

ELECTRICAL

BMW - X3 (F25) - 2011

DESCRIPTION

WARNING: Vehicles are equipped with air bag supplemental restraint system. Before attempting any repairs involving steering column, instrument panel or related components, see **AIR BAG SAFETY PRECAUTIONS** and **DISABLING & ACTIVATING AIR BAG SYSTEM** in **AIR BAG DEACTIVATION PROCEDURES** article.

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See appropriate **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery. Obtain radio code card from customer. Note stored stations and restore them after connecting battery. Stored settings of 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.

ENGINE COMPARTMENT

Power Distribution Box (Z4) has the following consumers:

- Electric Auxiliary Heater
- Electric Fan
- Electronic Power Steering (EPS)
- Dynamic Stability Control (DSC) Return Pump
- Fuse U2: Supply Voltage For Electric Fan
- Fuse U3: Supply Voltage For DSC Return Pump
- Fuse U4: Supply Voltage For Electric Auxiliary Heater

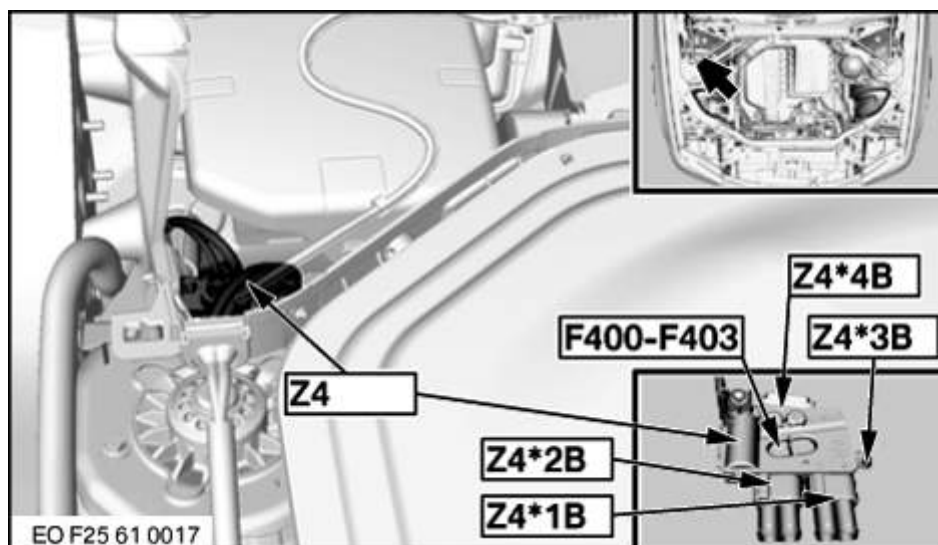
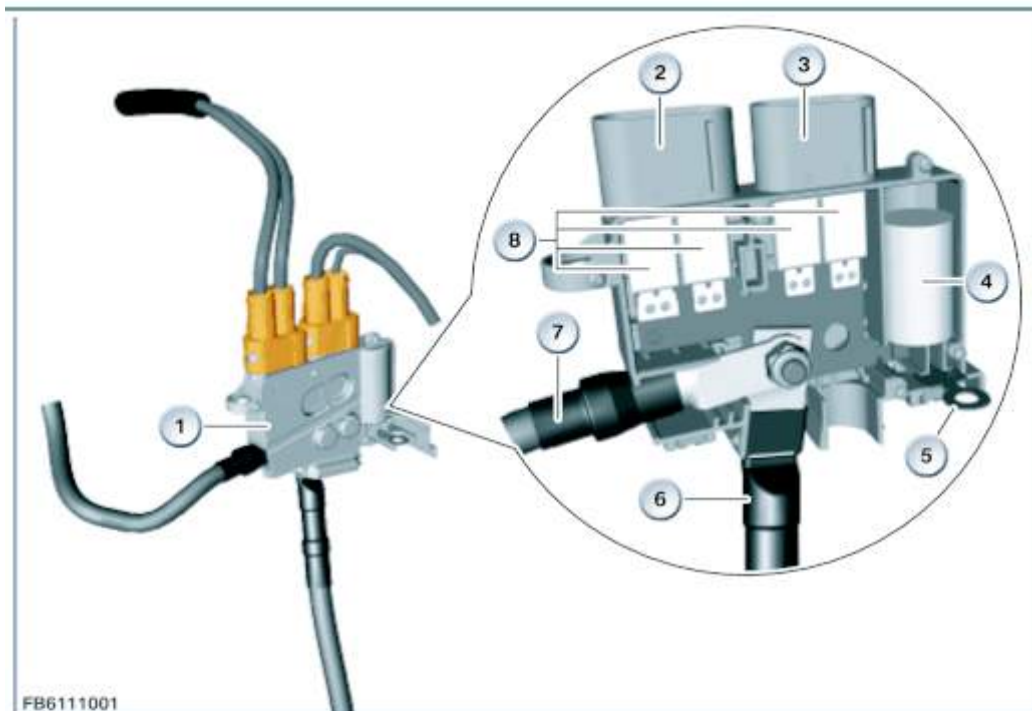


Fig. 1: Locating Power Distribution Box (Z4)

Courtesy of BMW OF NORTH AMERICA, INC.



Index	Explanation	Index	Explanation
1	Power distribution box, engine compartment	2	Power supply for the electric fan and EPS unit
3	Power supply for the electric auxiliary heater and return pump	4	Ignition capacitor
5	Ground connection for the capacitor	6	Voltage supply from the battery
7	Connection for positive battery connection point	8	Fuse

Fig. 2: Identifying Power Distribution Box (Z4)
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Power Distribution Box Z8 (Fuse block on the battery) contains fuses and relays. If one of the fuses or one of the relays is faulty, the complete power distribution box must be replaced.

Power Distribution Box (Z8) has the following consumers:

- Power distribution box at front in the junction box (passenger compartment)
- Power distribution box, rear (luggage compartment)
- Electronics box in engine compartment for Valvetronic, common rail (fuel injection for diesel fuel)
- Top HiFi amplifier
- Intelligent battery sensor (IBS)

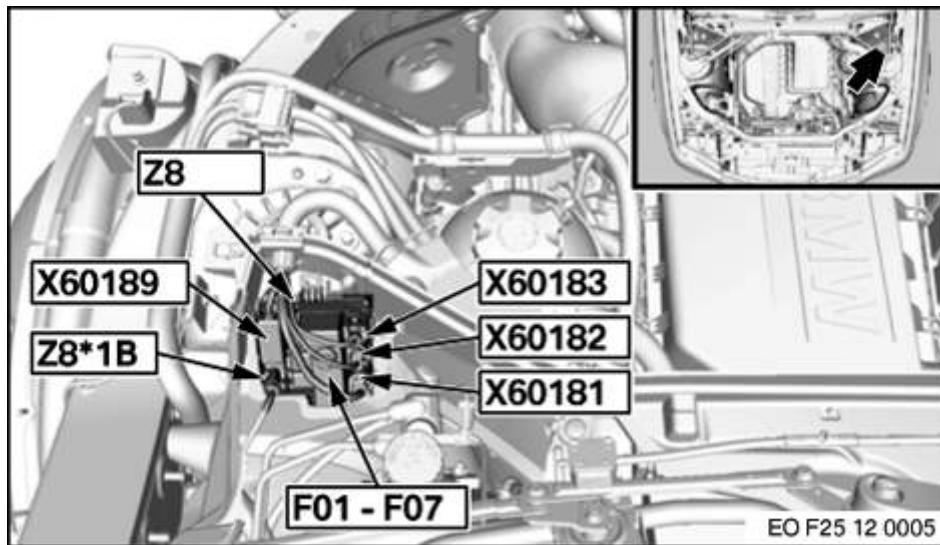


Fig. 3: Locating Power Distribution Box (Z8)
 Courtesy of BMW OF NORTH AMERICA, INC.

PASSENGER COMPARTMENT

For location of Front Distribution Box Z1, see [Fig. 4](#). For amperage and components covered, see [Fig. 5](#)

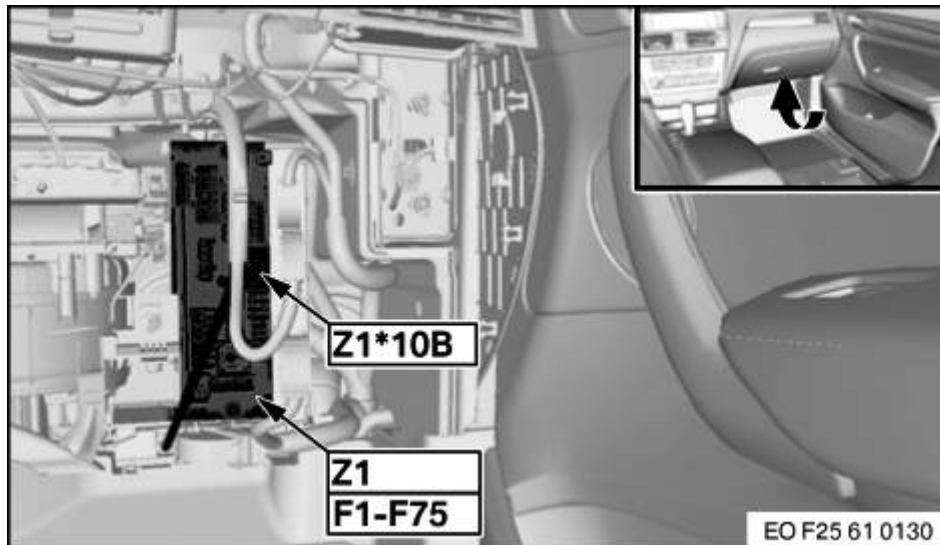


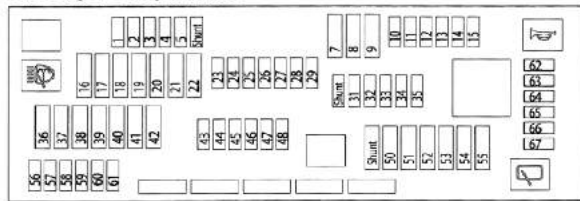
Fig. 4: Locating Front Distribution Box (Z1 - Glove Compartment)
 Courtesy of BMW OF NORTH AMERICA, INC.

	33, 34, 35, 40, 43, 115, 132, 169, 185, 190		2, 8, 14, 15, 32, 38, 56		35
	8, 13, 24, 33, 39, 43, 45, 60		7, 8, 9, 17, 18, 32		139, 184
	19, 100, 145, 146, 148		31, 186, 187, 188, 189		35, 46
	8, 10, 13, 25, 31, 43, 45, 47, 118, 119, 120, 121, 170, 190		31, 32, 52, 53, 67		13, 31, 43, 44, 105, 118, 120, 126, 170, 185, 190
	38, 56, 103, 190		8, 32		3
	34, 47, 118, 201		121		60, 169, 198, 199
	37, 40, 63, 64, 66		8, 51, 55		8, 36
	8, 13, 16, 24, 66, 101, 141		203		8, 36
	10, 13, 16, 66, 141, 154		8		153, 155, 200
	125		44, 48, 142, 175		58, 61
	58		5, 13, 48, 66		4, 23, 27, 117
	8, 45		34, 37, 45, 47		61, 100
	33, 46, 121, 137		8, 12, 13, 26		58, 61
	8, 62		8, 11, 31, 44		1, 54, 65, 143, 144, 171, 176

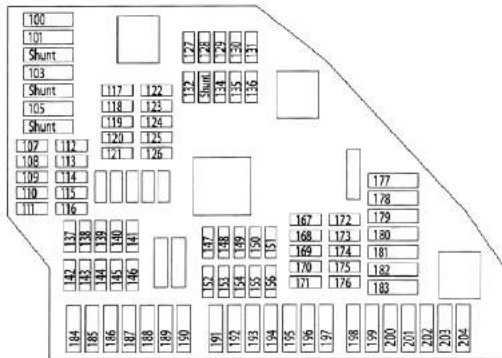
No.	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18
Ampere	5	5	5	5	10	30	30	30	10	7.5	5	5	15	20	40	30	30
No.	19	20	21	22	23	24	25	26	27	28	29	31	32	33	34	35	36
Ampere	20	20	30	30	5	10	5	5	5	5	5	5	7.5	5	5	15	30
No.	37	38	39	40	41	42	43	44	45	46	47	48	50	51	52	53	54
Ampere	30	40	-	30	-	30	5	5	-	10	5	5	30	30	30	30	20
No.	55	56	57	58	59	60	61	62	63	64	65	66	67				
Ampere	20	5	-	5	-	5	20	15	10	7.5	15	7.5	10				

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Passenger Compartment



Luggage Compartment



No.	100	101	103	105	107	108	109	110	111	112	113	114	115	116	117	118
Ampere	20	40	20	30	-	-	-	5	-	-	-	-	5	7.5	5	5
No.	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134
Ampere	15	5	5	-	-	-	5	15	-	-	-	-	5	-	-	-
No.	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
Ampere	-	-	-	-	5	-	5	20	15	15	20	-	-	20	-	-
No.	151	152	153	154	155	156	167	168	169	170	171	172	173	174	175	176
Ampere	-	-	5	5	15	-	-	5	5	-	-	-	-	-	20	15
No.	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192
Ampere	-	-	-	-	-	-	-	20	30	20	20	20	20	30	-	-
No.	193	194	195	196	197	198	199	200	201	202	203	204				
Ampere	-	-	-	-	-	30	30	40	20	-	30	-				

Fig. 5: Identifying Glove Box (Z1) & Luggage Compartment (Z2) Fuses
Courtesy of BMW OF NORTH AMERICA, INC.

LUGGAGE COMPARTMENT

For location of Rear Distribution Box Z2, see [Fig. 6](#). For amperage and components covered, see [Fig. 5](#)

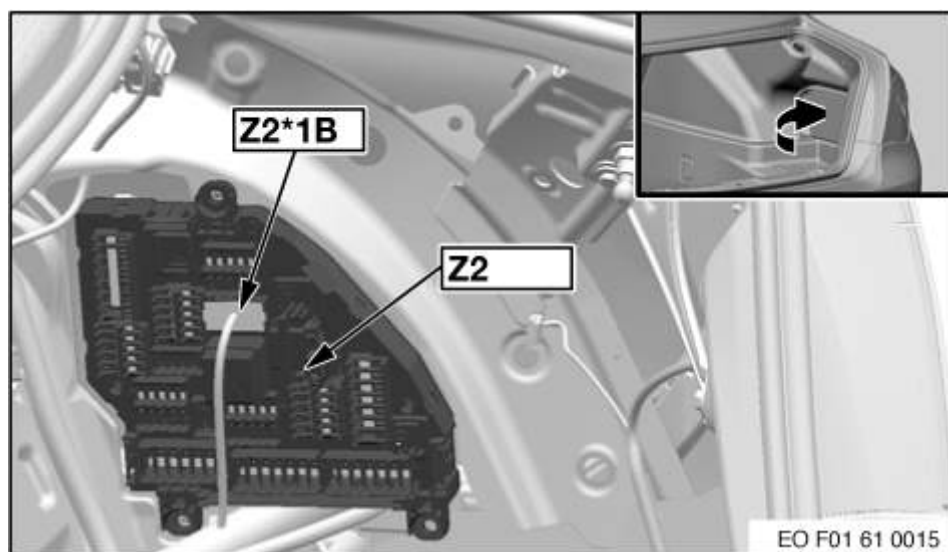


Fig. 6: Locating Rear Distribution Box (Z2 - Luggage Compartment)
Courtesy of BMW OF NORTH AMERICA, INC.

FUSE ASSIGNMENT SYMBOL DEFINITIONS

For help determining the meaning of the symbols on fuse assignment legends, see [FUSE ASSIGNMENT SYMBOL DEFINITIONS](#).

TROUBLESHOOTING

61 20... BATTERY REPLACEMENT INFORMATION

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

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

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

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

Vehicles with energy management systems (IBS, power module): Register battery replacement

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

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

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

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

Diagnosis system:

Register battery replacement

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

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

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

Programming system:

- Battery retrofitting

61 13... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

Special tools required:

- [61 0 300](#)
- [61 4 340](#)
- [61 0 240](#)

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

IMPORTANT:

NOTE:

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

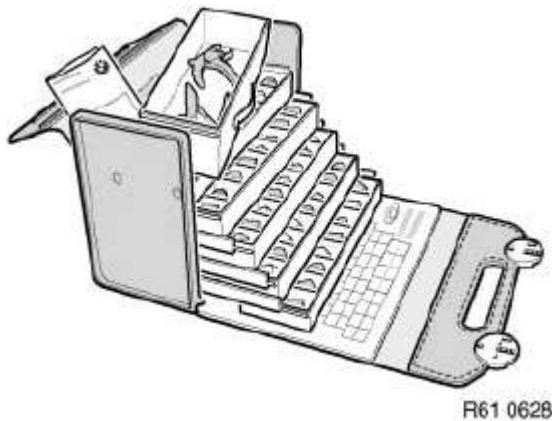
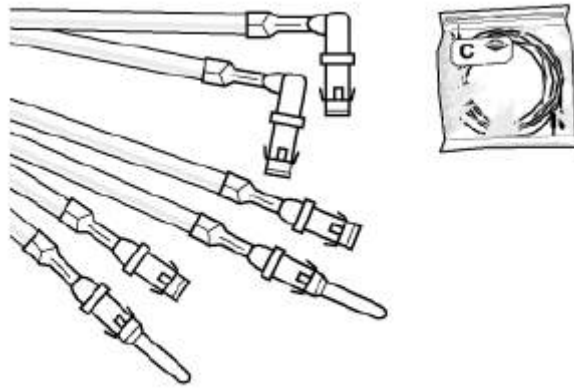


Fig. 1: Identifying Vehicle Repair Kit

Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular connector system D 2.5.

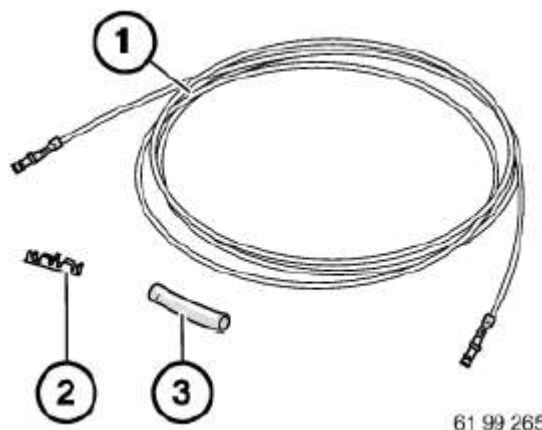


R61 99 257

Fig. 2: Identifying Circular Connector Of Repair Kit
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts:

1. Pre-packaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section
3. Shrink-fit hose



61 99 265

Fig. 3: Identifying Cable, Crimp Connector And Shrink-Fit Hose
 Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

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

See repair instructions

NOTES FOR OPENING CONTACTS AND LOCKS of different plug contact systems.

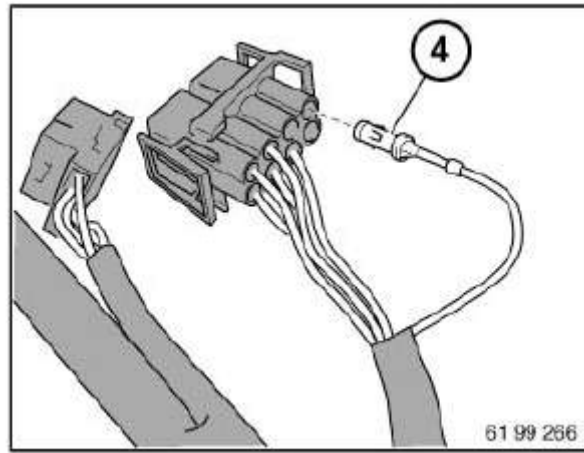


Fig. 4: Identifying Socket Number Of Housing
 Courtesy of BMW OF NORTH AMERICA, INC.

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

IMPORTANT:

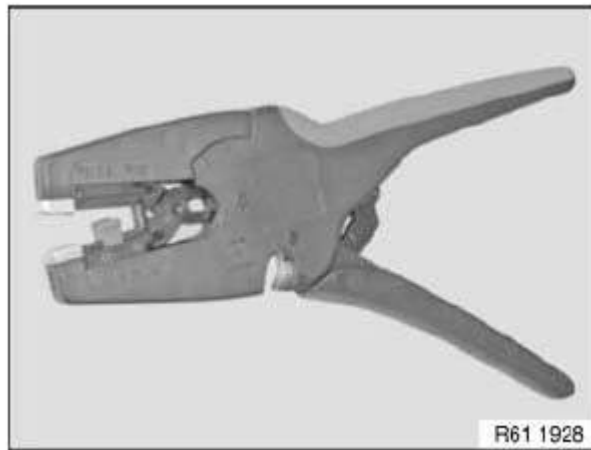


Fig. 5: Identifying Wire Cutting Plier
 Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to following procedure:

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

Refer also to repair instruction:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

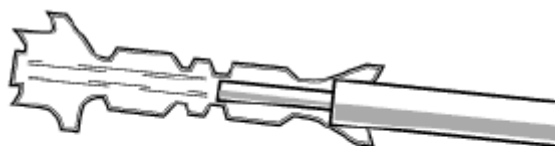
Crimp butt connector on preassembled wire end.

Special tools:

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

See repair instructions

CRIMPING ON STOP PARTS

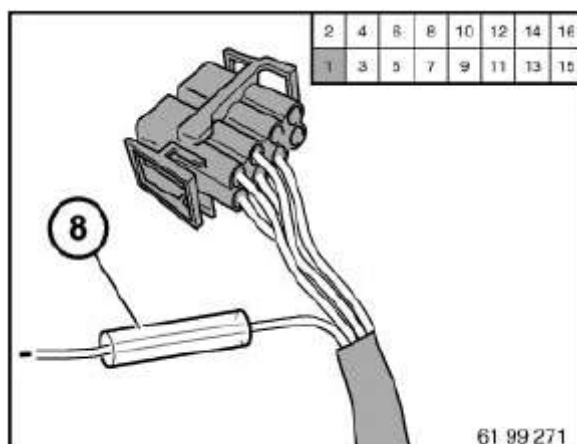


61 99 270

Fig. 6: Identifying Special Tools (61 4 340)

Courtesy of BMW OF NORTH AMERICA, INC.

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

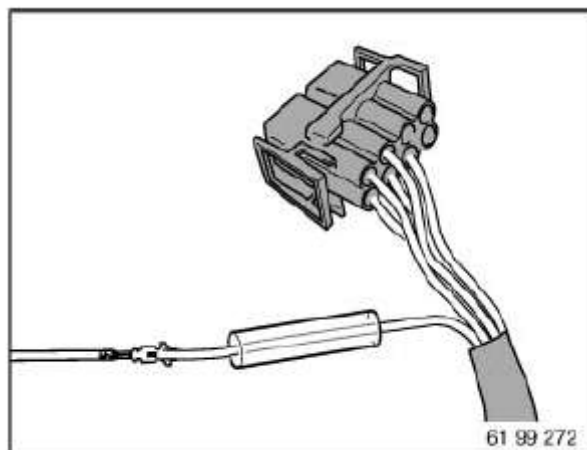


61 99 271

Fig. 7: Identifying Shrink-Fit Hose

Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.



61 99 272

Fig. 8: Identifying Crimp Wire End To Butt Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

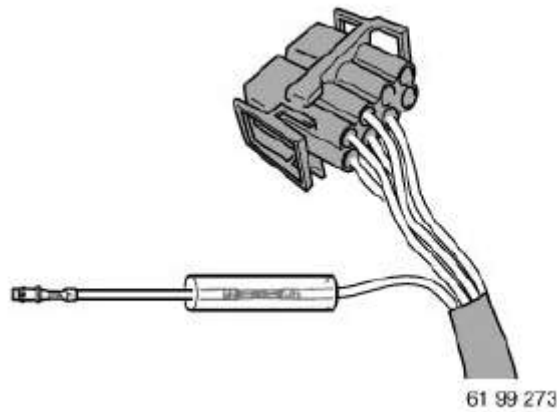


Fig. 9: Identifying Shrink On Sleeve Butt Connector
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

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

Insert contact in housing.

Close secondary lock on housing.

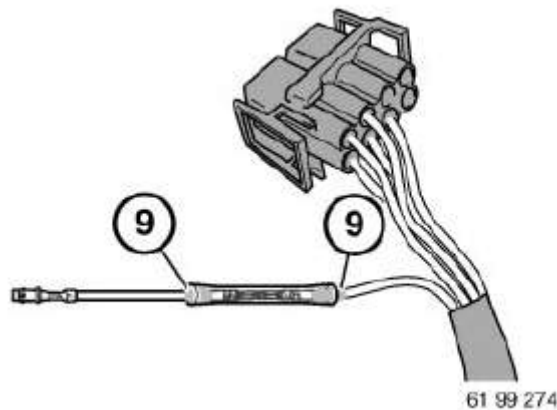


Fig. 10: Identifying Shrink-Fit Hose
 Courtesy of BMW OF NORTH AMERICA, INC.

12 00 CONTENTS OF ENGINE ELECTRICAL SYSTEM GENERAL

General Information -> **WORKING ON IGNITION SYSTEM**

-> **REMOVING AND INSTALLING ELECTRONIC CONTROL UNITS**

-> **WELDING WORK** (overload protection of control units)

-> Disconnecting and connecting battery

-> **DISCONNECTING AND CONNECTING TEST EQUIPMENT**

-> **COMPONENT INSPECTION**

-> **EXTERNAL JUMP-STARTING AID**

-> Compression testing

11 00... HANDLING COMPONENTS AFTER FLOOD DAMAGE

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

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

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

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

12 00... INSTRUCTIONS FOR 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.
- 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 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, Repair Manual.
- 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 FOR CONNECTING AND DISCONNECTING TEST UNITS

When connecting and disconnecting:

- Service Tester
- testing devices
- test leads and
- when replacing control units

it is essential to **turn off the ignition!**

FOLLOW 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 FOR REMOVAL AND REPLACEMENT OF CONTROL UNITS

IMPORTANT:

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

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

- In every case use the diagnosis system to read out the hardware/software version of the corresponding control unit.

Comply with the diagnosis system instructions for the encoding and programming work operations.

On vehicles with an electronic immobiliser, comply with the diagnosis system instructions.

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

12 00... INSTRUCTIONS FOR WORKING ON THE IGNITION SYSTEM

CAUTION:

**Always switch off ignition before working on ignition system.
Use only test leads which have been approved and belong to these testing instruments (e.g. DIS Tester).
Comply with operating instructions of the respective testing instrument used.**

Comply with the country-specific safety regulations.
Never touch components under current with engine running!
Comply with instructions of DIS tester.
Do not connect any suppression capacitors or inspection lamps to terminal 1 on the ignition coil.
Terminal 1 of ignition coil must not be connected to ground or battery positive lead.
If an alarm system is subsequently installed, lead of terminal 1 must not be used for start prevention.
When working on ignition system, always disconnect supply leads to ignition coils.

High tension! - High tension!

IMPORTANT: Hazardous voltages occur at:

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

61 00... NOTES FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INFORMATION FOR HANDLING VEHICLE BATTERY**.

Before disconnecting battery:

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

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

IMPORTANT:

- There is a danger of mixing up battery cables: 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.
- The on-board computer and clock may lose your data.

General notes on disconnecting battery:

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

Only lead AGM battery:

- On vehicles with IBS at negative battery terminal:

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

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

After connecting battery:

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

IMPORTANT: Personal Profiles may also be lost.

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

For example:

- Activate **slide/tilt sunroof** . See **54 10... NOTES ON GLASS SLIDE/TILT SUNROOF (INITIALIZATION/NORMALIZATION/LEARNING OF CHARACTERISTIC CURVE)** or **54 0... NOTES ON PANORAMA GLASS ROOF (INITIALIZATION/NORMALIZATION/LEARNING OF CHARACTERISTIC CURVE)** , if necessary
- Activate **power window** . See **67 62... NOTES ON INITIALIZING POWER WINDOWS** , **67 62 020 REMOVING AND INSTALLING/REPLACING FLAT MOTOR FOR REAR LEFT OR RIGHT POWER WINDOW REGULATOR** or **67 62 000 REMOVING AND INSTALLING OR REPLACING FLAT MOTOR FOR FRONT LEFT OR RIGHT POWER WINDOW REGULATOR** , if necessary

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

61 13... NOTES FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

Special tools required:

- **61 0 300**
- 61 0 400
- **61 1 100**

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

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

IMPORTANT: Ultrasonically welded connectors (1) must be replaced completely.

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

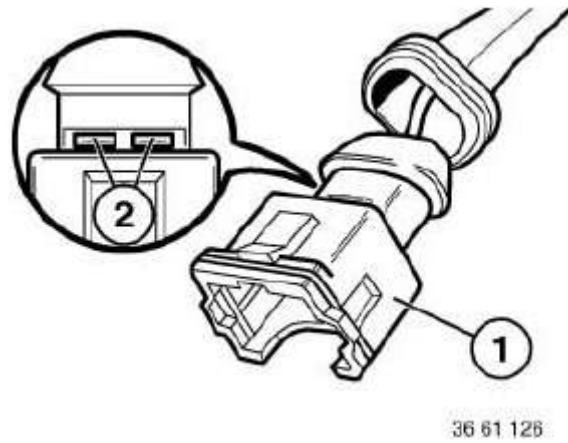


Fig. 11: Identifying Ultrasonic-Welded Connectors And Welds

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Connector system D 1.5/D 2.5:

- [CIRCULAR CONNECTORS, 7- OR 8-PIN, SYSTEM D 2.5](#)
- [CIRCULAR CONNECTORS, 13-PIN, SYSTEM D 2.5](#)
- [CIRCULAR CONNECTORS, 20-PIN, SYSTEM D 2.5](#)
- [CIRCULAR CONNECTORS, 4-, 7-, 10-, 12- OR 25-PIN, SYSTEM D 1.5/D 2.5](#)
- [IN-LINE CONNECTORS, 15-PIN, SYSTEM D 2.5](#)
- [IN-LINE CONNECTORS, 8-, 12-PIN, SYSTEM D 2.5](#)
- [IN-LINE CONNECTORS, 30-PIN, SYSTEM D 2.5](#)
- [IN-LINE CONNECTORS, 20-PIN, SYSTEM D 2.5](#)

Connector system JPT/MDK/DFK:

- [IN-LINE CONNECTORS, 2-PIN, SYSTEM JPT ELA](#)
- [IN-LINE PLUGS, 2-PIN, SYSTEM MDK 3 PLUS 2.8](#)
- [IN-LINE PLUGS, 4-PIN, SYSTEM DFK ELA](#)

Connector system Elo/Elo Power:

- [INLINE PLUGS, 4-, 10-PIN, SYSTEM ELO](#)
- [IN-LINE CONNECTORS, 6- TO 50-PIN, SYSTEM ELO](#)
- [INLINE PLUGS, 3-, 6-PIN, SYSTEM ELO-POWER 2.8](#)

Connector system LSK:

- [CONNECTOR HOUSING LSK CONTACT](#)

Connector system MQS/MPQ:

- INLINE CONNECTORS, 6-, 8-PIN, SYSTEM MOS
- INLINE PLUGS, 2-PIN, SYSTEM MPQ 2.8
- CONTROL UNIT CONNECTORS, 25-, 35-, 55-, 83-, 88-PIN
- IN-LINE PLUGS, 24-PIN, HYBRID SYSTEM MOS/MPQ
- SOCKET HOUSING 42-, 43-PIN, HYBRID SYSTEM MOS/MPQ
- SOCKET HOUSINGS 2X21-, 2X27-PIN, HYBRID SYSTEM MOS/MPQ, ELO/ELO POWER
- IN-LINE CONNECTORS, 30-PIN, HYBRID SYSTEM MOS/MPQ
- SOCKET HOUSINGS, 5-, 8-PIN, SYSTEM MOS/MPQ
- SOCKET HOUSING (RADIO CONNECTOR), HYBRID SYSTEM MOS/MPQ

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

The following applies in general:

To avoid damage, observe the following instructions:

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

The following additionally applies

Shielded cables

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial cable

- Shielded RTK031 coaxial lines may only be repaired with special crimping tools.

CVBS cables

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

HSD cables

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

Fibre-optic cables:

NOTE: Optical fibre cables are colored differently as follows:

- Green = MOST (Media Oriented Systems Transport) optical fibre
- Yellow = ISIS (Intelligent Safety Integration System) optical fibres
- Orange=repair fibre-optic cables

IMPORTANT:

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

Treating cables and fibre-optic cables . See 61 13... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH or 61 13... CRIMPING OPTICAL FIBRES

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK TUBING**.

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary.**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair.**

Airbag lines:

REPAIRING AIRBAG CABLES

12 00... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation:

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

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

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

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

Operation:

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

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

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

Risk of explosion!

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

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

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

Observe safety precautions when working on MSA vehicles.

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

MSA function is deactivated by:

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

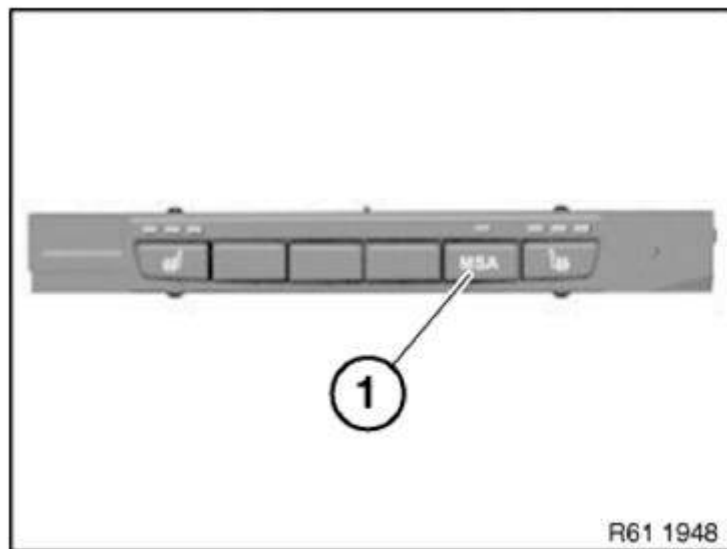


Fig. 12: Identifying MSA Button In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

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

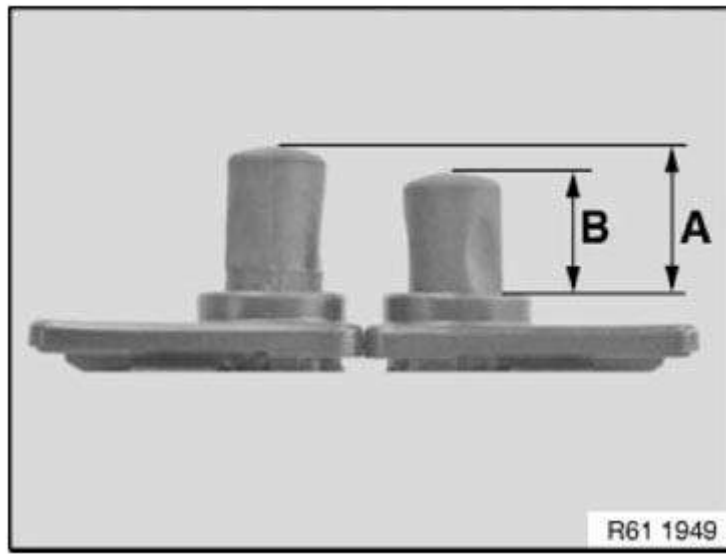


Fig. 13: Identifying Engine Bonnet/Hood Dimension
 Courtesy of BMW OF NORTH AMERICA, INC.

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

When working with diagnosis tools:

- Observe instructions in diagnosis tool

IGNITION WIRES, SPARK PLUGS

12 12 011 REMOVE AND INSTALL/REPLACE ALL SPARK PLUGS (N52T)

Special tools required:

- [12 1 171](#)

Necessary preliminary tasks:

- Switch off ignition.
- Remove **IGNITION COILS**.

IMPORTANT: Wear safety goggles.
 Oil and dirt particles may get into your eyes!

Clean spark plug slot with compressed air.

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

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

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

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

Unscrew spark plugs with special tool [12 1 171](#) and an extension with a joint.

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

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

Installation note:

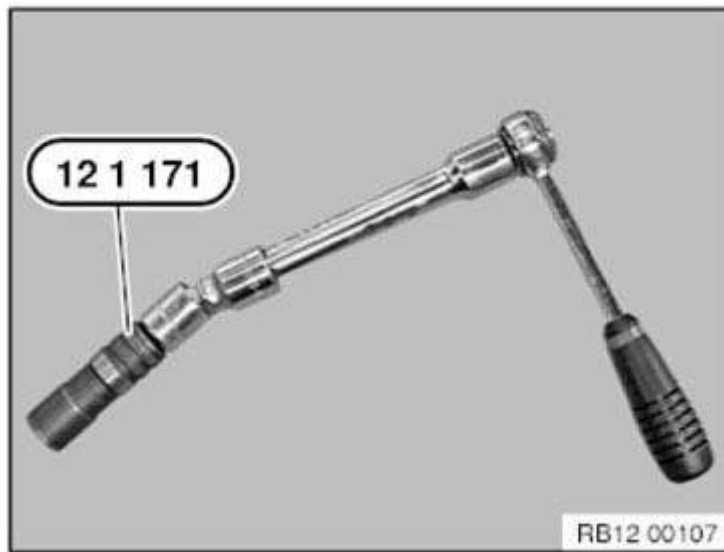


Fig. 14: Identifying Special Tool (12 1 171)

Courtesy of BMW OF NORTH AMERICA, INC.

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

First, hand-tighten the spark plugs with special tool [12 1 171](#) and with an extension with a joint into the engine.

Then tighten the spark plugs using a torque wrench, special tool [12 1 171](#) and an extension with a joint.

Observe tightening torque.

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

12 12 011 REMOVING AND INSTALLING/RENEWING ALL SPARK PLUGS (N20, N26)

Special tools required:

- [12 1 220](#)
- [12 1 230](#)

Necessary preliminary tasks:

- Switch off ignition.
- Remove [IGNITION COILS](#).
- **F20, F21, F22, F23, F30, F31, F32, F33, F34, F35, F36 only:**

Remove tension struts.

IMPORTANT: Wear safety goggles.
Oil and dirt particles may get into your eyes!

Clean spark plug slot with compressed air.

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

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

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

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

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

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

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

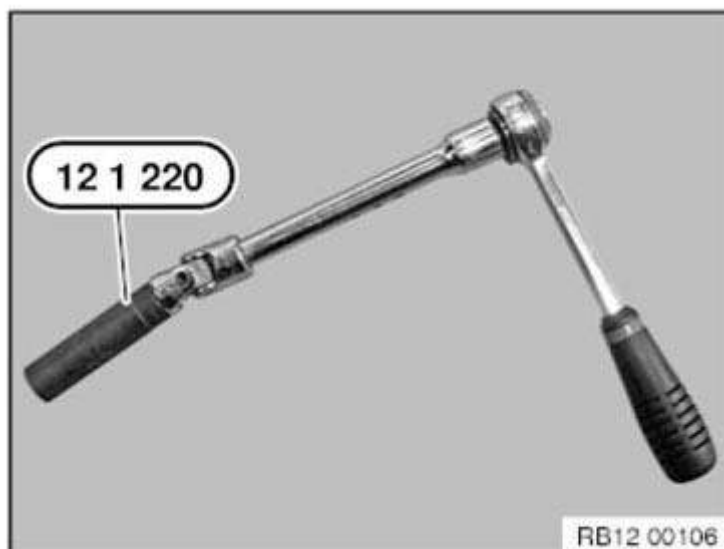


Fig. 15: Identifying Special Tool (12 1 220)

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

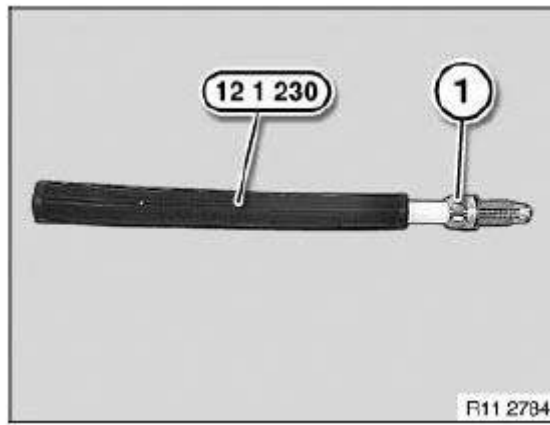


Fig. 16: Attaching Spark Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Screw spark plug into the plug thread hand-tight with special tool [12 1 230](#) until it reaches the limit position.

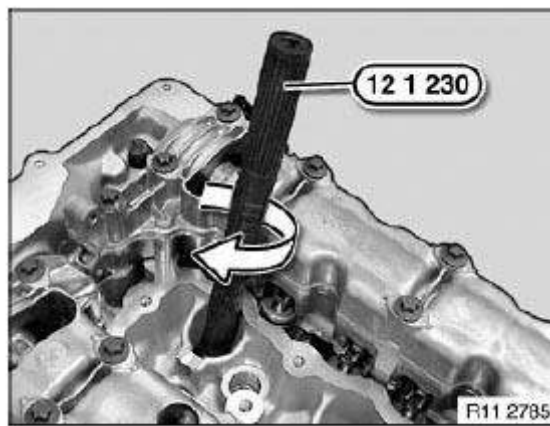


Fig. 17: Turning Spark Plug Using Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten spark plugs with torque wrench, special tool [12 1 220](#) and extension with min. 8° bend.

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

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

Observe tightening torque.

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

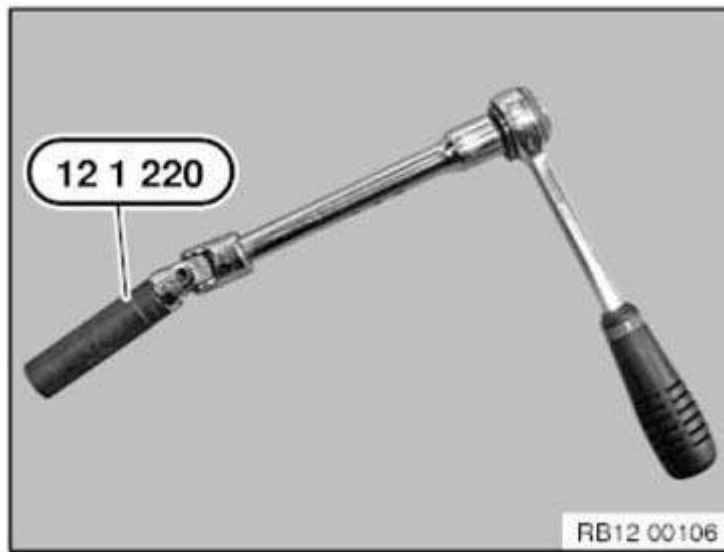


Fig. 18: Identifying Special Tool (12 1 220)

Courtesy of BMW OF NORTH AMERICA, INC.

12 12 011 REMOVING AND INSTALLING/RENEWING ALL SPARK PLUGS (N55)

Special tools required:

- [12 1 220](#)
- [12 1 230](#)

Necessary preliminary tasks:

- Switch off ignition.
- Remove [IGNITION COILS](#).

IMPORTANT: Wear safety goggles.
Oil and dirt particles may get into your eyes!

Clean spark plug slot with compressed air.

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

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

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

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

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

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

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

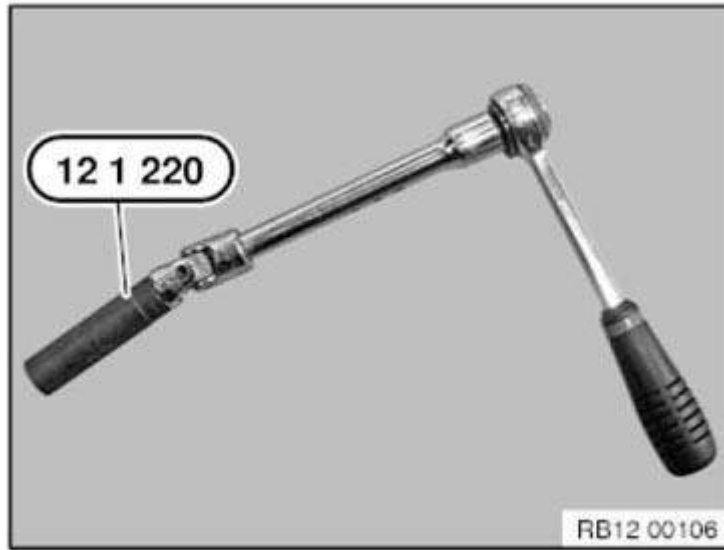


Fig. 19: Identifying Special Tool (12 1 220)
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

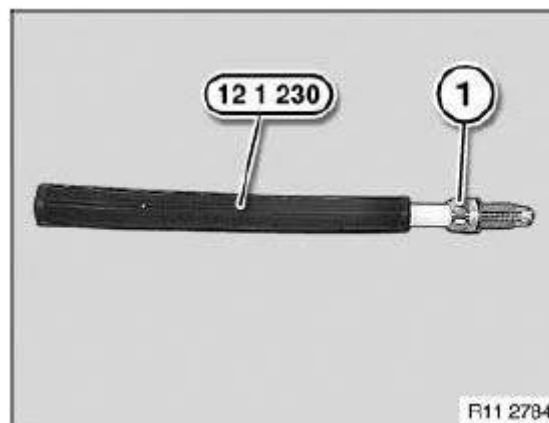


Fig. 20: Attaching Spark Plug
Courtesy of BMW OF NORTH AMERICA, INC.

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

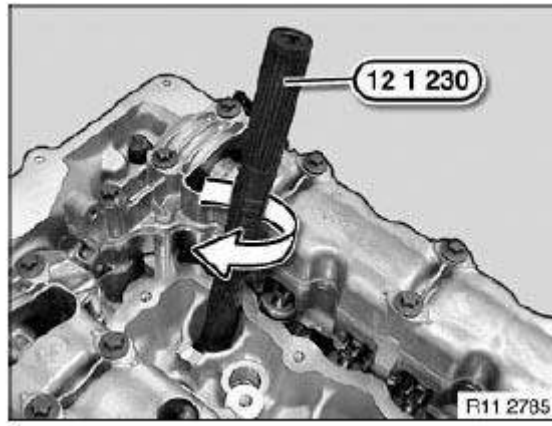


Fig. 21: Turning Spark Plug Using Tool
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten spark plugs with torque wrench, special tool [12 1 220](#) and extension with min. 8° bend.

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

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

Observe tightening torque.

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

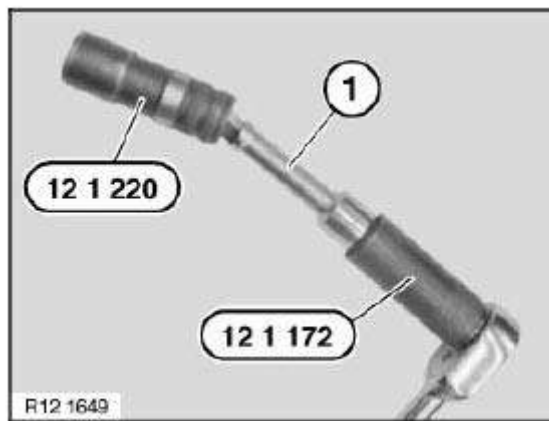


Fig. 22: Identifying Spark Plug Special Tool (12 1 220)
 Courtesy of BMW OF NORTH AMERICA, INC.

IGNITION COIL

12 13 011 REPLACING IGNITION COILS (N20)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Check stored fault messages and process procedure.
- Switch off ignition.
- Remove [ACOUSTIC COVER](#)

Ignition coils must not be contaminated by fuel.

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

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

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

Ensure that cables are not crushed or damaged.

Repair damaged cable.

Pull ignition coil (2) up and out.

NOTE: There is a possibility that the silicone tube will tear and therefore be destroyed. This procedure is applicable to all ignition coils.

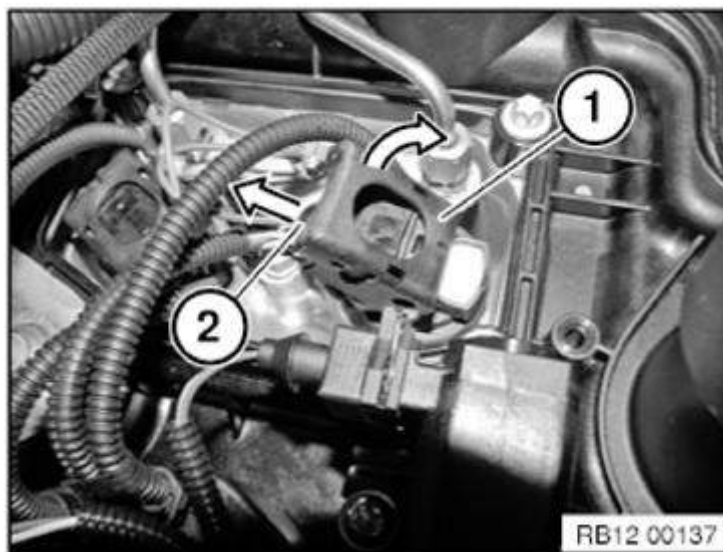


Fig. 23: Pulling Ignition Coil

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

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

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

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

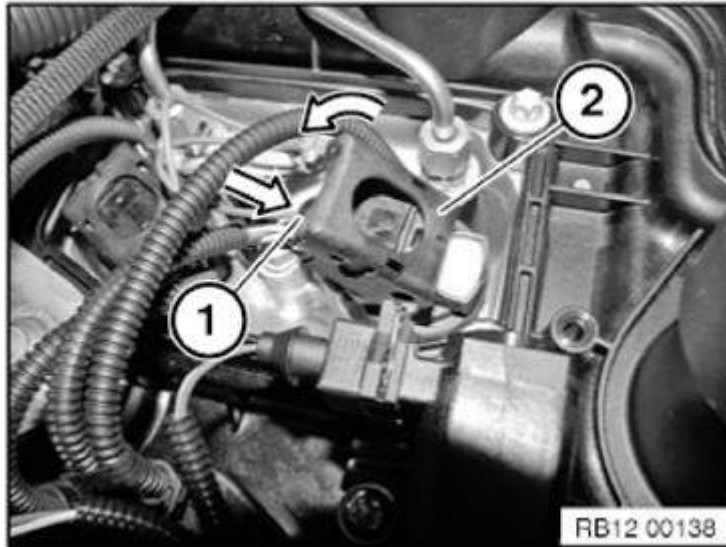


Fig. 24: Pushing Connector

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Ensure that cables are not crushed or damaged.

