

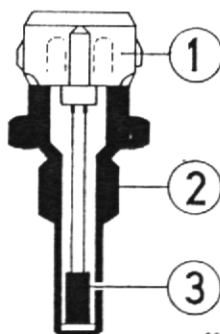
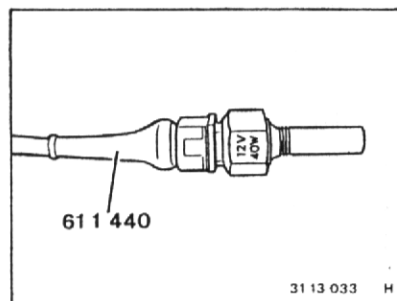
13 Fuel System

13 00 002	Digital motor electronics (DME) – check	13-00/1
	DME components – check	13-00/1
	Coolant temperature sensor – check	13-00/1
	Intake air temperature sensor – check	13-00/1
	Tank venting valve – check	13-00/1
054	Engine Idle speed and CO level – check (cars prepared for catalyst)	13-00/2
060	Engine Idle speed and CO level – check (cars with catalyst)	13-00/3
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13 72 002	Air filter cartridges – replace	13-72/1
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	Tank venting valve layout	13-90/1

13 00 002 CHECKING FUNCTION OF
DIGITAL ENGINE ELECTRONICS (DME)

Connect BMW SERVICE TESTER.
Carry out brief test.
Call fault memory.
Call status.
Refer to operating instructions of BMW
SERVICE TESTER / BMW diagnosing
system.

Additional Troubleshooting Information:
Car Electric/Electronic Test Plan and
Wiring Diagrams.



Checking Components

Checking Coolant Temperature Sensor:

Connect Jetronic test lead 61 1 440.
Check nominal value* with ohmmeter.
To check the entire temperature range,
remove and place sensor in a water
bath up to the hexagon and check re-
sistance* with an ohmmeter.

The temperature sensor measures the
engine temperature and sends an
equal resistance value to the control
unit.
The resistance value drops with rising
temperature (NTC).
1 = Plug connection
2 = Housing
3 = NTC resistor

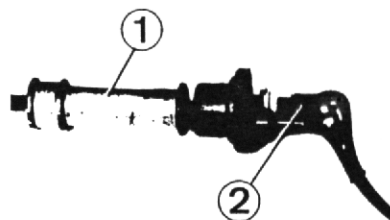
* See Specifications of Gr. 12/Gr. 13

Checking Intake Air Temperature Sen-
sor:

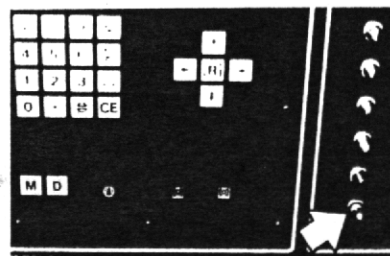
Check resistance value* on tempera-
ture sensor.
Check electric wires from control unit
plug to temperature sensor plug for
breaks or shorts**

Checking Tank Venting Valve:

Connect vacuum hose (1) from BMW
SERVICE TESTER on 8 mm (0.315")
dia. connector.
Supply 12 volts power to tank venting
valve with (2) (Special Tool 61 1 440).



32 16 035

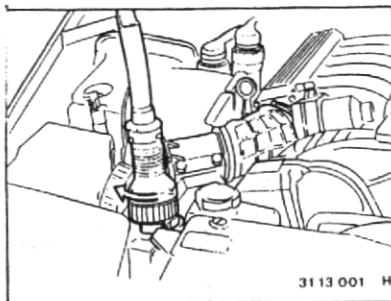


Select multimeter function 21 on BMW
SERVICE TESTER.
Set vacuum to 600 ± 100 mbar.
Switch off vacuum pump.

Pressure must not drop by more than
50 mbar during the measuring time of
approx. 20 seconds.
Replace tank venting valve if the pres-
sure loss is greater than 50 mbar.

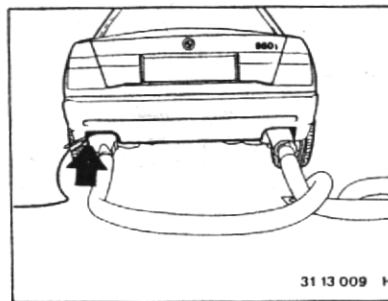
* See Specifications
** See Wiring Diagrams

13 - 00/2



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

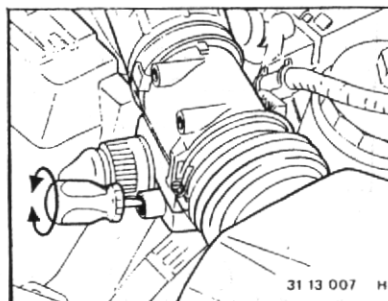
Adjusting Conditions:
Engine at operating temperature, i.e. oil temperature at least 60° C (140° F).
Engine and Ignition in perfect condition.
BMW SERVICE TESTER connected to operating instructions.
Routine checking is not necessary.



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.

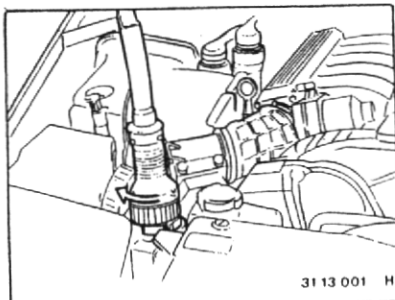


3) CO Level Correction
Remove anti-tamper lock. Correct CO setting on the air mass sensor with a screwdriver, if necessary.

Note:
Read BMW self diagnosis before making corrections.

