diagnosis Information System (DIS).
- For further technical information, refer to Technical Data.

## **12 00 ... INSTRUCTIONS ON EXTERNAL STARTING AID**

Do not start the engine with help of starting sprays.

Preparation:

Conform with the following when starting engine with starting cable.

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

**CAUTION: Never touch ignition system components and current - dangerous high tension!**

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

Carrying out:

Always conform with the procedures to avoid injury to persons or damage to parts.

- On automatic transmission, select "P" setting, apply handbrake.
- Move the shift lever of vehicles with manual transmission into neutral and apply the parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect positive terminals of both batteries with one jump lead (red).
- Use positive connection point in engine compartment for vehicles with one battery in trunk.
- Then attach second jump lead (black) to negative terminal of donor battery and to engine ground or body ground on vehicle to be started.

**CAUTION: Never connect second jump lead (black) to negative terminal of battery in vehicle to be started. This would produce explosive gas which could be ignited by sparks.**

### **Danger Of Explosion!**

After engine of vehicle to be started has started up, first disconnect the jump lead on the negative terminal/ground connection. Then remove jump lead from positive terminals.

## **12 13 NOTES ON CHECKING IGNITION SYSTEM**

### **Troubleshooting:**

- > Fault in fuel injection system, refer to **12 13 ... FAULT IN FUEL INJECTION SYSTEM** .
- > Spark plug faults, refer to **12 13 ... SPARK PLUG FAULTS** .
- > Ignition coil faults, refer to **13 13 ... IGNITION COIL FAULTS** .
- > Further fault patterns with evaluation, refer to **12 13 ... FURTHER FAULT PATTERNS WITH EVALUATION** .
- > Additional fault notes for troubleshooting, refer to **12 13 ... ADDITIONAL FAULT NOTES FOR TROUBLESHOOTING** .

### **Oscillograms:**

- > Normal oscillogram, refer to **12 13 ... NORMAL OSCILLOGRAM (M, S, W ENGINES ONLY)** .
- > Oscillograms of ignition coils from different manufacturers, refer to **12 13 ... OSCILLOGRAMS OF IGNITION COILS FROM DIFFERENT MANUFACTURERS** .

### **Check**

- > Secondary signal for stationary ignition distribution, refer to **12 13 ... CHECKING SECONDARY SIGNAL FOR STATIONARY IGNITION DISTRIBUTION** .

## **IGNITION WIRES, SPARK PLUGS**

### **12 12 011 REPLACING ALL SPARK PLUGS**

**NOTE:** For Special Tool identification, see **SPECIAL TOOLS - X5 (3.0i)** .

### **Special Tools Required:**

- 12 1 171
- 12 1 200

**NOTE:** This repair instruction is valid for the following engines:

- M52/M52TU/M54/M56.

### **Necessary Preliminary Tasks:**

- Remove ignition coils. Refer to **12 13 511 REPLACING IGNITION COIL (M52, M52TU, S52, S50US, M54)** .

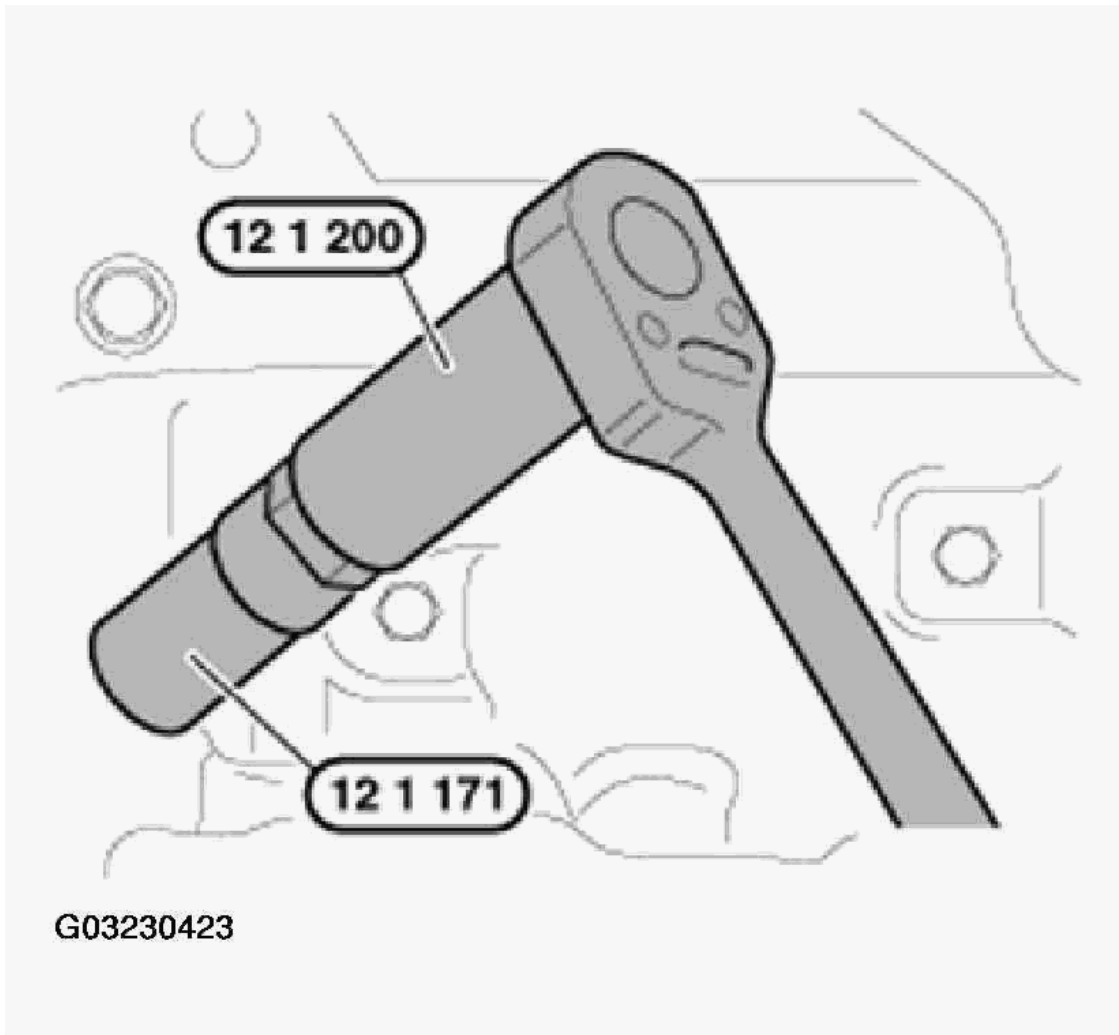
Unscrew and remove spark plugs with special tool 12 1 171 in conjunction with special tool 12 1 200.



**Installation:**

If special tool 12 1 200 is not used,

Tightening torque, refer to 12 12 1AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .



**Fig. 1: Removing Spark Plug**

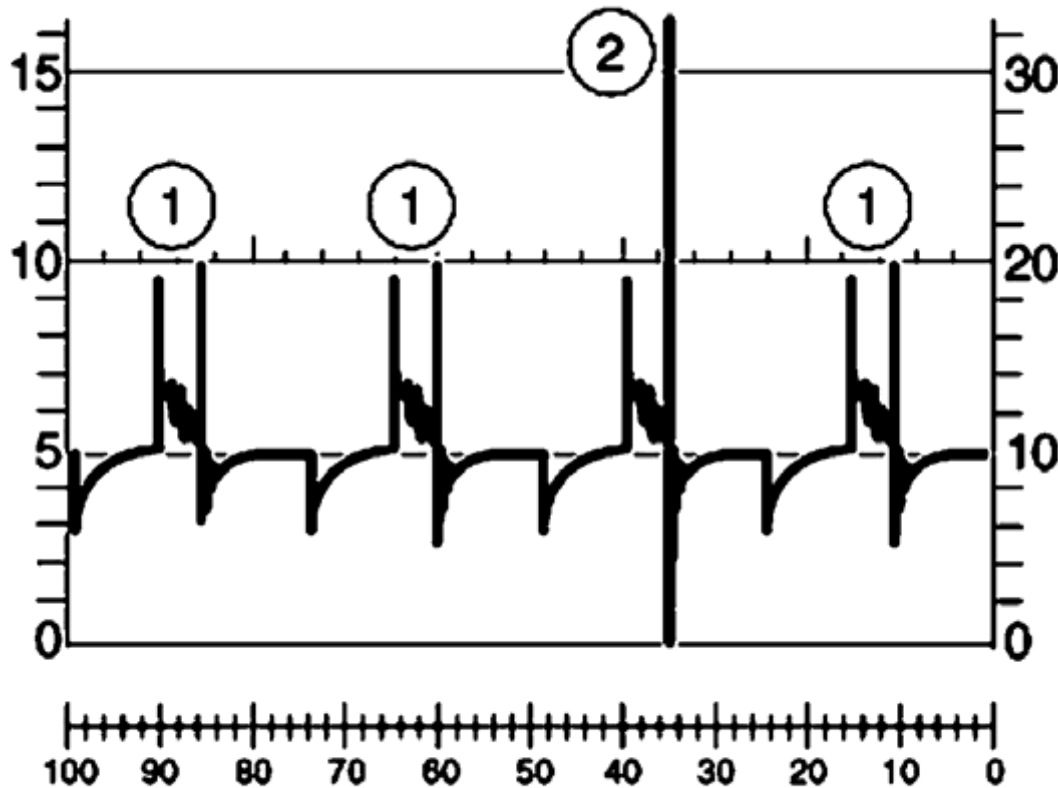
Courtesy of BMW OF NORTH AMERICA, INC.

**IGNITION COIL****12 13 NOTES ON CHECKING IGNITION SYSTEM**

See **12 13 NOTES ON CHECKING IGNITION SYSTEM** .

**12 13 ... FAULT IN FUEL INJECTION SYSTEM**

Evaluation of ignition voltage peaks in response to sudden accelerator loads.



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**Fig. 2: Identifying Ignition System Faults With Oscilloscope**  
 Courtesy of BMW OF NORTH AMERICA, INC.

1. Beginning of dying-out process is not much higher than ignition voltage peak. Ignition system is OK.
2. Beginning of dying-out process is considerably higher than ignition voltage peak.

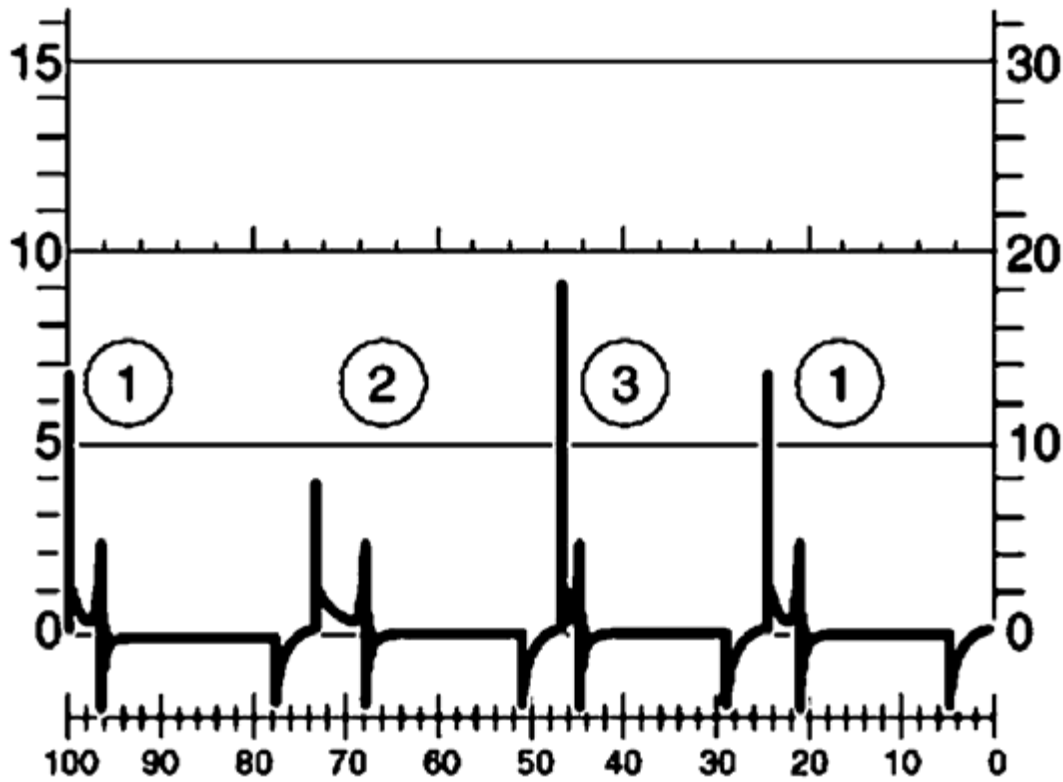
Fault in injection system:

- Lean Mixture.
- Defective Injection Valve.
- Low Compressions.

## 12 13 ... SPARK PLUG FAULTS

Evaluation of sparking period at idling speed.

1. Normal ignition voltage peak. Spark plug is OK.
2. Low ignition voltage peak. Small electrode gap.
3. High ignition voltage peak. Large electrode gap.



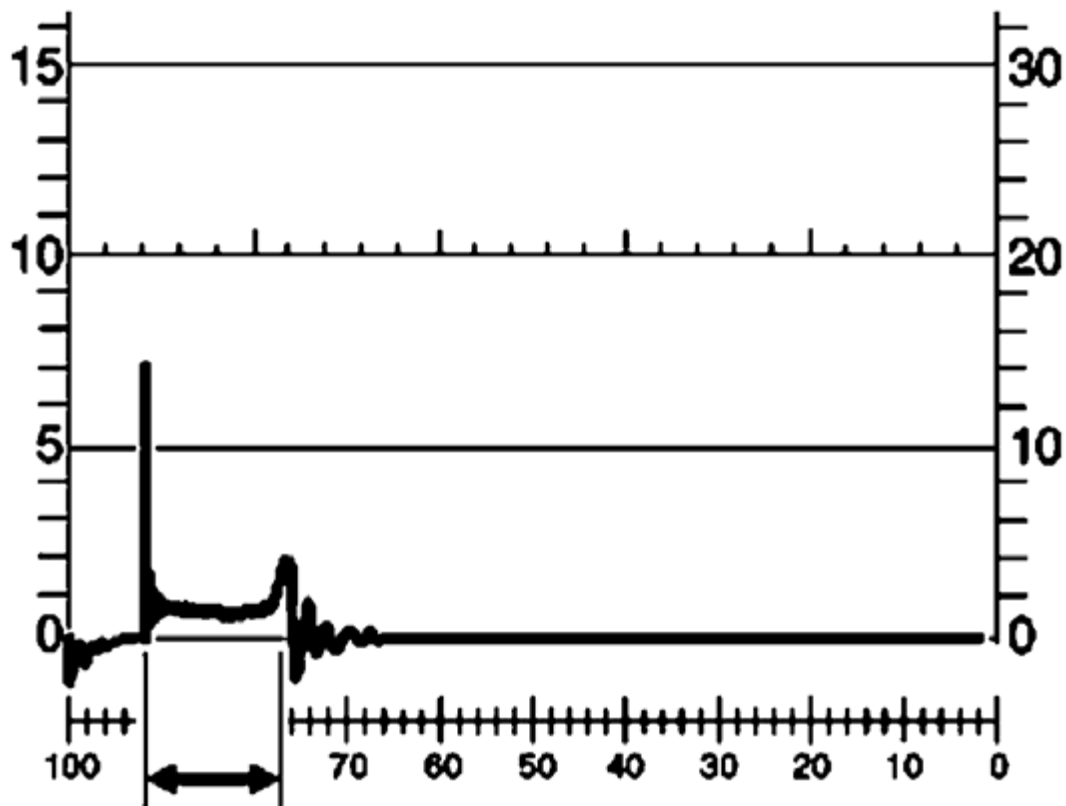
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**Fig. 3: Evaluation Of Sparking Period During Idling Period**  
Courtesy of BMW OF NORTH AMERICA, INC.

Evaluation of sparking period at idling speed:

Normal combustion period:

- Spark plug is OK.

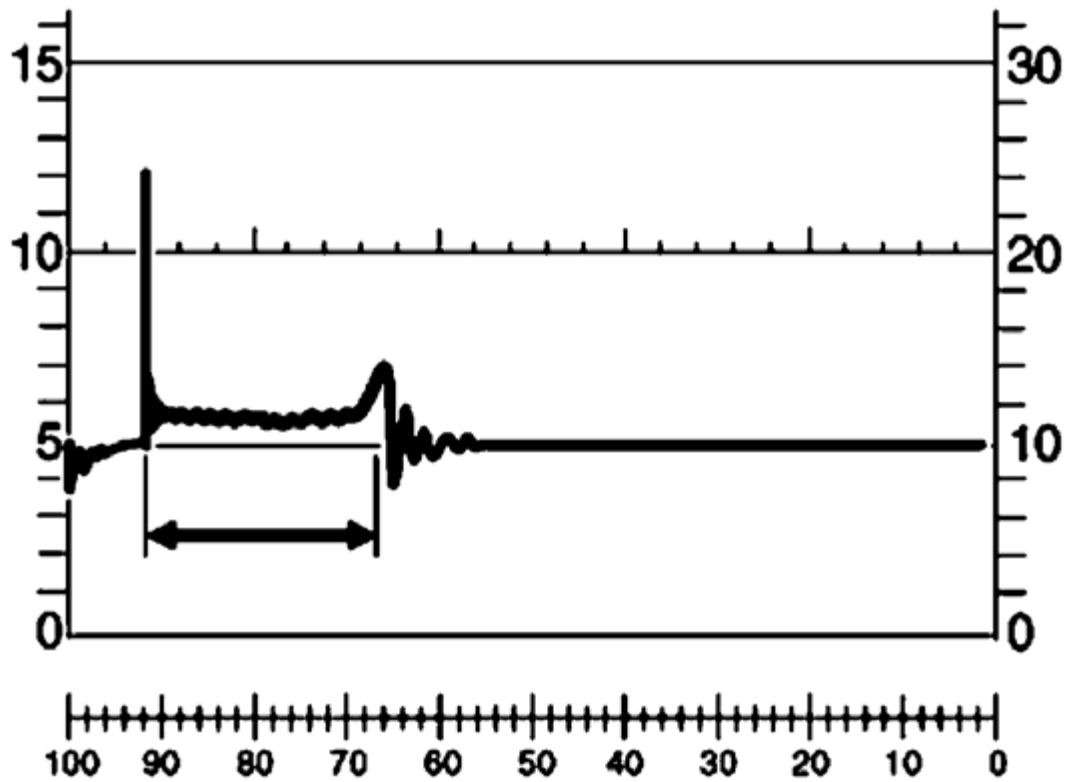


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**Fig. 4: Evaluation Of Sparking Period - Normal Combustion**  
Courtesy of BMW OF NORTH AMERICA, INC.

Long combustion period:

- Small electrode gap.

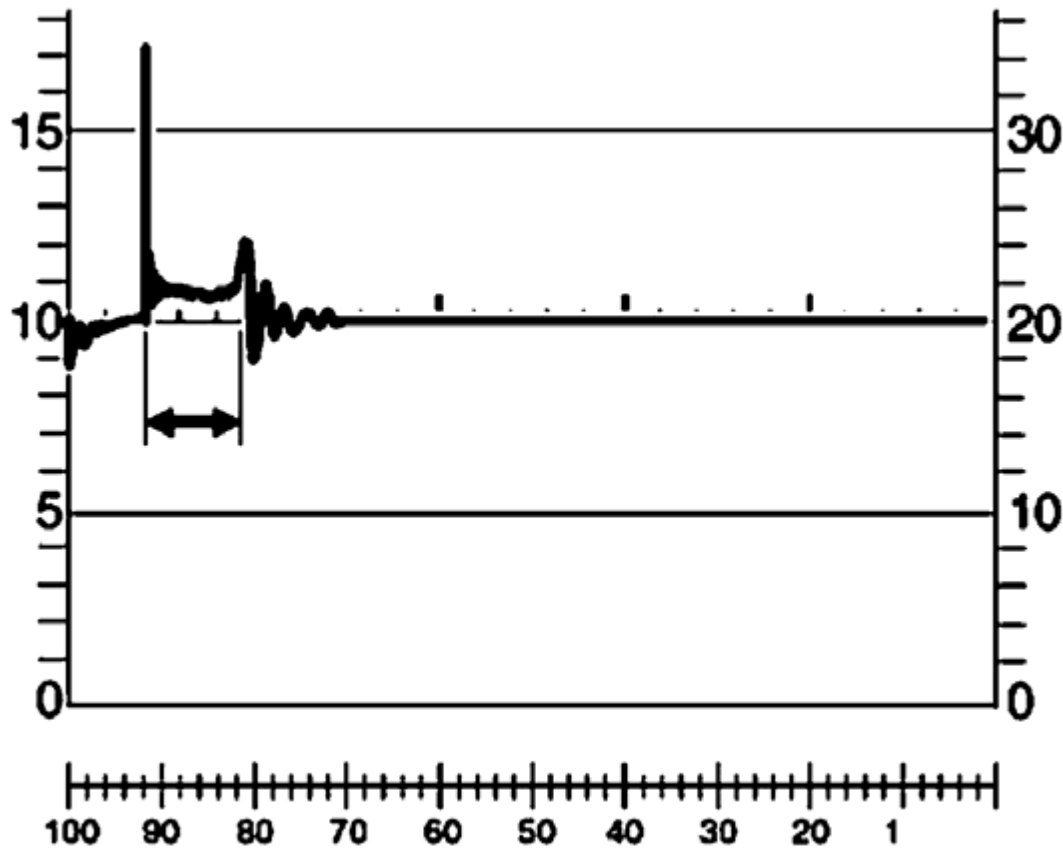


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**Fig. 5: Evaluation Of Sparking Period - Long Combustion Period**  
Courtesy of BMW OF NORTH AMERICA, INC.

Short sparking period:

- Large electrode gap.



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**Fig. 6: Evaluation Of Sparking Period - Short Sparking Period**

Courtesy of BMW OF NORTH AMERICA, INC.

### 13 13 ... IGNITION COIL FAULTS

Evaluation of ignition voltage peaks and attenuation process at idling speed:

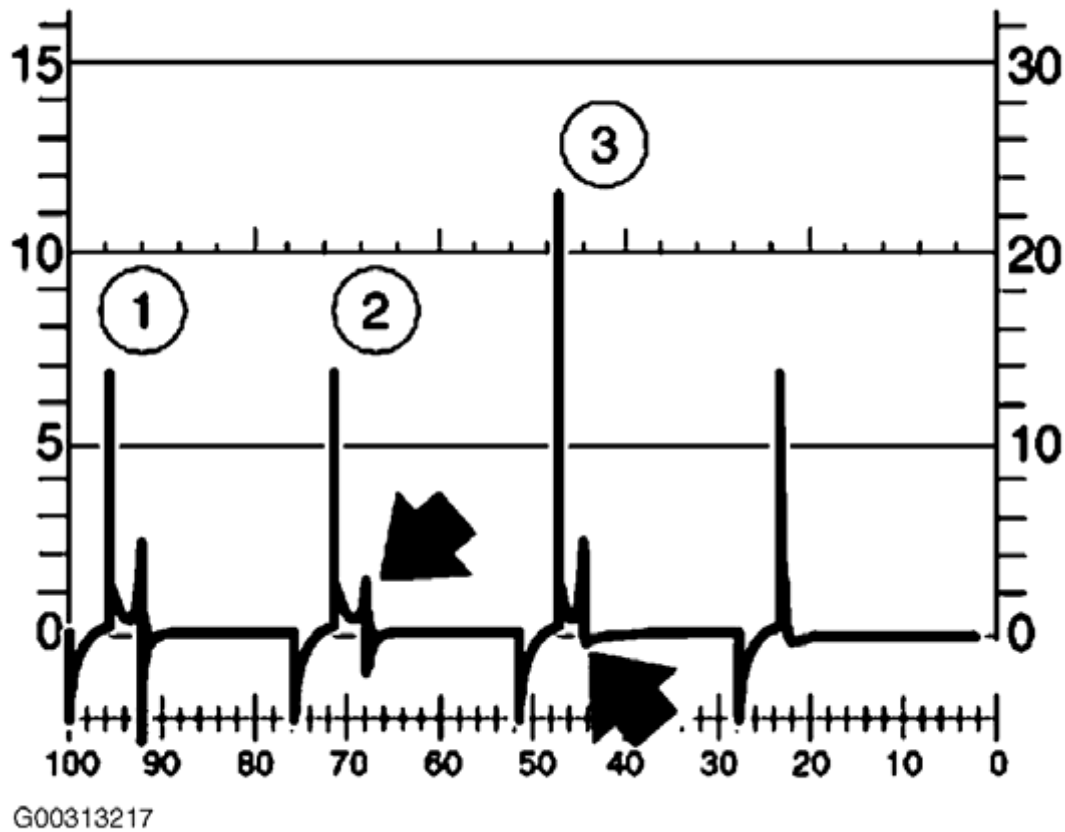
1. Beginning of attenuation processes with normal peaks upwards and downwards.
2. Beginning of attenuation processes strongly shortened.

Ignition coil is defective!

3. Absence of initial downwards attenuation.

Ignition coil is defective!

**NOTE:** Higher ignition voltage peak is not always available.

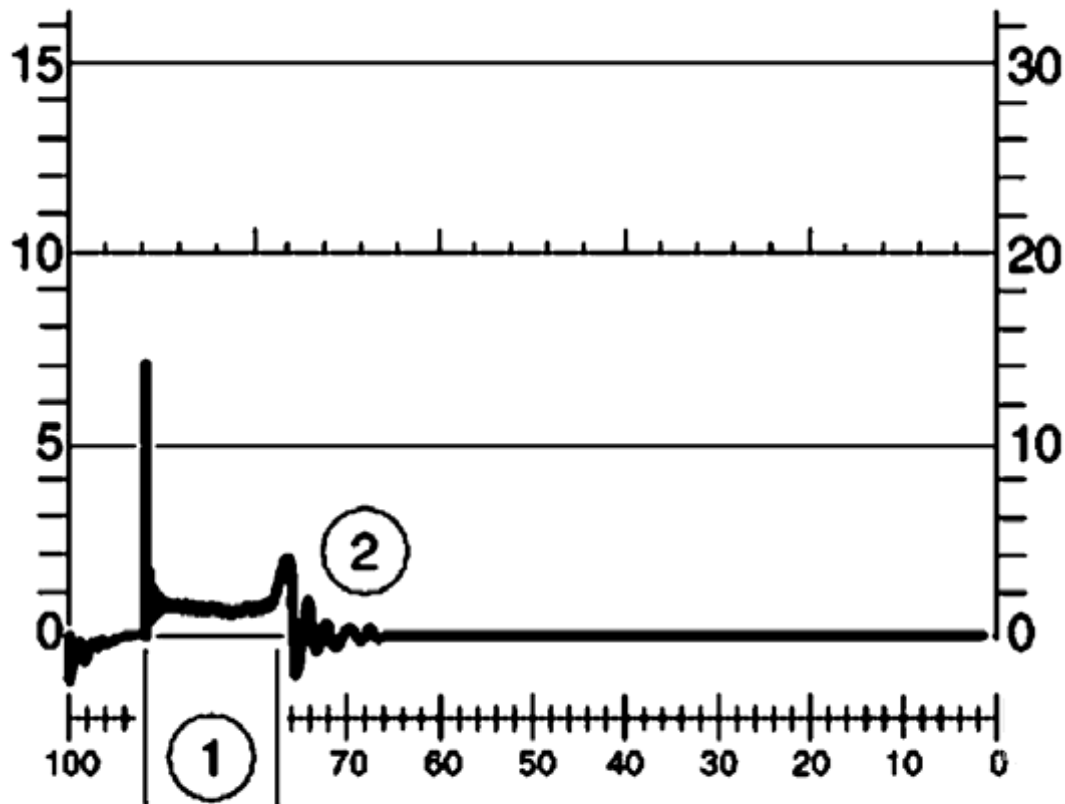


**Fig. 7: Evaluation Of Ignition Voltage Peaks & Attenuation Process**  
Courtesy of BMW OF NORTH AMERICA, INC.

Evaluation of sparking voltage line at idling speed:

1. Normal combustion period.
2. Normal attenuations to sparking voltage line.

Ignition coil is OK.



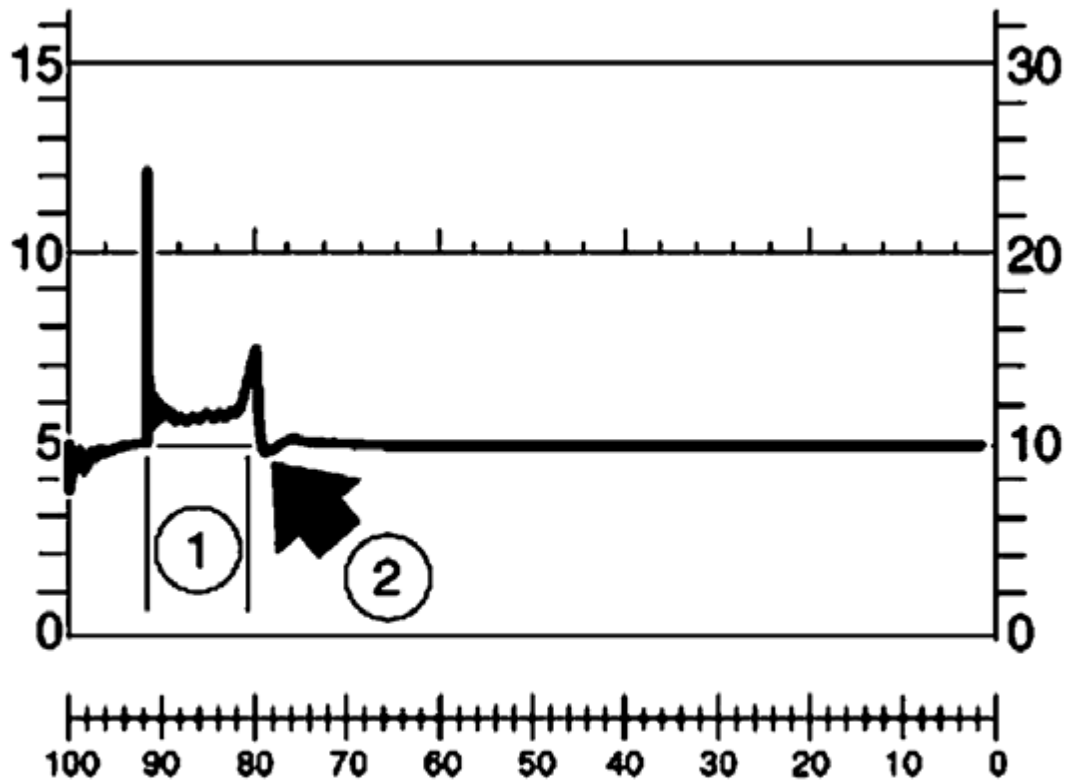
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**Fig. 8: Evaluation Of Sparking Voltage - Normal Combustion Period**  
Courtesy of BMW OF NORTH AMERICA, INC.

1. Shorter sparking period.
2. Attenuation to sparking voltage line is only slight.

Ignition coil is defective!



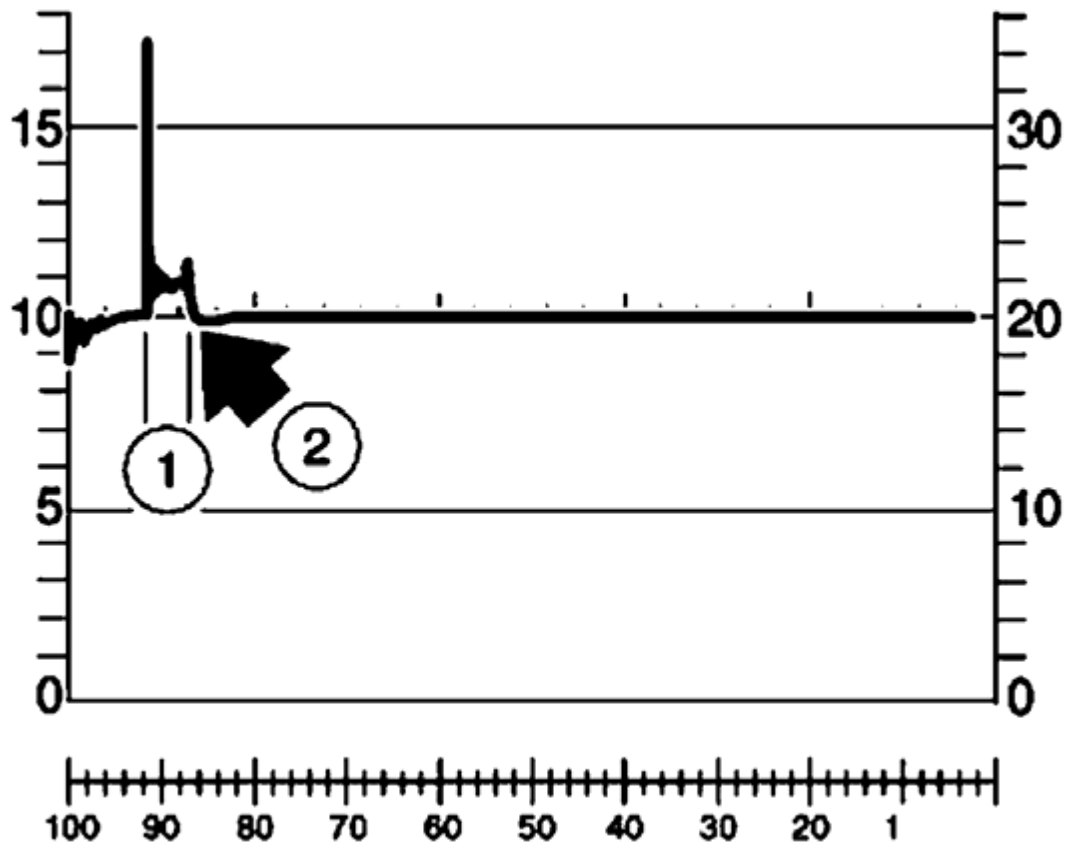


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**Fig. 9: Evaluation Of Sparking Voltage - Shorter Period**  
Courtesy of BMW OF NORTH AMERICA, INC.

1. Much shorter sparking period.
2. Attenuations to sparking voltage line absent.

Ignition coil is defective!

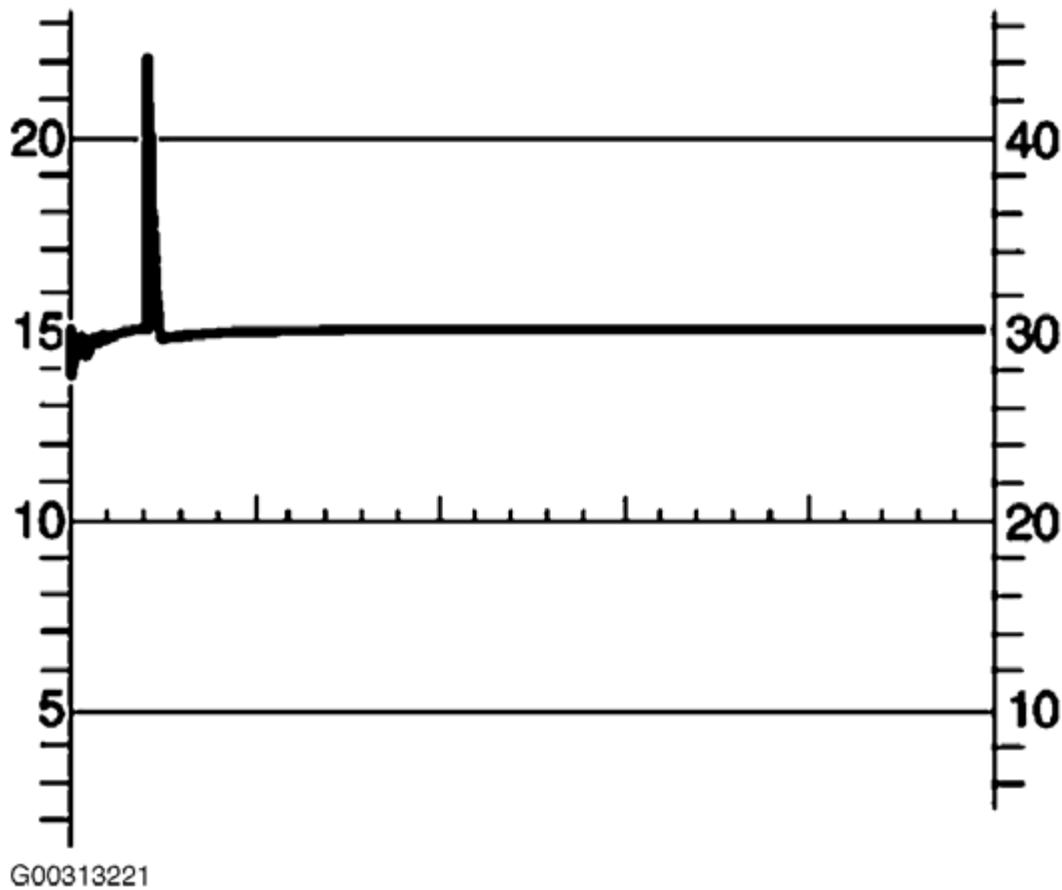


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**Fig. 10: Evaluation Of Sparking Voltage - Much Shorter Period**  
Courtesy of BMW OF NORTH AMERICA, INC.

No sparking voltage line.

Ignition coil is defective!

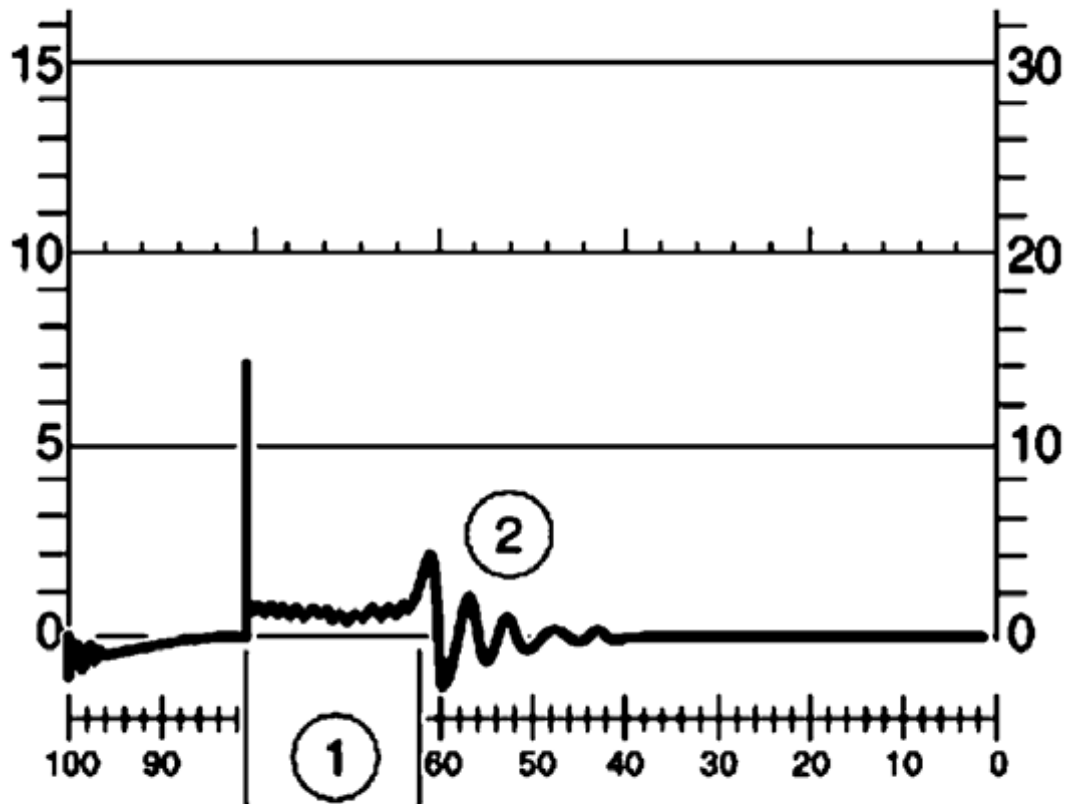


**Fig. 11: Evaluation Of Sparking Voltage - No Sparking Voltage Line**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

Evaluation of combustion voltage line at raised engine speeds approx. 1500 Min (1):

1. Normal combustion period.
2. Normal attenuations to sparking voltage line.

Ignition coil is OK.

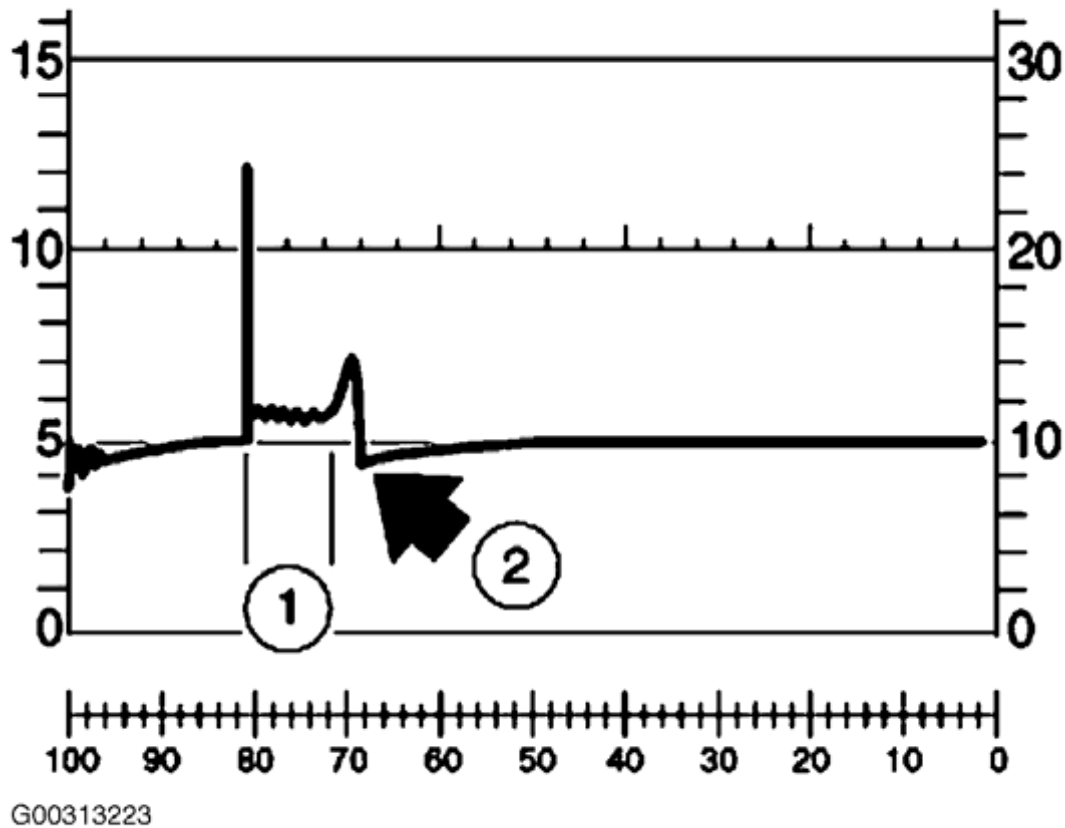


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**Fig. 12: Evaluation Of Combustion Voltage Line - Normal Combustion Period**  
Courtesy of BMW OF NORTH AMERICA, INC.

1. Shorter sparking period.
2. Attenuation to sparking voltage line is only slight.

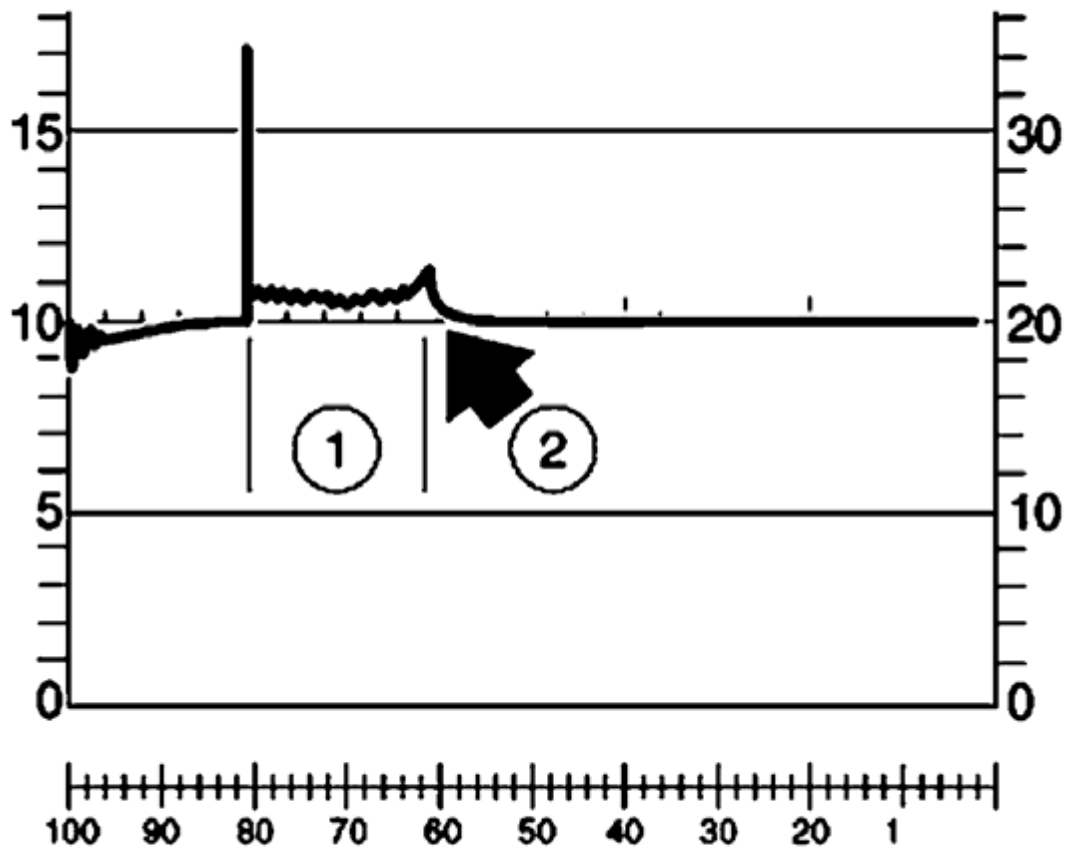
Ignition coil is defective!



**Fig. 13: Evaluation Of Combustion Voltage Line - Shorter Sparking Period**  
Courtesy of BMW OF NORTH AMERICA, INC.

1. Normal combustion period.
2. Attenuations to sparking voltage line absent.

Ignition coil is defective!



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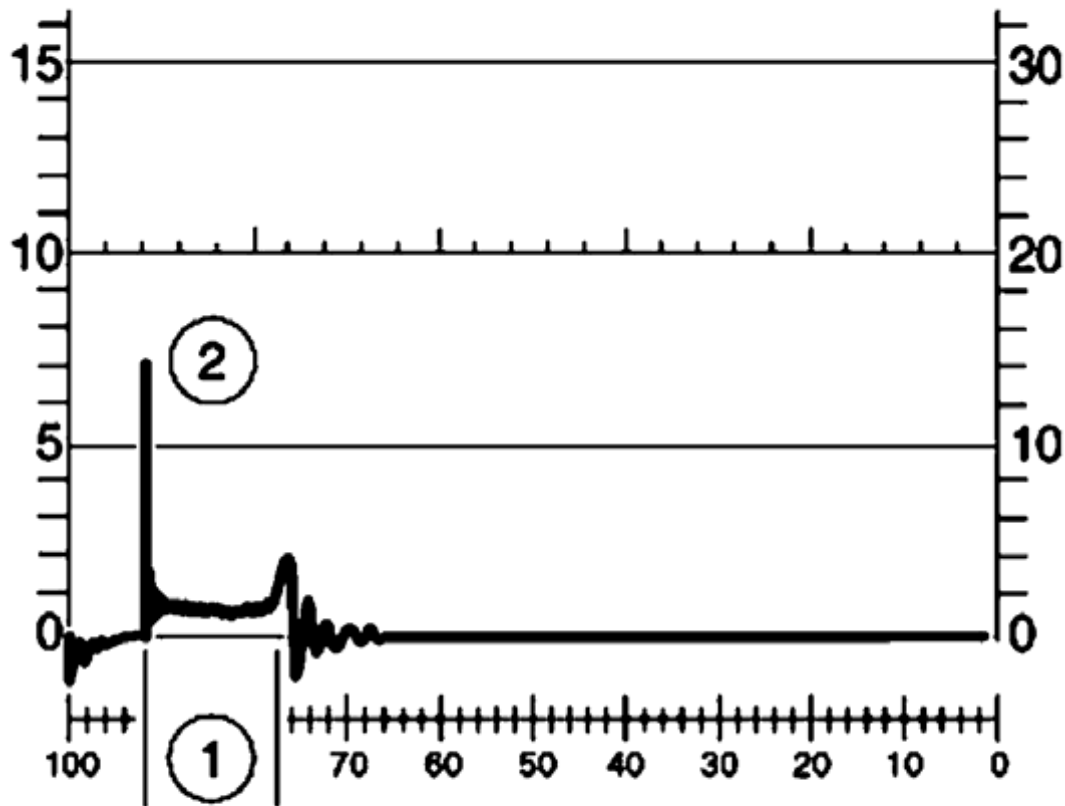
**Fig. 14: Evaluation Of Combustion Voltage Line - Normal Combustion Period**  
Courtesy of BMW OF NORTH AMERICA, INC.

## 12 13 ... FURTHER FAULT PATTERNS WITH EVALUATION

Evaluation of sparking period and ignition voltage peaks at idling speed:

1. Normal combustion period.
2. Normal ignition voltage peak.

Ignition system is OK.



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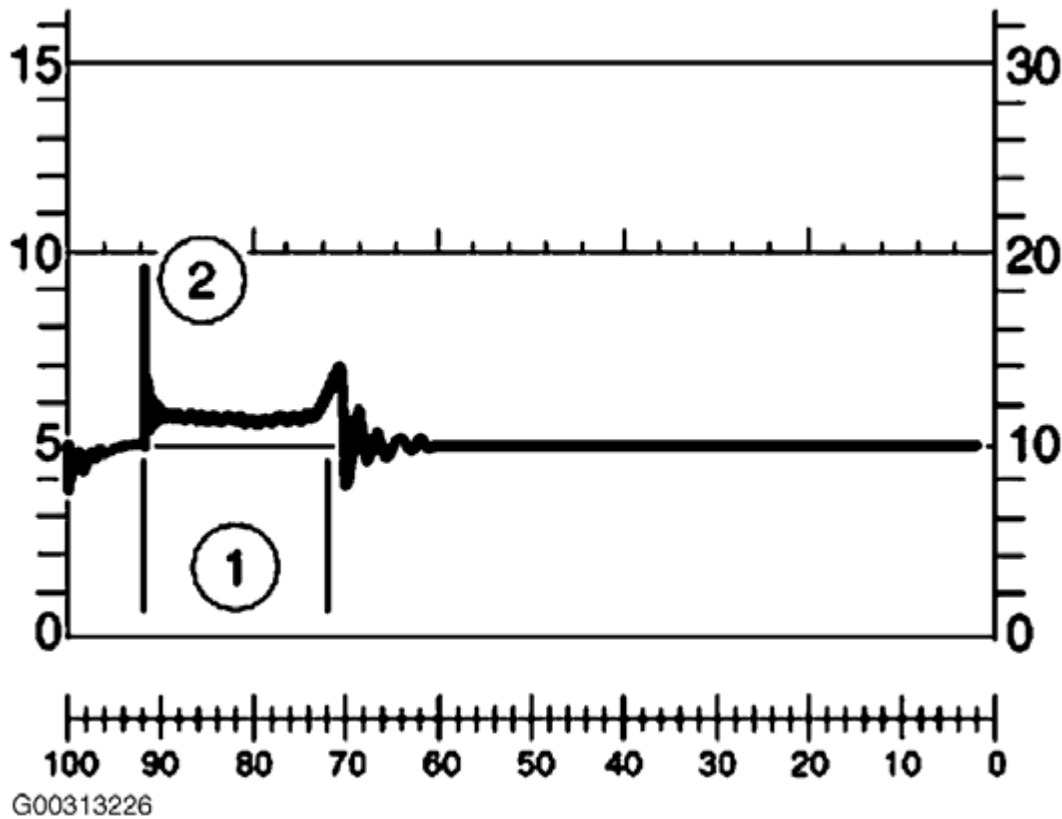
**Fig. 15: Evaluation Of Sparking Period & Ignition Voltage Peaks At Idle Speed**  
Courtesy of BMW OF NORTH AMERICA, INC.

Long sparking period (1) with low ignition voltage peak (2).

Indicates low compression.

Fluctuating sparking period:

Indicates contamination on spark plug (shunt).

