

13 Fuel system

13 00 002	Function check of Digital Motor Electronics (DME)	13- 0/1
...	Component test	13- 0/1
	Checking coolant temperature sensor	13- 0/1
	Checking intake air temperature sensor	13- 0/1
	Tank vent valve – check	13- 0/1
054	Engine idle and exhaust contents – check	13- 0/2
060	Engine idle and exhaust contents – check	13- 0/3
13 31 029	Fuel pump delivery pressure – check	13-31/1
029	Delivery pressure of fuel pump – check (M73)	13-31/2
	Summary of fuel filter and lines	13-32/1
13 32 051	Fuel filter – replace	13-32/1
051	Fuel filter – replace (M73)	13-32/2
13 51 199	Fuel pressure regulator – check	13-51/1
630	Fuel pressure regulator – replace	13-51/1
630	Fuel pressure regulator – replace (M73)	13-51/2
13 54 535	Throttle body – replace	13-54/1
13 61 000	Control unit (for DME) – remove and install or replace	13-61/1
13 62 511	Temperature sensor for intake air	13-62/1
531	Temperature sensor for coolant – replace	13-62/1
560	Mass air flow sensor – remove and install or replace	13-62/2
511	Temperature sensor for intake air – replace (M73)	13-62/3
531	Temperature sensor for coolant – replace (M73)	13-62/3
13 63 590	Fuel pump relay – replace (M73)	13-63/1
	Summary of injection pipes with ancillary parts	13-64/1
13 64 541	All injection valves – replace	13-64/1
582	Injection valves – check for leaks and clean	13-64/3
541	All injection valves – replace (M73)	13-64/4
13 72 002	Both air filter inserts – replace	13-72/1
13 90 500	Tank vent valve – replace	13-90/1
	Arrangement of tank vent valves	13-90/1
...	Tank vent valve – check	13-90/2
500	Tank vent valve – replace (M73)	13-90/3

For additional work, refer to "Repair Instructions for 7 Series E38"

13 00 002 Function check of the Digital Motor Electronics (DME)

Connect up BMW Service Tester.
Carry out brief test.
Interrogate fault memories.
Interrogate status,
refer to: operating instructions for
BMW Service Tester/BMW diagnosing system

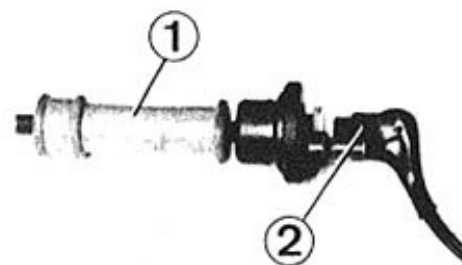
Additional information on troubleshooting, refer to:
Electrical Troubleshooting Manual file / Schematics folder

Checking intake air temperature sensor:

Check resistance value* on temperature sensor. Check leads from control unit connector to temperature sensor connector for interrupts or short circuits**.

Checking tank vent valve

Attach vacuum hose (1) from BMW Service Tester to the 8 mm dia. neck.
Provide tank vent valve with 12 V voltage (2) (special tool 61 1 440).

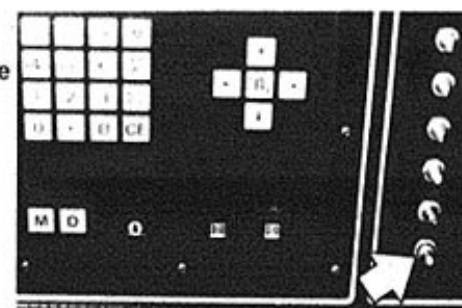


32 16 035

13 00 ... Checking components

Checking coolant temperature sensor:

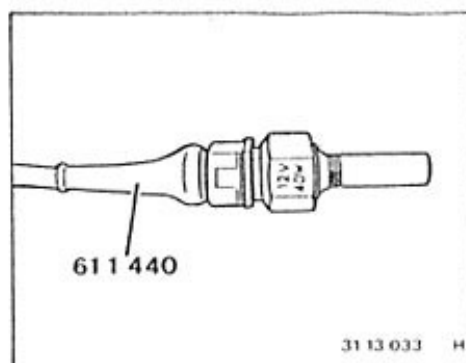
Attach Jetronic test cable 61 1 440.
Use ohmmeter to check nominal value*, to check the entire temperature range, remove the sensor, immerse in water bath up to hex head and check using an ohmmeter*.



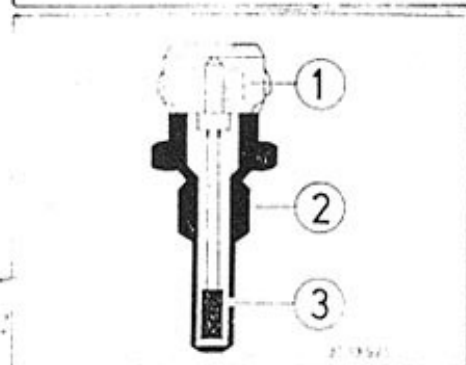
32 16 036

Select multimeter function 21 on BMW Service Tester.
Set vacuum to 600 mbar · 100.
Switch off vacuum pump.

During the measuring period of approx. 20 seconds, pressure must not drop by more than 50 mbar.
When pressure losses exceed 50 mbar, a new tank vent valve must be fitted.



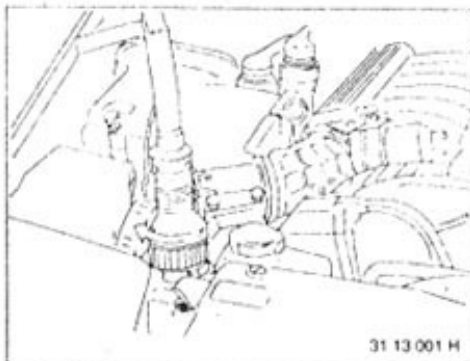
31 13 033 H



The temperature sensor measures engine temperature and transmits this to the control unit in the form of a resistance value.
The resistance value falls as temperature rises (NTC).
1 = plug connection
2 = housing
3 = NTC resistance

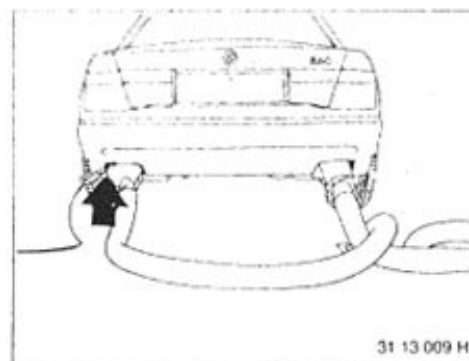
* Refer to Technical Data

** Refer to Schematics folder



13 00 054 CHECKING ENGINE IDLE SPEED AND CO LEVEL
(M 70 Engines with M 1.7 Motronic)
-Cars Prepared for Catalyst-

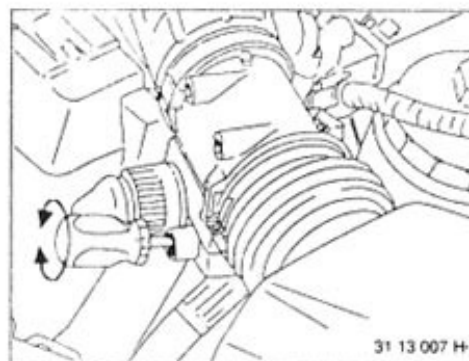
Adjusting Conditions:
Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
Engine and Ignition in perfect condition.
BMW SERVICE TESTER connected to operating instructions.
Routine checking is not necessary.



2) CO Level Test
Connect CO probe on exhaust tailpipe. Switch off exhaust extraction systems for the time of testing.
Check Idle speed CO level*, see operating instructions of **BMW SERVICE TESTER** or operating instructions of other tester.

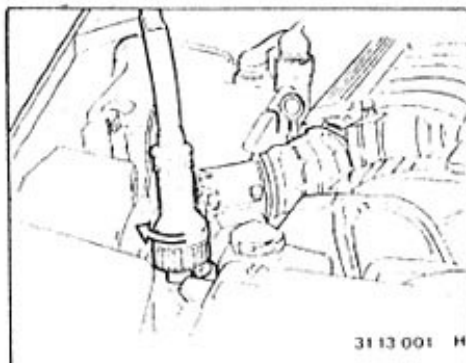
Important!
Air mass sensor not on same side as tailpipe.

1) Engine Idle Speed Checked with BMW Diagnosing System (Status Call)
Refer to calling faults in case of deviation from nominal value*.
Check Intake system for leaks.



3) CO Level Correction
Remove anti-tamper lock.
Correct CO setting on the air mass sensor with a screwdriver, if necessary.

Note:
Read BMW self diagnosis before making corrections.



13 00 060 CHECKING ENGINE IDLE SPEED AND CO LEVEL (M 70 Engines with M 1.7 Motronic) - Cars with Catalyst -

Adjusting Conditions:
Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
Engine and Ignition in perfect condition.
BMW SERVICE TESTER connected to operating instructions.
Routine checking is not necessary.

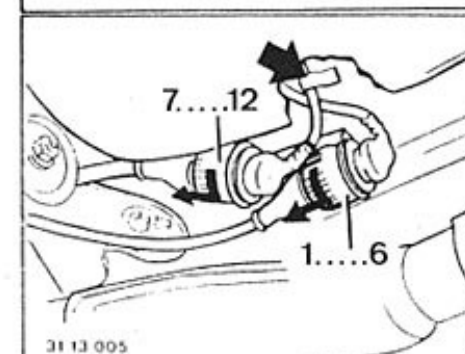
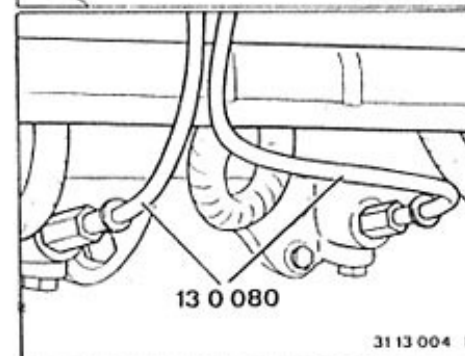


2) CO Level Test Disconnect oxygen sensor plug connectors and mark connectors. Unscrew bolts (1) and connect Special Tool 13 0 090 on the exhaust manifold.

Caution!
CO probes will be very hot!

Excessive CO Level:
Check fuel injectors, fuel pressure and coolant/air temperature sensors.

Insufficient CO Level:
Check hoses and connections or detect air leaks.

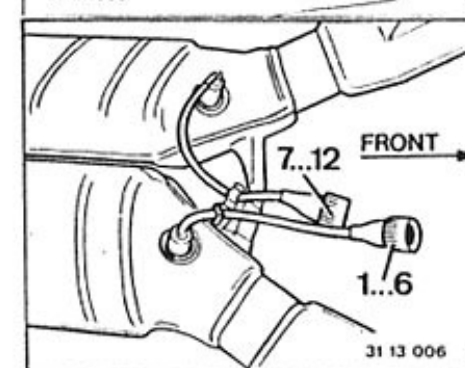


Check idle speed CO level*.
Switch off exhaust extraction systems for the time of testing.
Refer to EML and Motronic diagnosing system when nominal value is not reached.

Note:
Connect oxygen sensor after trial run.

Important!
Don't mix up oxygen sensor connections — plug with white tab is for cylinders 7 ... 12.
Read via self diagnosis if necessary.
The displayed value (approx. 0.45 V) remains constant with a disconnected oxygen sensor plug, when calling on the pertinent control unit.

Note:
Check EML safety path — see Group 12.



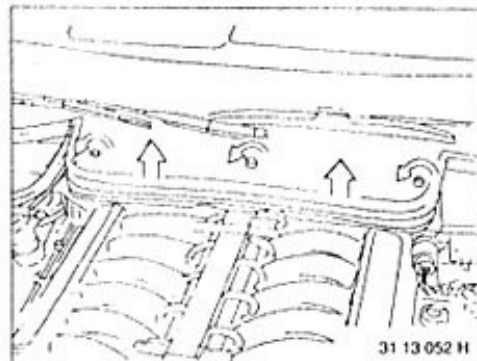
1) Engine Idle Speed* Checked with BMW Diagnosing System (Status Call) Call faults in case of deviation from the nominal value. Check intake system for leaks.

Important!
Intake pipes cross each other.

Note:
Don't turn the CO level adjusting screw on the air mass sensor.

* See Specifications

* See Specifications

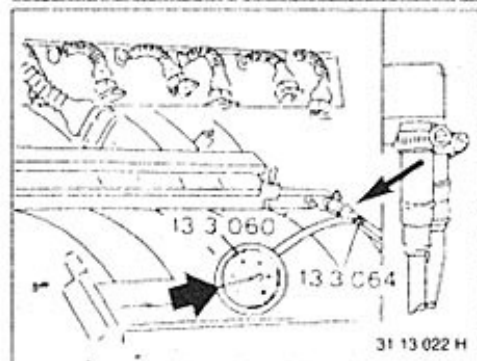


13 31 029 Checking supply pressure of fuel pump

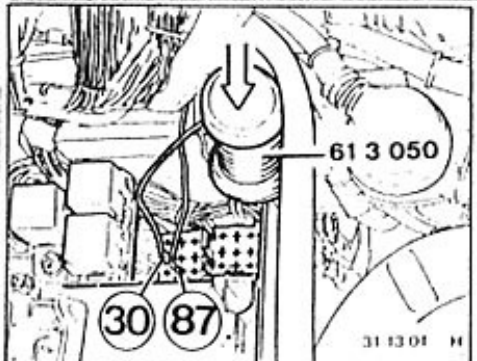
Remove cover from fresh air housing.



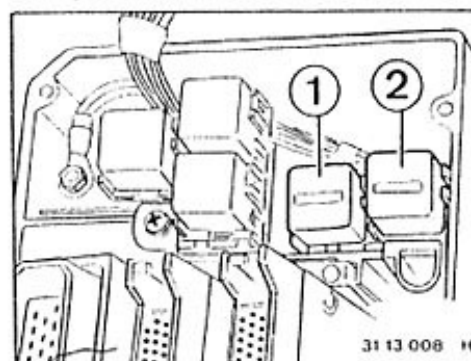
Remove fresh air housing.



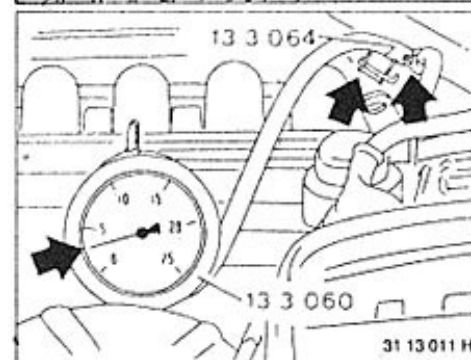
Install connection from BMW Service Tester or pressure gage 13 3 060 with connecting lead and T-piece 13 3 064 to the fuel intake line – before the fuel pressure regulator.–



Remove relevant fuel pump relay.
Use tool 61 3 050 to bridge terminal 87 and terminal 30.
Read off system pressure*) and check layout (relay/cylinder bank).



Layout: fuel pump relay
Relay (1= left)/right cylinder bank 1 - 6
Relay (2= right)/left cylinder bank 7 - 12



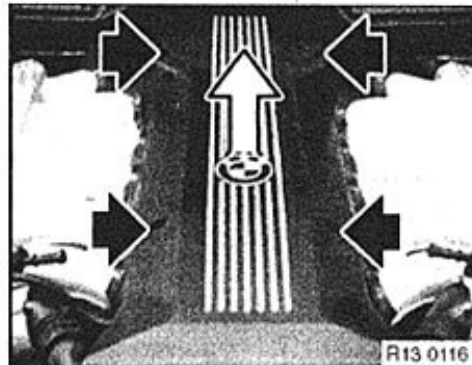
Check fuel delivery pressure;
Seal fuel line after T-piece with tool 13 3 010.
Actuate tool 61 3 050.
Check fuel delivery pressure .

* Refer to Technical Data Gr. 16

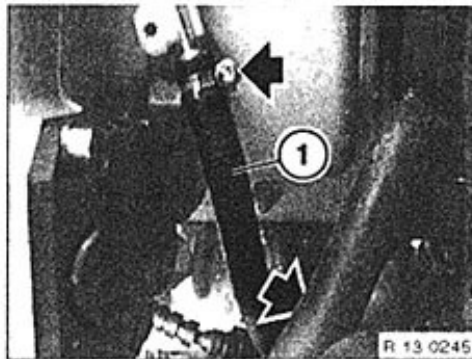
* Refer to Technical Data Gr. 16

13 31 029 Checking delivery pressure of fuel pump (M73)

Switch off Ignition.



Twist screws through 90°. Remove cover from cylinder head cover.

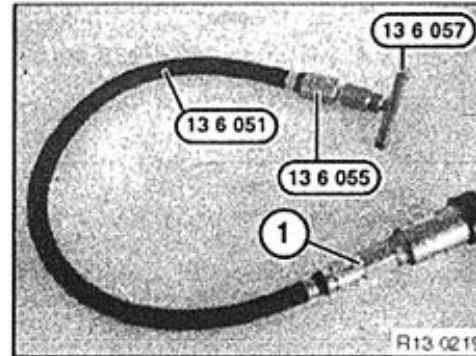


Caution!
Fuel in lines is under pressure (approx. 3 bar): catch escaping fuel and dispose of correctly!

Cut through hose to fuel delivery line (1).

Installation:
Replace fuel hose and hose clips.

Connect up Diagnosis Information System (DIS):
Select Measuring option.
Select Pressure Check.

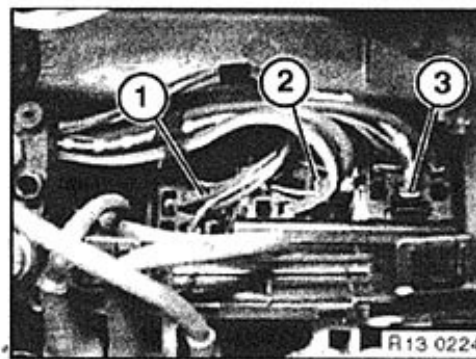


Install special tool 13 6 057 (T-piece) between the two open ends of the fuel delivery hose.

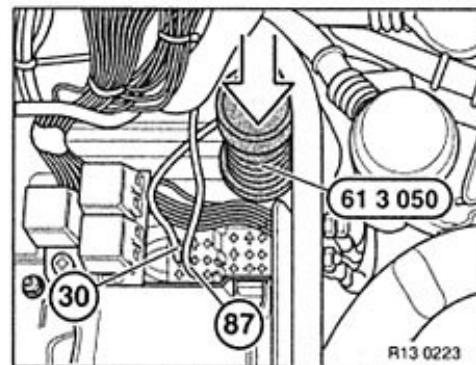
Connect special tool 13 6 057 (T-piece) to special tool 13 6 055 (reducer) and special tool 13 6 051 (hose).

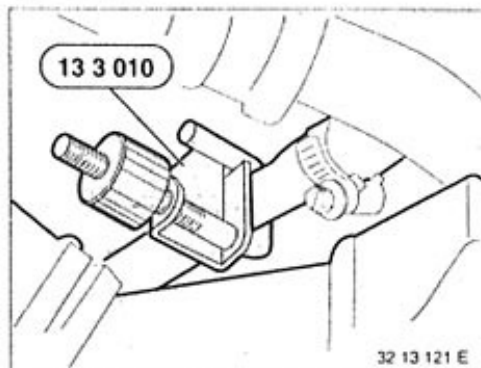
Connect special tool 13 6 051 to quick-release coupling on pressure sensor (1) on DIS.

Caution:
note when removing the special tool!
Fuel in lines is under pressure (approx. 3 bar), catch escaping fuel and dispose of it correctly!



Remove fuel pump relay (1).
Connect special tool 61 3 050 to terminal 87 or 87b and to terminal 30.
Actuate special tool 61 3 050 for approx. 10 seconds and read off delivery pressure.
Nominal values:
Delivery pressure of fuel pump, refer to Technical Data 16 14
Fuel pressure regulator, refer to Technical Data 13 53





If delivery pressure is not reached, fuel return line must be sealed using special tool 13 3 010.

Repeat the pressure check.

If the delivery pressure is reached or exceeded:

Replace the pressure regulator.

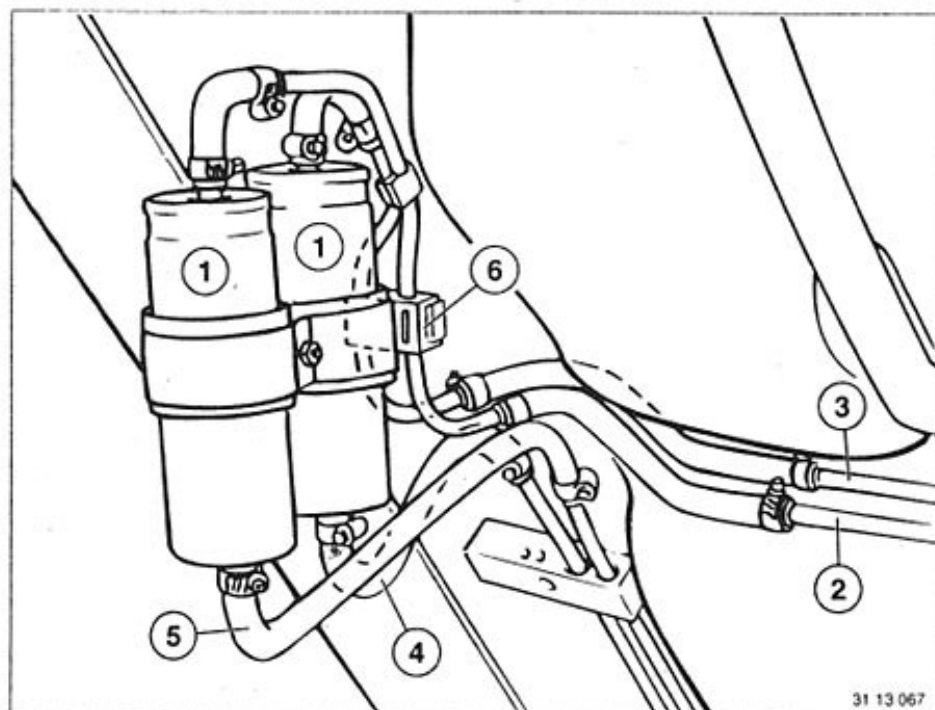
If the delivery pressure is not achieved:

Check hose routing from tank to engine on fuel pump (e.g. squashed areas, leaking).

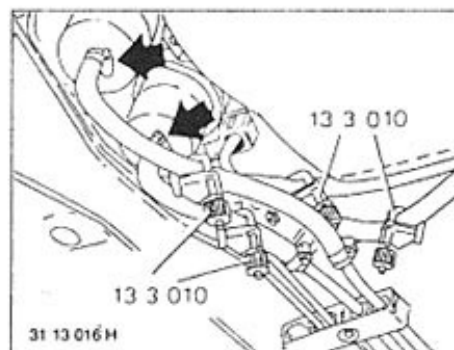
Check fuel filter (e.g. for contamination) and replace if necessary.

If the hose routing and fuel filter are O.K., check plug connection on the fuel pump for signs of corrosion, cleaning if necessary, then repeat the pressure test. If the delivery pressure is still not reached after this action is taken, replace the fuel pump.

SURVEY OF FUEL FILTER AND PIPES



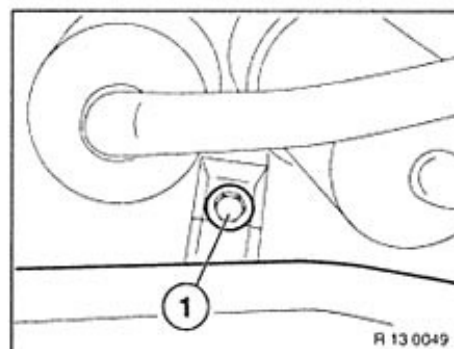
- 1 = Fuel filter
 2 = Fuel pipe from tank
 3 = Fuel pipe from tank
 4 = Fuel pipe to cyl. 1...6 (right)
 5 = Fuel pipe to cyl. 7...12 (left)
 6 = Pipes secured on filter holder



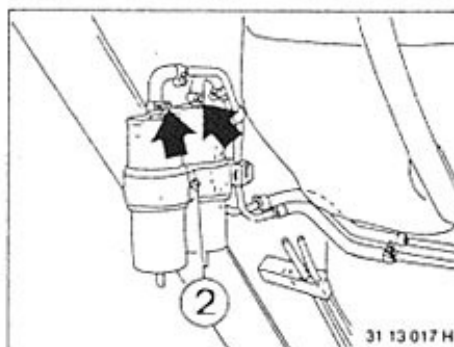
13 32 051 REPLACING FUEL FILTER

Clamp all hoses with Special Tool
 13 3 010.
 Unscrew bolt (1).
 Take off lower hoses.