Repair damaged cable.

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

NOTE: The locking lever can become deformed if it is not installed correctly. This means that there is no longer a safety lock on the plug connection. As a result, the connector can slip out during engine operation (loose contact, misfiring). The connector catch must snap into place without great effort.

NOTE: Clear diagnostic fault entries from fault memory.
Assemble engine.

12 13 511 REPLACING IGNITION COILS (N55)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Check stored fault messages and process procedure.
- Switch off ignition.
- Remove **IGNITION COIL COVER**.
- Remove **CLEAN AIR PIPE**.

Ignition coils must not be contaminated by fuel.

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

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

Release screws (1).

Slide cable channel (2) to one side.

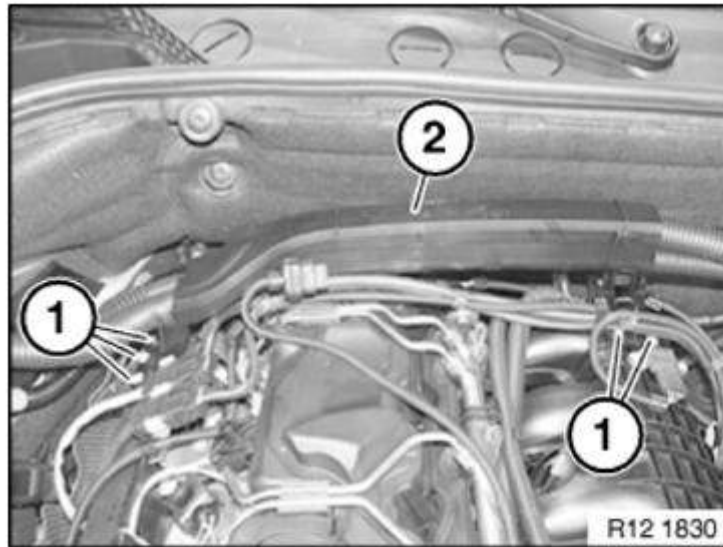


Fig. 25: Identifying Cable Channel And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release oxygen sensor connector (1) from bracket.

Release screw (2).

Put cable clip aside.

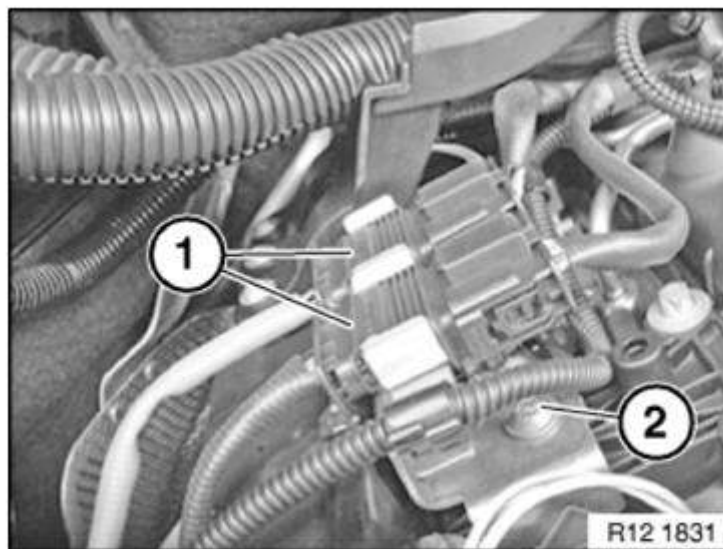


Fig. 26: Identifying Oxygen Sensor Connector And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

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

Ensure that cables are not crushed or damaged.

Repair damaged cable.

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

NOTE: There is a possibility that the silicone tube will tear and therefore be destroyed.
This procedure is applicable to all ignition coils.

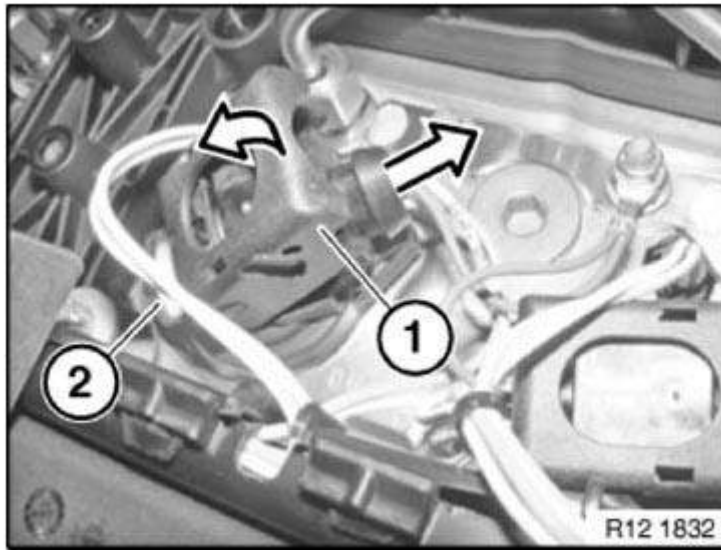


Fig. 27: Pulling Out Ignition Coil

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

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

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

NOTE:

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

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

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

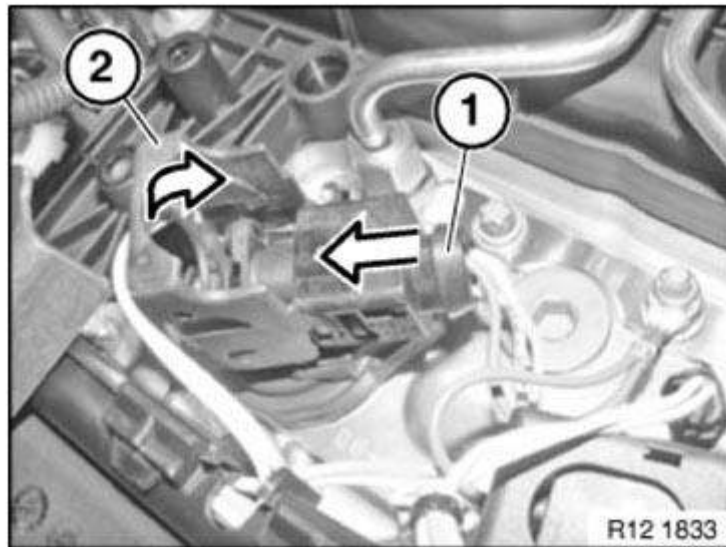


Fig. 28: Pushing Connector

Courtesy of BMW OF NORTH AMERICA, INC.

The connector catch must snap into place without great effort.

Ensure that cables are not crushed or damaged.

Repair damaged cable.

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

are positioned inside the counter piece.

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

NOTE: Clear diagnostic fault entries from fault memory.
Assemble engine.

12 13 511 REPLACING IGNITION COILS (N52T)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Check stored fault messages and process procedure.
- Switch off ignition.
- Remove **IGNITION COIL COVER** .

Ignition coils must not be contaminated by fuel.

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

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

Release positive battery cable (1) from holder (3) and lay to one side.

Unfasten screws (2).

Tightening torque **12 52 1AZ** .

Remove bracket (3).

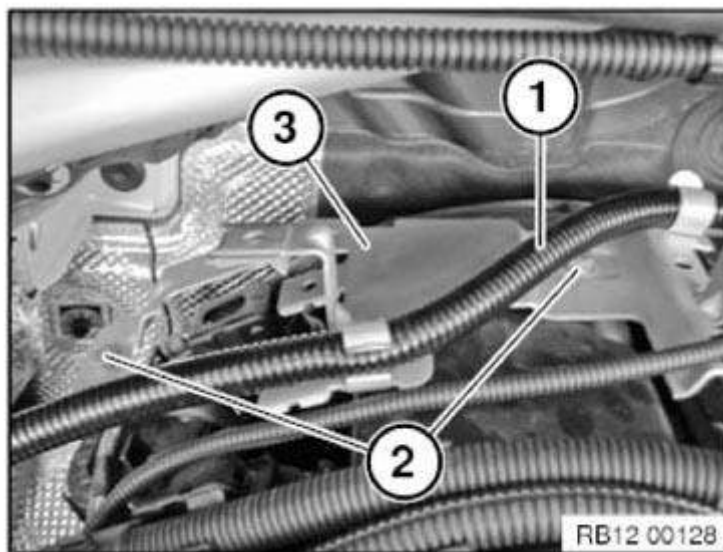


Fig. 29: Identifying Positive Battery Cable, Holder And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector fastener of ignition coil (1) and disconnect connector.

Slowly pull the ignition coil (1) up and out without jerking it.

NOTE: There is a possibility that the silicone tube will tear and therefore be destroyed. This procedure is applicable to all ignition coils.

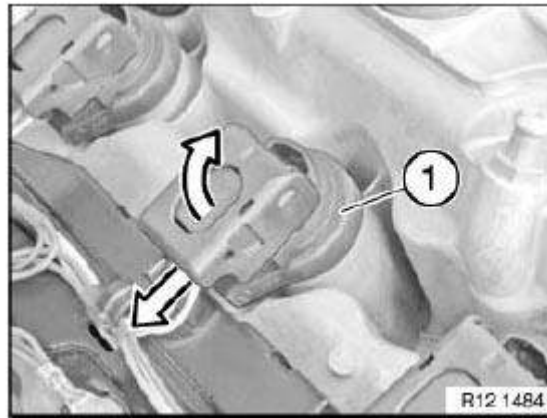


Fig. 30: Pulling Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Position the ignition coil (1) and gently push it to the limit position, if necessary by twisting it back and forth slightly. Then check anti-twist lock.

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

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

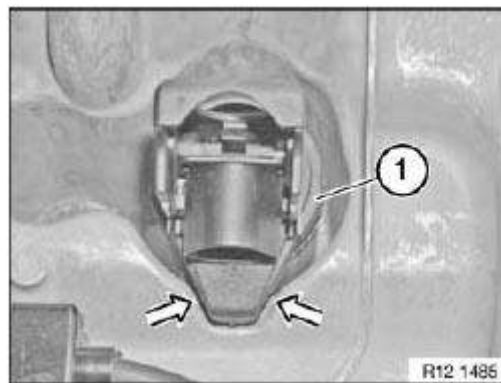


Fig. 31: Positioning Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

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

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

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

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

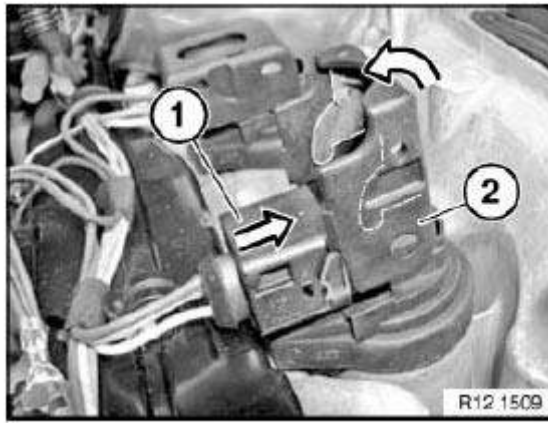


Fig. 32: Pushing Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The connector fastener must snap into place without great effort.

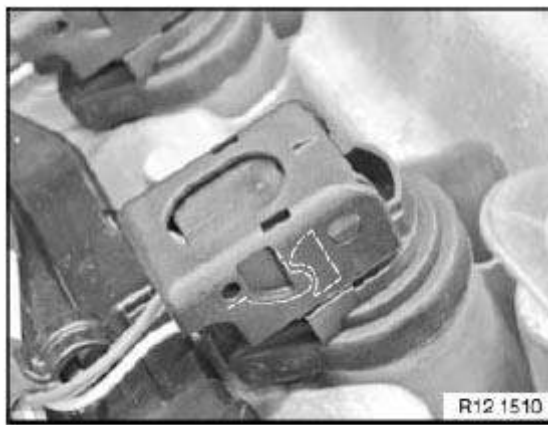


Fig. 33: Identifying Connector Fastener

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Delete fault memory.

12 00..... REMOVING AND INSTALLING/REPLACING IGNITION COIL COVER (N55)

Pull ignition coil cover (1) off of rubber mounts and remove in direction of travel.

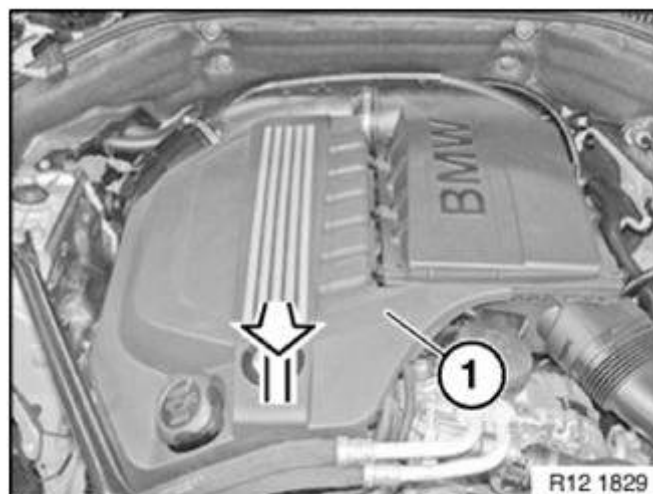


Fig. 34: Pulling Ignition Coil Cover

Courtesy of BMW OF NORTH AMERICA, INC.

12..... REMOVING AND INSTALLING/REPLACING REAR IGNITION COIL COVER (N55)

Necessary preliminary work:

- Remove **CLEAN AIR PIPE** .

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

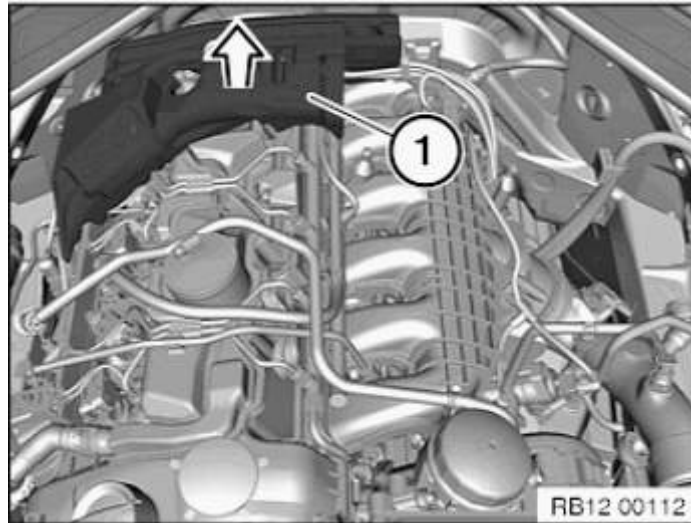


Fig. 35: Removing Rear Ignition Coil Cover

Courtesy of BMW OF NORTH AMERICA, INC.

ELECTRONIC SWITCHING OR CONTROL UNITS

12 14 700 CODING CONTROL MODULE (DME/DDE)

Switch on ignition.

Connect MoDiC or DIS/GT1 Tester.

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 on ignition.

Connect MoDiC or DIS/GT1 Tester.

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 14 602 REMOVING/REPLACING KNOCK SENSOR (1ST AND 2ND CYLINDER) (N20, N26)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **THROTTLE VALVE ASSEMBLY** .

Unlock connector (1) and remove.

Release bolt (2) on knock sensor.

Tightening torque **13 62 4AZ** .

Remove knock sensor for 1st and 2nd cylinder.

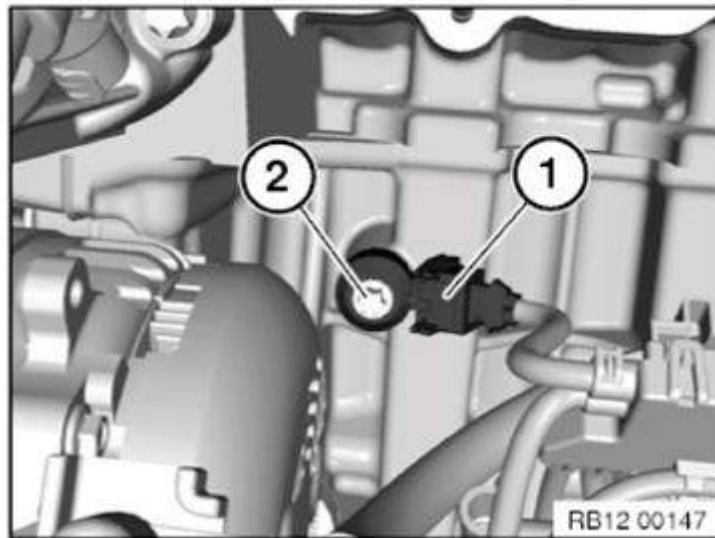


Fig. 36: Identifying Connector And Bolt On Knock Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean contact surface of knock sensors on engine block.

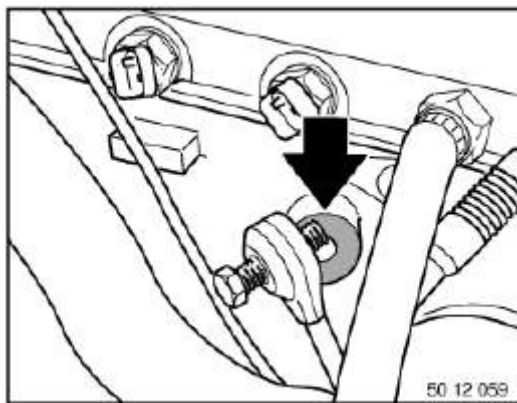


Fig. 37: Locating Contact Surface Of Knock Sensors On Engine Block
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
 Check stored fault message.
 Delete fault memory.

12 14 600 REMOVING/REPLACING KNOCK SENSOR (3RD AND 4TH CYLINDER) (N20, N26)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **STARTER MOTOR**.

Unlock connector (1) and remove.

Release bolt (2) on knock sensor.

Tightening torque **13 62 4AZ** .

Remove knock sensor for 3rd and 4th cylinders.

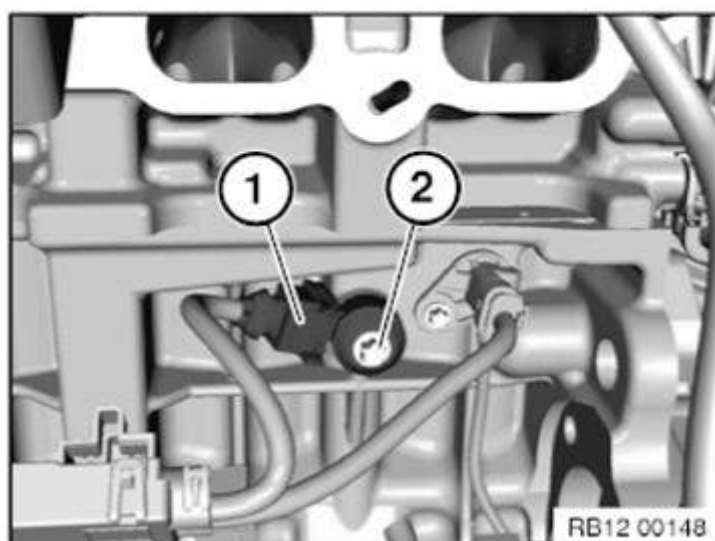


Fig. 38: Identifying Connector And Bolt On Knock Sensor
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean contact surface of knock sensor on engine block.

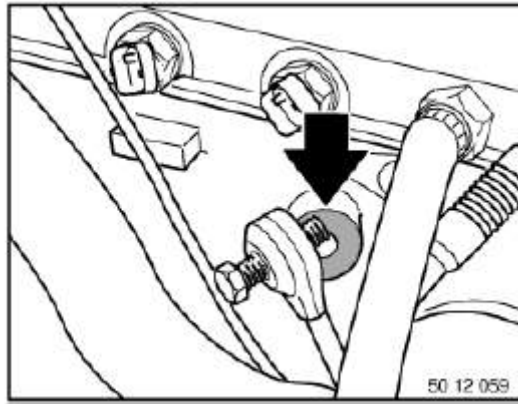


Fig. 39: Locating Contact Surface Of Knock Sensors On Engine Block

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
Check stored fault message.
Delete fault memory.

12 14 600 REMOVING/REPLACING KNOCK SENSORS (N52T)

Aluminum-magnesium materials.

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

A magnesium crankcase requires aluminum screws/bolts exclusively.

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

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic**.

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

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **INTAKE PLENUM**.

Unlock connector (1) and remove.

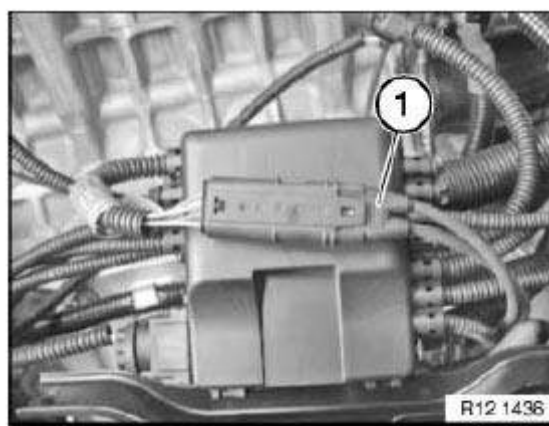


Fig. 40: Identifying Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on both knock sensors (1) and remove knock sensors (1).

Installation note:

Replace aluminum screws.

Tightening torque **13 62 3AZ** .

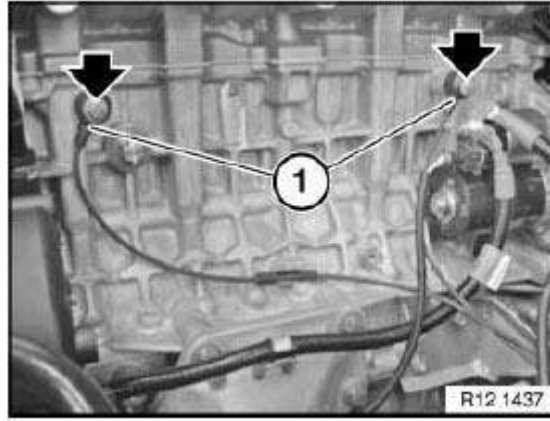


Fig. 41: Locating Knock Sensors

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean contact surface of knock sensors on engine block.

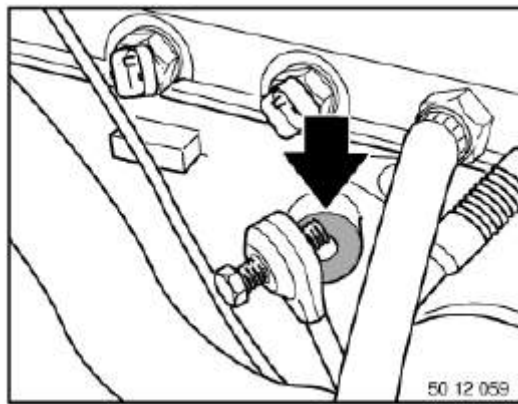


Fig. 42: Locating Contact Surface Of Knock Sensors On Engine Block

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Check stored fault messages.**
 Clear diagnostic fault entries from fault memory.

12 14 600 REMOVING/REPLACING KNOCK SENSORS (N55)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **INTAKE PLENUM** .
- **Vehicles with the Bosch high pressure pump only :**

Remove **HIGH PRESSURE PUMP** .

Unlock connector (1) and remove.

Feed out connector (1) behind feed line, remove **FEED LINE** if necessary.

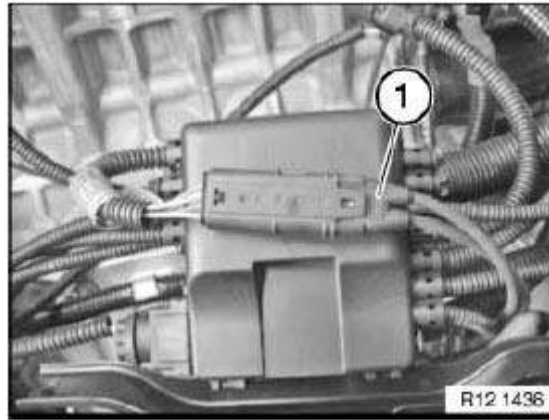


Fig. 43: Identifying Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on both knock sensors (1) and remove knock sensors (1).

Tightening torque **13 62 3AZ** .

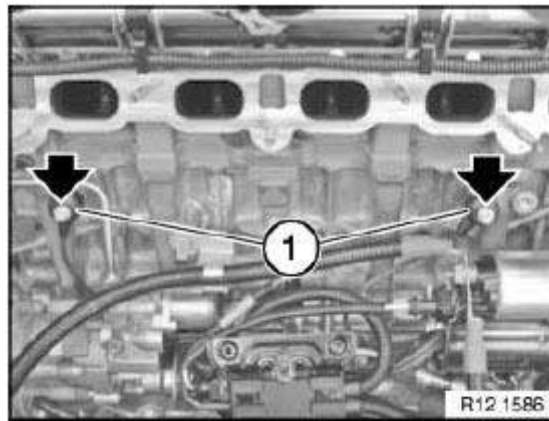


Fig. 44: Locating Knock Sensors

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean contact surface of knock sensors on engine block.

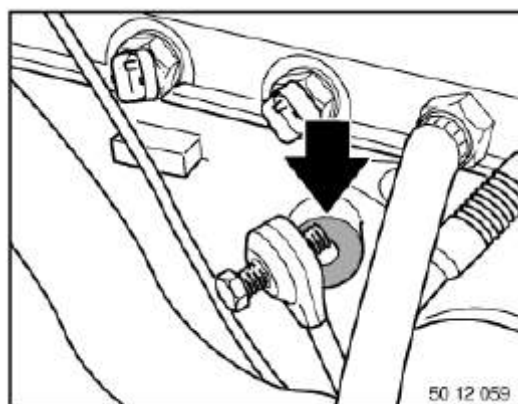


Fig. 45: Locating Contact Surface Of Knock Sensors On Engine Block

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
Check stored error/fault messages.
Clear diagnostic fault entries from fault memory.

13 61 501 REPLACING (DDE) CONTROL UNIT (N47 D20 O1)

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

Necessary preliminary work:

- Read out the fault memory of the DDE control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD**.
- **FOLLOW INSTRUCTIONS FOR REMOVING AND INSTALLING CONTROL UNITS.**

Replacement:

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

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

Switch off ignition.

Release screws (1).

Detach coolant hose from cover of electronics box.

Remove electronics box cover (3).

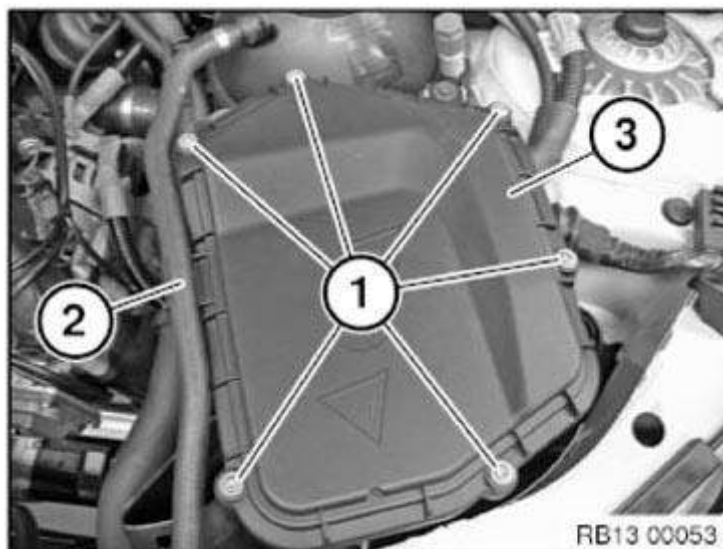


Fig. 46: Identifying Electronics Box Cover And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all connectors (1) from control unit and disconnect.

Detach rubber grommets (2) from electronics box. Place wiring harnesses to the side.

Installation note:

Make sure grommets are correctly fitted (watertightness).

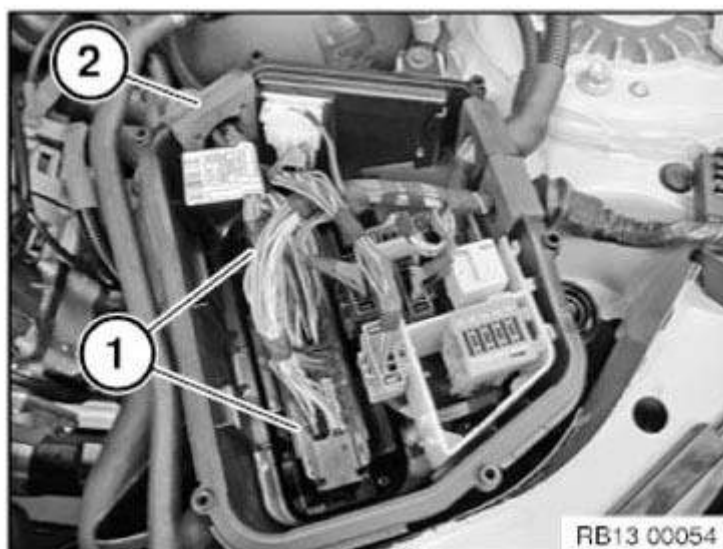


Fig. 47: Identifying Connectors And Rubber Grommets

Courtesy of BMW OF NORTH AMERICA, INC.

Release retainers (1) on control unit.

Pull out control unit (2) towards top.

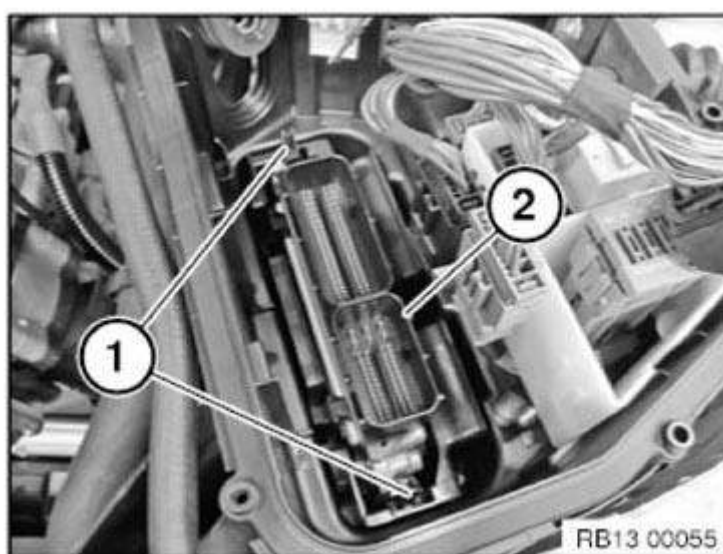


Fig. 48: Identifying Retainers And Control Unit

Courtesy of BMW OF NORTH AMERICA, INC.

Injector adjustment:

If the DDE control unit has been replaced, it will also be necessary to carry out injection quantity compensation!

The adjustment value (7-position letter/number code) is engraved on each injector.

Enter the numbers/letters according to the installation position (cylinder) of the injectors.

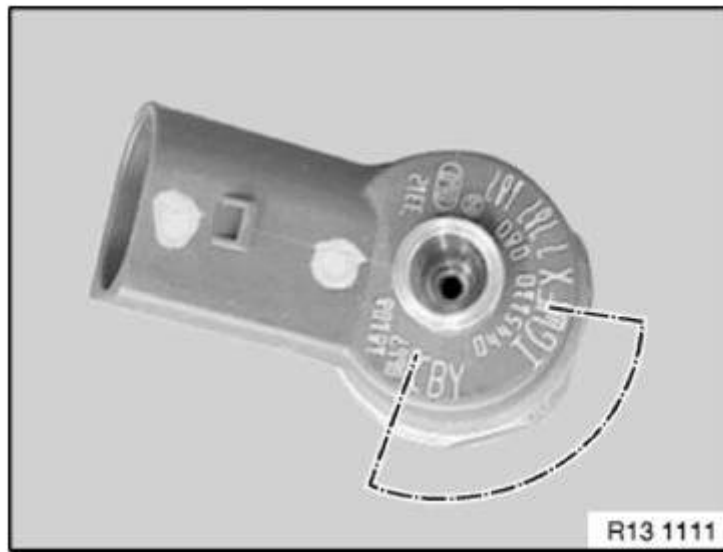


Fig. 49: Identifying Injector Number Code

Courtesy of BMW OF NORTH AMERICA, INC.

- Select "DDE".
- Select "Adjustment, injection quantity compensation"
- Select "Test plan"

The adjustment must be entered for each injector.

It is necessary to adjust the injectors to ensure their full operability.

NOTE: Check stored fault messages.
Delete fault memory.

12 14 550 REPLACING CONTROL UNIT (DME) (N20, N26)

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

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect **BATTERY NEGATIVE LEAD**.
- Remove **ACOUSTIC COVER**

IMPORTANT: Follow **INSTRUCTIONS** for removing and installing control units

Replacement:

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

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

Switch off ignition.

Unlock and pull off all connectors (1) from the DME control unit (2).

Release screws.

Tightening torque [12 14 1AZ](#) .

Remove DME control unit.

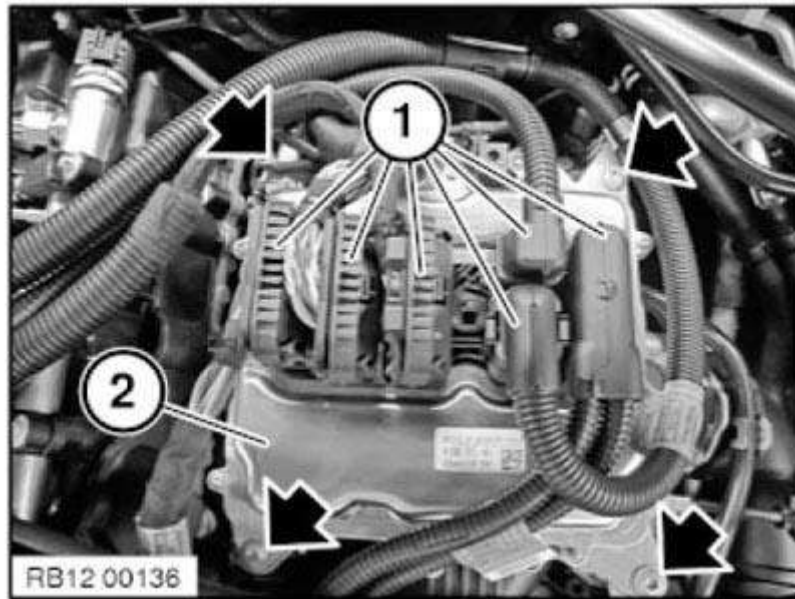


Fig. 50: Locating Connectors Of DME Control Unit

Courtesy of BMW OF NORTH AMERICA, INC.

Injection quantity compensation:

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

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

The adjustment value is printed on each injector in three digits.

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

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

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

- Connect BMW diagnosis system
- Identify vehicle
- Select "Function selection"
- Select "Service functions"



Fig. 51: Identifying Injector Adjustment Values
Courtesy of BMW OF NORTH AMERICA, INC.

- Select "Engine electronics"
- Select "Adjustment function"
- Select "Adjust injectors"
- Select "Test plan"
- The adjustment value must be entered for each cylinder.

NOTE: Check stored fault message.
Delete fault memory.

12 14 550 REPLACING CONTROL UNIT (DME) (N52T)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)**

Necessary preliminary work:

- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove **ACOUSTIC COVER**

IMPORTANT: **FOLLOW INSTRUCTIONS FOR REMOVING AND INSTALLING CONTROL UNITS.**

Replacement:

- **CARRY OUT PROGRAMMING/ENCODING**

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

Switch off ignition.

Unlock all plugs from control unit (1) and detach.

Unfasten screws (2).

Tightening torque [12 90 1AZ](#) .

Remove control unit.

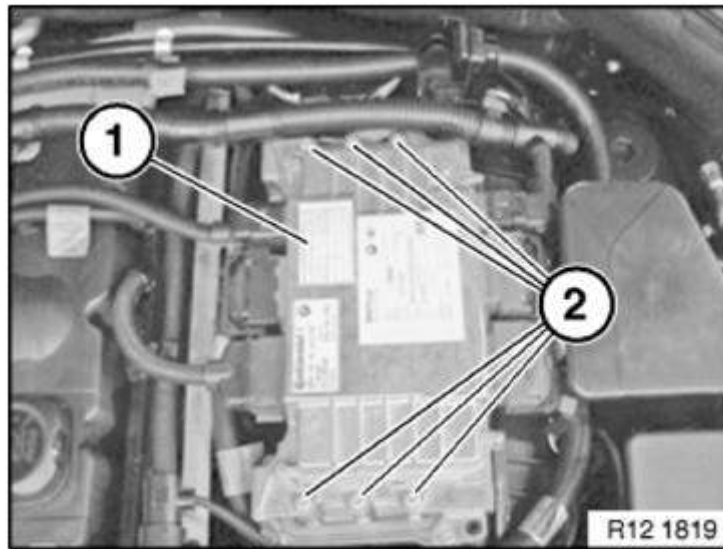


Fig. 52: Identifying Plugs From Control Unit And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Delete fault memory.

12 14 550 REPLACING CONTROL UNIT (DME) (N55)

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

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect [BATTERY NEGATIVE LEAD](#) .
- Remove [INTAKE PLENUM](#) .

IMPORTANT: [FOLLOW INSTRUCTIONS FOR REMOVING AND INSTALLING CONTROL UNITS](#).

Replacement:

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

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

Switch off ignition.

Release screws (1).

Tightening torque [12 14 2AZ](#) .

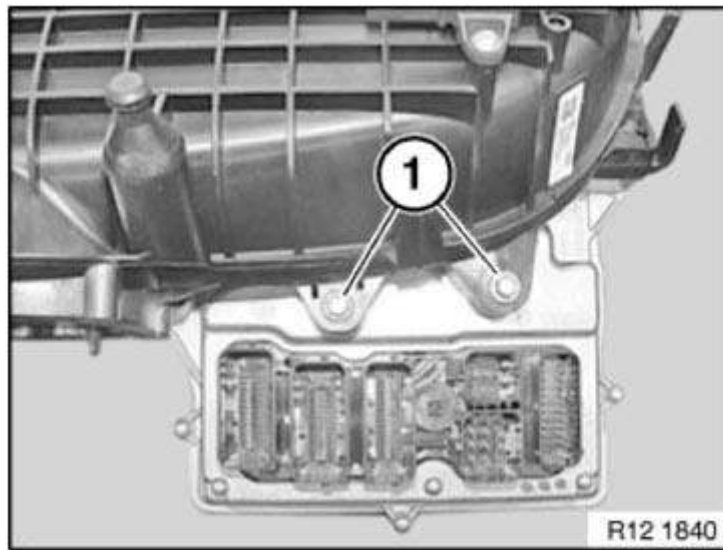


Fig. 53: Identifying Control Unit Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 14 1AZ**.

Remove control unit from intake plenum.

Installation note:

Renew gasket between intake plenum and control unit.

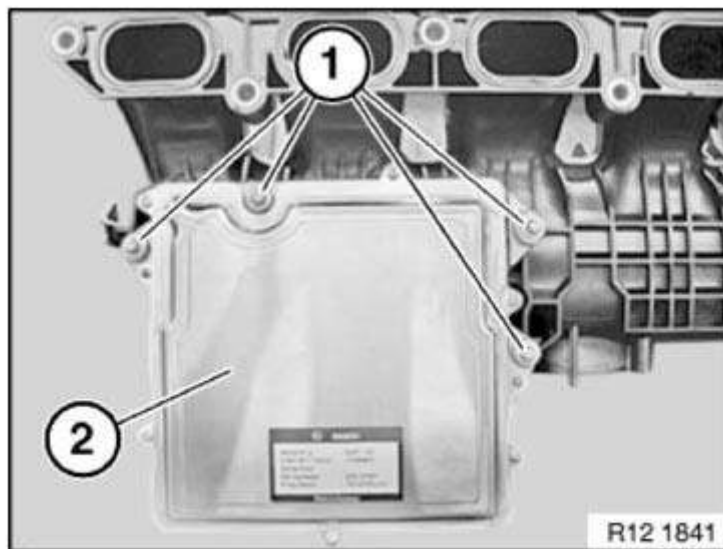


Fig. 54: Identifying Control Unit From Intake Plenum And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Injection quantity compensation:

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

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

The adjustment value is printed on each injector in three digits.

If necessary, remove EMC panel.

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

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

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

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

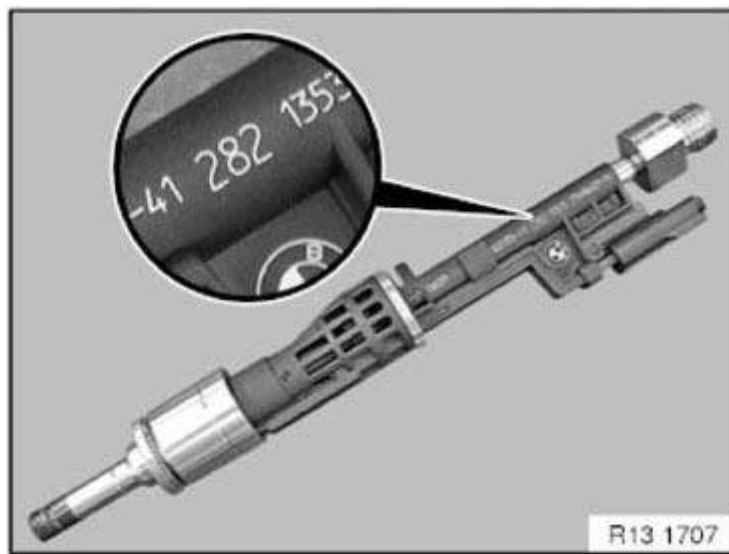


Fig. 55: Identifying Injector Adjustment Values

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Clear diagnostic fault entries from fault memory.

12 14 521 REPLACING CRANKSHAFT PULSE SENSOR (N20, N26)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)**.

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **STARTER MOTOR**.

Unlock connector (1) and remove.

Release screw (2).

Tightening torque **13 62 2AZ**.

Remove connector housing from crankcase.

Release screw (3).

Tightening torque **13 62 3AZ** .

Pull pulse sensor from crankcase and remove.

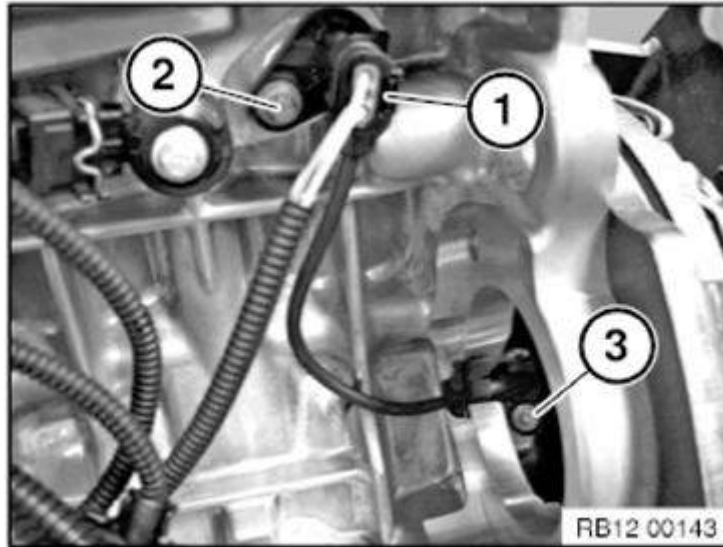


Fig. 56: Identifying Connector And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

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

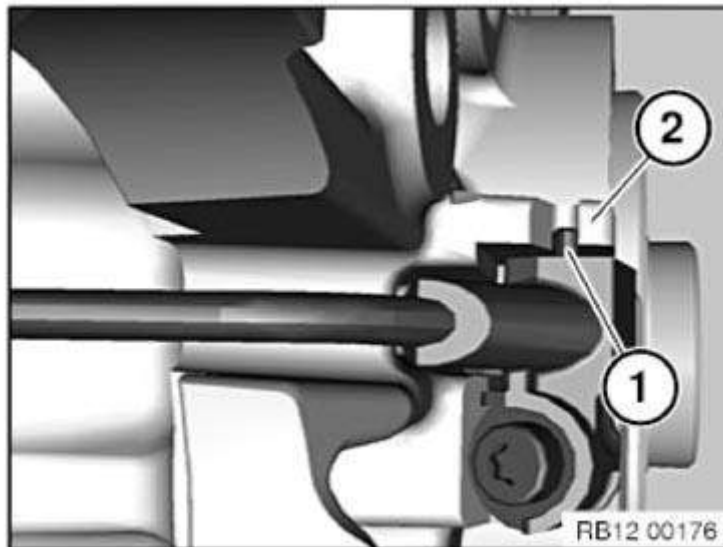


Fig. 57: Identifying Guide Pin And Groove Of Crankcase

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.
Check stored fault message.
Clear diagnostic fault entries from fault memory.

12 14 521 REPLACING CRANKSHAFT PULSE SENSOR (N52T)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)** .

Aluminum-magnesium materials.

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

A magnesium crankcase requires aluminum screws/bolts exclusively.

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

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic** .

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

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **INTAKE PLENUM** .

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

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

Release screw.

Installation note:

Replace aluminum screws.

Tightening torque **13 62 2AZ** .

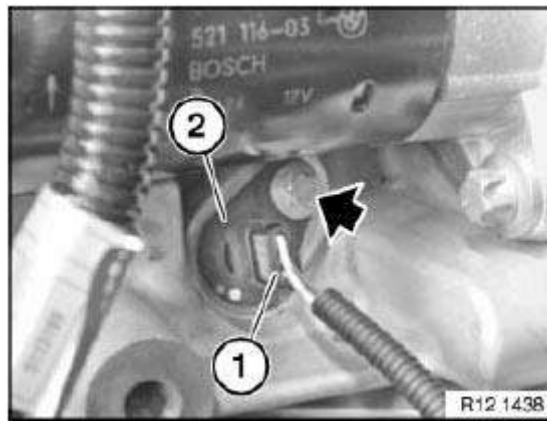


Fig. 58: Locating Screw Of Crankshaft Pulse Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw pulse sensor (2) from crankcase.

Installation note:

Replace sealing ring.

NOTE: Check stored fault messages.
Delete fault memory.

12 14 521 REPLACING CRANKSHAFT PULSE SENSOR (N55)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)** .

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **STARTER MOTOR**.

Unlock connector (1) and remove.

Release screw (2).

Tightening torque **13 62 2AZ** .

Remove connector housing from crankcase.

Release screw (3).

Tightening torque **13 62 8AZ** .

Pull pulse sensor from crankcase and remove.

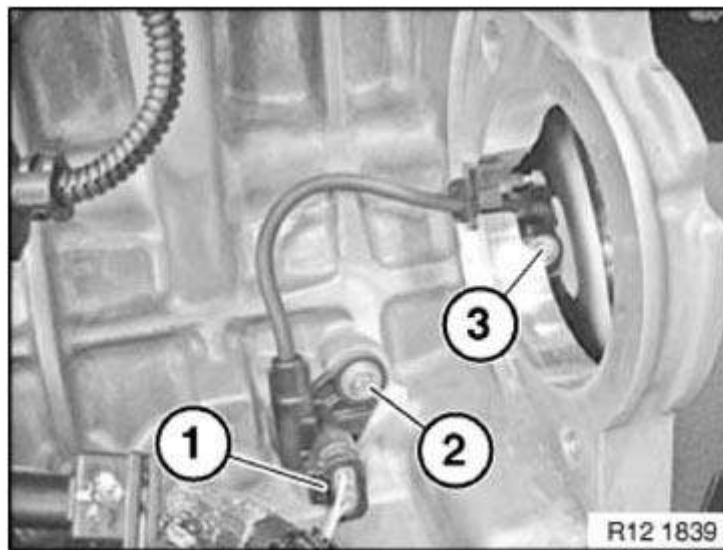


Fig. 59: Identifying Connector And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

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

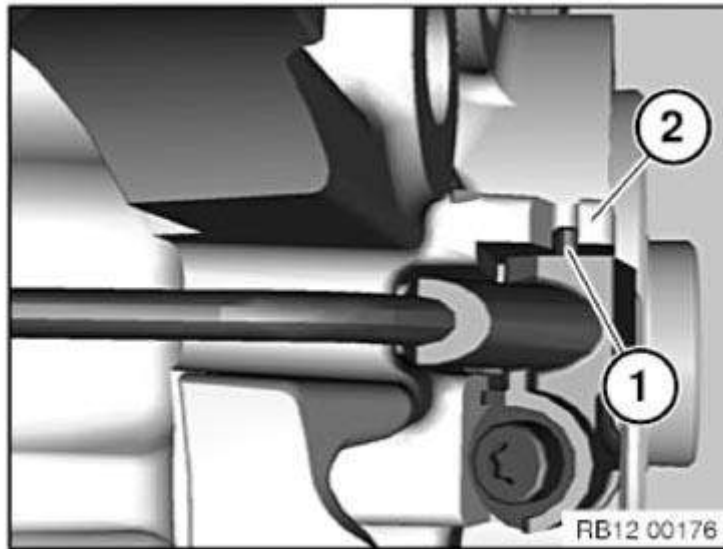


Fig. 60: Identifying Guide Pin And Groove Of Crankcase

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.
Check stored fault message.
Delete fault memory.

