

Engine - Overhaul

RE - ASSEMBLY

I

Fitting the crankshaft

- Fit in the cylinder block:
- The oil gallery plugs coated with Loctite Threadlock.
- The grooved main bearing shells.

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- The piston crown cooling jets.

Note: For bearing shell thickness (See page 10)

II

- Fit:
- The crankshaft.
- Nos. 3, 4 and 5 main bearing caps.
- The two end float half - washers **(1)**, with the anti - friction faces towards the crankshaft.

III

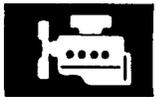
- Fit the No.2 main bearing cap **(2)** with its two end float half - washers, their anti - friction faces towards the crankshaft.
- Apply a thin coat of Loctite 518 sealant to the ends **(a)** of the bearing.

IV

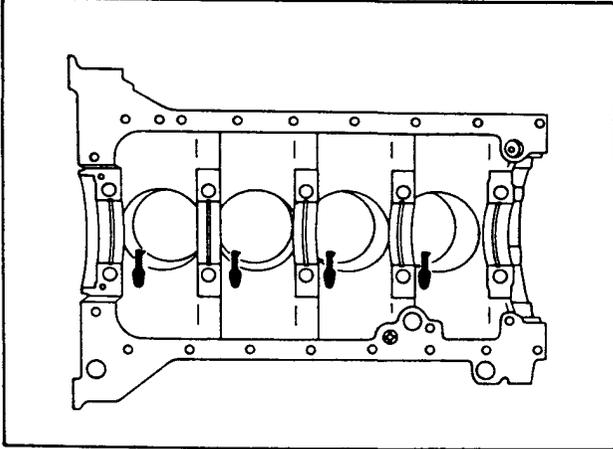
- Fit:
- New sealing rubbers to the bearing cap ensuring each rubber is located on the dowel pins.
- Lubricate:
- Side plates of tool **18G 1627**
- Assemble:
- Tool **18G 1627** to main bearing cap, secure tool to bearing cap using the two shortest sump bolts.
- Main bearing cap to cylinder block.

Note: When fitting bearing cap, insert it at an angle of 45° then carefully bring it to the vertical position and press it on to the crankshaft journal.

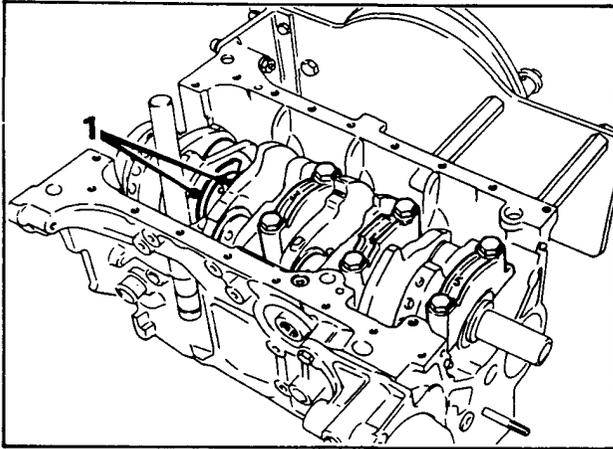
- Fit:
- The main bearing cap bolts and tighten them to 70 Nm.
- Remove:
- The bolts retaining tool **18G 1627** and remove the tool by rocking the tool backwards and forwards.
- Position:
- The hole (arrowed) in the centre of tool **18G 1627** over each sealing rubber and slice off each rubber level with the face of the tool; this will leave 2 mm of seal protruding from the main bearing cap.
- Tighten the bearing cap bolts to 70 Nm.
- Check that the crankshaft rotates without tight spots.