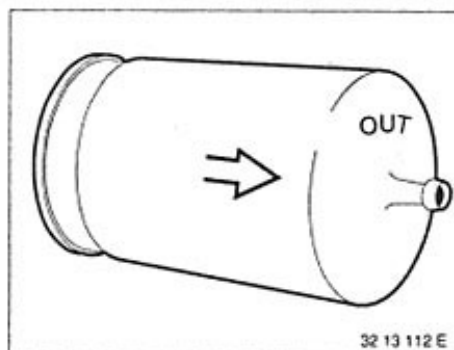
Caution!
 Catch escaping fuel.



Unscrew mounting nut (2).
 Take off upper hoses.

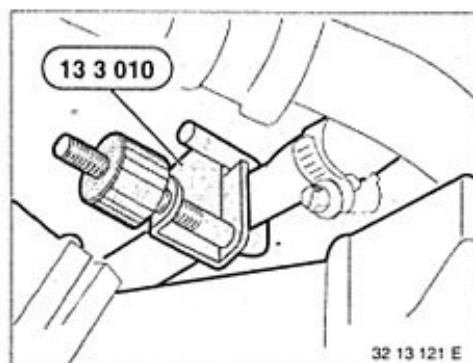


Installation:
 Check direction of flow (arrow) or out-
 let (OUT).

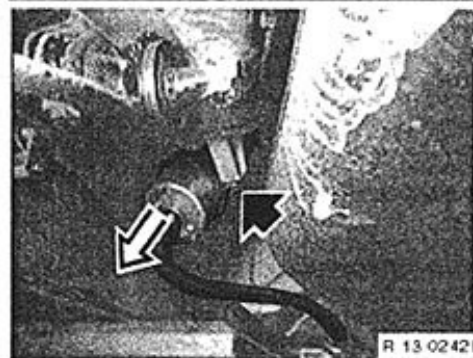


13 32 051 Replacing fuel filter (M73)

Switch off ignition.



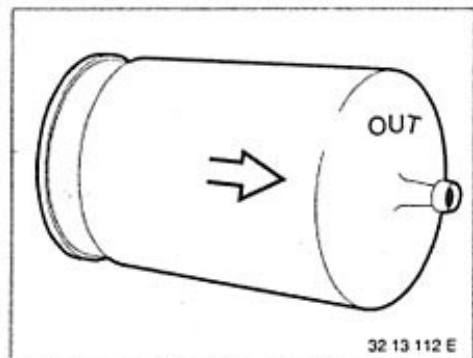
Disconnect all lines to and from fuel filter with special tool 13 3 010.



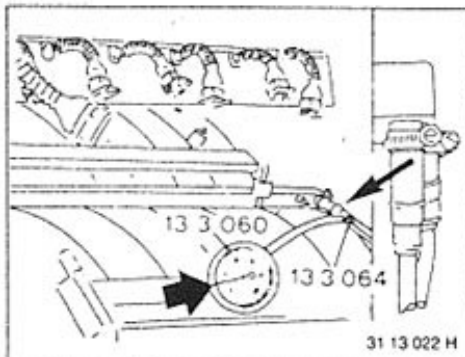
Unfasten screw and pull filter downwards to remove.
Unfasten hose clips and remove hoses.

Caution!
Catch escaping fuel and dispose of correctly.

Installation:
Fit new hose clamps.

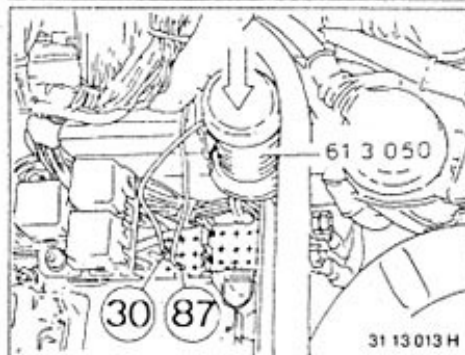


Installation:
designated by direction of flow (arrow) or letters "OUT": always take account of this during installation.

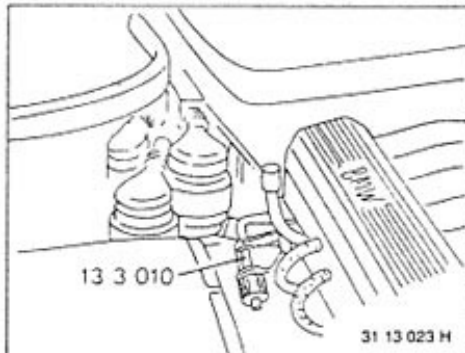


13 51 199 Checking fuel pressure regulator

Install BMW Service Tester or pressure gage 13 3 060 with connecting hose and T-piece 13 3 064 in the fuel feed line in front of the fuel pressure regulator.



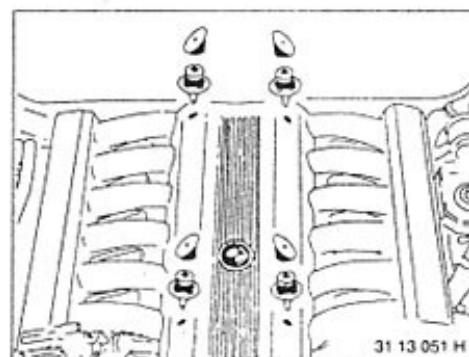
Pull off fuel pump relay. Bridge terminals 87 and 30 with tool 61 3 050. Check fuel injection pressure*).



If fuel injection pressure*) drops too fast, plug return hose with tool 13 3 010 and briefly operate tool 61 3 050 once again, refer to 13 31 ...

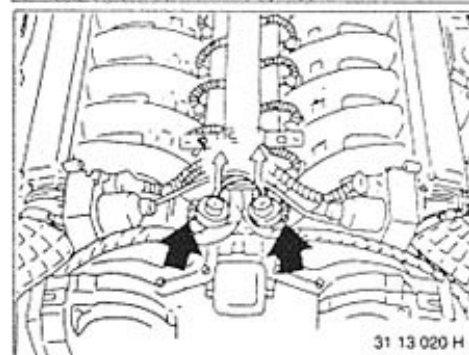
If the injection pressure is now maintained, the pressure regulator is faulty. If the injection pressure drops, there is a leak in front of the pressure regulator.

*) Refer to Technical Data

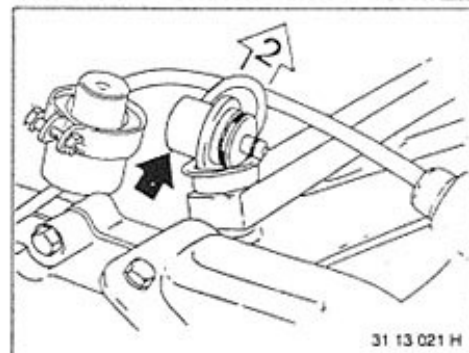


13 51 630 Replacing fuel pressure regulator

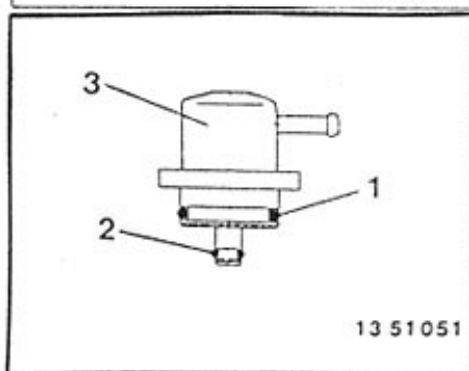
Remove cover.



Remove vacuum hose. Unfasten screw, remove clip.



Lift up and remove pressure regulator (2).



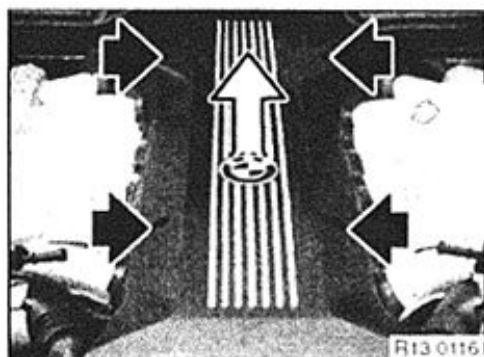
Installation:
Replace seals (1) and (2).
Check code (3).

13 51 630 Replacing fuel pressure regulator (M73)

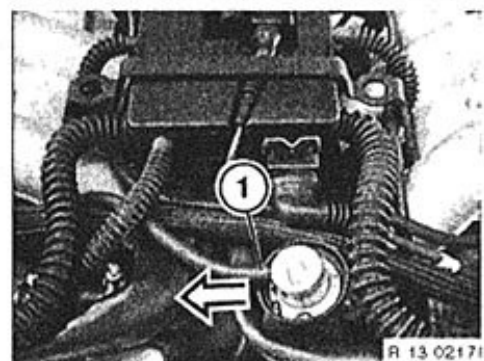
Switch off ignition.



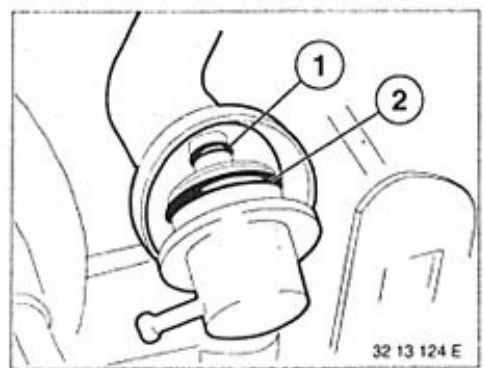
Installation:
Allow lug of retaining ring to locate in recesses in injector pipe.



Twist screws through 90°. Remove cover from manifold.

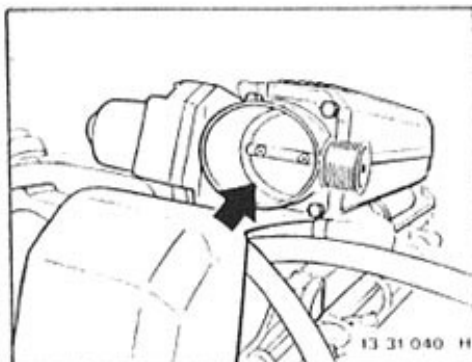


Remove vacuum hose (1). Remove retaining rings.



Note position of vacuum hose and note for subsequent assembly.
Twist and remove pressure regulator.

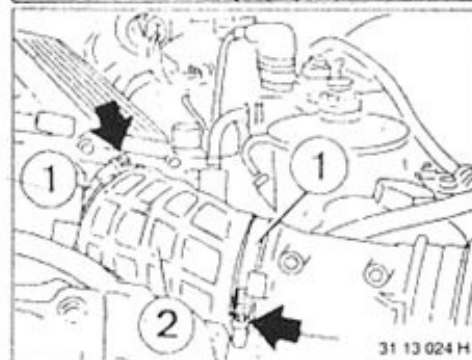
Installation:
Ensure cleanliness of sealing faces.
Replace sealing rings (1 and 2).
Coat sealing rings before assembly with anti-friction agent.



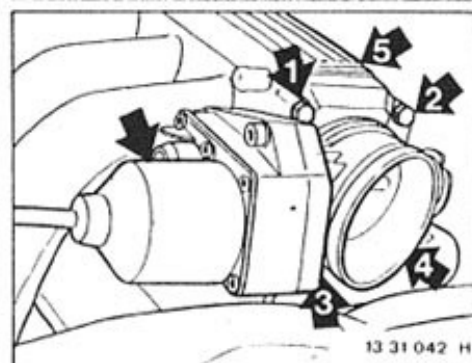
13 54 535 Replacing throttle body

Caution:

Do not reach into throttle body unit while ignition is switched on (risk of injury).



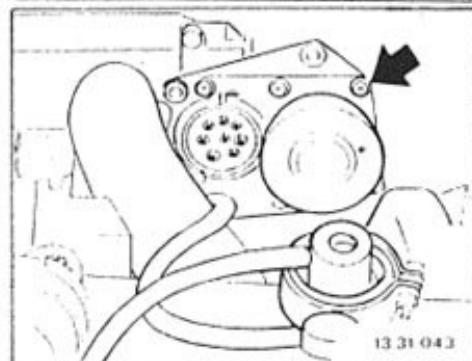
Remove feed line.
Unfasten hose clip (1) and remove hose (2).



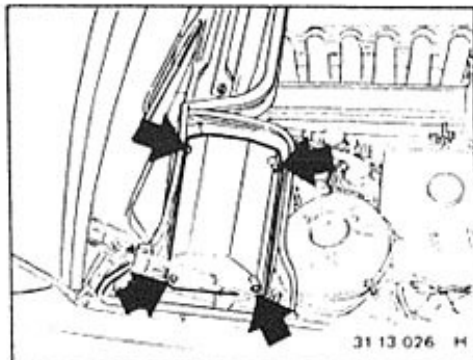
Unfasten plug connection from housing.
Unfasten screws 1 - 4.
Remove throttle body.
5 = gasket

Installation:

Fit new gasket (5).

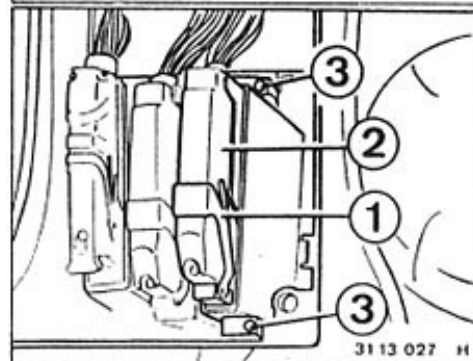


Do not dismantle EML throttle body.
Fault memory can be interrogated using EML on-board diagnosis facility.

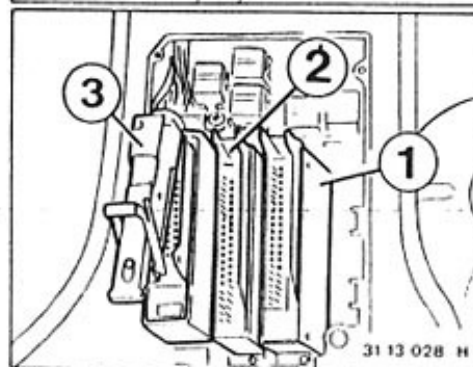


13 61 000 REMOVING AND INSTALLING OR REPLACING CONTROL UNIT FOR DME

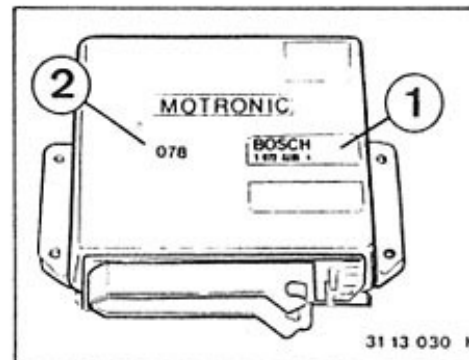
Unscrew electronic box cover screws.
Take off cover.



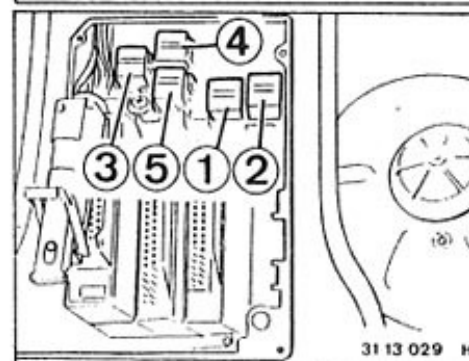
Pull up lock (1) and pull off plug (2).
Loosen clamps (3) and remove control unit.



1 = DME control unit for cyl. 1...6
2 = DME control unit for cyl. 7...12
3 = EML control unit

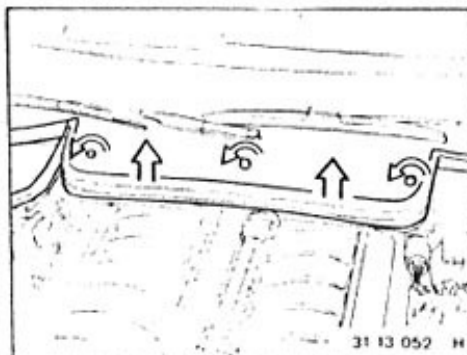


Installation:
Check code number (1)* and manufacturing date (2)*.



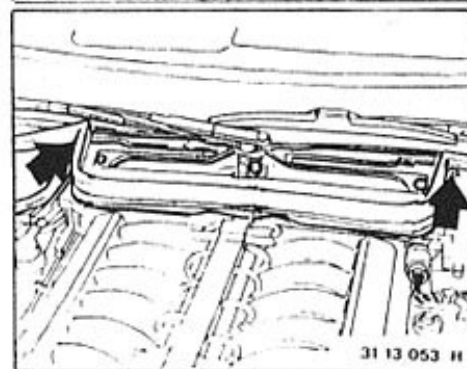
Relays in Electronic Box:

- 1 = Fuel pump relay for cyl. 7...12
- 2 = Fuel pump relay for cyl. 1...6
- 3 = Oxygen sensor heating relay (both)
- 4 = DME master relay 2 (cyl. 7...12)
- 5 = DME master relay 1 (cyl. 1...6)

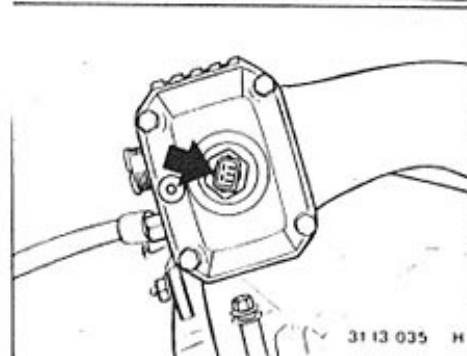


13 62 511 REPLACING INATKE AIR TEMPERATURE SENSOR

Check function – see 13 00 002.
Unscrew cover for fresh air housing.



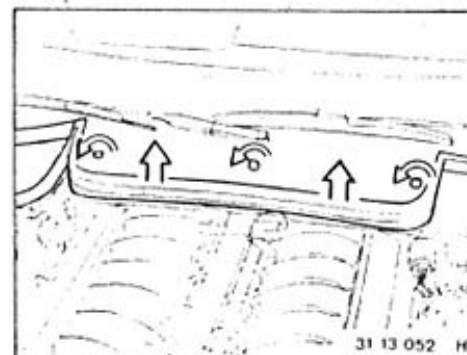
Remove fresh air housing.



Press spring-loaded lock.
Pull off plug.
Unscrew sensor.

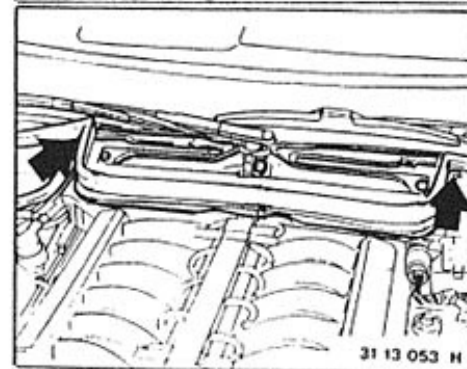
Installation:
Tightening torque*.

* See Specifications

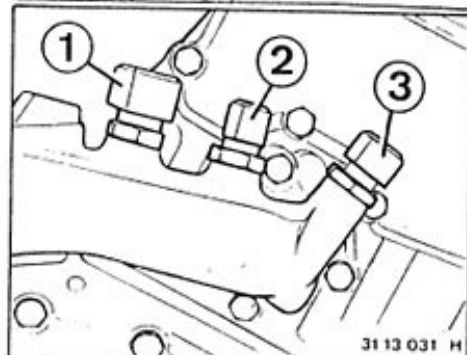


13 62 531 REPLACING COOLANT TEMPERATURE SENSOR

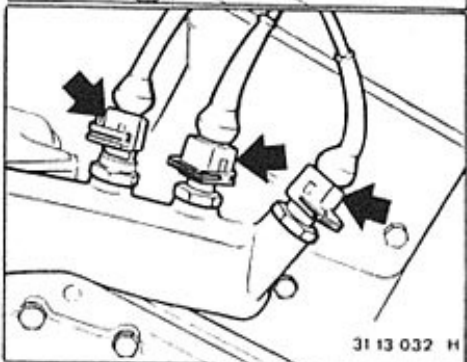
Check function – see 13 00 002.
Unscrew cover for fresh air housing.



Remove fresh air housing.



Arrangement:
1 = Temperature sensor - DME
2 = Temperature sensor - EML
3 = Temperature sensor - temp. gage



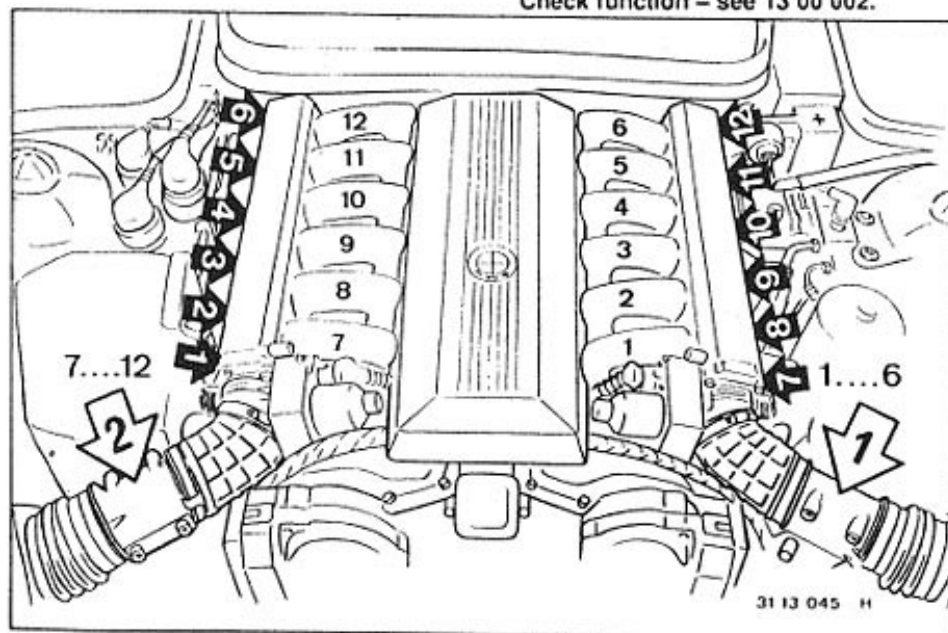
Press spring-loaded lock.
Pull off plug.
Unscrew sensor.

Installation:
Tightening torque*.

* See Specifications

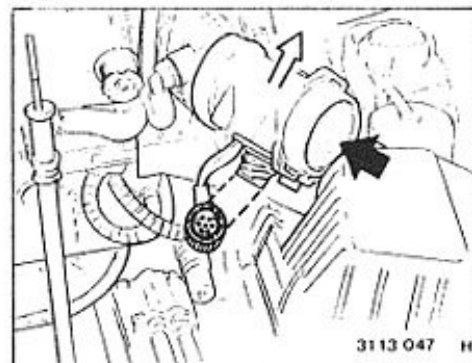
13 62 560 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT AIR MASS SENSOR

Check function – see 13 00 002.



Hot Wire Air Mass Sensors:
1 = Right bank of cylinders 1...6
2 = Left bank of cylinders 7...12

Important!
Intake pipes cross; air mass sensors
are inversed.

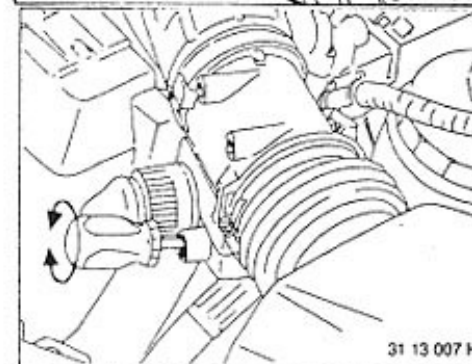


Lift out Intake neck.

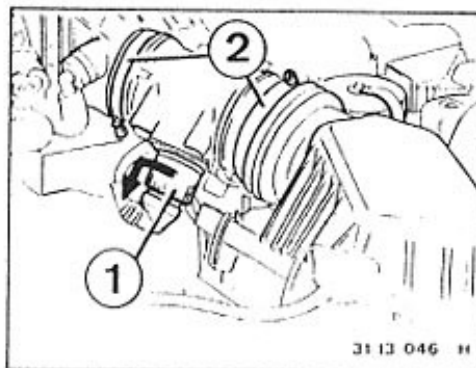
Installation:
Install clean filter screen only.



Cars with Catalyst:
Don't remove anti-tamper lock/correction
screw.
Don't make corrections.



Cars Prepared for Catalyst:
CO setting* – see 13 00 060.



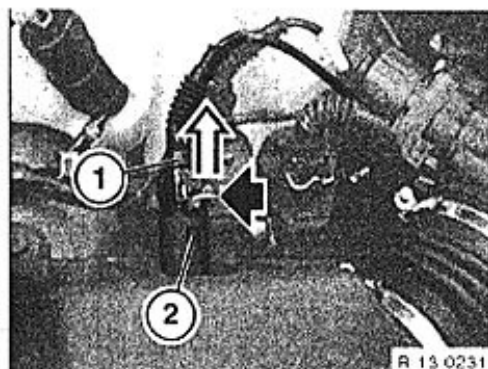
Disconnect plug (1) and loosen hose
clamp (2).

