USING THIS MANUAL

There are three main sections in this manual:

- specifications;

- dismantling the engine;

- reassembling the engine.

Consult the MR for the vehicle in question for the overhaul of units in situ.

UNITS OF MEASUREMENT

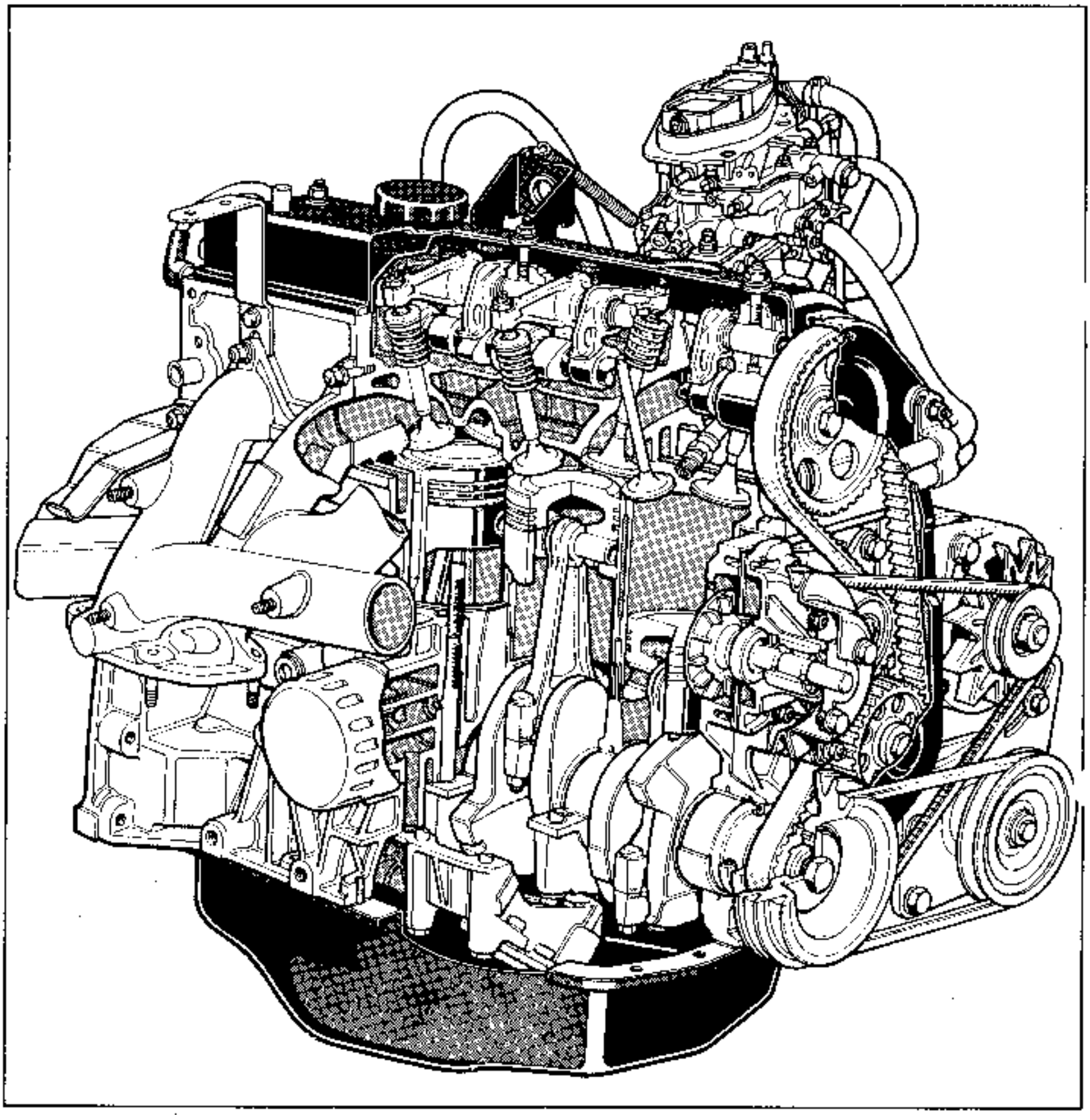
- All dimensions are given in millimetres: **mm** (unless indicated otherwise).

- Tightening torques are in Newton decameters: **daNm** (remember **1 daNm = 1.02 m.kg**).

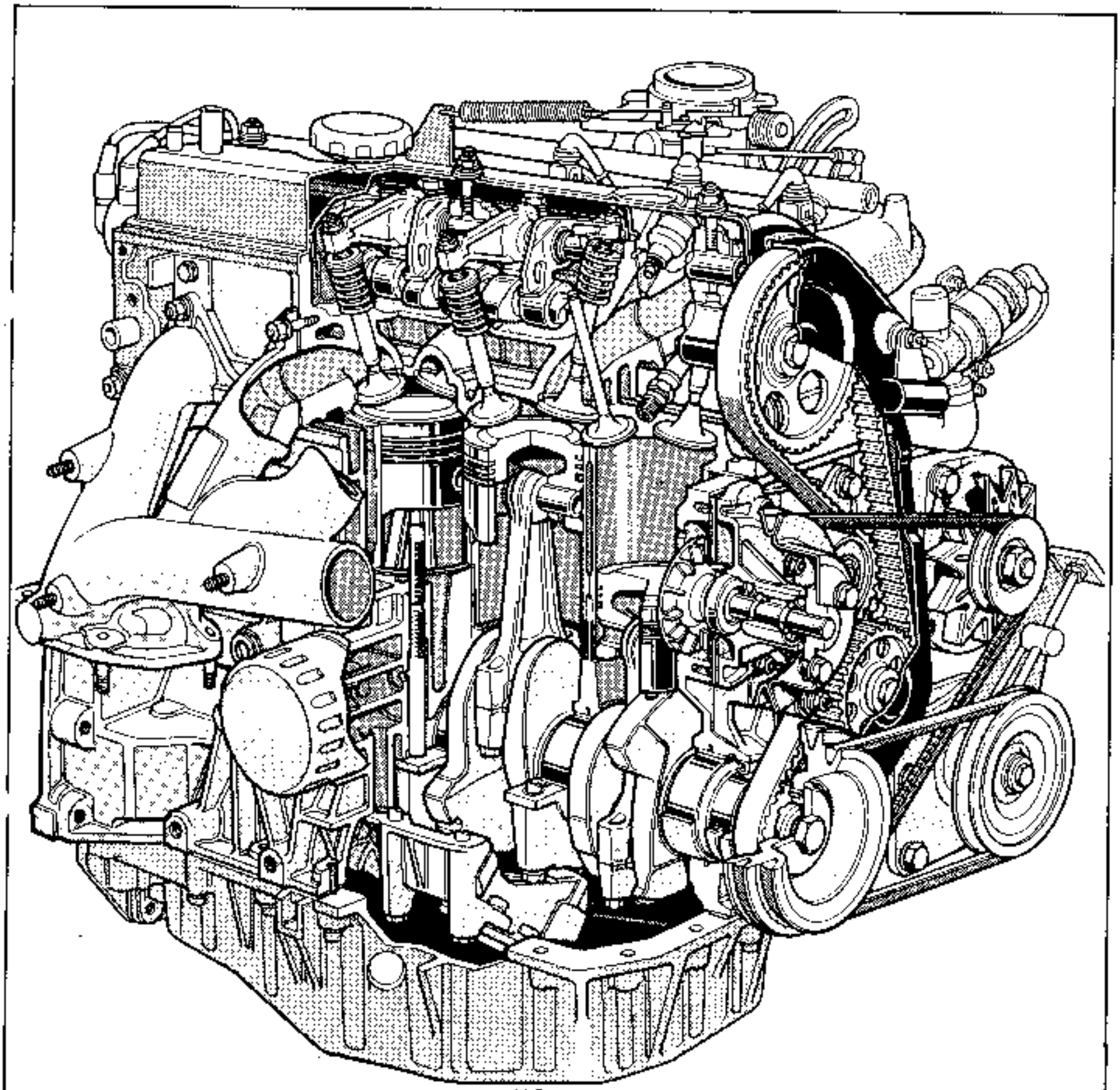
  Tightening torques with not specified tolerance are to within ± **10%**.

  Pressures are given in **bars**.

J6R ENGINE

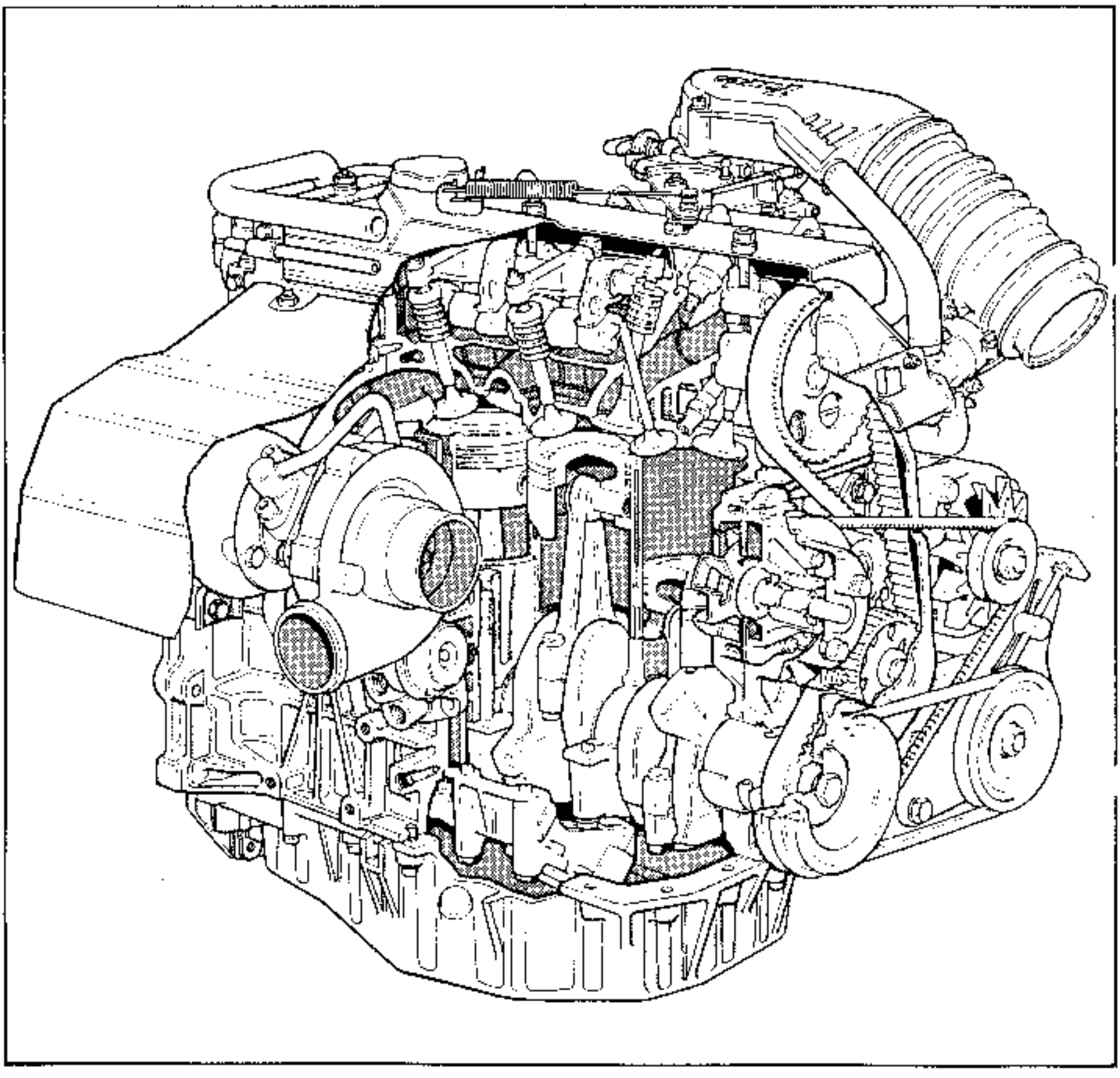


J7T and J7R ENGINES

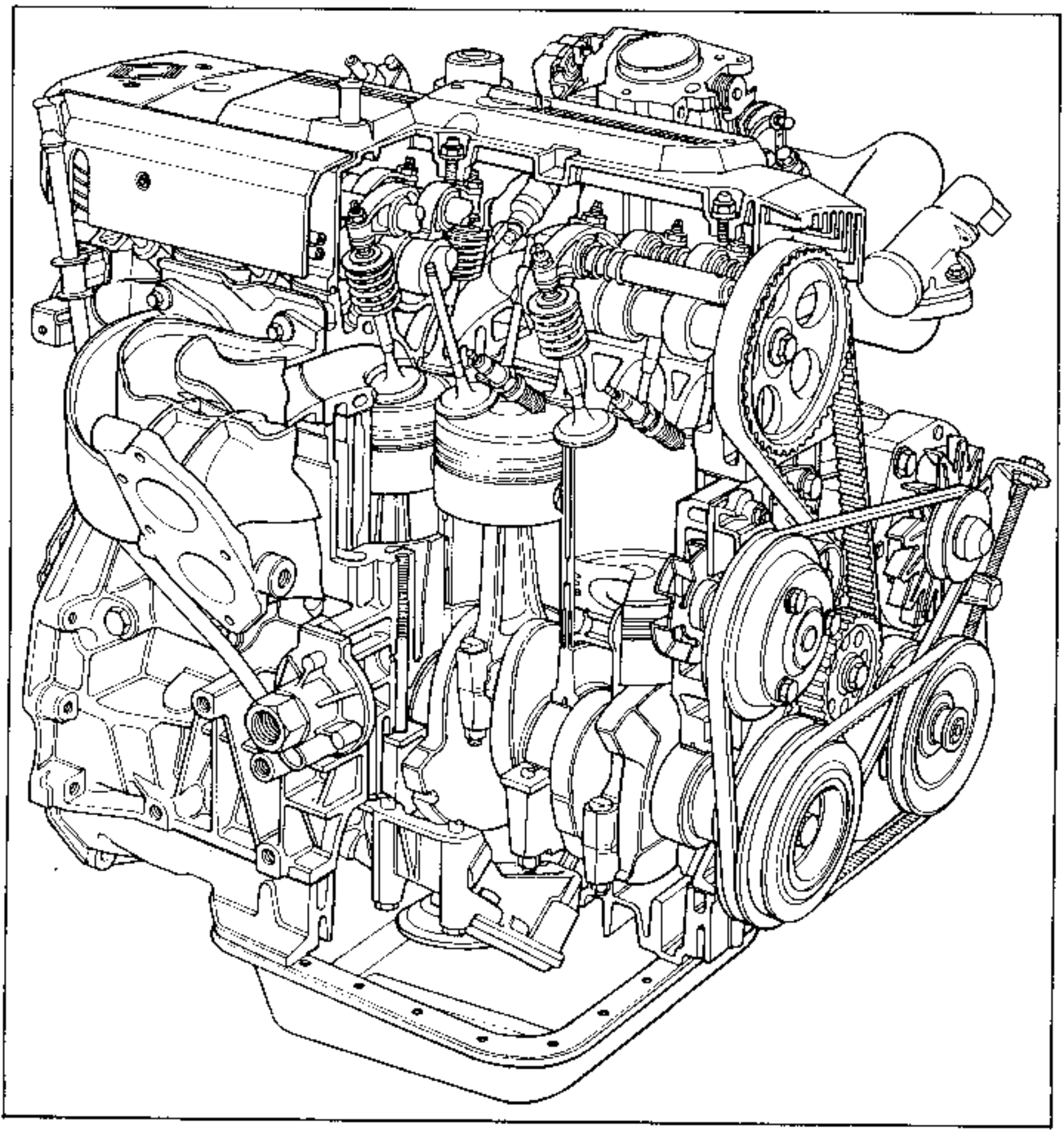


E.T.A.I France

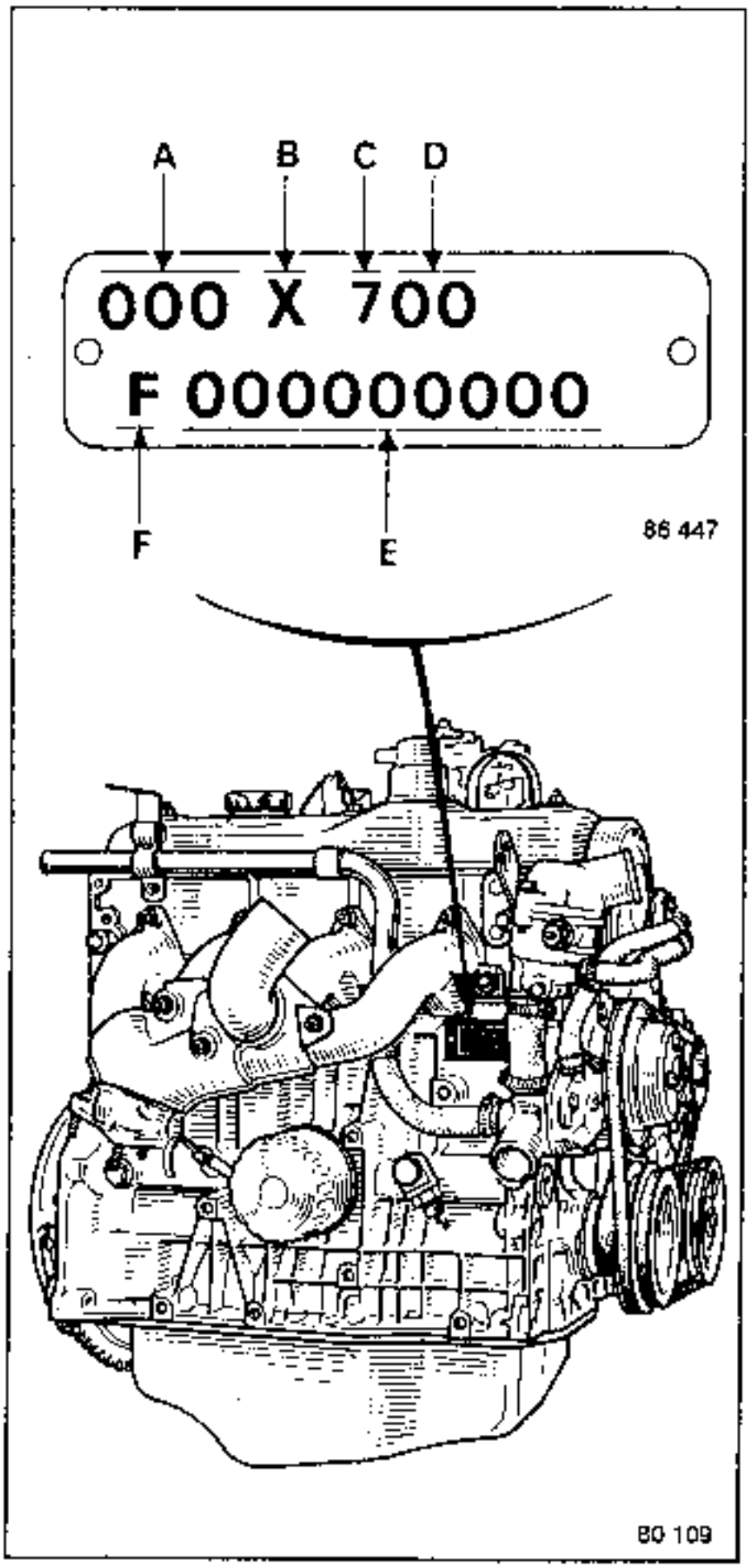
J7T TURBO ENGINE



J7R 720 12-valve ENGINE



The engine is identified by a plate rivetted to the cylinder block.



It shows:

at A:
the engine type

at B:
the engine homologation letter

at C:
the RNUR identity

at D:
the engine suffix

at E:
the engine fabrication number
(preceded by the engine suffix reminder)

at F:
the factory of assembly of the engine
F = Francaise de Mecanique

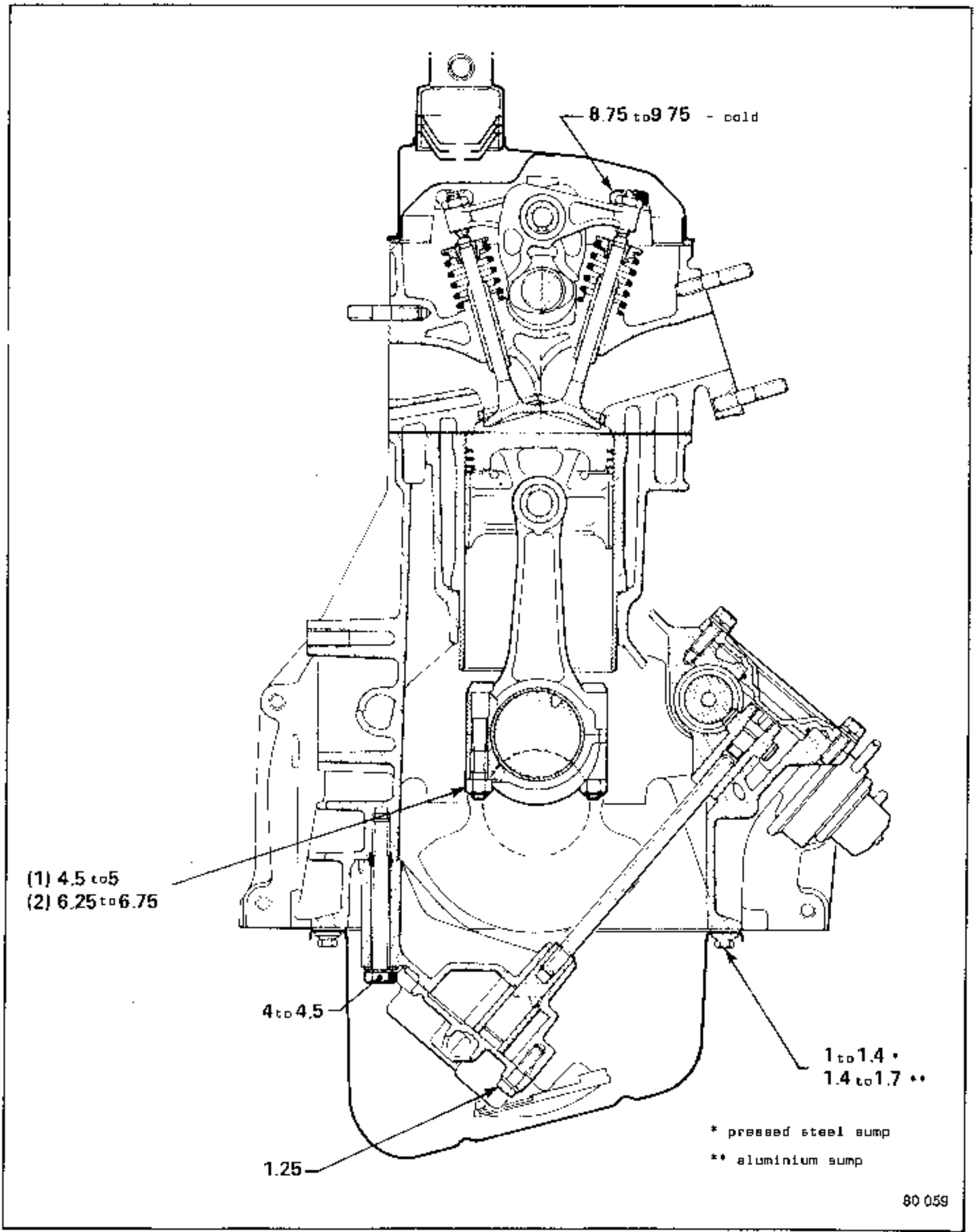
Engine	Suffix	Vehicle	C/R	Bore (mm)	Stroke (mm)	Cubic capac. (cc)	Country
829	A7-00	1272	9.2	88	82	1995	Sweden
	C7-00	1272	8				
	B7-01	1272	9.2				Sweden
	D7-01	1272	8				
	G7-02	1277	9.2				
	N7-02	1277	8				
	H7-03	1277	9.2				
	P7-03	1277	8				
	7-10	1363	9.2				
	7-20	Pxx2	9.2				
	7-30	Qxx2	8				
	7-31	Rxx2	8				
851	A7-00	1279	9.2	88	89	2165	
	B7-01	1279 BVA	9.2	88	89	2165	
J5R	7-16	Txx2	8	88	82	1995	
	7-18	Rxx2	8				
	7-26	Pxx2	8				
	7-28	Qxx2	8				
	8-00	CJ7	9.2				
J6R	2-34	J112	9.2	88	82	1995	
	2-36	J112	9.2				Switzerland
	7-04	1277	8.6				Switzerland
	7-05	1277	8.6				Switzerland
	7-06	B297	9.2				
	7-07	B297 BVA	9.2				DAI
	7-08	1277	8.6				DAI
	7-09	1277 BVA	8.6				
	7-11	1343-1353-1363 BVA	9.2				
	7-14	1343-1353-1363	8.6				Switzerland
	7-15	1343-1353-1363 BVA	8.6				Switzerland
	7-16	1343-1353	9.2				Saudi arabia
	7-26	1363	8.6				
	7-34	J112-S112	9.2				
	7-58	L489-K489-B489	8.6				Saudi arabia
	7-59	L489-K489-B489 BVA	8.6				Saudi arabia
	7-60	B297	8.6				Switzerland
	7-62	B297	8.6				DAI
	7-63	B297 BVA	8.6				DAI

BVA = Automatic transmission

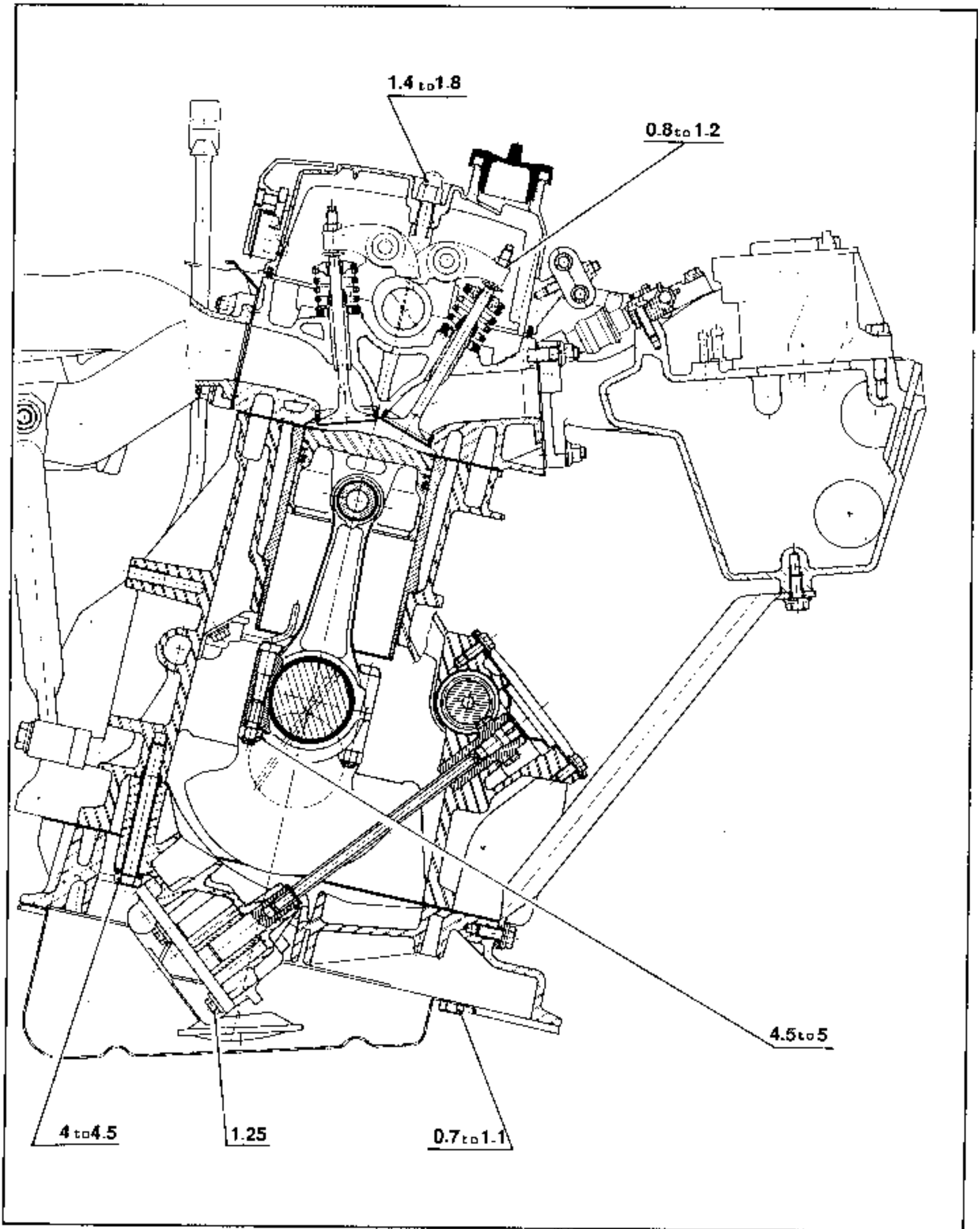
Engine	Suffix	Vehicle	C/R	Bore (mm)	Stroke (mm)	Cubic capac. (cc)	Country
J7R	7-20	B292	9.3	88	82	1995	Germany, Belgium Austria, Switzerland
	7-21	B292 BVA	9.3				
	7-22	B29H	10				
	7-23	B29H BVA	9.3				
	7-26	B294 BVA	9.3				
	7-40	B48R-L48R	9.3				Germany, Austria
	7-50	L483-K483-B483	10				
	7-51	L483-K483-B483 BVA	10				
	7-52	L485 Turbo	8				
	7-54	B48Q-L48Q	9.3				
	7-60	J116	10				
J7T	7-06	B29E	9.9	88	89	2165	Germany, Unleaded petrol
	7-07	B29E BVA	9.9				Switzerland, Austria
	7-08	B29B	8.7				
	7-14	B29E	9.9				Switzerland, Austria
	7-15	B29E BVA	9.9				
	7-18	135B-136B	8.7				
	7-19	135B-136B BVA	8.7				
	7-26	K48A-L48A	9.2				
	7-27	K48A-L48A BVA	9.2				
	7-30	B29E	9.9				
	7-31	B29E BVA	9.9				
	7-32	B29B	9.2				Germany, Austria, Switz. Australia
	7-33	B29B BVA	9.2				
	7-54	K48K-L48K-B48K	9.2				Germ., Austria, Switzer. Holland, Australia
	7-55	B48K-K48K-L48K BVA	9.2				
	7-80	TxxA-VxxA	9.2				Germ., Belgium, Switz. Sweden, Austria
	7-82	RxxA	9.2				Germ., Sweden, Switz.

BVA = Automatic transmission

(1) : 829, J5R, J6R, J7R engines
(2) : 851, J7T engines

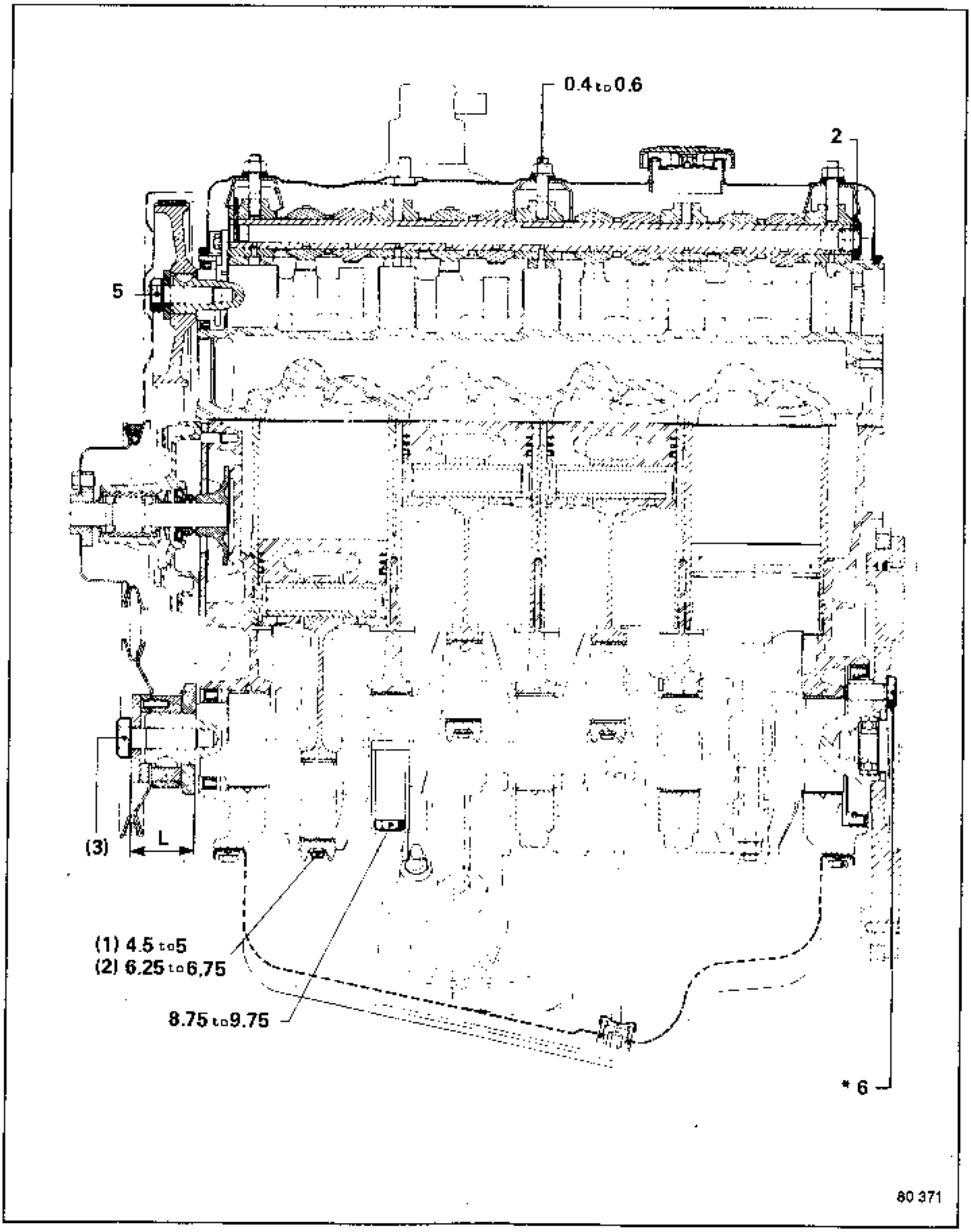


J7R 720 engine



(1) : 829, J6R, J5R, J7R engines
(2) : 851, J7T engines

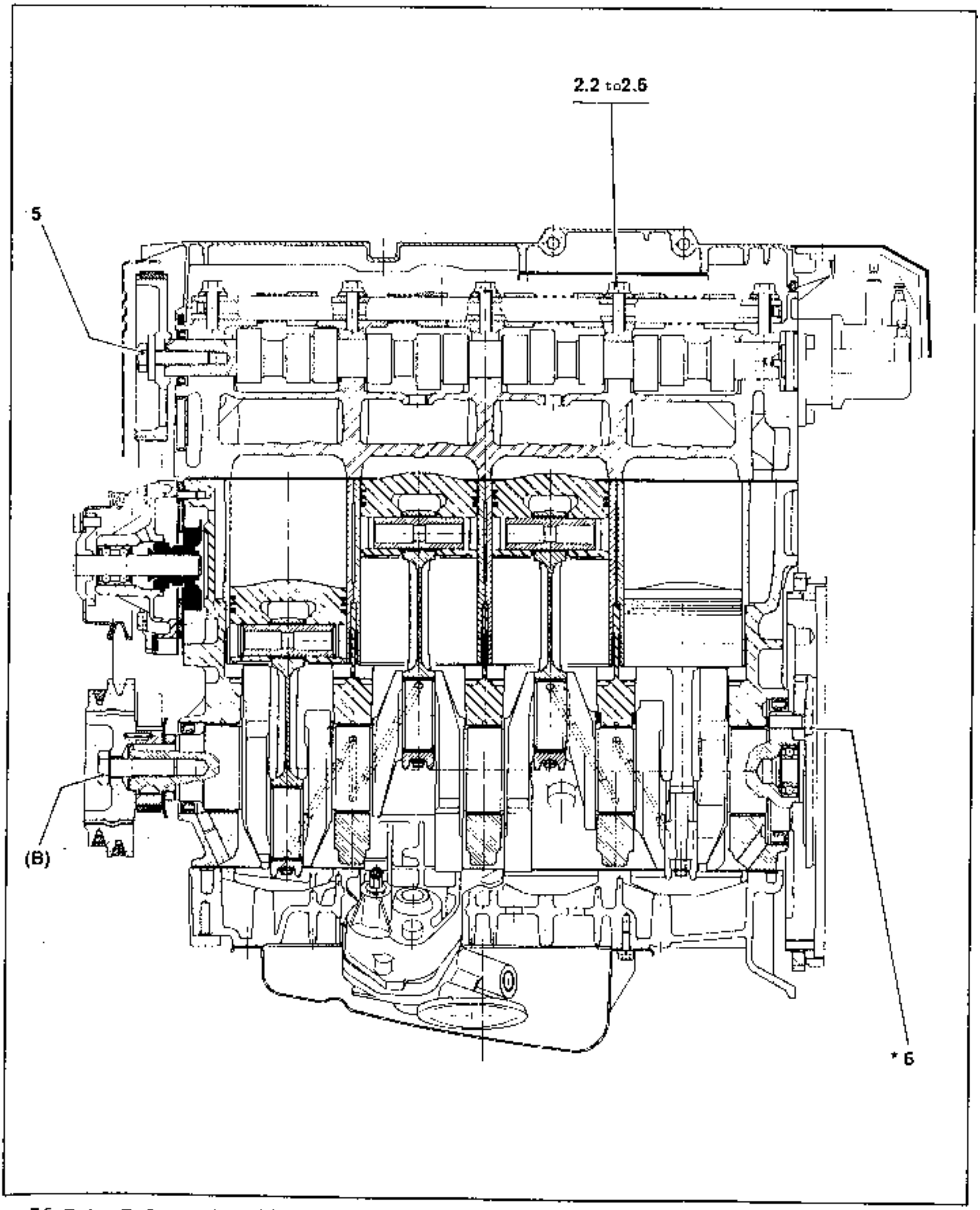
(3) : L = 45 mm tightening 7.5 to 8.5
L ≥ 55 mm tightening 12 to 13.5



* 6.5 to 7 for automatic transmission

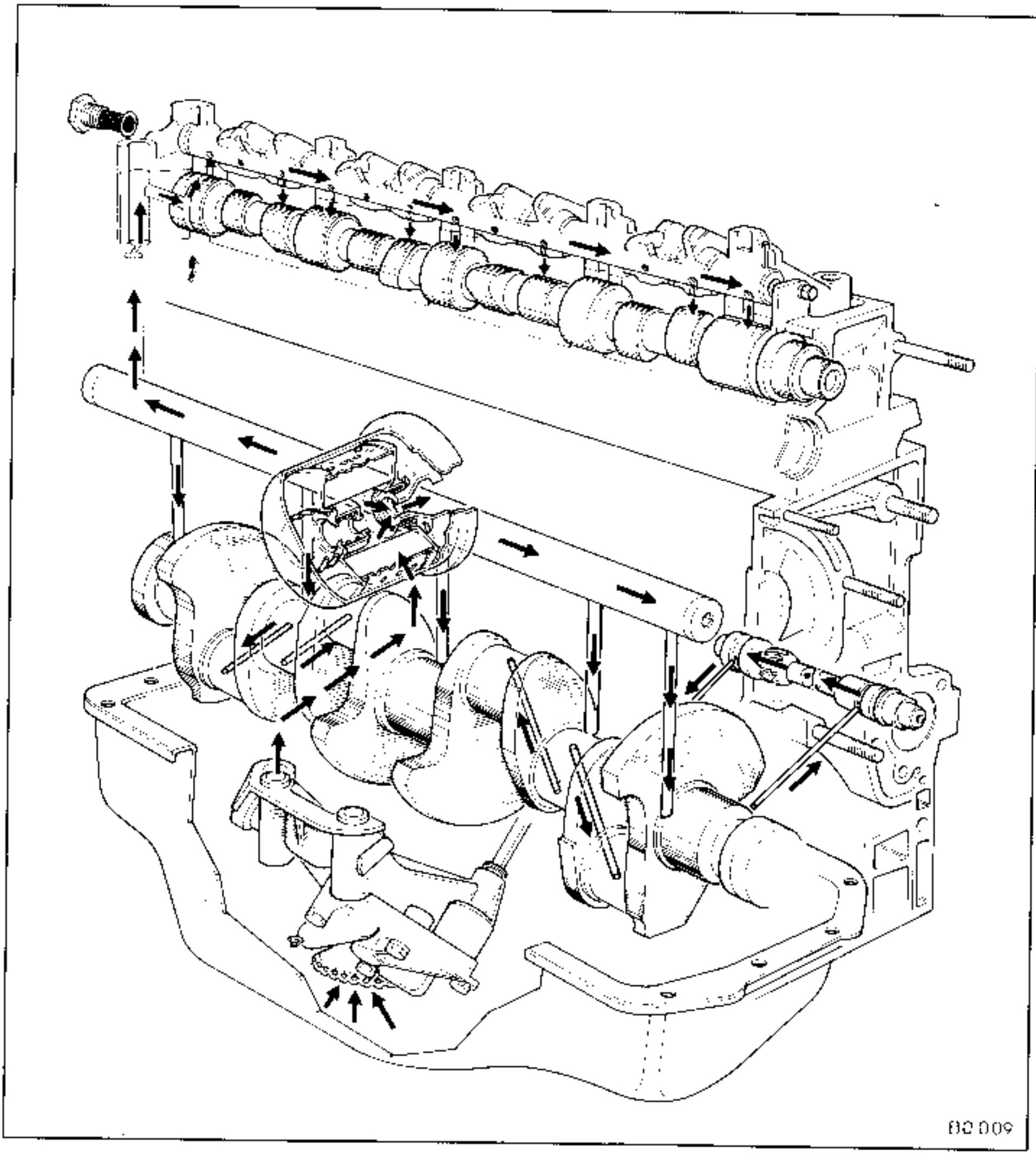
J7R 720 engine

(B) : L = 45 mm tightening 7.5 to 8.5
: L ≥ 55 mm tightening 12 to 13.5



*6.5 to 7 for automatic transmission

829, J5 R, J6R, J7R, 851, J7T engines



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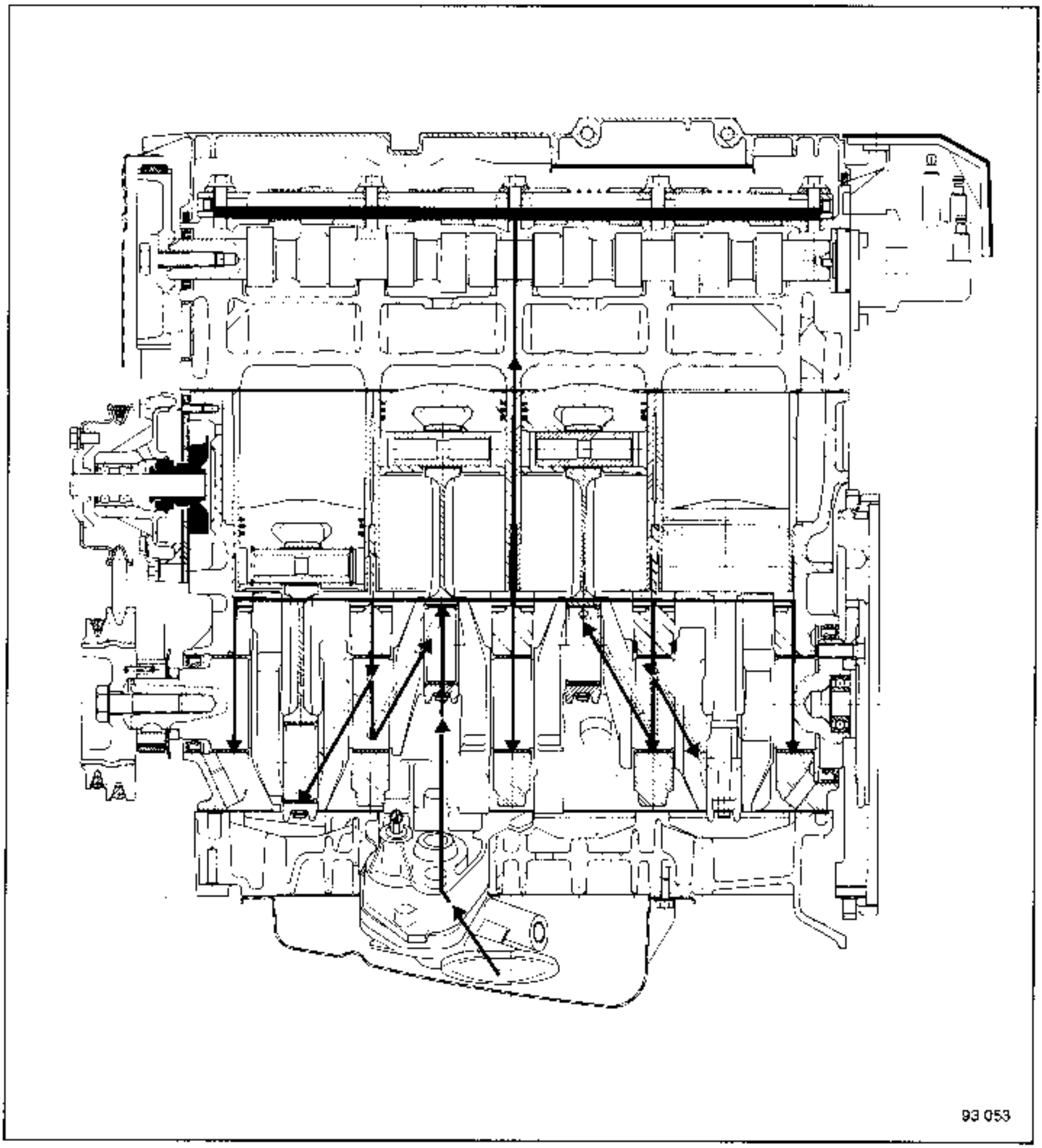
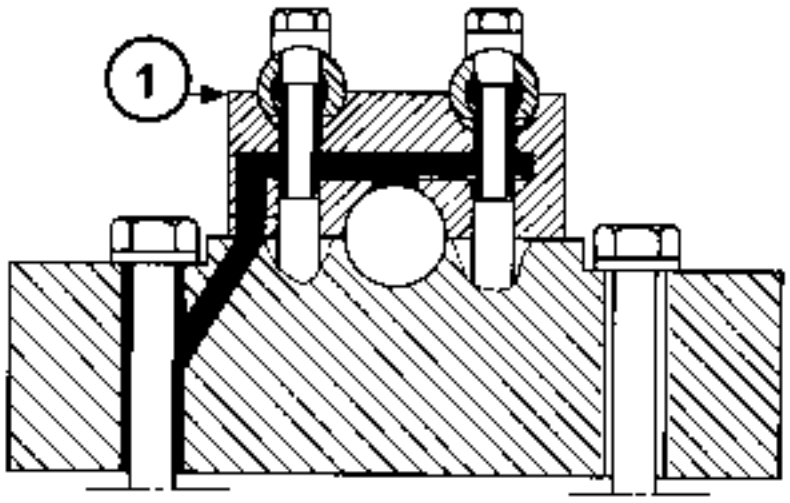
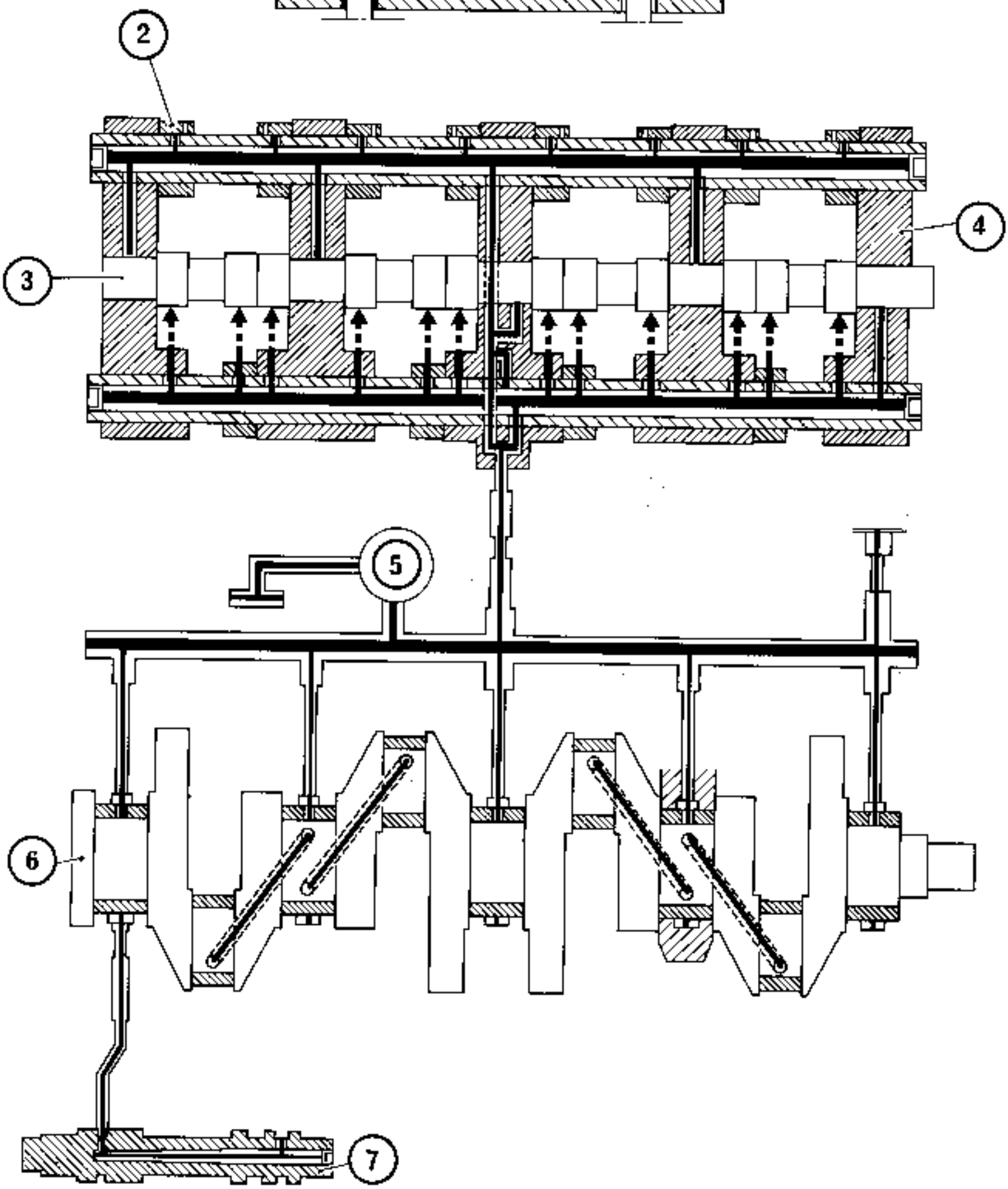
J7R 720 engine





1 : Coupe palier 3
2 : Culbuteurs
3 : Arbre à cames
4 : Culasse
5 : Sortie filtre
6 : Vilebrequin
7 : Arbre intermédiaire



93 054

CYLINDER HEAD

There is no cylinder head tightening or rocker arm clearance adjustment at the "1st inspection and checks" between 500 **and 2000 miles (1000 and 3000 km).**

The rocker arm clearance and cylinder head tightening are carried out with the engine **cold, at least 2½ hours** after the engine has been switched off.

Cylinder head bolt tightening:

- all types ..... 8.75 to 9.75 daNm

- J7R 720 engine:
  . pre-tightening to ..... 2.5 daNm
  .1st angled tightening to ..... 93°
  .2nd angled tightening to ..... 93°
  .3rd angled tightening - after engine has run for 15 minutes-to 20°

Rocker arm clearance adjustment (mm)
(See adjusting method)

Inlet valve clearance adjustment:
- 829-J5R-J6R-851 engines 0.10
- J7T-J7R engines ..... 0.10 to 0.15
- J7R 720 engine ..... 0.15 to 0.20

Exhaust valve clearance adjustment:
- 829-J5R-J6R-851 engines 0.25
- J7T-J7R-J7R 720 engines. 0.20 to 0.25

Cylinder head height (mm)
- All types 111.6
- J7R 720 engine 90.5

Gasket face bow (mm) 0.05
Cylinder head resurfacing not permitted.

Spark plugs tightening torque:
- J7R 720 engine ..... 2.4 to 3 daNm

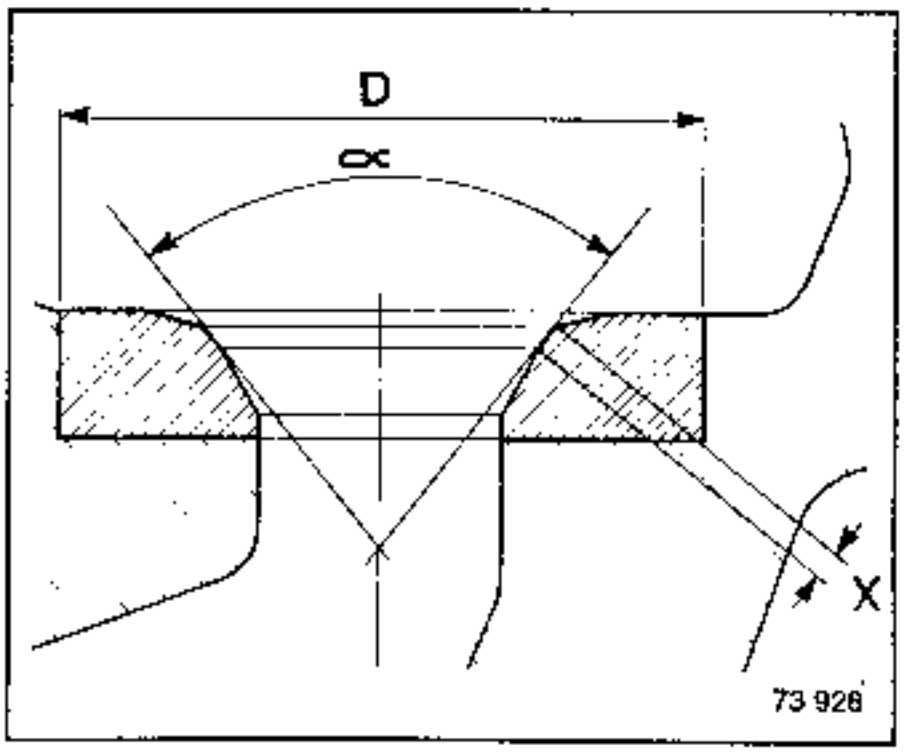
	J7R 720	829-851 J5R-J6R J7R-J7T
VALVE SEATS		
- Stem diameter (mm)	7	8
Seat angle:		
- inlet	90°	120°
- exhaust	90°	90°
Head diameter (mm)		
- inlet	36.3-30.3	44
- exhaust	40	38.5

J7R 752 ENGINE
NEUTRALISING THE SODIUM IN THE EXHAUST VALVES

Before discarding the exhaust valves, the sodium in them must be neutralised.

Procedure:
- The valves must be sawn in a dry place away from any water (do not use a wet grinder).
- Goggles must be worn to protect the eyes.
- Saw the valve stems at the valve neck.
- Prepare a container filled with water and place it outside **(approximately 10 litres of water are needed for four valves).**
- Immediately they have been sawn off, throw the cut valves into the container, taking care not to splash.
- Sodium reacts with water immediatel it comes into contact with it; sodium carbonate is produced and hydrogen given off. The sodium is completely destroyed when no more hydrogen is released (no more bubbles in the water).
- Keep the container away from all sources of ignition and do not smoke during the reaction.
- Valves which have been treated in this way may be scrapped. Waterproof gloves must be worn whilst the valves are being recovered.
- Wash the container out with copious amounts of water.
- If the sodium or water comes into contact with the skin and/or eyes, rinse immediately with copious amoun⁺ of water for 15 minutes and see medical help.

	J7R 720	829 - 851 J5R - J6R J7R - J7T
VALVE SEATS		
Seat angle α:		
- inlet	90°	120°
- exhaust	90°	90°
Seat width (mm) X:		
- inlet	1.7	1.8
- exhaust	1.7	1.6
External diameter (mm) D:		
- inlet	32-38	45
- exhaust	41	39.5



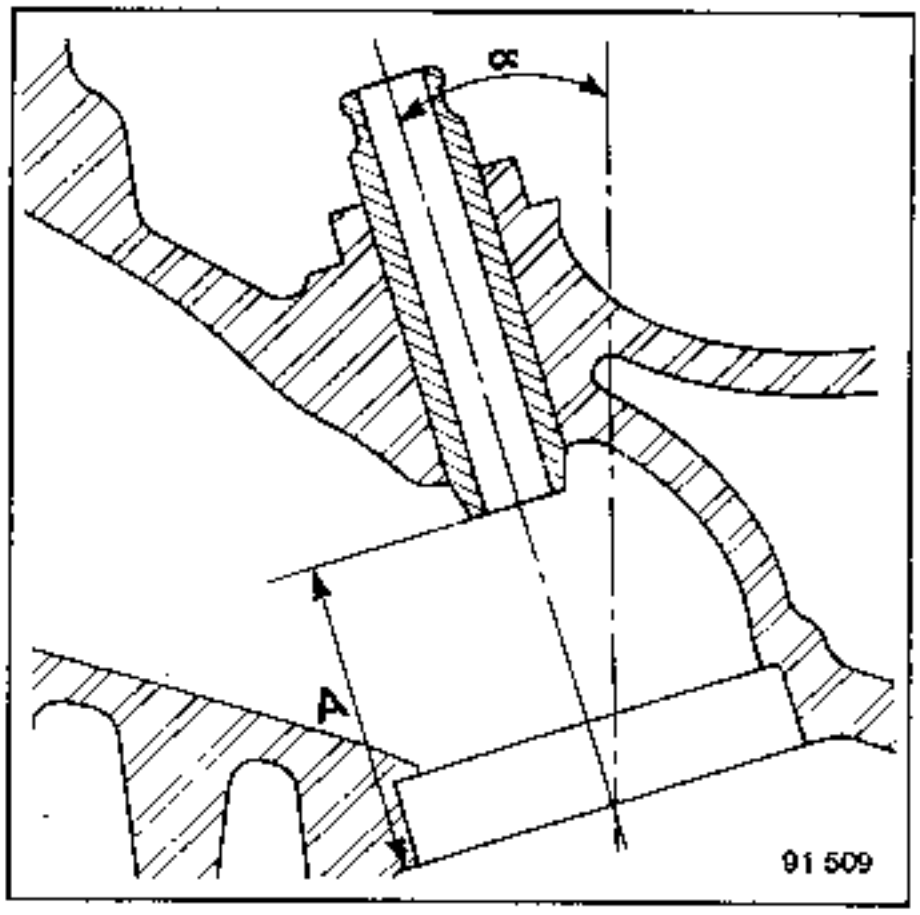
	J7R 720	All types
VALVE GUIDES		
- Bore (mm)	7	8
- Diameter of location in cylinder head (mm):		
- normal	12	13
- repair	–	13.25
- Guide diameter:		
- repair	–	13.25

The valve guides have an interference fit of 0.1 mm to ensure a correct fit.

The inlet and exhaust valve guides have oil seals on their stems.

The inlet and exhaust valve guides are inclined to:

- J7R 720 engine ..... α = 17°30'
- All types ..... α = 16°30'

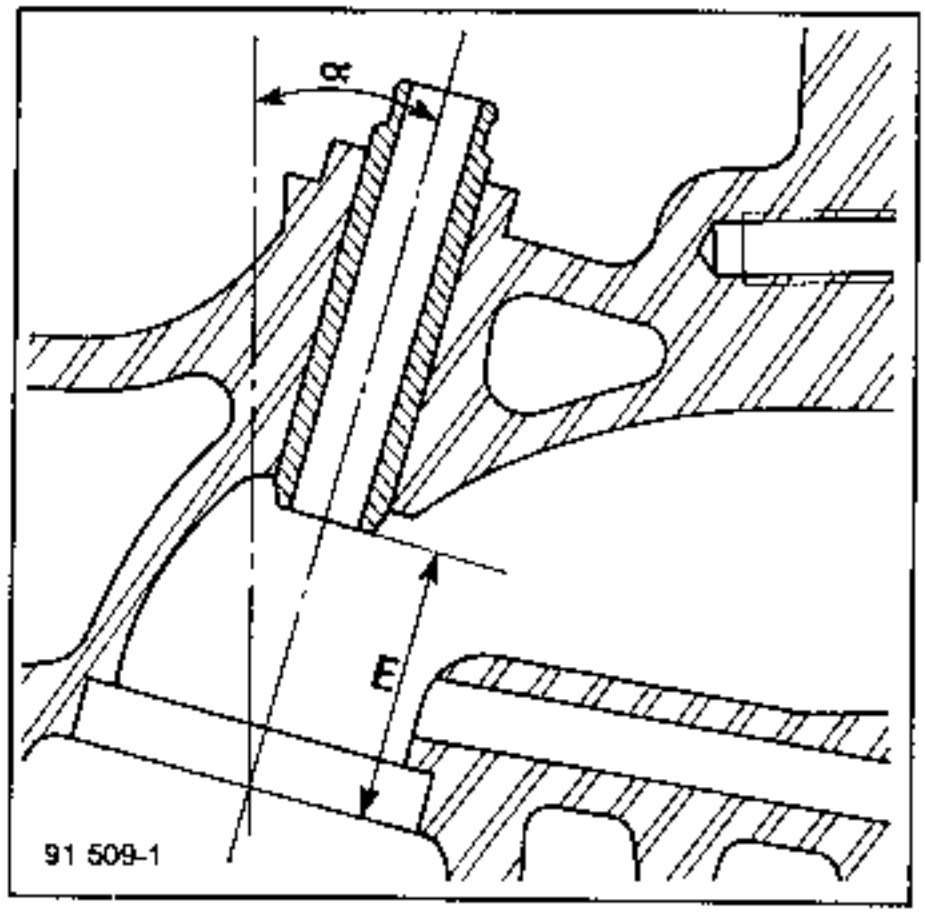


Valve guide positions in relation to their inlet seats:

- J7R 720 engine ..... A = 38.3 mm ± 0.25
- All types ..... A = 33.2 mm ± 0.25

Valve guide positions in relation to their exhaust seats:

- J7R 720 engine ..... E = 31.5 mm ± 0.25
- All types ..... E = 32 mm ± 0.25



CAM SHAFT

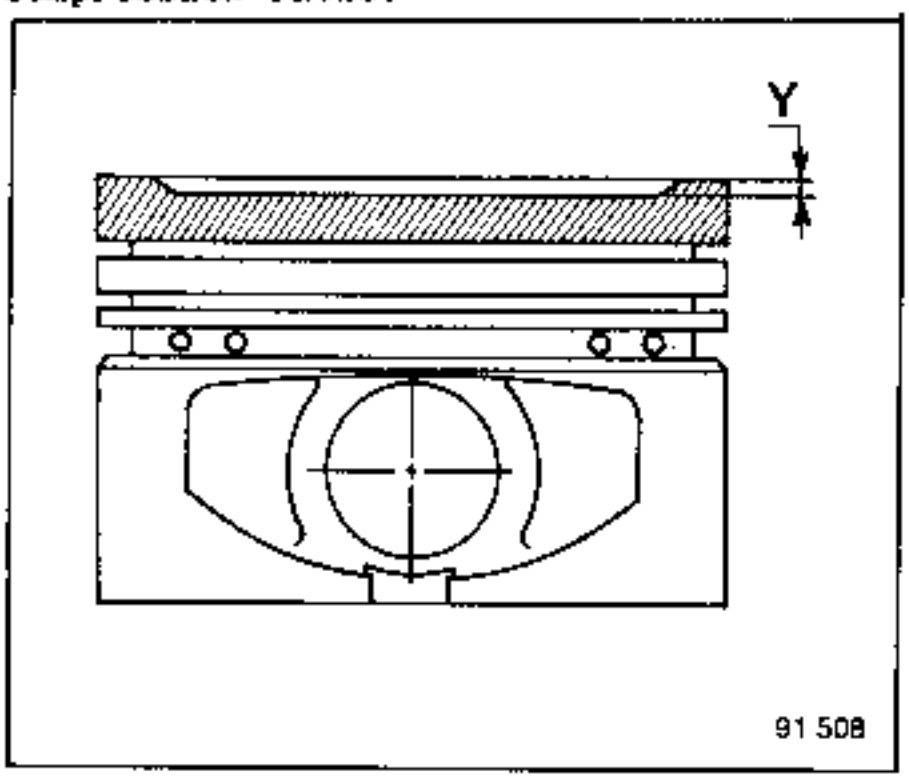
Endplay (mm):

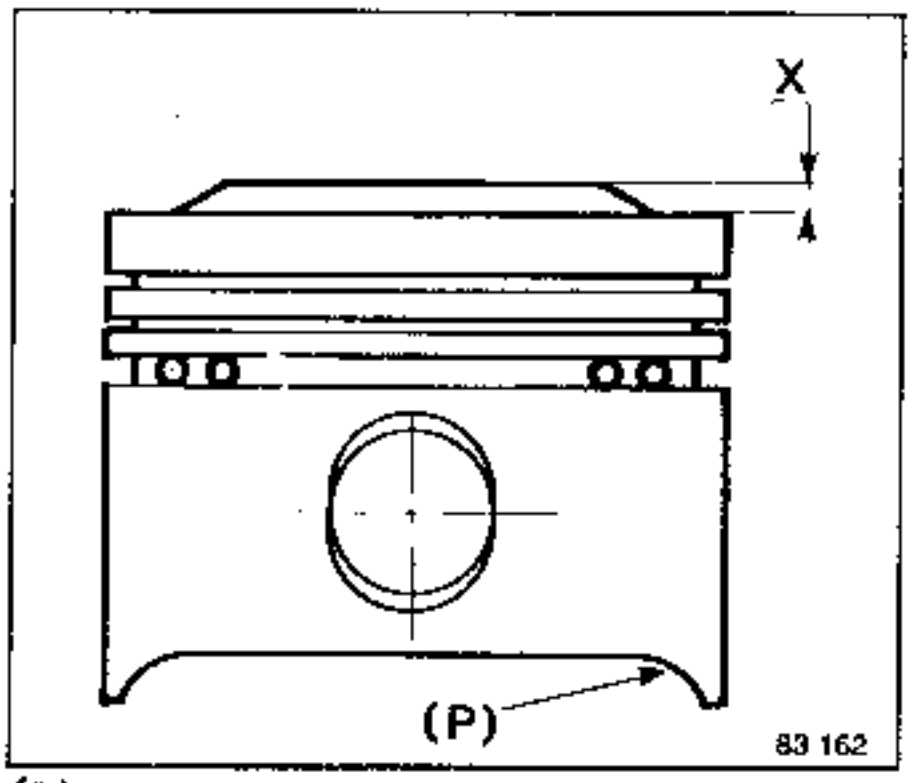
- J7R 720 engine ..... 0.10 to 0.165
- All types ..... 0.07 to 0.15

INTERMEDIATE SHAFT

- Endplay (mm) ..... 0.17 to 0.22

Dimensions **X** and **Y** indicate the compression ratio.