12 14 524 REPLACING PULSE SENSOR ON EXHAUST CAMSHAFT (N20)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION).

Necessary preliminary tasks:

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

Unlock connector (1) and remove.

Release screw (2).

Tightening torque **13 62 1AZ**.

Remove pulse sensor (2).

Check gasket, renew damaged gasket.

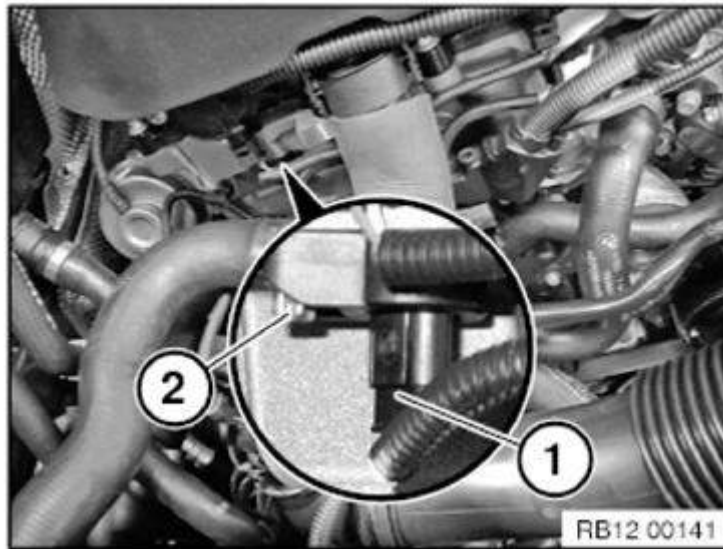


Fig. 61: Identifying Pulse Sensor And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 14 524 REPLACING PULSE SENSOR ON EXHAUST CAMSHAFT (N52T)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION).

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove ACOUSTIC COVER

Release screw (1).

Tightening torque 12 90 2AZ.

Release holder (2) from cylinder head.

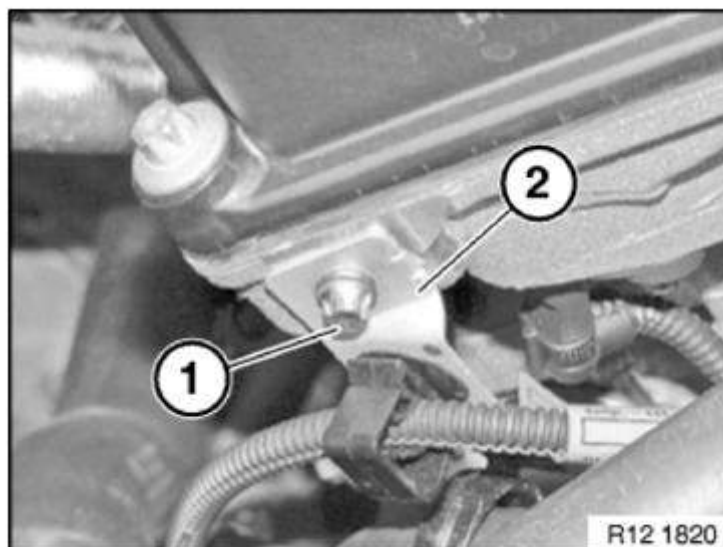


Fig. 62: Identifying Holder From Cylinder Head And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release connector (1) and remove.

Release screw.

Installation note:

Replace screw.

Tightening torque **13 62 1AZ** .

Remove pulse sensor (2).

Installation note:

Replace gasket.

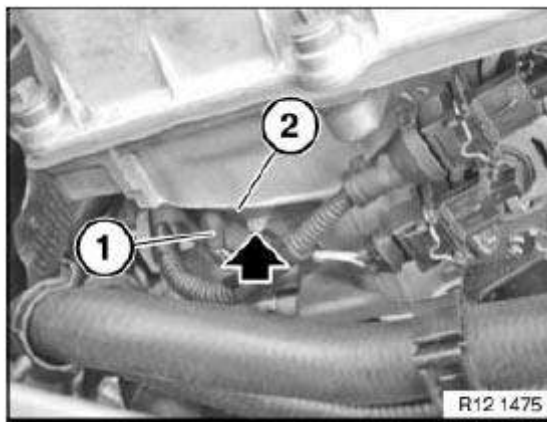


Fig. 63: Locating Screw Of Pulse Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Delete fault memory.

12 14 524 REPLACING PULSE SENSOR ON EXHAUST CAMSHAFT (N55)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are **released** .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Jointing torque and angle of rotation must be observed without fail (**risk of damage**) .

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **FAN COWL** .

Release connector (1) and remove.

Release screw.

Tightening torque **13 62 1AZ** .

Remove pulse sensor (2).

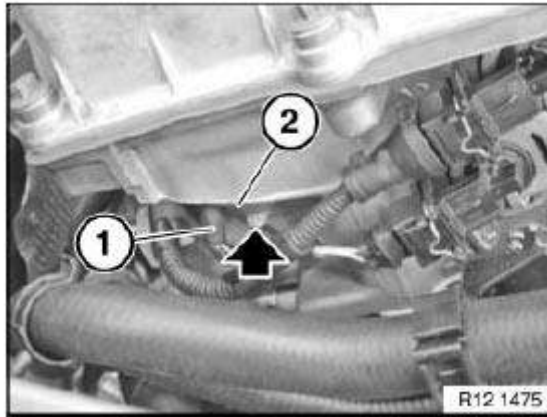


Fig. 64: Locating Screw Of Pulse Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 14 523 REPLACING PULSE SENSOR ON INTAKE CAMSHAFT (N20)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)** .

Necessary preliminary tasks:

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

Unlock connector (1) and remove.

Release screw.

Tightening torque **13 62 1AZ** .

Remove pulse sensor (2).

Check gasket, renew damaged gasket.

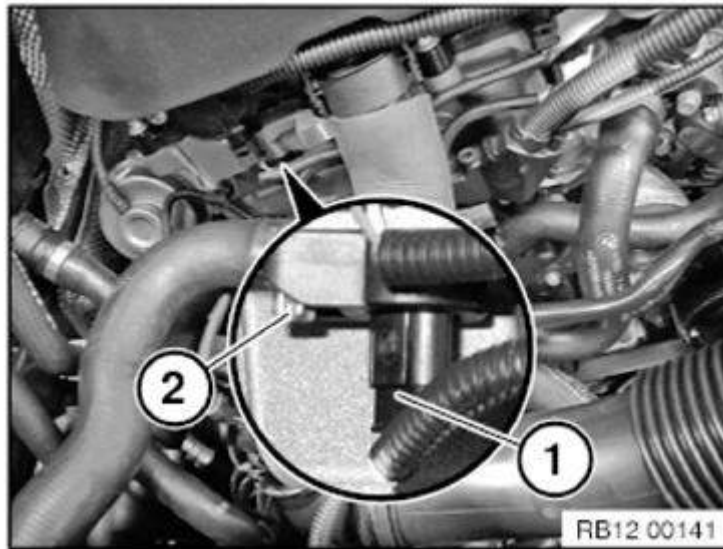


Fig. 65: Identifying Pulse Sensor And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 14 523 REPLACING PULSE SENSOR ON INTAKE CAMSHAFT (N52T)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION).

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove ACOUSTIC COVER

Release connector (1) and remove.

Release screw.

Installation note:

Replace screw.

Tightening torque 13 62 1AZ.

Remove pulse sensor (2).

Installation note:

Replace sealing ring.

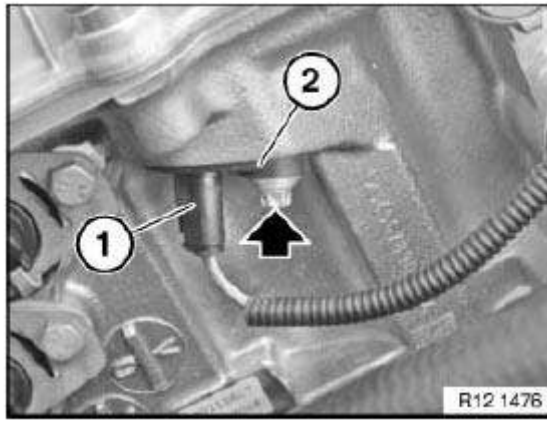


Fig. 66: Locating Pulse Sensor Screw

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Delete fault memory.

12 14 523 REPLACING PULSE SENSOR ON INTAKE CAMSHAFT (N55)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are **released** .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Jointing torque and angle of rotation must be observed without fail (**risk of damage**) .

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **FAN COWL** .

Release connector (1) and remove.

Release screw.

Tightening torque **13 62 1AZ** .

Remove pulse sensor (2).

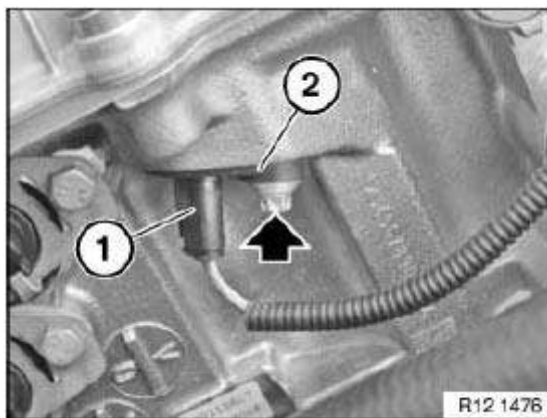


Fig. 67: Locating Screw Of Pulse Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 14 650 REPLACING SUCTION PRESSURE SENSOR ON INTAKE PLENUM (N20, N26)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Partially undo the acoustic cover.

Unlock connector (1) and remove.

Unfasten screws (2).

Tightening torque **13 62 5AZ** .

Pull out the vacuum pressure sensor (3) from the intake plenum.

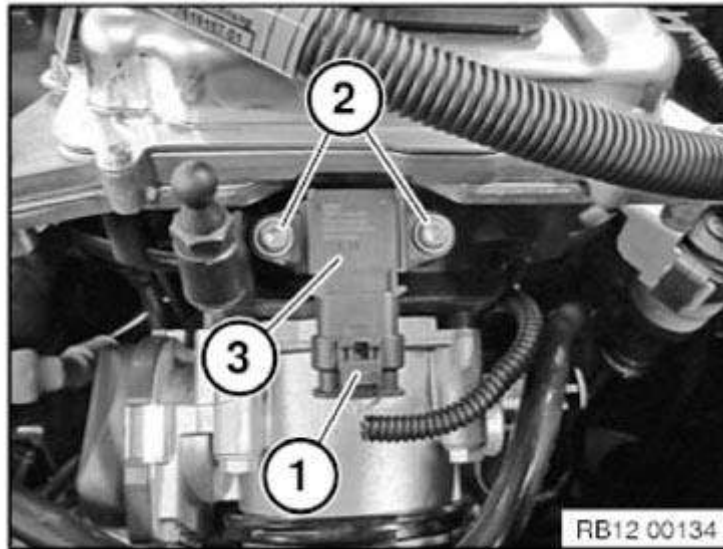


Fig. 68: Identifying Connector, Vacuum Pressure Sensor And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check sealing ring for damage. Replace damaged sealing ring.

When installing, coat sealing ring with suitable lubricant.



Fig. 69: Locating Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
Check stored fault message.
Delete fault memory.

12 14 650 REPLACING SUCTION PRESSURE SENSOR ON INTAKE PLENUM (N55)

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **INTAKE FILTER HOUSING**.

Release connector (1) and remove.

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

Tightening torque **13 62 4AZ**.

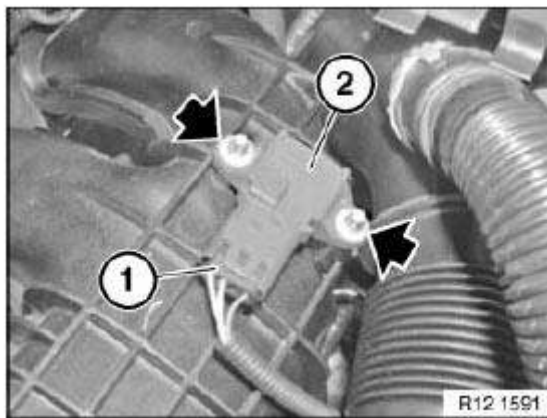


Fig. 70: Locating Suction Pressure Sensor Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check sealing ring for damage. Replace damaged sealing ring.

When installing, coat sealing ring with suitable lubricant.



Fig. 71: Locating Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
Check stored fault message.
Delete fault memory.

12 14 650 REPLACING SUCTION PRESSURE SENSOR ON PRESSURE PIPE (N20, N26)

Necessary preliminary tasks:

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

Unlock connector (1) and remove.

Unfasten screws (2).

Tightening torque **13 62 5AZ**.

Pull suction pressure sensor (3) out of pressure pipe.

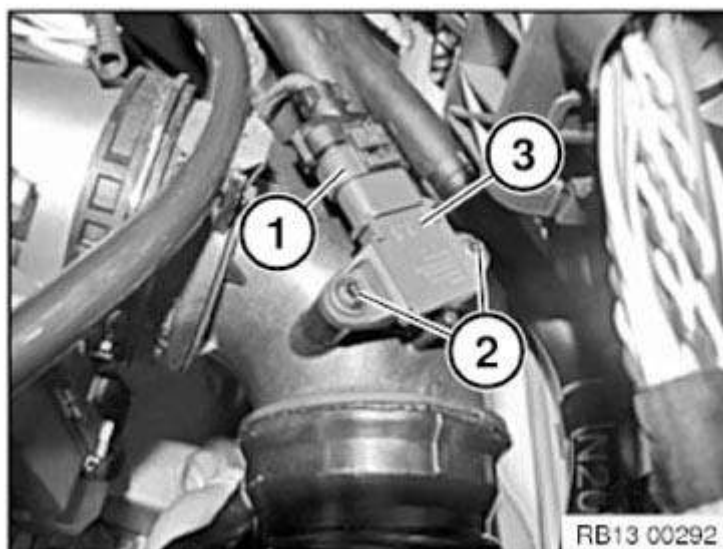


Fig. 72: Identifying Connector, Screws And Suction Pressure Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check sealing ring for damage. Replace damaged sealing ring.

When installing, coat sealing ring with suitable lubricant.



Fig. 73: Locating Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
Check stored fault message.
Delete fault memory.

PREHEATING RELAY

12 21 520 REPLACING PREHEATING CONTROL UNIT (N47D20 01)

Necessary preliminary tasks:

- Switch off ignition.
- Remove **INTAKE SILENCER HOUSING** .

Release positive battery cable (1) from clamp.

Release expanding rivets (2).

Remove rear acoustic cover (3).

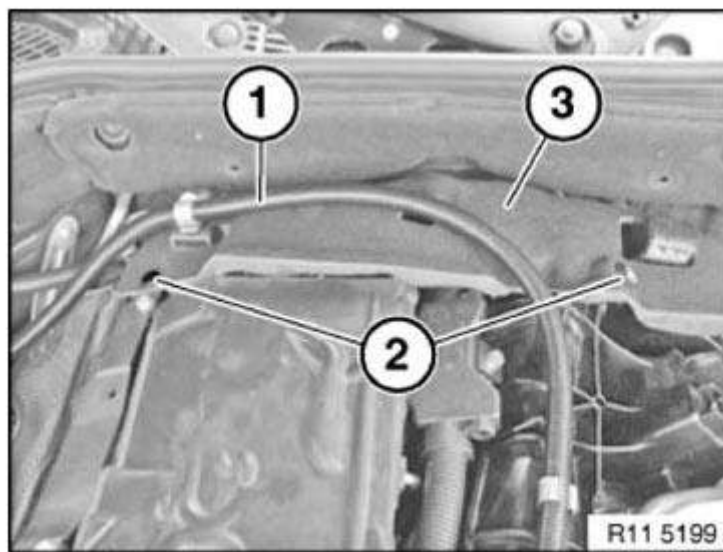


Fig. 74: Identifying Positive Battery Cable, Expanding Rivets And Rear Acoustic Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Detach connector (1) from preheating control unit.

Release screw (2).

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

Remove preheating control unit (3).

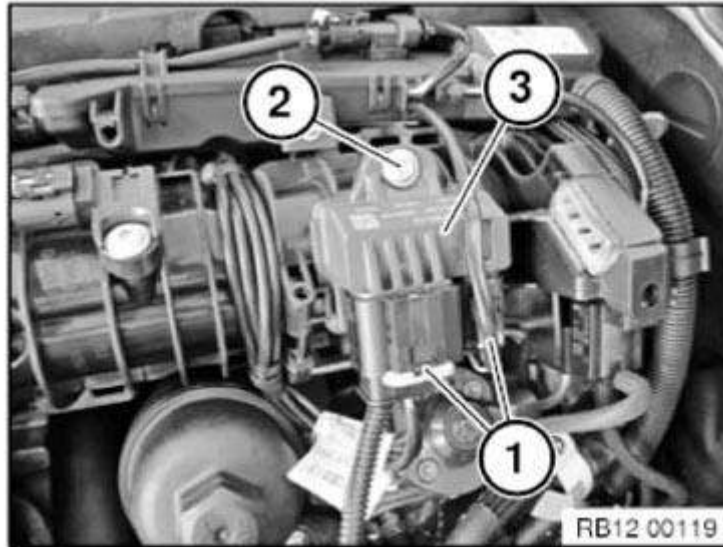


Fig. 75: Identifying Connector, Preheating Control Unit And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the preheating control unit is replaced, the preheating control service function must be performed using the diagnosis system after it is replaced.

Installation note:

Assemble engine.

PREHEATER PLUGS

12 23 505 REPLACING ALL GLOW ELEMENTS (N47 D20 O1)

Special tools required:

- [11 6 050](#)
- 12 2 300

NOTE: When one or more glow elements are replaced, the preheating control service function must be started with the BMW diagnosis system before replacement and the "Security data record in the preheating control must be activated".

NOTE: If malfunctions have occurred at the glow elements, it is essential to check the safety fuse.
Switch off ignition.

NOTE: It is recommended to warm the engine up to operating temperature for easy removal of glow elements. In addition, spray glow element with [DISASSEMBLY AGENT 5.1](#) and let it take effect for approx. 2 minutes.

Removing glow elements from a cold engine may cause damage to the thread in the cylinder head.

IMPORTANT: Risk of burning! The use of gloves is mandatory!

Necessary preliminary tasks:

- Disconnect **BATTERY EARTH LEAD**.
- Remove **ACOUSTIC COVER**.
- Remove **INTAKE SILENCER HOUSING**.

Release positive battery cable (1) from clamp.

Release expanding rivets (2).

Remove acoustic cover (3).

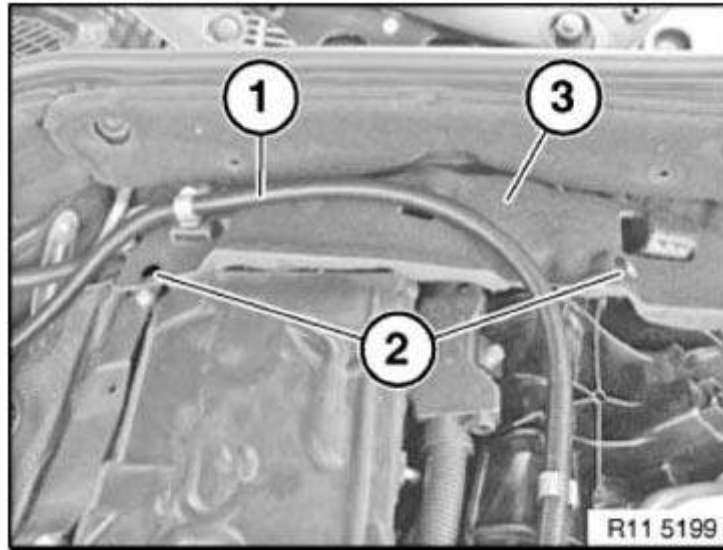


Fig. 76: Identifying Positive Battery Cable, Expanding Rivets And Rear Acoustic Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Unlock connector from cable channel and pull off. Slide cable channel (2) to one side.

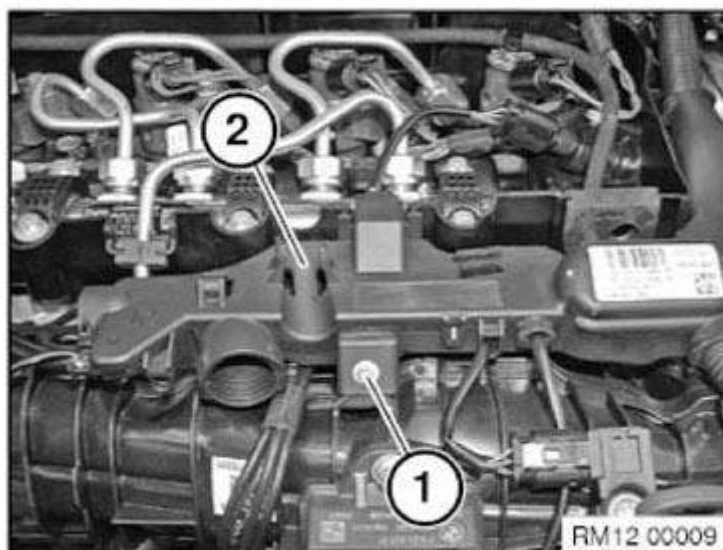


Fig. 77: Identifying Cable Channel And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Compress connector fastener (1) with special tool 12 2 300 and pull connectors from glow elements.

NOTE: For purposes of clarity, the intake plenum is shown removed.

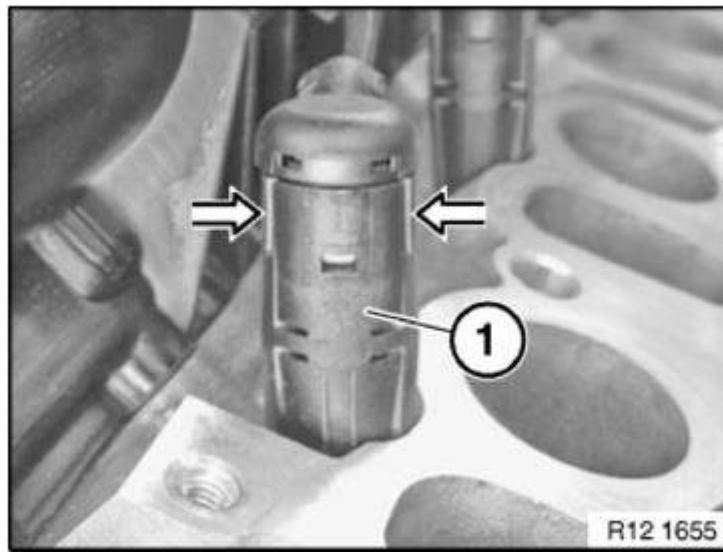


Fig. 78: Compressing Connector Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew glow elements with special tool [11 6 050](#) .

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

NOTE: For purposes of clarity, the intake plenum is shown removed.

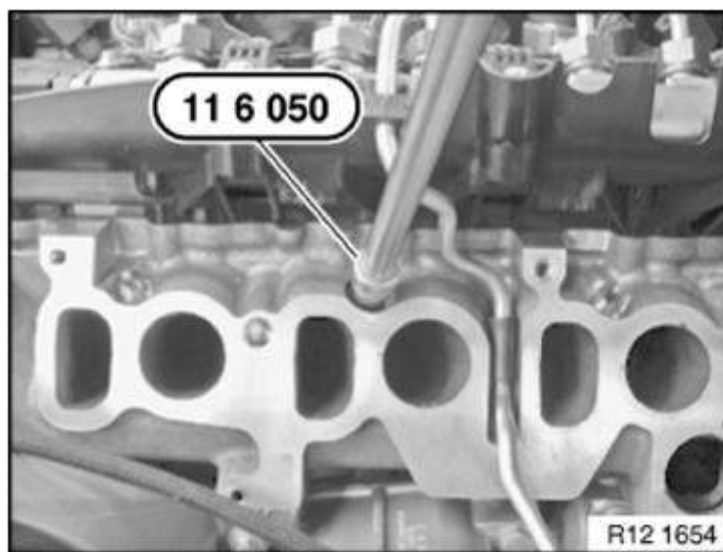


Fig. 79: Identifying Special Tool (11 6 050)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If one or more glow elements are renewed, the preheating control service function must be performed using the diagnosis system after they are replaced.

Read out fault code memory in DDE control unit. Check stored fault message. Rectify fault. Delete fault memory.

ALTERNATOR WITH DRIVE AND MOUNTING

12 31 020 REMOVING AND INSTALLING ALTERNATOR (N52T)

Aluminum-magnesium materials.

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

A magnesium crankcase requires aluminum screws/bolts exclusively.

IMPORTANT: Aluminum screws/bolts must be replaced each time they are **released** .
Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic** .

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

Necessary preliminary work:

- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove **INTAKE SILENCER HOUSING** .
- Remove **ALTERNATOR DRIVE BELT** .

Release connector (1) and remove.

Slacken nut (2).

Installation note:

Tightening torque **12 42 1AZ** .

Disconnect positive battery cable from alternator.

Release screws (3) and remove alternator.

Installation note:

Replace aluminum screws.

Tightening torque **12 31 1AZ** .

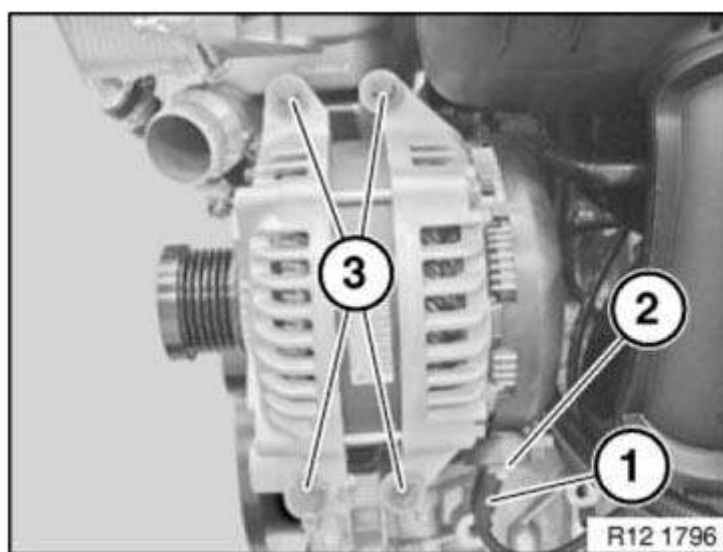


Fig. 80: Identifying Connector, Slacken Nut And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N20, N26)

Necessary preliminary tasks:

- Switch off ignition
- Disconnect **BATTERY EARTH LEAD** and cover.
- Remove **INTAKE SILENCER HOUSING** .
- Remove **CLEAN AIR PIPE** , top.
- Remove **TENSIONING DEVICE** for drive belt.

Release screws (1).

Tightening torque **12 31 1AZ** .

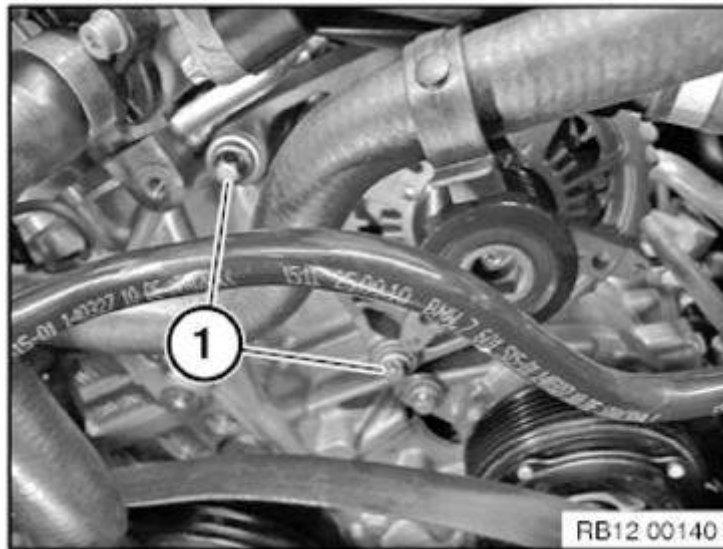


Fig. 81: Identifying Screws Of Alternator

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) and remove.

Release nut (2) and remove the positive battery cable.

Tightening torque **12 42 1AZ** .

Disconnect tank ventilation line (3) and place to one side.

Feed out alternator (4) to the left and remove.

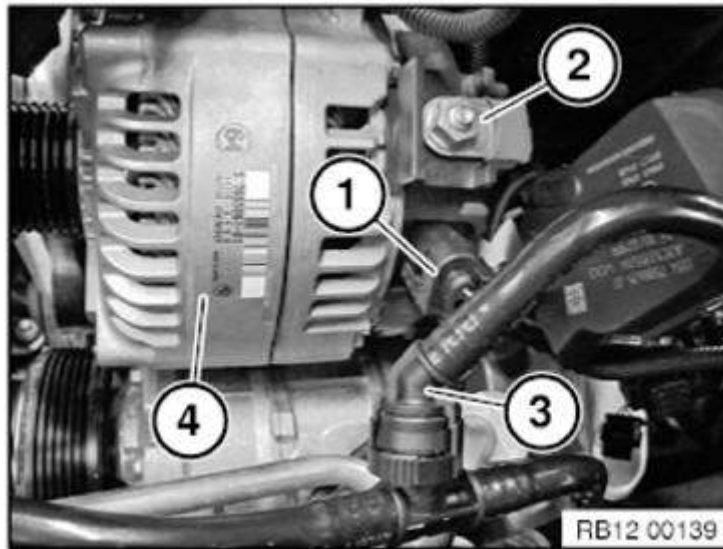


Fig. 82: Identifying Tank Ventilation Line, Alternator And Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N55)

Necessary preliminary tasks:

- Switch off ignition
- Disconnect **BATTERY EARTH LEAD** and cover.
- **REMOVE LEFT CHARGE AIR DUCT** .
- Remove alternator **DRIVE BELT** .

NOTE:

In order to remove the alternator, it is necessary to remove . See **64 52 523 REPLACING AIR CONDITIONING SYSTEM COMPRESSOR (N55)** or **64 52 523 REPLACING AIR CONDITIONING SYSTEM COMPRESSOR (N55)** the air conditioning compressor .

In so doing:

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

Release screws (1).

Tightening torque **12 31 1AZ** .

Release screw (2).

Tightening torque **12 31 2AZ** .

Release screw (3) and remove with holder (4).

Tightening torque **12 31 2AZ** .

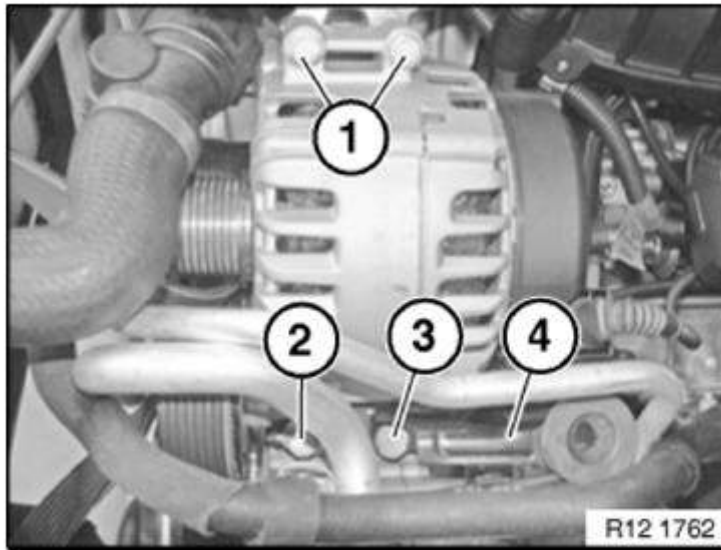


Fig. 83: Identifying Holder And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) and remove.

Remove protective cap (2) and release nut underneath.

Tightening torque [12 42 1AZ](#) .

Remove positive battery cable(3).

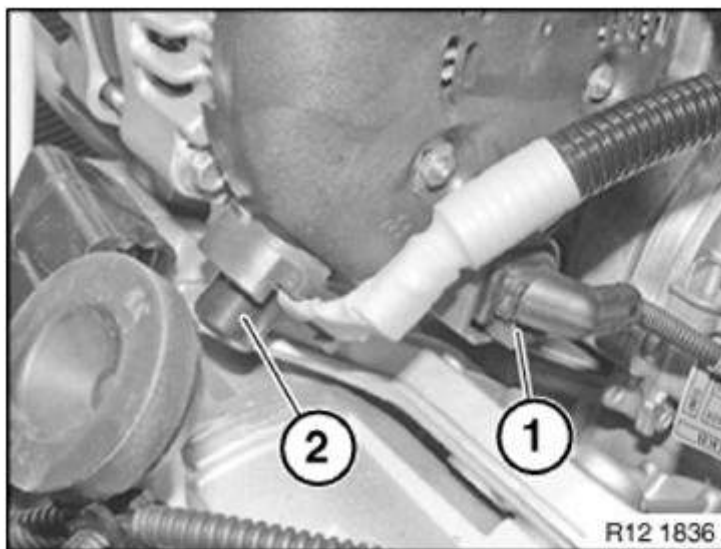


Fig. 84: Identifying Protective Cap And Connector

Courtesy of BMW OF NORTH AMERICA, INC.

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

Release screws (1) a few turns until bracket (2) is loose. Do not remove bracket (2).

Tightening torque [12 31 3AZ](#) .

Feed out alternator (3) and remove.

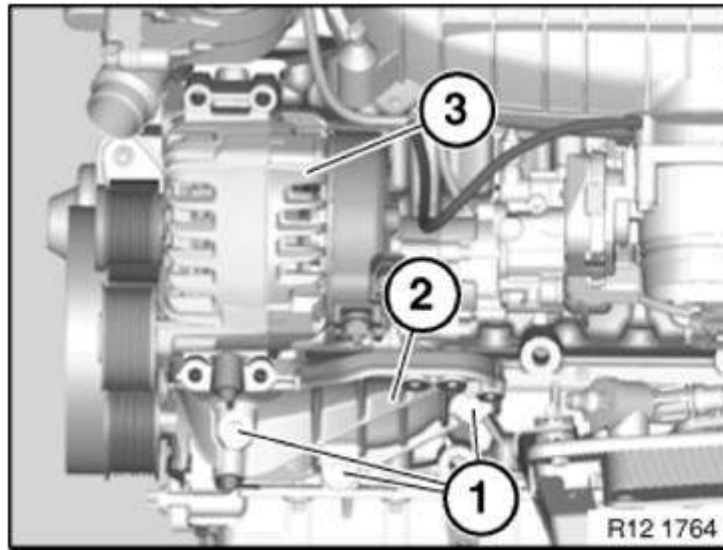


Fig. 85: Identifying Alternator, Screws And Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

12 31 020 REMOVING AND INSTALLING/REPLACING ALTERNATOR (N47 D20 O1)

Necessary preliminary work:

- Read out the fault memory of the DDE control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove **INTAKE FILTER HOUSING** .
- Remove **INTAKE PORT** .
- Remove **THROTTLE BODY** .
- Remove **INTAKE PLENUM** .
- **REMOVE** drive belt for alternator.

Release connector (1) and remove.

Slacken nut (2).

Tightening torque **12 52 2AZ** .

Disconnect positive battery cable from alternator.

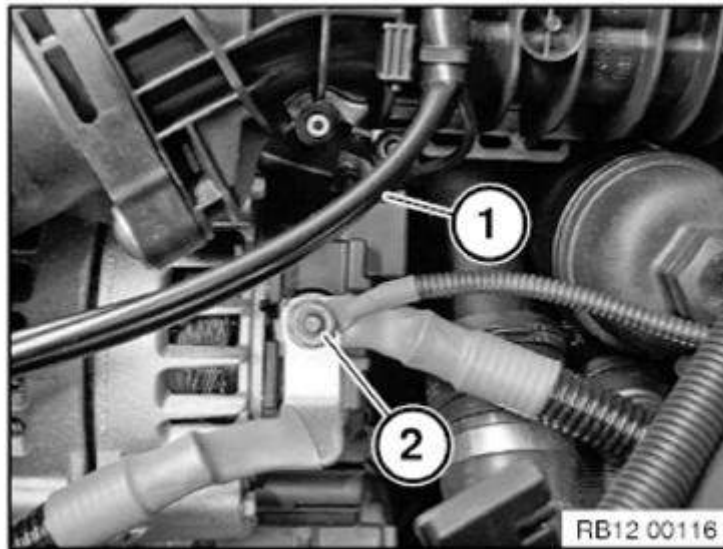


Fig. 86: Identifying Connector And Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Remove cover from idler pulley and undo bolt (1) beneath it.

Tightening torque [12 31 2AZ](#) .

Remove idler pulley.

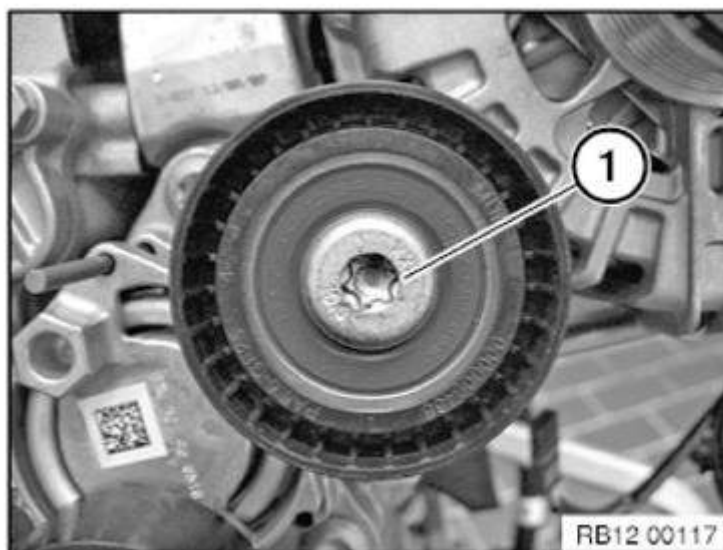


Fig. 87: Identifying Deflecting Element Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

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

Feed out alternator upwards and remove.

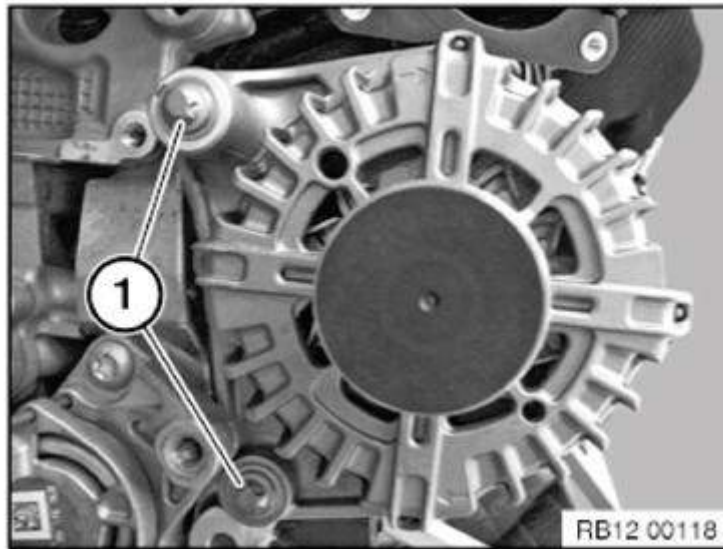


Fig. 88: Identifying Screws Of Alternator

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Delete fault memory.

CONTROLLER

12 32 501 REPLACING VOLTAGE REGULATOR

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery negative lead
- Notes on removing and installing electronic control units. Refer to [12 00... INSTRUCTIONS FOR CONNECTING AND DISCONNECTING TEST UNITS](#) or [12 00... INSTRUCTIONS ON COMPONENT TESTING](#)
- Remove alternator

Bosch:

Release protective caps (1).

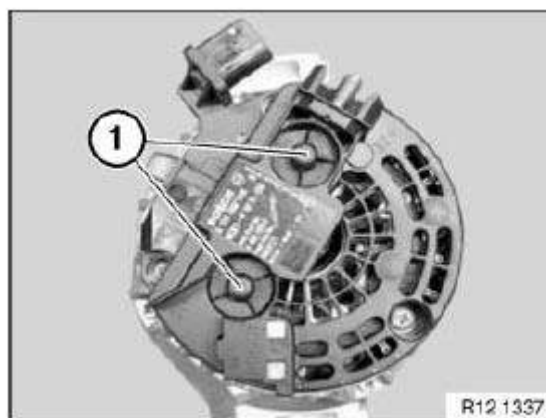


Fig. 89: Identifying Protective Caps

Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

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

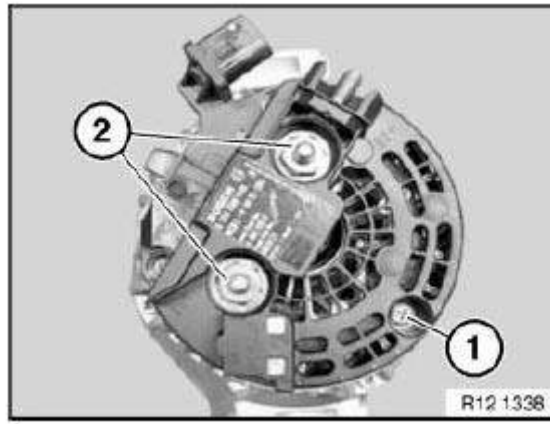


Fig. 90: Identifying Screw And Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

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

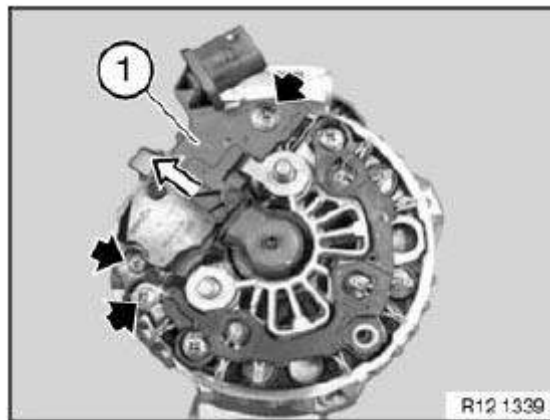


Fig. 91: Removing Regulator Switch

Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

Installation:

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

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

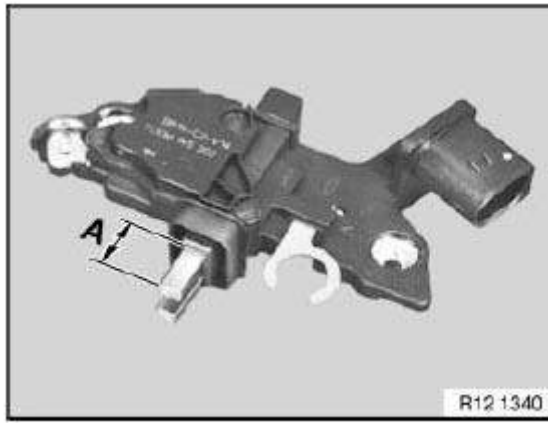


Fig. 92: Identifying Collector Ring Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Slacken nut (1).

Slacken nut (2).

Release screws (3).

Release cover (4).

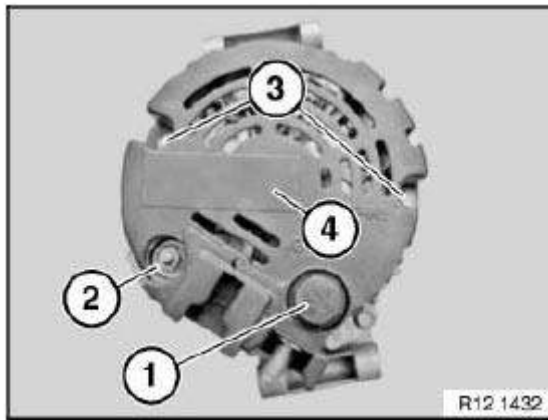


Fig. 93: Identifying Cover, Screws And Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Release screws.

Remove regulator switch (1) towards top.

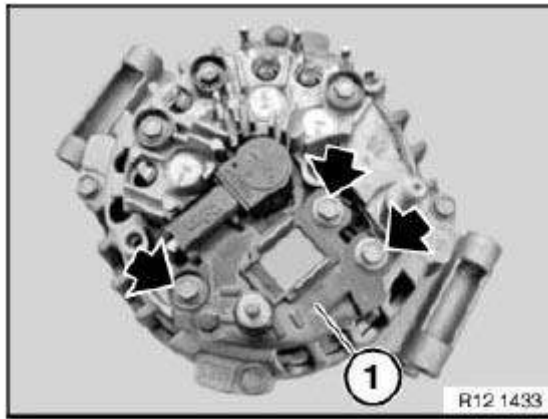


Fig. 94: Locating Regulator Switch Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Installation:

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

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

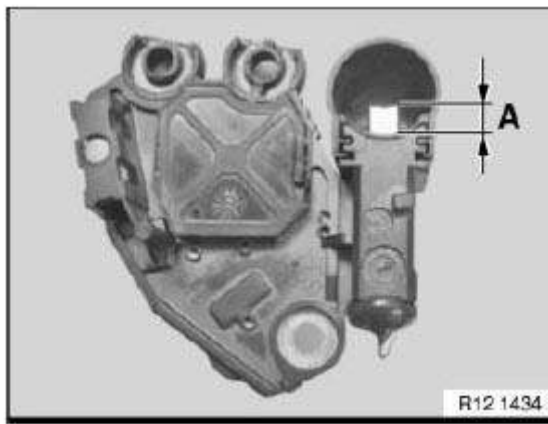


Fig. 95: Identifying Collector Ring Distance

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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

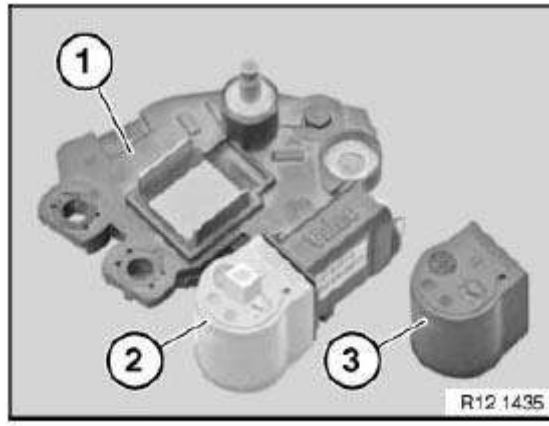


Fig. 96: Identifying Regulator, Mounting Sleeve And Cover
 Courtesy of BMW OF NORTH AMERICA, INC.

STARTER WITH MOUNTING

11 00... HANDLING COMPONENTS AFTER FLOOD DAMAGE

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

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

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

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

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER MOTOR (N20, N26)

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect **BATTERY NEGATIVE LEAD** .
- Remove **INTAKE PLENUM** .

Unlock connector (1) and remove.

Release nuts (2) and disconnect positive battery cables.

Tightening torque **12 42 2AZ** .

Release screws (3).

Tightening torque **12 41 1AZ** .

Feed out starter motor and remove.

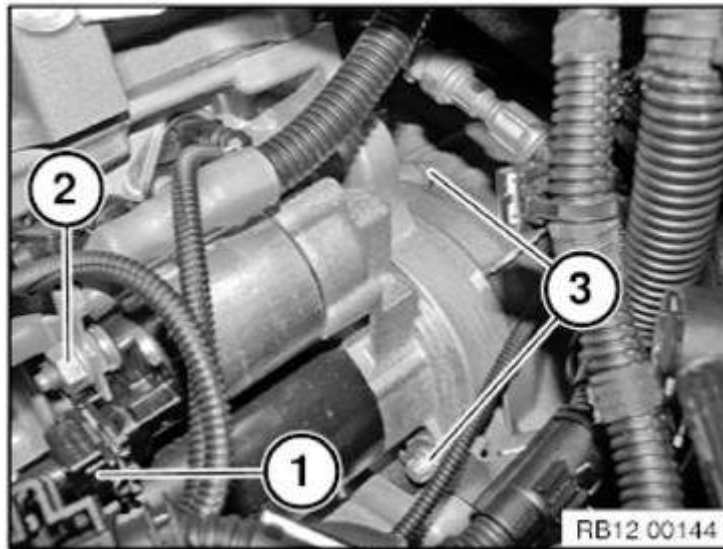


Fig. 97: Identifying Connector, Nuts And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

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

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

- Use BMW diagnosis system to reset the starter counter.

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER MOTOR (N47 D20 O1)

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect **BATTERY NEGATIVE LEAD** .
- Remove **REINFORCEMENT PLATE** .

Release nut (1) and remove cable.

Tightening torque **12 52 1AZ** .

Release nut (2) and remove the positive battery cable.

Tightening torque **12 52 3AZ** .

Release cable at clamp (3) from starter motor.

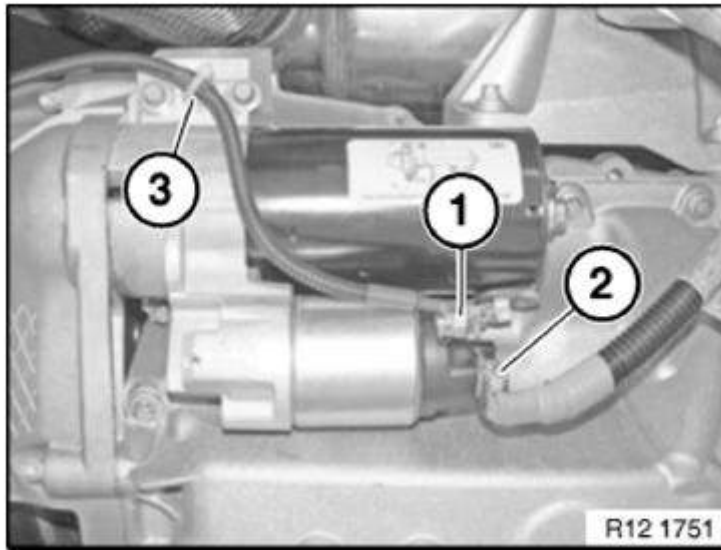


Fig. 98: Identifying Clamp And Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1), (2) and (3).

