

11 Engine M70

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For additional work, refer to “Construction Group Repair Instructions”

General Information

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Cylinder configuration:

Cylinders 1 ... 6, viewed in direction of travel, are arranged on the right side of the vehicle, starting with cylinder 1.

Cylinders 7 ... 12, viewed in direction of travel, are arranged on the left side of the vehicle, starting with cylinder 7.

Air manifold, throttle body and air filter with mass air flow sensor for each cylinder bank are arranged on the opposite side to their respective bank.

The operations described apply to both cylinder banks: if special explanations are required, the procedures for each cylinder bank are described separately.

General instructions for operations on valve timing:

If operations on the cylinder head are performed where the camshaft was removed, please note the following:

The hydraulic valve tappets expand without load being applied by the camshaft and, after installation, require some time before they compress back down. This means that, if parts are assembled in rapid sequence, even the "closed" valves may still be open and in direct contact with the piston.

Note the following wait periods between installation of the camshaft and mounting of the cylinder head:

ambient temperature 20° C	4 mins.
10° C - 20° C	11 mins.
0° C - 10° C	30 mins.

After assembly of the camshaft and the timing chain, wait for the following periods before turning the engine crankshaft:

ambient temperature 20° C after 10 mins.
10° C - 20° C after 30 mins.
0° C - 10° C after 75 mins.

General instructions for work involving the gaskets:

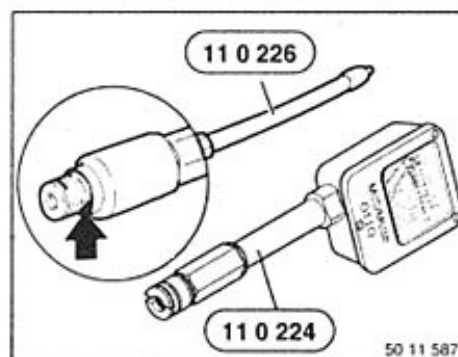
Apply a bead of cement to all contact points and a thin, even coat of Hylomar SQ 32M** to determine the location of the gaskets.

** Refer to BMW Parts Service

11 00 039 Checking compression of all cylinders (M70)

Caution!

High voltage – danger of death!
Disconnect power supply from ignition coils.
Disconnect fuel pump relay and DME main relay.
Note instructions on compression check, refer to General Data MG12

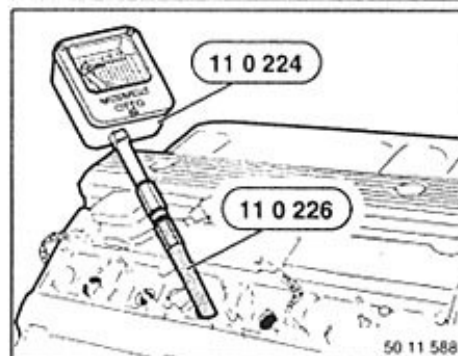


Removing all spark plugs, refer to 12 12 011

Insert special tool 11 0 226 in spark plug thread by hand.

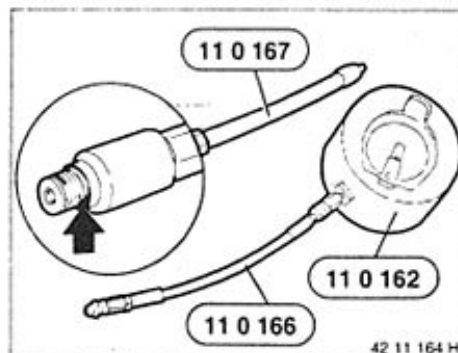
Note:
Check condition of seal and replace if necessary.

Connect up special tool 11 0 224 (compression tester).



Depress accelerator and actuate starter until compression stops rising.

Compression pressure



Note:
special tool 11 0 162 / 166 / 167 can still be re-used.

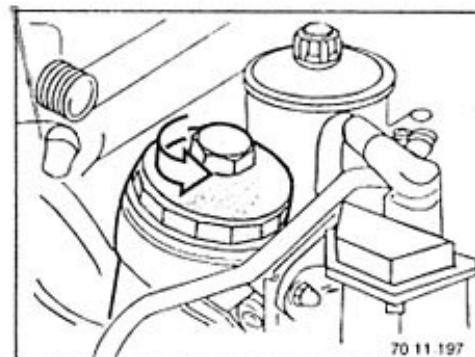
Refer to Technical Data

00 00 249 BMW engine oil service

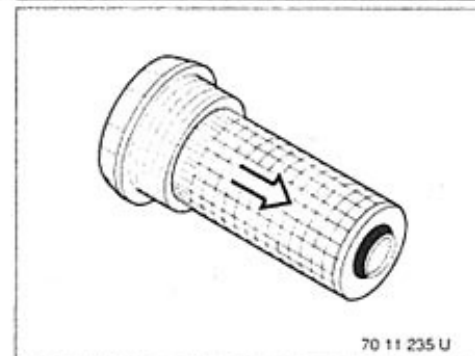
M70

(change engine oil and oil filter)

The oil change should be performed at operating temperature.

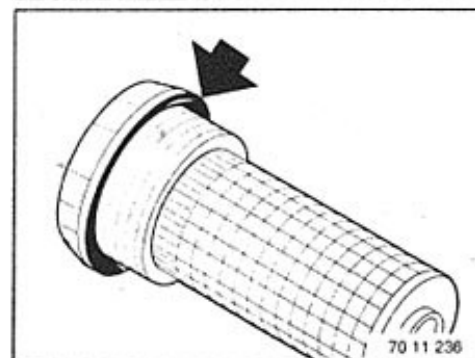


Drain oil from oil filter into oil pan by opening the oil filter cover.



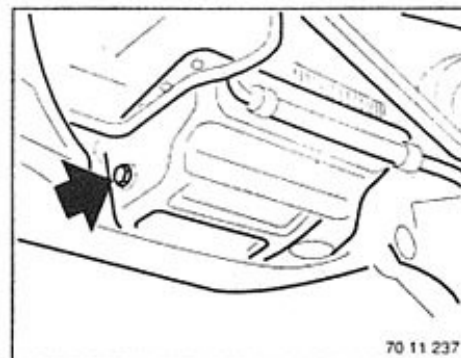
Remove oil filter from oil filter cover.

Installation:
Note installation direction of filter.
Filter must locate in cover.



Installation:
Replace O-ring in oil filter cover.
Tightening torque 11 42 2AZ*

* Refer to Technical Data



Once oil filter housing has been drained, open oil drain plug.
Drain or draw off the oil.

Installation:
Fit a new seal.
Tightening torque 11 13 1AZ*

Fill with engine oil

Switch on engine and run at idle speed until oil indicator lamp goes out.

Switch off engine and check oil level (vehicle on level ground).
Engine oil grades **

* Refer to Technical Data

** Refer to BMW Operating Fluids

11 00 050 Removing and installing engine

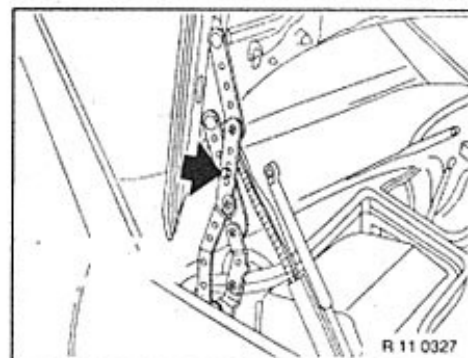
M70

Remove radiator and expansion tank, refer to 17 11 500.

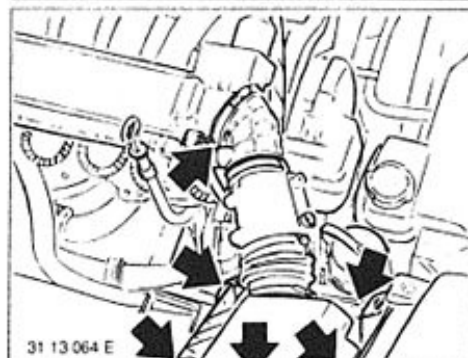


Remove transmission, refer to 23 00 025, 24 00 026.

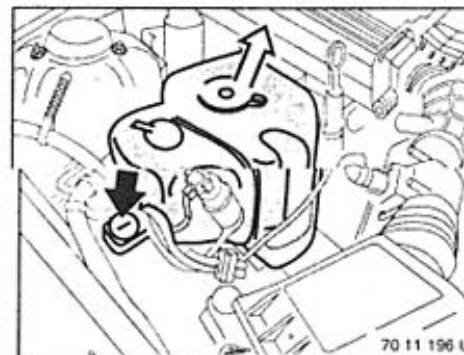
Caution!
To prevent damage to the heating connections, special tool 00 0 200 or special tool 11 0 010 used for removal of transmission must remain in place until engine is attached to special tool 11 0 100.



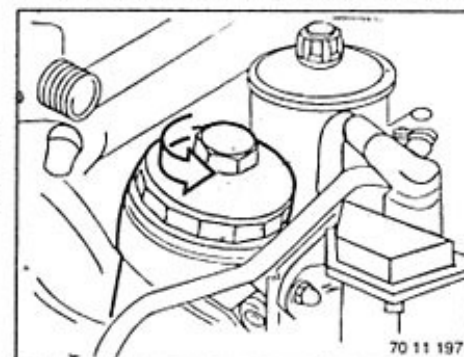
Lift engine hood into assembly position. Disconnect damper strut on engine hood, completely open engine hood and secure with one screw on each side (left and right).



Remove complete mass air flow sensor with suction gaiter and upper section of filter from left and right sides.

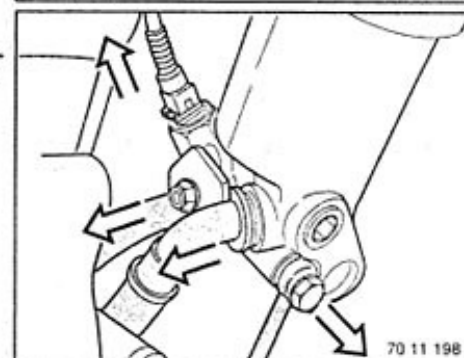


Remove windshield wash container and place to one side.

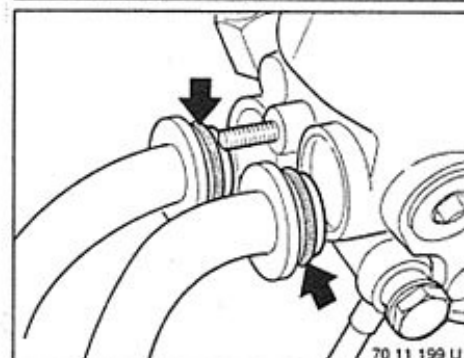


Drain oil from oil filter into the oil pan by opening the oil filter cover.

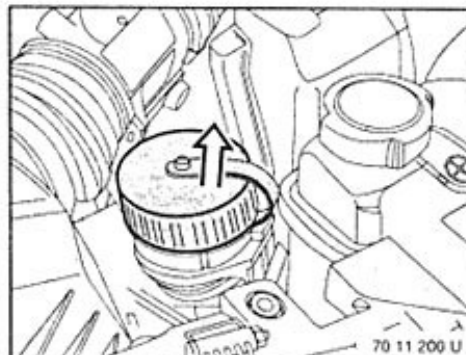
Installation:
Fit new gasket.



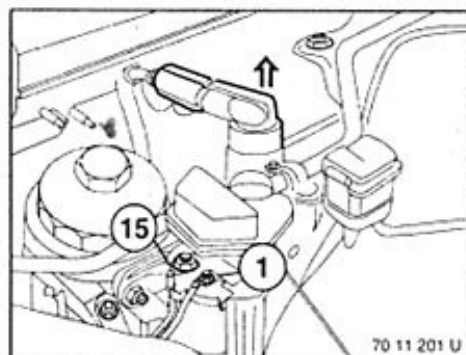
Disconnect oil lines from oil filter. Remove connector.



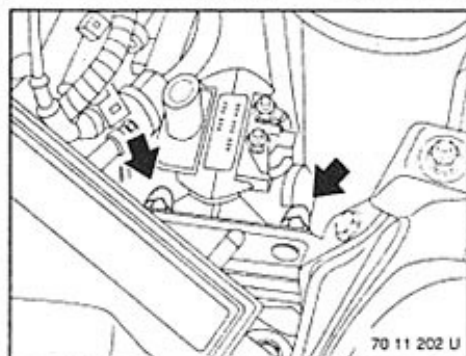
Installation:
Fit new seals.



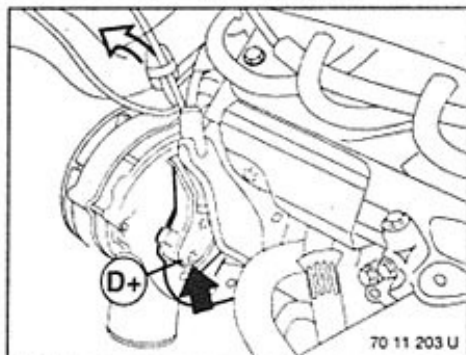
Unclip diagnostic plug.



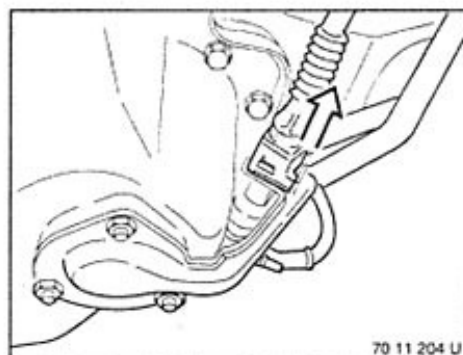
Disconnect ignition leads and connections on left and right ignition coils.



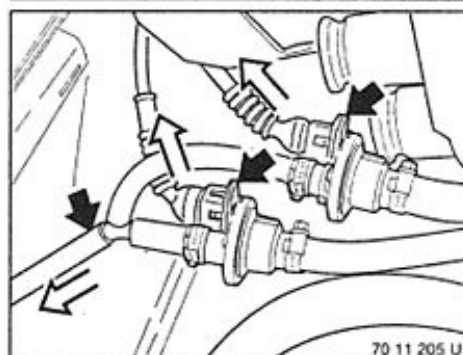
Unscrew right ignition coil.



Unscrew lead for D+ (thin lead) on the alternator and pull out of rubber cap.

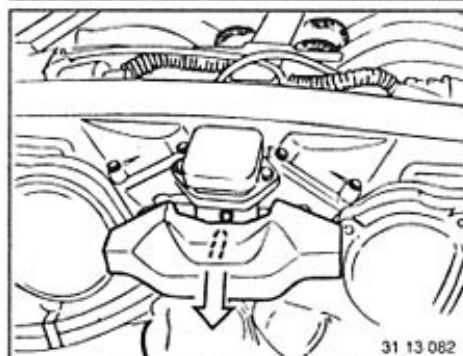


Disconnect oil level sender plug.

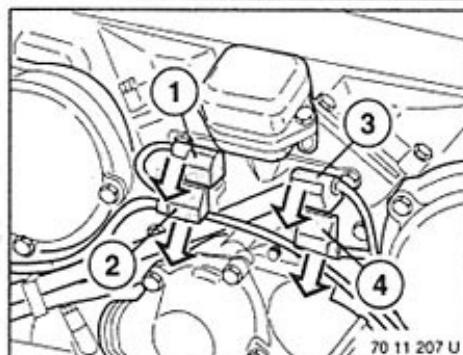


Pull both plugs off of tank venting valves.
Disconnect hose.

Important!
Don't mix up plugs.



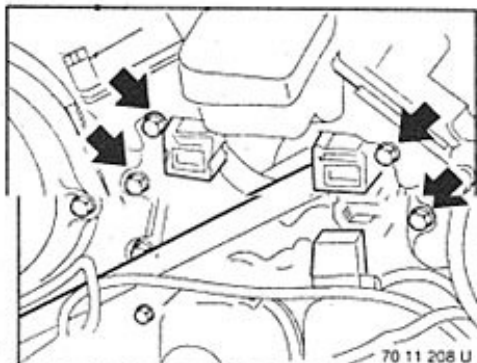
Pull off oil catching tray



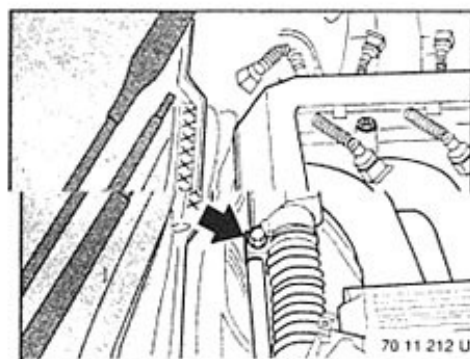
Pull off plugs (1 ... 4).

Installation:

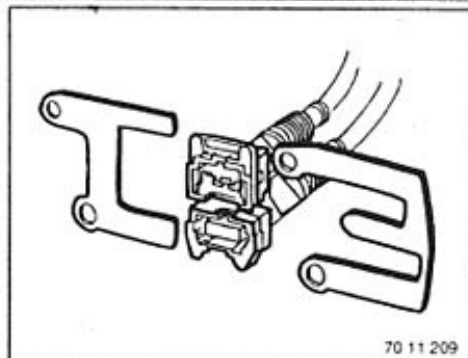
1 = Pulse sender	Cyl. 1 ... 6
2 = Cyl. Identifier	Cyl. 1 ... 6
3 = Cyl. Identifier	Cyl. 7 ... 12
4 = Pulse sender	Cyl. 7 ... 12



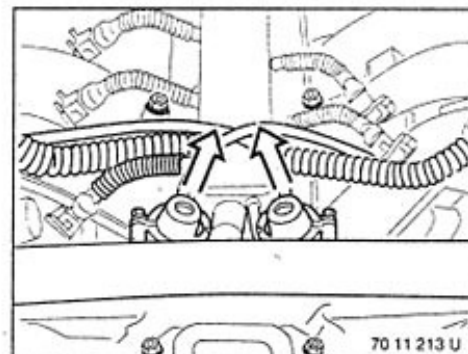
Unscrew bracket.



Unscrew electric lead duct on rear end of engine.

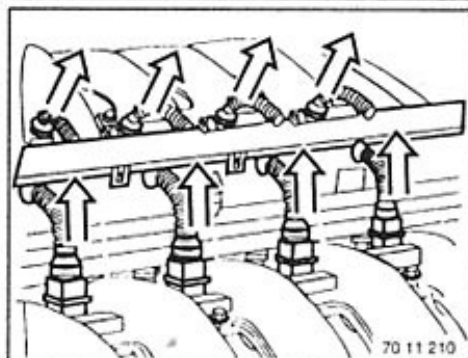


Pull plugs out of holders.

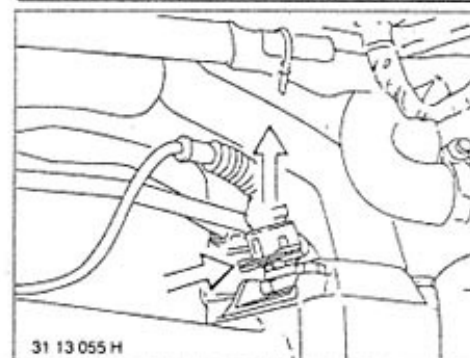


Pull vacuum hoses off of pressure regulators.

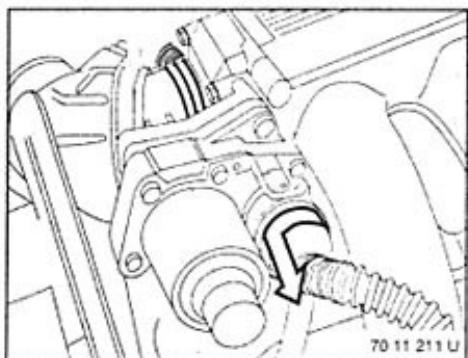
Installation:
Note arrangement of hoses.



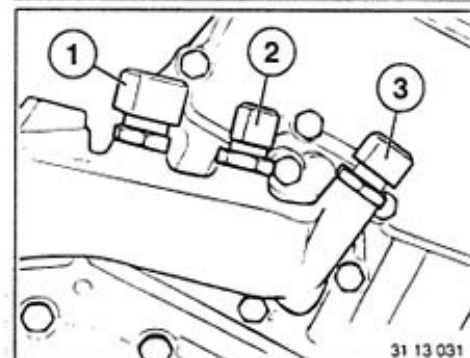
Pull plugs off of fuel injectors.



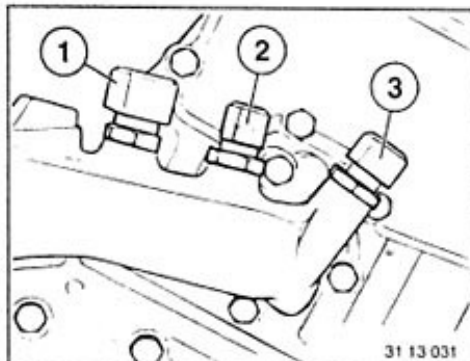
Pull off both plugs on air intake manifolds.



Disconnect plugs on left and right throttle valve assemblies.

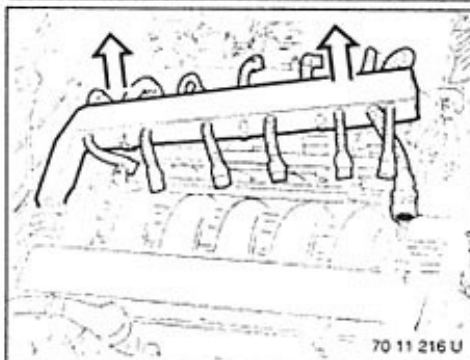


Pull off plugs on temperature sensors on rear end of engine.

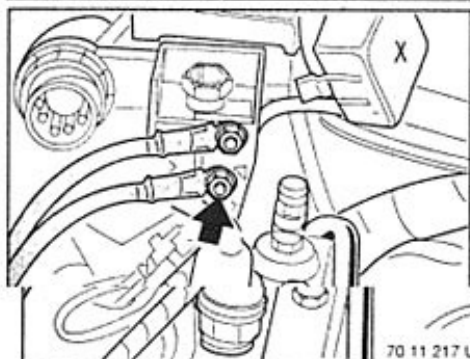


Arrangement:

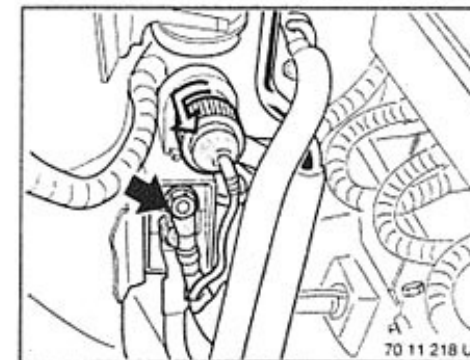
- 1 Temperature sensor - DME
- 2 Temperature sensor - EML
- 3 Temperature sensor - temp. gage



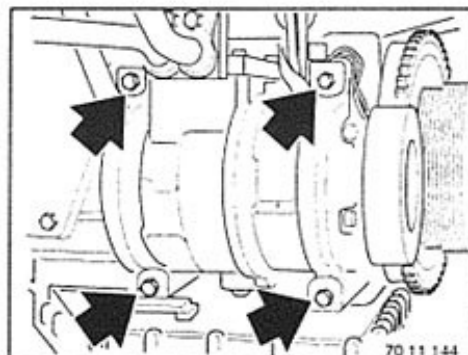
Lift off and move back electric lead duct.



Unscrew connection for alternator on B+ connection point.



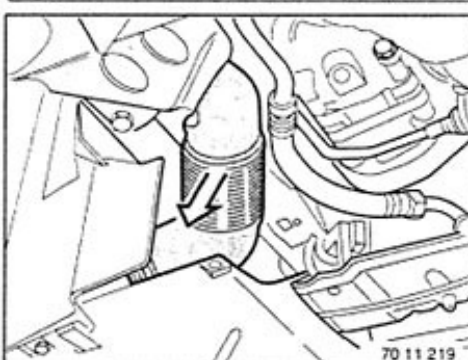
Unscrew connections for starter at connection point on right wheel house.