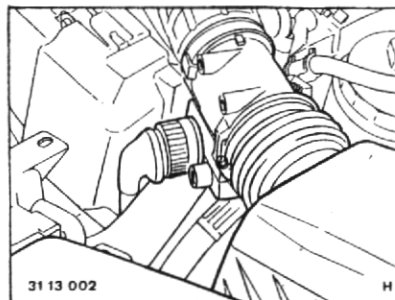
* See Specifications

* See Specifications



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.

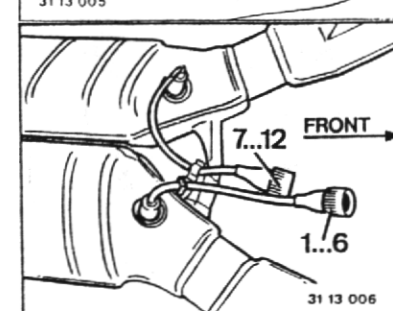
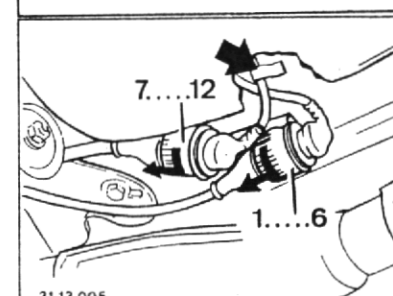
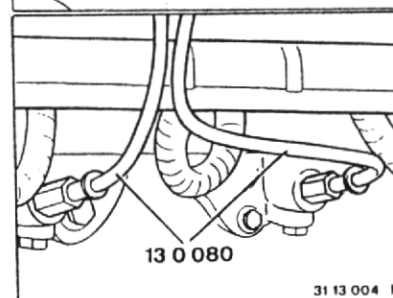
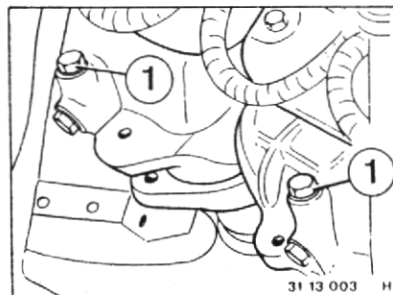


- 1) Engine Idle Speed* Checked with BMW Diagnosing System (Status Call)
Call faults in case of deviation from the nominal value.
Check intake system for leaks.

Important!
Intake pipes cross each other.

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

* See Specifications



- 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.

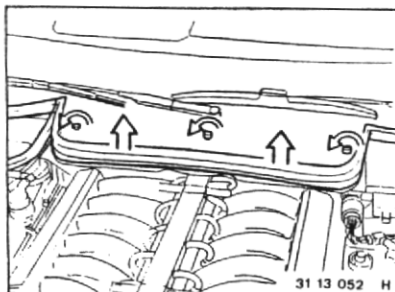
Note:
Connect oxygen sensor after trial run.

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.

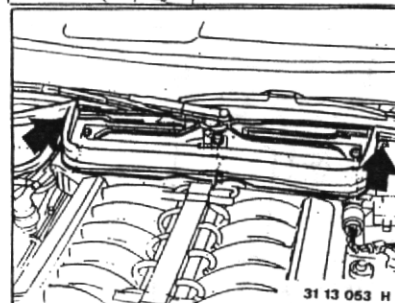
* See Specifications

13 - 31/1

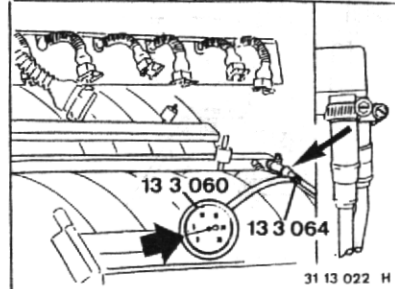


13 31 029 CHECKING DELIVERY PRESSURE OF FUEL PUMPS

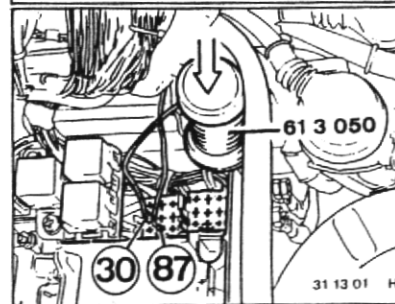
Remove cover on fresh air housing.



Remove fresh air housing.

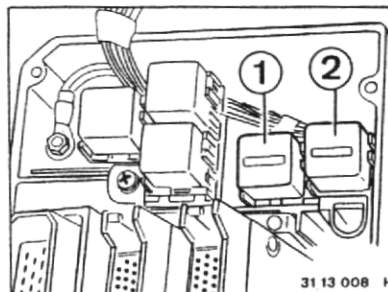


Install connection from BMW SERVICE TESTER or pressure tester 13 3 060 with connecting pipe and t-adaptor 13 3 064 in the fuel feed line – in front of the fuel pressure regulator.

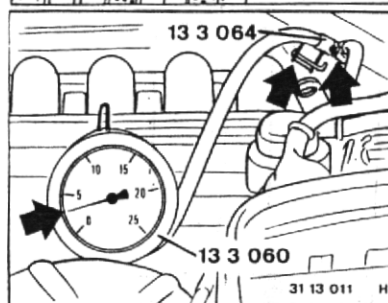


Pull off concerned fuel pump relay. Bridge terminals 87 and 30 with Special Tool 61 3 050. Read system pressure*. Check arrangement (relay/bank of cylinders).