Installation:
Check code number and manufactur-
ing date.

* See Specifications

13 62 511 Replacing temperature sensor for intake air (M73)

Switch off ignition.



Press down retaining spring (2).
Remove connector (1).
Unclip temperature sensor.

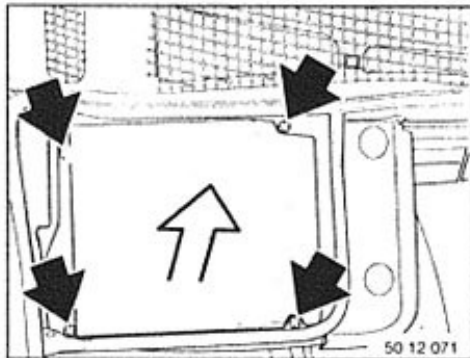
Interrogate fault memory on control unit of Digital Motor Electronics (DME), check error messages and clear fault memory.

13 62 531 Replacing temperature sensor for coolant (M73)

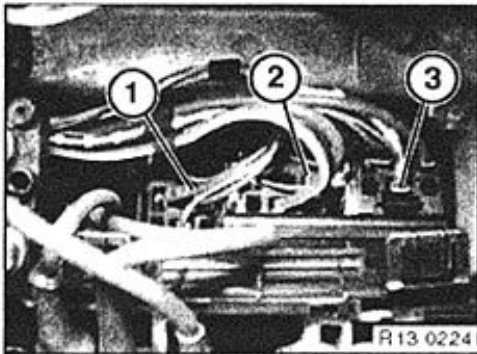
Refer to,
Repair Instructions for 7 Series E38.

13 63 590 Replacing fuel pump (M73)

Switch off ignition.



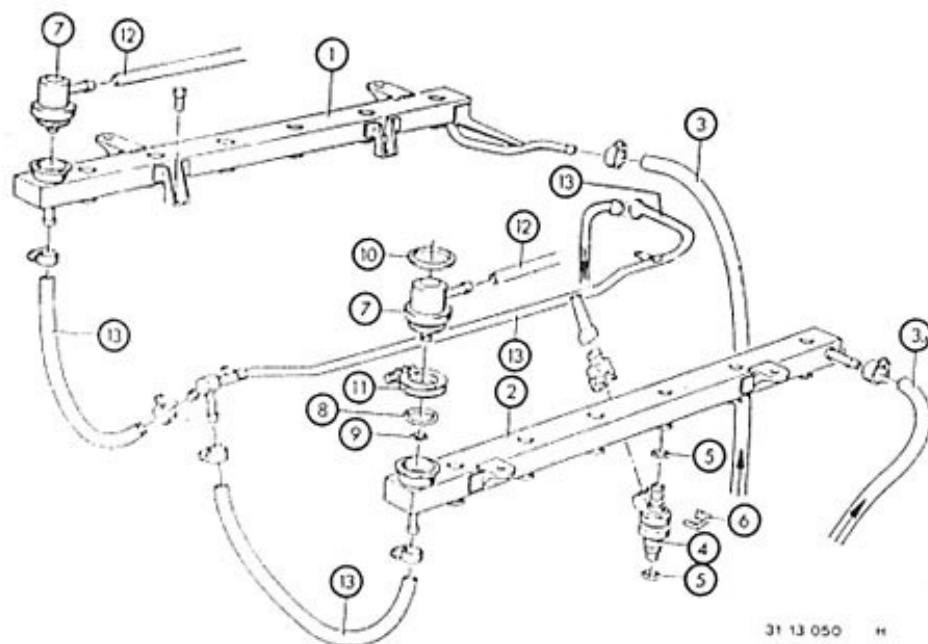
Unfasten screws.
Remove cover.



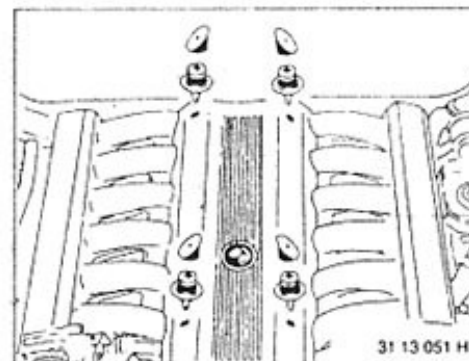
Unclip fuel pump relay (1) and receptacle from bracket. Pull relays out of relay receptacle.

Interrogate fault memory of Digital Motor Electronics (DME), check faults in memory, rectify faults and correct fault memory.

Summary of injection pipes with accessories

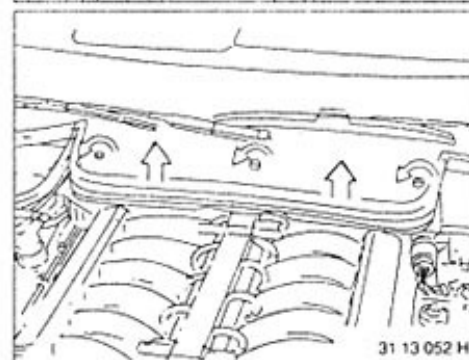


- 1 = cyl. 1 - 6 right injection pipe
- 2 = cyl. 7 - 12 left injection pipe
- 3 = fuel line, cyl. 1 - 6
- 3a = fuel line, cyl. 7 - 12
- 4 = injector valve
- 5 = seal
- 6 = clip (fuse)
- 7 = pressure regulator
- 8 = O-ring
- 9 = O-ring
- 10 = ring
- 11 = clamping strap
- 12 = vacuum hose
- 13 = return line

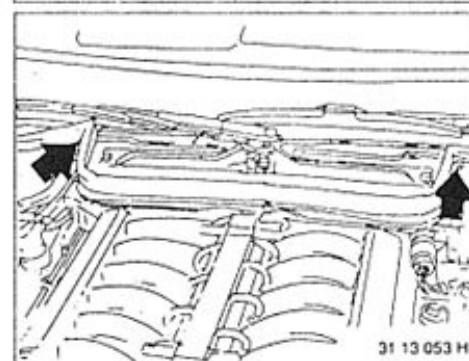


13 64 541 Replacing all injection valves

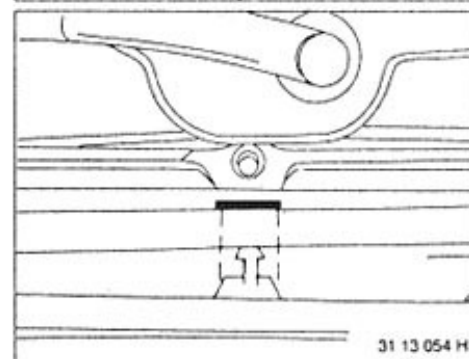
Remove protective cover.



Remove cover from fresh air housing.

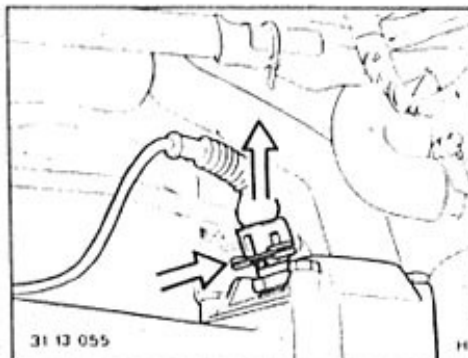


Unfasten screws.
Remove fresh air housing ...

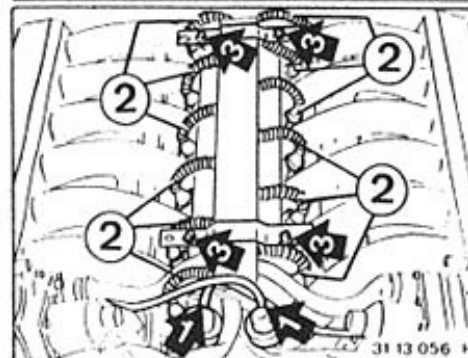


Installation:
Lower lug must locate in recess.

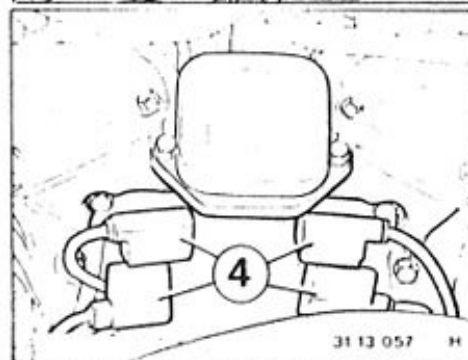
*) Refer to Technical Data



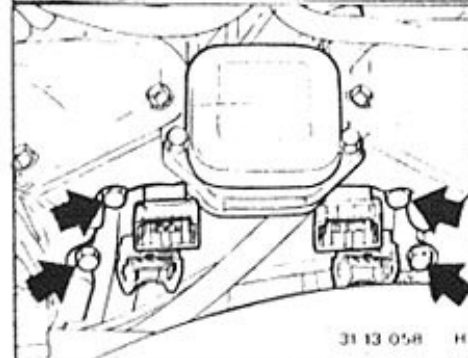
Pull off plug on air temperature sensor.



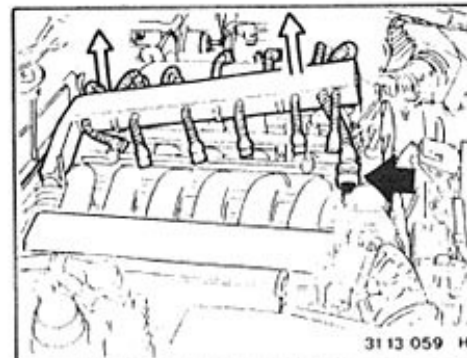
Pull off vacuum hoses (1).
Pull off fuel injector plugs (2).
Unscrew electric lead duct screws (3).



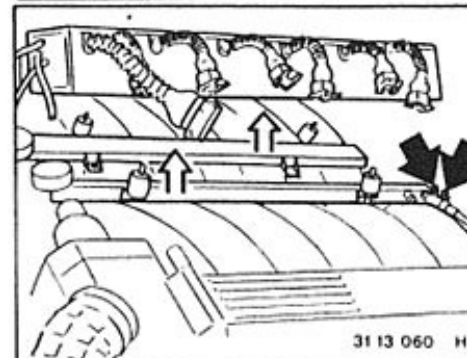
Pull off sender plugs (4).



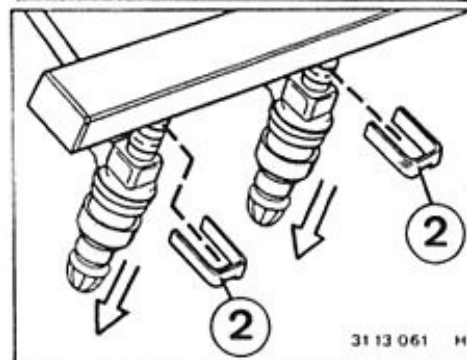
Unscrew screws.
Pull off plugs from above.



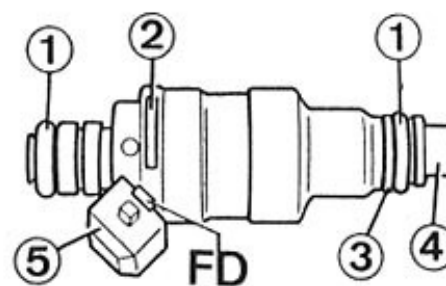
Turn and pull off throttle valve plugs.
Pull up electric lead duct.



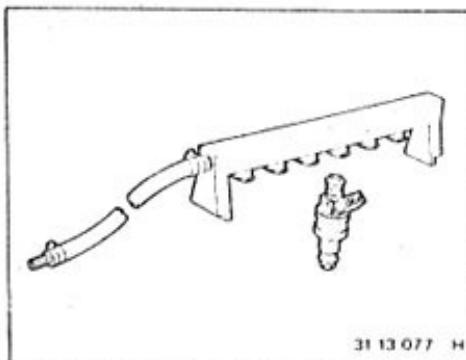
Disconnect fuel hoses.
Pull up injection pipes.



Lift off retainers (2) and remove fuel injectors.



Installation:
Check/replace O-rings (1).
Check code number (2)*.
FD = Manufacturing date
Check position of plastic washer (3).
Check color* of control box (5) or injection nozzle guard (4).
Only lubricate O-rings with vaseline for installation.

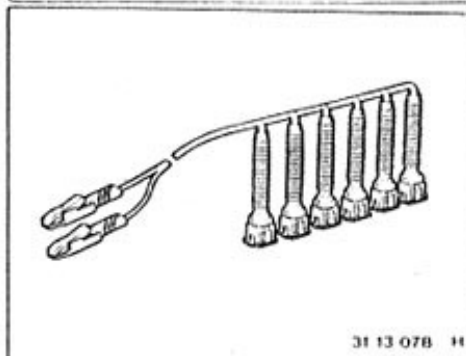


13 64 582 CHECK ALL FUEL INJECTORS FOR LEAKS AND CLEANING

Remove fuel injectors – refer to 13 64 150.

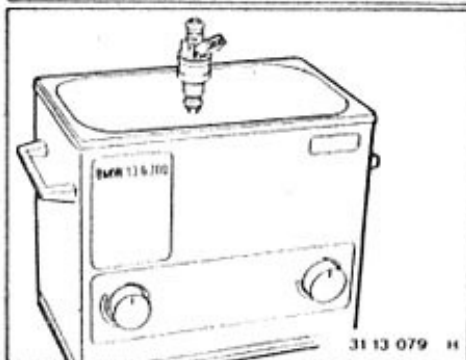
Checking Fuel Injectors for Leaks:
Clip fuel injectors in Special Tool 13 6 205 (Injection pipe).
Keep to sequence of cylinders.

31 13 077 H



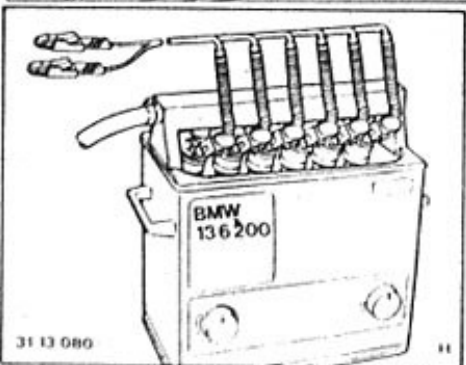
Connect Special Tool 13 6 206 (wire harness).
Supply 3 bar pressure to the fuel injectors.

31 13 078 H



To remove residual fuel from fuel injectors, connect wire harness on 12 V battery.
Pull wire plugs off of fuel injectors.
Set air pressure to 3 bar again.
Place fuel injectors with Injection pipe in a suitable tank filled with hot water (60 ... 80° C).
Check for air leaks.
Permissible leak rate = two air bubbles per fuel injector in 15 seconds.
Note fuel injectors with greater air leak rate.

31 13 079 H



Take fuel injectors out of the water.
Remove air pressure connections.
Dry plug connections of fuel injectors with compressed air.

31 13 080

Cleaning Fuel Injectors:
Connect wire plugs of Special Tool 13 6 206 (wire harness) on fuel injectors and connect wire harness on 12 V battery.

Suspend fuel injectors with Special Tool 13 6 205 (Injection pipe) in ultrasonic cleaner (Special Tool 13 6 200).

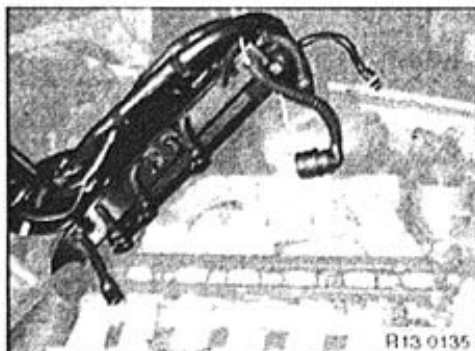
Clean and simultaneously supply current to fuel injectors in accordance with operating instructions of the cleaning machine.

Repeat leak test.

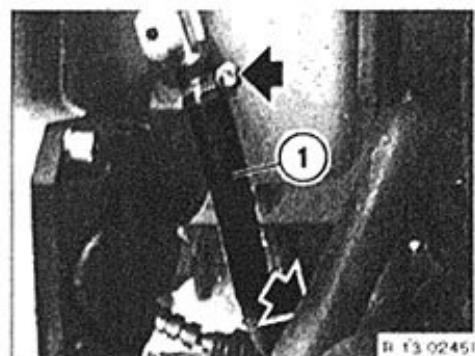
Important!
Don't carry out leak test in cleaning fluid, but instead only in a water bath.

13 64 541 Replacing all injector valves (M73)

Switch off ignition.



Unfasten engine wiring harness from engine and lift upwards, tying up on engine lid. Remove engine wiring harness, refer to 61 11 051.



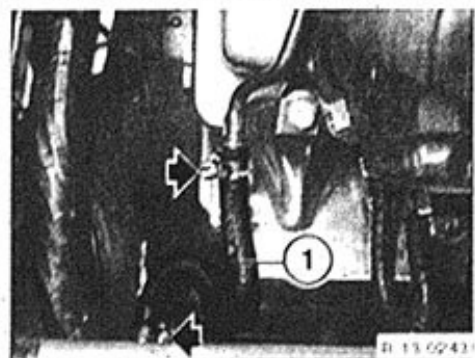
Unfasten hose clips. Remove fuel delivery hose (1).

Caution!

The fuel in the line is under pressure (approx. 3 bar). Catch escaping fuel with suitable receptacle and dispose of it correctly.

Installation:

The fuel hoses and hose clips must be replaced!



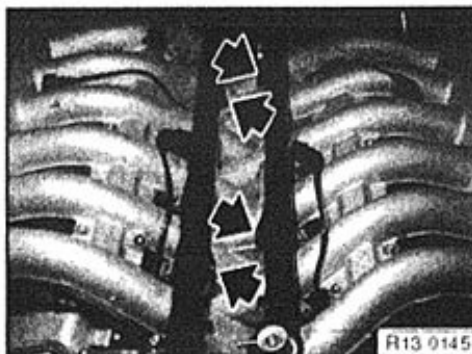
Unfasten hose clips. Remove fuel return hose (1).

Caution!

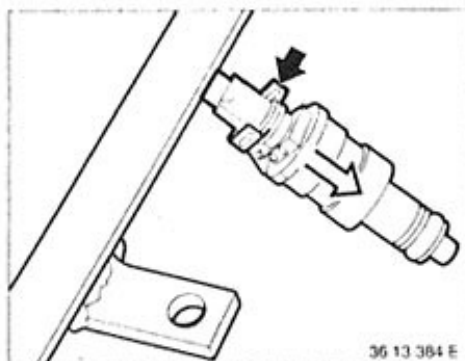
Fuel in line is under pressure (approx. 3 bar). Catch escaping fuel in suitable receptacle and dispose of it correctly.

Installation:

Fuel hoses and hose clips must be replaced!



Unfasten screws. Remove injector strip together with injector valves.



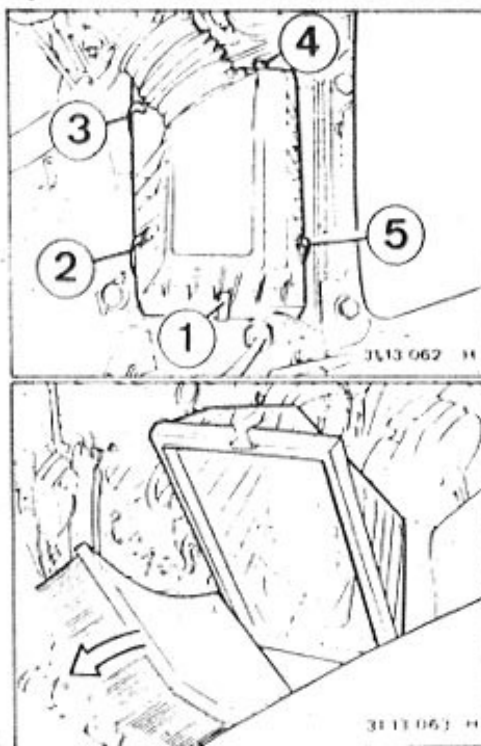
Unclip retainer. Remove injector valves.

Installation:

Check seals on injector valves and replace if necessary.

Before installing the injector valves, coat seals with acid-free grease.

Check injector valves for leaks and clean, refer to 13 63 582.

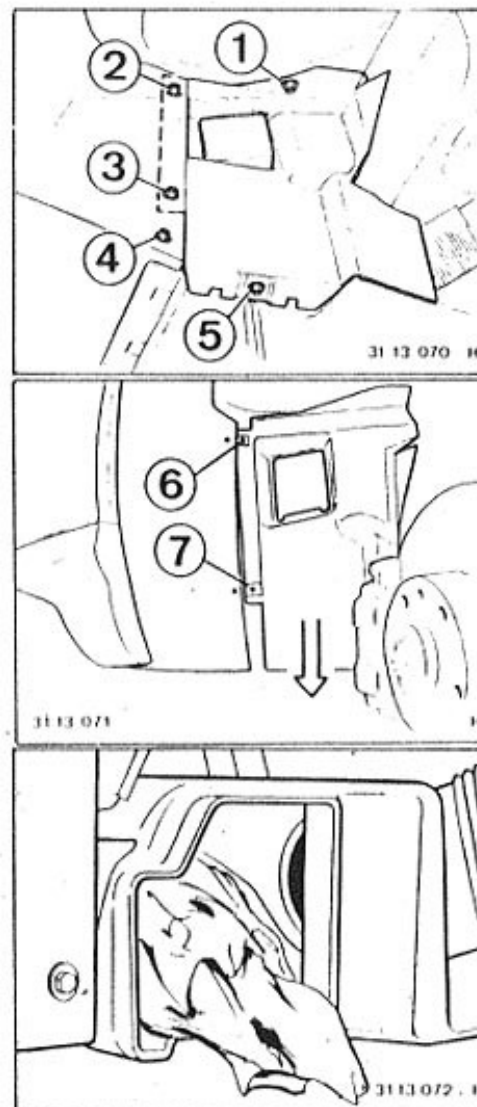


13 72 002 REPLACING AIR FILTER CARTRIDGES (BOTH)

Open clips (1...5).

Lift upper section.
Take out air filter cartridge.

When replacing an air filter cartridge, it is always necessary to remove deposits of dirt from the corresponding intake manifold.



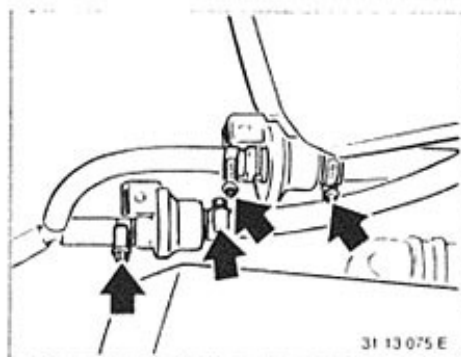
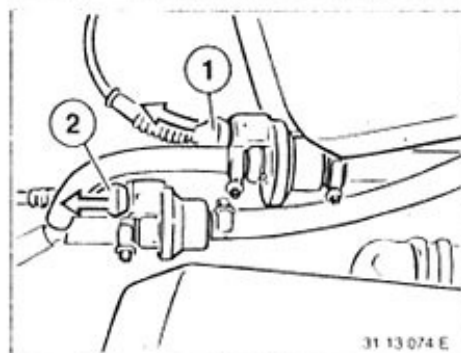
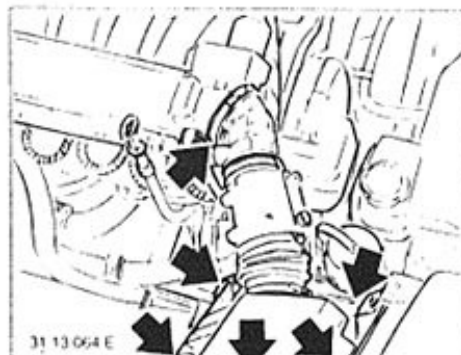
Cleaning Intake Manifold:

Unscrew screws (1...5).

Pull off cover.

Installation:
Note self-tapping screws (6 and 7).
Insert air duct and guides correctly.

Wipe out lower manifold housing with a cloth which does not lose lint.