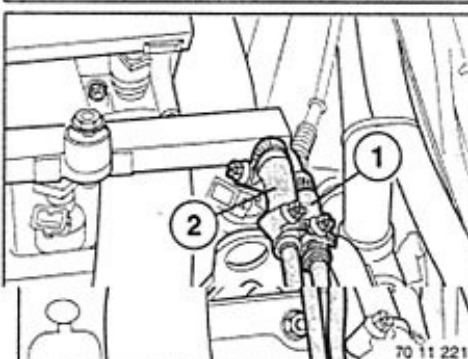
Unscrew AC compressor on engine.

Note:

Hoses remain connected.
Mount side of AC compressor on wheel house.



Unscrew cool air guide for alternator.

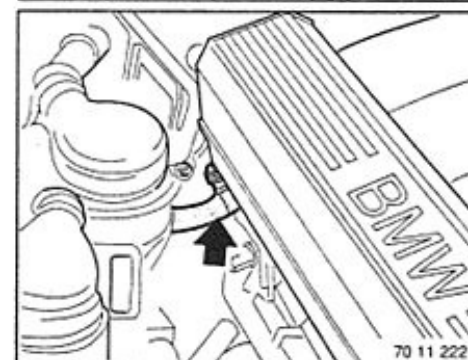


Unscrew fuel pipes (1 ... 2)

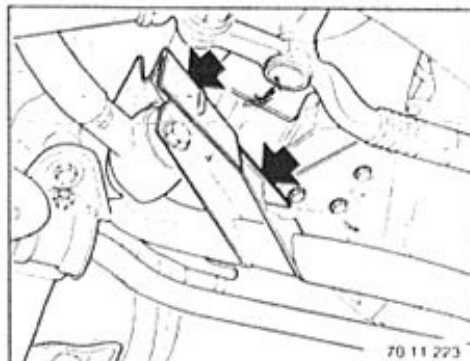
Installation:

Arrangement of Fuel Pipes:

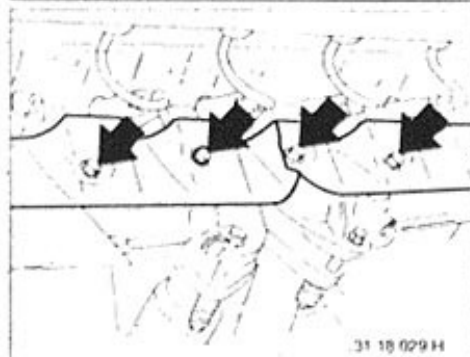
- 1 = Cylinders 1 ... 6
- 2 = Cylinders 7 ... 12



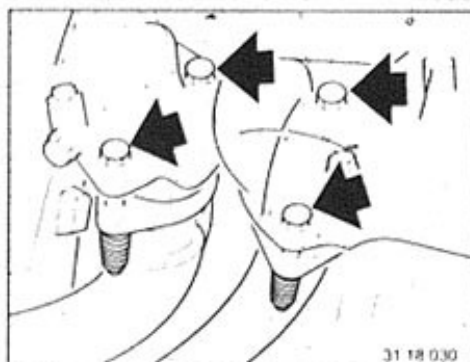
Unscrew fuel return pipe on rear end of engine to the right.



Unscrew heat shields on left and right thrust struts.



Unscrew heat shields on right exhaust manifolds.

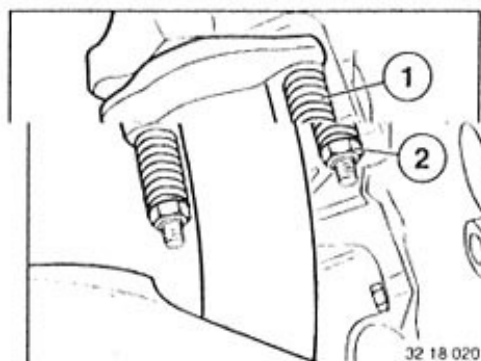


Unscrew right exhaust pipes on exhaust manifolds and remove.



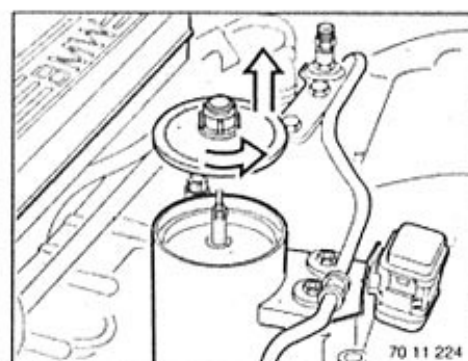
50 11 500 U

Important!
Tighten exhaust pipes only after installation of the engine and complete exhaust assembly.



Installation:
Replace self-locking nuts.
Lubricate tapers of flanges with CRC**

Press springs (2) flat uniformly by tightening nuts (1) with a torque of 10 Nm (7 ft. lbs.).
Loosen nuts (1) 1 and 1/2 turns afterwards.
Flanges must be parallel to each other after finishing installation.
Springs must not be pressed flat.
The pipe with compensator must be tightened last due to the danger of torsion.

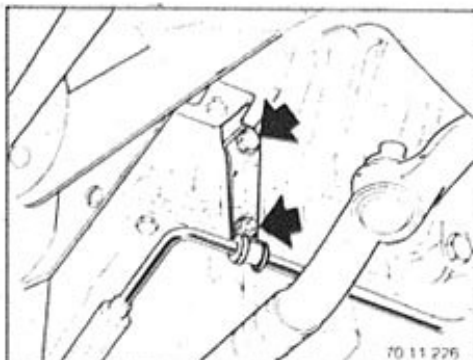


Draw oil out of power steering pump's supply tank.

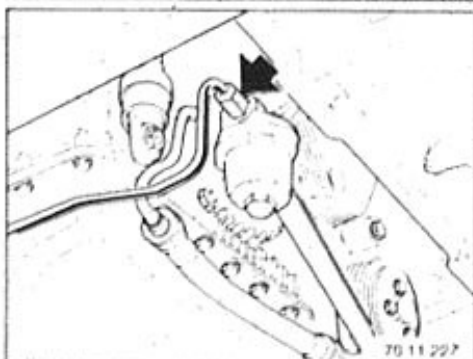


Unscrew hose on supply tank.

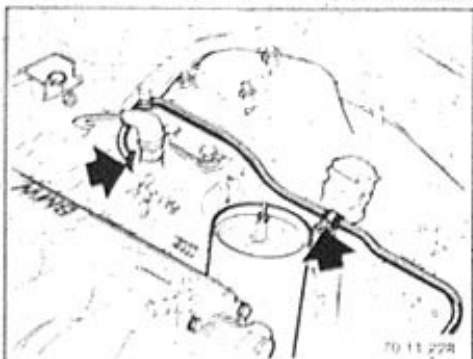
** Source of Supply: HWB



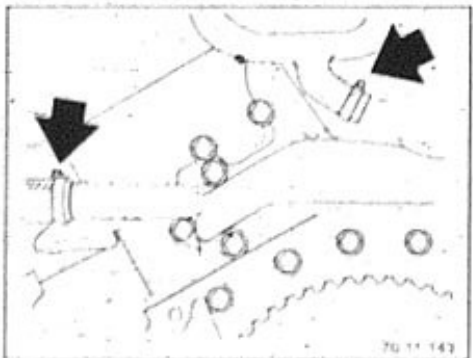
Unscrew bracket for ASC+T line and starter motor support from engine block.
Lift out starter motor.



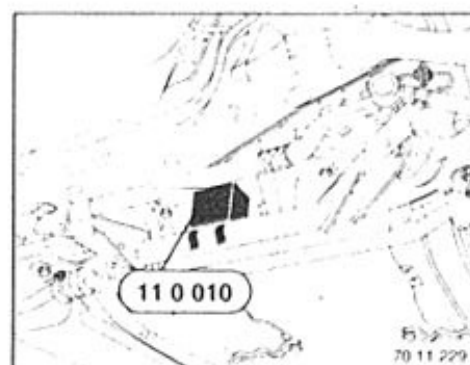
Unscrew ASC+T line from filter.



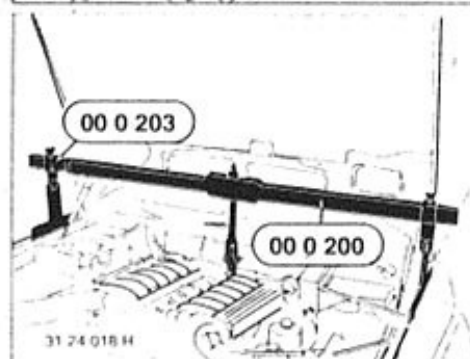
Remove bracket and hydraulic line from 3-phase governor.



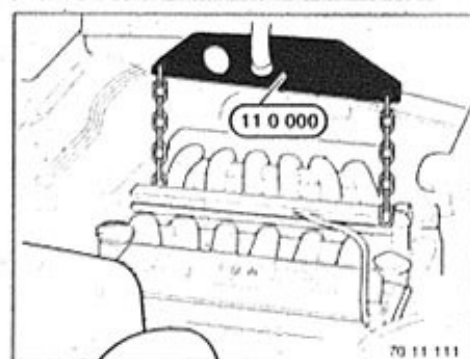
Fit heating hoses from coolant manifold and coolant pipe between heating firewall and engine.



Caution!
Before removing special tool 00 0 200, always install special tool 11 0 010 since otherwise the engine makes contact with the spigot neck of the heating unit, causing damage.
Install special tool 11 0 010.



Remove special tool 00 0 200.

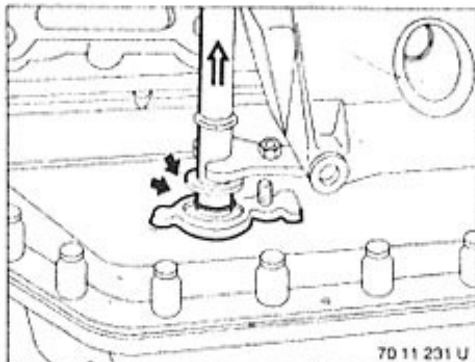


Attach special tool 11 0 000 to the brackets.



Unscrew ground tape from engine support arm.

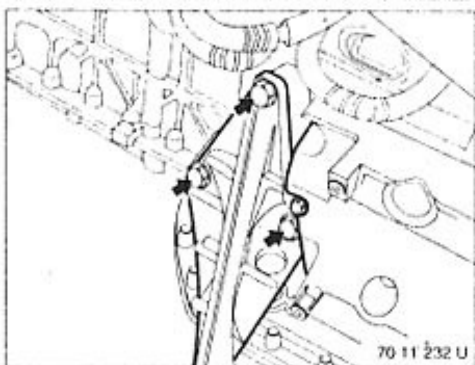
Unscrew engine mount on left and right sides.



Remove guide tube for oil dipstick.

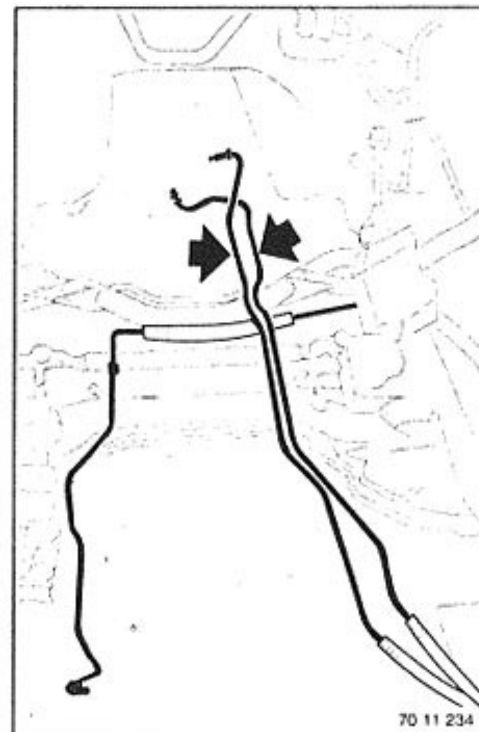
Installation:

Note arrangement of seal and disc.



Raise engine slightly and remove right engine support bracket.

Lift engine and turn back to the right.
Guide exhaust pipes to left of steering spindle when lifting out.



Installation:

On version with automatic transmission:
Before installing the engine, install oil cooler lines in the correct position.

11 12 002 Removing and installing / sealing left or right cylinder head cover

Remove the following components:

- Air intake manifold
(11 61 056 without "both gasket faces")
- Protective cover for distributor cap and
ratchet band
- Cylinder head cover with gasket

11 12 105 Removing and installing left cylinder head

Remove the following components:

- Engine (11 00 050)
- Support arm for left engine mount
- Support for left and right assembly frame
- Engine in assembly frame
- Rear left heat shield on A manifold
partially installed
- Flexible hoses on left of manifold
- Injection pipe with E valves on left and
right
- Ignition line pipe on left and right
manifold
- Left and right distributor caps
- Manifold with noise insulation strip on left
and right
- Valve cover with gasket on left and right
sides
- Distributor finger housing and adapter
housing with gasket on left and right
- Drive belt tensioner for alternator
- Timing case cover with gasket
- Chain tensioner
- Top sliding rail for timing chain
- Sprocket wheel on left and right camshaft
- Engine in TDC position, disconnect, check
timing
- Sliding rail for left timing chain
- Upper timing case with gasket
- Coolant connecting duct with gasket
and rear O-ring
- Cylinder head screws on left, torque
and torsion angle 120°
- Cylinder head with gasket on left
- Measure amount by which piston protrudes
- Clean crankcase
- Clean cylinder head
- Clean base of piston

**11 13 010 REMOVING AND INSTALLING
OR REPLACING UPPER OIL
PAN SECTION**

Remove following parts:

- Transmission (23 00 025, 24 00 024)
- Clutch pressure plate on drive plate
(only manual transmissions)
- Windshield washing fluid tank
- Oil dipstick guide tube
- Both nuts on bottom engine mounts
- Splash guard
- Drain and fill engine oil
- Level sender plug
- Lower oil pan section
- Clean sealing surfaces
- Level switch
- O-ring
- AC compressor drive belt tensioner
- Drain hose from oil filter to oil pan
- Flywheel
- Ride level control oil pipe holder
- Power pump holder on oil pump

11 14 102 REMOVING AND INSTALL- ING, SEALING OR REPLAC- ING UPPER TIMING CASE

Remove following parts:

- Both cylinder head covers
- Oil catch tray on timing case cover
- Fan
- Distributor caps left and right, Igni-
tion leads
- Distributor arms, adapters and dis-
tributor housings left and right
- Alternator drive belt and tighten
- Alternator drive belt tensioner
- Upper timing case cover and gasket
- Set and hold engine in TDC
- Chain tensioner
- Adjust chain tensioner
- Upper chain guide rail
- Both sprockets
- Check timing
- Left guide rail
- Upper timing case and gasket

11 14 110 REMOVING AND INSTALL- ING, SEALING OR REPLAC- ING LOWER TIMING CASE COVER

Remove following parts:

- Upper timing case (11 14 102)
- Lower oil pan section
- Coolant hose on thermostat housing
left, right, upper
- Coolant hose on expansion tank bot-
tom
- Coolant hoses on radiator
- Fill coolant
- AC compressor drive belt tensioner
- Pulley on water pump
- Vibration damper on hub
- Wrench on hub (ST 11 2 230)
- Central bolt for hub
- Hub with puller (ST 00 7 501)
- Upper oil pan section loosened par-
tially
- Timing case cover with seal and
gasket (ST 11 1 210, 11 1 220)

ST = Special Tool

11 14 115 REMOVING AND INSTALL- ING, SEALING OR REPLAC- ING LOWER TIMING CASE

Remove following parts:

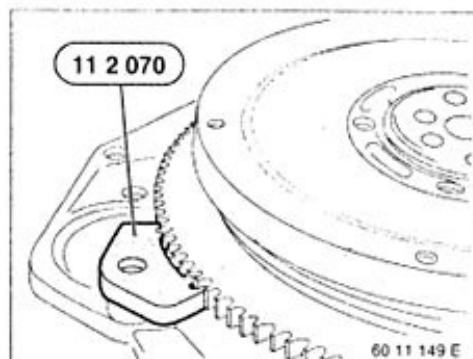
- Upper timing case (11 14 102)
- Lower oil pan section
- Lower timing case cover (11 14 110)
- Water pump
- Replace O-ring
- Tensioning rail and chain
- Lower timing case and gasket
(ST 11 1 210, 11 1 220)

ST = Special Tool

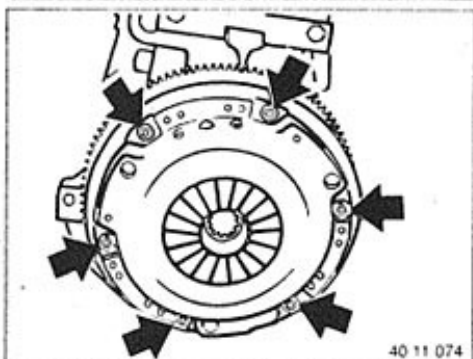
11 22 000 Replacing flywheel

M70

Remove transmission,
see 23 00 025

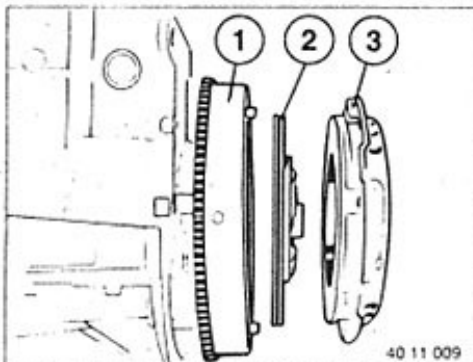


Arrest flywheel with special tool 11 2 070.



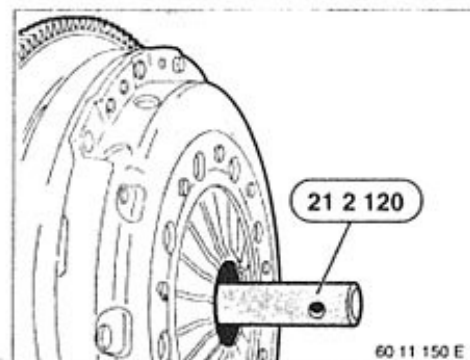
Unfasten screws, applying even pressure.
Remove pressure plate and drive plate.

Installation:
Note dowel pins.
Tightening torque 21 21 1AZ*

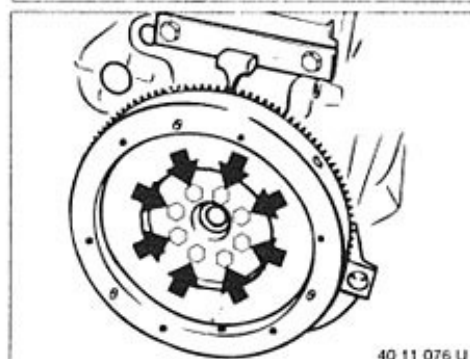


Installation:
1 Flywheel
2 Drive plate
3 Pressure plate

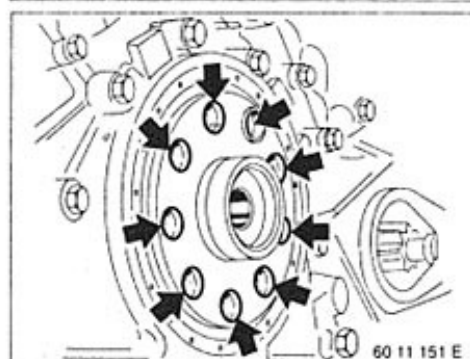
Caution!
Note direction of installation of drive plate.



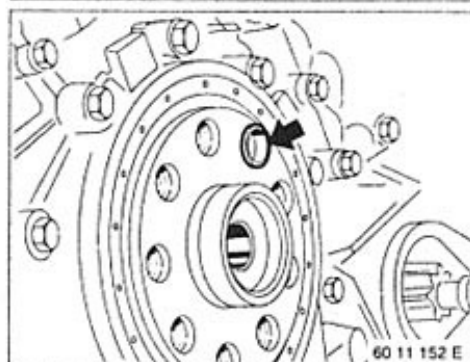
Installation:
Center drive plate with
special tool 21 2 120.



Unfasten flywheel.



Installation:
Clean thread for flywheel screws in the crank-
shaft.



Installation:
Note hollow dowels.
Install new micro-encapsulated screws.
Tightening torque 11 22 1AZ*

* Refer to Technical Data

11 23 031 REPLACING HUB FOR
VIBRATION DAMPER

Remove following parts:

- Fan
- Splash guard
- Water pump pulley
- AC compressor drive belt tensioner
- Tighten drive belt
- Alternator drive belt tensioner
- Tighten drive belt
- Vibration damper on hub
- Hub with pulter (ST 00 7 501)
- Radial oil seal (with puller)
- Wrench for hub (ST 11 2 230)

ST = Special Tool

11 28 010 REPLACING ALTERNATOR
DRIVE BELT

Remove following parts:

- Oil catch tray on timing case
- Fan
- Drive belt

11 31 002 Replacing left or right camshaft

Remove the following components:

- Upper timing case cover
- Finger
- Oil line for camshaft
- Bearing cover for camshaft

11 31 051 Replace timing chain

Remove the following components:

- Lower timing case cover (11 14 110)
- Engine into TDC position
- Tensioning rail and chain

11 33 062 REPLACING ALL HYDRAULIC
VALVE CLEARANCE COM-
PENSATING ELEMENTS

Remove following parts:

- Both cylinder head covers
- Fan
- Drag lever with (ST 11 3 180)
- Hydraulic valve clearance compensating elements

ST = Special Tool

11 51 000 REMOVING AND INSTALLING
OR REPLACING WATER
PUMP

Remove following parts:

- Splash guard
- Fan
- Alternator drive belt tensioner
- AC compressor drive belt tensioner
- Pulley on water pump
- Coolant hose on thermostat housing
left, top and right
- Vibration damper and hub
- Coolant - drain and fill
- Cover for thermostat housing
- Water pump with O-rings

11 53 000 REMOVING AND INSTALLING
OR REPLACING COOLANT
THERMOSTAT

Remove following parts:

- Splash guard
- Coolant - drain and fill
- Fan
- Cover for thermostat housing

11 61 056 REPLACING SEALING
FLANGE FOR LEFT OR
RIGHT INTAKE AIR
MANIFOLD

Remove following parts:

- Air box complete on firewall
- Cover for fuel injectors
- Upper air cleaner section with air mass sensor
- Plugs on left and right throttle valve assemblies
- Plugs for fuel injectors
- Plugs for pulse sender and cylinder identifier
- Electric plate partially
- Injection pipe complete on manifold
- Fuel feed pipes
- Fuel return pipes
- Fuel injectors with vaseline
- Windshield washing fluid tank if necessary
- Ignition leads on manifold
- Intake air manifold
- Both sealing flanges

11 62 145 REMOVING AND INSTALLING
OR REPLACING ALL
EXHAUST MANIFOLDS

Remove following parts:

- Upper air cleaner section with air mass sensor left
- Clamp on split pipe left and right
- Heat shields on manifolds left
- Heat shield on steering gear
- * Manifold/split pipe bolts left
- Front manifold with gaskets (left)
- Rear manifold with gaskets (left)
- Nuts on staybolts
- * Staybolts for left manifolds in head
- Upper air cleaner section with air mass sensor right
- Windshield washing fluid tank
- Oil dipstick guide tube
- Heat shields on manifolds right
- Front manifold with gaskets (right)
- Rear manifold with gaskets (right)
- Nuts on staybolts
- Staybolts for right manifolds in head

11 Engine M60

	General information	11- 0/10
11 00 039	Compression check – all cylinders	11- 0/10
00 00 249	BMW engine oil service	11- 0/11
11 00 050	Engine – remove and install	11- 0/12
11 12 004	Both cylinder head covers – remove and install/seal	11- 12/10
11 12 005	Left cylinder head cover – remove and install/seal	11- 12/13
006	Right cylinder head cover – remove and install/seal	11- 12/13
105	Left cylinder head – remove and install	11- 12/14
106	Right cylinder head – remove and install	11- 12/14
107	Both cylinder heads – remove and install	11- 12/15
110	Left cylinder head gasket – replace	11- 12/15
111	Right cylinder head gasket – replace	11- 12/16
112	Both cylinder head gaskets – replace	11- 12/16
11 13 010	Upper section of oil pan – remove and install or replace	11- 13/10
020	Lower section of oil pan – remove and install or replace	11- 13/13
11 14 080	Top left timing case cover – remove and install, seal or replace	11- 14/10
085	Top right timing case cover – remove and install, seal or replace	11- 14/11
141	Radial seal in lower timing case cover – replace	11- 14/13
151	Crankshaft radial seal – replace	11- 14/13
11 22 000	Flywheel – remove and install or replace	11- 22/10
11 23 010	Vibration damper – remove and install or replace	11- 23/10
031	Hub for vibration damper – remove and install or replace	11- 23/10
11 28 010	Alternator drive belt – replace	11- 28/10
11 31 010	Timing of camshaft(s) – adjust	11- 31/10
011	Left camshaft – replace	11- 31/11
015	Right camshaft – replace	11- 31/11
11 41 000	Oil pump – remove and install or replace	11- 41/10
11 42 020	Complete full-flow oil filter – remove and install, seal or replace	11- 42/10
11 51 000	Water pump – remove and install or replace	11- 51/10
011	Pulley on water pump – replace	11- 51/10
11 53 000	Coolant thermostat – remove and install or replace	11- 53/10
325	Coolant manifold – remove and install or replace	11- 53/10
11 61 050	Intake air manifold – remove and install	11- 61/10
11 62 142	Both left exhaust manifolds – remove and install or replace	11- 62/10
143	Both right exhaust manifolds – remove and install or replace	11- 62/12

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

General information

M60

Cylinder configuration:

Cylinders 1 ... 4, viewed in direction of travel, are located on the right side of the vehicle, with cylinder 1 at the front.