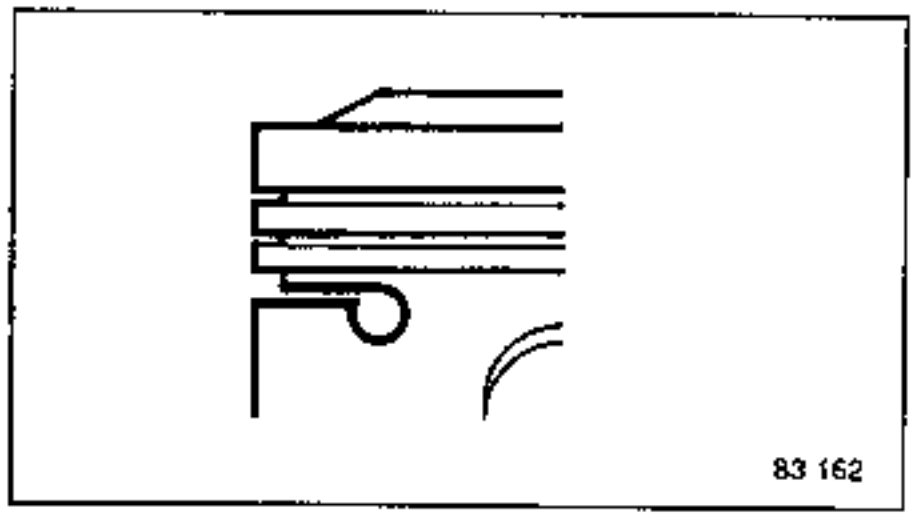


(P): Passage for piston base cooling jet on J7R 720 engine.

Only B models are supplied for the second assembly.

Model A

These pistons have oil drain slots behind the scraper ring.



Model B

These pistons have oil drain holes behind the scraper ring.

Type \ Rating	8	8,6	8.8	9.2	9,3	9.9	10
829	A Y = 1.3			A X = 1.55			
851				B X = 0			
J5R	A Y = 1.3			A X = 1.55			
J6R		B X = 0		A X = 1.55			
J7R							B X = 4.33
J7R 720					B X = 5.52		
J7R 752	B Y = 0.76						
J7T			B Y = 0.8	B X = 0		B X = 1.55	

Gudgeon pin fitting: press fit in small end and free-turning in piston.

Direction of fitting: arrow pointing towards flywheel.

GUDGEON PINS

	829-J7R J6R-J5R	851 J7T	J7R 720
- Length (mm)	75	75	65
- External diameter (mm)	23	23	23
- Bore (mm)	15	14	14

The gudgeon pins for **J7R 752** engines are fully floating.

PISTON RINGS

	J7R-720	829-851 J6R-J5R J7R-J7T
- 1 top compression - thickness (mm)	1.5	1.75
- 1 taper compression- thickness (mm)	1.75	2
- 1 scraper - thickness (mm)	3	4

Gap: supplied pre-adjusted.

CONNECTING RODS

- Small end play (mm) ..... 0.31 to 0.57

The connecting rod cap bolts must be changed at each dismantling.

1st model: 829, J6R engines

The connecting rods are not drilled for oil.

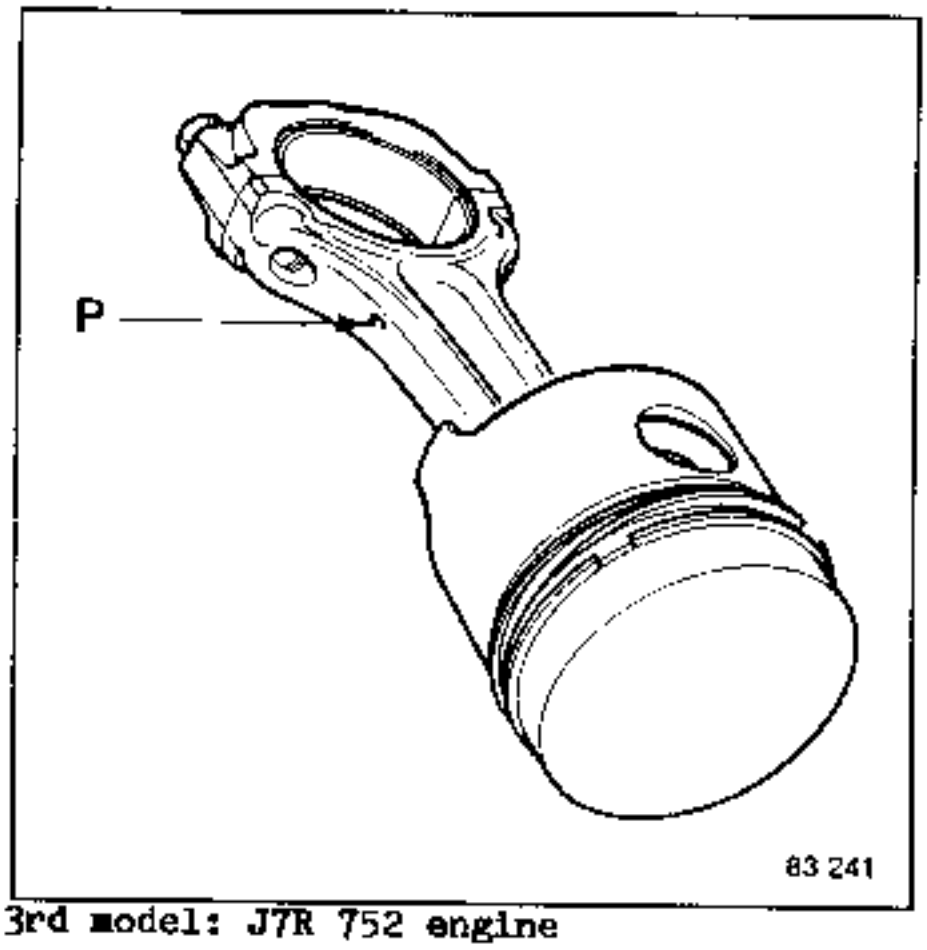
When connecting rods are changed, the Parts Department will only supply connecting rods drilled for the cooling oil jet together with a modified pump cover for correct circuit pressure.

2nd model: J5R, J6R, 851, J7T, J7R engines except J7R 752

- The connecting rods are drilled at (P) so that the cooling oil jet sprays the piston base.

- Connecting rod fitting: the oil jet hole is on the same side as the oil filter.

- Connecting rod bearing shells: The top bearing shells have an oil hole to match the hole in the connecting rod; the bottom bearing shells are plain.



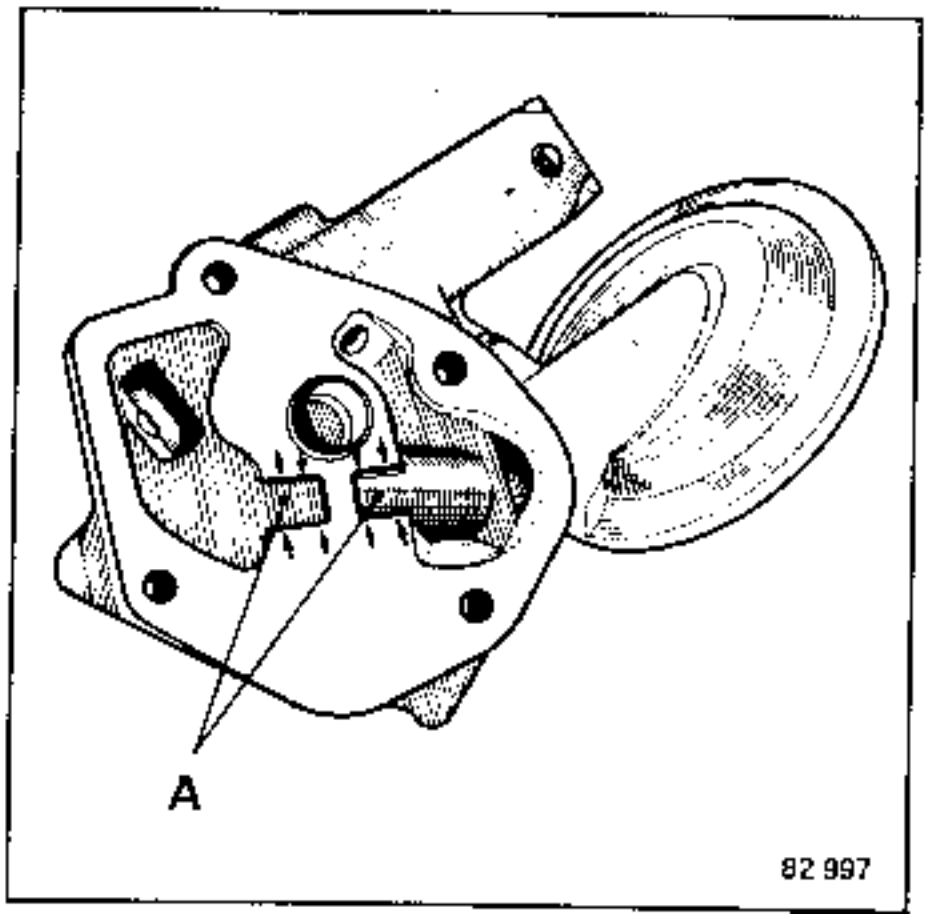
3rd model: J7R 752 engine

The connecting rods are not drilled. The Parts Department supplies connecting rods especially for this engine.

4th model: J7R 720 engine

The connecting rods are drilled at **(P)** but the bearing shells are plain.

The oil pump cover has two rectangular stamps **(A)**.

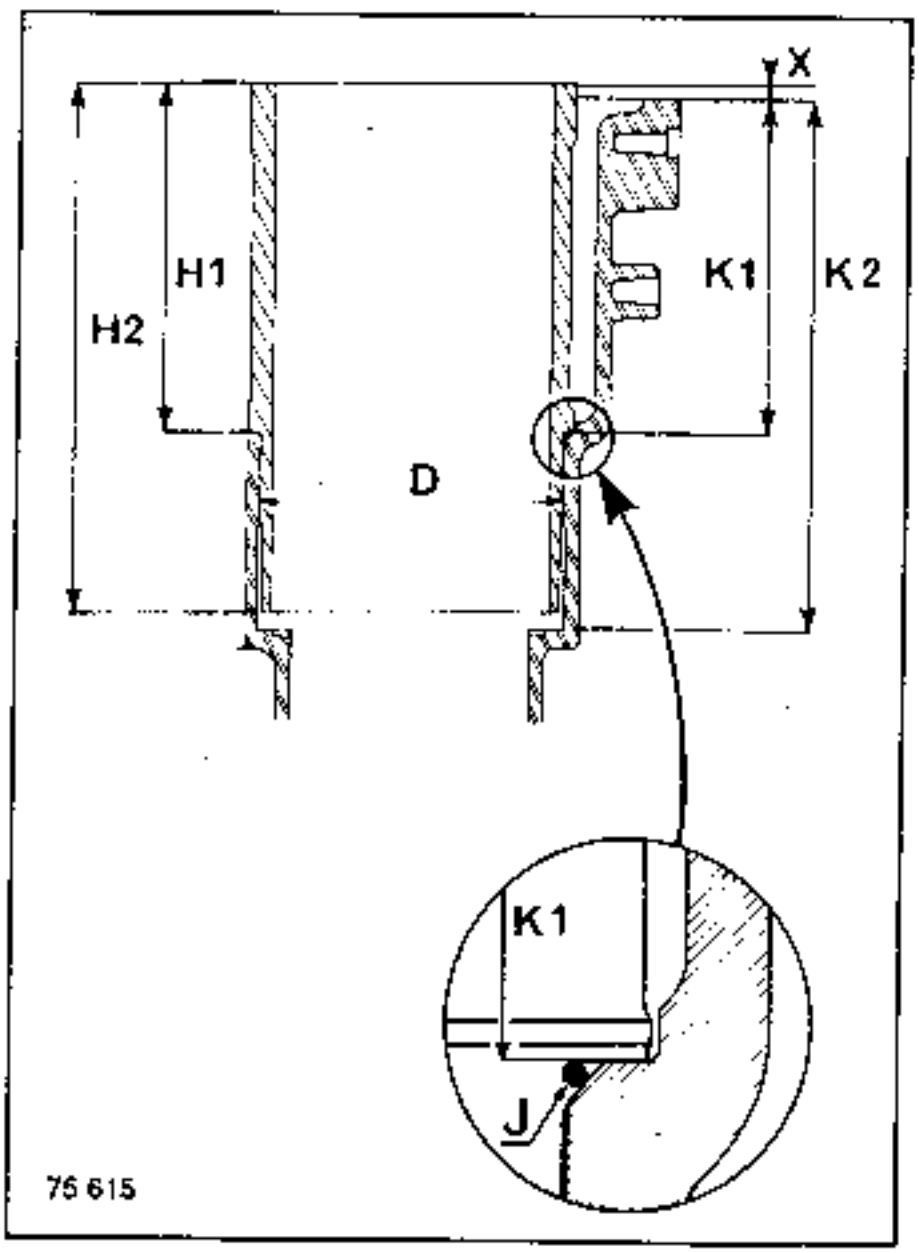


LINERS

They are of the "wet" type.

The base seal is an "O" ring (J).

	851-J7T	J7R 720 829-J7R J5R-J6R
- Liner height (H2) (mm)	148.5	143.5
- Bore (mm)	88	
- Base locating diameter (D) (mm)	93.6	
- Protrusion (X) without "O" ring (mm)	0.08 to 0.15	
- Liner height to flange (H1) (mm)	93.065 to 93.095	
- Cylinder block depth (K1) (mm)	92.945 to 92.985	
- Cylinder block depth (K2) (mm)	149.25 to 149.75	



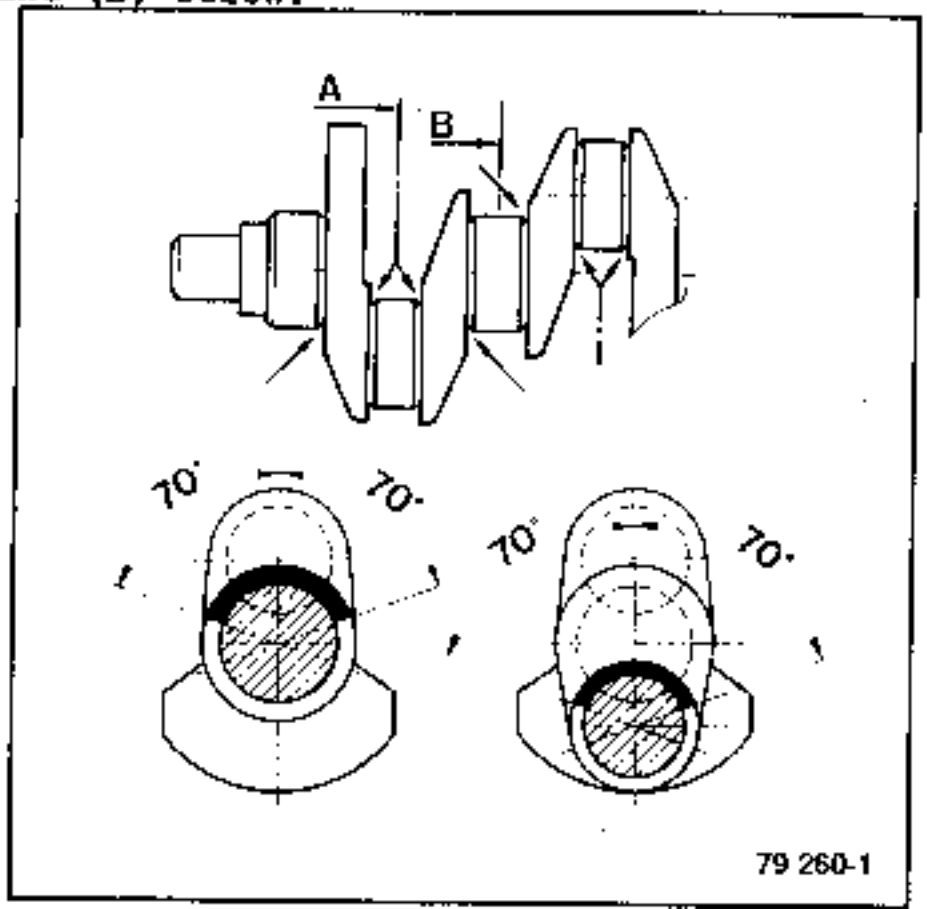
CRANKSHAFT

	J7R 720 829-J7R J5R-J6R	851-J7T
Number of bearings	5	
Roll-hardened main bearing journals:		
- Nominal diameter (mm)	62.88	
- Regrind diameter (mm)	62.63	
- Grinding tolerance (mm)	0 - 0.019	
Roll-hardened crankpins:		
- Nominal diameter (mm)	52.296	56.296
- Regrind diameter (mm)	- 0.25	
- Grinding tolerance	- 0.01 - 0.029	
End play (mm)	0.07 to 0.25	0.13 to 0.30

Thrust washers of different thicknesses are available.

After regrinding, the roll-hardened zone must still remain intact over the 140° zone shown by the arrows.

These zones may be seen at sections (A) and (B) below.



LUBRICATION

Oil pump

Minimum oil pressure at 80°C

- at idling ..... **min. 8 bars**
- J7R 752 engine at idling .. **min. 1 bar**
- J7R 750 engine at idling **min.1.25 bars**
- at 3000 rpm ..... **min. 3 bars**

COMPONENTS TO BE CHANGED AFTER EACH DISMANTLING

- Flywheel securing bolts.
- Converter drive plate securing bolts.
- Flywheel bolt lockplate (if fitted).
- Connecting rod cap nuts.
- Rocker shaft oil filter.

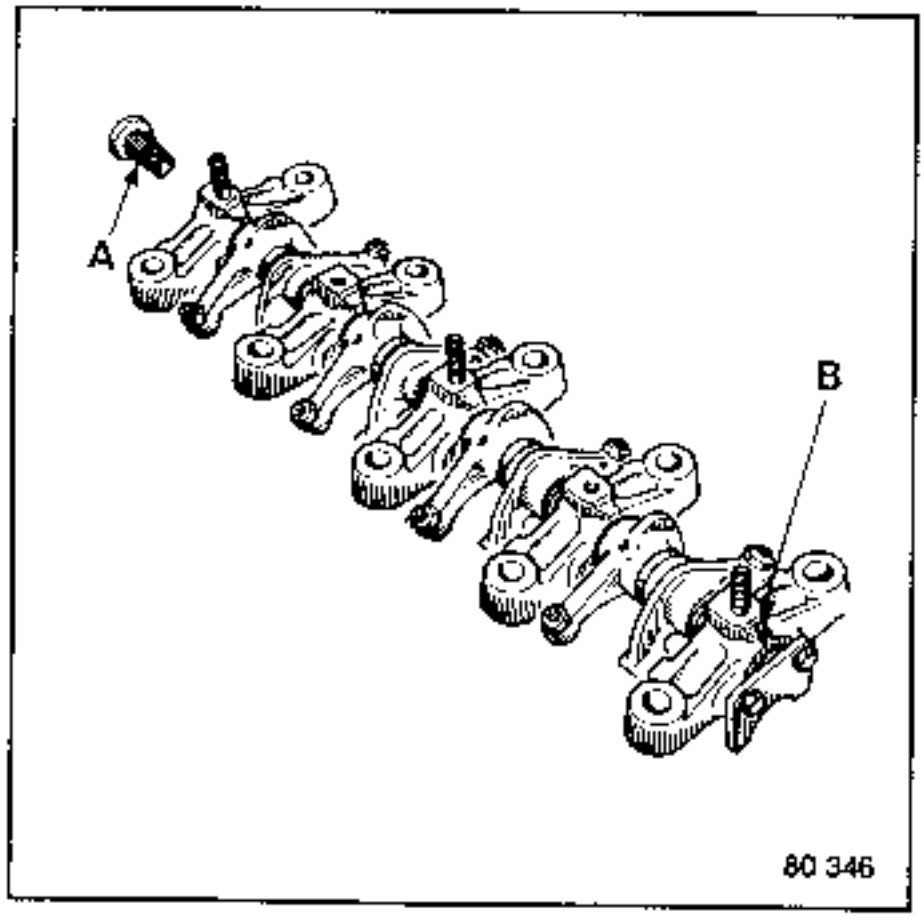
ROCKER SHAFT ASSEMBLY

Whenever an operation is being performed as a result of metal particles having been found in the oil, for example when there have been:

- worn big-end or main bearing shells;
- seized components;

it is essential that the following be replaced (all types except J7R 720):

- **oil filter (A)** at the end of the rocker shaft. If the rocker shaft is held in position with a **hollow rollpin (B), this must be replaced** by a solid pin **before** the rocker shaft plug is removed (to **prevent** possible shearing when the oil filter is changed);
- the main engine oil filter (clamp tool **Mot. 445**);
- the engine oil.



For J7R 720 engine:

- change the oil filter;
- change the lubricating oil;
- blow compressed air through the oil inlet and outlet holes.

TIMING SPROCKETS FOR TOOTHED BELT DRIVE

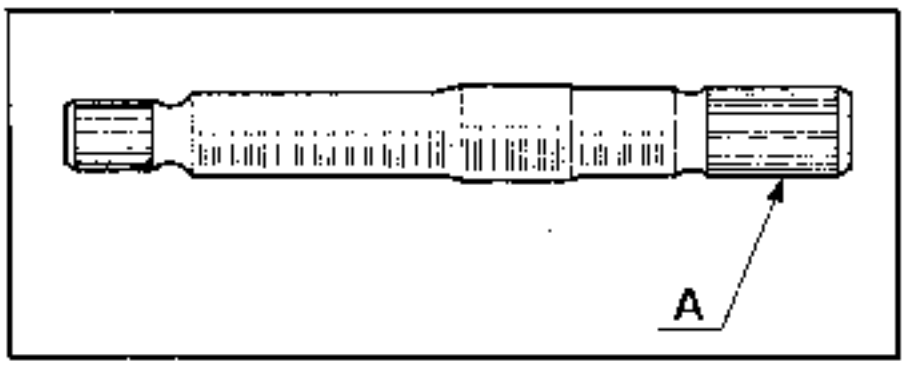
These sprockets, made of sintered steel, are very fragile.

They must be dismantled with care. Any burrs, caused by an extractor, for example, must be removed with a fine file.

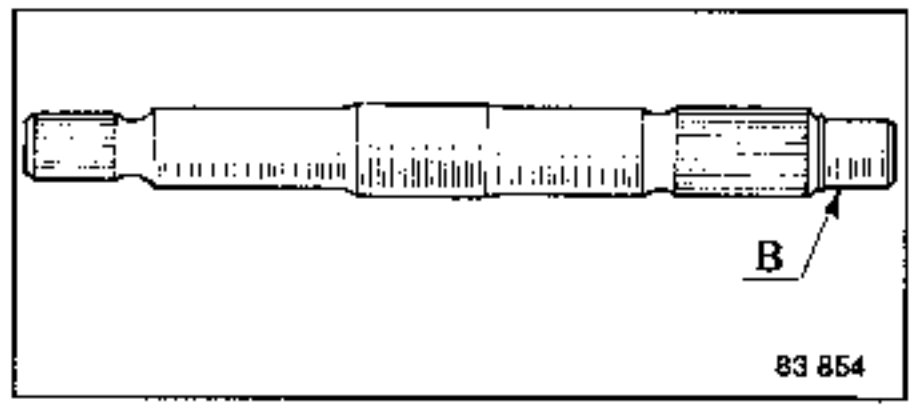
CLUTCH SHAFT CENTRE BEARING

Standard Service Exchange gearboxes may be supplied with either a short shaft **(A)** or a long shaft **(B)**:

- for a gearbox **with** a bearing in the clutch housing use a short shaft **(A)**.



- For a gearbox **without** a bearing in the clutch housing, use a long clutch shaft **(B)** (with spigot for flywheel).



1. If the gearbox has a long shaft (B), then the mating crankshaft must have a spigot bearing. If the flywheel bolts are not held by a lockplate then the spigot bearing must be bonded with **Loctite FRENBLOC.**

2. If the gearbox has a short shaft, the spigot bearing in the crankshaft must be removed.

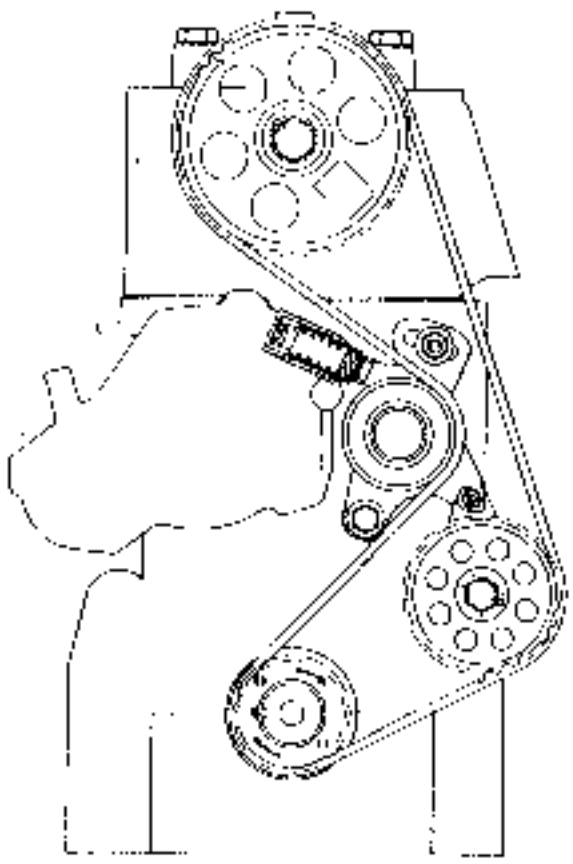
FITTING THREAD INSERTS

Threaded holes in all engine components may be restored by using thread inserts.

Use BRENCO end pieces to restore spark plug hole threads.

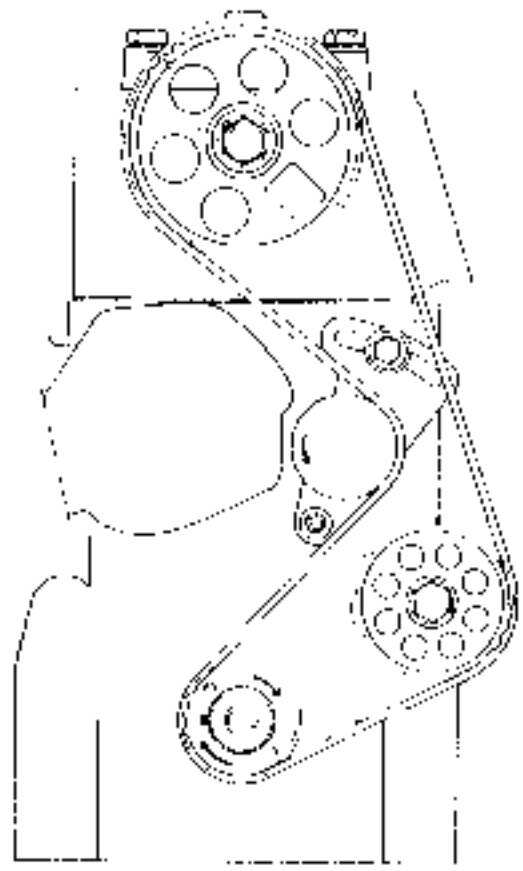
Development of the assembly for the toothed timing belt

1st type of assembly



93 147

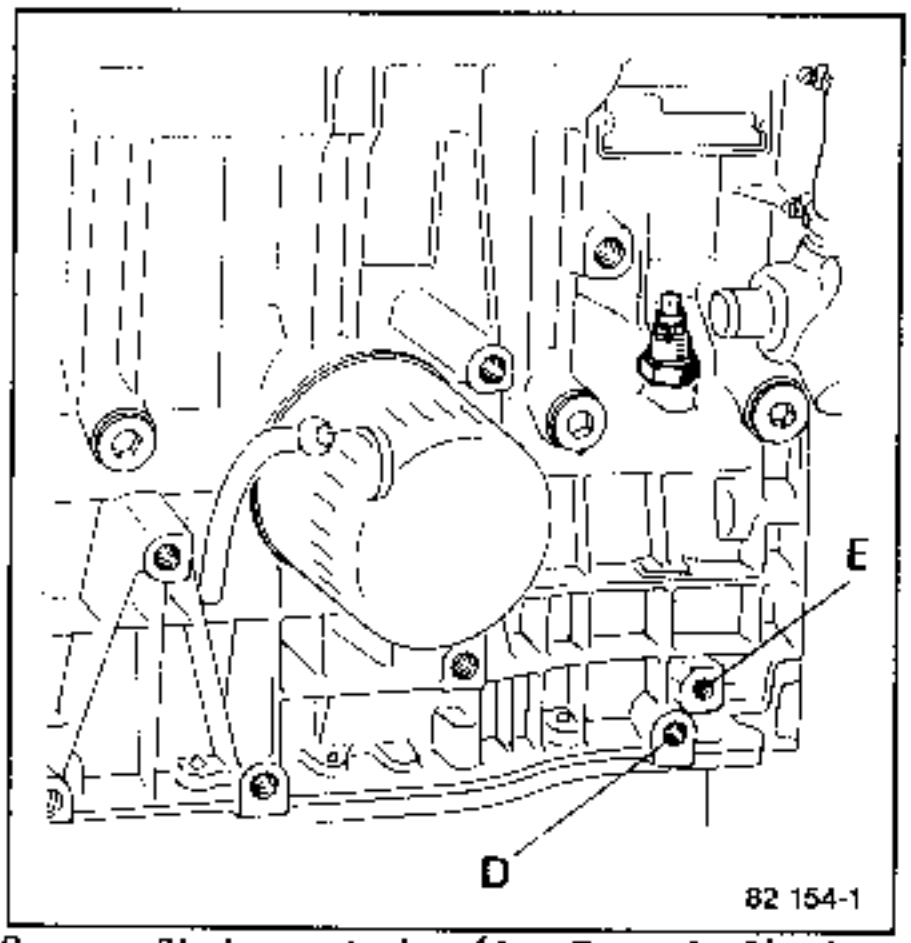
2nd type of assembly



93 146

FITTING THE ENGINE TO STAND Mot.792-01

The hole for stud (B) previously at (D) has been moved to (E).

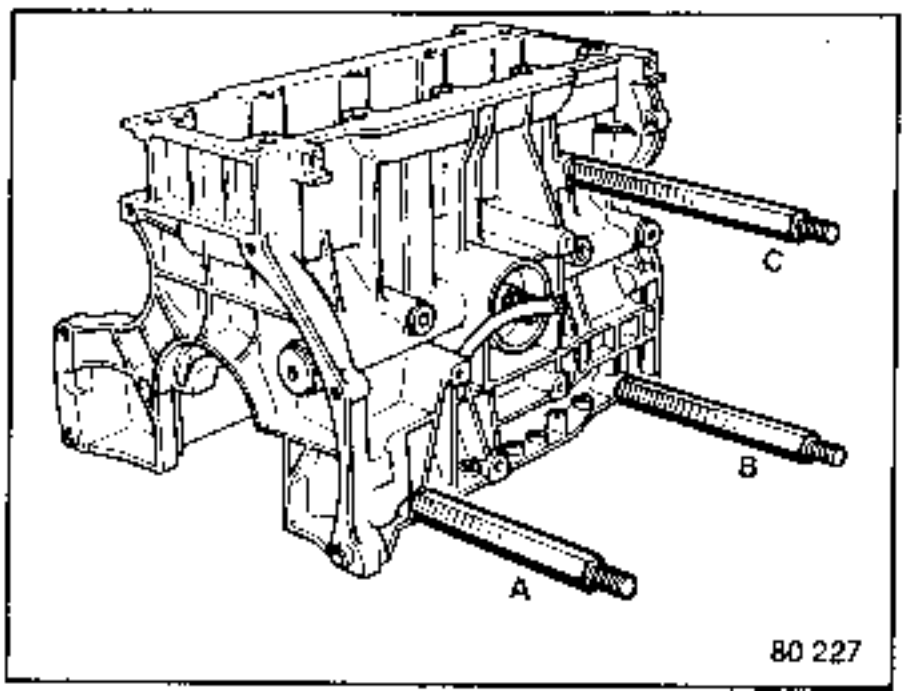


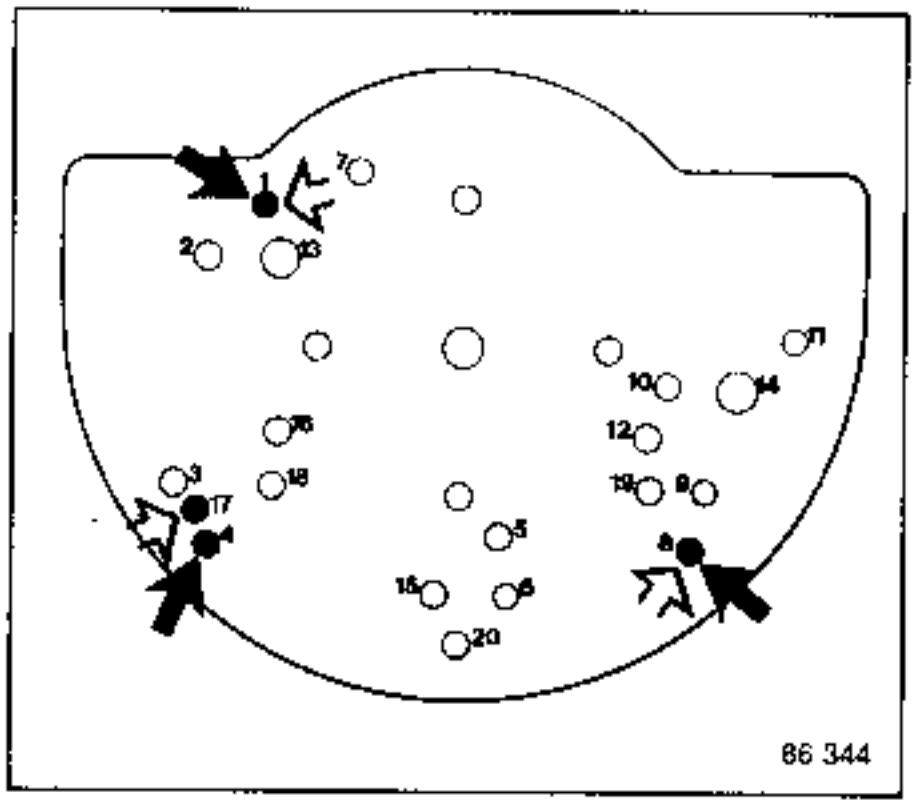
Screw fixing studs (A, B and C) into their appropriate holes in the cylinder block.

If the engine is fitted with a spacer between the cylinder block and engine mounting, insert it between the block and stud (A).

1st model: stud (B) inserted in hole (D)

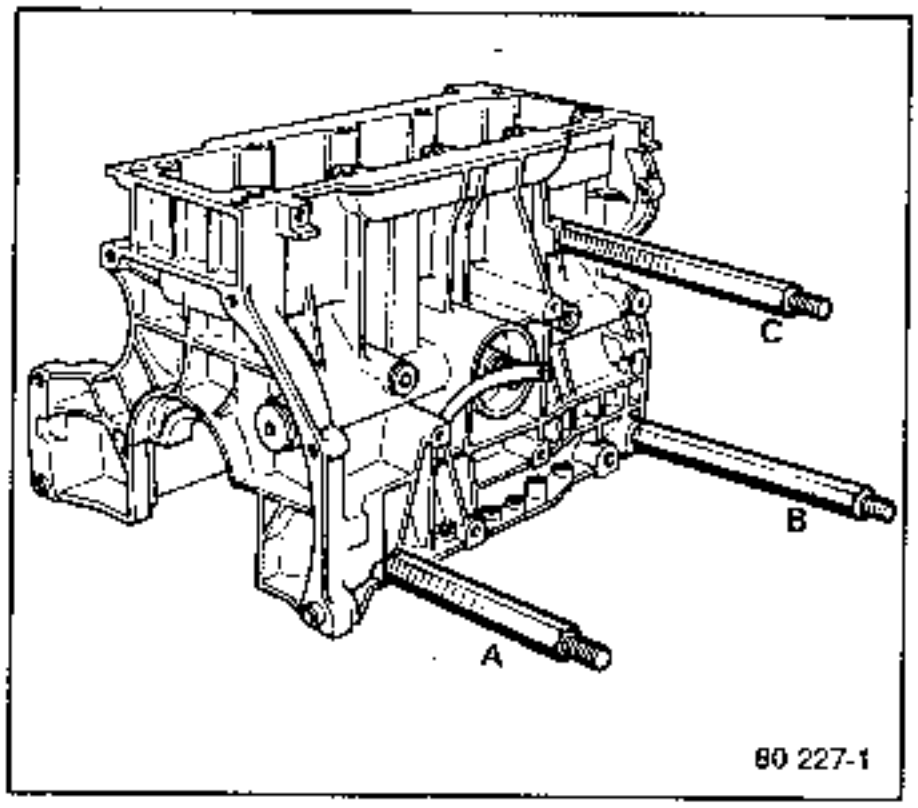
Offer up the engine or cylinder block with its fixing studs (A, B and C) in position so that the latter enter holes (1,8 and 4) in the plate.





2nd model: stud (B) inserted in hole (E).

Offer up the engine assembly with its fixing studs in position so that the latter enter holes (1, 8 and 17) in the plate.



NOTE: If it is difficult to fit the rods in the holes indicated in the plate, the diameter of the holes can be enlarged by 0.5 mm.

CLEANING ENGINE IN SITU

Protect the timing belt, distributor, ignition coil and alternator from water and cleaning fluid.

RETURNING THE OLD ENGINE TO THE PARTS DEPARTMENT

The engine must be clean and the sump must be empty.

Leave the following on the old engine or packed separately inside the engine carton:

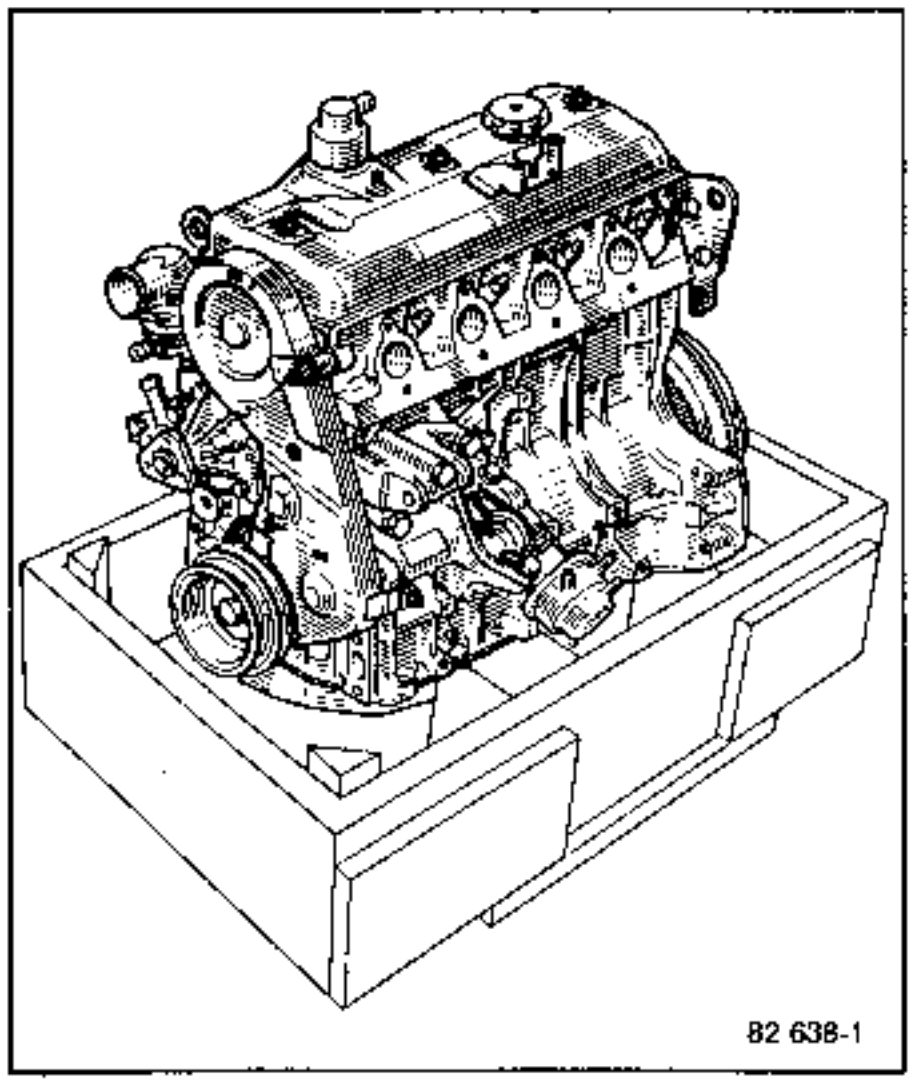
- dipstick and guide
- flywheel or driving plate
- clutch mechanism and disc
- fuel pump
- water pump and pulley
- crankshaft pulley
- rocker cover
- spark plugs
- belt tensioners
- pressure and temperature switches
- timing cover
- oil filter.

Remember to remove:

- all flexible coolant hoses
- all belts.

Fasten the old engine to the wooden pallet in the same way as the standard service exchange engine was received:

- plastic plugs and covers in place
- cardboard cover over the unit.



82 638-1

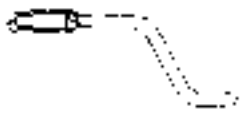
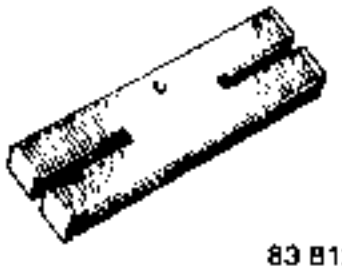
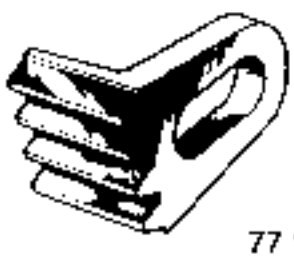
Illustration	Methods Reference	Part Number	Description
 68 603	Mot. 11	00 01 072 500	Crankshaft spigot bearing extractor
 83 812	Mot. 251-01	00 00 025 101	Clock gauge support (liner protrusion)
 83 812	Mot. 252-01	00 00 025 201	Thrust plate for checking liner protrusion
 69 716	Mot. 445	00 00 044 500	Oil filter clamping tool
 76 641-1	Mot. 574-13 Mot. 574-14 Mot. 574-16	00 00 057 413 00 00 057 414	Gudgeon pin inserting guide and thrust ring for pistons without skirts
 77 121	Mot. 582	00 00 058 200	Flywheel locking tool
 76 666	Mot. 588	00 00 058 800	Liner clamps
 77 889	Mot. 591-02	00 00 059 102	Magnetised flexible tube

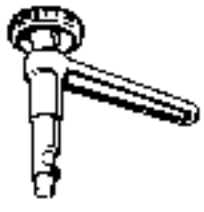
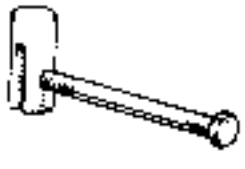
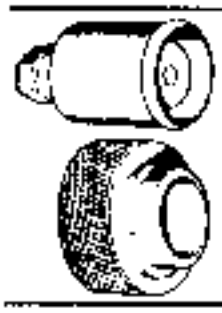
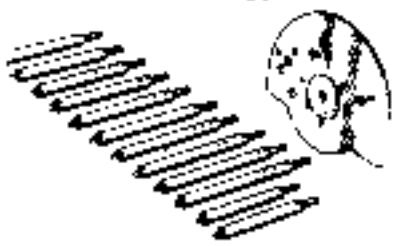
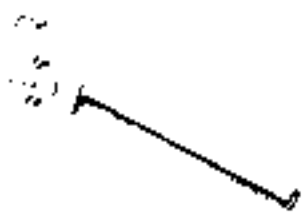
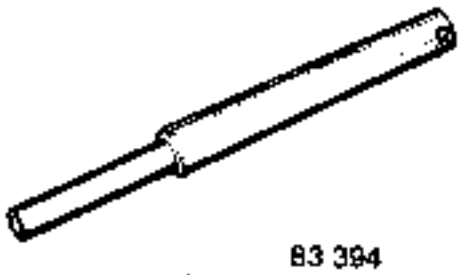
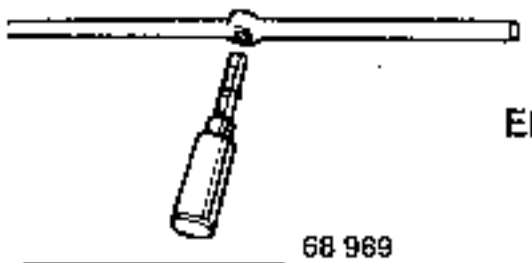
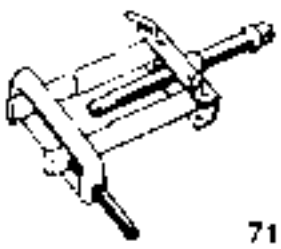
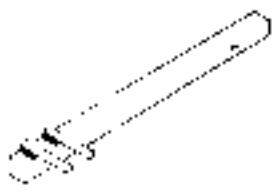
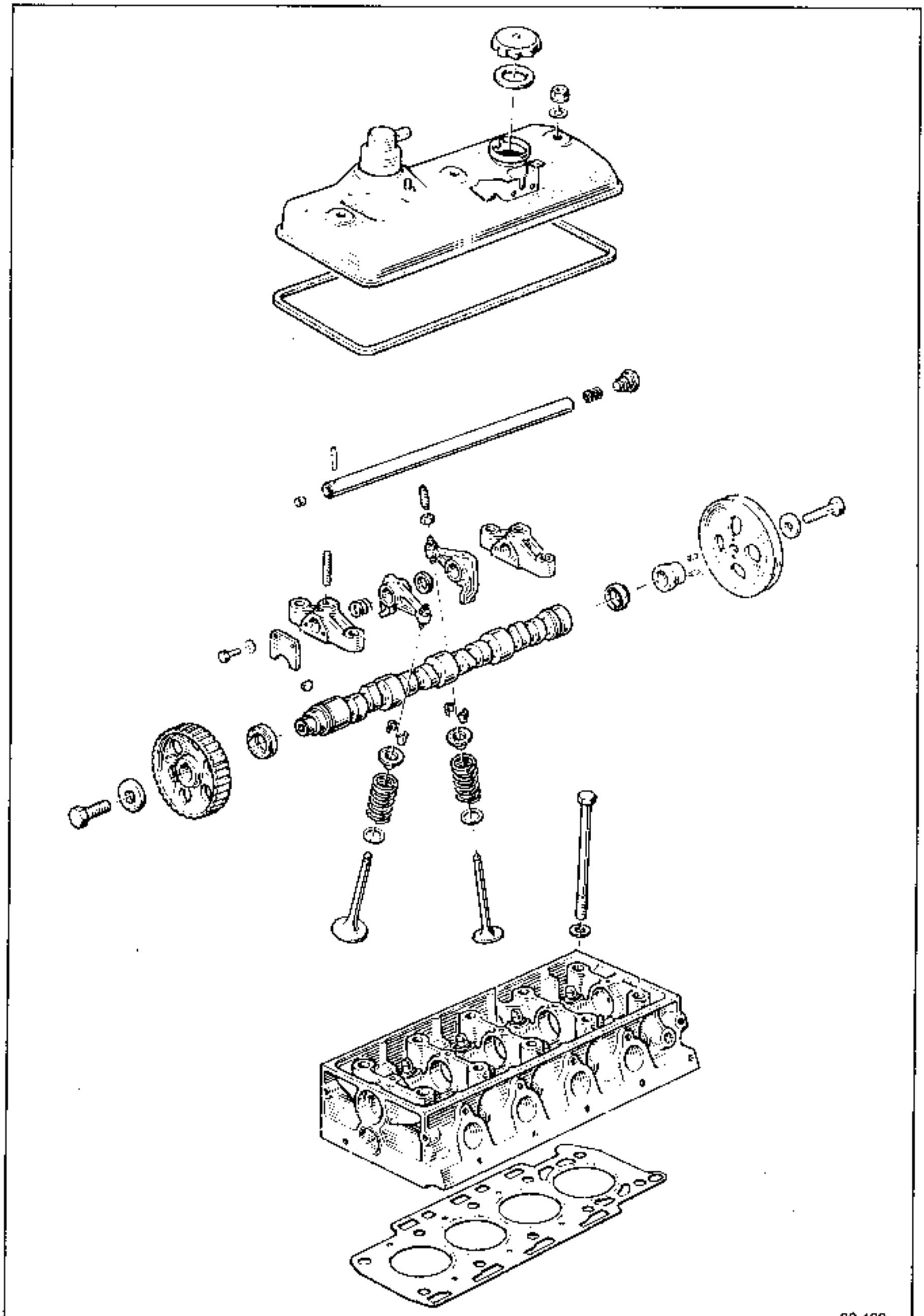
Illustration	Methods Reference	Part Number	Description
 77 744	**Moteur 647**	00 00 064 700	Rocker arm clearance adjusting wrench
 78 785	**Mot. 720**	00 00 072 000	Cylinder head locating tool
 68 658	**Mot. 788**	00 00 078 800	Crankshaft oil seal inserting mandrel (flywheel end)
 80 415	**Mot. 789**	00 00 078 900	Crankshaft oil seal inserting tool (timing cover end)
 80 357	**Mot. 790**	00 00 079 000	Oil seal inserting and intermediate shaft bearing locating tool
 80 259	**Mot. 1157** **Mot. 791**	00 00 115 700 00 00 079 100	Camshaft oil seal inserting and extracting tool - J7R 720 engine Camshaft oil seal inserting and extracting tool - All types
 82 919	**Mot. 792-01**	00 00 079 201	Engine support plate for Desvil stand
 80 359	**Mot. 799**	00 00 079 900	Sprocket locking tool

Illustration	Methods Reference	Part Number	Description
 83 289	Mot. 855	00 00 085 500	Toothed belt idler sprocket locking strap
 83 394	Mot. 861	00 00 086 100	T.D.C. rod
 87 273	Mot. 965	00 00 096 500	Tool for mounting camshaft oil seal
 93 127	Mot. 1169	00 00 116 900	Rocker shaft retaining forks
 68 969	Elé. 346-04	00 00 034 604	Belt tensioning tool
 71 625	B. Vt. 28-01	00 01 227 301	Extractor
 69 306-1	Rou. 15-01	00 01 331 601	Shaft protector end piece
 92 645	Rou. 1135	00 00 113 500	Belt tensioner

Supplier's ref.	Supplier	Description
U 43 L	Facom	Valve spring compressor
N° 110 N° 208	Neway	Valve seat cutter
N° 121 N° 213	Neway	Valve seat width reducing cutter
N° 100-7 N° 140-8 N° 150-8 N° 275-7	Neway	8 mm diameter pilot
N° 503-T	Neway	"T" handle

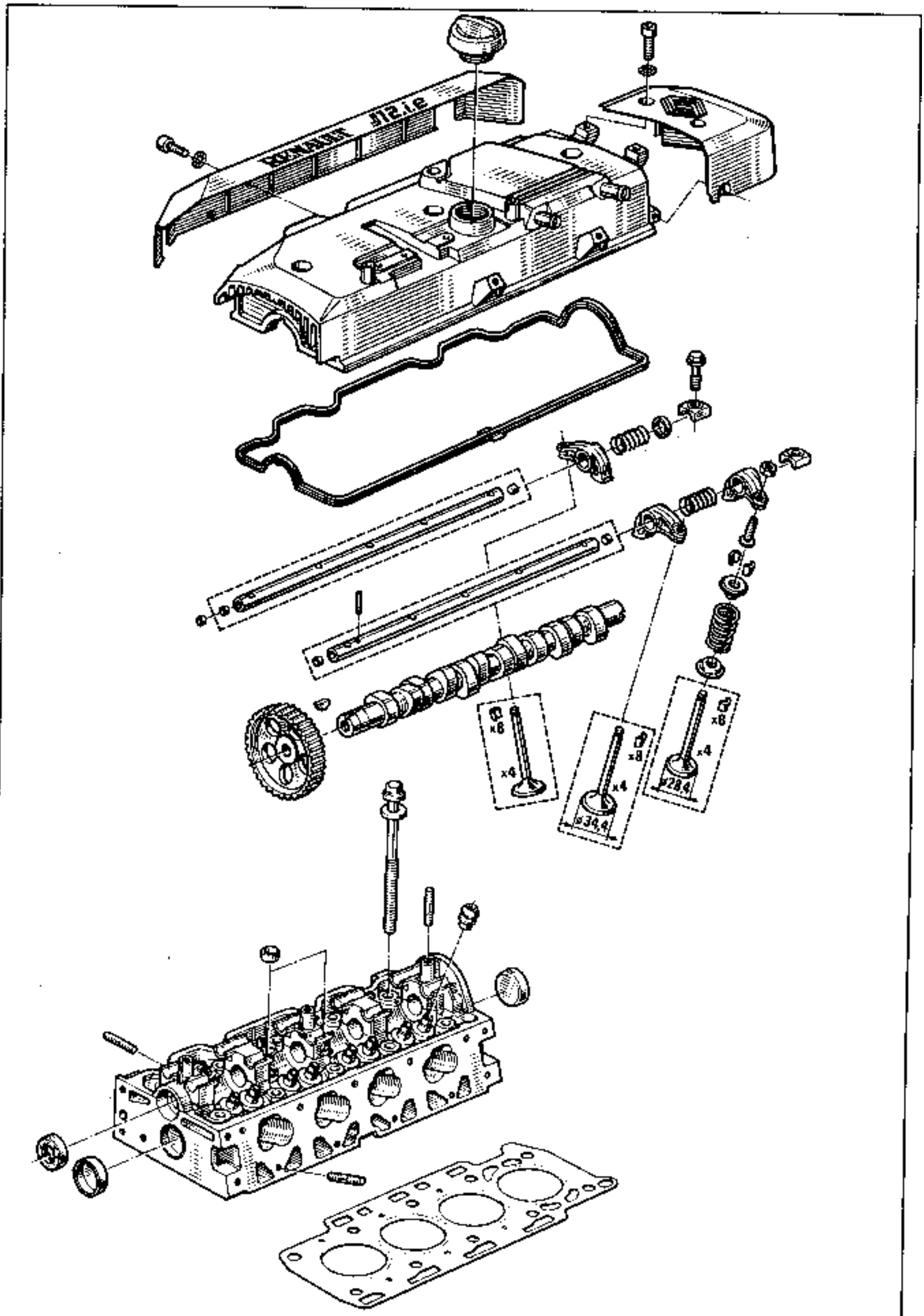
Type	Quantity	Unit concerned	Part no.
Ravitol Plus	2 litres	Component cleaning	77 01 417 424
Decap joint	smear	Cleaning cylinder head gasket faces	77 01 405 952
Loctite Frenetanch (Locking and sealing resin)	1 or 2 drops	Flywheel, converter driving plate, crankshaft pulley and intermediate shaft cover bolts	77 01 394 070
Loctite Frenbloc (Locking and sealing resin)	smear	Spigot bearing in crank-shaft (when there is no lockplate under flywheel fixing bolts)	77 01 394 071
CAF 4/60 THIXO	bead	Intermediate shaft cover sealing. Oil pump gear plate	77 01 404 452
CAF 4/60 THIXO Hardener kit		Crankshaft bearing cap sealing	77 01 421 080
Format joint	bead	Sealing coolant outlet pipe on cylinder head	77 01 394 073
Loctite 518	smear	Camshaft 1 and 5 bearing caps sealing	77 01 421 162
Loctite Autoform	smear	Flywheel to crankshaft joint face. Crankshaft pulley to timing sprocket joint face	77 01 400 309

CYLINDER HEAD
Exploded view



80 439

CYLINDER HEAD
Exploded view



Tightening - Retightening

The cylinder head is not tightened and the rocker arm clearance is not adjusted at the "1st inspection and checks" between 500 and 2000 miles (1000 and 3000 km).

CYLINDER HEAD TIGHTENING (in daNm)

- Pretightening 5

- Tightening 8

- Slacken one half-turn then tighten ..... 8.75 to 9.75

CYLINDER HEAD RETIGHTENING

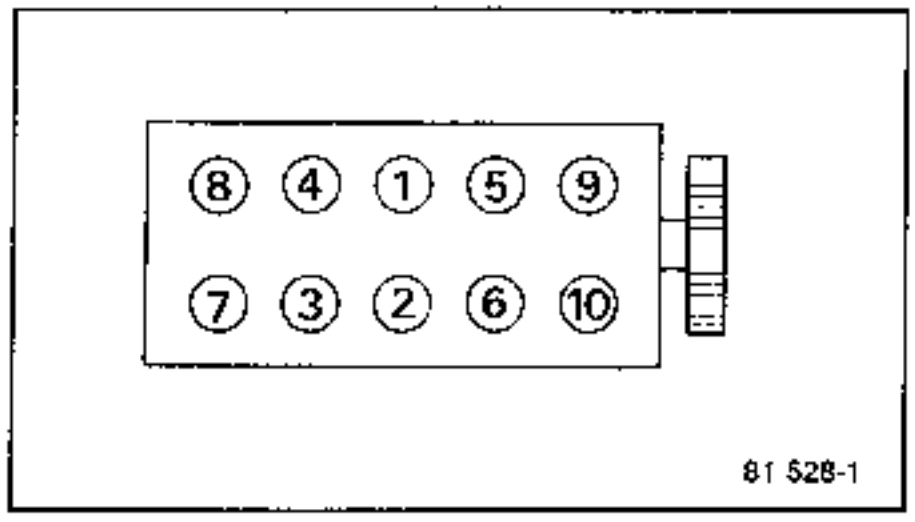
This operation must be performed when the engine is cold.

Run the engine for 20 minutes, switch off and let it cool down for at least 2½ hours before retightening.

Slacken bolt no. 1 one half-turn

Tighten: 8.75 to 9.75 daNm.

Repeat for the remaining bolts in the sequence shown.



TIGHTENING - RETIGHTENING

ESSENTIAL SPECIAL TOOLING
14 mm Torx-type dowel (Dir. 980)
Mot. 591-04 Torque wrench

The cylinder head is not tightened and the rocker arm clearance is not adjusted at the "1st inspection and checks" between 500 and 2000 miles (1000 and 3000 km).

METHOD FOR TIGHTENING THE CYLINDER HEAD

a) Initial seating of the gasket

Tighten all bolts to 2 daN.m in the sequence shown below.

b) Cylinder head tightening

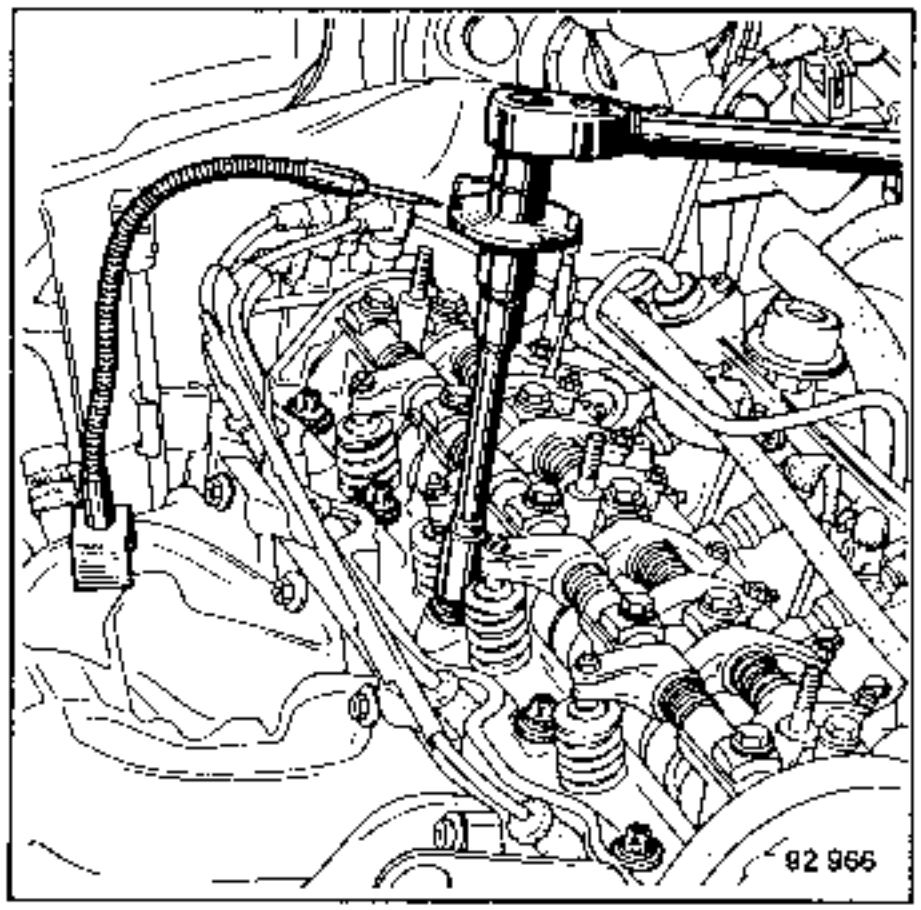
Tighten to a first angle of 93° in the sequence shown below (using tool **Mot.591-04**).