13 90 500 REPLACING TANK VAPOR VENTING VALVE

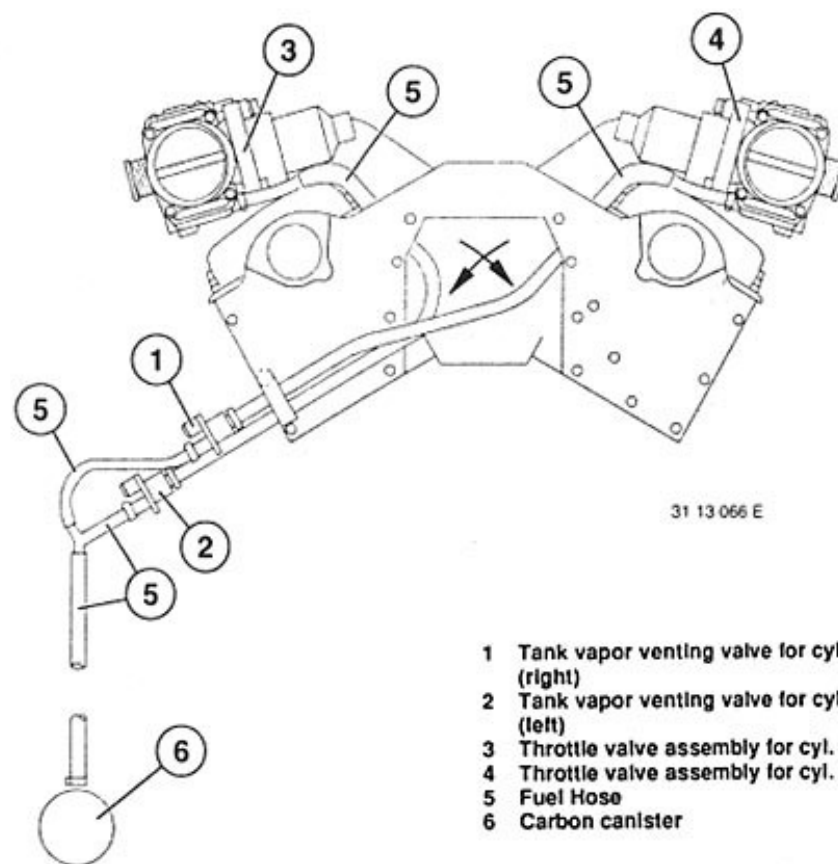
Check function - refer to 13 00 002.
Remove left air volume meter together with intake bellows and upper filter section.

Squeeze retainers and pull off plugs.

Important!
Don't mix up plugs — mark them if necessary.

Disconnect fuel hoses, catching any escaping fuel.

ARRANGEMENT OF TANK VAPOR VENTING VALVES (View Opposite Forward Direction)



- 1 Tank vapor venting valve for cyl. 1...6 (right)
- 2 Tank vapor venting valve for cyl. 7...12 (left)
- 3 Throttle valve assembly for cyl. 1...6
- 4 Throttle valve assembly for cyl. 7...12
- 5 Fuel Hose
- 6 Carbon canister

13 90 ... Checking tank venting valve

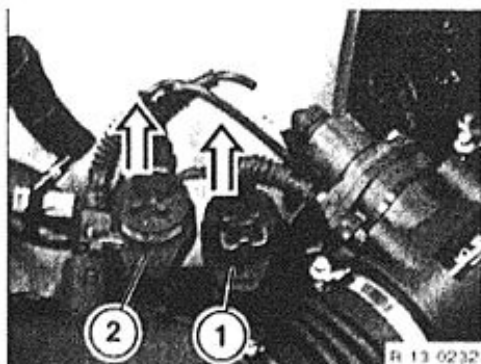
Attach vacuum hose (1) of BMW Service Tester to the 8 mm dia. neck.
Provide the tank venting valve with a 12 V power supply (2) (special tool 61 1 440).

Select multimeter function 21 on BMW Service Tester.
Set vacuum to 600 mbar $\pm$ 100.
Switch off vacuum pump.

During the measuring period of approx. 20 seconds, pressure must not drop by more than 50 mbar.
If pressure falls by more than 50 mbar, a new tank venting valve must be fitted.

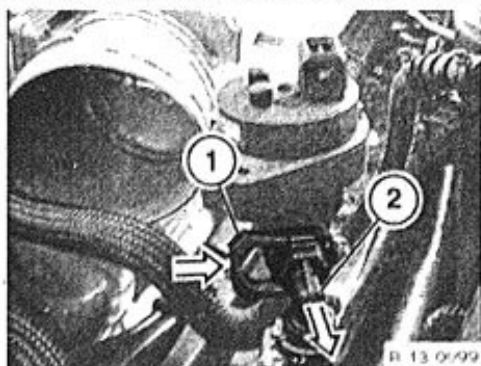
**13 90 500 Replacing tank vent valve
(M73)**

Switch off ignition.



To prevent plug connections becoming confused on the two tank vent valves, mark them before dismantling the plug connections. Disconnect plug connections.

- 1 Tank vent valve 1
for cylinder bank 1-6
- 2 Tank vent valve 2
for cylinder bank 7-12



Open fast-release coupling on tank vent valve, press down interlock (1) and remove hose (2). Remove tank vent valve from bracket. Unfasten hose clip. Remove hose.

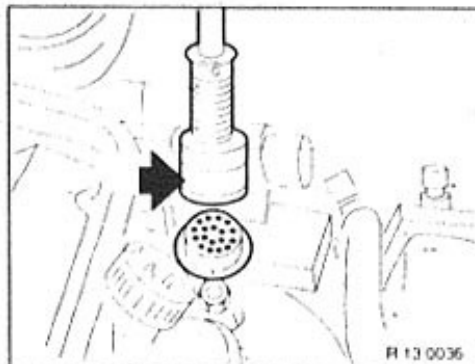
Installation:
Replace hose clip.

Interrogate fault memory of control unit on Digital Motor Electronics, rectify faults and clear the fault memory.

13 Fuel System M60

13 00 002	Function check of Digital Motor Electronics (DME)	13- 0/31
. . .	Checking components	13- 0/31
	Idle speed control valve – check	13- 0/31
	Temperature sensor for intake air – check	13- 0/31
	Temperature sensor for coolant – check	13- 0/32
	Tank vent valve – check	13- 0/32
13 31 029	Checking fuel pump delivery pressure	13- 31/31
	Summary of fuel filter and lines	13- 32/31
13 32 051	Fuel filter – replace	13- 32/31
13 41 500	Idle speed control valve – replace	13- 41/31
13 51 199	Fuel pressure regulator – check	13- 51/31
630	Fuel pressure regulator – replace	13- 51/32
13 54 030	Throttle body – remove and install/seal	13- 54/31
13 62 511	Temperature sensor for intake air – replace	13- 62/31
531	Temperature sensor for coolant – replace	13- 62/31
560	Mass air flow sensor – remove and install or replace	13- 62/32
13 64 541	All injection valves – remove and install or replace	13- 64/31
13 71 000	Suction filter housing – remove and install	13- 71/31
13 72 001	Air filter insert – replace	13- 72/31
13 90 500	Tank vent valve – replace	13- 90/31

For additional work, refer to "Repair Instructions Series 7 E38"



13 00 002 Checking function of digital motor electronics (DME)

Connect BMW Service Tester

Carry out brief test

Interrogate fault memories

Interrogate status

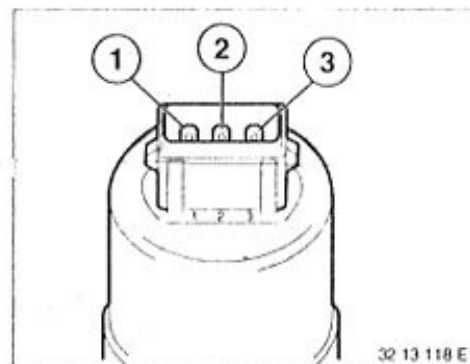
Refer to: operating instructions for BMW

Service Tester / BMW diagnosing system:

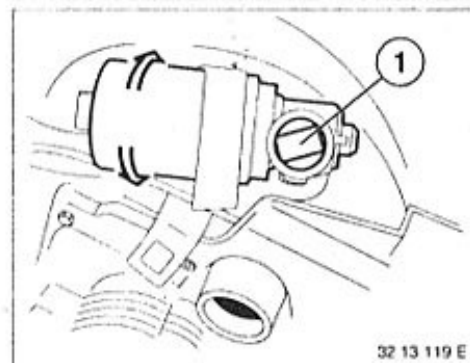
Additional instructions on troubleshooting - refer to:

Electrical Troubleshooting Manual for the 8 Series E31.

PI 13 0036



32 13 118 E



32 13 119 E

13 00 ... Checking components

Checking idle speed control valve

Electrical check

Measure resistance between terminal (1) and (3), nominal value of approx. 23 Ω

Measure resistance between terminal (2) and (1) or (2) and (3).

Nominal values of approx. 12 Ω respectively

Dynamic check

Remove idle speed control valve (connector remains attached).

Completely open or close rotary piston (1).

Switch on ignition.

Rotary piston must adopt and maintain a position of approx. 50 % cross section aperture.

For additional tests, refer to BMW Diagnosing System.

Checking temperature sensor for intake air

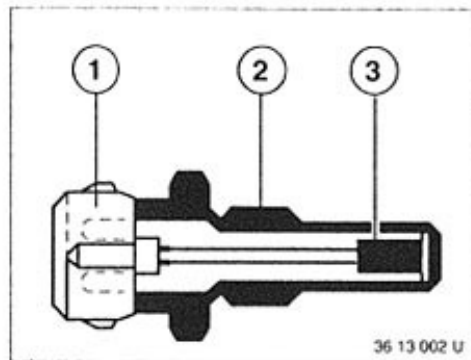
Check resistance value* on temperature sensor. Check leads from control unit connector to temperature sensor connector for interrupts and short-circuits**.

* Refer to Technical Data Gr. 12/Gr. 13

** Refer to Schematics for the 8 Series E31

Checking coolant temperature sensor

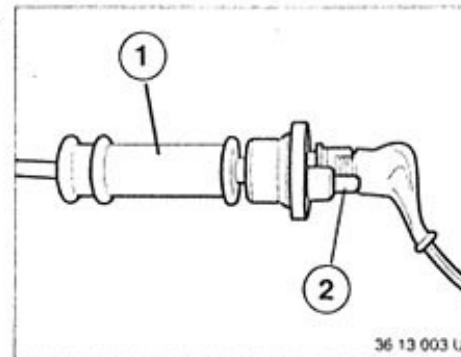
Attach Jetronic test cable 61 1 440. Use ohmmeter to check nominal value*) and, to check the entire temperature range, remove the sensor, immerse up to hex head in water bath and check with an ohmmeter**).



The temperature sensor measures the engine temperature and transmits this to the control unit as a resistance value.

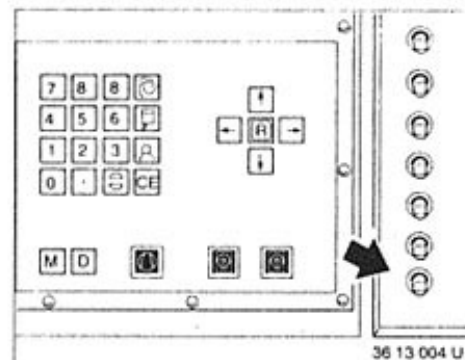
The resistance value falls as the temperature rises (NTC).

- 1 = Plug connector
- 2 = Housing
- 3 = NTC resistance



Checking tank vent valve

Connect vacuum hose (1) of BMW SERVICE TESTER to the 8 mm dia. neck. Provide tank vent valve with 12 V voltage (2) (special tool 61 1 440).



Select multimeter function 21 on BMW Service Tester.

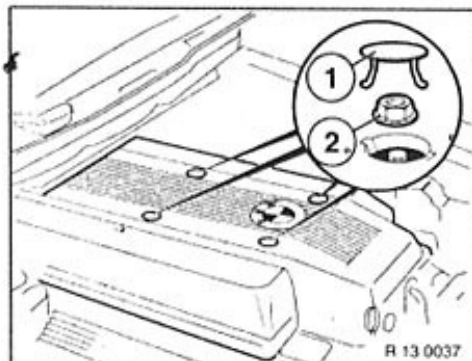
Set vacuum to 600 mbar $\pm$ 100. Switch off vacuum pump.

During the measuring period of approx. 20 seconds, the pressure drop must not exceed 50 mbar.

If pressure loss exceeds 50 mbar, the tank vent valve must be replaced.

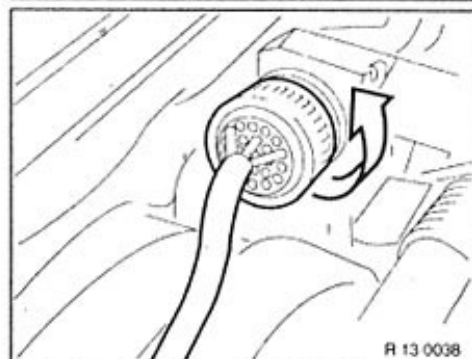
*) Refer to Technical Data Gr. 12/Gr. 13

**) Refer to Technical Data Group 12/Group 13
**) Refer to Schematics folder

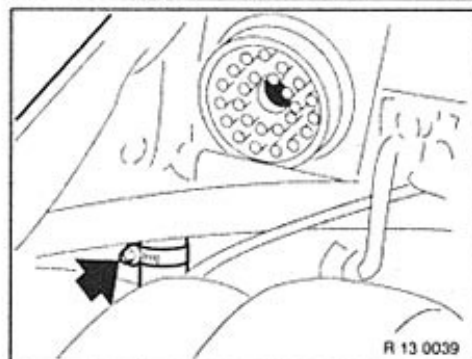


13 31 029 Checking fuel pump delivery pressure

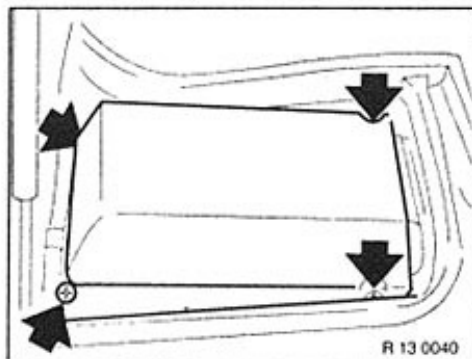
Press off sealing caps (1) and unfasten nuts (2).
Remove cover for manifold.



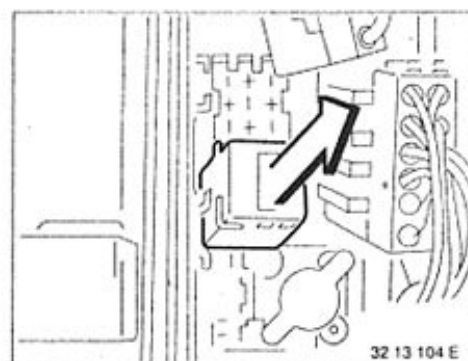
Twist engine cable connector and remove.



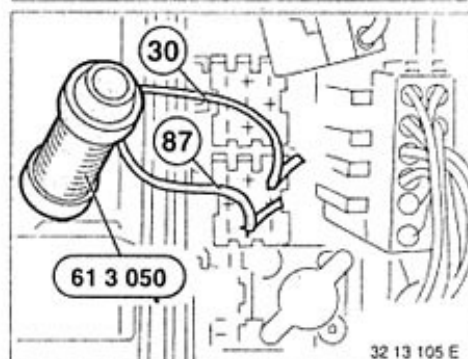
Install connection of BMW Service Tester or pressure gage 13 3 060 with connecting line and T-piece 13 3 064 in the fuel intake lead.



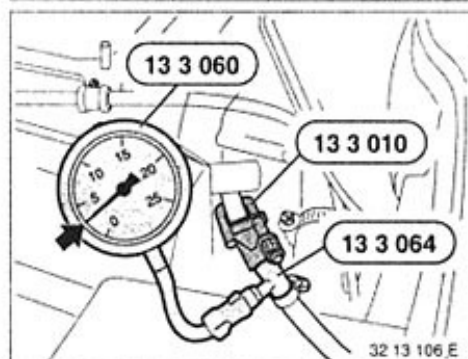
Unfasten screws.
Remove cover for E box.



Install connectors and cables to one side.
Remove fuel pump relay (orange).

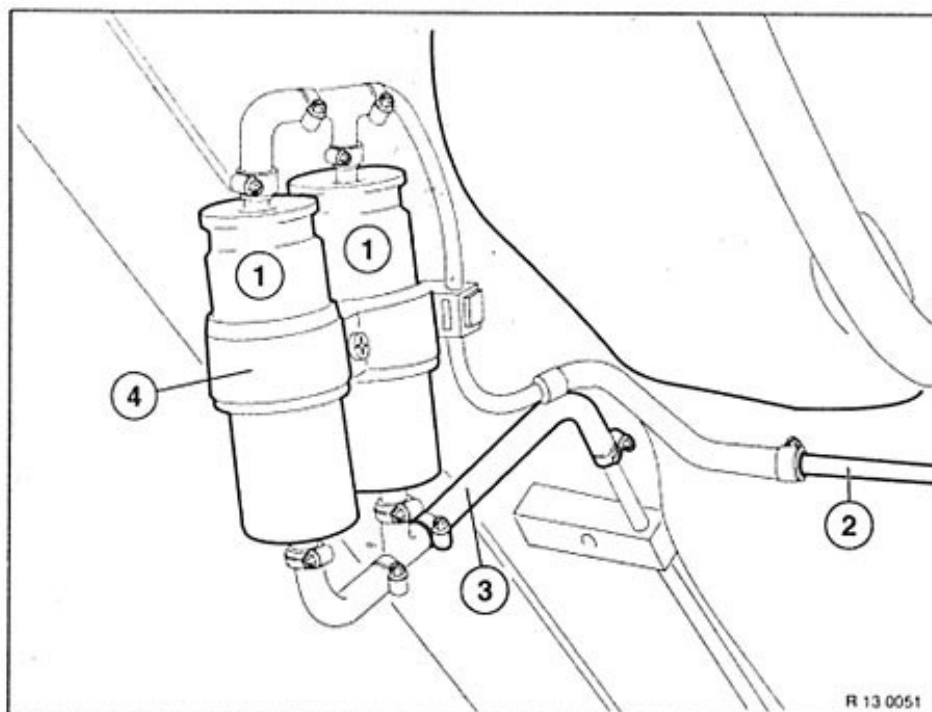


Use tool 61 3 050 to bridge terminal 87 and terminal 30. Switch on ignition, actuate tool. Read off system pressure* and check.



Check fuel delivery pressure:
seal fuel line after the T-piece with tool 13 3 010.
Switch on ignition. Actuate tool 61 3 050 and check fuel delivery pressure*.

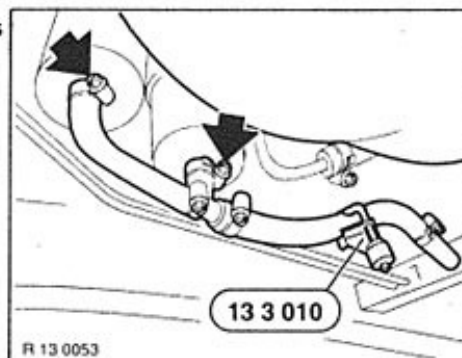
Summary of fuel filter and lines



840 i

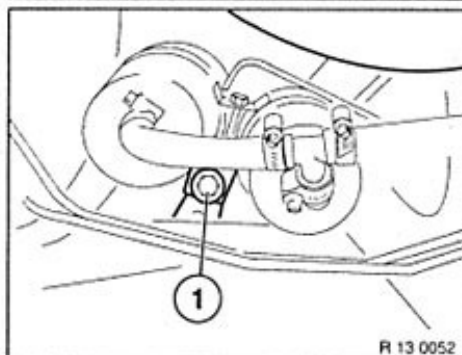
- 1 Fuel filter
- 2 Fuel line from tank
- 3 Intake line
- 4 Filter mount

R 13 0051

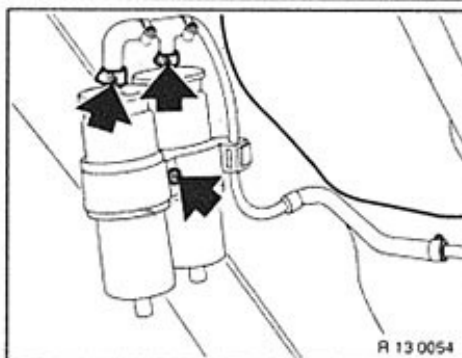


13 3 010

R 13 0053



R 13 0052



R 13 0054

13 32 051 Replacing fuel filter

Disconnect retaining clips from lines on the body as much as necessary.
Seal fuel hoses with special tool 13 3 010.
Remove lower hoses.

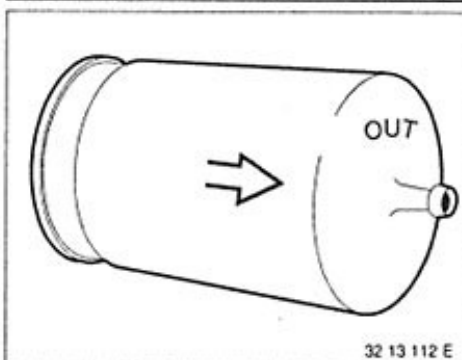
Caution!
Catch escaping fuel and dispose of correctly.

Unfasten screw (1) from filter mount.

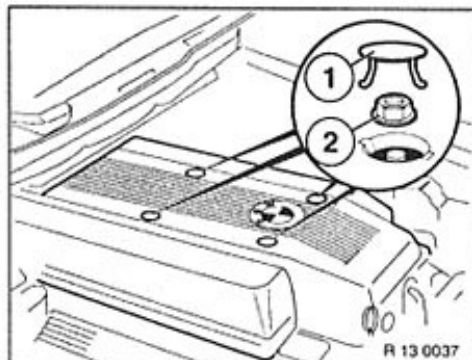
Remove hoses from fuel filter.
Unfasten retaining nut and remove filter.

Caution!
Catch escaping fuel and dispose of correctly.

Installation:
Note direction of flow (arrow), or (OUT) outlet.

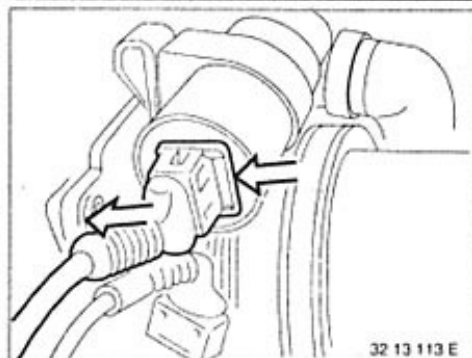


32 13 112 E

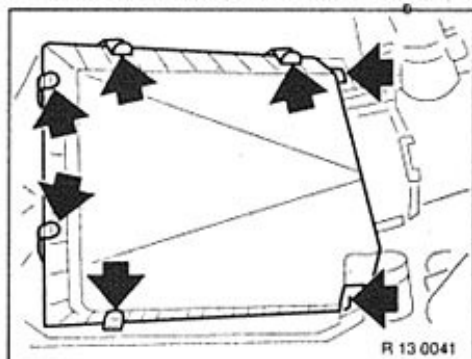


13 41 500 Replacing idling control valve

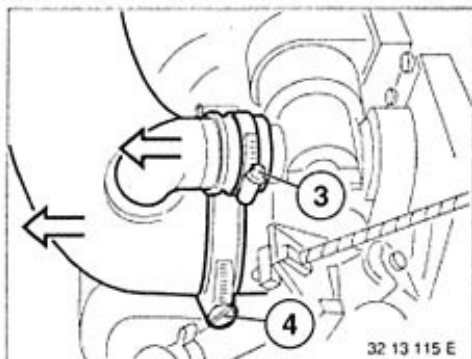
Press off sealing caps (1) and unscrew nut (2).
Remove manifold cover.



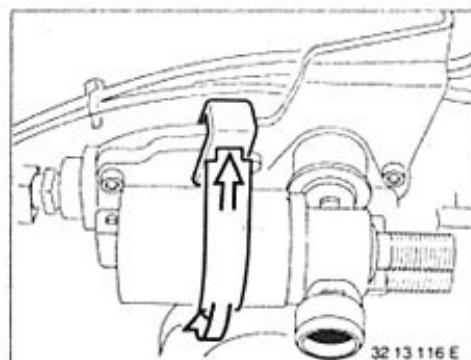
Compress retaining spring and remove connector.



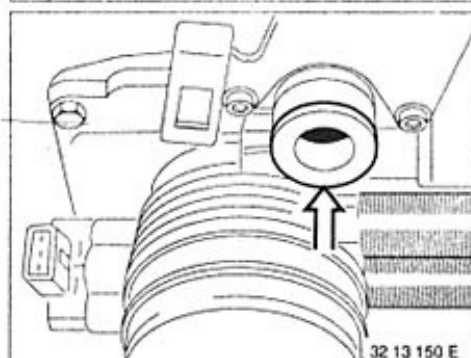
Open clips and lift out upper section of air filter housing.



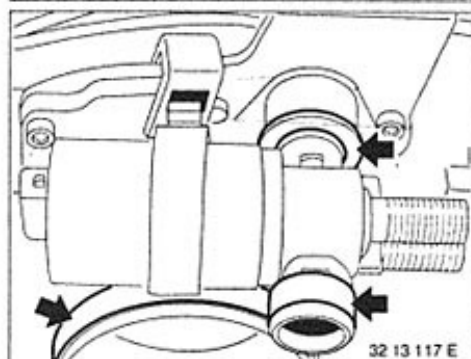
Unfasten hose clips (3 and 4).
Remove intake hoses with upper section of air filter housing.