Cylinders 5 ... 8, viewed in the direction of travel, are located on the left side of the vehicle, with cylinder 5 at the front.

The operations described apply to both cylinder banks: if special explanations are required, the procedures for each cylinder bank are described separately.

General Data for operations on the valve timing system:

If operations on the cylinder head are performed where the camshaft was removed, please note the following:

The hydraulic valve tappets expand without load being applied by the camshaft and, after installation, require some time before they compress back down. This means that, if parts are assembled in rapid sequence, even the "closed" valves may still be open and in direct contact with the piston.

Note the following wait periods between installation of the camshaft and mounting of the cylinder head:

ambient temperature 20° C	4 mins.
10° C - 20° C	11 mins.
0° C - 10° C	30 mins.

After assembly of the camshaft and the timing chain, wait for the following periods before turning the engine crankshaft:

ambient temperature 20° C	after 10 mins.
10° C - 20° C	after 30 mins.
0° C - 10° C	after 75 mins.

General instructions for work involving the gaskets:

Apply a bead of cement to all contact points and a thin, even coat of Hylomar SQ 32M** to determine the location of the gaskets.

** Refer to BMW Parts Service

11 00 039 Checking compression of all cylinders

M60

**Caution!**

High voltage – danger of death!
Interrupt power supply to ignition coils.
Follow instructions on compression testing,
refer to General Data MG12
Repair Instructions for 7 Series E38

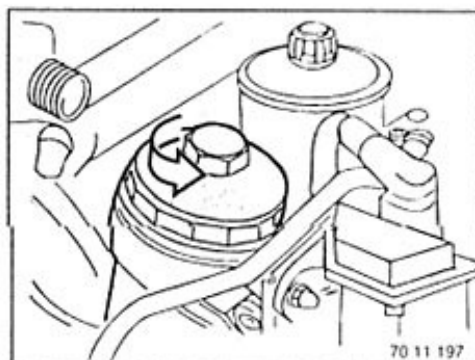
Disconnect fuel pump relay and DME master relay (installation: electronics box),
refer to Electrical Troubleshooting Manual
(schematics) 8 Series E31
Directory of components 7000.0

After checking interrogate fault memory and if necessary rectify faults. Cancel fault memory.
Subsequent procedure,
refer to 11 00 039
Repair Instructions Series 7 E38

00 00 249 BMW engine oil service

M60

Change engine oil and oil filter



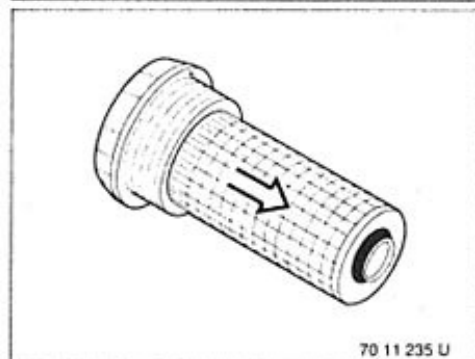
Unscrew and remove oil filter cover.

Note:

Oil flows out of the oil filter housing into the oil pan.

Installation:

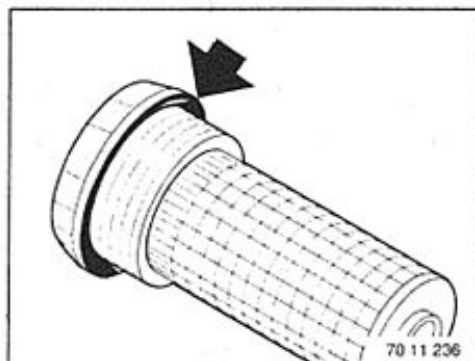
Tightening torque 11 42 2AZ*



Remove oil filter from the oil filter cover.

Installation:

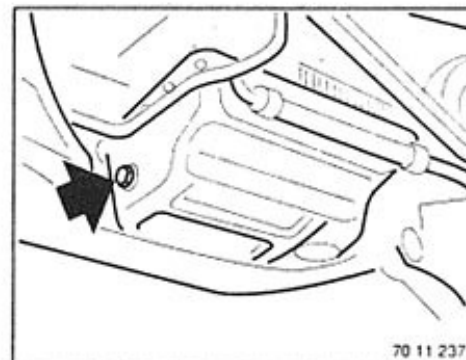
Note installation direction of the oil filter insert. Oil filter insert must engage in the oil filter cover.



Installation:

Fit new seal.

* Refer to Technical Data



Once the oil has drained out of the oil filter housing, open the oil drain plug or draw off the oil.

Installation:

Replace seal.

Tightening torque 11 13 1AZ*

Top up the engine oil level.

Switch on engine and run at idle speed until the oil display lamp goes out.

Switch off engine and check the oil level.

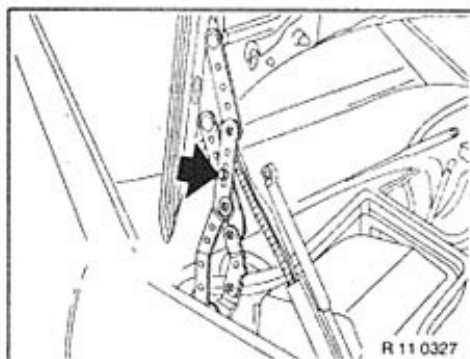
Note:

Vehicle on level ground.

Refer to Technical Data

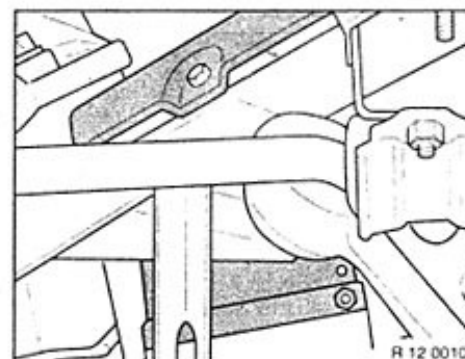
11 00 050 Removing and installing engine (M60)

Interrogate the fault memory in all the control units.
Follow instructions on disconnecting and connecting battery, refer to General Data HG12
Disconnect battery ground lead.
Remove automatic transmission, refer to 24 00 026

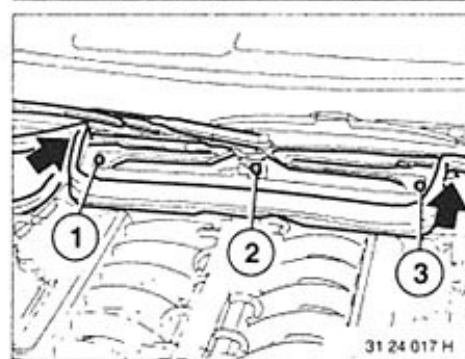


Lift engine hood into assembly position. Fully extend gas strut on engine hood, fully open engine hood and secure with one screw on each side (left and right).

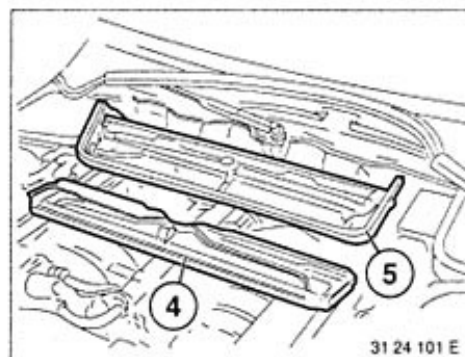
Remove radiator with expansion tank, refer to 17 11 000.



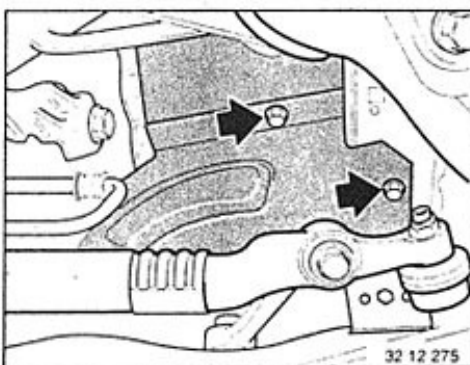
Remove left and right rear heat baffle plates.



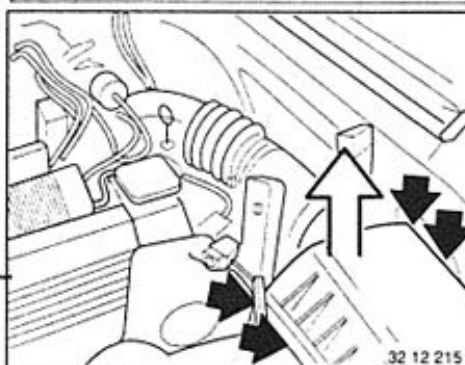
Partially remove rubber seal from air manifold. Twist mounting (1 ... 3). Remove screws on left and right sides.



Lift off trim (4) and microfilter (5).



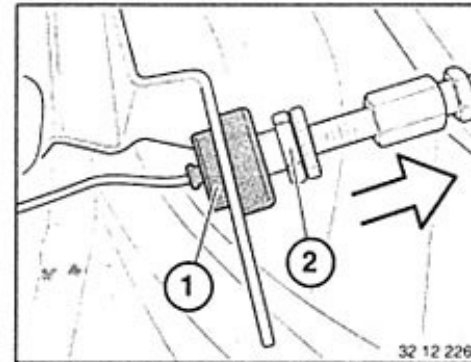
Remove left and right heat baffle plates from front axle carrier.



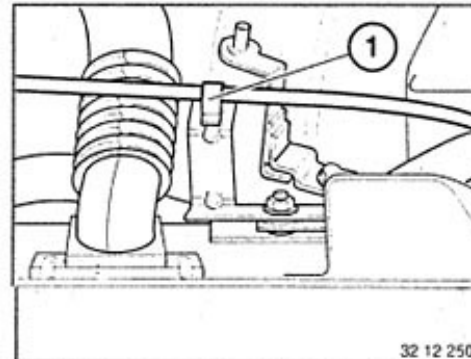
Remove upper section of suction filter with mass air flow sensor.

Remove left and right cable ducts.
These operations are described in the section
on Removing Cylinder Head,
see 11 12 004.

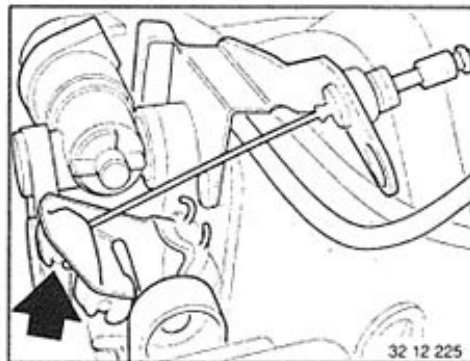
Note:
If necessary, disconnect the connectors
beside the timing cases if this facilitates the
task of lifting out the engine.



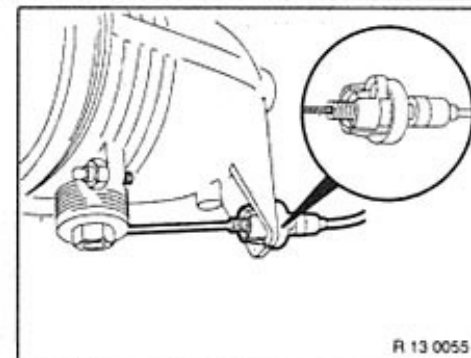
Remove Bowden cable (2) from rubber mount
(1).
Press rubber mount (1) out of bracket.



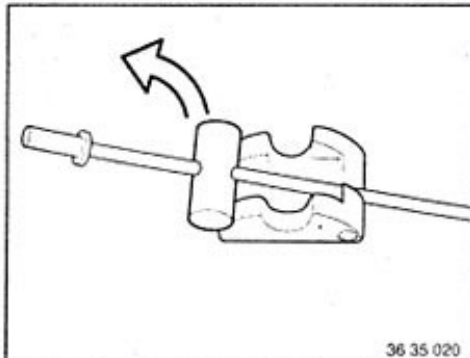
Remove accelerator cable from guide (1) and
place to one side.



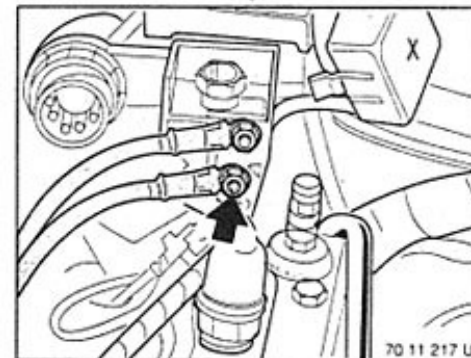
Disconnect accelerator cable.
Press together both lugs on the nipple mount
and press out the actuating lever.



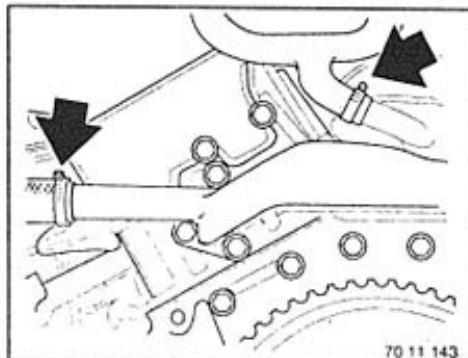
Press plastic locking unit in and remove Bow-
den cable from ASC throttle valve.



Press nipple out of nipple mount.
Remove Bowden cable from nipple mount.



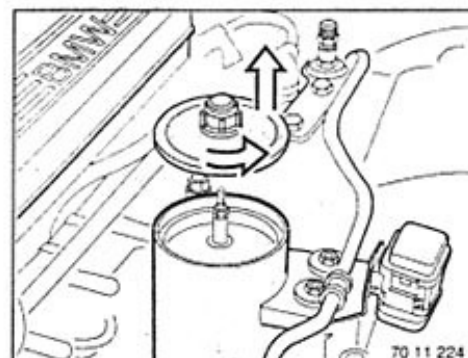
Disconnect cable from positive terminal.



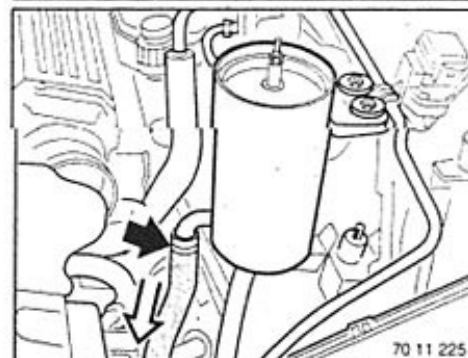
Remove heating hoses from coolant manifold and coolant tube between heating firewall and engine.

Remove 3-phase alternator, see 12 31 020.

Remove complete main flow oil filter, see 11 42 020.



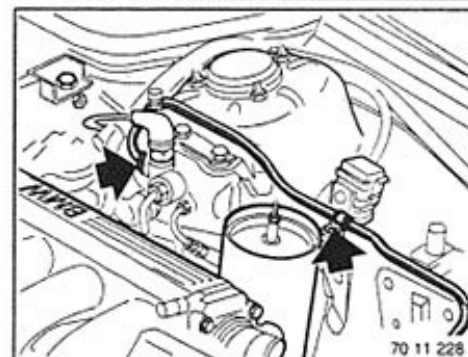
Draw off oil from container for power steering.



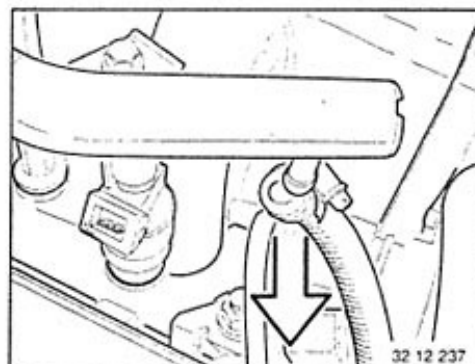
Remove hose from oil container.

Unfasten vane pump from bracket and tie to one side, see 32 41 060 Repair Instructions for 7 Series E32.

Note:
Lines remain connected.

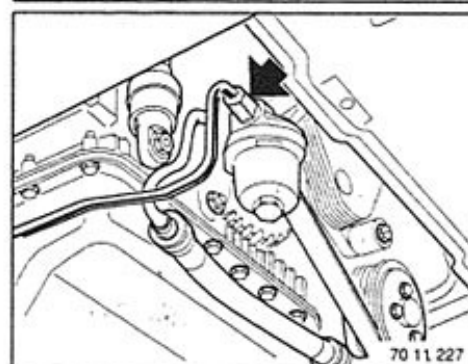


Remove bracket and hydraulic line from 3-phase governor.

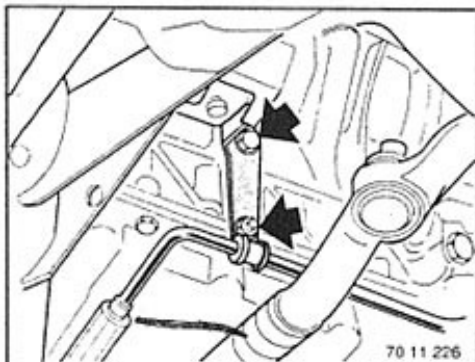


Caution!
Catch fuel as it escapes.

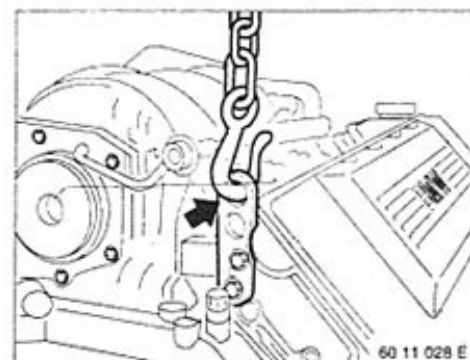
Remove fuel intake and fuel return lines on injection tube.



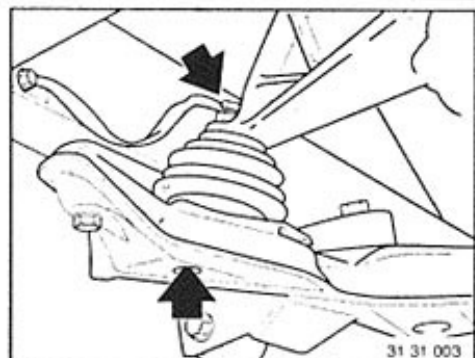
If necessary, remove hydraulic line for ASC+T filter and remove from lower section of oil pan.



Unfasten hydraulic line from back of lower section of oil pan.

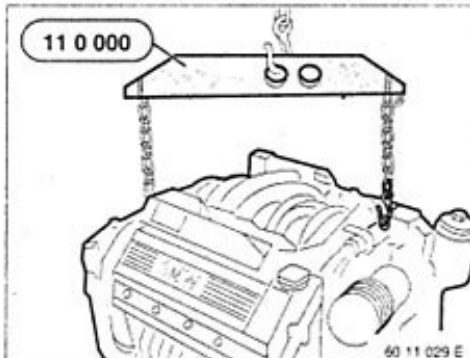


Arrangement of rear engine mounting.



Unfasten left and right engine mounts.
Remove ground tape from engine support arm.

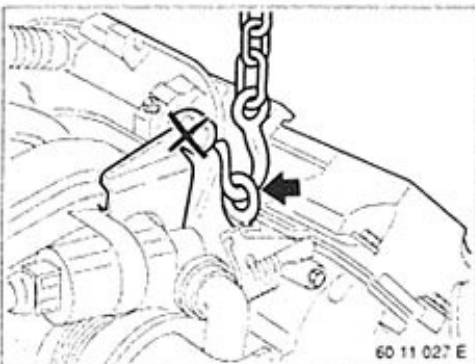
Installation:
Tightening torque 11 81 1AZ / 2AZ*



Lift out engine using special tool 11 0 000.

Unfasten air conditioning compressor from support block, see 64 52 020.

Note:
Lines remain connected.



Caution!
Only lift engine using the mounting lugs provided for this purpose.

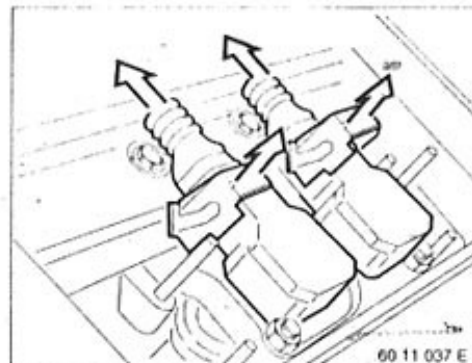
Arrangement of front engine mounting.

* Refer to Technical Data

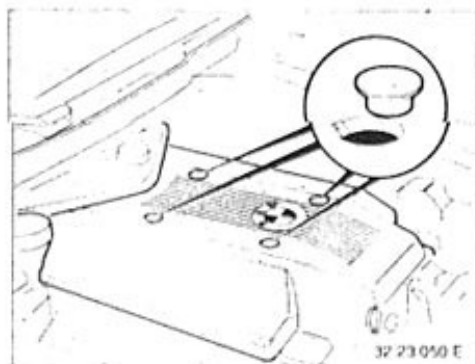
11 12 004 Removing and installing / sealing both cylinder head covers

M60

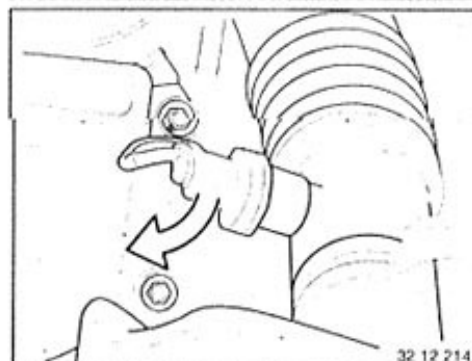
Read out error memories of all control units.
Disconnect battery negative lead.



Remove connectors from ignition coils on
both cylinder banks.

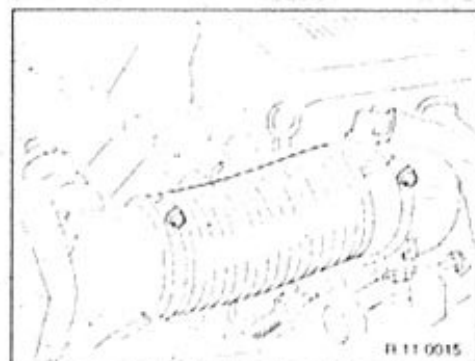


Lever clips off manifold cover.
Unscrew bolts.
Remove cover and insulation material.

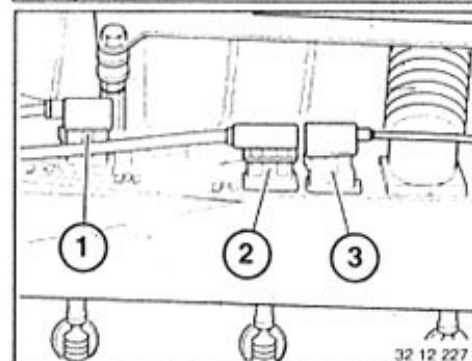


Disconnect plug connection on mass air flow
sensor.