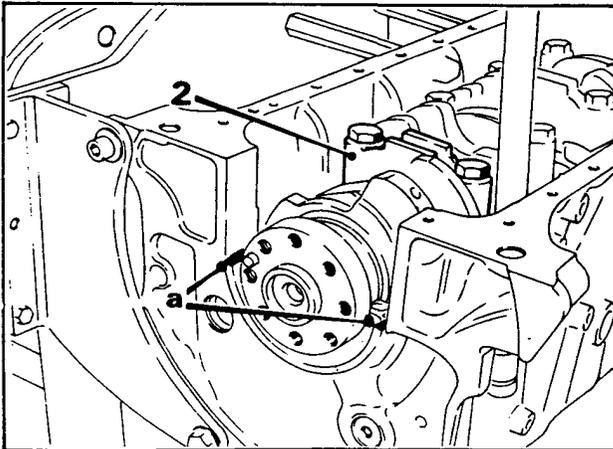
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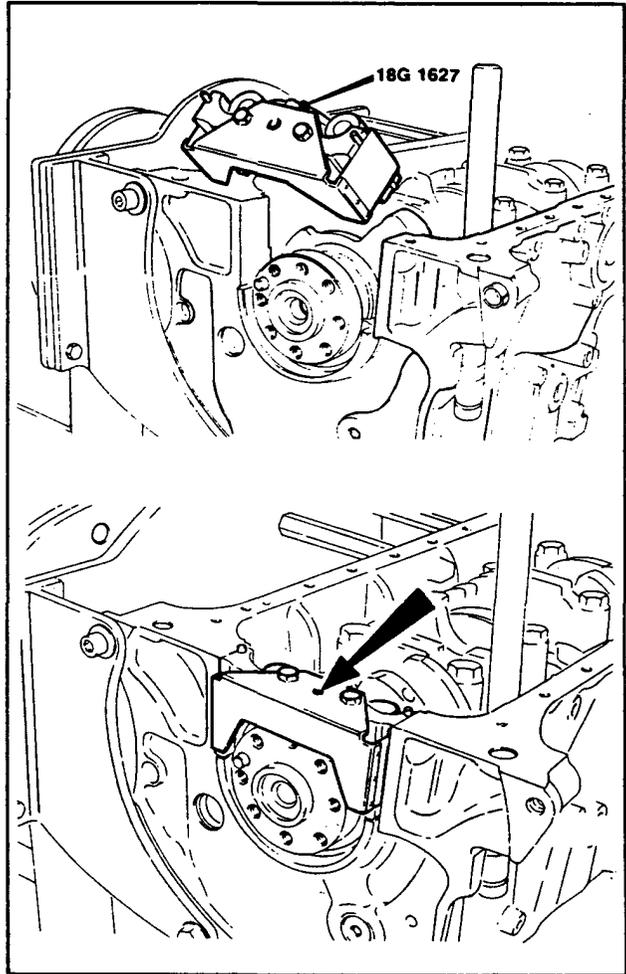
II



III



IV



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Engine - Overhaul

I

Checking crankshaft end float

- Assemble D.T.I. gauge to cylinder block.
- End float must be between **0.07** and **0.32** mm.

Note: For choice of half washer thickness, (see page 10)

II

Fitting pistons – connecting rods:

- Assemble the connecting rods and pistons with the bearing shell tab recesses **(a)** on the same side as the piston crown recess **(b)** .
- Fit the piston rings.

Note: the marked face of the tapered ring must be towards the combustion chamber.

- To assemble, use special pliers
- scraper ring (oil control) **(1)**
- tapered ring (second ring) **(2)**
- domed chrome ring (first ring) **(3)**
- Space the ring gaps at 120° in relation to the scraper ring gap **(c)** .
- Oil the piston and moderately tighten the piston ring clamp **(4)** (illustration III).

III

- Remove the big end caps.
- Fit the pistons in the bores, observing the markings made on removal and with the piston crown recess **(a)** on the oil filter side of the block.
- Fit the big end caps and tighten the nuts to 50 Nm.