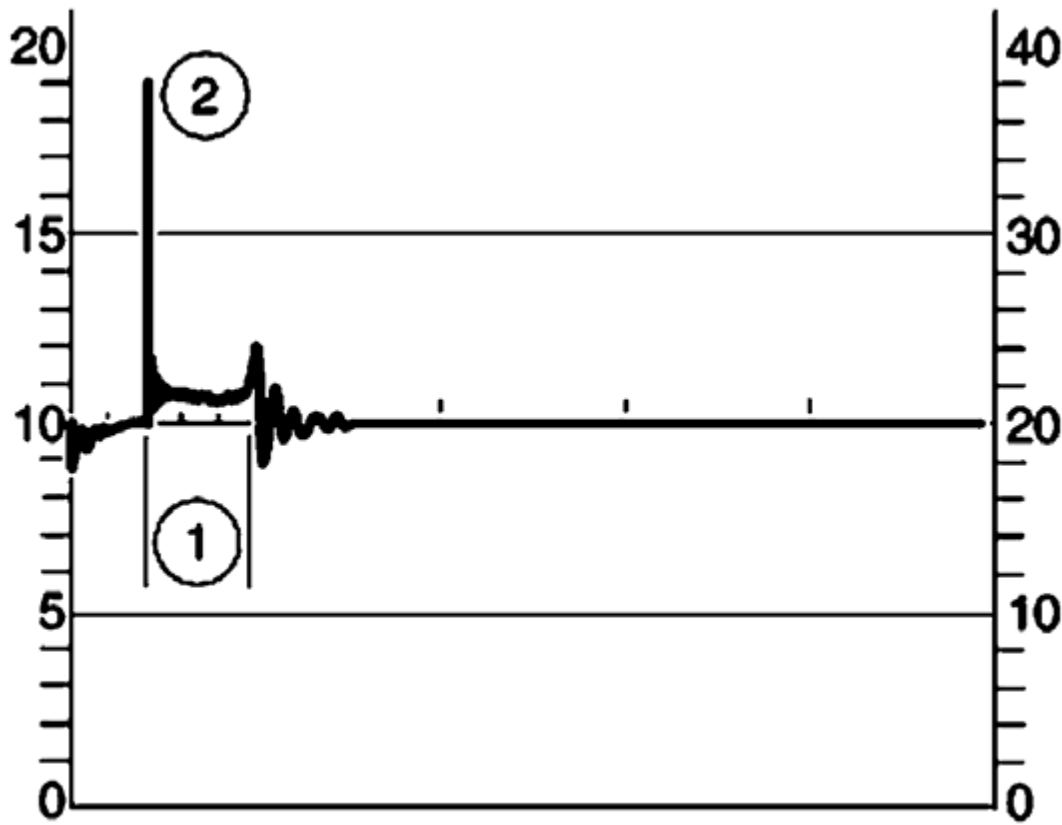


**Fig. 16: Long Sparking Period With Low Ignition Voltage Peak**  
Courtesy of BMW OF NORTH AMERICA, INC.

Short sparking period (1) with high ignition voltage peak. Constant but short sparking period:

Indicates defective ignition lead.





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**Fig. 17: Short Sparking Period With High Ignition Voltage Peak**

Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** The sparking-voltage line could sometimes be missing completely and the ignition voltage peak could rise very high.

**IGNITION VOLTAGE TOO HIGH**

Electrode Gap	Large
Compression	High
Fuel Air Mixture	Lean
Electrode Temperature	Low
Electrode Condition	Burnt
Ignition Lead	Interrupted

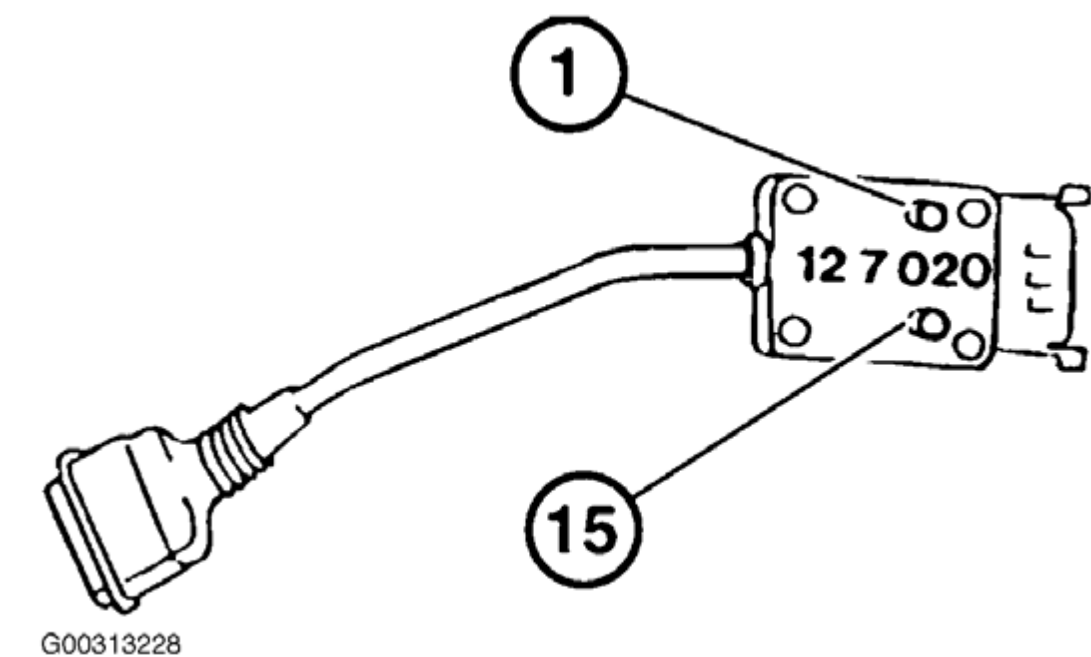
**IGNITION VOLTAGE TOO LOW**

Electrode Gap	Small
Compression	Low

Fuel Air Mixture	Correct
Electrode Temperature	High
Electrode Condition	New

**12 13 ... ADDITIONAL FAULT NOTES FOR TROUBLESHOOTING**

Use the primary voltage test adapter, Special Tool 12 7 020 to troubleshoot the primary side of a separate ignition coil.



**Fig. 18: Identifying Primary Voltage Tester**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** If terminal 1 signal is not present on pin 1 in the diagnosis connector, the external trigger signal for the BMW Service Tester can be prepared with the help of Special Tool 12 7 020.

Connect BMW SERVICE TESTER.

Select Engine Test Step 05.

Enter number of cylinders (four).

Connect universal adapter to tester.

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Connect brown clip to vehicle earth.

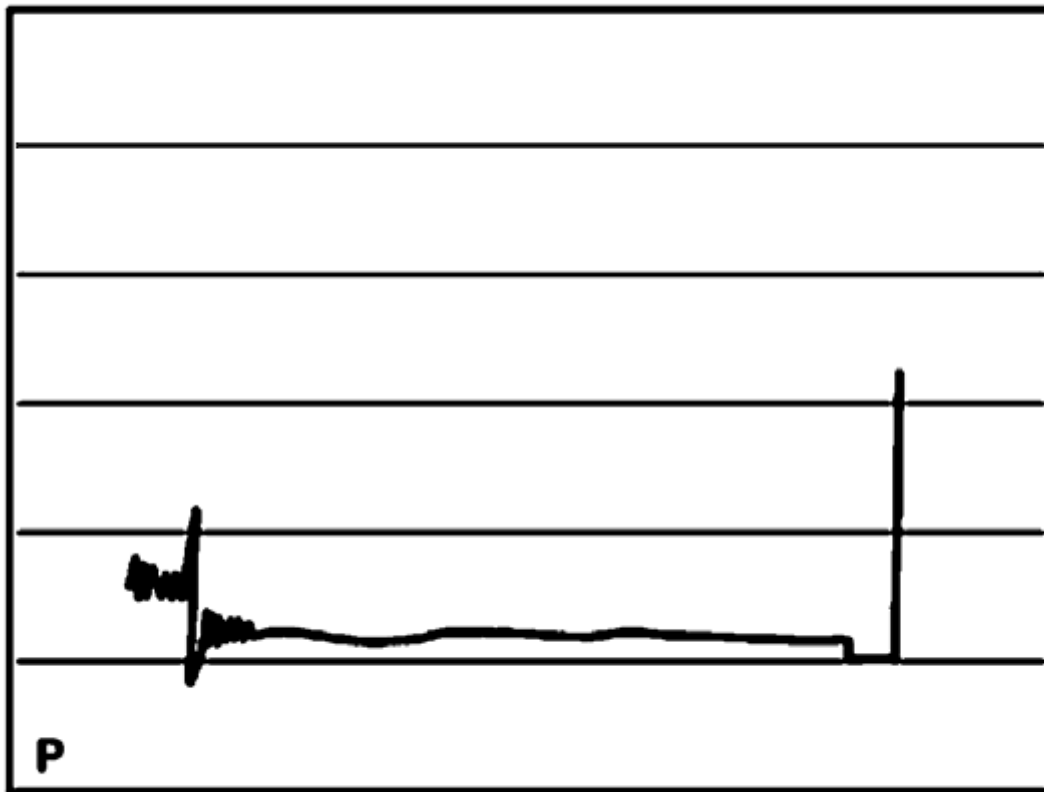
Connect black clip to terminal 1 of Special Tool 12 7 020.

**NOTE:** If trigger signal is missing from diagnosis box on 6-cylinder engine, preselect two cylinder settings on BMW SERVICE TESTER.

The red inductive clip is not used as only the cylinder is being tested. For this reason, the engine speed display will be too low by factor 4.

Connect Special Tool 12 7 020 to the ignition coil being tested and the vehicle wiring harness.

Produce a stationary signal on the oscilloscope by pressing key R.



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**Fig. 19: Identifying Spark Line**

Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** The sparking voltage line on the oscilloscope will be very nervous, as the

**fuel/air mixture swirl of a 4-valve engine will be greater than that of a 2-valve engine.**

## **12 13 ... CHECKING SECONDARY SIGNAL FOR STATIONARY IGNITION DISTRIBUTION**

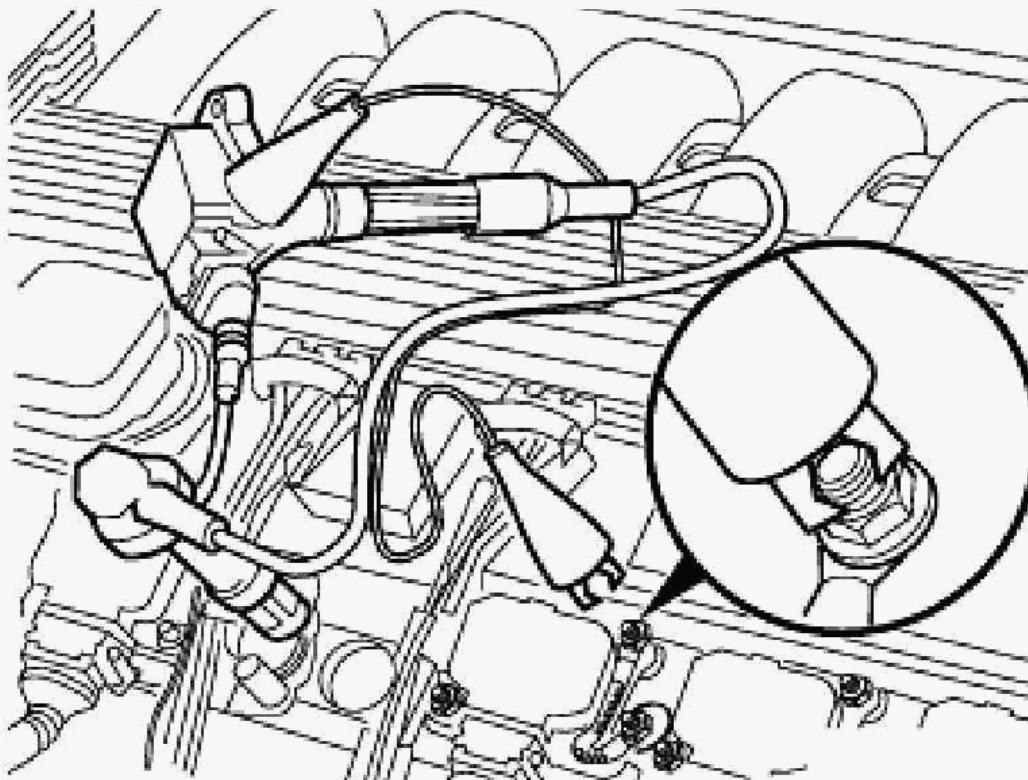
**NOTE:** For Special Tool identification, see **SPECIAL TOOLS - X5 (3.0i)** .

### **Special Tools Required:**

- 12 7 030

### **Engine Test Step 10:**

Remove ignition coil. Clip special tool 12 7 030 on relevant ignition coil to be tested. Clip high tension clip around ignition lead.



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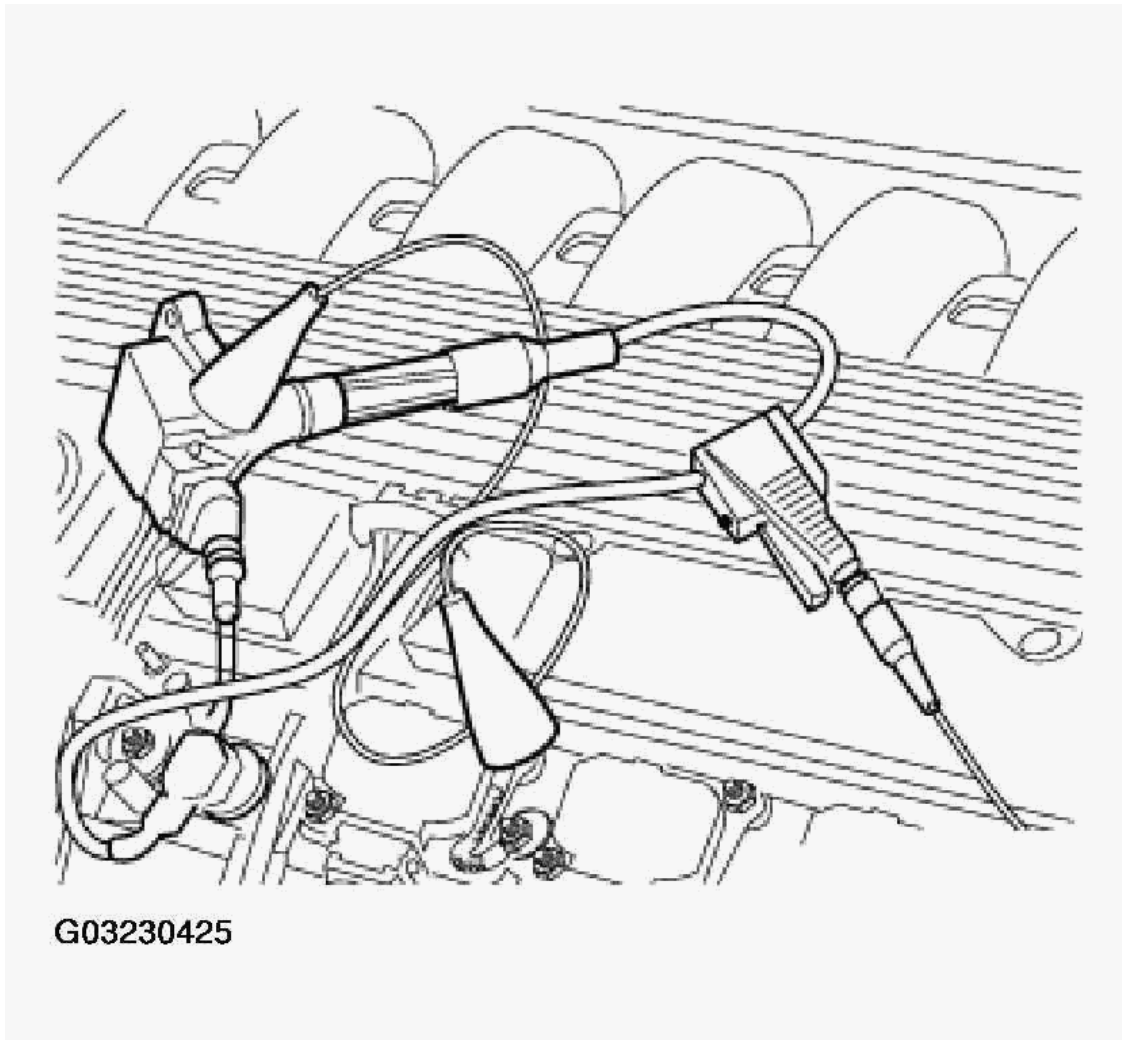
**Fig. 20: Checking Secondary Signal For Stationary Ignition Distribution**

**Courtesy of BMW OF NORTH AMERICA, INC.**

Connect earth lead of adapter to vehicle earth and ignition coil.

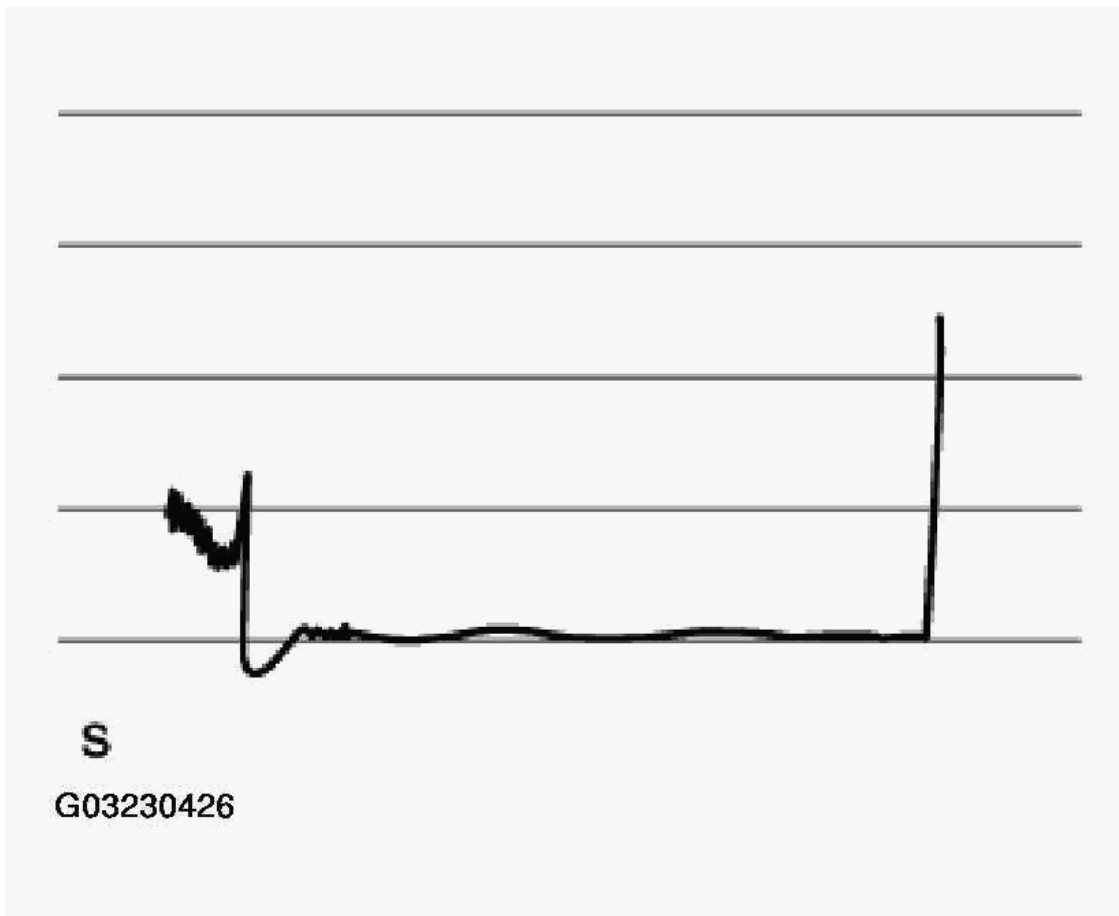
Connect up diagnosis connector.

If trigger signal is not present (terminal 1), connect black clip of universal adapter cable to pin 1 of primary adapter cable.



**Fig. 21: Connecting Up Diagnosis Connector**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

Produce a stationary signal by pressing key R on the tester.



**Fig. 22: Interrogating Fault Memory And Its Fault Reports**  
Courtesy of BMW OF NORTH AMERICA, INC.

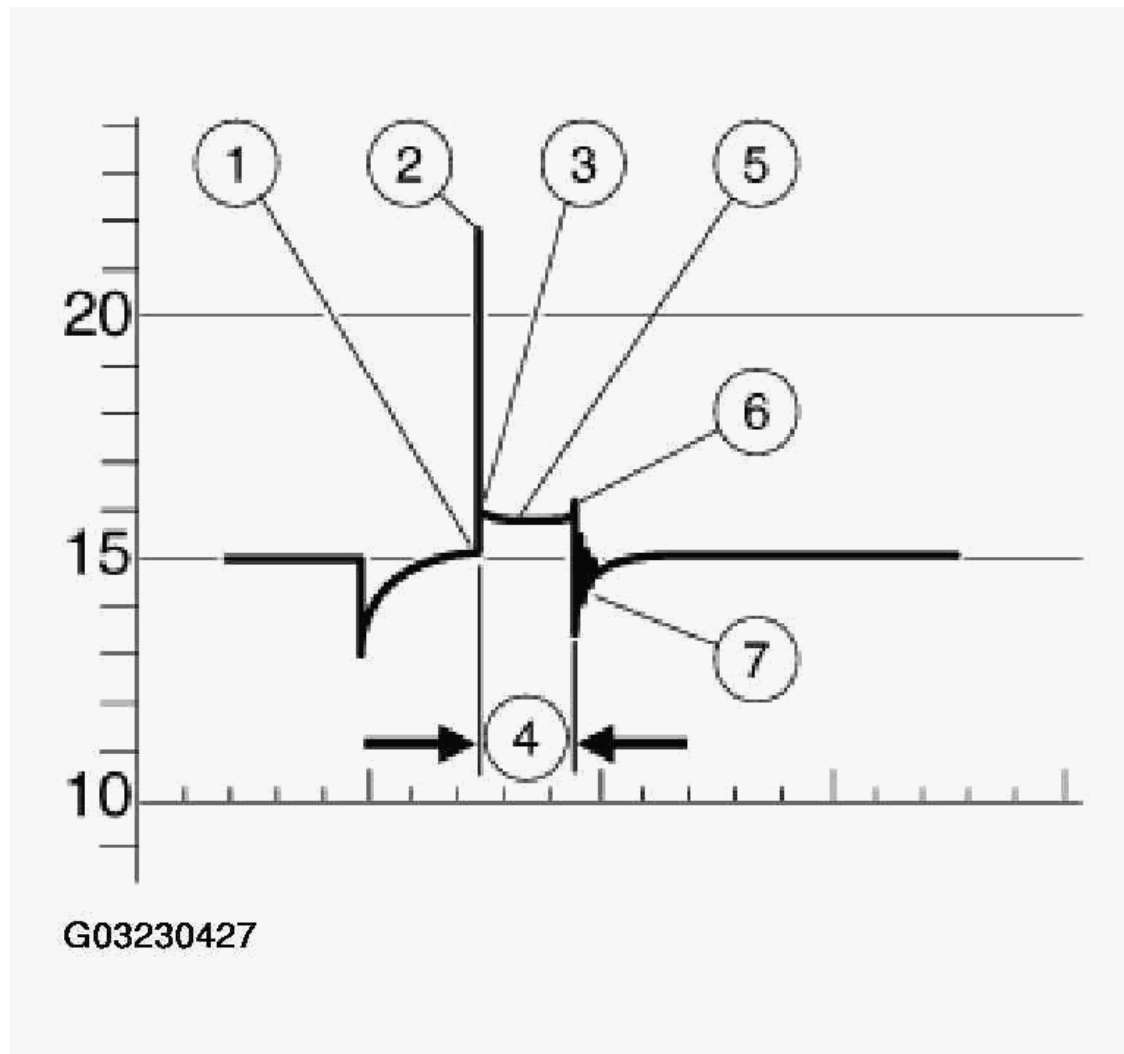
**NOTE:**        **Neighboring ignition leads could produce interference on the screen of the oscilloscope.**

Refer to the fault memories of engine control units for additional troubleshooting.

Interrogate fault memory and its fault reports.

### **12 13 ... NORMAL OSCILLOGRAM (M, S, W ENGINES ONLY)**

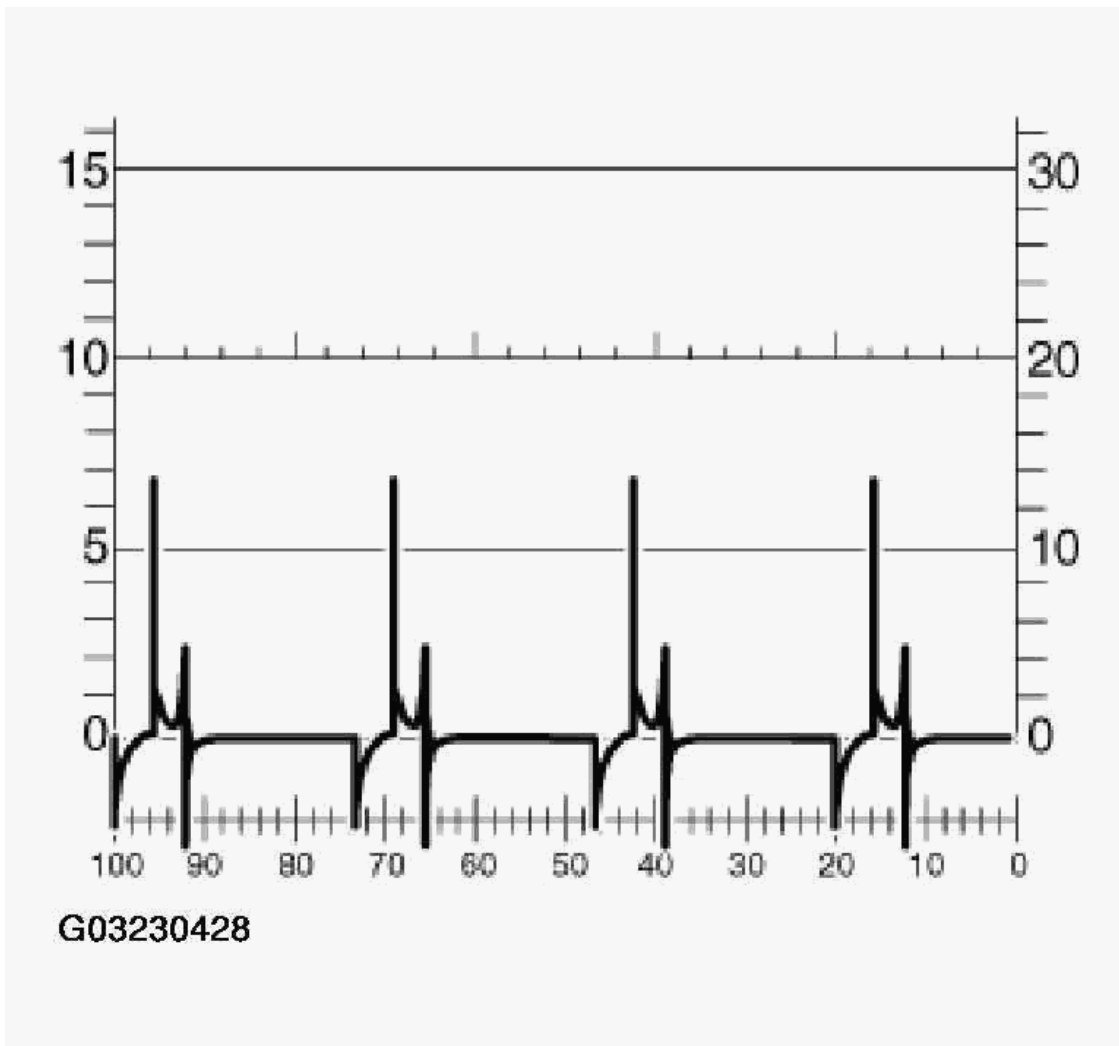
1. Start of ignition voltage peak.
2. Level of ignition voltage.
3. Level of combustion voltage.
4. Period of combustion.
5. Combustion curve characteristics.
6. Start of decay process.
7. Termination oscillations.



**Fig. 23: Identifying Starting Of Ignition Voltage Peak**  
Courtesy of BMW OF NORTH AMERICA, INC.

Secondary voltage patterns, beside one another:

Evaluation of ignition voltage peaks at idle speed (this example shows an engine with 4 cylinders).



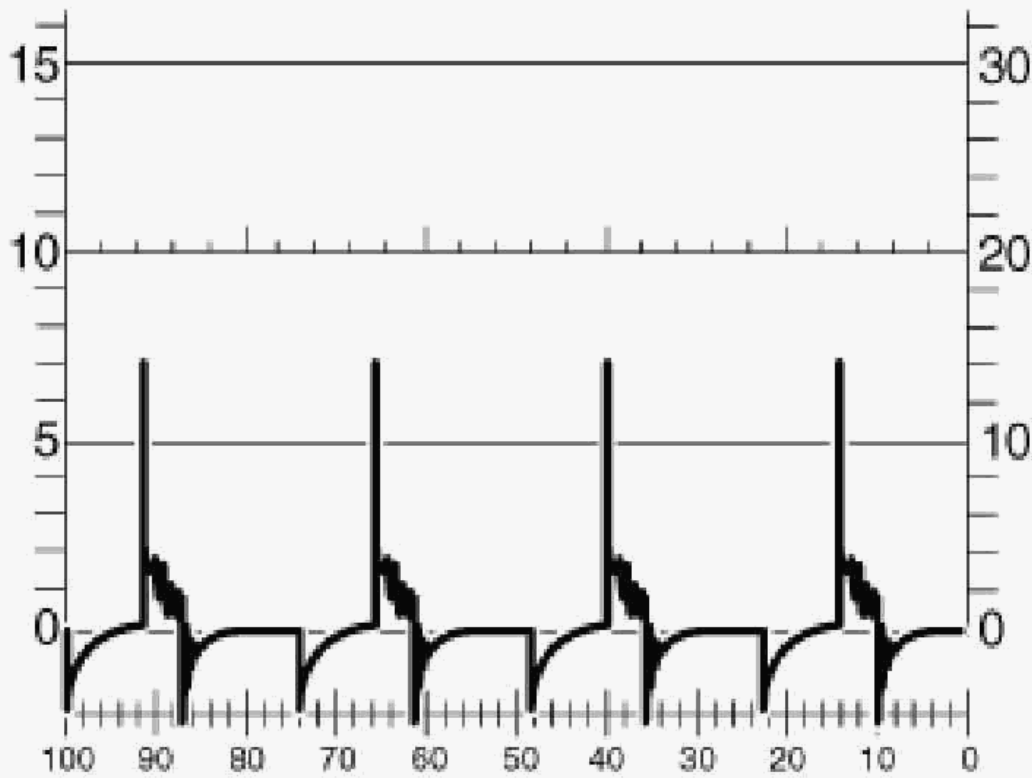
**Fig. 24: Evaluation Of Ignition Voltage Peaks At Idle Speed**

Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** The display of ignition voltage spikes is approx. 20-25% lower than the real value. The uniformity of all cylinders to each other is more important than the height of ignition voltage peaks. Differences of 3000-4000 V are permitted. In event of greater differences, refer to 12 13 ... Further Fault Patterns With Evaluation .

Evaluation of ignition voltage peaks at increased speed of approx. 2000 rpm. (this example shows an engine with 4 cylinders).





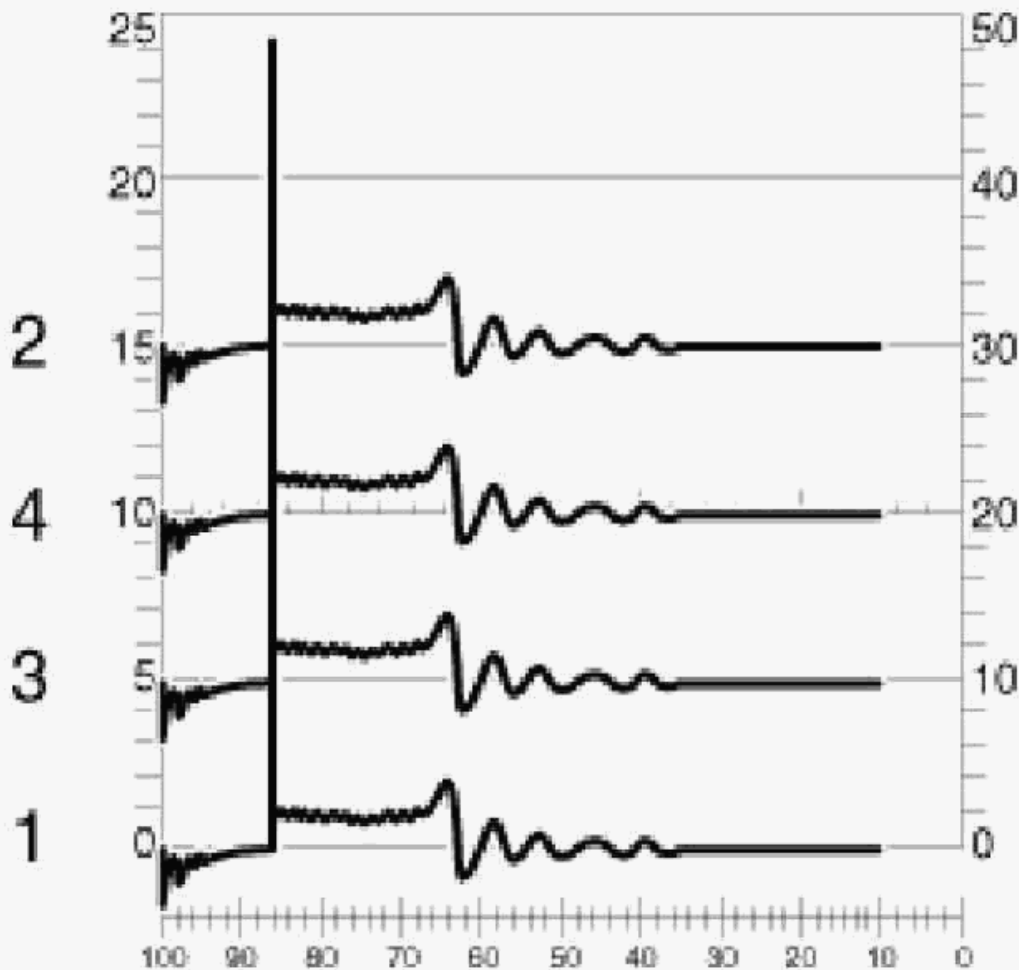
G03230429

**Fig. 25: Evaluation Of Ignition Voltage Peaks At Increased Speed**

Courtesy of BMW OF NORTH AMERICA, INC.

Secondary voltage diagrams, superimposed:

Evaluation of combustion characteristics curve and decay characteristics at idle speed (this example shows a 4-cylinder engine).



G03230430

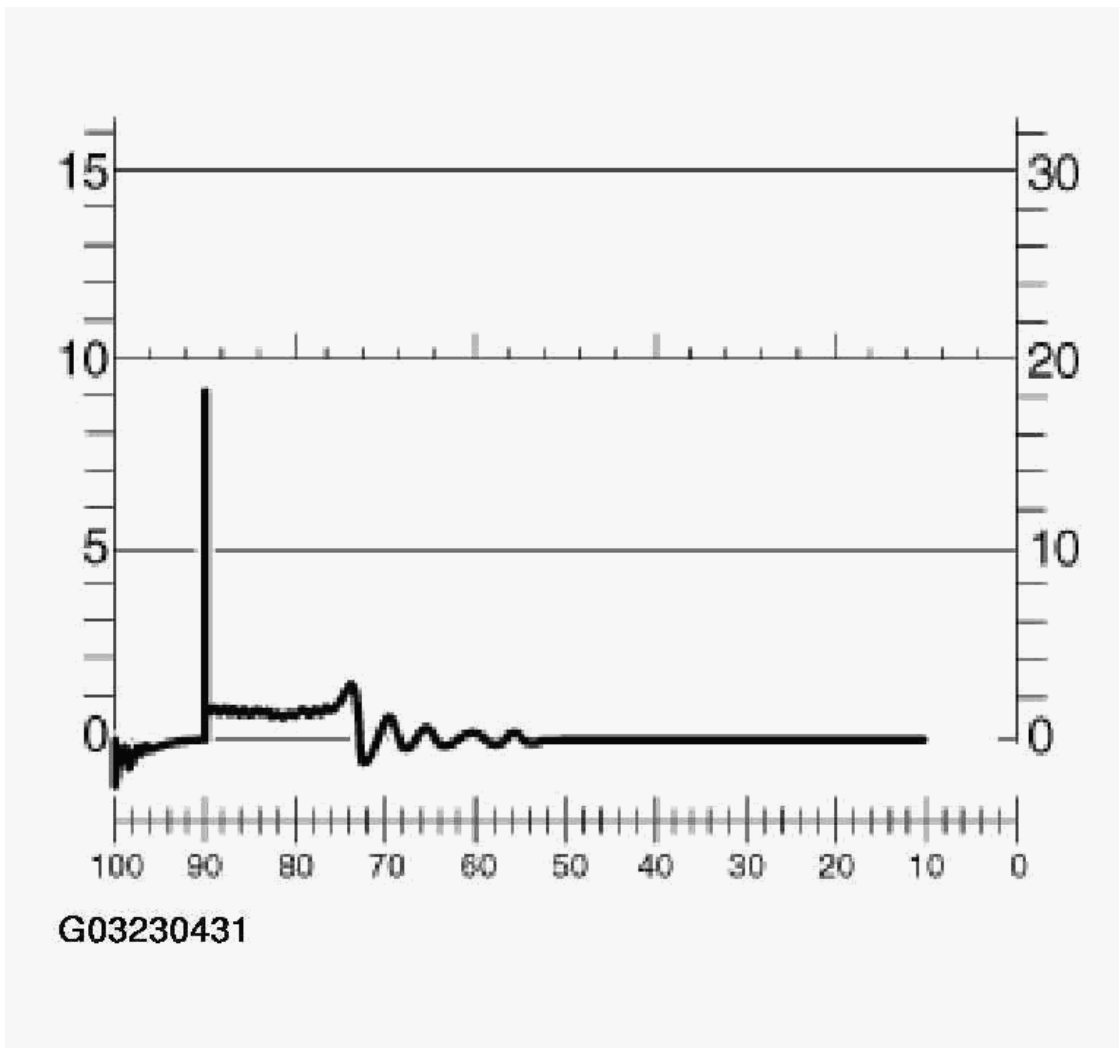
**Fig. 26: Identifying Evaluation Of Combustion**

Courtesy of BMW OF NORTH AMERICA, INC.

Secondary voltage diagrams, consecutive:

**NOTE:** Only the major differences in the ignition voltage patterns are revealed by this method of comparison.

The identified fault must be allocated to the relevant cylinder using the secondary voltage representation forms next to/on top of each other.



**Fig. 27: Identifying Secondary Voltage Diagrams**

Courtesy of BMW OF NORTH AMERICA, INC.

## 12 13 ... OSCILLOGRAMS OF IGNITION COILS FROM DIFFERENT MANUFACTURERS

### Evaluation Of Ignition Voltage Peaks And Decay Characteristics At Idle Speed.

#### Make: Bremi

1. Normal ignition voltage spikes (6000-9000 V).
2. Normal start of attenuation processes.

#### Make: Beru

3. Normal ignition voltage peak.
4. High initial level of attenuation processes.

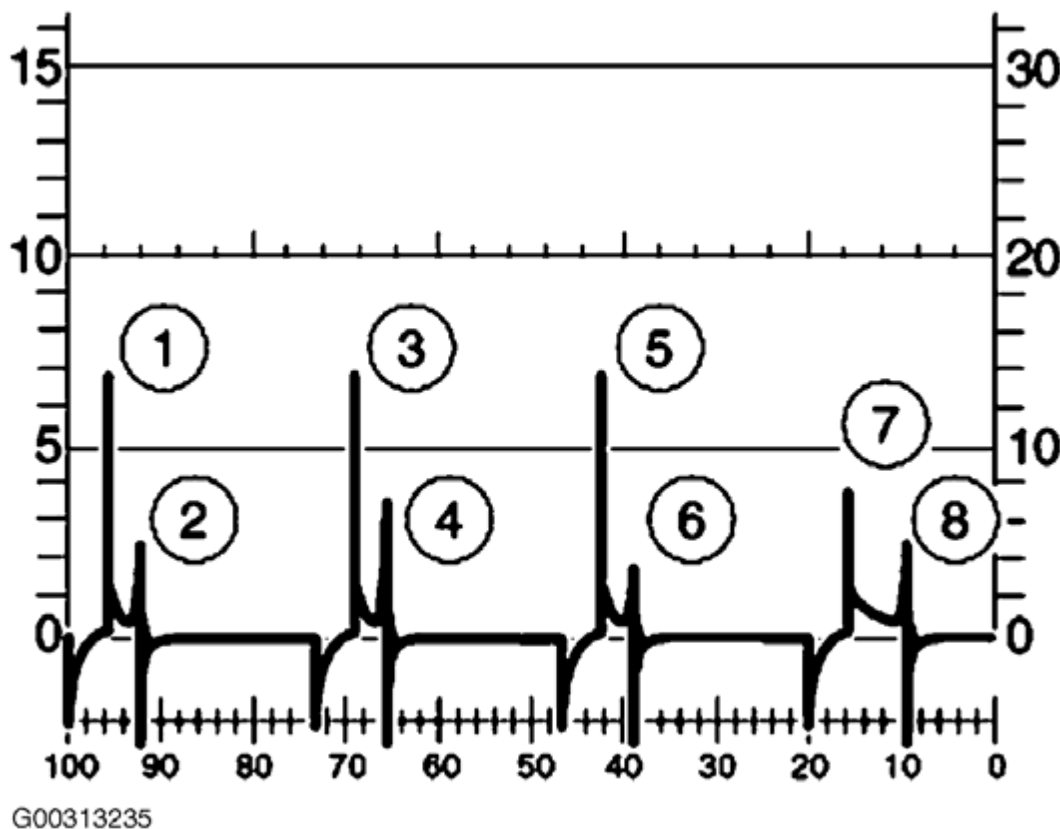
**Make: May & Christe**

- 5. Normal ignition voltage peak.
- 6. Low initial level of attenuation processes.

**Make: Bosch**

- 7. Low ignition voltage peak.
- 8. Normal start of attenuation processes.

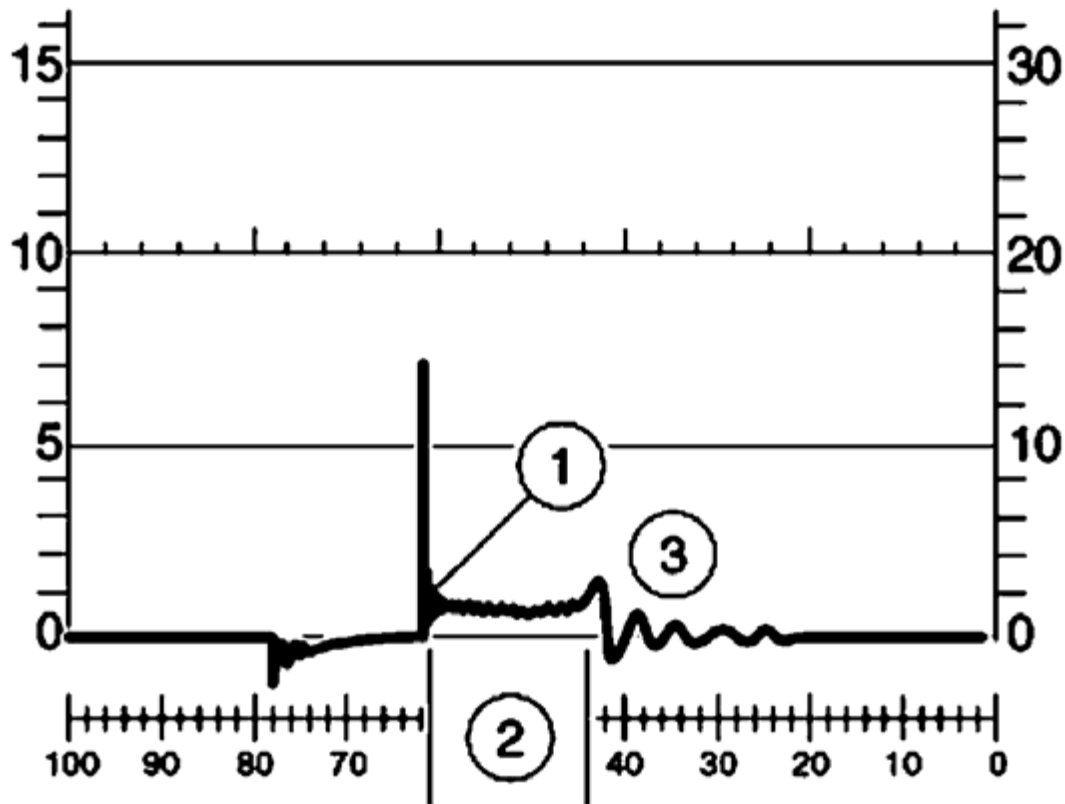
**Note:** At high speeds, the ignition voltage peak falls very markedly relative to the peaks on units from other ignition coil manufacturers.



**Fig. 28: Evaluation Of Different Ignition Coils (Idle Speed)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**Evaluation Of Combustion Voltage Characteristics At Raised Engine Speed Of Approx. 2500 Rpm.**

**Make: Bremi**

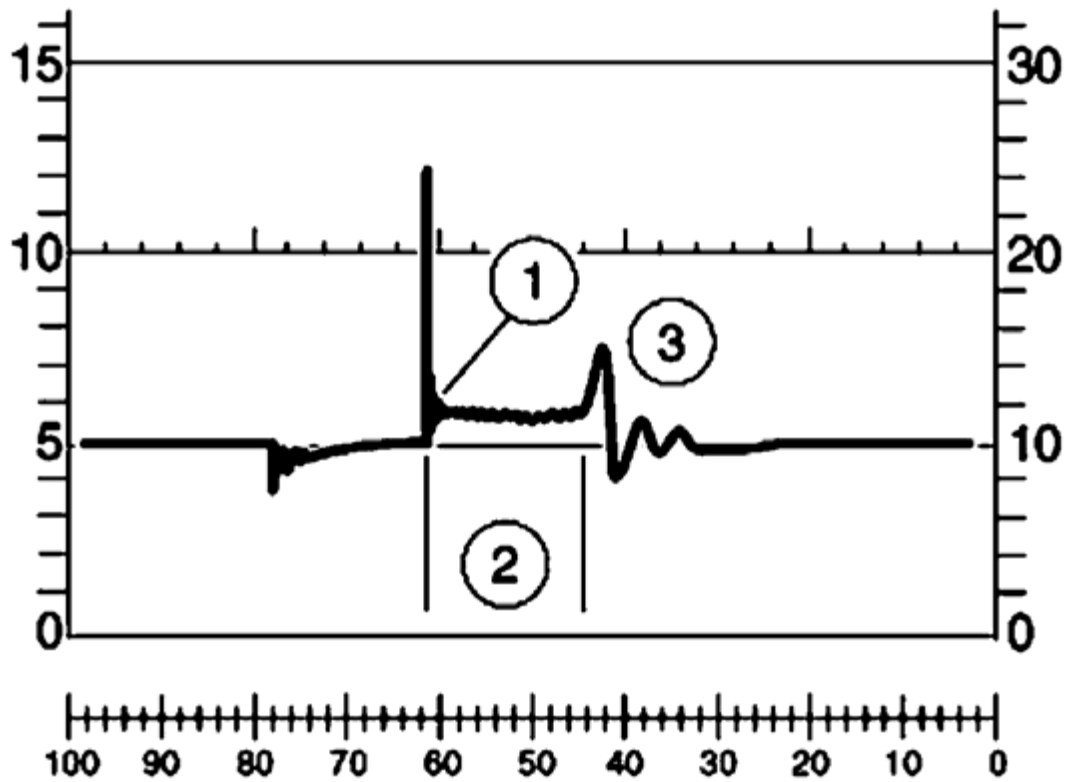


G00313236

**Fig. 29: Evaluation Of Different Ignition Coils At 2500 RPM (Breimi)**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

1. Normal oscillation of the combustion voltage curve.
2. Normal combustion period.
3. 3 to 4 attenuations.

**Make: Beru**

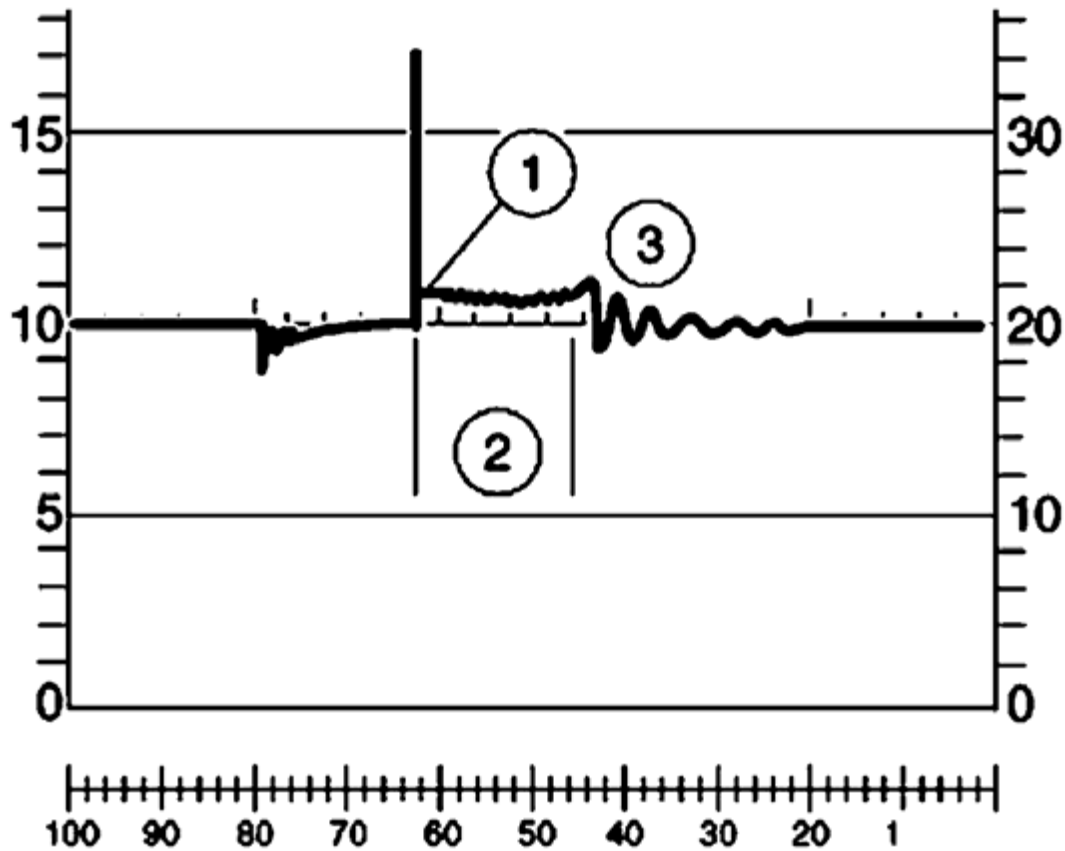


G00313237

**Fig. 30: Evaluation Of Different Ignition Coils At 2500 RPM (Beru)**  
Courtesy of BMW OF NORTH AMERICA, INC.

1. Normal oscillation of the combustion voltage curve.
2. Normal combustion period.
3. At least 3 decay oscillations.

**Make: May & Christe**

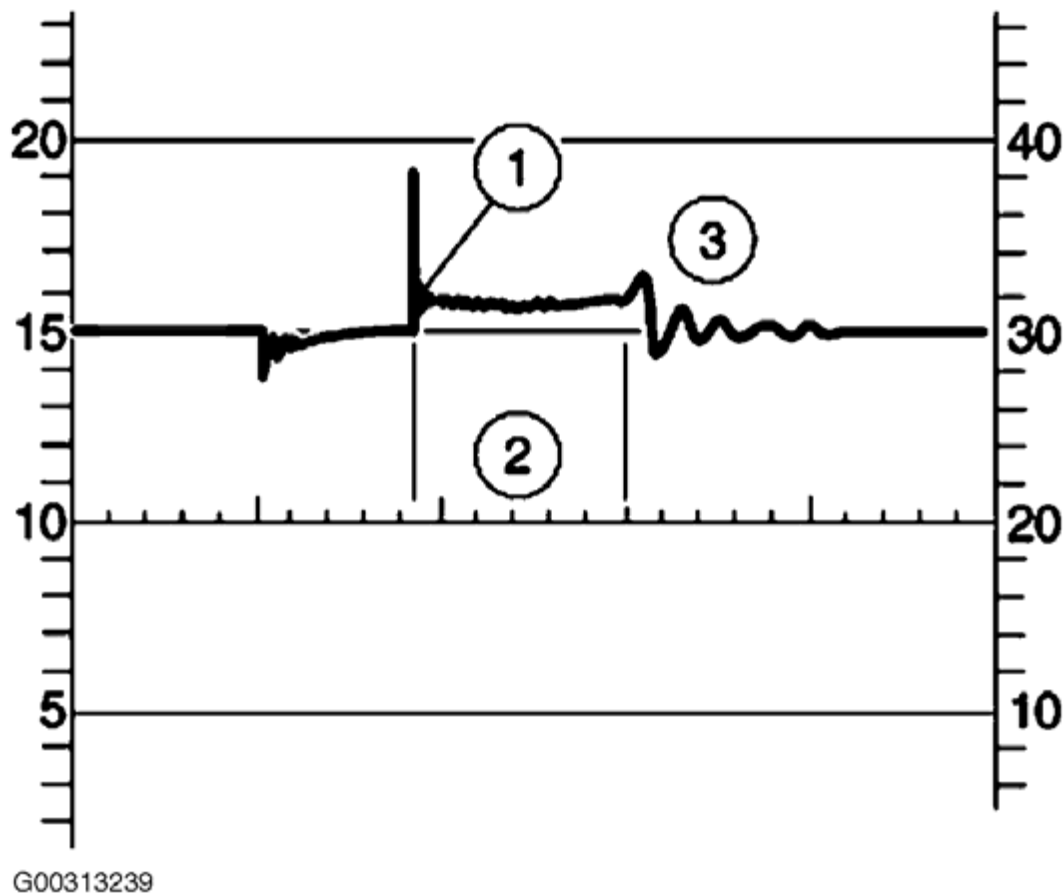


G00313238

**Fig. 31: Evaluation Of Different Ignition Coils At 2500 RPM (May & Criste)**  
Courtesy of BMW OF NORTH AMERICA, INC.

1. No oscillation on combustion voltage curve.
2. Normal combustion period.
3. At least 5 decay oscillations.

**Make: Bosch**



**Fig. 32: Evaluation Of Different Ignition Coils At 2500 RPM (Bosch)**  
Courtesy of BMW OF NORTH AMERICA, INC.

1. Normal oscillation of the combustion voltage curve.
2. Long combustion period.
3. At least 3 decay oscillations.

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

**NOTE:** For Special Tool identification, see SPECIAL TOOLS - X5 (3.0i) .

### Special Tools Required:

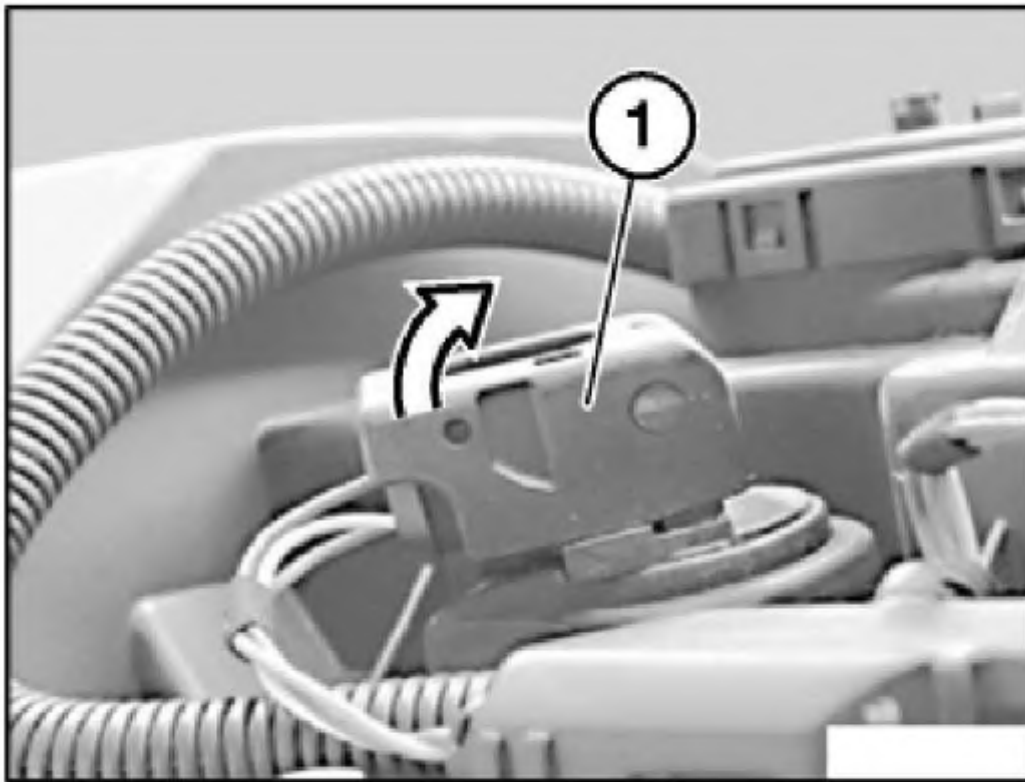
- 12 1 301
- 12 7 050

### Necessary Preliminary Tasks:



- Read out fault memory in DME (Digital Motor Electronics).
- Remove M54/56 ignition coil cover.