Remove tank venting valve from bracket, see
13 90 500.



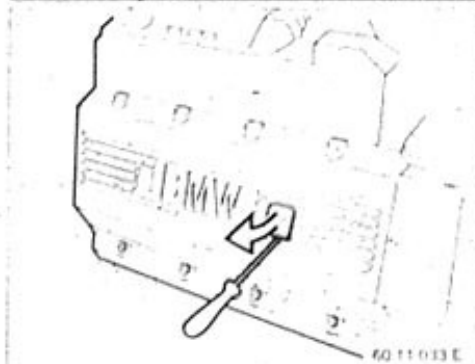
Remove hose to idle speed actuator and re-
move dust cover between throttle body and
mass air flow sensor.



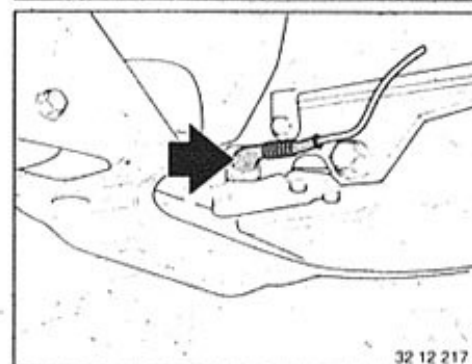
Disconnect all plug connections on left cable
duct:

- (1) camshaft sensor
- (2) and (3) knock sensors

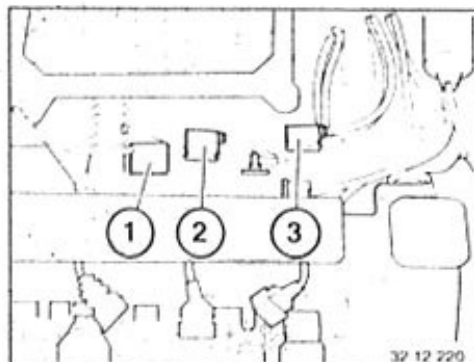
Caution!
Incorrect installation of plug connections (2)
and (3) causes engine damage.
Note instructions,
see 12 14 610 / 611.



Remove covers from ignition coils.

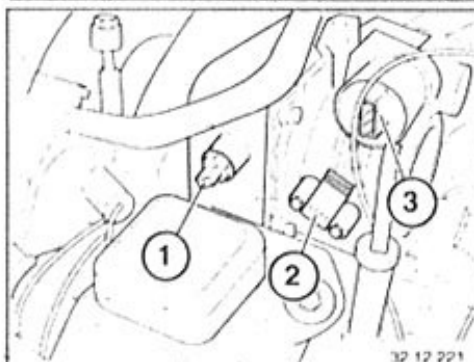


Disconnect plug connection on oil level switch.
Remove cable guide to oil level switch.

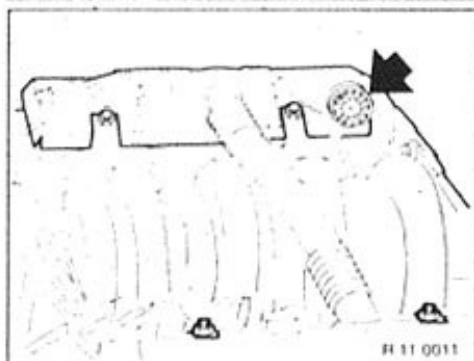


Disconnect all plug connections on right cable duct:
(1) and (2) knock sensors
(3) TDC sensor

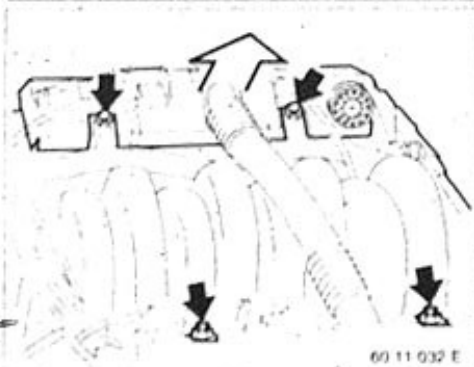
Caution!
Incorrect installation of plug connections (1) and (2) causes engine damage.
Note instructions, see 12 14 610 / 611.



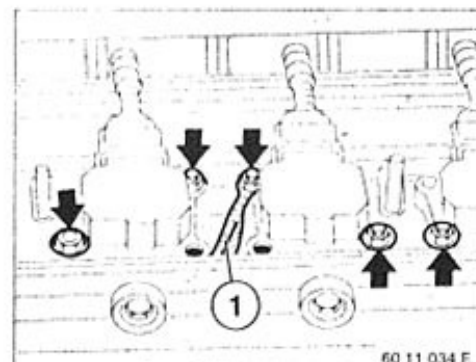
Disconnect plug connections:
(1) temperature sensor for intake air
(2) throttle valve potentiometer
(3) idle speed actuator



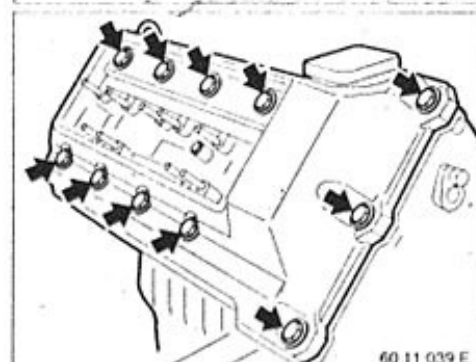
Disconnect engine connector from left and right cable ducts.



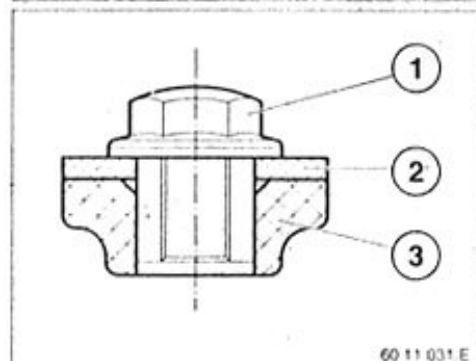
Remove left and right cable ducts from bracket and fold to one side.



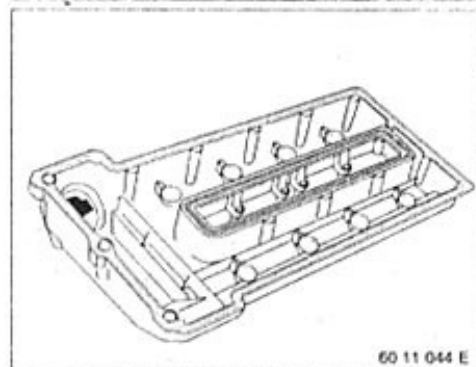
Remove ignition coils from both cylinder banks, see 12 13 011.



Unfasten left and right retainers.



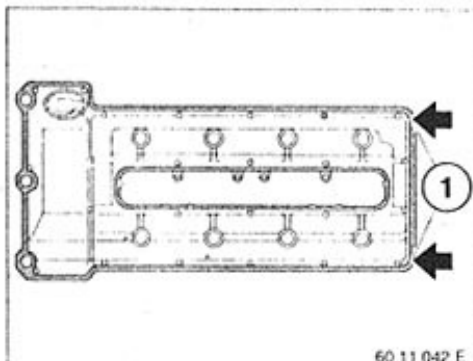
Installation:
Layout of retaining elements:
(1) nut
(2) washer
(3) rubber seal



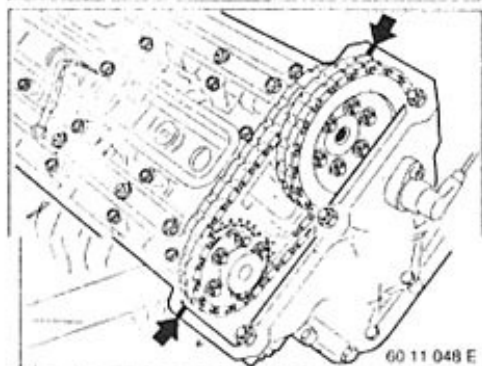
Installation:
Check gasket and replace if necessary.

Coat the entire circumference of the outer and inner groove and the sealing face of the cylinder head cover with rubber anti-friction compound, e.g. glycerine**. Press the inner gasket into the cover groove with no torsional stress, starting at the four corner radii.

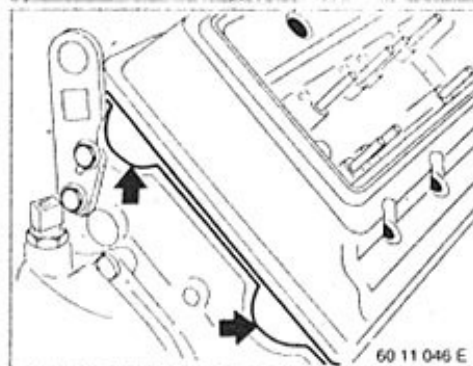
** Source of Supply: BMW Parts Service

**Installation:**

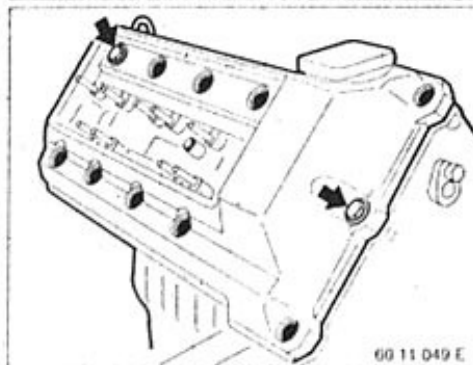
Align outer gasket loosely over the cover groove. Secure gasket in the cover groove, starting at the four reverse corners (1) and press into groove with no torsional stress.

**Installation:**

Coat the contact faces of the joint with Hy-lomar SQ 32 M** liquid sealing compound.

**Installation:**

Check for correct seating of gasket on back of cylinder head when installing the cylinder head cover.

**Installation:**

Attach two retainers to the locating points, without preload at this stage, and align the cover. Install all the other retaining elements and tighten crosswise, radiating out from the center.

** Source of Supply: BMW Parts Service

11 12 005 Removing and installing / sealing left cylinder head cover

M60

This operation is described in the section on
removing and installing / sealing both cylinder
heads,
see 11 12 004 .

11 12 006 Removing and installing / sealing right cylinder head cover

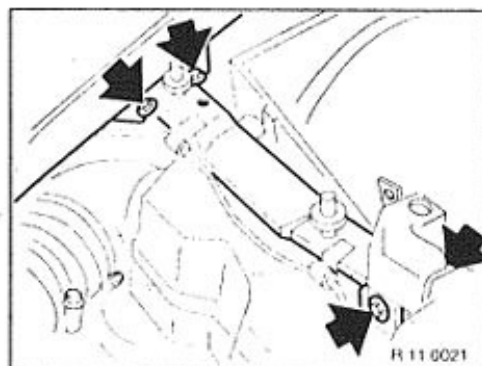
M 60

This operation is described in the section on
removing and installing / sealing both cylinder
heads,
see 11 12 004 .

11 12 105 Removing and installing left cylinder head

M60

Remove right pop-up headlight, refer to 63 12 460



Remove support for pop-up headlights and lower section of intake filter housing.

Remove both cylinder head covers, refer to 11 12 004

Remove intake air manifold, refer to 11 61 050

Remove coolant manifold, refer to 11 53 325

Remove both left exhaust manifolds, refer to 11 62 142

Unfasten air conditioning compressor from mount, refer to 64 52 020

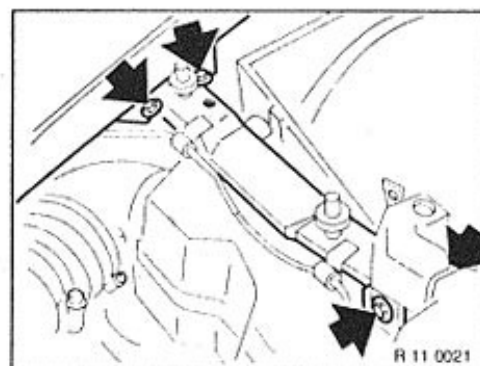
Note:
Lines remain connected.

Subsequent procedure, refer to 11 12 105
Repair Instructions Series 7 E38

11 12 106 Removing and installing right cylinder head

M60

Remove right pop-up headlight, refer to 63 12 460



Remove support for pop-up headlights and lower section of intake filter housing.

Remove both cylinder head covers, refer to 11 12 004

Remove intake air manifold, refer to 11 61 050

Remove coolant manifold, refer to 11 53 325

Remove both right exhaust manifolds, refer to 11 62 143

Unfasten air conditioning compressor from mount, refer to 64 52 020

Note:
Lines remain connected.

Subsequent procedure, refer to 11 12 106
Repair Instructions for 7 Series E38

**11 12 107 Removing and installing
both cylinder heads**

M60

This operation is described in section on removing and installing right / left cylinder heads,
refer to 11 12 105 / 106

**11 12 110 Replacing left cylinder head
gasket**

M60

This operation is described in section on removing and installing right / left cylinder heads,
refer to 11 12 105

**11 12 111 Replacing right cylinder
head gasket**

M60

This operation is described in section on removing and installing right / left cylinder heads,
refer to 11 12 106

**11 12 112 Replacing both cylinder head
gaskets**

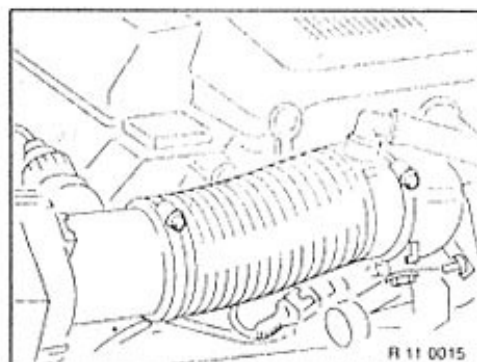
M60

This operation is described in section on removing and installing both cylinder heads,
refer to 11 12 107

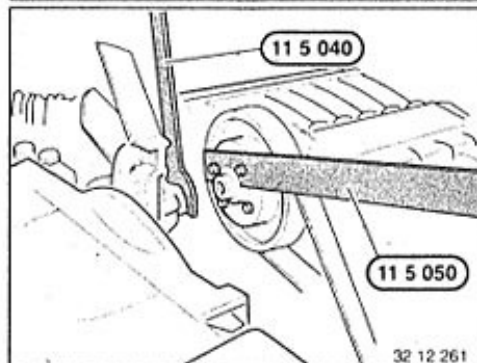
11 13 010 Removing and installing or replacing upper section of oil pan

M 60

Remove exhaust assembly, see 18 00 020.

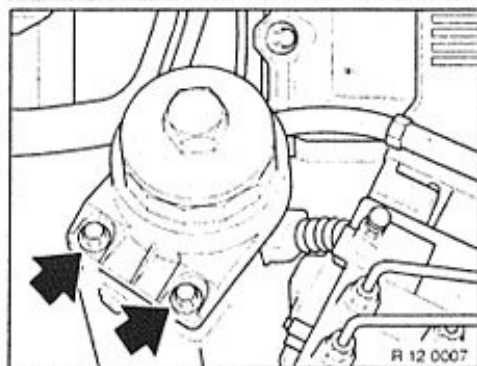


Pull off hose to idle speed actuator and remove dust cover between throttle body and mass air flow sensor.



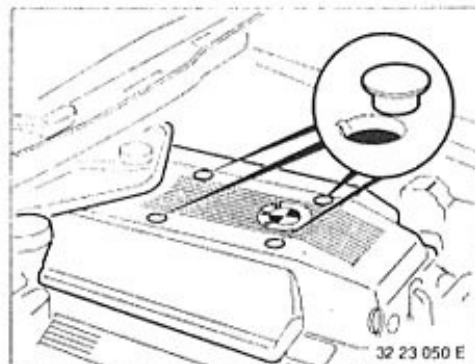
Remove fan. Use special tools 11 5 040 and 11 5 050.

Caution!
Left-hand threads.

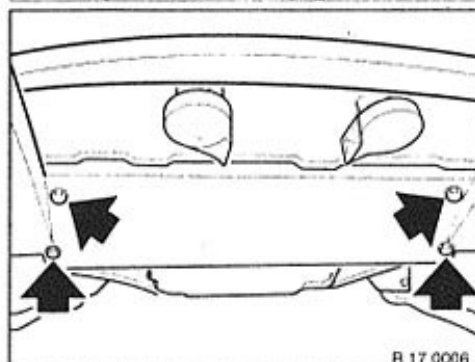


Unfasten full-flow oil filter, lift out of bracket and press forwards.

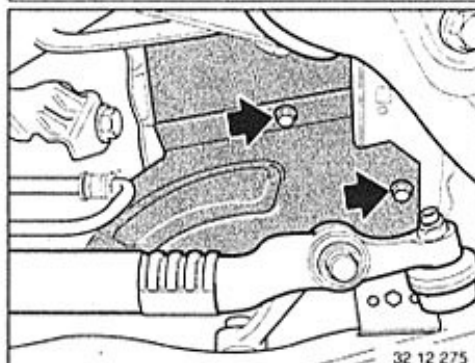
Note:
Hoses remain connected.



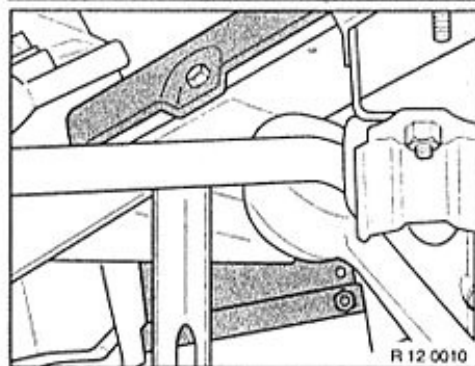
Lever clips out of manifold cover. Unscrew bolts. Remove cover together with noise insulation.



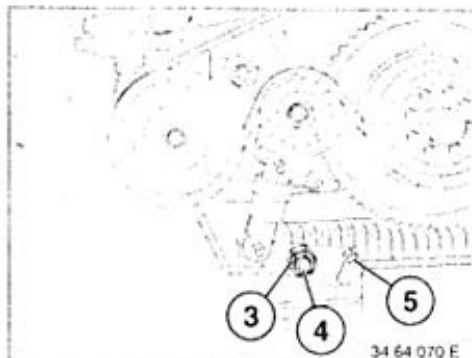
Unscrew and remove splash guard.



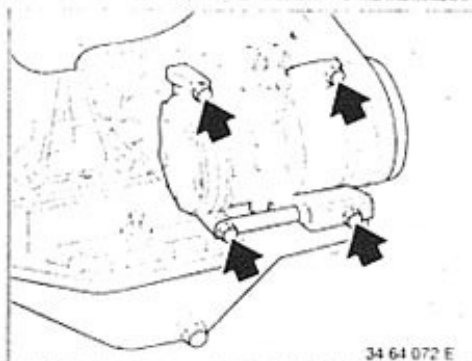
Remove left and right heat baffle plates from front axle carrier.



Remove left and right rear heat baffle plates.

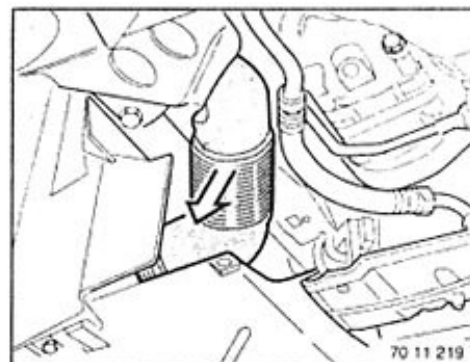


Remove adjustment plate and drive belt from air conditioning compressor, see 64 52 020.

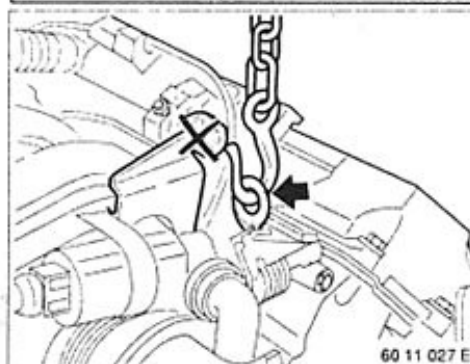


Unfasten air conditioning compressor from mounting bracket, see 64 52 020.

Note:
Lines remain connected.



Remove cooling air guide for 3-phase alternator.



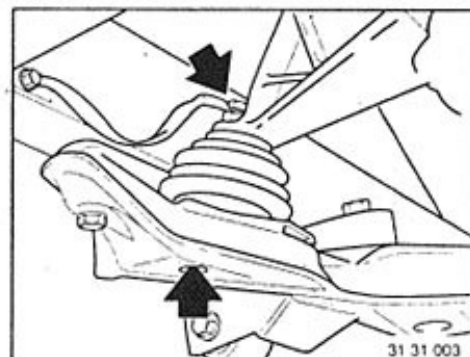
Lift up front of engine with special tool 00 0 200.

Important!
Note  between engine and splash guard.

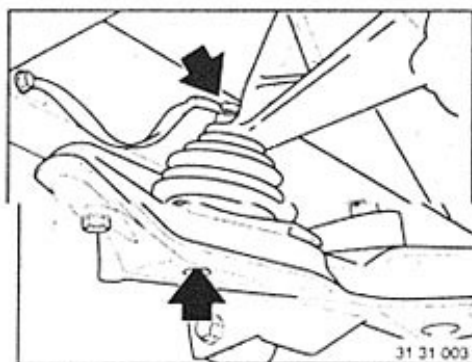
Remove alternator drive belt, see 11 28 010.

Unfasten vane pump from bracket, see 32 41 060 Repair Instructions for the 7 Series E32.

Note:
Lines remain connected.



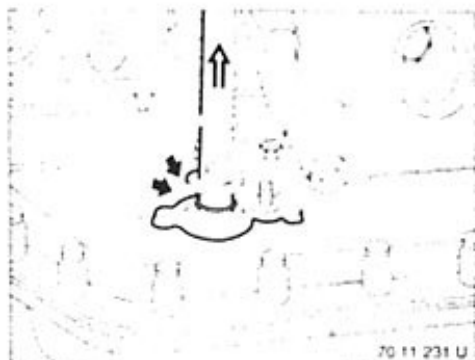
Remove right engine mount.



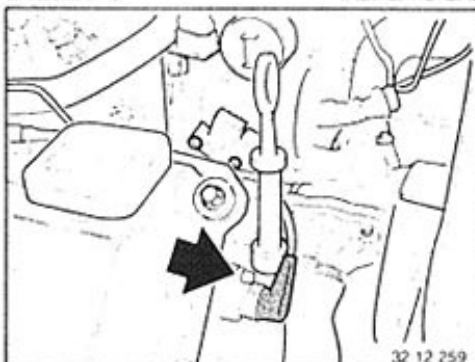
Unscrew left and right engine mounts. Remove ground tape from engine supporting arm.

Installation:
Tightening torque 11 81 1AZ / 2AZ*

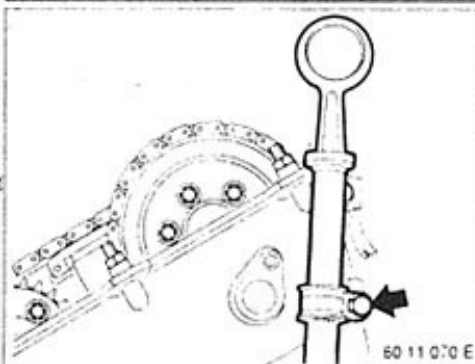
Unfasten mounting bracket for air conditioning compressor.



Unfasten dip stick guide from oil pan.



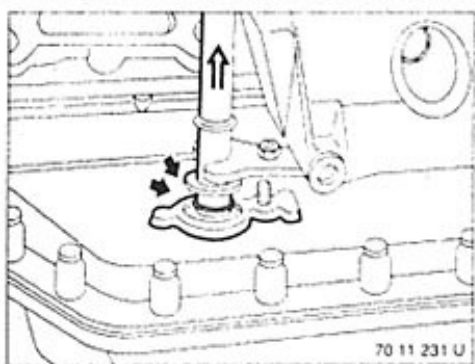
Remove camshaft sensor.