* See Specifications of Gr. 16



Fuel Pump Relay Arrangement:
Relay 1 (left) = cylinder bank 1...6
Relay 2 (right) = cylinder bank 7...12

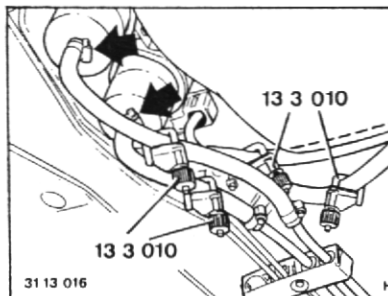
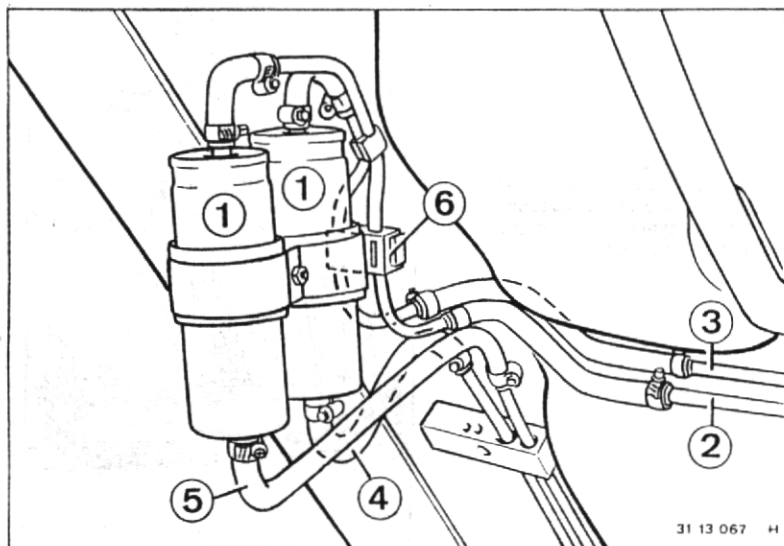


Checking Fuel Delivery Pressure:
Clamp fuel hose after the t-adaptor with Special Tool 13 3 010.
Operate Special Tool 61 3 050.
Read fuel delivery pressure*.

* See Specifications of Gr. 16

13 - 32/1

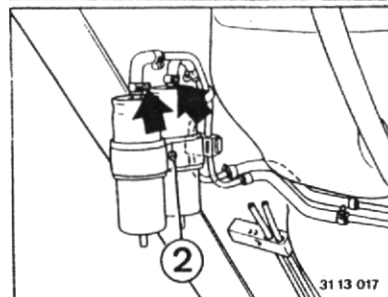
SURVEY OF FUEL FILTER AND PIPES



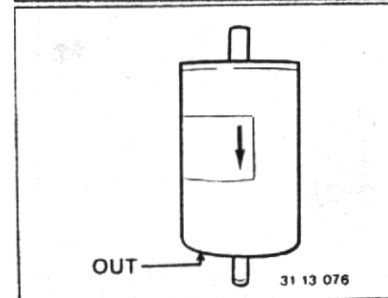
13 32 051 REPLACING FUEL FILTER

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

Caution!
Catch escaping fuel.



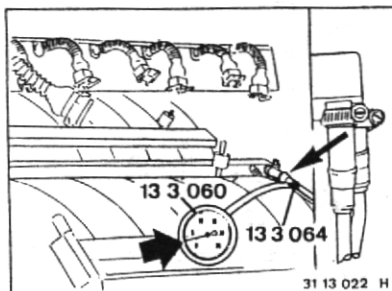
Unscrew mounting nut (2).
Take off upper hoses.



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

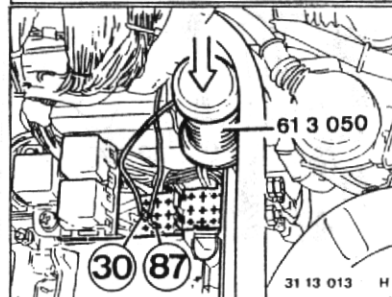
- 1 = Fuel filter
- 2 = Fuel pipe from tank
- 3 = Fuel pipe from tank
- 4 = Fuel pipe to cyl. 1...6 (right)
- 5 = Fuel pipe to cyl. 7...12 (left)
- 6 = Pipes secured on filter holder

13 - 51/1

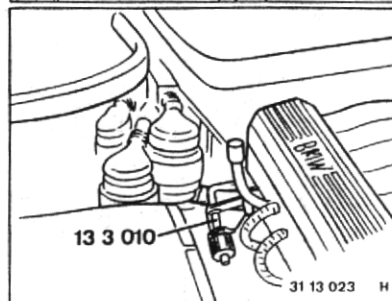


13 51 199 CHECKING FUEL PRESSURE REGULATOR

Install connection from BMW SERVICE TESTER or pressure tester 13 3 060 with connecting pipe and t-adaptor 13 3 064 in the fuel feed pipe – in front of the fuel pressure regulator.



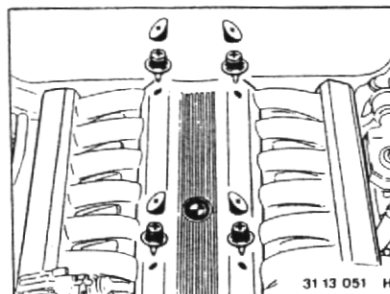
Pull off fuel pump relay. Bridge terminals 87 and 30 with Special Tool 61 3 050. Check fuel system pressure*



If the fuel system pressure* drops too fast, clamp return hose after the pressure regulator with Special Tool 13 3 010 and briefly operate Special Tool 61 3 050 again – see 13 31 ...

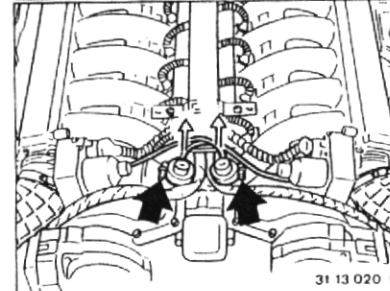
If the system pressure is now maintained, the pressure regulator is faulty. If the system pressure drops, there is a leak in front of the pressure regulator.