Tighten to a second angle of 93° in the sequence shown below.

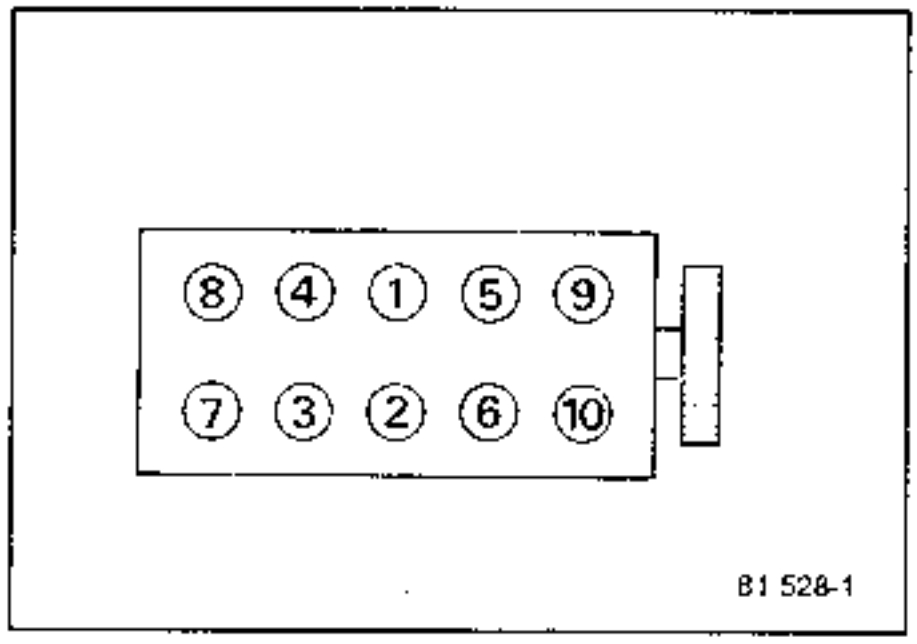
Run the engine for 15 minutes.

Apply a final tightening at an angle of 20°.

Angular tightening wrench with its pointer



Tightening sequence

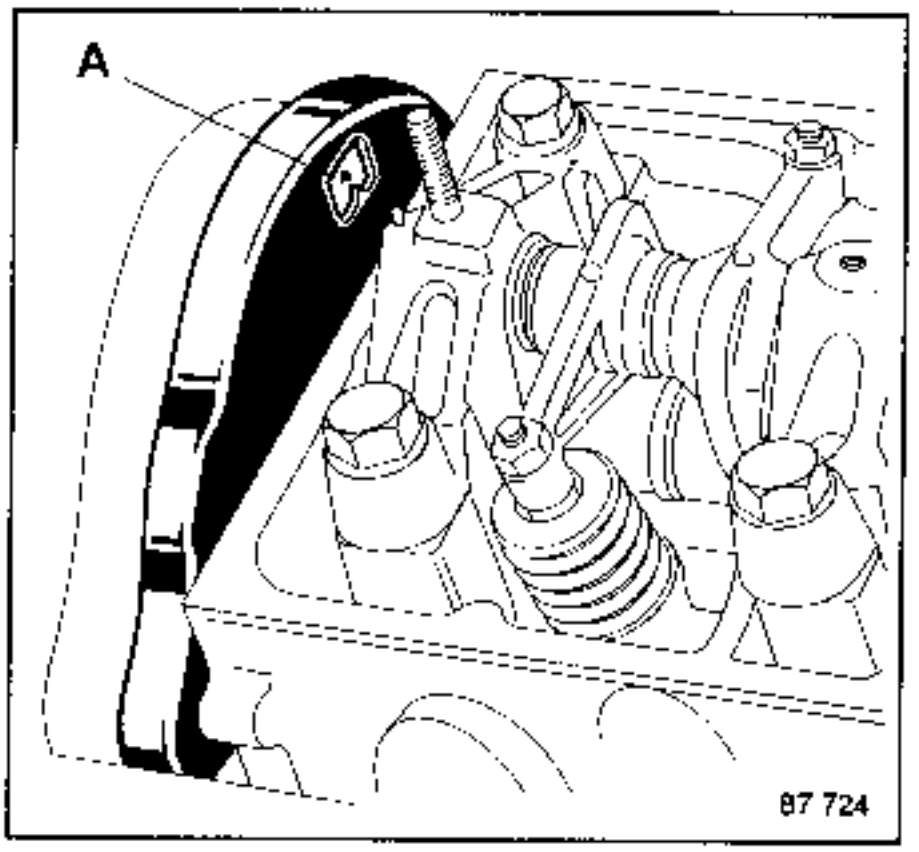


ROCKER ARM CLEARANCE ADJUSTMENT (except J7T and J7R engines)

If the engine has markings (A), follow the adjusting method and values for the J7T and J7R engines.

Turn the engine until **No. 1** cylinder exhaust valve is wide open; adjust the rocker arm clearance for **No. 3** cylinder inlet valve and **No. 4** cylinder exhaust valve.

Proceed in the same way for the other cylinders in the order given in the table.



Exhaust valve to be set wide open	Adjust clearance on inlet valve	Adjust clearance on exhaust valve
1	3	4
3	4	2
4	2	1
2	1	3

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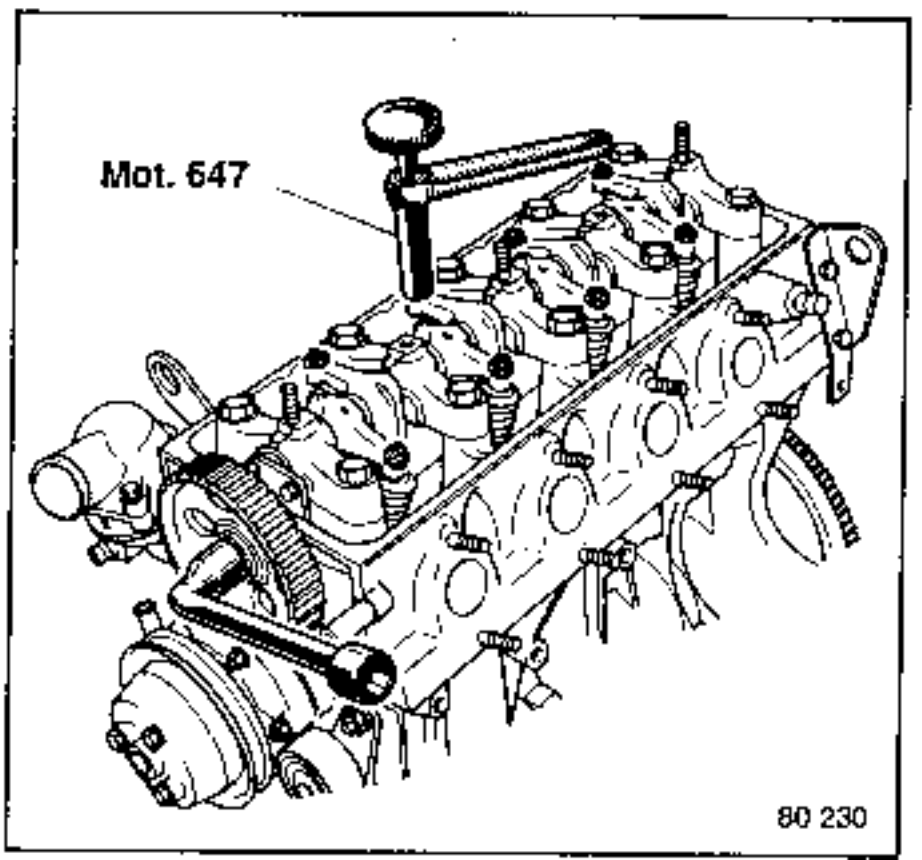
Rocker arm clearances (mm), cold:

- inlet 0.10
- exhaust 0.25



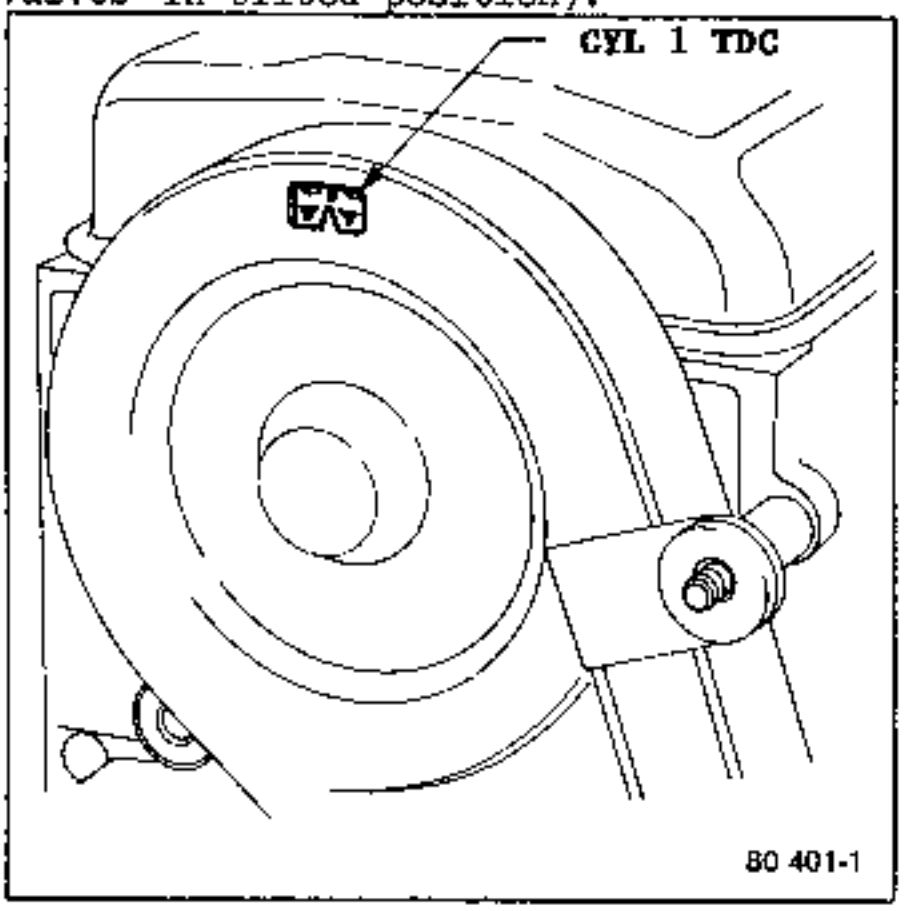
Rocker arm clearance adjustment for J7R and J7T engines (except J7R 720)

Adjustment clearance (mm), cold:

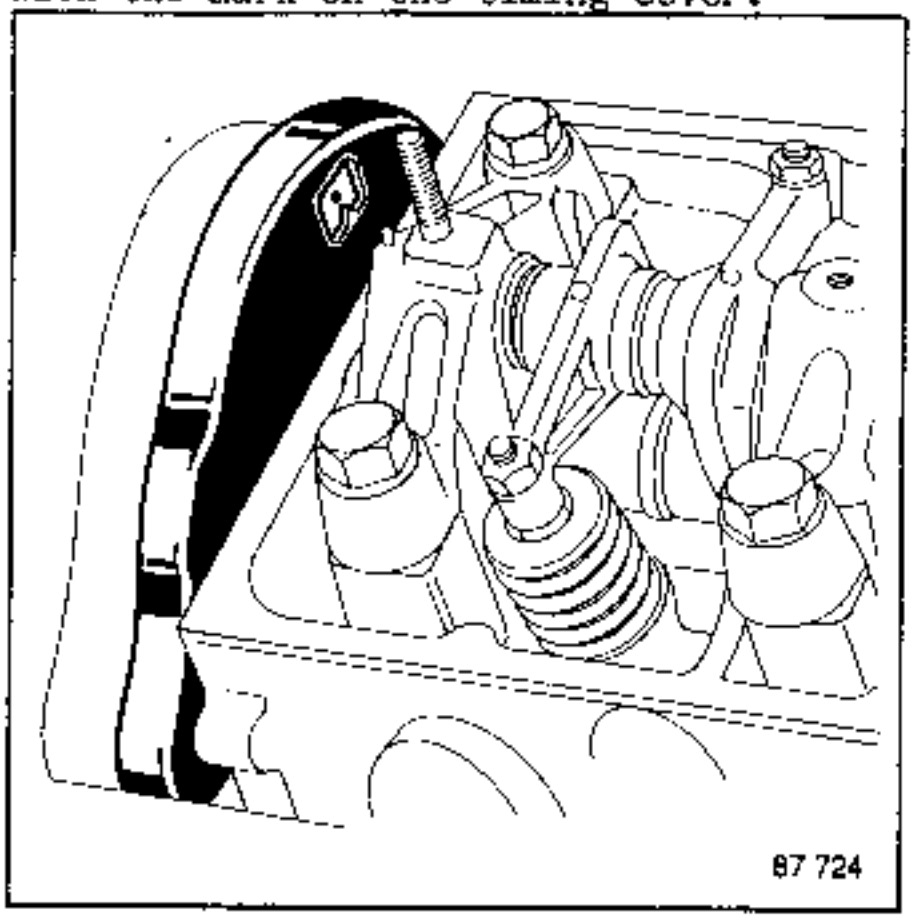
- inlet ..... 0.10 to 0.15 mm
- exhaust ..... 0.20 to 0.25 mm

These values must only be set and checked according to the method given below.

Turn the crankshaft so that no. 1 cylinder is at TDC (no. 4 cylinder valves in tilted position).



Turn the crankshaft (viewed from timing gear end) in a clockwise direction until the 1st timing mark on the camshaft sprocket (cylinder head end) is in line with the mark on the timing cover.

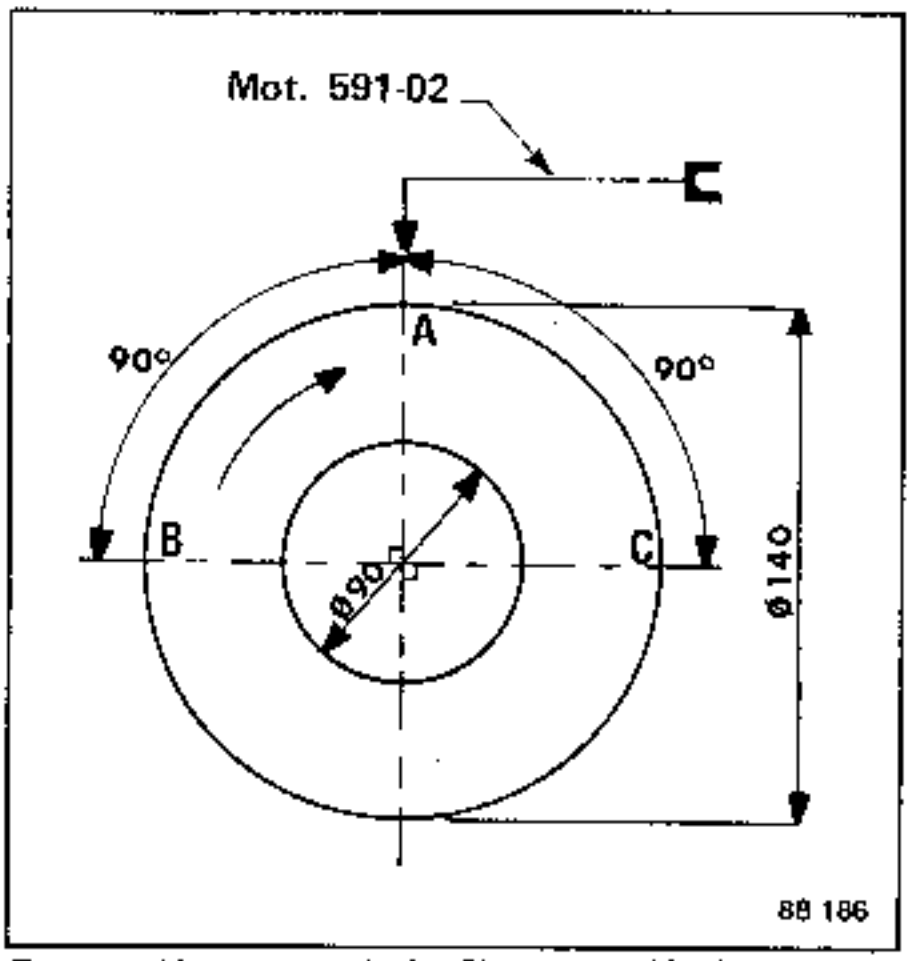


Adjust the corresponding rocker arm clearance then turn the camshaft to the next mark (see table).

Mark	Adjust	
	Inlet	Exhaust
1 st	2	4
2 nd	1	2
3 rd	3	1
4 th	4	3

NOTE: Some engines do not have marks on the cylinder head end. With these engines perform the following method:

Use a locally made-up gauge cut out of a piece of cardboard, as shown below:



Turn the crankshaft so that no. 1 cylinder is at TDC.

- Position and stick this gauge on the crankshaft pulley.
- Place a magnetized gauge opposite mark **A** (for example **Mot. 591-02**). Turn the engine in the direction in which it normally rotates to bring:
  - mark **B** opposite the gauge and adjust A2-E4;
  - mark **C** opposite the gauge and adjust A1-E2;
  - mark **B** opposite the gauge and adjust A3-E1;
  - mark **C** opposite the gauge and adjust A4-E3.

A = INLET E = EXHAUST

Rocker arm clearance adjustment for J7R 720 engines

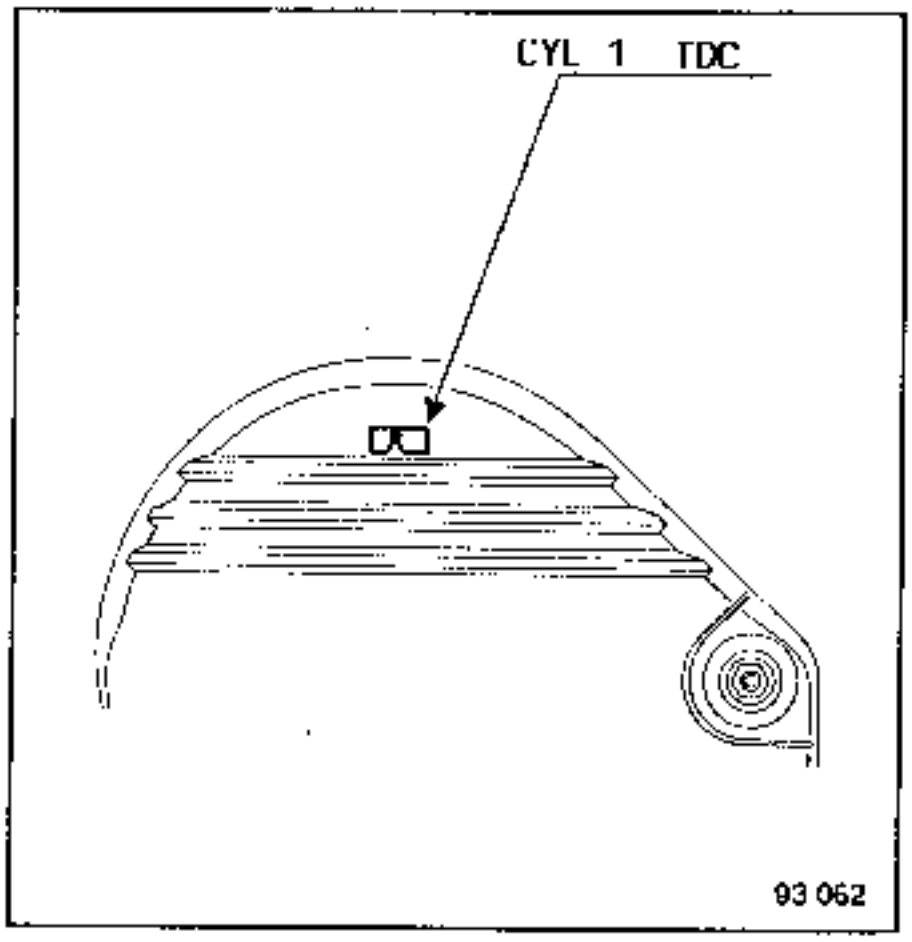
ESSENTIAL SPECIAL TOOLING	
Mot. 567 + T 290	Rocker arm clearance adjusting tool
Set of feeler gauges	

Adjustment clearance (mm), cold:

- inlet ..... 0.15 to 0.20 mm
- exhaust ..... 0.20 to 0.25 mm

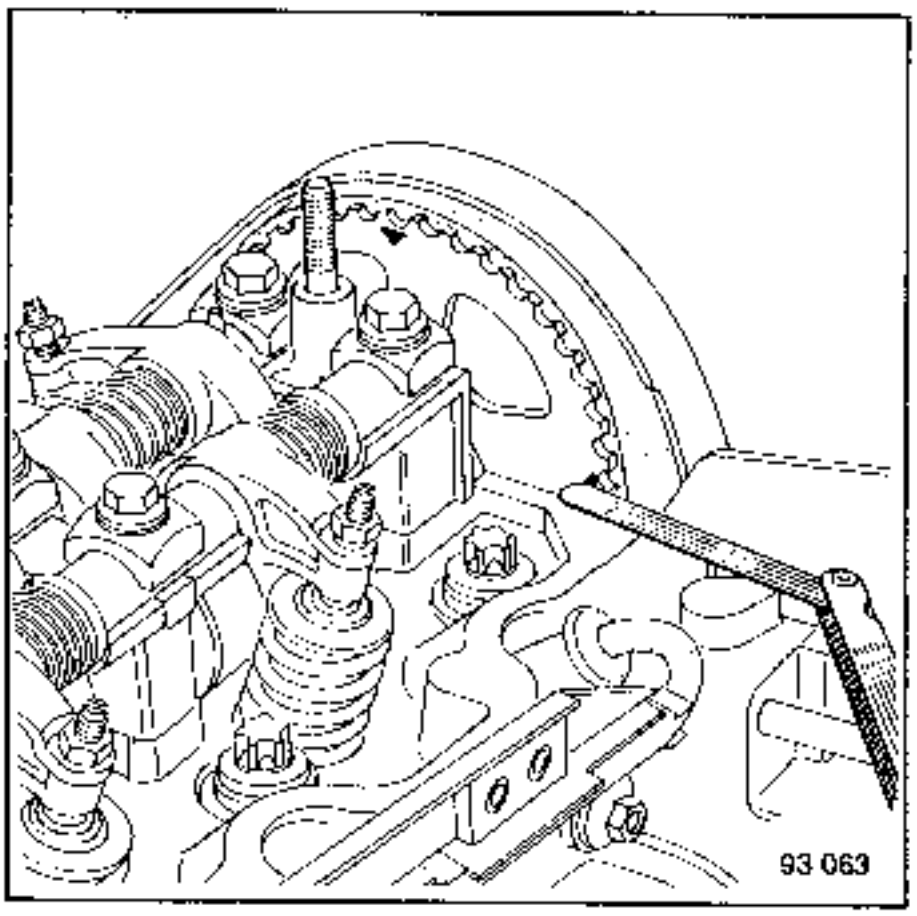
Turn the crankshaft so that no. 1 cylinder is at TDC.

Check that the label on the crankshaft sprocket is in the centre of the gap in the belt cover.



Turn the crankshaft (viewed from timing gear end) in a clockwise direction until the 1st timing marks (▶◀) on the pulley are parallel with the cylinder head cover gasket face.

Check the position of the marks using a feeler gauge placed over the rocker cover gasket face.



Adjust the corresponding rocker arm clearance then turn the camshaft to the next mark (see table).

Mark	Adjust	
	Inlet	Exhaust
1 st	2	4
2 nd	1	2
3 rd	3	1
4 th	4	3

Note:
When refitting the rocker cover, torque tighten the end bolts first then the centre bolt to between **1.4** and **1.8 daN.m.**

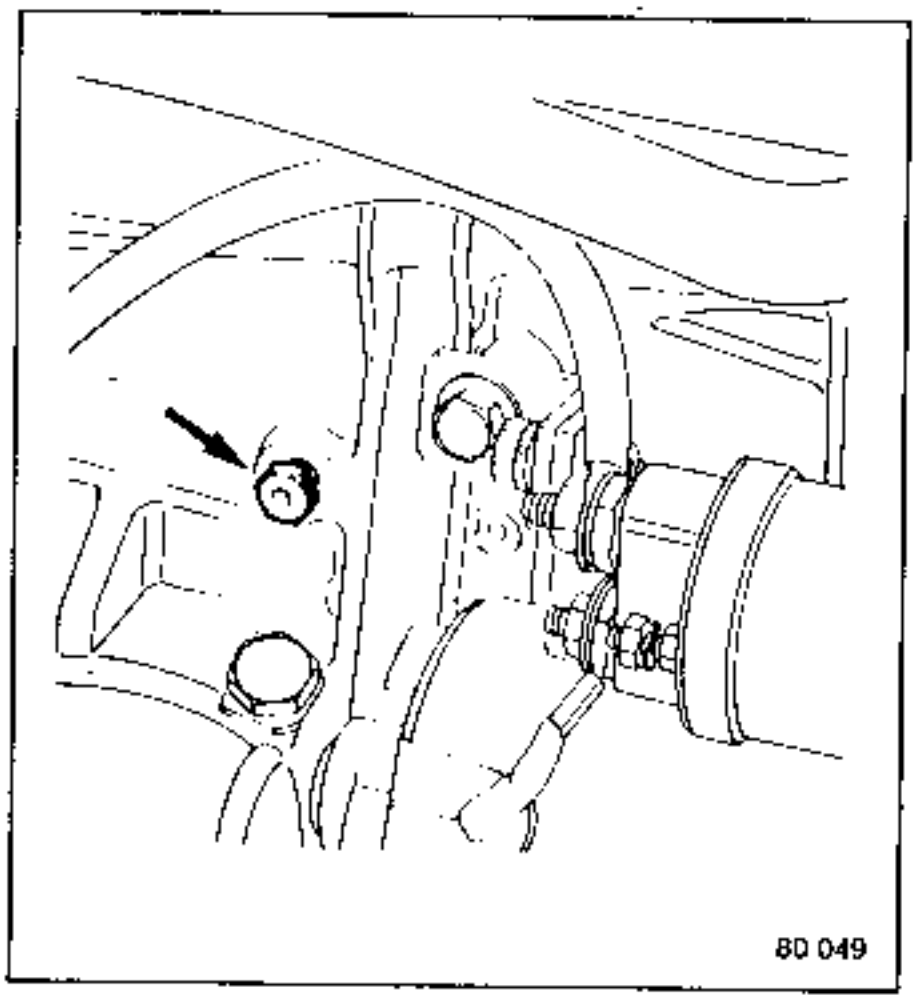
Replacing the gasket

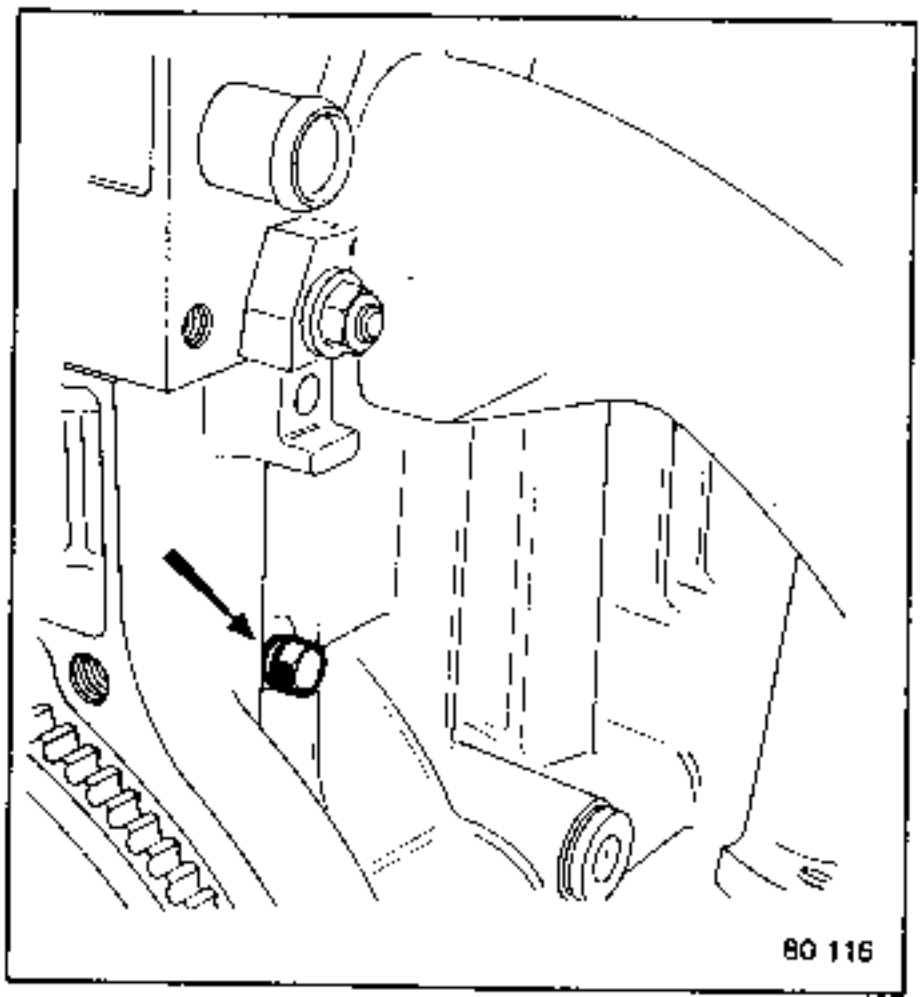
NECESSARY SPECIAL TOOLING	
Elé. 346-04	Belt tensioning tool
Mot. 251-01	Clock gauge bracket
Mot. 252-01	Thrust plate
Mot. 588	Liner clamp
Mot. 720	Cylinder head locating tool

MATERIALS
DECAPLOC 88: Cleaning gasket faces.

REMOVAL

Drain the coolant from the cylinder block.

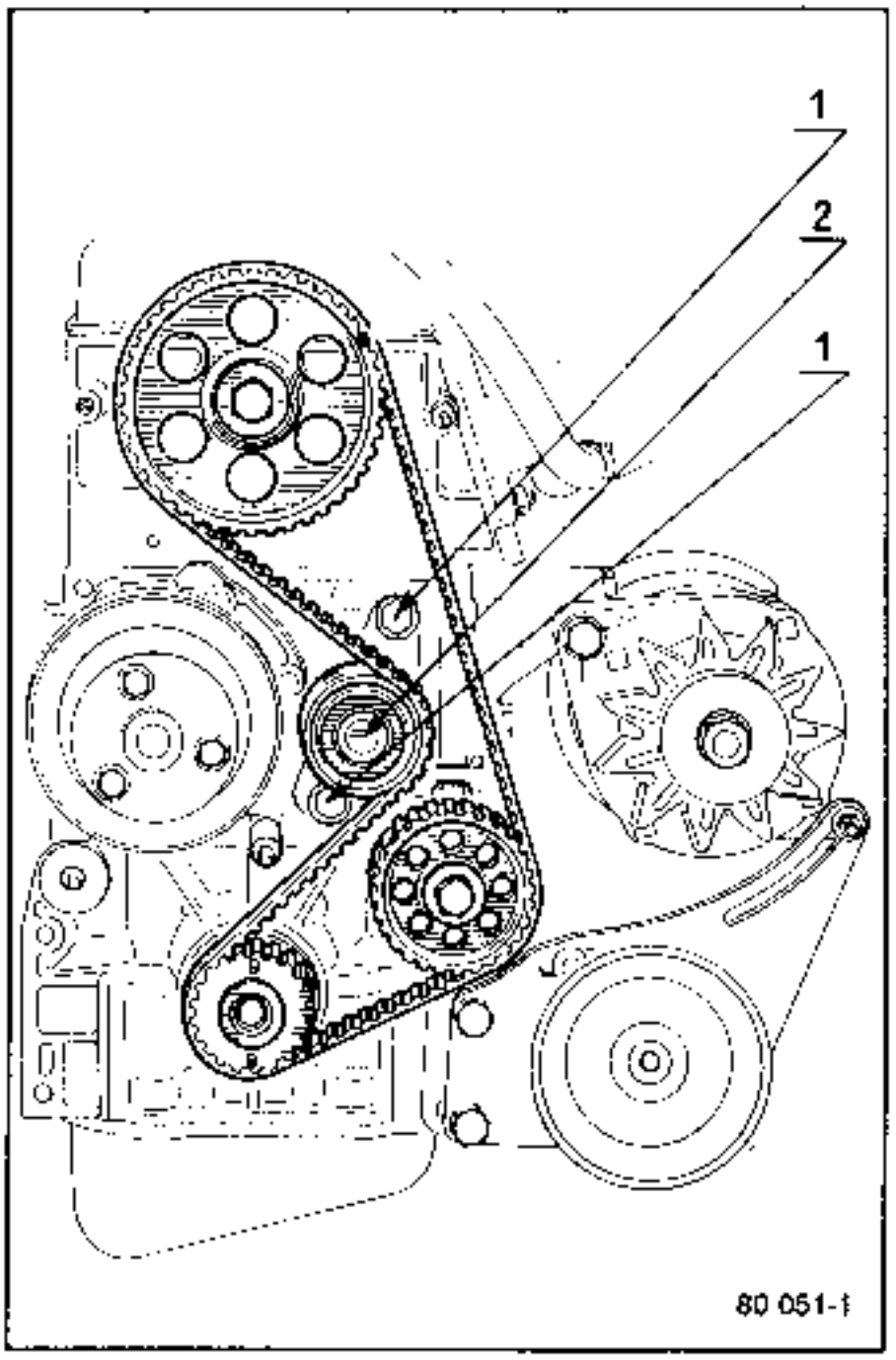




Remove the ancillaries from the cylinder head.

Remove the toothed timing belt.

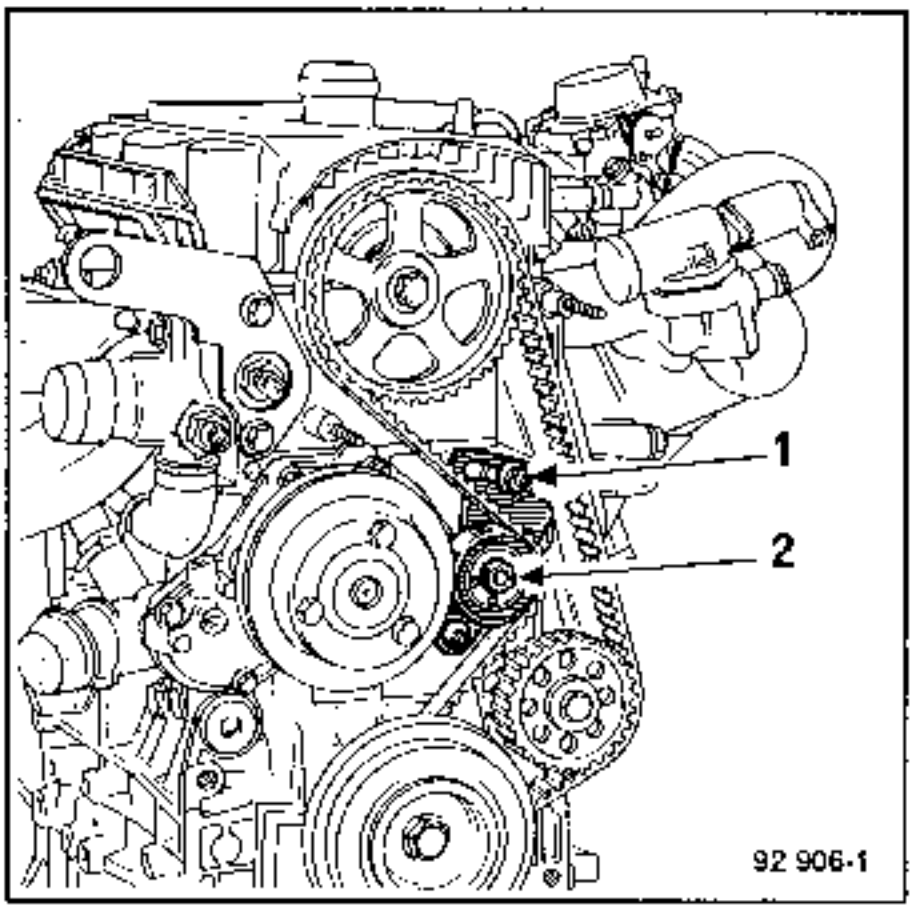
All types except J7R 720



- Slacken nuts 1;

- tilt tensioner 2.

J7R 720 engines



- Remove nut 2 then nut 1.

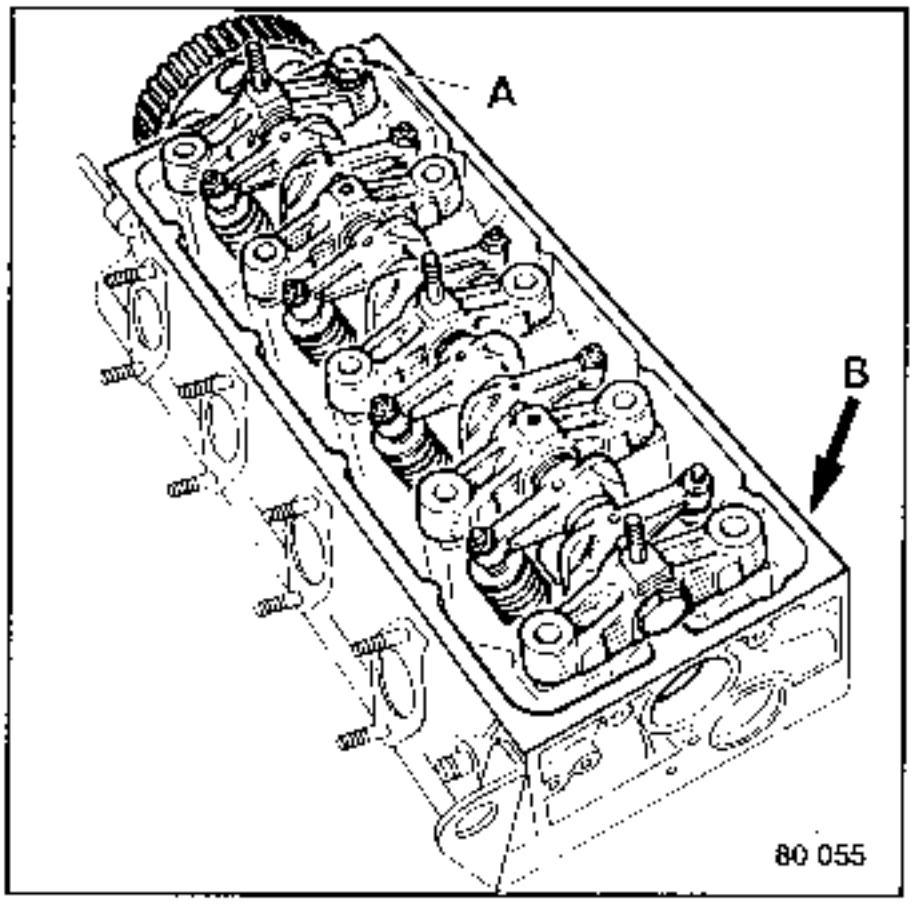
- Tilt the tensioner.

- Rotate the cam.

Loosen the cylinder head bolts.

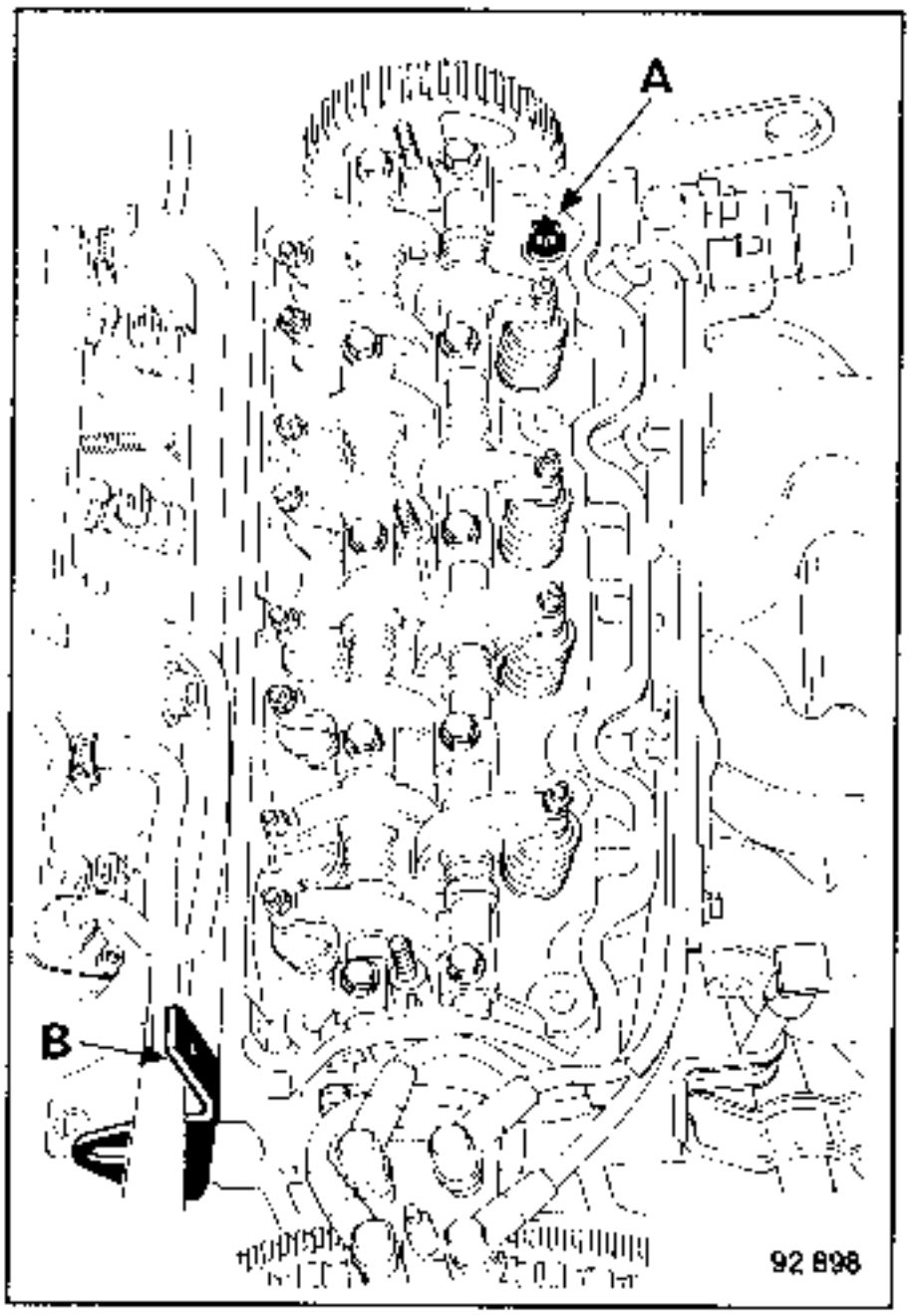
A dowel at **(A)** in the cylinder block locates the cylinder head.

Remove all the cylinder head bolts except bolt **(A)** then pivot the cylinder head around this bolt by placing a block of wood at **(B)** and tapping it with a wooden hammer.



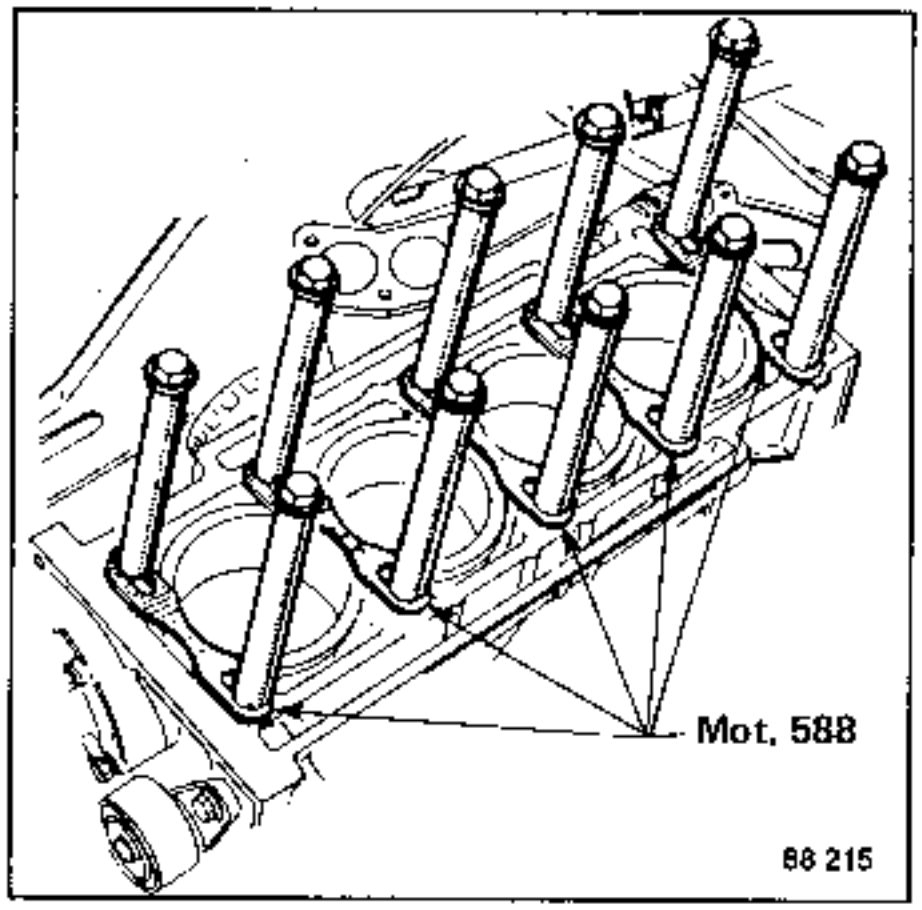
Remove the rocker shaft assembly.

J7R 720 engines



There is no need to remove the rocker shaft assembly when replacing the gasket only.

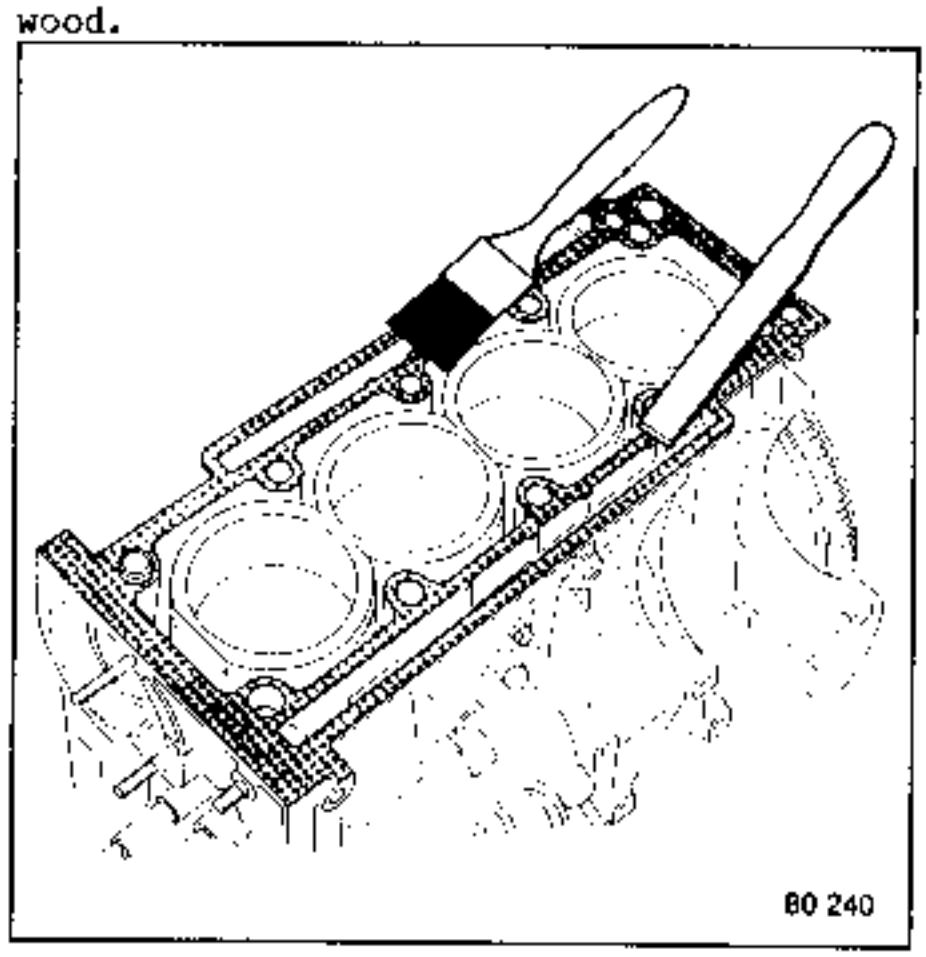
When fitting liner clamps **Mot. 588**, remove the cylinder head locating dowel.



The liner protrusion is checked with the base seals compressed. Fit clamps **Mot. 588** as shown in the diagram above.

CLEANING

It is very important not to scrape gasket faces on aluminium parts.
Use **Decajoint** to dissolve any part of the gasket still stuck to the cylinder block.
Brush the liquid onto the area to be cleaned; wait about ten minutes, then lift the remnants off with a piece of wood.



Gloves should be worn during this operation.

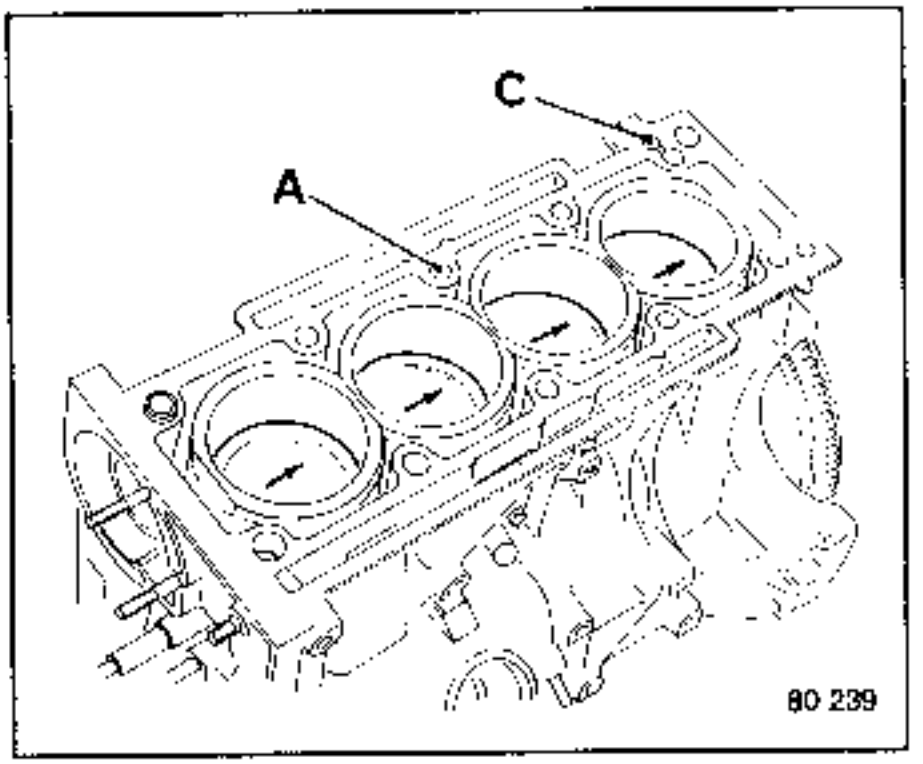
Do not let any drops of liquid fall onto paintwork.

Great care must be taken with this operation to prevent foreign matter entering the channels for pressure-fed oil to the rocker shaft assembly (channels in cylinder block and head).

If the above advice is disregarded, the rocker shaft filter or rocker arm oil jet holes may become choked, leading to rapid cam and rocker arm finger wear.

Using a syringe, suck up any oil remaining in the cylinder head bolt fixing holes and especially in the oil feed holes **(C)** (except J7R 720 engines) or **(A)** (for J7R 720 engines).

This is necessary for correct bolt tightening.

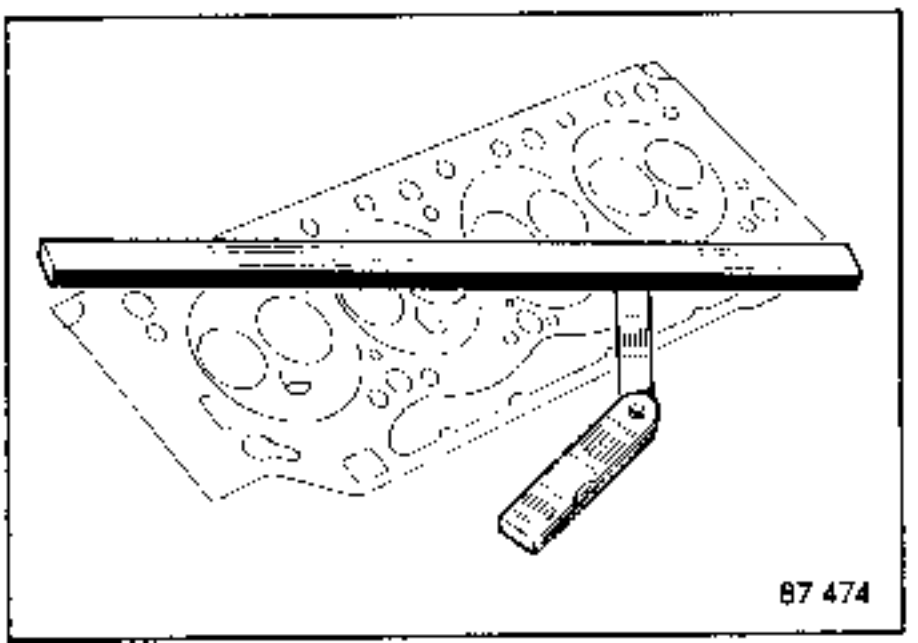


CHECKING THE GASKET FACE FOR BOW

Use a straight edge and a set of feeler gauges to check if there is any bow.

- Maximum permissible bow ..... **0.05 mm.**

No resurfacing of the cylinder head is permitted.

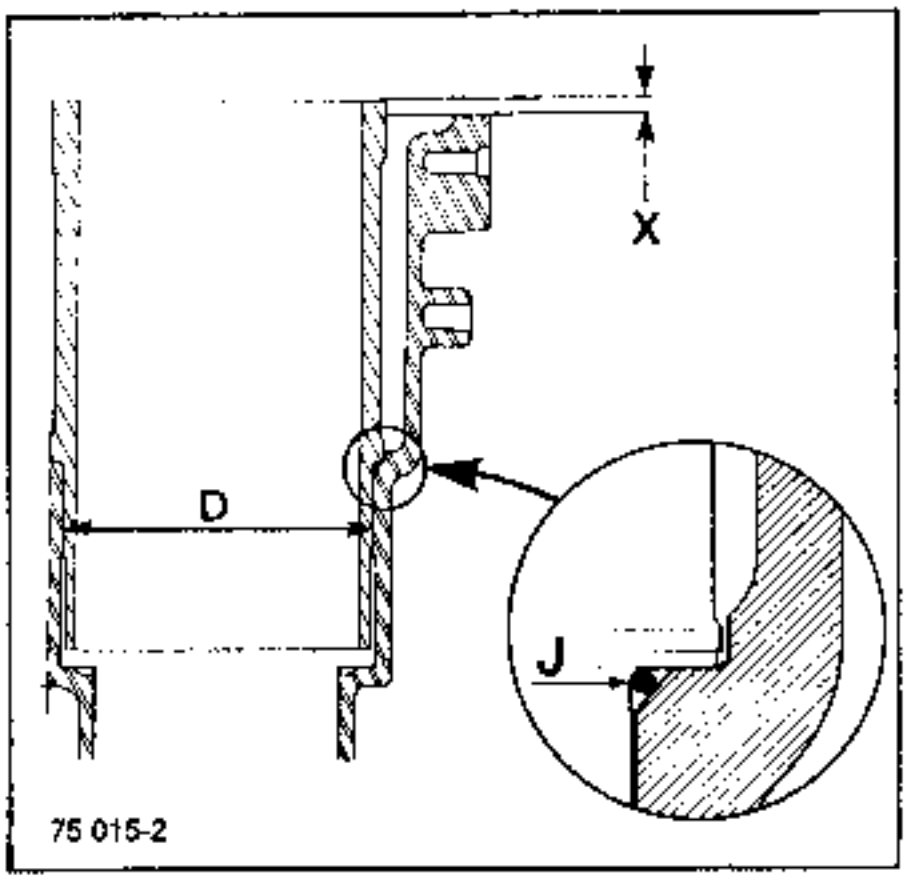


CHECKING LINER PROTRUSION

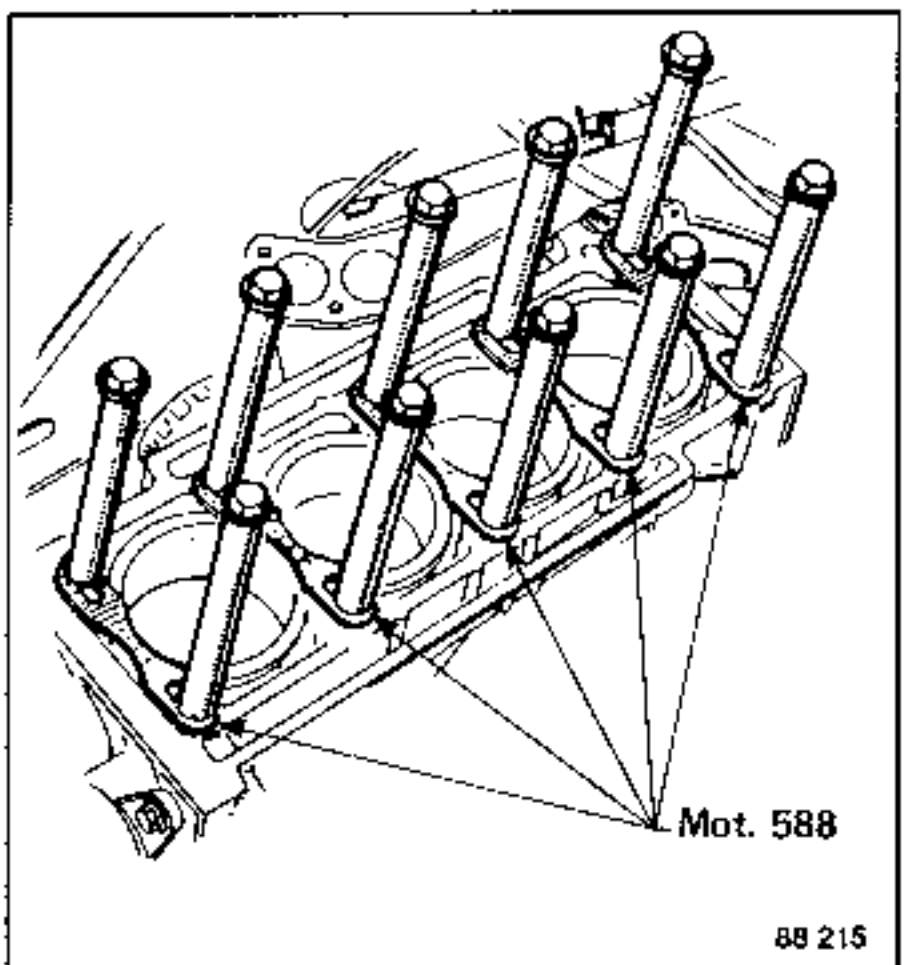
The "O" rings (J) act as coolant seals only.
Each liner locates direct on the cylinder block and the correct protrusion is achieved by close manufacturing tolerances on liners and cylinder block.
Protrusion (x) should be measured when the "O" **ring is compressed.**

- Protrusion (x) (mm) .... 0.08 to 0.15

Check liner protrusion with tools **Mot. 251-01** and **Mot. 252-01** with clamps **Mot. 588** in position.



75 015-2

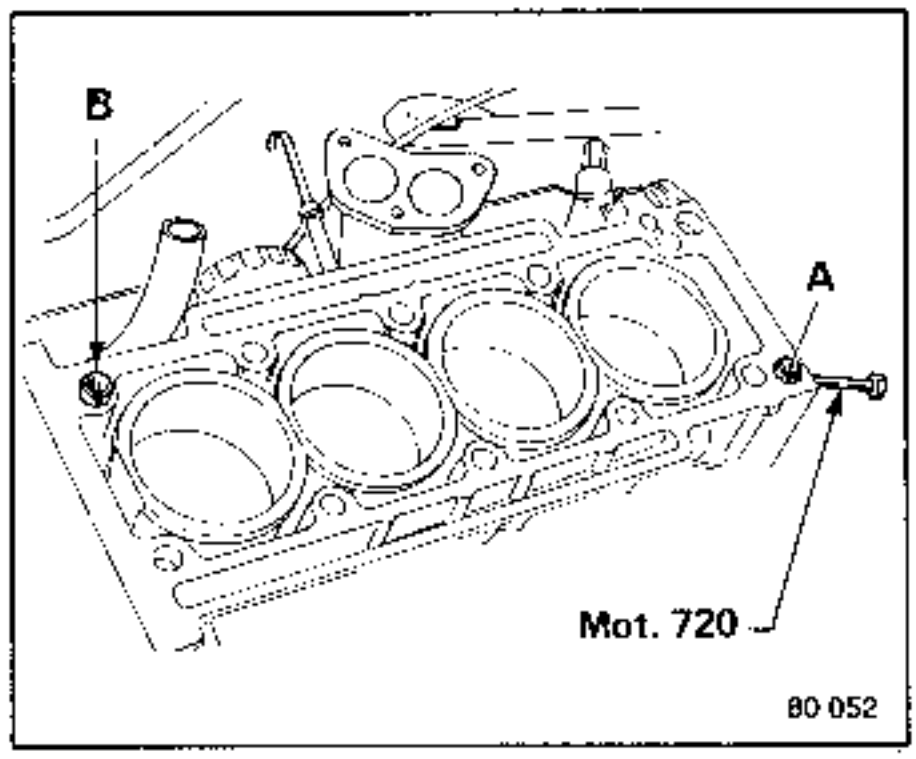


88 215

If protrusion is incorrect, refer to the section entitled "ENGINE ASSEMBLY AND LOWER ENGINE UNITS-Replacing pistons and liners".