Remove starter motor.

Installation note:

Observe screwing sequence.

Position and secure starter motor. Tighten down screws (1) and (2). Tighten down support screw (3).

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

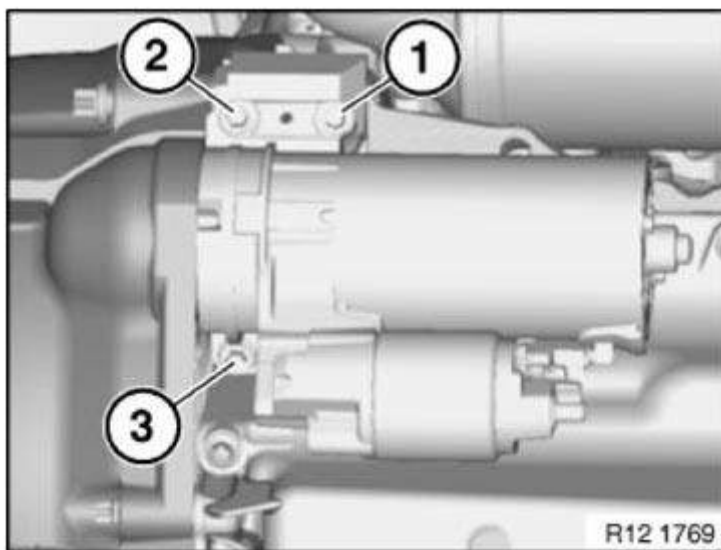


Fig. 99: Identifying Starter Motor Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check starter pinion and ring gear for damage.

Replace damaged starter motor.

Assemble engine.

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

- Use BMW diagnosis system to reset the starter counter.

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER MOTOR (N52T)

Aluminum-magnesium materials.

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

A magnesium crankcase requires aluminum screws/bolts exclusively.

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

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic**.

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

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect **BATTERY NEGATIVE LEAD**.
- Remove **INTAKE PLENUM**.

Unlock connector (1) and remove.

Unfasten nut.

Tightening torque **12 42 2AZ**.

Remove positive battery cable (2).

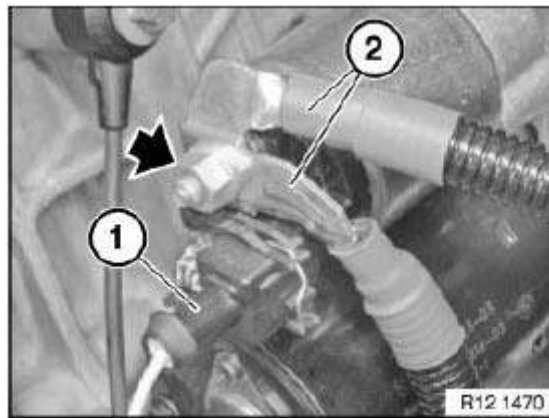


Fig. 100: Locating Positive Battery Cable Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Installation note:

Replace aluminum screws.

Tightening torque **12 41 1AZ**.

Unfasten screws (2).

Installation note:

Replace aluminum screws.

Tightening torque [12 41 2AZ](#) .

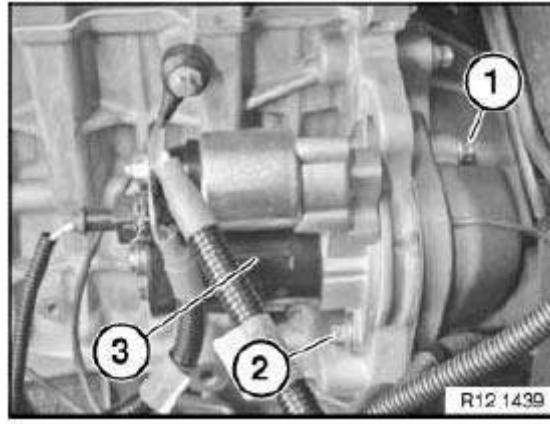


Fig. 101: Identifying Screw And Starter Motor
Courtesy of BMW OF NORTH AMERICA, INC.

Remove starter motor (3).

Installation note:

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

Assemble engine.

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

- Use BMW diagnosis system to reset the starter counter.

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER MOTOR (N55)

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect [BATTERY NEGATIVE LEAD](#) .
- Remove [INTAKE PLENUM](#) .

Unlock connector (1) and remove.

Release nuts (2) and disconnect positive battery cables.

Tightening torque [12 42 2AZ](#) .

Release screws (3).

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

Remove starter motor (4).

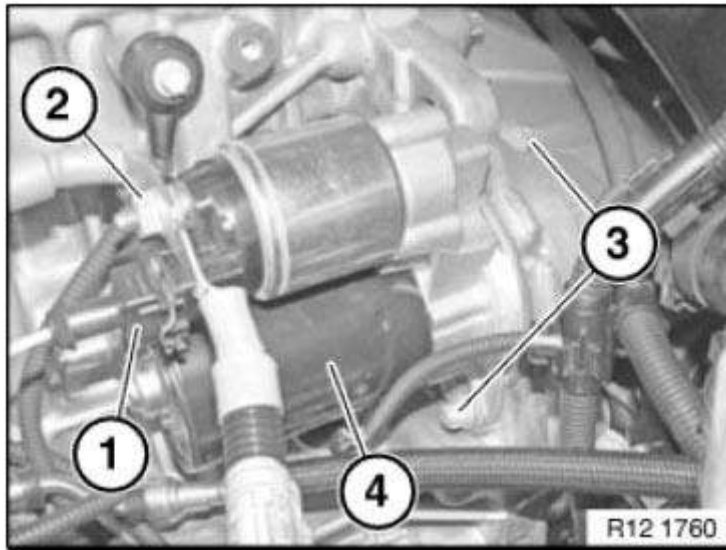


Fig. 102: Identifying Connector, Starter Motor And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

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

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

- Use BMW diagnosis system to reset the starter counter.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition.

Remove starter motor.

Release nut (1).

Remove cable lug (2).

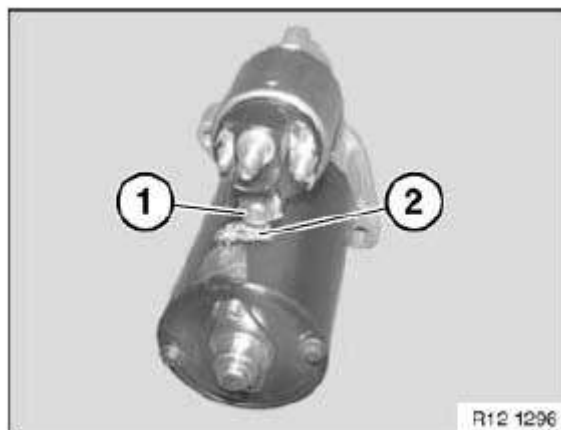


Fig. 103: Identifying Cable Lug And Nut

Courtesy of BMW OF NORTH AMERICA, INC.

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

Release screws (1).

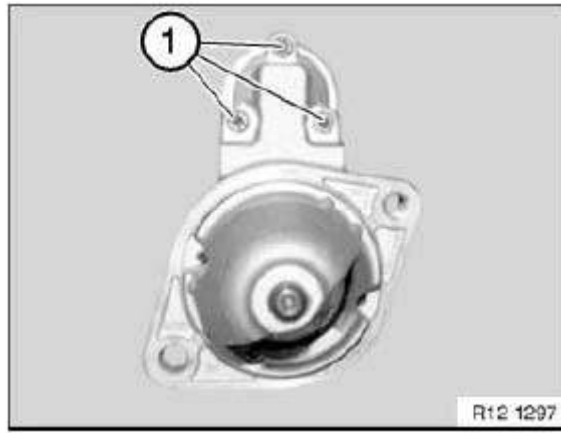


Fig. 104: Identifying Starter Motor Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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

Unhook pin (3).

Installation:

Check pin (3) for wear and apply grease.

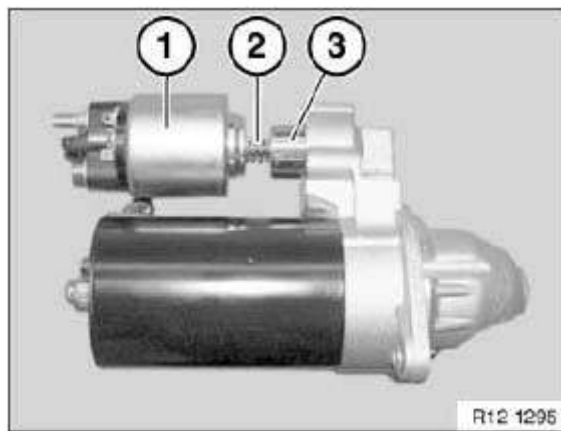


Fig. 105: Identifying Solenoid Switch, Spring And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

STARTER LEAD

12 42 500 REPLACING BATTERY POSITIVE LEAD BETWEEN STARTER, ALTERNATOR AND BATTERY POSITIVE TERMINAL (N52T)

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD**.
- Remove intake plenum.

Fold back cover (1).

Release nut underneath. Remove positive battery cable from positive battery connection point.

Tightening torque, [12 42 3AZ](#) .

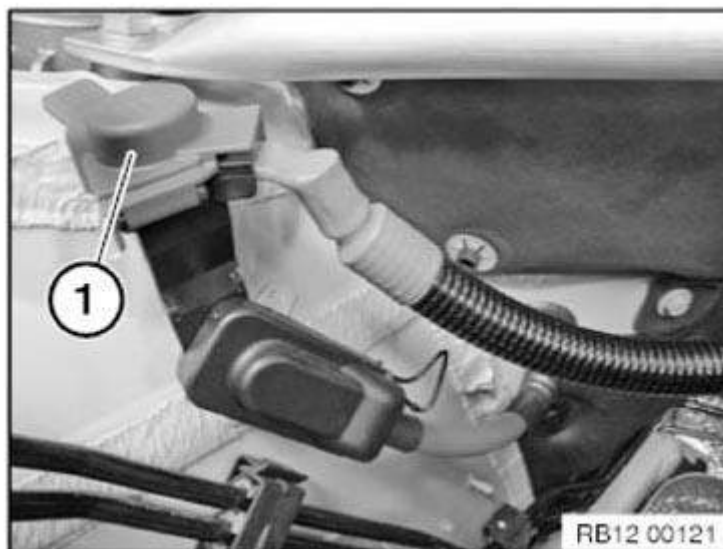


Fig. 106: Identifying Back Cover Of Positive Battery Cable

Courtesy of BMW OF NORTH AMERICA, INC.

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

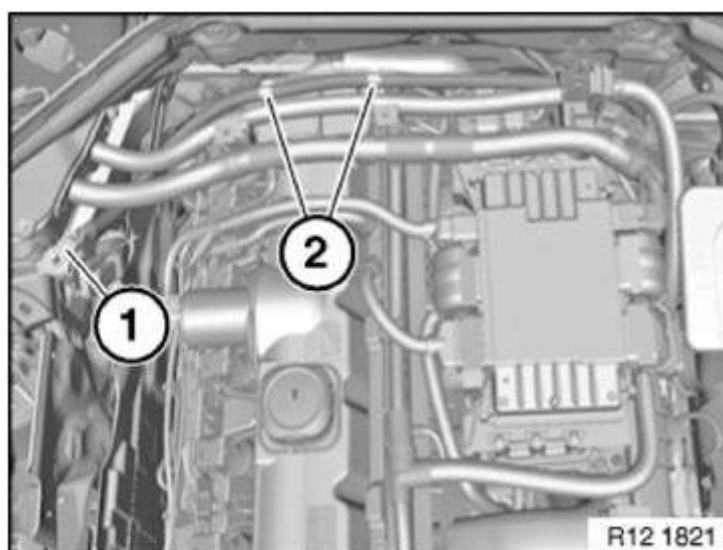


Fig. 107: Identifying Battery Positive Lead And Retainers

Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp (1).

Release clamps (2).

Unlock tab (3) in direction of arrow. Remove top part of cable holder toward the top and uncover wiring harnesses.

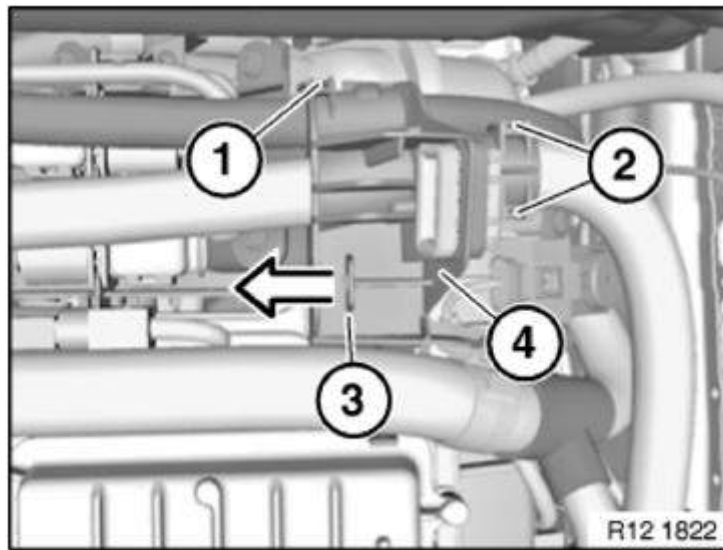


Fig. 108: Releasing Clamp

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Tightening torque [12 42 2AZ](#) .

Disconnect positive battery cable (2) from starter motor.

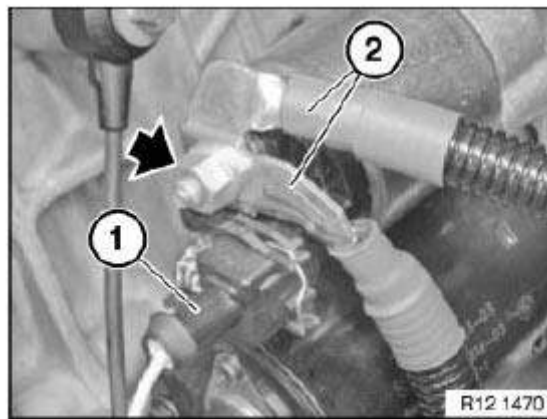


Fig. 109: Locating Positive Battery Cable Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective cap (2) and release nut underneath.

Tightening torque [12 42 1AZ](#) .

Remove battery positive lead from alternator and feed out.

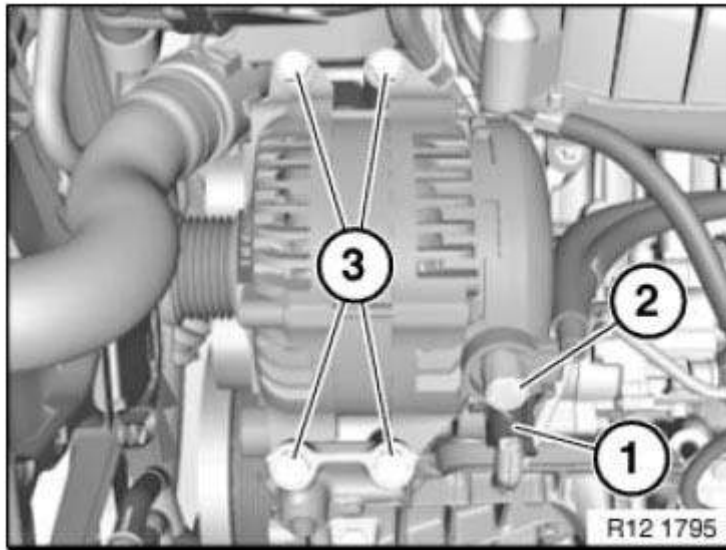


Fig. 110: Identifying Protective Cap, Alternator And Nut

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
 Check stored fault messages.
 Delete fault memory.

12 42 500 REPLACING POSITIVE BATTERY CABLE BETWEEN STARTER MOTOR, ALTERNATOR AND POSITIVE BATTERY CONNECTION POINT (N47 D20 O1)

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove **INTAKE FILTER HOUSING** .
- Remove **UNDERBODY PROTECTION**

Fold back cover (1).

Release nut underneath.

Tightening torque **12 52 4AZ** .

Remove positive battery cable from battery positive terminal.

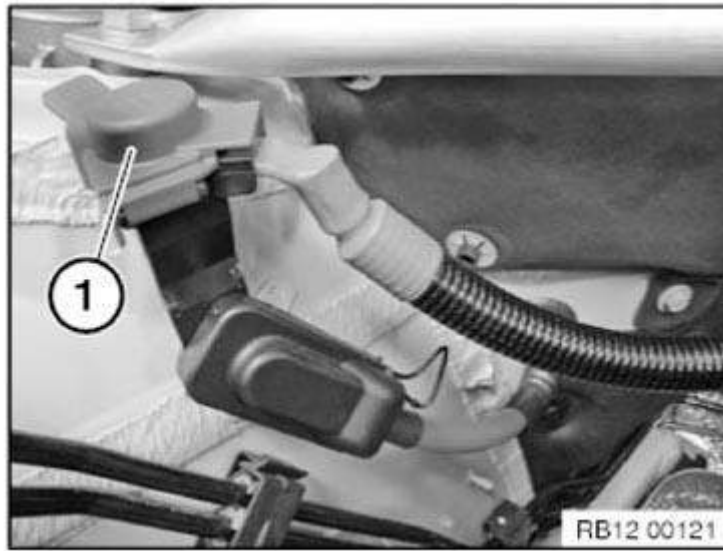


Fig. 111: Identifying Back Cover Of Positive Battery Cable
 Courtesy of BMW OF NORTH AMERICA, INC.

Release positive battery lead(1) from acoustic cover (3).

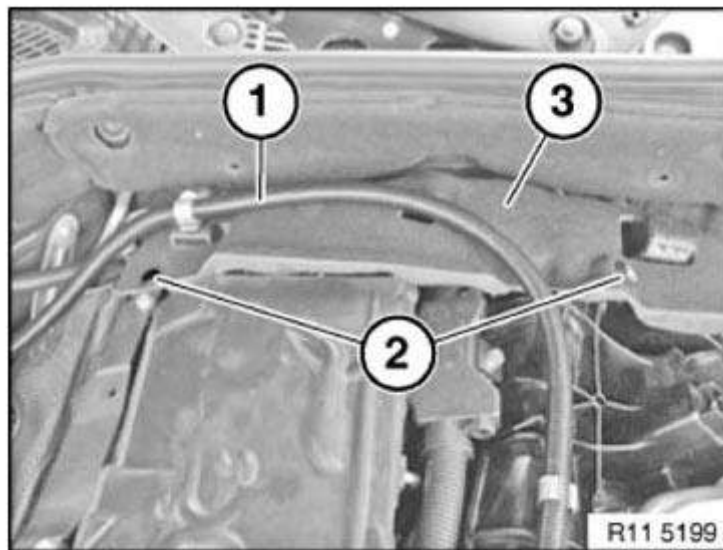


Fig. 112: Identifying Positive Battery Cable, Expanding Rivets And Rear Acoustic Cover
 Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque [12.52.2AZ](#).

Disconnect positive battery cable from alternator.

Release positive battery lead from retainer (2).

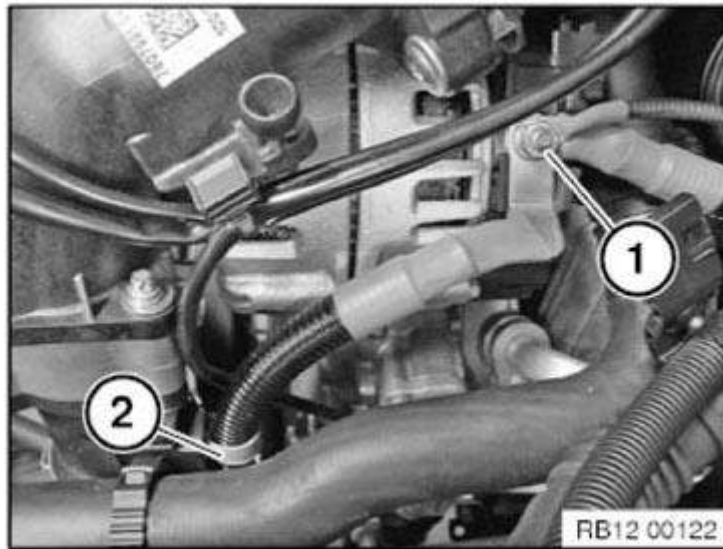


Fig. 113: Identifying Positive Battery Lead From Retainer And Slacken Nut
 Courtesy of BMW OF NORTH AMERICA, INC.

Release retainers (1) and detach positive battery lead from guide.

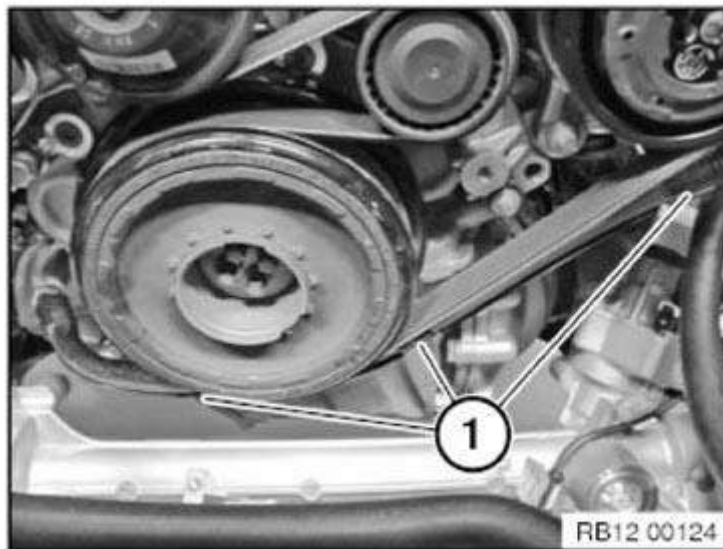


Fig. 114: Identifying Retainers Of Positive Battery Lead
 Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on starter motor.

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

Disconnect positive battery cable from starter motor.

Release positive battery cable from retainers (2).

Feed out positive battery cable and remove.

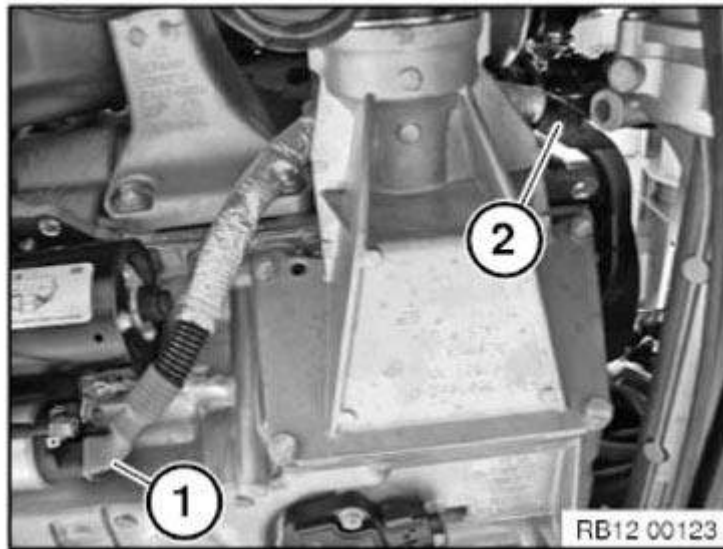


Fig. 115: Identifying Positive Battery Cable From Retainers And Nut

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
Check stored fault messages.
Delete fault memory.

12 42 500 REPLACING POSITIVE BATTERY CABLE BETWEEN STARTER MOTOR, ALTERNATOR AND POSITIVE BATTERY CONNECTION POINT (N55)

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD**.
- **REMOVE** intake plenum.

Fold back cover (1).

Release nut underneath. Remove positive battery cable from battery positive terminal.

Tightening torque: **12 42 3AZ**.

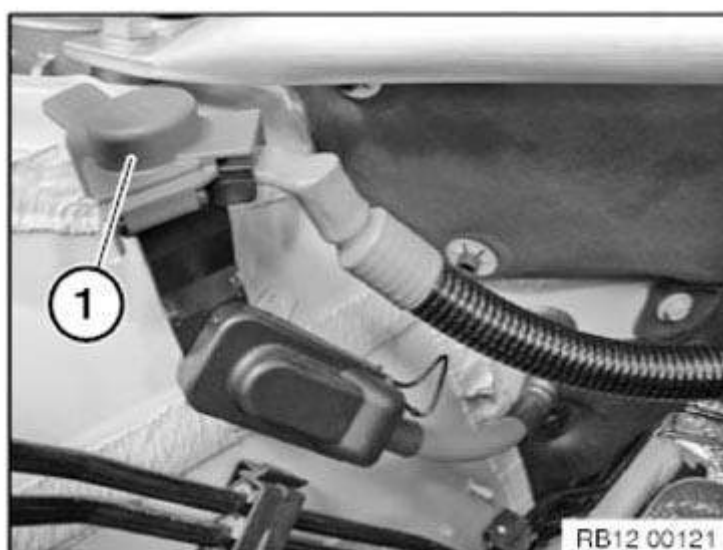


Fig. 116: Identifying Back Cover Of Positive Battery Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective cap (2) and release nut underneath.

Tightening torque: **12 42 1AZ** .

Disconnect positive battery cable from alternator.

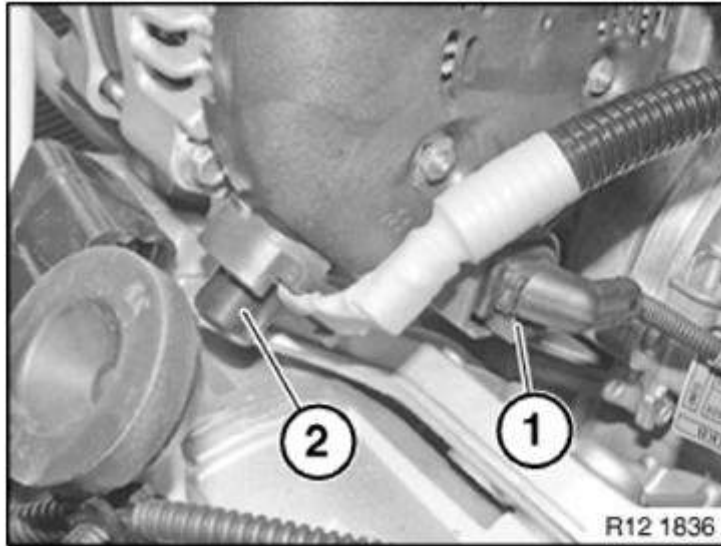


Fig. 117: Identifying Protective Cap And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

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

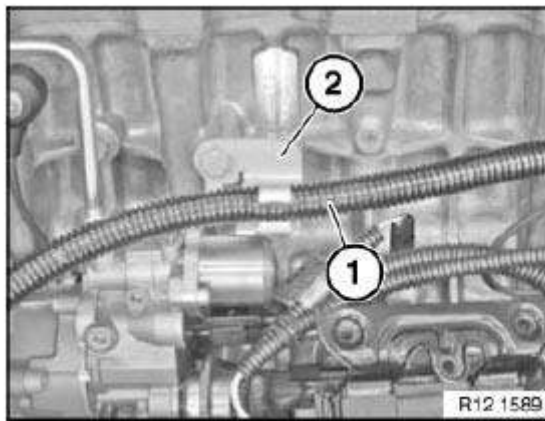


Fig. 118: Identifying Positive Battery Cable And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (2) on starter motor only.

Tightening torque, **12 42 2AZ** .

Remove positive battery cable from starter motor and pull out.

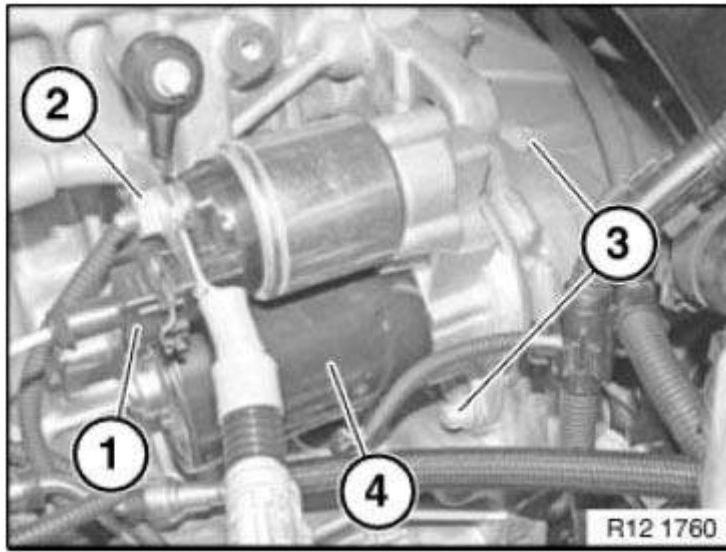


Fig. 119: Identifying Connector, Starter Motor And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
Check stored fault messages.
Delete fault memory.

12 42 500 REPLACING POSITIVE BATTERY CABLE BETWEEN STARTER MOTOR, ALTERNATOR AND POSITIVE BATTERY CONNECTION POINT (N20)

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect **BATTERY NEGATIVE LEAD** .
- Remove **INTAKE PLENUM** .
- **REMOVE COVER FOR WINDSCREEN COWL PANEL** .

Release screw (1).

Lever out cable clip (2).

Remove cover (3).

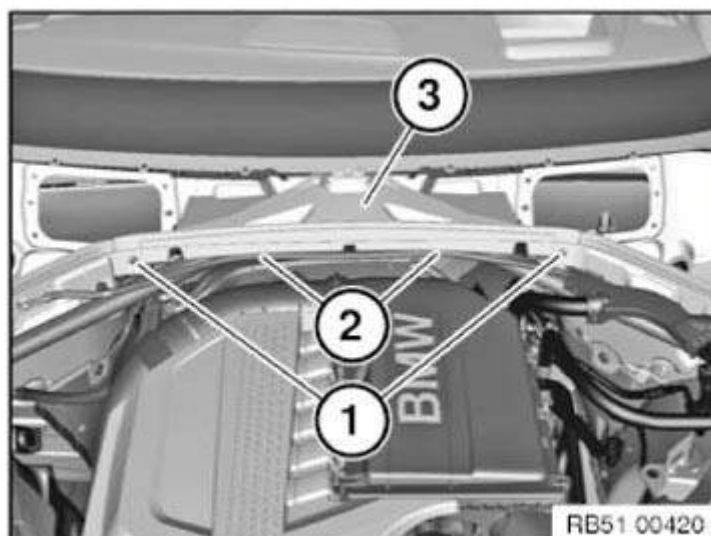


Fig. 120: Identifying Cable Clip, Cover And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Fold back cover (1).

Release nut underneath. Remove positive battery cable from positive battery connection point.

Tightening torque [12 42 3AZ](#) .

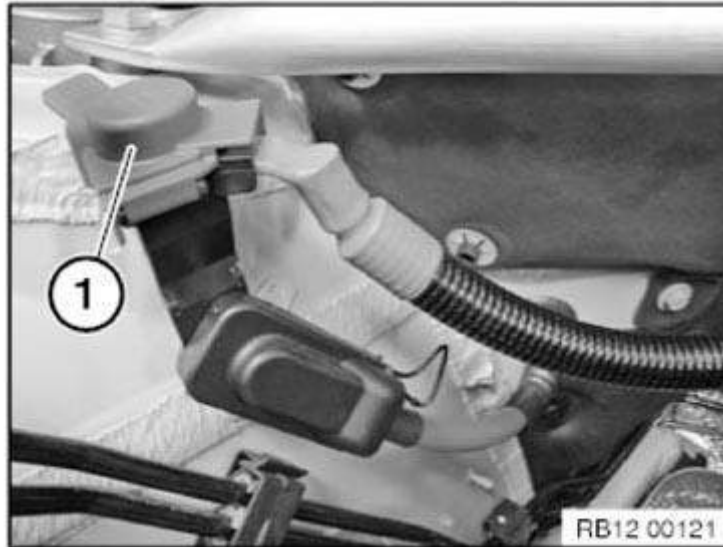


Fig. 121: Identifying Back Cover Of Positive Battery Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip positive battery cable (1) from brackets (2) at rear of engine block.

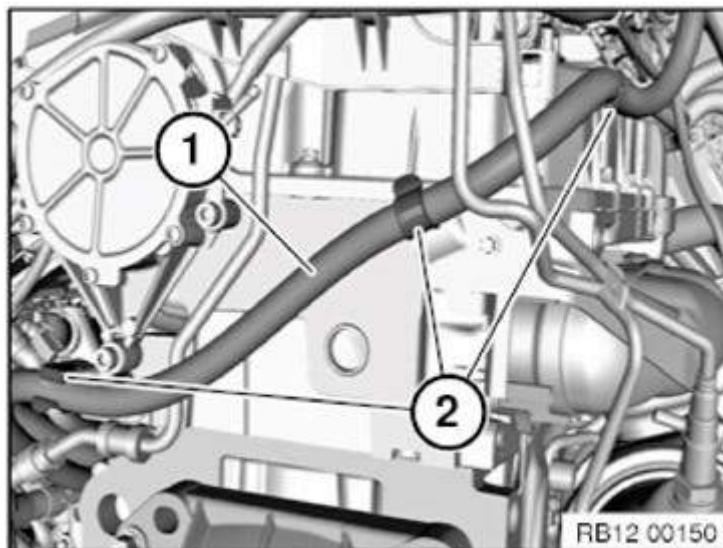


Fig. 122: Identifying Positive Battery Cable And Brackets
Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective cap (1) and release nut underneath.

Tightening torque: [12 42 1AZ](#) .

Release nut (2) on starter.

Tightening torque [12 42 2AZ](#) .

Disconnect positive battery cable (3) from alternator and starter motor. Feed out positive battery cable (3) and remove.

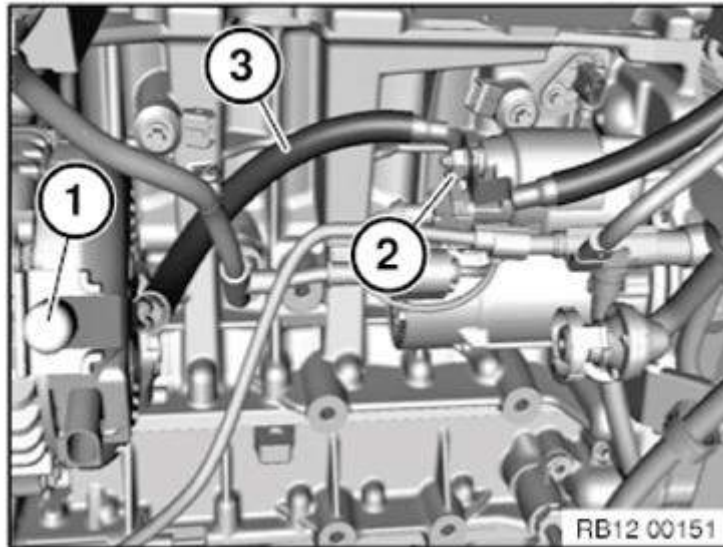


Fig. 123: Identifying Protective Cap, Positive Battery Cable And Nut

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
Check stored fault messages.
Delete fault memory.

12 42 540 REPLACING SAFETY BATTERY TERMINAL (SBK)

CAUTION: Observe safety regulations.
Investigate cause of triggering of safety battery terminal.
To do so, read out fault memory of airbag control unit. Note fault messages stored in memory. Rectify faults. Then clear fault memory.

Use of safety battery terminal:

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

The different models have different installation locations:

Battery in engine compartment

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

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

Battery in luggage compartment behind side trim panel

Remove side trim panel.

Follow instructions for disconnecting and connecting battery.

Disconnect and cover battery negative lead.

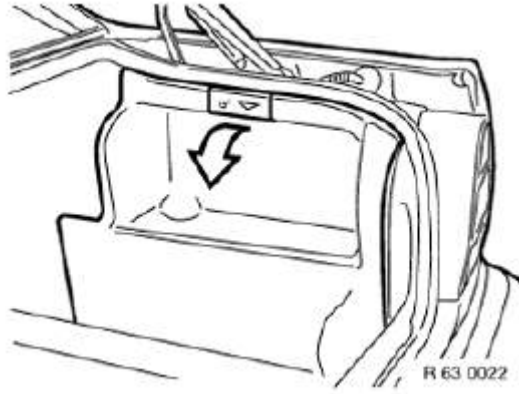


Fig. 124: Removing Side Trim Panel

Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.



Fig. 125: Releasing Front Side Trim Panel

Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under floor trim panel

Follow instructions for disconnecting and connecting battery.

Fold back floor trim panel (1).

Lift cover (2) on battery negative lead.

Disconnect and cover battery negative lead (3).

Release nuts (4).

Remove battery cover.

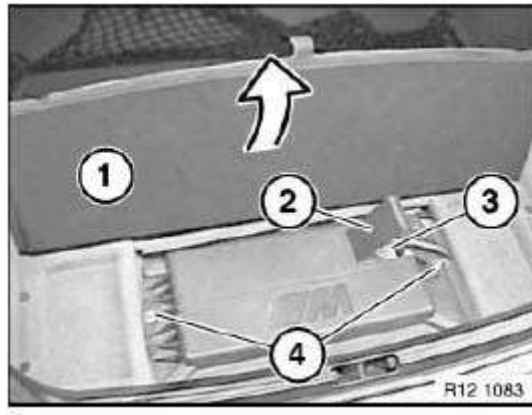


Fig. 126: Disconnecting Cover Battery Negative Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under spare wheel

Remove spare wheel.

Release screws.

CAUTION: Do not kink air pipes.

Set air supply system (1) to one side.

Follow instructions for disconnecting and connecting battery.

Disconnect battery negative lead.

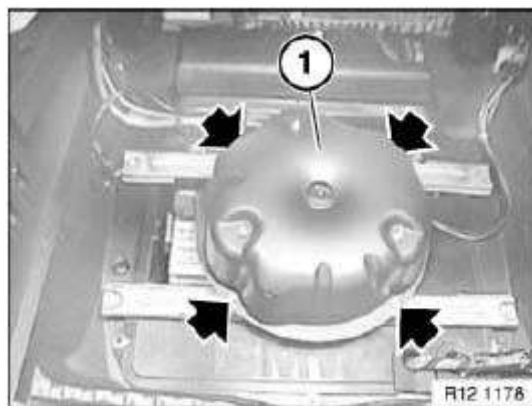


Fig. 127: Identifying Air Supply System Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect supply cable (1) for vehicle electrical system.

Installation:

Remove faulty fuses and carry out troubleshooting.

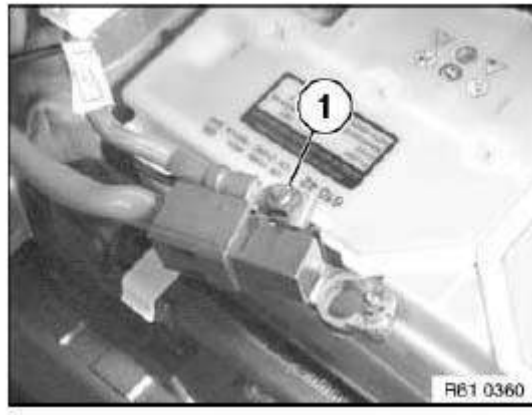


Fig. 128: Identifying Supply Cable

Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Pay attention to interface.

The repair cable is always a standard length.

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

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

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

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

Lay repair cable parallel to battery positive lead.

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

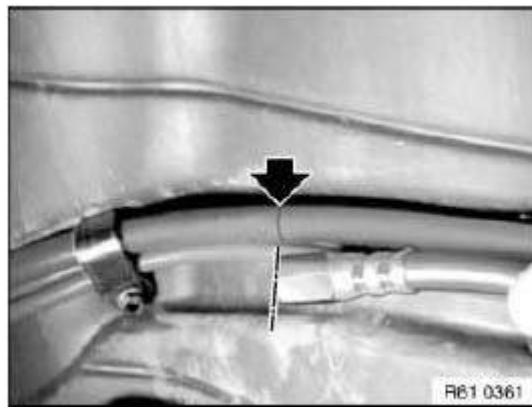


Fig. 129: Locating Battery Positive Lead Cable Mark

Courtesy of BMW OF NORTH AMERICA, INC.

Release cable ties (1).

Disconnect plug connection (2).

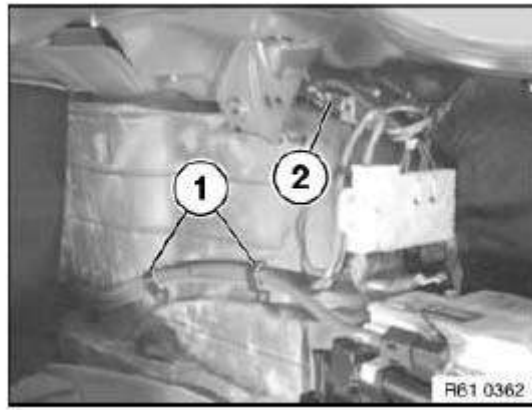


Fig. 130: Identifying Plug Connection And Cable Ties

Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not use bolt cutters or similar tools to cut through the cable.

A cable end that has been squashed flat will no longer fit into the clamping sleeve.

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

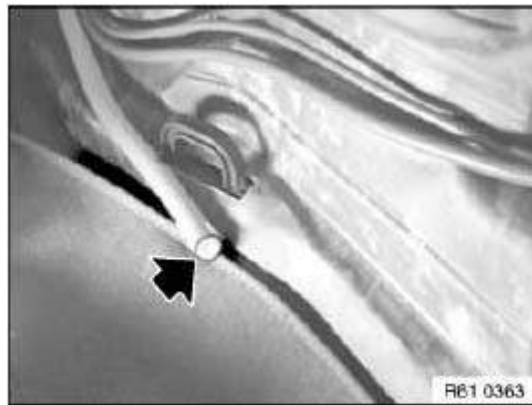


Fig. 131: Locating Battery Positive Cable

Courtesy of BMW OF NORTH AMERICA, INC.

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

Distance (A) = 15 mm.

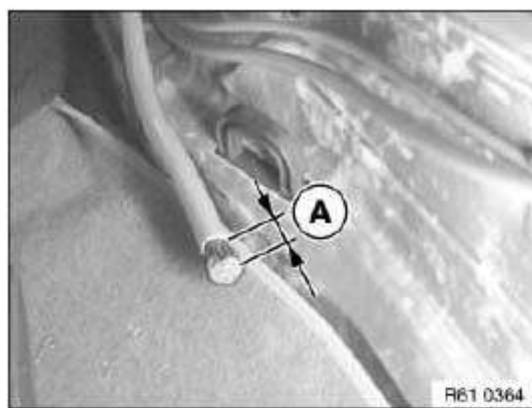


Fig. 132: Identifying Strip Insulation Distance

Courtesy of BMW OF NORTH AMERICA, INC.

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

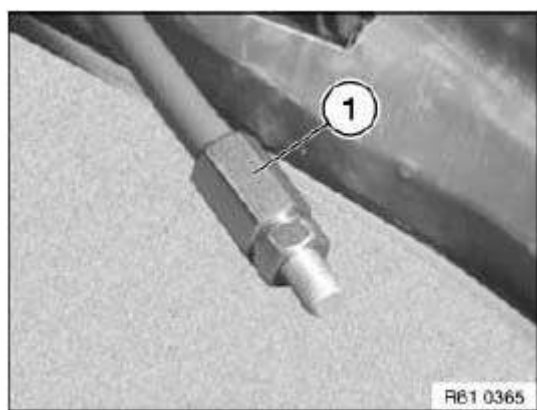


Fig. 133: Identifying Heavy-Current Connector
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

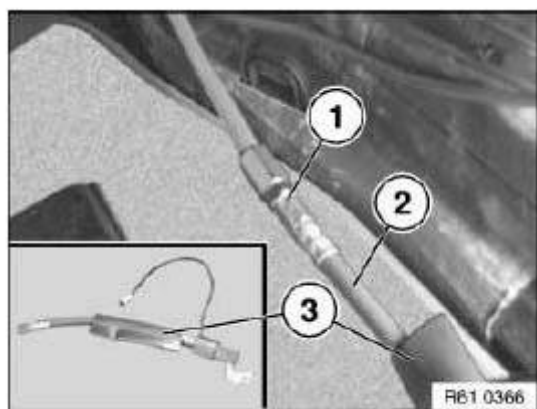


Fig. 134: Identifying Shrink-Fit Hose And Threaded Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

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

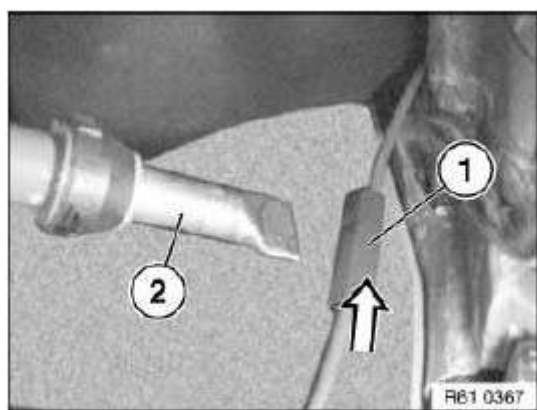


Fig. 135: Pushing Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

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

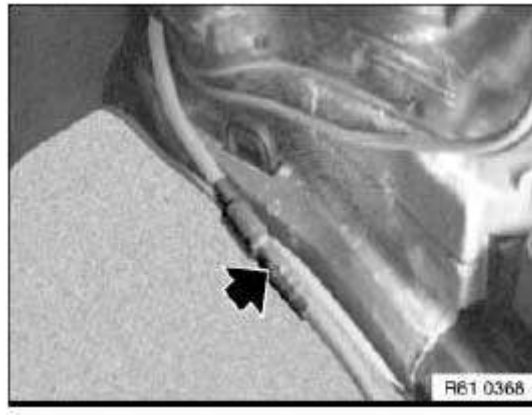


Fig. 136: Locating Connection Point Of Shrink-Fit Hose
 Courtesy of BMW OF NORTH AMERICA, INC.

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.)

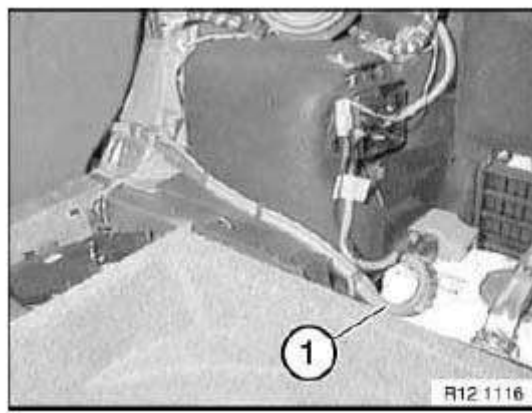


Fig. 137: Identifying Battery Positive Lead
 Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE WIRING LOOM

12 51 240 REMOVING AND INSTALLING/REPLACING ENGINE SENSOR SYSTEM MODULE 2 WIRING HARNESS (N20)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)** .

Necessary preliminary tasks:

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

- Release the **COOLANT THERMOSTAT** and set on the side. Do not drain the coolant and do not release the coolant hose.
- **REMOVE** bottom clean air pipe.
- Remove **ENGINE VENTILATION LINE** .

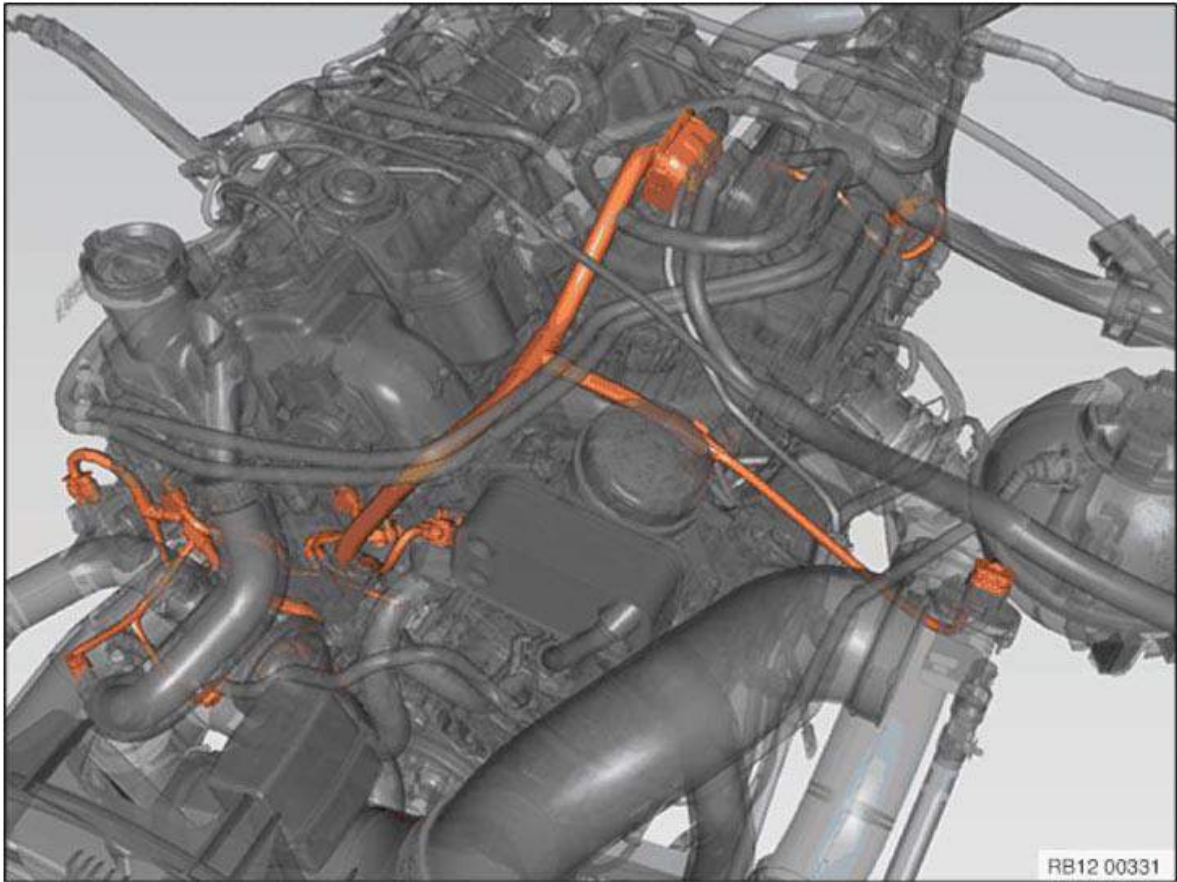


Fig. 138: Overview Of Engine Wiring Harness Sensor System Module 2
Courtesy of BMW OF NORTH AMERICA, INC.