* See Specifications

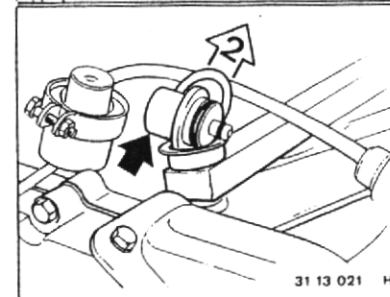


13 51 200 REPLACING FUEL PRESSURE REGULATOR

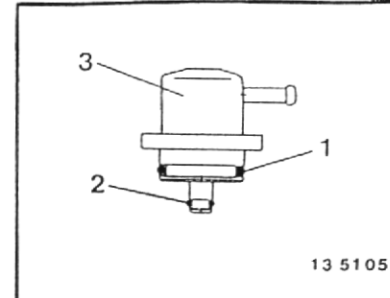
Unscrew cover.



Disconnect vacuum hose. Unscrew bolt. Take off clip.

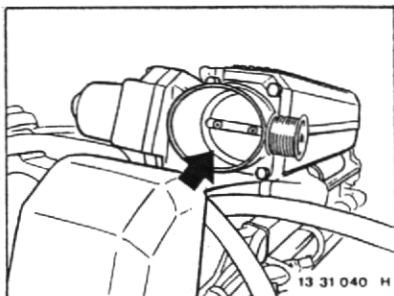


Pull out pressure regulator (2) from above.



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

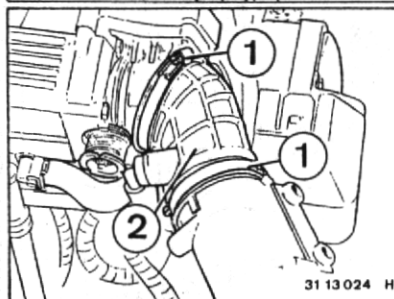
13 - 54/1



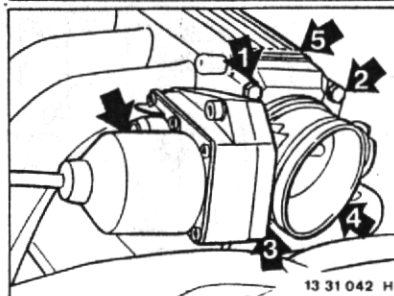
**13 54 035 REMOVING AND INSTALLING
LEFT OR RIGHT THROTTLE
VALVE ASSEMBLY**

Caution!

Keep hands out of the throttle valve
gap with the Ignition switched on –
danger of Injury.



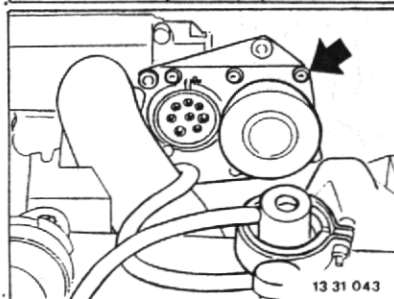
Remove intake hose.
Loosen clamp (1) and take out hose (2).



Disconnect plug on housing.
Unscrew screws (1...4).
Take off throttle valve assembly.

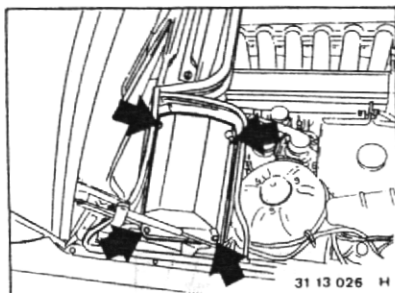
5 = Gasket

Installation:
Replace gasket (5).



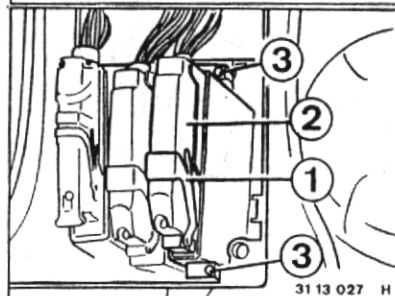
Do not disassemble EML throttle valve
assembly.
Read fault memory with EML self diag-
nosis.

13-61/1

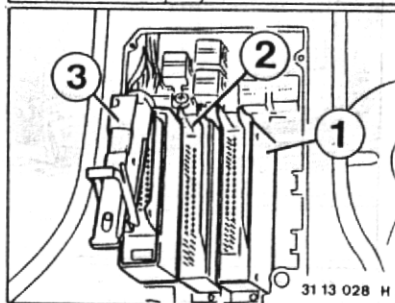


13 61 000 REMOVING AND INSTALLING OR REPLACING CONTROL UNIT FOR DME

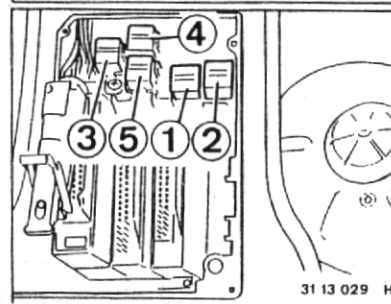
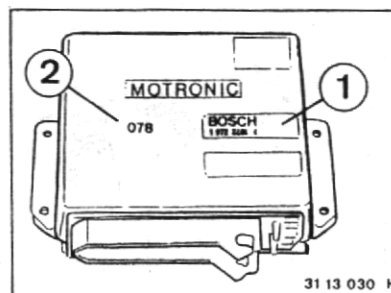
Unscrew electronic box cover screws.
Take off cover.