Note: For choice of bearing shell thickness, (see page 10)

IV

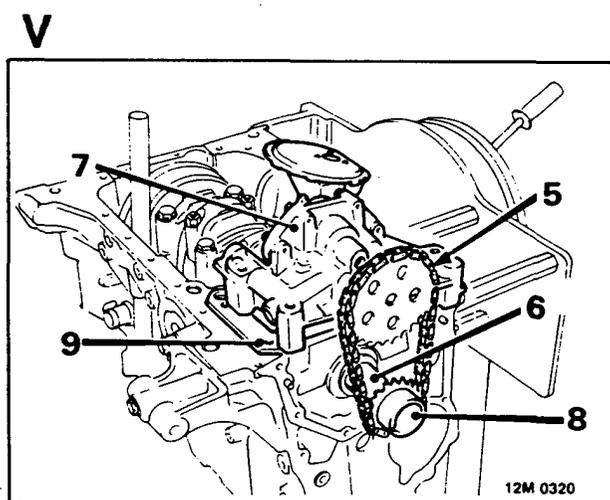
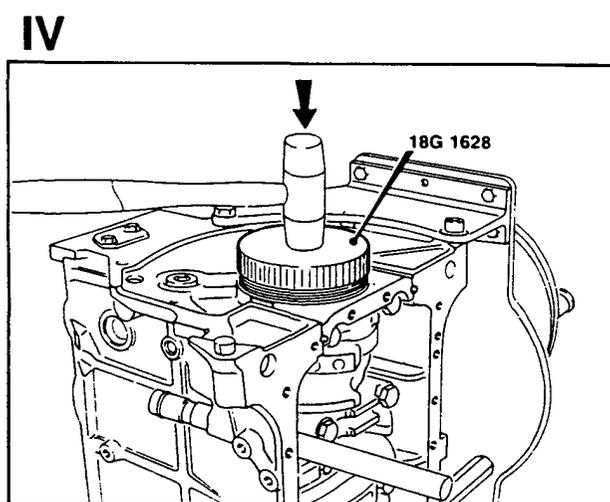
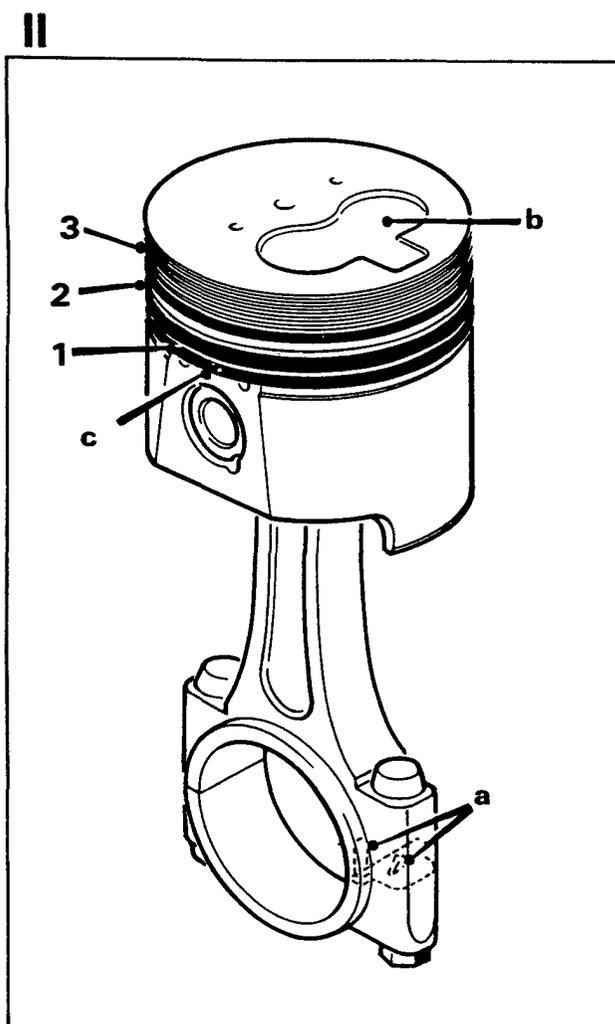
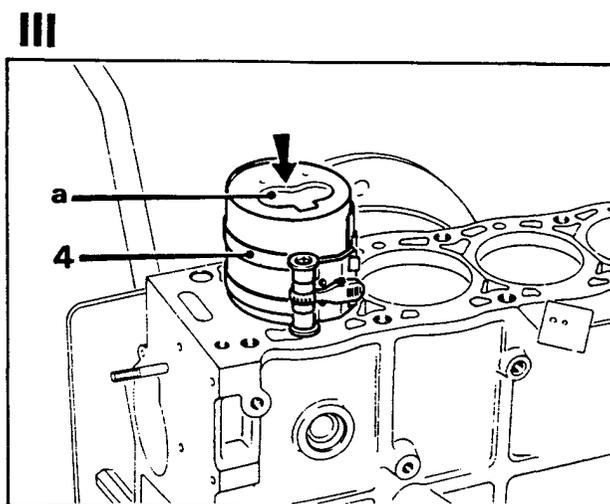
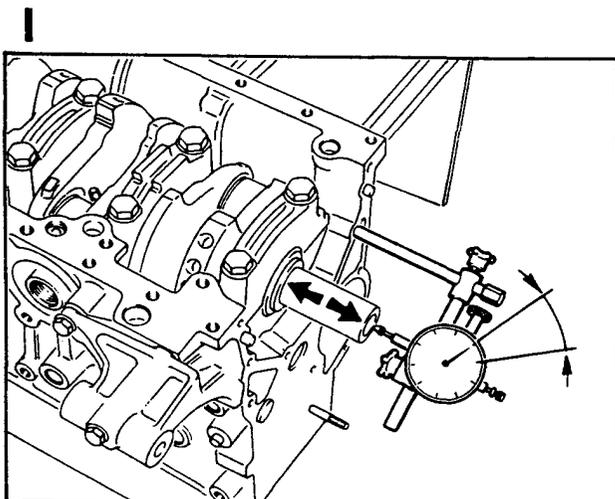
- Position a new oil seal on tool **18G 1628**.
- Fit the new seal by tapping it fully home with a mallet.
- Withdraw the tool with a twisting movement.
- Check that the visible lip of the seal is towards the outside.