Unlock plug fastener (1) of ignition coil.



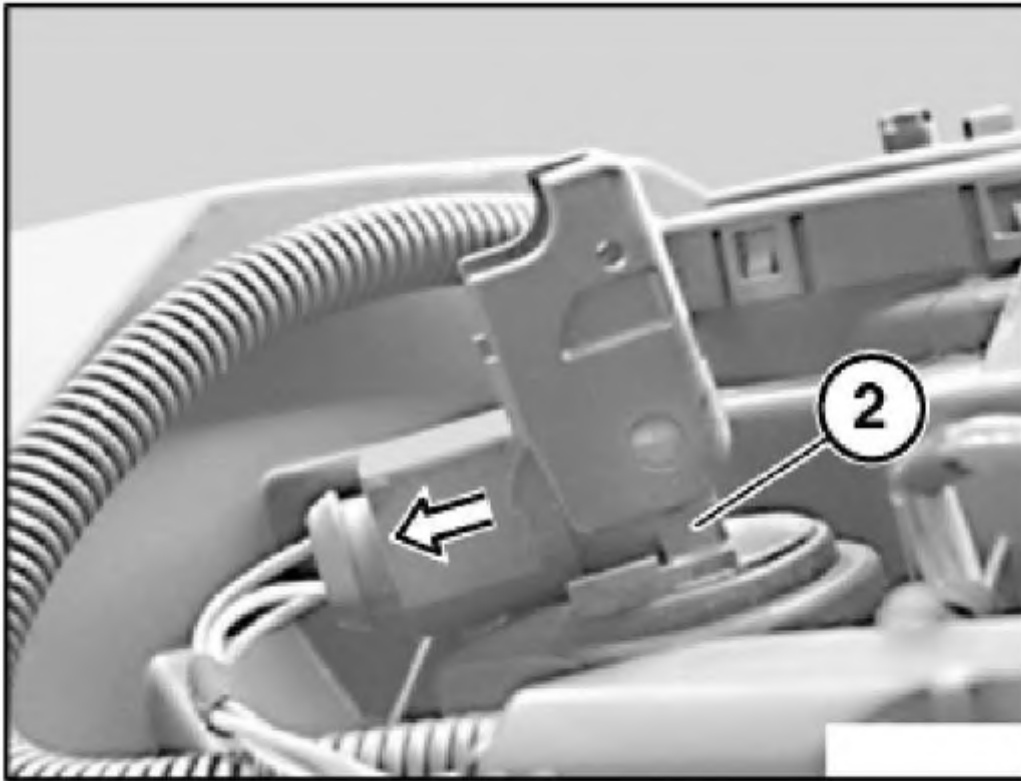
G03230432

**Fig. 33: 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.**



G03230433

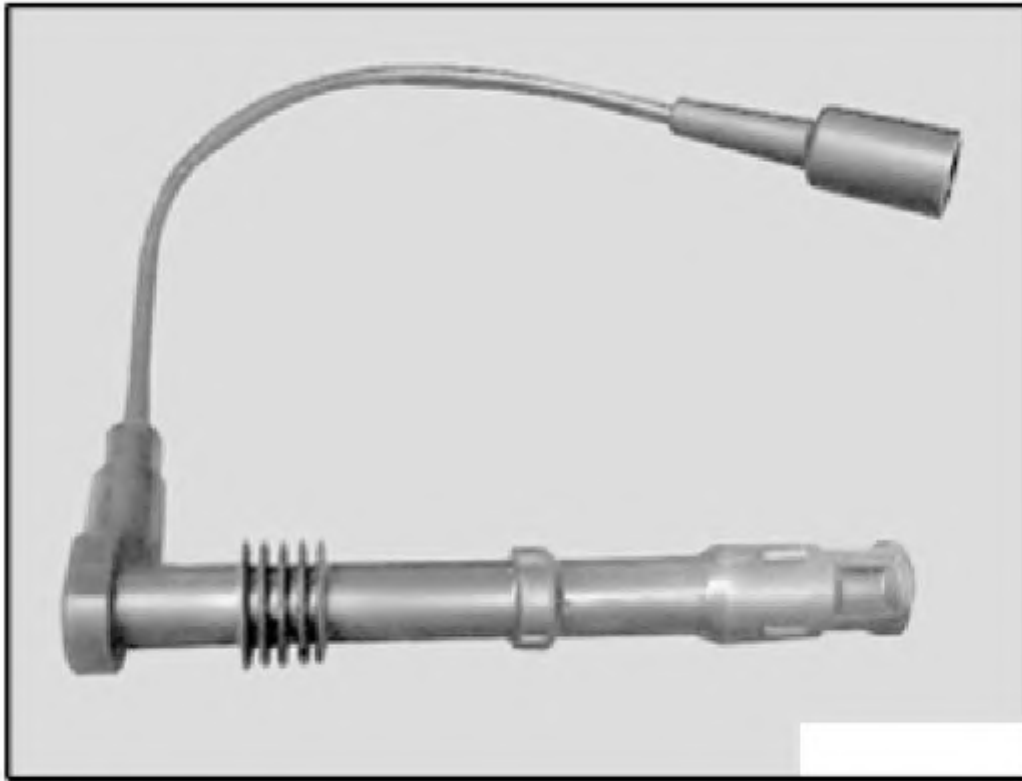
**Fig. 34: Removing Ignition Coil**

Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 12 7 050.

**Installation:**

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



**G03230434**

**Fig. 35: Installing Special Tool**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Secondary Measurement:**

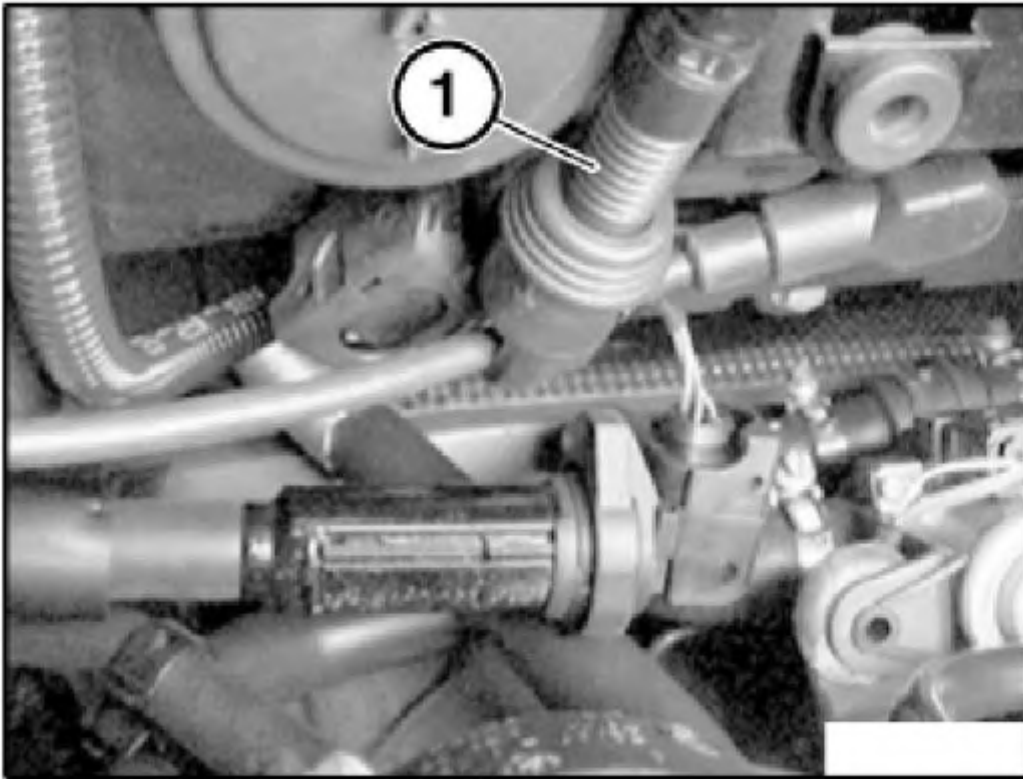
Connect KV clip-on probe (1) of DIS Tester to special tool 12 7 050.

**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 >.

For subsequent procedure, follow DIS instructions.

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



G03230435

**Fig. 36: Connecting KV Clip-On Probe Of DIS Tester To Special Tool 12 7 050**  
Courtesy of BMW OF NORTH AMERICA, INC.

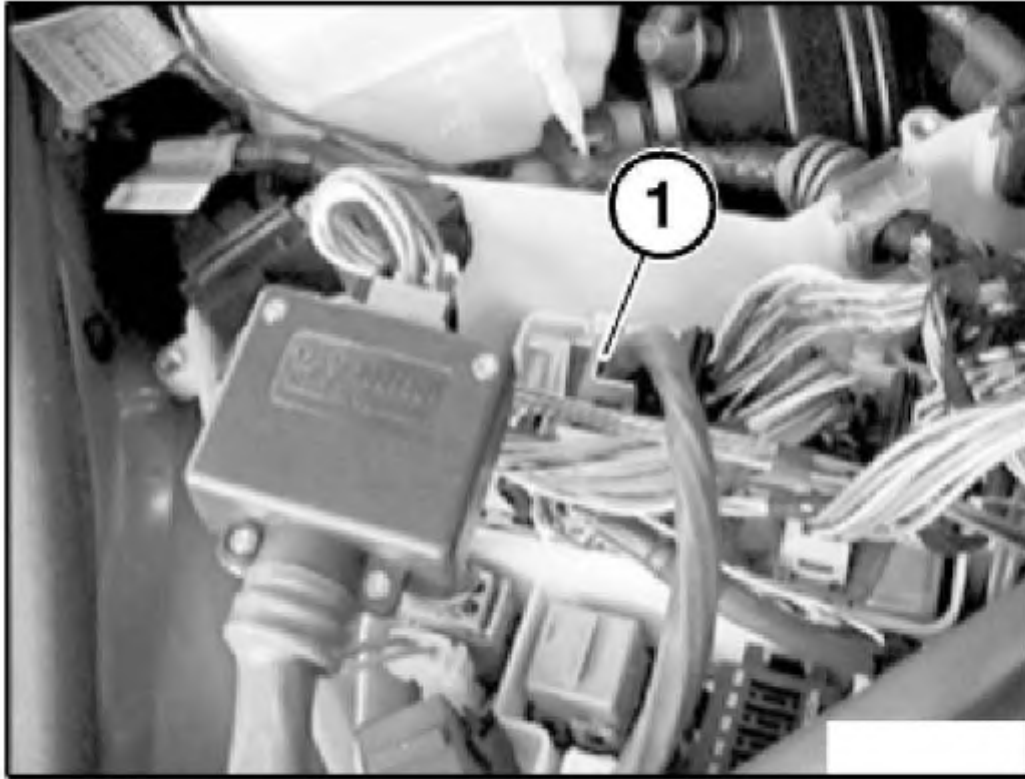
**Primary Measurement:**

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.



G03230436

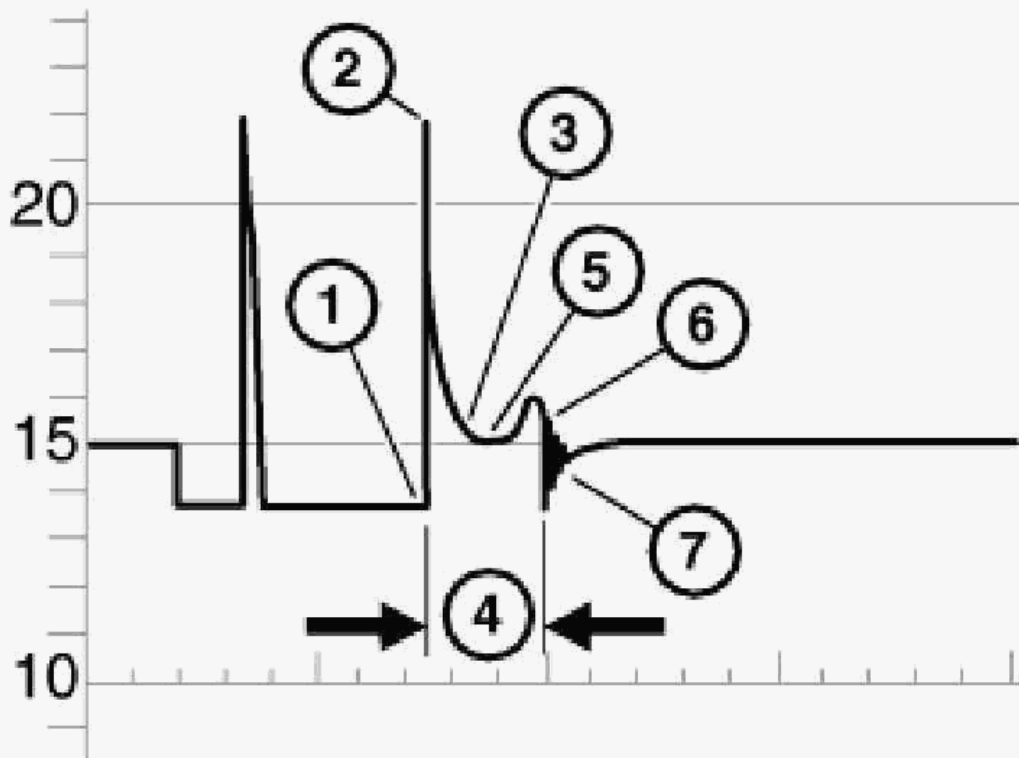
**Fig. 37: Connecting 26-Pin Pin Box With Special Tool 12 1 301 To Connector DME Module**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Pin assignment acc. to connection scheme.

**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.



- 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.

**Fig. 38: Identifying Signal Is Multiple Spark Ignition**  
Courtesy of BMW OF NORTH AMERICA, INC.

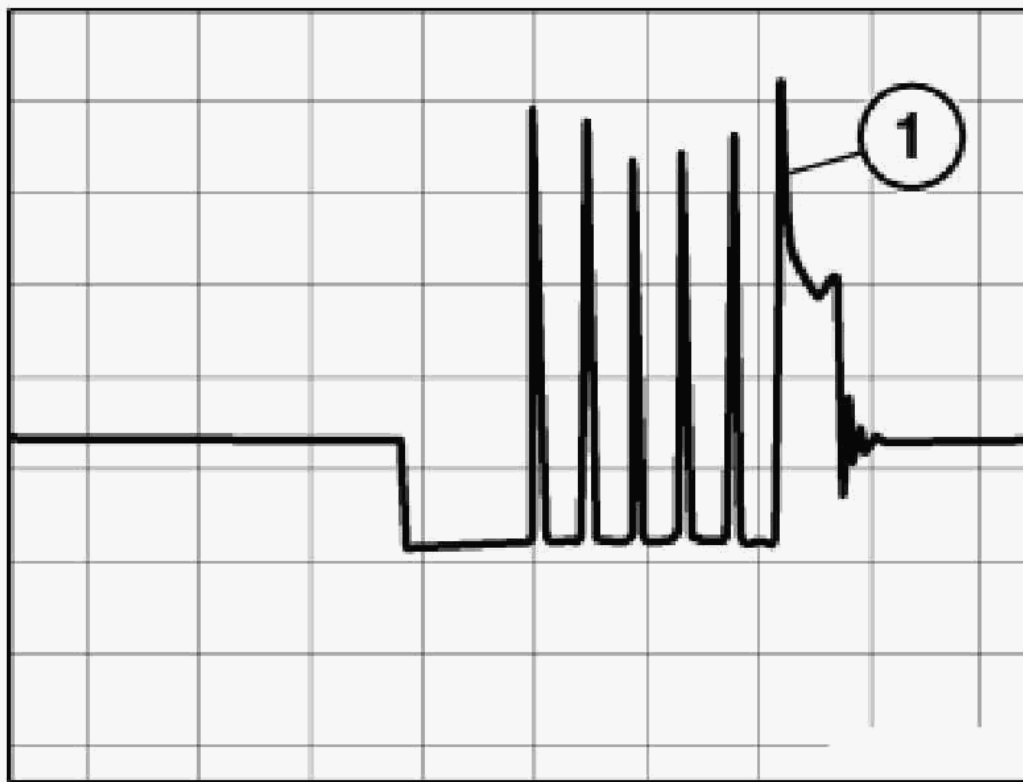
**M54:**

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

Depending on engine temperature (approx.  $-20^{\circ}$  to  $100^{\circ}$ ) 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.



G03230438

**Fig. 39: Oscillogram Of Engine With Multi Spark Ignition**  
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 (M52, M52TU, S52, S50US, M54)**

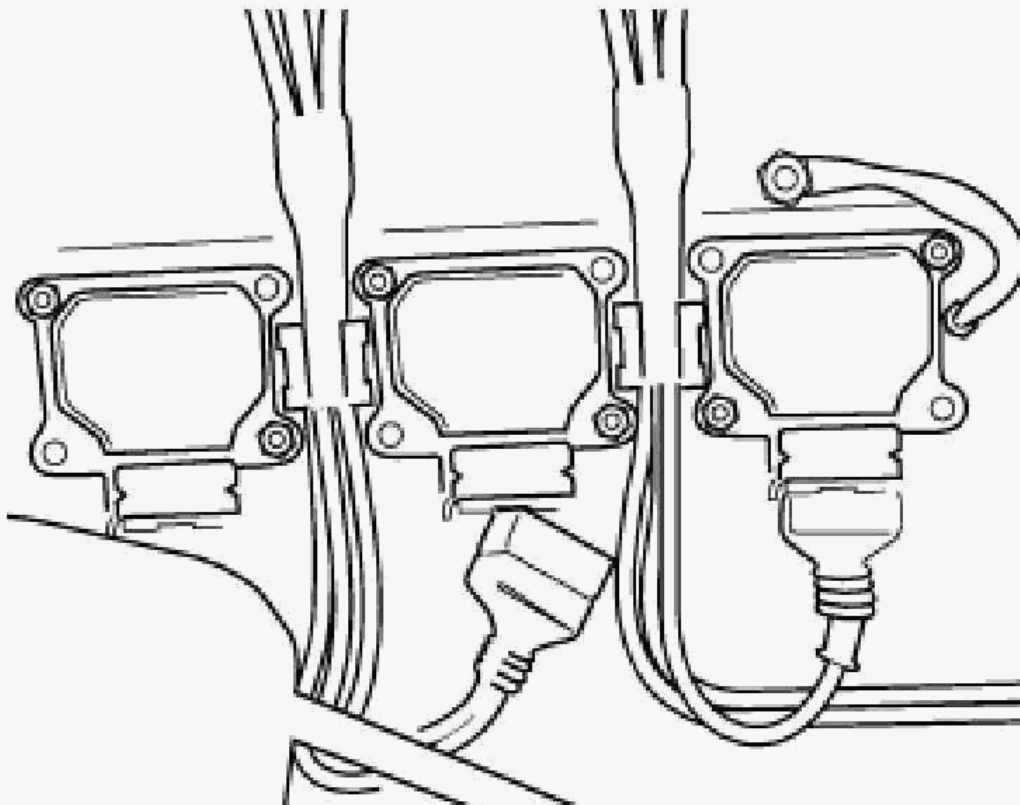
Switch off ignition.

Remove cover for ignition coils.

#### **Version With Single-Spark Ignition Coils:**

Unlock connector of ignition coils.

Disconnect connector from ignition coils.



G03230439



**Fig. 40: Disconnecting Connector From Ignition Coils**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws on ignition coil.

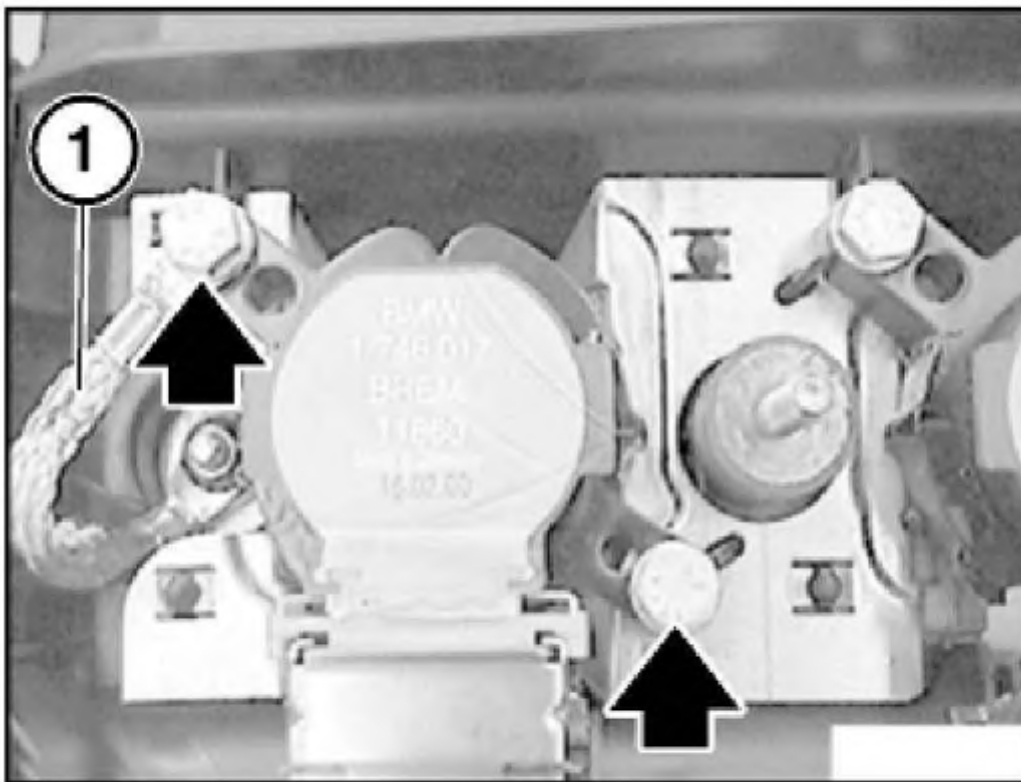
Pull out ignition coil.

**Installation:**

Screw down grounding strap (1) to cylinder head cover mounting and to ignition coil for cylinders 1 and 6.

On metal covers:

Screw down grounding strap of cable duct to cylinder head cover mounting between cylinders 2 and 3.



G03230440

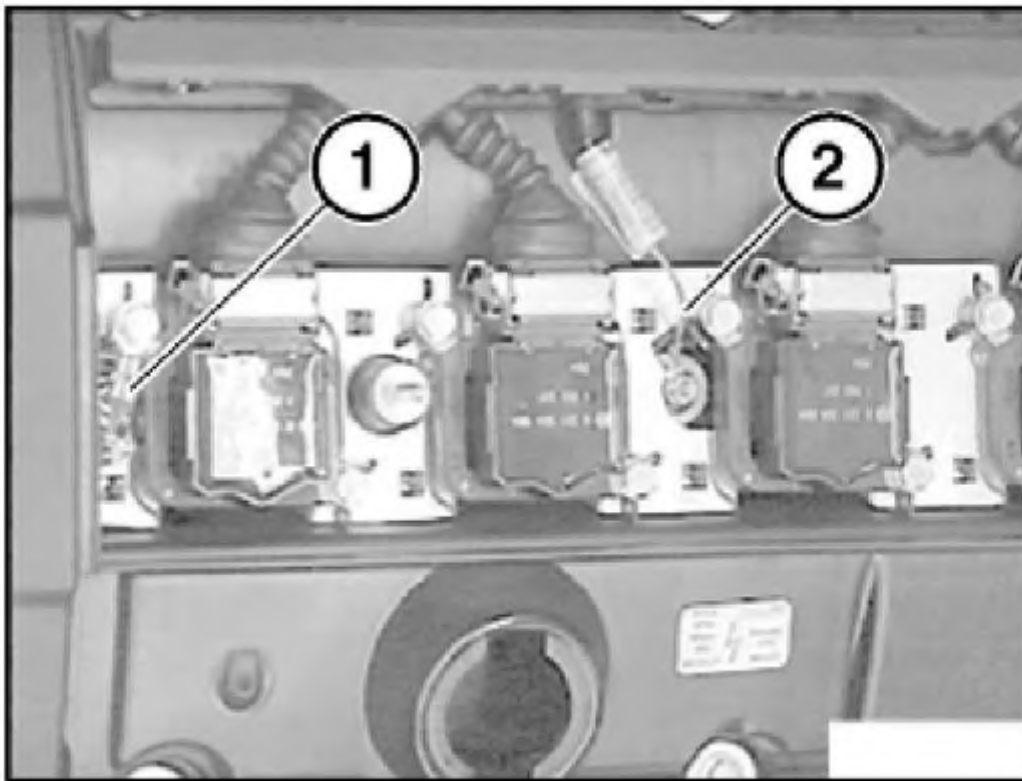
**Fig. 41: View Of Grounding Strap**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Plastic cover M52TU, M54:

Screw down grounding strap (1) of connecting plate of ignition coils with retaining pin of ignition coil of cylinder 1.

Screw down grounding strap (2) of cable duct with connecting plate of ignition coils between cylinders 2 and 3.



G03230442

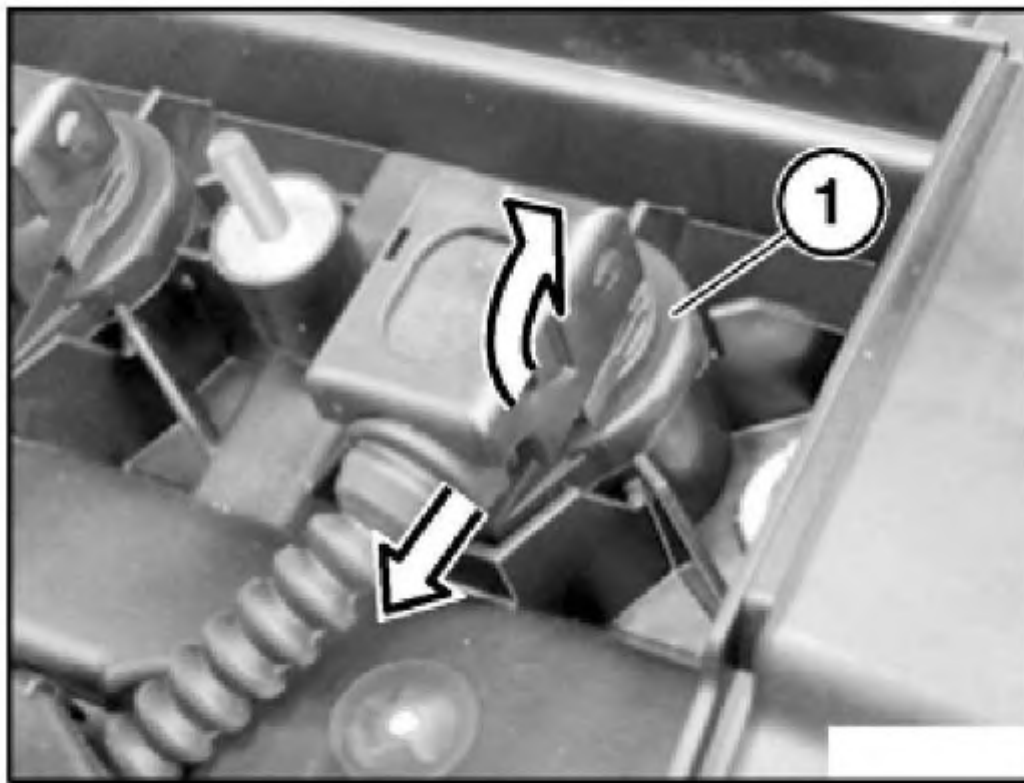
**Fig. 42: Locating Grounding Strap**

Courtesy of BMW OF NORTH AMERICA, INC.

**Version With Rod-Type Ignition Coils:**

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

Pull ignition coil (1) up and out.

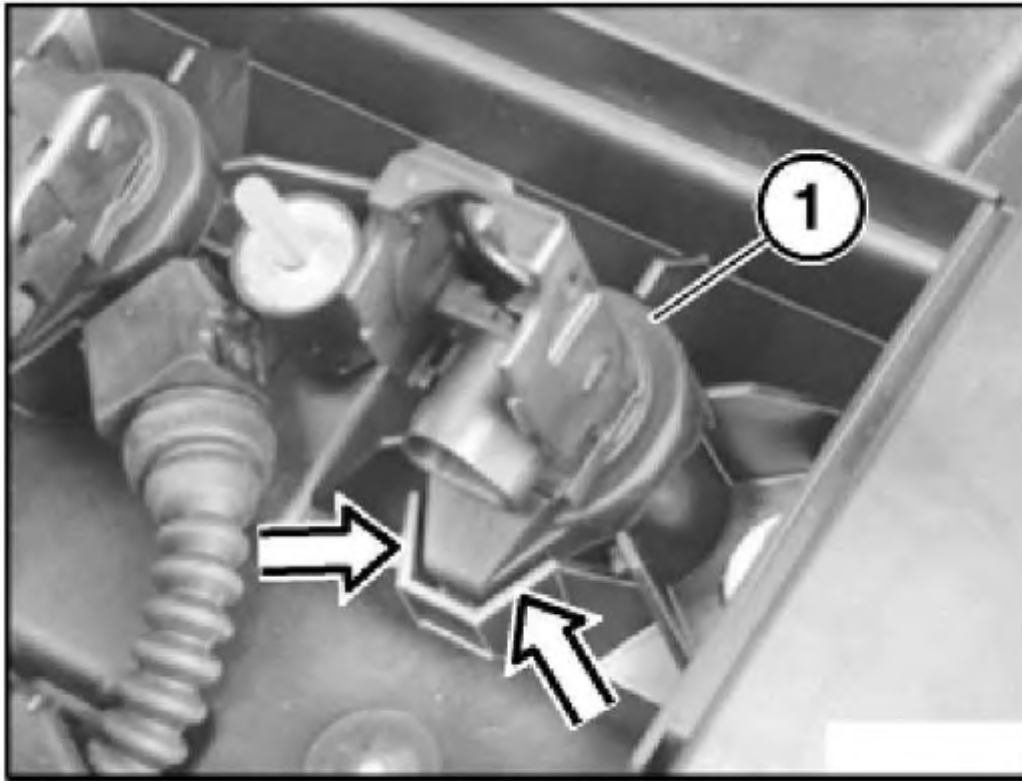


G03230443

**Fig. 43: Unlocking Plug Retainer Of Ignition Coil And Disconnecting Plug**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

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



G03230444

**Fig. 44: Checking Rubber Seal Of Ignition Coil Is Correctly Seated**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Interrogate fault memory of DME control unit.

Check stored fault messages.

Now clear the fault memory.

### **12 13 520 REPLACING A SPARK PLUG CONNECTOR (M60, M62, M54)**

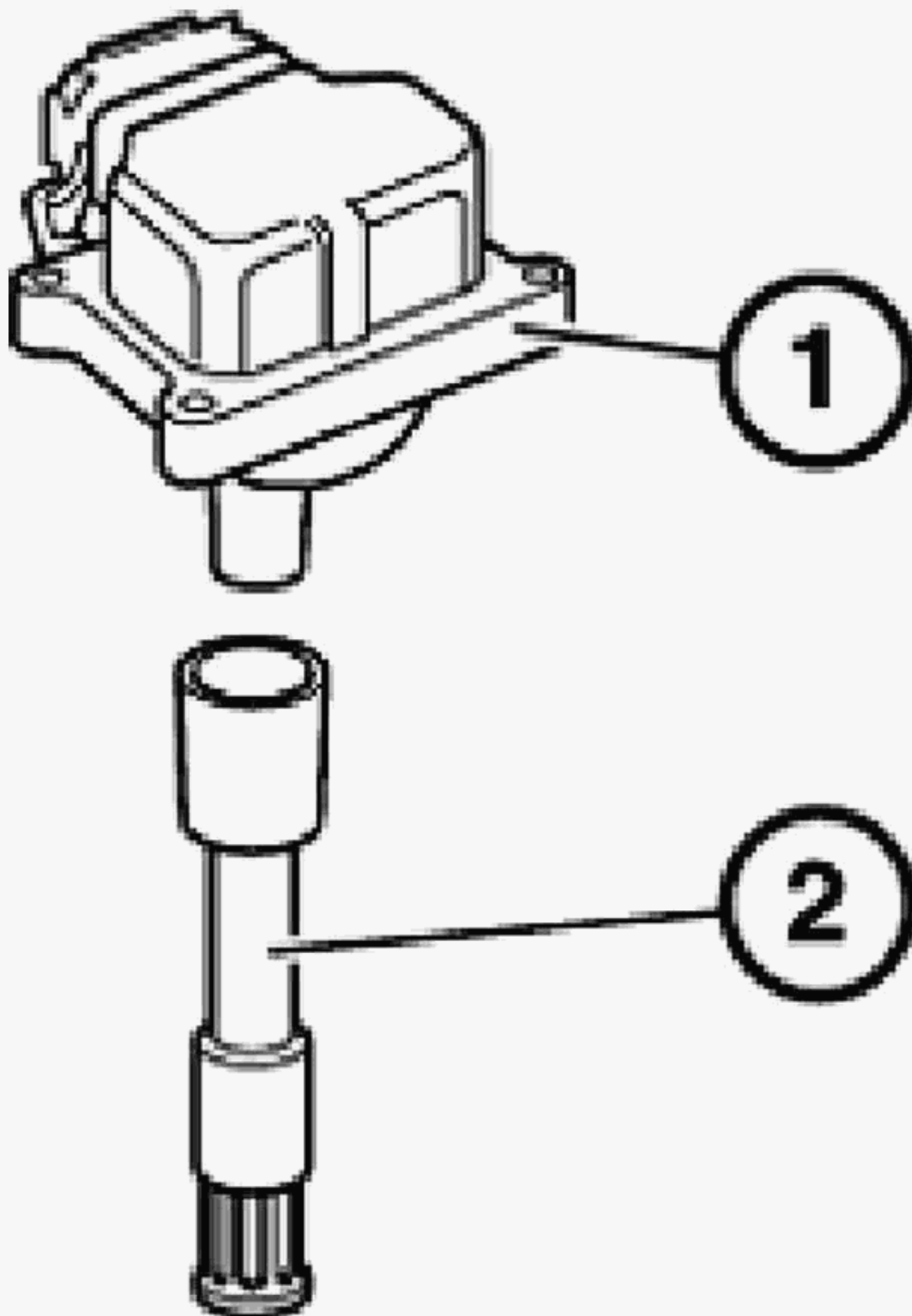
#### **Switch Off Ignition:**

Remove ignition coils. Refer to **12 13 511 REPLACING IGNITION COIL (M52, M52TU, S52, S50US, M54)**.

Detach ignition coil (1) from spark plug connector (2).

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2001-2003 ENGINE Ignition System - Repair Instructions - X5 (3.0i) M54



G03230445

**Fig. 45: Detaching Ignition Coil From Spark Plug Connector**

Courtesy of BMW OF NORTH AMERICA, INC.

## **ELECTRONIC SWITCHING OR CONTROL UNIT**

### **12 14 521 REPLACING PULSE GENERATOR ON CRANKSHAFT (M54/M56)**

#### **Necessary Preliminary Tasks:**

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

All models:

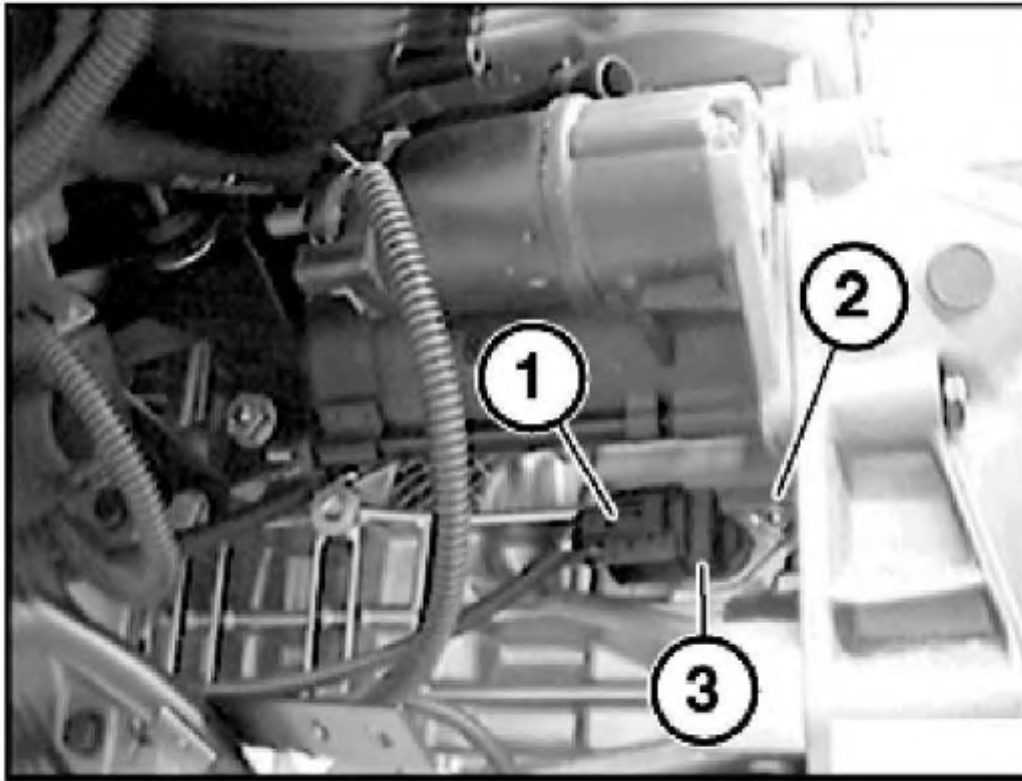
**NOTE:** Installation location of pulse generator for crankshaft is underneath starter motor.

**NOTE:** For a better overview, this work step is shown on an engine that has been removed.

Unlock plug (1) and remove.

Unscrew bolt (2).

Remove pulse generator (3).



G03230446

**Fig. 46: Removing Pulse Generator On Crankshaft (M54/M56)**  
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 (M52TU / M54 / M56)**

### **Necessary Preliminary Tasks:**

- Check stored fault messages.
- Switch off ignition.

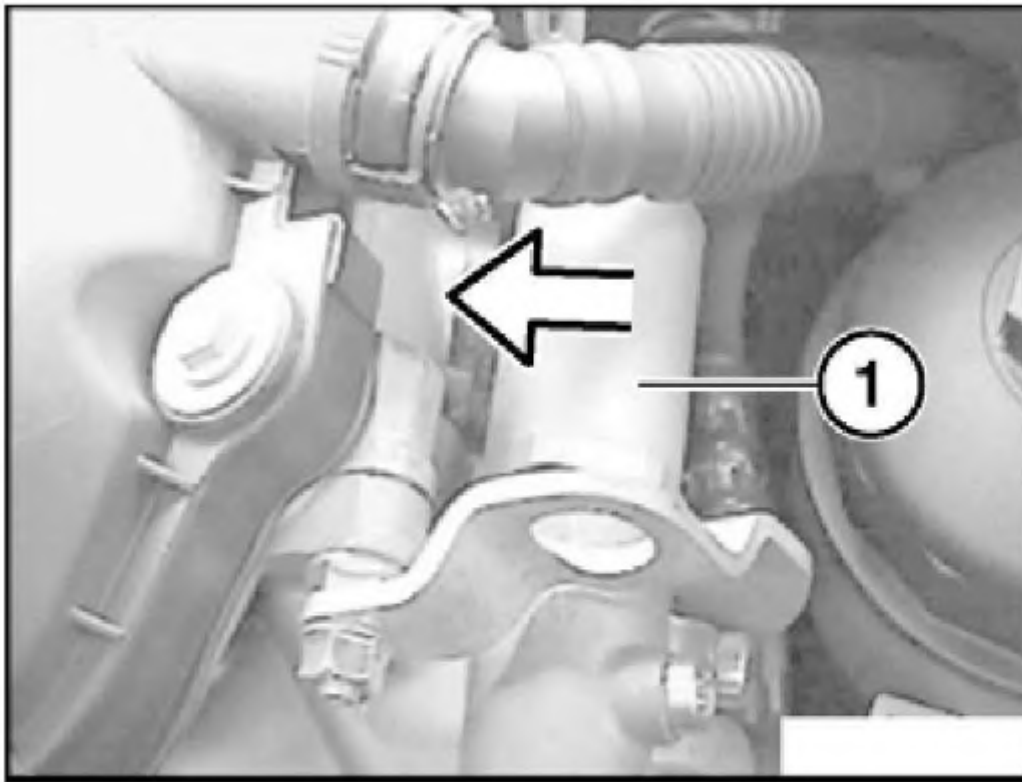
**NOTE:** Arrow shows installation position of pulse generator.

Remove solenoid valve (1) of VANOS adjustment unit for inlet camshaft.

**Installation:**

Replace sealing ring.

Tightening torque, (30 N.m.).

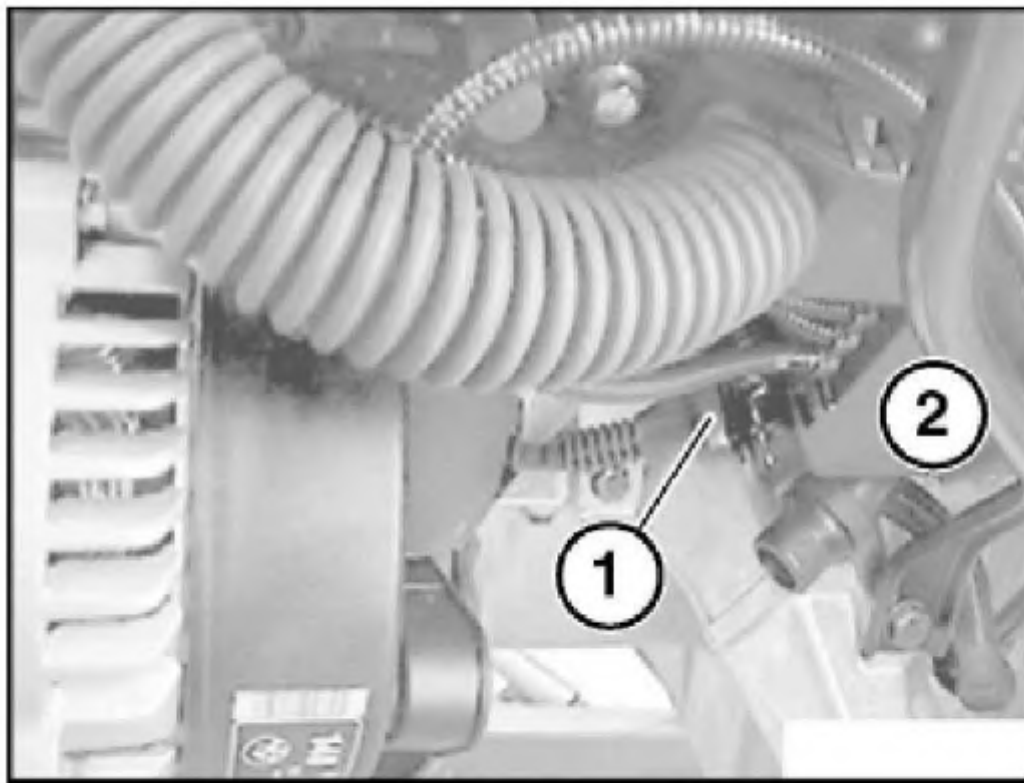


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**Fig. 47: Removing Solenoid Valve Of VANOS Adjustment Unit For Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on cable duct (2).





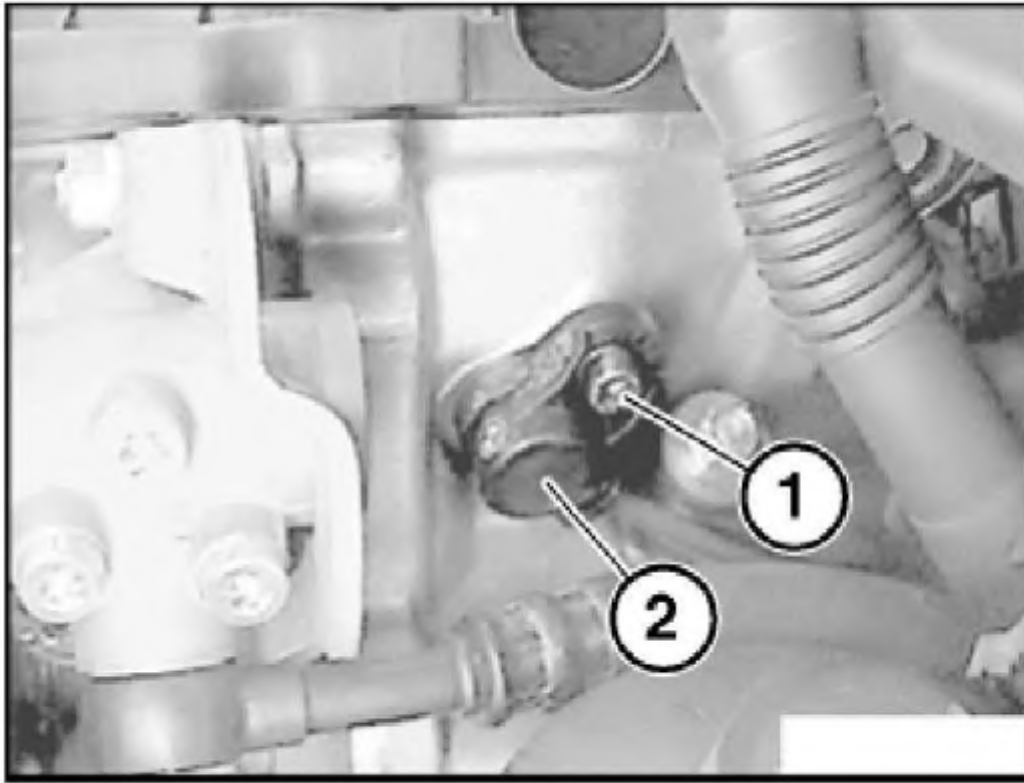
G03230448

**Fig. 48: Disconnecting Plug Connection On Cable Duct**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on pulse generator (2).

Remove pulse generator (2) from cylinder head.

**NOTE:** To facilitate installation of pulse generator lead:



G03230449

**Fig. 49: Removing Pulse Generator****Courtesy of BMW OF NORTH AMERICA, INC.**

Secure an approx. 50 cm long auxiliary lead to plug connection of pulse generator.

Feed out end of pulse generator lead but only to such an extent that the auxiliary lead remains in the original routing in the intake system.

Remove pulse generator with lead.

Disconnect auxiliary lead from faulty pulse generator. Secure plug connection of new pulse generator to auxiliary lead.

Using auxiliary lead, feed new lead of pulse generator through to cable duct at bottom.

**Installation:**

Check sealing ring for possible damage, replace if necessary.

**NOTE:** Read out fault memory of DME control unit.

Now clear the fault memory.

## **12 14 524 REPLACING PULSE GENERATOR ON EXHAUST CAMSHAFT (M52TU, M54, M56)**

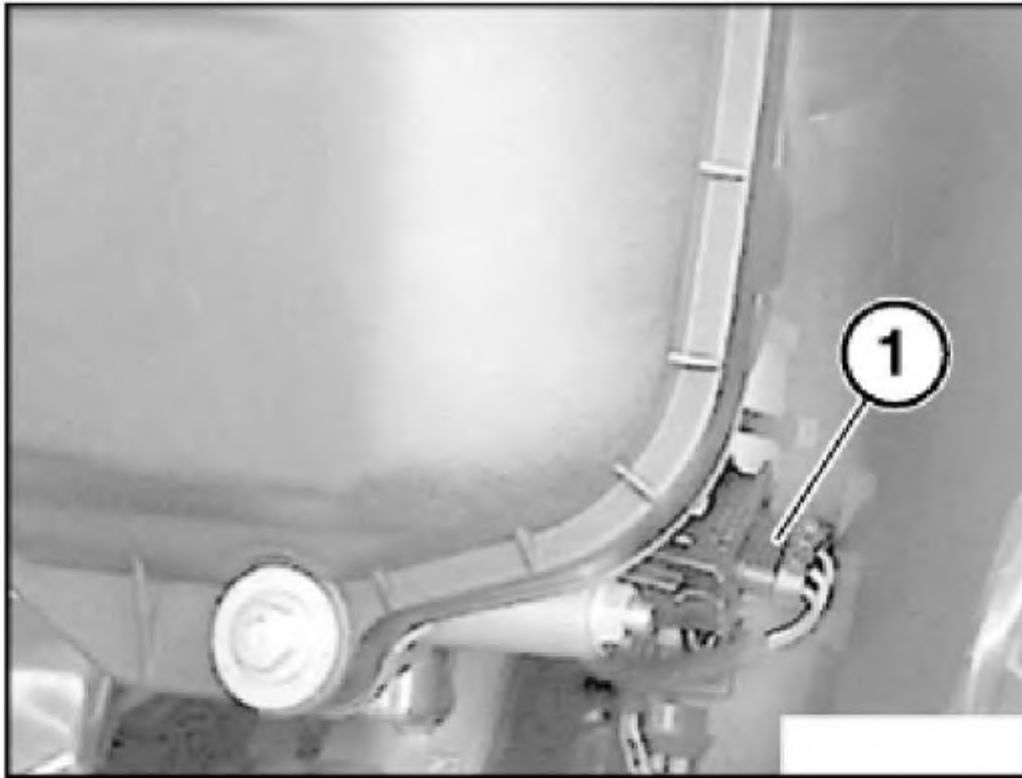
### **Necessary Preliminary Tasks:**

- Check stored fault messages.
- Switch off ignition.

### **Location:**

On cylinder head at front on exhaust side.

Unlock plug (1) and detach from pulse generator.



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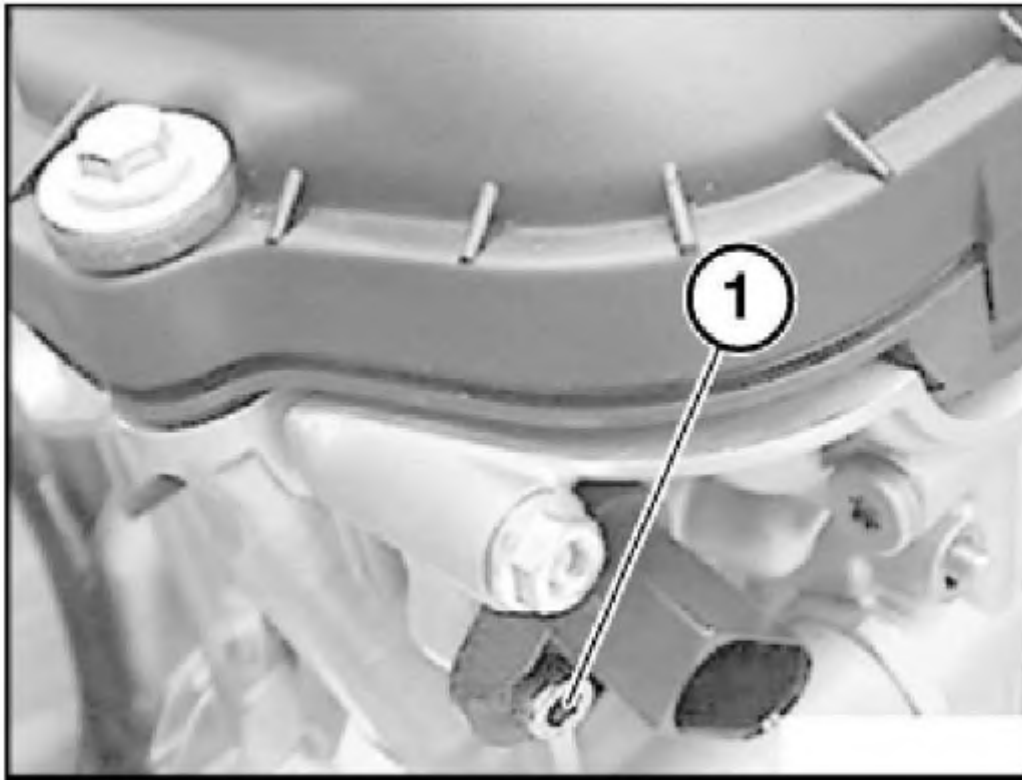
**Fig. 50: Detaching Plug Connection From Pulse Generator**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on cylinder head.