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



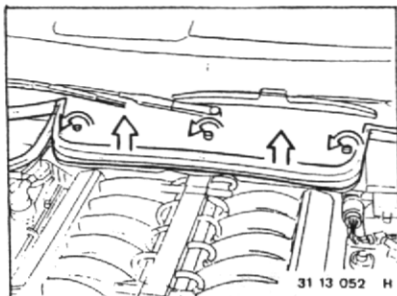
1 = DME control unit for cyl. 1...6
2 = DME control unit for cyl. 7...12
3 = EML control unit



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

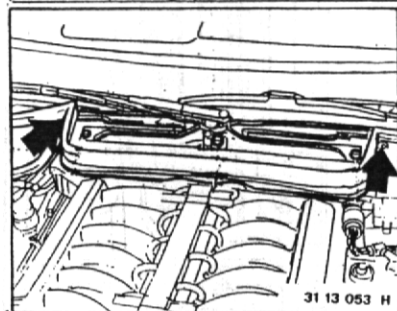
Relays in Electronic Box:
1 = Fuel pump relay for cyl. 7...12
2 = Fuel pump relay for cyl. 1...6
3 = Oxygen sensor heating relay (both)
4 = DME master relay 2 (cyl. 7...12)
5 = DME master relay 1 (cyl. 1...6)

13 - 62/1

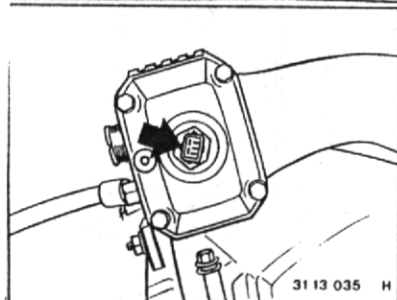


13 62 511 REPLACING INATKE AIR TEMPERATURE SENSOR

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



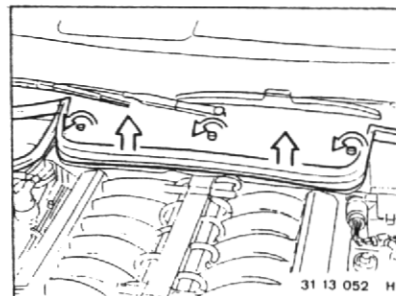
Remove fresh air housing.



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

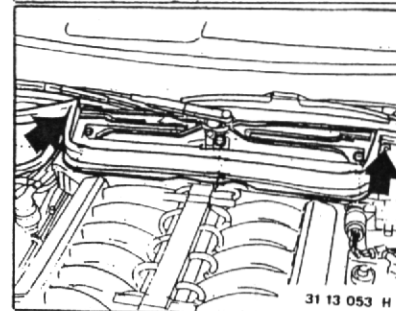
Installation:
Tightening torque*.

* See Specifications

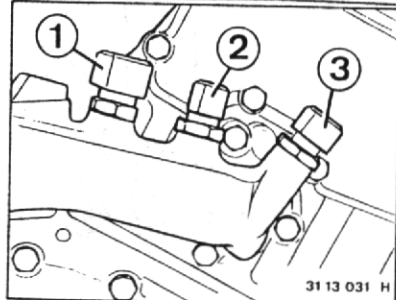


13 62 531 REPLACING COOLANT TEMPERATURE SENSOR

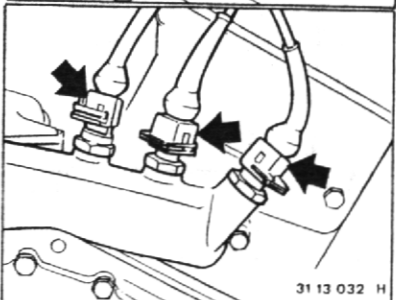
Check function – see 13 00 002.
Unscrew cover for fresh air housing.



Remove fresh air housing.



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



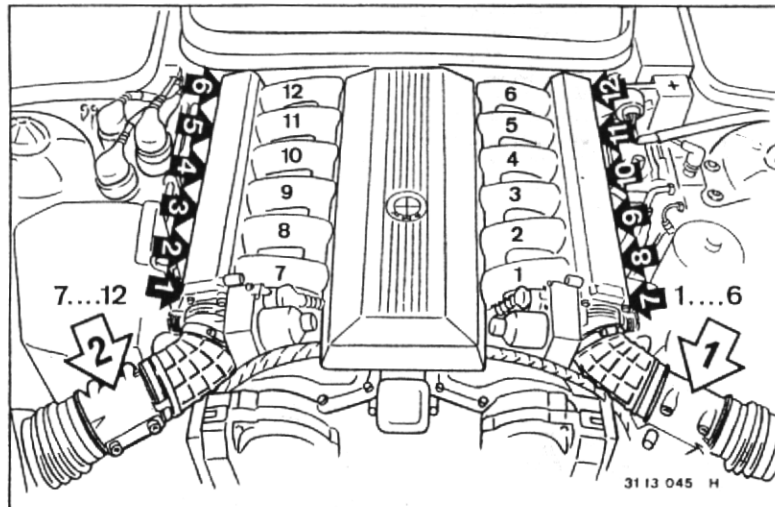
Press spring-loaded lock.
Pull off plug.
Unscrew sensor.

Installation:
Tightening torque*.

* See Specifications

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

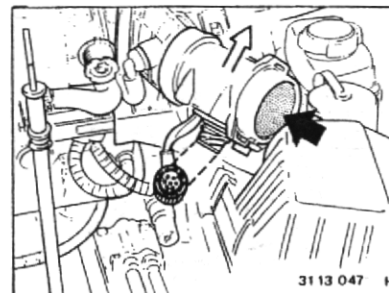
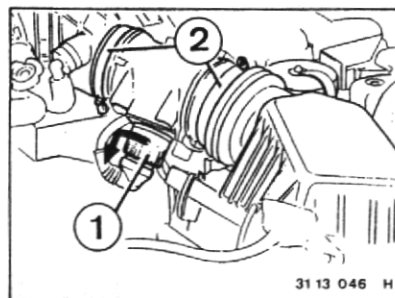
Check function – see 13 00 002.