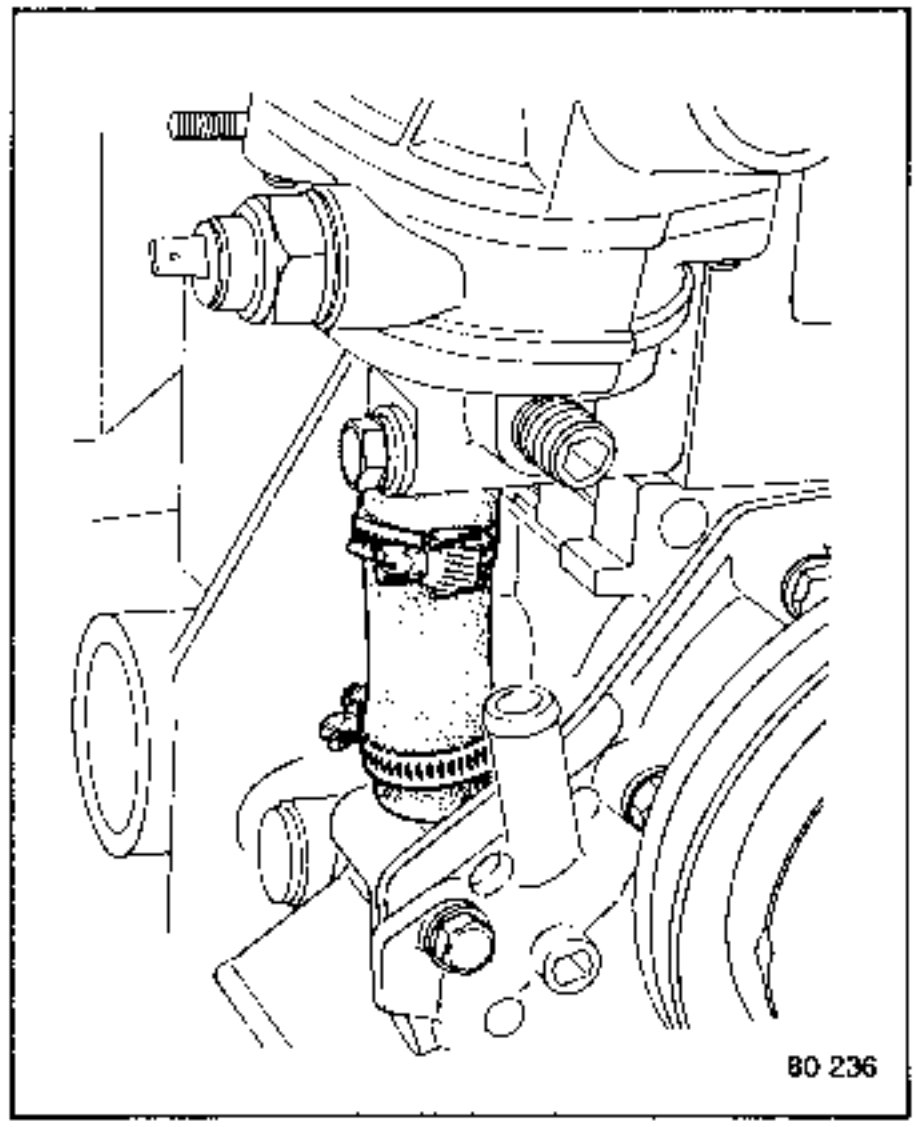
REFITTING

Position the cylinder head gasket and cylinder head using dowel (B) in the block and fit tool **Mot. 720 at A.**



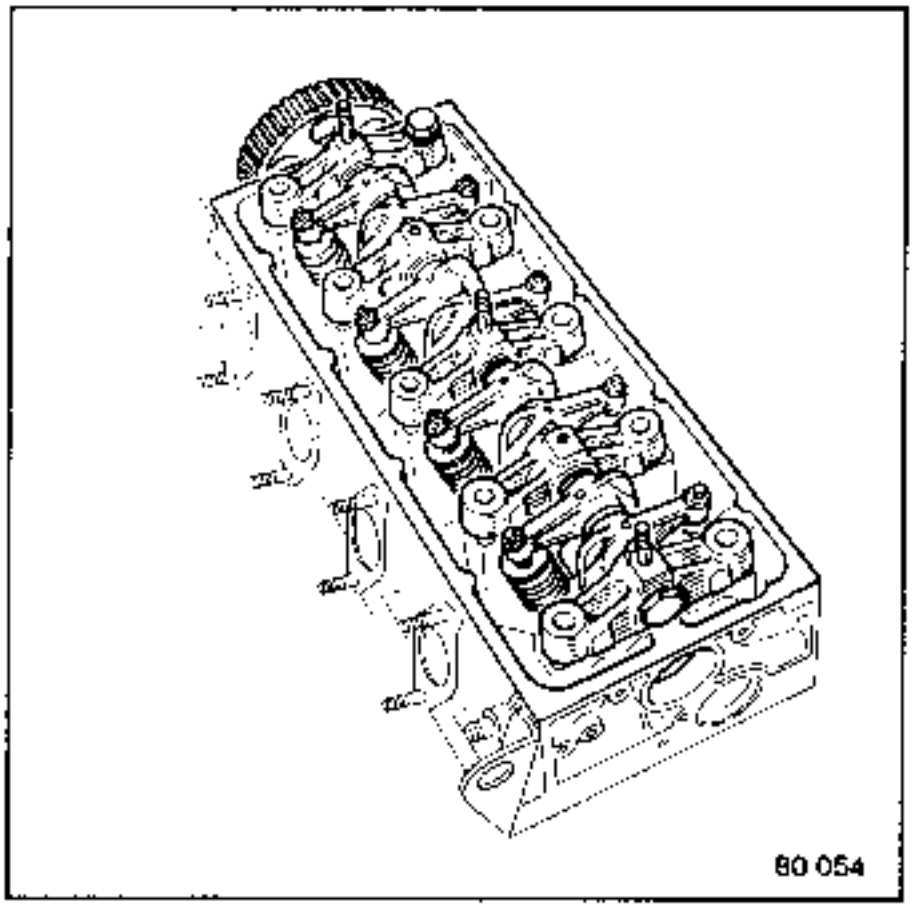
80 052

Remember to refit the hoses between the coolant inlet and outlet pipes as the cylinder head is lowered.

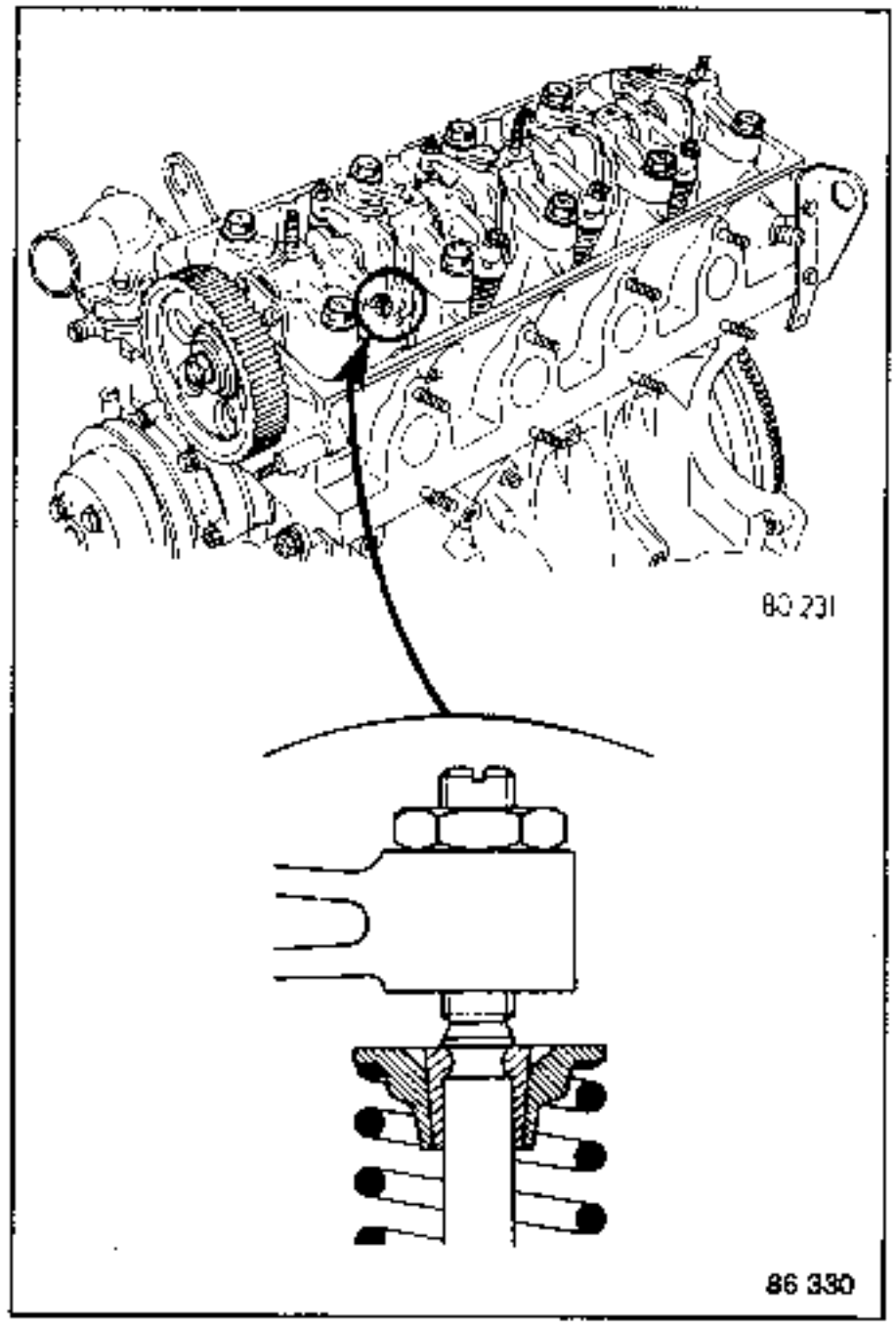

80 236

All types except J7R 720 engines

Refit the rocker shaft assembly and the cylinder head mounting bolts.



As the bolts are tightened down, make sure that the bottom of each rocker arm adjusting screw fits its cup in the pushrod (possibility of forcing and bending the valve stem).



All types

To tighten the cylinder head bolts correctly, refer to the section entitled "ENGINE ASSEMBLY AND LOWER ENGINE UNITS - Tightening - Retightening".

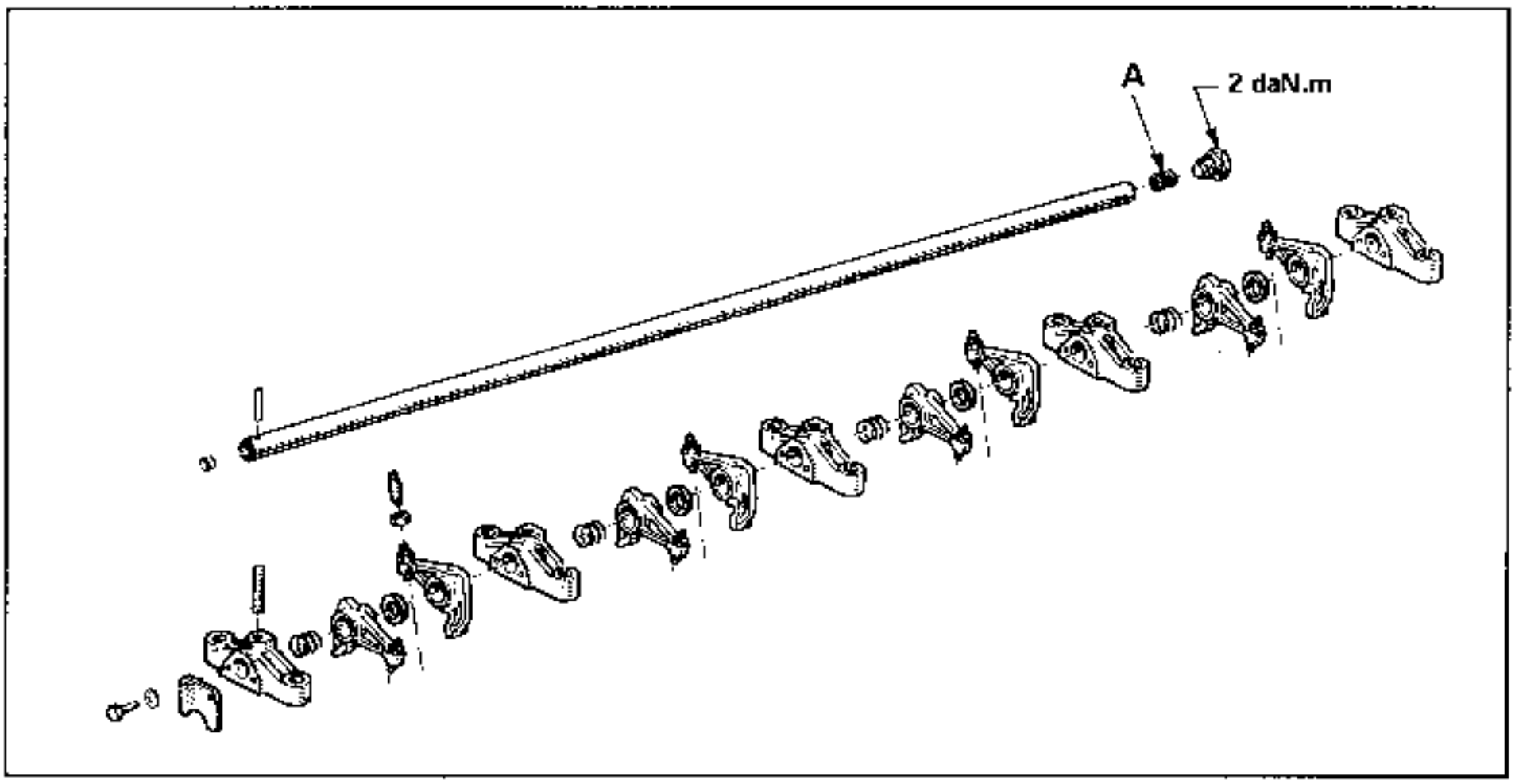
Refit the rocker cover and ancillaries.

Refit the coolant drain plug in the cylinder block.

Remove locating tool **Mot. 720.**

Check and adjust the valve timing (see section entitled "TIMING GEAR").

ROCKER SHAFT ASSEMBLY - All types except J7R 720 engines



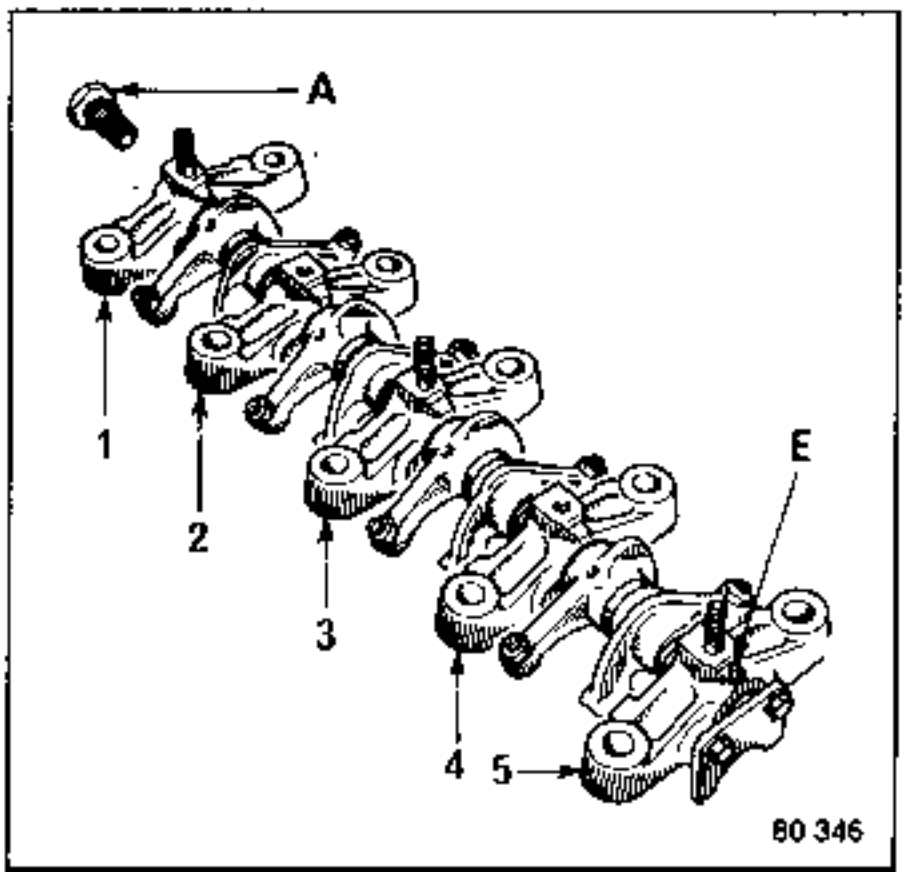
The cylinder head need not be removed for the removal of the rocker shaft assembly.

Proceed as follows:

- remove the timing gear (see section entitled "ENGINE ASSEMBLY AND LOWER ENGINE UNITS - Replacing the gasket");

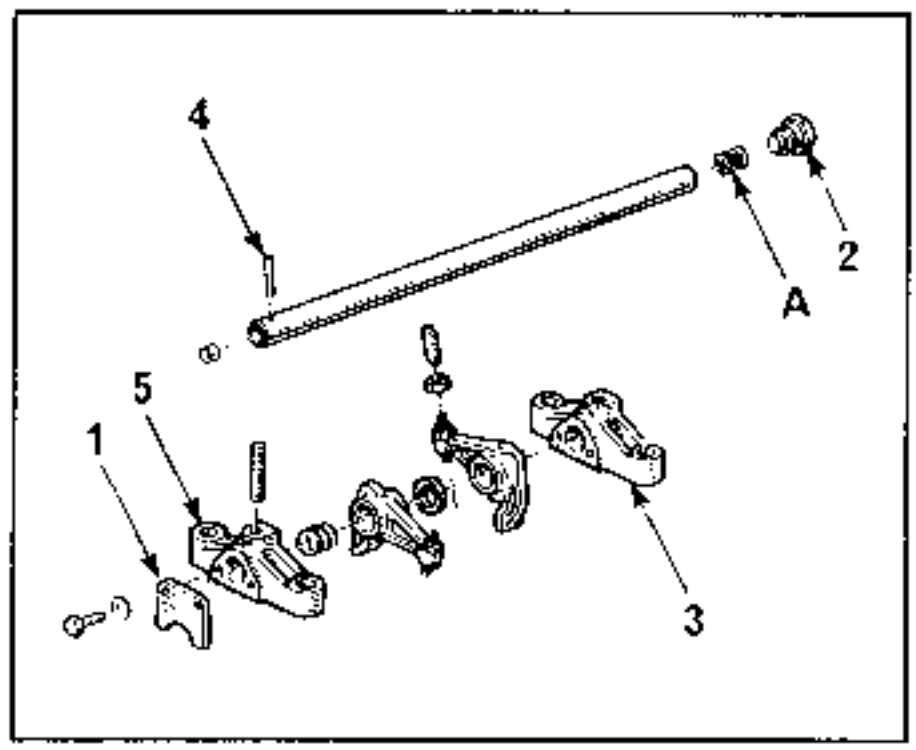
- remove the cylinder head bolts;

- remove the rocker shaft assembly.



Make sure that retaining pin (E) is of the SOLID type before undertaking any dismantling.

If a hollow rollpin is fitted, extract it and fit a **solid rollpin in its place.**



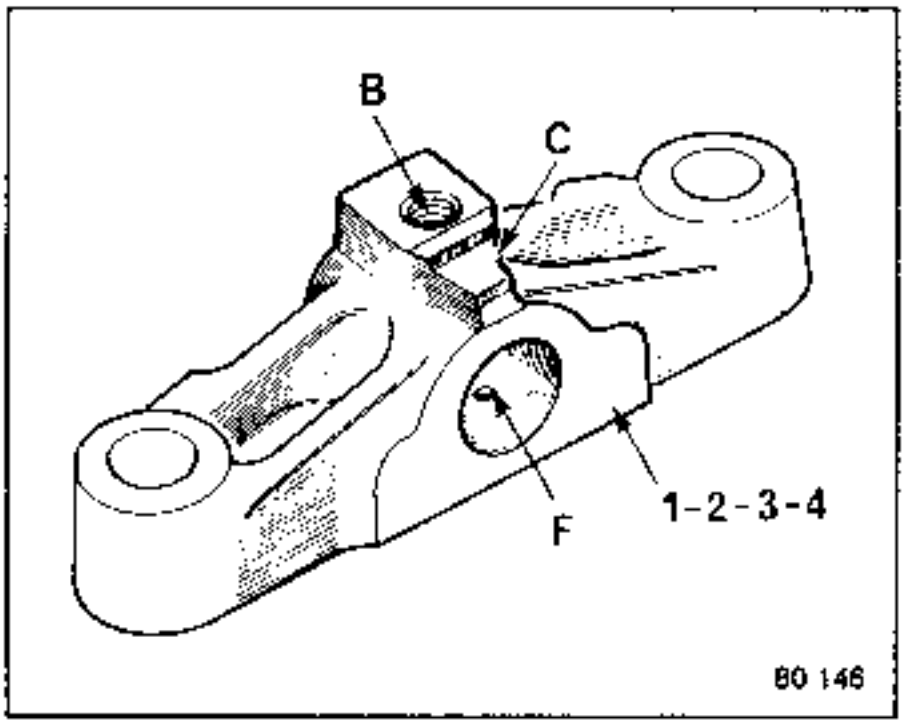
DISMANTLING

Dismantle in numerical order starting at 1.

REASSEMBLY

Component identification

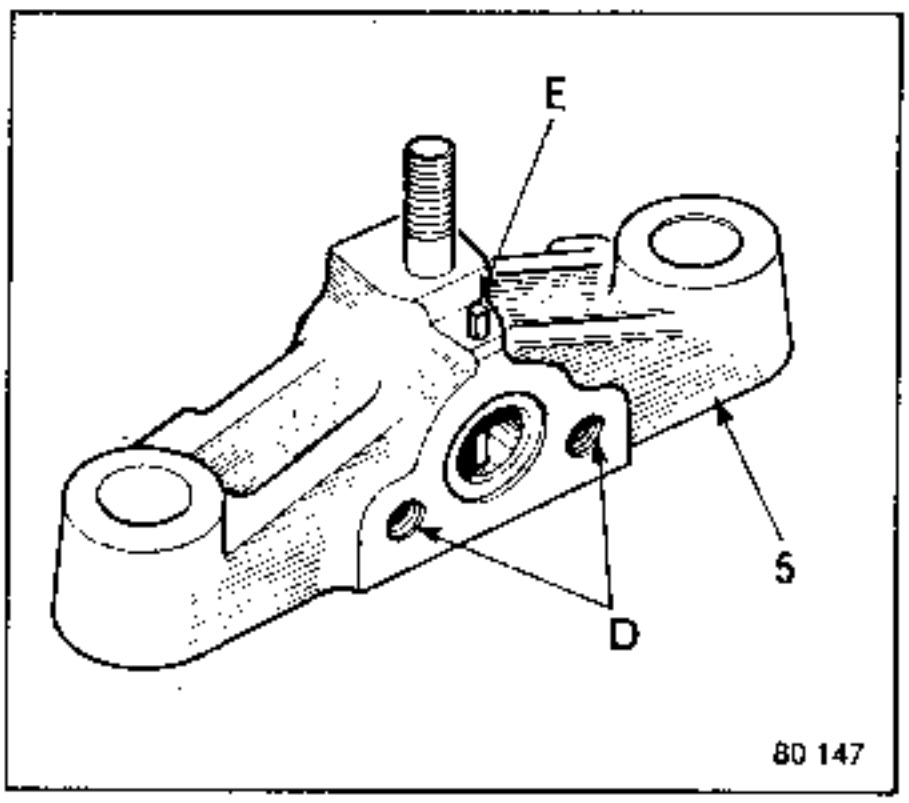
Shaft bearings 1, 2, 3, and 4 are identical.



F: oil feed hole

B: threaded hole for rocker cover stud

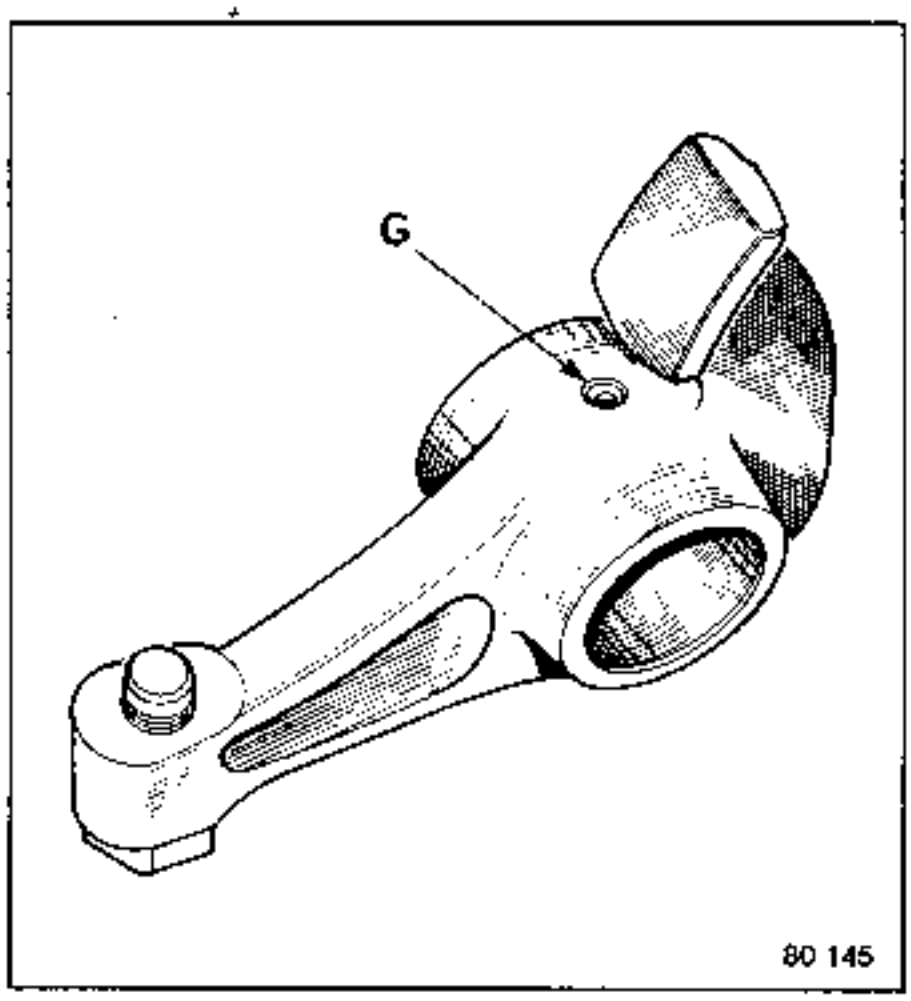
C: timing slot machined on top facing the timing sprocket.



D: 2 threaded holes for the camshaft thrust plate

E: location of solid rollpin.

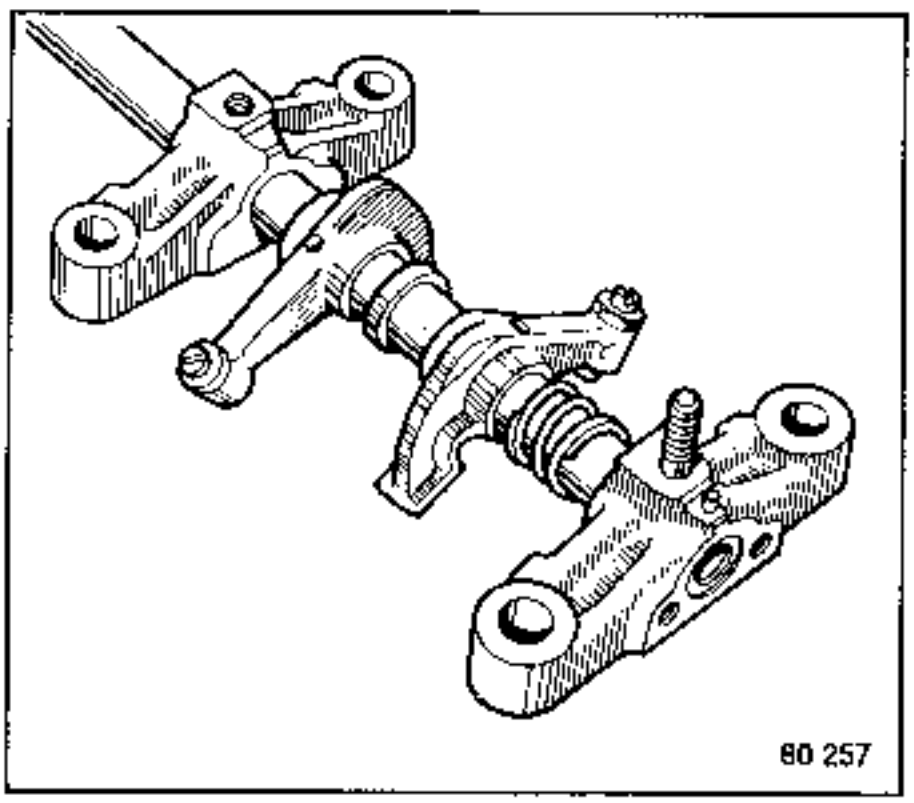
The inlet and exhaust rocker arms are identical.



G: oil jet hole for cam lubrication.

Reassembling the rocker shaft

Carry out the dismantling operations in reverse order.



Filter **(A)** in the rocker shaft assembly must be replaced at each dismantling operation.

(See exploded view of assembly).

End plug torque ..... **2 daNm.**

DISMANTLING - REFITTING THE CYLINDER HEAD - All types except J7R 720 engines

ESSENTIAL SPECIAL TOOLING	
Mot. 791	Camshaft oil seal extracting and inserting tool (timing end)
Mot. 799 or Mot. 855	Camshaft sprocket locking tool
Mot. 965	Camshft oil seal filling tool

Tightening torques (in daNm)	
Timing sprocket belt	5

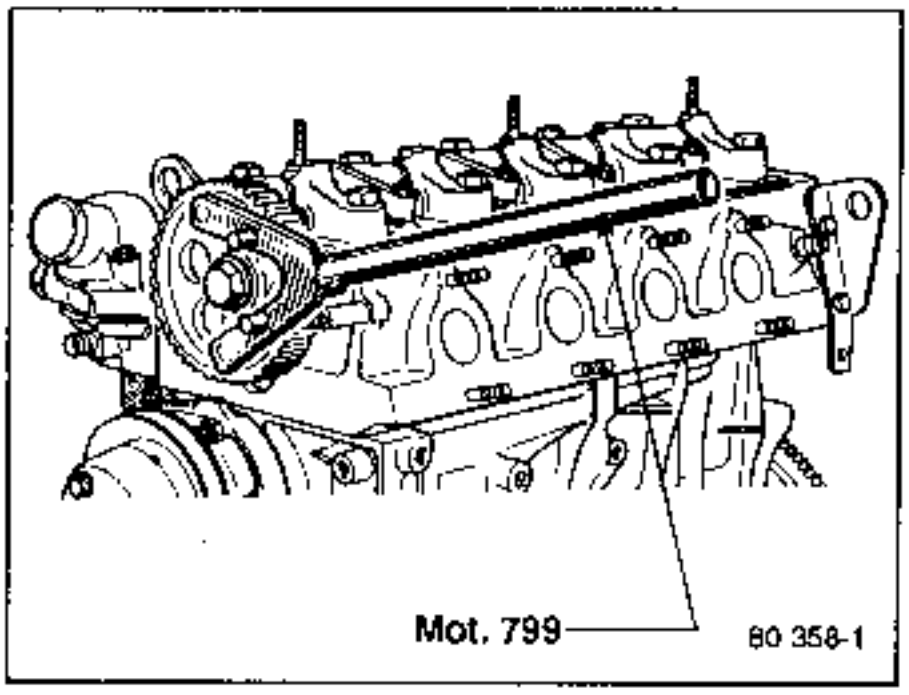
Remove the ancillaries from the cylinder head.

Remove the timing belt (see section entitled "ENGINE ASSEMBLY AND LOWER ENGINE UNITS - Engine repair").

DISMANTLING

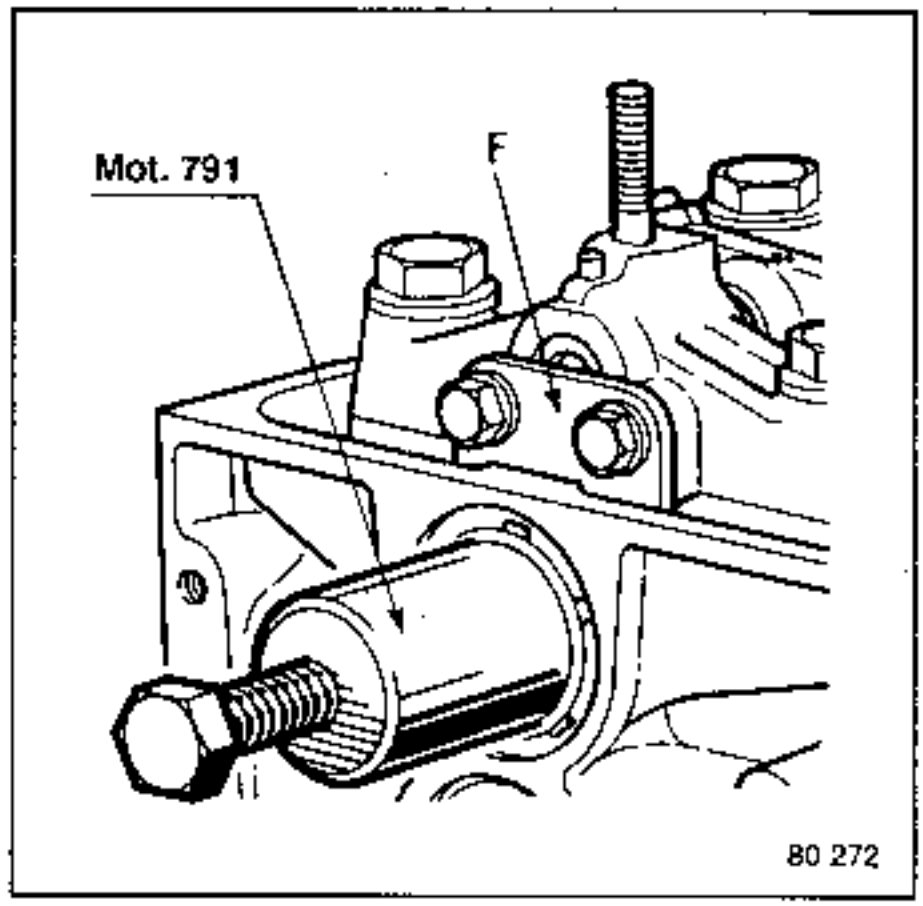
Camshaft

Use tool **Mot.** 799 or **Mot.** 855 when removing the timing sprocket.



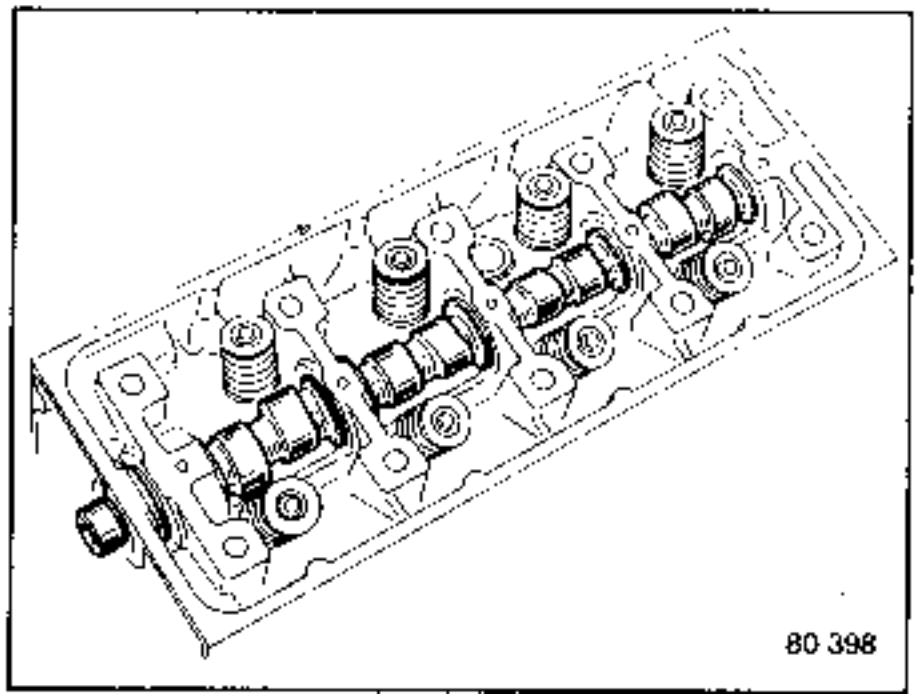
Use tool **Mot. 791** to extract the oil seal.

Camshaft thrust plate **(F)** must be in position.



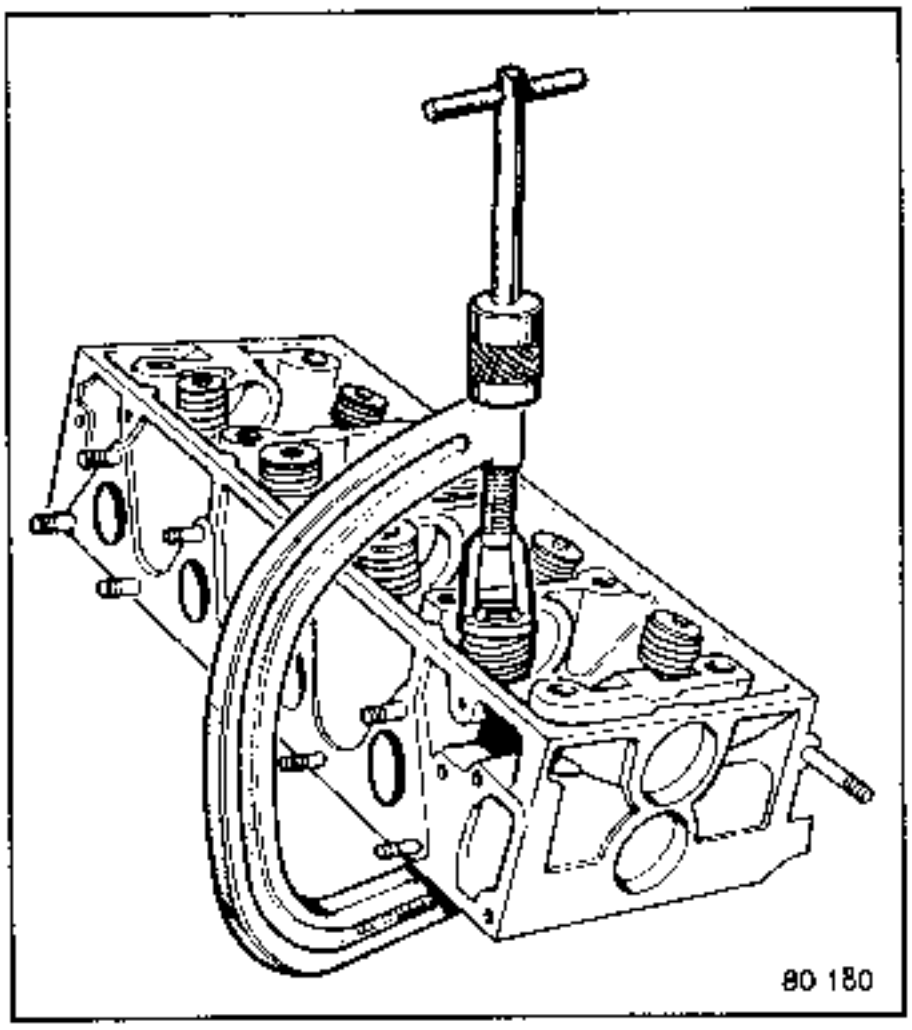
Remove the cylinder head (see the section entitled "ENGINE ASSEMBLY AND LOWER ENGINE UNITS - Engine repair").

Remove the camshaft.

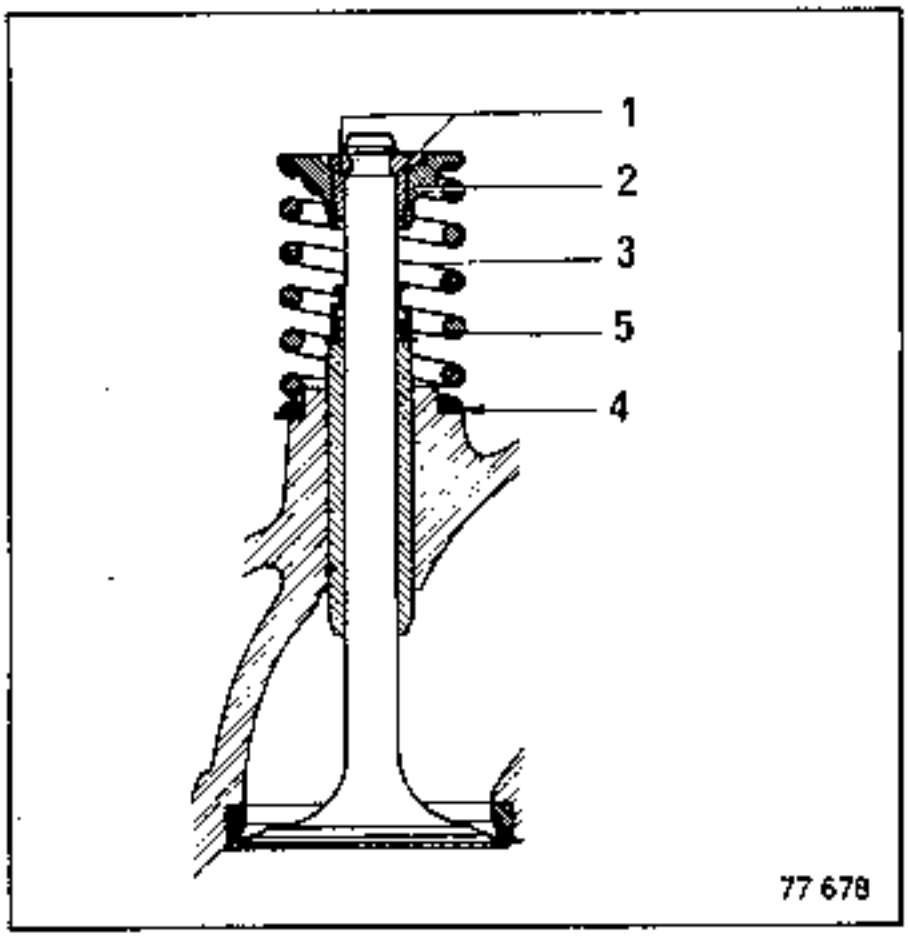


Valves

Use the **FACOM U43L** valve spring compressor.



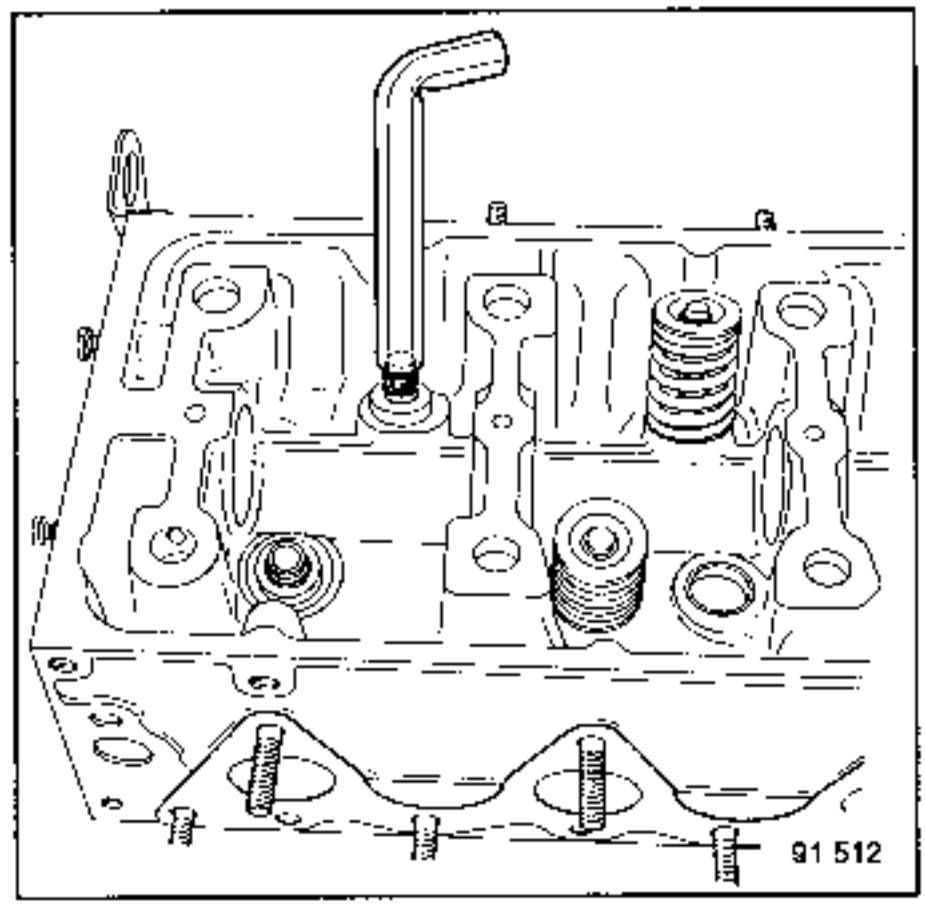
Remove the valve components in the order shown.



REASSEMBLY

Valves:

- Change valve stem oil seals (5). To fit the new oil seals, use a **Nervus type** 10 mm tubular socket wrench.

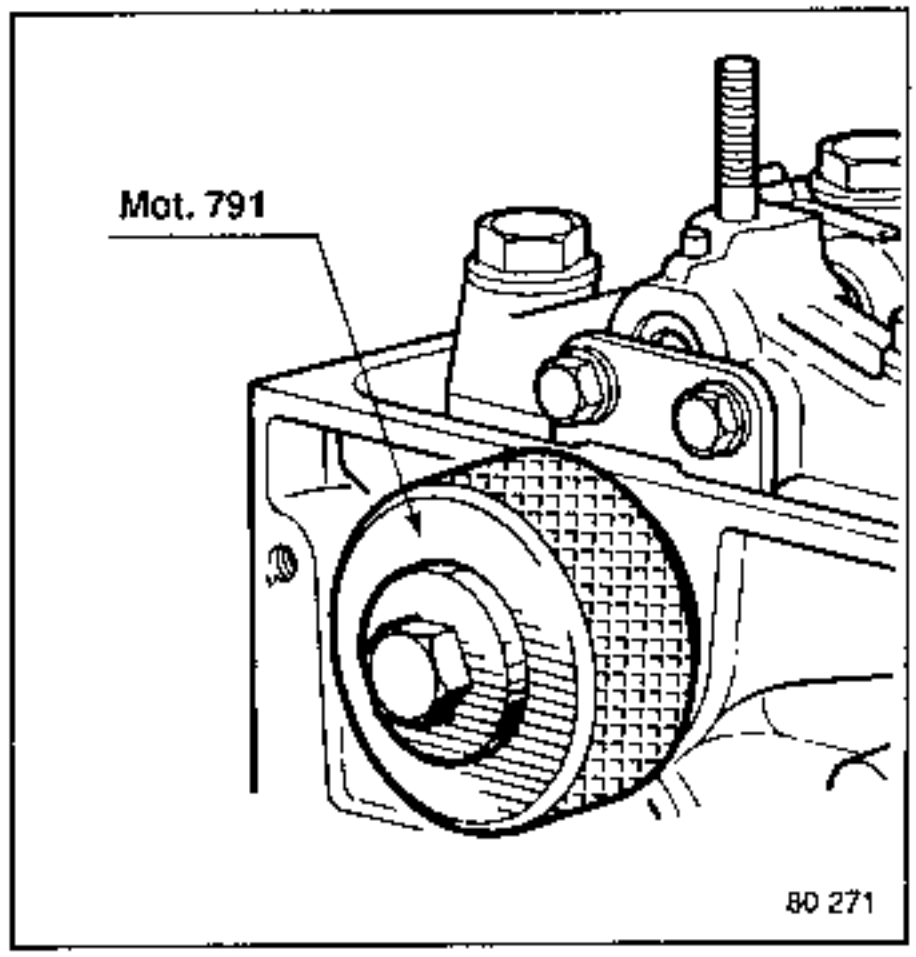


- Reassemble the components in the reverse order to dismantling (when fitting the valves, ensure that seals (5) have not moved).

Camshaft

Offer up the camshaft.

Use inserting tool **Mot. 791** to fit a new oil seal.

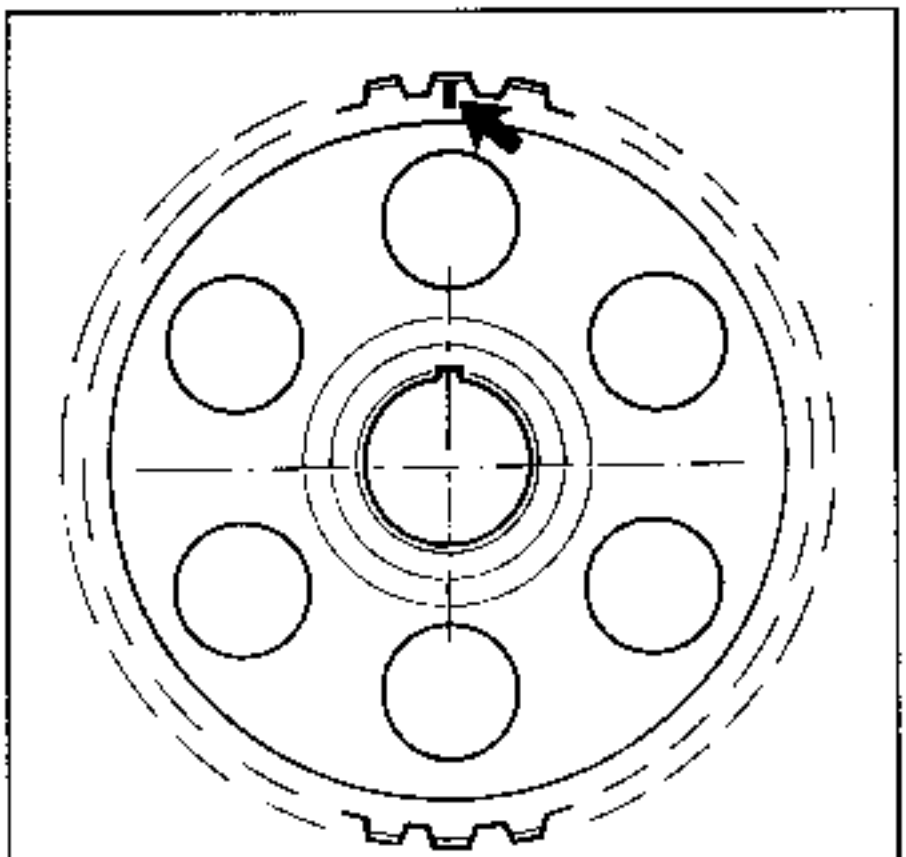


Check the end play; if it is incorrect the thrust plate or camshaft is at fault.

Timing sprocket

1st model: J5R, J6R and 829 engines with square teeth

- The timing sprocket has only one timing mark.



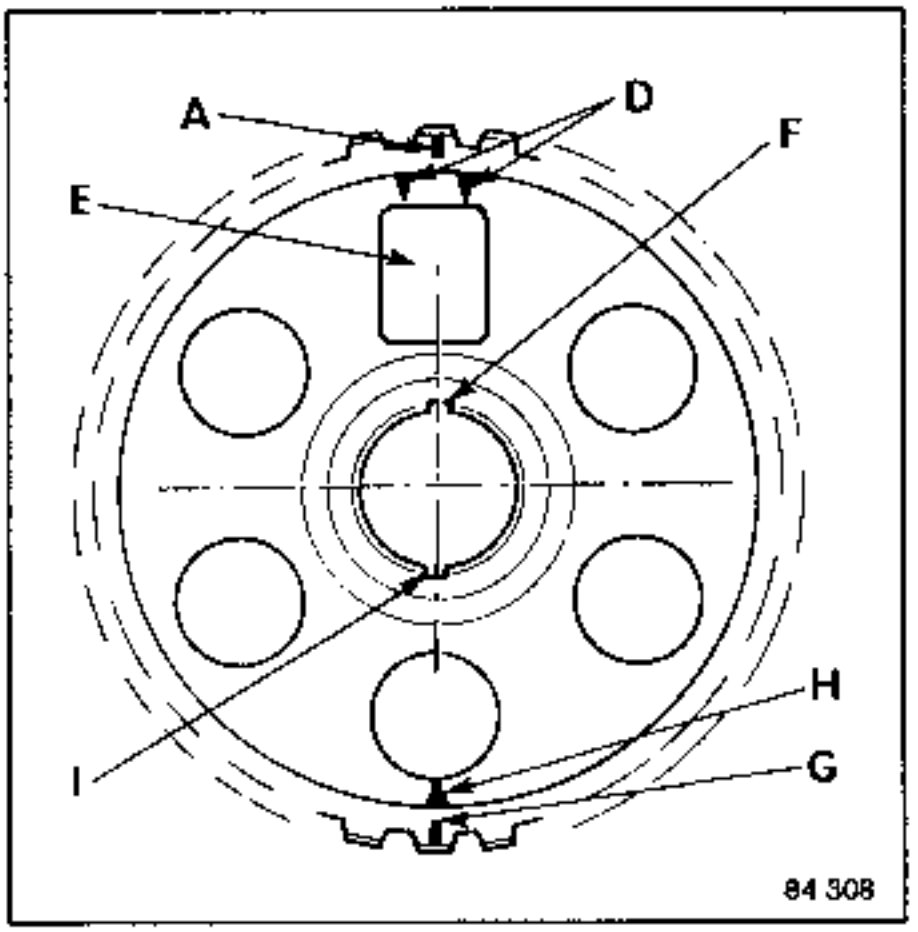
2nd model: J5R, J6R, 829, 851, J7T, J7R engines with square teeth, except J7R 720 engines

- On the above engine types, pay attention to the position of the keyways.

Timing marks are as follows:

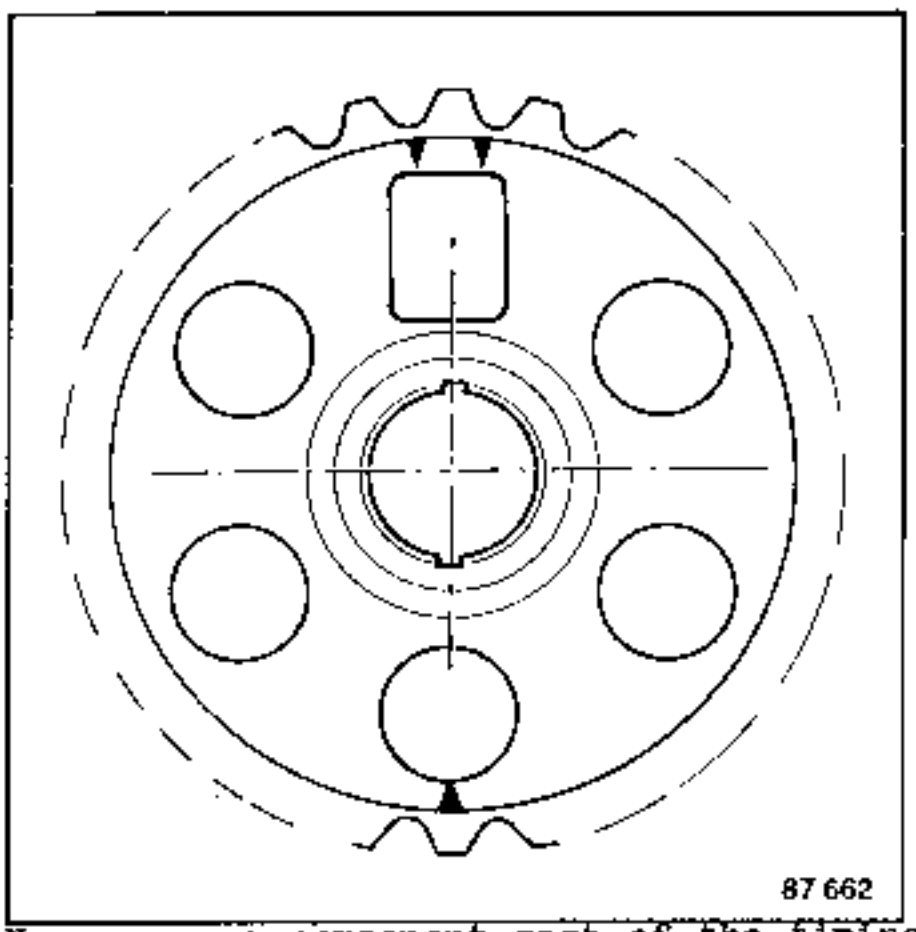
- one mark **A**, two bosses **D**, a rectangular hole **E** and a keyway **F** used to time the valves on **851, J7T and J7R 752 engines;**

- one mark **G**, one boss **H** and a keyway I are used to time the valves on **J6R, J5R, 829 and J7R engines.**



3rd model: J5R, J6R, 829, J7T, 851 J7R engines with rounded teeth, except J7R 720 engines

This is identical to the second model apart from the shape of the teeth.

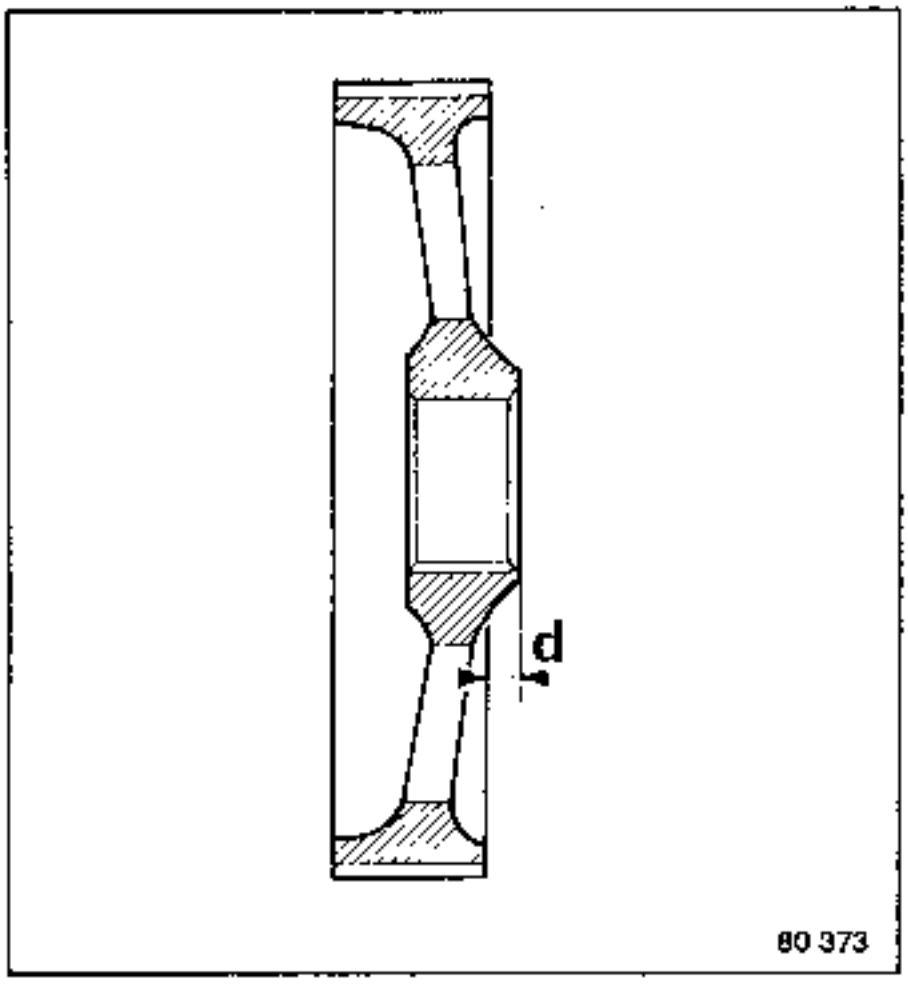


Never use a component part of the timing gear with square teeth with component parts of the timing gear with rounded teeth.

Offer up the sprocket:

- keyway I for engines: **J6R, J5R, 829, J7R**
- keyway F for engines: **J7R 752, J7T, 851**

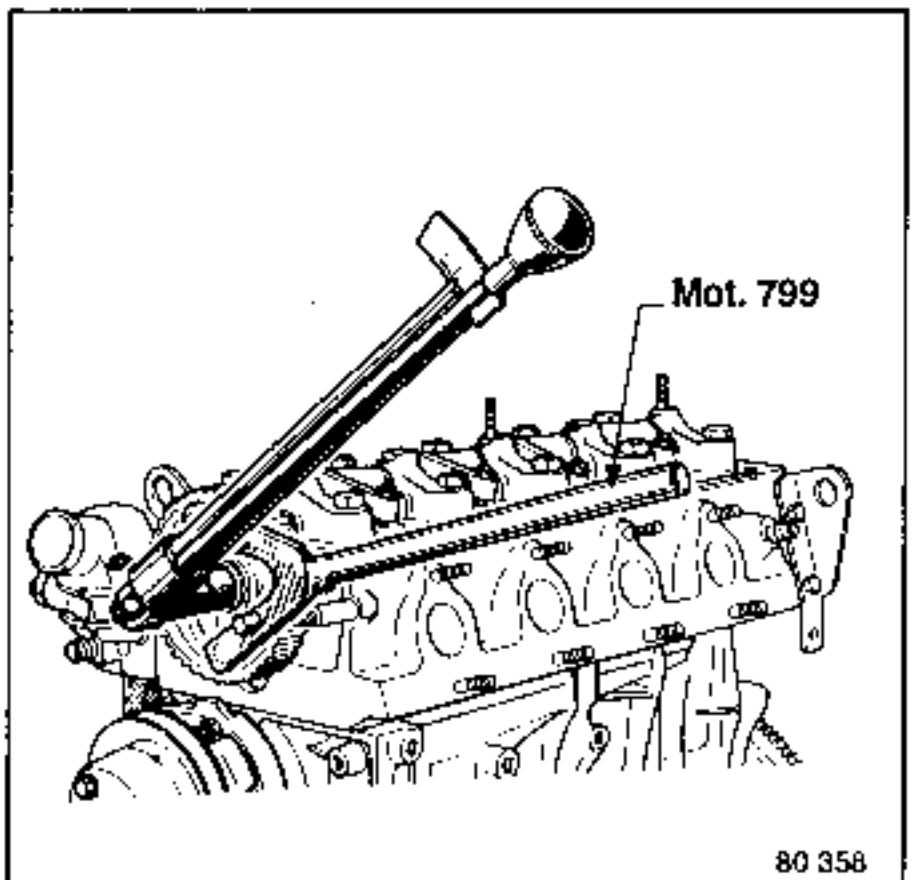
The sprocket is fitted with its offset **(d)** facing the cylinder head.



Smear the bolt with one or two drops of **Loctite FRENBLOC.**

Use tool **Mot.** 799 or tool **Mot.** 855 and torque tighten the sprocket bolt.

- Tightening torque ..... **5 daNm.**



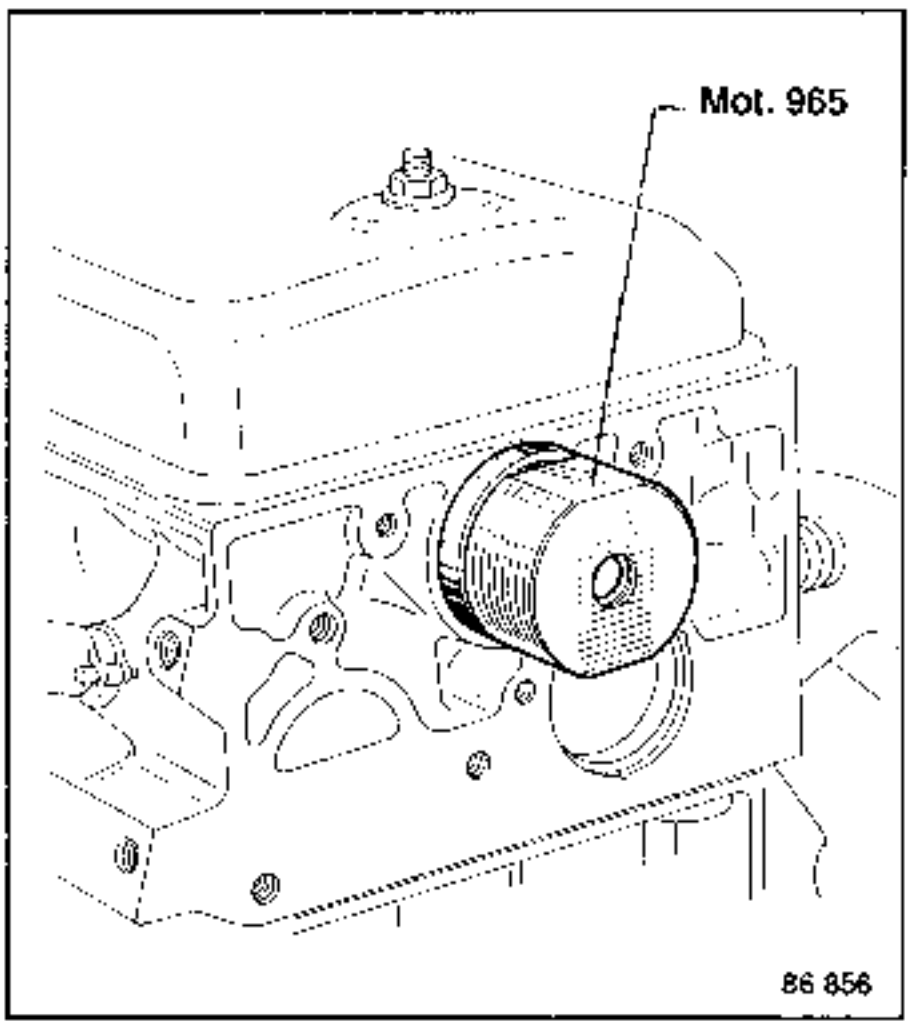
Refit the rocker shaft assembly.