Remove pulse generator.

**Installation:**

Check sealing ring for possible damage, replace if necessary.



G03230451

**Fig. 51: Releasing Screw On Cylinder Head**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Interrogate fault memory of DME control unit.

Rectify faults.

Now clear the fault memory.

## **12 14 550 REPLACING CONTROL UNIT (DIGITAL MOTOR ELECTRONICS) (M62, M54)**

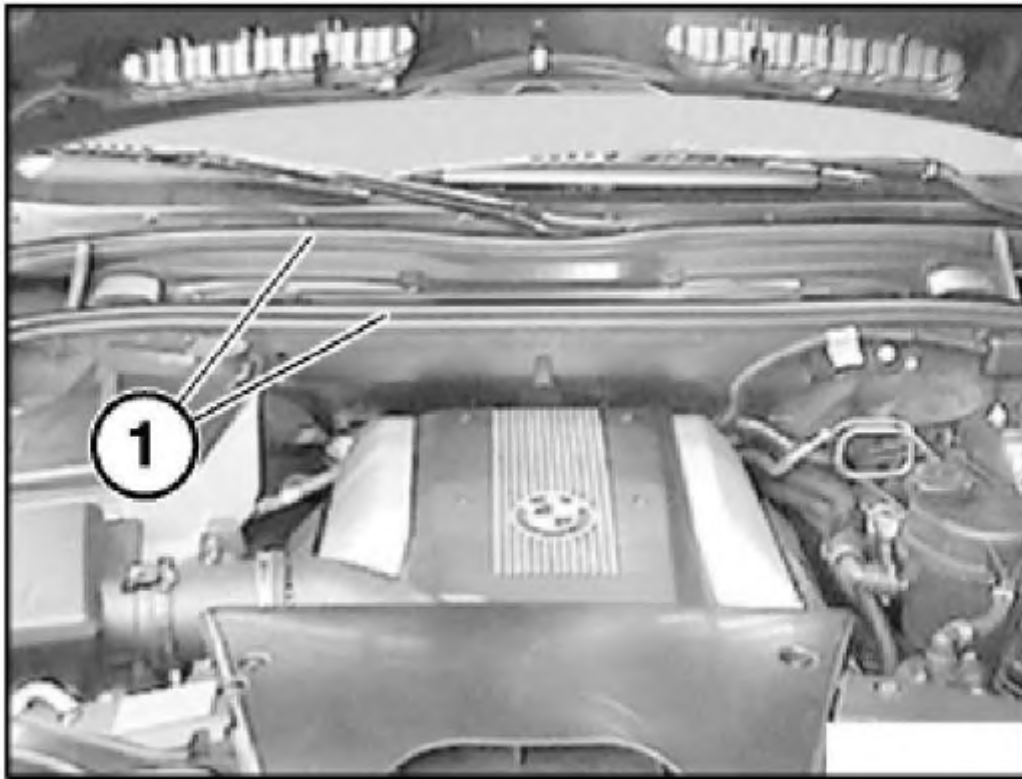
Connect DIS Tester or MoDiC.

**CAUTION:** Follow instructions for removing and installing electronic control units.  
**Refer to 12 00 ... INSTRUCTIONS FOR REMOVING AND INSTALLING  
ELECTRONIC CONTROL UNITS .**

Read fault memory.

Switch off ignition.

Detach sealing strips (1).



G03230452

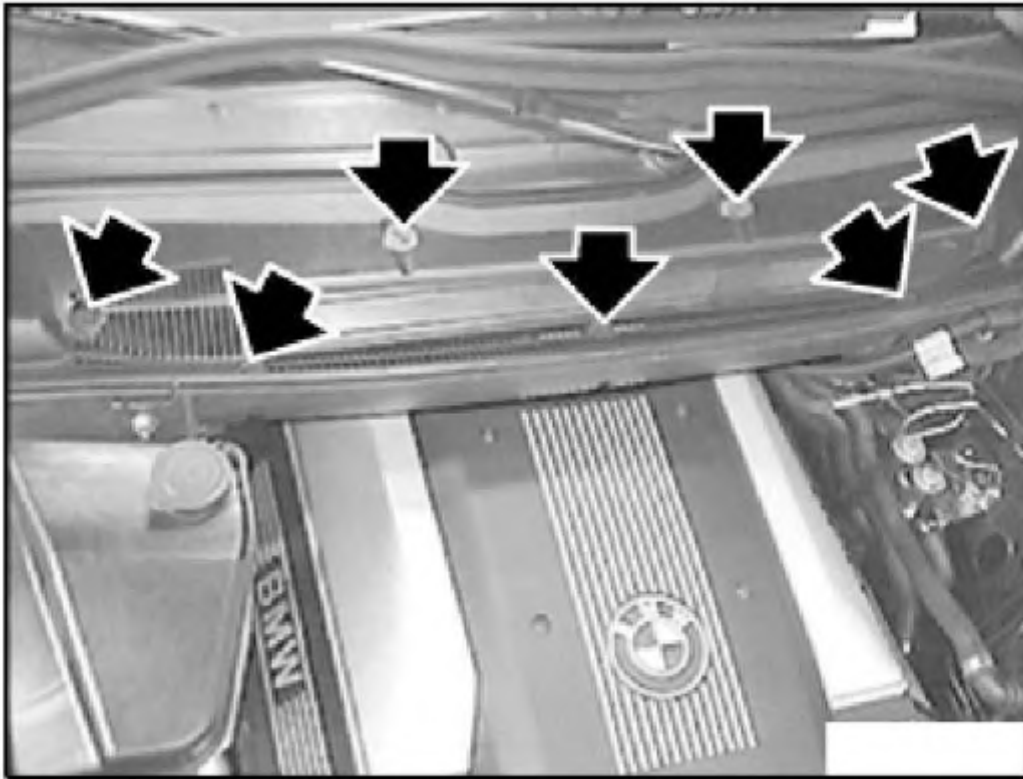
**Fig. 52: Detaching Sealing Strips**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

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Turn tommy bar through approx. 90°.

Remove cover.



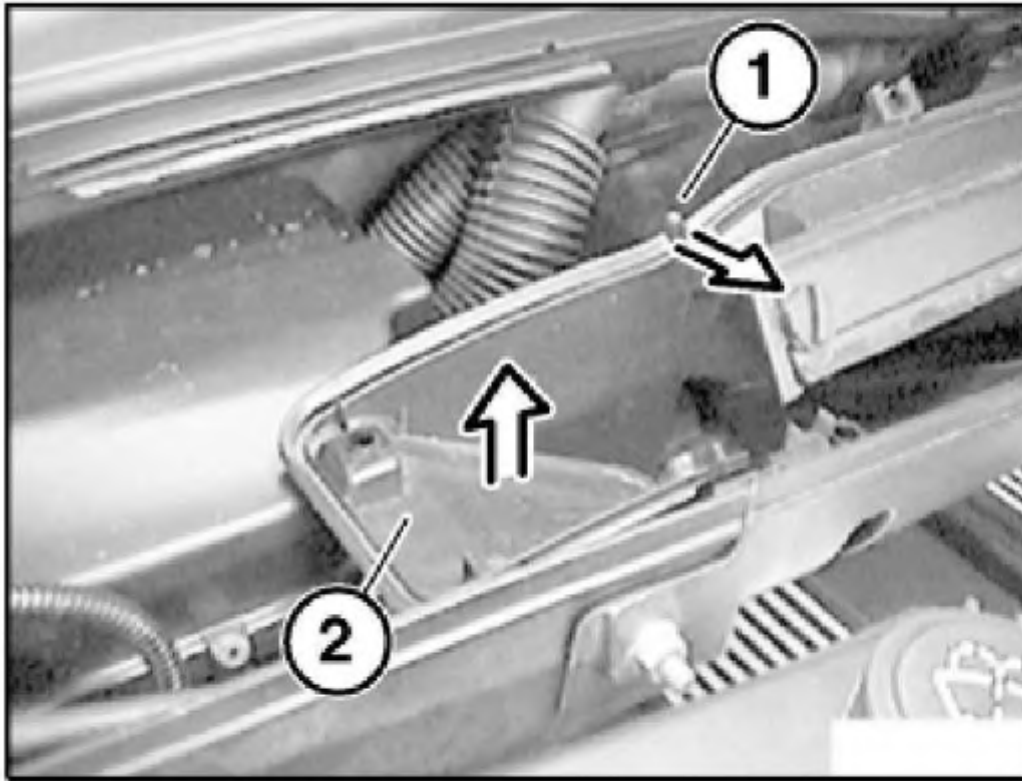
G03230453

**Fig. 53: Removing Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1).

Remove air funnel (2) towards top.

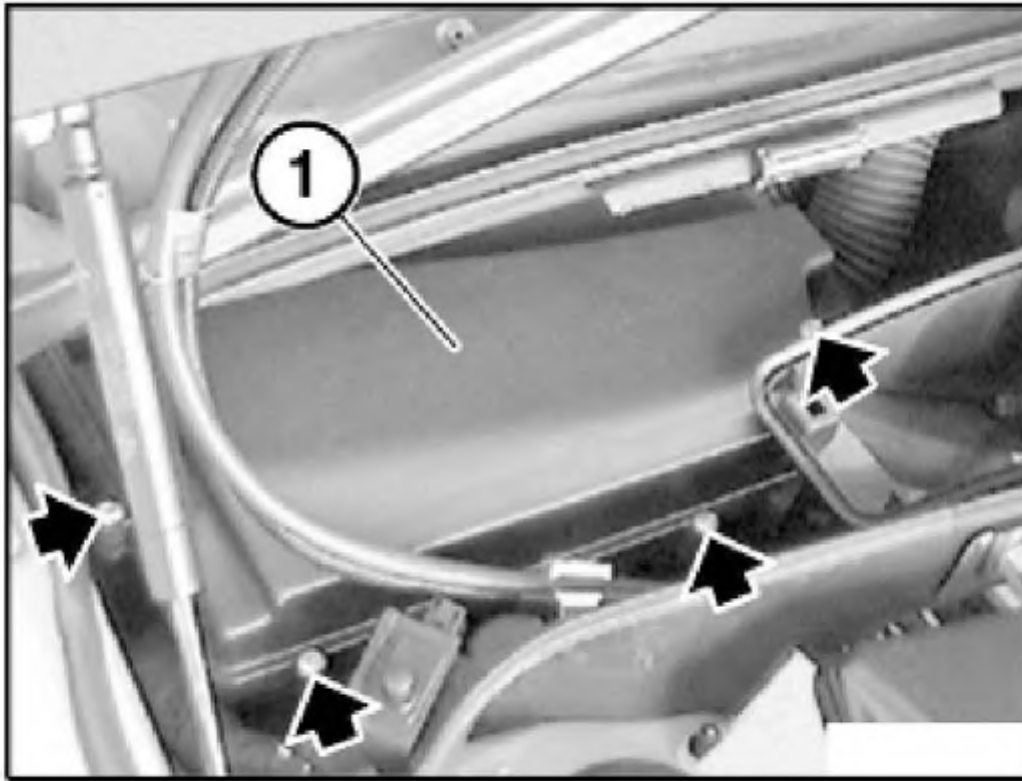


G03230454

**Fig. 54: Removing Air Funnel**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Remove cover (1) on control unit box.



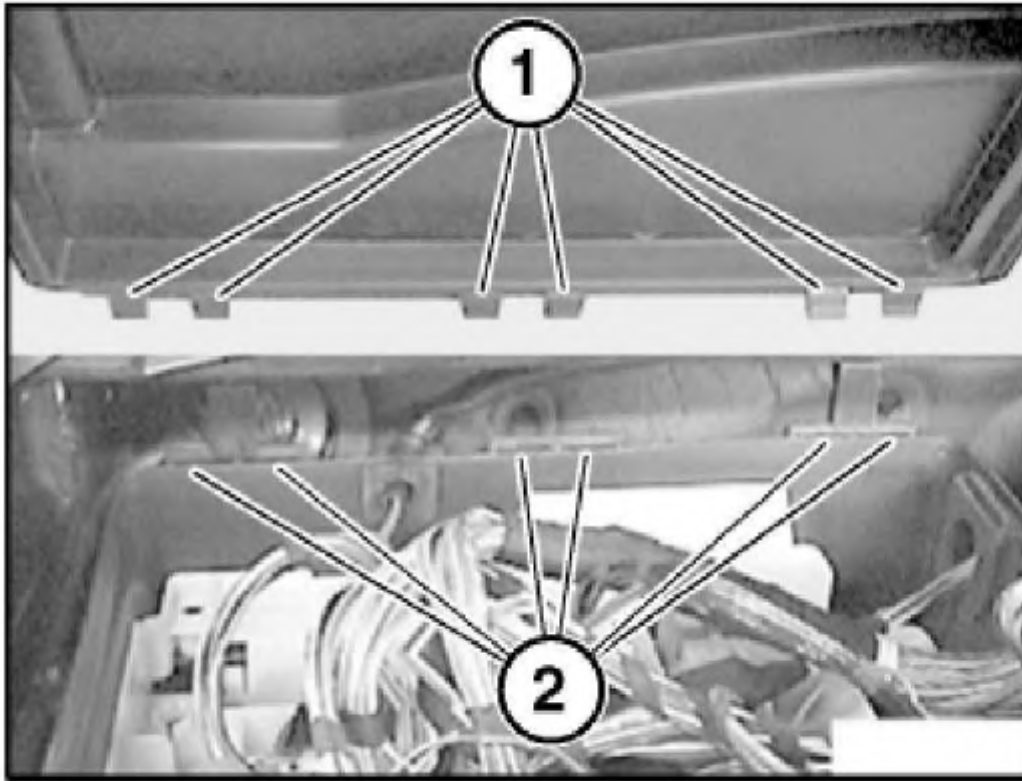
G03230455

**Fig. 55: Removing Control Unit Box Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Insert fixtures (1) of cover for control unit box in openings (2).





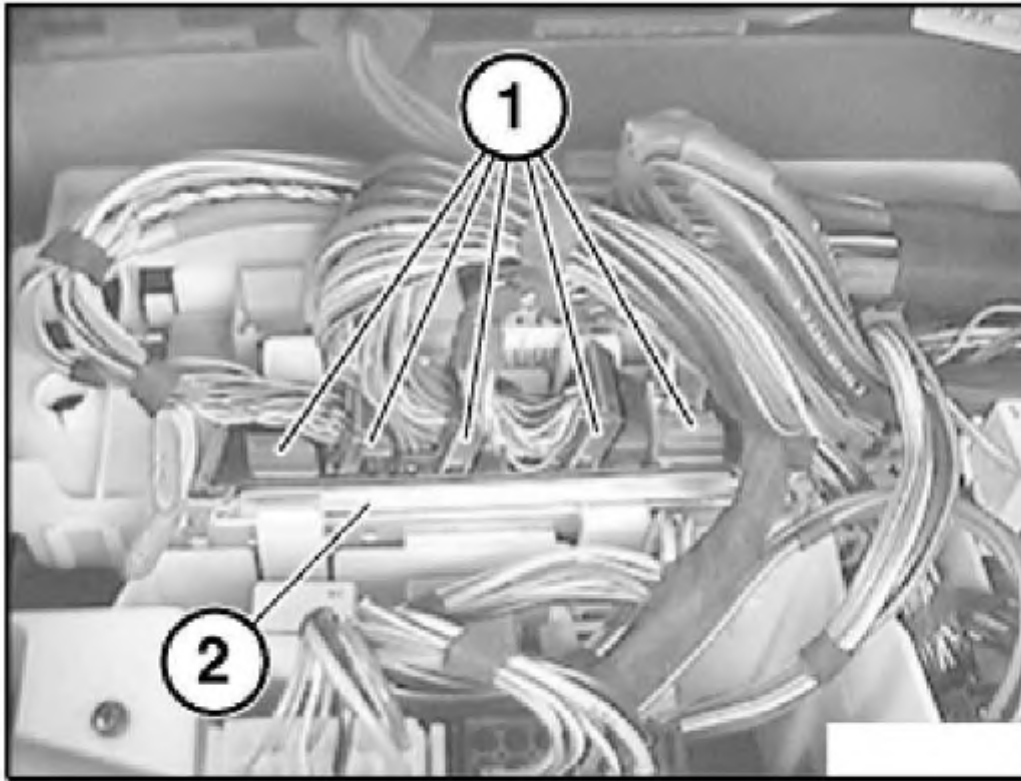
G03230456

**Fig. 56: Inserting Fixtures Of Cover For Control Unit Box In Openings**  
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1).

Unlock DME control unit (2) and remove.

For subsequent procedure, follow instructions of DIS Tester.



G03230457

**Fig. 57: Removing DME Control Unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

Code control unit. Refer to **12 14 700 CODING CONTROL MODULE (DME / DDE)** .

Program control unit. Refer to **12 14 705 PROGRAMMING CONTROL UNIT (DME / DDE)** .

**NOTE:** Interrogate fault memory of DME control module.

Check stored fault messages.

Rectify faults.

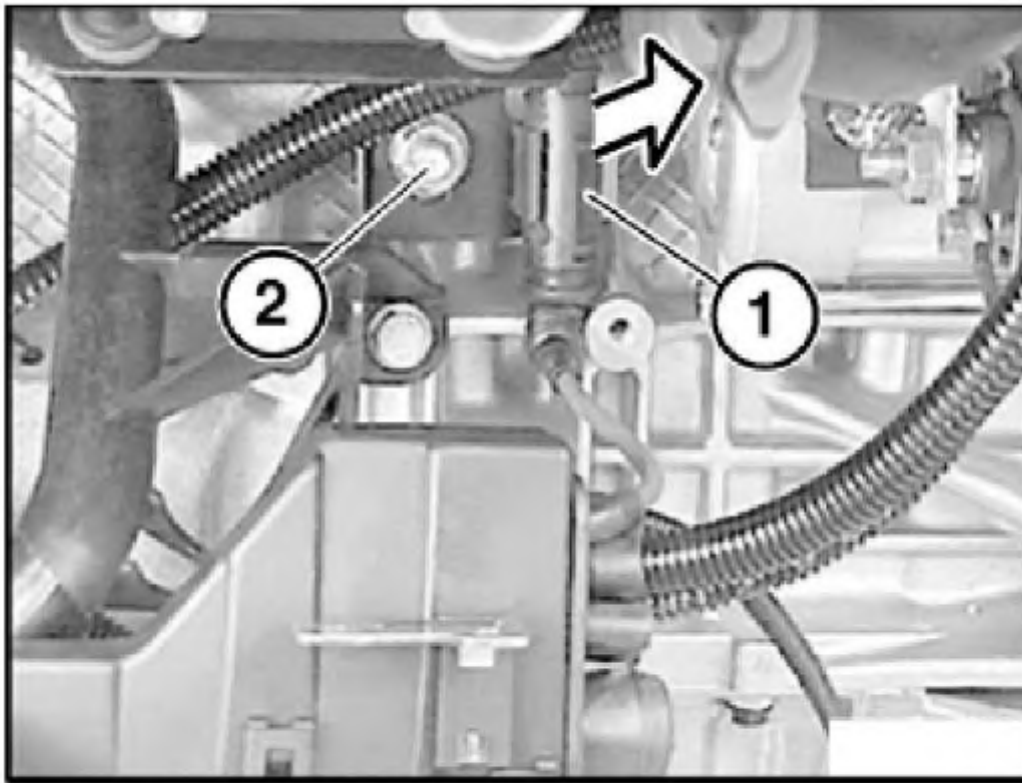
Then clear fault memory.

**12 14 600 REPLACING KNOCK SENSOR (M52TU, M54, M56)**

**Necessary Preliminary Tasks:**

- Check stored fault messages.
- Switch off ignition.
- Remove intake air manifold. Refer to **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (M54)** .

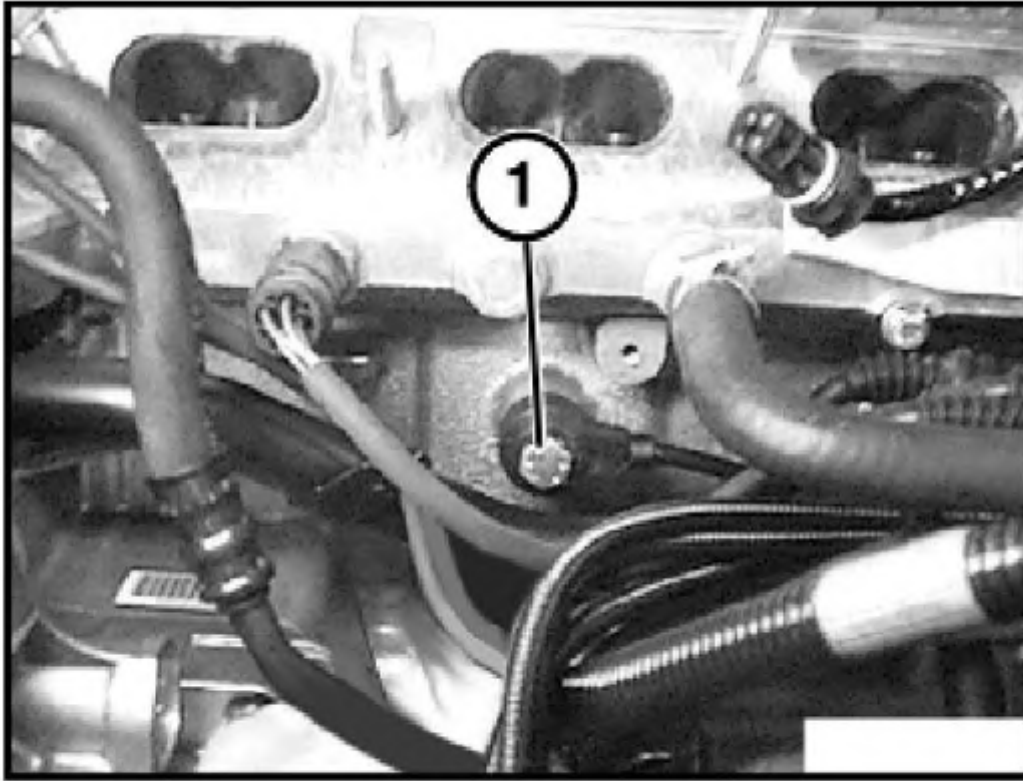
Unclip plug connection (1) from holder of cable duct (2) and disconnect.



G03230458

**Fig. 58: Disconnecting Plug Connection From Holder Of Cable Duct**  
Courtesy of BMW OF NORTH AMERICA, INC.

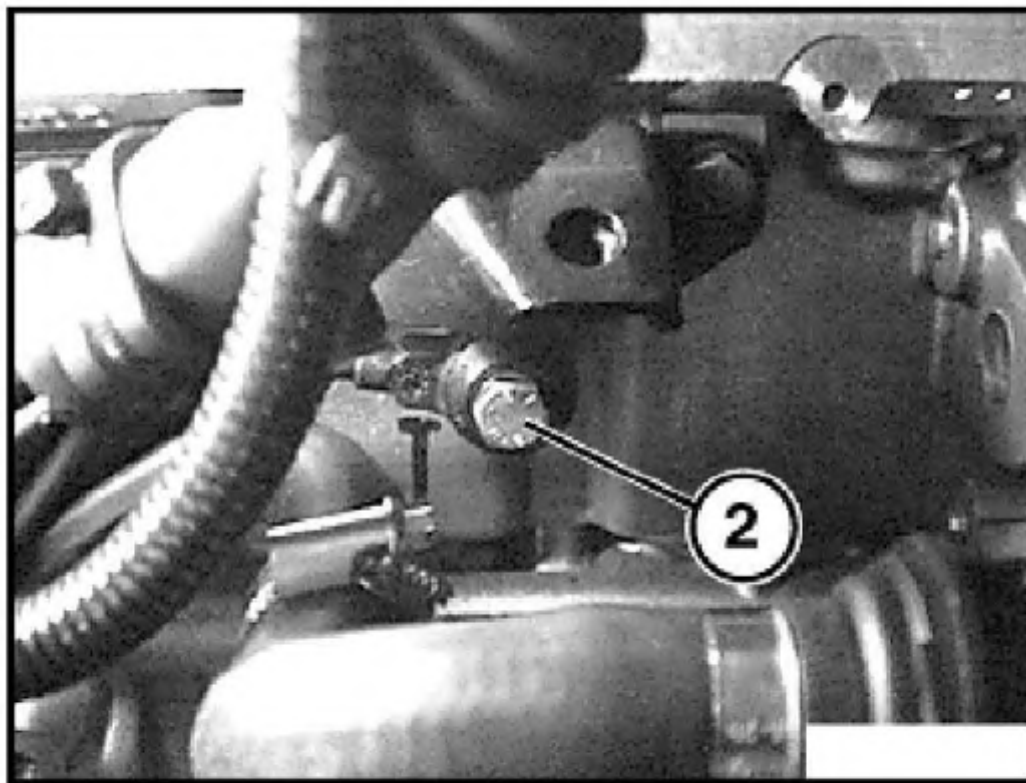
Release screw (1) and remove knock sensor for cylinder bank 1-3.



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**Fig. 59: Removing Knock Sensor For Cylinder Bank 1-3**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2) and remove knock sensor for cylinder bank 4-6.



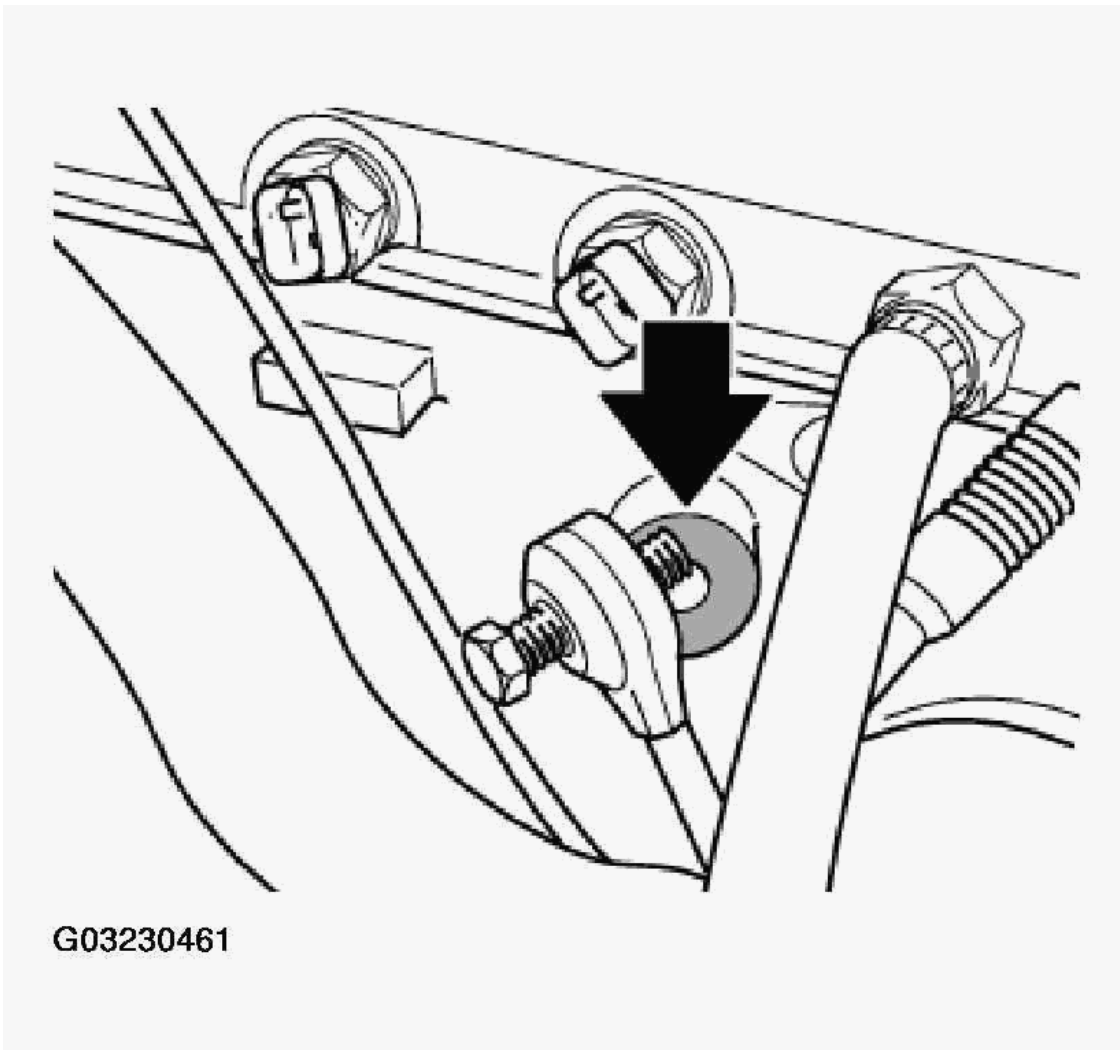
G03230460

**Fig. 60: Removing Knock Sensor For Cylinder Bank 4-6**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Clean support face of knock sensors on engine block.

Tightening torque, (20 N.m.).



**Fig. 61: Identifying Face Of Knock Sensors On Engine Block**

Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Read out fault memory of control unit of Digital Motor Electronics (DME).

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 63 520 REPLACING MAIN RELAY (M62, M54)**

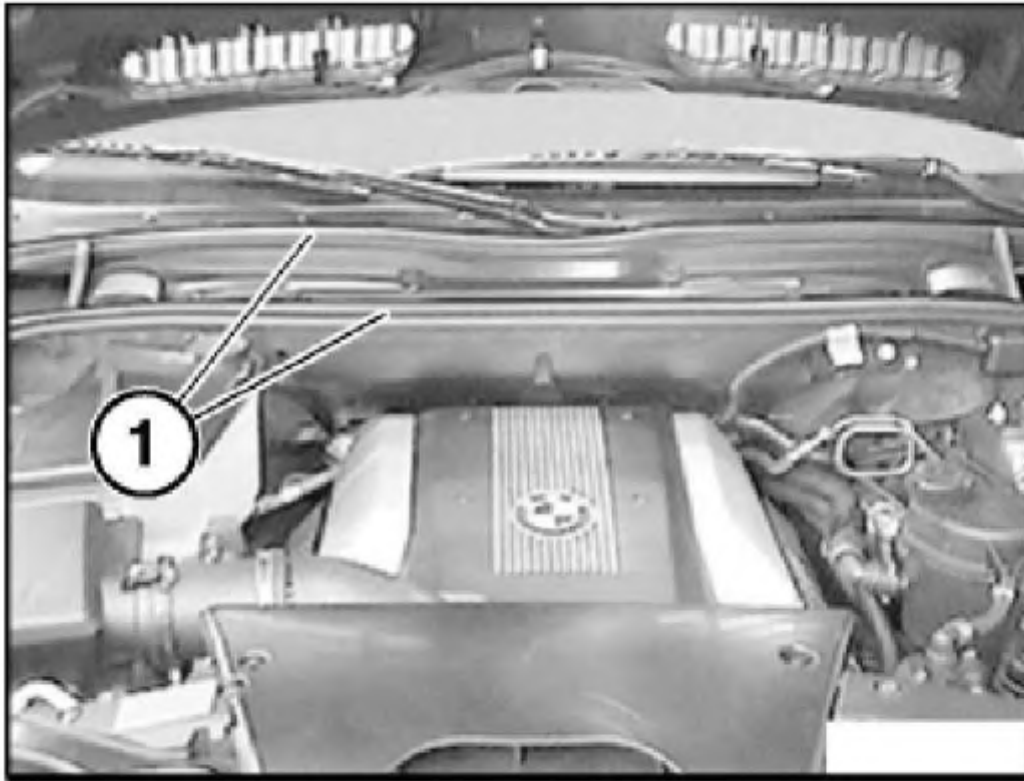
Switch off ignition.

Connect DIS Tester.

Detach sealing strips (1).

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2001-2003 ENGINE Ignition System - Repair Instructions - X5 (3.0i) M54



G03230462

**Fig. 62: Detaching Sealing Strips**  
Courtesy of BMW OF NORTH AMERICA, INC.

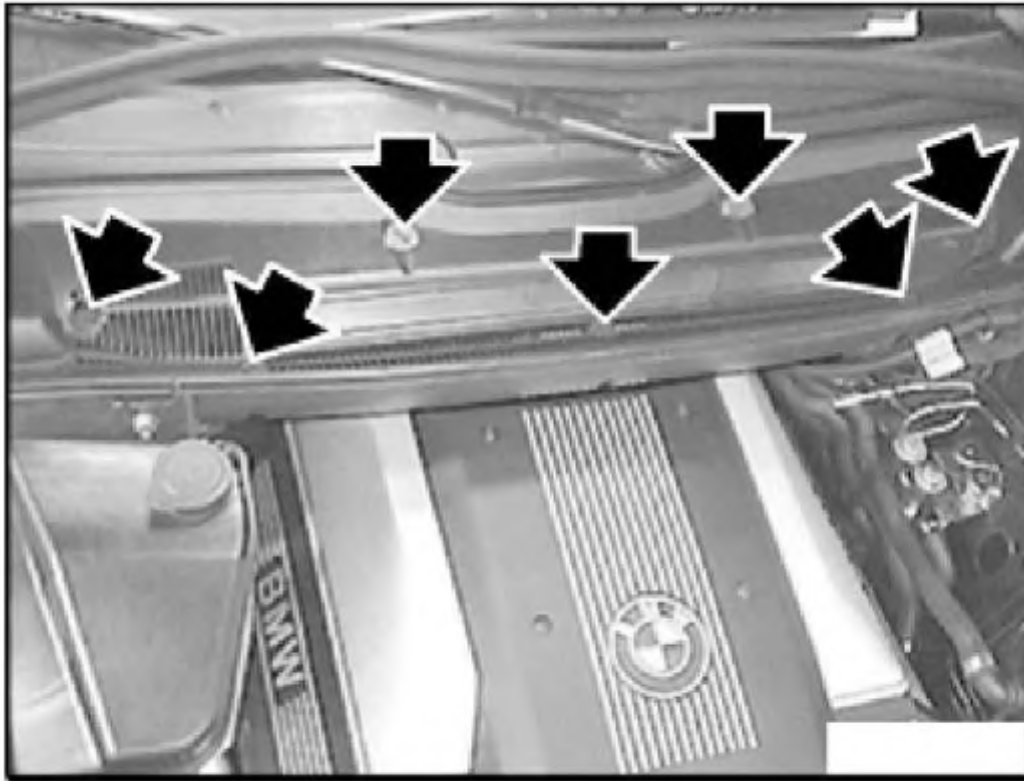
Turn tommy bar through approx. 90°.

Remove cover.



## 2002 BMW X5 30i

2001-2003 ENGINE Ignition System - Repair Instructions - X5 (3.0i) M54



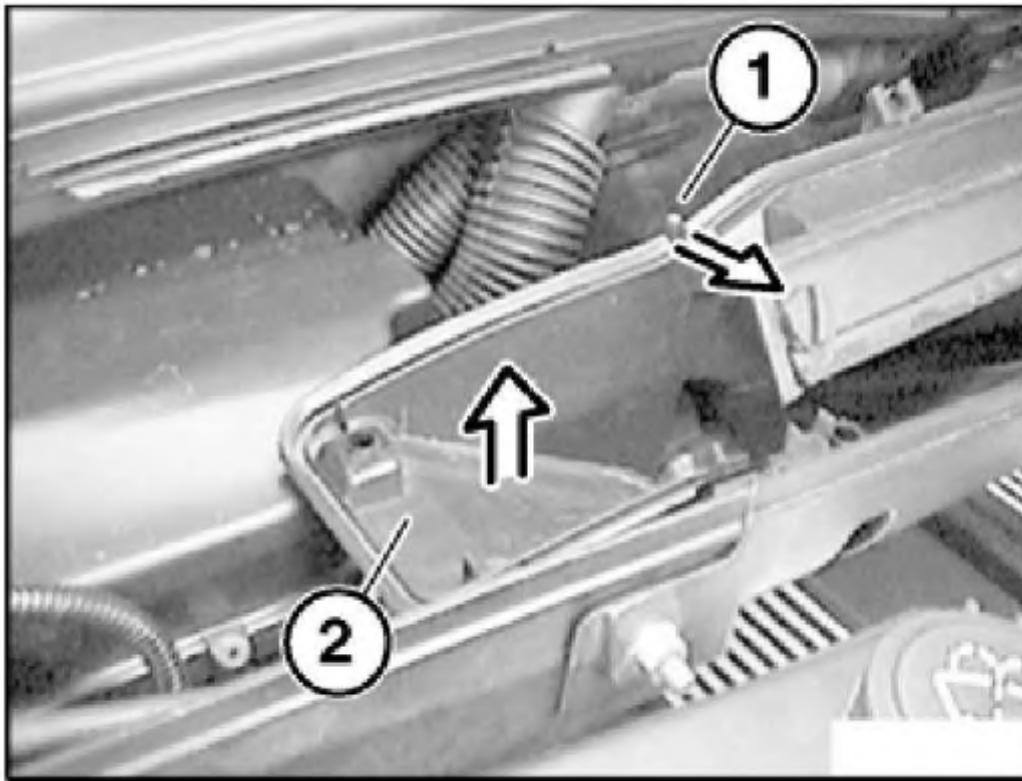
G03230463

### **Fig. 63: Removing Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1).

Remove air funnel (2) towards top.

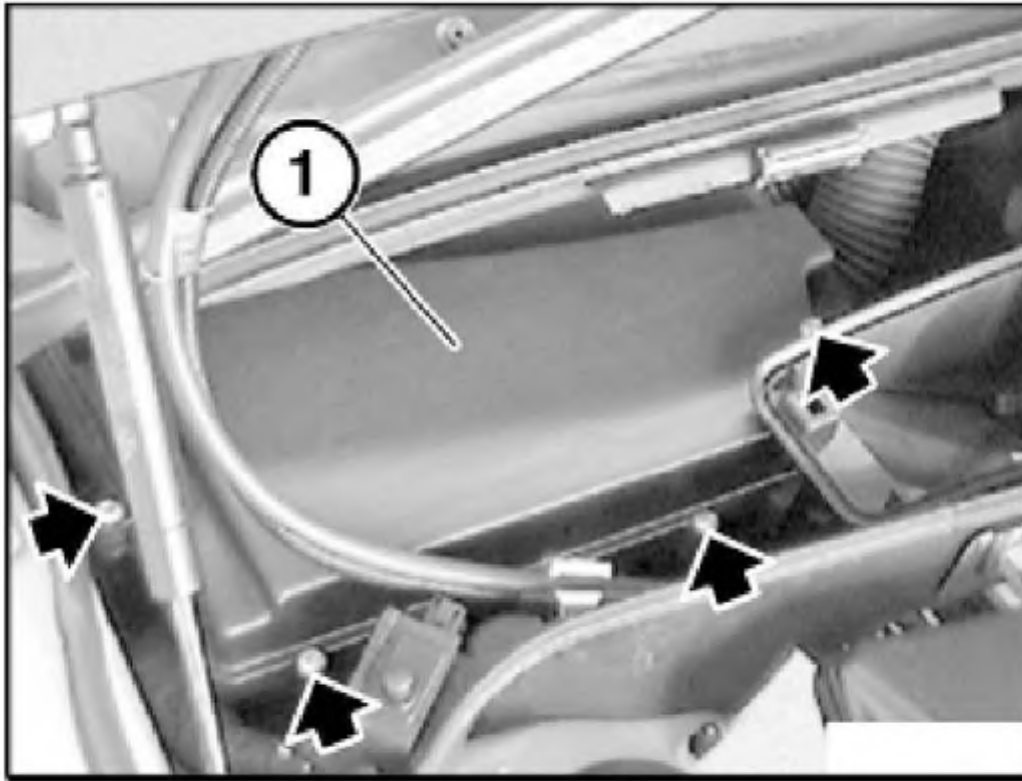


G03230464

**Fig. 64: Removing Air Funnel**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Remove cover (1) on control unit box.

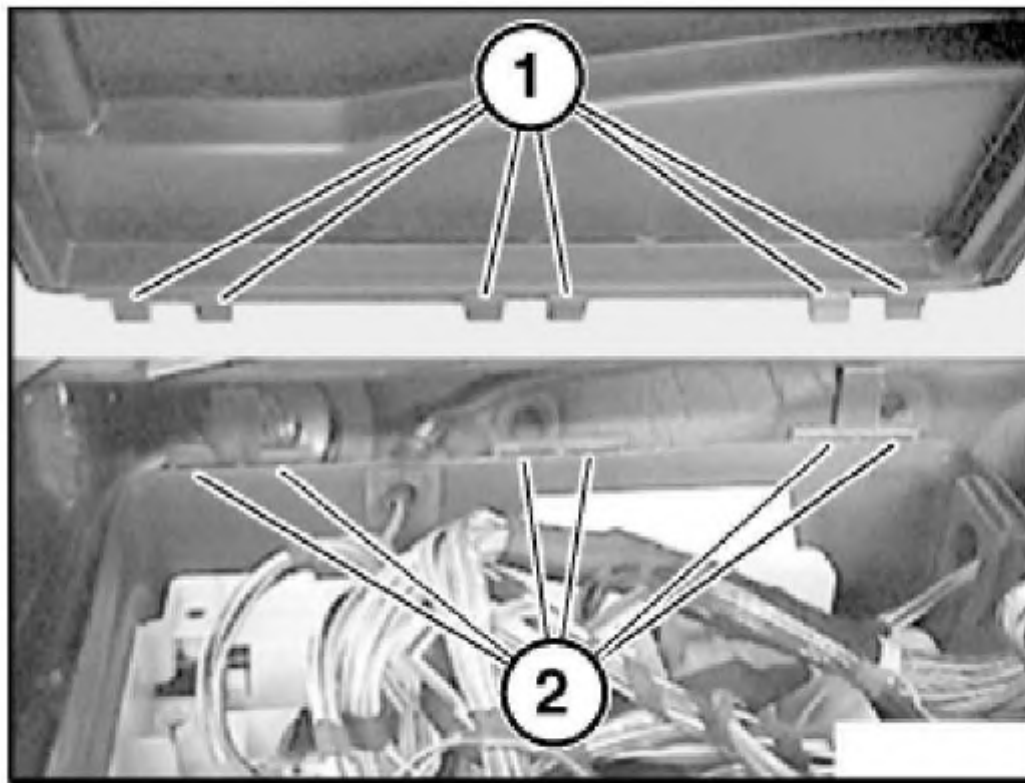


G03230465

**Fig. 65: Removing Control Unit Box Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Insert fixtures (1) of cover for control unit box in openings (2).

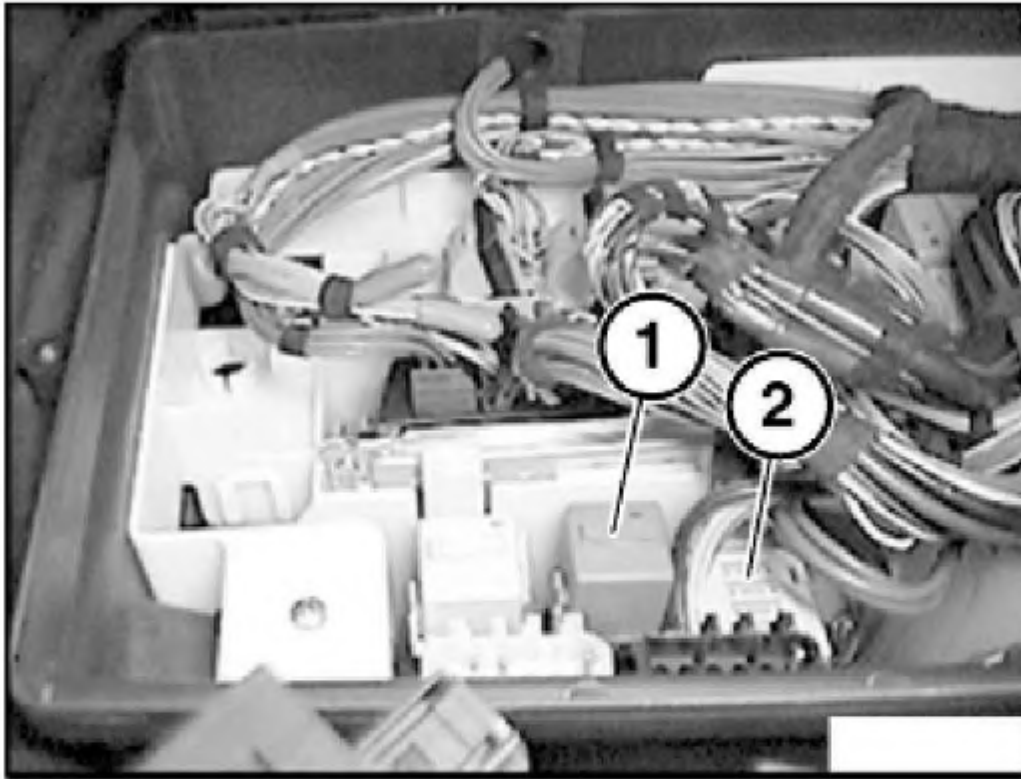


G03230466

**Fig. 66: Inserting Fixtures Of Cover For Control Unit Box In Openings**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Order:**

1. Main relay of Digital Motor Electronics.
2. Engine fuses of Digital Motor Electronics.



1. Main relay of Digital Motor Electronics

2. Engine fuses of Digital Motor Electronics

G03230467

**Fig. 67: Identifying Digital Motor Electronics Main Relay And Engine Fuses**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Notes On Troubleshooting:**

If the starter motor cranks the engine during the starting sequence but the engine fails to fire, then:

1. Check engine fuses.
2. If fuses are blown, replace them completely with fuse holder.
3. Find out why fuses have blown.

Continue troubleshooting as per DIS instructions.

**61 35... NOTE ON REPLACING CODABLE/PROGRAMMABLE CONTROL UNITS****Replacement:**

Carry out coding/programming.

Observe following IDC specifications:

- Programming.
- Coding.



G03230468

**Fig. 68: Identifying MoDiC Or DIS/GT1 Tester.**  
Courtesy of BMW OF NORTH AMERICA, INC.

**ALTERNATOR WITH DRIVE AND MOUNT****12 31... REPLACING ALTERNATOR BELT PULLEY**

**NOTE:** For Special Tool identification, see **SPECIAL TOOLS - X5 (3.0i)** .

**Special Tools Required:**

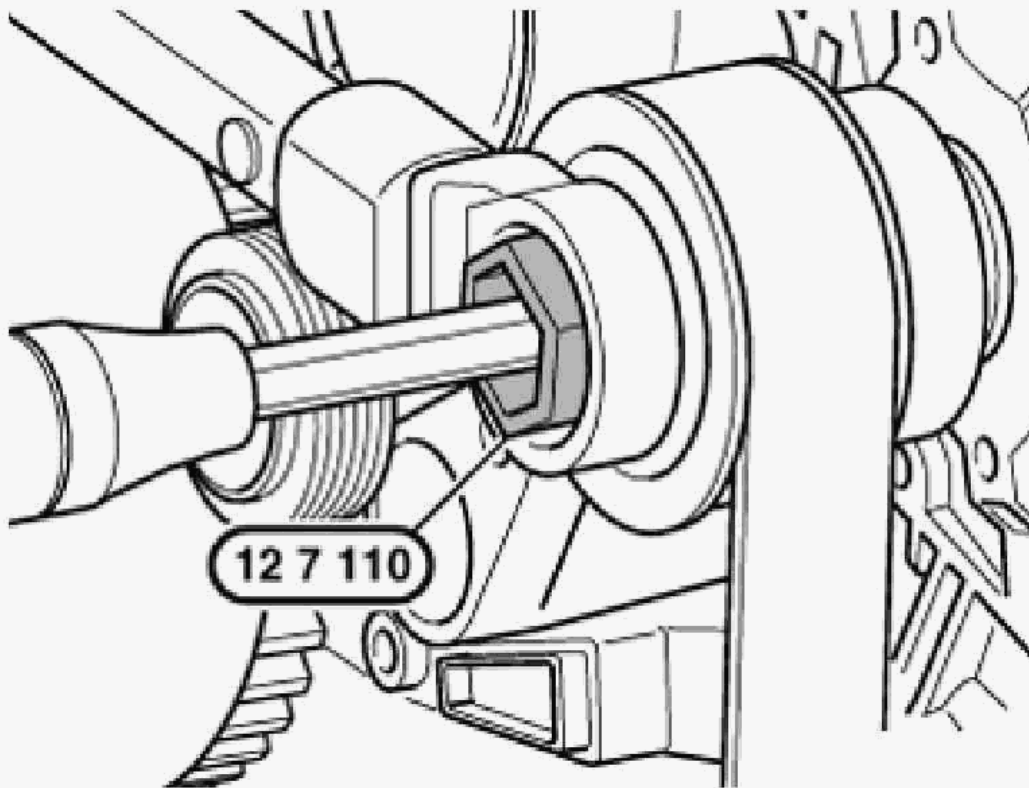
- 12 7 110

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.



G03230469

**Fig. 69: Releasing Nut Using Socket Wrench Socket WAF 24**

## 2002 BMW X5 30i

2001-2003 ENGINE Ignition System - Repair Instructions - X5 (3.0i) M54

Courtesy of BMW OF NORTH AMERICA, INC.

### Installation:

Tightening torque, refer to 12 31 2AZ / 12 31 3AZ in ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES .

### 12 31 009 CHECKING ALTERNATOR AND REGULATOR SWITCH

#### Test Requirements:

- Correct connections on charged battery.
- Correct connections on alternator and starter motor.
- Good ground connection between engine and body.
- Tightened drive belt.

#### Connect DIS Tester:

- Measurement.
- Checking alternator.

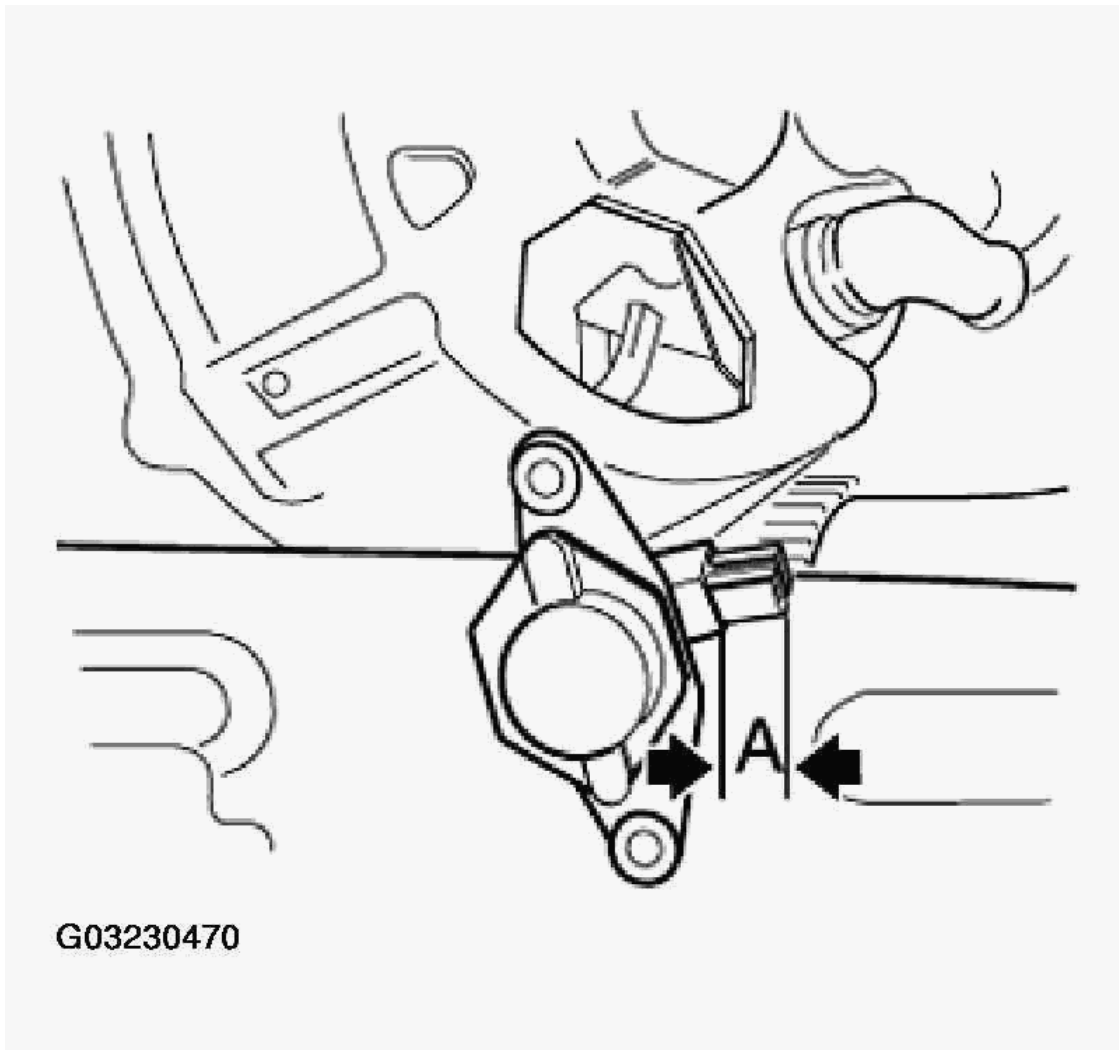
If charge indicator lamp is permanently lit:

Remove voltage regulator and check carbon brushes, replace if necessary.

Replace alternator regulator switch. Refer to 12 32 501 REPLACING VOLTAGE REGULATOR (VALEO/BOSCH) .

**NOTE:** Minimum length of carbon brushes "A" = 5 mm.





**Fig. 70: Identifying Minimum Length Of Carbon Brushes**

Courtesy of BMW OF NORTH AMERICA, INC.