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

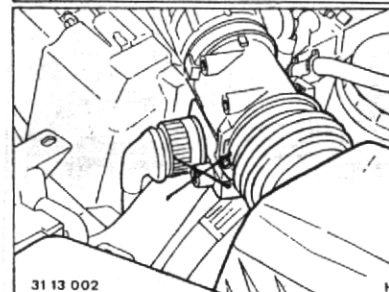
Important!
Intake pipes cross; air mass sensors
are inversed.

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

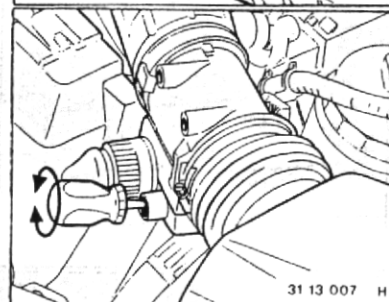


Lift out Intake neck.

Installation:
Install clean filter screen only.



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

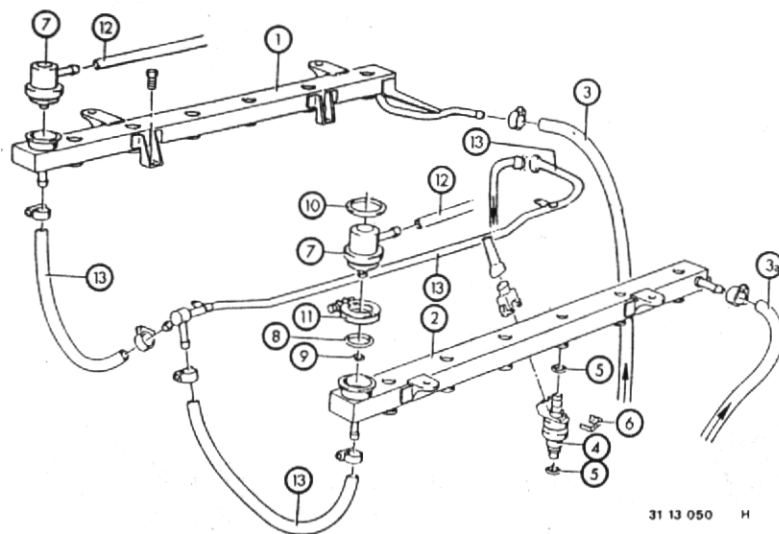


Cars Prepared for Catalyst:
CO setting* – see 13 00 060.

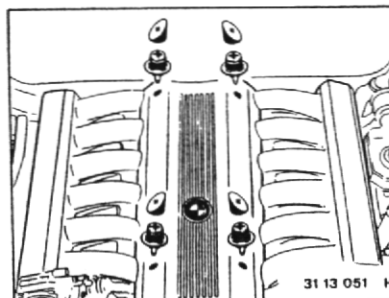
Installation:
Check code number and manufactur-
ing date.

* See Specifications

Über SURVEY OF INJECTION PIPES AND ATTACHMENTS

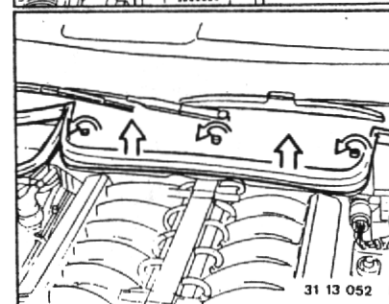


- 1 = Injection pipe, right, cyl. 1...6
- 2 = Injection pipe, left, cyl. 7...12
- 3 = Fuel pipe, cyl. 1...6
- 3a = Fuel pipe, cyl. 7...12
- 4 = Fuel injector
- 5 = Seal
- 6 = Clip (lock)
- 7 = Pressure regulator
- 8 = O-ring
- 9 = O-ring
- 10 = Ring
- 11 = Clamp
- 12 = Vacuum hose
- 13 = Return pipe

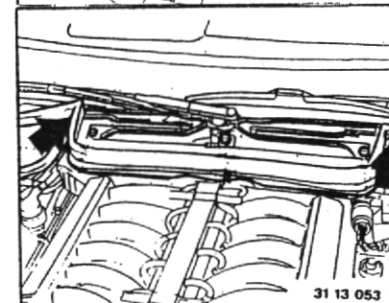


13 64 150 REMOVING AND INSTALLING OR REPLACING ALL FUEL INJECTORS

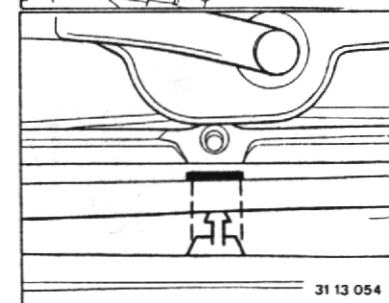
Unscrew cover.



Unscrew cover for fresh air housing.



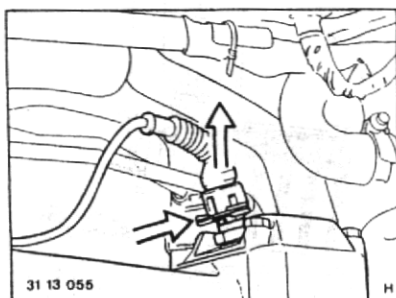
Unscrew screws.
Remove fresh air housing.



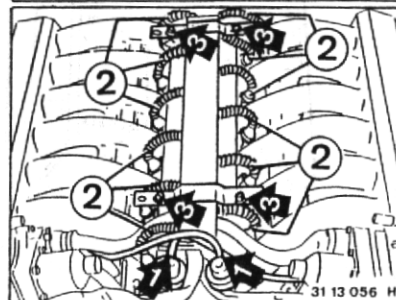
Installation:
Bottom tab must engage in opening.