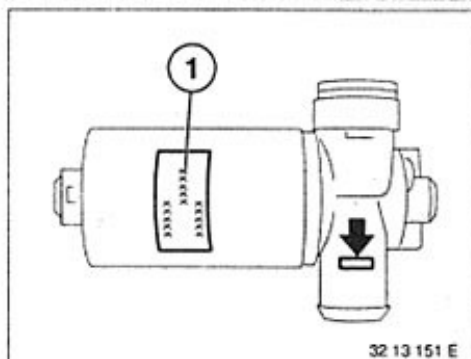
Compress retainer and disconnect.
Remove idling speed control valve.



Installation:
First install seal in throttle valve flange.



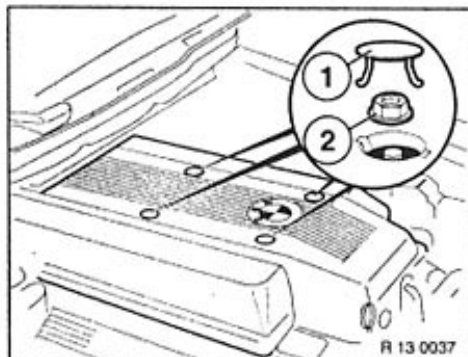
Installation:
Note seals on throttle body and on idling speed control valve.



Installation:
Check code (1)*.
Check idling speed.

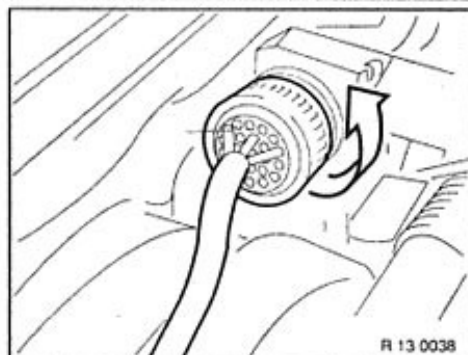
Component inspection, see 13 00 ...

* Refer to Technical Data

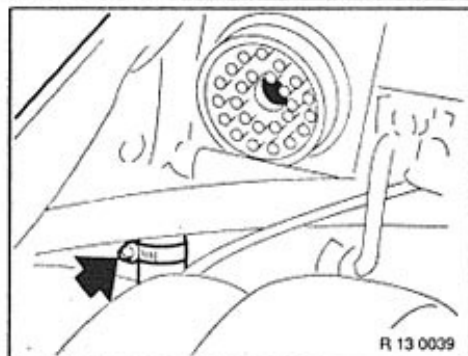


13 51 199 Checking fuel pressure regulator

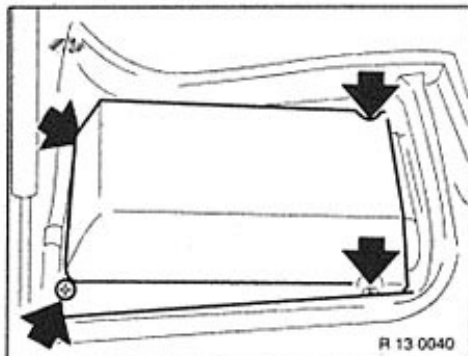
Compress sealing caps (1) and unfasten nuts (2).
Remove manifold cover.



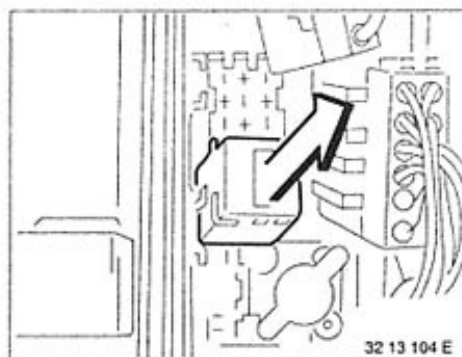
Turn and remove engine cable connector.



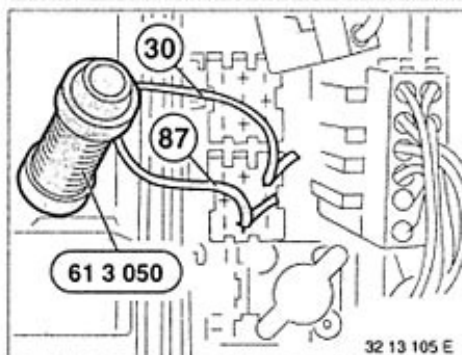
Install BMW Service Tester or special tool 13 3 060 with connecting line and special tool 13 3 064 in the fuel feed line.



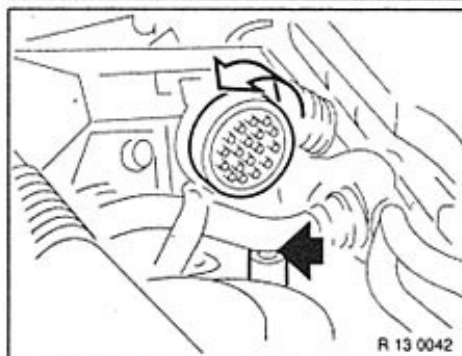
Unfasten screws.
Remove cover from E box.



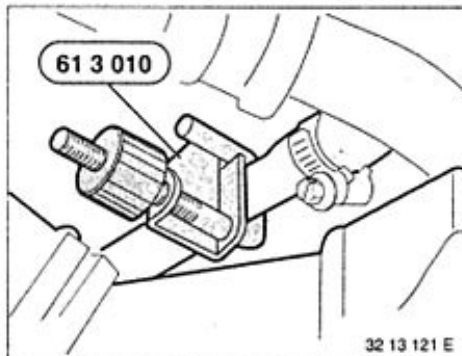
Place connector and cable to one side.
Remove fuel pump relays (orange).



Use special tool 61 3 050 to bridge terminals 87 and 30. Switch on ignition and actuate special tool.
Read off and check injection pressure*.

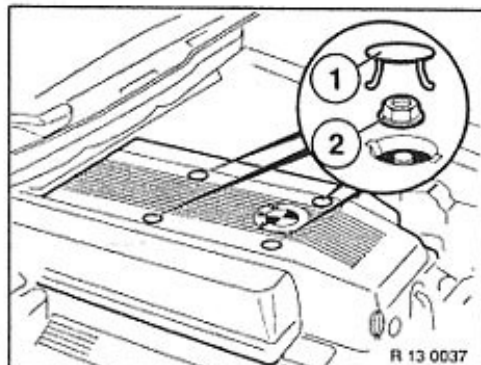


If the injection pressure* drops too fast:
Twist and remove engine cable connector on right side. Plug return line after pressure regulator with special tool 13 3 010.
Actuate special tool 61 3 050 briefly once again.



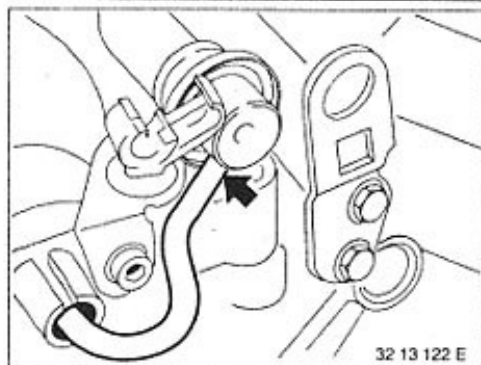
If the injection pressure now remains constant, the pressure regulator is faulty.
If the injection pressure drops, there is a leak before the pressure regulator (injection tube, hose connections, injection valves etc.).

* Refer to Technical Data Group 16

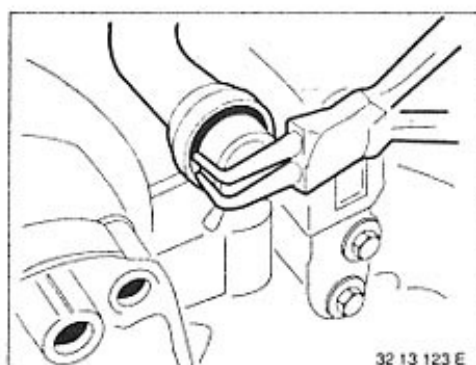


13 51 630 Replacing fuel pressure regulator

Press off sealing caps (1) and unfasten nuts (2).
Remove manifold cover.



Remove vacuum hose.

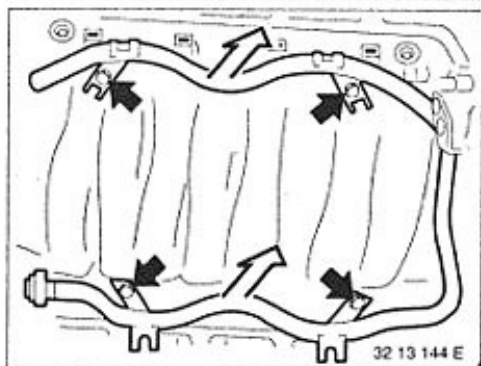


Lift out retaining ring.

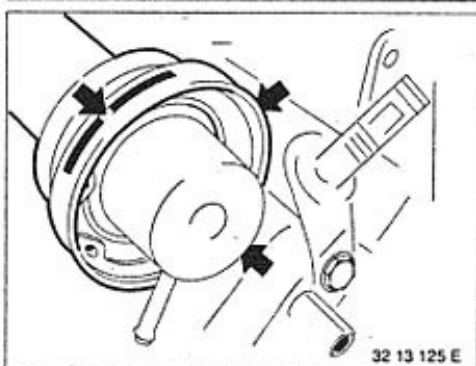


Note and mark position of vacuum connection.
Twist and remove pressure regulator.

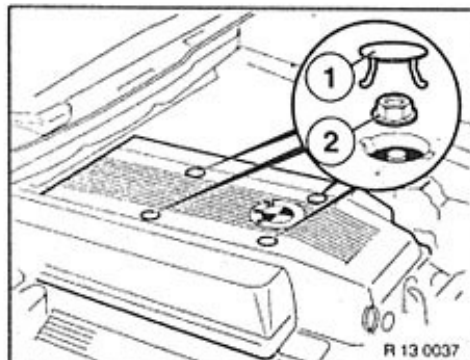
Installation:
Fit new seals (1 and 2).



Replace all injection valves, see:
13 64 541.



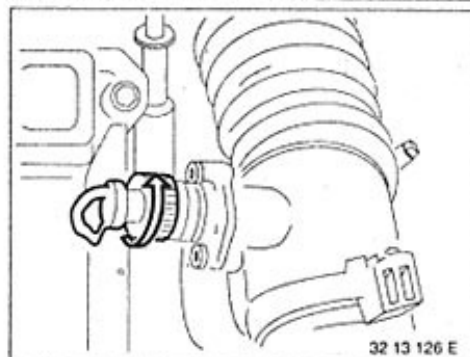
Installation:
Allow lugs on retaining ring to locate in the recesses.



13 54 030 Removing and installing / sealing throttle body

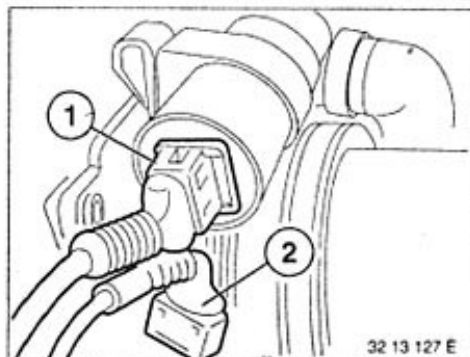
Press off sealing caps (1) and unscrew nuts (2).
Remove manifold cover.

R 13 0037



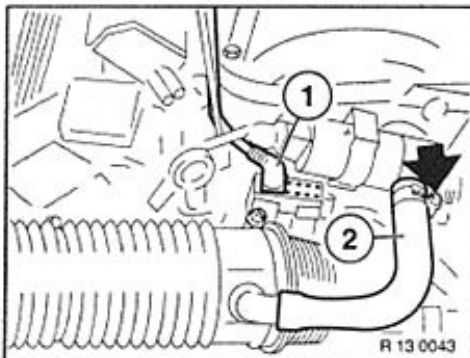
32 13 126 E

Twist and remove plug connector for mass air flow sensor.



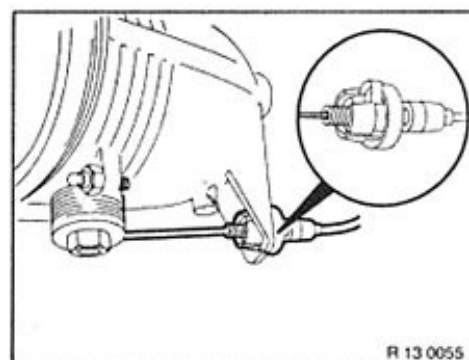
32 13 127 E

Remove connector (1) from idling speed control valve and (2) from throttle valve potentiometer.



R 13 0043

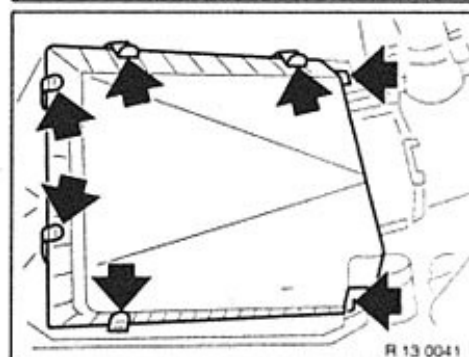
Remove connector from ASC throttle valve potentiometer. Remove idling speed hose.



R 13 0055

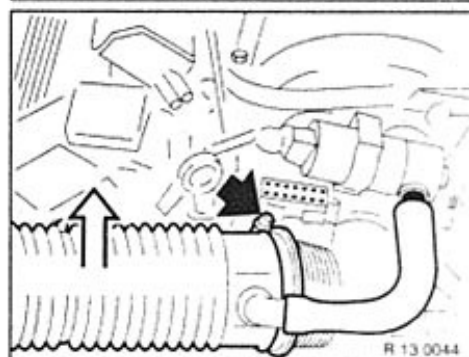
Press in plastic locking device and remove Bowden cable from ASC throttle valve.

Note:
ASC troubleshooting: refer to diagnosis program selection no. 50/55, fault memory.



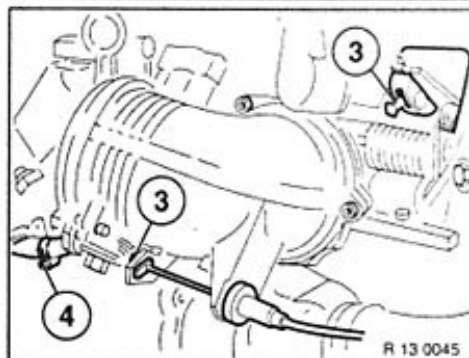
R 13 0041

Open clips and lift up upper section of air filter housing.



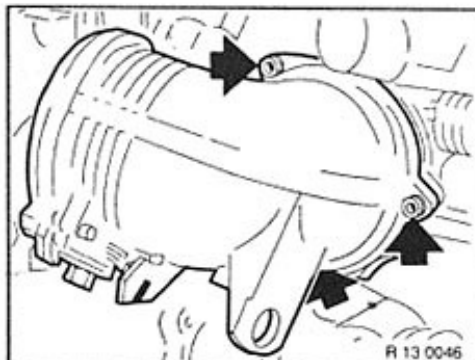
R 13 0044

Unfasten hose connector and remove gaiter with upper section of air filter housing.

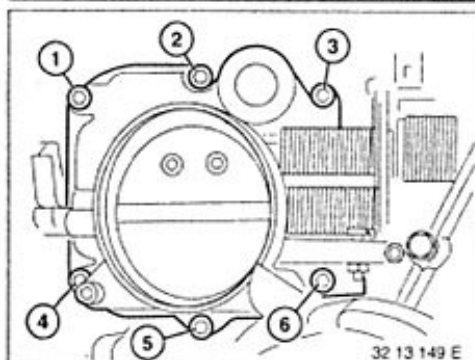


R 13 0045

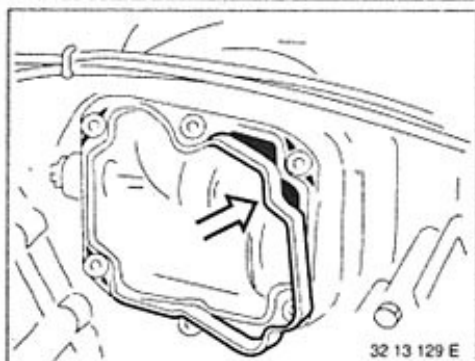
Remove accelerator cables (3).
Remove hose (4) from throttle body.



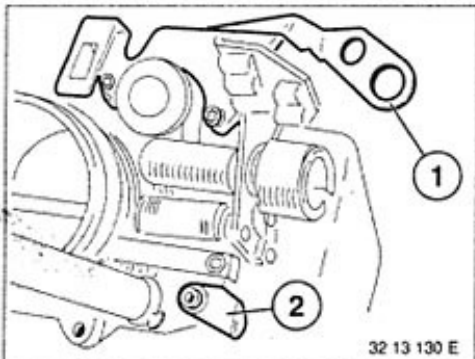
Unfasten screws and remove ASC throttle body.
Installation:
 Fit new seal.



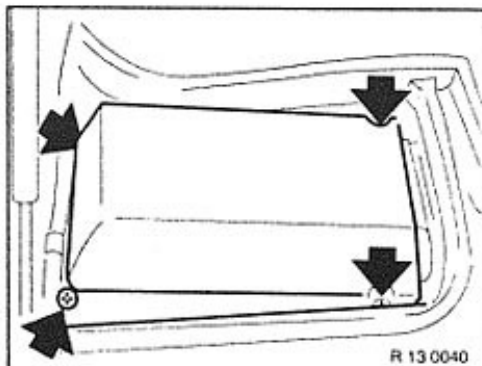
Unfasten screws (1...6) and remove throttle body



Installation:
 Fit new gasket.

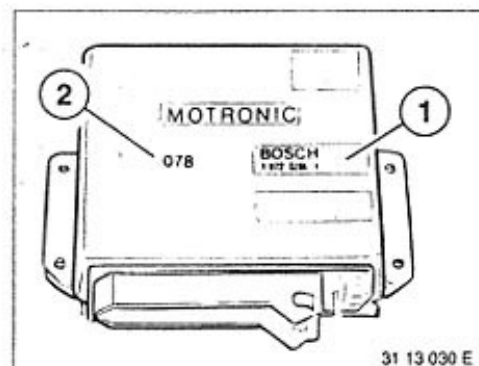


Installation:
 Fit brackets (1 and 2).

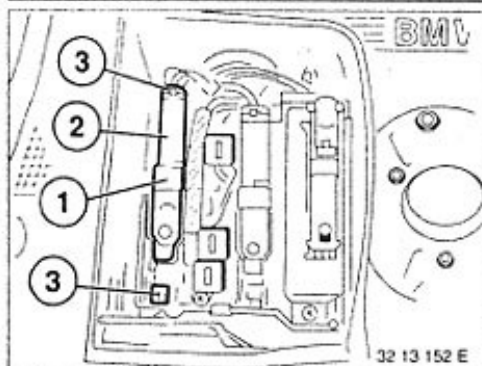


13 61 000 Removing and installing or replacing control unit (for DME)

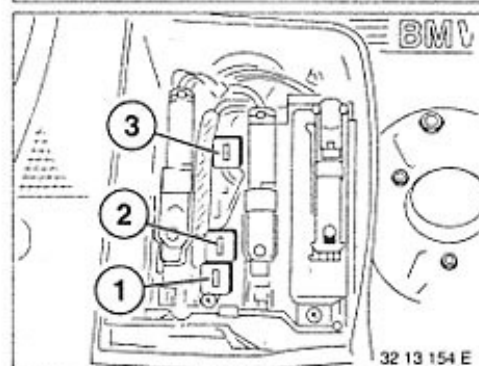
Unfasten cover screws from E box.
Remove cover.



Installation:
Check code (1) * and production date (2) *.

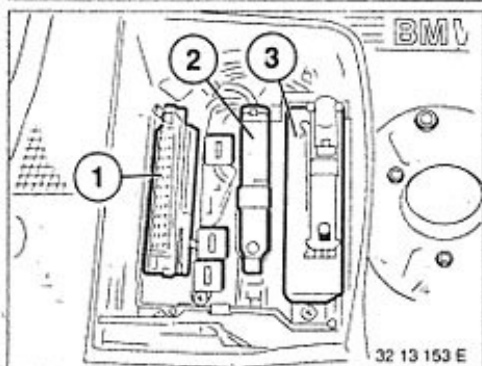


Lift up fuse (1) and remove connector (2).
Unfasten retaining clips (3) and remove control unit.

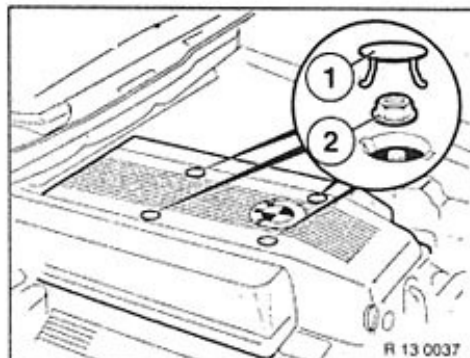


Relays in control unit for E box:

- 1 Fuel pump relay (orange)
- 2 DME main relay (white)
- 3 Lambda oxygen sensor heating (blue)



- 1 DME control unit
- 2 EGS control unit (automatic transmission)
- 3 ABS control unit



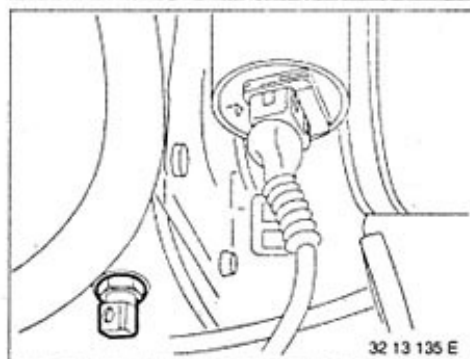
13 62 511 Replacing intake air temperature sensor

(After function check of Digital Motor Electronics (DME) 13 00 002).

Press off sealing caps (1) and unscrew nuts (2).
Remove manifold cover.



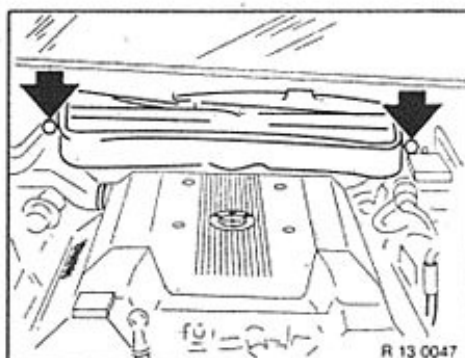
Compress retaining spring.
Remove connector.



Unscrew and remove temperature sensor.

Installation:
Note tightening torque*.

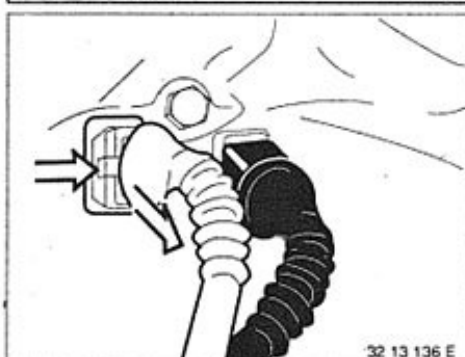
Components check:
see 13 00 ...



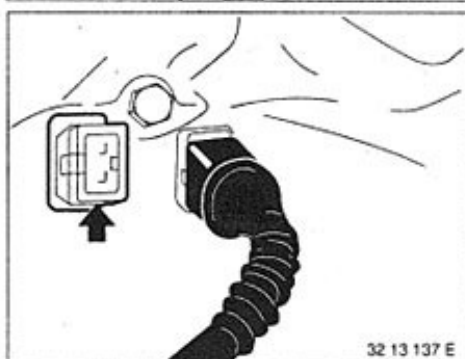
13 62 531 Replacing coolant temperature sensor

(After function check of the Digital Motor Electronics (DME) 13 00 002).

Remove air intake duct.

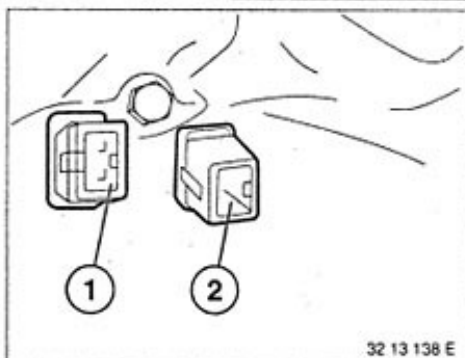


Compress retaining spring.
Remove connector (white).



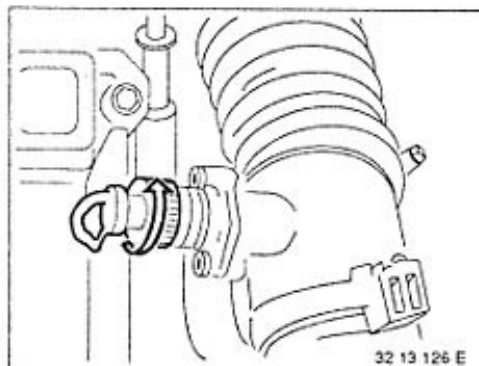
Unscrew and remove sensor.

Installation:
Note tightening torque*.