V

Fitting the oil pump.

- Fit in the following order:
- The centralising dowel **(5)** to the cylinder block.
- The key **(6)**.
- The pump **(7)** /drive chain/sprocket **(8)** assembly.
- The 'L' shaped spacer at **(9)*** .

* According to engine type.



Engine - Overhaul

I

WARNING: The bolt (1) is special; it serves to centralise the pump.

- Tighten the bolts (1), (2) and (3) to 20 Nm.
- Fit the seal carrier plate with a new seal (4) and tighten the bolts to 15 Nm.
- Fit the seal using 18G 1507 and by tapping it fully home with a mallet.
- Apply silicone jointing paste at (a).
- Fit the sump using a new gasket.
- Tighten the bolts to 20 Nm.

Note: The Allen screws are fitted at front of sump.

II

Cylinder head gasket selection

- Fit a D.T.I. gauge and zero it on a surface plate.
- Turn the crankshaft and measure the protrusion of each piston at T.D.C.
- Note the maximum protrusion (d).
- Select a cylinder head gasket of suitable thickness. Protrusion (d) less than 0.77 mm, fit gasket with 2 notches.
- Protrusion (d) greater than 0.77 mm, fit gasket with 3 notches.

Note: For gasket identification, (See page).

III

Fitting the cylinder head

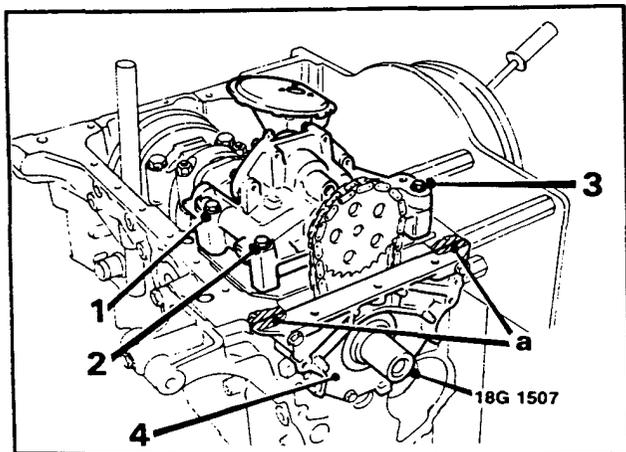
- Turn the crankshaft to position the pistons at mid stroke with the damper pulley key (6) at 9 o'clock.
- Clean the tapped holes in the cylinder block (12 x 150 thread).
- Fit:
 - The centralising dowel (7).
 - The head gasket (dry).
 - The cylinder head.
- Carefully brush the threads of the cylinder head bolts.

Important: If threads of any bolt are found to be "waisted", all ten bolts must be replaced.

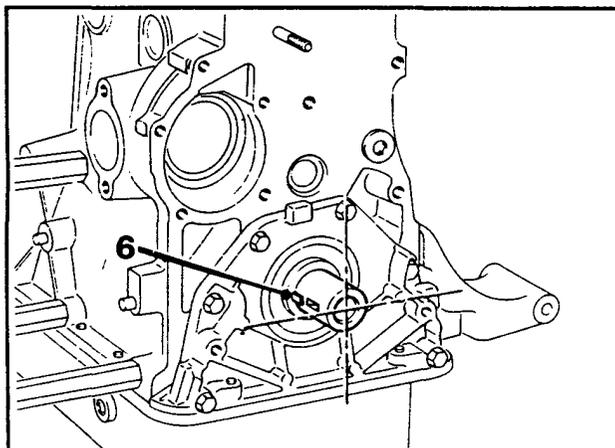
- Coat the bolt threads and the washer contact faces with Molycote G Rapid.



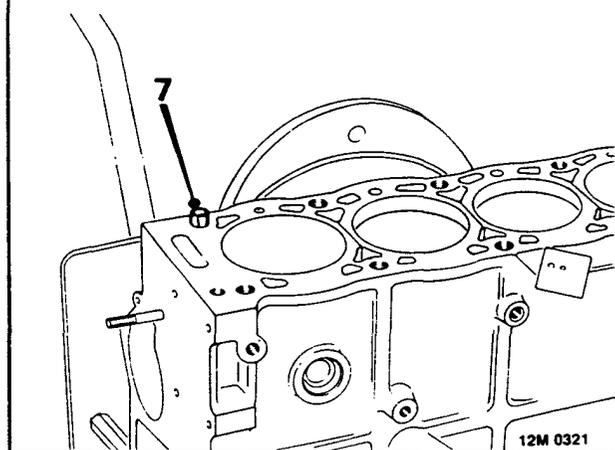
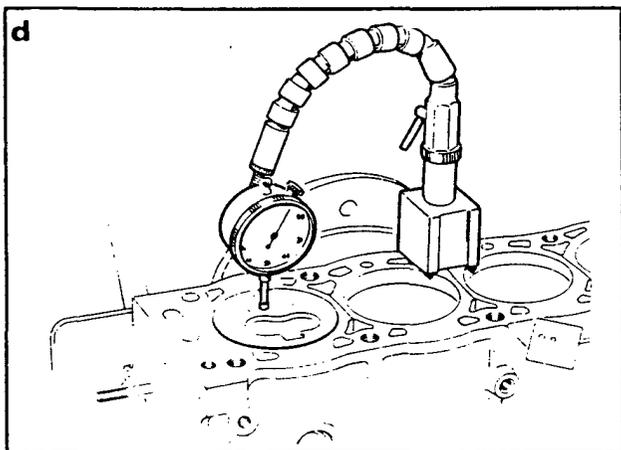
I



III



II



Engine - Overhaul

I

Cylinder head tightening

- Fit the bolts with new washers.