If charge indicator lamp goes out while engine is running:

Check control voltage. Refer to **ENGINE ELECTRICAL SYSTEM - TECHNICAL DATA** .

Regulator switch must be replaced if control voltage is not achieved.

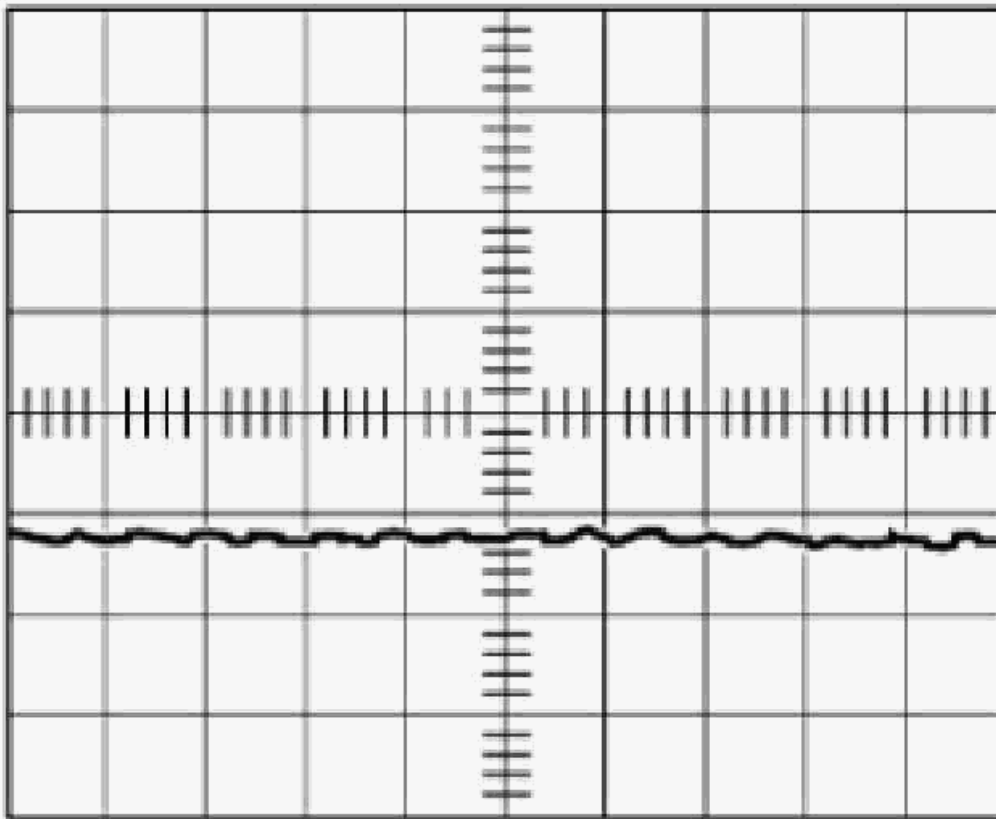
Replace alternator regulator switch. Refer to **12 32 501 REPLACING VOLTAGE REGULATOR (VALEO/BOSCH)** .

**From E46/E39 With Multifunction Regulator:**

Recognizable by plug connection on regulator.

Connect DIS Tester.

- Function selection.
- Complete vehicle.
- Drive.
- Voltage and current regulation.
- Voltage and current generation.
- Work through test modules.

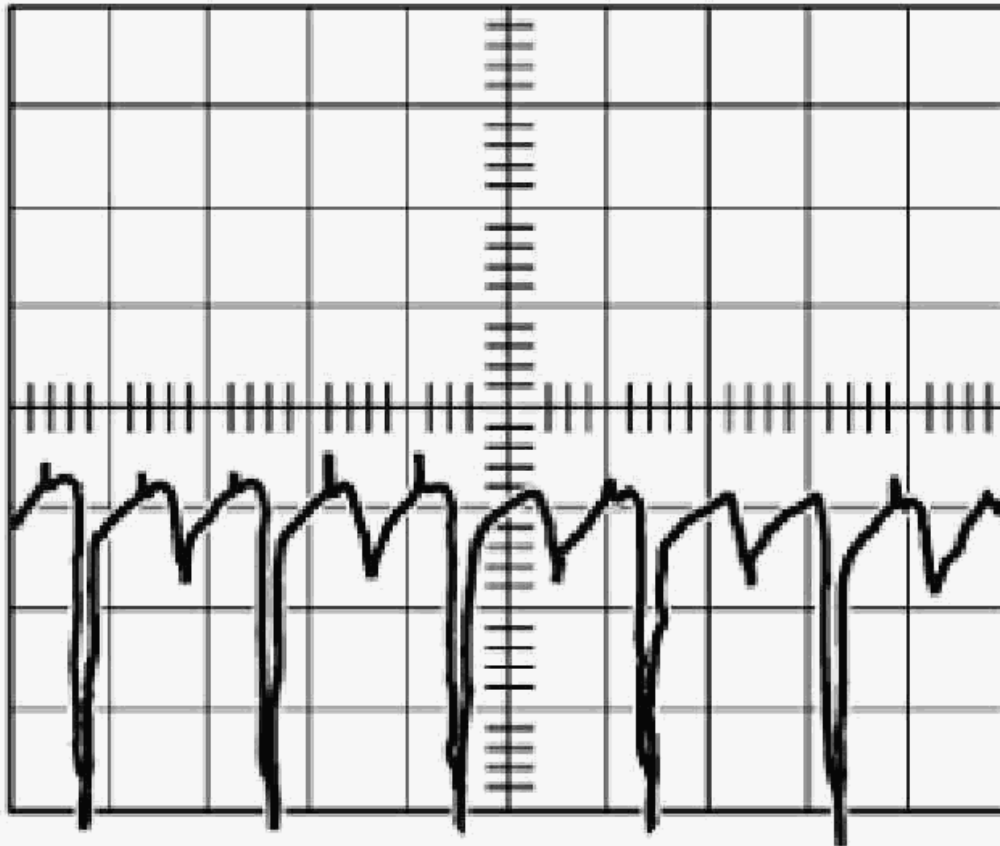
**Oscillogram For A Fault-Free Alternator:****G03230471**

**Fig. 71: Oscillogram For Fault-Free Alternator**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Oscillogram For A Faulty Alternator:**

One phase interrupted.

Repair/exchange alternator.

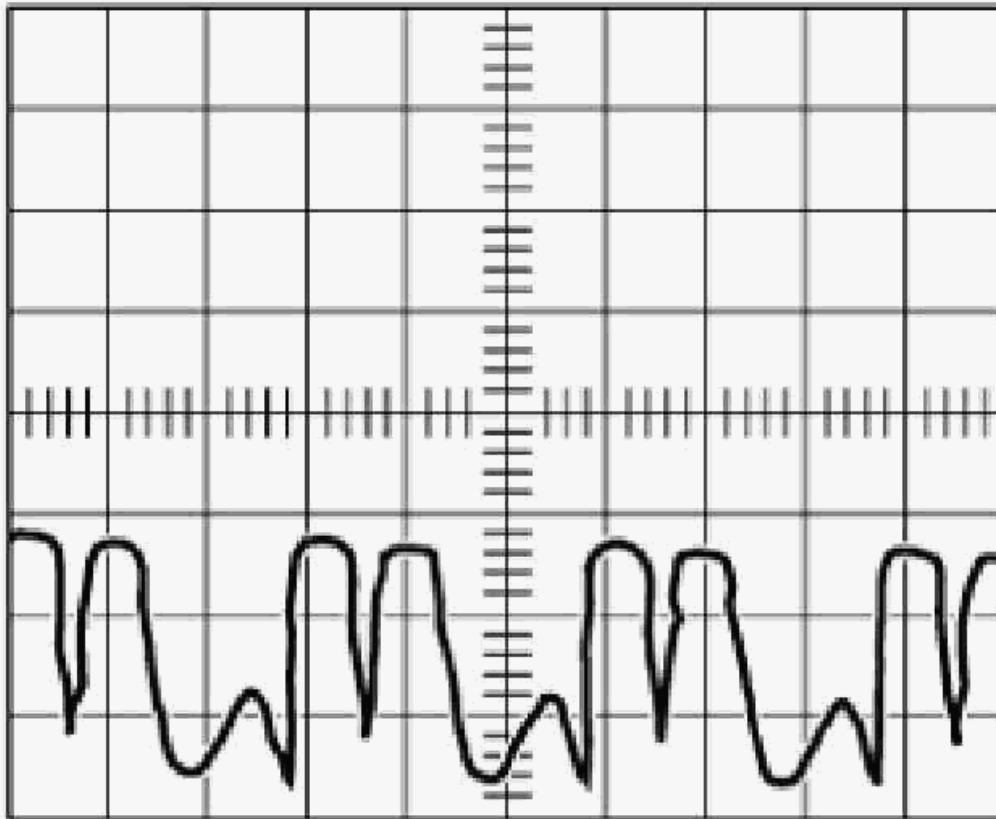


G03230472

**Fig. 72: Oscillogram For Faulty Alternator**  
Courtesy of BMW OF NORTH AMERICA, INC.

Interturn fault.

Repair/exchange alternator.

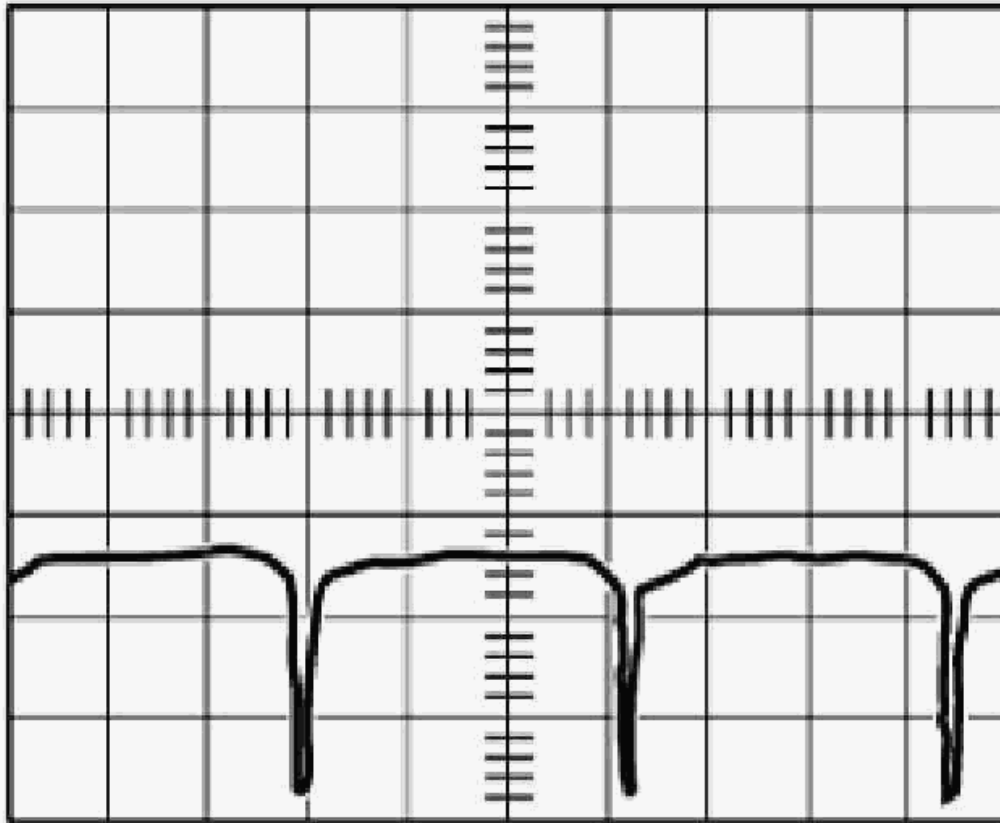
**G03230473**

**Fig. 73: Oscillogram For Interturn Fault**

Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in negative diode.

Repair/exchange alternator.

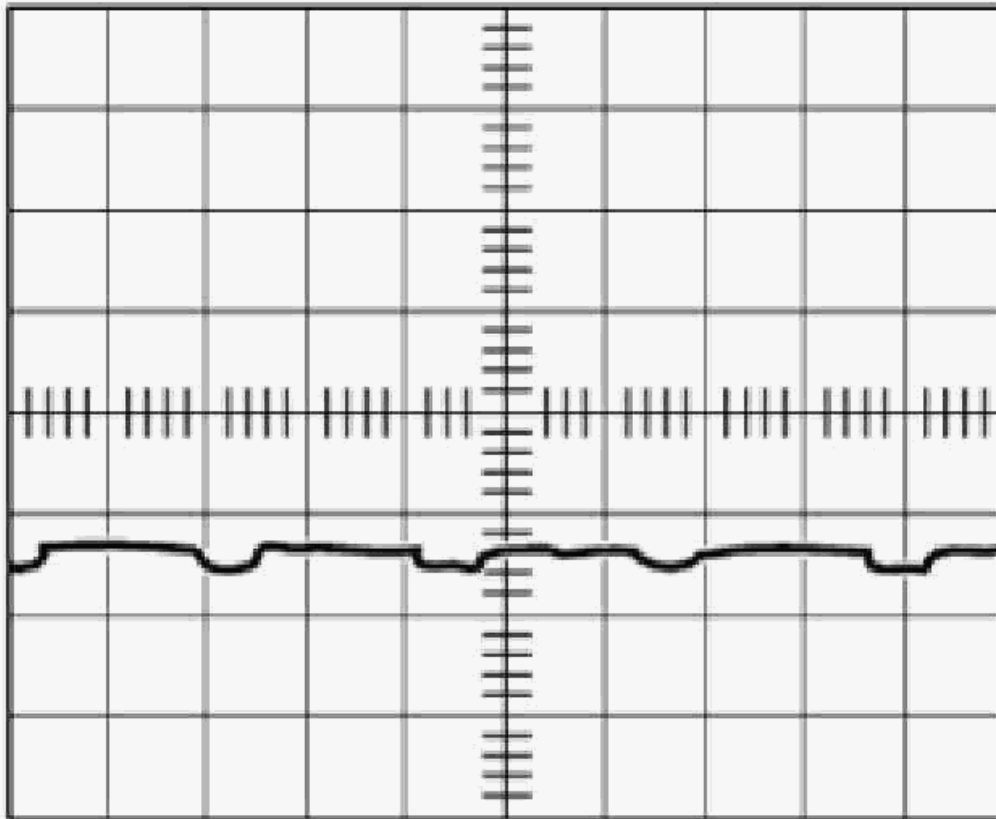


G03230474

**Fig. 74: Oscillogram For Open Circuit In Negative Diode**  
Courtesy of BMW OF NORTH AMERICA, INC.

Short circuit in positive diode.

Repair/exchange alternator.

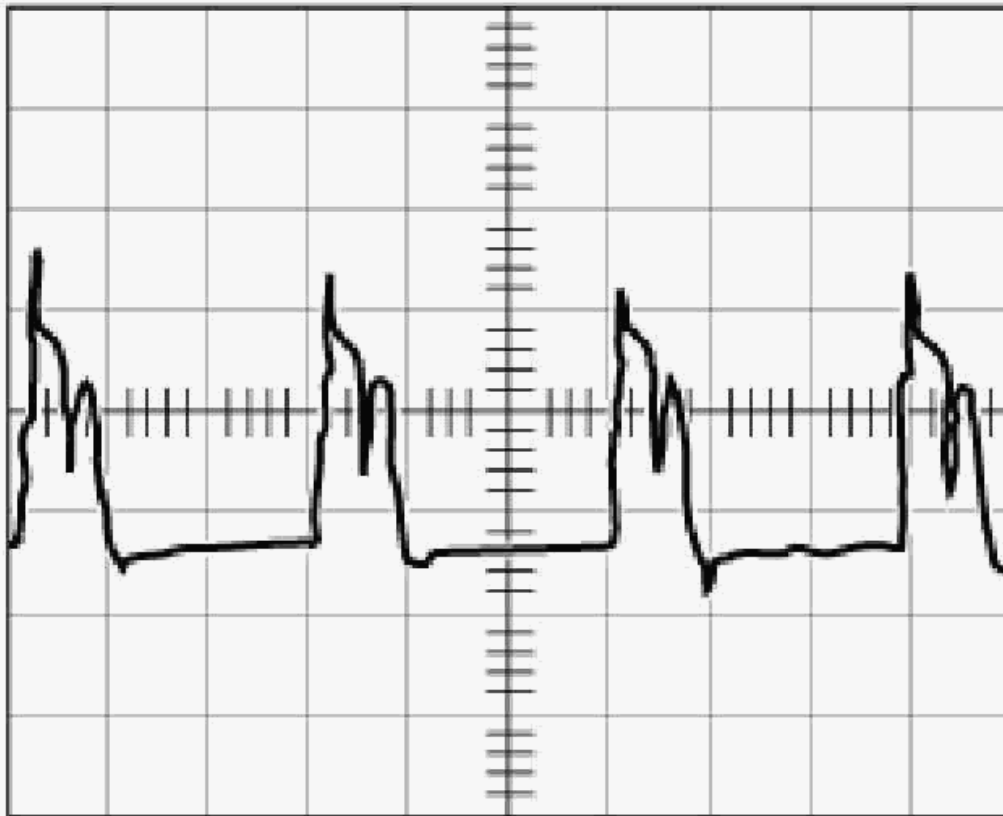


G03230475

**Fig. 75: Oscillogram For Short Circuit In Positive Diode**  
Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in positive diode.

Repair/exchange alternator.

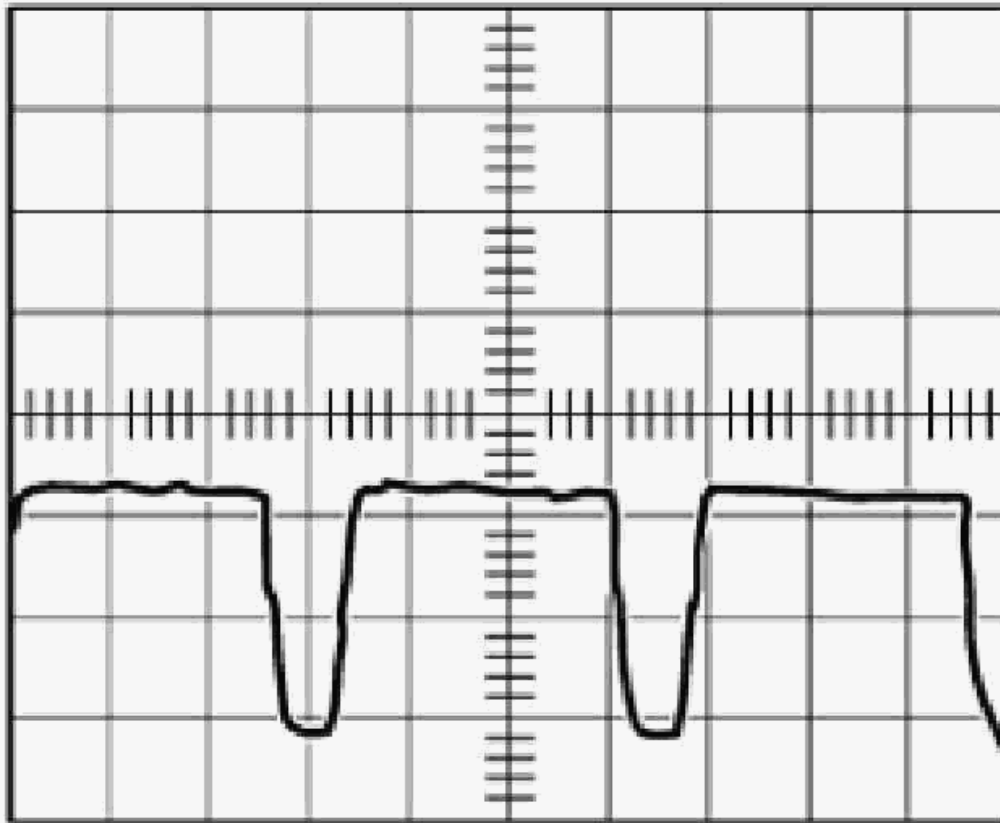


G03230476

**Fig. 76: Oscillogram For Open Circuit In Positive Diode**  
Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in exciter diode.

Repair/exchange alternator.



G03230477

**Fig. 77: Oscillogram For Open Circuit In Exciter Diode**  
Courtesy of BMW OF NORTH AMERICA, INC.

**12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (M52, M52TU, S50US, S52, M54, M56)**

**Necessary Preliminary Tasks:**

- Read out stored fault messages.
- Switch off ignition.
- Follow instructions for disconnecting and connecting battery. Refer to **12 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .
- Disconnect and cover battery negative terminal.
- Remove suction filter housing. Refer to **13 71 000 REMOVING AND INSTALLING INTAKE**



**FILTER HOUSING (M54) .**

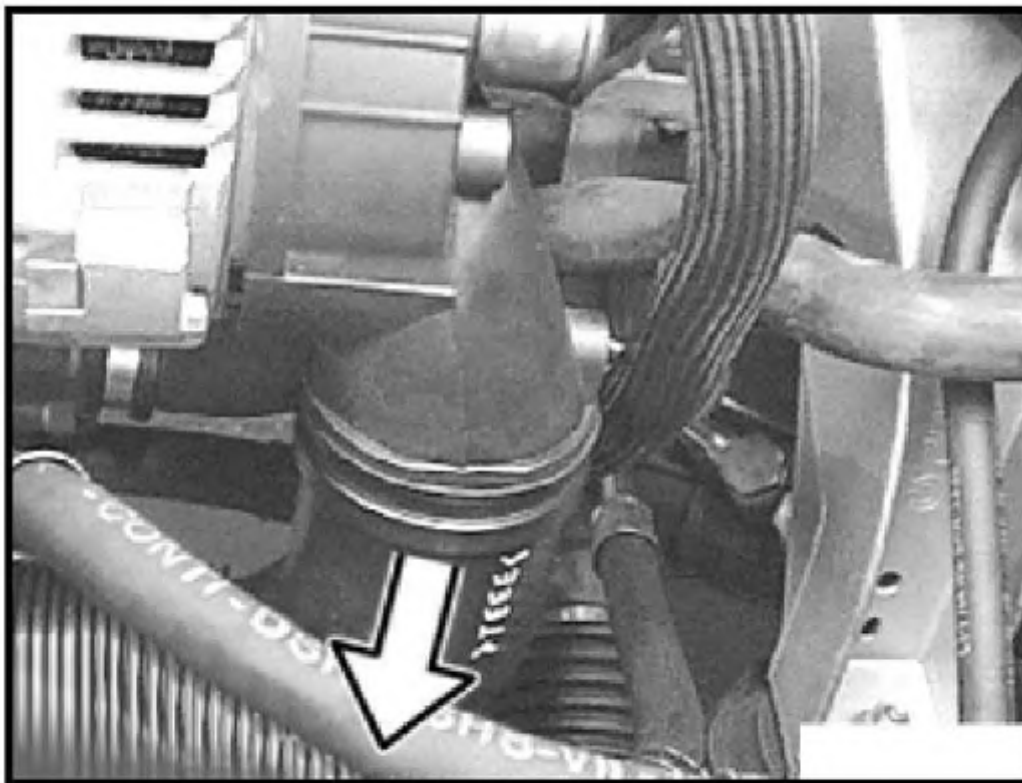
- Remove fan clutch. Refer to **11 52 020 REMOVING AND INSTALLING/REPLACING FAN CLUTCH (S52 / S54 / M52 / M52TU / M54 / M56) .**
- Remove alternator drive belt. Refer to **11 28 010 REPLACING ALTERNATOR DRIVE BELT (M52 / S52 / M52TU / M54 / M56) .**

If necessary, drain supply tank for power steering pump, remove with holder and place to one side.

**NOTE:** Lines on supply tank for power steering pump remain connected.

If fitted:

Remove air hose.



G03230478

**Fig. 78: Removing Air Hose**  
Courtesy of BMW OF NORTH AMERICA, INC.

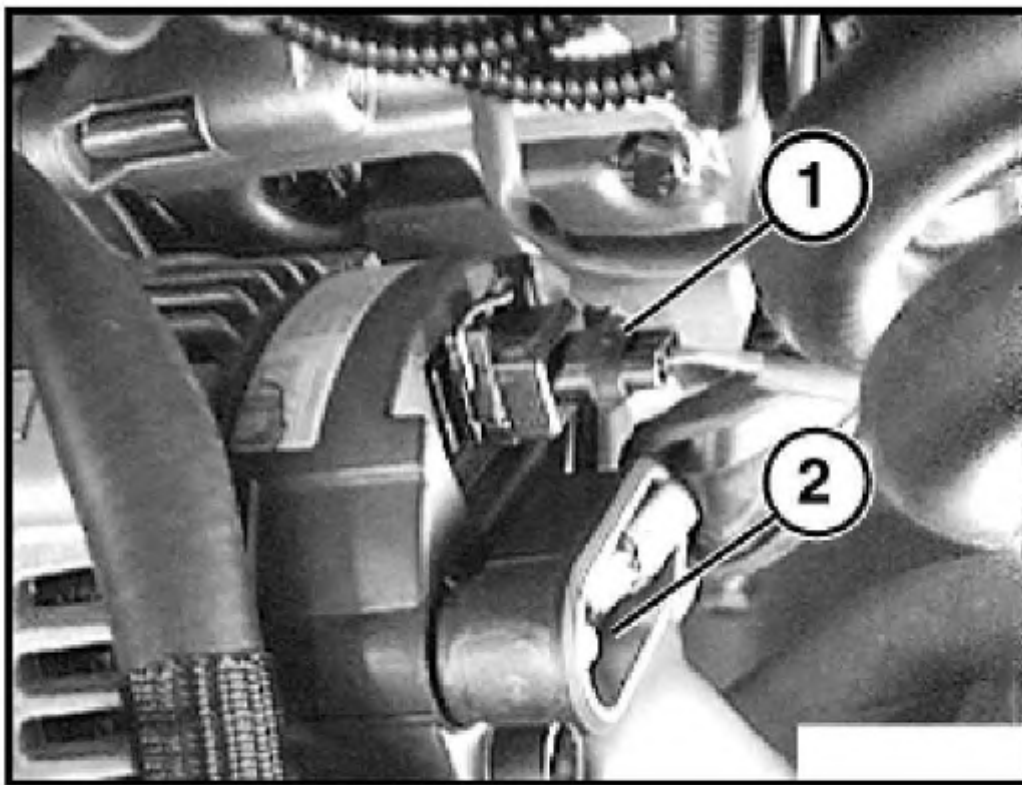
**Version 1:**

Take off cap on connections.

Disconnect plug connection (1).

Release nut (2) and disconnect battery positive lead.

Tightening torque, refer to 12 31 1AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .



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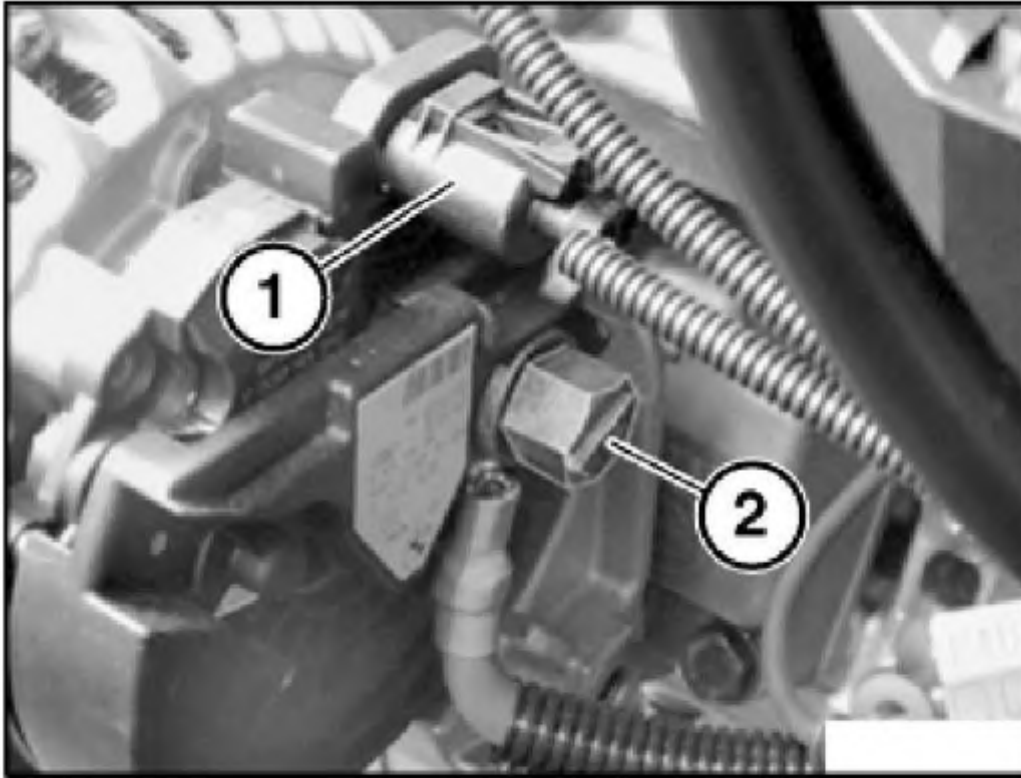
**Fig. 79: Disconnecting Plug Connection And Battery Positive Lead (Version 1)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Version 2:**

Unlock and detach plug connection (1).

Release nut (2) and disconnect battery positive lead.

Tightening torque, refer to 12 31 1AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .



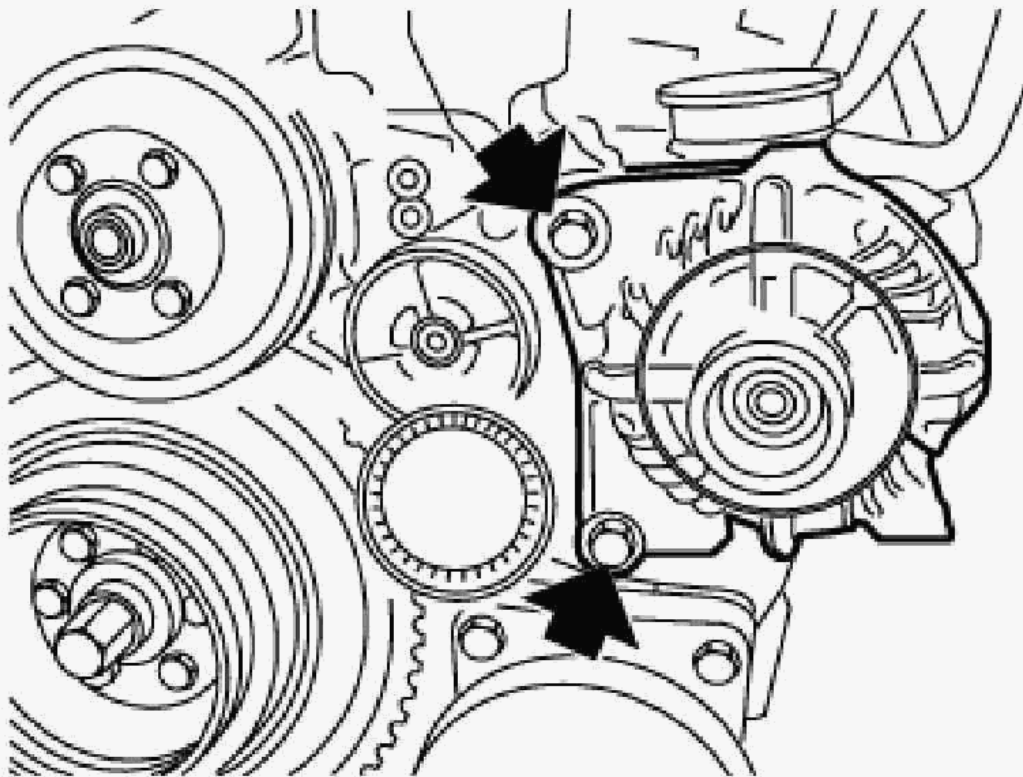
G03230480

**Fig. 80: Disconnecting Plug Connection And Battery Positive Lead (Version 2)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Version Without Idler Pulley:**

Release alternator screws in succession while simultaneously gripping alternator firmly.

Remove alternator.



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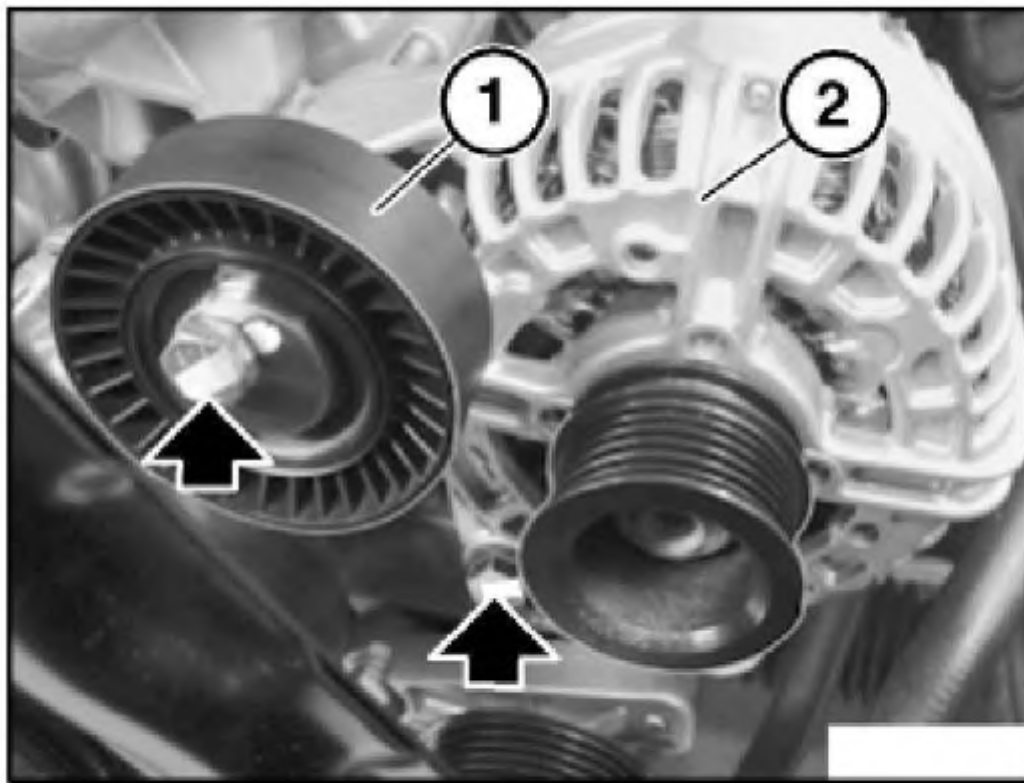
**Fig. 81: Removing Alternator (Version Without Idler Pulley)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Version With Idler Pulley:**

Remove cover from idler pulley (1).

Release screw and remove idler pulley (1).

Release screw and remove alternator (2).



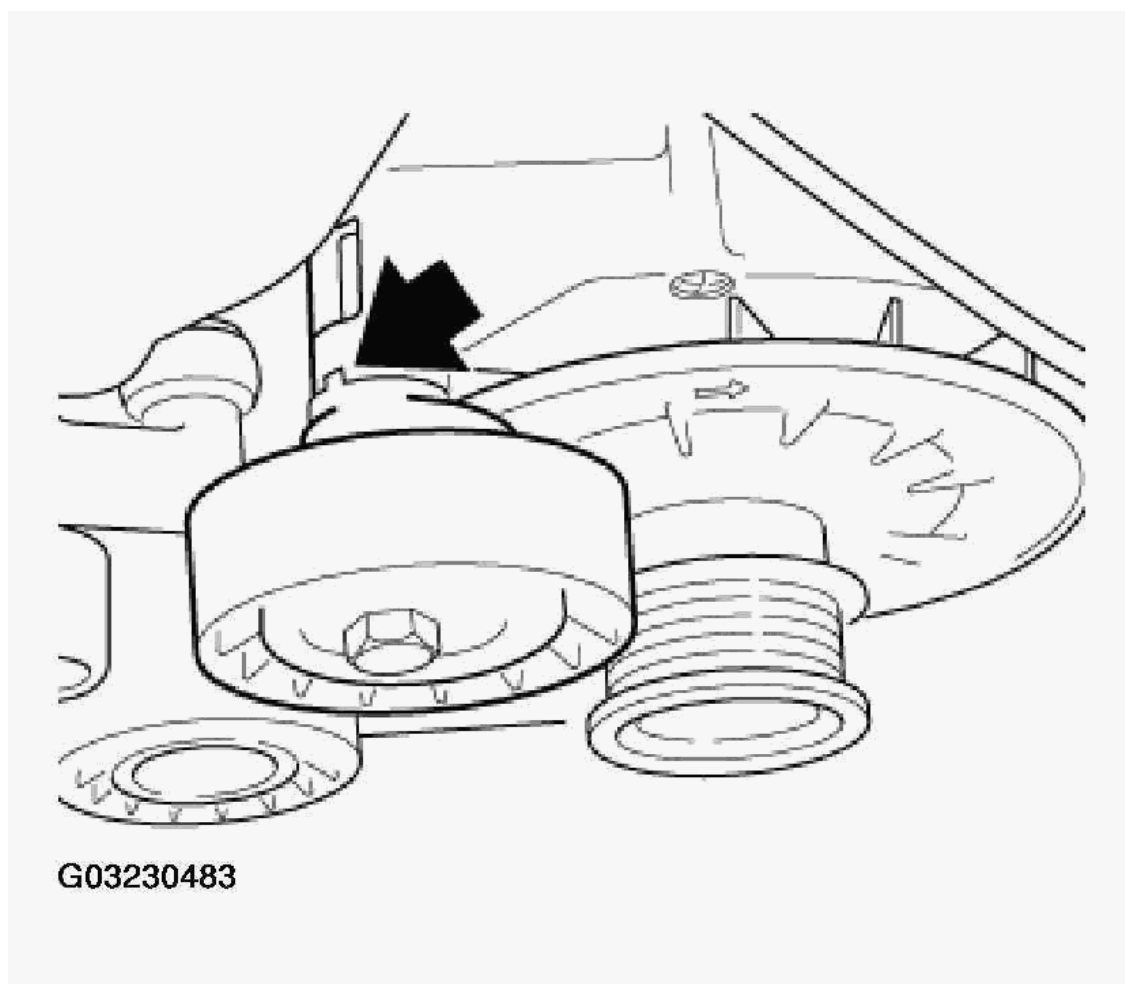
G03230482

**Fig. 82: Releasing Screw And Removing Alternator (Version With Idler Pulley)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Version With Idler Pulley:**

**Installation:**

Turning lock of tensioning roller must engage in alternator groove.



**Fig. 83: Turning Lock Of Tensioning Roller Must Engage In Alternator Groove (Version With Idler Pulley)**

Courtesy of BMW OF NORTH AMERICA, INC.

Interrogate fault memory of DME control unit.

Now clear the fault memory.

## **REGULATOR**

### **12 32 501 REPLACING VOLTAGE REGULATOR (VALEO/BOSCH)**

Refer to **12 00 ... INSTRUCTIONS FOR CONNECTING AND DISCONNECTING TEST UNITS** and **12 00 ... INSTRUCTIONS ON COMPONENT TESTING** .

Read fault memory.

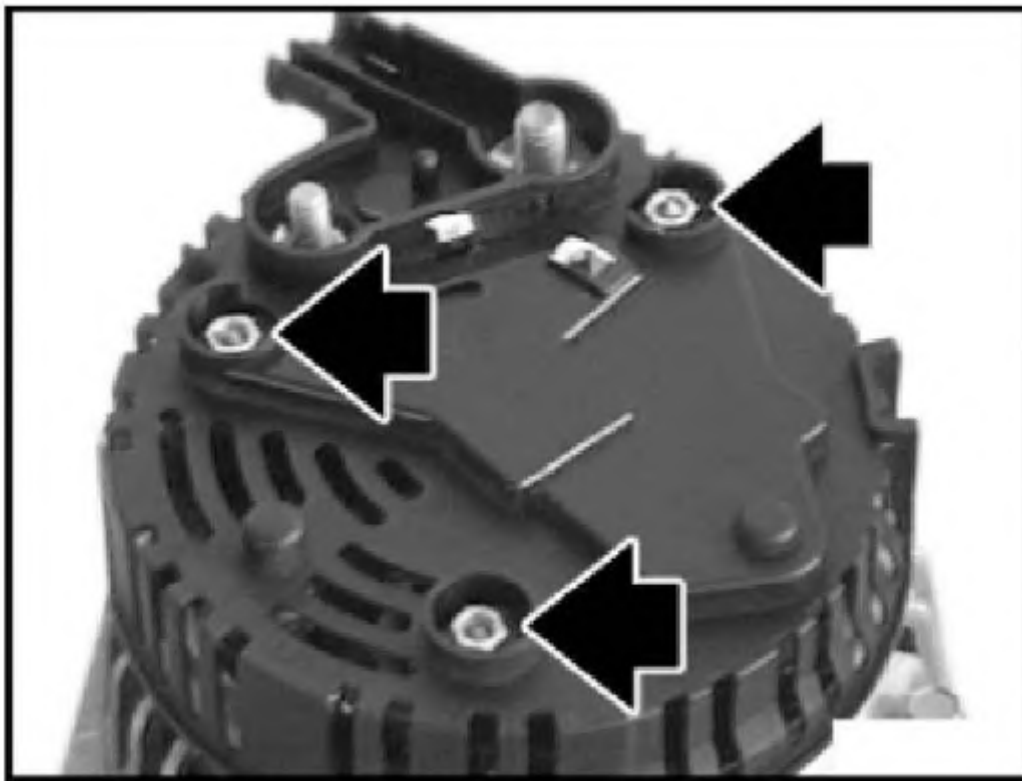
Follow instructions for disconnecting and connecting battery. Refer to **12 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .

Disconnect battery ground wire.

Remove alternator. Refer to **12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (M52, M52TU, S50US, S52, M54, M56)** .

**Valeo Alternator:**

Release screws on cover.

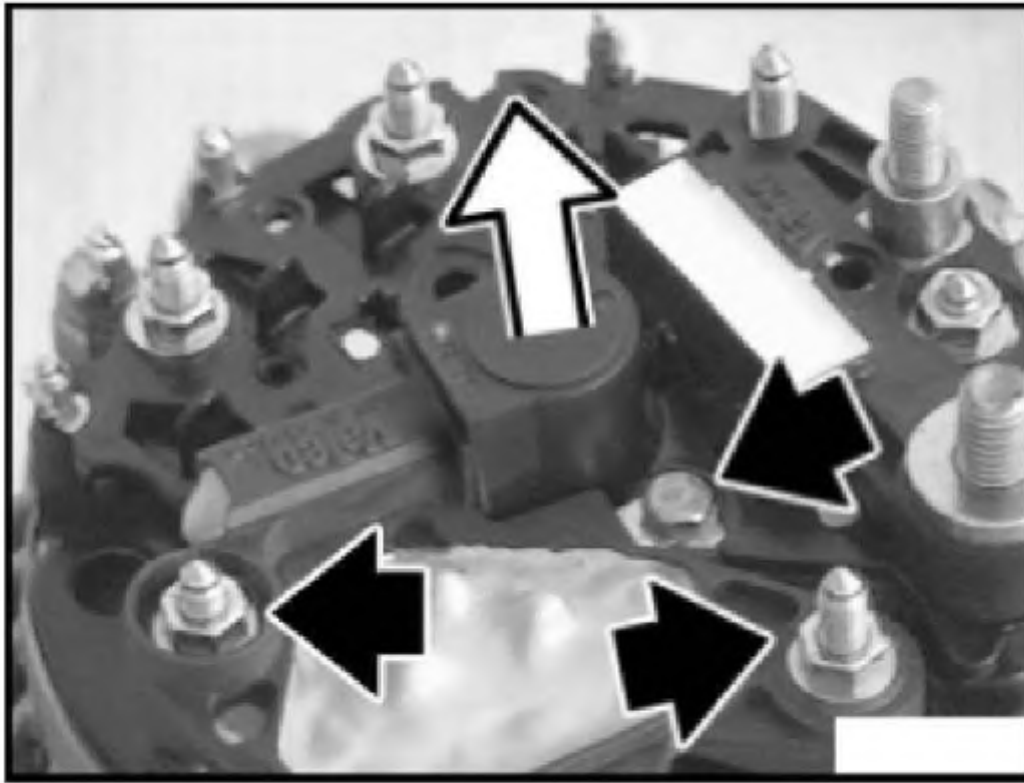


G03230484

**Fig. 84: Release Screws On Cover (Valeo Alternator)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Remove regulator switch.

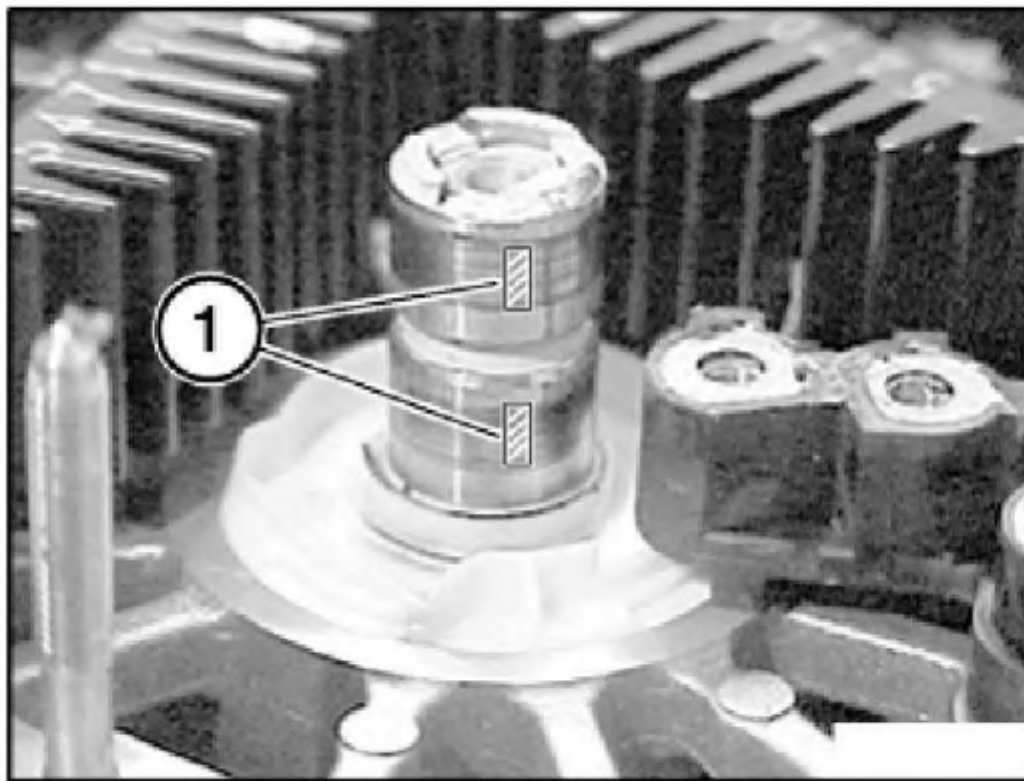


G03230485

**Fig. 85: Removing Regulator Switch (Valeo Alternator)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Check contact surfaces of collector rings for wear and recondition if necessary.





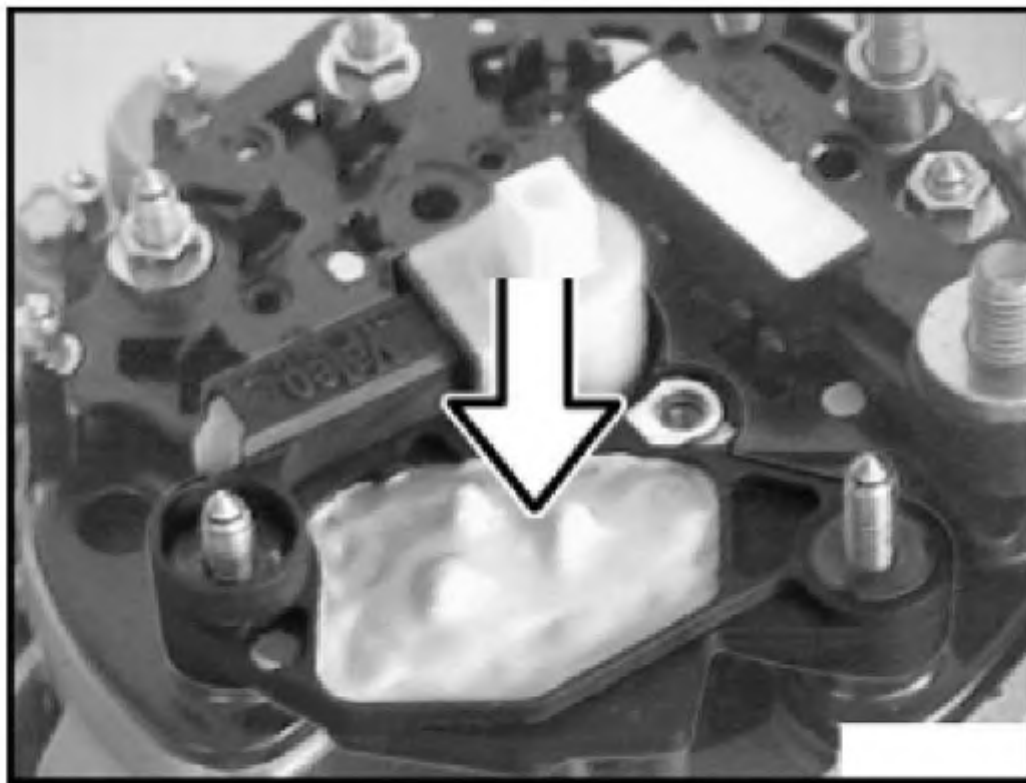
G03230486

**Fig. 86: Checking Contact Surfaces Of Collector Rings (Valeo Alternator)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Install regulator switch with assembly cap.

Initially tighten nuts of regulator switch.

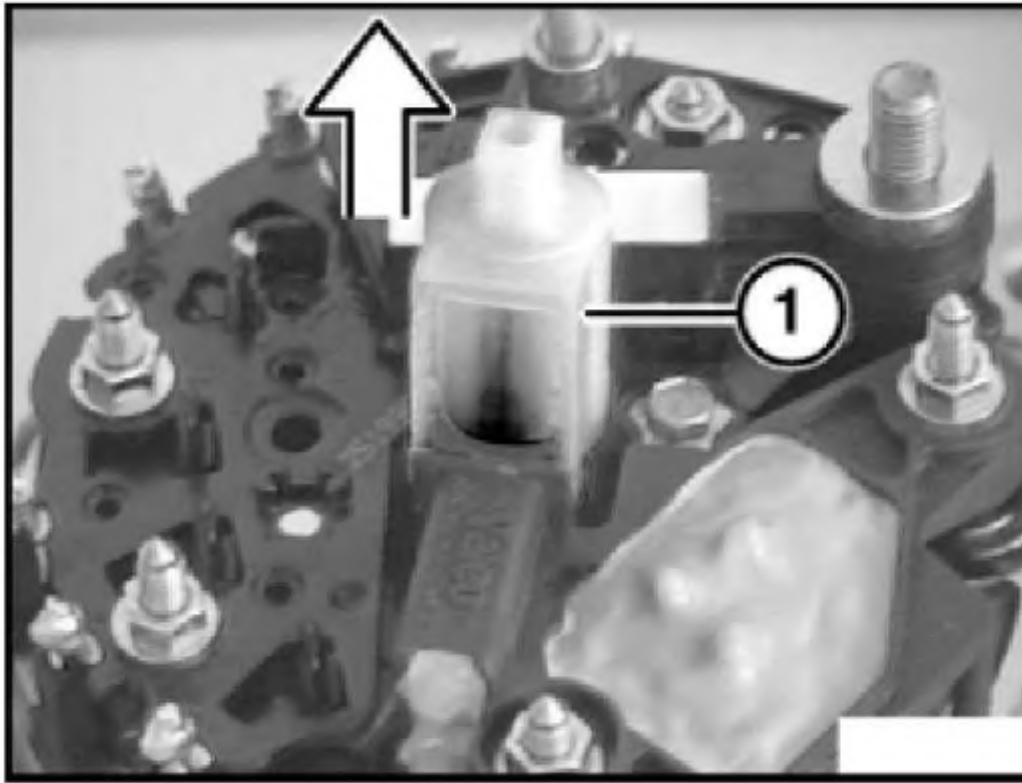


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**Fig. 87: Installing Regulator Switch With Assembly Cap (Valeo Alternator)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Remove assembly cap (1).



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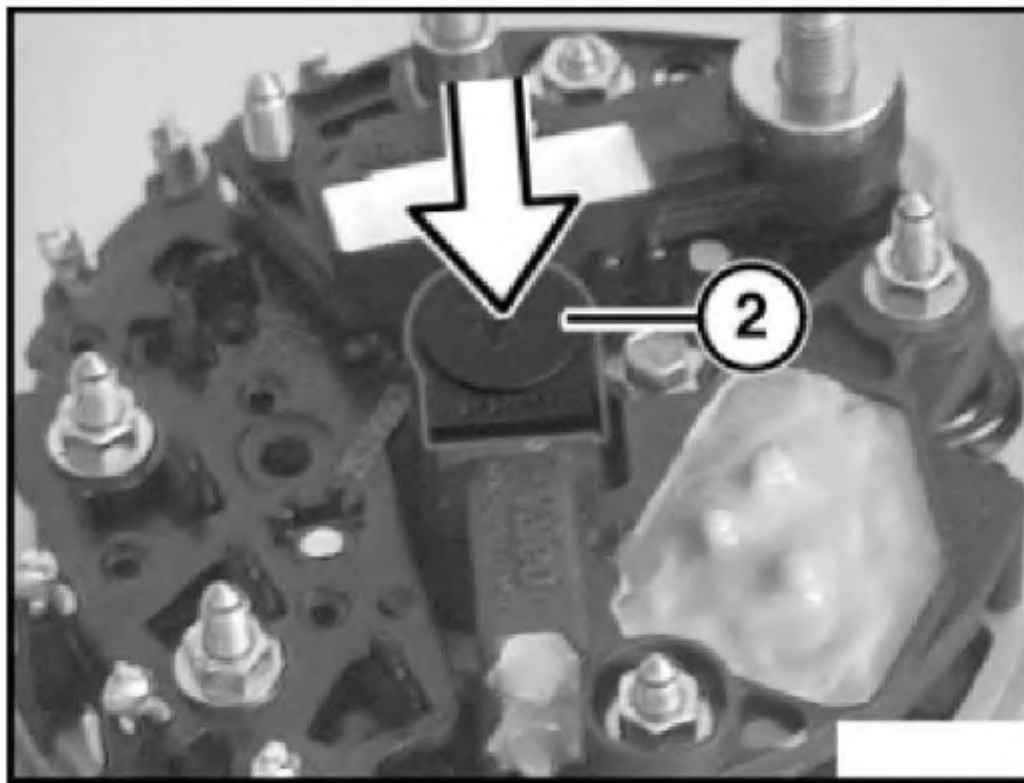
**Fig. 88: Removing Assembly Cap (Valeo Alternator)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Fit supplied cover cap (2).