Layout:
1 DME temperature sensor (white)
2 Temperature sensor -
remote thermometer (black)

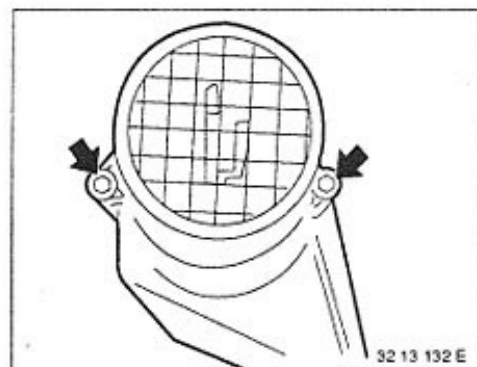
Component check:
see 13 00 ...



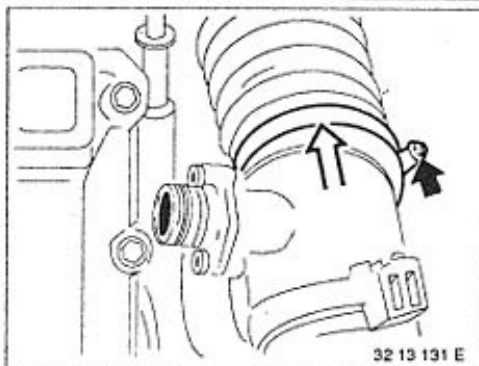
13 62 560 Removing and installing or replacing mass air flow sensor

(After function check of Digital Motor Electronics (DME) 13 00 002)

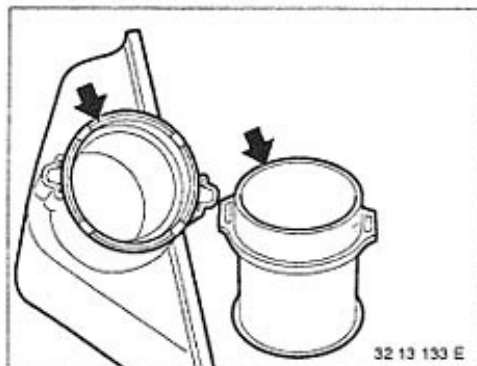
Twist and remove plug connection on mass air flow sensor.



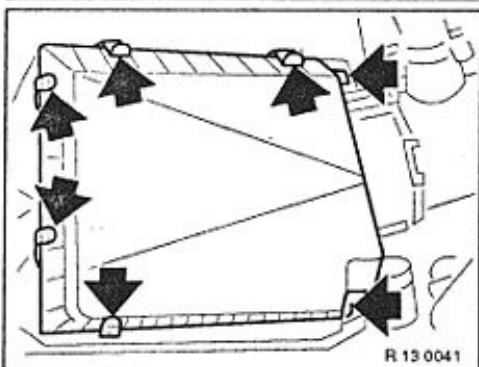
Unfasten screws. Twist and remove mass air flow sensor housing.



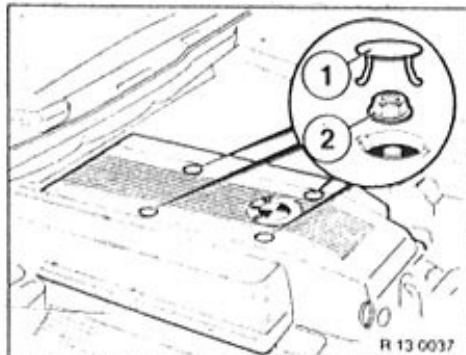
Unfasten hose connector and remove suction hose.



Installation:
Fit new seal. Coat sealing lip of housing with thin layer of acid-free grease.

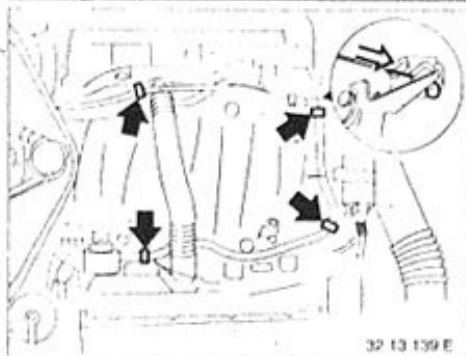


Open clips and lift off upper section of air filter housing together with mass air flow sensor.

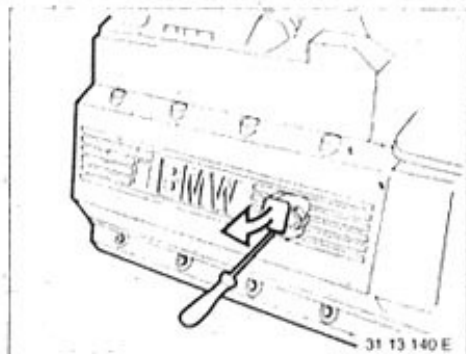


13 64 541 Removing and installing or replacing all fuel injection valves

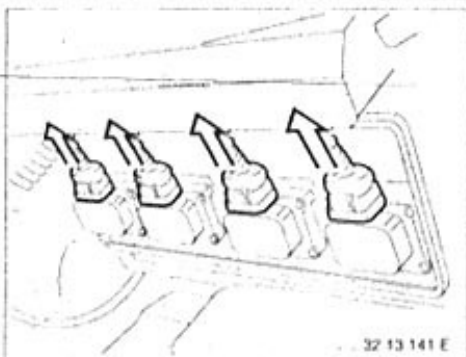
Press of sealing caps (1) and unscrew nuts (2). Remove manifold cover.



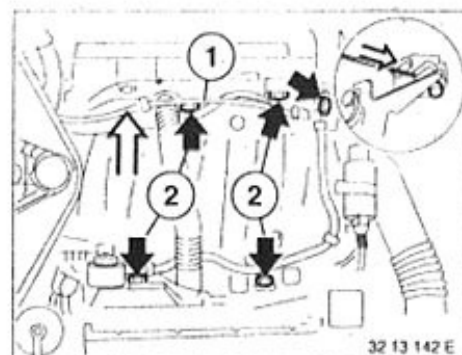
Remove ratchet tapes for cable retainer. Disconnect accelerator cable from throttle valve lever.



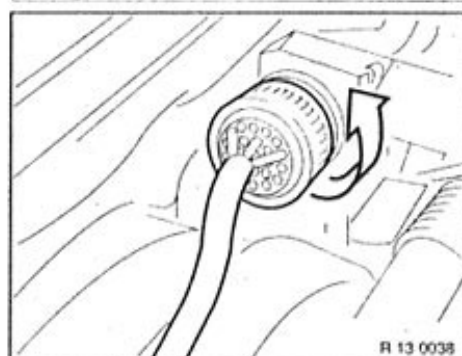
Remove cover for cylinder head covers from both sides.



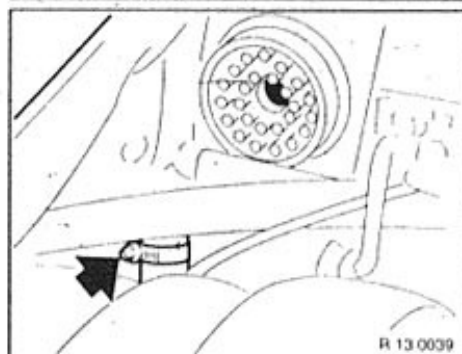
Remove cable connector from ignition coils on both cylinder heads.



Unclip accelerator cable (1) and place to one side. Remove cable ducts (2) and place to one side. Remove connector from fuel injection valves.

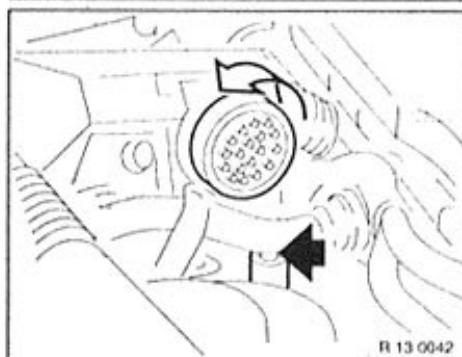


Turn and remove left and right engine cable connectors.

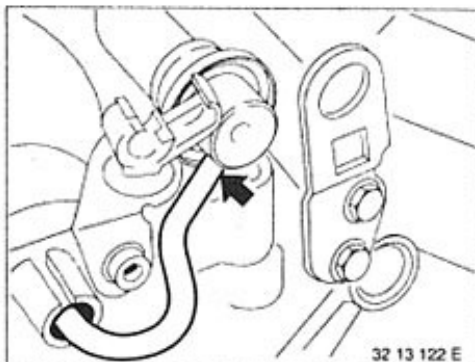


Plug fuel feed line with special tool 13 3 010 and remove.

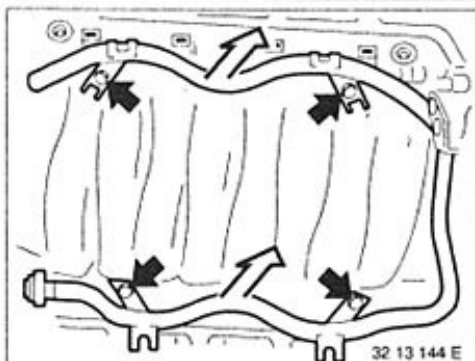
Caution!
Catch escaping fuel.



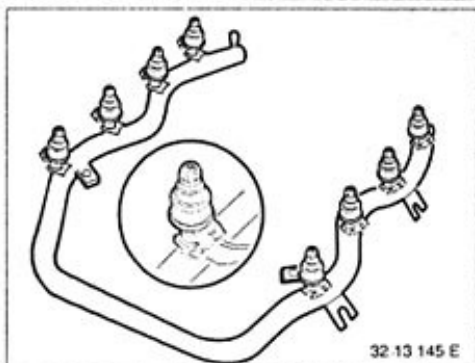
Plug fuel return line with special tool 13 3 010 and remove.



Remove vacuum hose from pressure regulator.



Unfasten injection pipe retainers. Remove injection tube with the fuel injection valves.



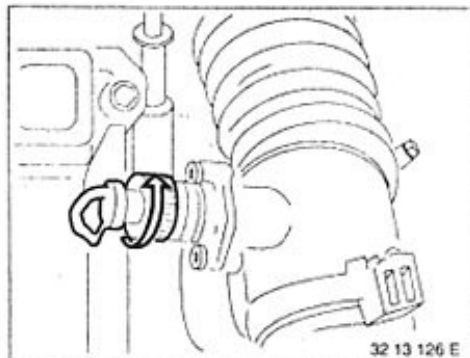
Press off clips. Remove fuel injection valves from injection pipe.

Installation:

Check seals and replace if necessary. Check injection valves for leaks and clean, see 13 64 582.

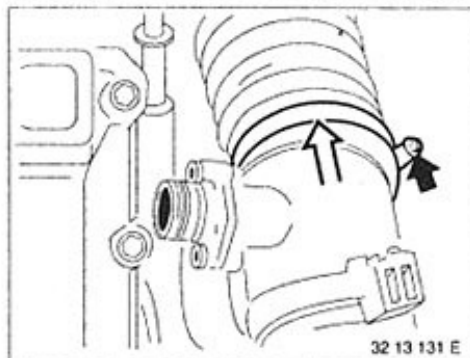
Coat seals used for installing the valves with acid-free grease.

When replacing the valves, check code no.*, color of connector housing* and production date.

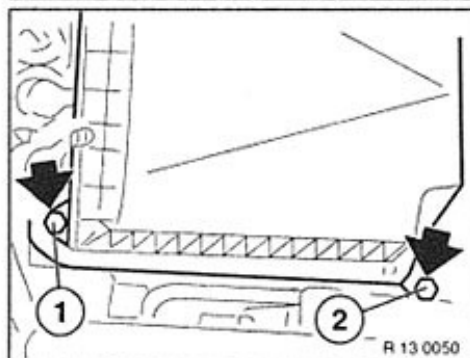


13 71 000 Removing and installing suction filter housing

Twist and remove plug connection for mass air flow sensor.



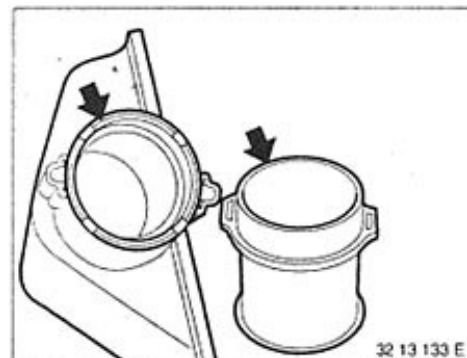
Unfasten hose clip.
Remove suction hose.



Unfasten screws (1 and 2).
Tilt filter housing and remove.

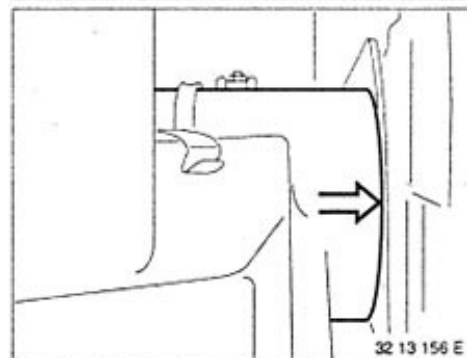


Unfasten screws. Twist mass air flow sensor housing and remove.



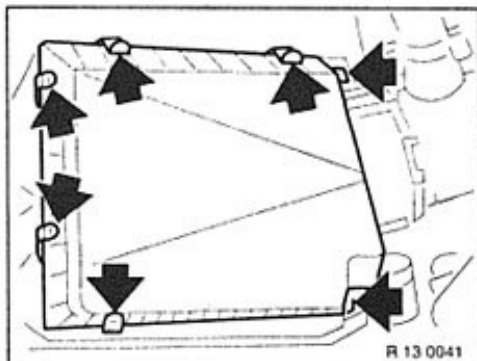
Installation:

Fit new seal. Apply a thin coat of acid-free grease to the sealing lip of the housing.



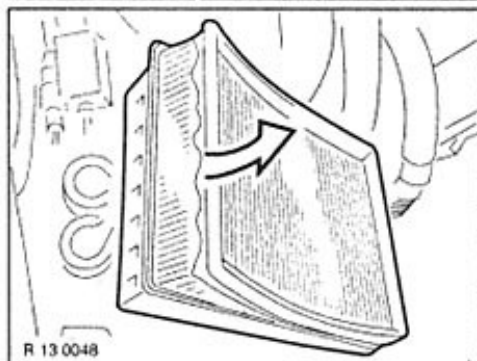
Installation:

Insert suction neck in the recess.
Fit the housing to the rubber mount.

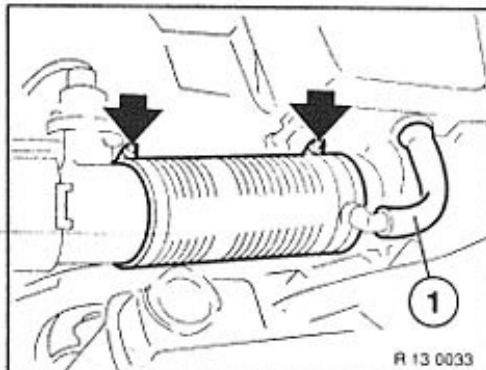


13 72 001 Replacing air filter insert

Open clips.



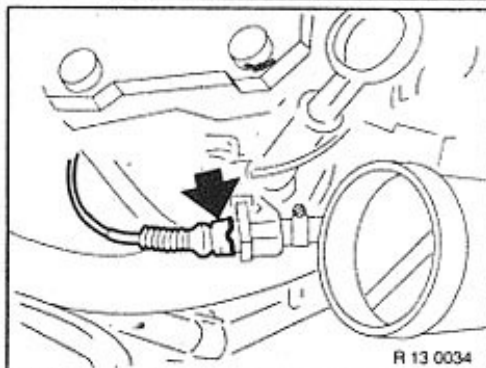
Lift upper section of air filter housing and remove air filter insert.



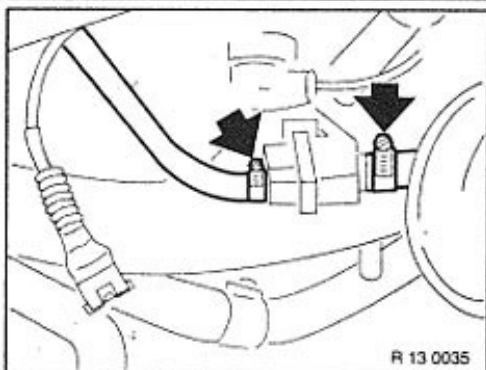
13 90 500 Replacing tank venting valve

(After function check of the Digital Motor Electronics (DME) 13 00 002).

Unfasten hose clip. Remove idle speed hose (1). Remove gaiter (2).



Compress retaining spring and remove connector.



Remove fuel lines.

Caution!

Catch any fuel which may still be in system.

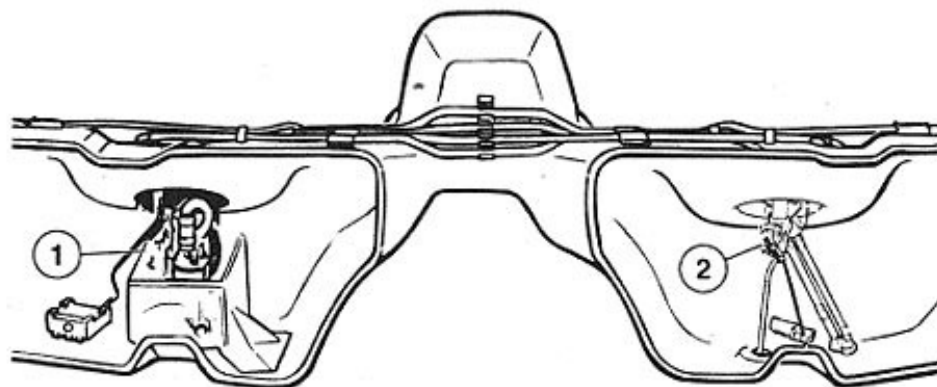
Slide tank venting valve out of rubber mount. Components check, see 13 00 ...

16 Fuel supply system

	Summary of fuel tank	16- 0/1
16 00 005	Fuel in fuel tank – draw out and top up	16- 0/2
16 11 030	Fuel tank – remove and install	16-11/1
	Fuel tank installation	16-11/3
	Summary of swing arm sensor and intank pumps	16-12/1
16 12 000	Fuel indicator sensor – remove and install or replace (right)	16-12/2
	Summary of swing arm sensor and sucking jet pump	16-12/4
001	Fuel display sensor – remove and install or replace (left)	16-12/5
	Connector allocation and hose connections	16-12/7
010	Active carbon filter – remove and install or replace	16-12/8
	Summary of tank venting	16-13/1
16 13 . . .	Float gravity valve – remove and install/replace	16-13/2
16 14 010	Fuel pump(s) – remove and install or replace	16-14/1

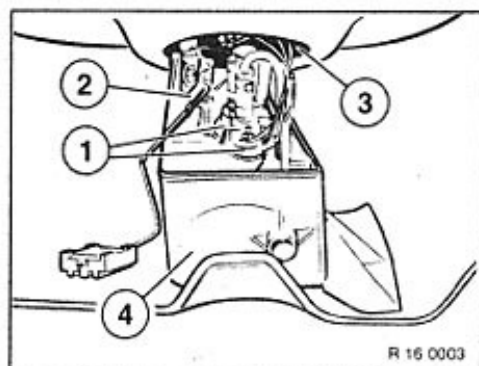
Fuel tank survey

(Cut away and shown in opposite direction to
direction of travel)



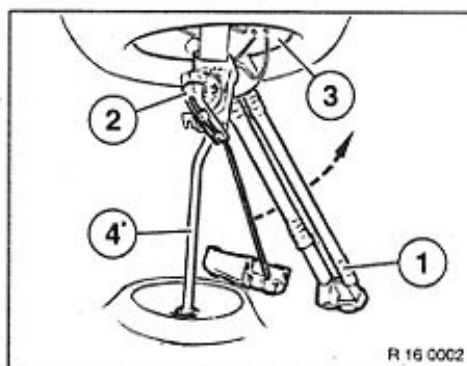
R 16 0001

1 = (right) Fuel pump sensor unit



R 16 0003

2 = (left) Sucking jet pump sender unit



R 16 0002

1 = Fuel pump
2 = Swing-arm fuel level sender unit

3 = Tank flange
4 = Fuel baffle

1 = Sucking jet pump
2 = Swing-arm fuel level sender

3 = Tank flange
4 = Probe (for basic setting)

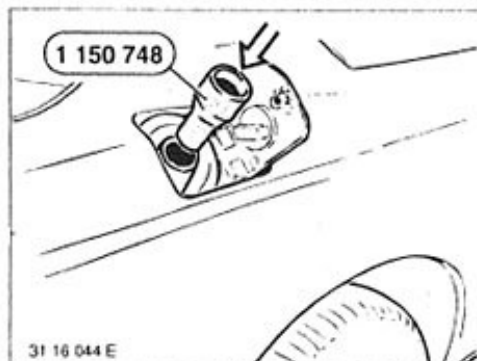


16 00 005 Draining and filling fuel tank

Remove ground lead from support point in trunk.

Caution!

Fault memories in control units are cancelled: if necessary, interrogate in advance.



Installation:

Always use new hose clips. Check fuel hoses for condition and leaks, replacing if necessary. Also refer to Service Information, Group 16.

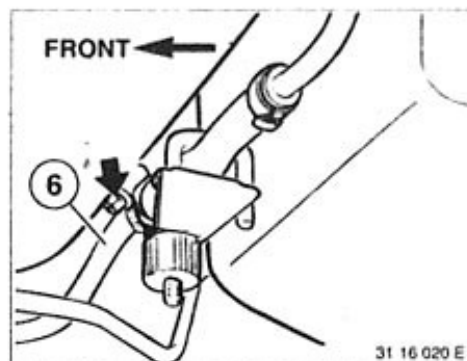
First install funnel (Parts No. 1 150 748) in filler neck.



Draw out as much fuel as possible with a scavenging pump**.

Caution!

Conform with safety regulations as well as local and national regulations. Use suitable suction hose* and twist slightly when installing and when pulling back out.

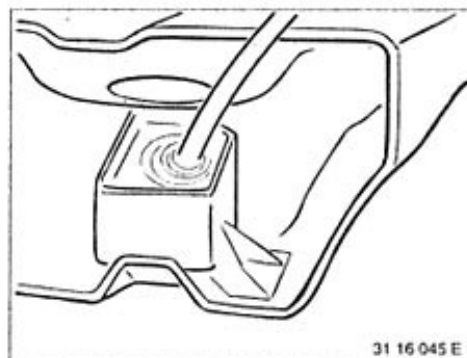


Disconnect return hose with special tool 13 3 010 and remove return hose (6). Connect fuel suction device*, open clamp and drain off left half of tank.

Caution!

Conform with safety regulations as well as local and national legislation. Use suitable suction hose* and connection.

Draw off fuel vapors in vehicle*



The tank can only be drained completely after removal of the sensor units (see 16 12 000/1), or after removal of the tank (16 11 030).

Installation:

Top up fuel with suction unit** through filler neck.

Caution!

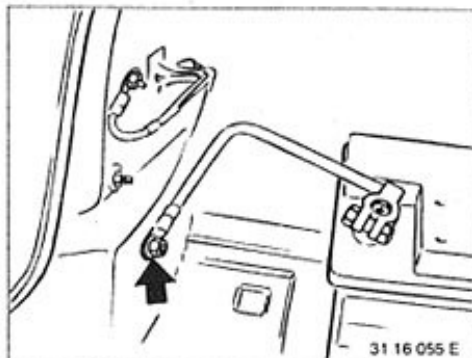
Only slide hose approx. 40 cm into tank: on no account slide in as far as baffle plate.

* Refer to Workshop Equipment Service Information

** Refer to BMW Parts Service

* Refer to Workshop Equipment Service Information

** Refer to BMW Parts Service



16 11 030 Removing and installing fuel tank

Remove ground lead from connection in trunk.

Caution!

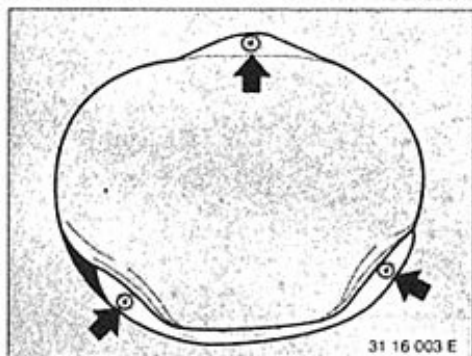
Fault memories in control units are cancelled: if necessary, interrogate first.



Draw off fuel with scavenging pump** as far as possible at the filler neck.

Caution!

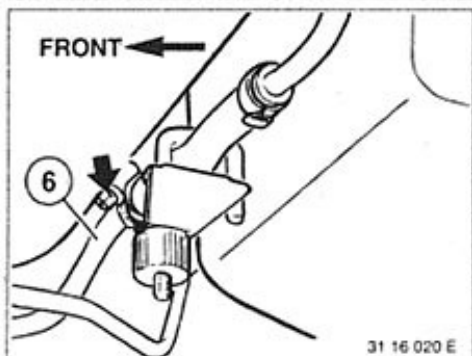
Conform to safety regulations as well as national legislation. Use suitable suction hose* and twist slightly when inserting and when removing.