Note: Concave side of washers must face towards cylinder head.

- In the order shown:
- Pre - tighten to 30 Nm.
- Tighten to 70 Nm.
- Tighten a further 120° using an angular gauge.

II

Valve clearance adjustment

- Fit the camshaft gear (1).
- Running clearance
IN: 0.15 mm
EX: 0.30 mm
Tolerance: ±0.04 mm
- Valves 1 and 2 rocking - check 7 and 8
- Valves 3 and 4 rocking - check 5 and 6
- Valves 5 and 6 rocking - check 3 and 4
- Valves 7 and 8 rocking - check 1 and 2
- Note the clearances

III

- Remove:
- The camshaft gear (1) (illustration II).
- The camshaft bearing caps (2).
- The camshaft (3).
- The tappets (4).
- The basic shims (5).
- Determine the shim thickness to be fitted for each valve.
- Example

Specified clearance	0.15
Clearance measured	0.25
Difference	+ 0.10
Shim fitted	* 2.425
Shim to be fitted	2.50
Clearance obtained	0.175

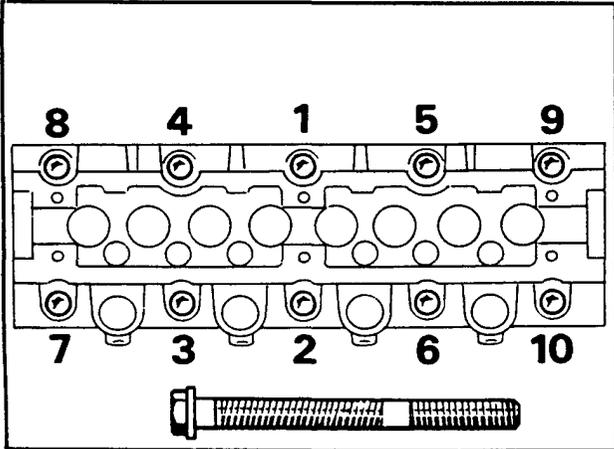
* Basic shim

IV

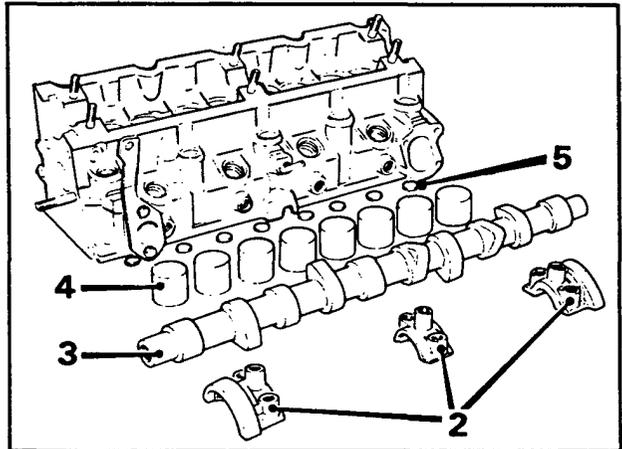
- Fit:
- The shims thus determined.
- The tappets.
- Apply:
- A thin coat of RTV sealant to each end of the bearing housing at (a).
- Molycote G Rapid to the bearing surfaces on the camshaft.
- Fit:
- The camshaft (3) with the DIST marking at the timing gear end.
- The camshaft bearing caps (2) (cast - in markings).
- Progressively tighten the bearing caps to 17.5 Nm.