* See Specifications

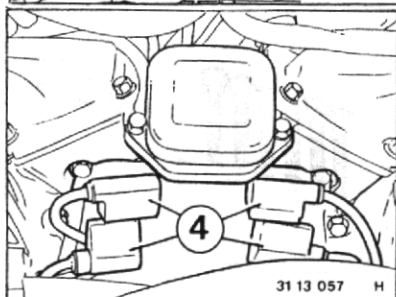
13 - 64/2



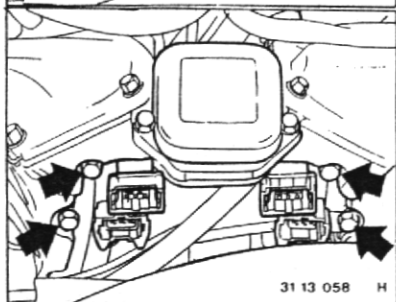
Pull off plug on air temperature sensor.



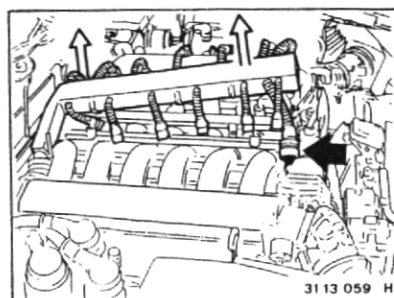
Pull off vacuum hoses (1).
Pull off fuel injector plugs (2).
Unscrew electric lead duct screws (3).



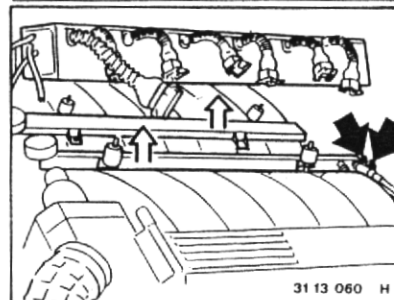
Pull off sender plugs (4).



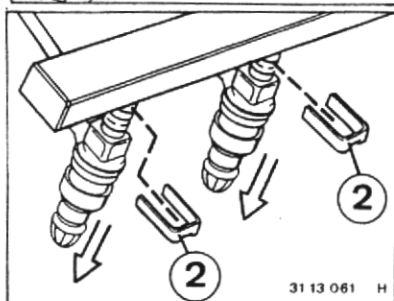
Unscrew screws.
Pull off plugs from above.



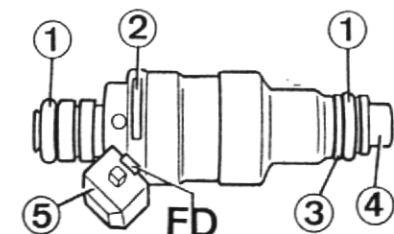
Turn and pull off throttle valve plugs.
Pull up electric lead duct.



Disconnect fuel hoses.
Pull up injection pipes.



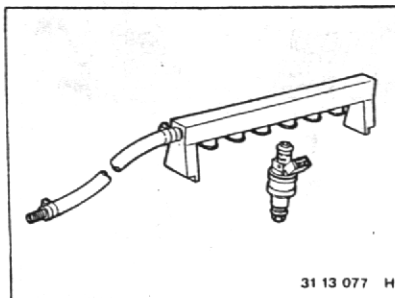
Lift off retainers (2) and remove fuel injectors.



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.

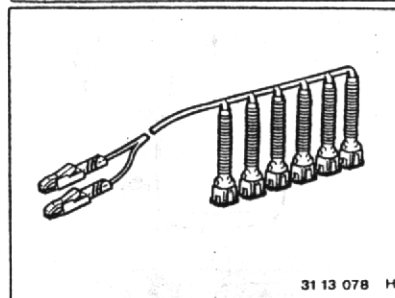
* See Specifications

13 - 64/3

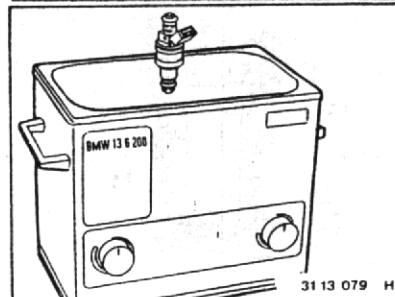


13 64 582 CHECKING ALL FUEL INJECTORS FOR LEAKS AND CLEANING

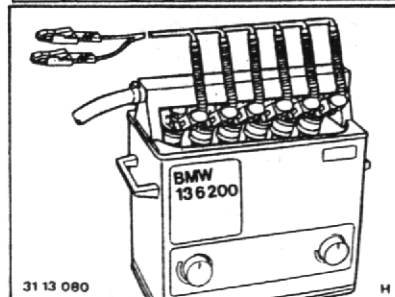
Remove fuel injectors – see 13 64 150.
 Checking Fuel Injectors for Leaks:
 Clip fuel injectors in Special Tool 13 6 205 (Injection pipe).
 Note order of cylinders.



Connect Special Tool 13 6 206 (wire harness).
 Supply 3 bar (42 psi) pressure to fuel injectors.



Connect wire harness on 12 V battery to remove residual fuel in fuel injectors. Pull off plugs on fuel injectors. Set air pressure to 3 bar (42 psi) again. Place fuel injectors with Injection pipe in a suitable tank filled with hot water (60...80° C / 140...175° F). Check for air leaks. Permissible leak rate = 2 air bubbles per fuel injector in 15 seconds. Note fuel injectors with greater air leak rate.