Installation:

Always use new hose clips. Check fuel hoses for condition and leakage, replacing if necessary. Also refer to Service Information Group 16.

Remove left and right rear seats. Unfasten screws. Remove left and right cover.



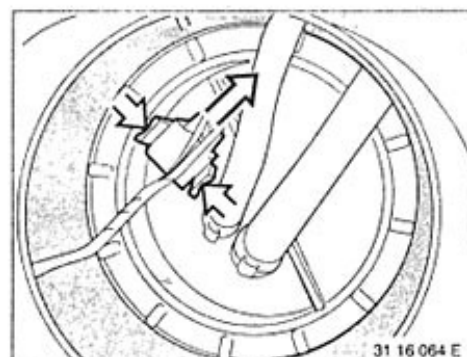
Disconnect return hose with special tool 13 3 010 and remove return line (6). Connect up fuel scavenging unit*, open clamp and drain left half of tank.

Caution!

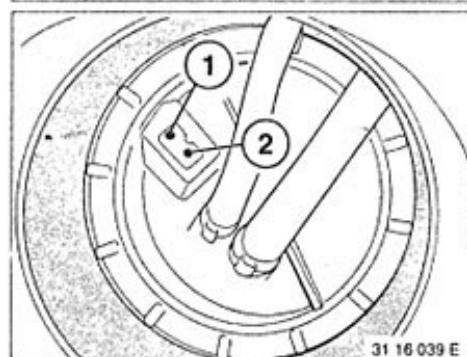
Conform to safety regulations as well as national legislation. Use suitable suction hose*.

* Refer to Workshop Equipment Service Information

** Refer to BMW Parts Service

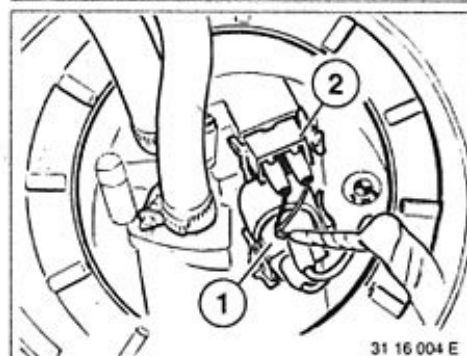


Remove connector for left swing-arm sender unit.

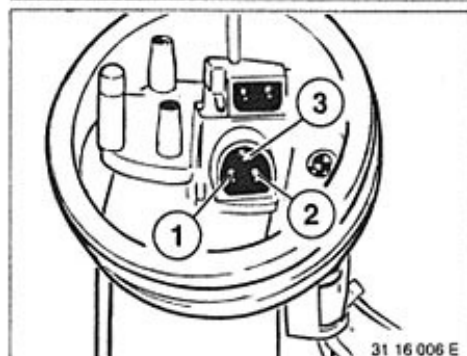


Swing-arm sender unit connection (left side of tank)

1 = Sender (black)
2 = Sender (yellow)

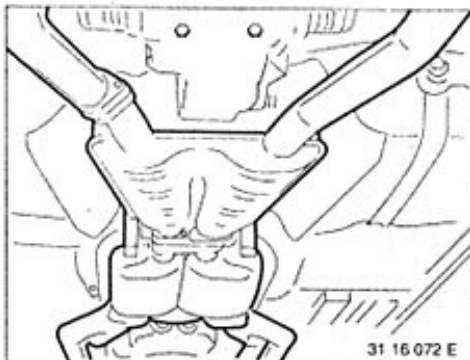


Remove connector for fuel pumps (1). Remove connector for right swing-arm sender unit (2).



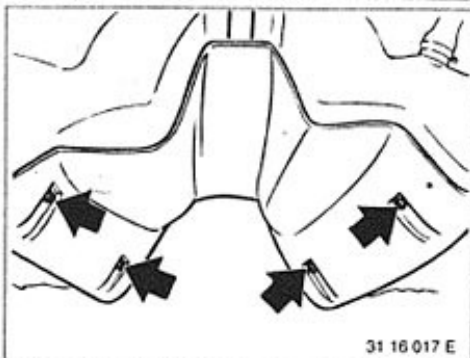
Pin allocation of fuel pump:

1 = Fuel pump 1 (gray, cylinder bank 1...6)
2 = Fuel pump 2 (purple, cylinder bank 7...12)
3 = Ground - (brown)

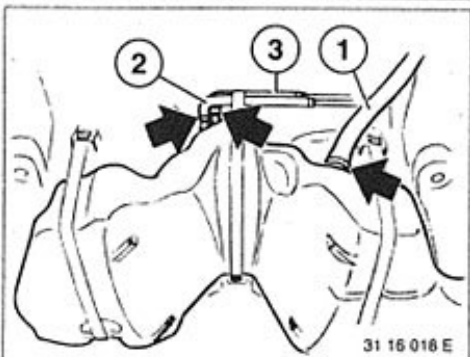


Removing and Installing Complete Exhaust System, see 18 00 020

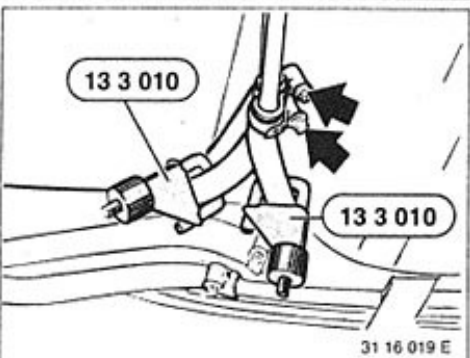
Removing and installing or replacing left or right Bowden cable on handbrake, see 34 41 600.



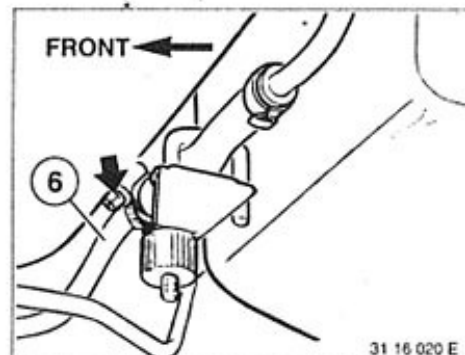
Remove and install complete propeller shaft, see 26 11 000. Unfasten nuts and remove heat shield.



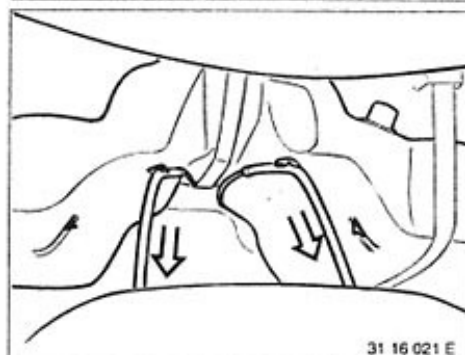
Remove filler hose (1).
Remove filler vent hose (2) and service venting hose (3).



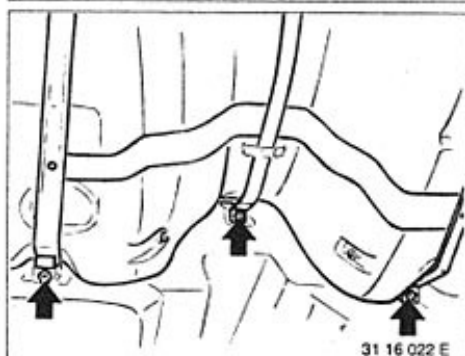
Disconnect fuel hoses with special tool 13 3 010 and remove feed lines.



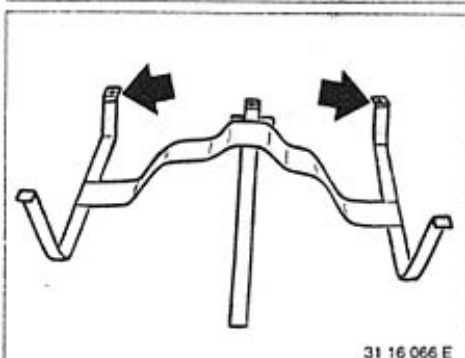
Remove suction hose from return line (6).



Withdraw cable guides from clamps.

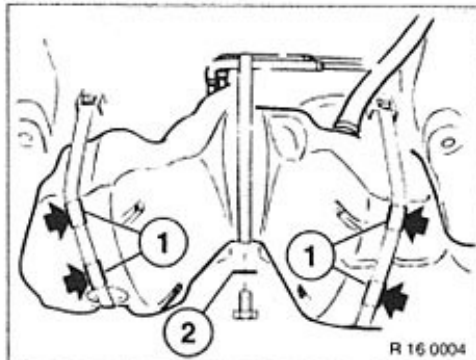


Unscrew nuts.
Disconnect retaining tapes.
Lower fuel tank.



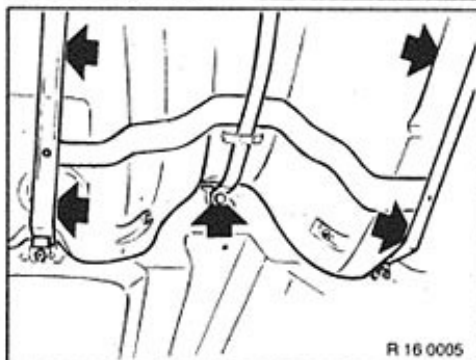
Installation:
Check hard rubber mounts and cement or replace if necessary.
Note tightening torque *.

* Refer to Technical Data

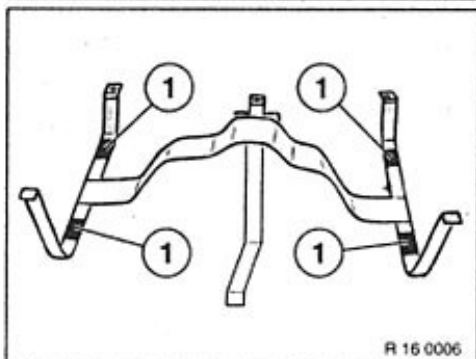


Installing fuel tank

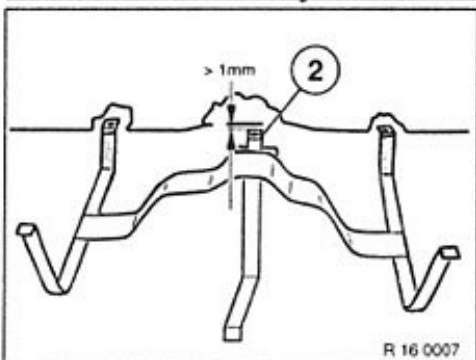
When replacing the tightening straps or replacing the fuel tank, it may be necessary to install rubber mounts (1) on the left and right tightening straps or washers (2) in the center of the tightening strap.



The fuel tank should be installed without any excess tension but also without any clearance (tight but not too tight).



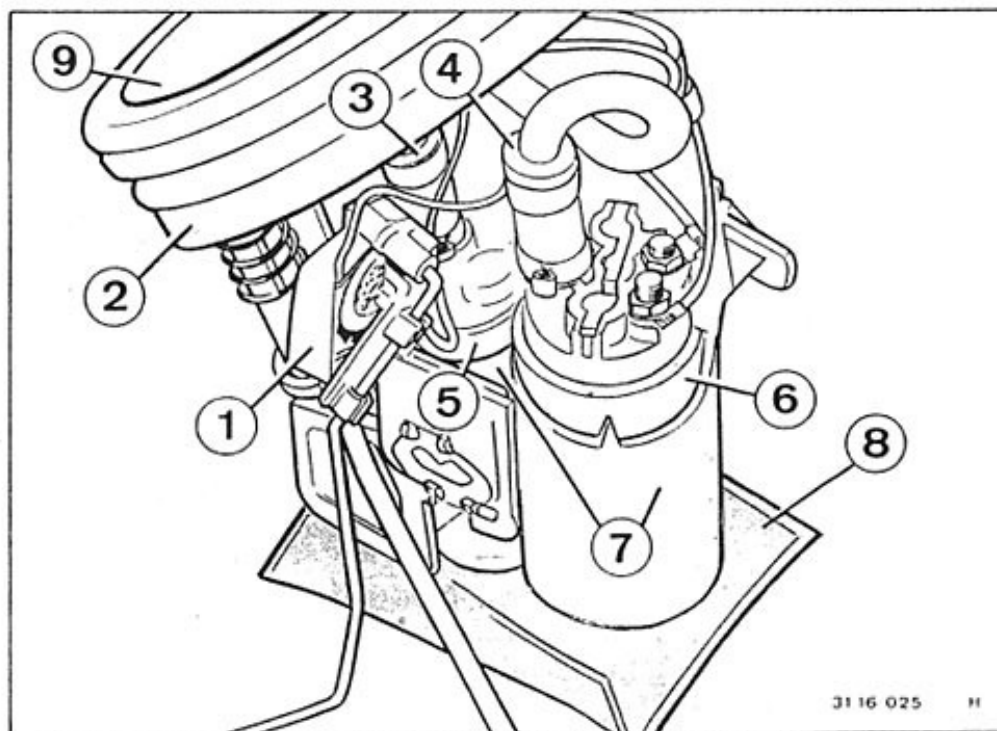
If there is a gap of more than 3 mm between the underside of the tank and the left/right tightening strap, cement damping strips to points (1).



If the gap between screw face on the body and the angle on the center tightening strap is larger than 1mm, compensate this with one or two washers at point (2).

**Swing-arm fuel level sender
and intank pump survey**

- 1 = Swing-arm sender
- 2 = Gasket
- 3 = Feed pipe 1
- 4 = Feed pipe 2
- 5 = Fuel pump 1
- 6 = Fuel pump 2
- 7 = Pump carrier with rubber mounts
- 8 = Fuel strainer
- 9 = Tank flange



Check fuel pressure and delivery quantity, see Group 13.

Check immersed tube indicator*, refer to pin allocation and hose connections, page 16-12/7.

Note:

Pressure dampers and non-return valves are installed in the pumps.



16 12 000 Removing and installing or replacing fuel level sender (right)

Draw fuel out of tank with scavenger pump** as far as possible at the filler neck.

Caution!

Conform to safety regulations as well as national legislation.

Use suitable scavenging hose* and twist slightly when inserting and withdrawing.

Installation:

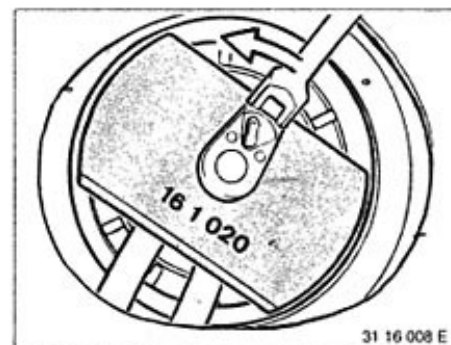
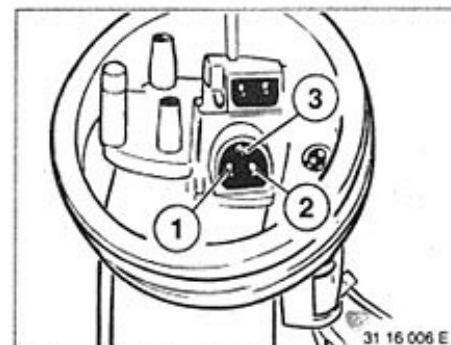
Always use new hose clamps.

Check fuel hoses for condition and leakage, replacing if necessary.

Remove right-hand back seat.

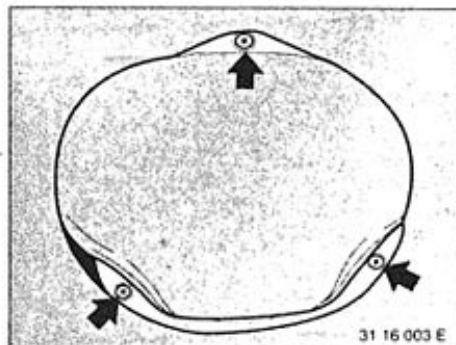
Unfasten screws.

Remove right cover.



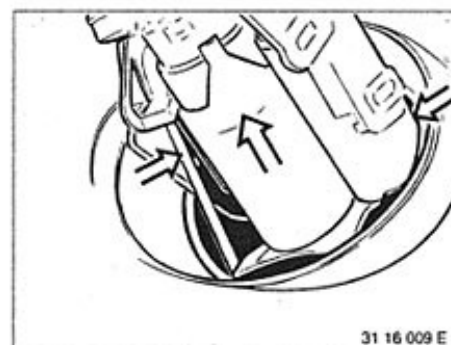
Pin allocation for fuel pump, see page 16-12/7.

Unscrew cap nut from swing-arm sender unit on fuel pump using special tool 16 1 020.



Remove connector for fuel pumps (1).

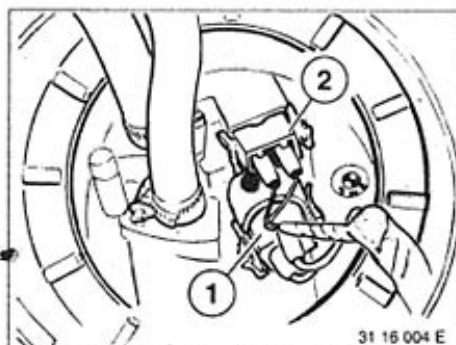
Remove connector for swing-arm fuel level sender (2).



Carefully remove unit.

Installation:

Press level sensor slightly towards housing.



Remove fuel hoses.

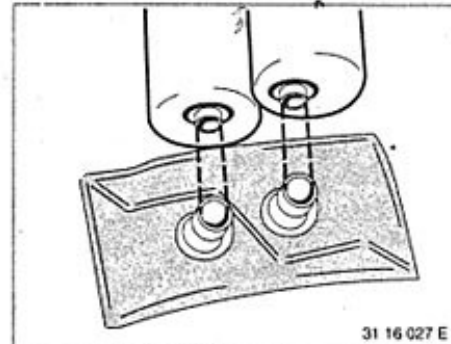
Draw off fuel vapors in car*.

Note:

Place identifying marks on fuel hoses.

1 Intake pump 1 (cylinder bank 1...6)

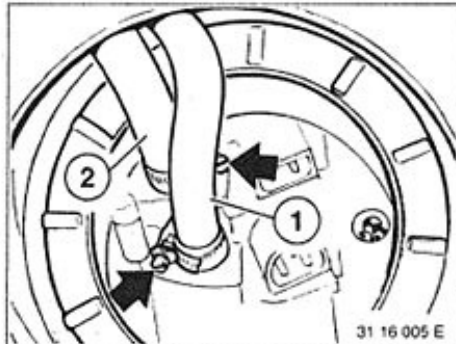
2 Intake pump 2 (cylinder bank 7...12)



Installation:

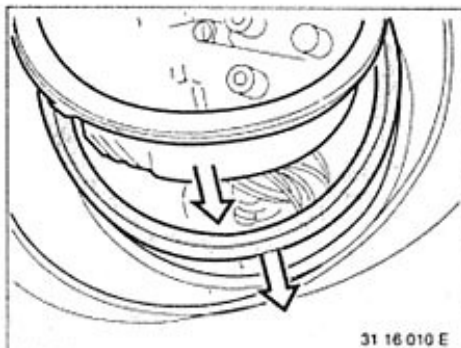
Fit new fuel strainer.

Fit new fuel strainer and allow to engage correctly.



* Refer to Workshop Equipment Service Information

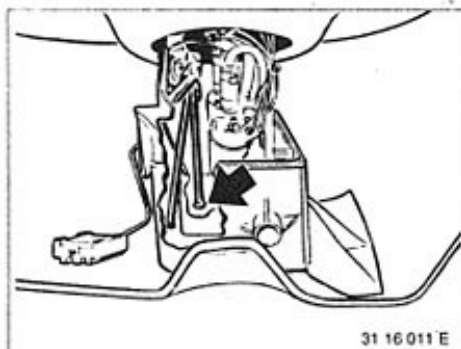
** Refer to BMW Parts Service



Important!
Always use a new seal and new coupling nut.

Installation:
Insert seal.
Swing strainer and float into the tank.
Press unit in vertically while slightly compressing the altitude stylus and housing.

The correct installed position is shown on page 16-12/5.

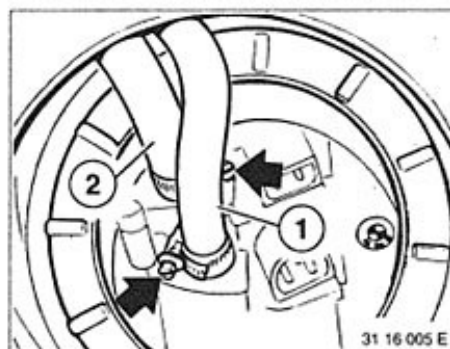


Installation:
Prior to pressing in to final position, slightly lift the unit (watch out for seal) and move back and forth slightly to guarantee that the altitude stylus is positioned vertically in the correct area and the float can be moved easily.

Installation:
Ensure that the rib on the flange is aligned with the cast tab on the tank (can be felt) in one direction before tightening the coupling nut.
Check tightening torque* of coupling nut.



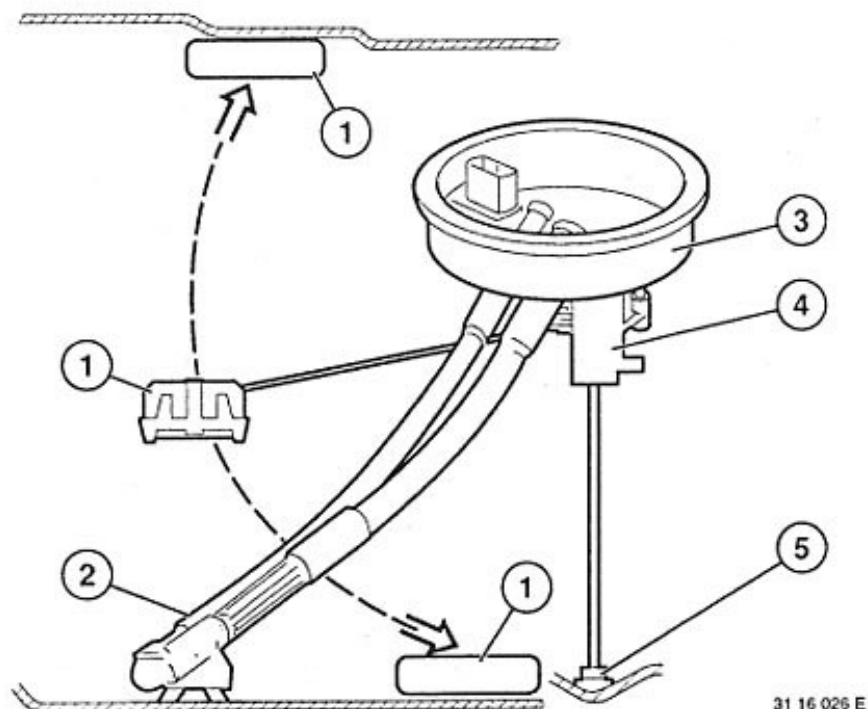
The sender for the right fuel gage makes up a single unit together with the fuel pumps and tank flange. It can only be replaced complete.

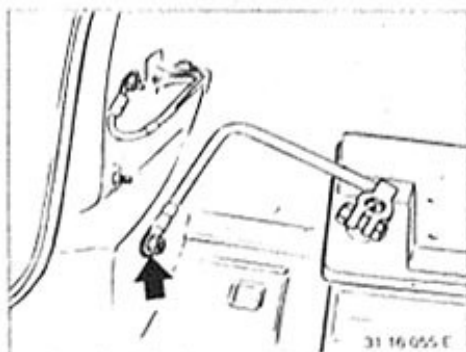


Installation:
Check fuel hoses, replacing if necessary.
Replace hose clamps.

SWING-ARM FUEL LEVEL SENDER AND
EJECTOR SURVEY

- 1 Float
- 2 Ejector
- 3 Tank flange
- 4 Swing-arm sender
- 5 Center and stylus (for basic setting)



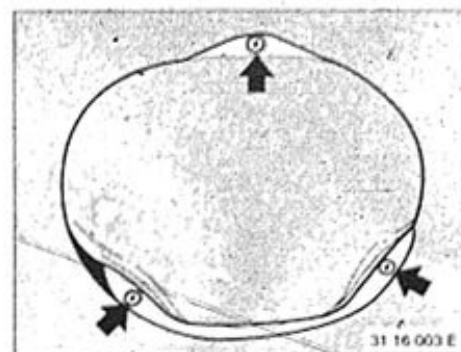


16 12 001 Removing and installing or replacing fuel indicator sender (left)

Remove ground leads from mount in trunk.

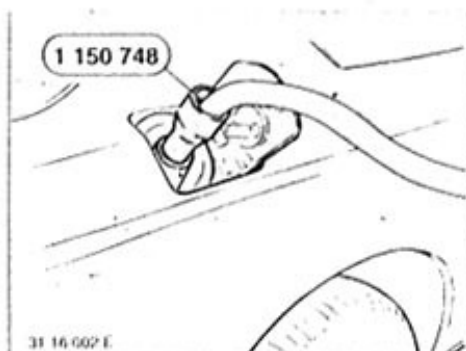
Caution!