Overview of engine wiring harness sensor system module 2.

Release screws (1).

Tightening torque **12 52 5AZ** .

Release cable channel (2).

Installation note:

Reconnect the earth connection.

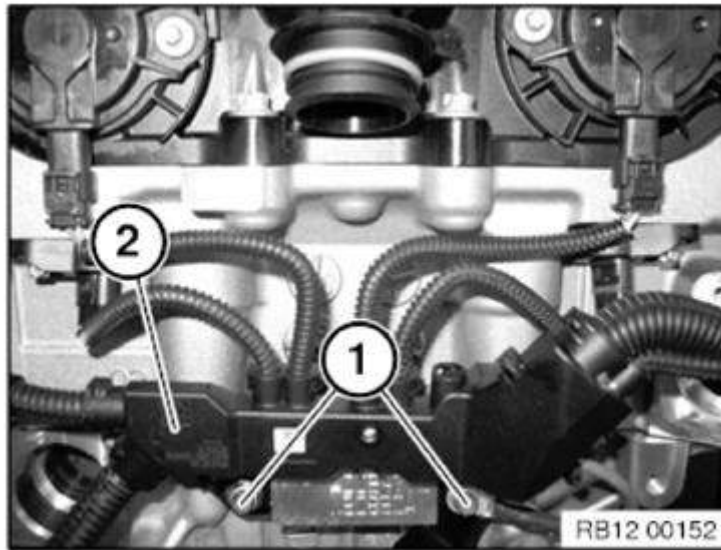


Fig. 139: Identifying Cable Channel And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect following connectors and lines	^
Release connector from engine oil pressure-temperature sensor and pull off	^
Unlock connector on hot film air mass meter and disconnect	^
Unlock connector on tank vent valve and disconnect	^
Release connector to wiring harness gearbox module and pull off	^
Unlock connector on both camshaft adjustment solenoid valves and disconnect	^
Unlock connector on coolant temperature sensor and disconnect	^
Unlock connector on intake camshaft pulse sensor and disconnect	^
Unlock connector on exhaust camshaft pulse sensor and disconnect	^
Unlock connector on coolant thermostat and disconnect	^
Unlock connector on exhaust turbocharger and disconnect	^
Unlock connector on the coolant pump and disconnect	^
Unlock connector on heating element for air duct and disconnect	^

Release wiring harness if necessary from existing clips and clamps.

Feed out wiring harness and remove.

Installation note:

Check wiring harness installation arrangement.

Check plug connections for correct fit.

Check stored fault message.

Clear diagnostic fault entries from fault memory.

12 51 235 REMOVING AND INSTALLING/REPLACING ENGINE SENSOR SYSTEM WIRING HARNESS MODULE 1 (N20, N26)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)**.

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **INTAKE PLENUM** .

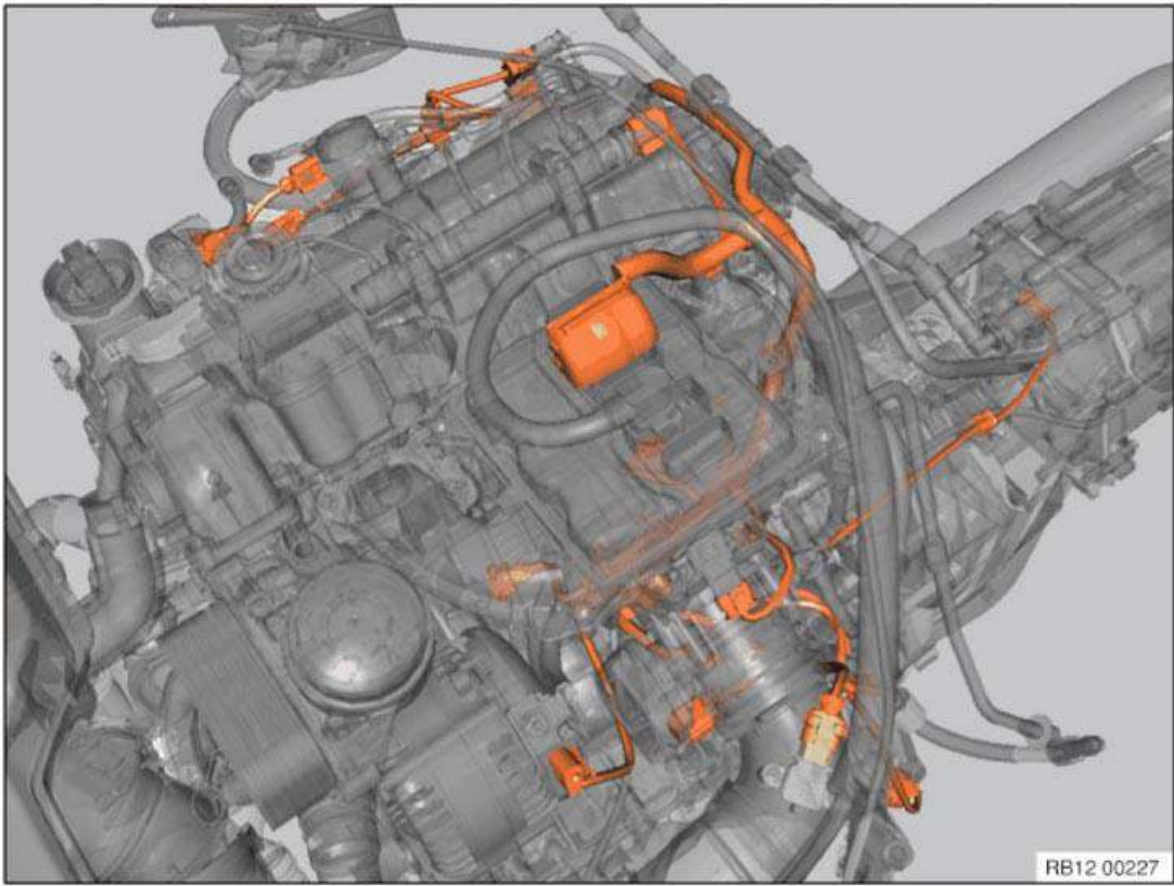


Fig. 140: Overview Of Engine Sensor System Wiring Harness Module 1
Courtesy of BMW OF NORTH AMERICA, INC.

Overview, engine sensor system wiring harness module 1.

Unlock and disconnect following connectors and lines	Â
Unlock connector from suction pressure sensor on the intake plenum and disconnect	Â
Unlock connector on the knock sensors and disconnect	Â
Unlock connector from suction pressure sensor on the pressure pipe and disconnect	Â
Unlock connector on throttle body and disconnect	Â
Unlock connector on oil level sensor and disconnect	Â
Unlock connector on zero-gear sensor and disconnect	Â
Unlock connector on hydraulic valve and disconnect	Â
Unlock connector on crankshaft sensor and disconnect	Â
Unlock connector on high-pressure fuel sensor and disconnect	Â
Unlock connector on oxygen sensor and disconnect	Â
Unlock connector on both knock sensors and disconnect	Â
Unlock connector on monitoring sensor and disconnect	Â
Unlock connector on high pressure pump and disconnect	Â
Unlock connector on pressure converter and disconnect	only N20

Release wiring harness if necessary from existing clips and clamps.

Feed out wiring harness and remove.

Installation note:

Check the wiring harness installation arrangement.

Check that the plug connections are correctly fitted.

Check stored fault message.

Clear diagnostic fault entries from fault memory.

12 51 001 REPLACING SECTION OF WIRING HARNESS FOR ENGINE (N47D20 O1)

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

Necessary preliminary work:

- Read out the fault memory of the DDE control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove **INTAKE FILTER HOUSING** .
- Remove **INTAKE PORT** .
- Remove rear acoustic cover.
- Remove sound insulation on injectors.
- Remove front **UNDERBODY PROTECTION** .

Release screws (1).

Detach coolant hose from cover of electronics box.

Remove electronics box cover (3).

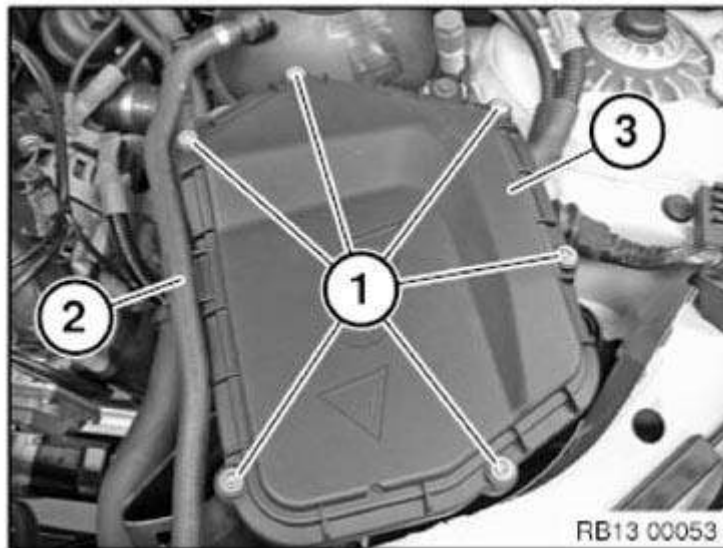


Fig. 141: Identifying Electronics Box Cover And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all connectors (1) from control unit and disconnect.

Detach rubber grommets (2) from electronics box. Place wiring harnesses to the side.

Installation note:

Make sure grommets are correctly fitted (watertightness).

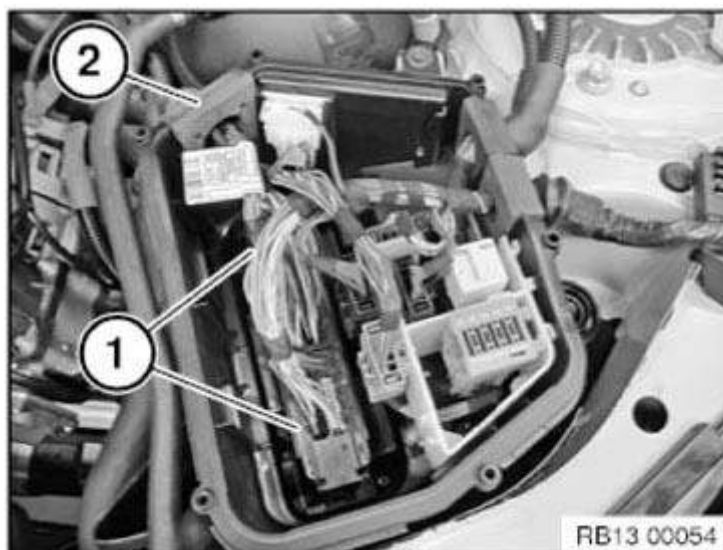


Fig. 142: Identifying Connectors And Rubber Grommets

Courtesy of BMW OF NORTH AMERICA, INC.

Pull out fasteners (1) in direction of arrow.

Push back sockets (2) and detach engine wiring harness from connector housing.

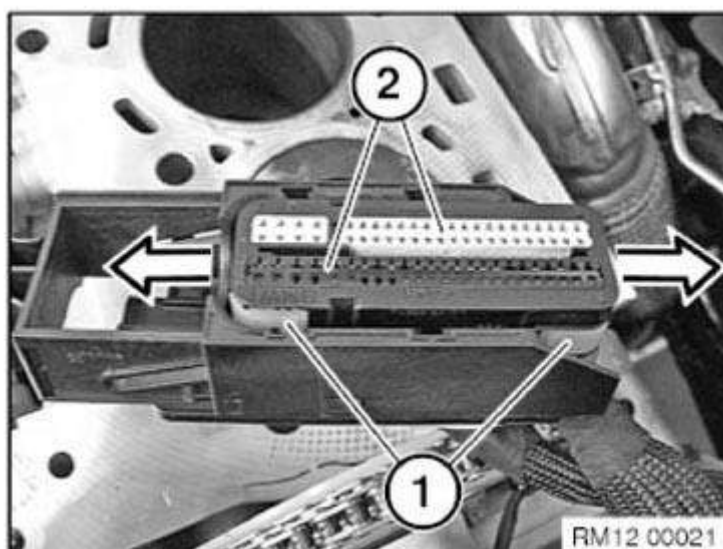


Fig. 143: Pulling Out Fasteners

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Release cable channel (2).

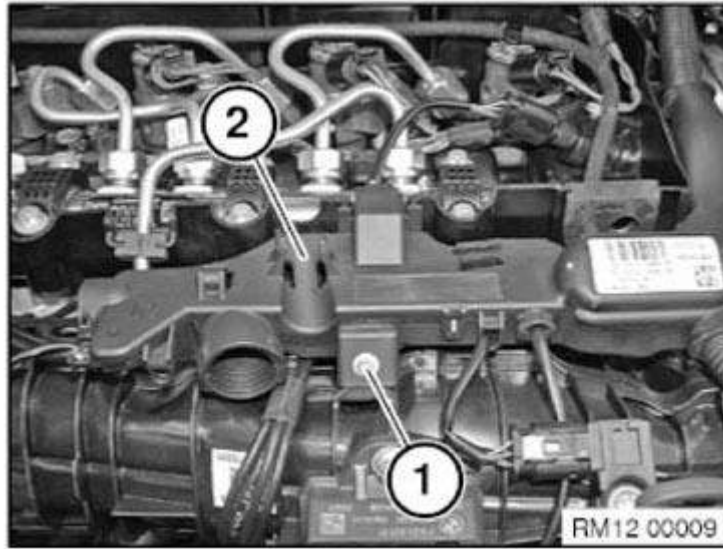


Fig. 144: Identifying Cable Channel And Screw
 Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect following connectors and lines	Note
Unlock connector on hot film air mass meter and disconnect	^
Unlock connector on exhaust turbocharger and disconnect	^
Unlock connector on all electric changeover valves on carrier plate and disconnect	^
Release and unplug connector from exhaust pressure sensor	^
Unlock connector on exhaust-gas temperature sensor and disconnect	^
Unlock connector on oxygen sensor and disconnect	^
Unlock connector on vacuum electric changeover valve (exhaust-gas recirculation) and disconnect	^
Unlock connector on exhaust-gas recirculation valve and disconnect	^
Unlock connector on coolant temperature sensor and disconnect	^
Unlock connector on intake plenum intake adjuster and disconnect	^
Unlock connector on intake pressure sensor and disconnect	^
Unlock connector on rail pressure sensor and disconnect	^
Unlock connector on rail pressure regulating valve and disconnect	If fitted:
Unlock connector on camshaft sensor and disconnect	^
Unlock connector on alternator and disconnect	^
Unlock connector on air conditioning compressor and disconnect	^
Unlock connector on intake air temperature sensor and disconnect	^
Unlock connector on oil pressure sensor and disconnect	^
Release nut (1) on starter motor, detach cable (terminal 50)	^
Unlock connector on transmission and disconnect	Automatic only
Unlock connector on crankshaft sensor and disconnect	^
Unlock connector on throttle body and disconnect	^
Unlock connector on exhaust-gas recirculation temperature sensor and disconnect	^
Unlock connector on high pressure pump and disconnect	^
Unlock connector on fuel pressure/temperature sensor and disconnect	^
Release and unplug connector from preheating control unit	^

Release wiring harness from clips and clamps.

Feed out wiring harness and remove.

Installation note:

Check wiring harness installation arrangement.

Check plug connections for correct fit.

Check stored fault message.

Delete fault memory.

12 51 200 REPLACING SECTION OF WIRING HARNESS FOR INJECTORS (N47 D20 O1)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)**.

Necessary preliminary work:

- Read out the fault memory of the DDE control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD**.
- Remove **INTAKE FILTER HOUSING**.
- Remove rear acoustic cover.
- Remove sound insulation on injectors.
- Partially release **WIRING HARNESS** for engine.

Release screws (1).

Detach coolant hose from cover of electronics box.

Remove electronics box cover (3).

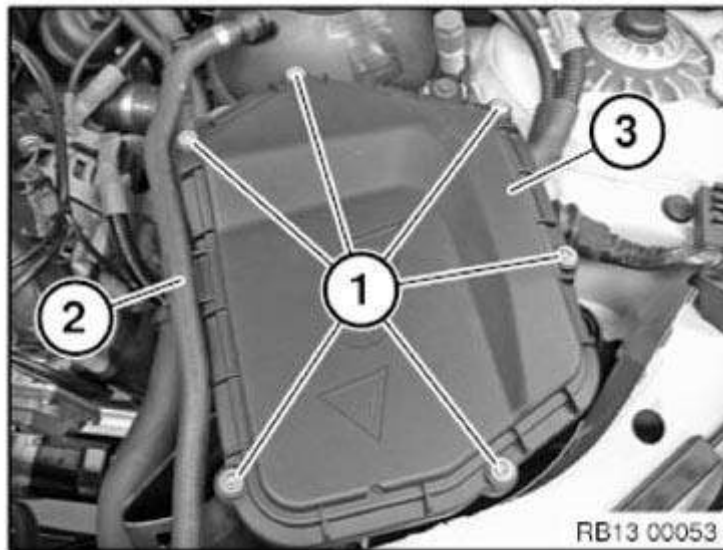


Fig. 145: Identifying Electronics Box Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all connectors (1) from control unit and disconnect.

Detach rubber grommets (2) from electronics box. Place wiring harnesses to the side.

Installation note:

Make sure grommets are correctly fitted (watertightness).

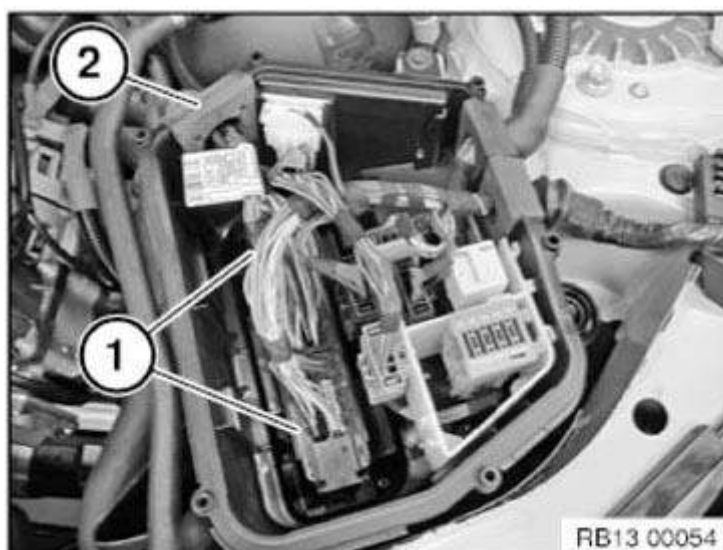


Fig. 146: Identifying Connectors And Rubber Grommets

Courtesy of BMW OF NORTH AMERICA, INC.

Release retaining element (1) in direction of arrow.

Press back socket (2) and remove wiring harness for injectors.

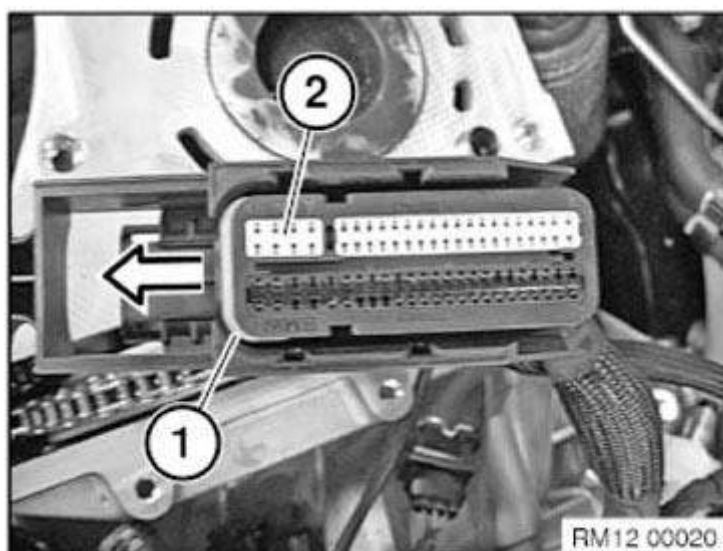


Fig. 147: Releasing Retaining Element

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plugs (1) on injectors and disconnect. Release wiring harness from cylinder head cover, feed out and remove.

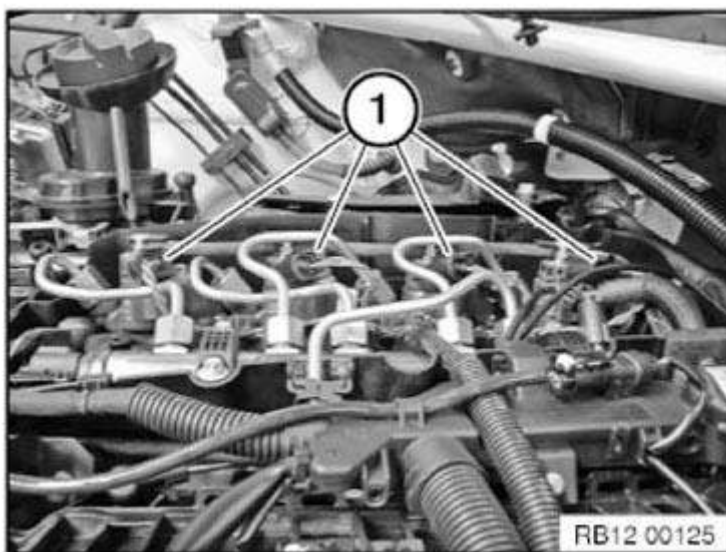


Fig. 148: Identifying Plugs On Injectors

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- Check wiring harness installation arrangement.
- Check plug connections for correct fit.
- Reassemble the vehicle.
- Read out the fault memory of the DDE control unit.
- Check and rectify stored fault messages.
- Delete fault memory.

12 51 245 REPLACING THE WIRING HARNESS SECTION FOR THE ENGINE TRANSMISSION MODULE (N20)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)**.

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove intake **PLENUM**.
- Remove rear **UNDERBODY PROTECTION**.
- Remove **cross member**. See **22 32 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING** or 22 31 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING for transmission mounting.

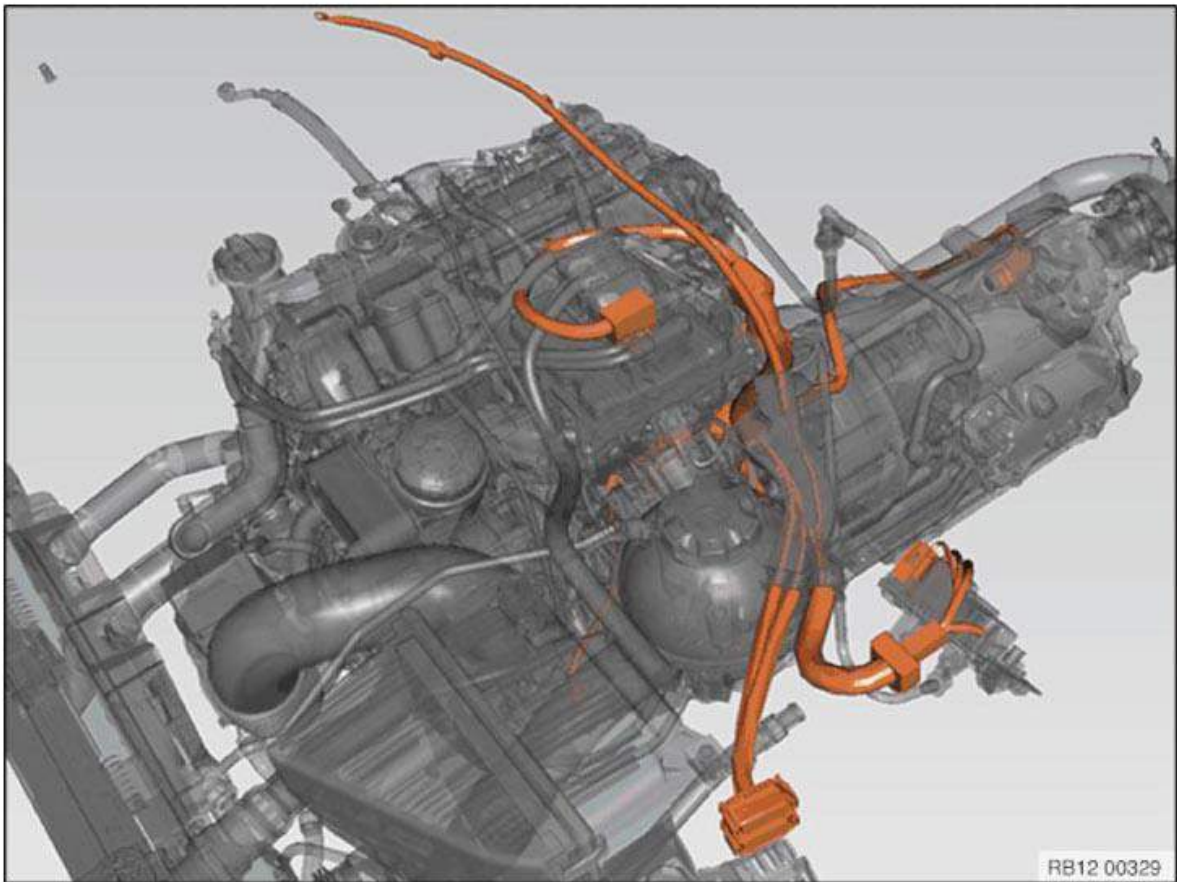


Fig. 149: Overview Of Wiring Harness Section For Engine Transmission Module
 Courtesy of BMW OF NORTH AMERICA, INC.

Overview of wiring harness section for engine transmission module (graphic shows wiring harness for vehicles with automatic transmission and four-wheel drive).

Detach all connectors from Power Distribution Module (1). Release wiring harness from bulkhead.

Disconnect plug connection (2).

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

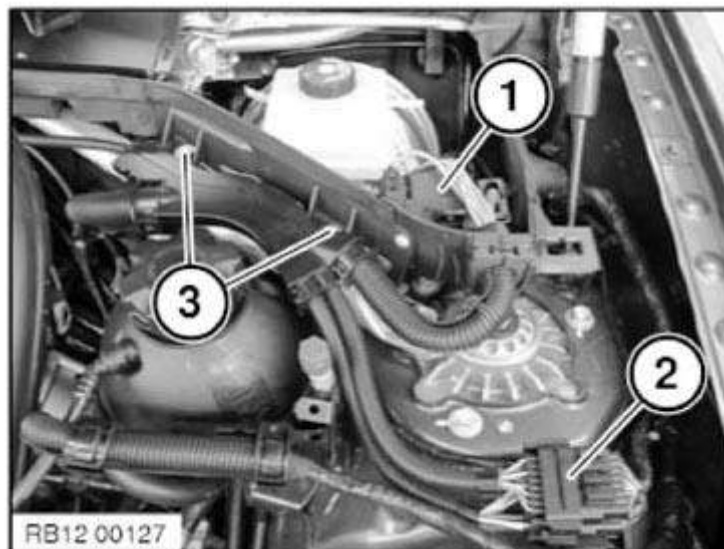


Fig. 150: Identifying Power Distribution Module, Plug Connection And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect following connectors and lines	Â
Unlock and disconnect connector on DME control unit	Â
Unlock connector on air conditioning compressor and disconnect	Â
Unlock connector on starter motor and disconnect	Â
Release ground cable	Â
Release positive wire from bulkhead panel	Â
Unlock and disconnect connector for wiring harness section of engine sensor system module 1	Â
Unlock and disconnect connector on reversing light switch	Manual gearbox only
Unlock connector on transmission and disconnect	Automatic transmission only

Release wiring harness if necessary from existing clips and clamps.

Feed out wiring harness and remove.

Installation note:

Check wiring harness installation arrangement.

Check plug connections for correct fit.

Check stored fault message.

Clear diagnostic fault entries from fault memory.

12 51 215 REPLACING WIRING HARNESS SECTION FOR VALVETRONIC SERVOMOTOR (N20, N26)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)**.

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **ACOUSTIC COVER**

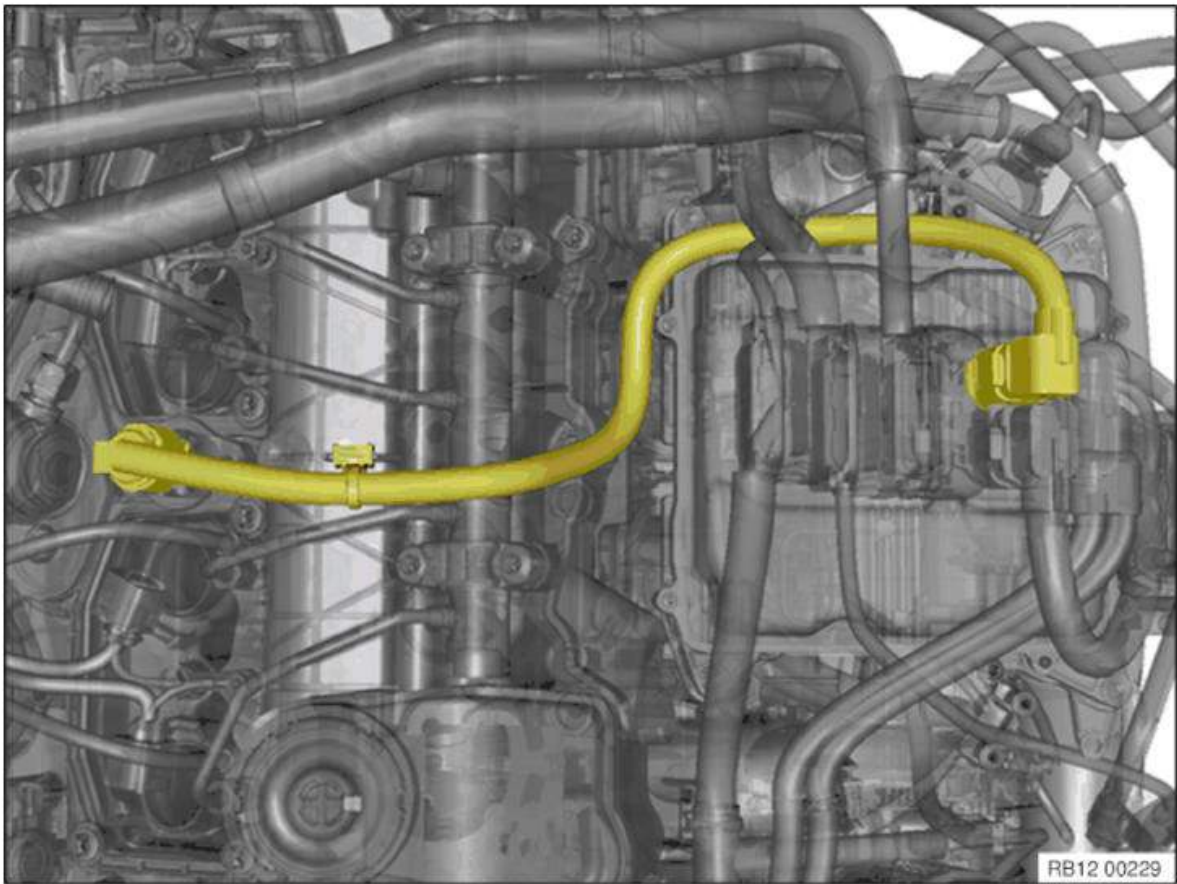


Fig. 151: Identifying Wiring Harness Section For Valvetronic Servomotor On DME Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Undo wiring harness section for Valvetronic servomotor on DME control unit and Valvetronic servomotor and pull off.

Undo, feed out and remove wiring harness section from clamps.

Installation note:

Check wiring harness installation arrangement.

Check plug connections for correct fit.

Check stored fault message.

Clear diagnostic fault entries from fault memory.

12 51 235 REPLACING WIRING HARNESS SECTION FOR ENGINE (N20)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)**.

Necessary preliminary tasks:

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

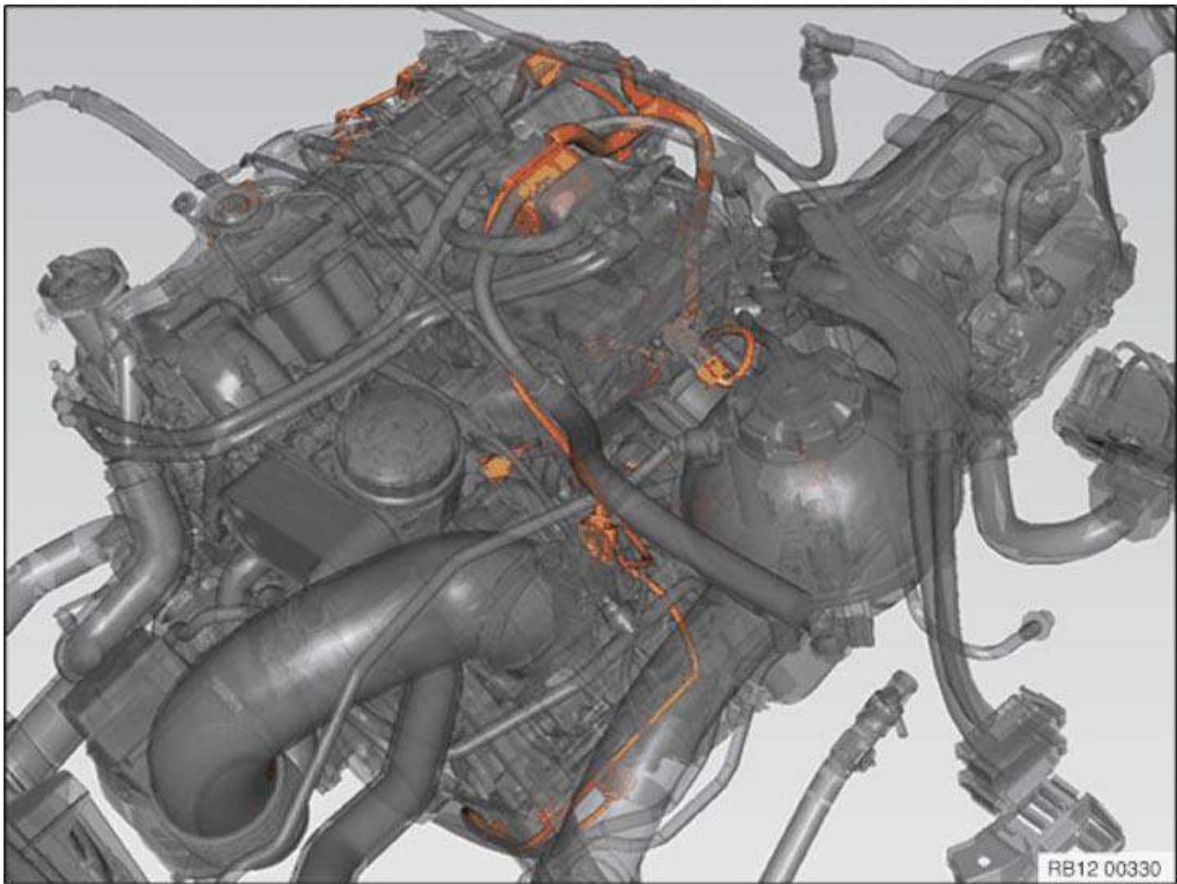


Fig. 152: Overview Of Engine Sensor System Wiring Harness Module 1
Courtesy of BMW OF NORTH AMERICA, INC.

Overview, engine sensor system wiring harness module 1.

Unlock and disconnect following connectors and lines	^
Unlock connector from suction pressure sensor on the intake plenum and disconnect	^
Unlock connector from suction pressure sensor on the pressure pipe and disconnect	^
Unlock connector on throttle body and disconnect	^
Unlock connector on oil level sensor and disconnect	^
Unlock connector on zero-gear sensor and disconnect	Manual gearbox only
Unlock connector on hydraulic valve and disconnect	^
Unlock connector on crankshaft sensor and disconnect	^
Unlock connector on high-pressure fuel sensor and disconnect	^
Unlock connector on oxygen sensor and disconnect	^
Unlock connector on both knock sensors and disconnect	^
Unlock connector on monitoring sensor and disconnect	^
Unlock connector on high pressure pump and disconnect	^
Unlock connector on pressure converter and disconnect	^

Release wiring harness if necessary from existing clips and clamps.

Feed out wiring harness and remove.

Installation note:

Check wiring harness installation arrangement.

Check plug connections for correct fit.

Check stored fault message.

Clear diagnostic fault entries from fault memory.

12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N55)

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

IMPORTANT: Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

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

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)** .

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove sound insulation at the rear of the engine.
- Remove intake **PLENUM** .
- Partially detach **WIRING HARNESS** for injectors and ignition coils.
- Remove **CLEAN AIR PIPE** .
- Remove **FAN COWL** .
- Remove front **UNDERBODY PROTECTION** .

Detach all connectors from Power Distribution Module (1). Release wiring harness from bulkhead.

Disconnect plug connection (2).

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

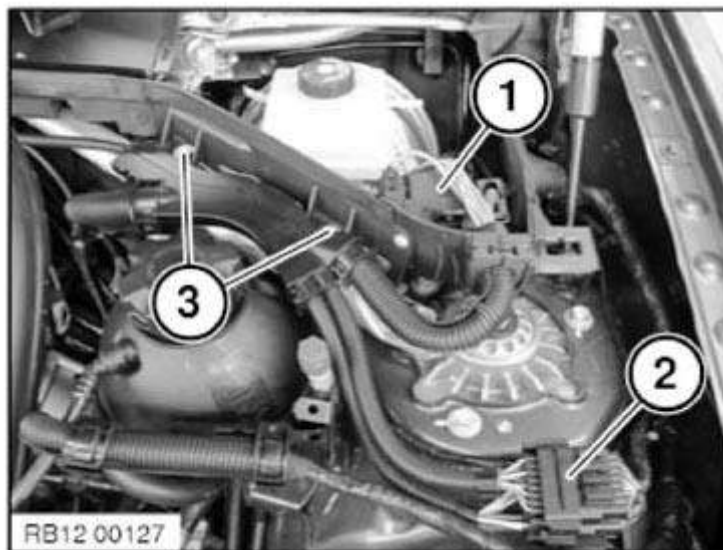


Fig. 153: Identifying Power Distribution Module, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Unclip upper part of cable channel (2) and expose the wiring harnesses.

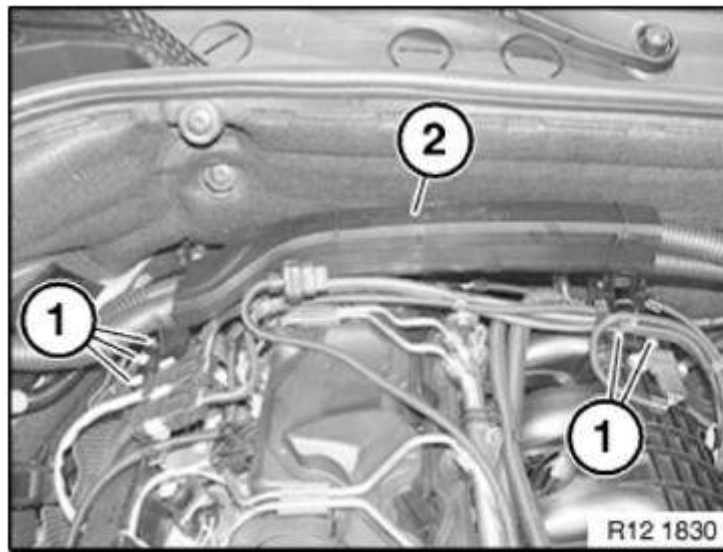


Fig. 154: Identifying Cable Channel And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all connectors (1) from control unit and disconnect.

Installation note:

Make sure grommets are correctly fitted (watertightness).

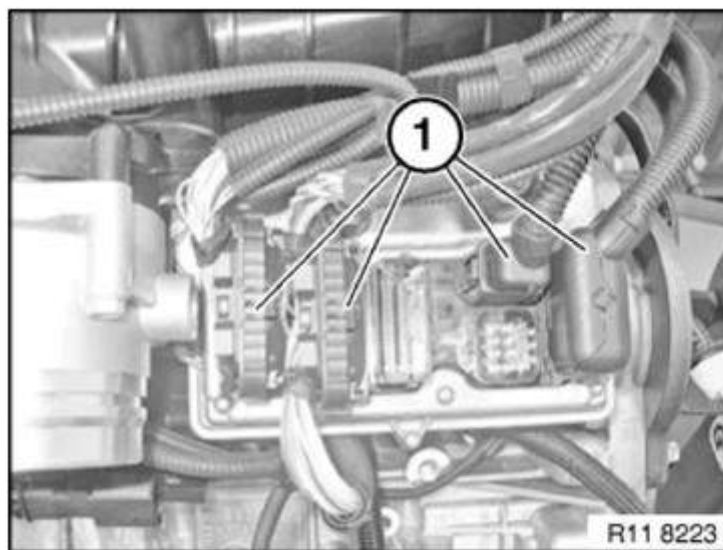


Fig. 155: Identifying Connectors From Control Unit
 Courtesy of BMW OF NORTH AMERICA, INC.

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

Replace aluminum screws.

Tightening torque **13 53 10AZ** .

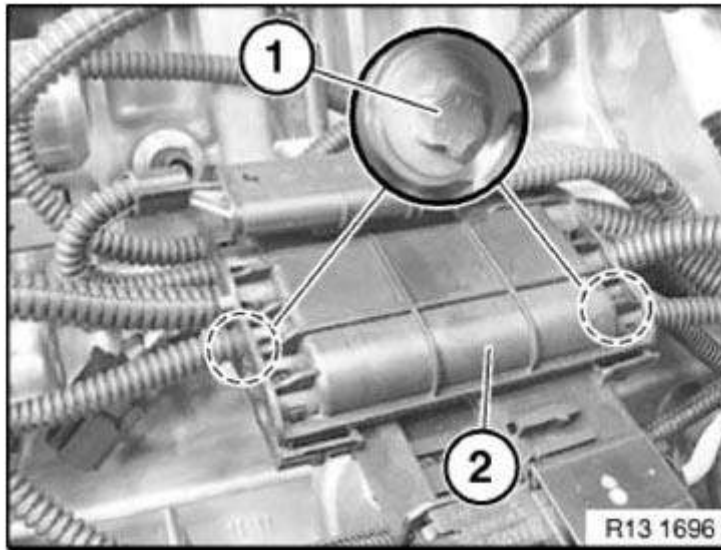


Fig. 156: Identifying Cable Channel And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 90 4Z** .

Release cable channel (2).

Installation note:

Reconnect the earth connection.

Replace aluminum screws.

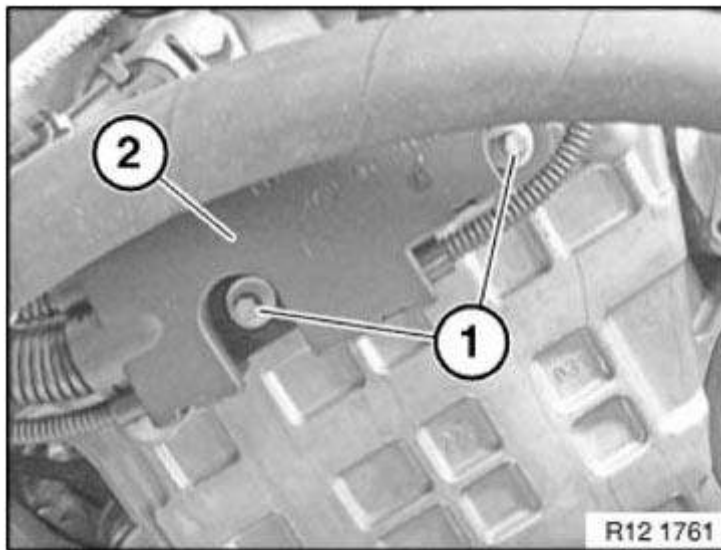


Fig. 157: Identifying Cable Channel And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect following connectors and lines	^
Unlock connector on charging pressure sensor and disconnect	^
Release connector on hot film air mass meter and disconnect	^
Release connector on intake pressure sensor and disconnect	^
Release connector on oxygen sensor and disconnect	^

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

Release wiring harness if necessary from existing clips and clamps.

Feed out wiring harness and remove.

Installation note:

Check wiring harness installation arrangement.

Check plug connections for correct fit.

Check stored fault message.

Delete fault memory.

12 51 210 REPLACING WIRING HARNESS SECTION FOR IGNITION AND INJECTORS (N20)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)** .

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **ACOUSTIC COVER**

- Remove the **PRESSURE CONVERTER** for the exhaust turbocharger

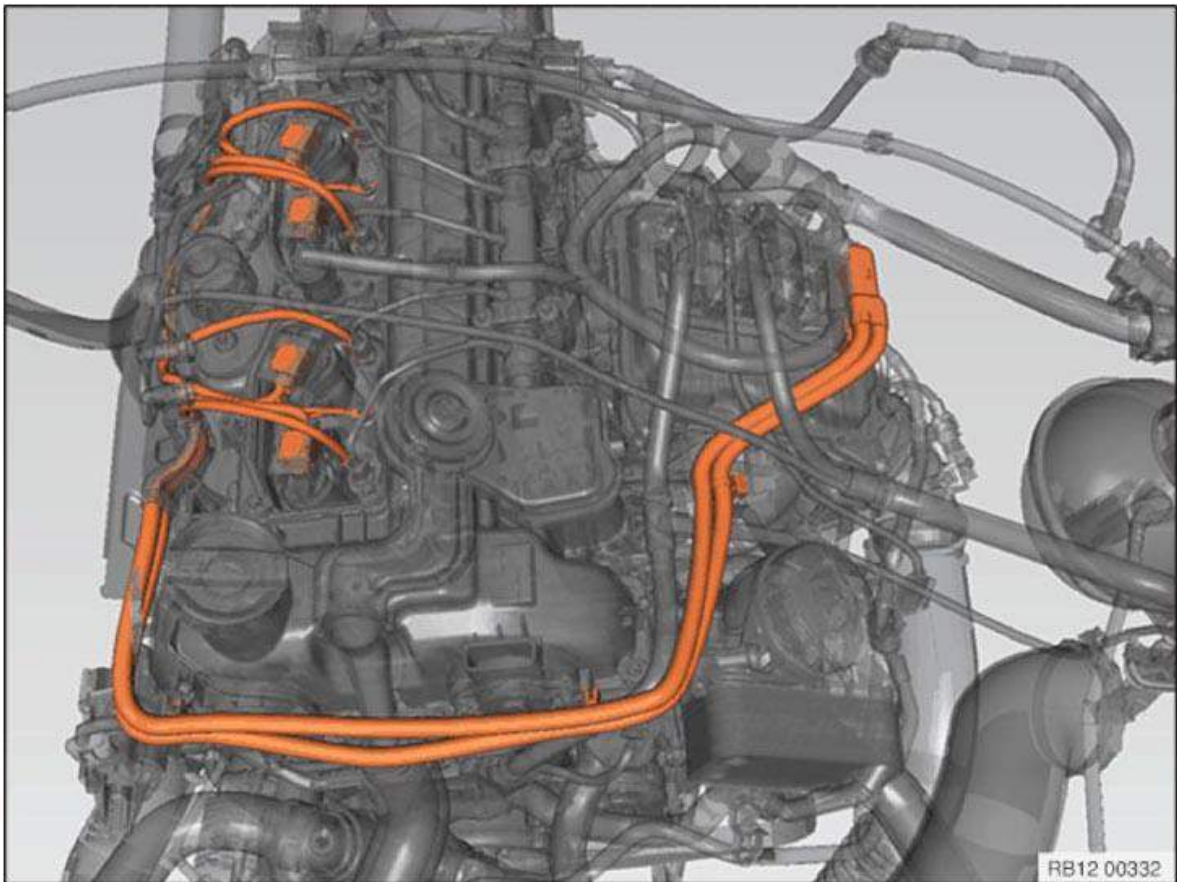


Fig. 158: Overview Of Wiring Harness Section For Ignition And Injectors
Courtesy of BMW OF NORTH AMERICA, INC.

Overview of wiring harness section for ignition and injectors.

Unlock and remove connector (1) from control unit.



Fig. 159: Identifying Connector From Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Release wiring harness from clamps (1).

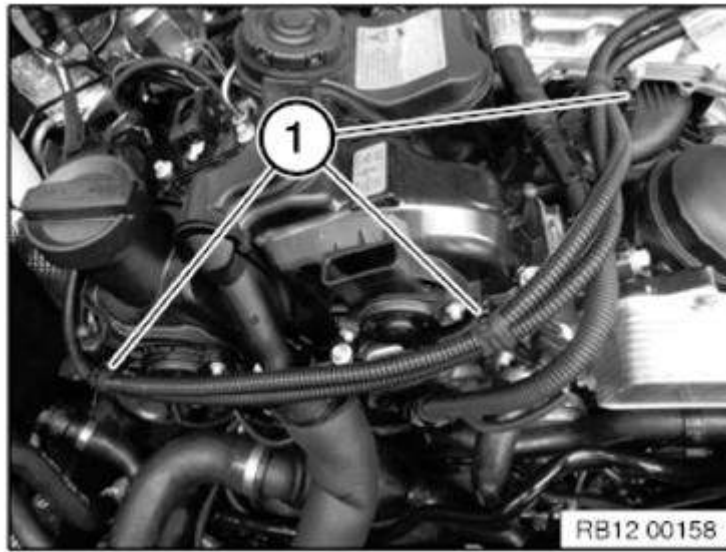


Fig. 160: Identifying Wiring Harness From Clamps

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: This procedure is applicable to all cylinders.