Tighten down nuts and ground screw of regulator switch.

Tightening torque, refer to 12 32 1AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

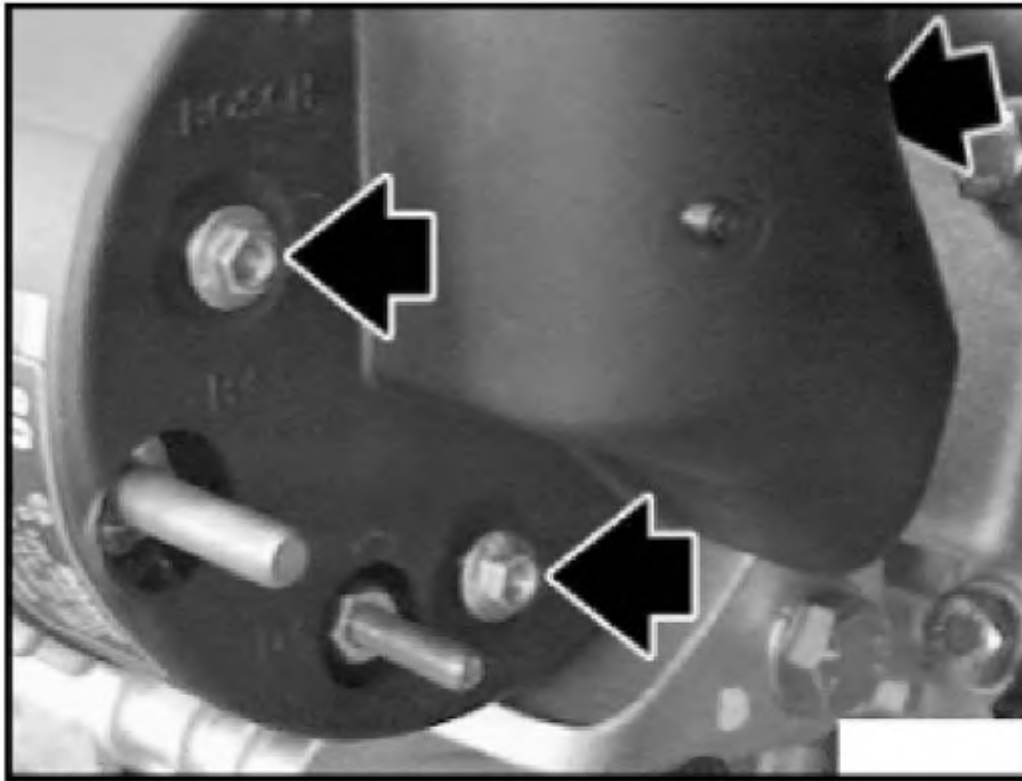


G03230489

**Fig. 89: Fitting Supplied Cover Cap (Valeo Alternator)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Bosch Alternator:**

Release screws on cover.



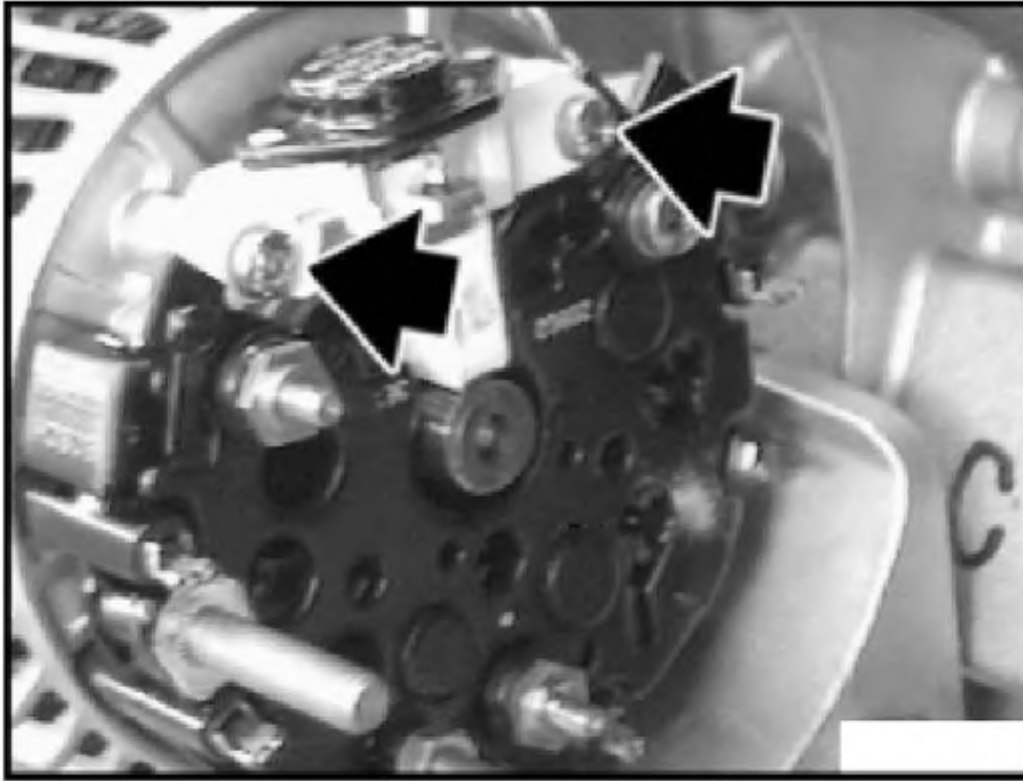
G03230490

**Fig. 90: Releasing Screws On Cover (Bosch Alternator)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Remove regulator switch.

Check contact surfaces of collector rings for wear and recondition if necessary.



G03230491

**Fig. 91: Identifying Contact Surfaces Of Collector Rings (Bosch Alternator)**  
Courtesy of BMW OF NORTH AMERICA, INC.

## STARTER WITH MOUNTING

### 12 41 020 REMOVING AND INSTALLING/REPLACING STARTER MOTOR (M54)

#### Necessary Preliminary Tasks:

- Switch off ignition.
- Follow instructions for disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .

Disconnect battery negative lead from battery.

**NOTE:** Remove starter motor from below.

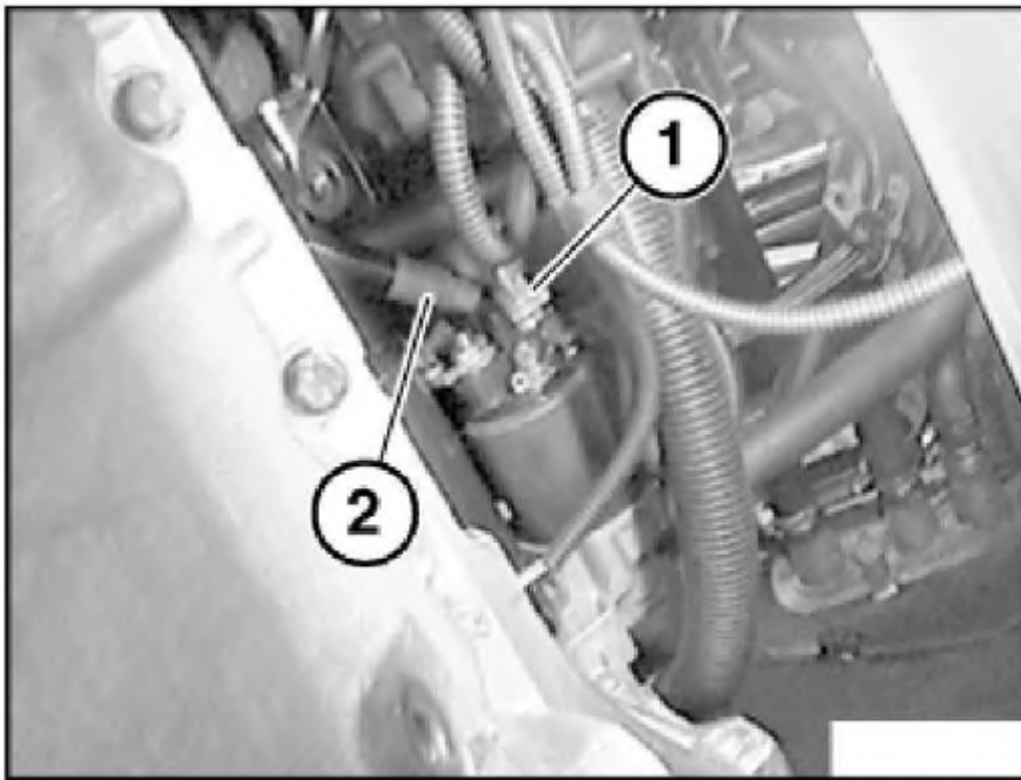
Unscrew nut (1).

Tightening torque, refer to 12 41 4AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

Disconnect battery positive lead (2) from starter motor.

**NOTE:** For purposes of clarity, reinforcement plate is now shown.

Do not remove reinforcement plate.



G03230492

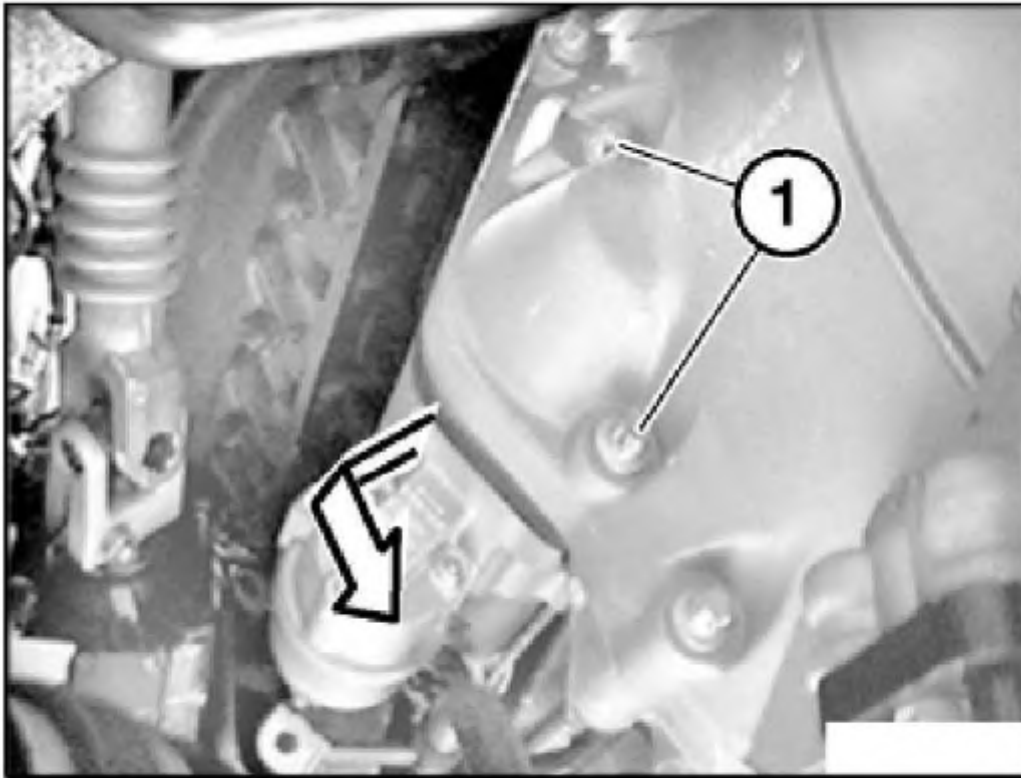
**Fig. 92: Disconnecting Battery Positive Lead From Starter Motor**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque, (45 N.m).

Pull starter motor out of transmission mount and turn in order to facilitate access to control leads on starter

motor.



G03230493

**Fig. 93: Releasing Starter Motor Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

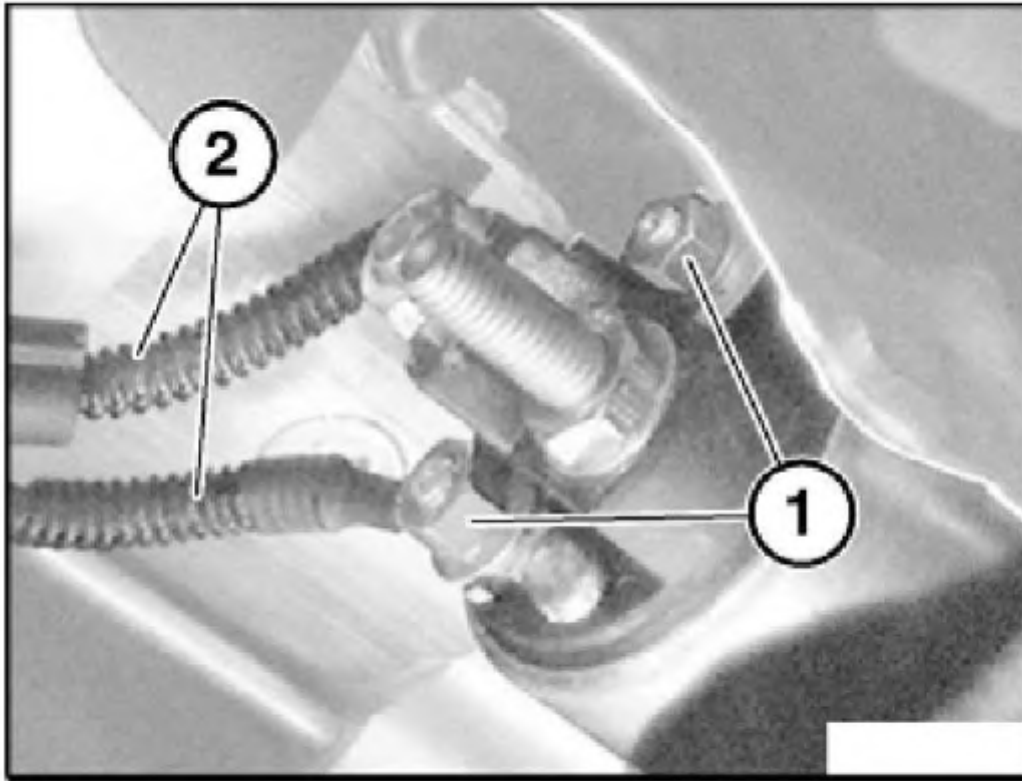
Unscrew nuts (1).

Tightening torque, refer to 12 41 4AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

Detach control leads (2) from starter motor.

Remove starter motor.



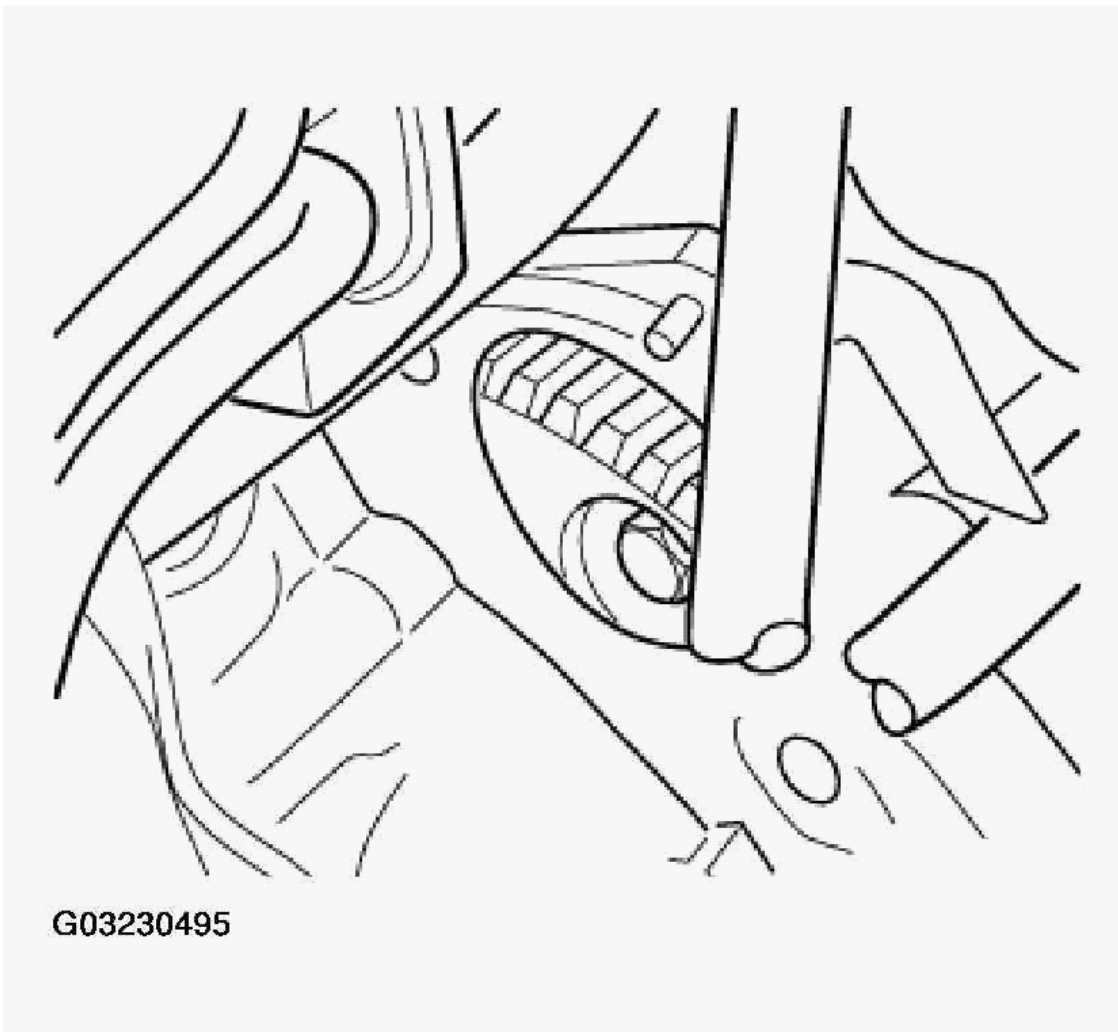


G03230494

**Fig. 94: Detaching Control Leads From Starter Motor**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Check starter pinion and starter ring gear for damage.



**Fig. 95: View Of Starter Pinion And Starter Ring Gear**  
Courtesy of BMW OF NORTH AMERICA, INC.

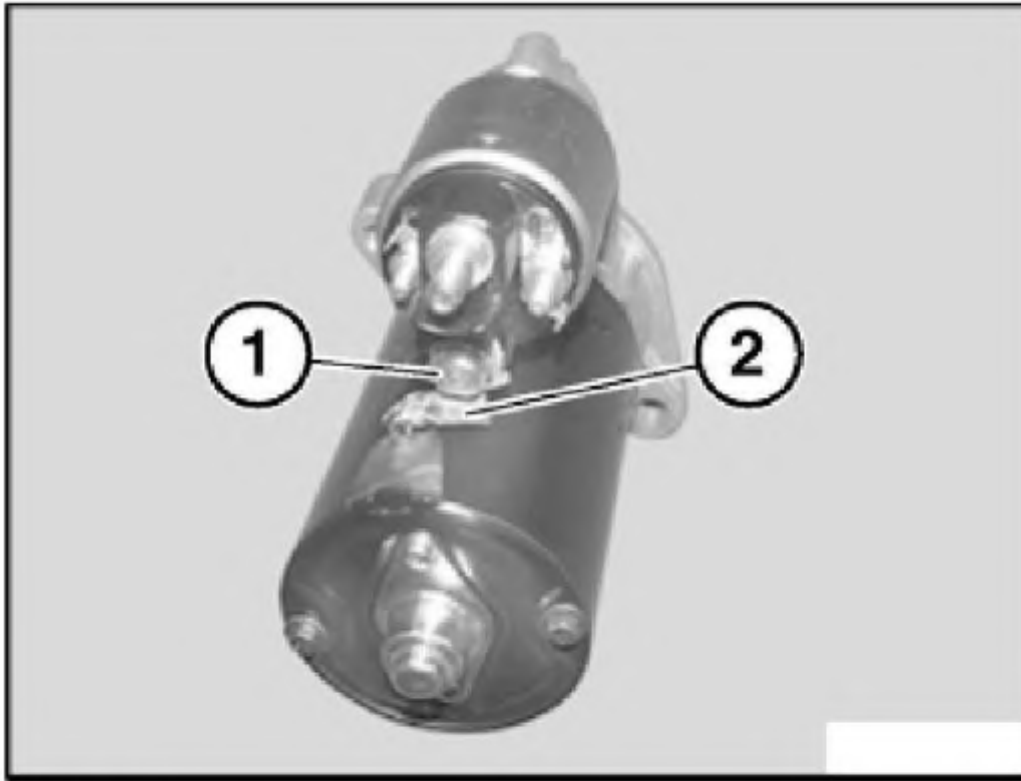
## **12 41 041 REPLACING SOLENOID SWITCH**

Turn off ignition.

Remove starter motor.

Release nut (1).

Remove cable lug (2).



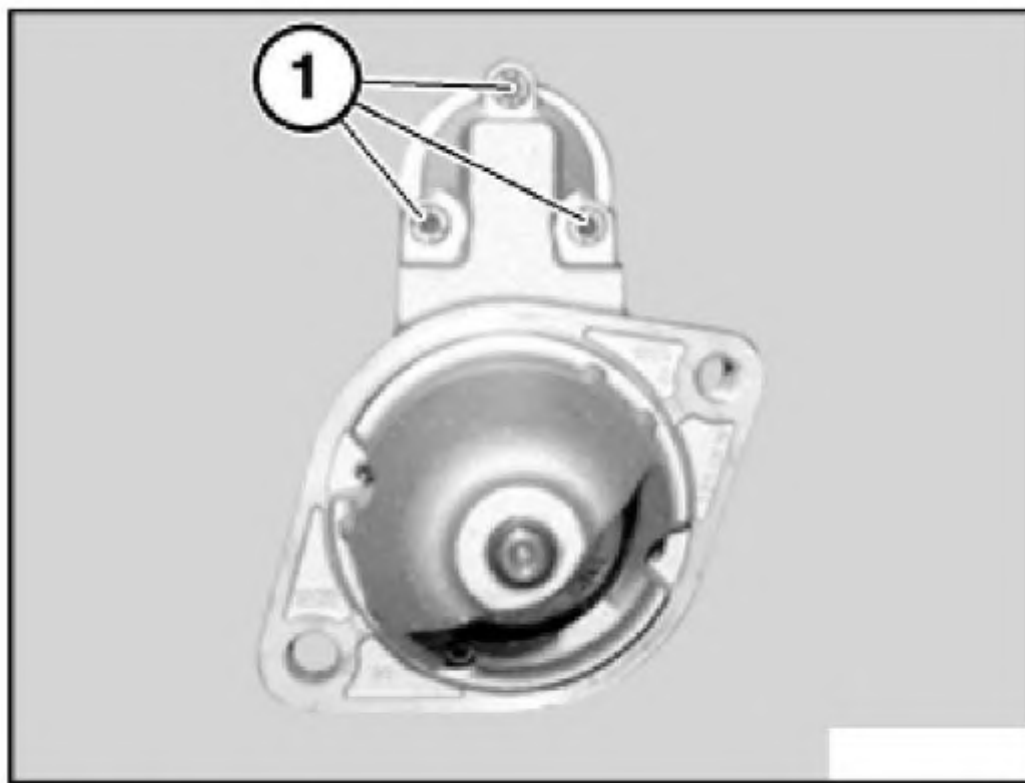
G03230496

**Fig. 96: Removing 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, refer to 12 41 4AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

Release screws (1).



G03230497

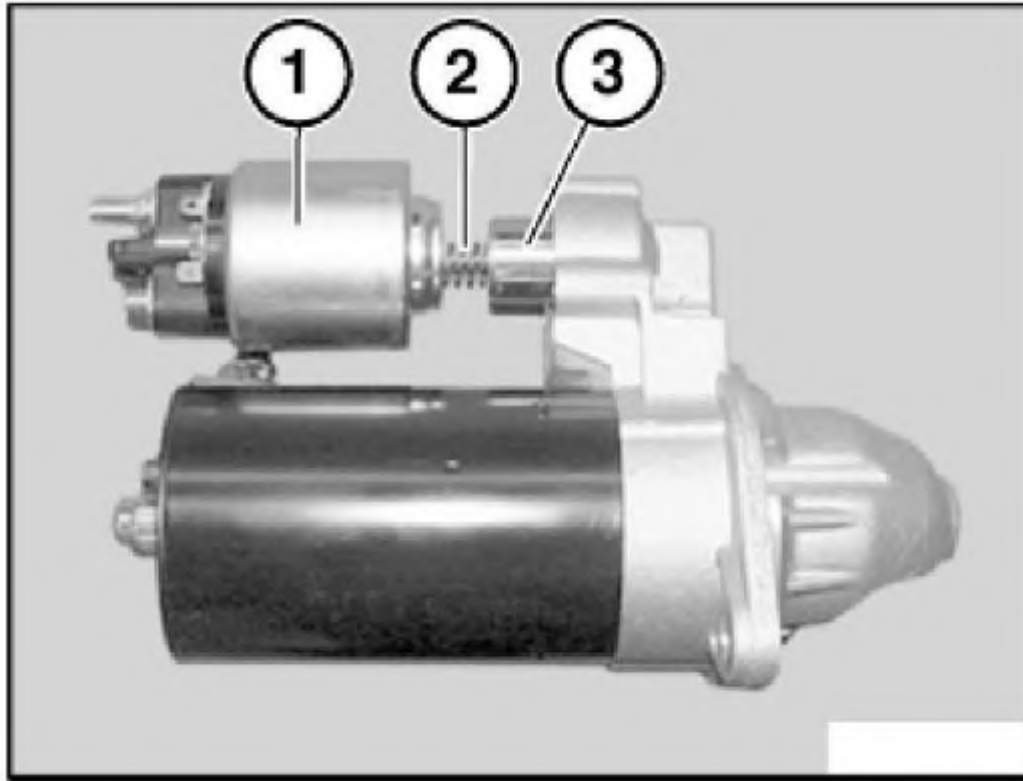
**Fig. 97: Releasing Starter Motor Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Unhook pin (3).

**Installation:**

Check pin (3) for wear and apply grease.



G03230498

**Fig. 98: Removing Solenoid Switch And Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

## **STARTER LEAD**

### **12 42 530 REMOVING AND INSTALLING/REPLACING BATTERY POSITIVE LEAD (BETWEEN STARTER MOTOR AND ALTERNATOR) (M54)**

#### **Necessary Preliminary Tasks:**

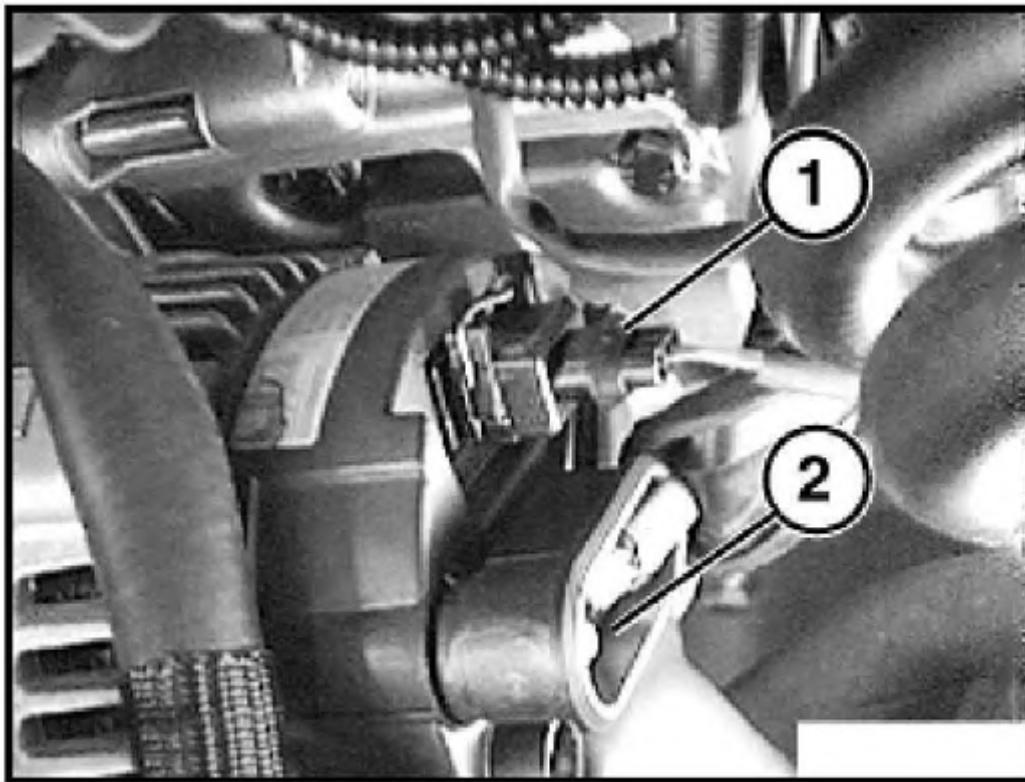
- Read out fault memory of DME control unit.
- Switch off ignition.
- Disconnect negative battery lead.

Observe instructions for disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR DISCONNECTING ANDCONNECTING BATTERY** .

- Remove suction filter housing. Refer to **13 71 000 REMOVING AND INSTALLING INTAKE FILTER HOUSING (M54)** .

Release nut and disconnect battery positive lead (2) from alternator.

Tightening torque, refer to 12 31 1AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .



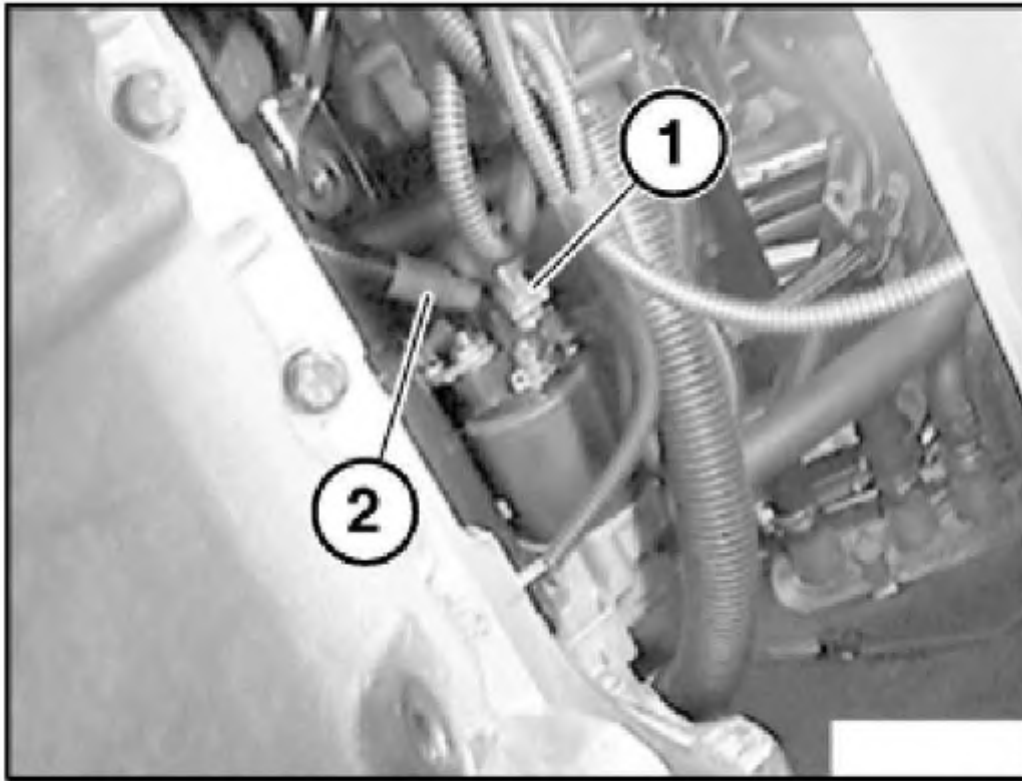
G03230499

**Fig. 99: Releasing Nut And Disconnecting Battery Positive Lead From Alternator**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Tightening torque, refer to 12 41 4AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

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



G03230500

**Fig. 100: Removing Battery Positive Lead From Starter Motor**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** For a better overview, this work step is shown from below. Carry out removal of battery positive lead from above.

**NOTE:** Interrogate fault memory of DME control unit.

Check stored fault messages.

Rectify faults.

Then clear fault memory.

**12 42 540 REPLACING SAFETY BATTERY TERMINAL (SBK)**

**CAUTION:** Observe safety regulations. Investigate cause of triggering of safety

## 2002 BMW X5 30i

2001-2003 ENGINE Ignition System - Repair Instructions - X5 (3.0i) M54

**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:

- 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.

### **Battery In Luggage Compartment Behind Side Trim Panel:**

Remove side trim panel.

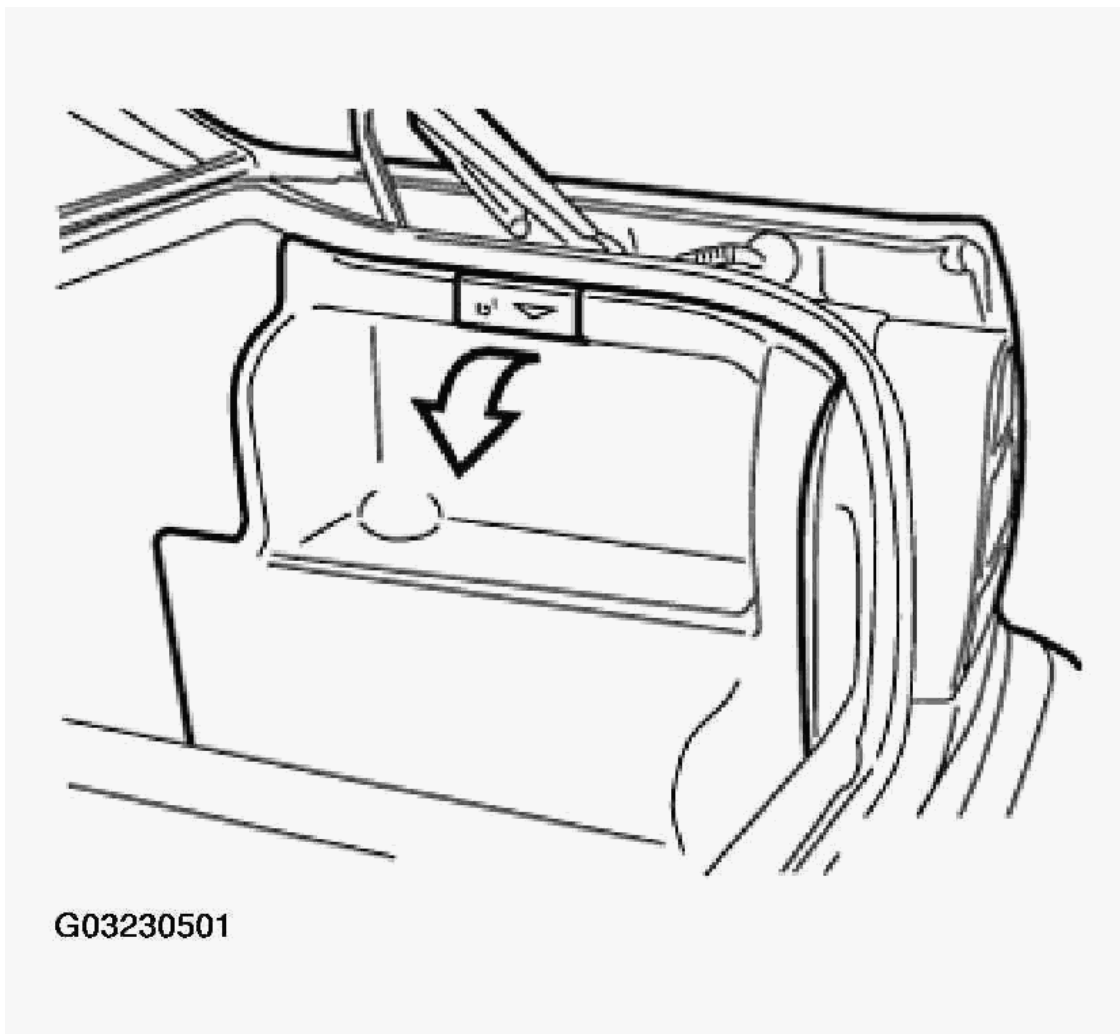
Follow instructions for disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .

Disconnect and cover battery negative lead.



## 2002 BMW X5 30i

2001-2003 ENGINE Ignition System - Repair Instructions - X5 (3.0i) M54



**Fig. 101: Removing Side Trim Panel**

Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.



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**Fig. 102: Releasing Front Side Trim Panel And Aligning Forward**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Battery In Luggage Compartment Under Floor Trim Panel:**

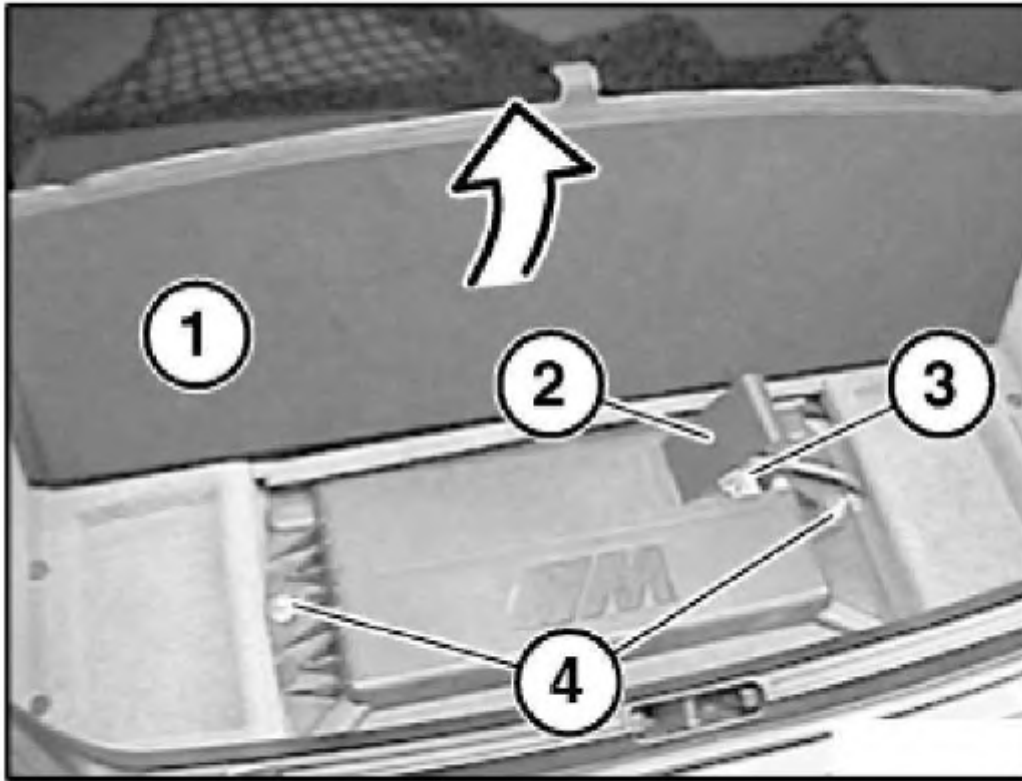
Follow instructions for disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .

Fold back floor trim panel (1).

Lift cover (2) on battery negative lead.

Disconnect and cover battery negative lead (3).

Release nuts (4).



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**Fig. 103: Folding Back Floor Trim Panel**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove battery cover.

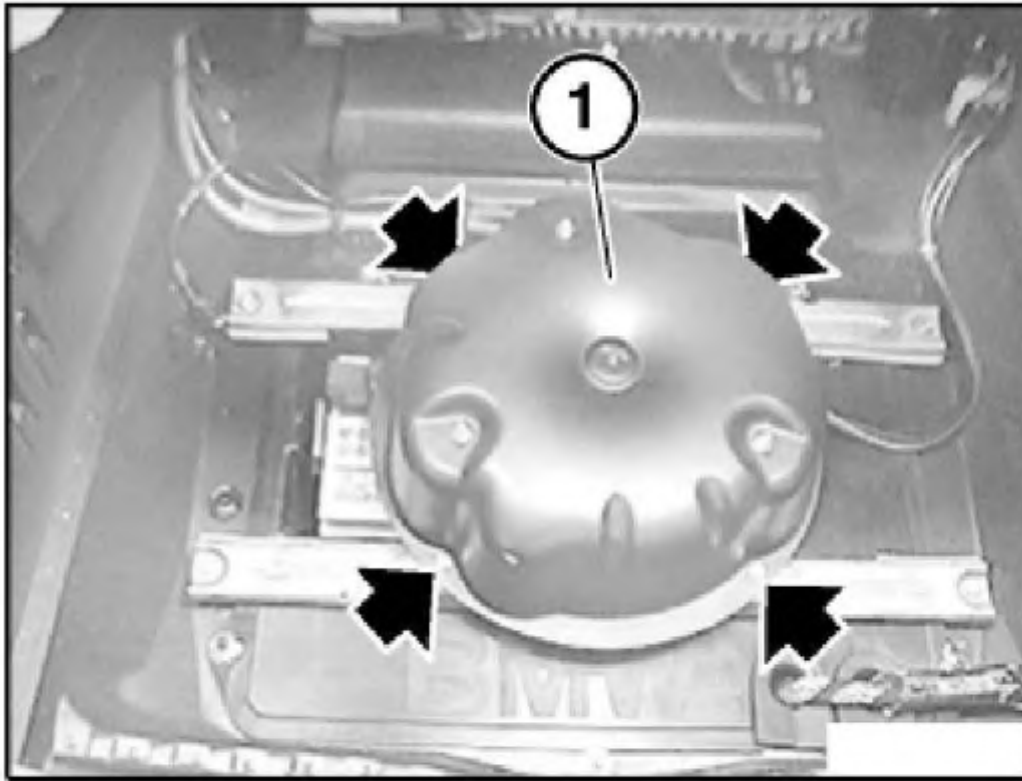
**Battery In Luggage Compartment Under Spare Wheel:**

Remove spare wheel.

Release screws.

**CAUTION: Do not kink air pipes.**

Set air supply system (1) to one side.



G03230504

**Fig. 104: Locating Air Supply System Retaining Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

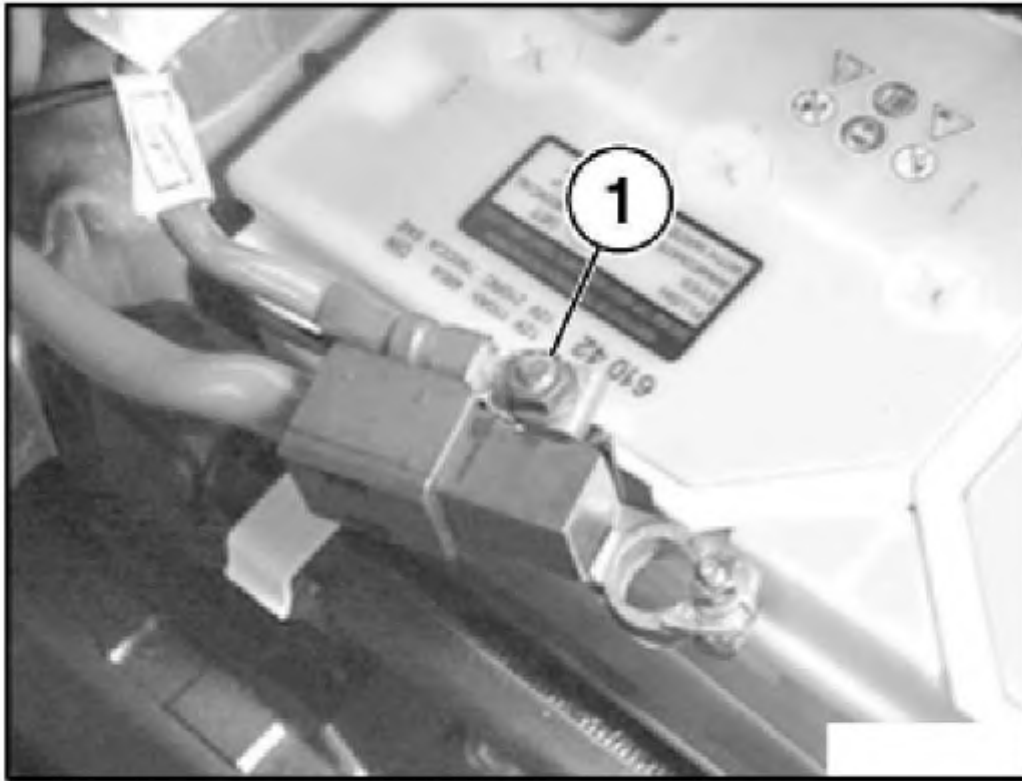
Follow instructions for disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .

Disconnect battery negative lead.

Disconnect supply cable (1) for vehicle electrical system.

**Installation:**

Remove faulty fuses and carry out troubleshooting.



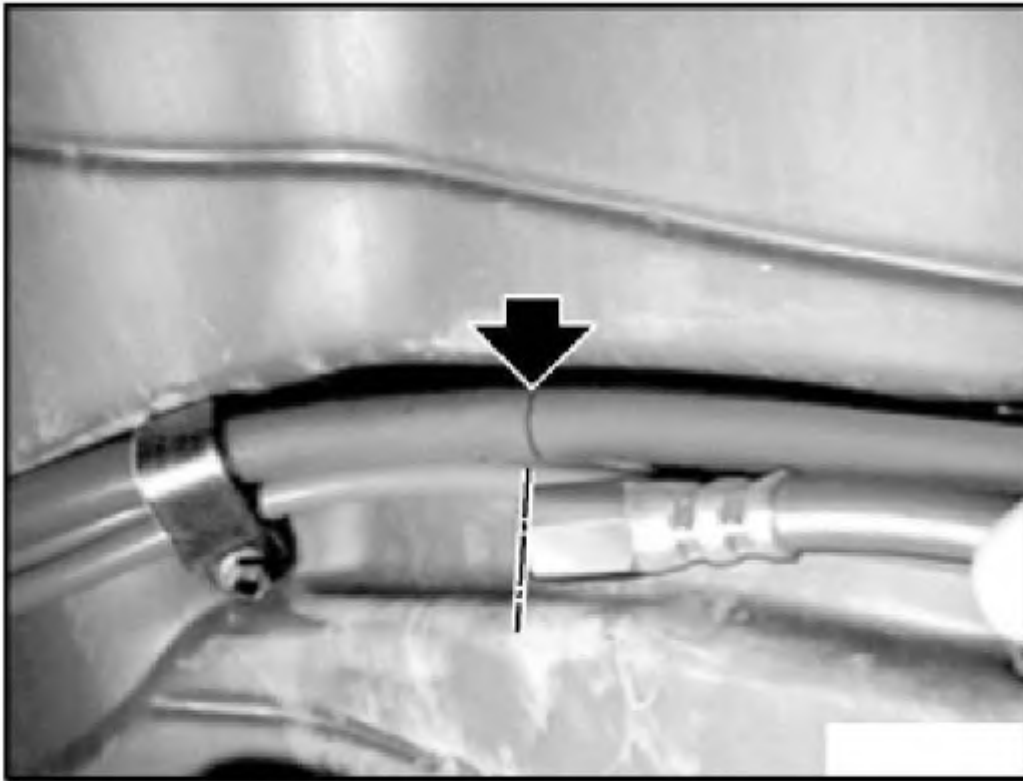
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**Fig. 105: Disconnecting Supply Cable For Vehicle Electrical System**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

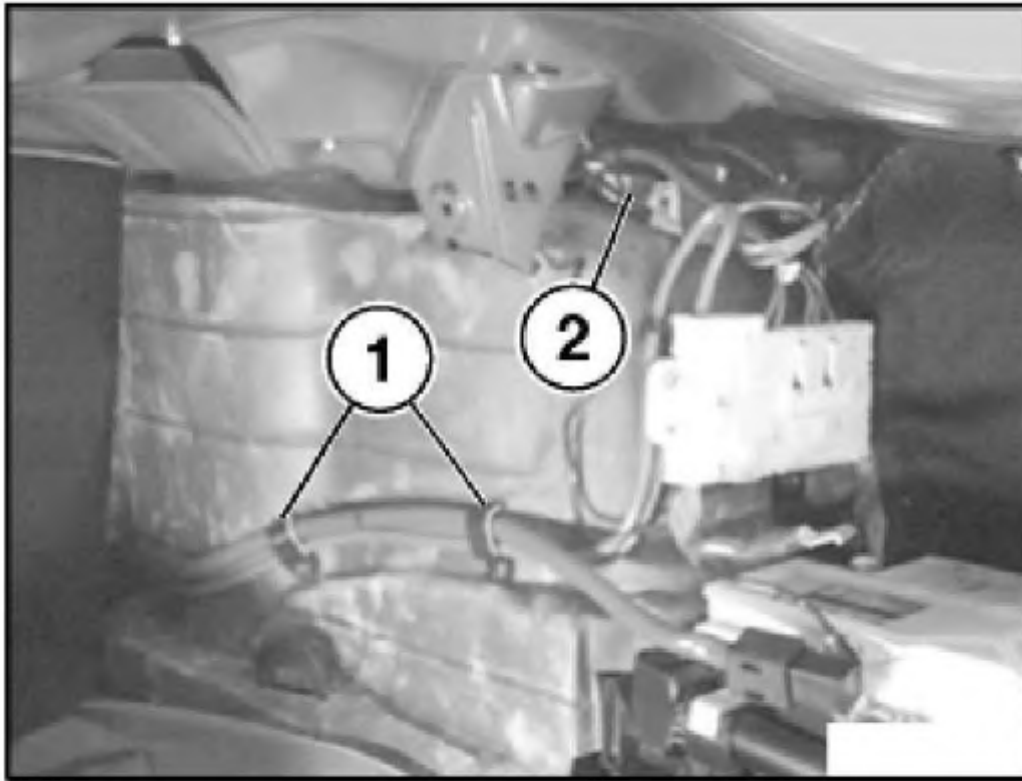


G03230506

**Fig. 106: Marking Interface Of Battery Positive Lead At End Of Repair Cable**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable ties (1).

Disconnect plug connection (2).

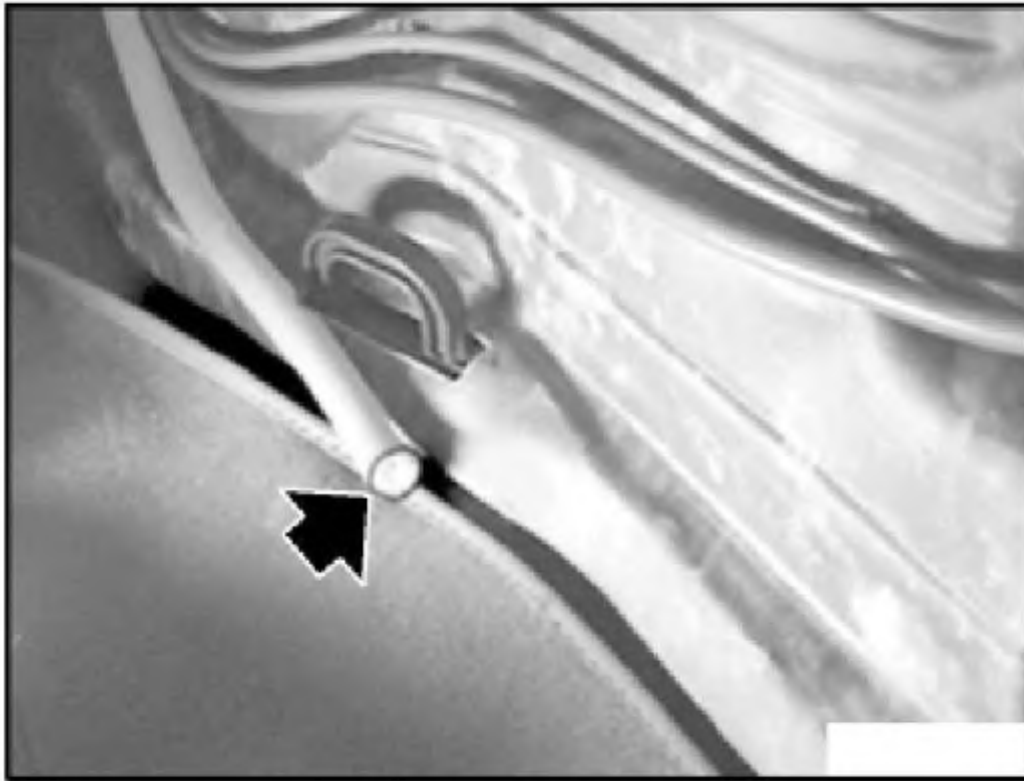


G03230507

**Fig. 107: Releasing Cable Ties And 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.



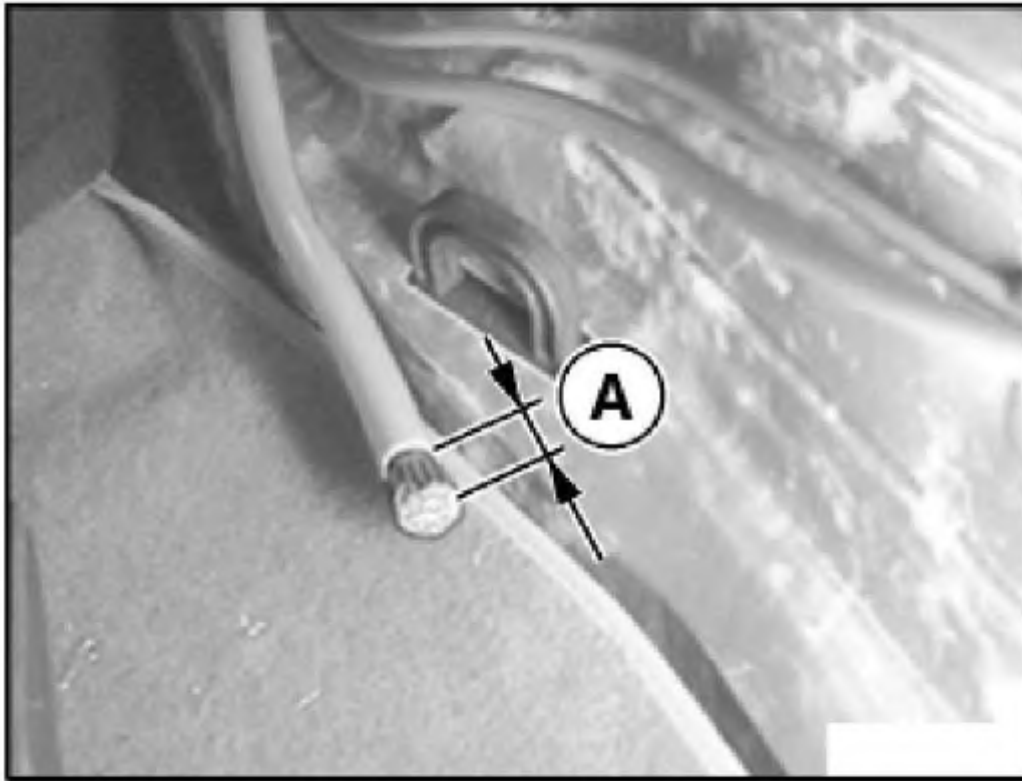
G03230508

**Fig. 108: View Of Battery Positive Cable At Marked Point**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Distance (A) = 15 mm.