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

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

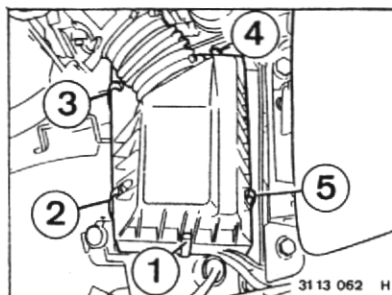
Suspend fuel injectors with Special Tool 13 6 205 (Injection pipe) in ultrasonic cleaner (Special Tool 13 6 200).

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

Repeat leak test.

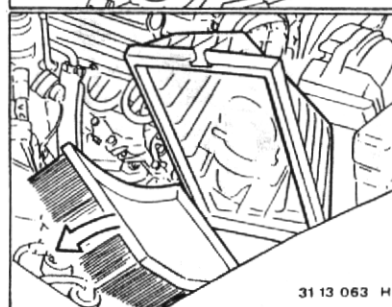
Important!
 Don't carry out leak test in cleaning fluid, but instead only in a water bath.

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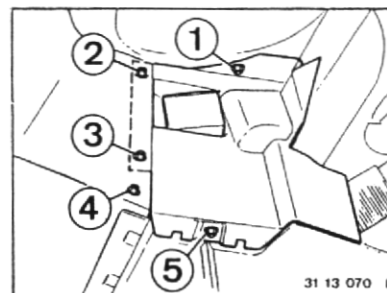
13 72 002 REPLACING AIR FILTER CARTRIDGES (BOTH)

Open clips (1...5).



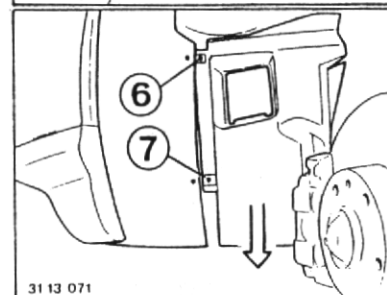
Lift upper section.
Take out air filter cartridge.

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



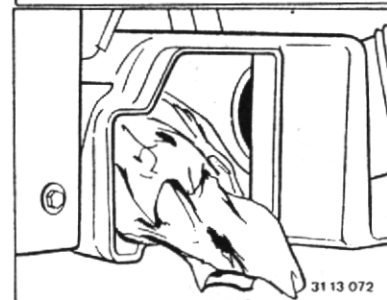
Cleaning Intake Manifold:

Unscrew screws (1...5).



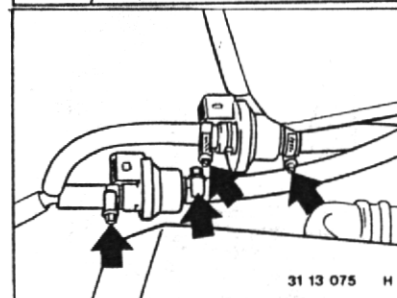
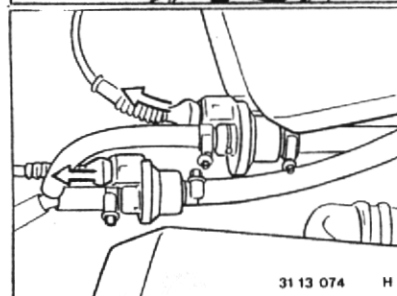
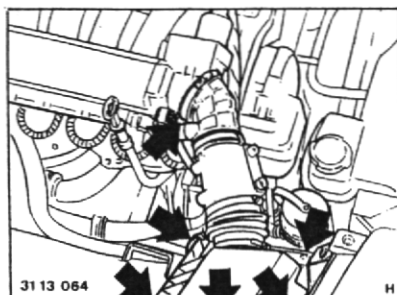
Pull off cover.

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.

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13 90 500 REPLACING TANK VENTING VALVE

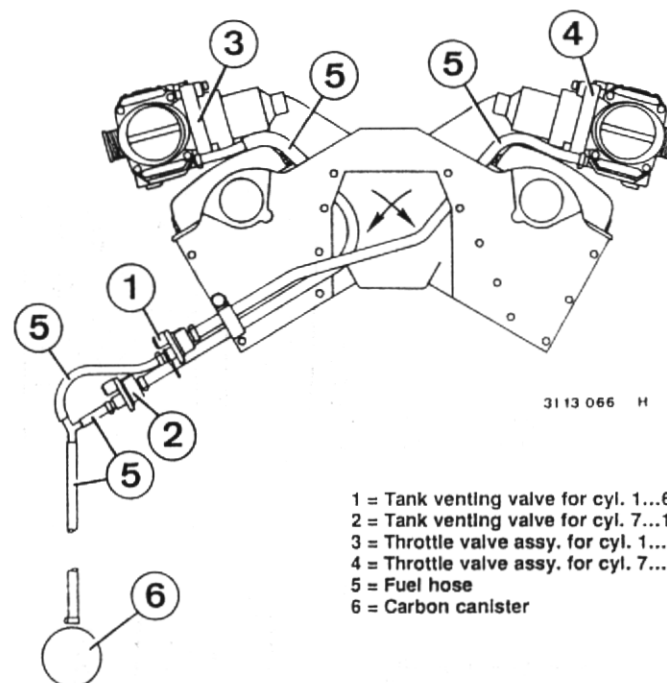
Check function — see 13 00 002.
Remove left air mass sensor with intake bellows and upper filter section.

Squeeze clips and pull off plugs.

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

Disconnect fuel hoses, catching fuel if applicable.

ARRANGEMENT OF TANK VENTING VALVES (View Opposite Forward Direction)



- 1 = Tank venting valve for cyl. 1...6 (right)
- 2 = Tank venting valve for cyl. 7...12 (left)
- 3 = Throttle valve assy. for cyl. 1...6
- 4 = Throttle valve assy. for cyl. 7...12
- 5 = Fuel hose
- 6 = Carbon canister