Torque tighten the cylinder head bolts.

Check and adjust the valve timing (see section entitled **"TIMING GEAR"**).

Refit the ancillaries.

For vehicles **1343 - 1353** and **1363 with PAS and air conditioning** fit the camshaft oil seal using tool **Mot.** 965.



DISMANTLING - REASSEMBLING THE CYLINDER HEAD ON J7R 720 ENGINE

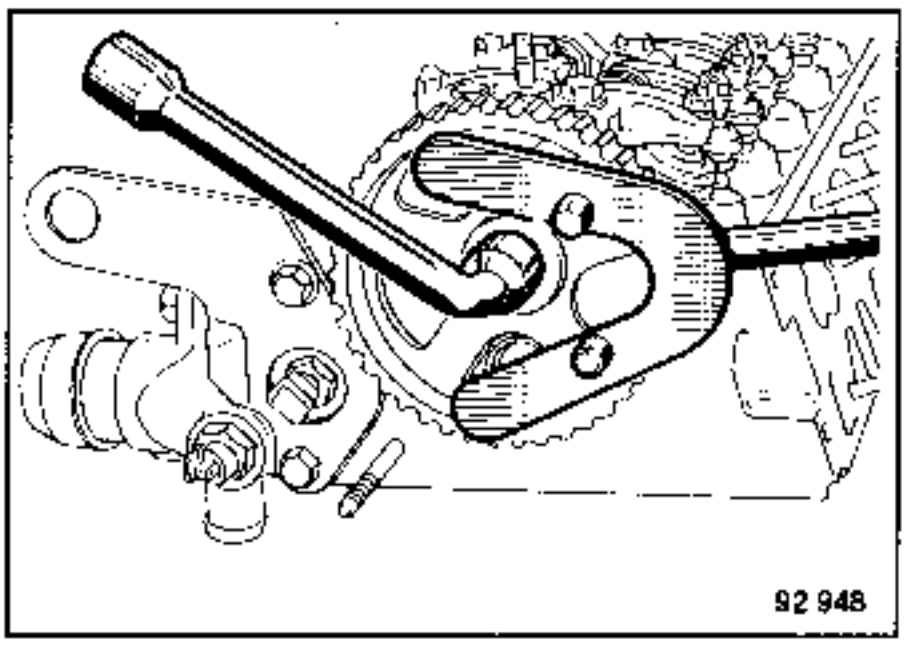
ESSENTIAL SPECIAL TOOLING	
Mot. 799 or Mot. 855	Sprocket holding tool for toothed belt timing gear
Mot. 1157	Extracting and inserting tool for camshaft oil seal.
Facom U43L	Valve spring compressor
Mot. 1169	Rocker arm locking tool

TIGHTENING TORQUES (in daNm)	
Timing bolt	5
Rocker shaft assembly bearing bolts	2.2 to 2.6
Spark plugs	2.4 to 3

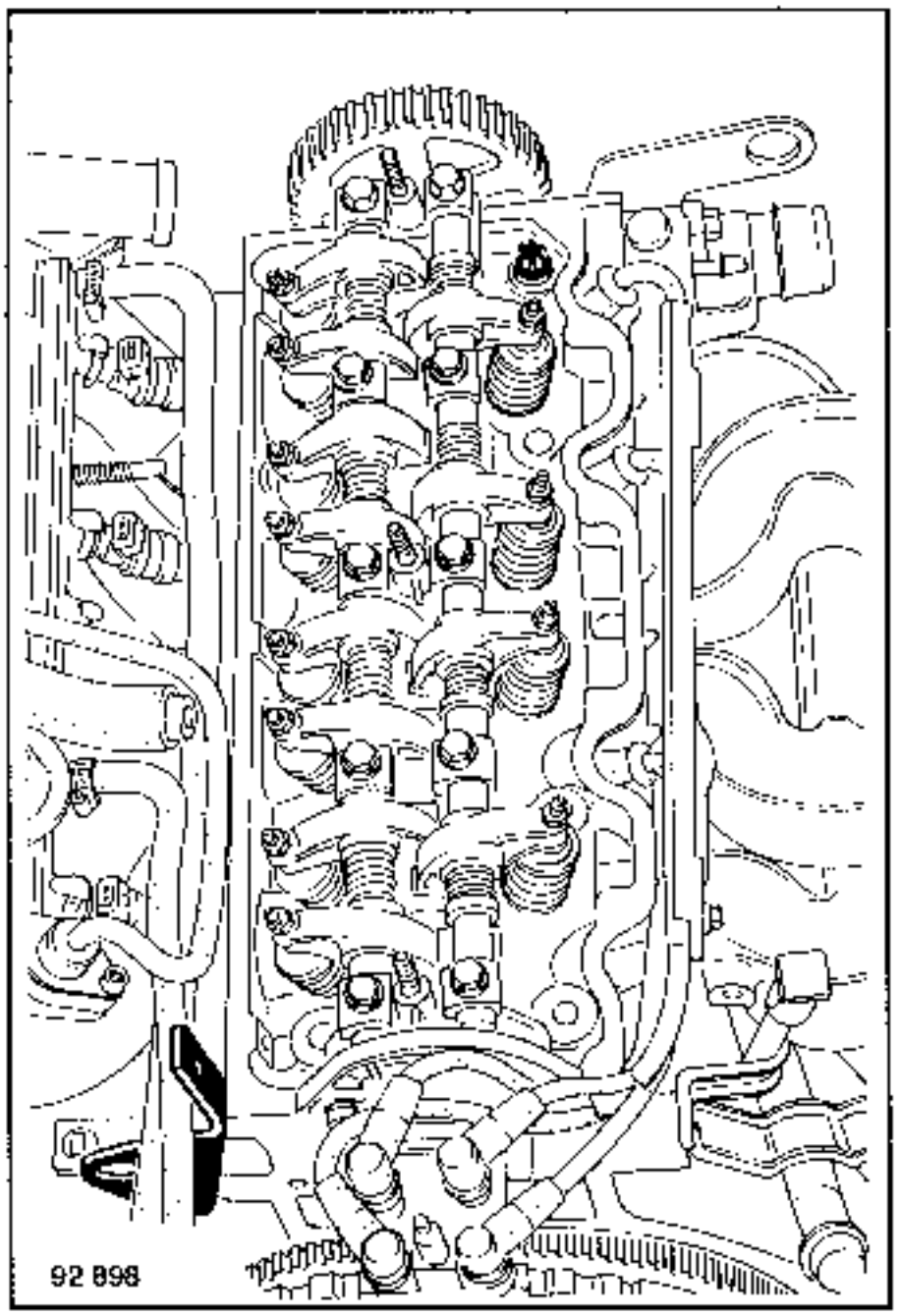
Remove the cylinder head and timing belt (see section entitled "Replacing the cylinder head gasket").

DISMANTLING

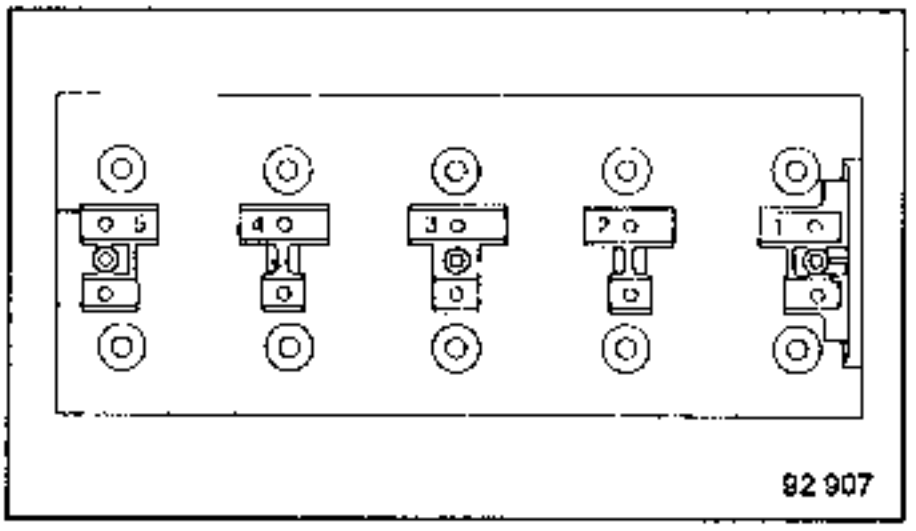
Remove:
- the distributor and pinking sensor;
- the inlet and exhaust manifolds;
- the timing sprocket using tool **Mot.799.**



Slacken:
- the rocker arm adjusting nuts and bolts;
- the rocker shaft assembly securing bolts.

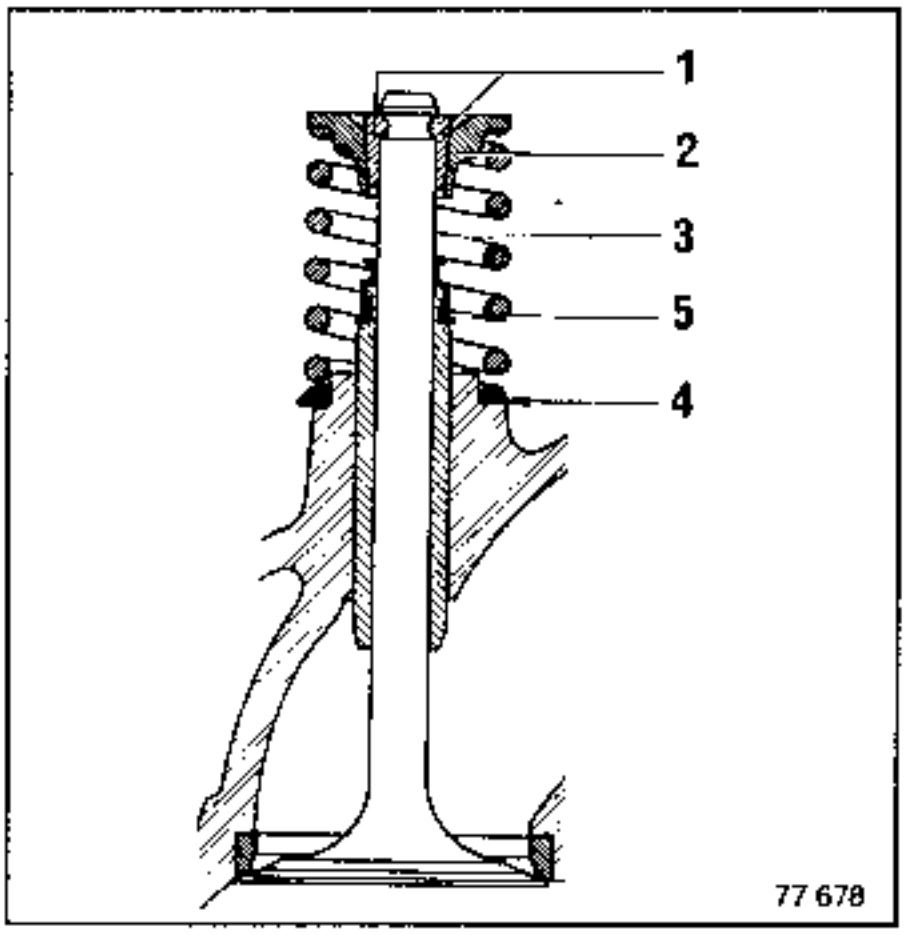


Remove:
- the rocker shaft assemblies;
- the shaft assembly bearings, marking the position of bearings No. 2 and No. 4;
- the camshaft and its seal;



- the inlet and exhaust valves using a valve compressor of the **Facom U43L** type.

Dismantle the parts in ascending numerical order.



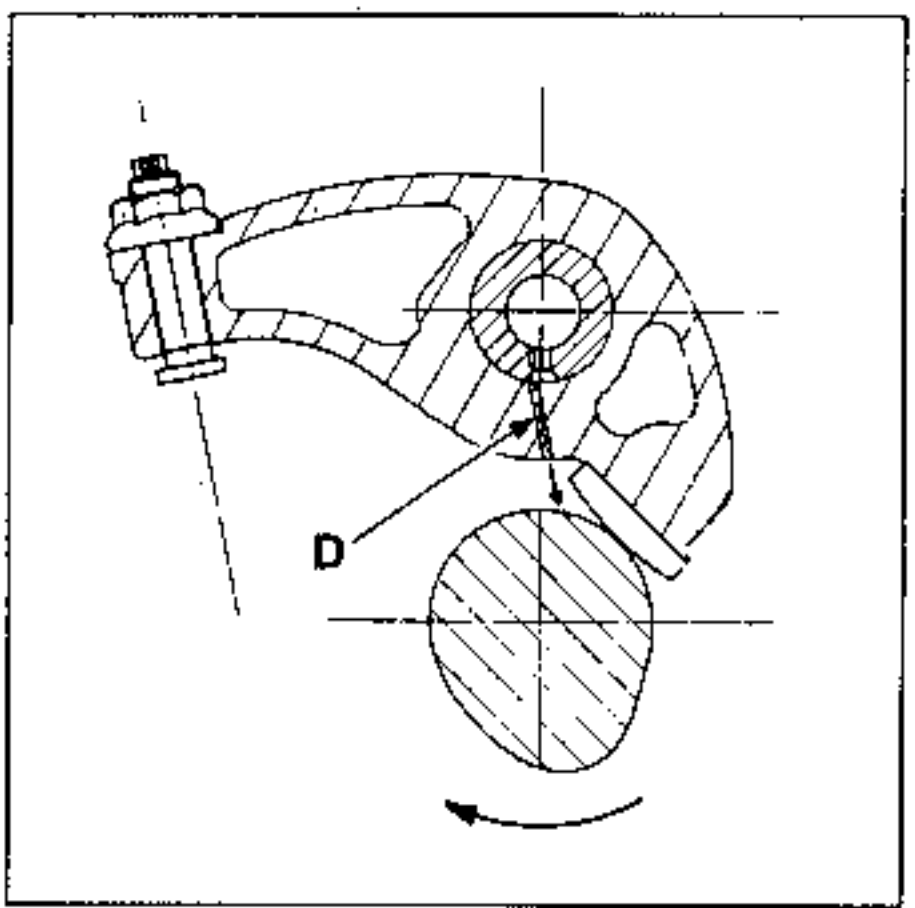
IDENTIFYING THE ROCKER SHAFT ASSEMBLIES

Dismantle the rocker shaft assembly, taking care to mark the position of the rocker arms on it.

Examine the condition of the rocker arm and tappet pad surfaces.

Check that lubricating holes (D) for the cams and pads are not blocked.

Replace any worn parts.



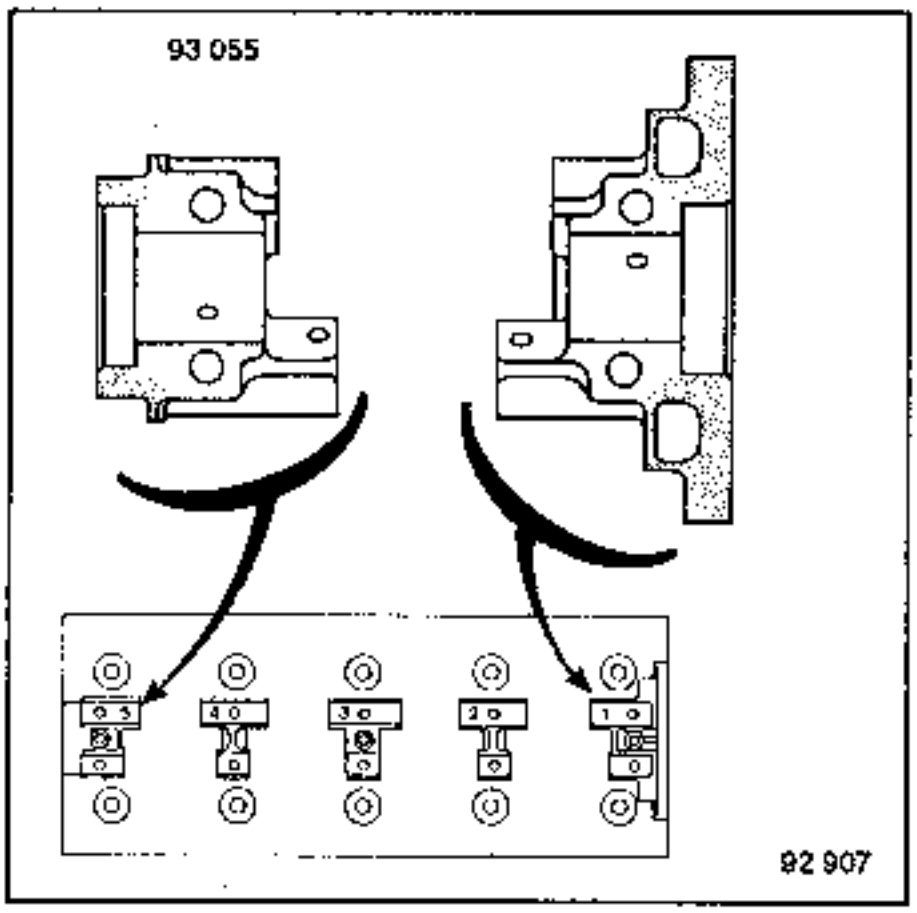
REASSEMBLY (Special points)

Change seals (5) for the valve stems using a 10 mm Nervus type tubular spanner.

Reassemble the valves (make sure that seals [5] have not moved).

Fit in place the camshaft and bearings numbers 2, 3 and 4 for the rocker shaft assembly, making sure that bearings 2 and 4 are in the correct position.

Smear the joint faces of bearings numbers 1 and 5 with **Loctite 518** (as indicated above).

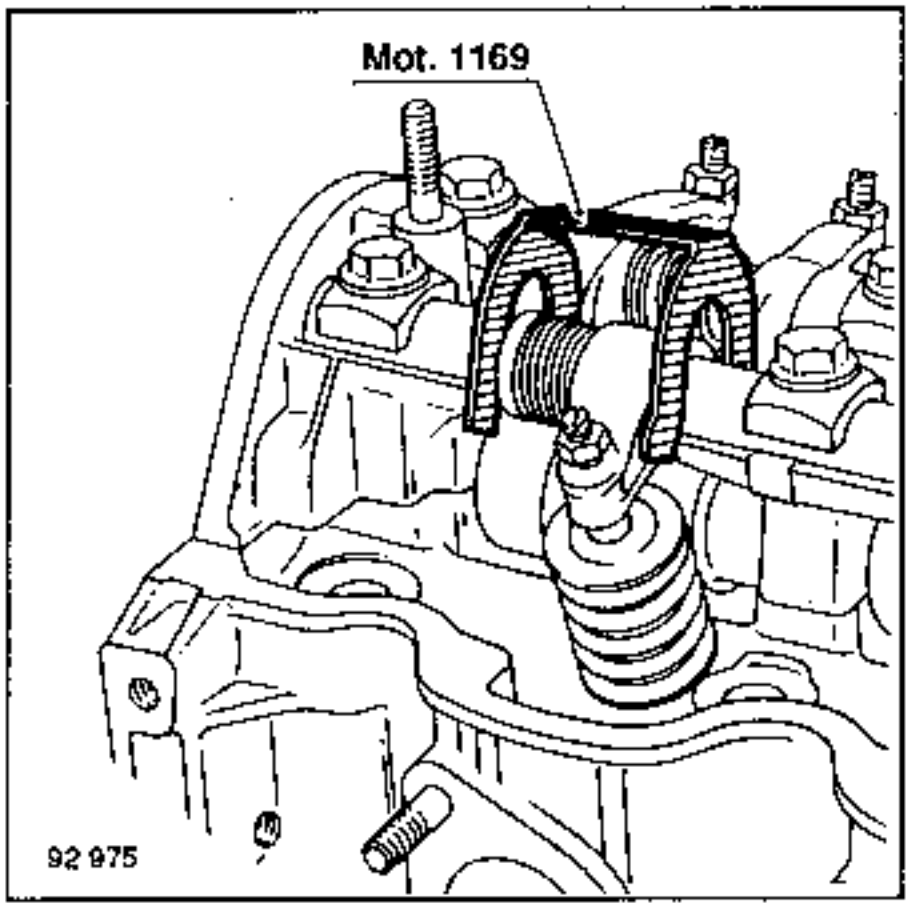


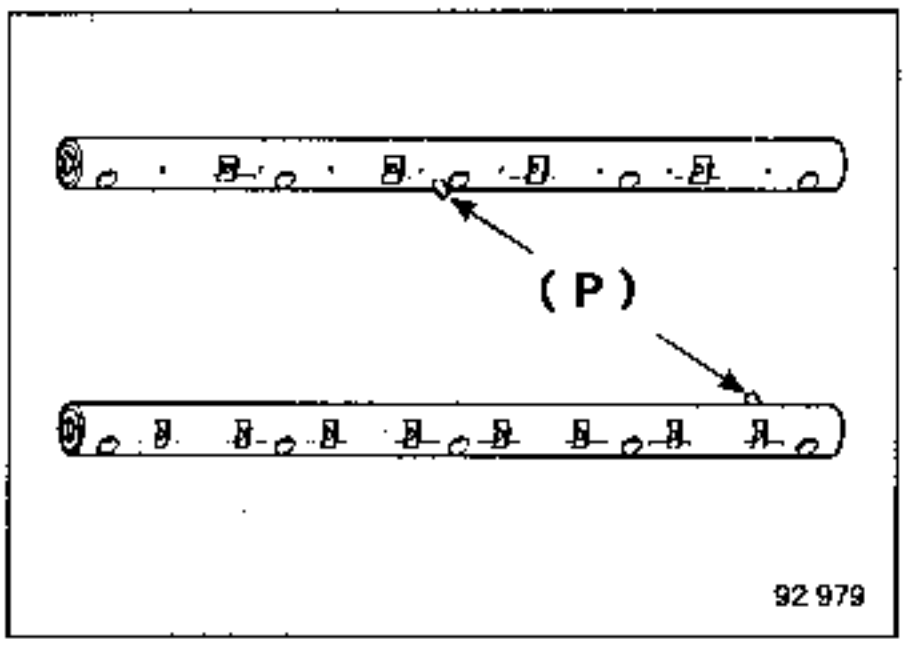
Prepare the rocker shaft assemblies, fitting the rocker shaft retaining forks **(Mot. 1169)**.

Fit bearings numbers 1 and 5 in place.

Refit the rocker shaft assemblies, fitting pins (P) as follows:

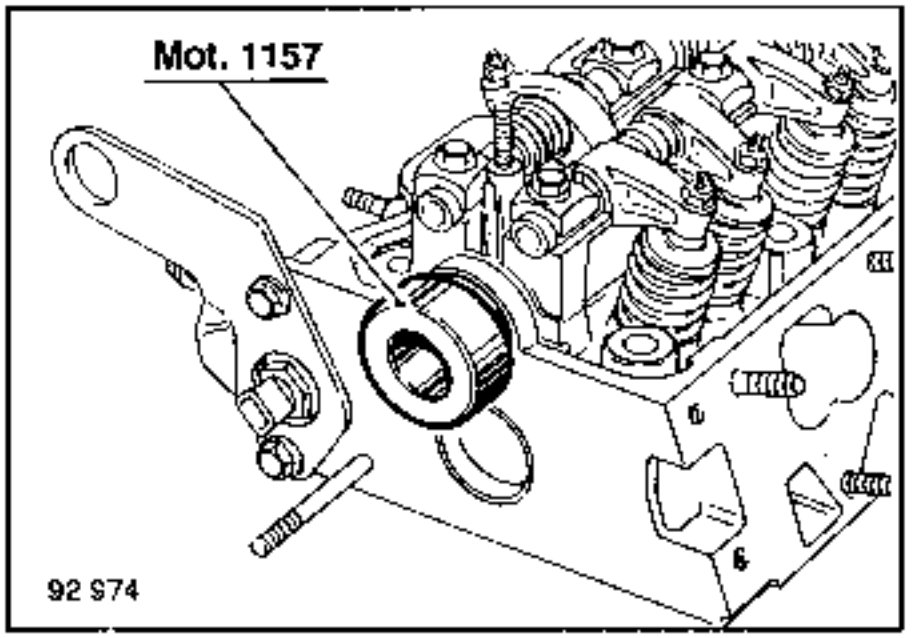
- on the exhaust rocker shaft assembly the pin is located in a hole on the centre bearing;
- on the inlet rocker shaft assembly the pin is at the top on the timing gear side.





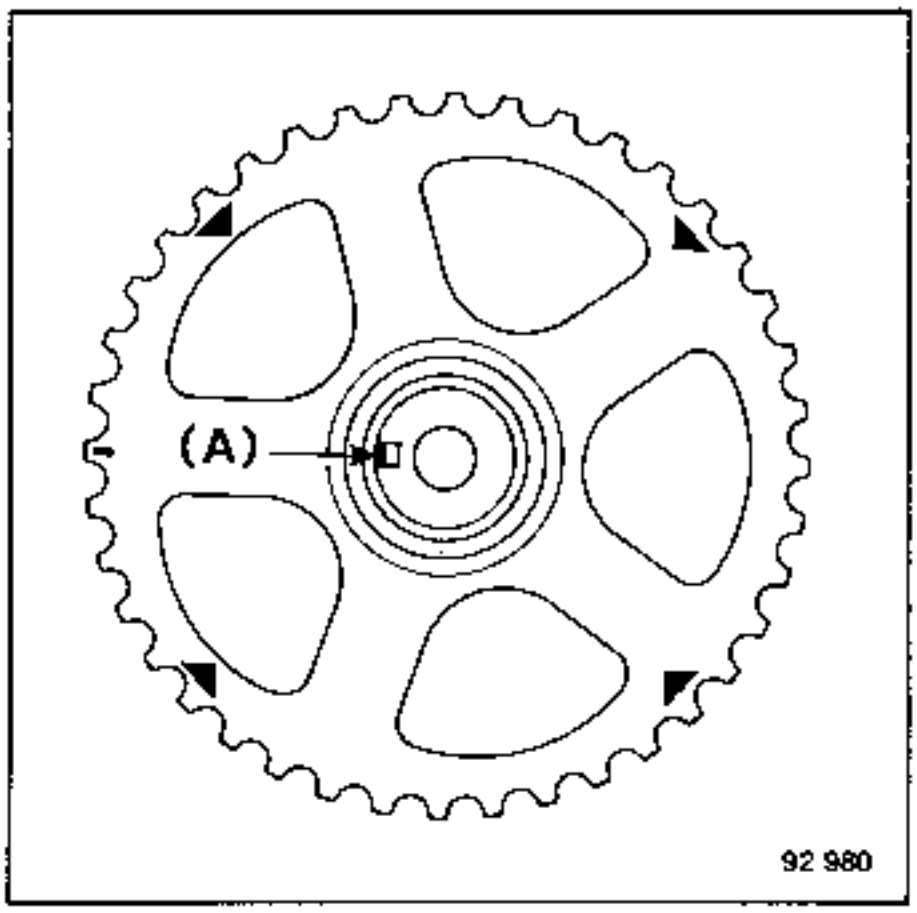
Retighten the rocker shaft assembly mounting bolts to the correct torque **(2.2 to 2.6 daNm)**, starting with the bolts for bearings numbers 1 and 5 (the bolts for bearings numbers 1 and 5 **must** be **fitted** and **torque tightened very quickly** owing to the **limited time** allowed by the **rapid polymerisation** of the **Loctite 518.**

Clean the camshaft joint face and fit the seal using tool **Mot.1157.**



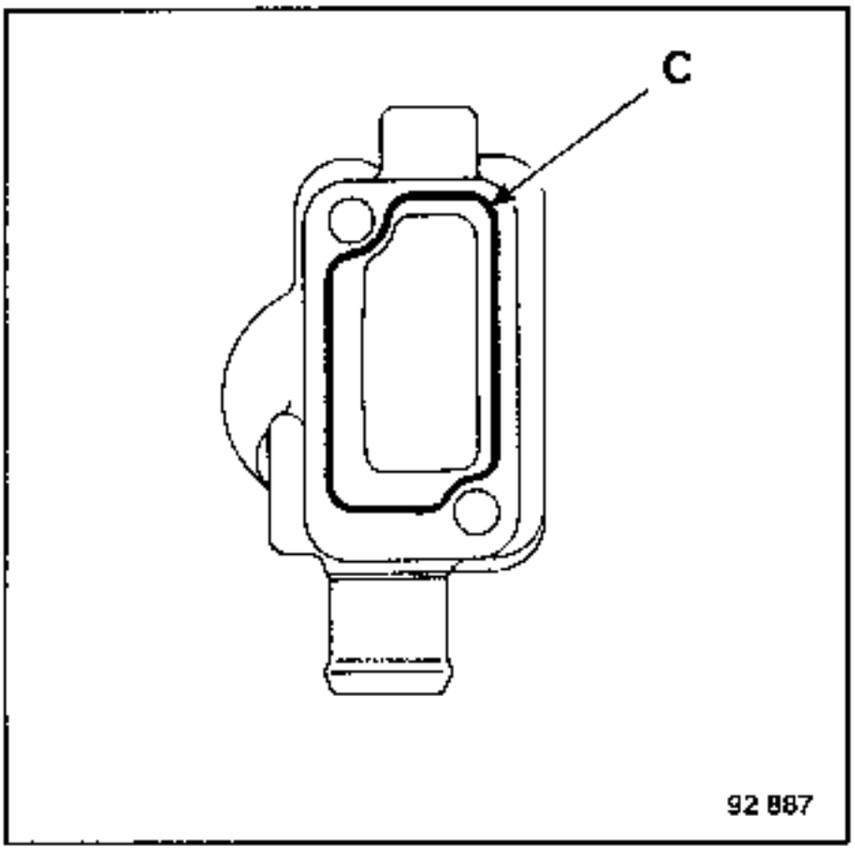
When reassembling the timing pulley, make sure that key **(A)** which is ground into the pulley is positioned correctly opposite its location on the camshaft.

Smear the pulley bolt with **Loctite FRENBLOC** and torque tighten it, locking the pulley using tool **Mot. 799, without turning the camshaft** (risk of breaking the key).



REASSEMBLING THE COOLANT OUTLET PIPE ON THE CYLINDER HEAD

As the coolant outlet pipe is mounted without a seal, on reassembly a bead (C) of **Formatjoint** which is between 0.6 and 1 mm thick must be applied as shown in the diagram below.



Note: When reassembling the rocker cover, torque tighten the two end bolts first, then the centre bolt (tightening torque **1.4 to 1.8 daNm**).

RECUTTING VALVE SEATS

ESSENTIAL SPECIAL TOOLING	
"NEWAY" reference	Description
100-7 / 140-8 / 150-8 / 275-7	Pilot
110 / 121 / 208 / 213 / 232 / 273	Cutters

INLET

	J7R 720	All types
- Valve seat width X (mm) ...	1.7	1.8
- Angle α	90°	120°

J7R 720 engines:
Once a satisfactory seating (1) has been cut using cutter no. 110 at 46°, reduce its length at 3 using cutter 121 at 15°.

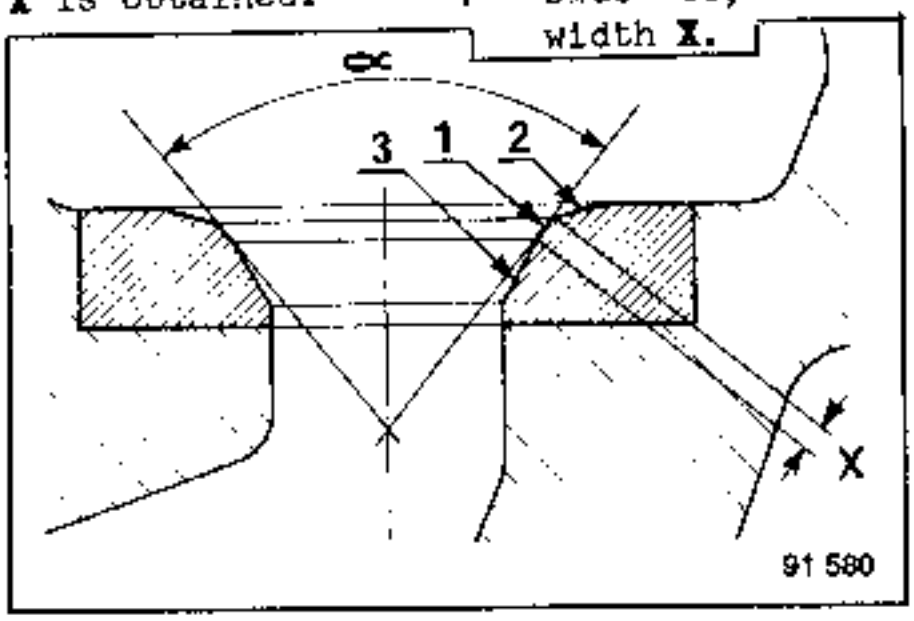
All types
Once a satisfactory seating (1) has been cut using cutter no. 208, side 31, reduce its width at 3 (using cutter 213, side 15) and at 2 (using cutter 213, side 60) until width X is obtained.

EXHAUST

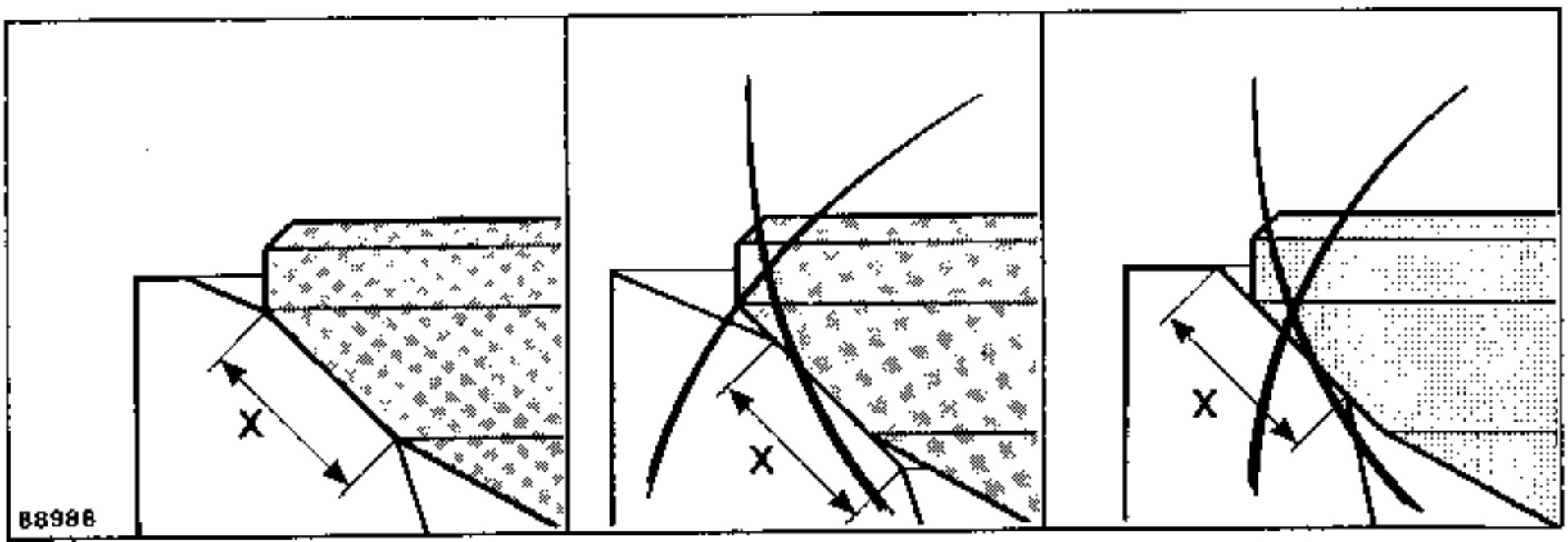
	J7R 720	All types
- Valve seat width X (mm)	1.7	1.6
- Angle α	90°	90°

J7R 720 engines:
Once a satisfactory seating (1) has been cut using cutter no. 110 at 46°, reduce its length at 3 using cutter 121 at 15°.

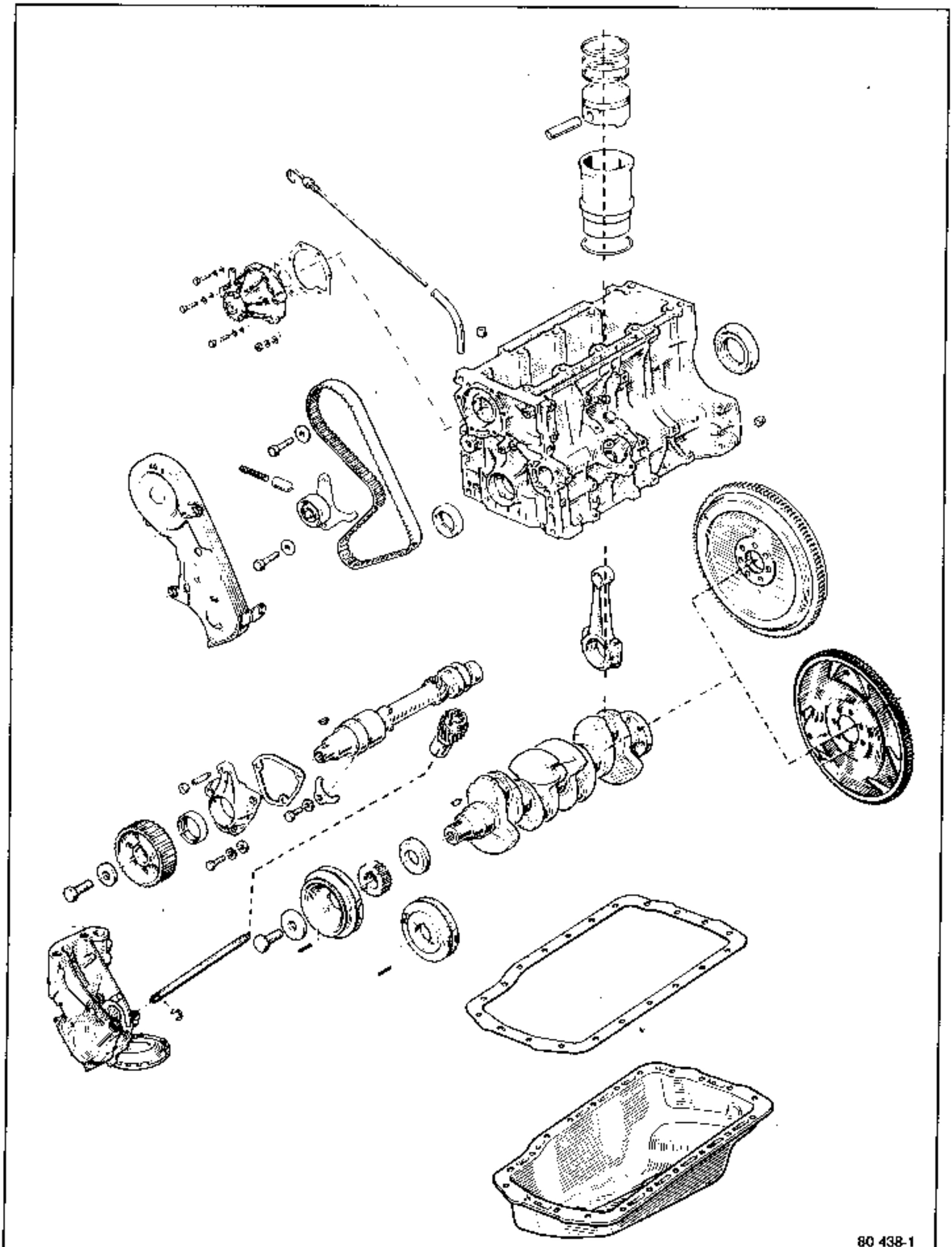
All types
Once a satisfactory seating (1) has been cut using cutter no. 208, side 46, reduce its width at 3 using cutter 213, side 15 and then at 2 using cutter 213, side 60, to obtain the correct seat width X.



NOTE: Make sure the valve sits properly on its seat.



CYLINDER BLOCK EXPLODED VIEW



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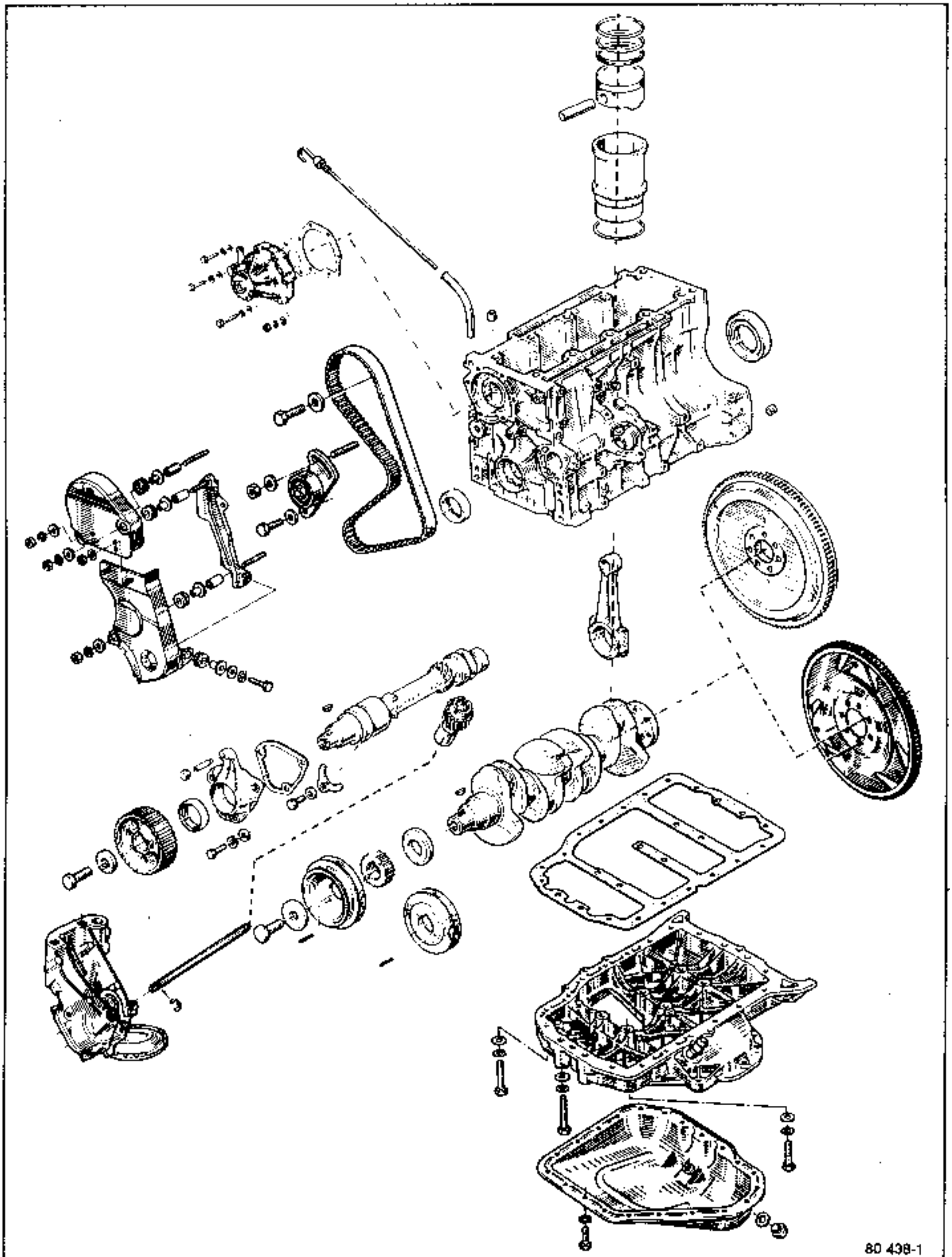
CYLINDER BLOCK EXPLODED VIEW



ESSENTIAL SPECIAL TOOLING

Elé. 346-04	Belt tensioning tool
Mot. 11	Clutch shaft spigot bearing extractor
Mot. 251-01	Clock gauge bracket for checking liner protrusion
Mot. 252-01	Thrust plate for checking liner protrusion
Mot. 445	Oil filter clamping tool
Mot. 574-16	Gudgeon pin inserting and removing tool
Mot. 582	Flywheel locking plate
Mot. 588	Liner clamp
Mot 646 or Mot. 851	Piston filting sleeve
Mot. 647	Rocker arm clearance adjusting tool
Mot. 720	Cylinder head locating tool
Mot. 788	Main bearing oil seal inserting tool (flywheel end)
Mot. 789	Main bearing oil seal inserting tool (timing gear end)
Mot. 790	Intermediate shaft oil seal inserting tool
Mot. 799 or Mot. 855	Sprocket holding tool
Mot. 861	T.D.C. rod

TIGHTENING TORQUES (in daNm)

	J7R 720	All types
Cylinder head bolts:		
.1st pre-tightening	2	5
.2nd pre-tightening	93°	8
.Tightening	93°	8.75 to 9.75
.15 min later angle	20°	

Big-end cap nuts:
- 829 - J6R - J5R - J7R - ..... 4.5 to 5
- 851 - J7T - ..... 6 to 6.5

Main bearing cap bolts ..... 8.75 to 9.75

Flywheel fixing bolts..... 6

Converter drive plate bolts.. 6.5 to 7

Crankshaft pulley bolt
(see "specifications", page 11 and 12)

	All types
Intermediate shaft pulley bolt	5
Camshaft timing sprocket	5
Oil pump fixing bolts	4 to 4.5

Sump fixing bolts:
- Pressed steel sump..... 1 to 1.4
- Aluminium sump ..... 1.4 to 1.7

Replacing liners and pistons

Drain:

- the cylinder block of coolant;
- the sump.

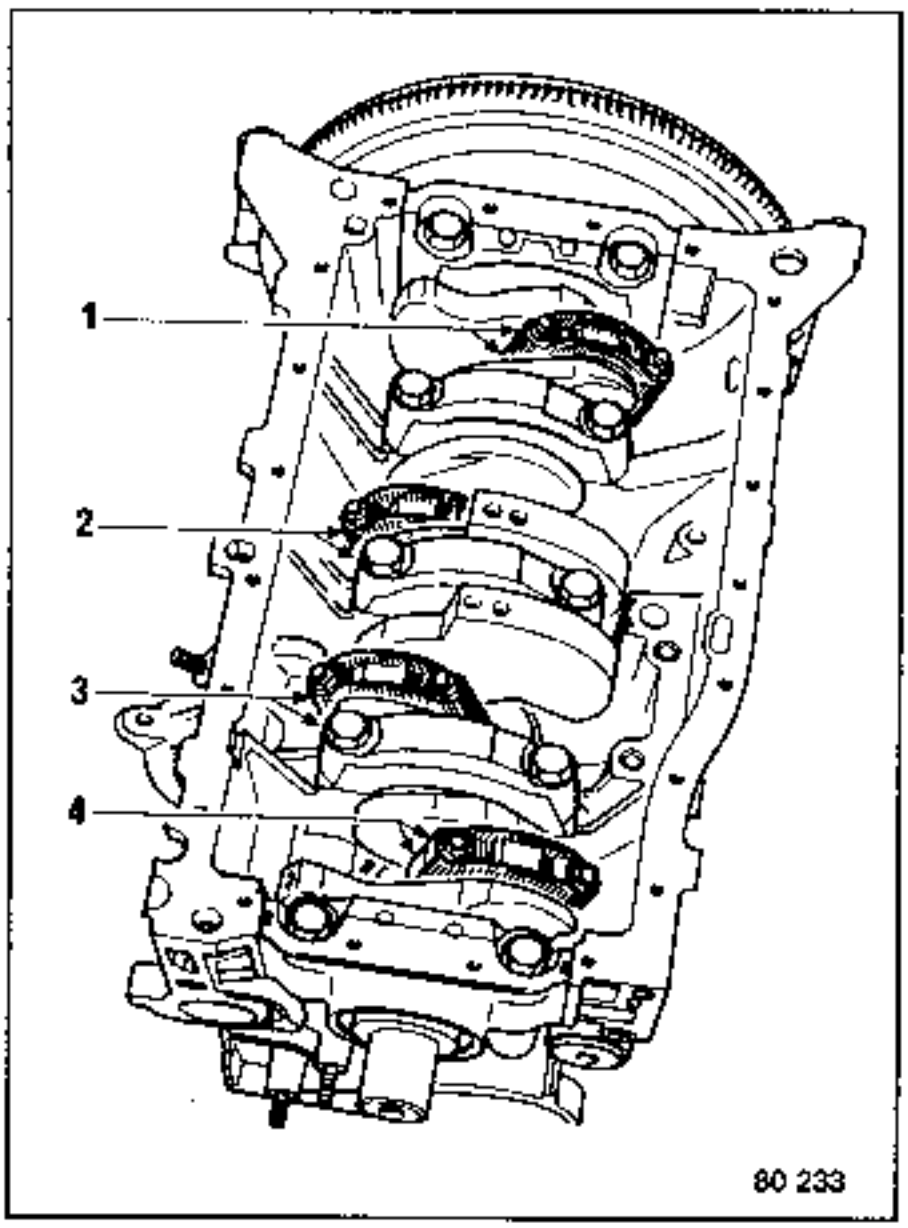
Secure the engine to support **Mot. 792** (see section entitled "SPECIFICATIONS").

REMOVING

Remove:

- the cylinder head (see section entitled "CYLINDER HEAD");
- the sump.

Mark the connecting rods - No. 1 at the flywheel end and on the intermediate side.



Remove the big-end caps and bearing shells.

Withdraw the liner-piston-connecting rod assemblies.

CLEANING

It is very important not to scrape gasket faces on aluminium parts.

Use **Decap joint** to dissolve any part of the gasket still stuck to the cylinder block.

Brush the liquid onto the area to be cleaned; wait about ten minutes, then lift the remnants off with a piece of wood.

Gloves should be worn during this operation.

Do not let any drops of liquid fall onto paintwork.

Great care must be taken with this operation to prevent foreign matter entering the channels for pressure-fed oil to the rocker shaft (channels in cylinder block and head).

If the above advice is disregarded, the rocker shaft filter or rocker arm oil jet holes may become choked, leading to rapid cam and rocker arm finger wear.

Using a syringe, suck up any oil remaining in the cylinder head bolt fixing holes.

This is necessary in order to obtain correct bolt tightening.

Clean:

- **inside the cylinder block;**
- **the liner base locations;**
- **the crankshaft.**

PREPARATION

Check the condition of:

- the oil pump
- the cylinder head.

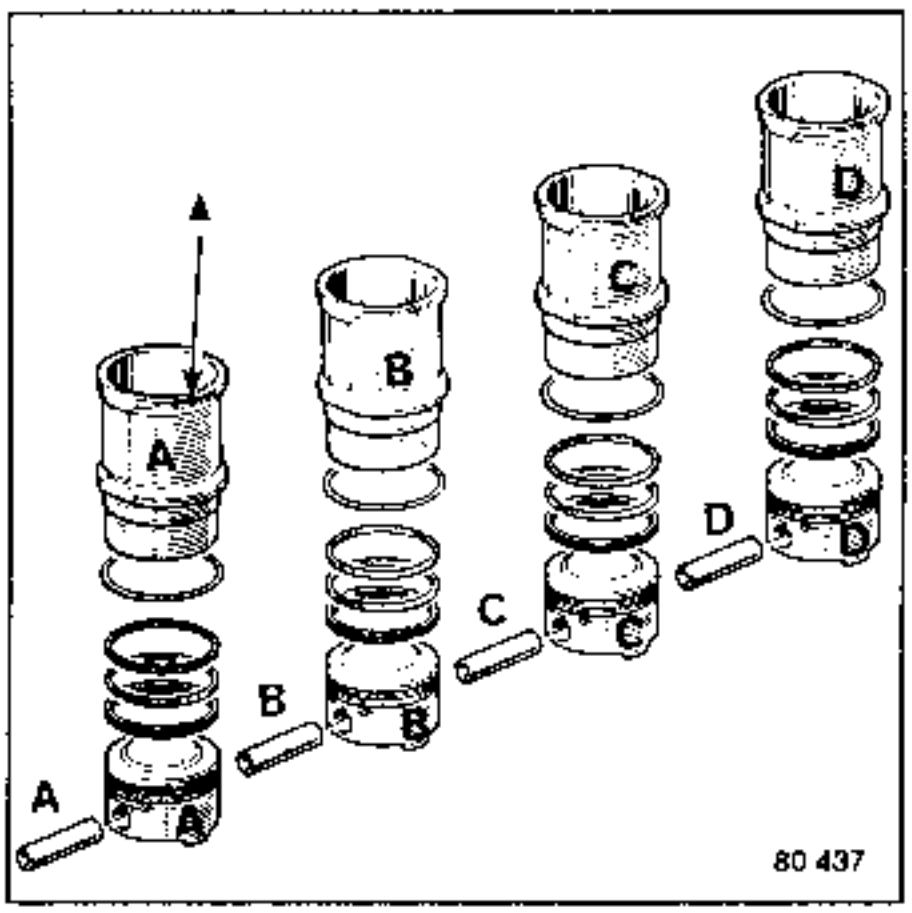
Refer to the corresponding sections.

Parts in the liner and piston kits are matched.

Mark each group of parts in lots **A** to D to keep them in matched sets.

NOTE: When repairing and not changing the piston-cylinder assembly, mark the liners from **1** to **4** and the location of the groove on top of the cylinder (▲).

Dissolve the protective coating; never scrape the parts.

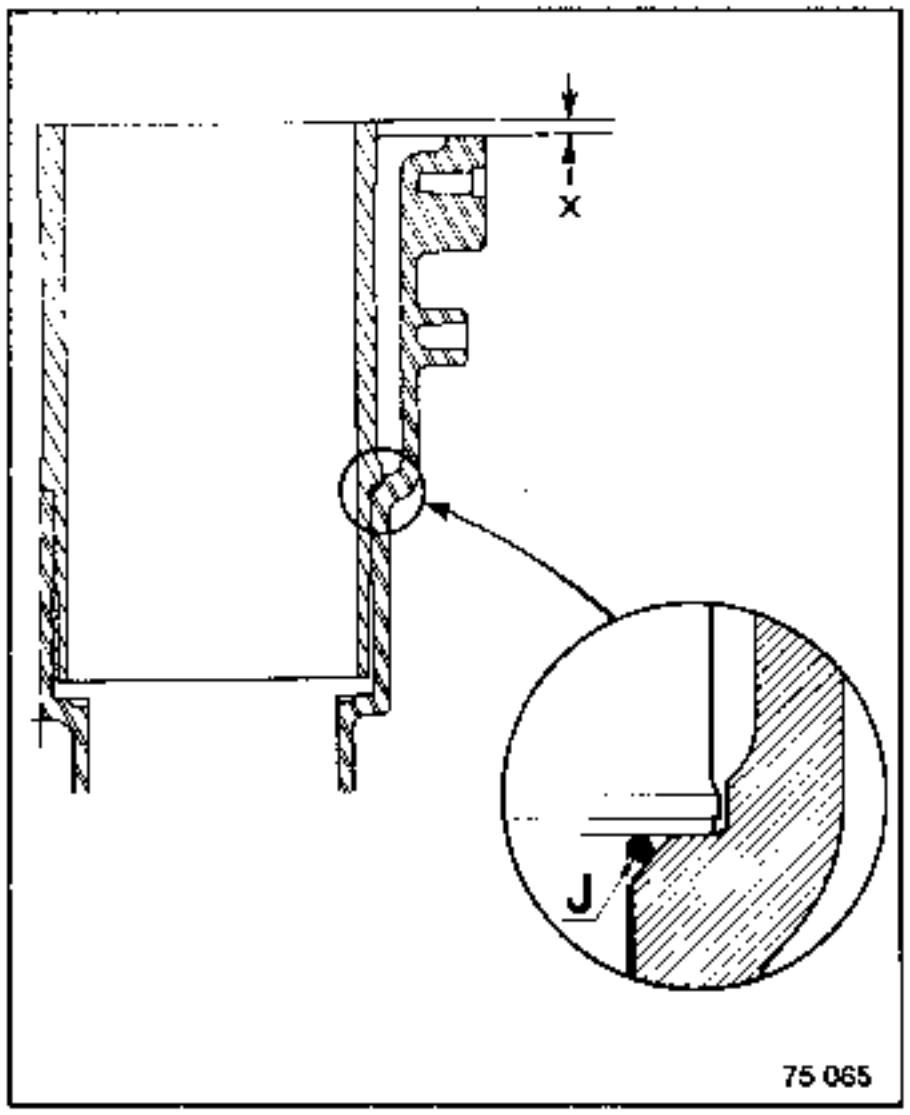


LINER PROTRUSION

These engines are fitted with "O" rings for sealing the liner locating flanges.

These seals are for sealing purposes only.

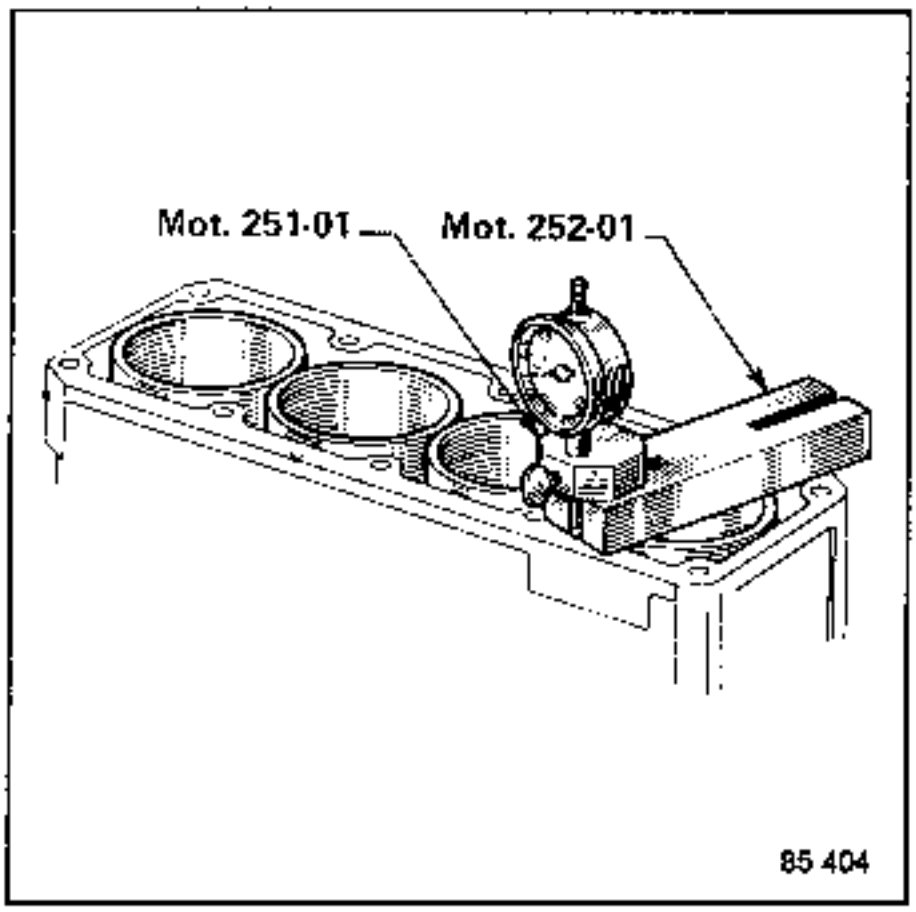
Each liner sits direct ón the block and liner protrusion (x) is obtained by close machining tolerances for the block and liners.



The liner protrusion (x) should be checked as follows:

- place each liner **without its "O" ring (J)** in the cylinder block;
- check protrusion using tooling **Mot. 251-01** and **Mot. 252-01.**

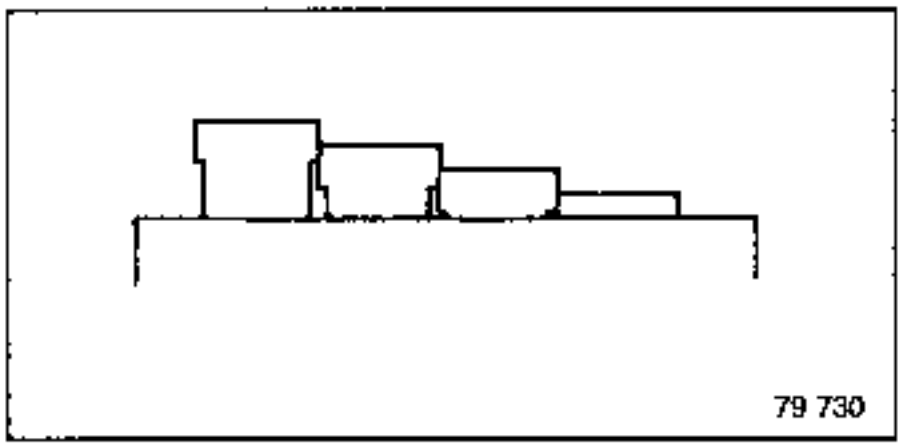
Protrusion (x) ..... **0.08 to 0.15 mm.**



Position the liners so that:

- the difference in protrusion of two adjacent liners does not exceed 0.04 mm maximum (within the permitted tolerance);

- the protrusions are stepped downwards from no. 1 cylinder or vice versa.



Once the correct protrusions have been found, reform assemblies **A, B, C** and **D** each with its matching liner, piston and gudgeon pin and mark the position of each liner in the block (no. 1 at flywheel end).

If incorrect protrusion is found, check with a new set of liners to establish whether the cylinder block or liners are at fault, otherwise check the theoretical dimensions (see section entitled "SPECIFICATIONS").