Unlock and disconnect connector (1) at injectors.

Slacken nut (1) and remove ground cable (3).

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

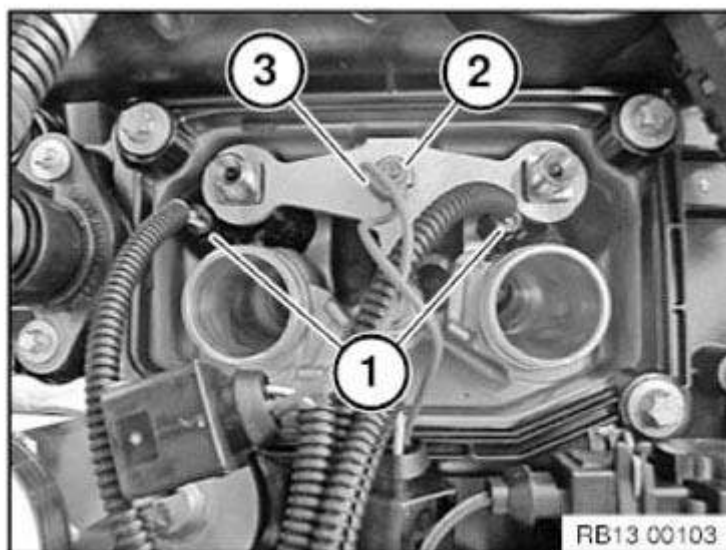


Fig. 161: Identifying Connector, Slacken Nut And Ground Cable

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: This procedure is applicable to all cylinders.

Release connector catch (1) at ignition coil (2) and pull off connector.

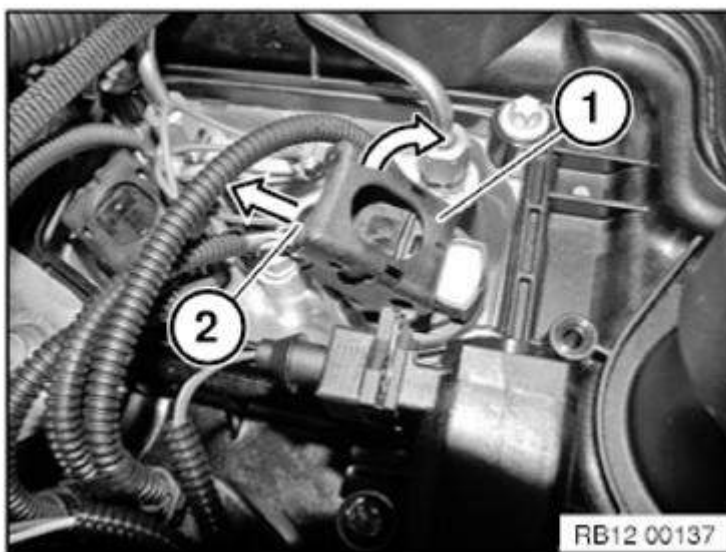


Fig. 162: Pulling Ignition Coil

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining lug (1) in direction of arrow.

Pull cable channel (2) from cylinder head cover.

Pull out and remove wiring harness section for injectors and ignition coils.

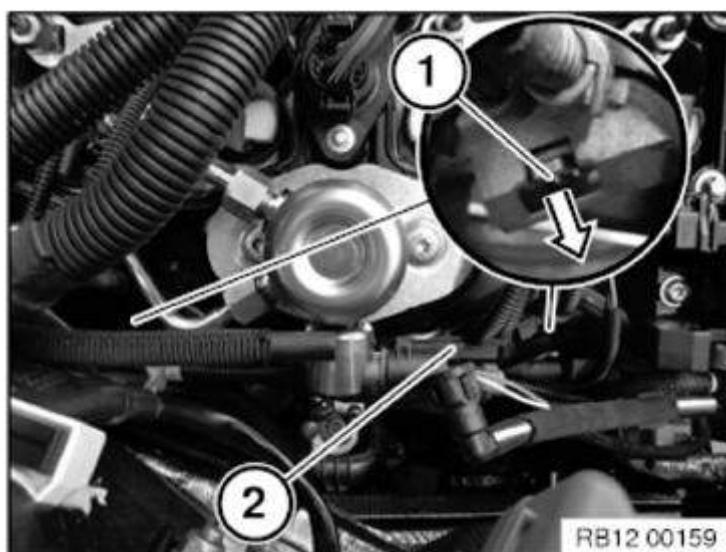


Fig. 163: Pulling Cable Channel

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Clear diagnostic fault entries from fault memory.

12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION AND INJECTORS (N55)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)**.

Necessary preliminary work:

- Read out the fault memory of the DME control unit.

- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD**.
- Remove **IGNITION COIL COVER**.
- Remove **CLEAN AIR PIPE**.
- Remove **REAR IGNITION COIL COVER**.

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

Release rear wiring harness from intake plenum.

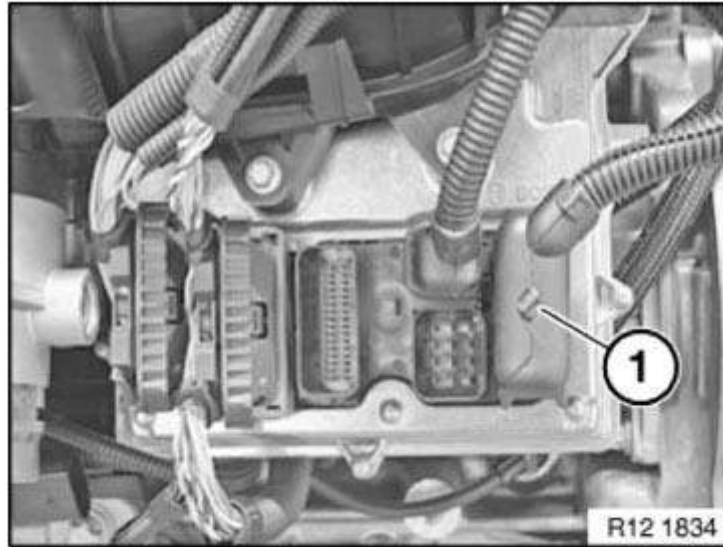


Fig. 164: Identifying Rear Plug From Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and remove earth cable.

Tightening torque **12 90 5AZ**.

Unlock all connectors from ignition coils and injectors and detach.

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

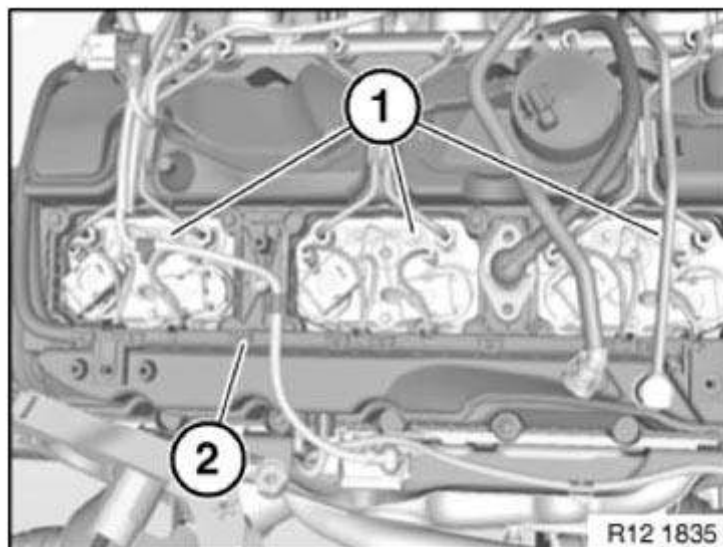


Fig. 165: Identifying Wiring Harness And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Delete fault memory.

OIL PRESSURE/OIL TEMPERATURE/OIL GAUGE

12 61 285 REMOVING AND INSTALLING/REPLACING OIL LEVEL SENSOR FOR ENGINE OIL (N47 D20 O1)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Switch off ignition
- Remove front UNDERBODY PROTECTION .
- Drain ENGINE OIL .

Unlock connector (1) and remove.

Unscrew nuts.

Tightening torque 12 61 2AZ .

Remove oil level sensor (2).

Installation note:

Clean sealing surface on oil sump.

Replace seal on oil level sensor.

An excessively low torque value will result in oil leaks.

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

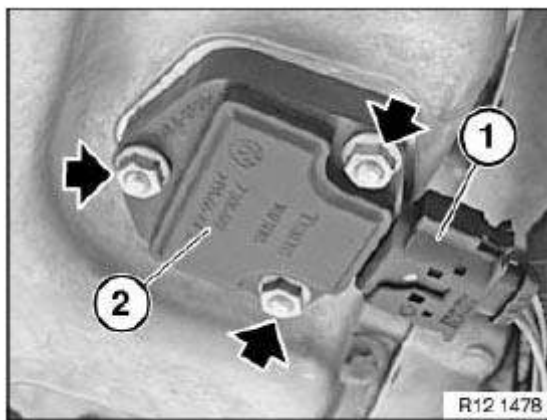


Fig. 166: Identifying Oil Level Sensor And Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Top up engine oil.

NOTE: Check stored fault messages.
Delete fault memory.

12 61 285 REMOVING AND INSTALLING/RENEWING OIL LEVEL SENSOR FOR ENGINE OIL

(N55)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION)** .

Necessary preliminary tasks:

- Switch off ignition.
- Remove **REINFORCEMENT PLATE** .
- Drain **ENGINE OIL** .

Unlock connector (1) and remove.

Unscrew nuts.

Tightening torque **12 61 2AZ** .

Remove oil level sensor (2).

Installation note:

Clean sealing surface on oil sump.

Replace seal on oil level sensor.

An excessively low torque value will result in oil leaks.

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

Top up engine oil.

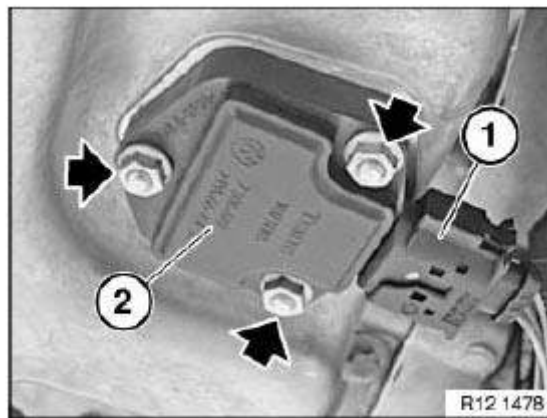


Fig. 167: Identifying Oil Level Sensor And Connector

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 61 588 REMOVING AND INSTALLING/REPLACING ENGINE OIL PRESSURE/TEMPERATURE SENSOR (N20, N26)

Special tools required:

- **34 5 160**

Necessary preliminary tasks:

- Switch off ignition.
- Remove **THROTTLE VALVE ASSEMBLY** .

WARNING: Risk of burning!
Only perform this repair work on an engine that has cooled down.

Unlock connector (1) and remove.

Release engine oil pressure/temperature sensor (2) with special tool **34 5 160** .

Tightening torque **12 61 1AZ** .

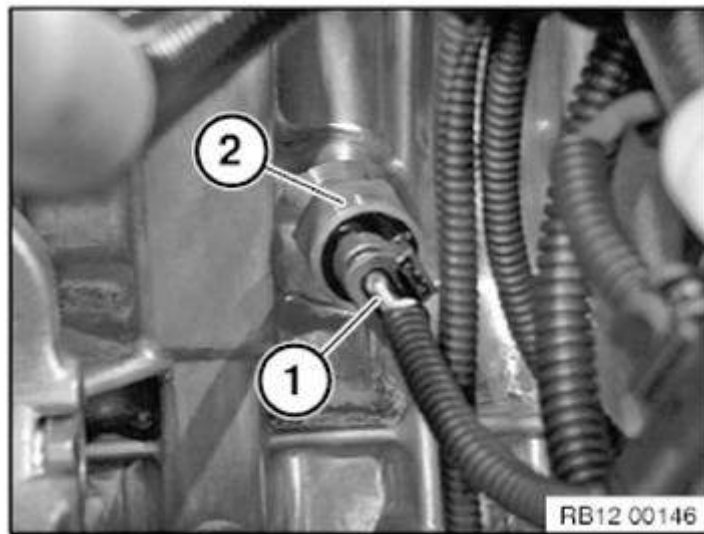


Fig. 168: Identifying Engine Oil Pressure/Temperature Sensor And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle
Check engine oil level. Top up engine oil if necessary.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N52T)

WARNING: Risk of burning!
Only perform this repair work on an engine that has cooled down.

Necessary preliminary work:

- Remove **ACOUSTIC COVER**

Installation location:

Oil filter housing, front left.

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

Release connector (1) and remove.

Release oil pressure sensor (2).

Tightening torque **12 61 2AZ** .

Installation note:

Check oil level, top up engine oil if necessary.

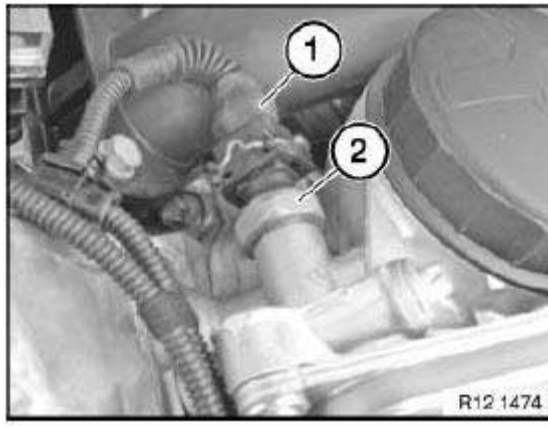


Fig. 169: Identifying Oil Pressure Sensor And Connector

Courtesy of BMW OF NORTH AMERICA, INC.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N55)

Necessary preliminary work:

- Switch off ignition.
- Remove **IGNITION COIL COVER**.

WARNING: Risk of burning!
Only perform this repair work on an engine that has cooled down.

Installation location:

Oil filter housing, front left.

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

Release connector (1) and remove.

Release oil pressure sensor (2).

Tightening torque **12 61 1AZ** .

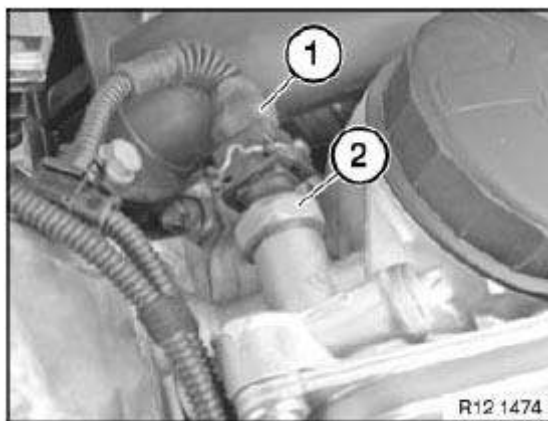


Fig. 170: Identifying Connector And Oil Pressure Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle
Check oil level: Top up engine oil if necessary.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SWITCH (N47 D20 O1)

IMPORTANT: When working on the oil, coolant or fuel circuit, you must protect the alternator against dirt contamination.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary work:

- Remove **INTAKE SILENCER HOUSING** .
- Remove **INTAKE PORT** .
- Remove left **TRAILING LINK** .
- **REMOVE** left partition wall for units compartment.

NOTE: The oil pressure switch is located beneath the high pressure pump.

IMPORTANT: A small amount of engine oil emerges when oil pressure switch is removed.

Have a cleaning cloth ready.

Release connector and remove.

Release oil pressure switch.

Installation note:

Replace sealing ring.

Tightening torque **12 61 1AZ** .

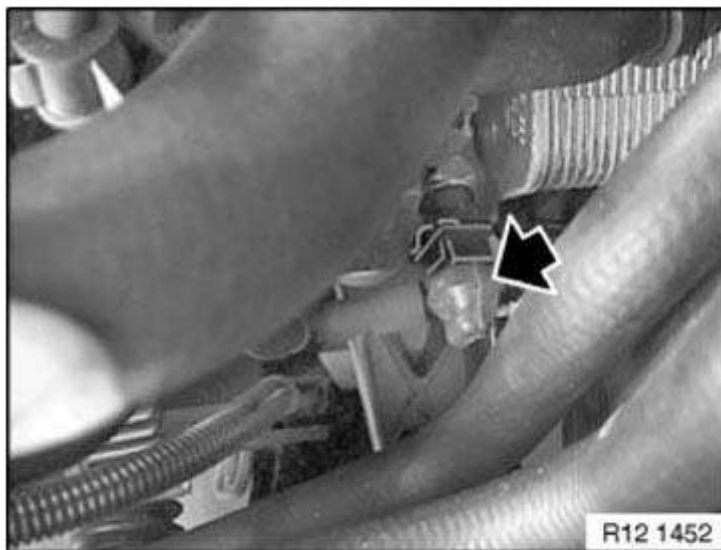


Fig. 171: Locating Oil Pressure Switch

Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

Check engine oil level.

12 61 285 REPLACING ENGINE OIL LEVEL SENSOR (N52T)

IMPORTANT: Read and comply with notes on **PROTECTION AGAINST ELECTROSTATIC**

DISCHARGE (ESD PROTECTION) .

Necessary preliminary work:

- Switch off ignition.
- Remove REINFORCEMENT PLATE .
- Drain ENGINE OIL .

Release connector (1) and remove.

Unscrew nuts.

Tightening torque 12 61 2AZ .

Remove oil level sensor (2).

Installation note:

Clean sealing surface on oil sump.

Replace gasket on oil level sensor.

An excessively low torque value will result in oil leaks.

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

Top up engine oil.

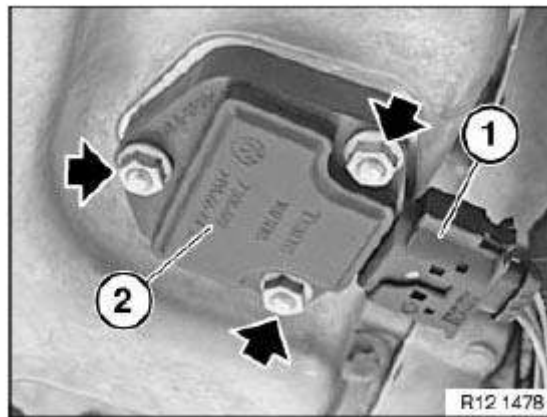


Fig. 172: Locating Oil Level Sensor Nut

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

SWITCHES AND RELAYS

12 63 586 REPLACING POWER DISTRIBUTION MODULE (N20, N52T, N55)

Necessary preliminary tasks:

- Switch off ignition.
- Disconnect BATTERY NEGATIVE LEAD .
- Remove left service flap on cowl panel cover.

Unlock and pull off all connectors (1) from power distribution module.

Remove cover (2).

Release nut beneath it and set positive battery cable aside.

Release lock (3).

Feed out and remove power distribution module in upward direction.

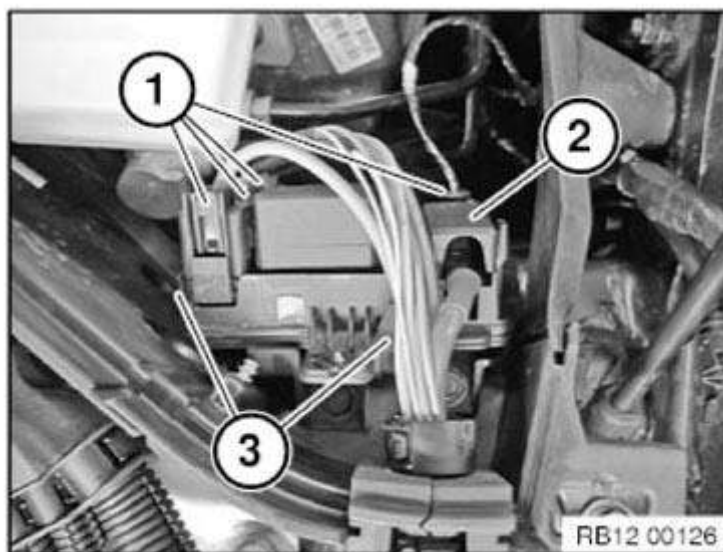


Fig. 173: Identifying Connectors, Cover And Lock Of Power Distribution Module
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

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Article GUID: A00702198

ENGINE

Engine Electrical System - Special Tools - F25

ENGINE ELECTRICAL SYSTEM

0491161 ADAPTER

0491161 127041 Adapter MP

NOTE: (Single adapter (8 pieces)) Deletion, only available via tool set

Storage Location

K 104

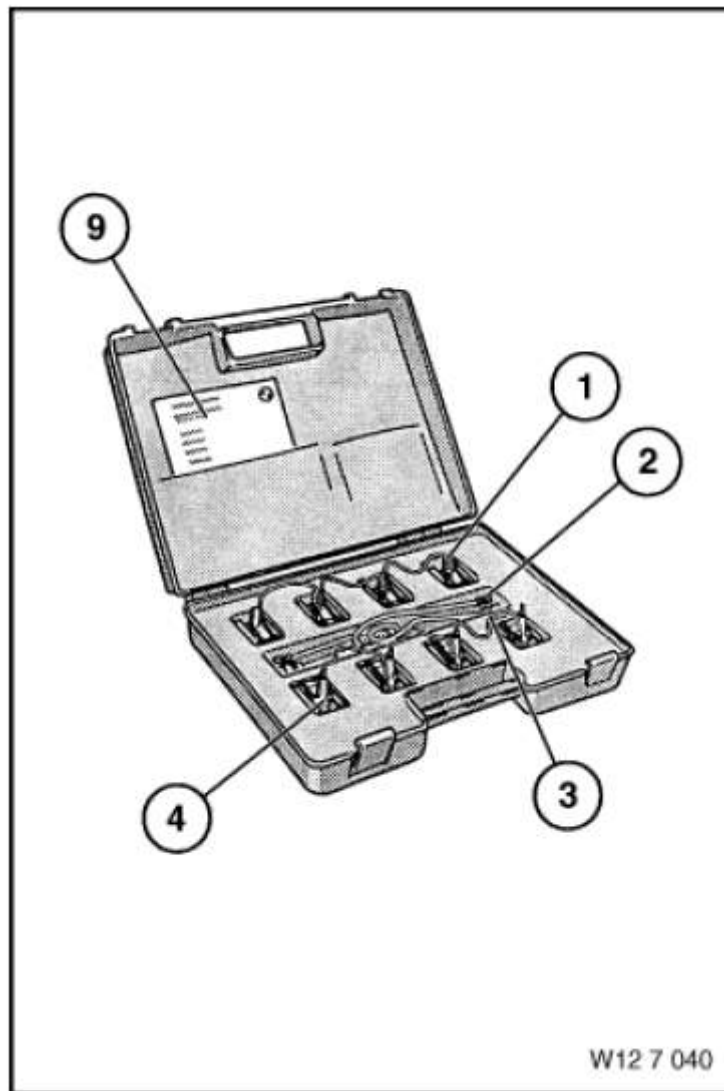


Fig. 1: Identifying Adapter (0491161)

Courtesy of BMW OF NORTH AMERICA, INC.

0491158 ADAPTER

0491158 127030 Adapter AM

NOTE: For measuring secondary voltage during static ignition distribution

Storage Location

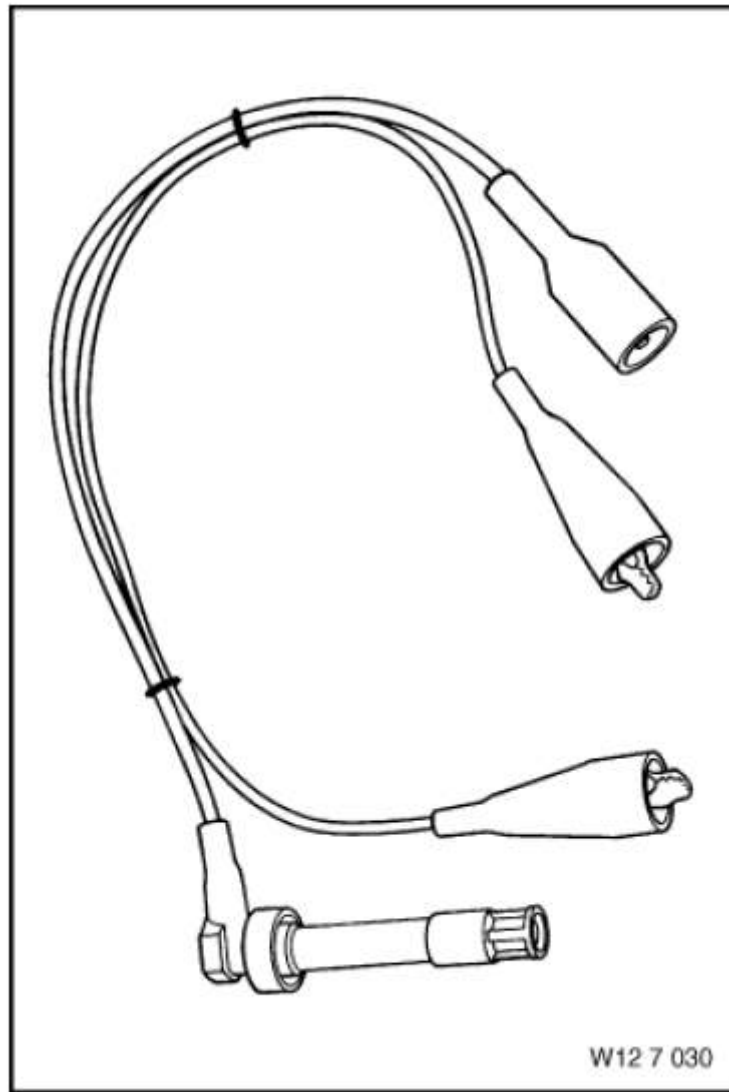
I 110

SI number

02 04 91 (321)

Consisting of:

9 = 0491159 Operating instructions



cardiagn.com

Fig. 2: Identifying Adapter (0491158)

Courtesy of BMW OF NORTH AMERICA, INC.

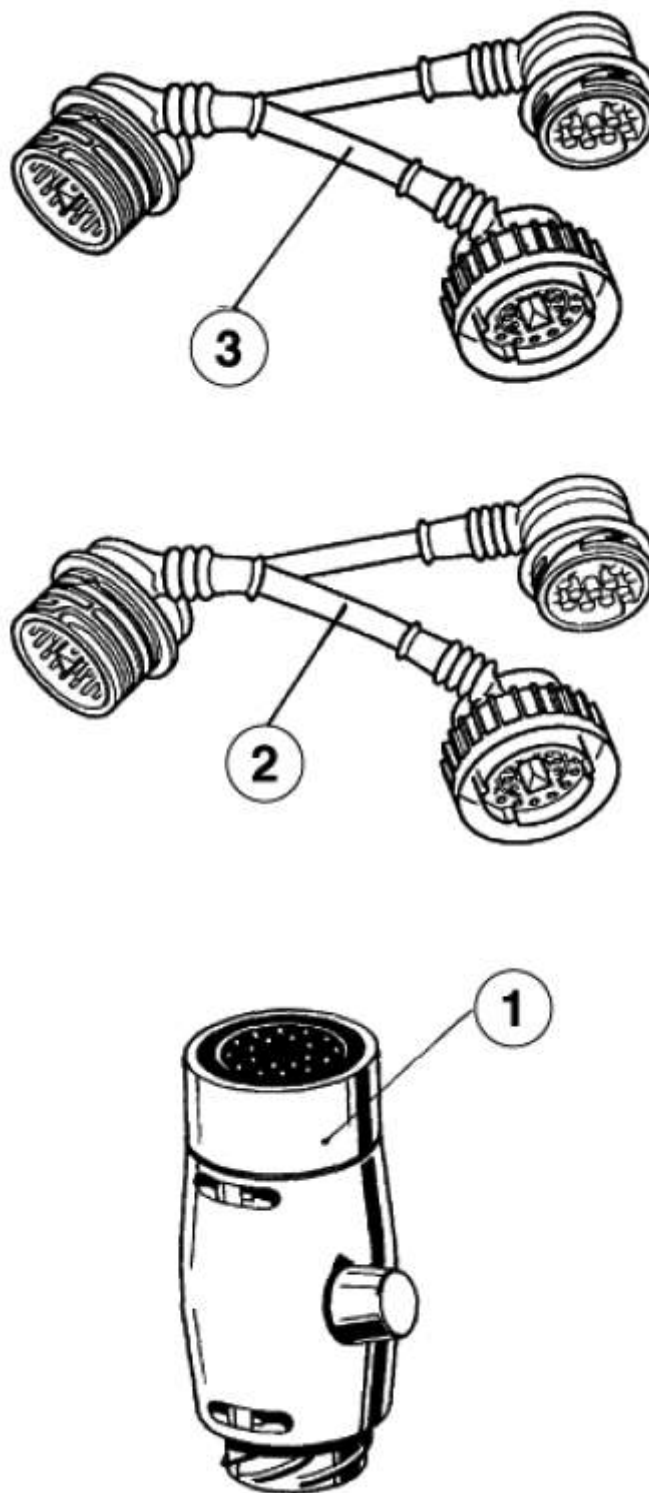
0491152 ADAPTER

0491152 127011 Adapter AM

NOTE: (Electronic engine power control adapter) For checking of electronic engine power control safety circuit with 20-pin engine connector

Storage Location

H 106



W12 7 010

Fig. 3: Identifying Adapter (0491152)

Courtesy of BMW OF NORTH AMERICA, INC.

0491160 ADAPTER

0491160 127040 Adapter MP

NOTE: (Adapter kit) For measuring secondary voltage during static ignition distribution

Storage Location

02 06 92 (548)

Consisting of:

6 = [0493911](#) Plate

NOTE: (Adapter plate) For engines with ignition coil block for measuring secondary voltage Deletion, only available via tool set

9 = [0491161](#) Adapter

NOTE: (Single adapter (8 pieces)) Deletion, only available via tool set

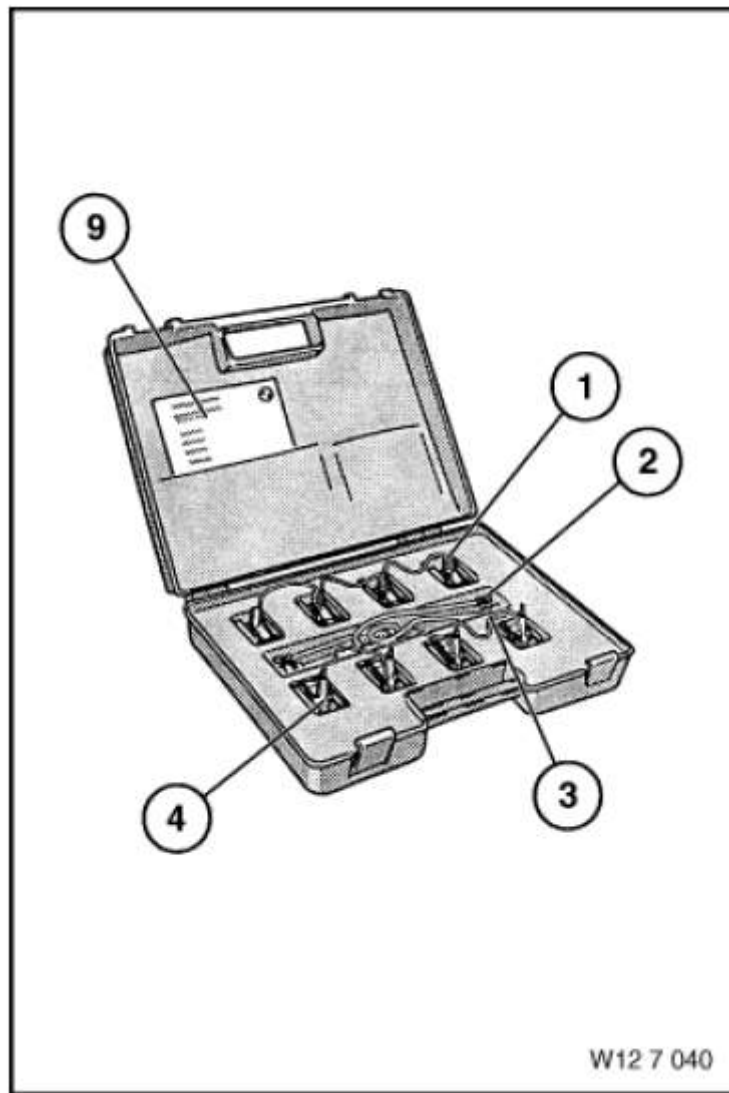


Fig. 4: Identifying Adapter (0491160)

Courtesy of BMW OF NORTH AMERICA, INC.

9 = [0491162](#) Cable

NOTE: (Cable) For BMW SERVICE TEST Deletion, only available via tool set

9 = [0491163](#) Cable

NOTE: (Cable) Consisting of 7 individual cables Deletion, only available via tool set

9 = **0491164** Clamp

NOTE: (Clamp) 8 pieces For ignition coils - engine: M43, M44 Deletion, only available via tool set

9 = **0491165** Operating instructions

0496727 ADAPTER

0496727 127123 Adapter AM

NOTE: Adapter with multiple serrations (from 08/2009 as replacement for 12 7 121)

Storage Location

A49



Fig. 5: Identifying Adapter (0496727)

Courtesy of BMW OF NORTH AMERICA, INC.

0491146 ADAPTER

0491146 125460 Adapter Mechanical tool

NOTE: (Test adapter 35-pin) Universal wiring harness test adapter

0491156 ADAPTER

0491156 127020 Adapter MP

NOTE: For measuring primary voltage during static ignition distribution

Storage Location

H 103

SI number

02 01 90 (155)

Consisting of:

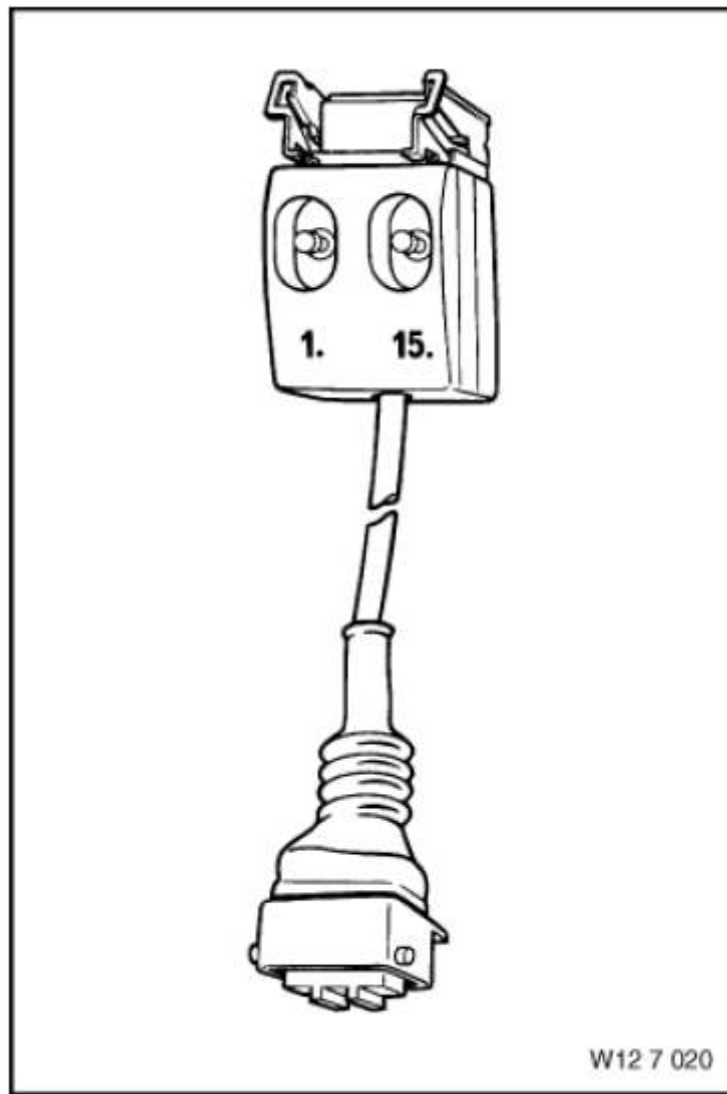


Fig. 6: Identifying Adapter (0491156)

Courtesy of BMW OF NORTH AMERICA, INC.

0491134 ADAPTER

0491134 121300 Adapter MP

NOTE: (Adapter kit) For 134-pin module connector For diagnosis and troubleshooting in Digital Motor Electronics and transmission control unit - from model year 98

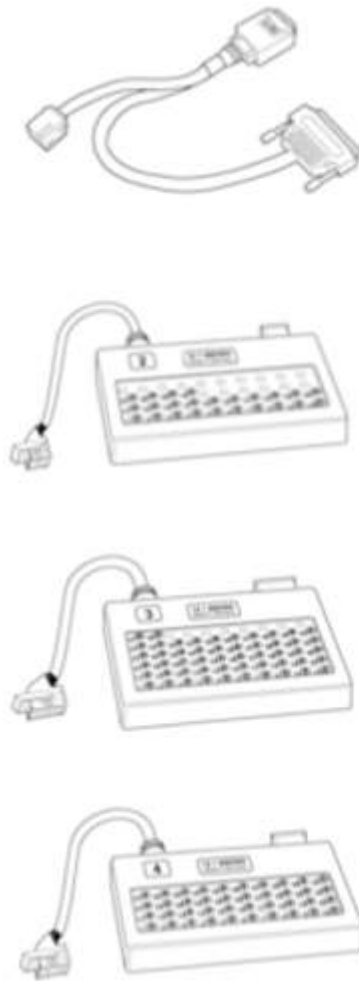
SI number

02 04 97 (248)

Consisting of:

4 = [0495069](#) Cap

NOTE: (Zero-encoded protective cap for test box, 52-pin (12 1300/304)) New connector in E61/E61/E63 and E64 on SGM control unit protective cap 12 1300/305 for diagnosis on wiring harness. From 08/2004 protective cap will be supplied with test box.



W12 1 300

Fig. 7: Identifying Adapter (0491134)

Courtesy of BMW OF NORTH AMERICA, INC.

2 = **0491135** Adapter cable

NOTE: (Adapter cable) 9-pin

2 = **0491136** Measuring module

NOTE: (Measuring module) 24-pin

2 = **0491137** Measuring module

NOTE: (Measuring module) 40-pin

2 = **0491138** Measuring module

NOTE: (Measuring module) 52-pin Delivered from 08/2004 in combination with 12 1 305 (zero-encoded protective cap for new SGM control unit in E6x).

0491200 ADAPTER

0491200 128000 Adapter Mechanical tool

NOTE: (Test adapter, 56-pin) For checking the engine wiring harness on compressed natural gas vehicles

Storage Location

W 2..

SI number

01 14 95 (014)

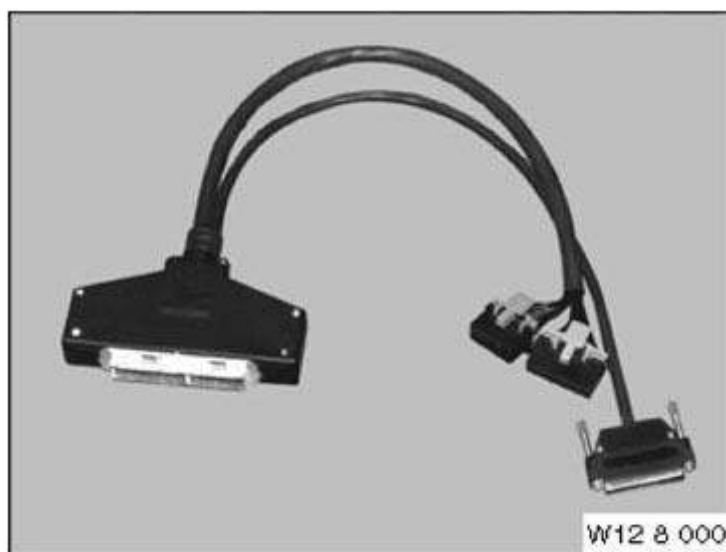


Fig. 8: Identifying Adapter (0491200)

Courtesy of BMW OF NORTH AMERICA, INC.

0491201 ADAPTER

0491201 128010 Adapter Mechanical tool

NOTE: (plug adapter for CNG wiring harness) For reducing the gas pressure in the CNG system

Storage Location

W 2..

SI number

01 14 95 (014)



Fig. 9: Identifying Adapter (0491201)

Courtesy of BMW OF NORTH AMERICA, INC.

0494146 ADAPTER CABLE

0494146 127420 Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: (V adapter cable set 58-pin) For diagnosis and troubleshooting on Digital Diesel Electronics 5.0 04/04 control unit; encoding with special probe (002250) removed - for N46, N52 and S85 engines. Set 12 7 420 consisting of 12 7 421 adapter cable and 12 7 422 cover plate 05/2004 set modification SI 2 03 04 (106)

Storage Location

Q204

SI number

02 05 01 (479)

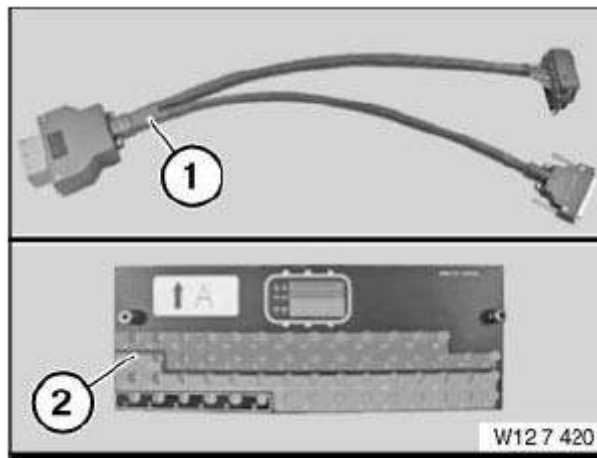


Fig. 10: Identifying Adapter Cable (0494146)

Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1. **0494963** Adapter cable

NOTE: (Adapter cable 58-pin) Only available as part of complete special tool set 12 7 420 (83 30 0 494 146).

2. **0494964** Plate

NOTE: (Cover plate for test box) For pin allocation on 105-pin test box (61 4 380)

0492732 ADAPTER CABLE

0492732 611216 Adapter cable AM

NOTE: For ignition timing simulator 12 1 460. Miscellaneous: USA only

Storage Location

W 2..

0491135 ADAPTER CABLE

0491135 121301 Adapter cable MP

NOTE: (Adapter cable) 9-pin

Storage Location

N201

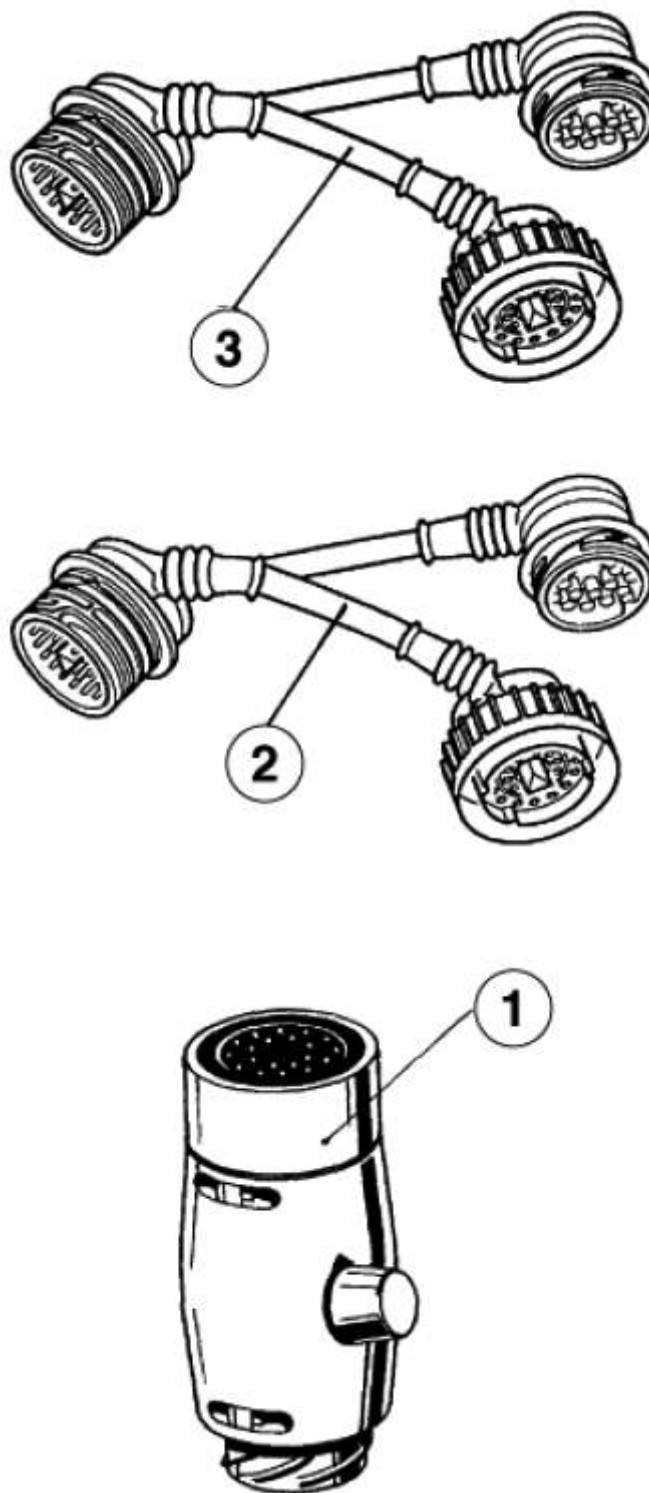
0491154 ADAPTER CABLE

0491154 127013 Adapter cable AM

NOTE: (Adapter cable 25-pin) For checking/encoding B of electronic engine power control safety circuit - model series: E31/engine: M70

Storage Location

H 102



W12 7 010

Fig. 11: Identifying Adapter Cable (0491154)
 Courtesy of BMW OF NORTH AMERICA, INC.

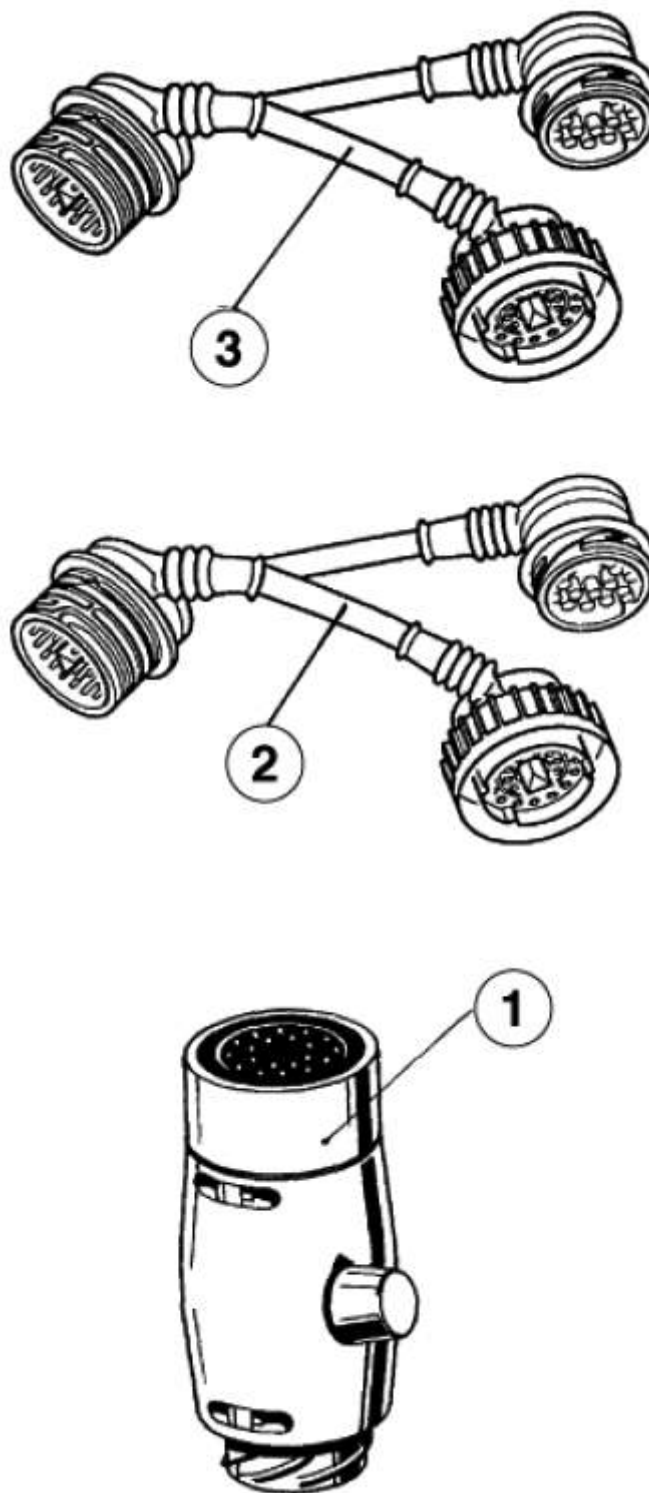
0491153 ADAPTER CABLE

0491153 127012 Adapter cable AM

NOTE: (Adapter cable, 25-pin) Encoding A

Storage Location

H 102



W12 7 010

Fig. 12: Identifying Adapter Cable (0491153)
Courtesy of BMW OF NORTH AMERICA, INC.