Memories of control units will be deleted. If necessary, read them out, first.



Remove left-hand back seat and left cover. Remove connector from left swing-arm fuel level sender unit. Remove return line fuel hoses and expansion tank.

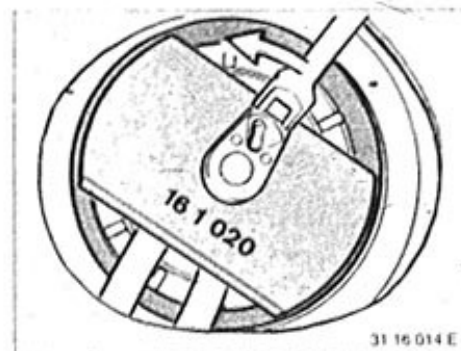
Draw off fuel vapors in car*



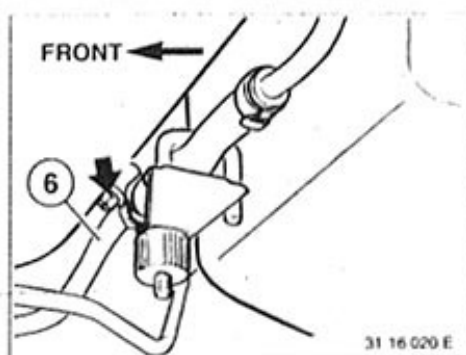
Draw off fuel with scavenge pump*, as far as possible at filler neck.

Caution!

Conform to safety regulations as well as national legislation. Use suitable suction hose* and twist slightly when inserting and when withdrawing.



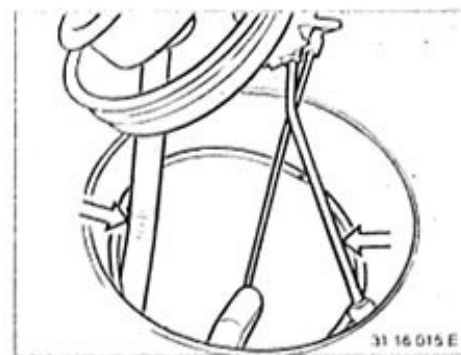
Remove cap nut from swing-arm fuel level sender unit with special tool 16 1 020.



Disconnect return hose with special tool 13 3 010 and remove return line (6). Connect up fuel scavenging unit**, open clamp and drain left half of tank.

Caution!

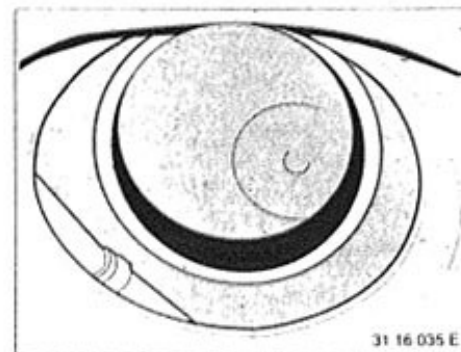
Conform to safety regulations as well as national legislation. Use suitable scavenging hose*.



Carefully remove unit, pressing level sensor slightly towards housing while doing so.

Installation:

Always use new hose clips. Check fuel hoses for condition and leakage and replace if necessary.



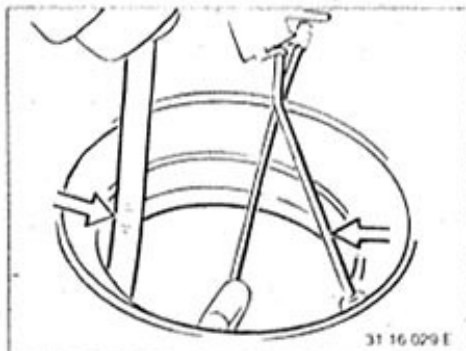
Caution!

Always use new seal and new cap nut.

* Refer to Workshop Equipment Service Information

** Refer to BMW Parts Service

* Refer to Workshop Equipment Service Information



Installation:

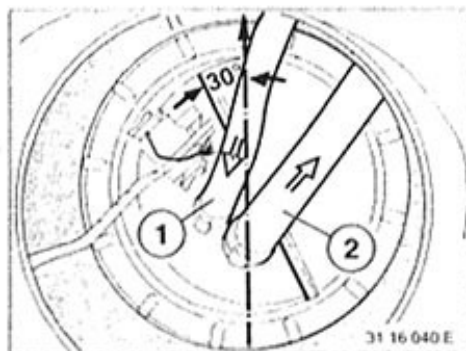
Install seal and press unit vertically into correct position so that probe just makes contact with the base of the tank.

Installation position - see page 16-12/7.



Caution!

The return and sucking jet pump line is pressed onto the base of the tank with slight preload. The level sensor must locate in the recess provided. The swing-arm fuel level sender unit and float must be able to move freely.



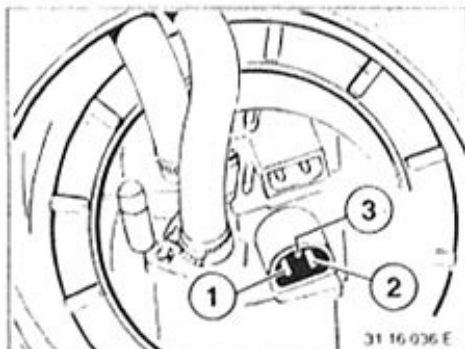
Installation:

Before tightening the cap nut, ensure that the rib on the flange points towards the cast lug on the tank (protruding), approx. 30° to direction of travel. Note tightening torque* of the cap nuts.



The sender for left fuel level indicator forms one unit with the sucking jet pump and the tank flange. This can only be replaced as a complete unit.

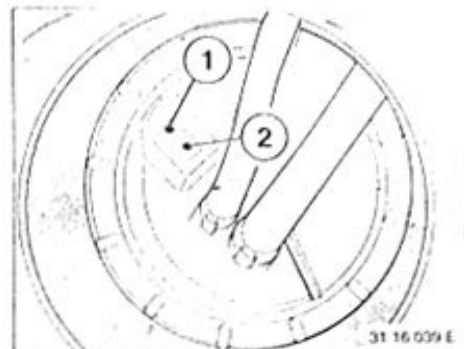
* Refer to Technical Data



Plug and Hose Connections:

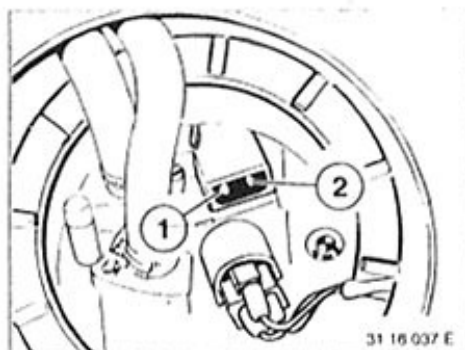
Fuel Pump Connection (Right Side of Tank)

- 1 = Fuel pump 1 (cyl. 1...6)
- 2 = Fuel pump 2 (cyl. 7...12)
- 3 = Ground (-) for both fuel pumps



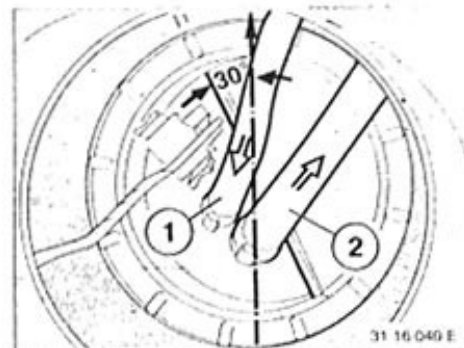
Swing-arm Sender Connection (Left Side of Tank)

- 1 = Sender (black)
- 2 = Sender (yellow)



Swing-arm Sender Connection (Right Side of Tank)

- 1 = Sender (black)
- 2 = Sender (yellow)



- 1 = Fuel return
- 2 = Fuel expansion tank from ejector

Installed position = approx. 30° to forward direction.
Cast tabs on the tank can be felt.

Fuel Feed

- 1 = Fuel pump 1 (cyl. 1...6)
- 2 = Fuel pump 2 (cyl. 7...12)

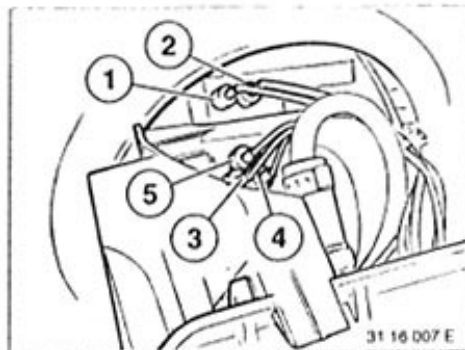
Arrow = Installed position
Front = Forward direction

Installed position = front.
Cast tabs on the tank can be felt.



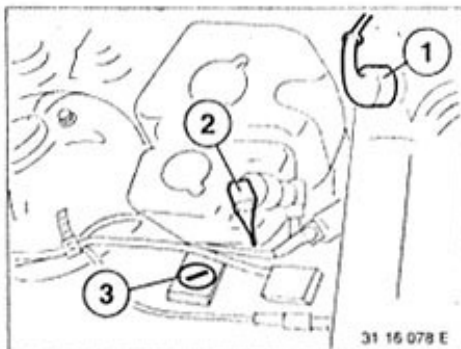
Electric Wire Connections on Inside of Tank Flange:

- 1 = Swing-arm sender (black)
- 2 = Swing-arm sender (yellow)



Electric Wire Connections on Inside of Tank Flange:

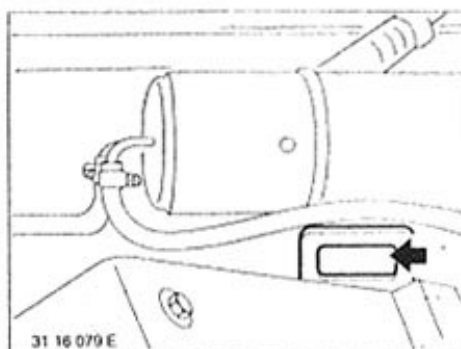
- 1 = Swing-arm sender (yellow)
- 2 = Swing-arm sender (black)
- 3 = Fuel pump 1 (gray)
- 4 = Fuel pump 2 (violet)
- 5 = Fuel pump ground (brown)



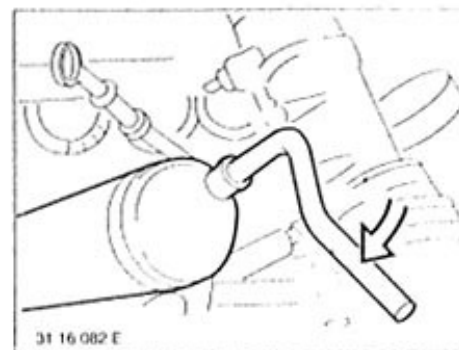
16 12 010 Removing and installing or replacing active carbon filter

Remove connectors (1) and (2). Unfasten screw (3), remove tank and place to one side.

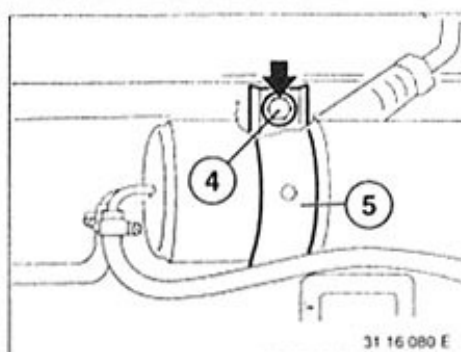
Caution!
Catch escaping fuel in a suitable receptacle.



Installation:
First install tank in retaining tab.

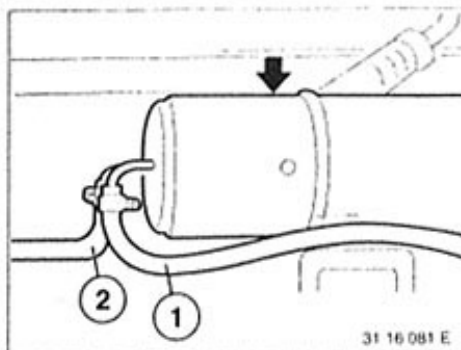


Installation:
Check that vent line is correctly located and installed.



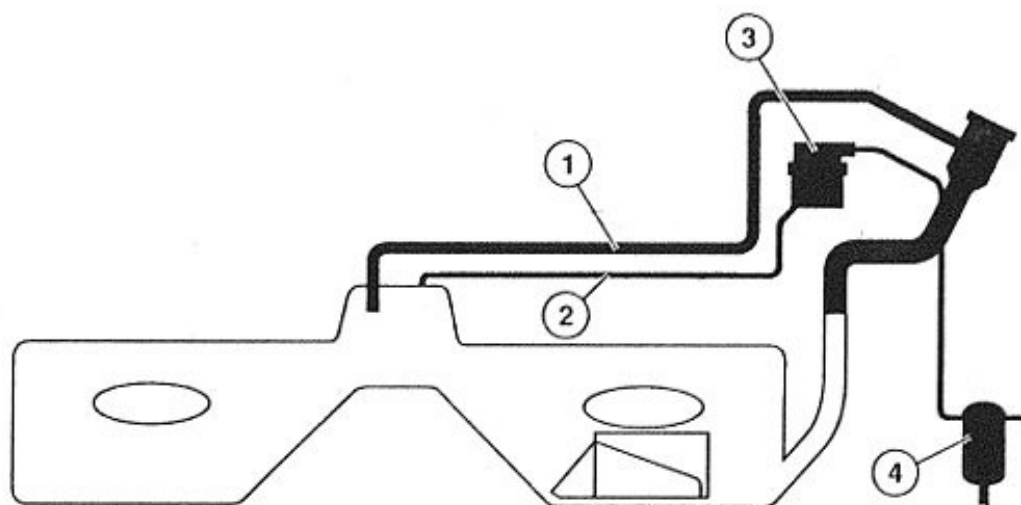
Unfasten screw (4) and disconnect bracket (5).

Replace tank venting valves, see 13 90 500.



Lift up active carbon filter, remove hose (1) to the tank venting valves and hose (2) from the gravity float valve.

Tank venting survey



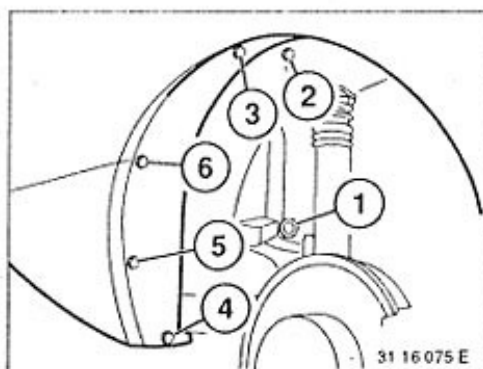
- 1 Tank venting line
- 2 Tank venting line
- 3 Gravity float valve
- 4 Active carbon filter

Replace tank venting valve,
see 13 90 500

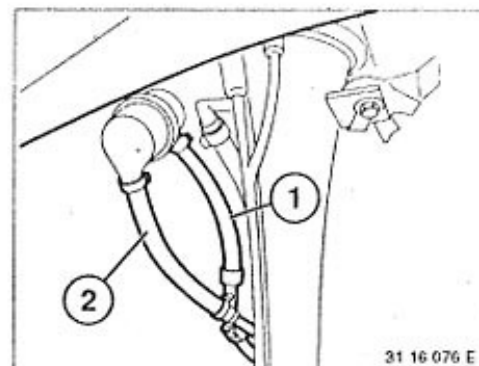
16 13 ... REMOVING AND INSTALLING OR REPLACING FLOAT GRAVITY VALVE

Checking:

The float gravity valve is faulty in case of excessively high pressure in the fuel system or leakage, fuel flows from the float gravity valve to the carbon canister (carbon canister is filled with fuel).



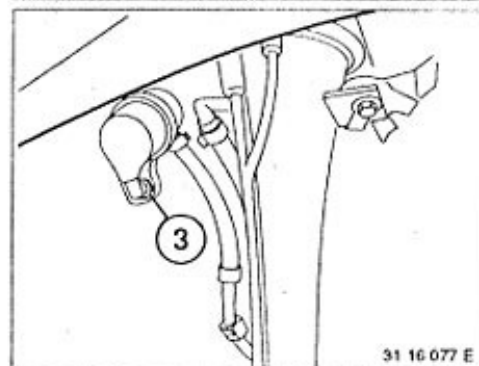
Removing and Installing:
Unscrew nuts (1 ... 6) and remove trim panel from the right rear wheel house.



Disconnect hose (1) to the carbon canister and hose (2) to the tank.

Caution!

Pipes could be filled with fuel which is under pressure.
Catch escaping fuel in a suitable container.



Unscrew nut (3).
Remove valve.

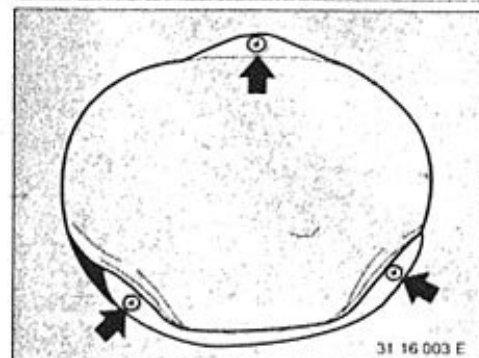


16 14 010 Removing and installing or replacing fuel pump(s)

Draw fuel out of tank with scavenge pump** as far as possible at filler neck.

Caution!

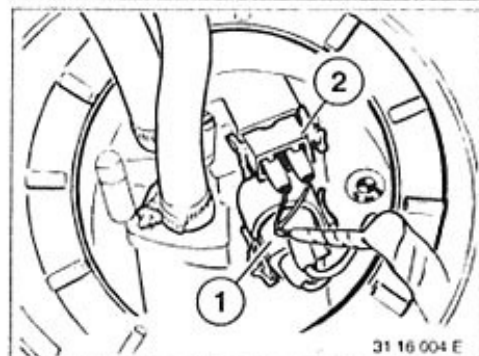
Conform to safety regulations as well as national legislation.
Use suitable scavenge hose* and twist slightly when inserting and when withdrawing.



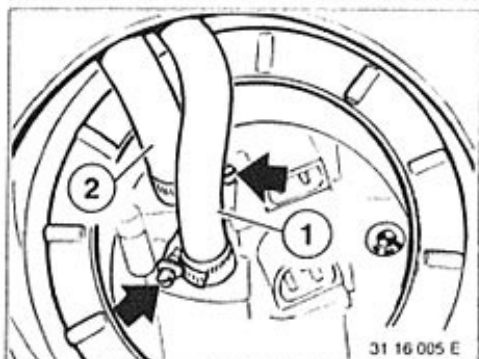
Installation:

Always use new hose clamps.
Check fuel hoses for condition and leakage, replacing if necessary.
Also refer to Service Information, Group 16.

Remove right-hand back seat.
Unfasten screws.
Remove right cover.



Remove connector for fuel pumps (1).
Remove connector for swing-arm fuel level sender (2).



Remove fuel hoses.

Draw off fuel vapors in car*

Note:

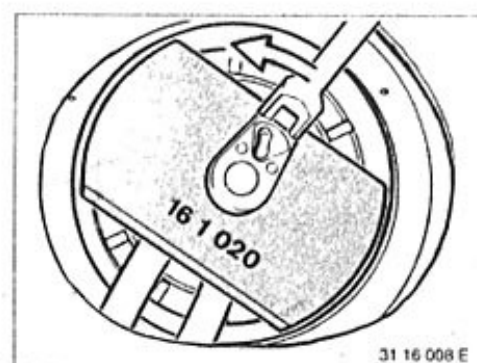
Mark fuel hoses.

1 = Intake pump 1 (cylinder bank 1...6)

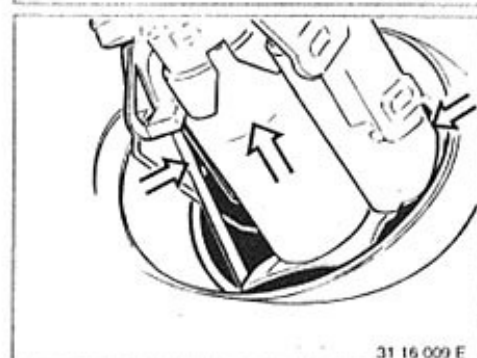
2 = Intake pump 2 (cylinder bank 7...12)

* Refer to Workshop Equipment Service Information

** Source of Supply: BMW Parts Service



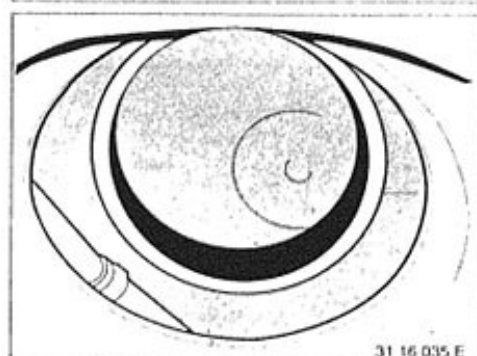
Unscrew cap nut from fuel level sender unit on fuel pump using special tool 16 1 020.



Carefully remove unit.

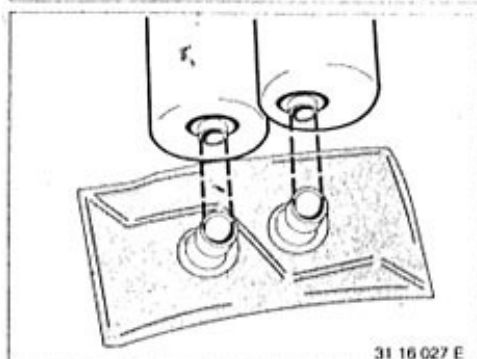
Installation:

Press level sensor slightly into housing.



Caution!

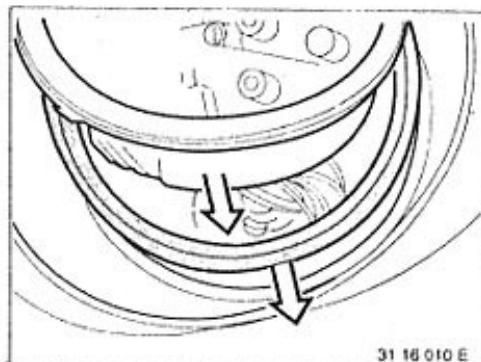
Always use new seal and new cap nut.



Installation:

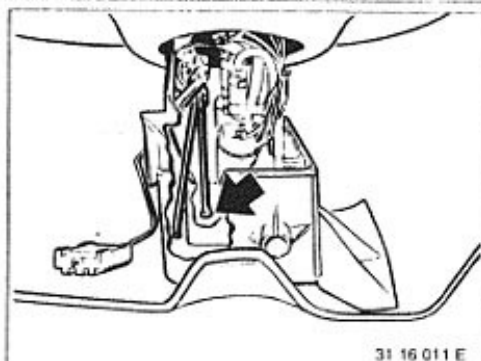
Always use new fuel strainer.

Fit fuel strainer and allow to engage correctly.

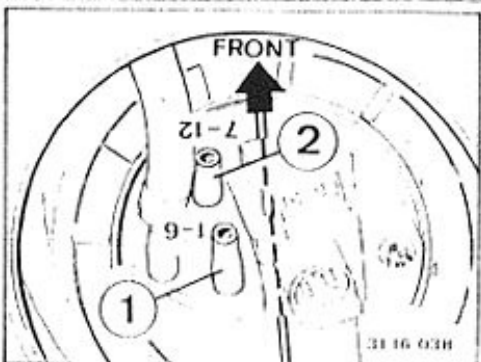

Installation:

Install seal, then swivel strainer and float into tank. Slide in unit upright, compressing level sensor and housing slightly as you do so.

Installation position, refer to page 16-12/7.


Installation:

Before pressing finally home, raise unit slightly (taking care of seal) and move gently to and fro to ensure that the level sensor is upright in the correct area and that the float is able to move freely.

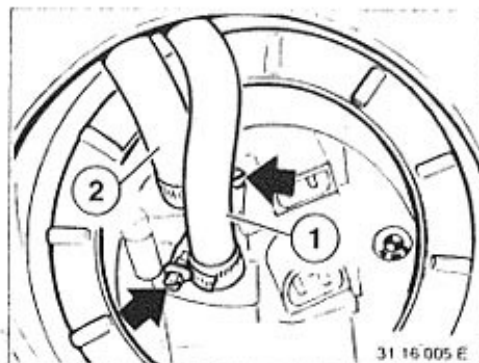

Installation:

Before tightening the cap nut, ensure that the rib on the flange and the cast lug (protruding) on the tank point in the same direction. Note tightening torque* of cap nuts.



The sensor for the right fuel indicator forms one unit with the fuel pumps and the tank flange. This must be replaced as a complete unit.

* Refer to Technical Data


Installation:

Check fuel hoses and replace if necessary. Fit new hose clamps.