FITTING THE GUDGEON PINS

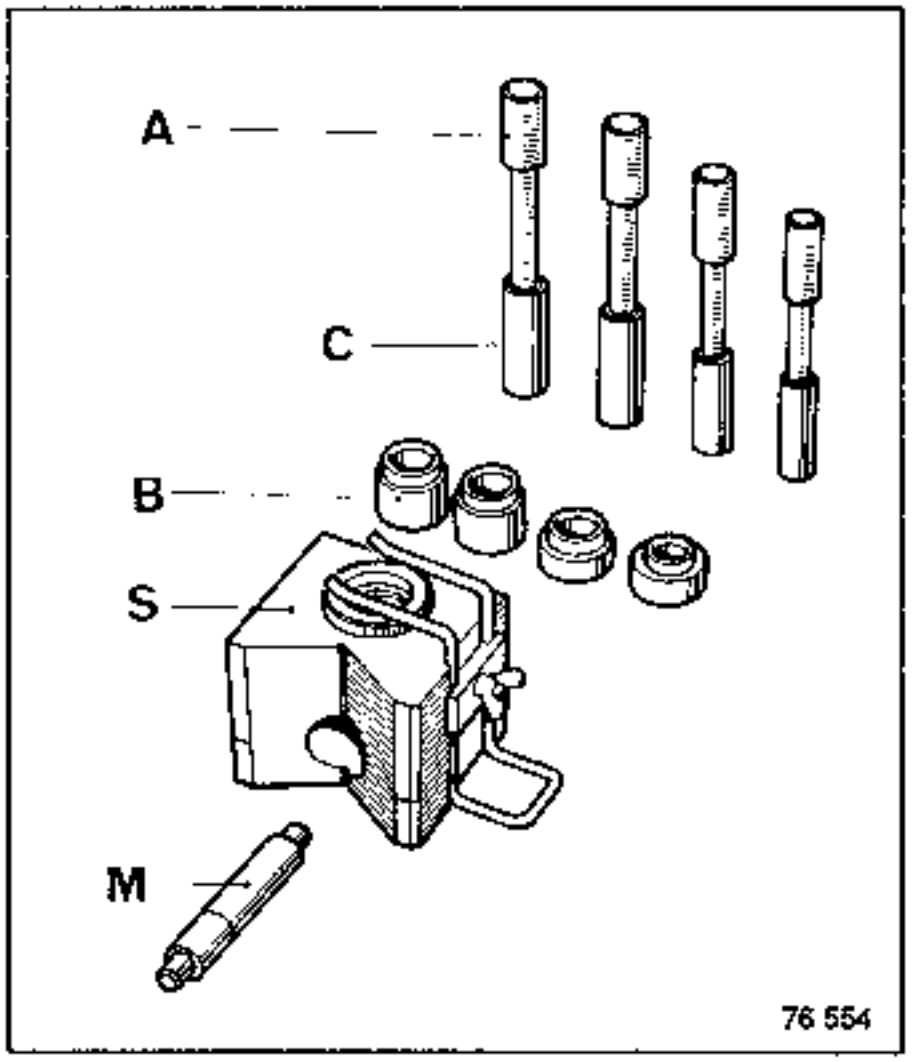
The gudgeon pins are a press fit in the small ends and free-turning in the pistons. Use tooling **Mot. 574-13** supplied in a box containing:

- a piston supporting block **(S)**;

- an extraction mandrel **(M)**;

- piston thrust collars **(B)**;

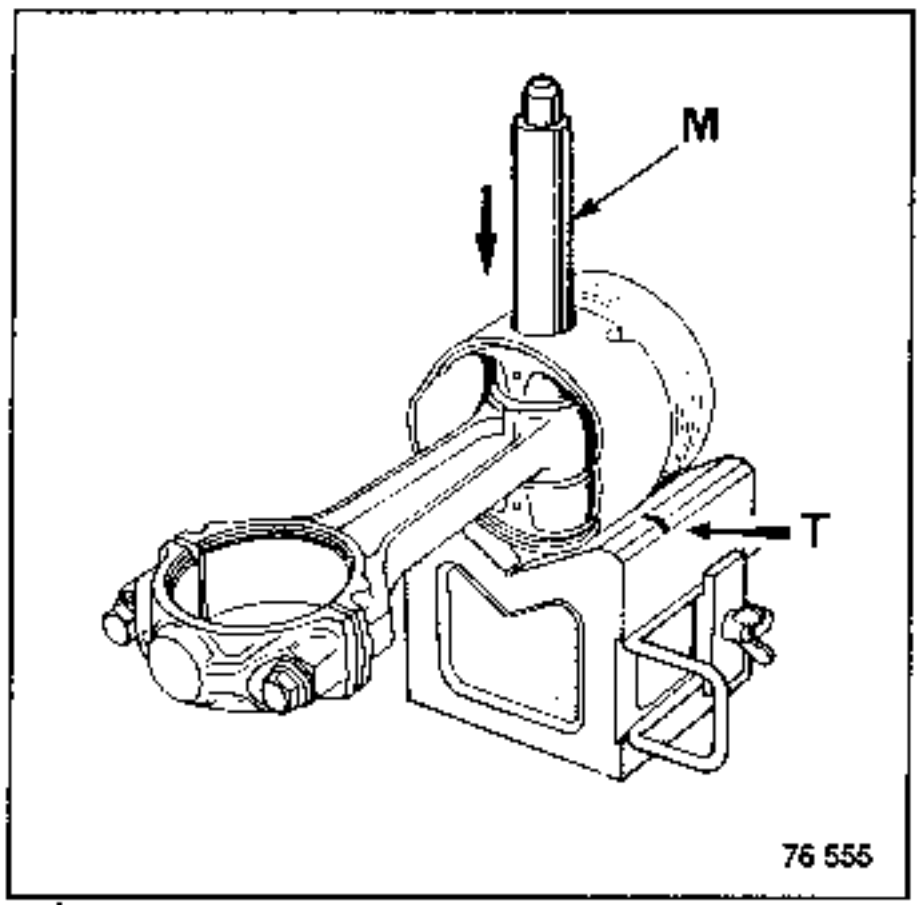
- inserting mandrels **(A)** and guides **(C)**.



Extracting the gudgeon pins

Lay the piston in the Vee in supporting block **(A)**, with the centre of the gudgeon pin bores in line with the clearance hole (the block has two grooves **(T)** to assist alignment).

Press the gudgeon pin out with mandrel **(M)**.



Preparing the connecting rods

Check:

- connecting rods for truth (twist, out-of-square);
- the fit of the caps to the rods (if necessary, remove any burrs with a stone).

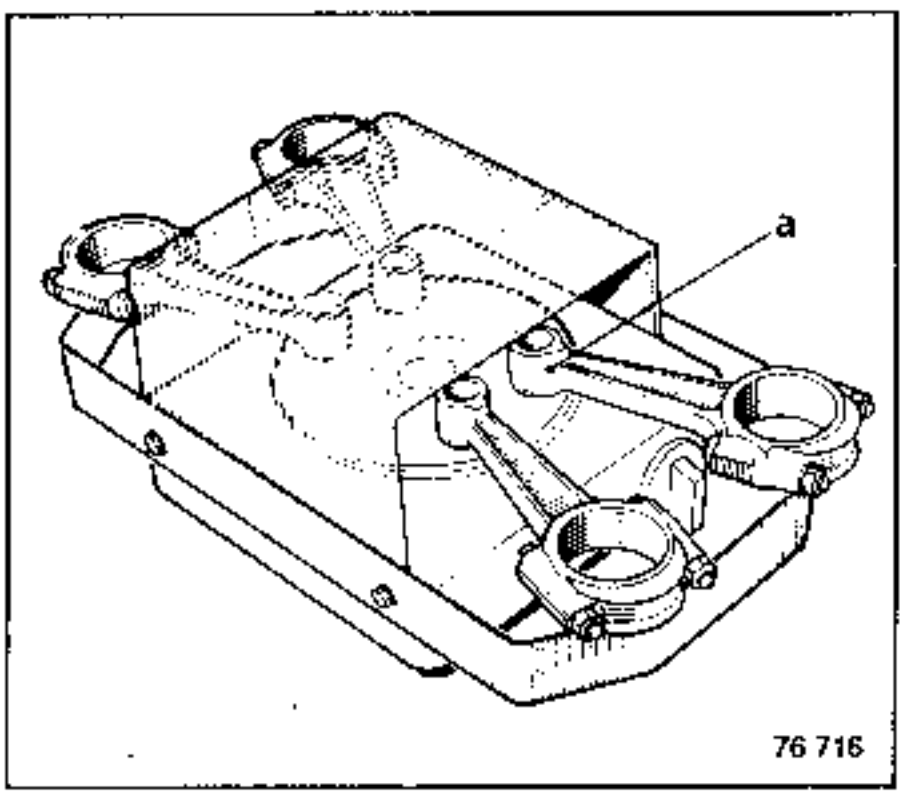
Use a 1500 watt hotplate.

Lay the small ends on the hotplate.

Make certain that each small end lays square on the hotplate.

Place a small piece of tinman's solder with a melting point of approximately 250°C on each small end at (a) as a temperature guide.

Let the small ends heat up until the solder melts.



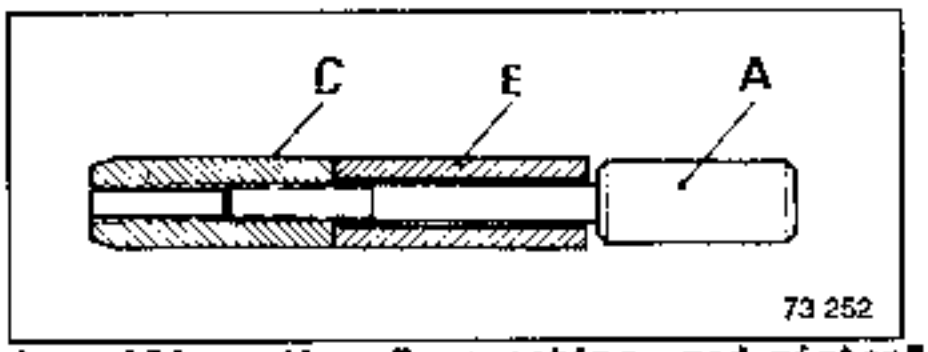
Preparing gudgeon pins

Check that each gudgeon pin rotates freely in its new piston.

Use:

A7 and C7 for engines 851 - J7T
A8 and C7 for engines 829-J5R-J6R-J7R
C7 and A10 for engines J7R 720

Fit gudgeon pins **(E)** to mandrel **(A)** (do not tighten the gudgeon pin on guide C).

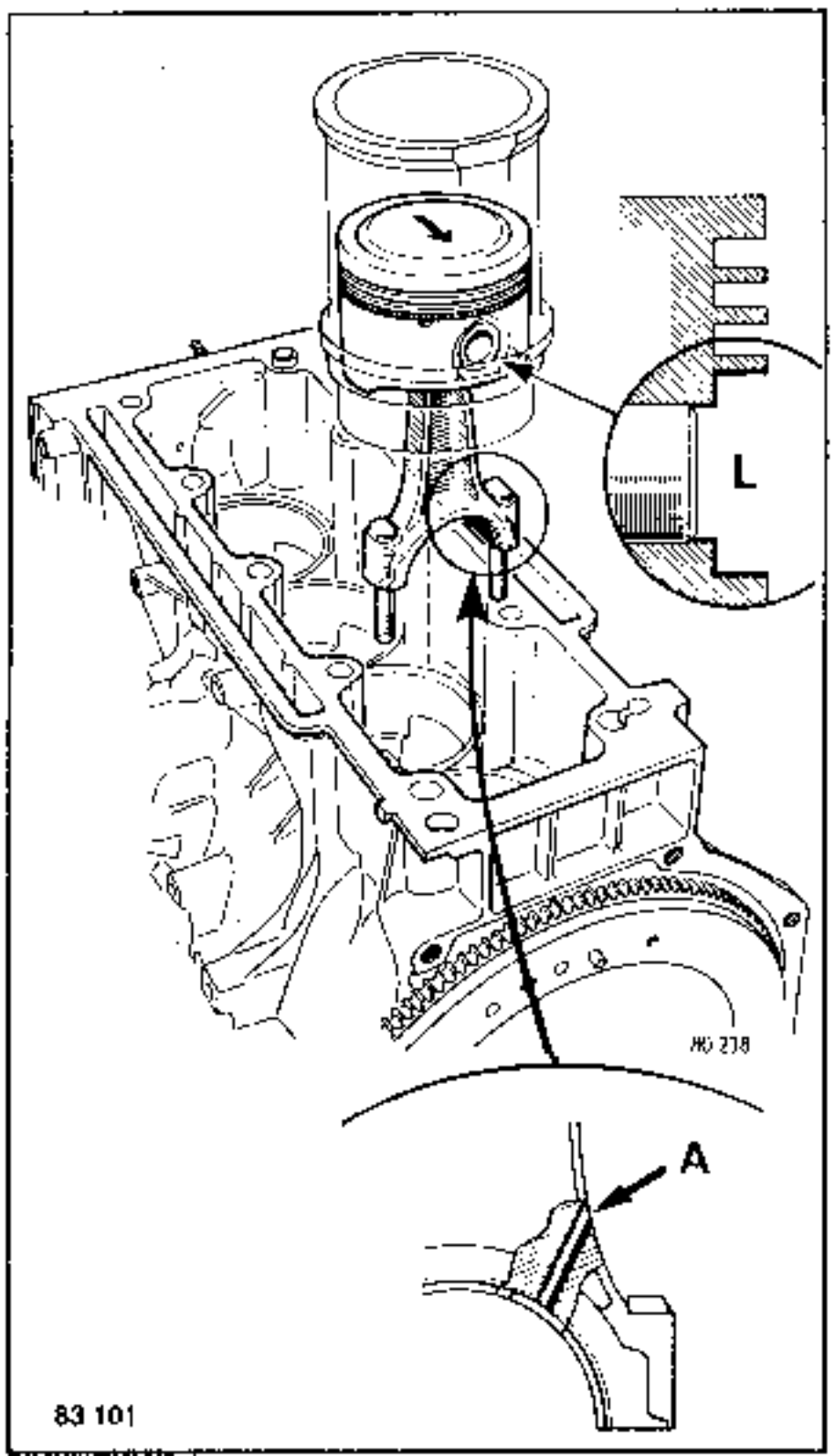


Assembling the "connecting rod-piston" assemblies

Each piston is marked with an arrow on the crown and by a spotfacing **(L)** which must point towards the flywheel.

Connecting rods:

- connecting rods with oil jet: oil jet hole **(A)** on same side as oil filter;
- plain connecting rods: shell bearing recess on same side as oil filter.



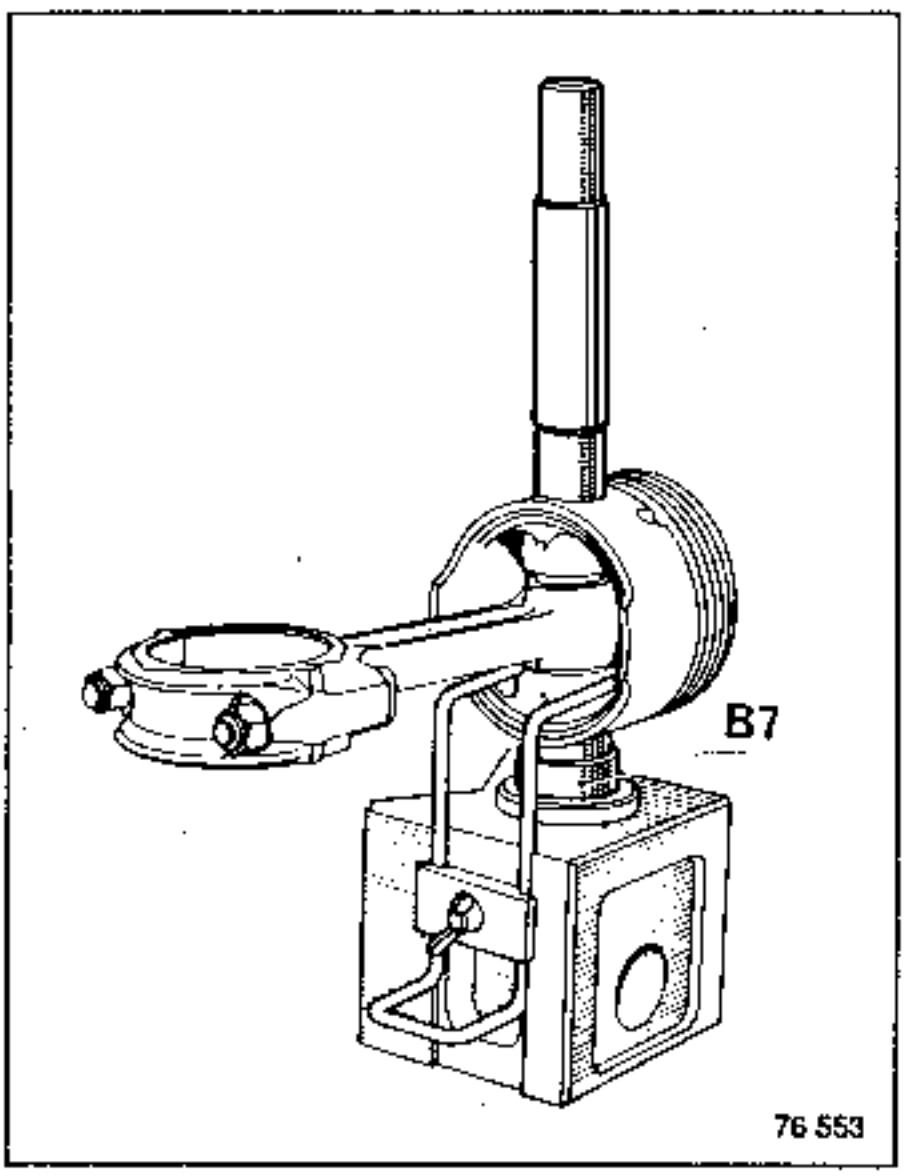
Proceed as follows to assemble a piston and connecting rod:

- fit a thrust pad **(B7)** or **(B14)** corresponding to the gudgeon pin diameter on the support base and clamp the piston to the block with the clip; **the spot-facing on the piston must rest on the thrust pad;**
- the big-end mark **(X)** made on dismantling must face towards the intermediate shaft.

The following operations must be carried out rapidly so that heat loss is kept to a minimum.

As soon as the piece of solder melts (becomes a droplet):

- wipe off the solder;
- insert the locating guide in the piston;
- fit the connecting rod to the piston with their respective markings in line;
- press the gudgeon pin quickly until the guide butts up against the bottom of the support base.



Check that the gudgeon pin is recessed on both sides of the piston in all positions of the small end in the piston.

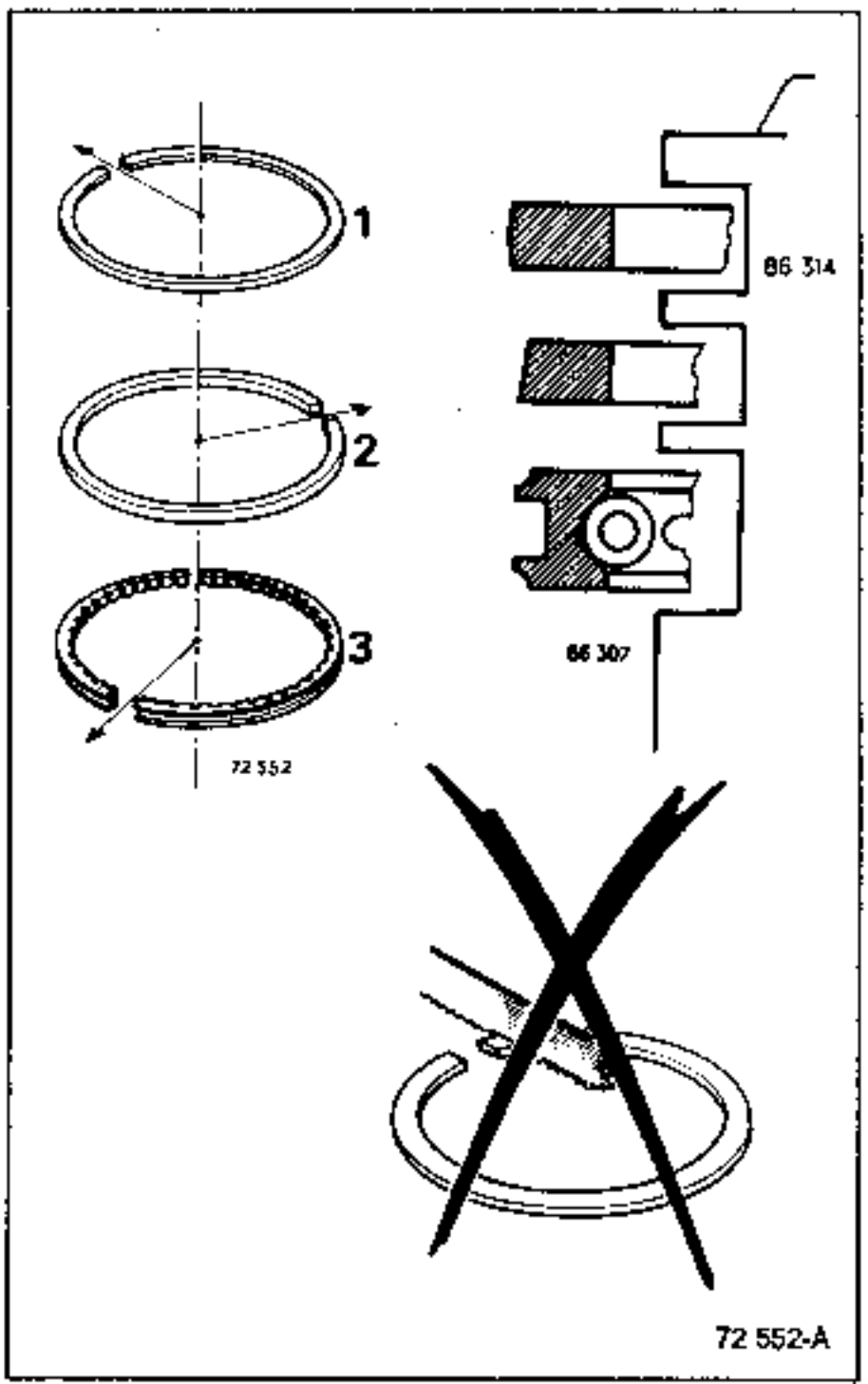
Fitting the rings

Fit the following to the piston:

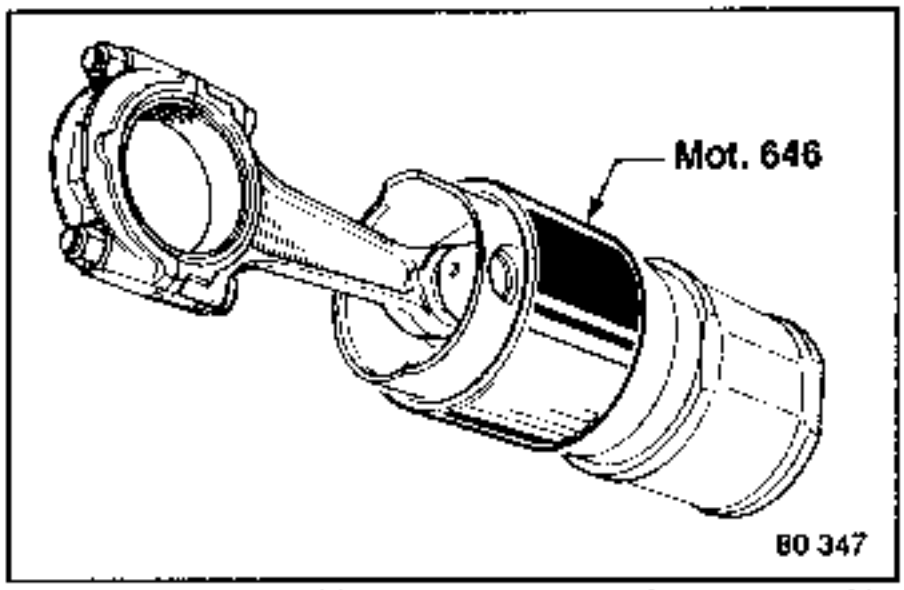
- oil scraper ring (3);
- taper compression ring **(2)** (mark uppermost);
- top compression ring (1).

The pistons are supplied pre-gapped and **this must never be altered.**

Lubricate the rings and space them with their gaps at 120° to each other, opposite a plain portion of each groove.

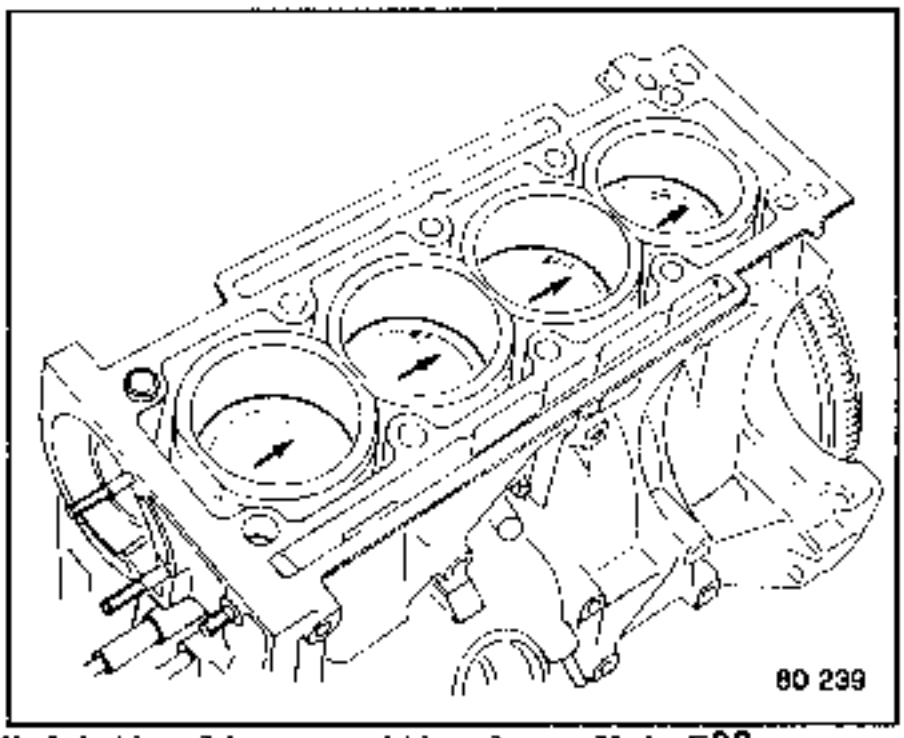


Fit the "connecting rod-piston" assemblies in their matching liners using sleeve **Mot. 646** or universal sleeve **Mot. 851.**

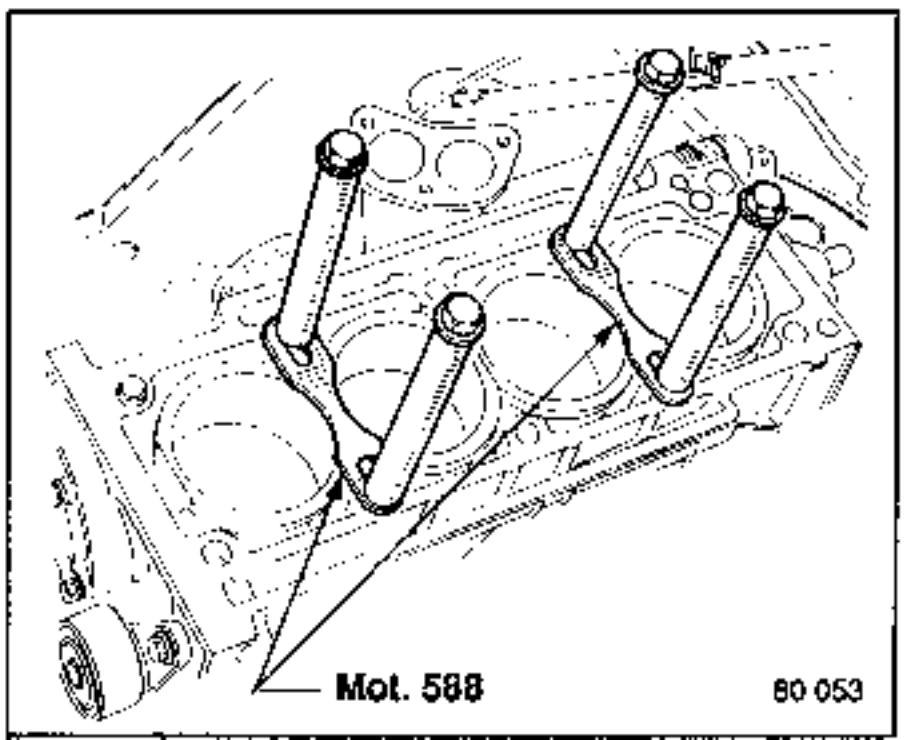


Remember to fit an "O" ring to the bottom of each liner, ensuring that it is not twisted, before inserting each "liner-piston-connecting rod" assembly.

Insert each assembly in its correct place in the cylinder block.



Hold the liners with clamp **Mot.588.**



Fitting the bearing shells to the connecting rods

The bottom shells (in the caps) are not drilled.

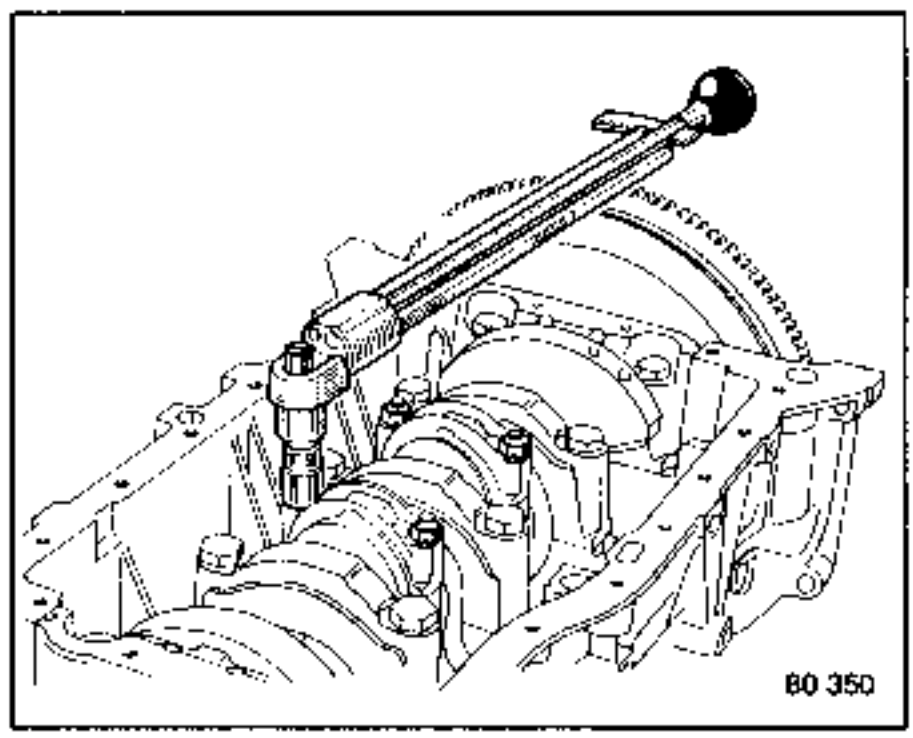
Top shells:

- **1st model:** the connecting rods are not drilled; the shells may or may not be drilled.
- **2nd model:** the connecting rods are drilled; the drilling of the shells corresponds to the connecting rod drilling so that there is an oil jet hole.
- **3rd model:** the connecting rods are drilled (J7R 720 engine); ths shells are not drilled.

Fit the big-end caps with their new bearing shells making sure that they are correctly matched.
The connecting rod nuts must be changed at each dismantling.

Torque tighten the nuts to **(daNm):**

- **829 - J5R - J6R - J7R ... 4.5 to 5**
- **851 - J7T ..... 6 to 6.5**



Check that the assembly rotates freely.

Fit:

- the oil pump with its drive shaft;
- the sump;
- the cylinder head.

REPLACING THE CRANKSHAFT

ESSENTIAL SPECIAL TOOLING	
Mot. 11	Extractor
Mot. 582	Locking plate
Mot. 788	Main bearing oil seal inserting tool (flywheel end)
Mot. 789	Main bearing oil seal inserting tool (timing gear end)
B. Vi. 28-01	Extractor
Rou. 15-01	Thrust bush

TIGHTENING TORQUES (in daNm)	
Big end caps:	
– **829-J5R-J6R-J7R**	4.5 to 5
– **851-J7T**	6 to 6.5
Main bearing cap nuts	**8.75 to 9.75**
Flywheel securing bolts	6
Converter drive plate bolts	6.5 to 7
Crankshaft sprocket bolts (see specifications, page 11 and 12)	
Oil pump bolts	4 to 4.5
Sump bolts:	
-Pressed steel sump	1 to 1.4
-Aluminium sump	1.4 to 1.7

Drain:

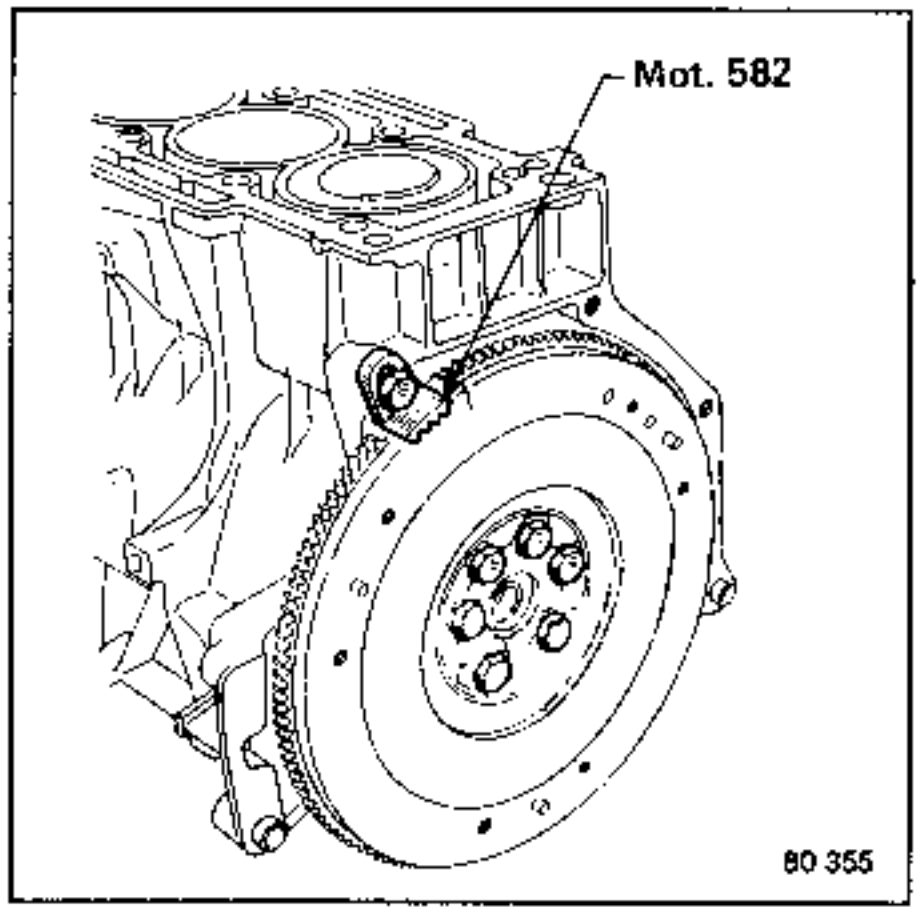
- the coolant;
- the sump.

REMOVAL

Remove:

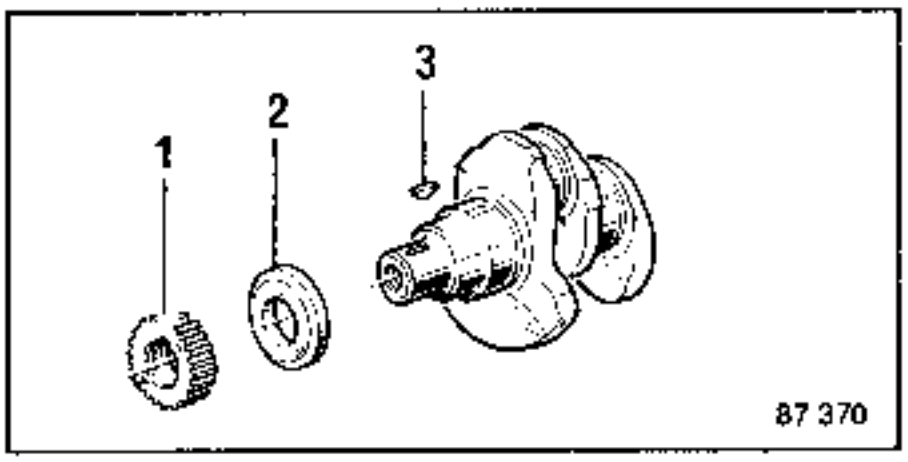
- the crankshaft pulley;
- the timing cover;
- the timing belt (see the section entitled **"CYLINDER HEAD - Changing the gasket"**).

Prevent the crankshaft from turning using locking plate **Mot. 582.**



Remove the clutch mechanism.

Extracting the timing belt on the crankshaft



Sprocket **(1)** and washer **(2)** cannot be extracted in one go since washer **(2)** abuts against key **(3)**.

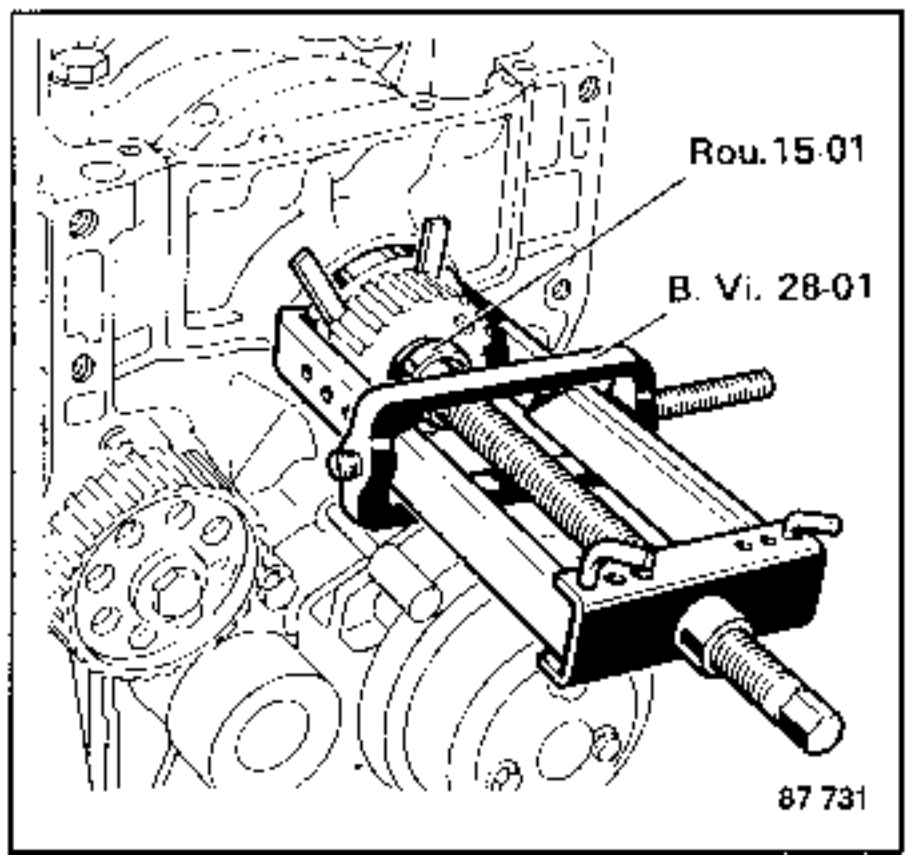
Proceed as follows:

- fit tool **B.Vi. 28-01** with **Rou.15-01** on washer **(2)**;

- move washer **(2)** and sprocket **(1)** assembly until it abuts against key **(3) (make sure there is no chaffing)**;

- offer up the prongs of tool **B.Vi.28-01** between washer **(2)** and sprocket **(1)** to extract the washer.

If there is insufficient space, place two **2 mm** thick spacers between washer **(2)** and sprocket **(1)** then pull on washer **(2)** again until it contacts key **(3)**.



This operation enables you to increase the space between the washer and sprocket and to place the prongs of tool **B.Vi.28-01** on the sprocket so that it can be removed alone.

Remove the sprocket.

If the assembly is of the type with a pulley instead of washer **(2)**, the pulley has a recess to allow the key to pass through.

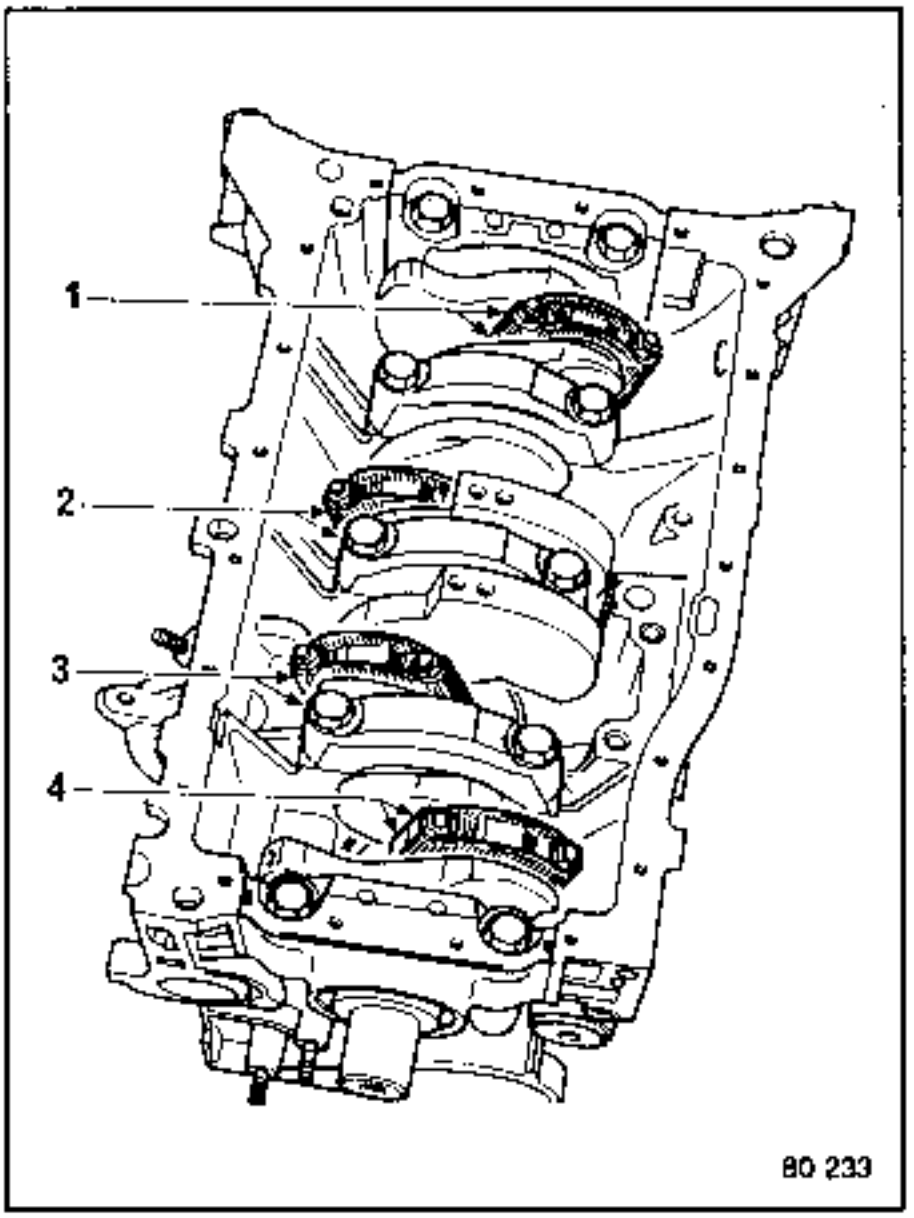
Remove:

- the sump or the sump and strengthening base;

- the oil pump with its drive shaft;

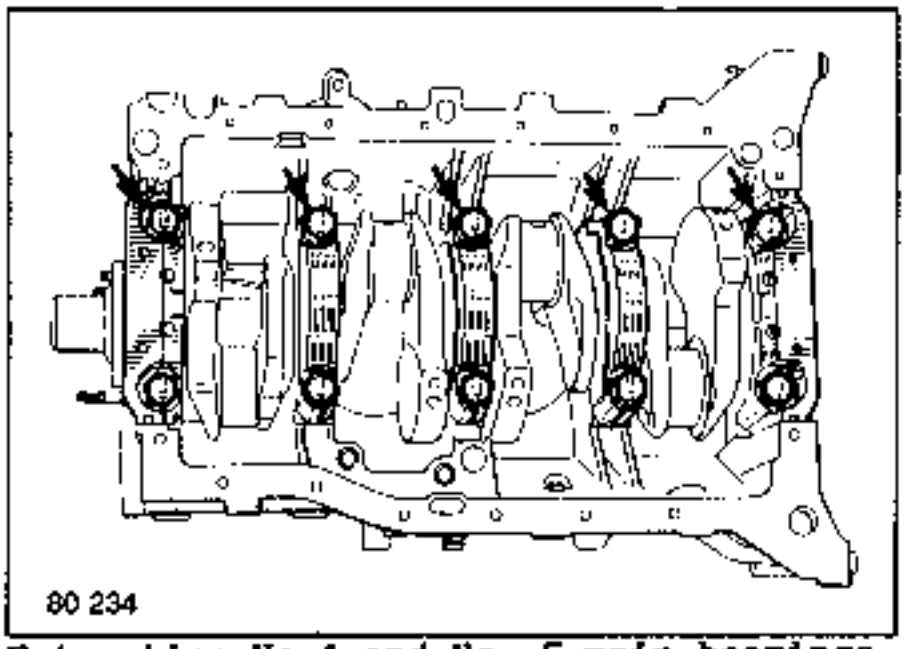
- the flywheel or converter driving plate.

Mark the connecting rods - No.1 at the flywheel end and on the intermediate shaft side.



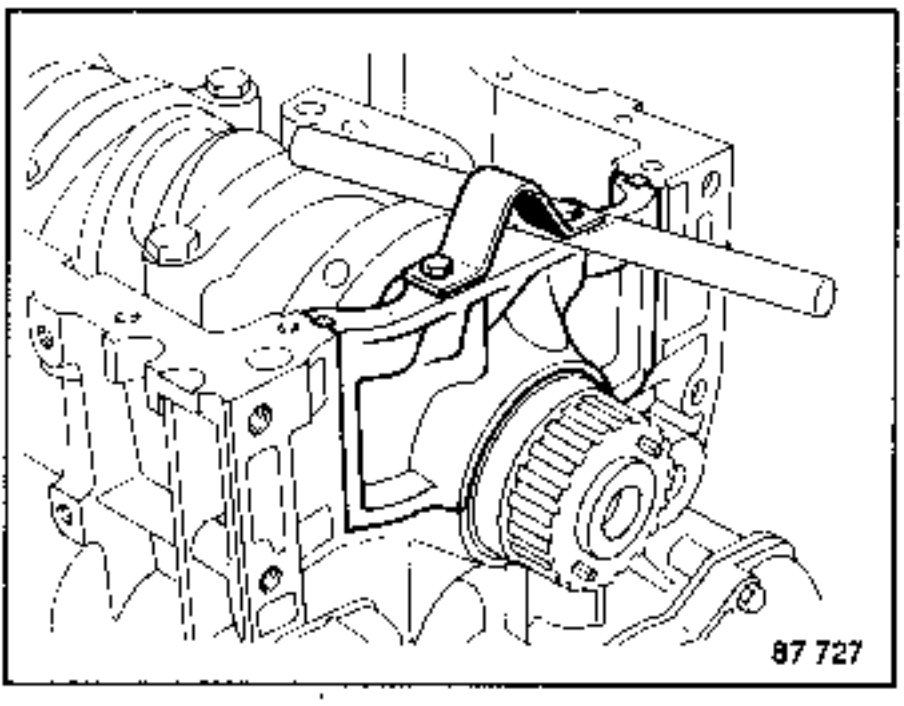
Remove the big-end caps and their shell bearings.

If necessary, mark the main bearing caps in relation to their position in the cylinder block then remove them.



Extracting No.1 and No. 5 main bearings

The extraction of No. 1 and No. 5 main bearings equipped with strips of injected silicone paste is facilitated by using a locally made-up tool of sheet metal approximately 2.5 mm thick.



Remove:

- the crankshaft;

- the thrust half-washers;

- the bearing shells remaining in the block and connecting rods.

CLEANING

Clean the joint faces on the cylinder block.

Pass a length of soft iron wire through the oil channels.

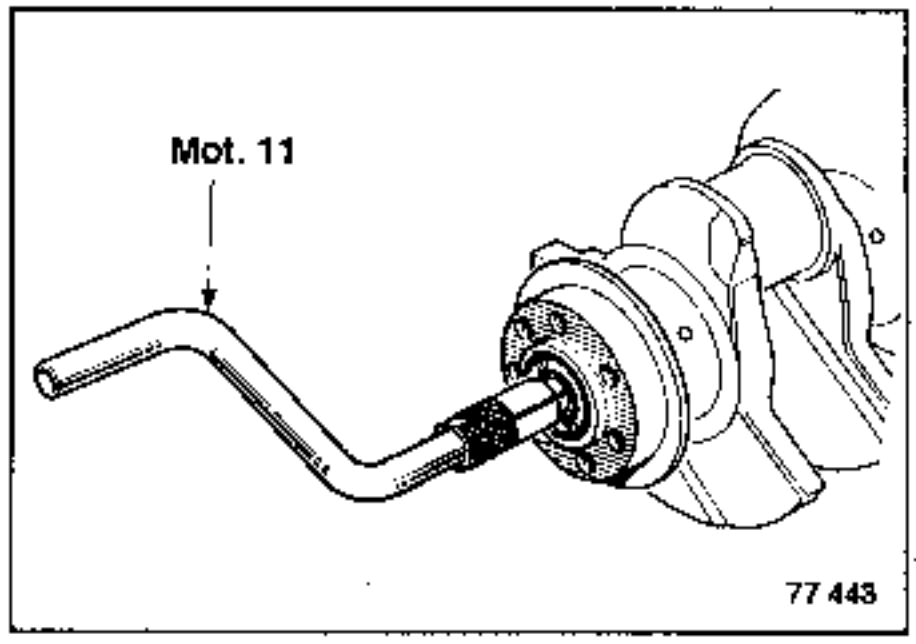
CLUTCH SHAFT BEARING

- If the gearbox is fitted with a **short** clutch shaft there should be no spigot bush in the crankshaft.

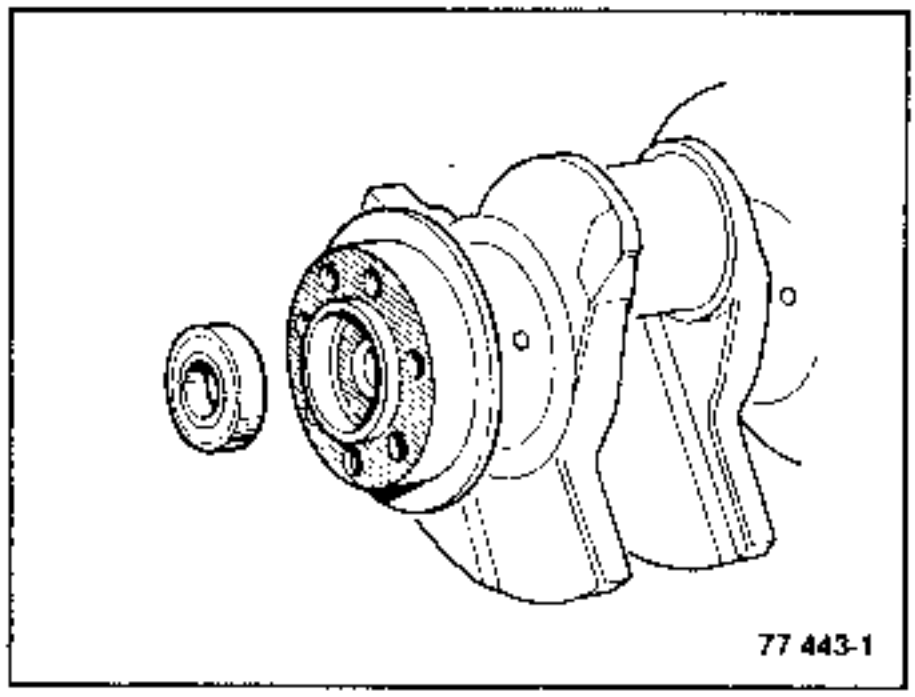
- If the gearbox is fitted with a **long** clutch shaft there should be a spigot bush in the crankshaft.

Changing the spigot bearing

Use extractor **Mot.11** to remove the bearing.



Bond the bearing with **Loctite FRENBLOC** if the flywheel fixing bolts have no lockplate as standard.



REFITTING

Fit the new bearing shells to the cylinder block and main bearing caps and lubricate them with engine oil.

Fit:

- the crankshaft;

- insert the half-thrust washers (main bearing no. 2, grooves at crankshaft end);

- main bearing caps nos. 2, 3 and 4 (check that the locating dowels are fitted).

  Tightening torque: 8.75 to 9.75 daNm.

There are two possibilites for sealing main bearings nos. 1 and 5:

1) Injection of silicone

2) Fitting of butyl seals.

1) Injection of silicone

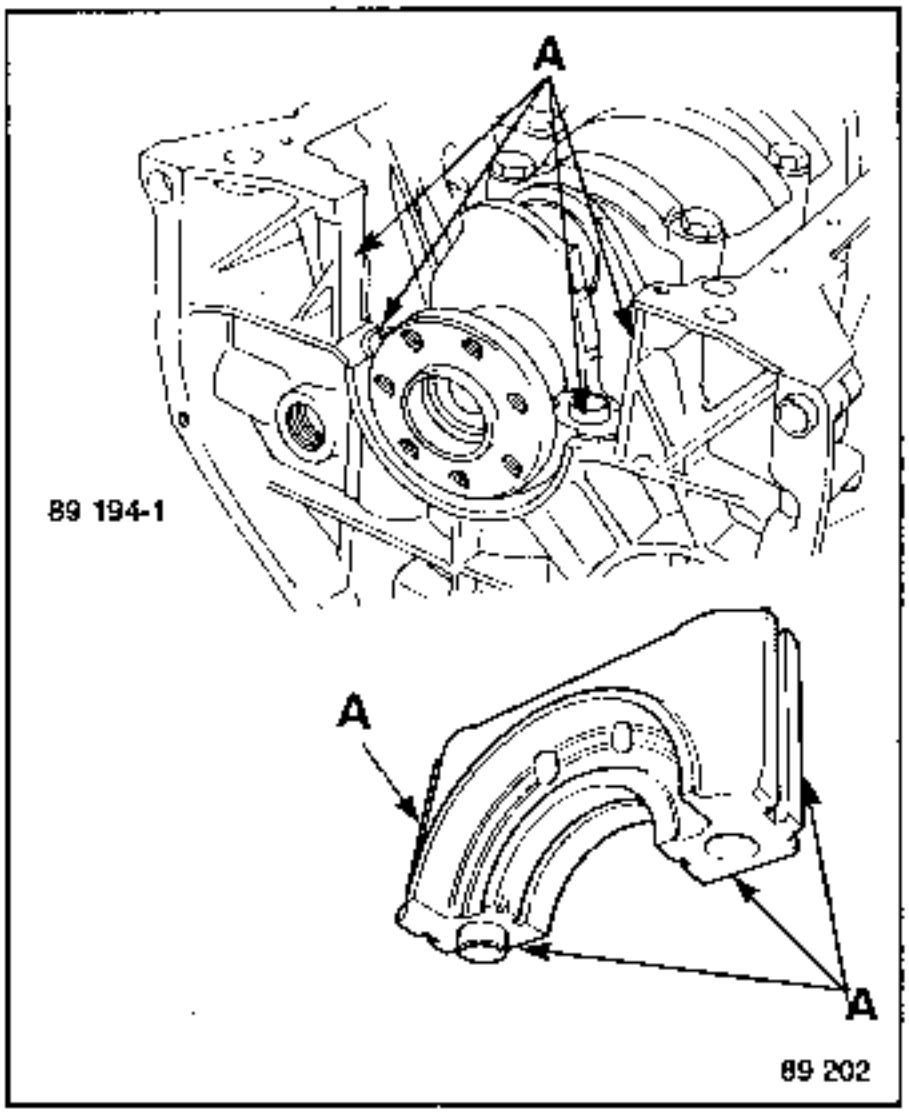
The kit required for this operation comprises:

- a 50 ml syringe
- a 5 ml tube of hardener
- a spatula for mixing
- instructions for use.

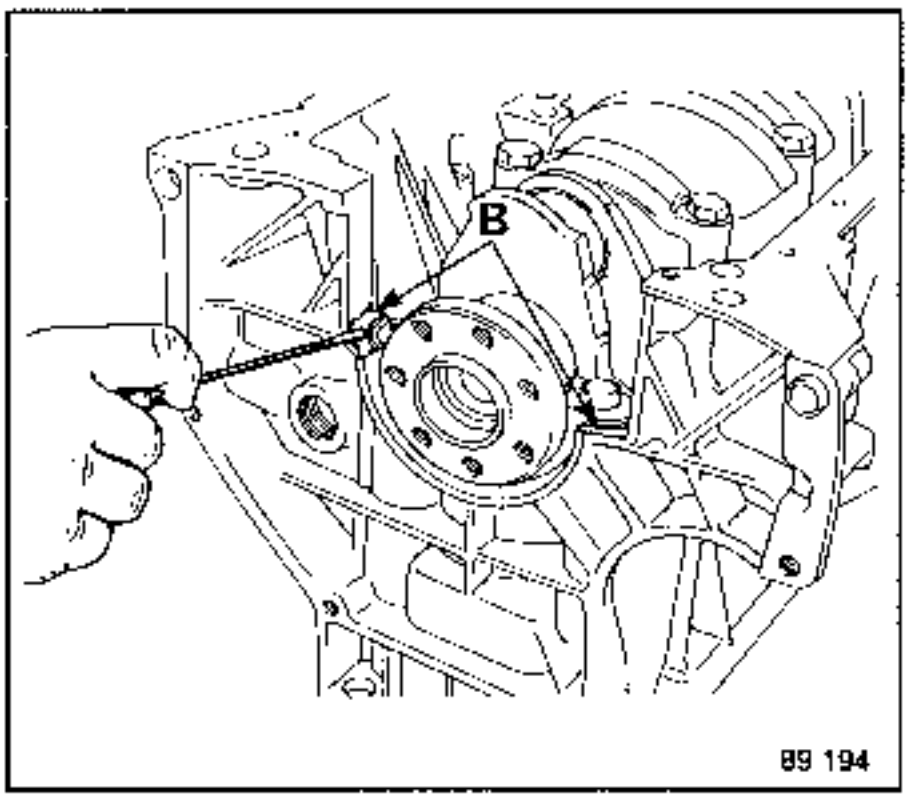
IMPORTANT: The silicone should be injected within approximately five minutes in order to avoid the mixture polymerising in the syringe.

- Thoroughly clean surfaces **(A)** on the cylinder block and the main bearing caps. Use a cloth impregnated with cleaning thinners to degrease.

- Leave to dry.

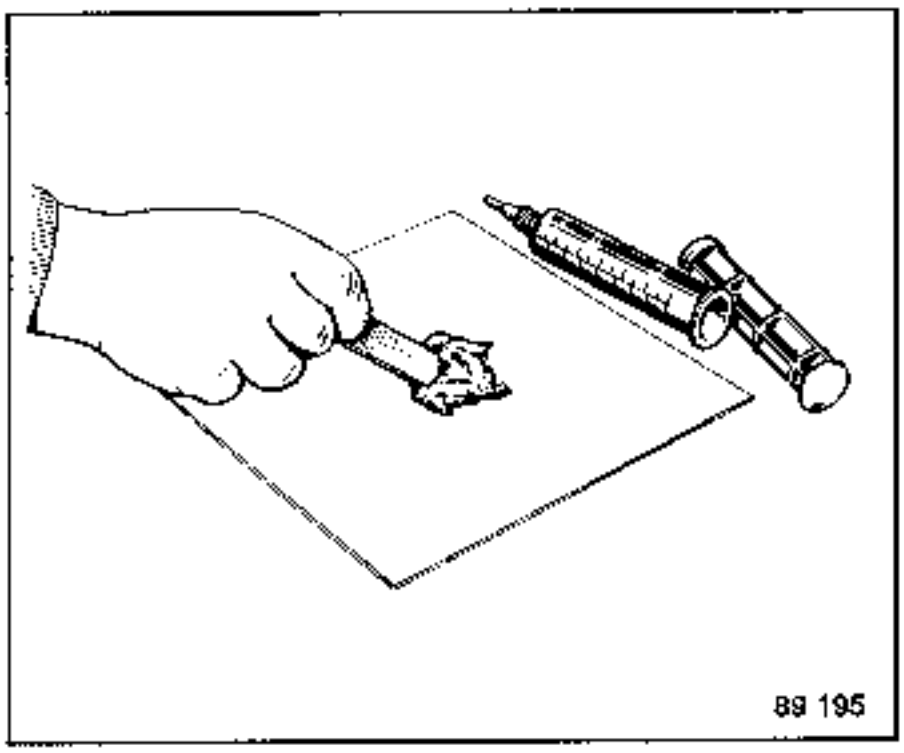


- Lightly coat the lower faces of the cylinder block at **(B)** with **CAF 4/60 THIXO** but do not block the oil retention grooves.

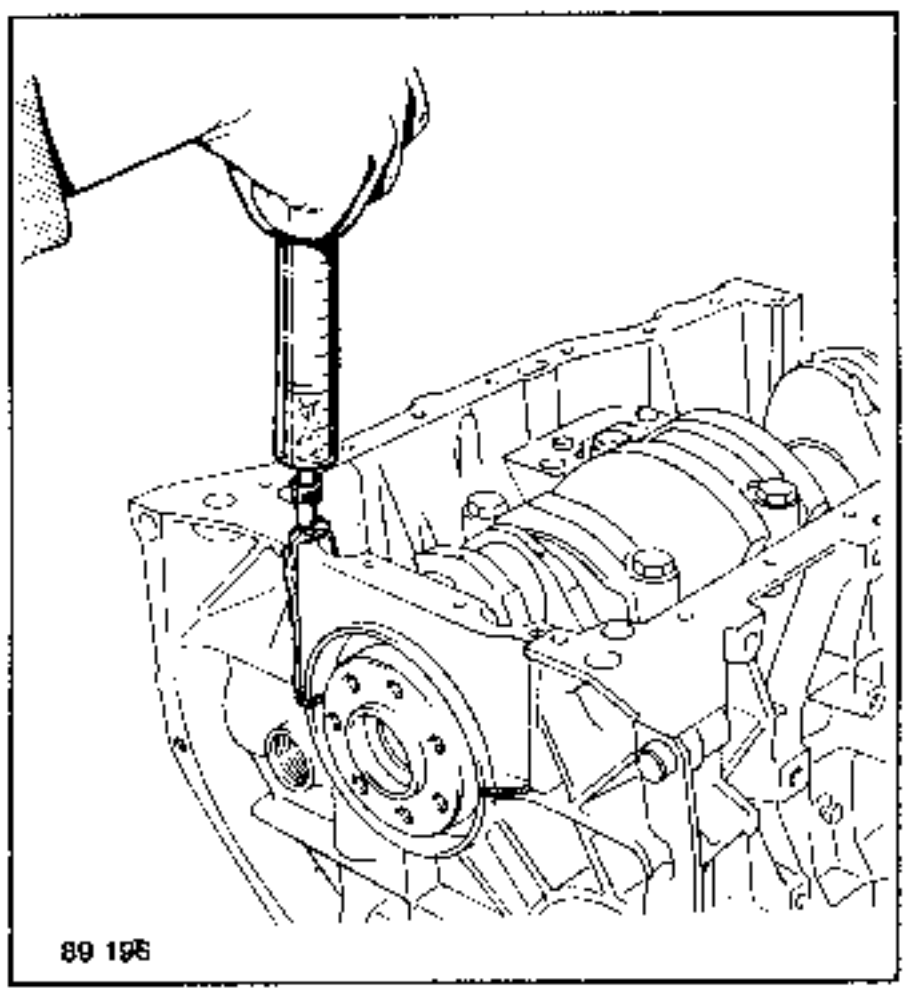


- Fit the main bearing caps and torque tighten them.

- Mix 45ml of **CAF 4/60 THIXO** (approximately half a 100 g tube) with the contents of the tube of hardener using the spatula supplied to obtain a pinkish homogeneous mixture.

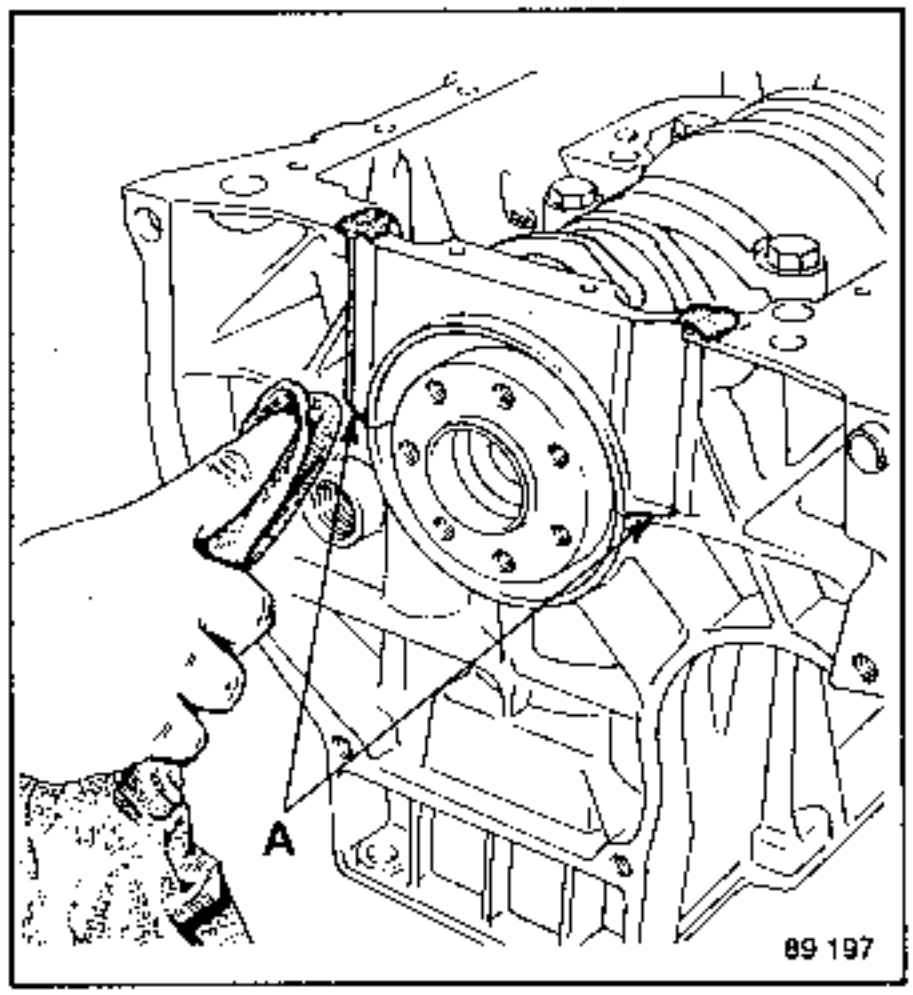


- Place the mixture in the syringe and inject it into the grooves in the main bearing caps.