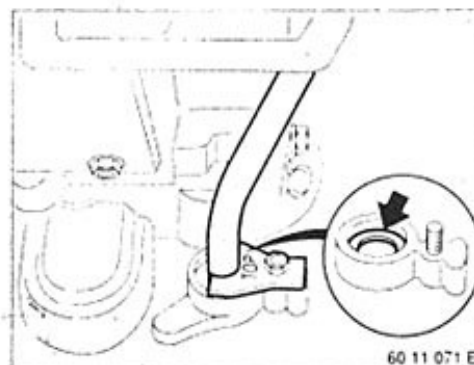
Remove tank venting valve from bracket, see 13 90 500.

Unfasten top of dip stick guide.

Unfasten water hose from bracket between expansion tank and water pump.

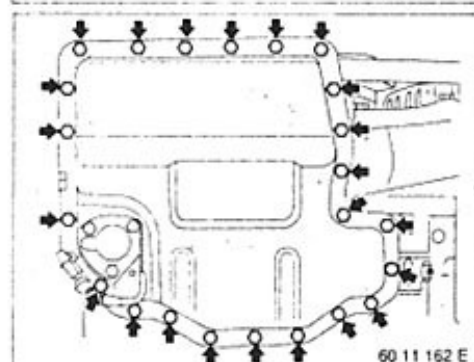


Remove dip stick guide by pulling upwards.



Installation:

Pull water hose to one side.
Place disc and O-ring in oil pan bore.
If necessary, replace O-ring.



Remove complete lower section of oil pan, see 11 13 020.



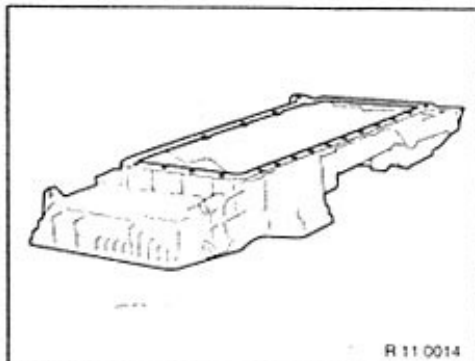
Remove return line between oil filter and oil pan.

Installation:

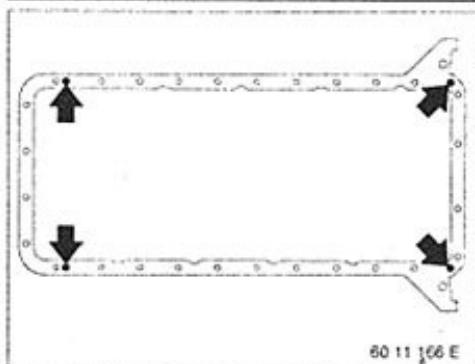
Replace the sealing ring.

Remove oil lines for automatic transmission from vane pump.

Remove oil pump, see 11 41 000.



Unfasten screws in oil pan.
Remove upper section of oil pan by pulling forwards.



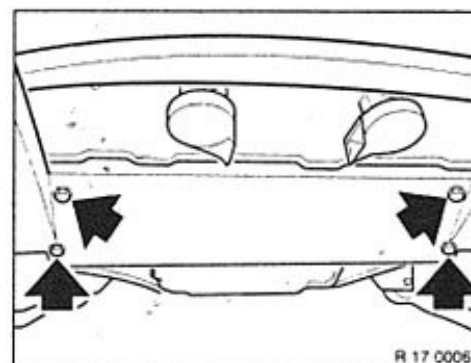
Installation:
Clear sealing faces of gasket residue and clean.
Coat contact edges of sealing face with liquid sealing compound Hylomar SQ 32 M**
Replace seal.

Installation:
Insert all screws in oil pan.
Fit screws on transmission end without preload. Tighten screws on engine end.
Tighten screws on transmission end.

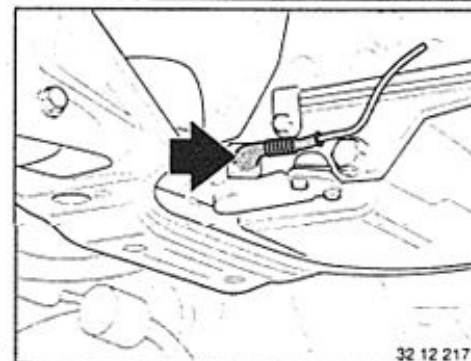
11 13 020 Removing and installing or replacing lower section of oil pan

M 60

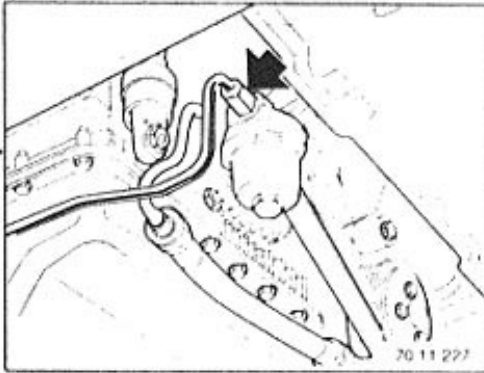
Drain engine oil.
This operation is described in the section on the BMW engine oil service, see 00 00 249.



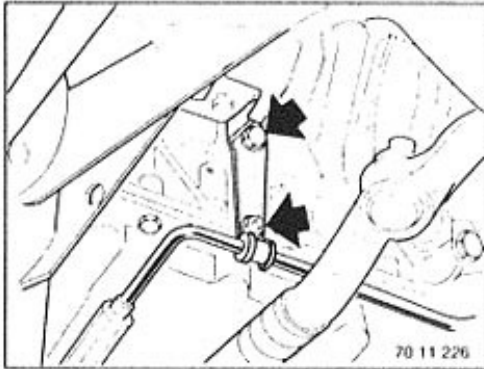
Remove underbody protection from engine.



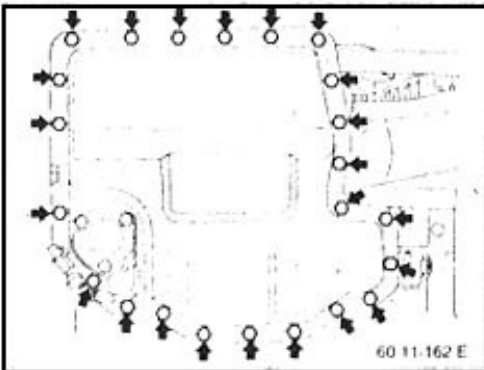
Disconnect plug connection on oil level switch.



If necessary, unfasten hydraulic line for ASC+T from filter.



Unfasten hydraulic line from lower section of oil pan.



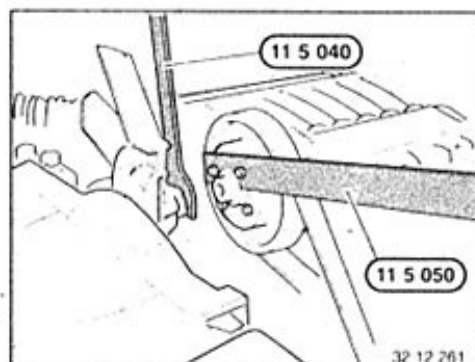
Unfasten screw connection from lower section of oil pan.

Installation:
Clean sealing faces and fit new gasket.

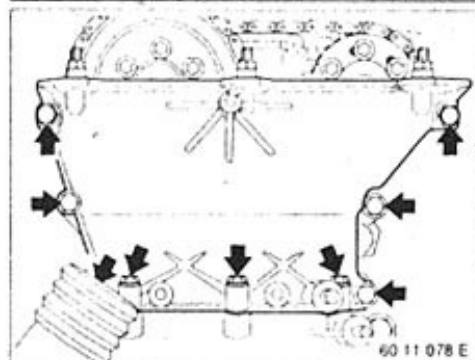
11 14 080 Removing and installing, sealing or replacing top left timing case cover

M60

Remove left cylinder head cover. This operation is described in the section removing and installing / sealing both cylinder head covers, see 11 12 004.

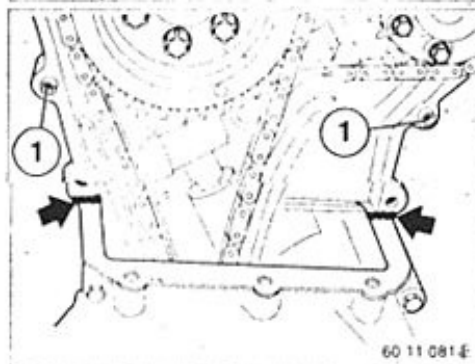


Remove fan cowl.
Use special tool 11 5 040 and 11 5 050.



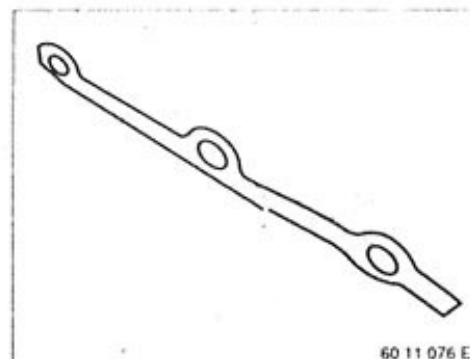
Disconnect positive battery lead from alternator, unfasten retaining screws from protective pipe and place line to one side.

Unscrew bolt connection on timing case cover.



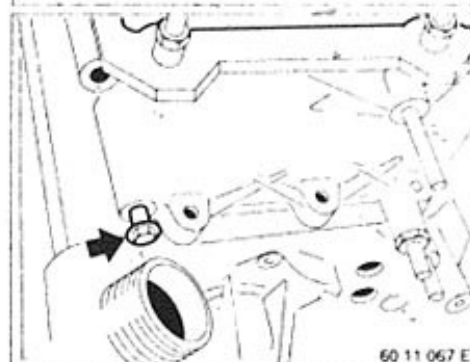
Installation:
Ensure that hollow dowels are correctly located (1).
Coat the edges of the joint between cylinder head and cylinder head gasket with liquid sealing compound Hylomar SQ32 M**.

* Source of Supply: BMW Parts Service



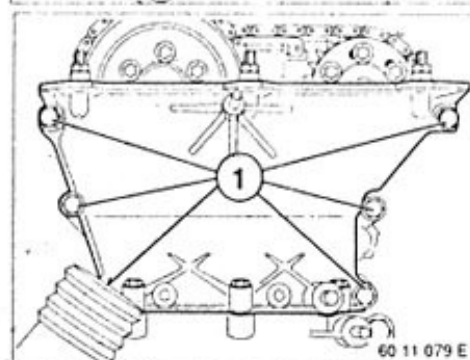
Installation:
Sealing faces clean and free of oil.
Replace gasket.

Caution!
Remove protective film.

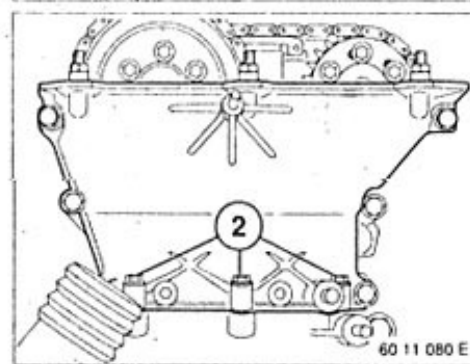


Installation:
Ensure that gaskets are correctly seated, fit timing case cover with screw inserted.

Caution!
It is not possible to install the screw afterwards.



Installation:
Install all screws.
Tighten screw connection (1) until flush with cylinder head.

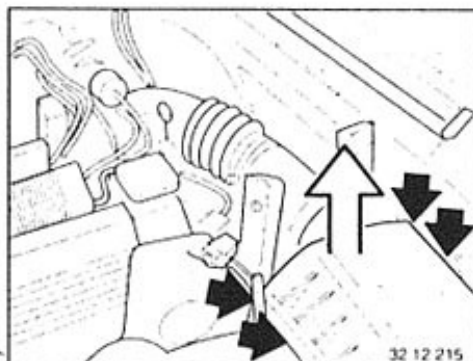


Installation:
Tighten screw connection (2) on timing case cover in two stages.
Then tighten the screw connection to the cylinder head in two stages.

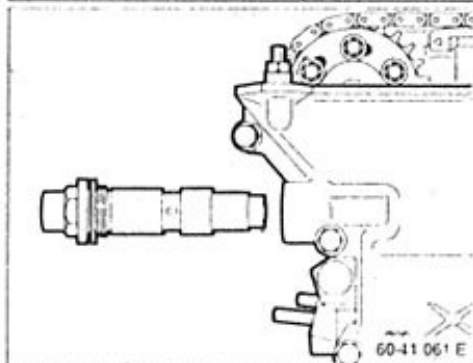
11 14 085 Removing and installing, sealing or replacing top right timing case cover

M60

Remove right cylinder head cover. This operation is described in the section on removing and installing / sealing both cylinder head covers, see 11 12 004 .

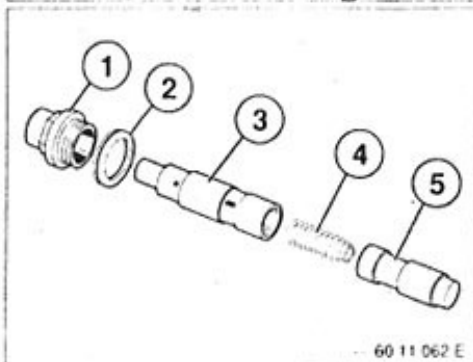


Remove upper section of air intake housing with mass air flow sensor.



Remove chain tensioner.

Installation:
Replace seal.
Tightening torque 11 31 7AZ*

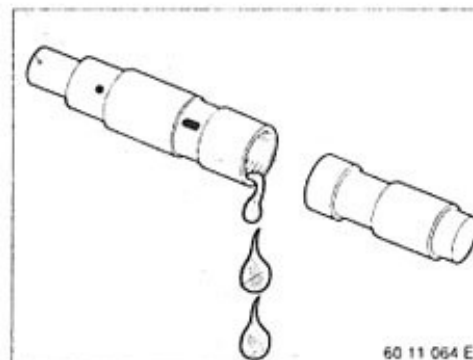


Arrangement of components:

- (1) Screw plug
- (2) Sealing ring
- (3) Sleeve
- (4) Recoil spring
- (5) Hydraulic piston

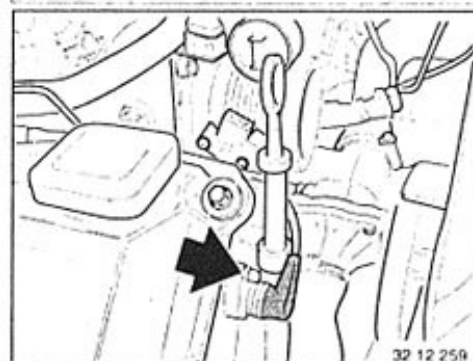
Installation:
Tapered end of recoil spring (4) points towards hydraulic piston (5).

* Refer to Technical Data

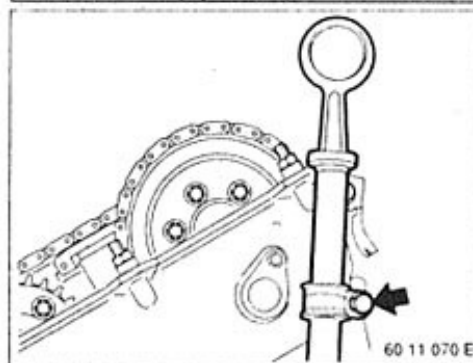


Installation:
To facilitate assembly operation, drain oil chamber between sleeve and hydraulic piston.

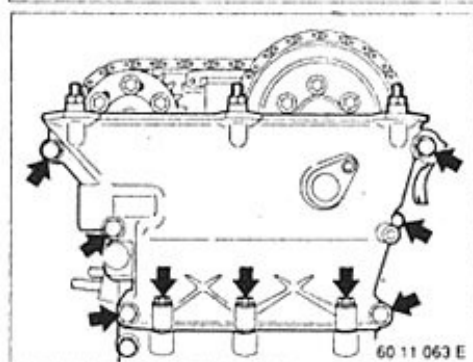
Replace the sealing ring.
Tightening torque 11 31 7AZ*



Remove camshaft sensor.

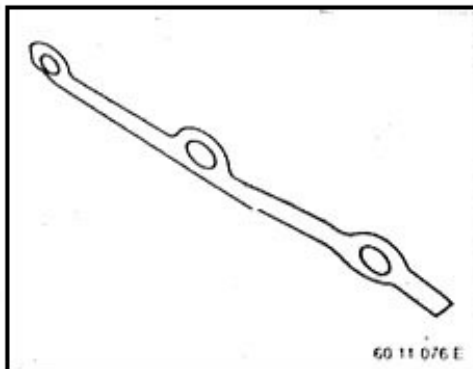


Unfasten upper screw on dipstick guide.



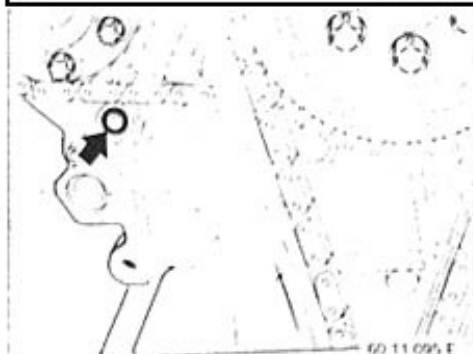
Unfasten screws in timing case cover.

* Refer to Technical Data

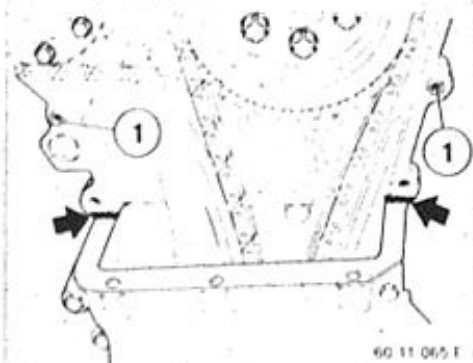


Installation:
Sealing faces clean and free of oil.
Replace gasket.

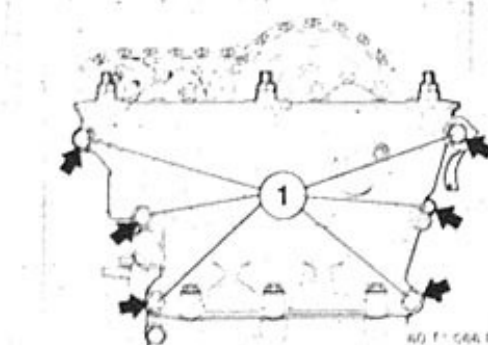
Caution!
Remove protective film.



Caution!
Replace sealing ring in cylinder head for oil supply of chain tensioner.



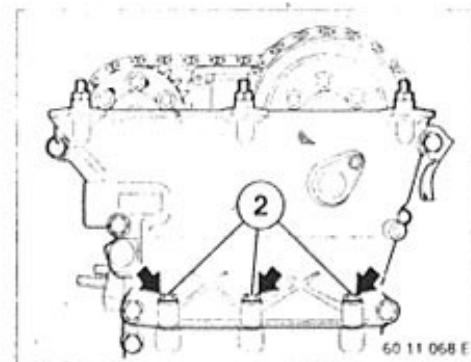
Installation:
Ensure that hollow dowels are correctly located (1).
Coat the edges of the joint between cylinder head and cylinder head gasket with liquid sealing compound Hylomar SQ32 M**.



Installation:
Ensure that gaskets are correctly seated.
Fit timing case cover.
Install all screws.

Fit screw connection flush to cylinder head (1).

** Refer to BMW Parts Service



Installation:
Tighten screws on timing case cover (2) in two stages.
Then tighten the remaining screws (1) in two stages.

11-14 141 Replacing radial seal in
lower timing case cover

M60

Refer to Repair Instructions for the 5 Series
E34.

11 14 151 Replacing radial crankshaft
seal

Transmission side

M60

Refer to Repair Instructions for the 5 Series
E34.

11-22/10

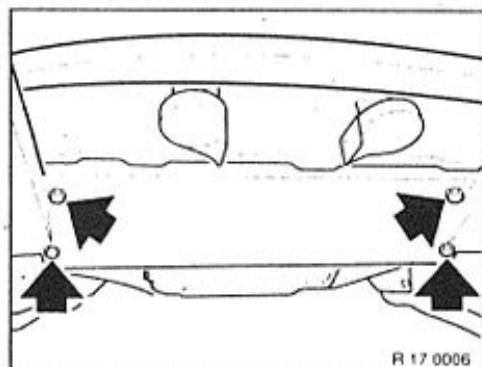
11 22 000 Removing and installing or
replacing the flywheel

M60

Refer to Repair Instructions for 5 Series E34.

11 23 010 Removing and installing or replacing vibration damper

M60



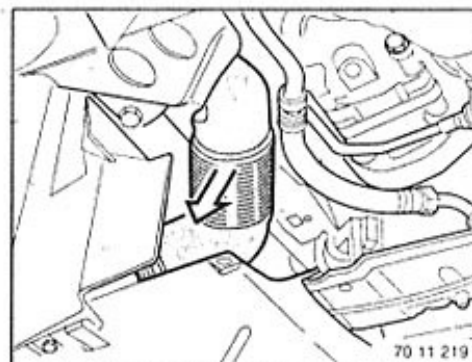
Remove underbody protection from engine.

Subsequent procedure, see Repair Instructions for 5 Series E34.

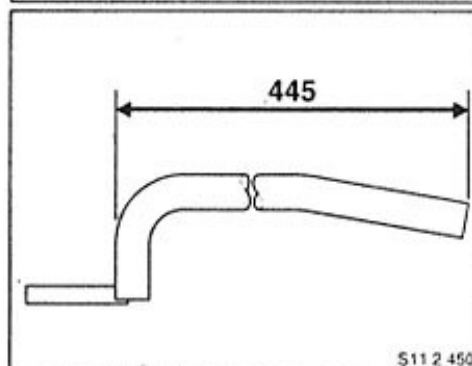
11 23 031 Removing and installing or replacing hub for vibration damper

M60

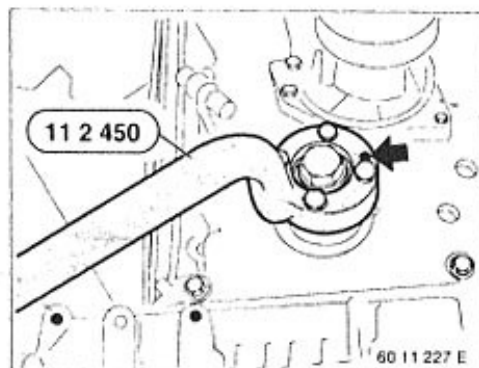
Remove vibration damper, see 11 23 010.



Remove cooling air duct for 3-phase alternator.

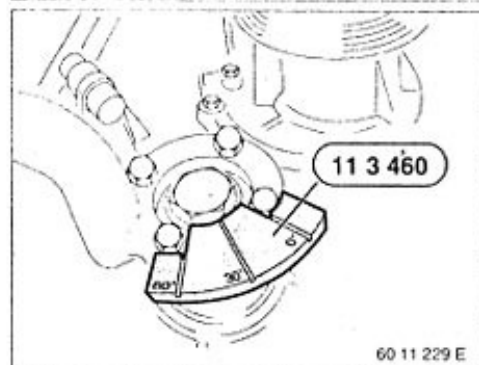


If necessary, shorten end of special tool 11 2 450 to the specified dimension.



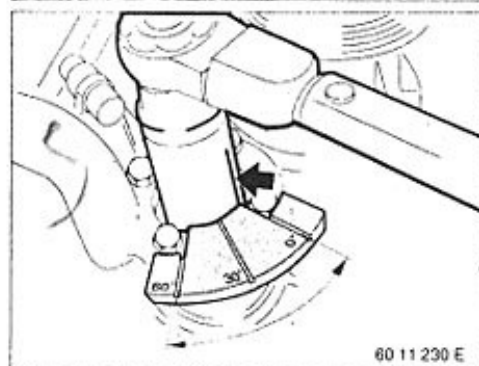
Caution!
Note dowel pin.

Screw special tool 11 2 450 firmly to hub of vibration damper.
Unfasten central screw.



Installation:
Attach special tool 11 3 460 to special tool 11 2 450.