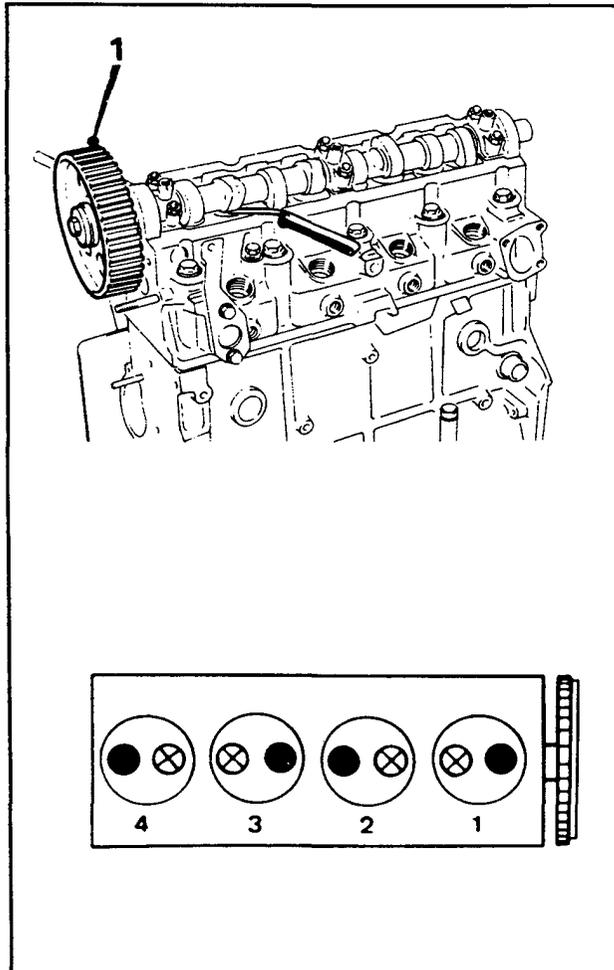
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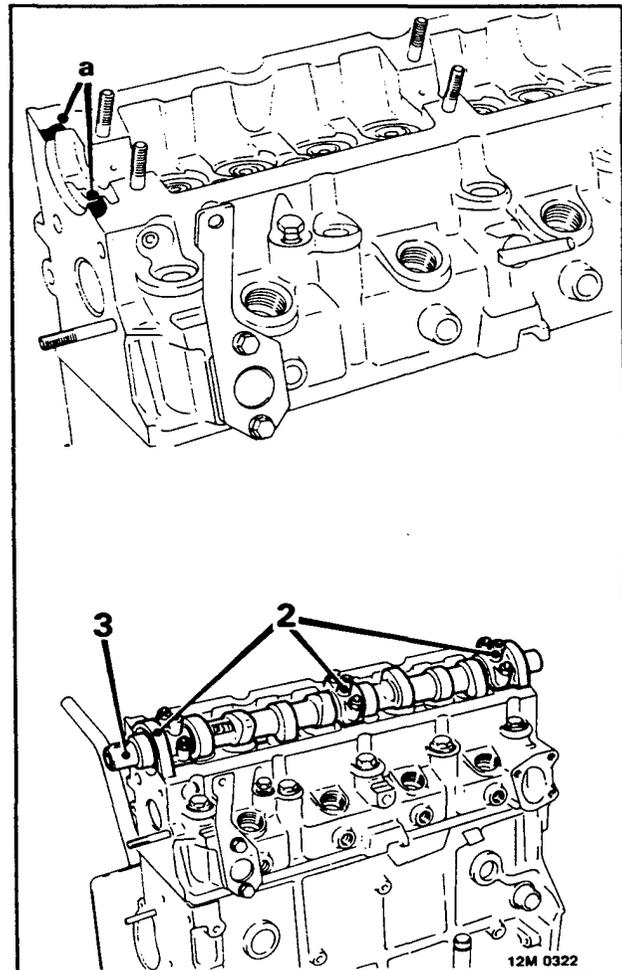
III



II



IV



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Engine - Overhaul

I

Camshaft oil seals

- Fit:
- New camshaft oil seals using tool **18G 1509**.
- Camshaft gear, restrain gear using tool **18G 1521** and tighten bolt to 40 Nm.
- Gearbox adapter plate, tighten bolts to 45 Nm.

All ancillary components as detailed in the appropriate section of the Repair Manual.