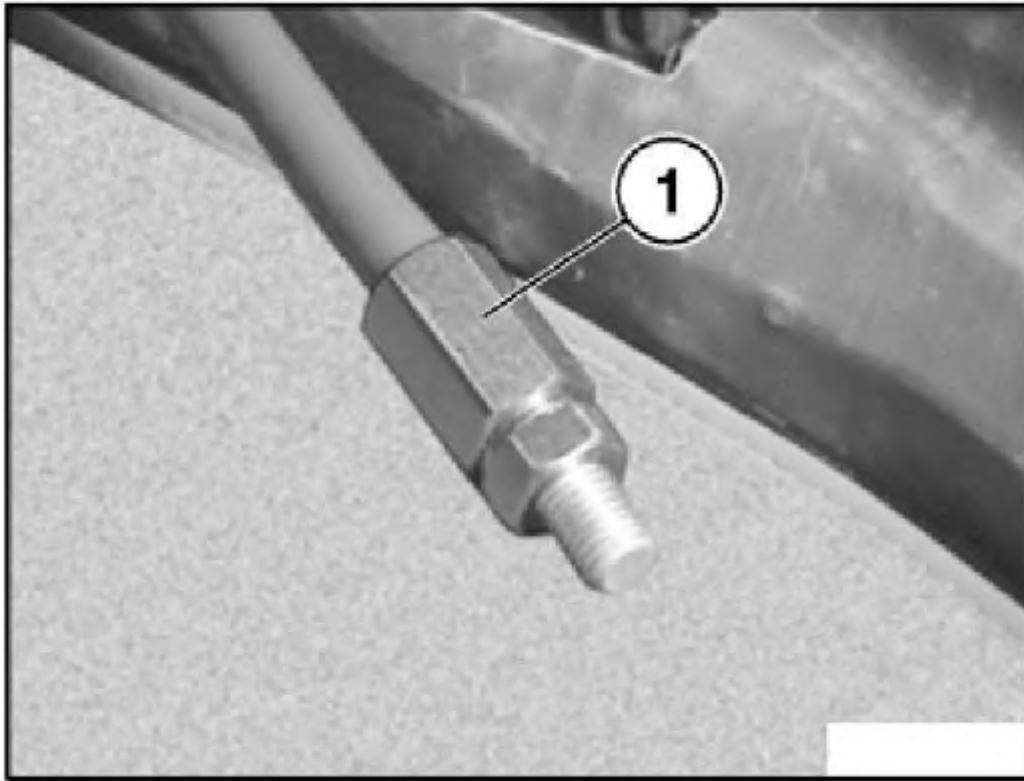




G03230509

**Fig. 109: Identifying Strip Insulation Length (A) From Cable End**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

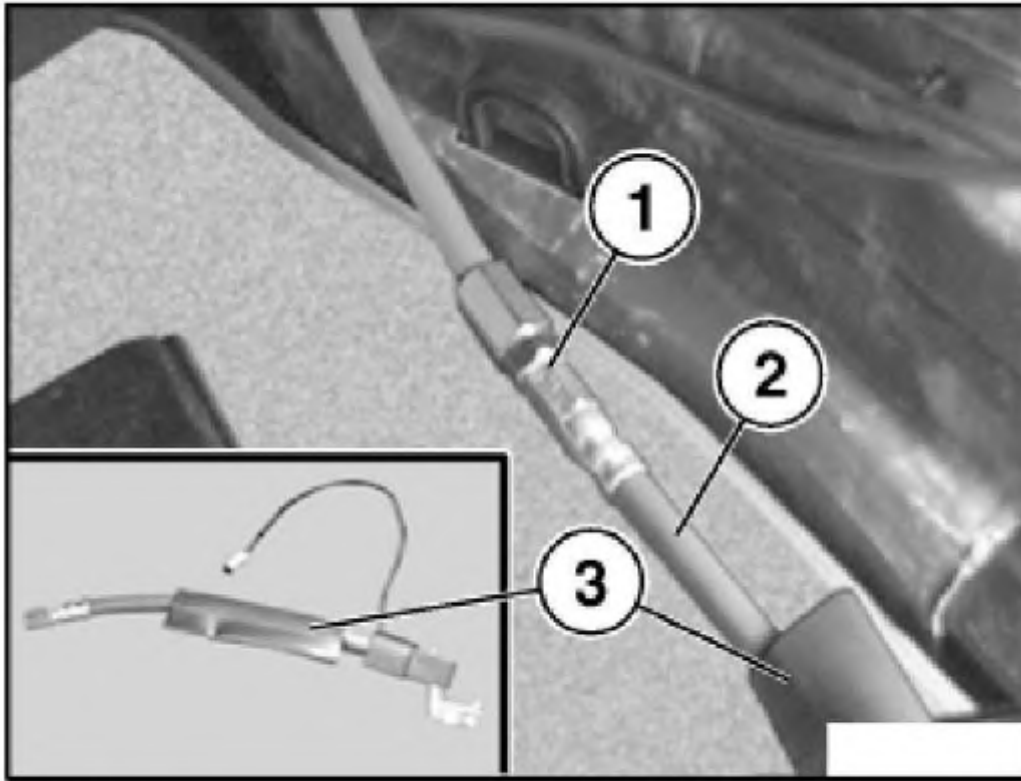


G03230510

**Fig. 110: Installing Heavy-Current Connector Over Stripped Cable End**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

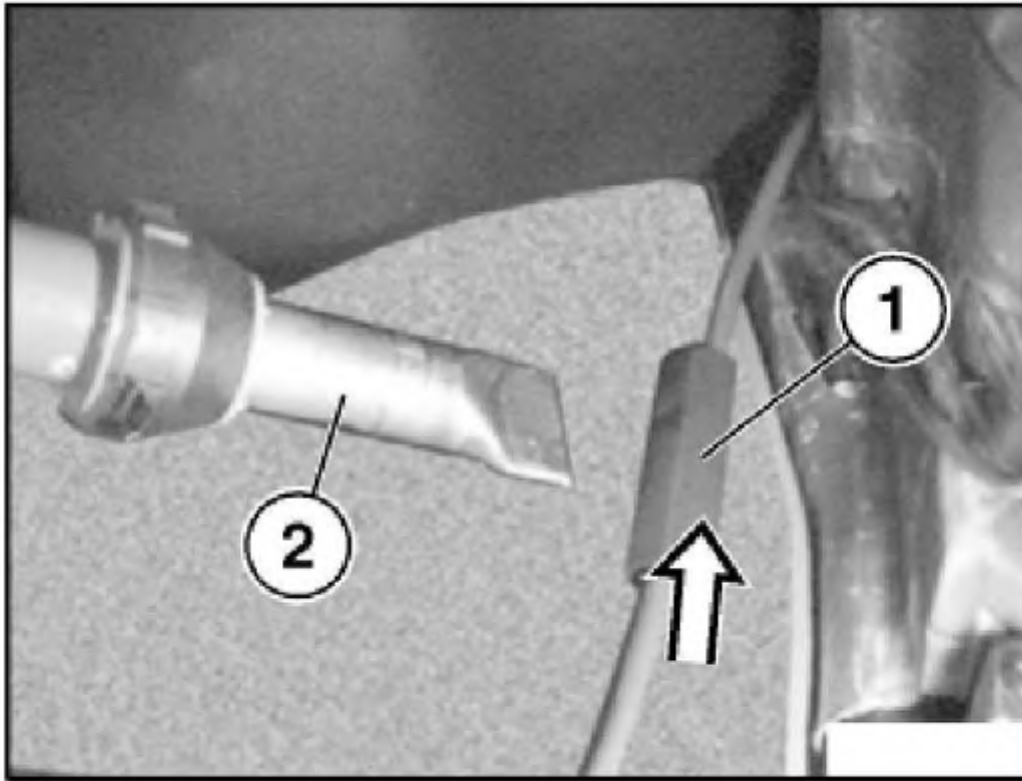
Screw threaded sleeve (1) of repair cable (2) to heavy-current connector.



G03230511

**Fig. 111: Installing Shrink-Fit Hose Over Repair Cable**  
Courtesy of BMW OF NORTH AMERICA, INC.

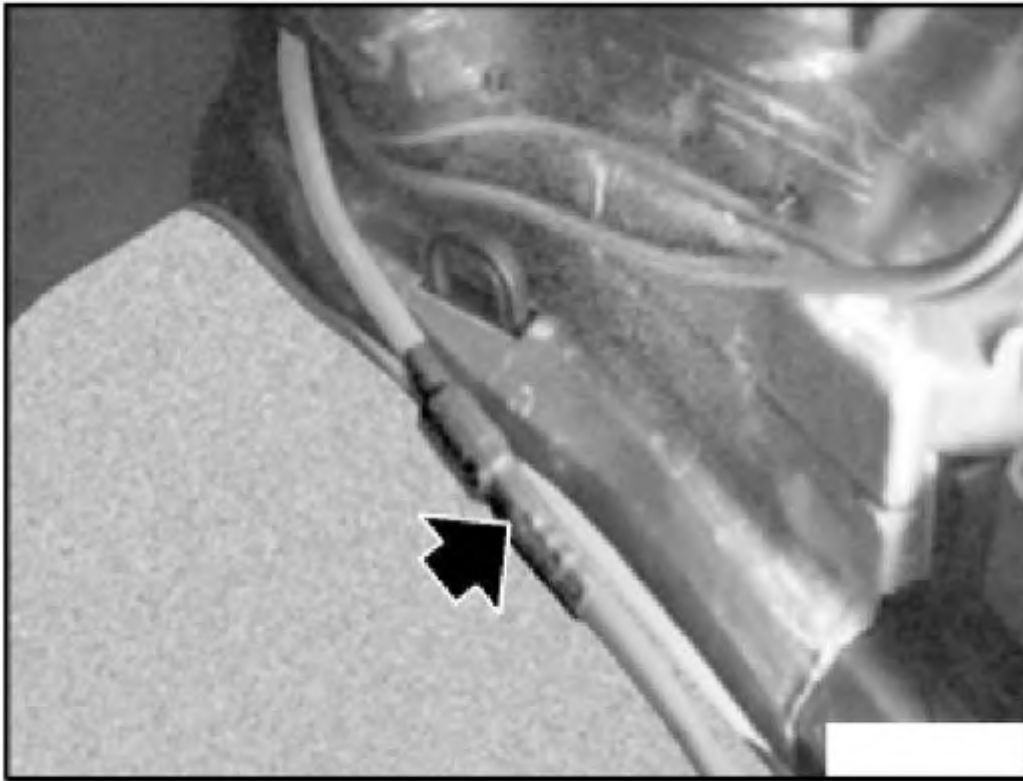
Push shrink-fit hose (1) over connecting point and shrink on with a hot-air blower (2).



G03230512

**Fig. 112: Using Hot-Air Blower On 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.



G03230513

**Fig. 113: View Of Shrink-Fit Hose**

**Courtesy of BMW OF NORTH AMERICA, INC.**

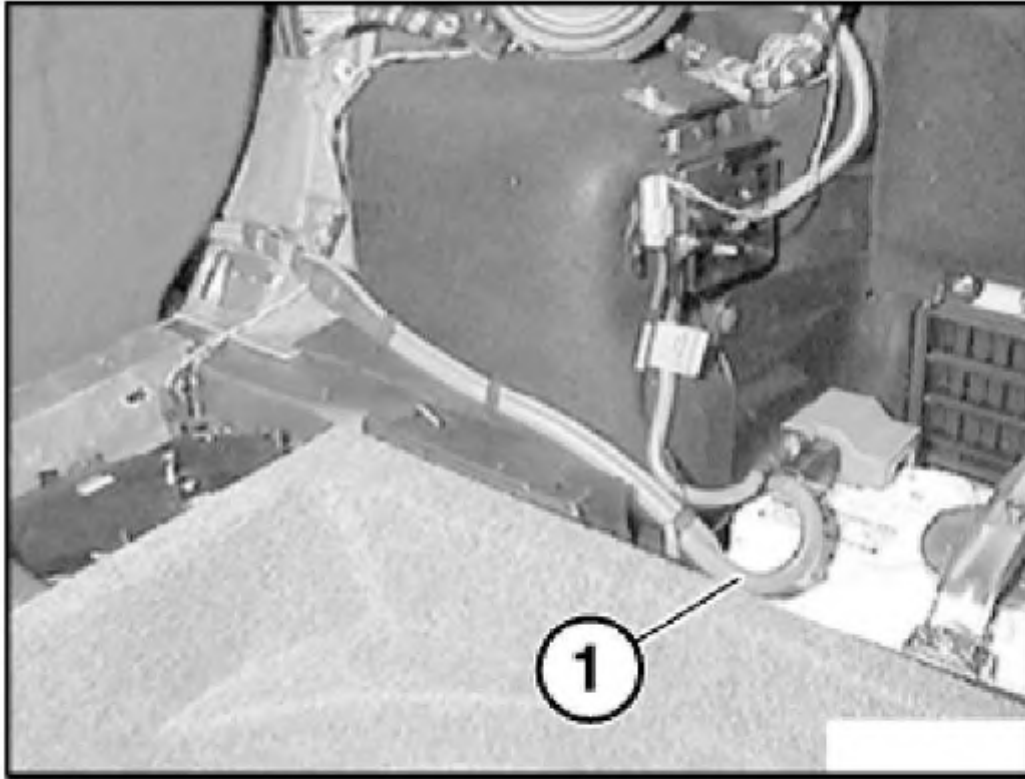
When laying the repaired battery positive cable, observe the following:

- 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).



G03230514

**Fig. 114: Laying Battery Positive Lead Without Kinks**  
Courtesy of BMW OF NORTH AMERICA, INC.

**12 42 550 REMOVING AND INSTALLING/REPLACING BETWEEN BATTERY POSITIVE LEAD  
BETWEEN STARTER MOTOR AND JUMP START TERMINAL (M54)**

Interrogate fault memory of DME control unit.

Switch off ignition.

Observe instructions for disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .

Disconnect negative battery lead.

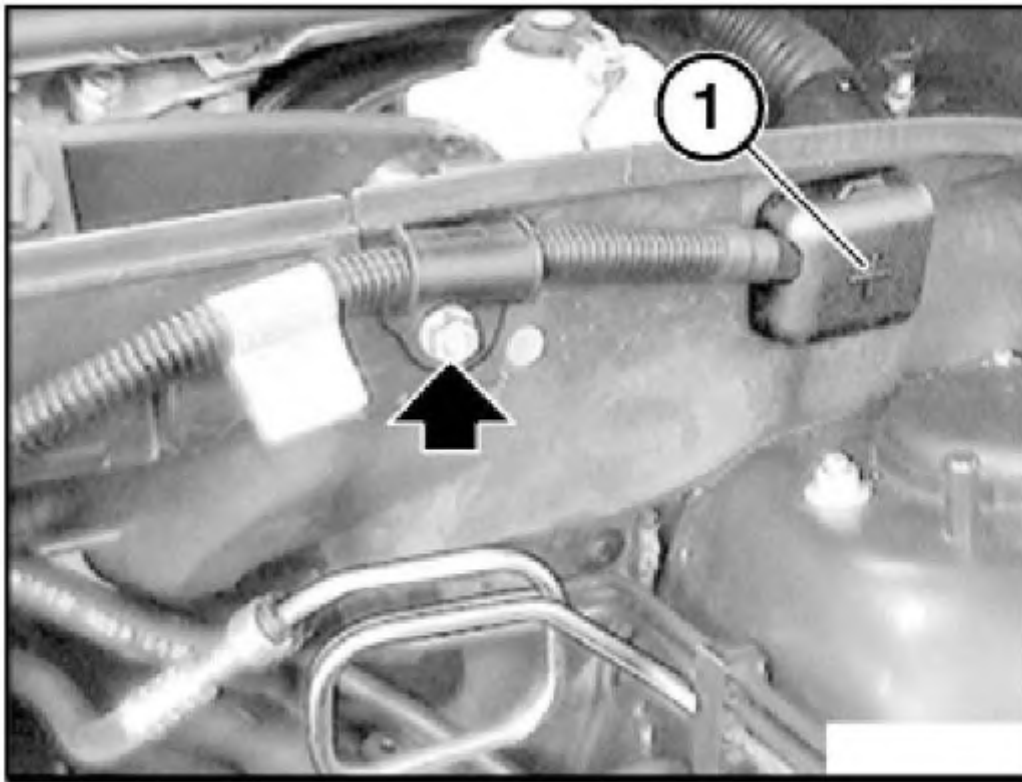
Release nut.

Fold down protective cap (1).

Release nut.

Tightening torque, (21 N.m).

Remove battery positive lead from positive support point for jump starting.

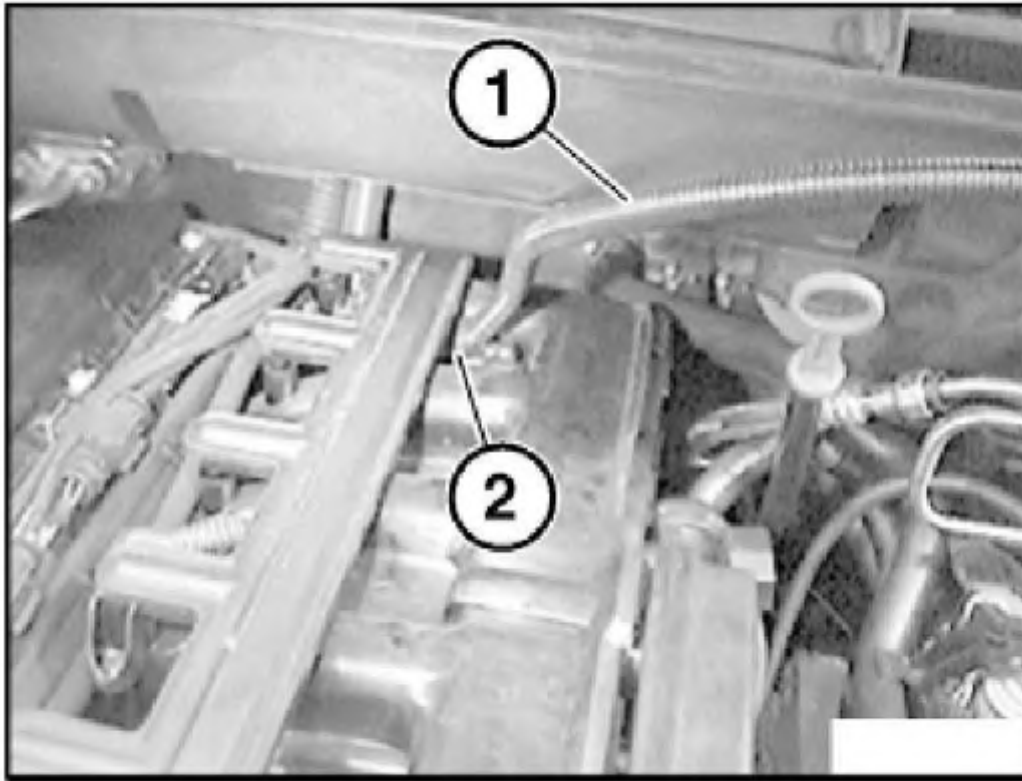


G03230515

**Fig. 115: Folding Down Protective Cap**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover from fuel injectors.

Unclip battery positive lead (1) from holder (2).



G03230516

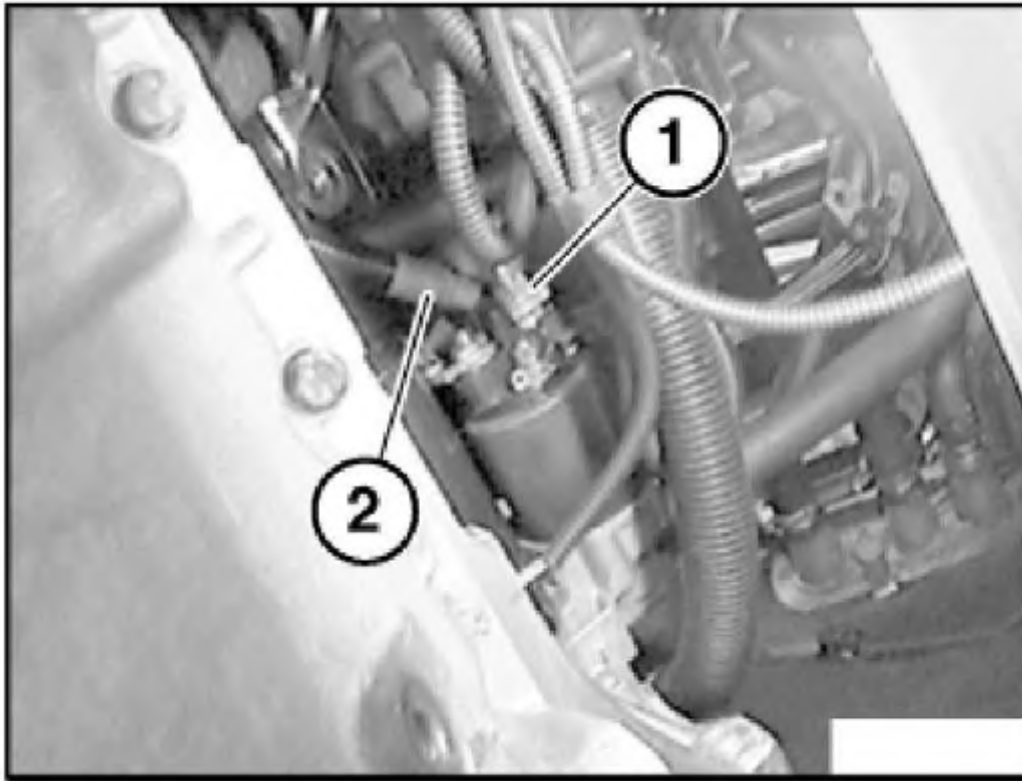
**Fig. 116: Unclipping Battery Positive Lead From Holder**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (2).

Tightening torque, refer to 12 41 4AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

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





G03230517

**Fig. 117: Removing Battery Positive Lead From Starter Motor**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** For purposes of clarity, reinforcement plate is now shown.

Do not remove reinforcement plate.

**NOTE:** Interrogate fault memory of DME control unit.

Check stored fault messages.

Rectify faults.

Then clear fault memory.

**ENGINE WIRING LOOM**

## **12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (M54)**

Interrogate fault memory of DME control unit.

Switch off ignition.

Follow instructions for disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY** .

Disconnect battery negative lead from battery.

**WARNING: Scalding hazard! Only perform these tasks on an engine that has cooled down.**

### **E53 And E46:**

Remove reinforcement plate.

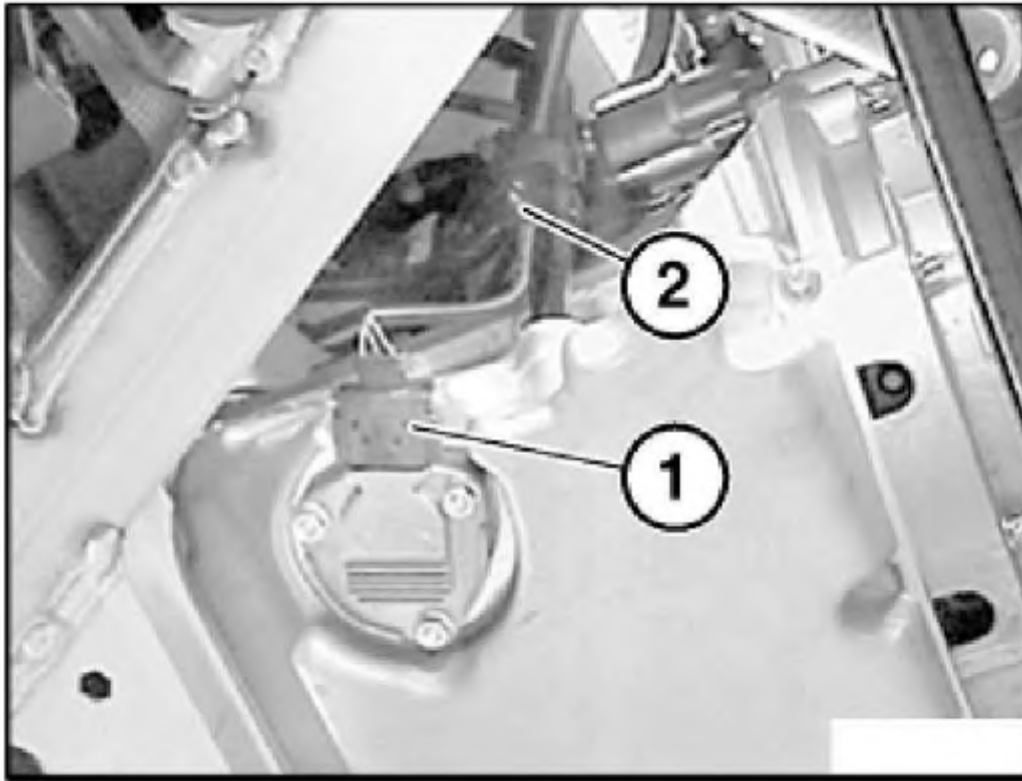
**CAUTION: The article FRONT AXLE SUPPORT contains important installation instructions.**

Remove underbody protection.

### **E53, E46, E39:**

Detach plug (1) from oil level sensor.

Unclip cable from cable holder (2) and lay upwards.



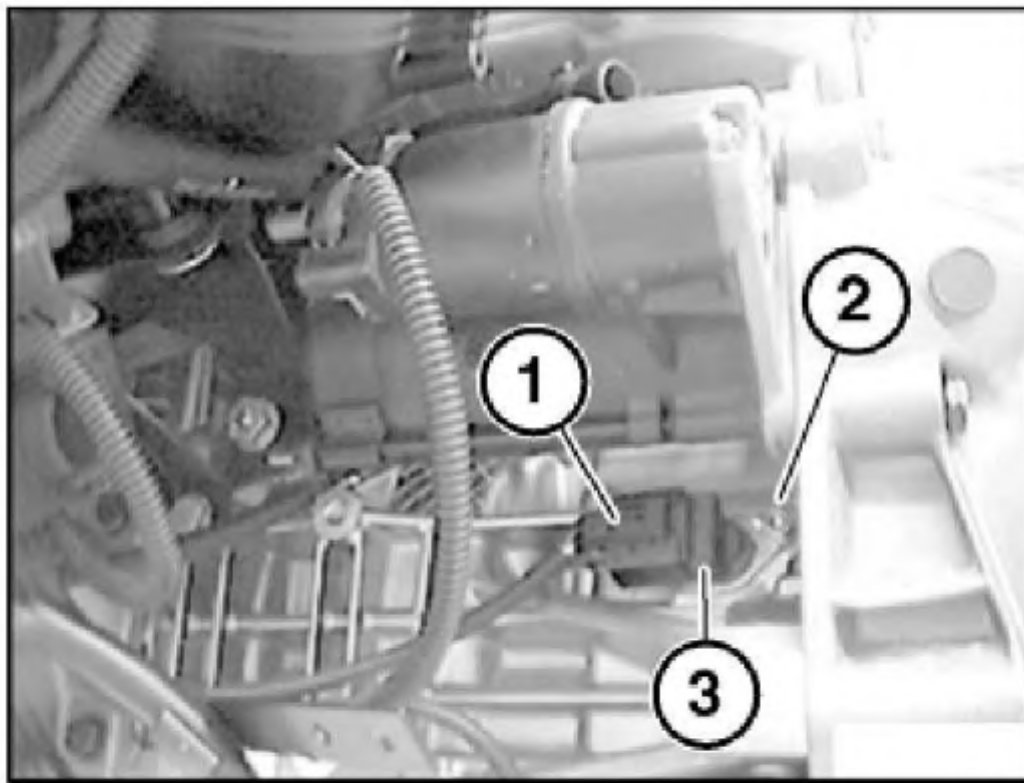
G03230518

**Fig. 118: Detaching Plug From Oil Level Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

When fitted:

Remove vacuum tank for exhaust flap.

Unlock plug (1) and detach from pulse generator for crankshaft.



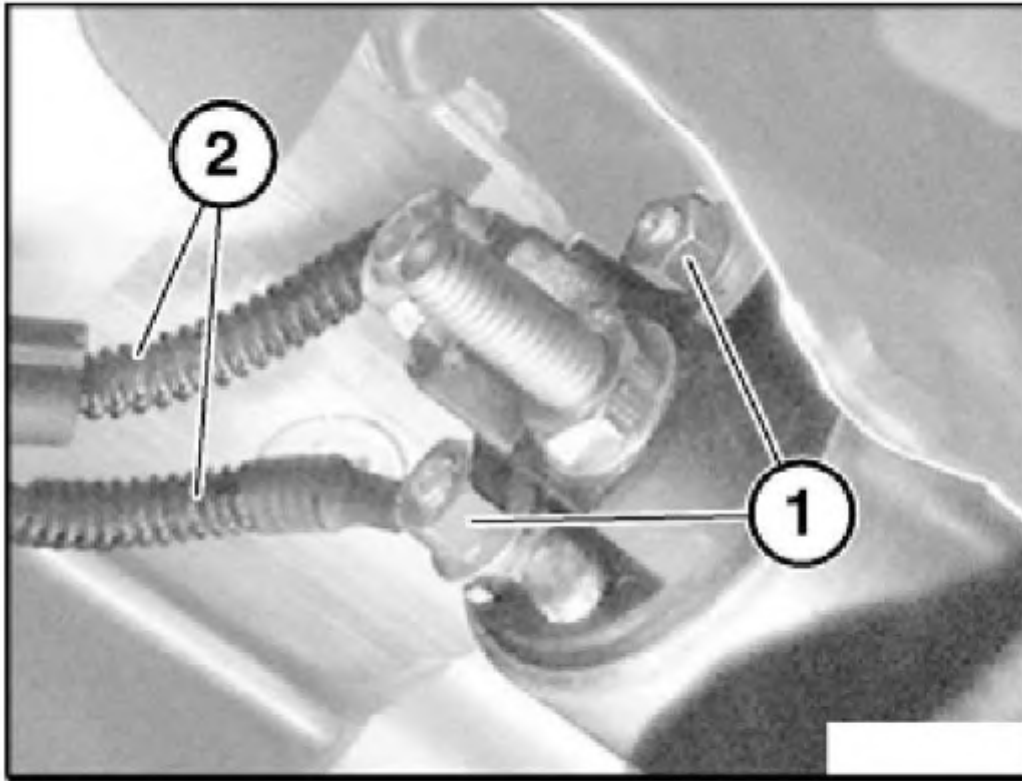
G03230519

**Fig. 119: Unlocking Plug Connection From Pulse Generator**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1).

Tightening torque, refer to 12 41 4AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

Detach leads (2) from starter motor.

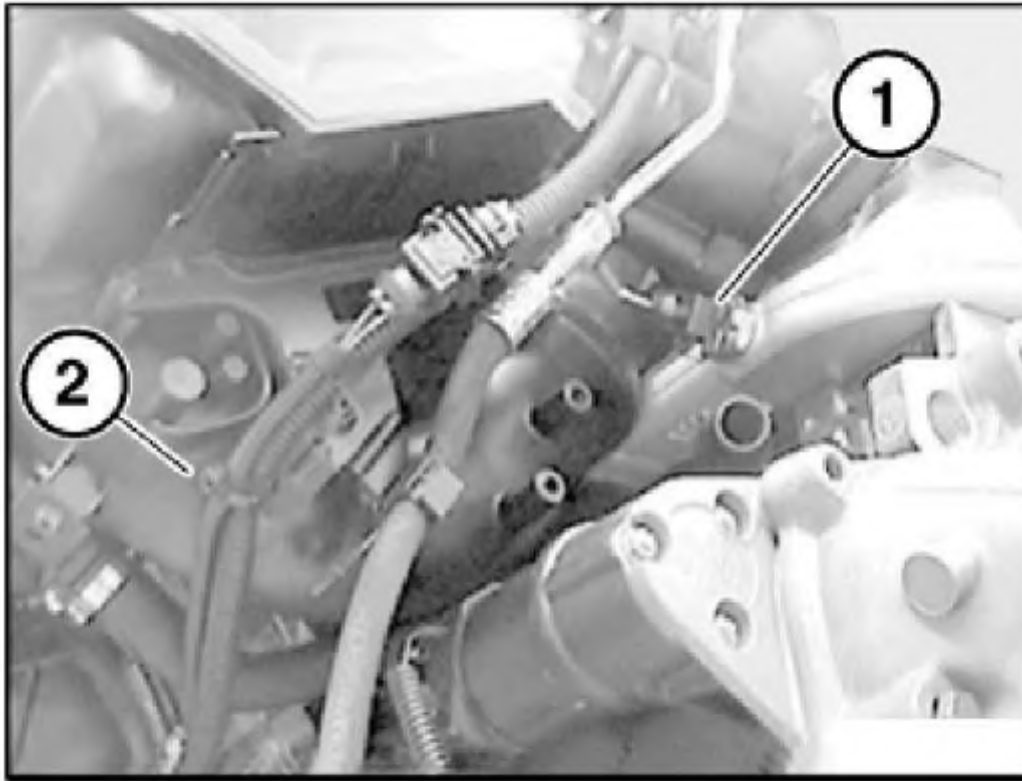


G03230520

**Fig. 120: Detaching Leads From Starter Motor**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and detach from coolant temperature sensor.

Release cable tie (2).



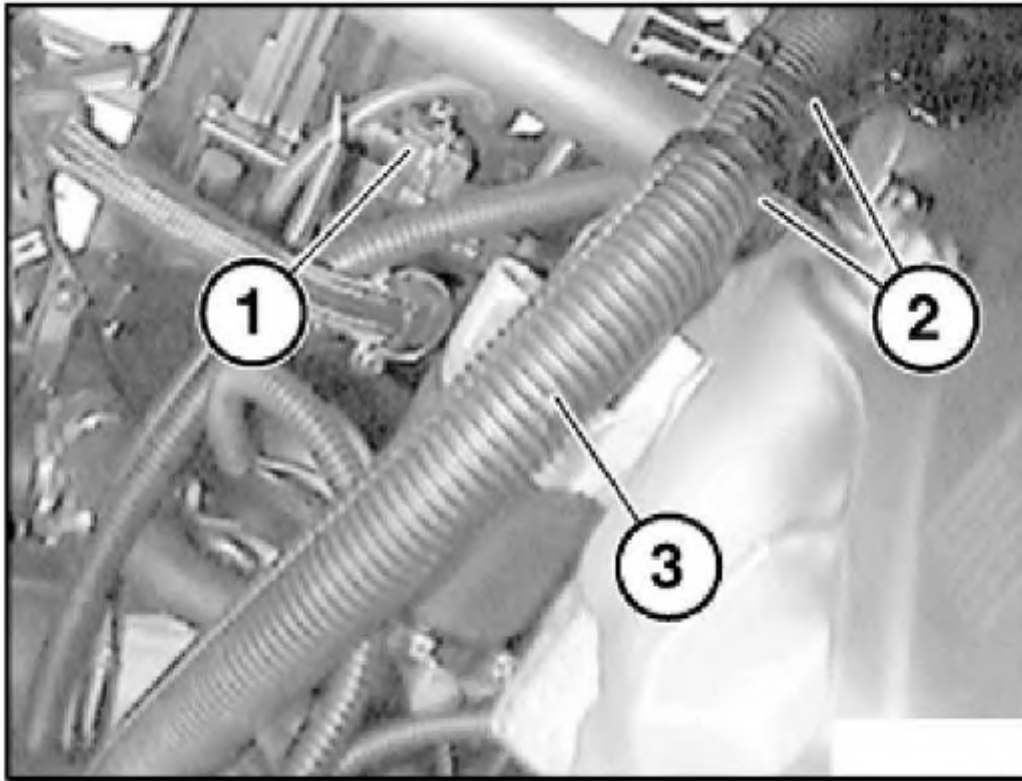
G03230521

**Fig. 121: Detaching Plug Connection From Coolant Temperature Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

**E53 Only:**

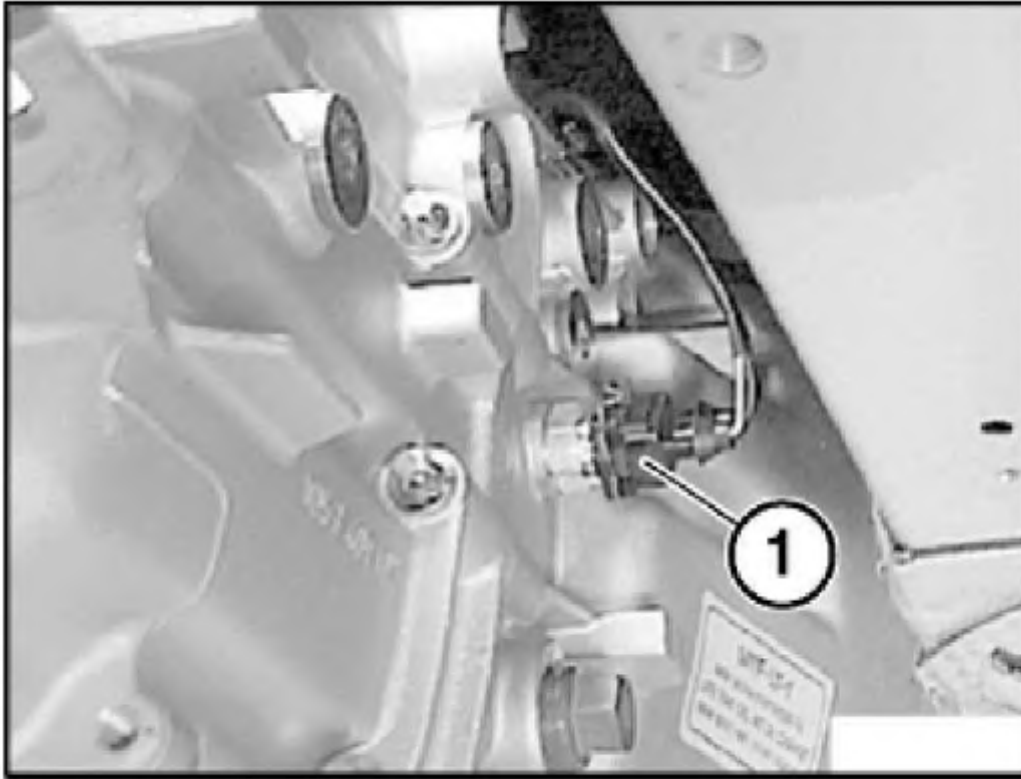
Release cable tie (2) on transmission housing and disconnect cable (3).



G03230522

**Fig. 122: Releasing Cable Tie On Transmission Housing And Disconnecting Cable**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and detach from reverse gear switch.



G03230523

**Fig. 123: Detaching Plug Connection From Reverse Gear Switch**  
Courtesy of BMW OF NORTH AMERICA, INC.

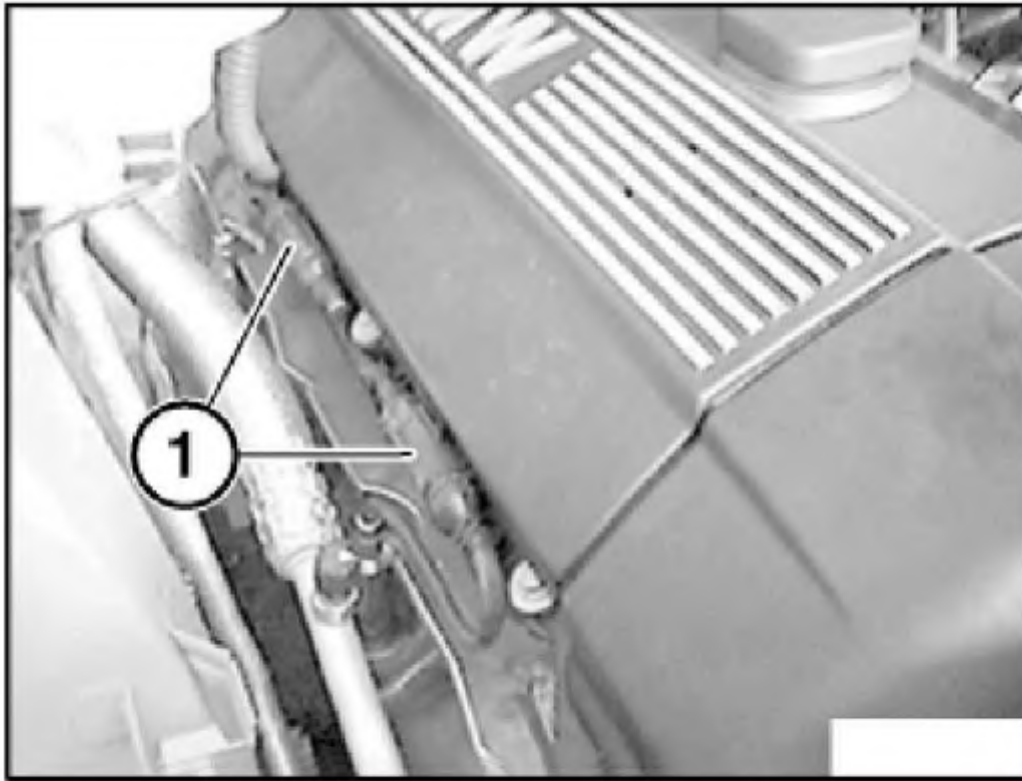
**E53 And E46 Only:**

Remove heater bulkhead. Refer to **51 71 080 REMOVING AND INSTALLING/REPLACING HEATER BULKHEAD** .

**E53, E46 And E39:**

Unclip plug connections (1) on oxygen control sensors from holders and disconnect.





G03230524

**Fig. 124: Unclipping Plug Connections On Oxygen Control Sensors**  
Courtesy of BMW OF NORTH AMERICA, INC.

**E53 Only:**

Disconnect all plugs in control unit box.

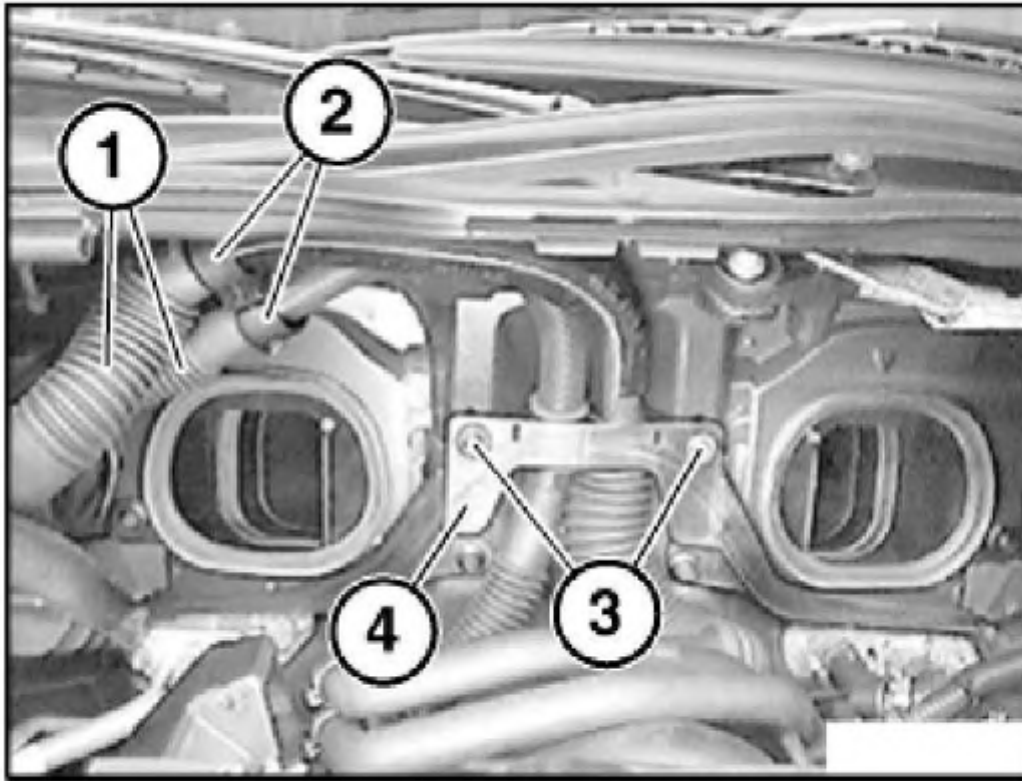
One part of this operation is described in **12 14 550 REPLACING CONTROL UNIT (DIGITAL MOTOR ELECTRONICS) (M62, M54)** .

Unlock cable holders (2).

Remove cables (1) from cable holders (2).

Release screws (3).

Remove holder (4).



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**Fig. 125: Removing Cables From Cable Holders**  
Courtesy of BMW OF NORTH AMERICA, INC.

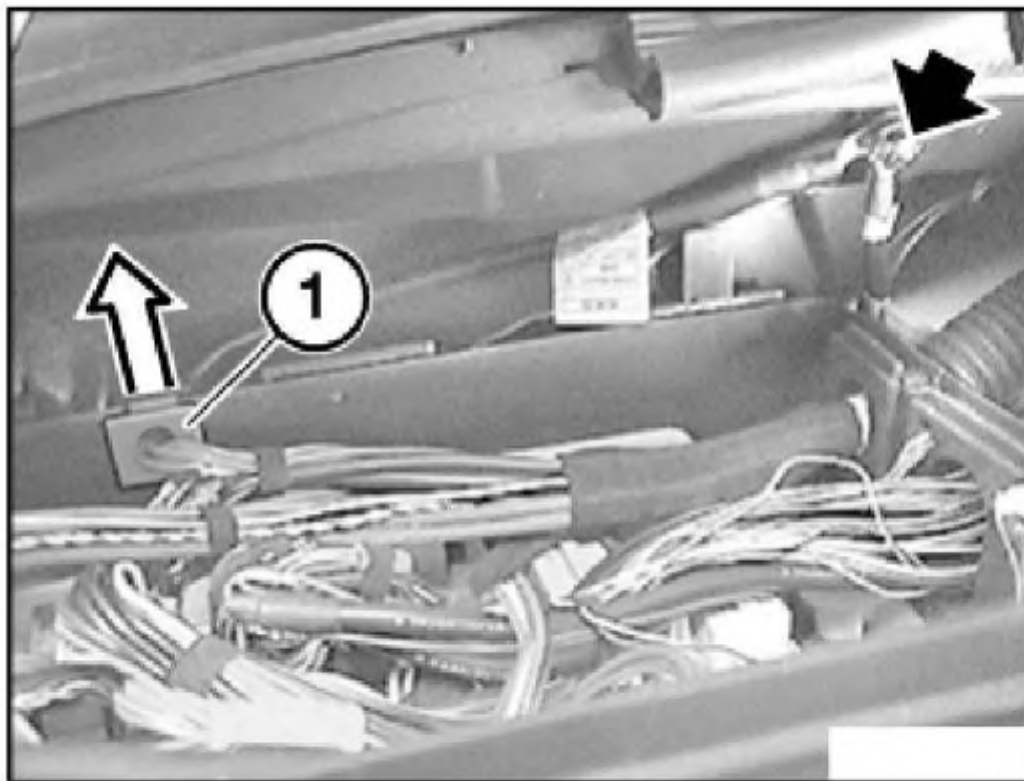
Release nut.

Remove grounding cables from ground support point.

Detach profile seal (1) towards top.

**Installation:**

To prevent leaks, you must install profile seals correctly.



G03230526

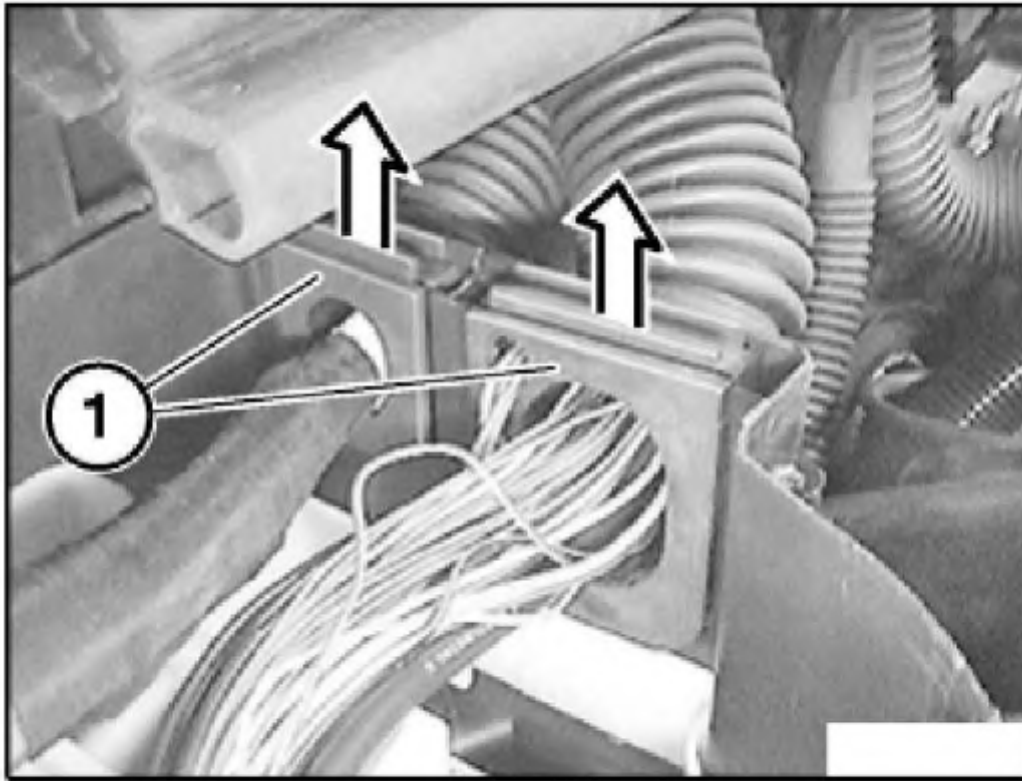
**Fig. 126: Detaching Profile Seal**

Courtesy of BMW OF NORTH AMERICA, INC.

Detach profile seals (1) towards top.

**Installation:**

To prevent leaks, you must install profile seals correctly.



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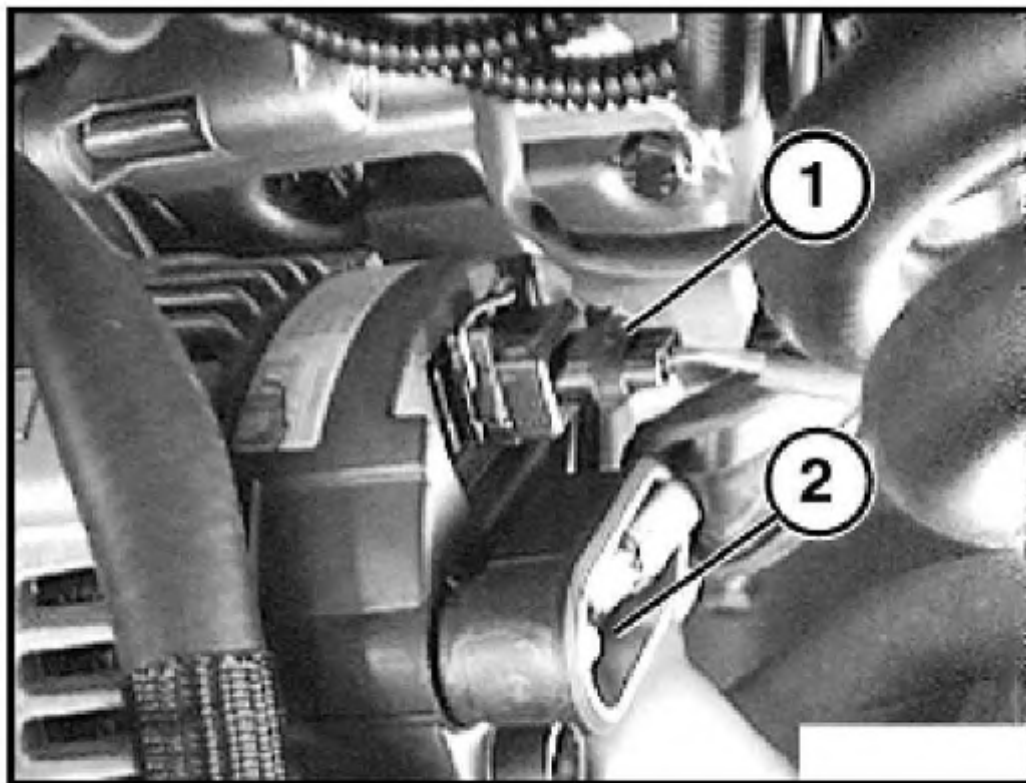
**Fig. 127: Detaching Profile Seals Towards Top**  
Courtesy of BMW OF NORTH AMERICA, INC.