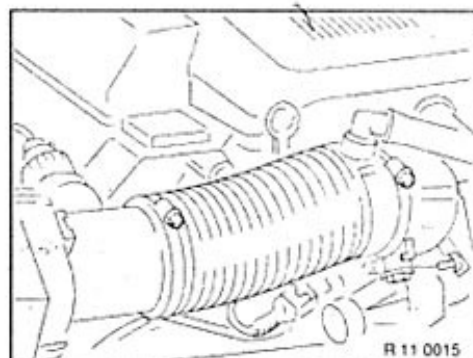
Note:
Special tool 11 3 460 is magnetic.



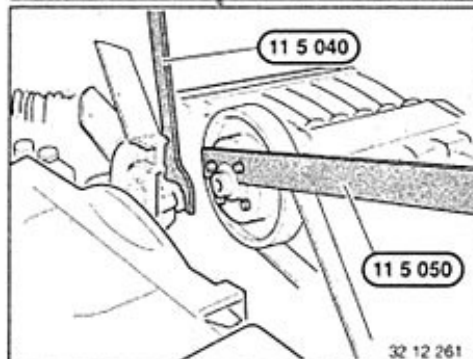
Installation:
Tighten central screw to jointing torque.
Tightening torque 11 23 2AZ*
Select 0° position and mark on the socket head.
Tighten central screw with torsion angle.
Tightening torque 11 23 2AZ*

11 28 010 Replacing drive belt for alternator

M60



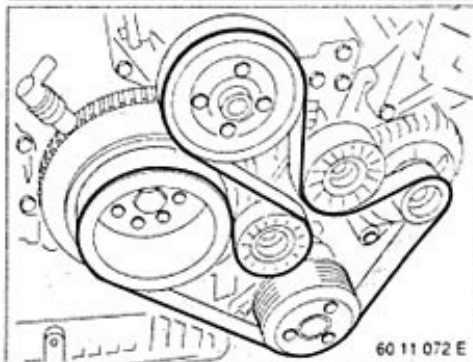
Remove hose from idle speed actuator and remove gaiter between throttle body and mass air flow sensor.



Remove fan.
Use special tools 11 5 040 and 11 5 050.

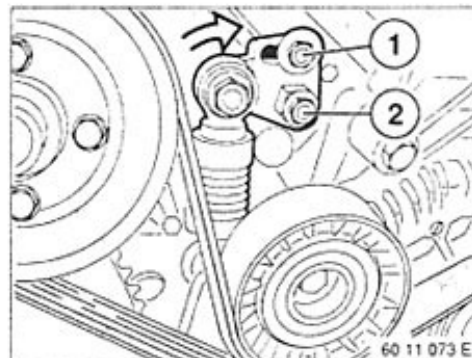
Caution!
Counterclockwise thread

Installation:
Tightening torque 11 52 1AZ*



Arrangement of drive belt guide.

* Refer to Technical Data

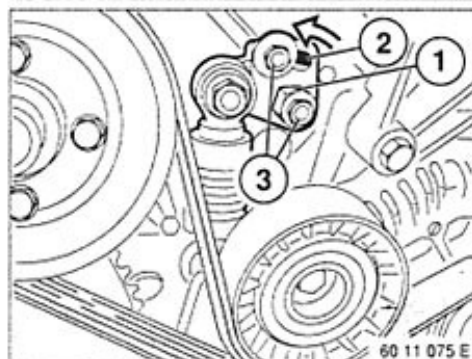


Unfasten nuts (1) and (2) and relieve tension on belt drive.
Remove Vee belt.

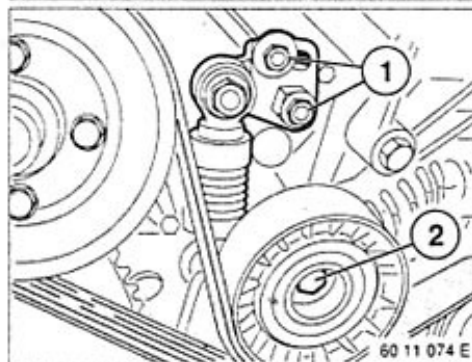
Installation:
Check Vee belt for coolant and oil residue, replacing if necessary.



Caution!
Always replace Vee belt if contaminated with hydraulic oil.



Installation:
Fit Vee belt and check that pulley wheels are correctly located.
Preload adjusting plate on hex head (1) until it contacts the end of the long bore (2) and tighten nuts (3).



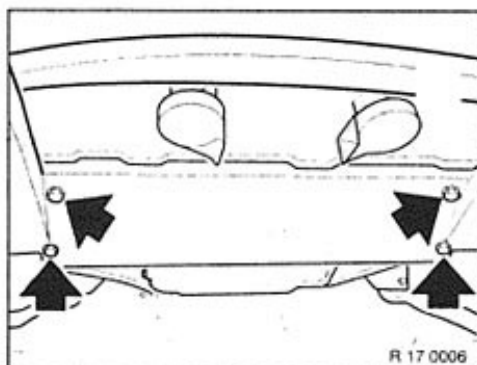
Note:
To remove the complete belt tensioning fixture, unfasten nut (1) and screw (2).

11 31 010 Adjusting timing of camshaft(s)

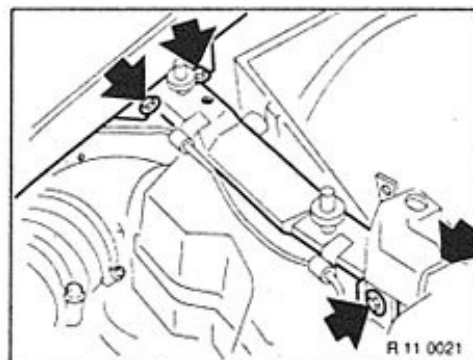
M60

Remove active carbon filter,
refer to 16 12 010

Remove pop-up headlights,
refer to 63 12 460



Remove underbody protection from engine.

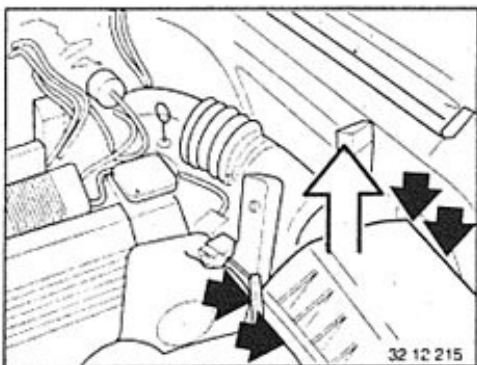


Remove support for pop-up headlights.
Remove complete lower section of air intake
filter housing.

Unfasten air-conditioning compressor from
mounting block,
refer to 64 52 020

Note:
Lines remain connected.

Subsequent procedure,
refer to 11 31 010
Repair Instructions for 7 Series E38



Remove complete upper section of air intake
filter together with mass air flow sensor.

11 31 011 Replacing left camshaft

(inlet or exhaust side, as applicable)
Cylinder bank 5 - 8

M60

Preliminary work in accordance with "Adjusting timing of camshaft(s)",
refer to 11 31 010

Subsequent procedure,
refer to 11 31 011
Repair Instructions for 7 Series E38

11 31 015 Replacing right camshaft

(inlet or exhaust side, as applicable)
Cylinder bank 1 - 4

M60

Perform preliminary work in accordance with
"Adjusting timing of camshaft(s)"
refer to 11 31 010

Subsequent procedure,
refer to 11 31 015
Repair Instructions for 7 Series E38

11-41/10

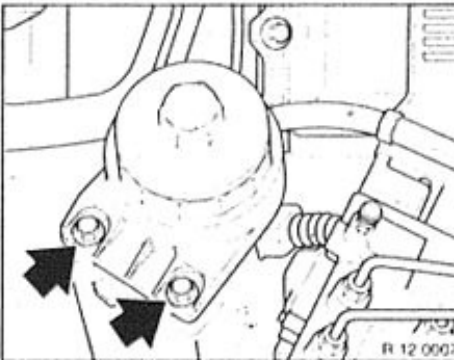
11 41 000 Removing and installing or
replacing oil pump

M60

see Repair Instructions for 5 Series E34.

11 42 020 Removing and installing, sealing or replacing complete full-flow oil filter

M60

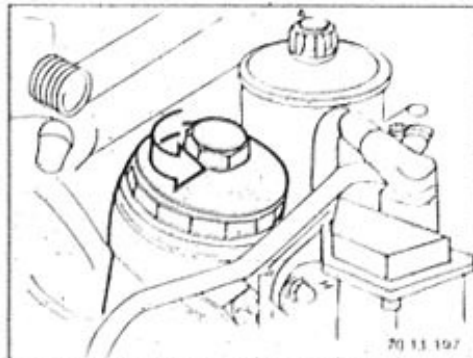


Unfasten full-flow filter housing and lift out of bracket.

Installation:

If necessary, replace oil filter.

Check oil level and top up oil if necessary.



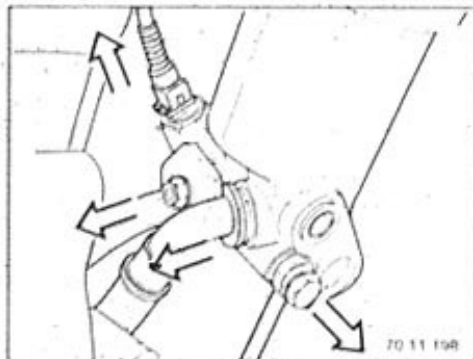
Note:

Do not damage full-flow oil filter cover: only open and tighten using a socket nut. Unfasten full-flow filter cover to enable engine oil to flow back into the oil pan.

Installation:

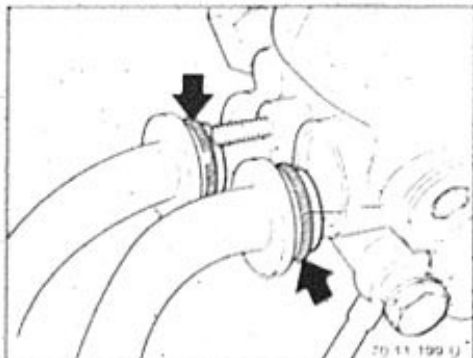
Fit new seal.

Tightening torque 11 42 2AZ*



Disconnect plug connection on oil pressure switch.

Remove oil lines from full-flow filter housing.



Installation:

Fit new seals.

* Refer to Technical Data

**11 51 000 Removing and installing or
replacing water pump**

M60

Remove coolant hose between expansion tank
and water pump.

For subsequent procedure,
see Repair Instructions for 5 Series E34.

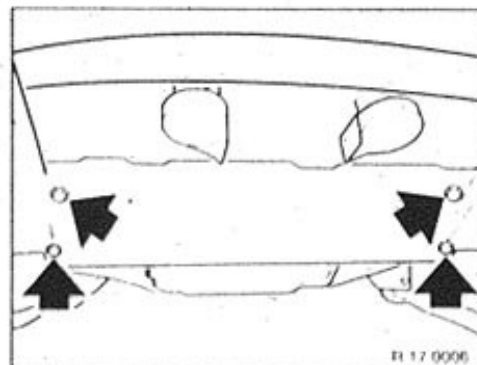
**11 51 011 Replacing pulley wheel on
water pump**

M60

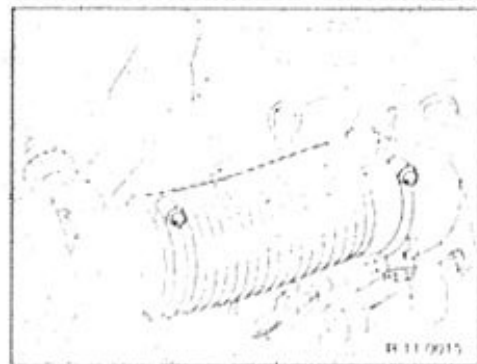
see Repair Instructions for 5 Series E34.

11 53 000 Removing and installing or replacing coolant thermostat

M60



Remove underbody protection from engine.

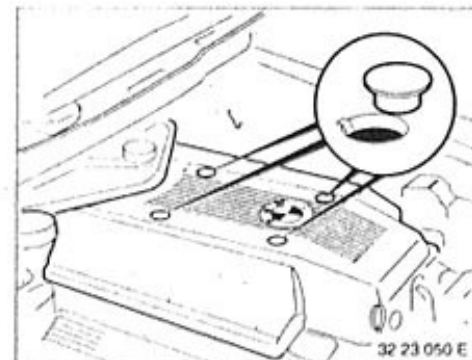


Remove hose to idle speed actuator and remove gaiter between throttle body and mass air flow sensor.

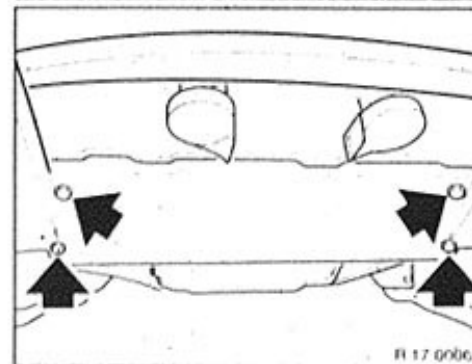
Subsequent procedure, see Repair Instructions, 5 Series E34.

11 53 325 Removing and installing or replacing coolant manifold

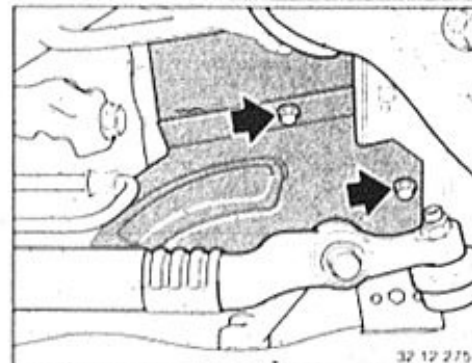
M60



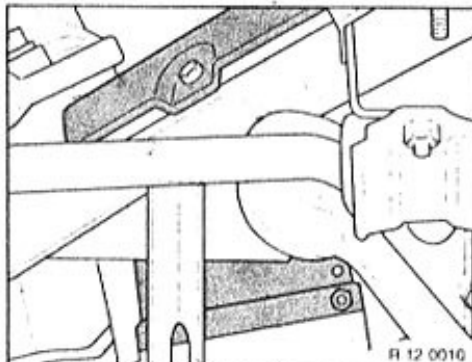
Lever clips off manifold cover. Unfasten screws. Remove cover together with acoustic insulation.



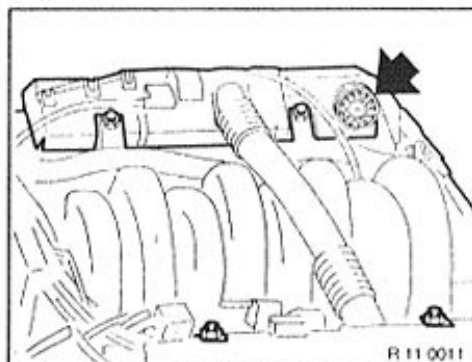
Remove underbody protection from engine.



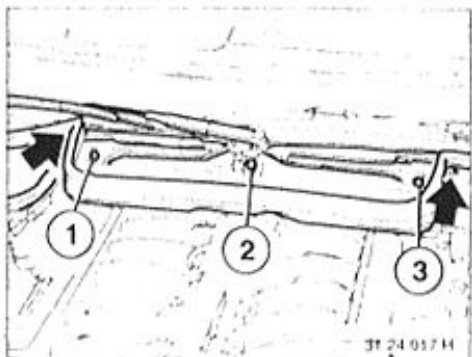
Remove left and right heat baffle plates from front axle carrier.



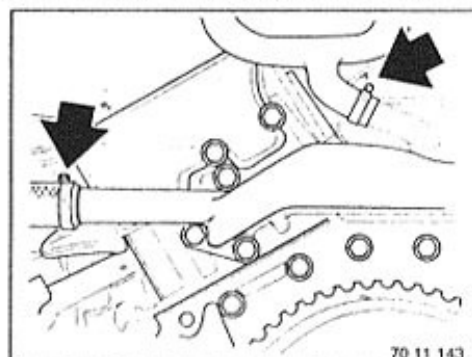
Remove rear left and right heat baffle plates.



Disconnect engine connector from left and right cable ducts.

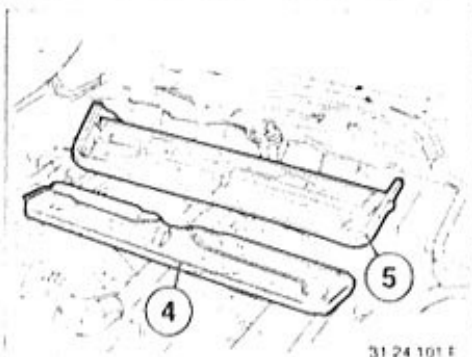


Partially remove rubber seal from air manifold. Twist retainers (1...3). Unscrew and remove screws on left and right sides.

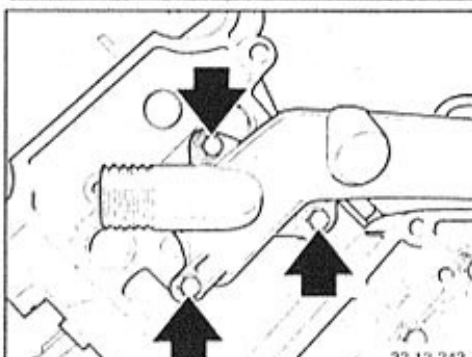


Drain off coolant, see 17 00 039.

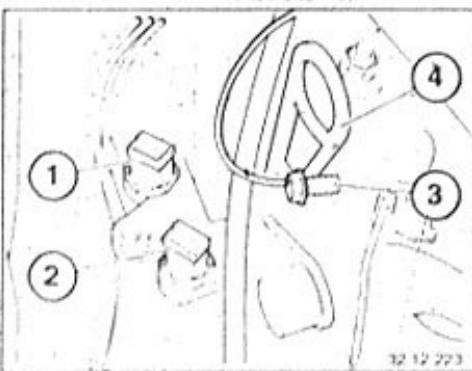
Remove coolant hoses from coolant manifold.



Lift out trim section (4) and microfilter (5).

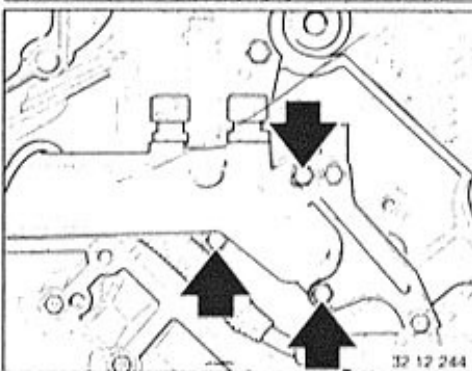


Unfasten screw connection from coolant manifold.



Disconnect plug connections:
(1) Temperature sensor for remote thermometer (black)
(2) Temperature sensor for control unit on Digital Motor Electrics (white)

Unscrew beside engine mount (4) behind shared ground wire for the ignition coils (3).



Unfasten screw connection on coolant manifold.

Installation:
Clean sealing faces and replace gaskets.

Top up coolant.
Bleed cooling system and check for leaks, see 17 00 039.

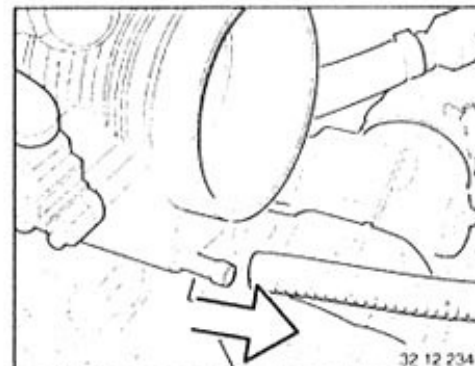
11 61 050 Removing and installing air intake manifold

M60

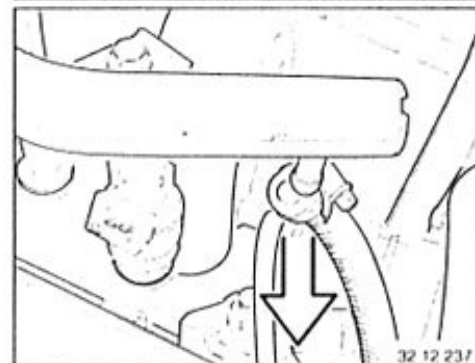
Interrogate fault memory.
Switch off ignition.

Remove left and right cable duct.
These operations are described in the section on Removing Both Cylinder Heads, see 11 12 004.

Disconnect accelerator cable and Bowden cable from ASC throttle valve.
This operation is described in Removing and Installing the Engine, see 11 00 050.

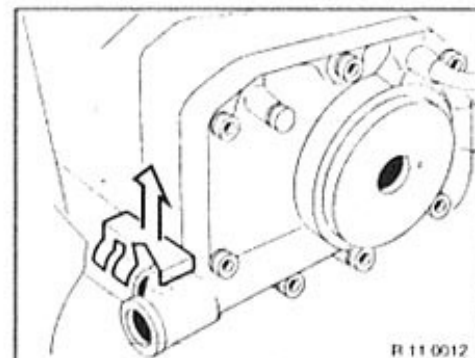


Remove tank vent hose from throttle body.



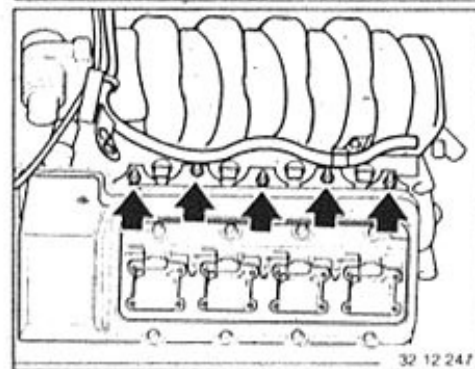
Caution!
Catch escaping fuel.

Remove fuel inlet and return lines from injection tube.

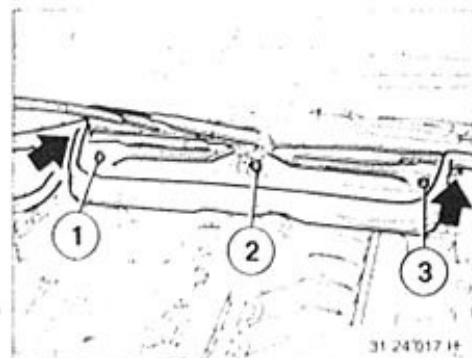


Remove clips and slide tube for engine venting forwards.

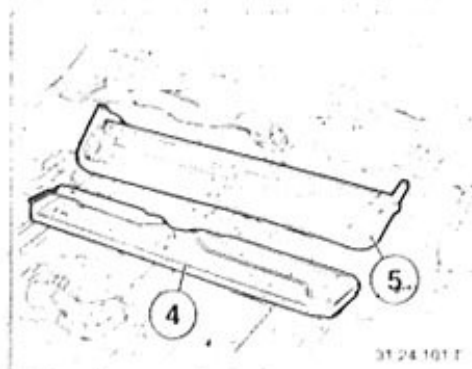
Installation:
Check seal and replace if necessary.



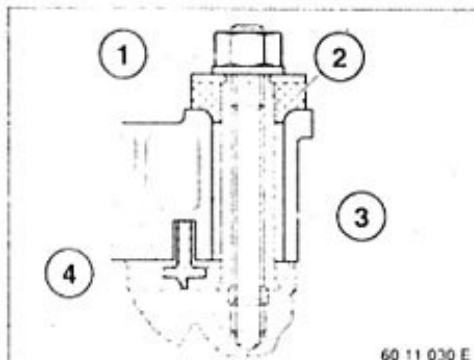
Loosen nuts.
Remove decoupling units, then remove intake air manifold by lifting upwards.



Partially remove rubber seal from air manifold.
Twist retainers (1 ... 3).
Unscrew and remove left and right screws.



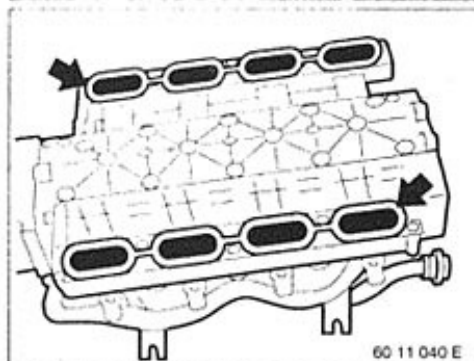
Lift out trim section (4) and microfilter (5).