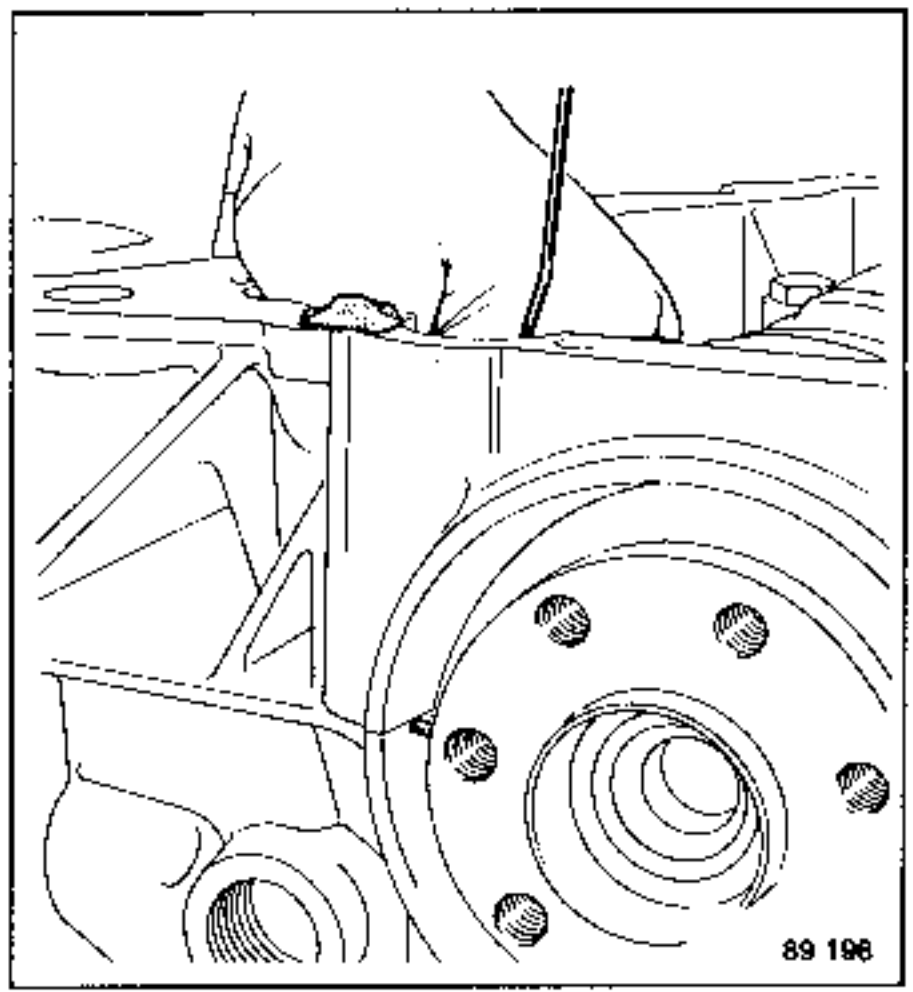


- Allow the mixture to overflow either side of the main bearing cap grooves, so as to be certain that the mixture injected has properly filled the sealing groove.

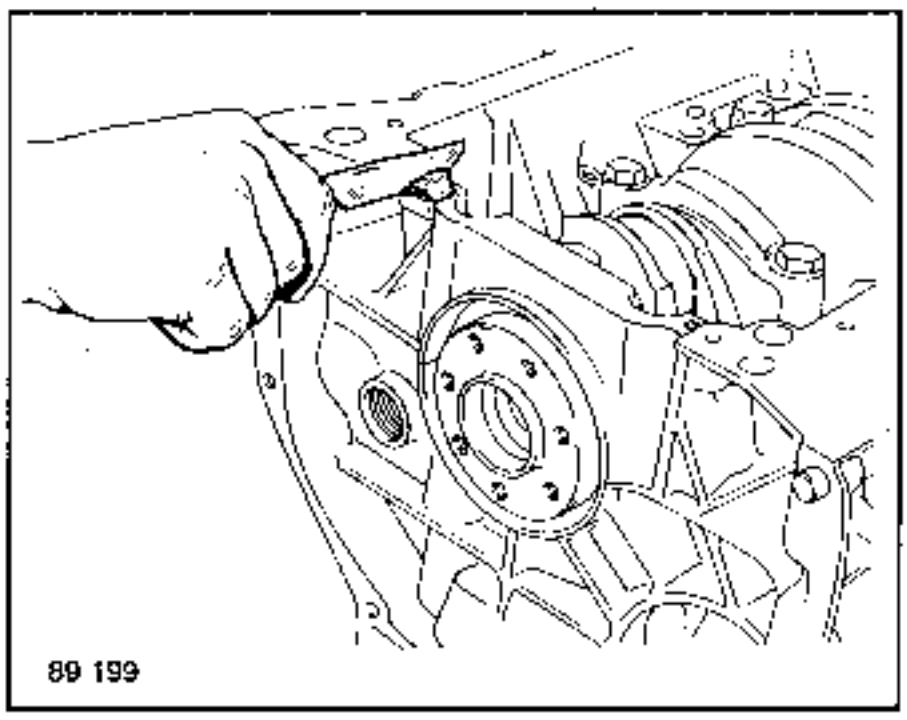
- Using a piece of cloth, wipe off the surplus mixture, both inside and outside the cylinder block and at (A).



- Pass a piece of wire through the oilways to ensure that they are not blocked (or compressed air can be blown through them).



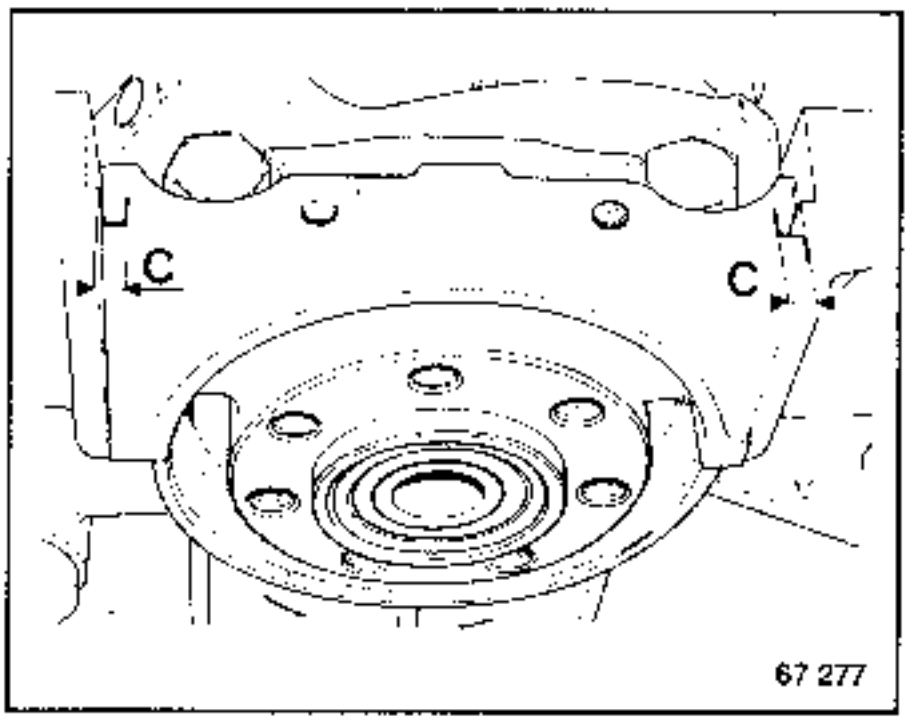
- Leave to dry for a few minutes then cut off the excess from the joint face.



2) Fitting butyl seals

Fit main bearing caps nos. 1 and 5.

Measure dimension C using a drill bit.



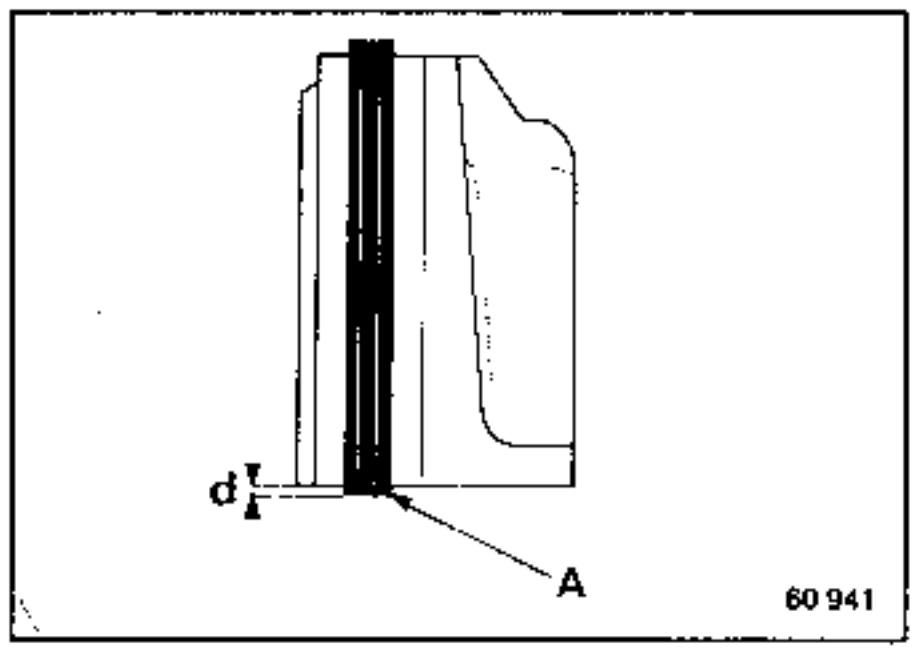
If dimension C is 5 mm or less, select a 5.10 mm thick seal.

If dimension C is more than 5 mm, select a 5.4 mm thick seal (colour code).

Insert the side seals:

- groove outwards

- seal proud **d = approx. 0.2 mm** at **A**.



Smear a thin layer of **CAF 4/60 THIXO** on the bearing faces of main bearings nos. 1 and 5 but do not block holes in the seal which allow oil to return to sump.

Screw centring studs **G (12 mm diameter, pitch 1.50)** to the cylinder block.

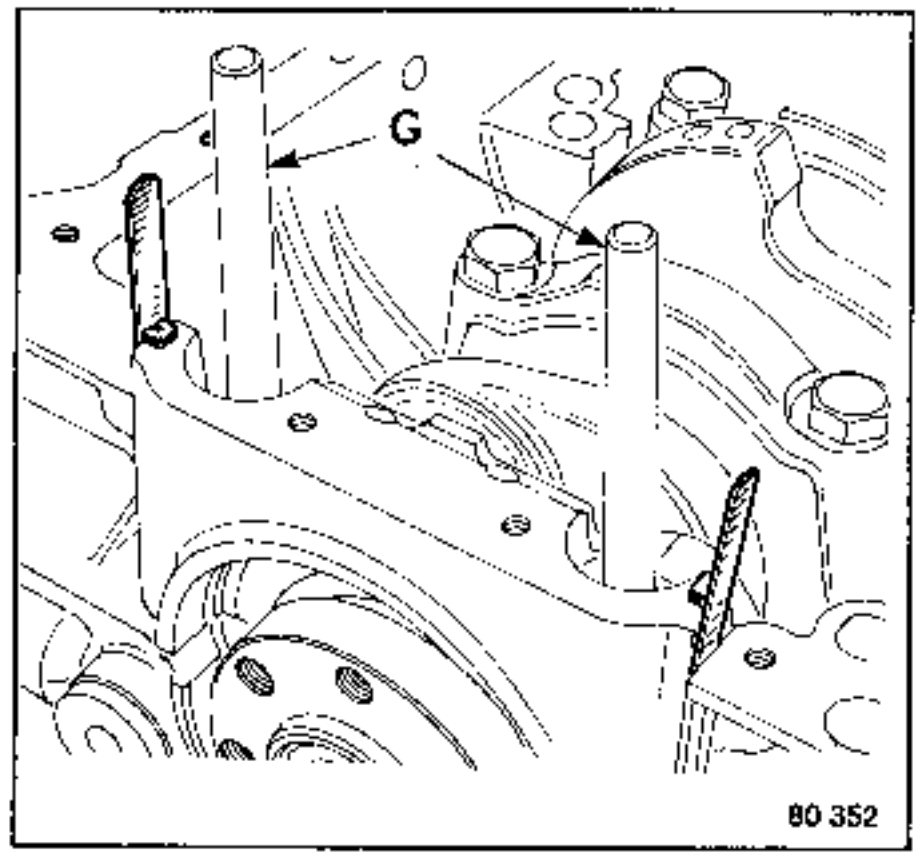
Fit the main bearings.

- Lubricate both seals.

Use two strips of foil on each side of the main bearing cap.

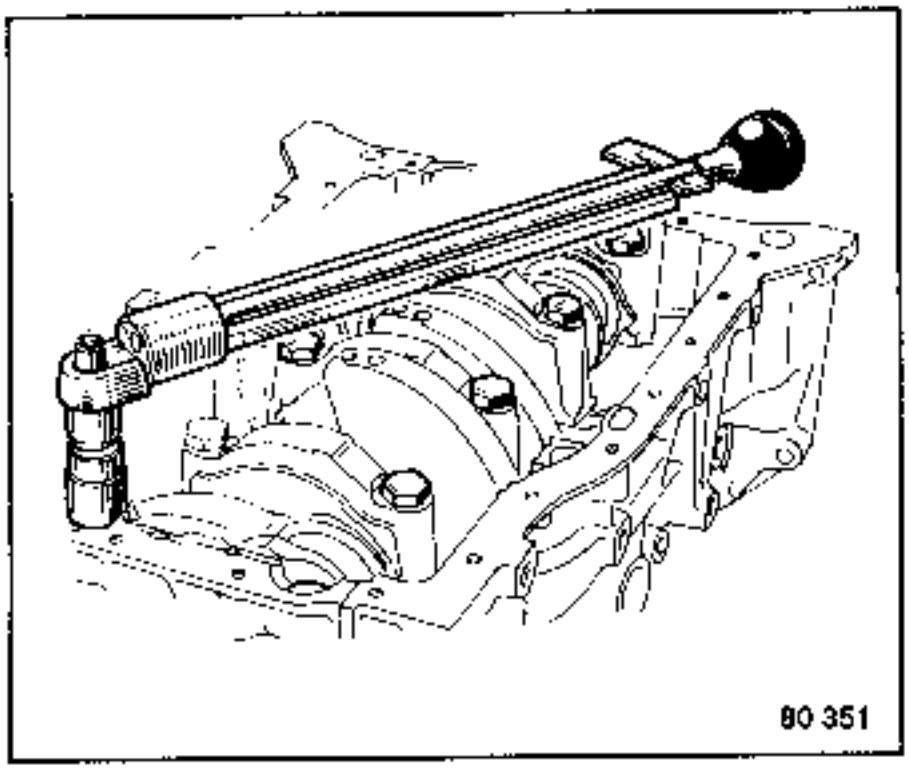
Push the cap down.

When the cap is almost in position, make sure that seal ends **(A)** are still proud.

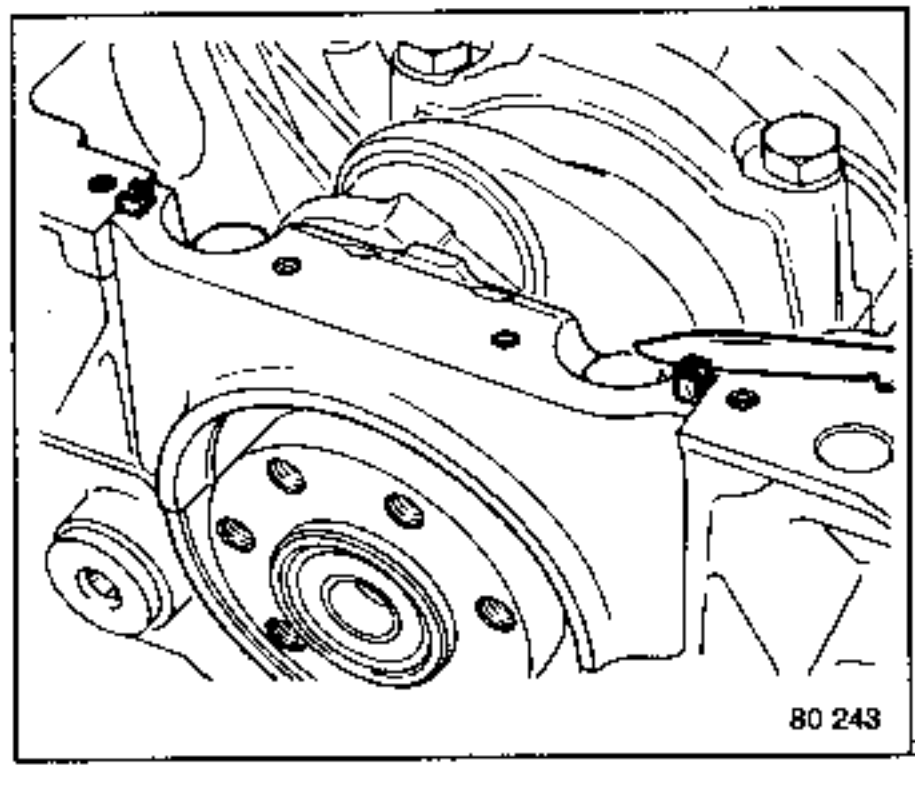


Remove the foil strips and studs.

Torque tighten the main bearing caps ..... 8.75 to 9.75 daNm

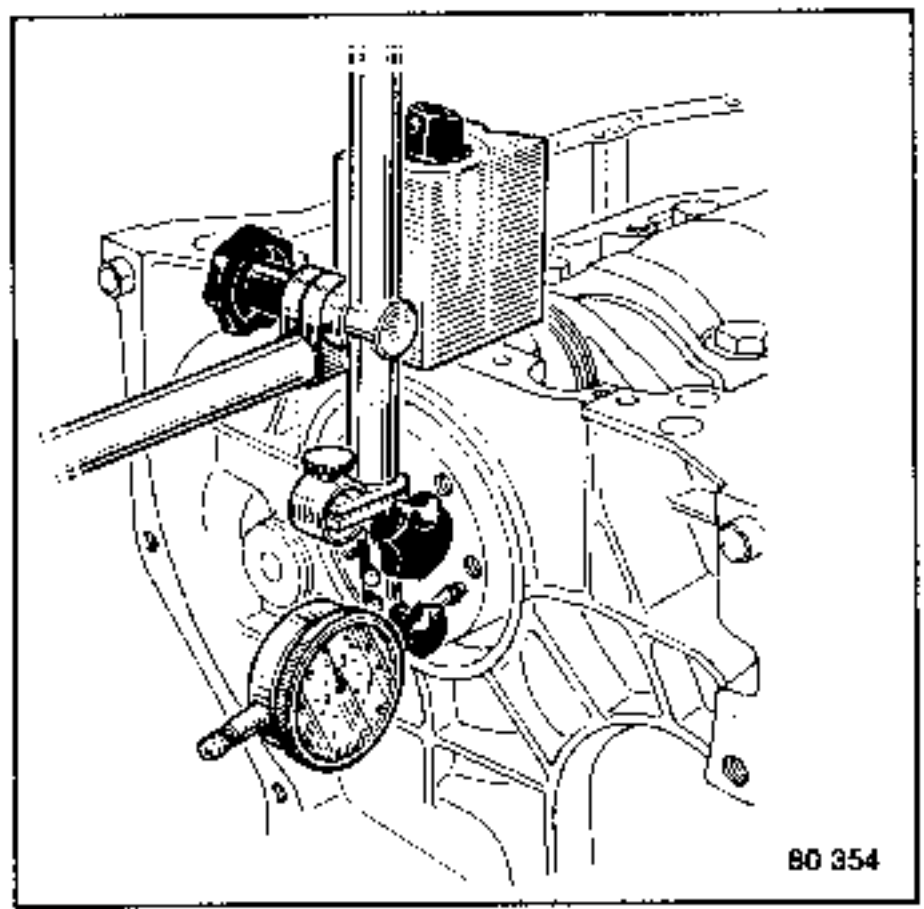


Cut the side seals so that they remain 0.5 to 0.7 mm proud of the sump joint face.

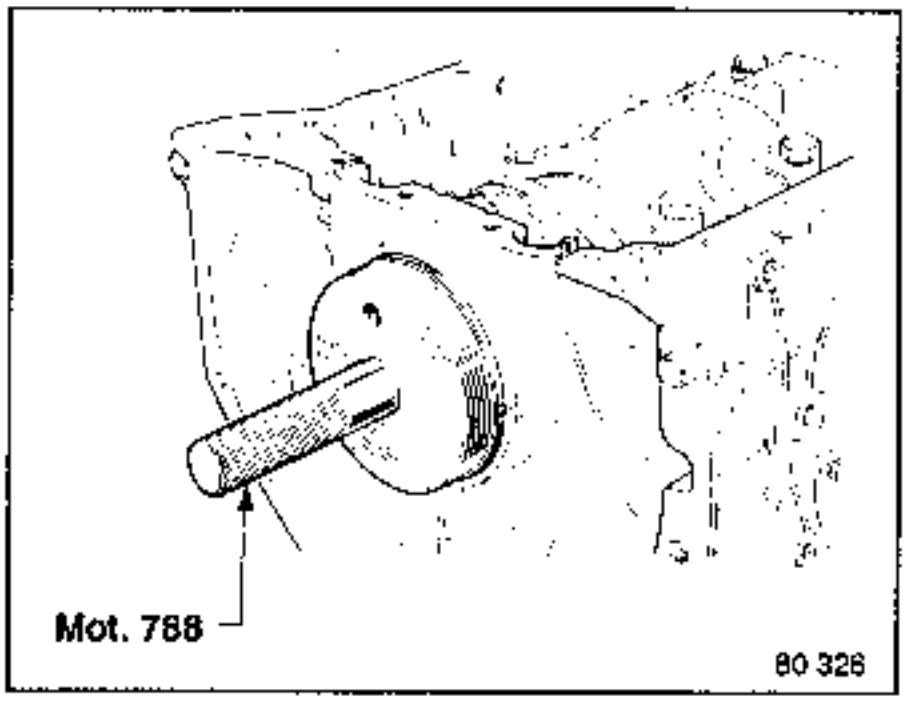


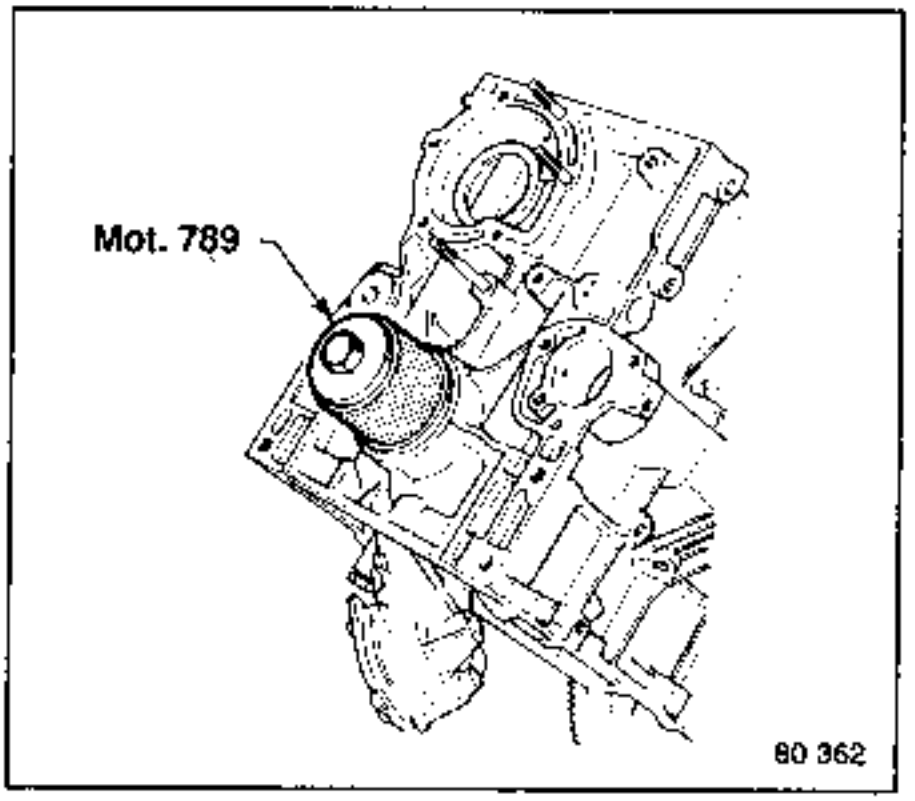
Check the endplay (mm): (this operation may be performed before silicone is injected into main bearings nos. 1 and 5):

- 829-J5R-J6R-J7R ..... 0.07 to 0.25
- 851-J7T ..... 0.13 to 0.30.



Use tools **Mot.788** and **Mot.789** to fit the main bearing oil seals.





If the old oil seal lip has marked the crankshaft, a **1.5 mm** thick washer must be inserted between the new seal and the tool to give it the necessary offset.

Fit the flywheel or converter driving plate using locking plate **Mot.582.**

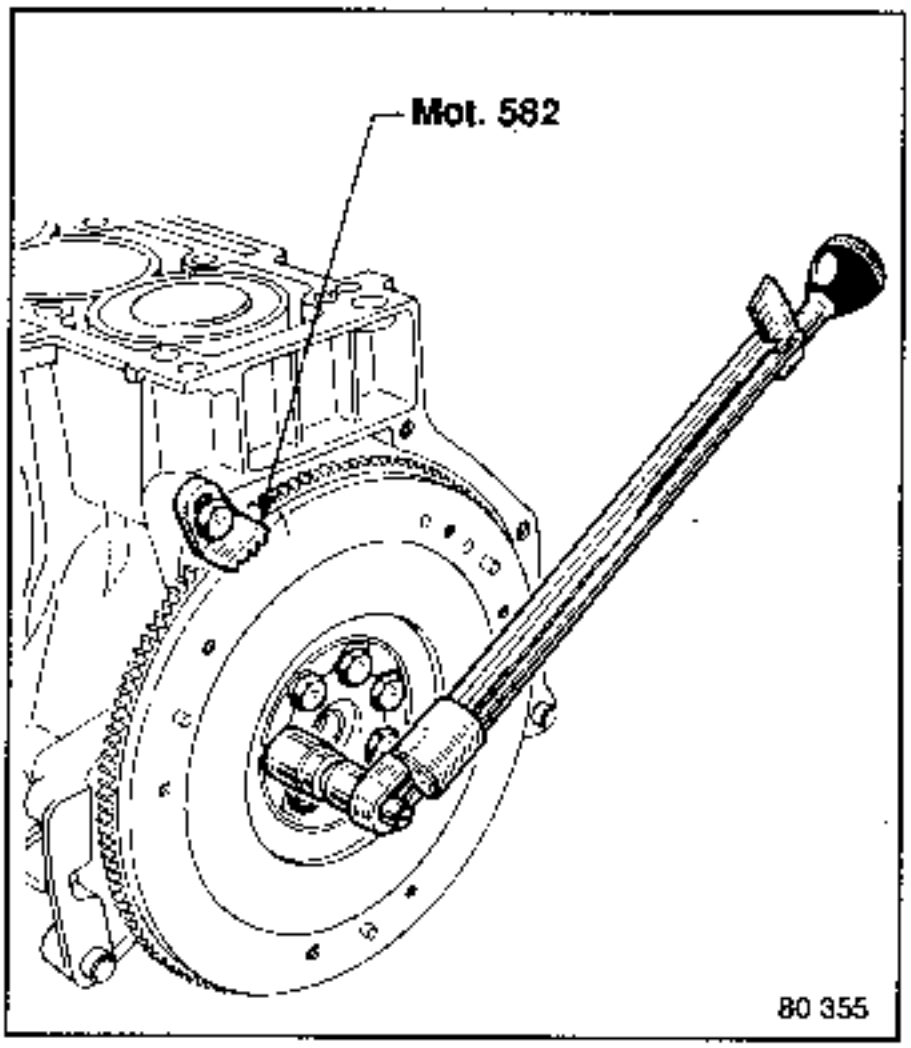
Smear the flywheel mounting face with **Loctite Autoform.**

Place a drop of **Loctite Frenetanch** on the **new** bolt threads.

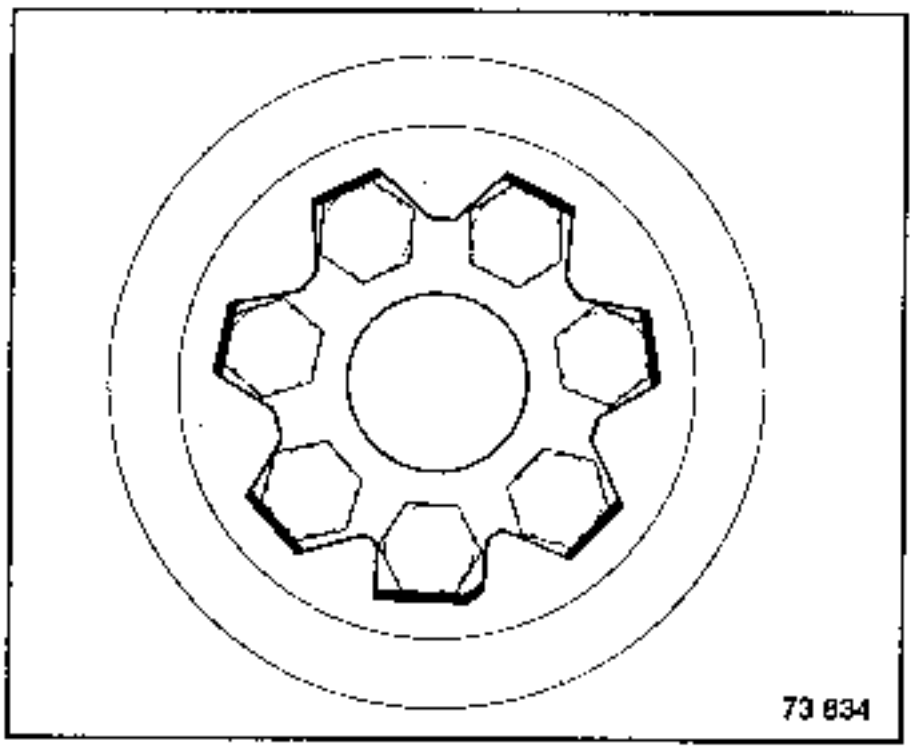
Refit the lockplate for the flywheel bolts if one is fitted as standard.

Torque tighten the flywheel bolts
to ..... **6 daNm.**

Torque tighten the converter driving plate bolts
to ..... between **6.5** and **7 daNm.**



Bend one tab on the lockplate over each flywheel bolt if applicable.

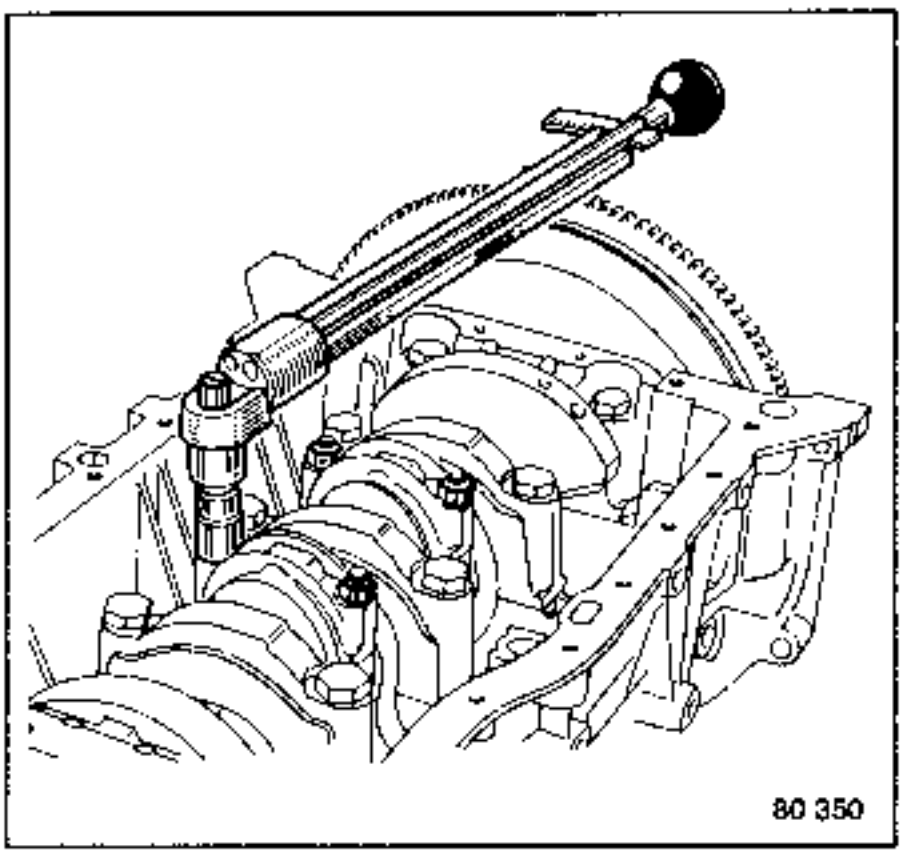


FITTING THE BEARING SHELLS TO THE CONNECTING RODS

The bearing shells for the big-end caps are plain and undrilled.

Connecting rod bearing shells:

- **1st model:** the connecting rods have no oil jet hole; plain or drilled bearing shells may be fitted;
- **2nd model:** the connecting rods are drilled for the oil jet hole; the drilled hole in the bearing shell matches the jet hole in the connecting rod.
- **3rd model (J7R 720 engine):** the connecting rods are drilled for the oil jet hole; the bearing shells are not.



Fit the big-end caps and new nuts and torque tighten them:

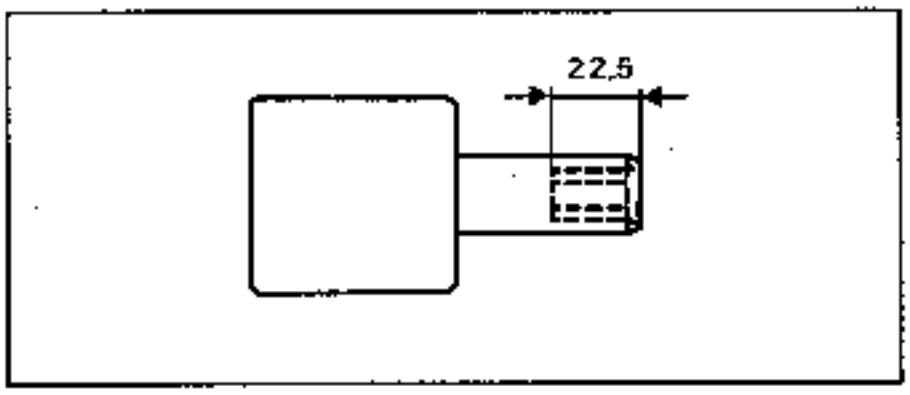
- **829-J5R-J6R-J7R ..... 4.5 to 5 daNm**
- **851-J7T ..... 6 to 6.5 daNm**

Oil pump:

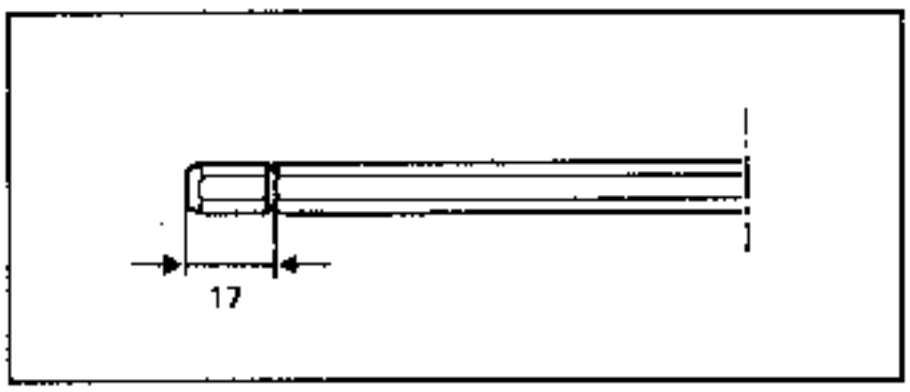
There are two types of oil pump:

1st type

Drive gear

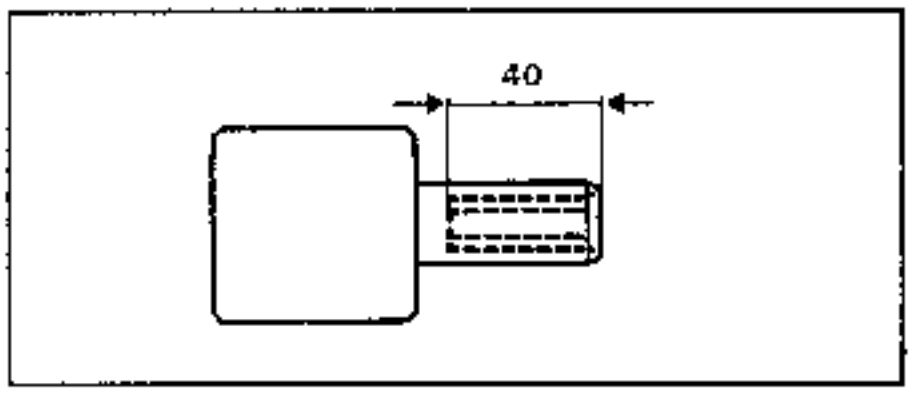


Shaft

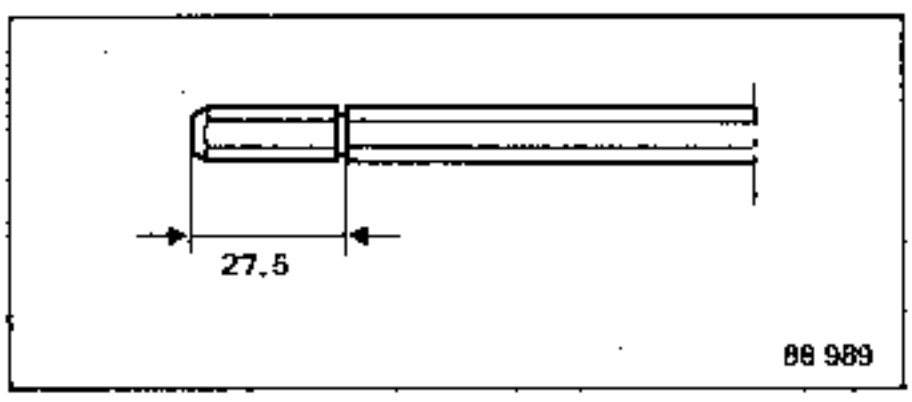


2nd type

Drive gear



Shaft

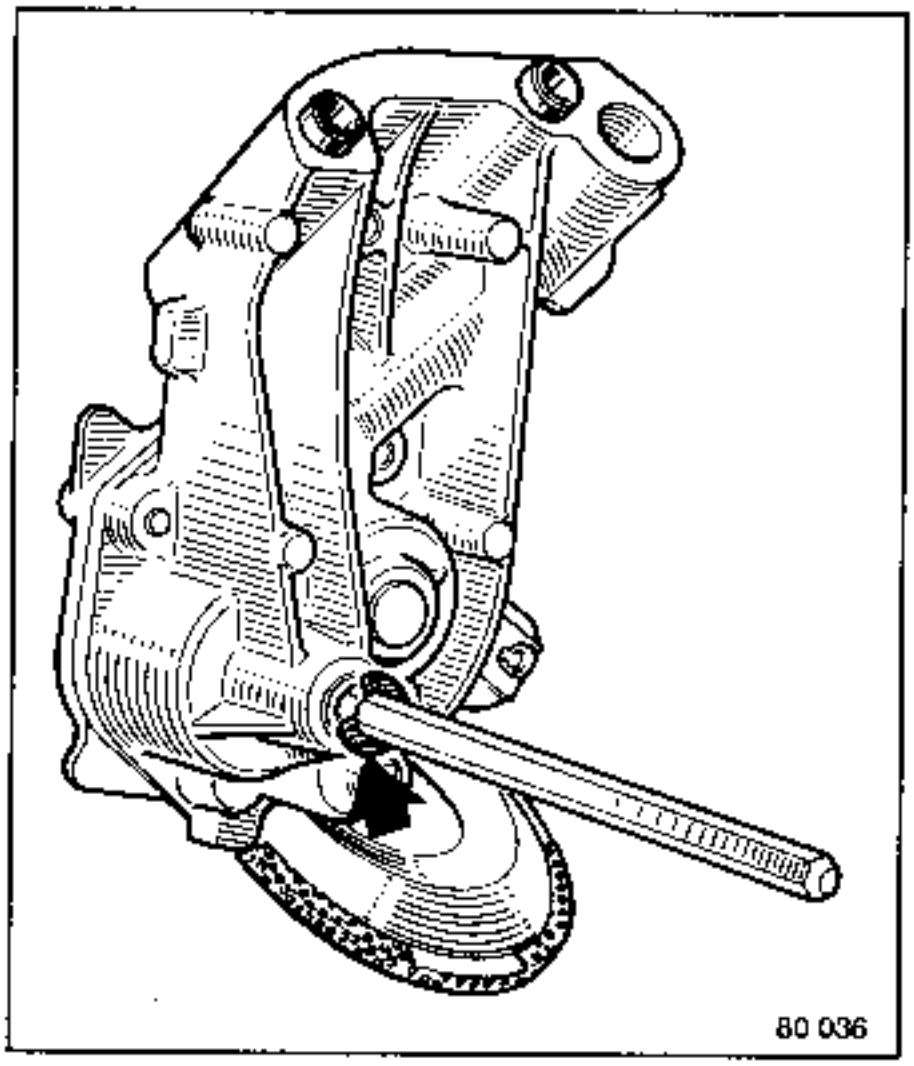


Interchangeability

Never fit the 2nd type of shaft to a 1st type drive gear.

- Fit the oil pump together with its drive shaft, with the circlip at the oil pump end.

Torque tighten the oil pump bolts to ..... **4 to 4.5 daNm**

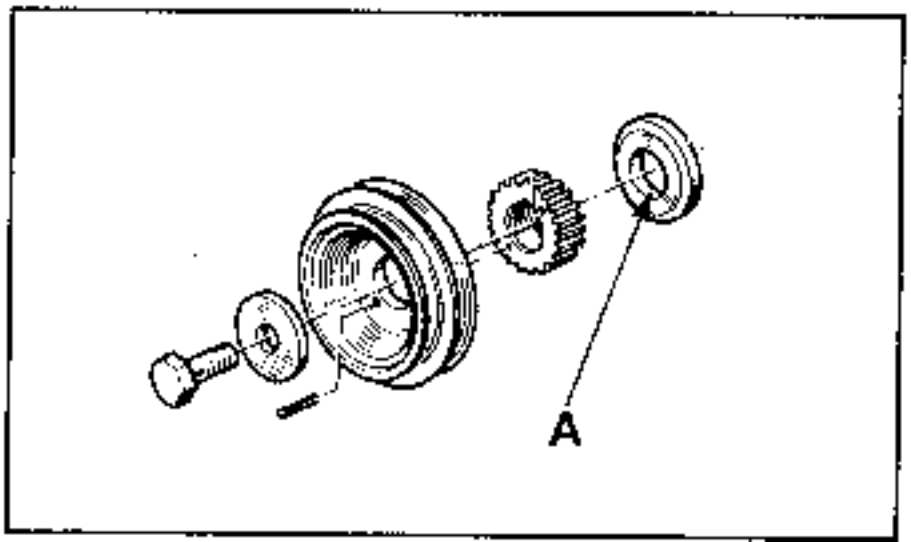


Fit the timing sprocket (chamfer **A** facing cylinder block) and its washer.

Use locking plate **Mot. 582** to prevent the crankshaft from turning.

Smear the pulley joint face with **Loctite AUTOFORM.**

Put one or two drops of **Loctite FRENBLOC** on the bolt.



Torque tighten the crankshaft pulley bolt: (see **"Specifications"** pages 11 and 12).

NOTE:

When replacing a dipstick tube it must be bonded in the cylinder block; likewise on **J7R 752** engines after operations have been performed on the dipstick tube mounting on the exhaust manifold.

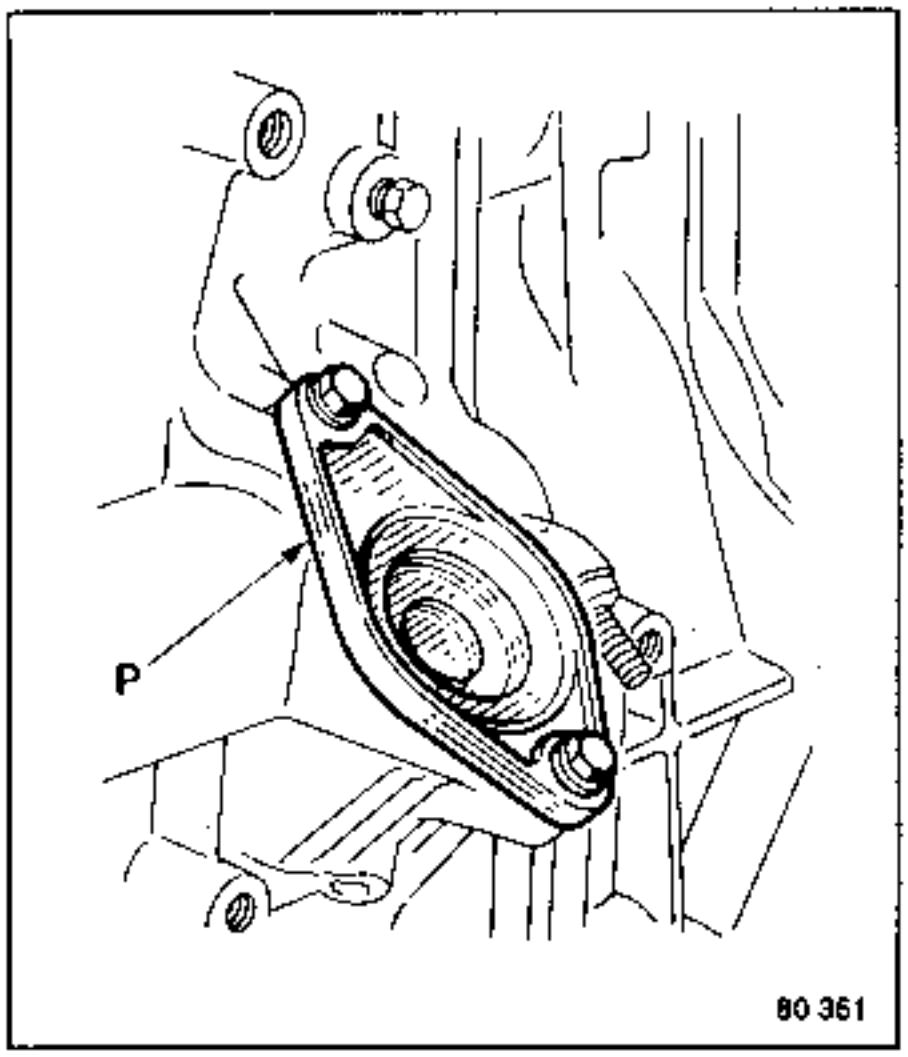
INTERMEDIATE SHAFT - REMOVING-REFITTING

ESSENTIAL SPECIAL TOOLING	
Mot. 790	Oil seal inserting tool
Mot. 799 or **Mot. 855**	Locking tool

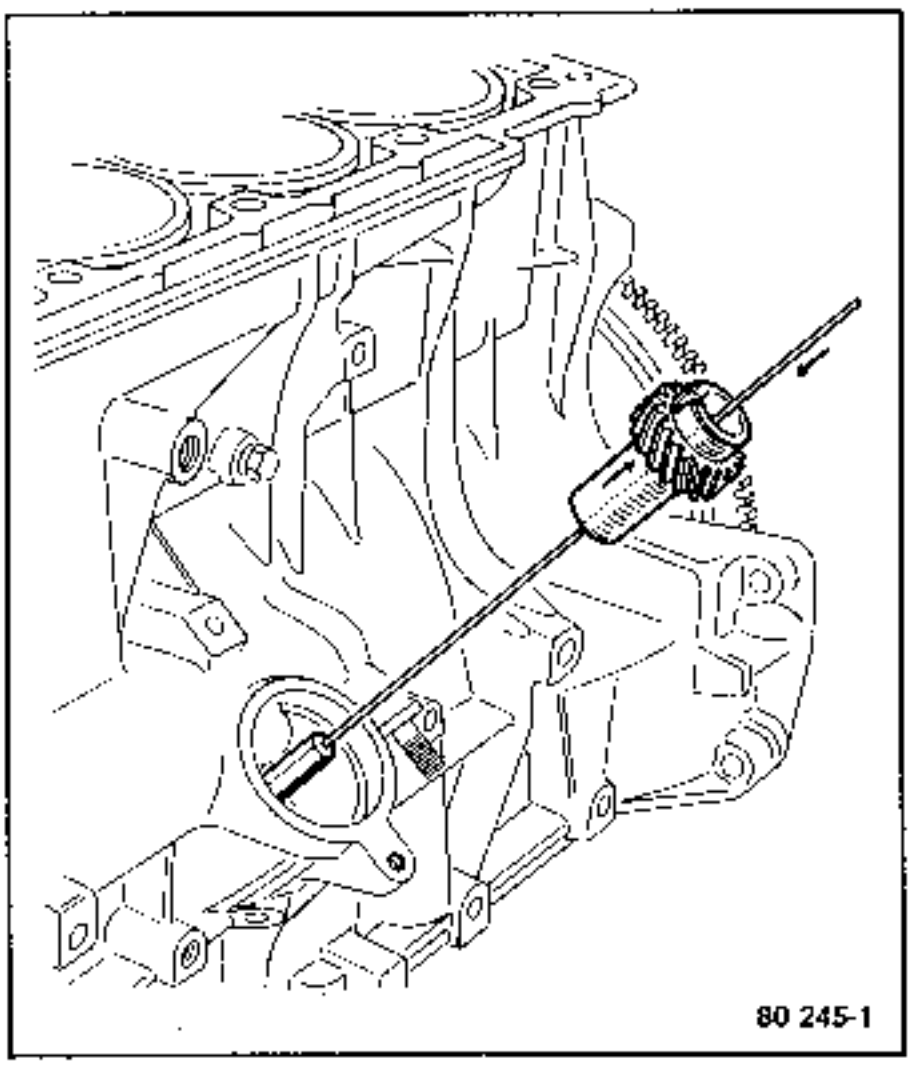
REMOVING

Remove:

- the timing cover;
- the timing gear (see section entitled "TIMING GEAR" removing-refitting);
- closure plate (P) for the oil pump.



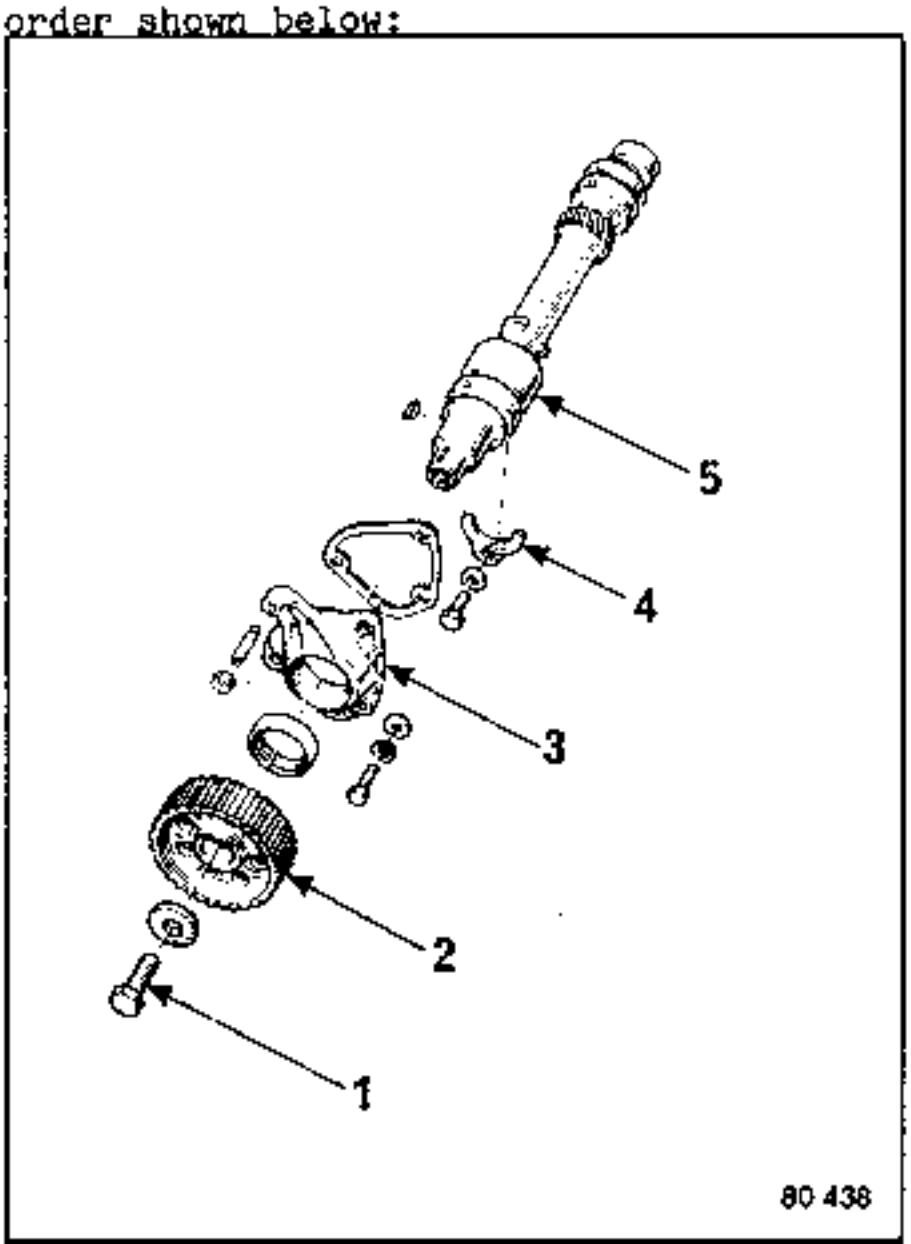
When removing this gear, place a metal rod (of the brazing rod type) through the gear so that oil pump drive rod stays in its location and does not drop into the sump.



Remove the fuel pump (if necessary).

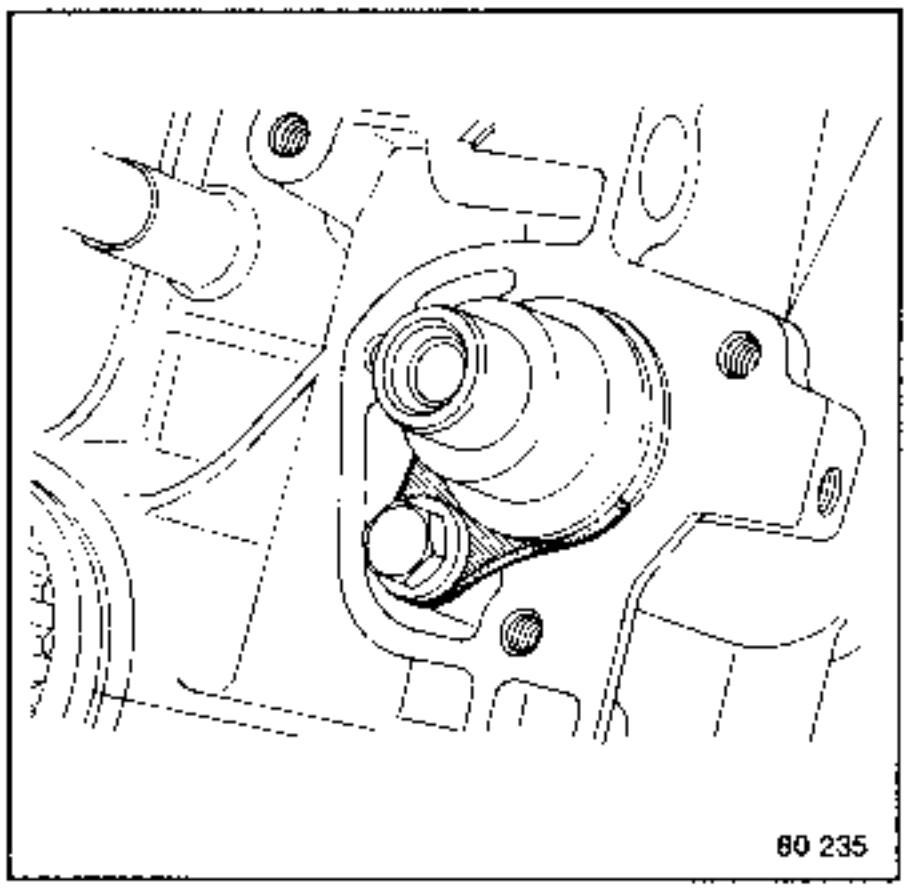
Loosen the sprocket with tool **Mot.799** or **Mot.855**.

Dismantle the intermediate shaft in the order shown below:



REFITTING

Secure the intermediate shaft with its clamp plate.



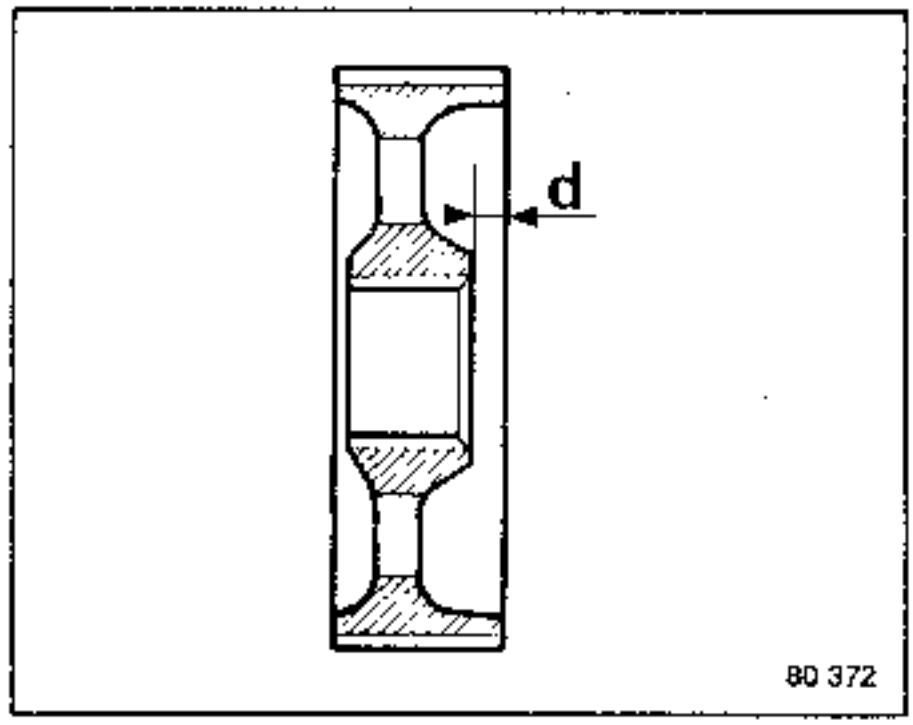
Use tool **Mot. 790** to insert the oil seal and to centre the cover.

If the bearing surface has been marked by the old seal, insert a 1 **mm** thick washer to offset the new seal.

Tightening

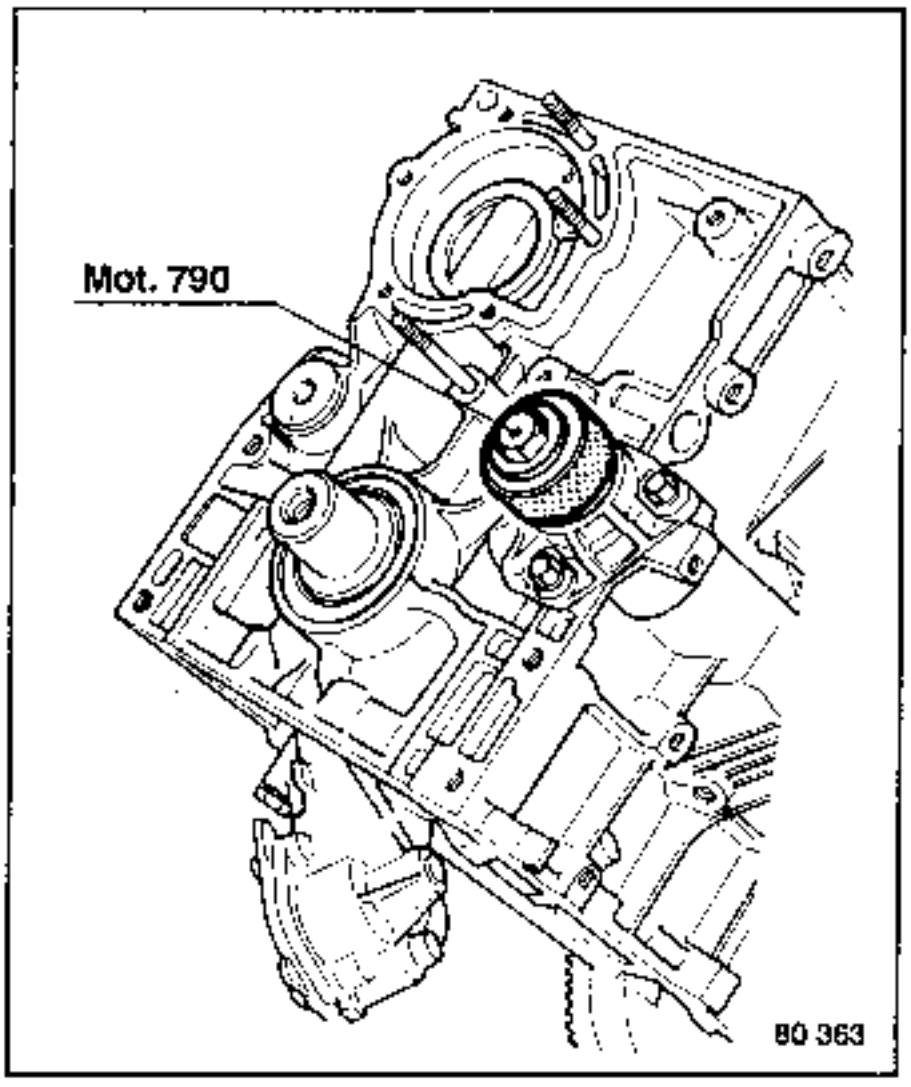
The toothed sprocket is fitted with its wider offset **(d)** facing the cylinder block.