E53, E46 and E39:

Remove throttle assembly. Refer to **13 54 030 REMOVING AND INSTALLING/SEALING THROTTLE ASSEMBLY (M54)** .

Remove intake air manifold. Refer to **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (M54)** .

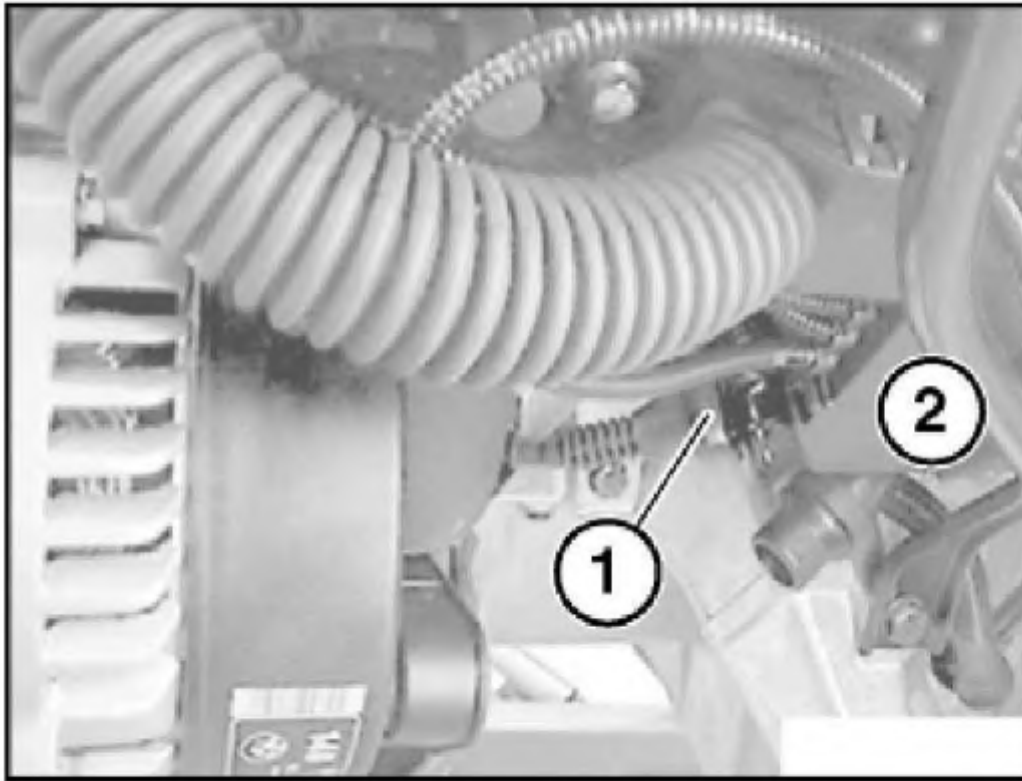
Unlock plug (1) and detach from alternator.



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**Fig. 128: Detaching Plug Connector From Alternator**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) on pulse generator of inlet camshaft and detach from cable duct (2).

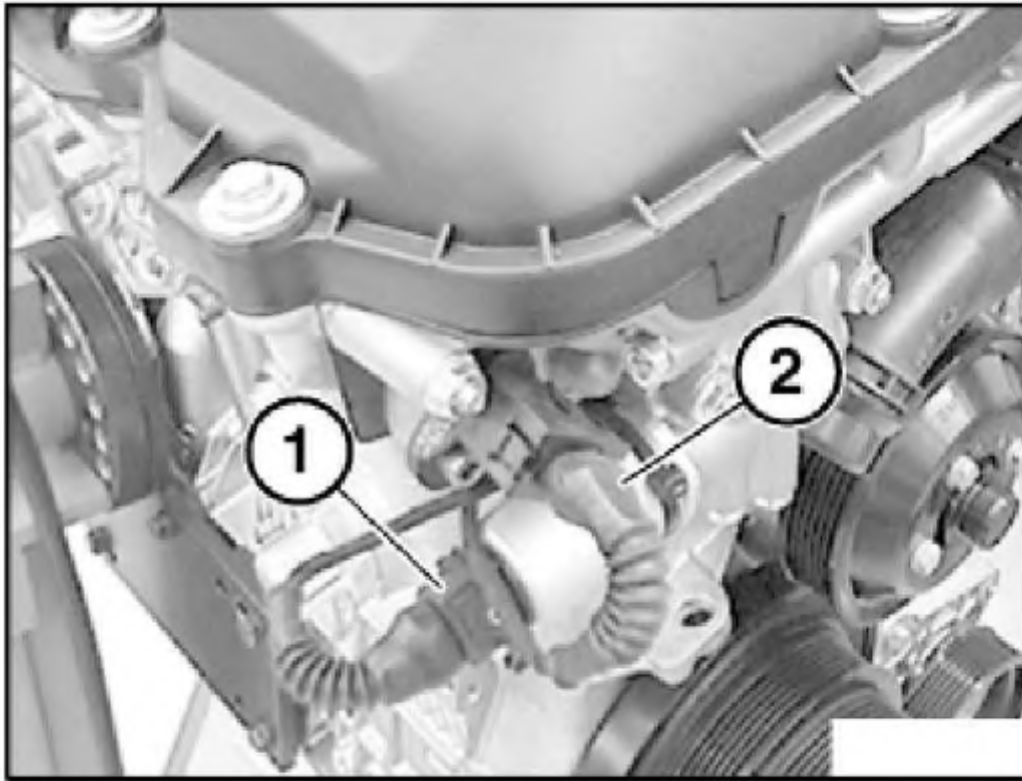


G03230535

**Fig. 129: Detaching Plug On Pulse Generator Of Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and detach from solenoid valve of VANOS adjustment unit.

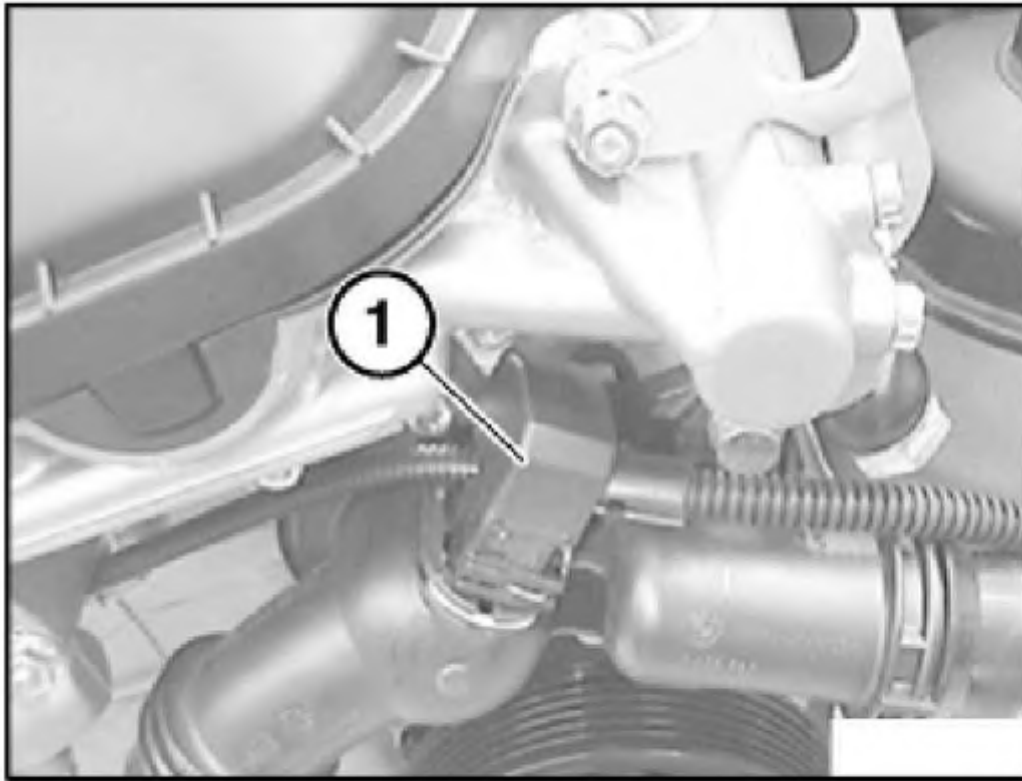
Unlock plug (2) and detach from pulse generator for exhaust camshaft.



G03230536

**Fig. 130: Detaching Plug From Solenoid Valve Of VANOS Adjustment Unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and detach from thermostat housing.



G03230537

**Fig. 131: Detaching Plug From Thermostat Housing**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Interrogate fault memory of DME control unit.

Check stored fault messages.

Rectify faults.

Then clear fault memory.

## **12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION COILS (M54)**

Interrogate fault memory of DME control unit.

Switch off ignition.

Follow instructions for disconnecting and connecting battery. Refer to **12 00... INSTRUCTIONS FOR**



**DISCONNECTING AND CONNECTING BATTERY .**

Disconnect battery negative lead from battery.

**E53 Only:**

Remove heater bulkhead.

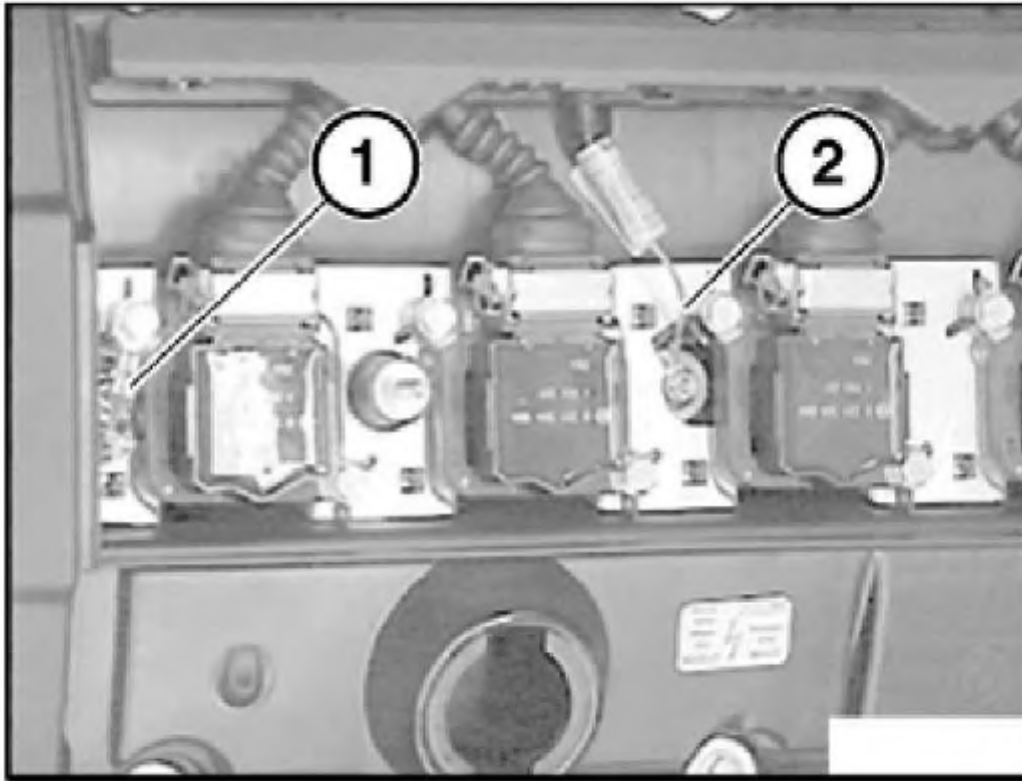
**Z3, E39, E46, E53:**

Remove cover for ignition coils.

Detach plug of wiring harness for ignition coils from DME control unit. This operation is described in **12 14 550 REPLACING CONTROL UNIT (DIGITAL MOTOR ELECTRONICS) (M62, M54)** . Disconnect plug connection of wiring harness for ignition coils in electronics box.

**NOTE:**        **Do not remove DME control unit.**

Detach grounding strap (2) of cable duct from connecting plate of ignition coils between cylinders 2 and 3.

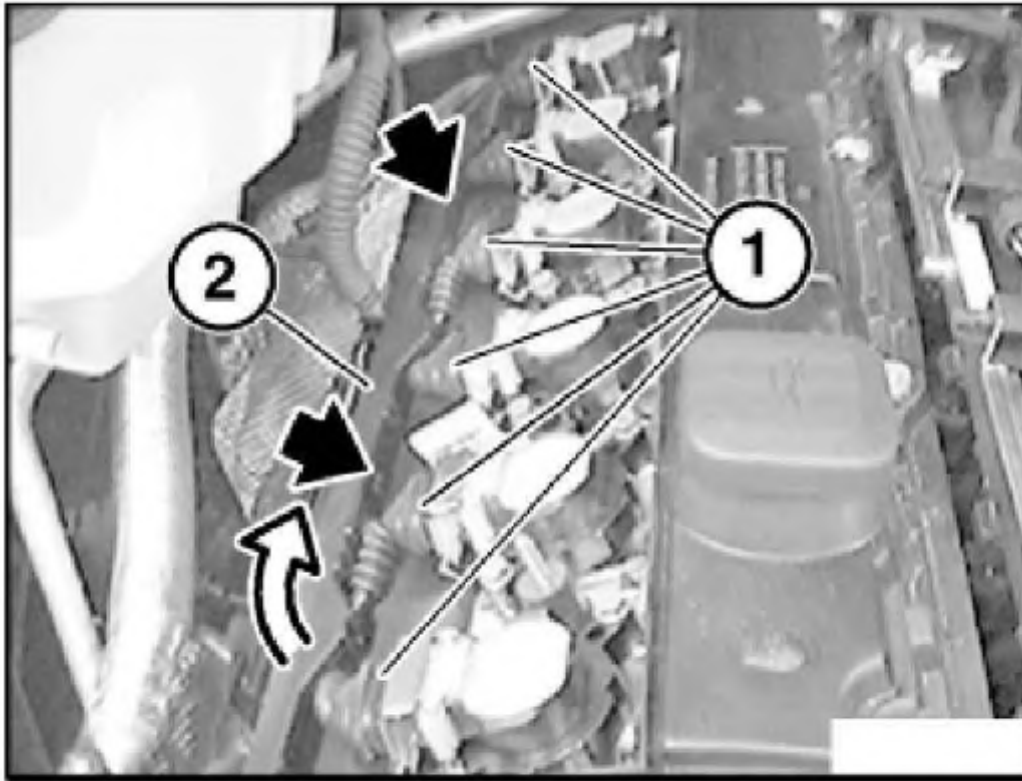


G03230538

**Fig. 132: Detaching Grounding Strap**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and detach from ignition coils.

Unlock cable strip (2) and remove towards top.



G03230539

**Fig. 133: Unlocking Plug And Detaching From Ignition Coils**  
Courtesy of BMW OF NORTH AMERICA, INC.

**E53 Only:**

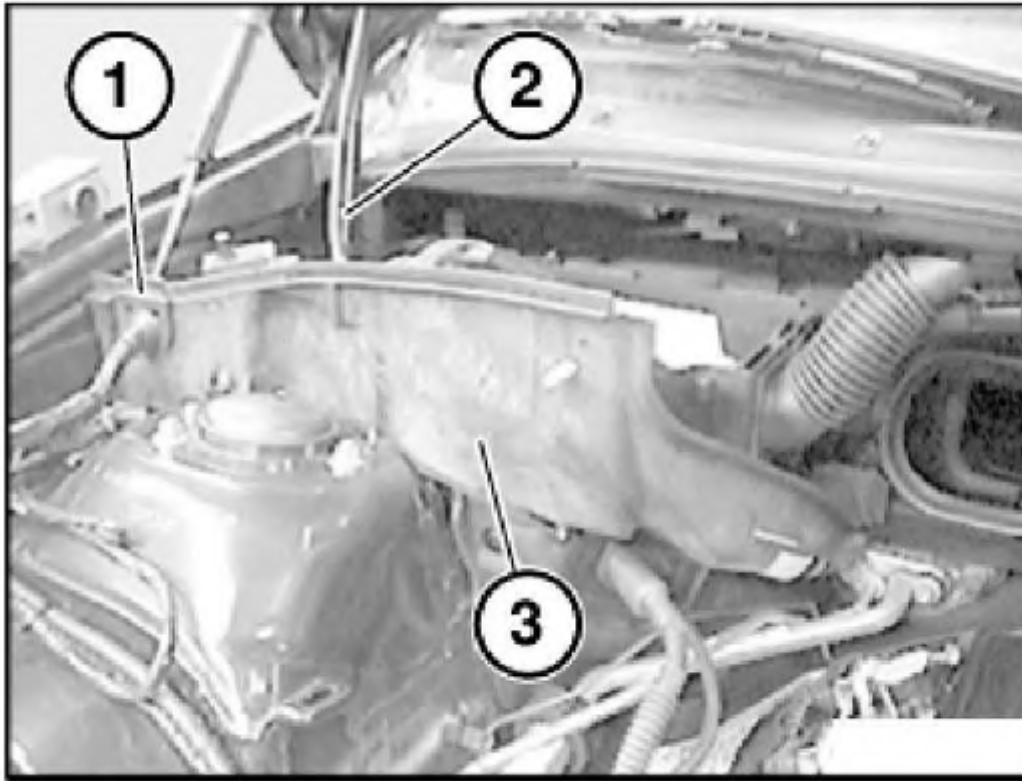
Remove water reservoir for windshield washer system. Refer to **61 71 061 REPLACING FLUID TANK FOR WINDSHIELD WASHER SYSTEM** .

Remove cable (1) with profile seal from partition wall (3).

Unclip cable (2) from partition wall (3).

Release screw connection of partition wall (3) with body.

Remove partition wall (3).



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**Fig. 134: Removing Partition Wall**

Courtesy of BMW OF NORTH AMERICA, INC.

Pull profile seal (1) out of electronics box.

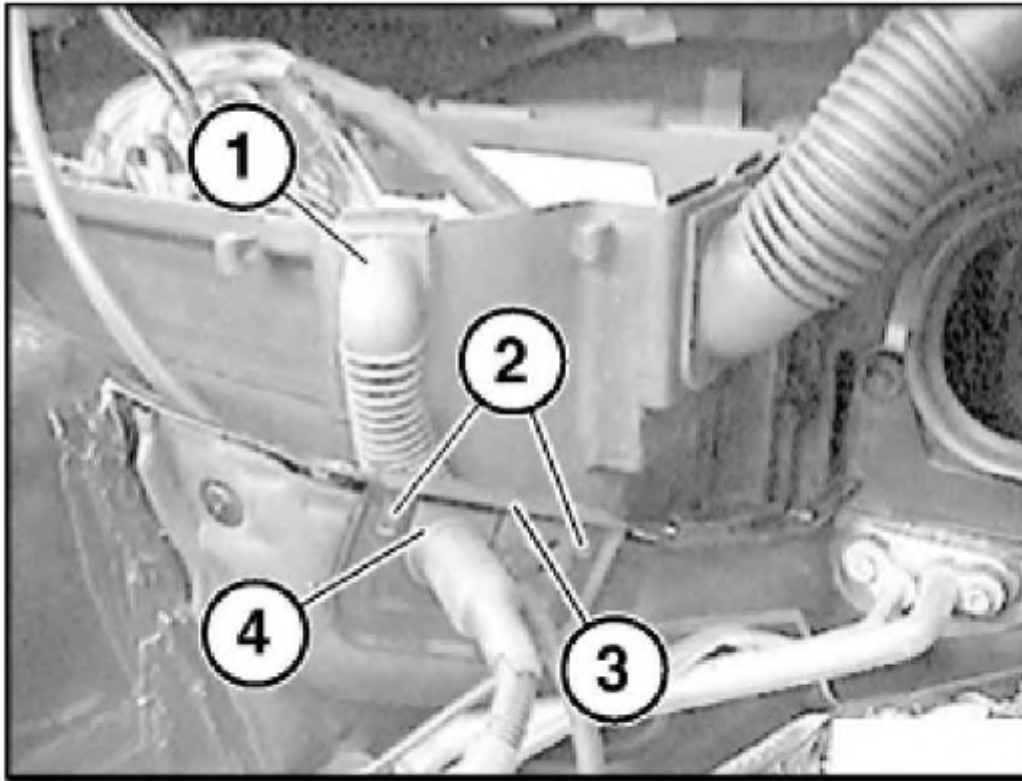
Release locks (2).

Remove strip (3).

Pull out profile seal (4).

**Installation:**

To prevent leaks, you must install profile seals (1 and 4) correctly.



G03230541

**Fig. 135: Pulling Profile Seal Out Of Electronics Box**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Z3, E46, E53 And E39:**

**NOTE:** Interrogate fault memory of DME control unit.

Check stored fault messages.

Rectify faults.

Then clear fault memory.

## **OIL PRESSURE/OIL TEMPERATURE GAUGE**

**12 61 250 REMOVING AND INSTALLING/REPLACING OIL TEMPERATURE SWITCH (M52TU, M54, M56)**

Switch off ignition.

Remove suction filter housing. Refer to **13 71 000 REMOVING AND INSTALLING INTAKE FILTER HOUSING (M54)** .

Unfasten oil filter cover to enable engine oil in filter to flow back into the oil sump.

The procedure is described in **00 00 250 BMW ENGINE OIL SERVICE INCL. SUPPLEMENTARY SERVICE (M54 / M56)** .



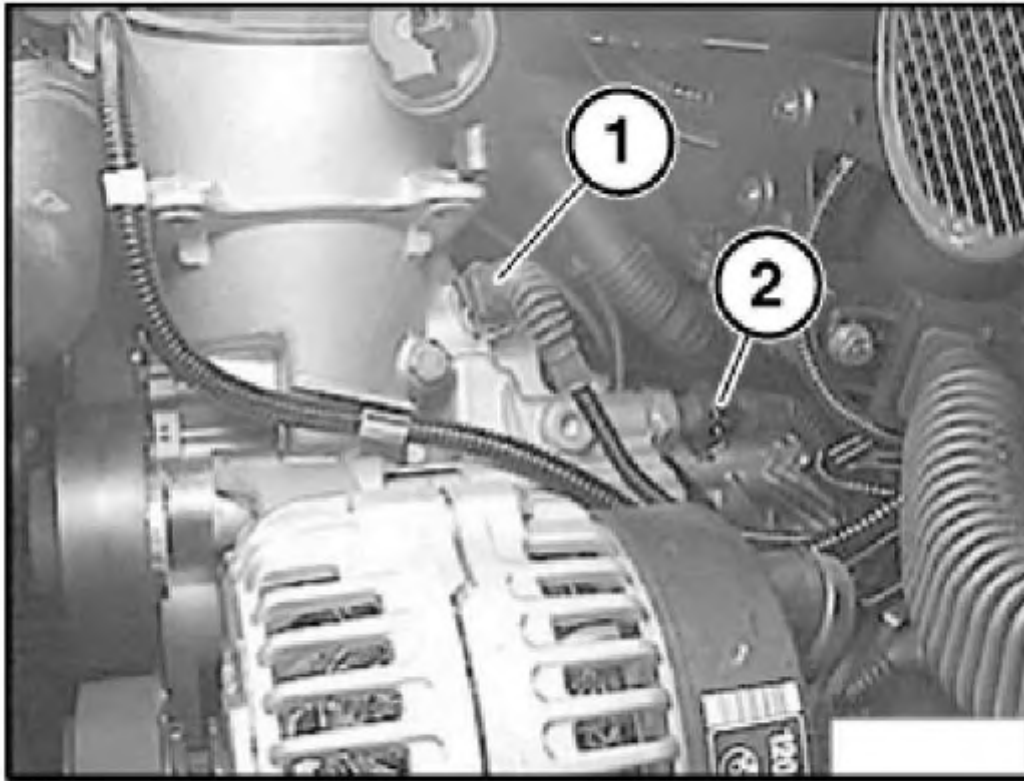
G03230544

**Fig. 136: Locating Oil Filter Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

Location: On base of oil-filter.

**NOTE:** Figure shows power steering pump supply tank removed.

Disconnect plug connection (1).



G03230545

**Fig. 137: Disconnecting Plug Connection**

Courtesy of BMW OF NORTH AMERICA, INC.

**CAUTION:** A few drops of oil escape when the oil temperature switch is released.  
Catch residual oil with cleaning cloth and dispose of oil.

Release oil temperature switch.

**Installation:**

Tightening torque, (27 N.m).

**12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SWITCH (M52TU, M54, M56)**

Switch off ignition.

Remove suction filter housing. Refer to **13 71 000 REMOVING AND INSTALLING INTAKE FILTER HOUSING (M54)** .

Unfasten oil filter cover to enable engine oil in filter to flow back into the oil sump.

The procedure is described in **00 00 250 BMW ENGINE OIL SERVICE INCL. SUPPLEMENTARY SERVICE (M54 / M56)** .



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**Fig. 138: View Of Oil Filter Cover**

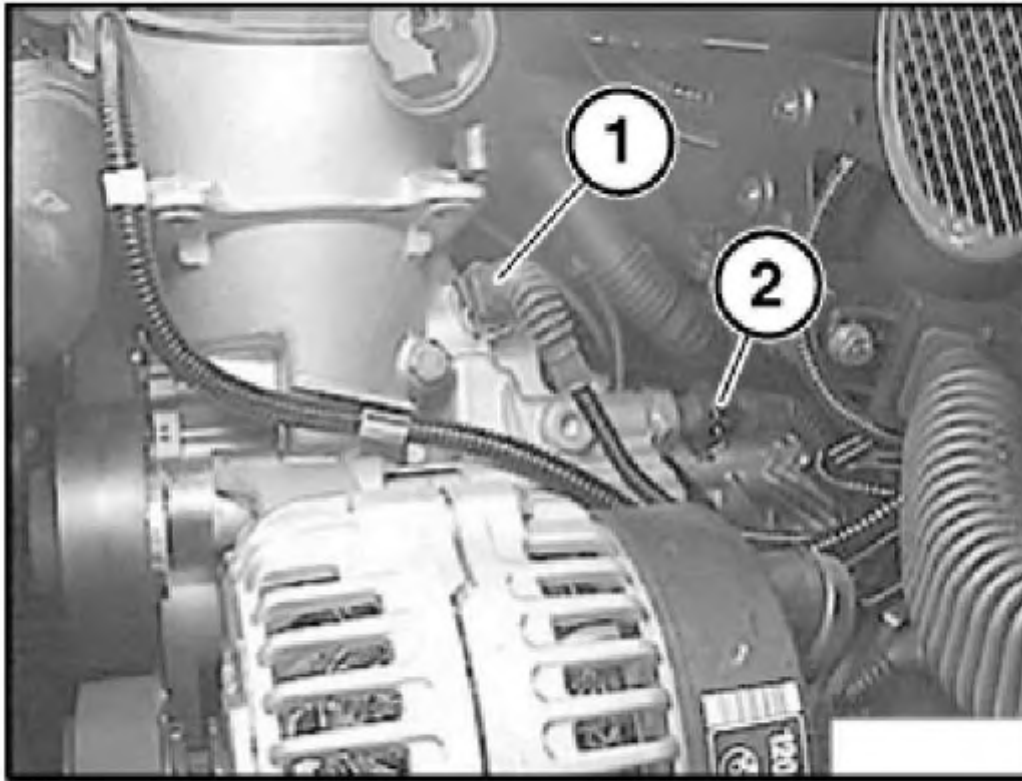
Courtesy of BMW OF NORTH AMERICA, INC.

Location: On base of oil-filter.

**NOTE:**        **Figure shows power steering pump supply tank removed.**

Disconnect plug connection (2).





G03230547

**Fig. 139: Disconnecting Plug Connection**

Courtesy of BMW OF NORTH AMERICA, INC.

**CAUTION:** A few drops of oil escape when the oil pressure switch is released. Catch residual oil with cleaning cloth and dispose of oil.

Release oil pressure switch.

**Installation:**

Tightening torque, (27 N.m).

**12 61 285 REPLACING LEVEL SWITCH FOR ENGINE OIL (M62, M54, S54, M56)**

**Necessary Preliminary Tasks:**

- Switch off ignition.

## 2002 BMW X5 30i

2001-2003 ENGINE Ignition System - Repair Instructions - X5 (3.0i) M54

- Unfasten cover on full-flow oil filter to enable engine oil in filter to flow back into the oil sump.
- Drain engine oil.

These operations are described in **00 00 250 BMW ENGINE OIL SERVICE INCL. SUPPLEMENTARY SERVICE (M54 / M56)** .

Remove reinforcement plate.

**IMPORTANT:** The article **FRONT AXLE SUPPORT** contains important installation instructions.

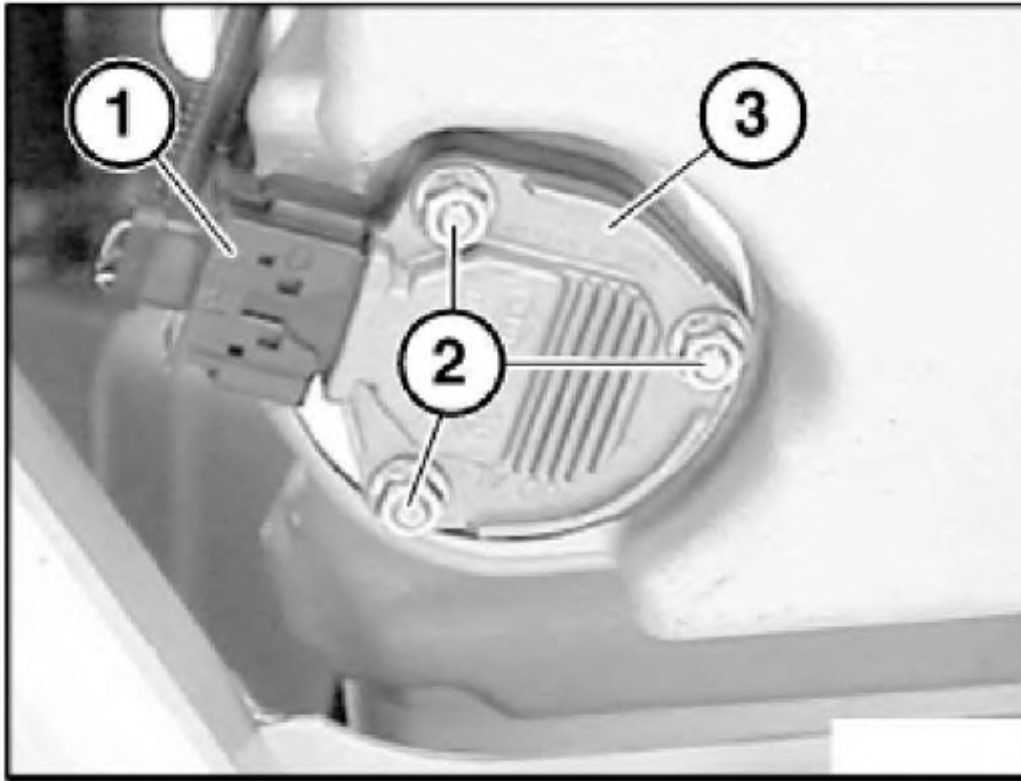
Disconnect plug connection (1).

Unscrew nuts (2).

Remove level switch (3).

### **Installation:**

Clean sealing surface on oil sump and replace seal of level switch.



G03230548

**Fig. 140: Removing Level Switch**

Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Screw on oil-filter cover tightly.

Tightening torque, refer to 11 42 2AZ in **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

Top up engine oil. Refer to **00 00 250 BMW ENGINE OIL SERVICE INCL. SUPPLEMENTARY SERVICE (M54 / M56)** .

## **SWITCH AND RELAYS**

### **12 63 520 REPLACING MAIN RELAY (M62, M54)**

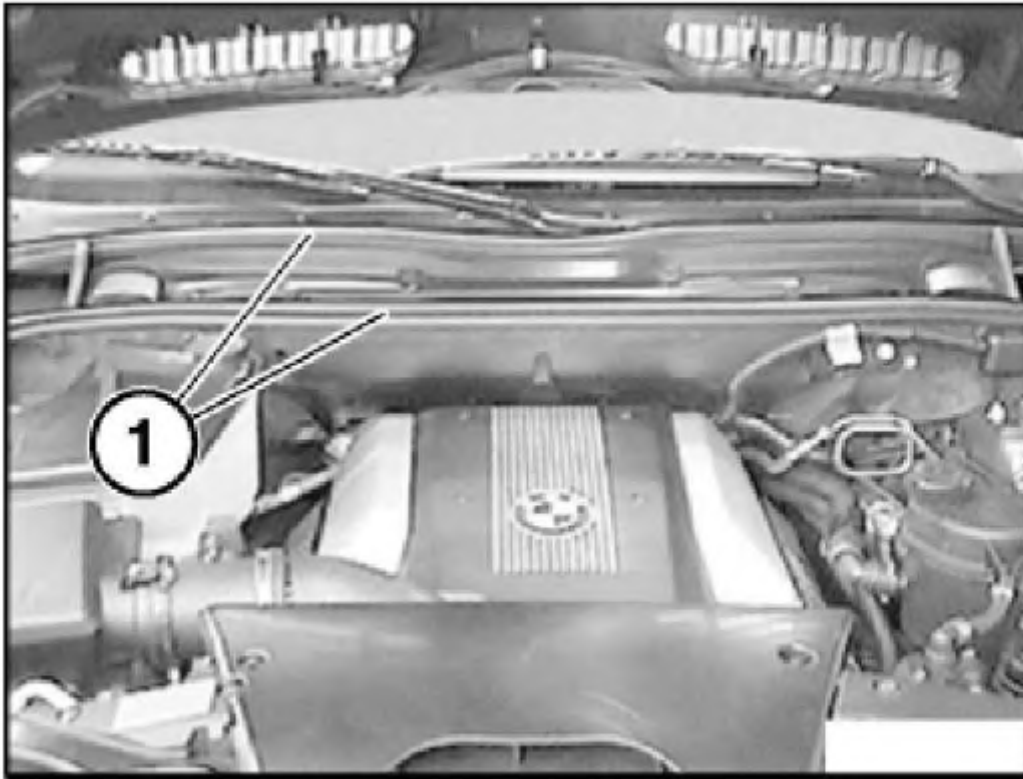
Switch off ignition.

## 2002 BMW X5 30i

2001-2003 ENGINE Ignition System - Repair Instructions - X5 (3.0i) M54

Connect DIS Tester.

Detach sealing strips (1).



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**Fig. 141: Detaching Sealing Strips**

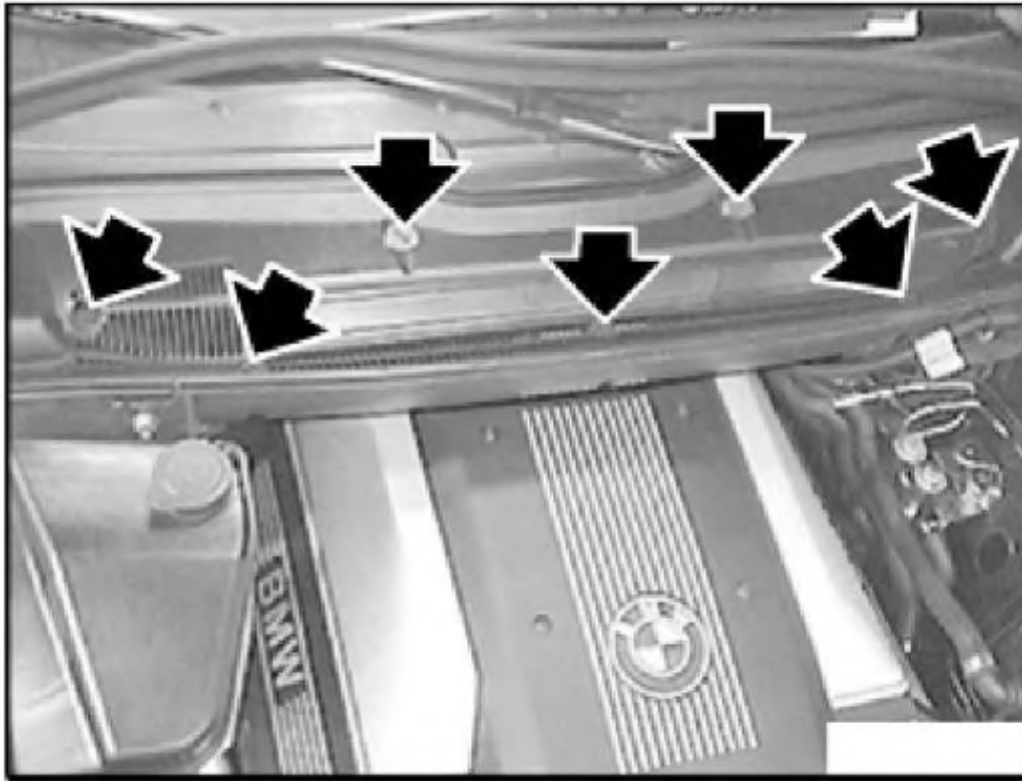
Courtesy of BMW OF NORTH AMERICA, INC.

Turn tommy bar through approx. 90°.

Remove cover.

## 2002 BMW X5 30i

2001-2003 ENGINE Ignition System - Repair Instructions - X5 (3.0i) M54



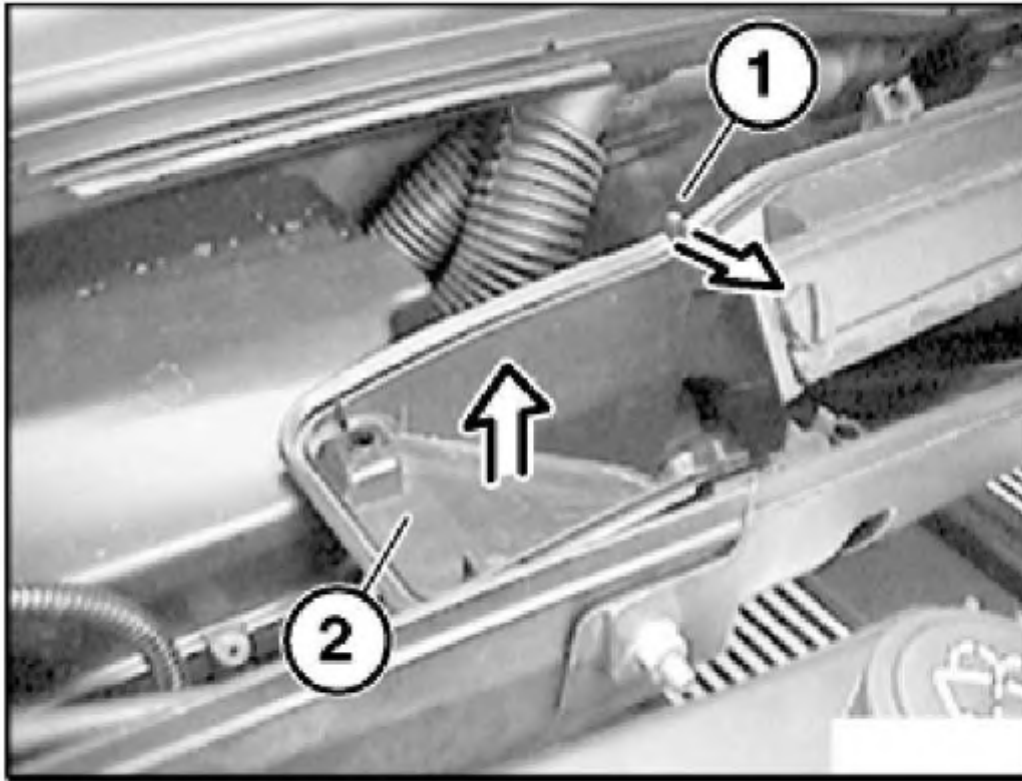
G03230550

**Fig. 142: Removing Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1).

Remove air funnel (2) towards top.

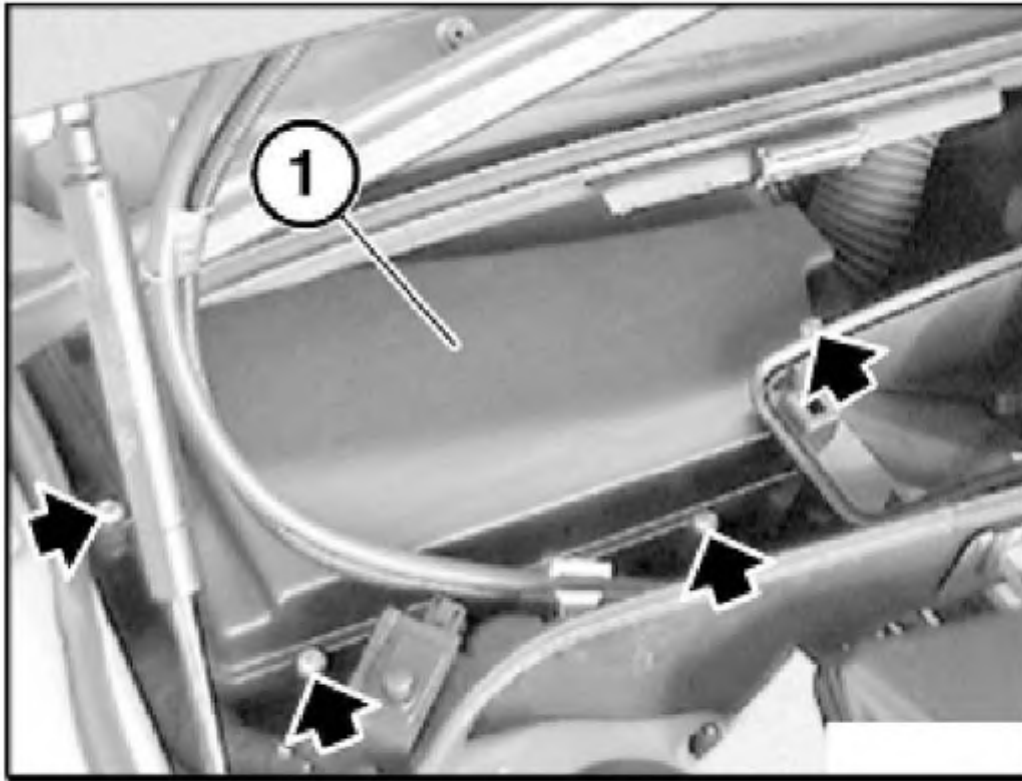


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**Fig. 143: Removing Air Funnel**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Remove cover (1) on control unit box.

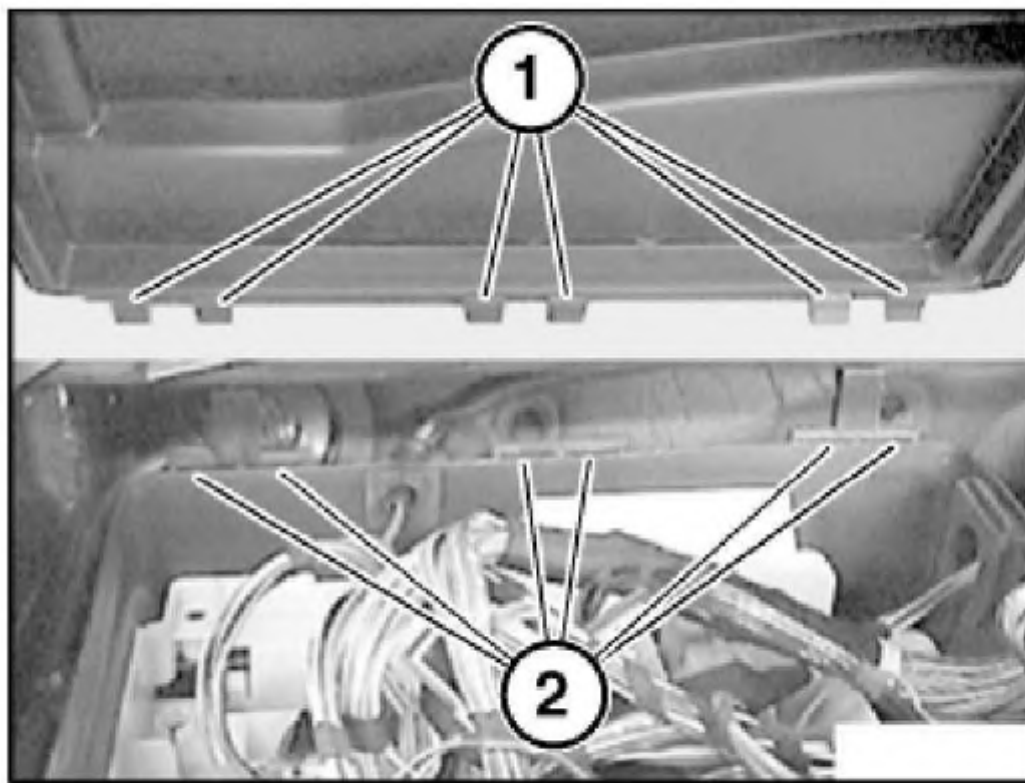


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**Fig. 144: Removing Cover On Control Unit Box**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Insert fixtures (1) of cover for control unit box in openings (2).



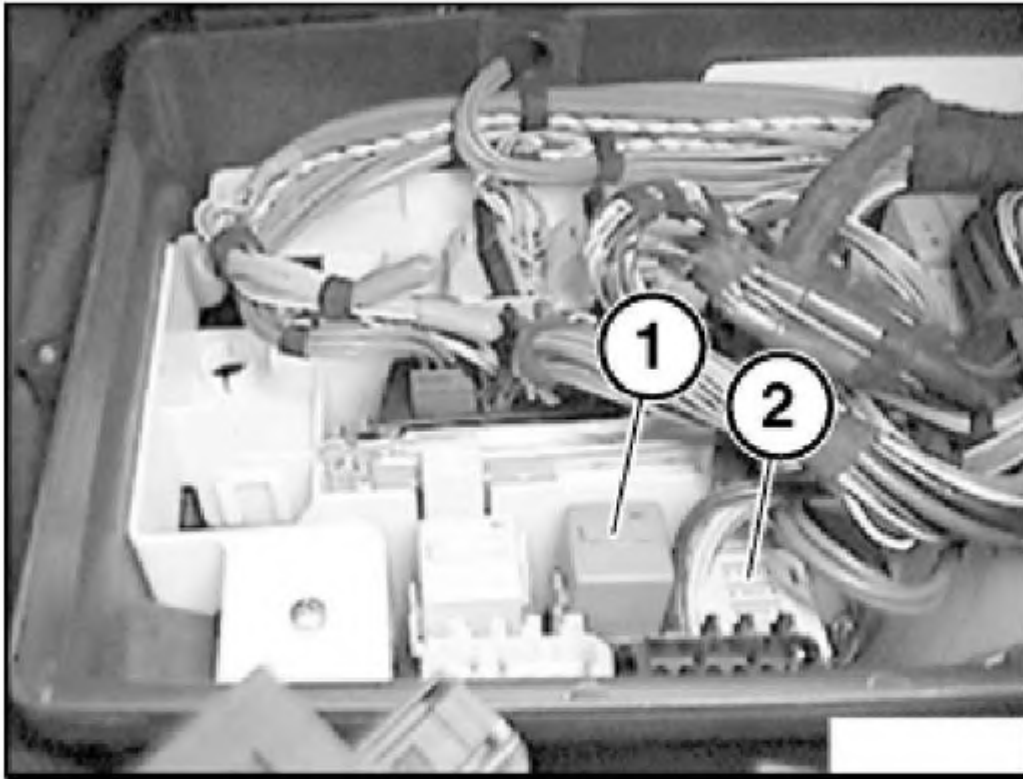
G03230553

**Fig. 145: Inserting Fixtures Of Cover For Control Unit Box In Openings**  
Courtesy of BMW OF NORTH AMERICA, INC.

Order:

1. Main relay of Digital Motor Electronics.
2. Engine fuses of Digital Motor Electronics.





1. Main relay of Digital Motor Electronics
2. Engine fuses of Digital Motor Electronics

G03230554

**Fig. 146: Identifying Main Relay And Engine Fuses Of Digital Motor Electronics**  
Courtesy of BMW OF NORTH AMERICA, INC.

#### **Notes On Troubleshooting:**

If the starter motor cranks the engine during the starting sequence but the engine fails to fire, then:

1. Check engine fuses.
2. If fuses are blown, replace them completely with fuse holder.
3. Find out why fuses have blown.

Continue troubleshooting as per DIS instructions.

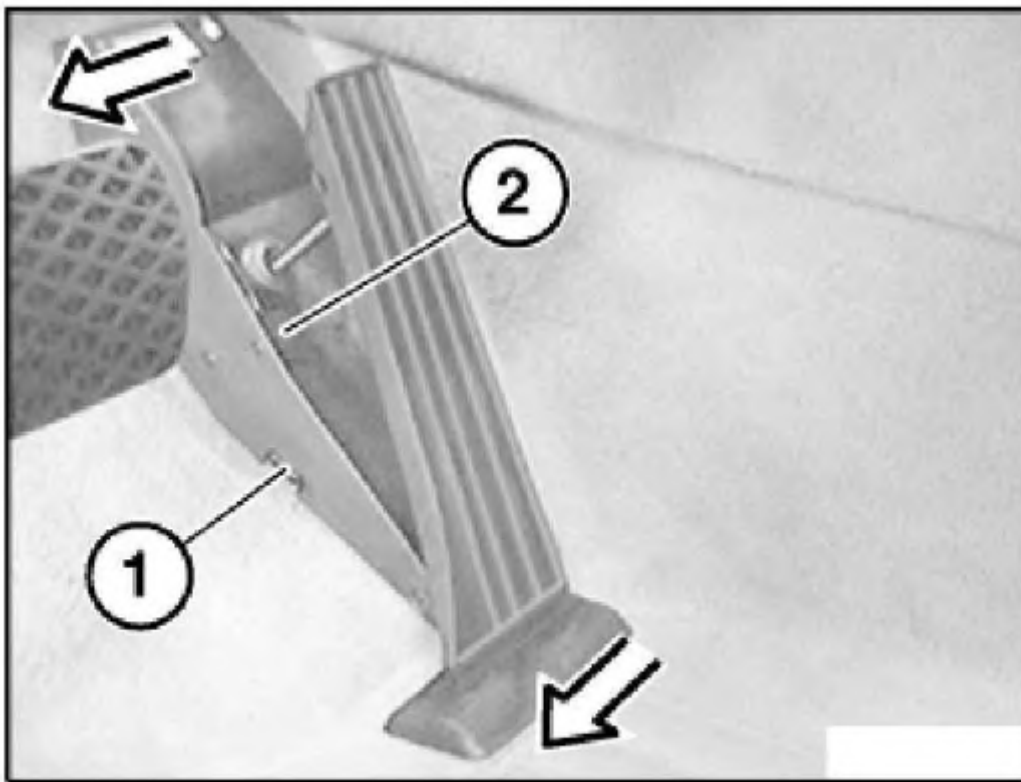
## SENSOR FOR CONTROL UNIT

### 12 72 520 REMOVING AND INSTALLING/REPLACING PEDAL TRAVEL SENSOR (M62, M54)

Refer to **13 00 002 CHECKING FUNCTION OF DIGITAL ENGINE** .

Switch off ignition.

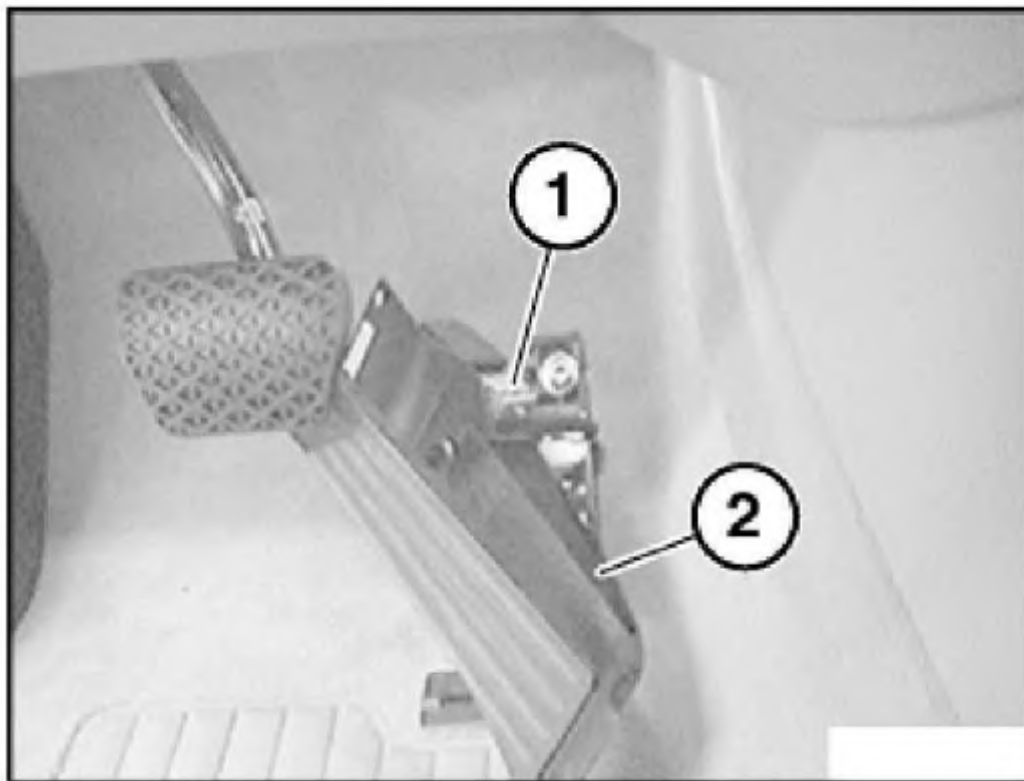
Carefully press down locking lug (1) and pull out accelerator pedal module (2) at side.



G03230555

**Fig. 147: Locating Locking Lug**  
Courtesy of BMW OF NORTH AMERICA, INC.

Detach plug (1) from accelerator pedal module (2).



G03230556

**Fig. 148: Detaching Plug From Accelerator Pedal Module**  
Courtesy of BMW OF NORTH AMERICA, INC.

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