Note:
The intake air manifold is separated from the cylinder head by decoupling units and gaskets (vibration damping).
(1) Nut
(2) Decoupling unit
(3) Intake air manifold
(4) Gasket



Installation:
Fit two decoupling units on left and right with nut - not under preload - and align the intake air manifold.
Fit all the other decoupling units with nut and tighten crosswise, radiating outwards from the center.
Tightening torque 11 61 1AZ*

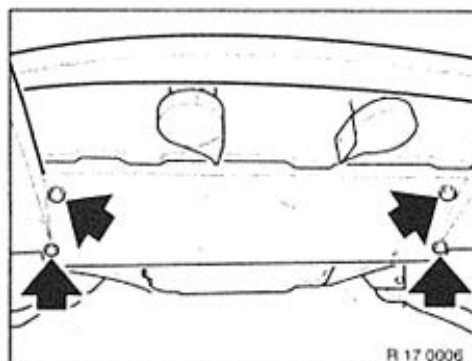


Installation:
Check gaskets and replace if necessary.
Ensure that the gaskets are correctly seated.

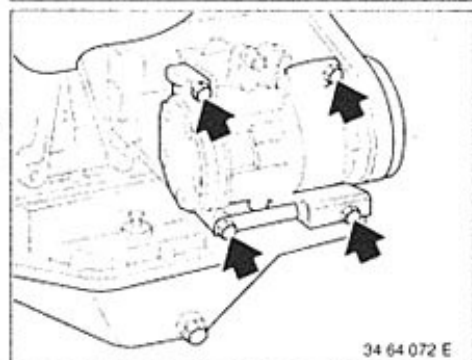
11 62 142 Removing and installing or replacing both left exhaust manifolds

M60

Remove complete exhaust unit, see 18 00 020.



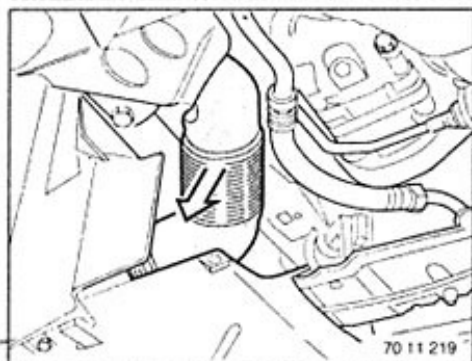
Remove underbody protection from engine.



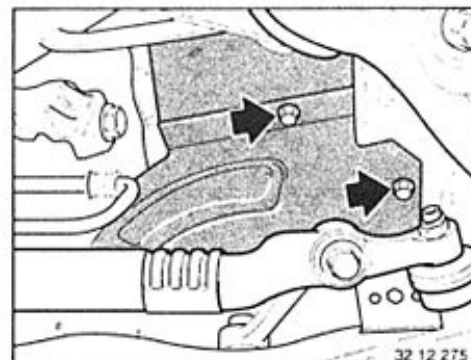
Remove drive belt from air conditioning compressor, see 64 52 020.

Unfasten air conditioning compressor from mount, see 64 52 020.

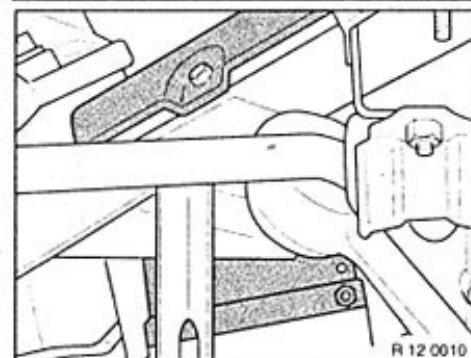
Note:
Lines remain connected.



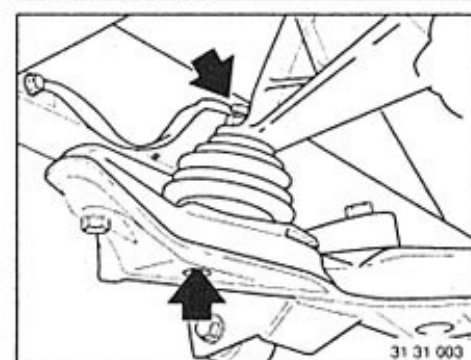
Remove cooling air guide for 3-phase alternator:



Remove left and right heat baffle plates from front axle carrier.

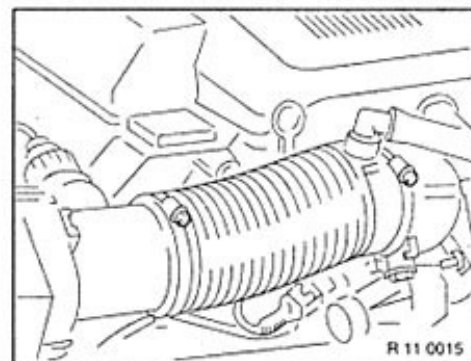


Remove left and right heat baffle plates.



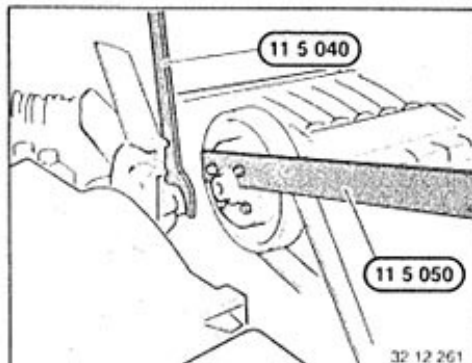
Unfasten left and right engine mount.
Remove ground tape from engine support arm.

Installation:
Tightening torque 11 81 1AZ*



Remove hose to idle speed actuator and remove gaiter between throttle body and mass air flow sensor.

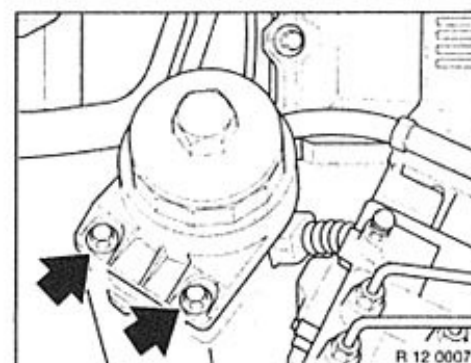
* Refer to Technical Data



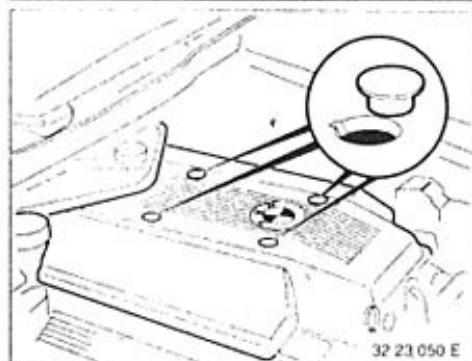
Remove fan wheel.
Use special tool 11 5 040 and 11 5 050.

Caution!
Counterclockwise thread

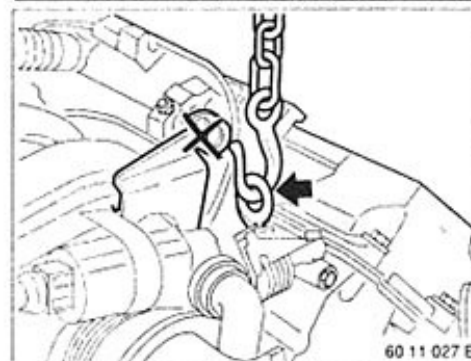
Installation:
Tightening torque 11 52 1AZ*



Disconnect full-flow oil filter.

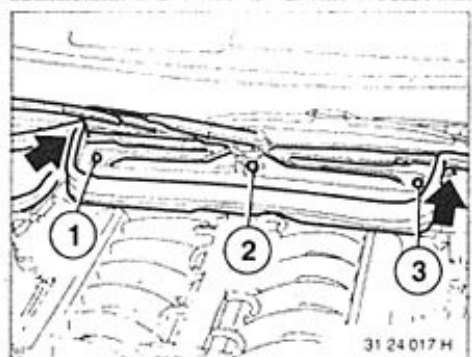


Lever clips out of manifold cover.
Unfasten screws.
Remove cover and acoustic insulation.

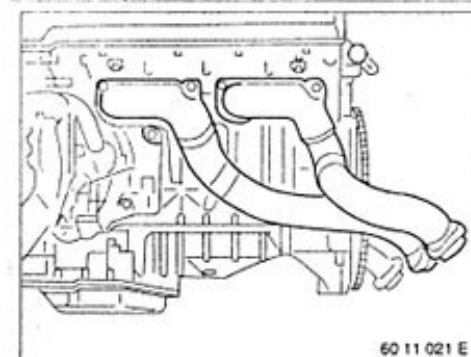


Raise engine at front with special tool 00 0 200.

Caution!
Note distance between engine and splash guard.



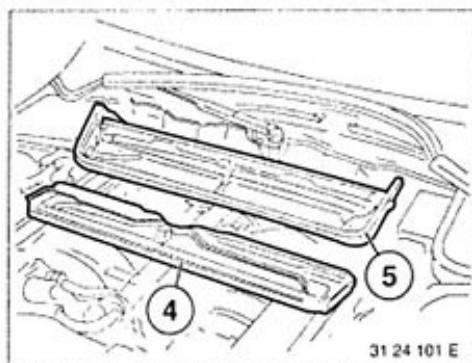
Partially remove rubber seal from air manifold.
Twist retainers (1 ... 3).
Unscrew and remove left and right screws.



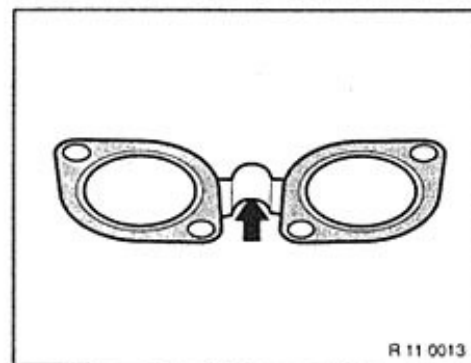
Completely unfasten screw connections on both exhaust manifolds.
Remove both exhaust manifolds from below.

Note:
Unfasten screw connection on exhaust manifold for cylinders 7/8 from below.

Installation:
Tightening torque 11 62 1AZ*



Lift out trim section (4) and microfilter (5).



Installation:
Replace gaskets.
Sealing bead faces the exhaust manifold.

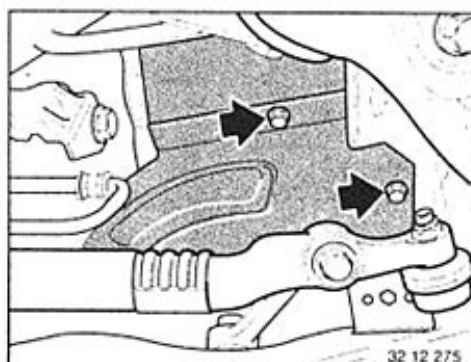
* Refer to Technical Data

* Refer to Technical Data

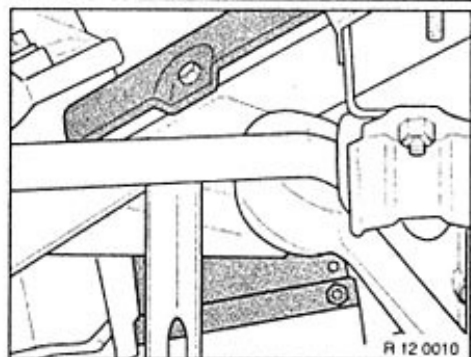
11 62 143 Removing, installing or replacing both exhaust manifolds

M60

Remove complete exhaust system, see 18 00 020.



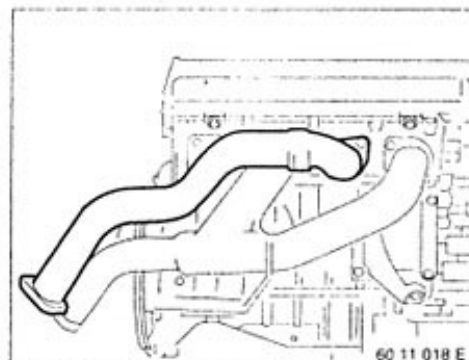
Remove left and right heat baffle plates from front axle carrier.



Remove left and right heat baffle plates from rear.

Remove active carbon filter, see 16 12 010.

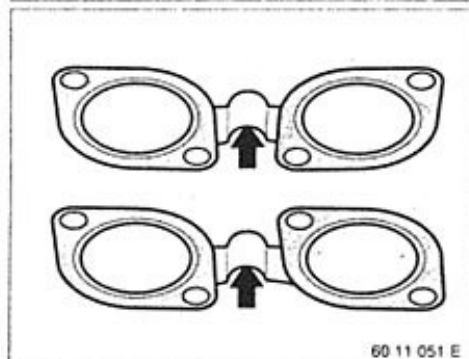
Remove both heat baffle plates from engine support.



Completely unfasten screw connection on both exhaust manifolds. Remove both exhaust manifolds by lifting upwards.

Note:
Unfasten screw connection on exhaust manifold for cylinders 2/4 from below.

Installation:
Tightening torque 11 62 1AZ*



Installation:
Replace gaskets. Sealing bead faces exhaust manifold. Install gaskets from below.

11 Engine M73

00 00 249	BMW engine oil service	11- 0/20
11 00 039	Compression check – all cylinders	11- 0/20
050	Engine – remove and install	11- 0/21
11 12 004	Both cylinder head covers – remove and install/seal	11- 12/20
005	Left cylinder head cover – remove and install/seal	11- 12/20
006	Right cylinder head cover – remove and install/seal	11- 12/20
105	Left cylinder head – remove and install	11- 12/20
106	Right cylinder head – remove and install	11- 12/20
11 13 010	Upper section of oil pan – remove and install/replace	11- 13/20
11 53 325	Coolant manifold – remove and install/replace	11- 53/20
11 62 142	Both left exhaust manifolds – remove and install/replace	11- 62/20
143	Both right exhaust manifolds – remove and install/replace	11- 62/21
11 72 000	Air pump – remove and install/replace	11- 72/20

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

00 00 249 BMW engine oil service

M73

Refer to 00 00 249

Repair Instructions for 7 Series E38

11 00 039 Checking compression of all cylinders

M73



Caution!

High voltage – danger of death!

Interrupt power supply to ignition coils.

Note instructions on compression testing,
refer to General Data MG12

Repair Instructions for 7 Series E38

Disconnect fuel pump relay and DME master relay (installation: electronics box),
refer to Electrical Troubleshooting Manual
(Schematics) for 8 Series E31
Directory of components 7000.0

After the test, interrogate fault memory and, if
necessary, rectify faults. Cancel fault memory.
Subsequent procedure,
refer to 11 00 039

Repair Instructions for 7 Series E38

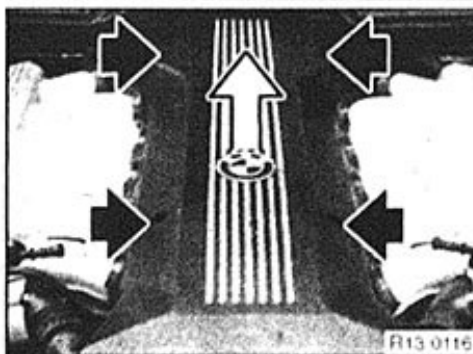
11 00 050 Removing and installing engine

M73

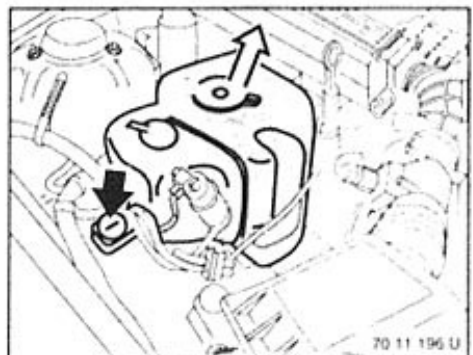
Note instructions on disconnecting and connecting battery, refer to General Data MG 12: removing battery ground wire.



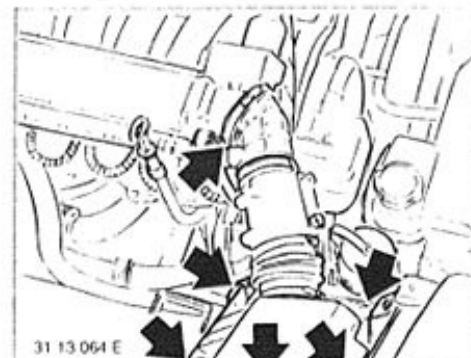
Move engine hood into assembly position. Disconnect damper strut from engine hood, fully open the engine hood and secure with a screw on left and right sides.



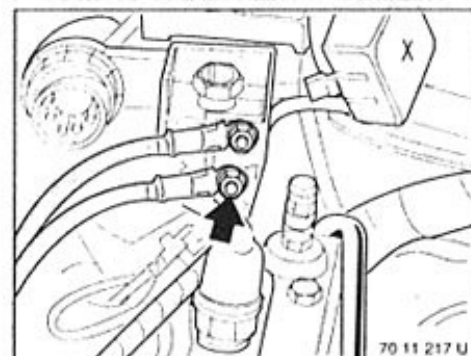
Rotate interlock through 90°. Remove cover.



Remove windshield wash container and place to one side.



Remove upper section of intake filter housing with left and right mass air flow sensors.



Disconnect positive battery lead from positive battery terminal.

Remove section of engine wiring harness from engine and place to one side, refer to 61 11 051

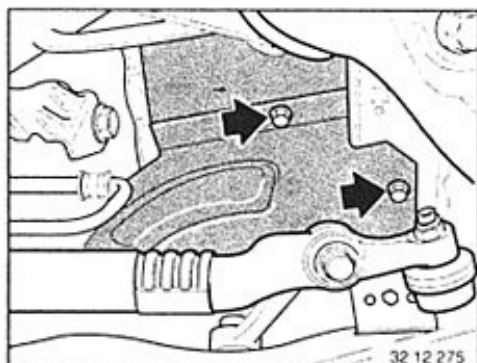
Disconnect plug connection and remove hoses from tank vent valve, refer to 13 90 500



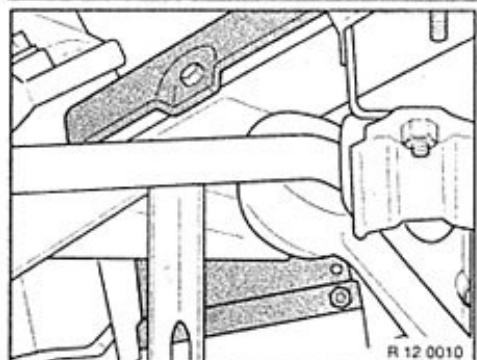
Unfasten hose clip from pressure pipe on air pump. Remove hose.

Remove complete full flow oil filter,
refer to 11 42 020
Repair Instructions for 7 Series E38

Completely remove radiator,
refer to 17 11 000



Remove left and right heat baffle plates from
front axle carrier.



Remove left and right rear heat baffle plates.

Unfasten drain plugs for coolant from left and
right sides of engine block.
Drain coolant and dispose of it correctly.

Installation:
Replace sealing rings.
Tightening torque,
refer to Technical Data 11 11 5AZ

Remove exhaust pipes from cylinder
bank 1 to 6,
refer to 18 31 010
Repair Instructions for 7 Series E38

Remove exhaust pipes from cylinder
bank 7 to 12,
refer to 18 31 015
Repair Instructions for 7 Series E38

Starter motor remove,
refer to 12 41 020

"Removing automatic transmission,"
refer to 24 00 026

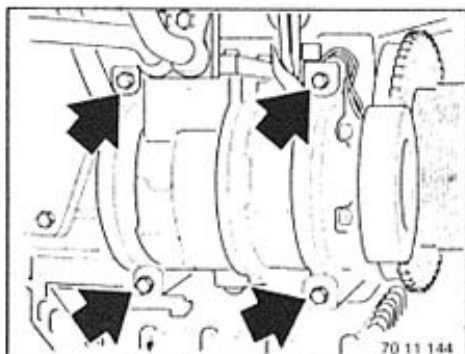
Remove alternator drive belt,
refer to 11 28 010
Repair Instructions for 7 Series E38

Remove drive belt for compressor on air condi-
tioner,
refer to 11 28 550
Repair Instructions for 7 Series E38

Remove dipstick tube,
refer to 11 43 000
Repair Instructions for 7 Series E38

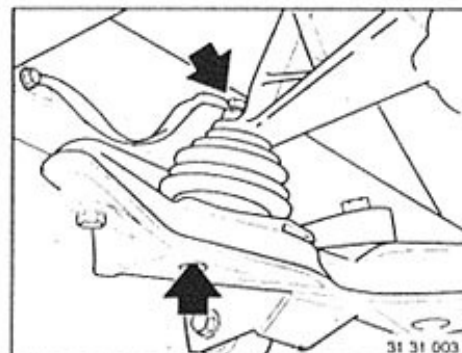
Unfasten hydraulic line from front oil pan.

Remove vane pump,
refer to 32 41 060



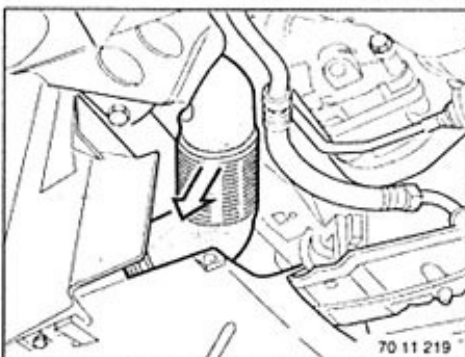
Unfasten air conditioning compressor from
mount and tie to one side.

Note:
Lines remain connected.

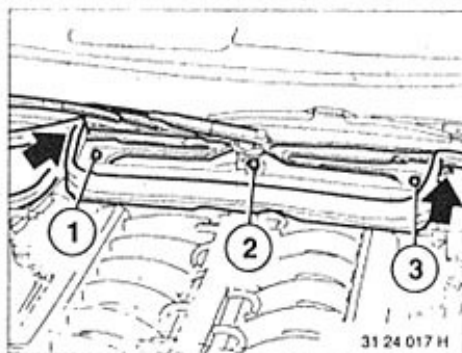


Unfasten ground strap from right engine sup-
port arm.

Unfasten both engine mounts on front axle
support and on engine support arm.



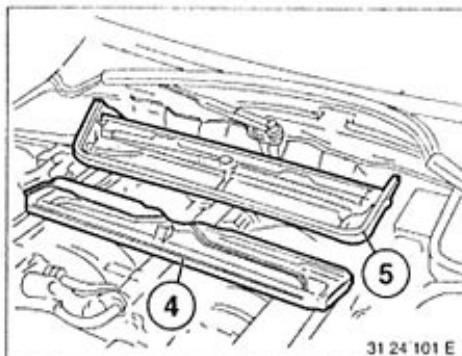
Remove cooling air guide for 3-phase alterna-
tor.



Partially remove rubber seal.
Twist retainers (1 to 3) through 90°.
Unfasten left and right screws.
Loosen top nut in centre.



Remove bracket for hydraulic lines from vane
pump.



Lift off cover (4) and air manifold box (5).

Caution!

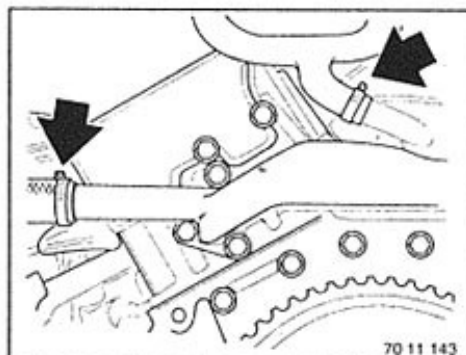
Catch fuel as it flows out and dispose of it correctly.

Remove fuel inlet and outlet lines.

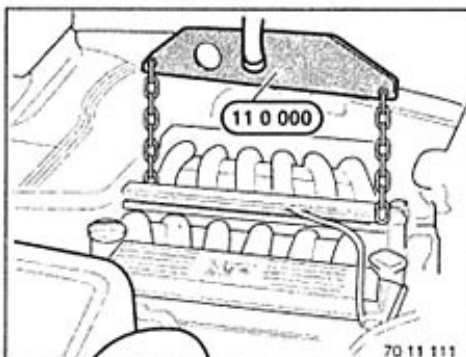
This operation is described in section on replacing all injection valves, refer to 13 64 541

Installation:

Replace fuel hoses.