0494383 ADAPTER CABLE

0494383 127050 Adapter cable MP

NOTE: For engines with rod-type ignition coils for measuring secondary voltage

Storage Location

SI number

02 01 01 (671)

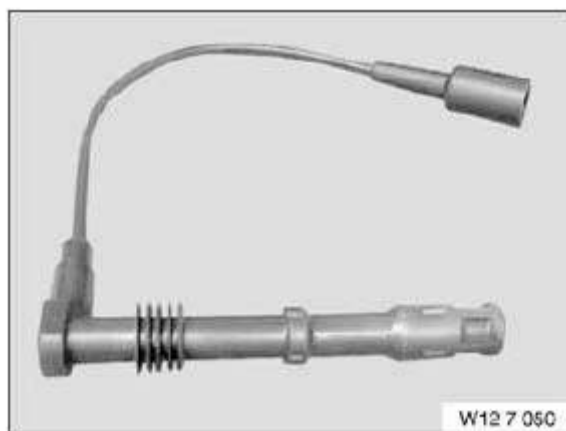


Fig. 13: Identifying Adapter Cable (0494383)

Courtesy of BMW OF NORTH AMERICA, INC.

0494145 ADAPTER CABLE

0494145 127410 Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: (V adapter cable 96-pin) For diagnosis and troubleshooting on DDE 5.0 control unit

Storage Location

Q 203

SI number

02 05 01 (479)

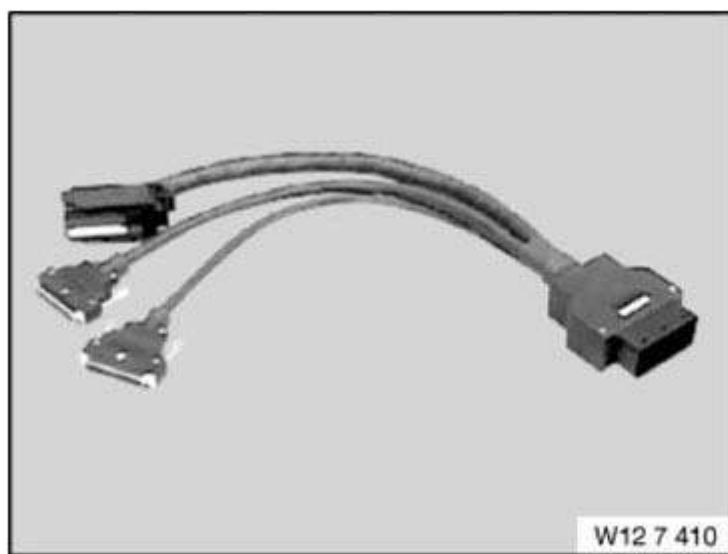


Fig. 14: Identifying Adapter Cable (0494145)

Courtesy of BMW OF NORTH AMERICA, INC.

0491149 ADAPTER CABLE

0491149 126411 Adapter cable MP

NOTE: (Adapter cable with diode) For reverse polarity protected connection to a 12 volt-voltage source Engine: M50, M52, S62, S54. Only available as part of complete tool set 12 6 410 - (83 30 0 491 148).

Storage Location

F107



Fig. 15: Identifying Adapter Cable (0491149)
Courtesy of BMW OF NORTH AMERICA, INC.

0494963 ADAPTER CABLE

0494963 127421 Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: (Adapter cable 58-pin) Only available as part of complete special tool set 12 7 420 (83 30 0 494 146).

Storage Location

Q204

SI number

02 03 04 (106)

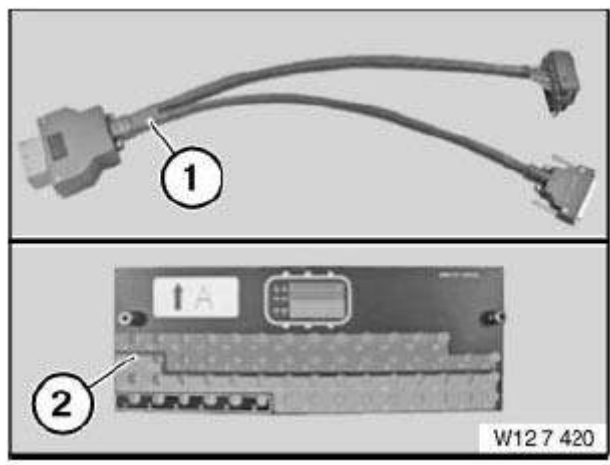


Fig. 16: Identifying Adapter Cable (0494963)
Courtesy of BMW OF NORTH AMERICA, INC.

0493915 ADAPTER CABLE

0493915 127300 Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: (V adapter cable, 9-pin) For diagnosis and troubleshooting on both sensors (VVT control unit)

Storage Location

Q207

SI number

02 02 01 (695)

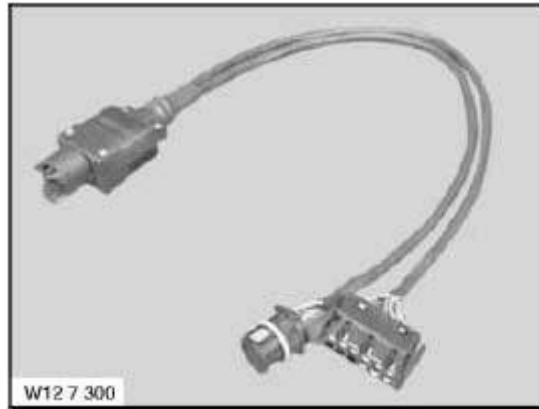


Fig. 17: Identifying Adapter Cable (0493915)
Courtesy of BMW OF NORTH AMERICA, INC.

0491148 ADAPTER CABLE

0491148 126410 Adapter cable MP

NOTE: (Adapter cable and switching device) For external activation of VANOS unit during installation and for function check of shift valve

SI number

01 08 92 (555)

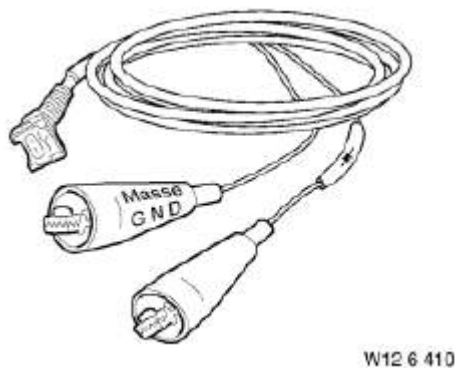


Fig. 18: Identifying Adapter Cable (0491148)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

3 = **0493625** Guard

NOTE: (Reverse polarity protection) Retrofit kit with reverse polarity protection diode for installation into adapter cable 12 6 411, to adjust it to

performance data of switching device 12 6 050. Identification: Red heat-shrink tubing Only available as part of complete tool set 12 6 410 - (83 30 0 491 148).

2 = **0491149** Adapter cable

NOTE: (Adapter cable with diode) For reverse polarity protected connection to a 12 volt-voltage source Engine: M50, M52, S62, S54. Only available as part of complete tool set 12 6 410 - (83 30 0 491 148).

2 = **0491150** Measuring device

NOTE: (Switching device with cable connection) Engine: S50B32. Only available as part of complete tool set 12 6 410 (83 30 0 491 148).

0491177 ANTISTATIC MAT

0491177 127192 Antistatic mat AM

Replaced by: 83300495054

NOTE: (Antistatic mat) Is replaced by main number 12 7 060.

0491145 BOLT

0491145 124010 Bolt Mechanical tool

NOTE: (Adjusting bolt) For adjusting the circuit board switch on the DME control unit

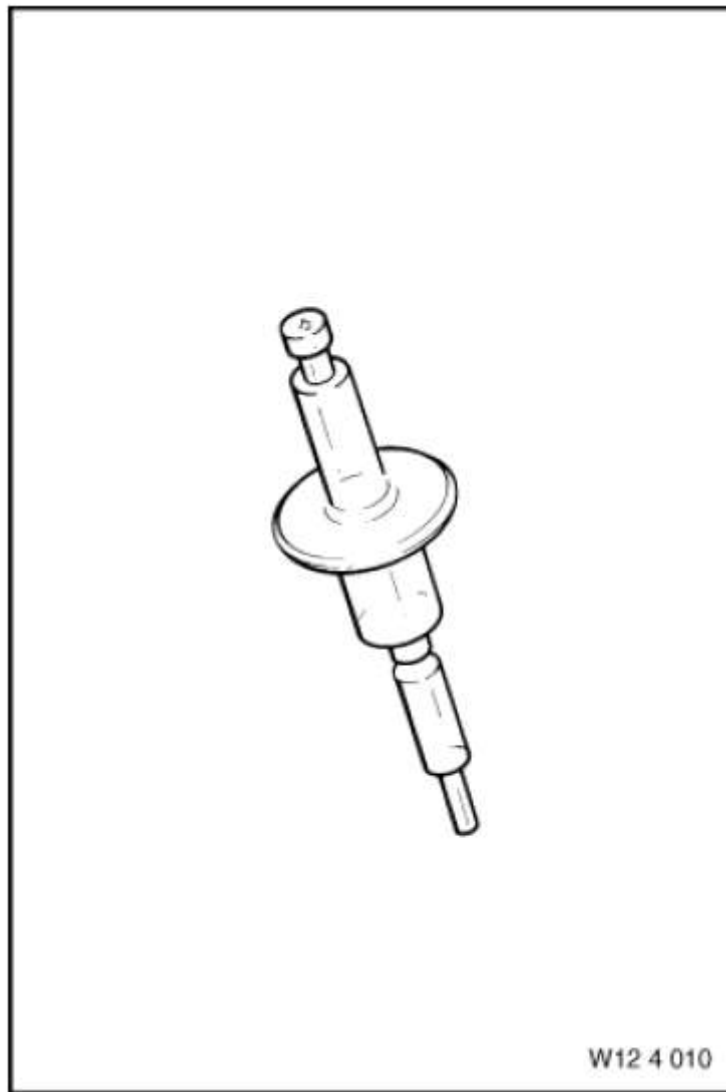


Fig. 19: Identifying Bolt (0491145)

Courtesy of BMW OF NORTH AMERICA, INC.

0491162 CABLE

0491162 127042 Cable MP

NOTE: (Cable) For BMW SERVICE TEST Deletion, only available via tool set

Storage Location

K 104

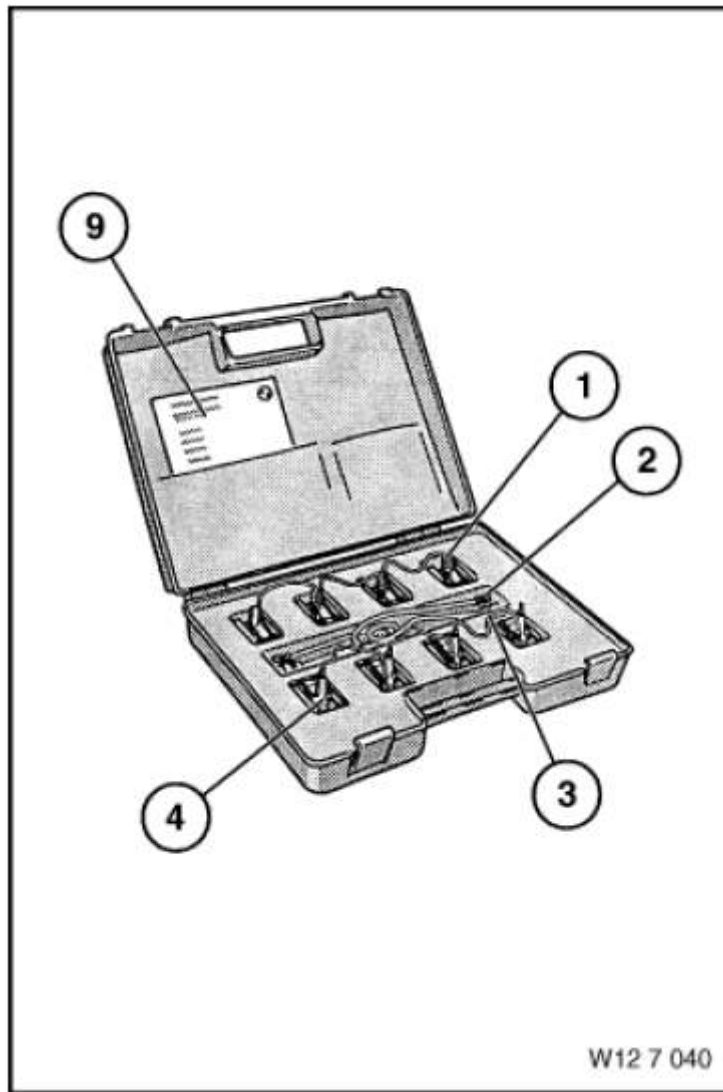


Fig. 20: Identifying Cable (0491162)

Courtesy of BMW OF NORTH AMERICA, INC.

0491163 CABLE

0491163 127043 Cable MP

NOTE: (Cable) Consisting of 7 individual cables Deletion, only available via tool set

Storage Location

K 104

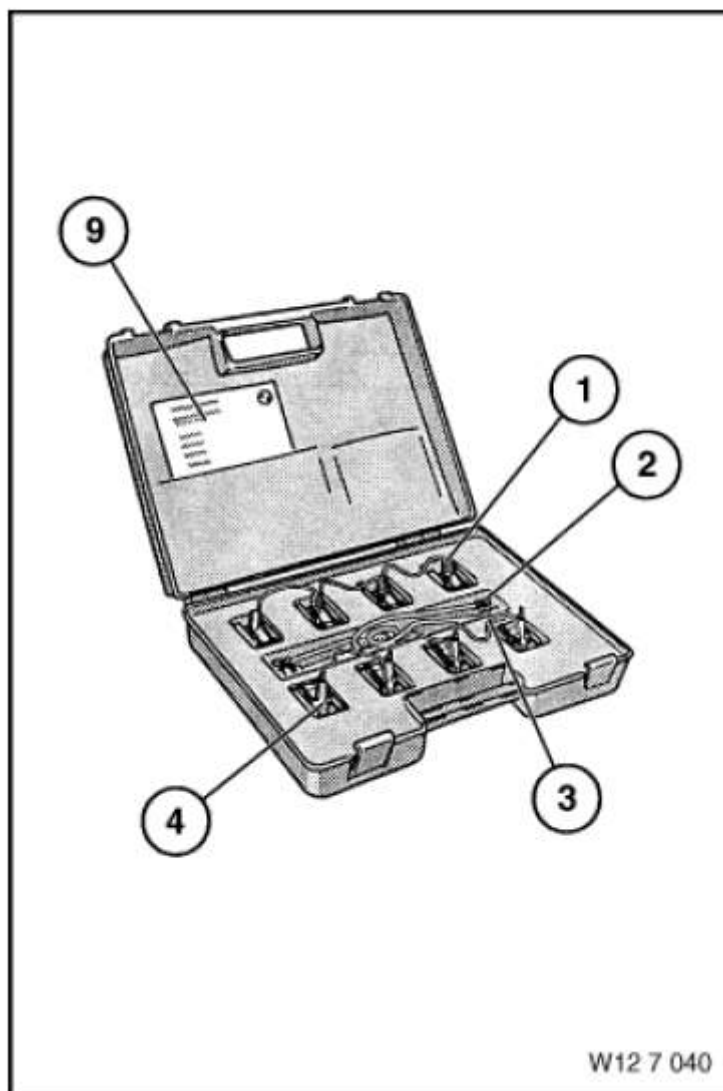


Fig. 21: Identifying Cable (0491163)

Courtesy of BMW OF NORTH AMERICA, INC.

0495069 CAP

0495069 121305 Cap MP

NOTE: (Zero-encoded protective cap for test box, 52-pin (12 1300/304)) New connector in E61/E61/E63 and E64 on SGM control unit protective cap 12 1 300/305 for diagnosis on wiring harness. From 08/2004 protective cap will be supplied with test box.

SI number

02 07 04 (138)

0491197 CASE

0491197 127229 Case AM

NOTE: (Case)

0491164 CLAMP

0491164 127045 Clamp MP

NOTE: (Clamp) 8 pieces For ignition coils - engine: M43, M44 Deletion, only available

via tool set

Storage Location

K 104

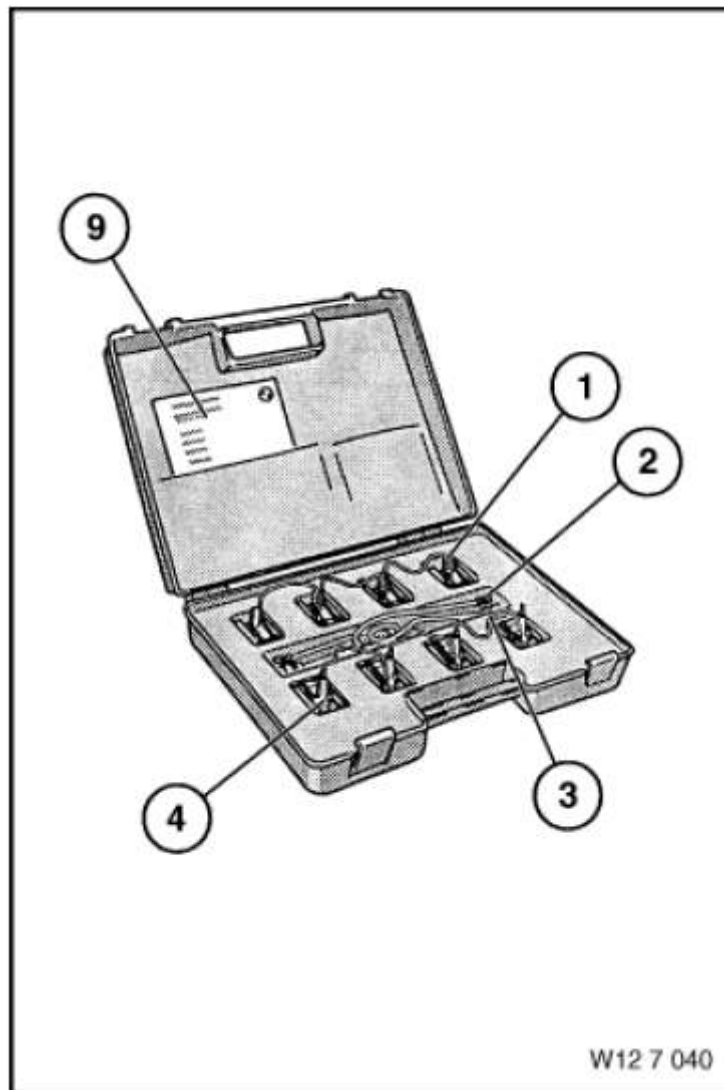


Fig. 22: Identifying Clamp (0491164)

Courtesy of BMW OF NORTH AMERICA, INC.

0491125 DEVICE

0491125 121130 Device Mechanical tool

NOTE: (Turning device) for ignition distributors - H. Korner

0491126 DEVICE

0491126 121150 Device Mechanical tool

NOTE: (retainer) For holding the ignition distributor during removal of the cotter pin on the distributor pinion

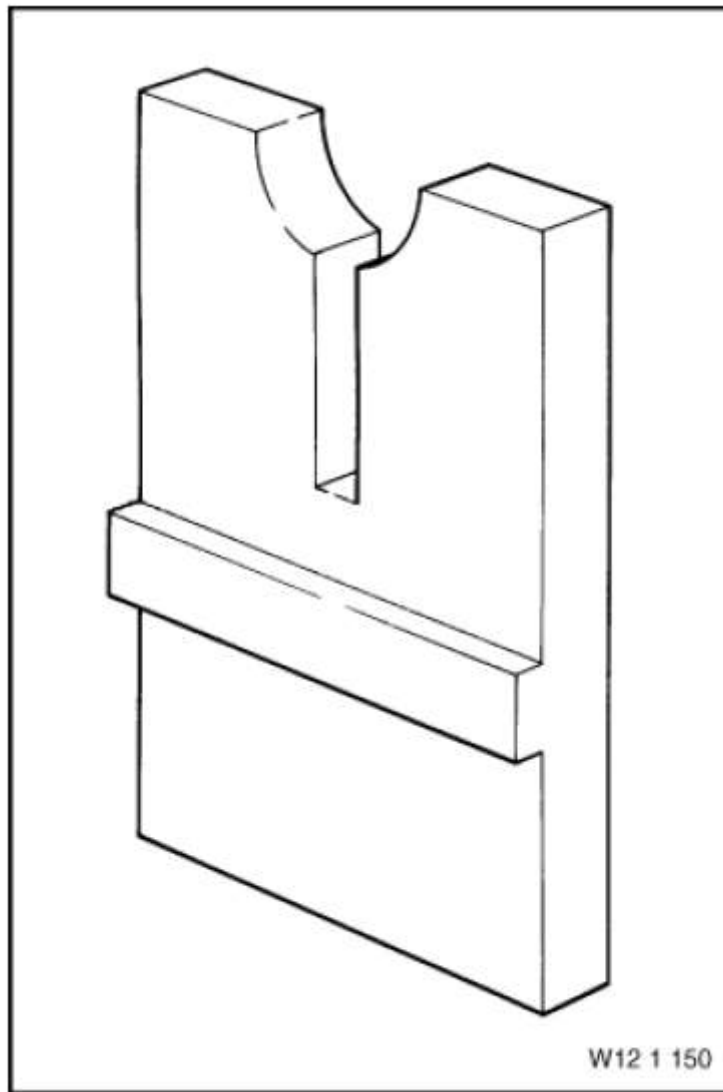


Fig. 23: Identifying Device (0491126)

Courtesy of BMW OF NORTH AMERICA, INC.

0491118 DIE-PLATE

0491118 121083 Die-plate AM

NOTE: (set of dies) Cable 4 mm² /ignition lead

Storage Location

K 103



W12 1 080

Fig. 24: Identifying Die-Plate (0491118)

Courtesy of BMW OF NORTH AMERICA, INC.

0491192 EPROM

0491192 127224 EPROM AM

0491188 EPROM

0491188 127220 EPROM AM

NOTE: (Eprom set)

Consisting of:

1. 0491189 EPROM

NOTE: (Eprom 128 K-type)

2. 0491190 EPROM

NOTE: (Eprom 256 K-type)

3. 0491191 EPROM

4. 0491192 EPROM

5. 0491193 EPROM

6. 0491194 EPROM

7. 0491195 EPROM

8. 0491196 EPROM

9. 0491197 Case

NOTE: (Case)

0491190 EPROM

0491190 127222 EPROM AM

NOTE: (Eprom 256 K-type)

0491189 EPROM

0491189 127221 EPROM AM

NOTE: (Eprom 128 K-type)

0491196 EPROM

0491196 127228 EPROM AM

0491195 EPROM

0491195 127227 EPROM AM

0491191 EPROM

0491191 127223 EPROM AM

0491193 EPROM

0491193 127225 EPROM AM

0491194 EPROM

0491194 127226 EPROM AM

0491174 ELECTRONICS BOX

0491174 127180 Electronics box Mechanical tool

NOTE: (Eprom deletion unit)

0491173 ELECTRONICS BOX

0491173 127170 Electronics box Mechanical tool

NOTE: (Eprom programming system)

0496065 FITTING AID

0496065 121230 Fitting aid Mechanical tool

NOTE: Fitting aid for spark plug installation. Original BERU ZMH 001 rubber hose 0 890 00 001.

SI number

01 04 07 (352)

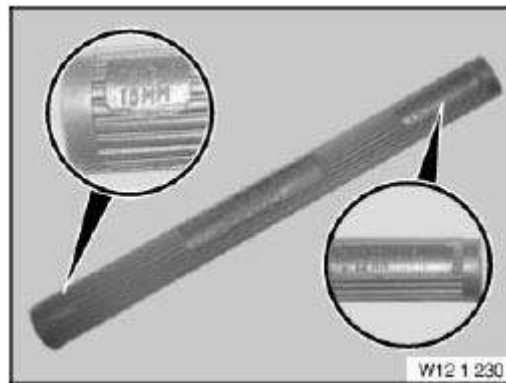


Fig. 25: Identifying Fitting Aid (0496065)

Courtesy of BMW OF NORTH AMERICA, INC.

0491124 FORK

0491124 121100 Fork Mechanical tool

NOTE: (Removal fork) For pressing vacuum hose off vacuum units of ignition distributors and carburetor

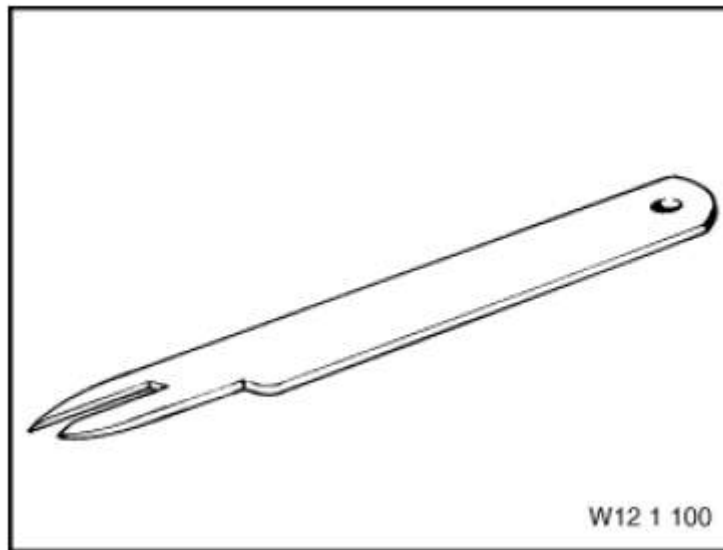


Fig. 26: Identifying Fork (0491124)

Courtesy of BMW OF NORTH AMERICA, INC.

0491166 GAUGE

0491166 127100 Gauge Mechanical tool

NOTE: (Gauge for pedal sensor)

Storage Location

Y3

SI number

01 04 87 (780)

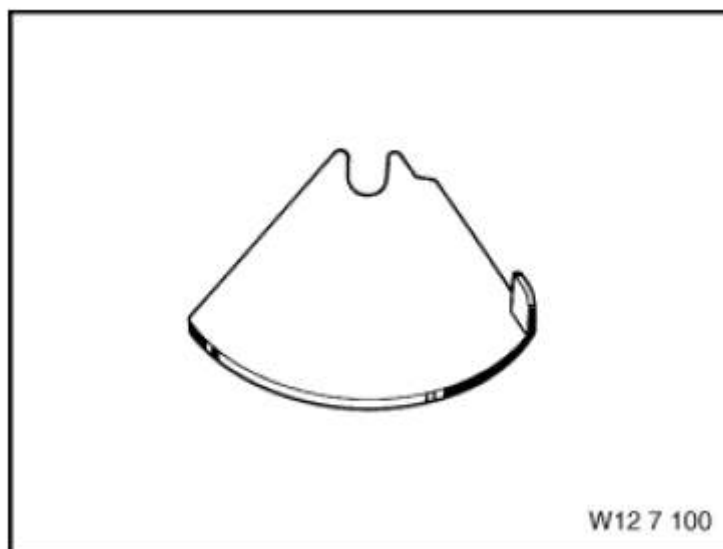


Fig. 27: Identifying Gauge (0491166)

Courtesy of BMW OF NORTH AMERICA, INC.

0491199 GAUGE

0491199 127400 Gauge Mechanical tool

NOTE: (Test gauge) for wiring harness, pedal sensor

0491120 GUARD

0491120 121087 Guard AM

NOTE: (Protective gloves)



W12 1 080

Fig. 28: Identifying Guard (0491120)

Courtesy of BMW OF NORTH AMERICA, INC.

0493625 GUARD

0493625 126413 Guard MP

NOTE: (Reverse polarity protection) Retrofit kit with reverse polarity protection diode for installation into adapter cable 12 6 411, to adjust it to performance data of switching device 12 6 050. Identification: Red heat-shrink tubing Only available as part of complete tool set 12 6 410 - (83 30 0 491 148).

0495431 GUARD

0495431 121097 Guard AM

NOTE: (Protective gloves)

0494846 HOLDER

0494846 127120 Holder AM

NOTE: (Counter support for alternator with freewheel) Counter support for alternator with freewheel N42 engine (with external serrations)/from 08/2009, 12 7 121 will be replaced by 12 7 123

Storage Location

A49

SI number

01 28 03 (051)



Fig. 29: Identifying Holder (0494846)

Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1. **0494856** Holder

NOTE: (Brace wrench) Alternator, N42 engine Replaced by 12 7 123 (0 496 727)

2. **0494857** Socket wrench

NOTE: For screw with internal serrations (Hazet 8808 lg10)

3. **0496727** Adapter

NOTE: Adapter with multiple serrations (from 08/2009 as replacement for 12 7 121)

0494856 HOLDER

0494856 127121 Holder AM

Replaced by: 83300496727

NOTE: (Brace wrench) Alternator, N42 engine Replaced by 12 7 123 (0 496 727)

Storage Location

A49

0491119 HOLDING SLEEVE

0491119 121086 Holding sleeve AM

NOTE: (Assembly sleeve)

Storage Location

K 103



W12 1 080

Fig. 30: Identifying Holding Sleeve (0491119)

Courtesy of BMW OF NORTH AMERICA, INC.

0491186 LABELS

0491186 127211 Labels AM

NOTE: (Official marks)

0491178 LABELS

0491178 127193 Labels AM

NOTE: (Eprom label)

0491185 LABELS

0491185 127210 Labels AM

NOTE: (Control unit sealer)

Storage Location

J 106

Consisting of:

1. **0491186** Labels

NOTE: (Official marks)

2. **0491187** Pliers

NOTE: (Punch pliers) For official mark dating

0491182 LEVER

0491182 127202 Lever AM

NOTE: For bending the sheet metal tabs

0493902 LEVER

0493902 121120 Lever Mechanical tool

NOTE: For unlocking the plug connector on the fuel injectors

Storage Location

B42

SI number

01 15 00 (609)

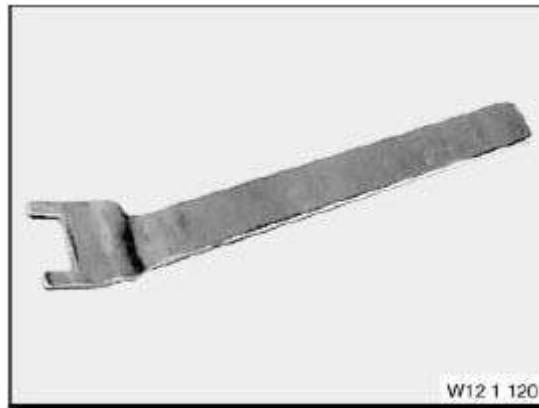


Fig. 31: Identifying Lever (0493902)

Courtesy of BMW OF NORTH AMERICA, INC.

0491121 LUBRICANT

0491121 121088 Lubricant AM

NOTE:

(Lubricant) sale of existing inventory and then to be ordered with 83 19 2 208 609 - silicone spray

Storage Location

K 103



Fig. 32: Identifying Lubricant (0491121)

Courtesy of BMW OF NORTH AMERICA, INC.

0491150 MEASURING DEVICE

0491150 126412 Measuring device MP

NOTE:

(Switching device with cable connection) Engine: S50B32. Only available as part of complete tool set 12 6 410 (83 30 0 491 148).

Storage Location

H 103

0493429 MEASURING DEVICE

0493429 126050 Measuring device MP

NOTE: (Device) For activating solenoid valves of VANOS unit

Storage Location

H 103

SI number

01 01 99 (416)

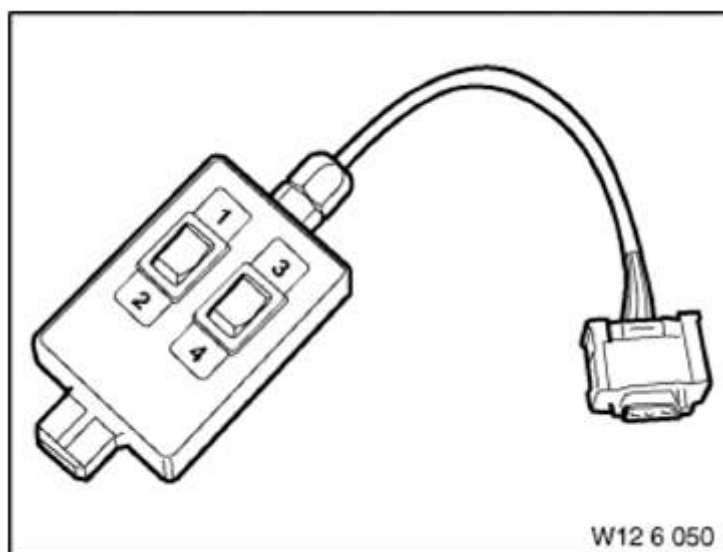


Fig. 33: Identifying Measuring Device (0493429)
Courtesy of BMW OF NORTH AMERICA, INC.

0491147 MEASURING DEVICE

0491147 126400 Measuring device Mechanical tool

NOTE: (Device) mixture controlling device (integrator) for checking of mixture adjustment - oxygen=1. Other: only Japan and USA, tool is discontinued.

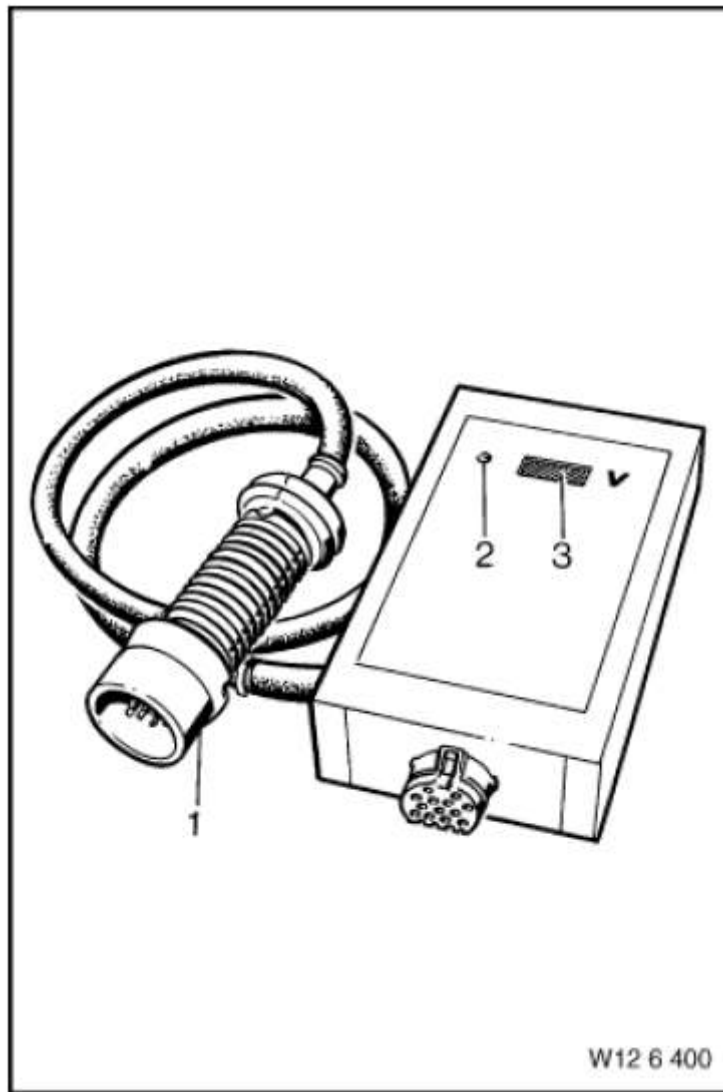


Fig. 34: Identifying Measuring Device (0491147)
Courtesy of BMW OF NORTH AMERICA, INC.

0491139 MEASURING DEVICE

0491139 121400 Measuring device Mechanical tool

NOTE: (TDC sensor)

Storage Location

W 2..

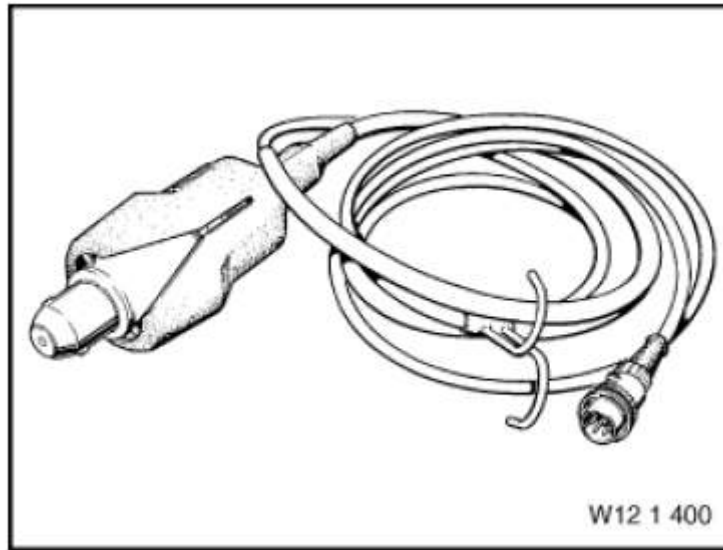


Fig. 35: Identifying Measuring Device (0491139)
Courtesy of BMW OF NORTH AMERICA, INC.

0491136 MEASURING MODULE

0491136 121302 Measuring module MP

NOTE: (Measuring module) 24-pin

Storage Location

N 202

0491138 MEASURING MODULE

0491138 121304 Measuring module MP

NOTE: (Measuring module) 52-pin Delivered from 08/2004 in combination with 12 1 305 (zero-encoded protective cap for new SGM control unit in E6x).

Storage Location

N204

0491137 MEASURING MODULE

0491137 121303 Measuring module MP

NOTE: (Measuring module) 40-pin

Storage Location

N 203

2184136 MOBILE EQUIPMENT TABLE LIFT

2184136 Mobile equipment table lift Mechanical tool

NOTE: Table lift Gruse MHT 1200

SI number

06 01 10 (649)

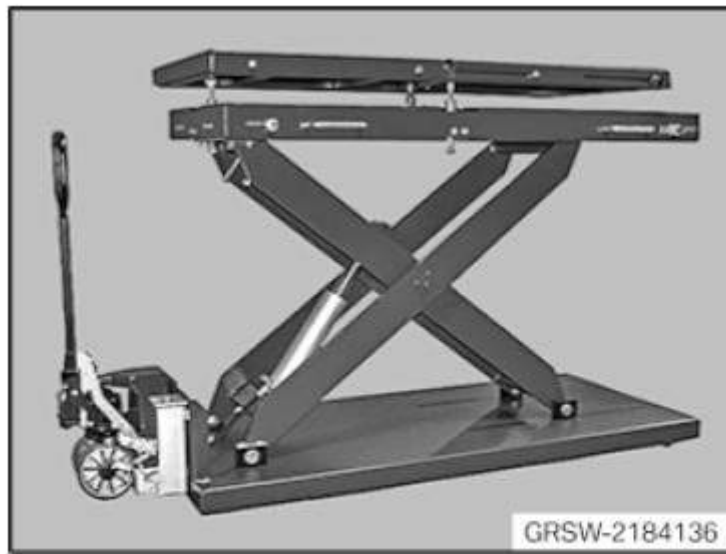


Fig. 36: Identifying Mobile Equipment Table Lift (2184136)
Courtesy of BMW OF NORTH AMERICA, INC.

0491159 OPERATING INSTRUCTIONS

0491159 127039 Operating instructions AM

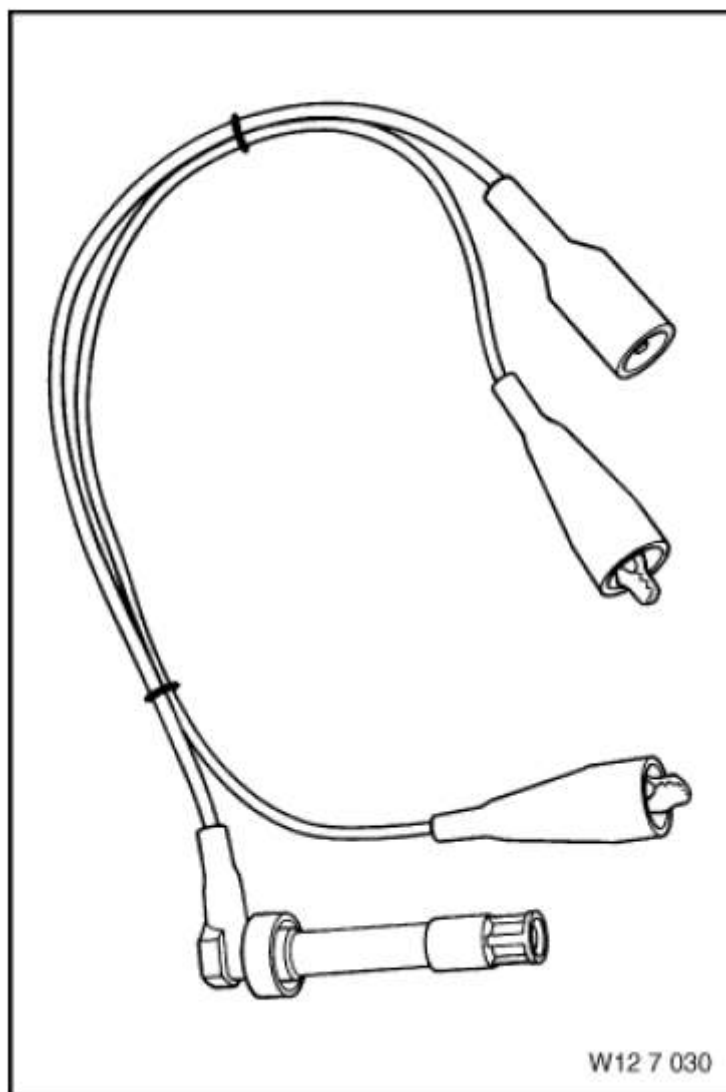


Fig. 37: Identifying Operating Instructions (0491159)
Courtesy of BMW OF NORTH AMERICA, INC.

0491157 OPERATING INSTRUCTIONS

0491157 127029 Operating instructions MP

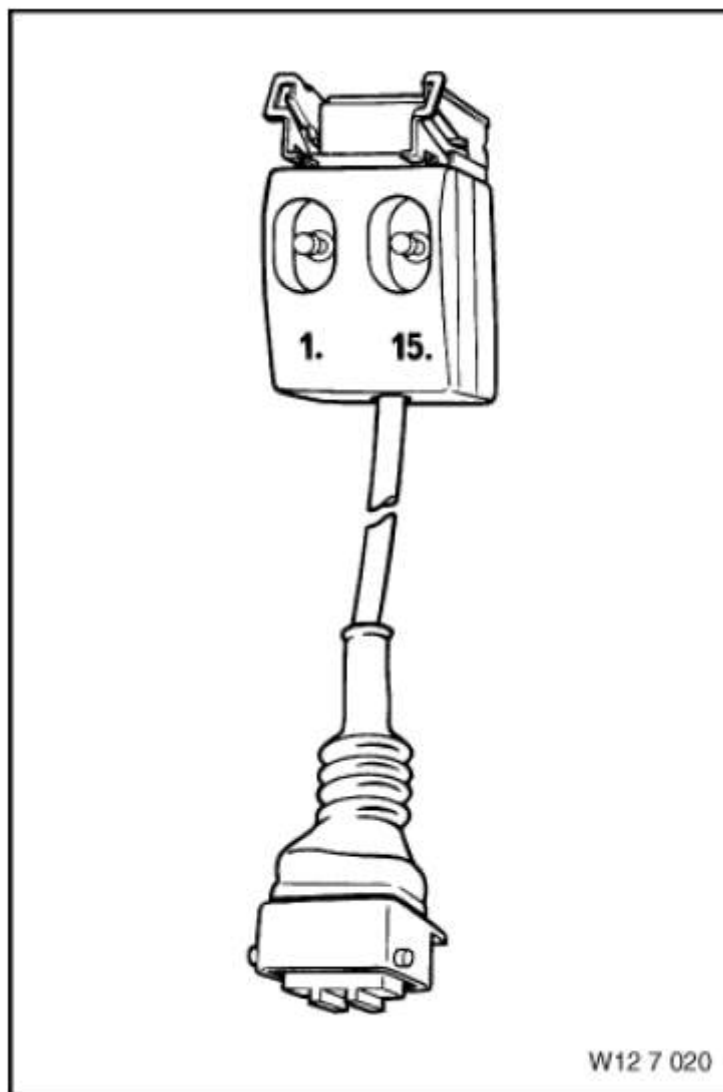


Fig. 38: Identifying Operating Instructions (0491157)

Courtesy of BMW OF NORTH AMERICA, INC.

0491165 OPERATING INSTRUCTIONS

0491165 127049 Operating instructions MP

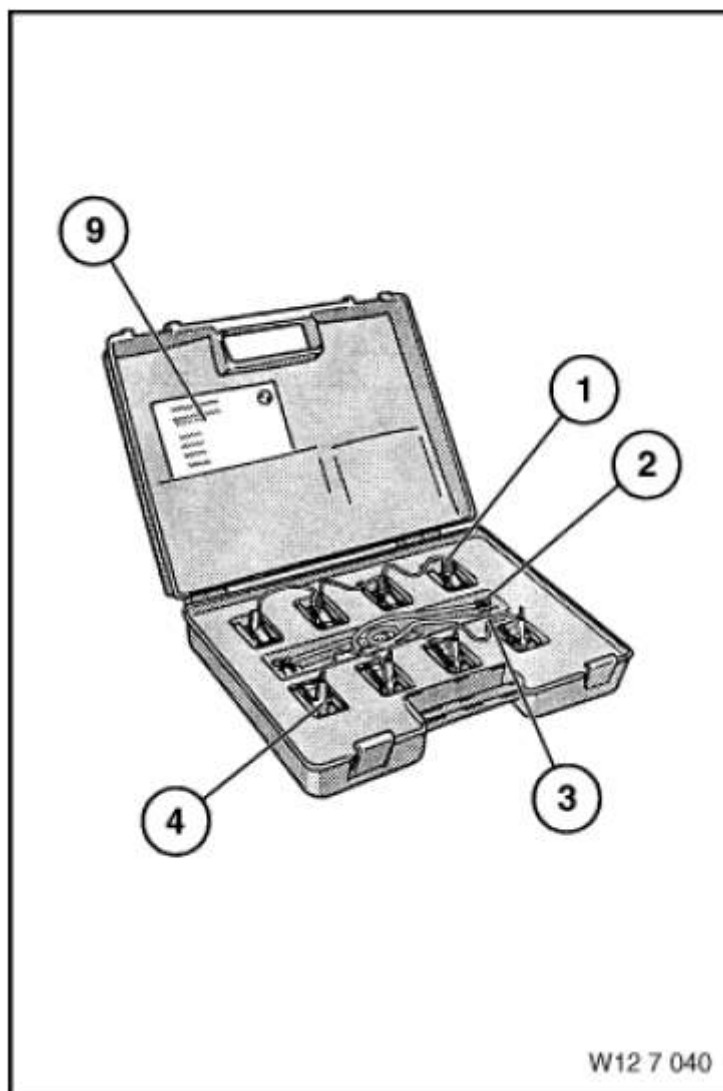
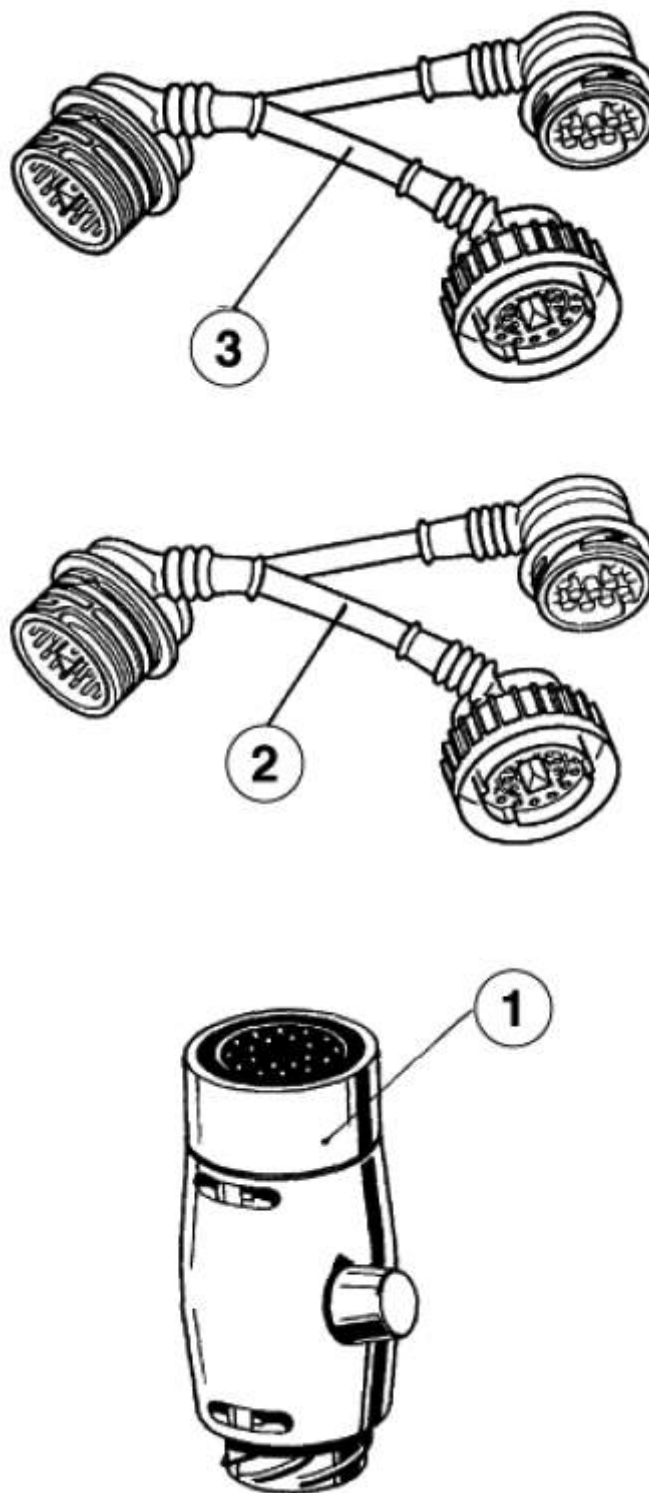


Fig. 39: Identifying Operating Instructions (0491165)

Courtesy of BMW OF NORTH AMERICA, INC.

0491155 OPERATING INSTRUCTIONS

0491155 127019 Operating instructions AM



W12 7 010

Fig. 40: Identifying Operating Instructions (0491155)
 Courtesy of BMW OF NORTH AMERICA, INC.

0491122 OPERATING INSTRUCTIONS

0491122 121089 Operating instructions AM



W12 1 080

Fig. 41: Identifying Operating Instructions (0491122)

Courtesy of BMW OF NORTH AMERICA, INC.

0493404 PIN

0493404 127206 Pin AM

NOTE: (Fine line pen) Black, waterproof

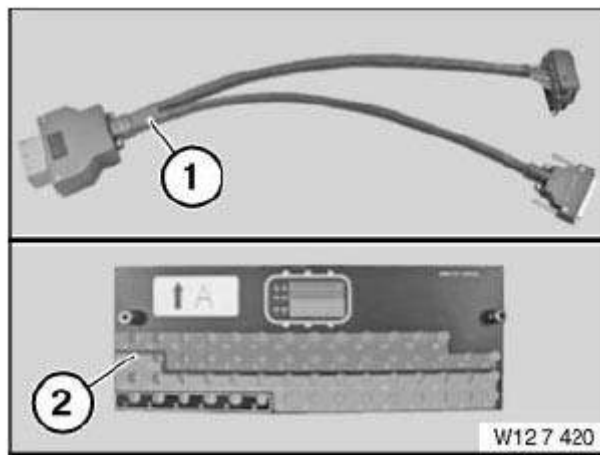
0494964 PLATE

0494964 127422 Plate Minimum set: Measuring and testing equipment MP

NOTE: (Cover plate for test box) For pin allocation on 105 - pin test box (61 4 380)

Storage Location

Q204



W12 7 420

Fig. 42: Identifying Plate (0494964)

Courtesy of BMW OF NORTH AMERICA, INC.

0493911 PLATE

0493911 127046 Plate MP

NOTE: (Adapter plate) For engines with ignition coil block for measuring secondary voltage Deletion, only available via tool set

Storage Location

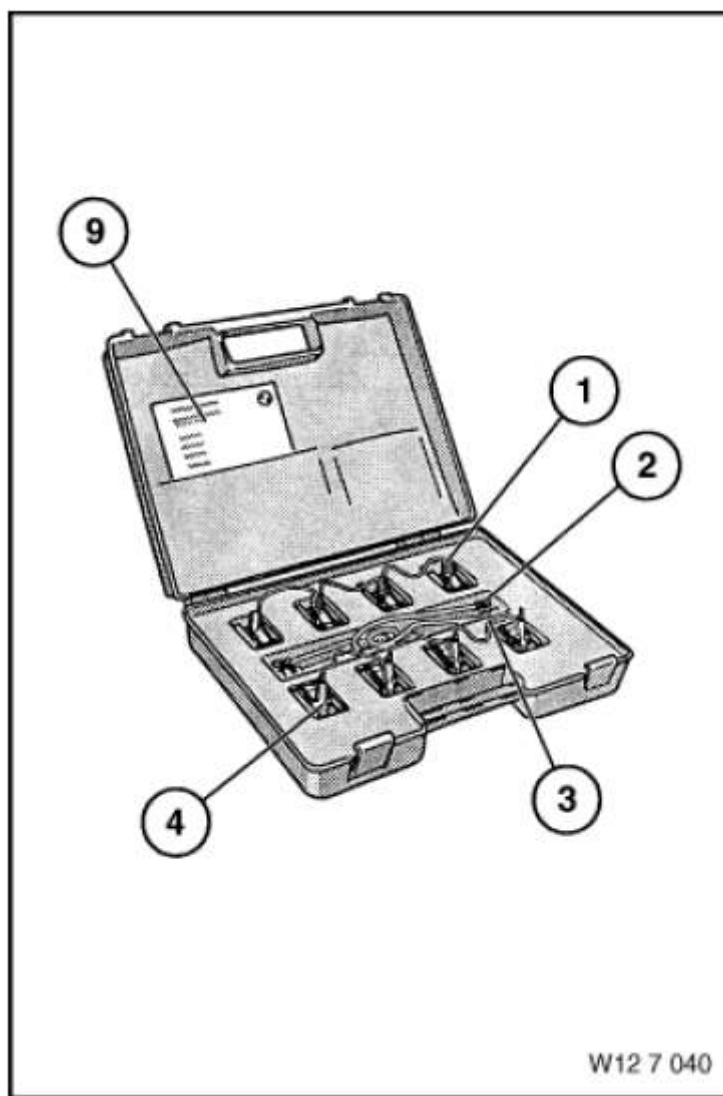


Fig. 43: Identifying Plate (0493911)

Courtesy of BMW OF NORTH AMERICA, INC.

0491181 PLIERS

0491181 127201 Pliers AM

NOTE: For bending the sheet metal tabs open

0491183 PLIERS

0491183 127203 Pliers AM

NOTE: For closing the sheet metal tabs

0491131 PLIERS

0491131 121180 Pliers Mechanical tool

NOTE: For detaching spark plug connectors

Storage Location

A9

B9

SI number

01 04 88 (906)

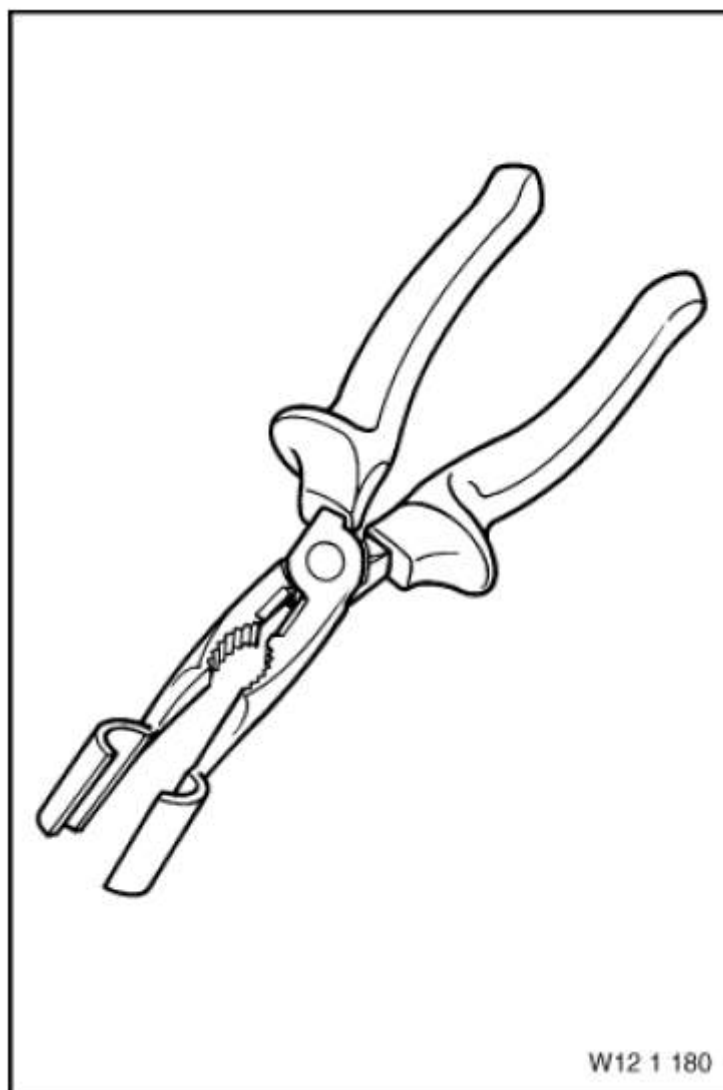


Fig. 44: Identifying Pliers (0491131)

Courtesy of BMW OF NORTH AMERICA, INC.

0491116 PLIERS

0491116 121081 Pliers AM

Storage Location

K 103



W12 1 080

Fig. 45: Identifying Pliers (0491116)

Courtesy of BMW OF NORTH AMERICA, INC.

0491176 PLIERS

0491176 127191 Pliers AM

NOTE: (Eprom extraction tool) No longer available. Antistatic mat can be ordered under special tool number 12 7 060.

Storage Location

J101

0491187 PLIERS

0491187 127212 Pliers AM

NOTE: (Punch pliers) For official mark dating

0491123 REPAIR KIT

0491123 121090 Repair kit AM

Replaced by: 83300491115

NOTE: (Repair kit) For ignition lead crimping tool for fitting the ignition leads onto the spark plug connectors - Replaced by 12 1 080 (0 491 115)

Storage Location

K 103

Consisting of:

1. **0495431** Guard

NOTE: (Protective gloves)

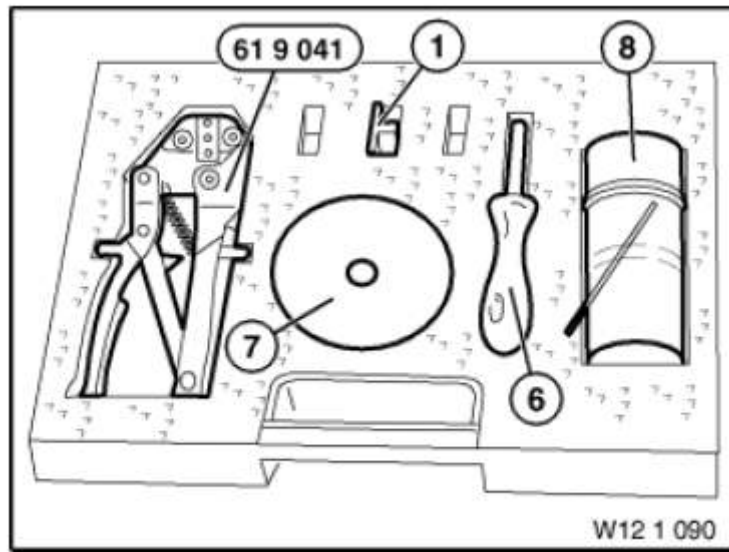


Fig. 46: Identifying Repair Kit (0491123)

Courtesy of BMW OF NORTH AMERICA, INC.

0491115 REPAIR KIT

0491115 121080 Repair kit AM

NOTE: For installation of spark plug connectors to ignition lead

Storage Location

K 103

SI number

01 03 89 (037)



Fig. 47: Identifying Repair Kit (0491115)

Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = **0491116** Pliers

2 = **0491117** Shaped part

NOTE: (Shaped part) Replaced by 12 1 083 (0 491 118)

3 = **0491118** Die-plate

NOTE: (set of dies) Cable 4 mm² /ignition lead

6 = 0491119 Holding sleeve

NOTE: (Assembly sleeve)

7 = 0491120 Guard

NOTE: (Protective gloves)

8 = 0491121 Lubricant

NOTE: (Lubricant) sale of existing inventory and then to be ordered with 83 19 2 208 609 - silicone spray.

9 = 0491122 Operating instructions

0491143 RING SPANNER

0491143 123000 Ring spanner Mechanical tool

NOTE: (Ring spanner (counter support)) for the belt pulley on the alternator

Storage Location

Z2

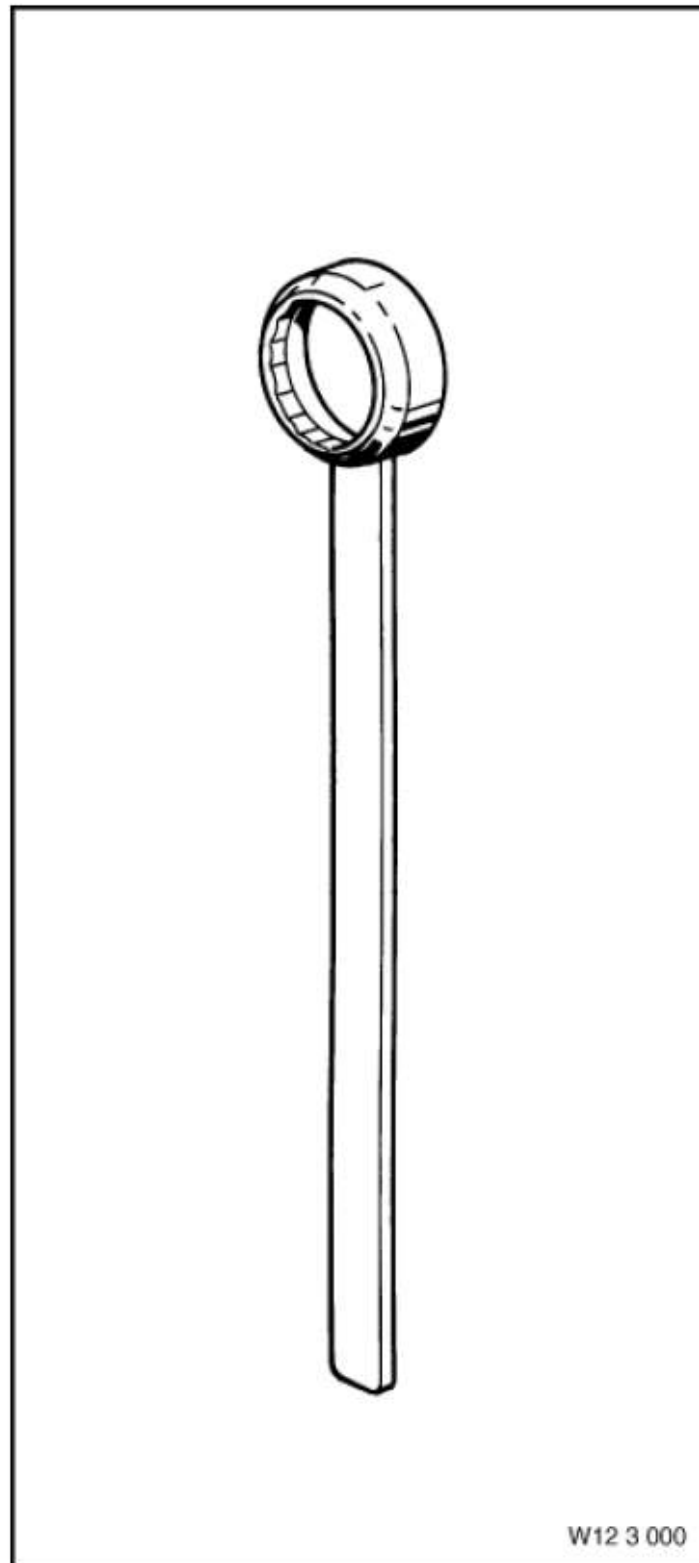


Fig. 48: Identifying Ring Spanner (0491143)
Courtesy of BMW OF NORTH AMERICA, INC.

0493405 SCREWDRIVER

0493405 127208 Screwdriver AM

NOTE: (Screwdriver)

0491117 SHAPED PART

0491117 121082 Shaped part AM

Replaced by: 83300491118

NOTE: (Shaped part) Replaced by 12 1 083 (0 491 118)



W12 1 080

Fig. 49: Identifying Shaped Part (0491117)

Courtesy of BMW OF NORTH AMERICA, INC.

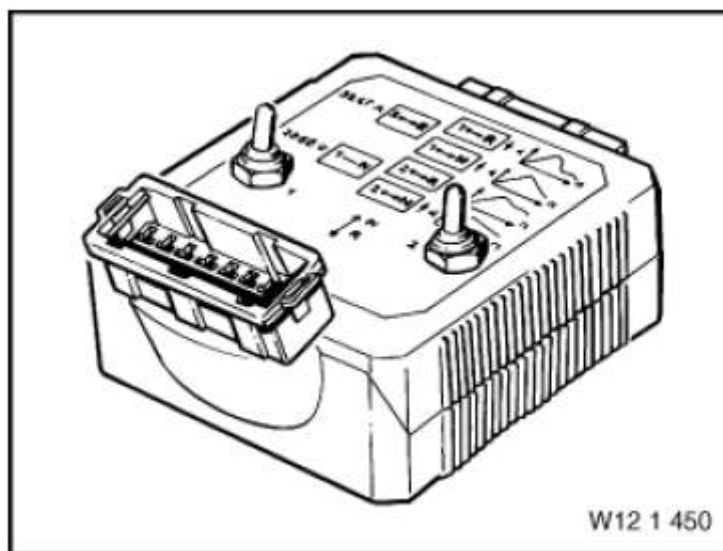
0491140 SIMULATOR

0491140 121450 Simulator Mechanical tool

NOTE: (Simulator) For checking the switching function Miscellaneous: USA only

Storage Location

W 2..



W12 1 450

Fig. 50: Identifying Simulator (0491140)

Courtesy of BMW OF NORTH AMERICA, INC.

0491141 SIMULATOR

0491141 121460 Simulator AM

NOTE: (Simulator) Miscellaneous: Japan and USA only

Storage Location

W 2..

Consisting of:

2 = [0492732](#) Adapter cable

NOTE: For ignition timing simulator 12 1 460. Miscellaneous: USA only

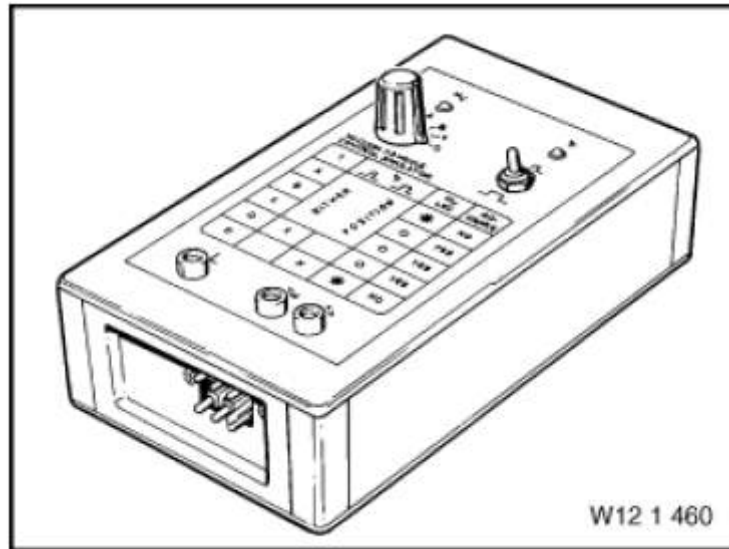


Fig. 51: Identifying Simulator (0491141)

Courtesy of BMW OF NORTH AMERICA, INC.

0491132 SOCKET WAF 46

0491132 121190 Socket WAF 46 Mechanical tool

NOTE: (Socket) AF 18

0491129 SOCKET WAF 46

0491129 121171 Socket WAF 46 Minimum set: Mechanical tools AM

NOTE: (Spark plug wrench) WAF 16 mm S50, M40, M42, M43, M44, M50, M52, M60, M62, M70, M73, W10, W11, N40, N42, N43, N73, N73H

Storage Location

A9

0491127 SOCKET WAF 46

0491127 121160 Socket WAF 46 Mechanical tool

NOTE: (Socket) AF 17.5 mm For releasing and tightening the spark plugs

Storage Location

A9

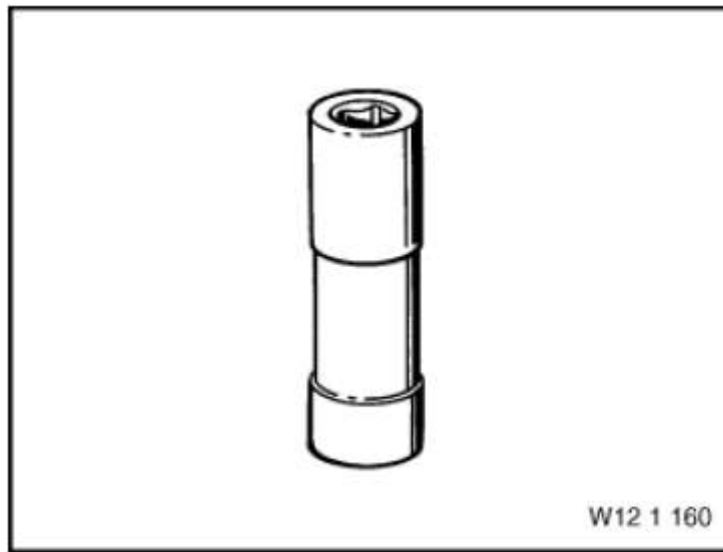


Fig. 52: Identifying Socket WAF 46 (0491127)
 Courtesy of BMW OF NORTH AMERICA, INC.

0495560 SOCKET WAF 46

0495560 121220 Socket WAF 46 Minimum set: Mechanical tools AM

NOTE: For removing and installing the spark plugs (WAF 14 bihexal).

Storage Location

A20

A86

SI number

01 20 06 (299)



Fig. 53: Identifying Socket WAF 46 (0495560)
 Courtesy of BMW OF NORTH AMERICA, INC.

0494857 SOCKET WRENCH

0494857 127122 Socket wrench AM

NOTE: For screw with internal serrations (Hazet 8808 Ig10)

Storage Location



Fig. 54: Identifying Socket Wrench (0494857)
 Courtesy of BMW OF NORTH AMERICA, INC.

0491184 SOCKET WRENCH INSERT

0491184 127204 Socket wrench insert AM

NOTE: (Torx socket wrench insert T20)

0491167 SOCKET WRENCH INSERT

0491167 127110 Socket wrench insert Minimum set: Mechanical tools Mechanical tool

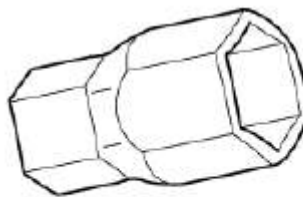
NOTE: (Socket wrench insert WAF 24) For removing and installing the belt pulley on the alternator

Storage Location

A12

SI number

01 12 93 (701)



W 12 7 110

Fig. 55: Identifying Socket Wrench Insert (0491167)
 Courtesy of BMW OF NORTH AMERICA, INC.

0491142 SOCKET WRENCH INSERT

0491142 122100 Socket wrench insert Mechanical tool

NOTE: (socket wrench insert WAF 12) For removing and fitting the glow elements

Storage Location

C10

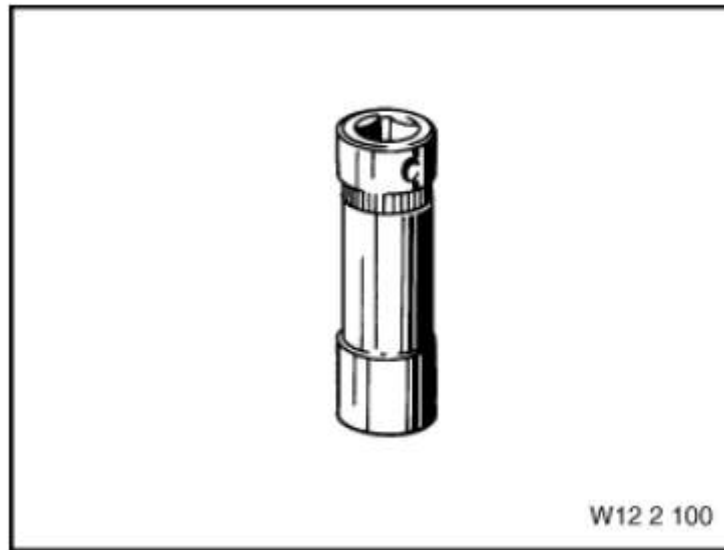


Fig. 56: Identifying Socket Wrench Insert (0491142)

Courtesy of BMW OF NORTH AMERICA, INC.

0493403 SOCKET WRENCH INSERT

0493403 127205 Socket wrench insert AM

NOTE: (Torx socket wrench insert T10)

0491144 SOCKET WRENCH INSERT

0491144 123100 Socket wrench insert Mechanical tool

Replaced by: 83300491167

NOTE: (Socket wrench insert WAF 24) For removal and installation of the belt pulley on the alternator - Replaced by 12 7 110 (0 491 167)

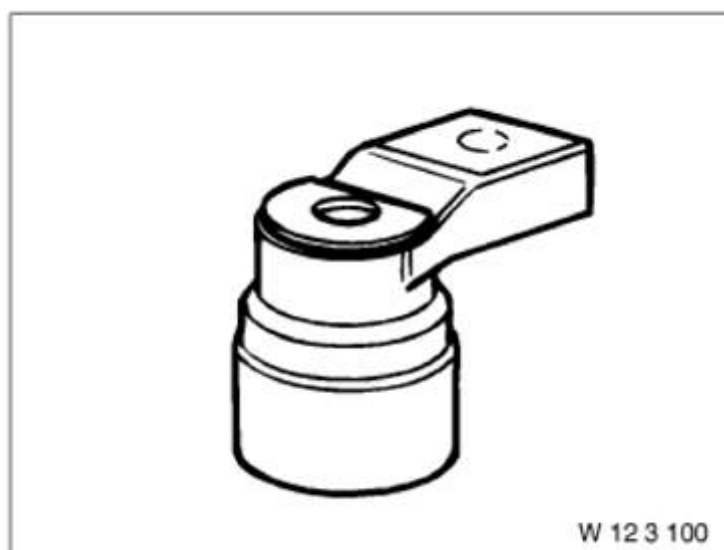


Fig. 57: Identifying Socket Wrench Insert (0491144)

Courtesy of BMW OF NORTH AMERICA, INC.

0491179 SOFTWARE

0491179 127194 Software AM

NOTE: (Floppy disk) Printer software floppy disk For printing letters on the labels with a needle printer.

0491172 SUPPLEMENT

0491172 127160 Supplement Mechanical tool

NOTE: (EPROM set) For programming DME control units Comprising: 12 7 170, 12 7 180, 12 7 190

0491151 TEST SET

0491151 127010 Test set AM

NOTE: (Test set) For checking electronic engine power control safety circuit

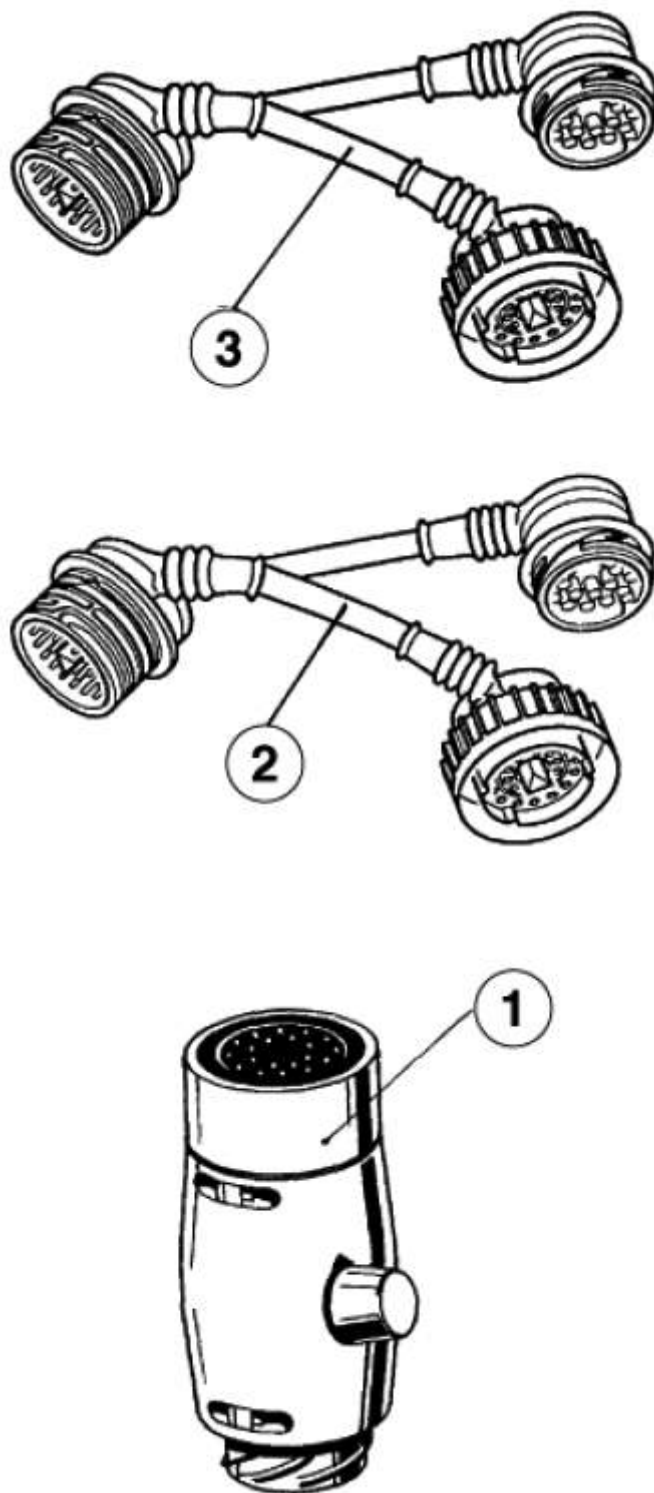
Consisting of:

1 = 0491152

2 = 0491153

3 = 0491154

9 = 0491155



W12 7 010

Fig. 58: Identifying Test Set (0491151)

Courtesy of BMW OF NORTH AMERICA, INC.

0491202 TESTER

0491202 129490 Tester Mechanical tool

NOTE: (Capacitor) Test capacitor for DME/AGS relay KD action/model year: 94

Storage Location

W 2..

0491114 TOOL

0491114 121070 Tool Mechanical tool

NOTE: (Tool) for ignition timing adjustment (CIFI)

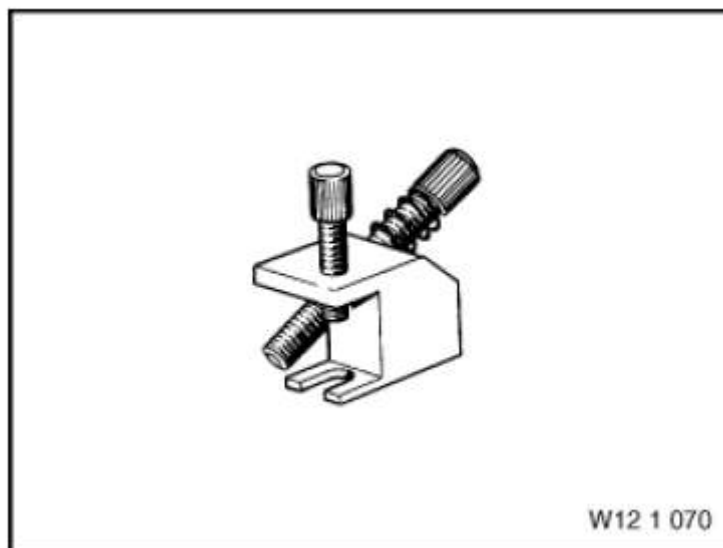


Fig. 59: Identifying Tool (0491114)

Courtesy of BMW OF NORTH AMERICA, INC.

0491180 TOOL

0491180 127200 Tool AM

NOTE: (Tool set) to open and close the electronics box

Storage Location

J 106

Consisting of:

1 = 0491181 Pliers

NOTE: For bending the sheet metal tabs open

2 = 0491182 Lever

NOTE: For bending the sheet metal tabs

3 = 0491183 Pliers

NOTE: For closing the sheet metal tabs

4 = 0491184 Socket wrench insert

NOTE: (Torx socket wrench insert T20)

5 = 0493403 Socket wrench insert

NOTE: (Torx socket wrench insert T10)

6 = [0493404](#) Pin

NOTE: (Fine line pen) Black, waterproof

8 = [0493405](#) Screwdriver

NOTE: (Screwdriver)

9 = [0493406](#) Tool

NOTE: (Straightening tool) For Eprom connections

0493406 TOOL

[0493406 127209 Tool AM](#)

NOTE: (Straightening tool) For Eprom connections

0491112 TOOL

[0491112 121050 Tool Mechanical tool](#)

NOTE: (Tool) shorter version for adjusting the dynamic ignition timing and carburetor synchronization - discontinued from July 92/automatic transmission

0491175 TOOL

[0491175 127190 Tool AM](#)

NOTE: (Eprom tool) Set no longer available. Antistatic mat can be ordered under number 12 7 060.

Storage Location

J101

Consisting of:

1. [0491176](#) Pliers

NOTE: (Eprom extraction tool) No longer available. Antistatic mat can be ordered under special tool number 12 7 060.

2. [0491177](#) Antistatic mat

NOTE: (Antistatic mat) Is replaced by main number 12 7 060.

3. [0491178](#) Labels

NOTE: (Eprom label)

4. [0491179](#) Software

NOTE: (Floppy disk) Printer software floppy disk For printing letters on the labels with a needle printer.

0491113 TOOL

0491113 121060 Tool Mechanical tool

NOTE: (Tool) For adjusting the dynamic ignition timing - Deletion as of July 92

0491111 TOOL

0491111 121040 Tool Mechanical tool

NOTE: (Tool) longer version to adjust the dynamic ignition timing adjustment and carburetor synchronization - discontinued from July 92/manual gearbox

0491128 TOOL

0491128 121170 Tool Minimum set: Mechanical tools AM

NOTE: (Spark plug tool) For releasing spark plugs and for tightening to torque limitation, special tool is being discontinued without replacement!

Storage Location

A9

Consisting of:

1. 0491129 Socket WAF 46

NOTE: (Spark plug wrench) WAF 16 mm S50, M40, M42, M43, M44, M50, M52, M60, M62, M70, M73, W10, W11, N40, N42, N43, N73, N73H

2. 0491130 Torque limiter

NOTE: (Torque limiter) 23 Nm $\pm$ 3 Nm, engine: S14, S38, S50 Do not use the special tool any more because the torque will change.

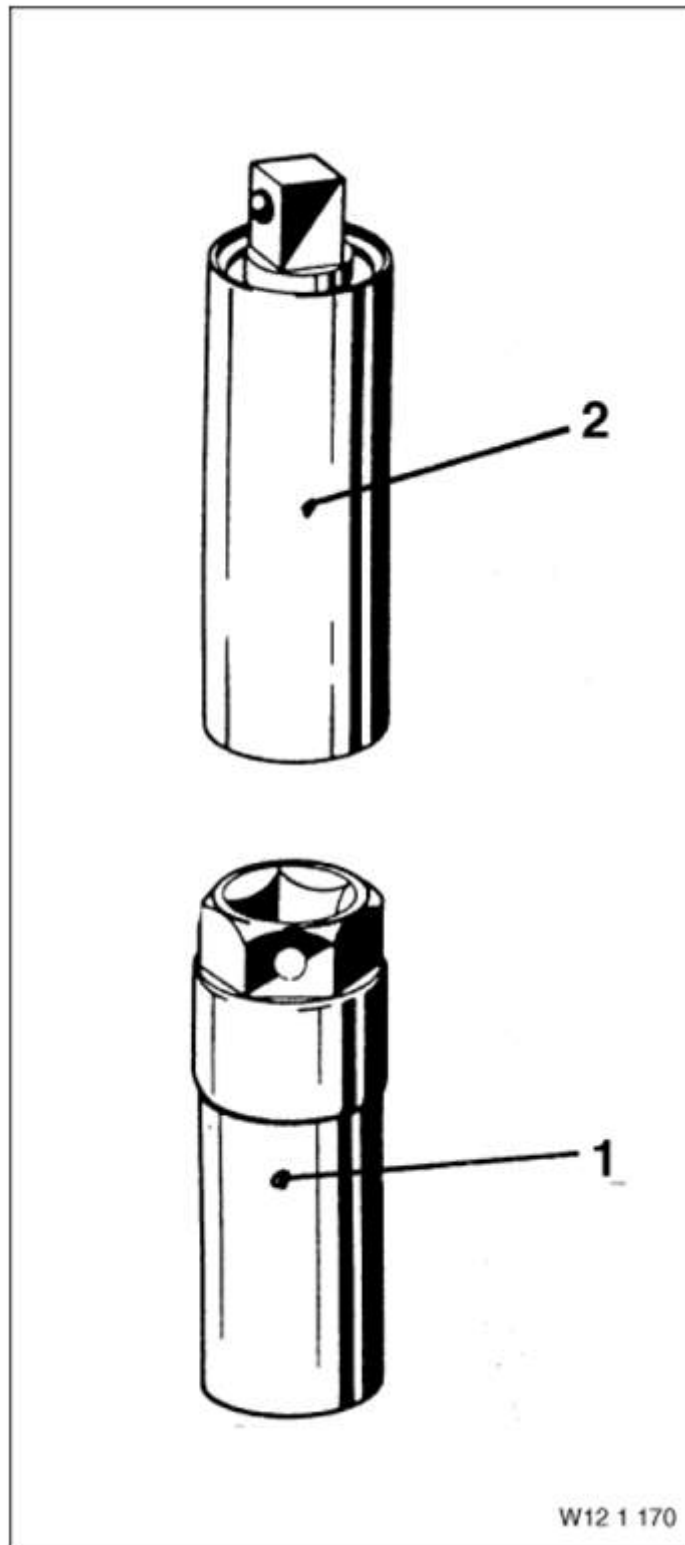


Fig. 60: Identifying Tool (0491128)

Courtesy of BMW OF NORTH AMERICA, INC.

0491133 TORQUE LIMITER

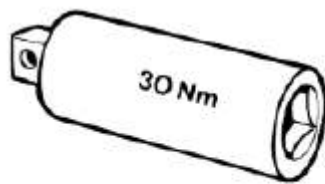
0491133 121200 Torque limiter Minimum set: Mechanical tools Mechanical tool

NOTE: (torque limiter) 30 Nm For tightening the spark plugs to a limited torque setting

Storage Location

A9

SI number



W 12 1 200

Fig. 61: Identifying Torque Limiter (0491133)
Courtesy of BMW OF NORTH AMERICA, INC.

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Article GUID: A00702111

ENGINE**Engine Electrical System - Tightening Torques - X3 Utility****ALTERNATOR LEAD (N52T)****12 42 ALTERNATOR LEAD****TIGHTENING SPECIFICATION - ALTERNATOR LEAD**

Â		Type	Thread	Tightening specifications	Measure
1AZ	Battery positive lead to alternator	N52T	M8	Â	19 Nm
2AZ	Battery positive lead to starter	N52T	M8	Â	13 Nm
3AZ	Battery positive lead to battery positive terminal	N52T	M8	Â	15 Nm
4AZ	Earth pin for positive battery connection point	N52T	Â	27 Nm	

ALTERNATOR LEAD (N55)**12 42 ALTERNATOR LEAD****TIGHTENING SPECIFICATION - ALTERNATOR LEAD**

Â		Type	Thread	Tightening specifications	Dimension
1AZ	Alternator lead to alternator	N55/N55 Hybrid	M8	Â	19 Nm
2AZ	Alternator lead to starter	N55/N55 Hybrid	M8	Â	13 Nm
3AZ	Alternator lead to battery positive terminal	N55/N55 Hybrid	M8	Â	15 Nm
			M6	Â	8 Nm

ALTERNATOR LEAD (N20)**12 42 ALTERNATOR LEAD****TIGHTENING TORQUE SPECIFICATION - ALTERNATOR LEAD**

Â		Type	Thread	Tightening specifications	Dimension
1AZ	Battery positive lead to alternator	N20/N26	M8	Â	19 Nm
2AZ	Battery positive lead to starter	N20/N26	M8	Â	13 Nm
3AZ	Battery positive lead to battery positive terminal	N20/N26	M8	Flange nut	15 Nm
			M6	Flange nut	8 Nm
4AZ	Battery positive lead to battery positive terminal	N20/N26	M6	Flange nut	10 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS (N55)**12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS**

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

Â	Type	Thread	Tightening specifications	Dimension
1AZ Alternator to crankcase, top	N55/N55 Hybrid	M8 x 85	Â	19 Nm
2AZ Alternator to crankcase with A/C compressor carrier	N55/N55 Hybrid	M8x105	Â	19 Nm
3AZ Holder, air conditioning compressor, to bedplate	N55/N55 Hybrid	M8	Â	19 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS (N52T)

12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

Â	Type	Thread	Tightening specification	Measure
1AZ Alternator to crankcase	N52T	M8x82	Replace screws Jointing torque Torque angle	Â 10 Nm 190 Â°

ALTERNATOR WITH MOUNTING (N20)

12 31 ALTERNATOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH MOUNTING

Â	Type	Thread	Tightening specifications	Dimension
1AZ Alternator to crankcase	N20/N26	M10x125	Â	38 Nm
		M10x75	Â	38 Nm

ALTERNATOR WITH MOUNTING (N47)

12 31 ALTERNATOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH MOUNTING

Â	Type	Thread	Tightening specifications	Dimension
1AZ Alternator to holder	N47 D20 O1	M10	Â	38 Nm
2AZ Deflecting element to belt tensioner	N47 D20 O1	M10	Â	38 Nm

ELECTRONIC SHIFT UNITS OR CONTROL UNITS (N20)

12 14 ELECTRONIC SHIFT UNITS OR CONTROL UNITS

TIGHTENING TORQUE SPECIFICATION - ELECTRONIC SHIFT UNITS OR CONTROL UNITS

Â	Type	Thread	Tightening specifications	Dimension
1AZ Control unit (DME) to intake plenum	N20/N26	M6	Â	12 Nm

ELECTRONIC SHIFT UNITS OR CONTROL UNITS (N55)

12 14 ELECTRONIC SHIFT UNITS OR CONTROL UNITS

TIGHTENING TORQUE SPECIFICATION - ELECTRONIC SHIFT UNITS OR CONTROL UNITS

Â	Type	Thread	Tightening specifications	Dimension

Â	Type	Thread	specifications	Dimension
1AZ Control unit (DME) to intake plenum	N55/N55 Hybrid	Â	Â	10 Nm
2AZ Control unit (DME) to intake plenum	N55/N55 Hybrid	M6	Â	12 Nm

ELECTRONICS BOX, WIRING HARNESS (N52T)

12 90 ELECTRONICS BOX, WIRING HARNESS (N52T)

TIGHTENING TORQUE SPECIFICATION - ELECTRONICS BOX, WIRING HARNESS

Â	Type	Thread	Tightening specification	Measure
1AZ Control unit (DME) to mounting plate	N52T	Â	Â	8 Nm
2AZ Cable clip to cylinder head	N52T	Â	Â	8 Nm

ELECTRONICS BOX, WIRING HARNESS (N55)

12 90 ELECTRONICS BOX, WIRING HARNESS

TIGHTENING TORQUE SPECIFICATION - ELECTRONICS BOX, WIRING HARNESS

Â	Type	Thread	Tightening specifications	Dimension
1AZ Cable channel to cylinder head cover	N55/N55 Hybrid	Â	Â	8 Nm
2AZ Earth cable to crankcase lower section	N55/N55 Hybrid	M8	Replace aluminum screw. Jointing torque Angle of rotation	Â 8 Nm 45 Â°
3AZ Earth cable to rear cylinder head	N55/N55 Hybrid	M6	Â	8 Nm
4AZ Cable channel to engine block	N55/N55 Hybrid	M6	Replace aluminum screws.	8 Nm
5AZ Earth cable for ignition coils	N55/N55 Hybrid	Â	Â	5 Nm

GLOW ELEMENTS (N47)

12 23 GLOW ELEMENTS (N47)

TIGHTENING TORQUE SPECIFICATION - GLOW ELEMENTS

Â	Type	Thread	Tightening specifications	Dimension
1AZ Glow elements	N47 D20 O1	Â	Â	13 Nm
2AZ Preheating control unit to holder	N47 D20 O1	M6	Â	8 Nm

OIL PRESSURE SWITCH, OIL LEVEL SENSOR (N47)

12 61 OIL PRESSURE SWITCH, OIL LEVEL SENSOR (N47)

TIGHTENING TORQUE SPECIFICATION - OIL PRESSURE SWITCH, OIL LEVEL SENSOR

Â	Type	Thread	Tightening specifications	Dimension
1AZ Oil pressure switch to oil filter	N47 D20 O1	M12x1.5	Â	28 Nm
2AZ Oil level sensor to oil sump	N47 D20 O1	M6	Â	8 Nm

OIL PRESSURE, OIL CONDITION DISPLAY (N52T)

12 61 ENGINE OIL PRESSURE, OIL CONDITION DISPLAY

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL PRESSURE, OIL CONDITION

Â	Type	Thread	Tightening specification	Measure
1AZ Engine oil pressure switch	N52T	M12x1.5	Â Jointing torque Torque angle	Â 20 Nm 16 Â°
2AZ Oil condition sensor for engine oil	N52T	M6	Â	8.5 Nm

OIL PRESSURE, OIL LEVEL INDICATOR (N20)

12 61 OIL PRESSURE, OIL LEVEL INDICATOR

TIGHTENING TORQUE SPECIFICATION - OIL PRESSURE, OIL LEVEL INDICATOR

Â	Type	Thread	Tightening specifications	Dimension
1AZ Engine oil pressure/temperature sensor	N20/N26	M12x1.5	Â	15 Nm
2AZ Oil level sensor to oil sump	N20/N26	M6	Â	8, 5 Nm

OIL PRESSURE, OIL LEVEL INDICATOR (N55)

12 61 OIL PRESSURE, OIL LEVEL INDICATOR

TIGHTENING TORQUE SPECIFICATION - OIL PRESSURE, OIL LEVEL INDICATOR

Â	Type	Thread	Tightening specifications	Dimension
1AZ Engine oil pressure switch	N55/N55 Hybrid	M12x1.5	Â Jointing torque Angle of rotation	Â 20 Nm 16 Â°
2AZ Replacing engine oil level sensor	N55/N55 Hybrid	M6	Â	8, 5 Nm

PLUG CONNECTORS, TERMINALS (N52T)

12 52 PLUG CONNECTORS, TERMINALS

TIGHTENING TORQUE SPECIFICATION - PLUG CONNECTORS, TERMINALS

Â	Type	Thread	Tightening specification	Measure
1AZ Holder, wiring harness, to cylinder head cover	N52T	M6	Â	8 Nm

PLUG CONNECTIONS, TERMINALS, LOOSE COMPONENTS (N20, N55)

12 52 PLUG CONNECTIONS, TERMINALS, LOOSE COMPONENTS

TIGHTENING TORQUE SPECIFICATION - PLUG CONNECTIONS, TERMINALS, LOOSE COMPONENTS

Â	Type	Thread	Tightening specifications	Dimension
1AZ Bracket on cylinder head cover	N20/N26	Â	Â	5.5 Nm
2AZ Earth cable for ignition coils	N20/N26	M5	Â	4.5 Nm
3AZ Earth cable to crankcase (electr. coolant pump)	N20/N26	M6	Â	8 Nm
4AZ Earth cable to earth point	N20/N26	M6	Â	8 Nm
5AZ Cable channel to engine block	N20/N26	M6	Â	8 Nm

6AZ VTC earth cable to jump start terminal point	N20/N26	M6	Â	8 Nm
7AZ Positive battery cable to power distribution module	N20/N26/N55/N55 Hybrid	M6	Â	8 Nm

PLUG CONNECTIONS, TERMINALS, LOOSE PARTS (N47)

12 52 PLUG CONNECTIONS, TERMINALS, LOOSE PARTS (N47)

TIGHTENING TORQUE SPECIFICATION - PLUG CONNECTIONS, TERMINALS, LOOSE PARTS

Â	Type	Thread	Tightening specifications	Dimension
1AZ Wiring harness to starter motor (terminal 50)	N47 D20 O1	M6	Â	7 Nm
2AZ Positive battery cable to alternator	N47 D20 O1	M8	Â	19 Nm
3AZ Positive battery cable to starter motor	N47 D20 O1	M8	Â	13.4 Nm
4AZ Positive battery cable to jump start terminal point	N47 D20 O1	M8 nut	Â	19 Nm
5AZ Cable clip to starter motor	N47 D20 O1	M6	Â	8 Nm

SPARK PLUGS

12 12 SPARK PLUGS

TIGHTENING TORQUE SPECIFICATION - SPARK PLUGS

Â	Type	Thread	Tightening specification	Measure
1AZ Spark plugs (ungreased)	All	M12x1.25	Â	23 Â± 3 Nm
	All	M14x1.25	Â	30 Â± 3 Nm

STARTER MOTOR WITH MOUNTING (N20)

12 41 STARTER MOTOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - STARTER MOTOR WITH MOUNTING

Â	Type	Thread	Tightening specifications	Dimension
1AZ Starter motor to crankcase	N20/N26	M10x30	Â	38 Nm
		M10x85	Â	38 Nm

STARTER MOTOR WITH MOUNTING (N52T)

12 41 STARTER MOTOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - STARTER MOTOR WITH MOUNTING

Â	Type	Thread	Tightening specification	Measure
1AZ Starter motor	N52T	M10x85	Replace screw	Â

	mounting to crankcase			Jointing torque Torque angle	20 Nm 180 Å°
2AZ	Starter motor mounting to crankcase	N52T	M10x30	Replace screw Jointing torque Torque angle	Å 20 Nm 90 Å°

STARTER MOTOR WITH MOUNTING (N55)

12 41 STARTER MOTOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - STARTER MOTOR WITH MOUNTING

Å	Type	Thread	Tightening specifications	Dimension
1AZ Starter motor to crankcase	N55/N55 Hybrid	M10x30	Å	38 Nm
Starter motor to transmission housing		M10x85	Å	38 Nm

STARTER MOTOR WITH MOUNTING (N47)

12 41 STARTER MOTOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - STARTER MOTOR WITH MOUNTING

Å	Type	Thread	Tightening specifications	Dimension
1AZ Starter mounting to oil sump	N47 D20 O1	M8x60	Observe screwing sequence.	19 Nm

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