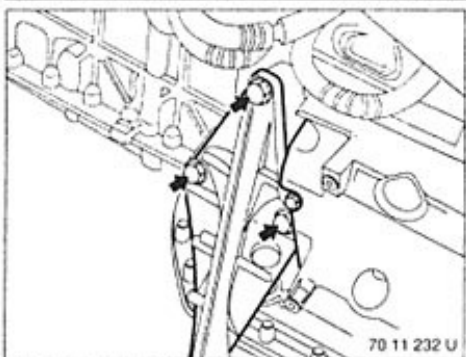
Remove coolant hoses from coolant manifold, coolant pipe and heater.



Secure engine on special tool 11 0 000.

Caution!

Only lift engine using the mounting lugs provided for this purpose.



Raise engine slightly and remove right engine support arm.



50 11 500 U

Caution!

Lift engine and turn back to the right.

Note narrow gap between exhaust manifold and steering spindle.

Lift out engine carefully.

**11 12 004 Removing and installing /
sealing both cylinder head
covers**

M73

Refer to 11 12 004
Repair Instructions for 7 Series E38

**11 12 005 Removing and installing /
sealing left cylinder head
cover**

M73

This operation is described in section remov-
ing and installing / sealing both
cylinder head covers,
refer to 11 12 004
Repair Instructions for 7 Series E38

**11 12 006 Removing and installing /
sealing right cylinder head
cover**

M73

This operation is described in section on re-
moving and installing / sealing both cylinder
head covers,
refer to 11 12 004
Repair Instructions for 7 Series E38

**11 12 105 Removing and installing left
cylinder head**

M73

Remove engine,
refer to 11 00 050

Subsequent procedure,
refer to 11 12 105
Repair Instructions for 7 Series E38

**11 12 106 Removing and installing
right cylinder head**

M73

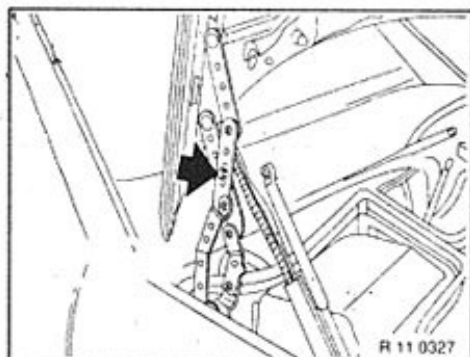
Remove engine,
refer to 11 00 050

Subsequent procedure,
refer to 11 12 106
Repair Instructions for 7 Series E38

11 13 010 Removing and installing / replacing upper section of oil pan

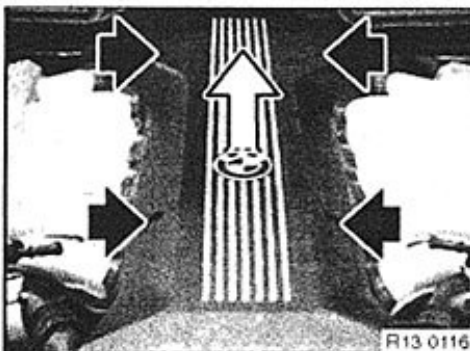
M73

Remove fan coupling with fan wheel, refer to 11 52 020
Repair Instructions for 7 Series E38

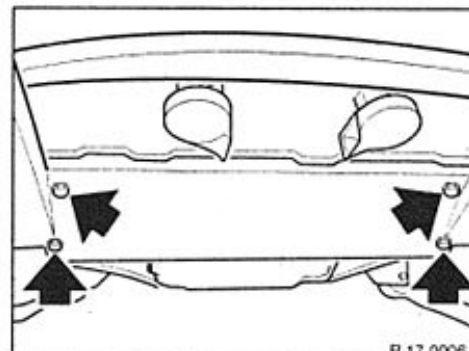


Lift engine hood into assembly position.

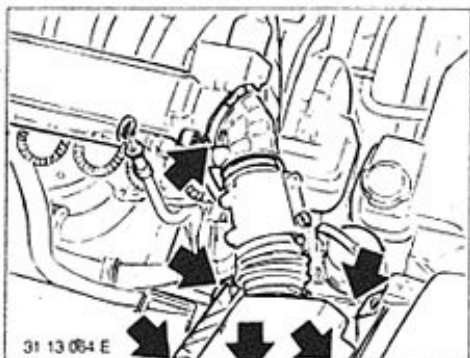
Disconnect damper strut on engine hood, open engine hood fully and secure with one screw on left and right sides.



Twist interlock through 90°. Remove cover.



Remove front underbody protection.



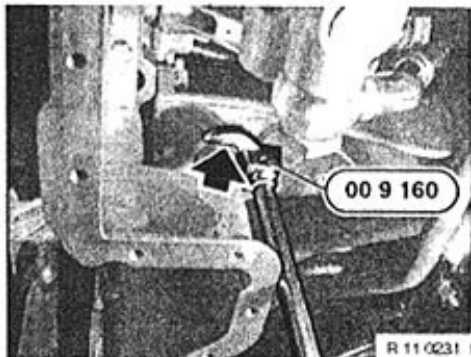
Remove upper section of intake filter housing with left and right mass air flow sensors.



Remove coolant guide on alternator.

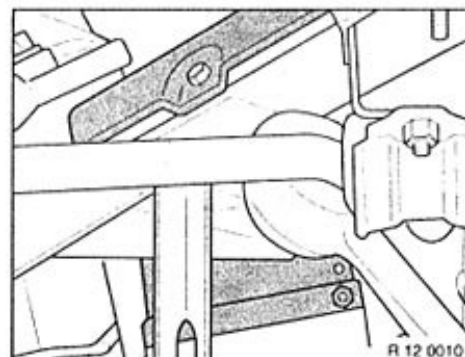
Remove alternator drive belt, refer to 11 28 010
Repair Instructions for 7 Series E38

Relieve tension on drive belt for air conditioner compressor and remove adjustment plate from oil pan, refer to 11 28 550
Repair Instructions for 7 Series E38

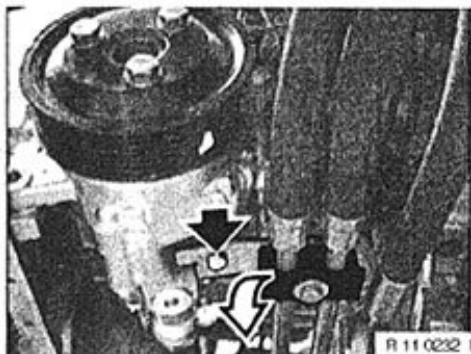


Unfasten return line of main flow fuel filter on oil pan with special tool.

Installation:
Replace sealing ring.
Tightening torque,
refer to Technical Data 11 42 5AZ



Remove left and right rear heat baffle plates.



Remove bracket for hydraulic lines from vane pump.

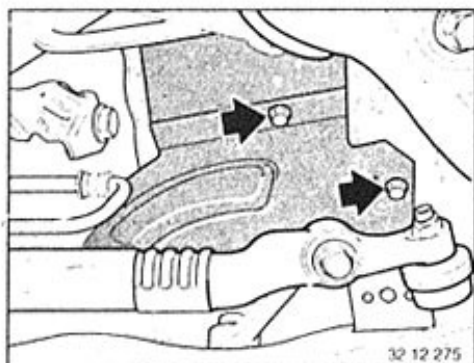
Unfasten left and right exhaust pipes from exhaust system,
refer to 18 31 010 / 015
Repair Instructions for 7 Series E38

Unfasten hydraulic line from front oil pan.

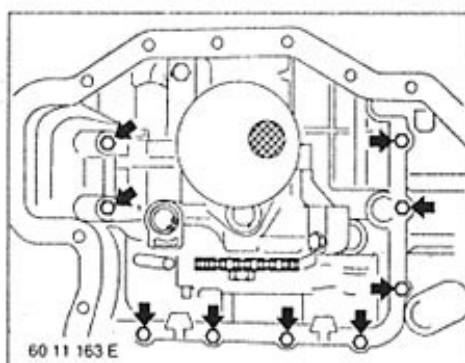
Remove vane pump,
refer to 32 41 060

Remove lower section of oil pan,
refer to 11 13 020
Repair Instructions for 7 Series E38

Remove dipstick tube,
refer to 11 43 000
Repair Instructions for 7 Series E38

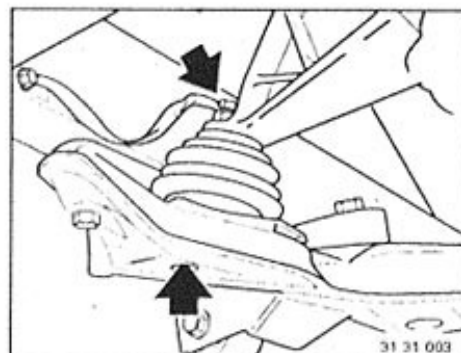


Remove left and right heat baffle plates from front axle carrier.

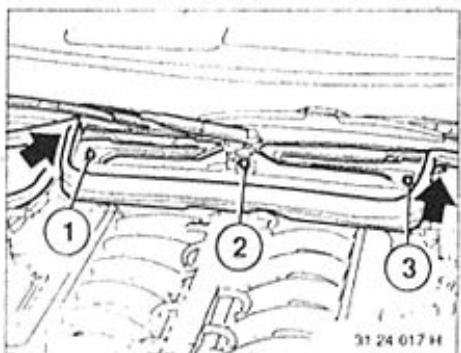


Unfasten screws inside oil pan.

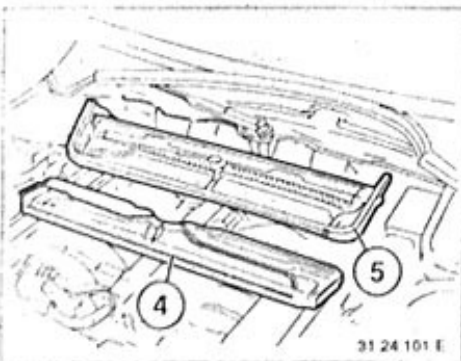
Remove oil pump,
refer to 11 41 000
Repair Instructions for 7 Series E38



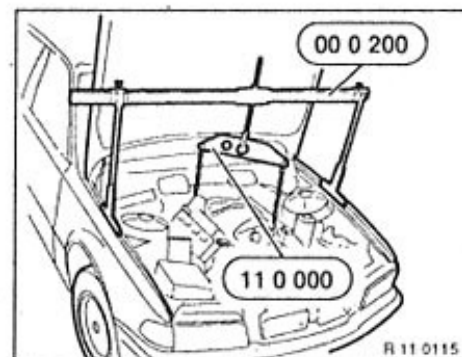
Unfasten left and right lower engine mounts.



Partially remove rubber seal.
Twist retainers (1 to 3) through 90°.
Unfasten screws on left and right sides.
Loosen top nut in centre.



Lift out cover (4) and air manifold box (5).



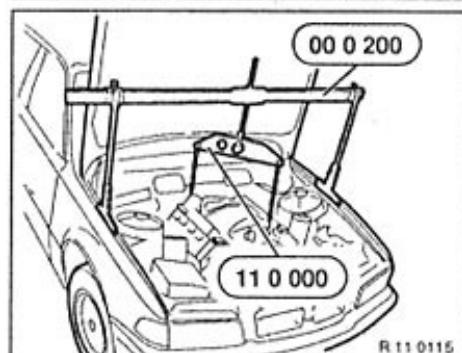
Assemble special tool 00 0 200 with
special tool 00 0 2001 / 202 / 204 / 206
and attach.

Note:
Supports must be located on screws in both
side panels.
Secure special tool 11 0 000 to
special tool 00 0 200.

Caution!
Only attach engine on locating lugs provided.



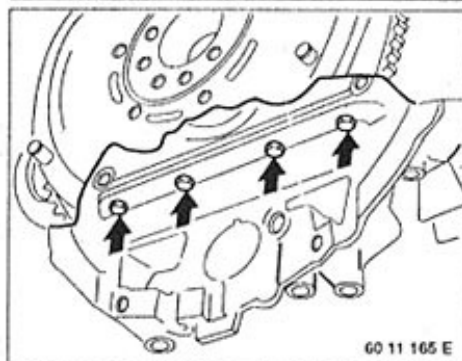
50 11 500 U



Lift engine with special tool 00 0 200 ap-
prox. 40 mm.

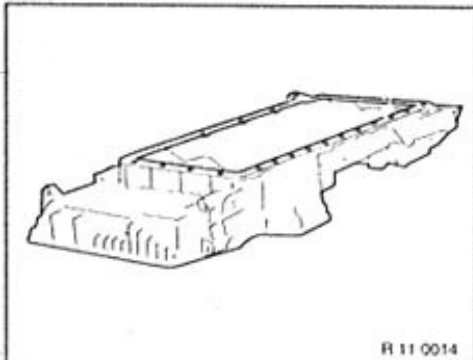
Caution!
Note gap between engine, heating
connections and end wall.

To obtain more clearance between oil pan and
track rod, move steering over to right lock.

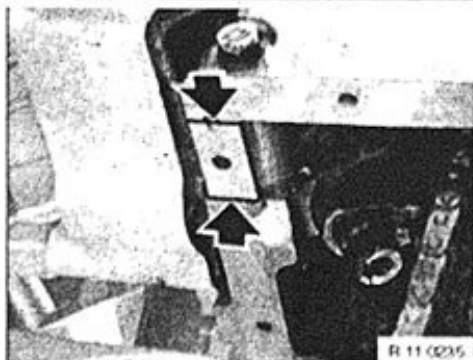


Unfasten screws on end cover.

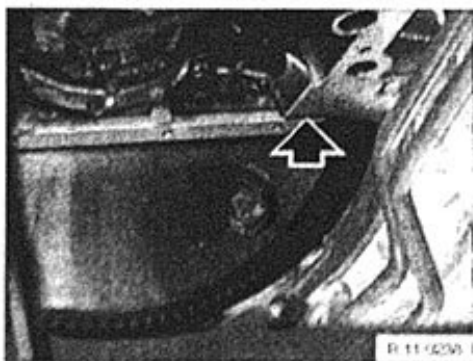
60 11 165 E



Unfasten remaining screws in oil pan.
Pull upper section of oil pan forwards to remove.



Installation:
Clear gasket debris off left and right sealing faces and clean them.
Coat contact edges of separating plane with liquid sealing compound Hylomar SQ 32 M, refer to BMW Parts Service.



Installation:
Clean gasket debris off sealing faces on left and right end covers.
Coat contact edges of separating plane with liquid sealing compound Hylomar SQ 32 M, refer to BMW Parts Service.

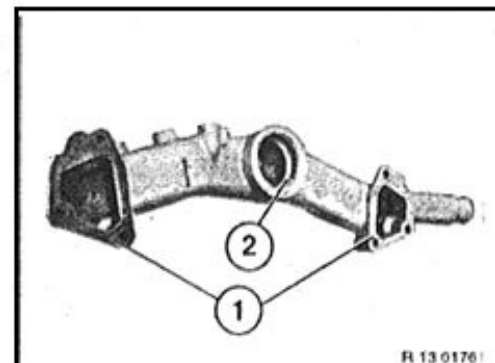
Replace gasket.

Installation:
Install all screws in oil pan.
Fit screws on transmission end without pre-load.
Tighten screws on engine end.
Tighten screws on transmission end.

11 53 325 Removing and installing / replacing coolant manifold

M73

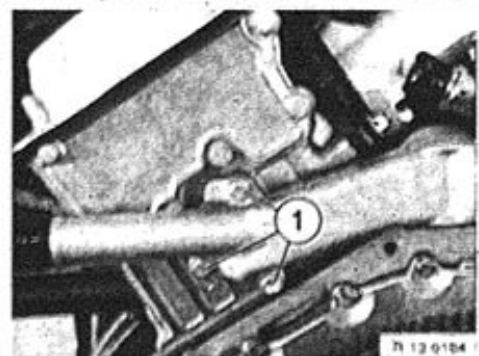
Remove engine,
refer to 11 00 050



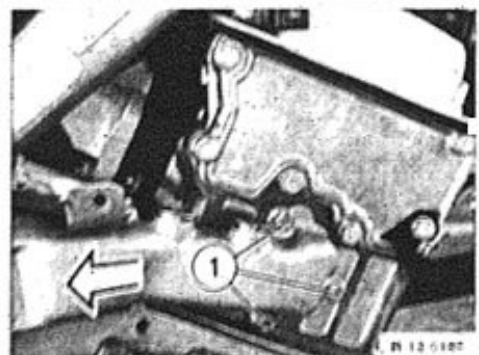
Installation:
Clean sealing faces (1) on back of cylinder heads and on coolant manifold.
Replace gaskets.
Replace O-ring (2).



Unfasten hose clips and remove coolant hoses.
Unfasten screw.



Cylinder head on cylinder bank 7-12:
Unfasten screws (1).



Cylinder head on cylinder bank 1-6:
Unfasten screws (1)
Remove coolant manifold.

11 62 142 Removing and installing / replacing both left exhaust manifolds

M73

Remove exhaust pipes,
refer to 18 31 010
Repair Instructions for 7 Series E38

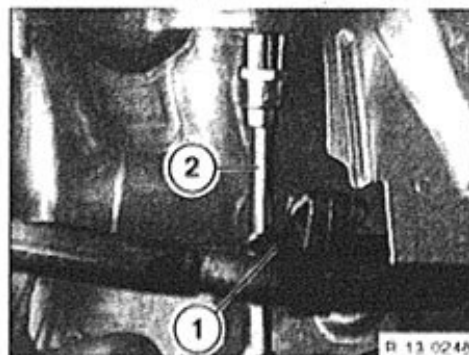
Remove non-return valve for cylinder bank
7 to 12,
refer to 11 72 054
Repair Instructions for 7 Series E38

Remove left distributor cap (cylinder bank
7 to 12),
refer to 12 11 096
Repair Instructions for 7 Series E38

Note:
Do not remove ignition cable from distributor
cap



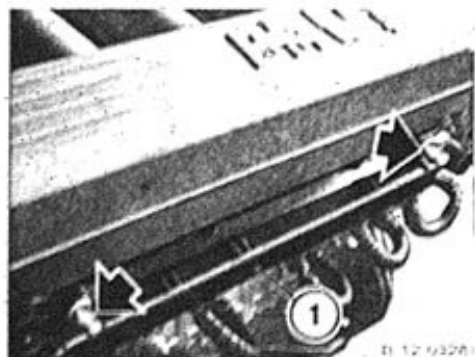
Remove bracket (1) for distributor caps cover.



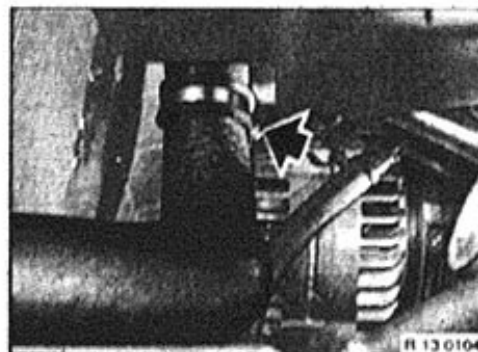
Baffle plate is secured with top nuts in ex-
haust manifold.

Note:
Insert tool (2) between exhaust manifold and
pipe (1).

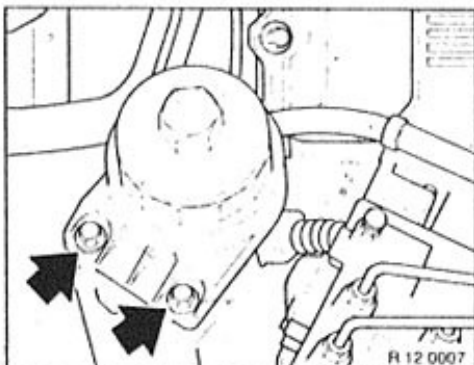
Remove pipe for secondary air induction,
refer to 11 72 194
Repair Instructions for 7 Series E38



Unfasten screw connection from ignition wir-
ing harness.
Remove spark plug connector.
Place ignition wiring harness (1) and distribu-
tor cap to one side.

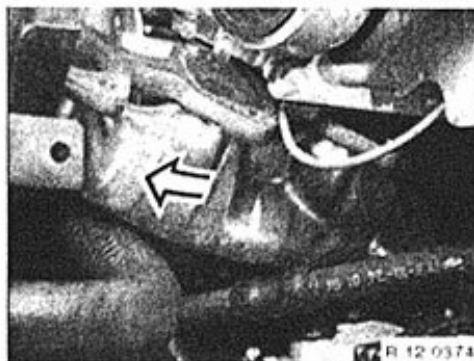


Unfasten bracket for cooling water hose.



Unfasten full flow oil filter from bracket.

Note:
Lines remain connected.



Unfasten exhaust manifold and pull forward to remove.

Subsequent procedure,
refer to 11 62 142
Repair Instructions for 7 Series E38

11 62 143 Removing and installing / replacing both right exhaust manifolds

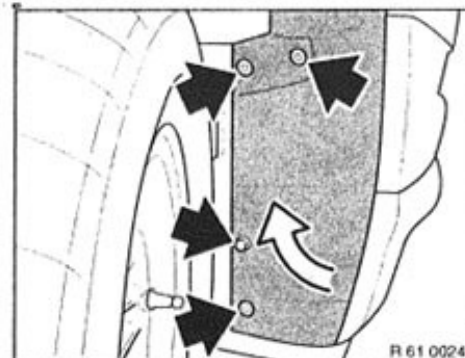
M73

Refer to 11 62 143
Repair Instructions for 7 Series E38

11 72 000 Removing and installing / replacing air pump

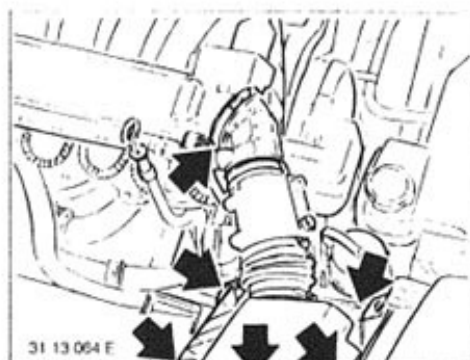
M73

Remove right pop-up headlight, refer to 63 12 460



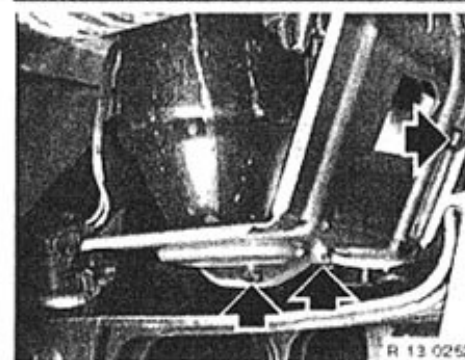
R 61 0024

Partially remove internal wheel arch trim.



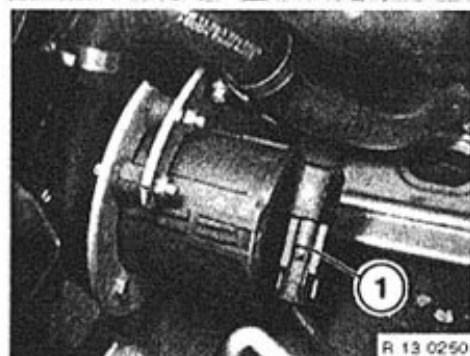
31 13 064 E

Remove upper right section of intake filter housing.



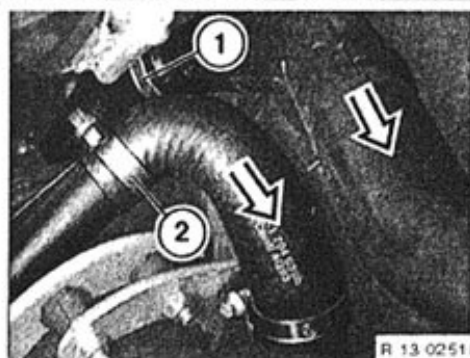
R 13 0252

Remove right brake air duct. Unfasten screws in bracket for air pump.



R 13 0250

Unfasten plug connection (1).



R 13 0251

Unfasten hose clips (1 and 2). Remove hoses.

Lift out air pump from top.