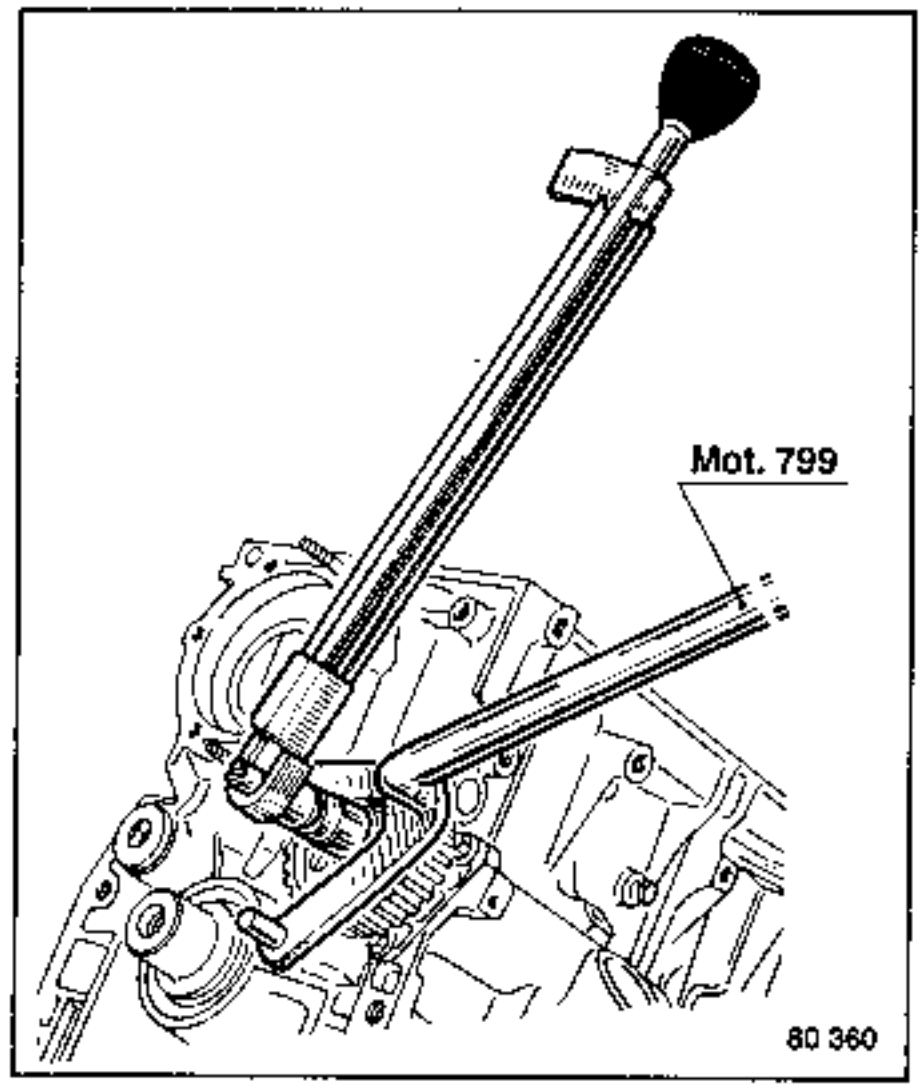
Put one or two drops of **Loctite FRENBLOC** on the bolt.



Tighten the toothed sprocket using tool **Mot. 799** or **Mot. 855.**

Tightening torque ..... **5 daNm.**

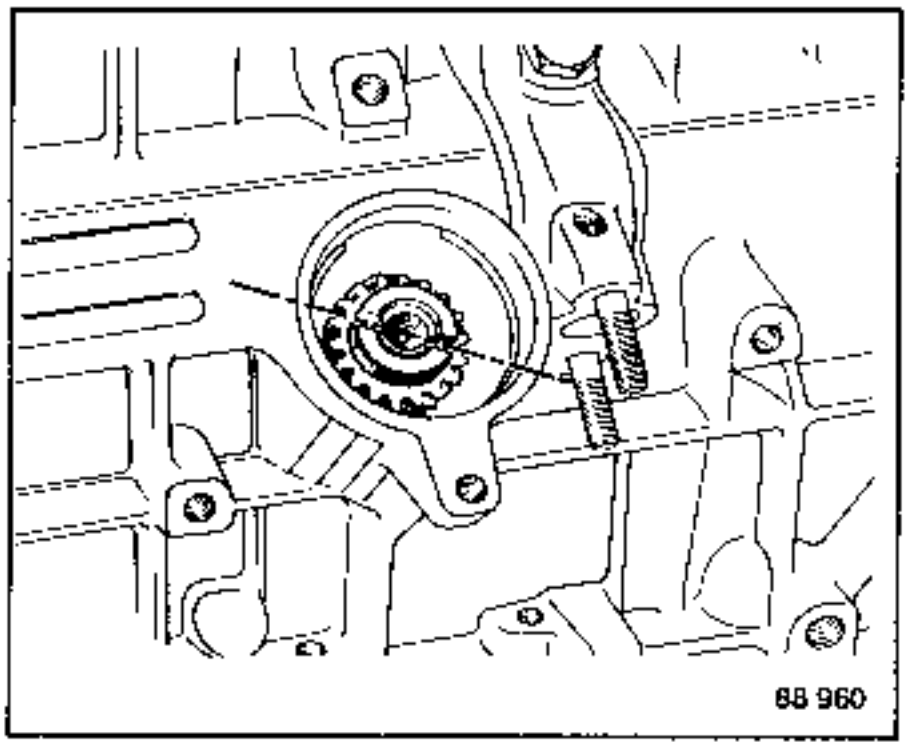




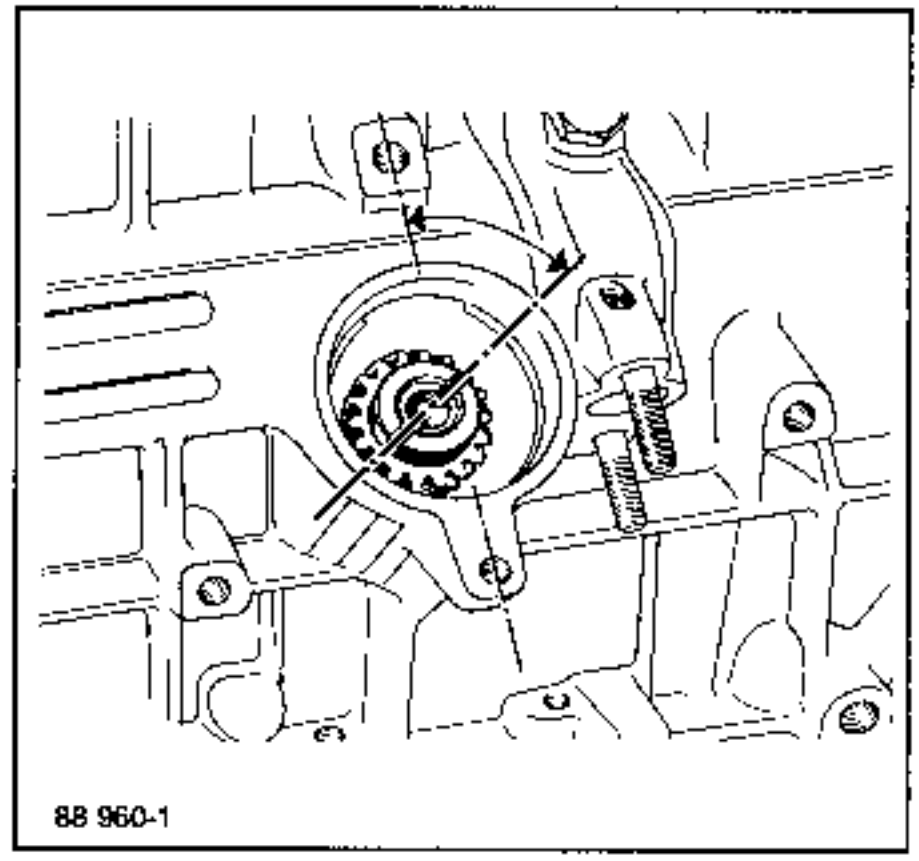
Fit:
- the timing gear;
- the oil pump drive gear.

Note:
On engines equipped with a distributor or rotor arm driven by the intermediate shaft, ensure that no. 1 cylinder piston **is at TDC-firing stroke.**

J5R 716 - J5R 718 - J5R 726 - J5R 728 - 829 720 - 829 730 - 829 731



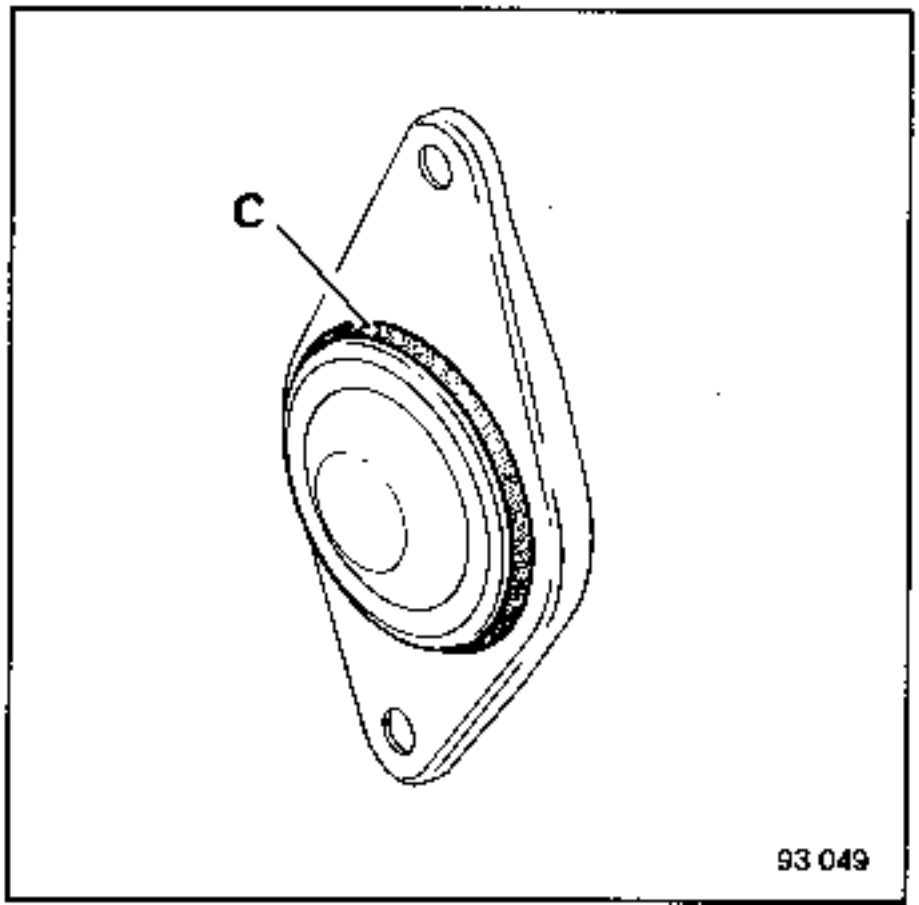
J6R 234 - J6R 236 - J6R 734



Fit the distributor or the aluminium plate with its seal or the sheet metal plate coated with **CAF 4/60 THIXO.**

Refit closure plate (P):

Apply a continuous sealing bead (c) (**0.7mm** diameter) of **CAF 4/60 THIXO** as shown below.



REPLACING THE CYLINDER BLOCK

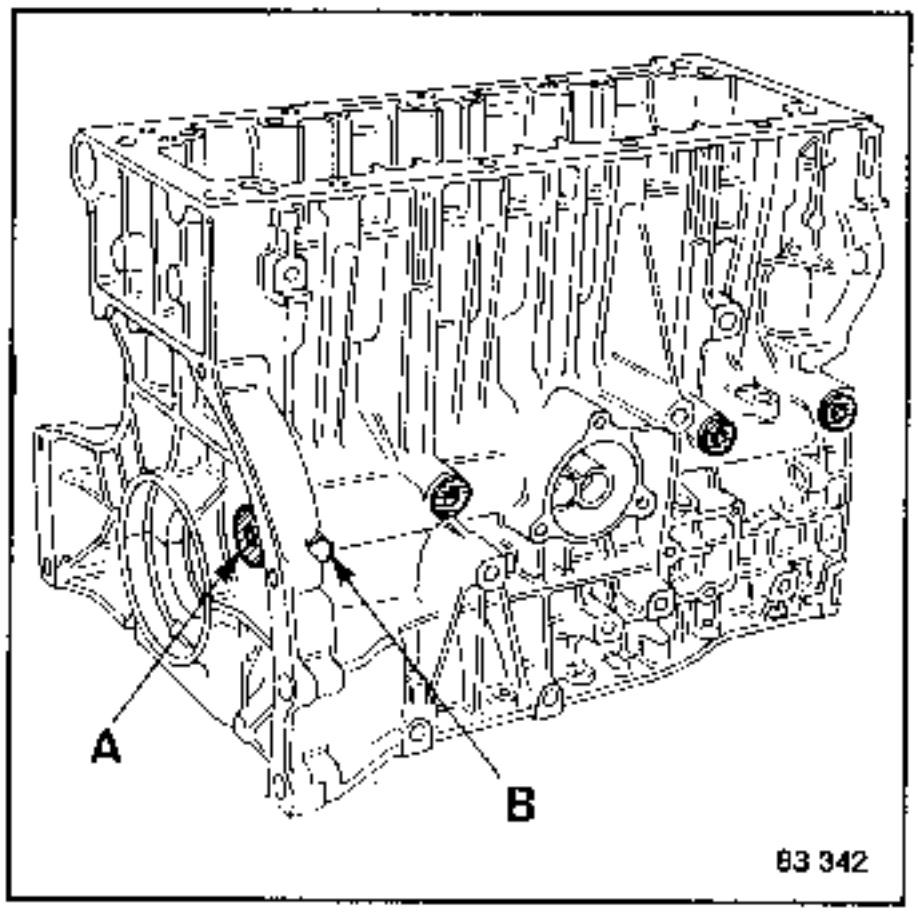
SPECIAL FEATURES

If the threaded plugs blocking the oil channels are dismantled, they must be torque tightened as indicated below when refitted:

- 8 **daNm** for plug **(A)**;

- 2 **daNm** for plug **(B)** of no. 1 bearing;

- 4 **daNm** for the other plugs.



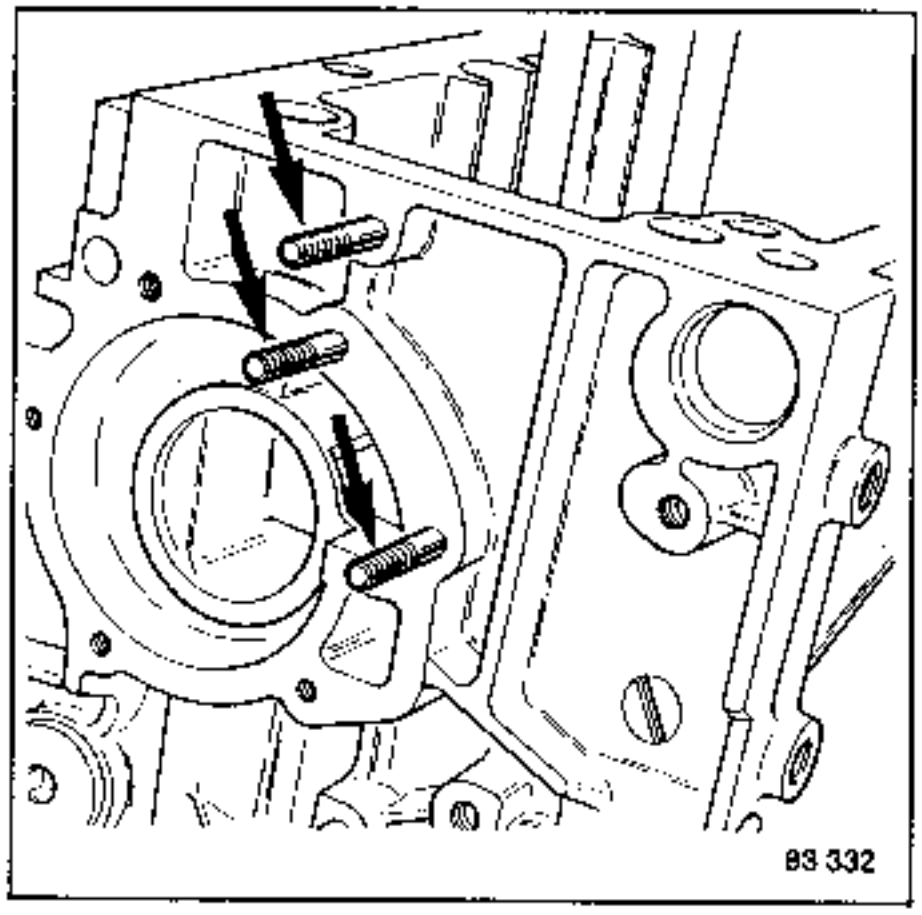
The plug-cup assemblies must only be removed when a worn cylinder block is cleaned and then they must be coated with **Loctite SCELBLOC** (locking and sealing resin).

Check that the cylinder head bolts can be easily tightened.

If necessary, screw them in several times so as to grind-in the threads.

Place the cylinder block on support **Mot.792-01** (see section entitled "SPECIFICATIONS - Special features").

Fit in position the various securing studs. The studs for the cylinder block water pump and timing belt cover must be coated with one or two drops of **Loctite FRENETANCH** since their threads penetrate into the cooling system.

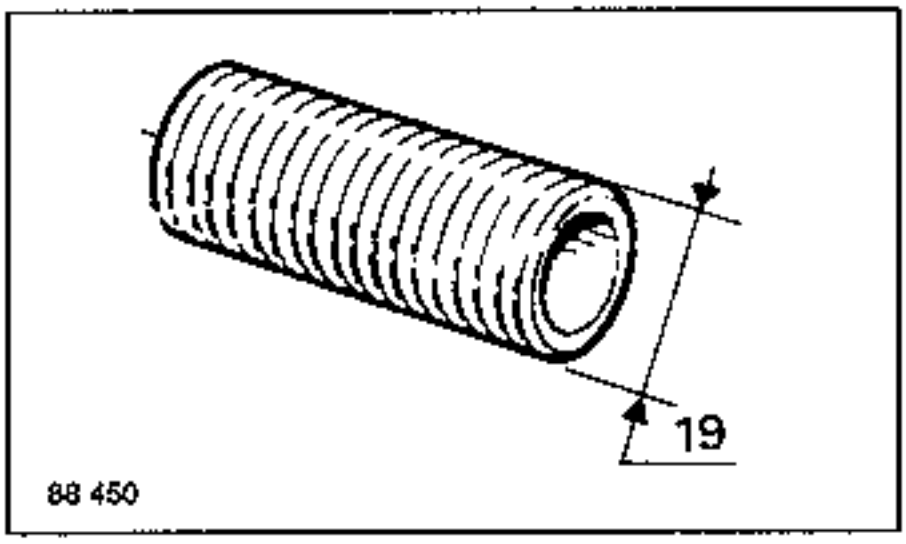


FITTING THREAD INSERTS

The threaded holes of all the parts constituting the engine may be repaired using thread inserts.

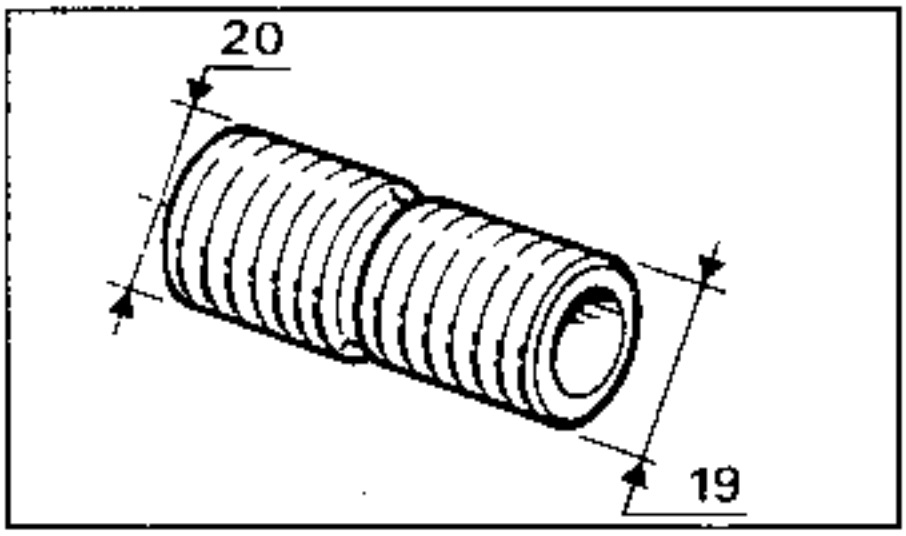
OIL FILTER THREADED UNION

1st model: cylindrical union



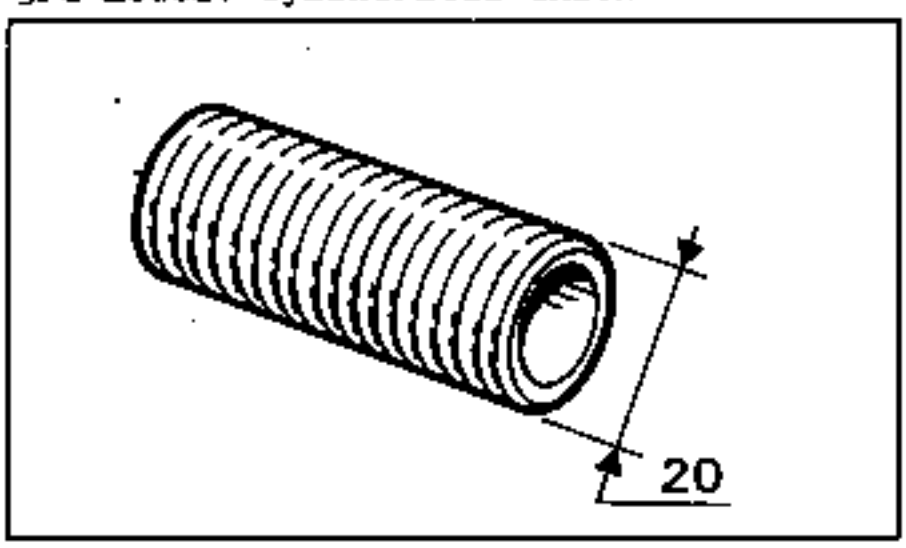
- 19 mm dia., pitch 1.587

2nd model: stepped union



- 19 mm dia., pitch 1.587 (cylinder block end)
- 20 mm dia., pitch 1.50 (oil filter end).

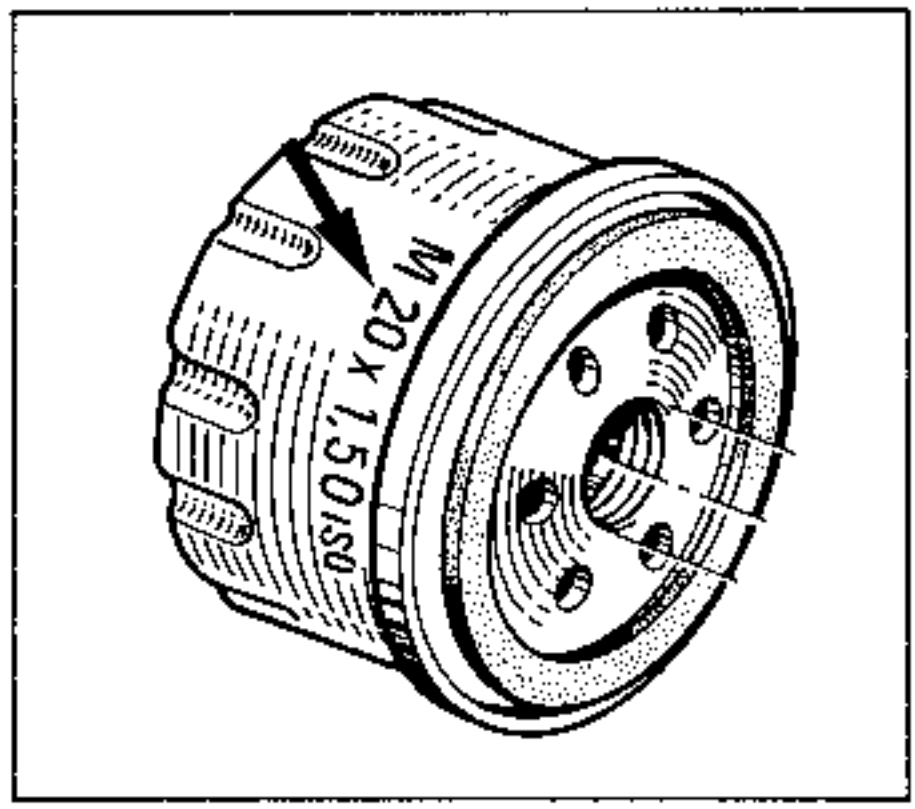
3rd model: cylindrical union



- 20 mm dia., pitch 1.50.

The filter stamped "20 x 1.50" is fitted on a threaded union with a **metric pitch of 20 x 1.50.**

Visual identification of filter



ATTENTION:

It is possible **in error** to fit a 20 x 1.50 oil filter on a 19 x 1.587 threaded union and in such a case the oil filter will loosen as the engine vibrates. In addition, there will be abnormal clearance between the assembly and the engine block.

Note:

Engines fitted with a 20 x 1.50 oil filter are marked with a label stuck on the rocker cover.

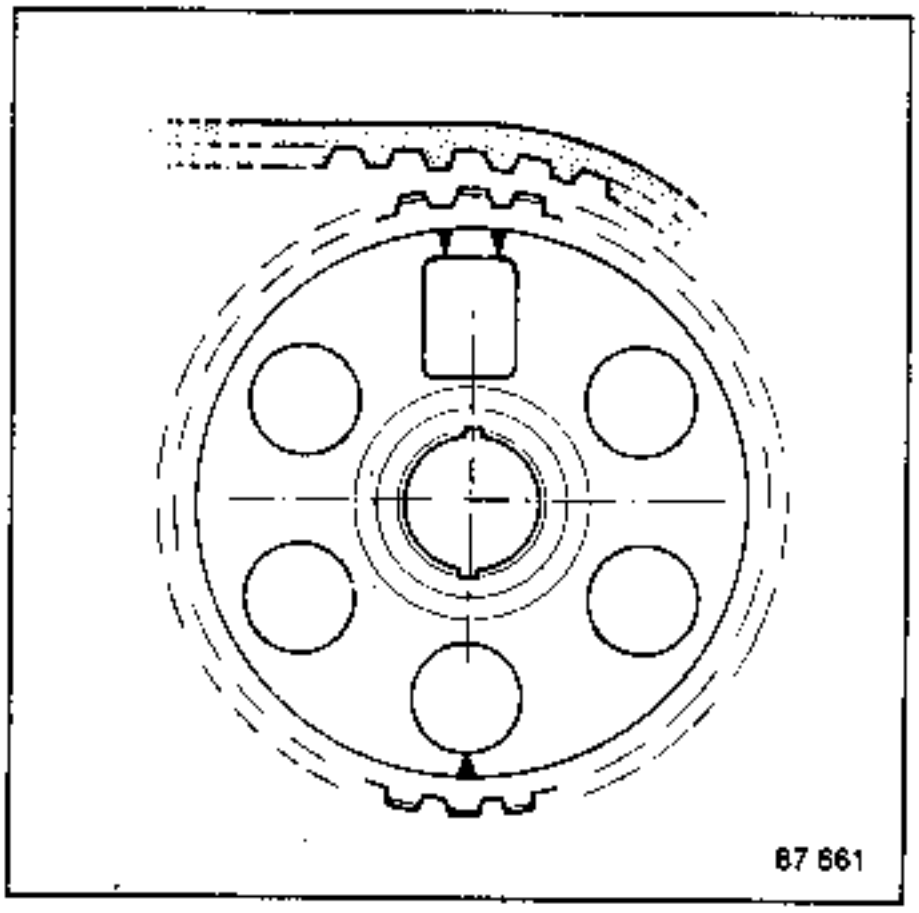
TIMING GEAR - REMOVING-REFITTING

All types except J7R 720

ESSENTIAL SPECIAL TOOLING	
El6. 346-04	Belt tensioning tool
Mot. 861	T.D.C. rod

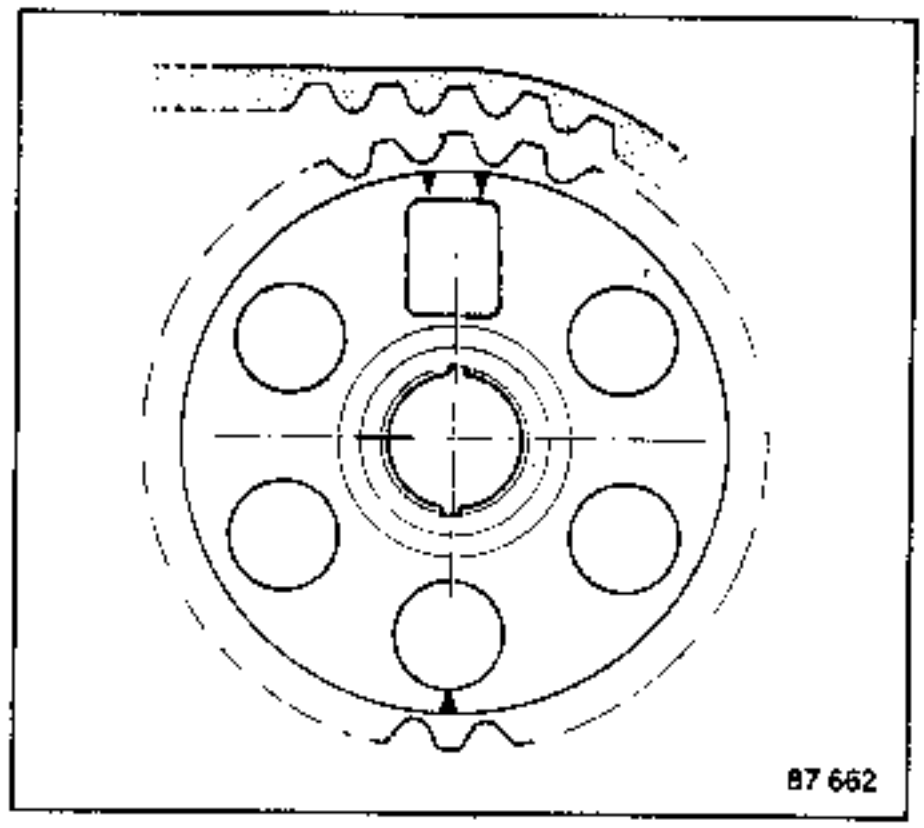
ATTENTION: Development of tooth profile

1st type - 2nd type



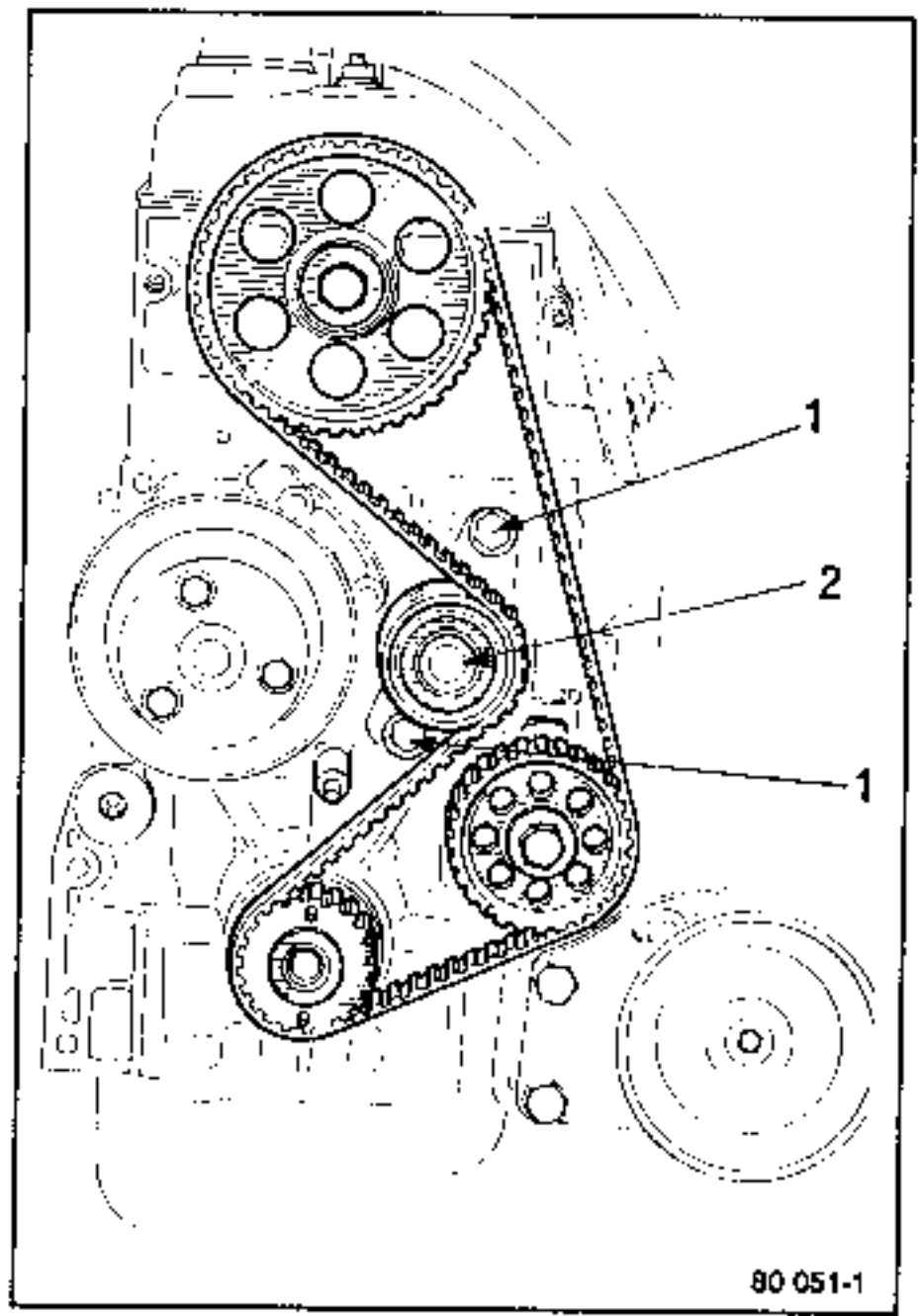
Never fit a part with type 1 or type 2 timing gear teeth with a part with the 3rd type of teeth (including the cover which has a cut-away section in the 2nd type of assembly).

3rd type



REMOVING

- Align the markings (using the gauge rod and the camshaft marks).
- Remove the timing belt.
- Loosen nuts 1.
- Tilt tensioner 2 and retighten nuts 1.

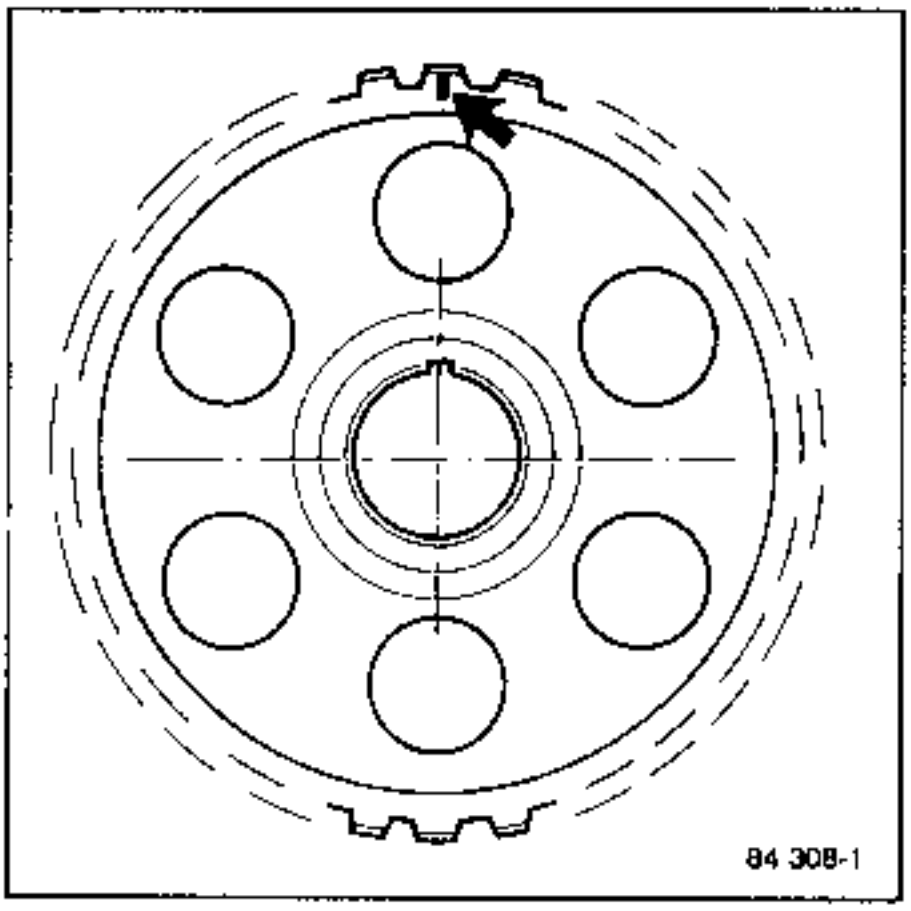


REFITTING

. Camshaft sprocket

1st type: J5R, J6R, 829 engines

- The sprocket has only one mark for timing the valves.



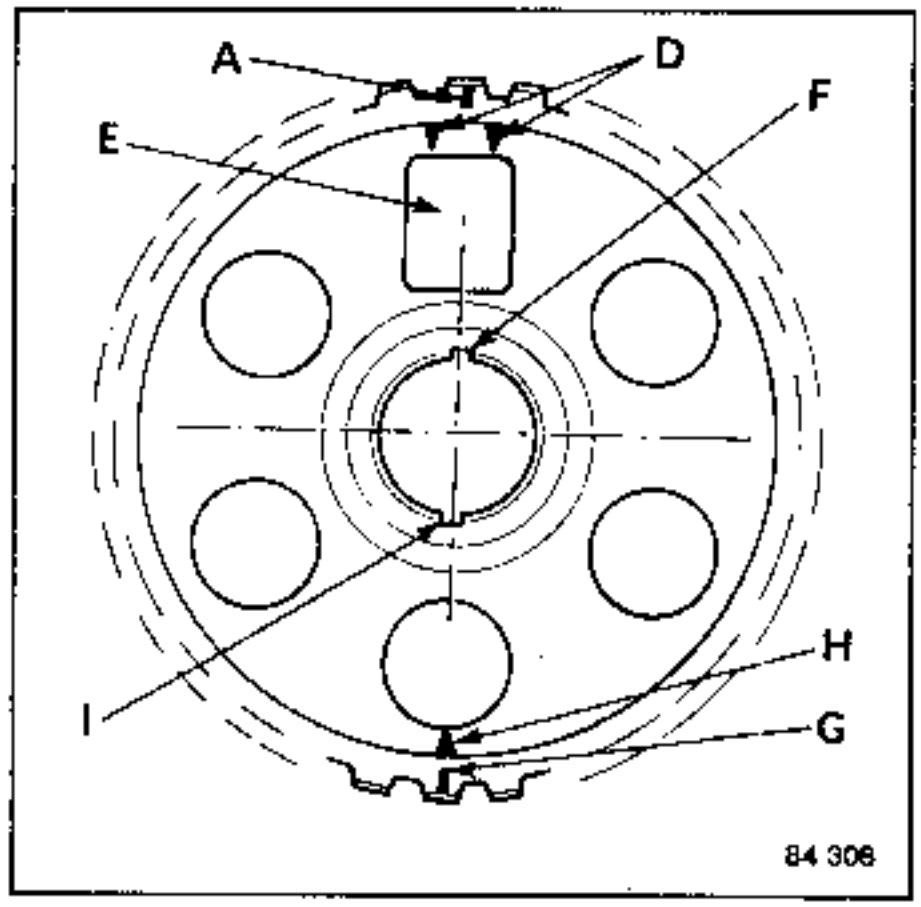
2nd and 3rd types: J5R, J6R, 851, 829, J7T, J7R engines

- It is essential to ensure that the correct keyways are used for each particular engine.

The sprocket has:

- a timing mark **A**, two bosses **D**, a rectangular hole **E** and a keyway **F** which are used to time the valves on **851, J7T and J7R 752 engines;**

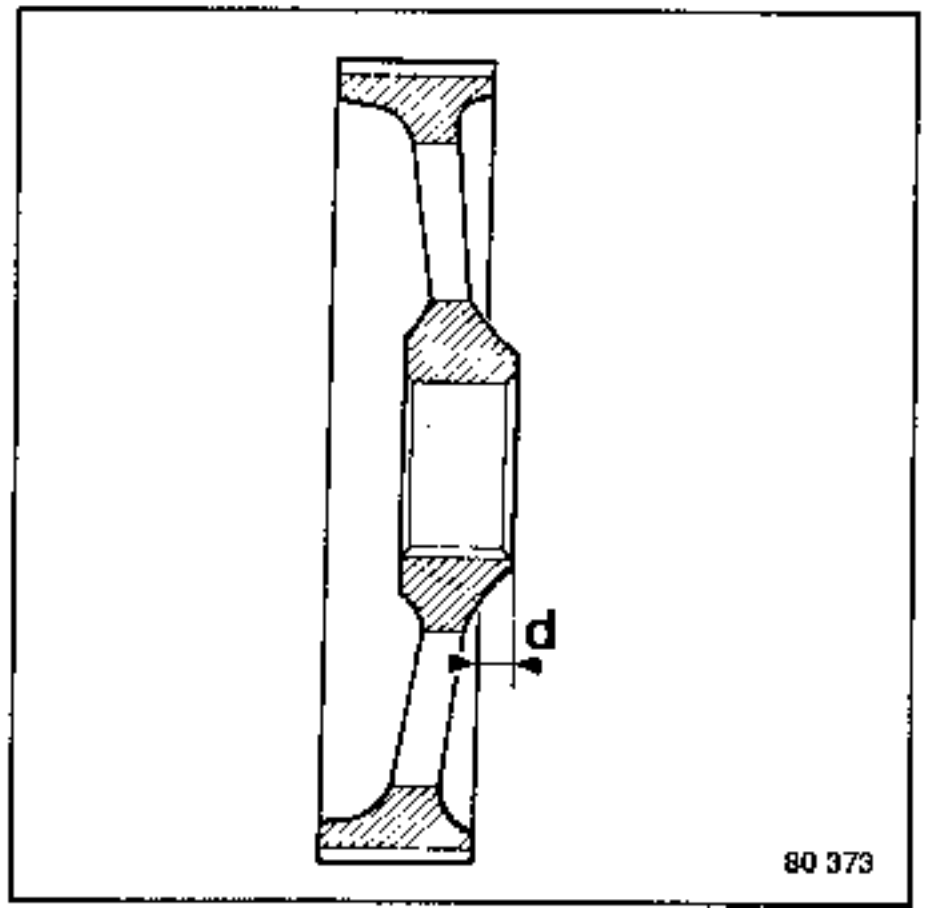
- one mark **G**, a boss **H** and a keyway **I** which are used to time the valves on **J6R, J5R, 829 and J7R engines.**



Fit the camshaft sprocket:

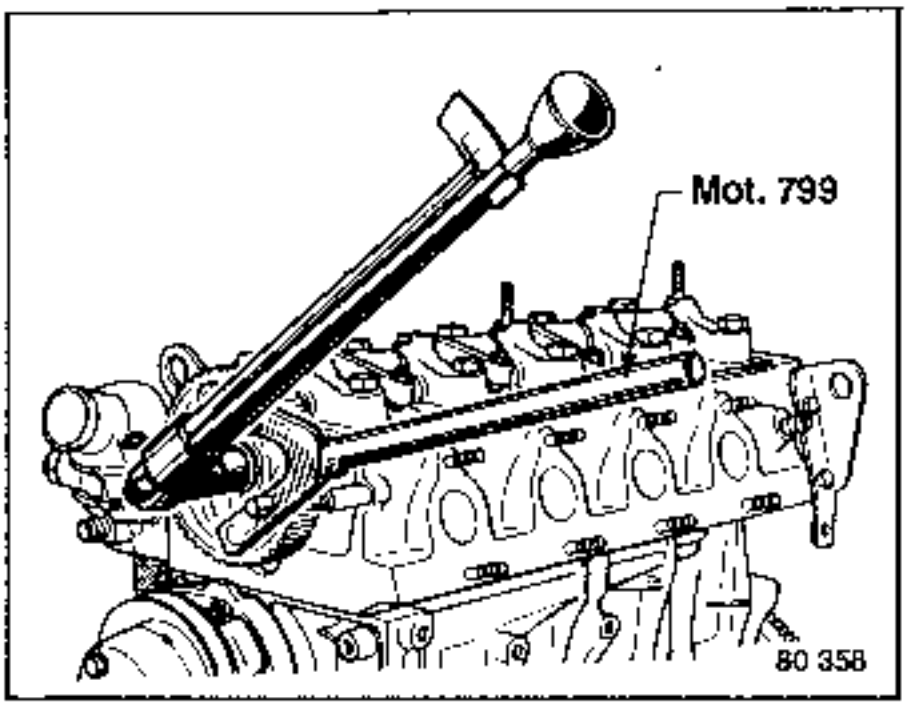
- keyway **I** for engines **829, J6R, J5R, J7R;**
- keyway **F** for engines **J7R 752, J7T, 851.**

The sprocket is fitted with hub offset **(d)** at the cylinder head end.



Use tool **Mot. 799** or **Mot. 855** and torque tighten the camshaft sprocket (having smeared the threads with **Loctite FRENBLOC**).

- Tightening torque ..... **5 daNm.**

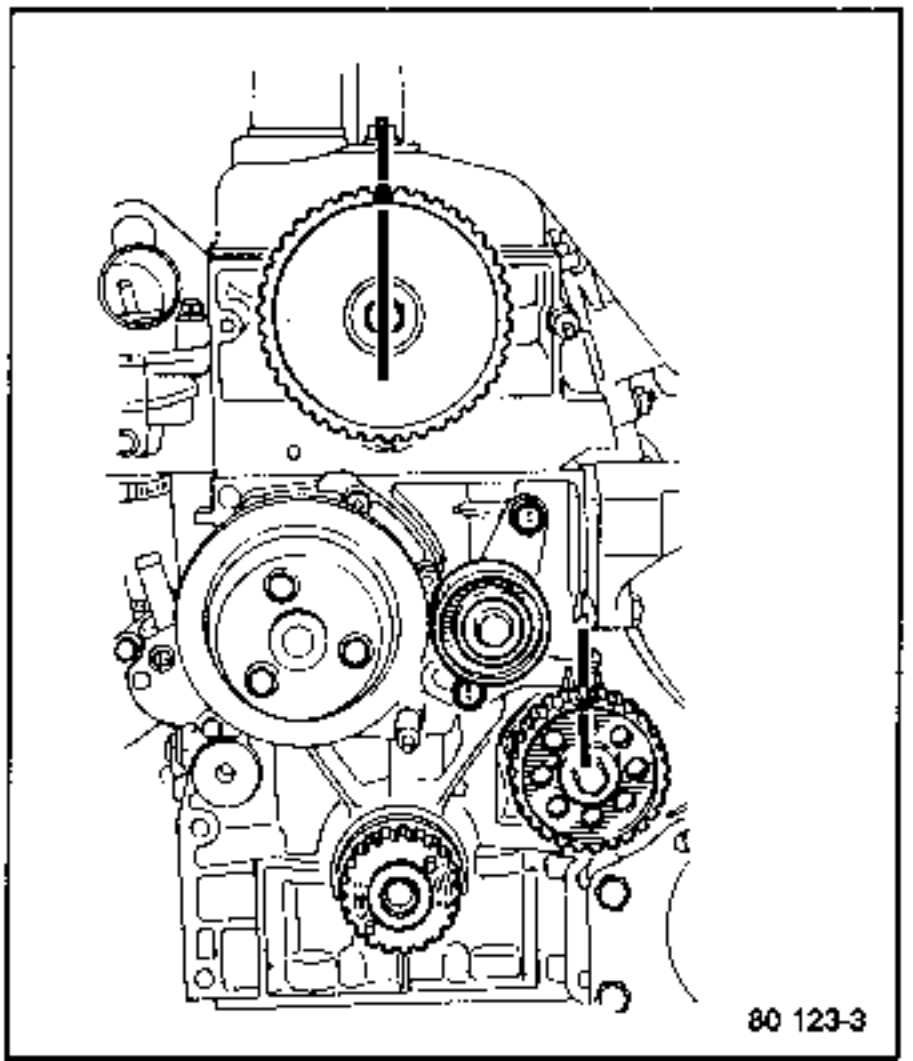


. **Toothed timing belt**

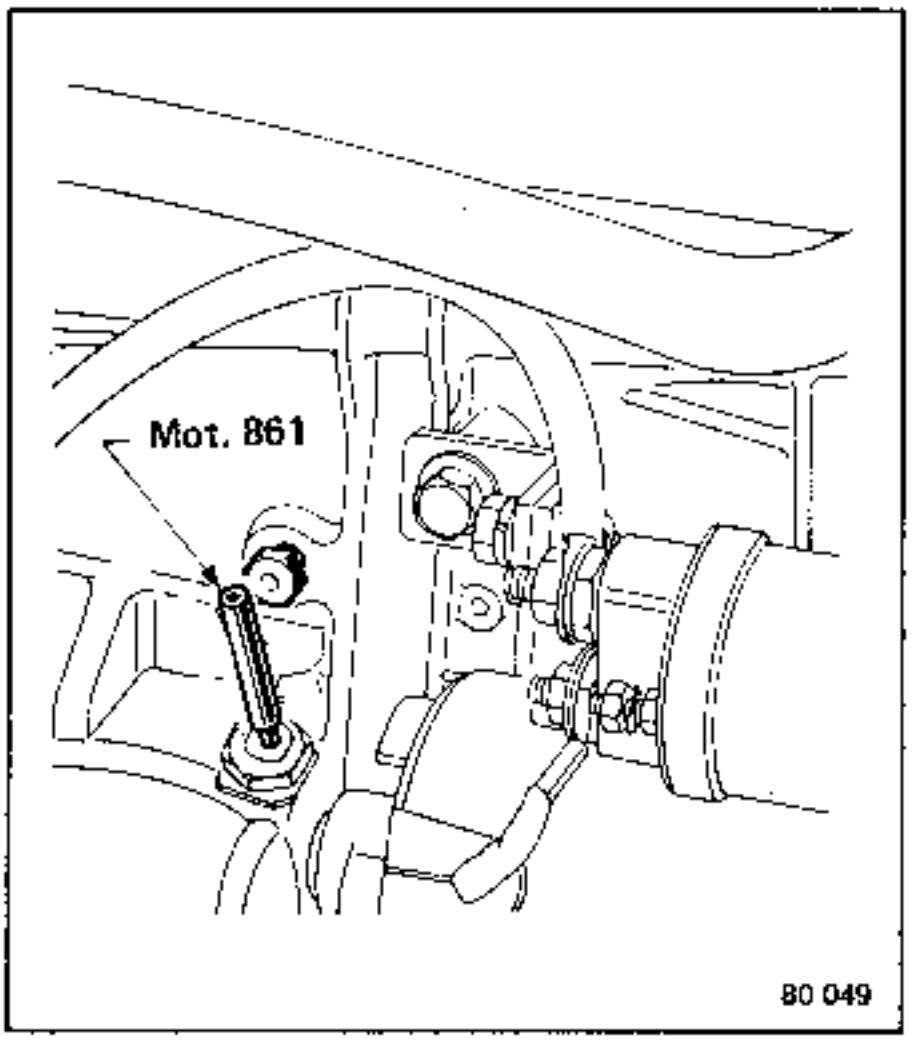
- **J7T, 851 engines:** it has **118** teeth;
- **829, J5R, J6R, J7R engines:** it has **116** teeth;
- **J7R 752 engine:** it has **115 teeth.**

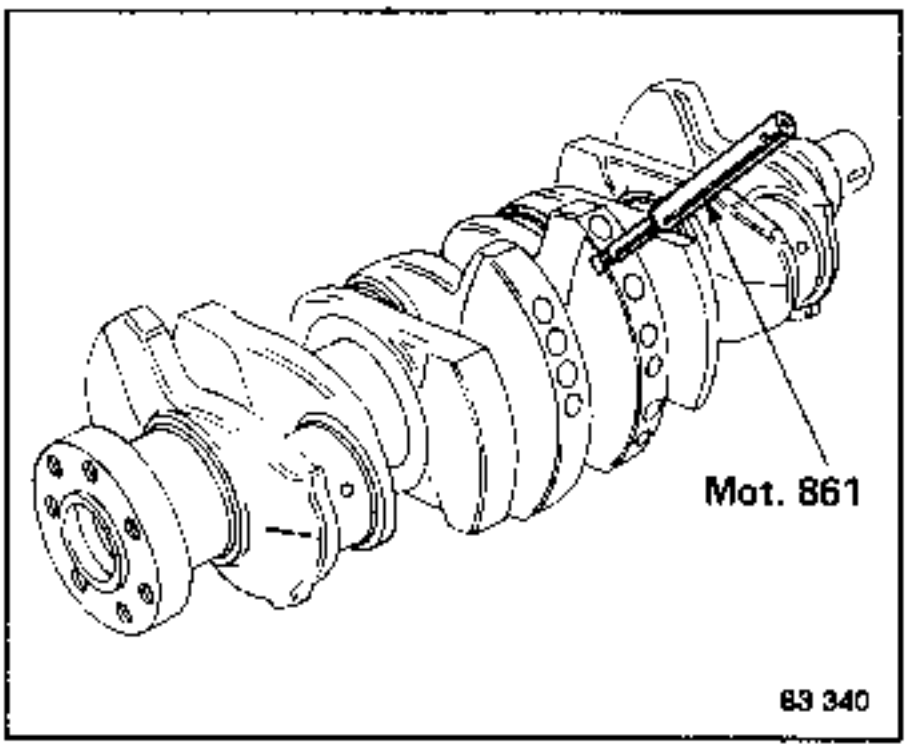
Fitting the timing belt

Position the camshaft sprocket and intermediate shaft sprocket in line with their respective static marks.



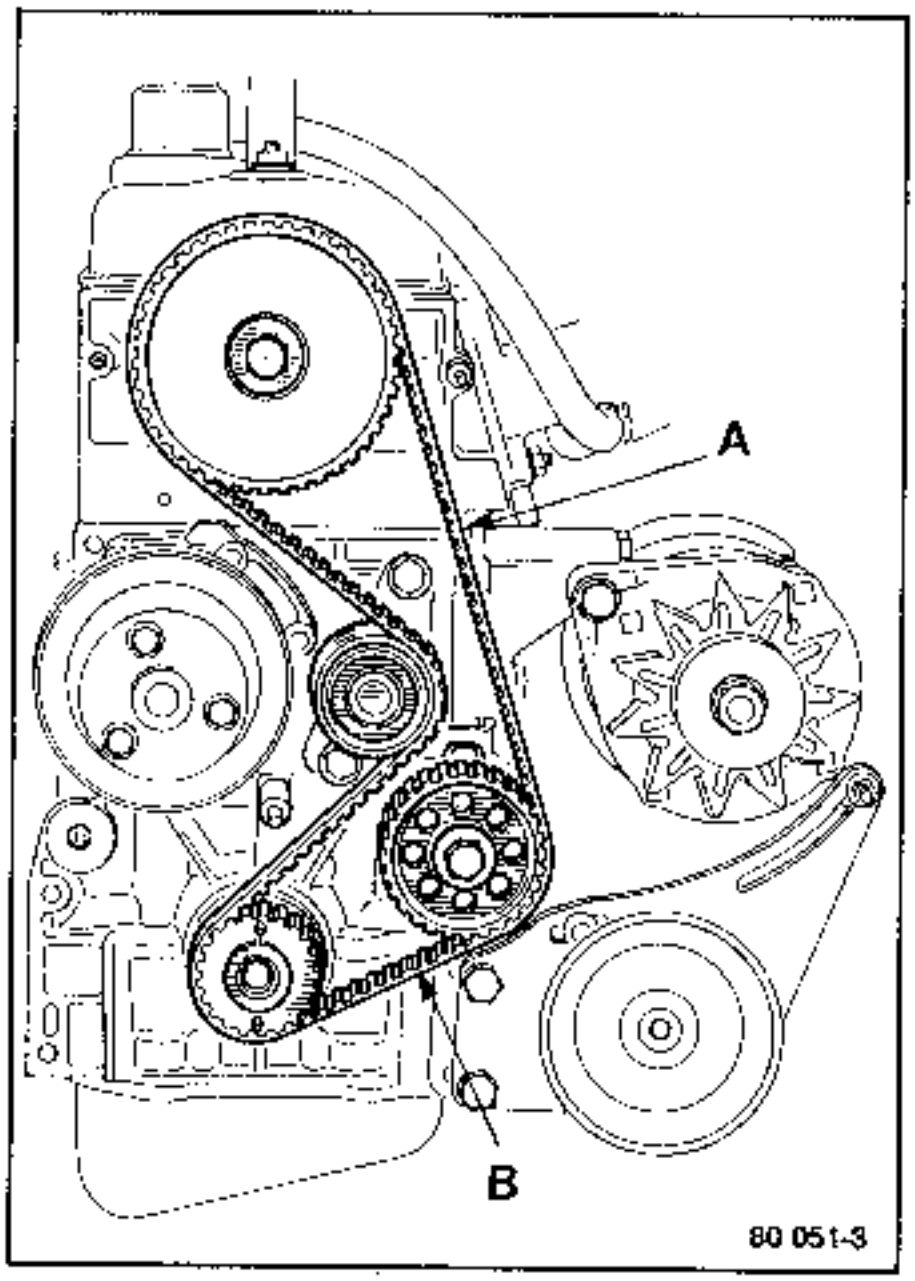
Using rod **Mot. 861**, position the crankshaft so that **No. 1 cylinder is on TDC - firing stroke.**



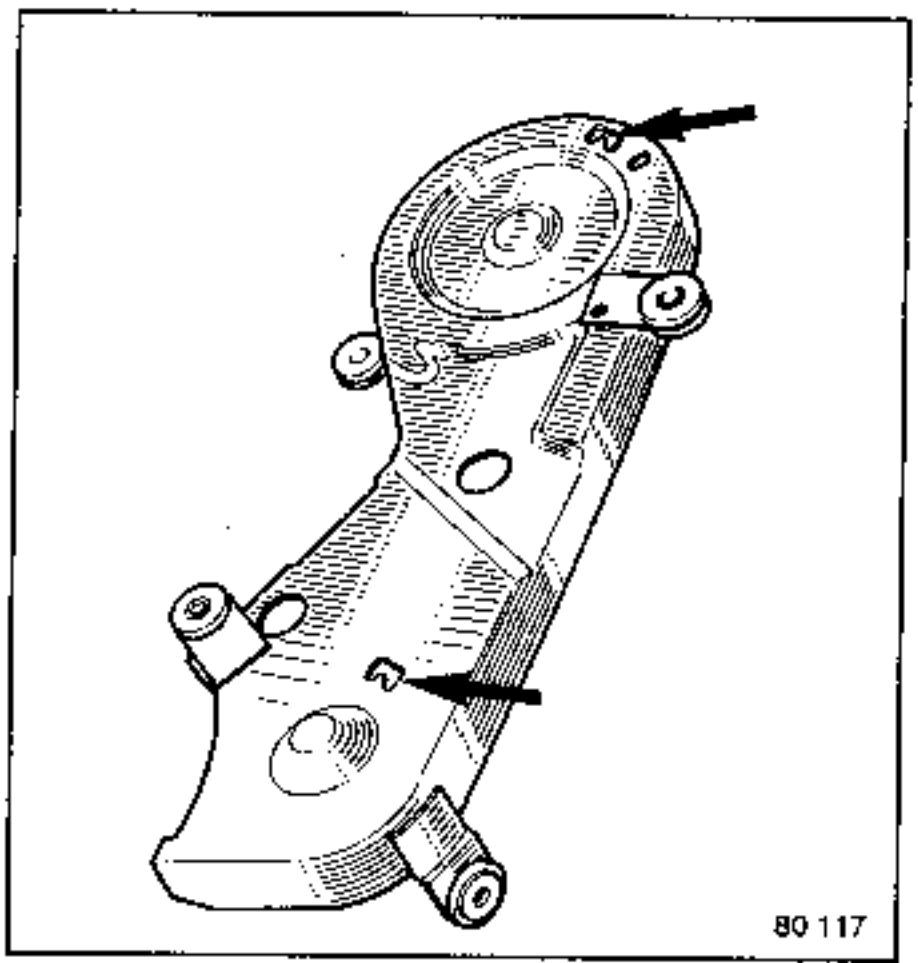


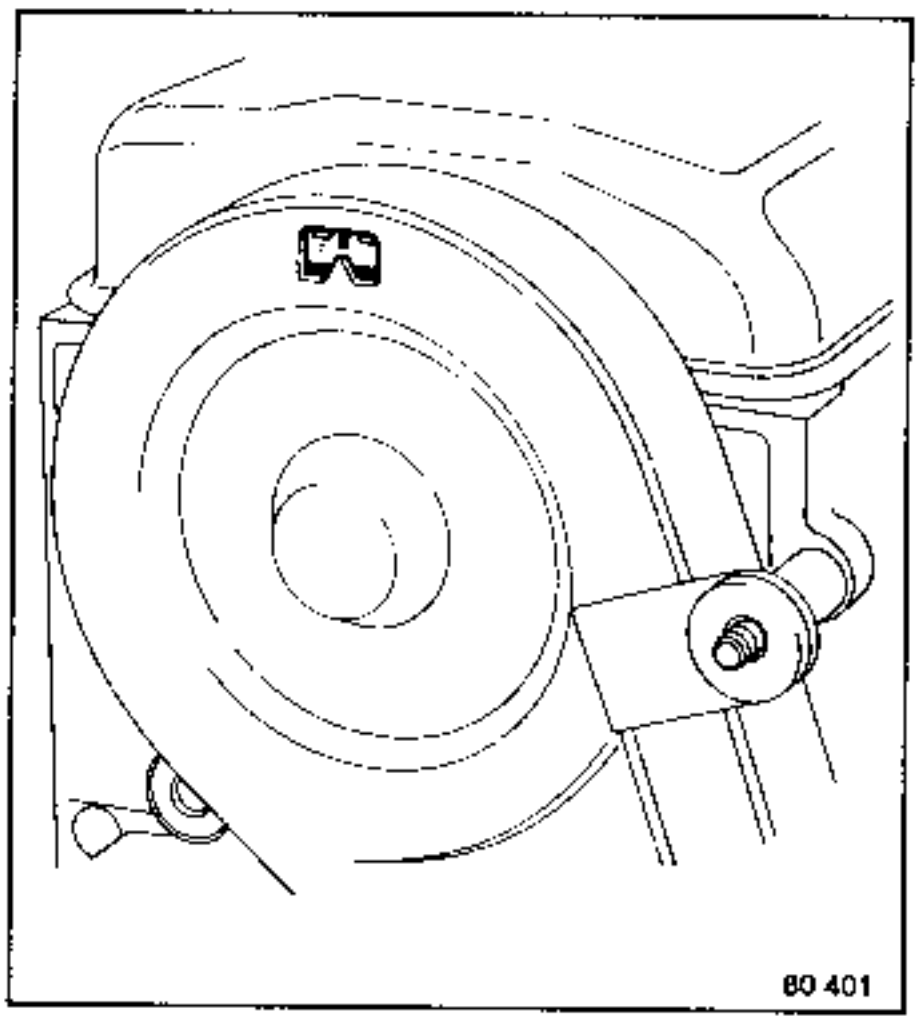
Do not use the TDC rod to prevent the crankshaft turning while loosening or tightening bolts; there is a flywheel locking plate for this.

Offer up the timing belt to the sprockets, sections **A** and **B** must be taut. **Pay no attention to the marks on the belt** (except for running direction ⇄).



Check the timing with the timing cover.





Loosen the tensioner bolts not more than one quarter of a turn. The tensioner, in contact with the belt, will then take up its new position automatically under the influence of its spring.

Retighten the tensioner bolts.

Checking the belt tension

Remove TDC rod **Mot. 861** and refit the plug. Stand in front of the engine and turn the crankshaft pulley nut so that the engine rotates through two complete turns in a clockwise direction (direction of normal running).

NOTE:

If a new belt tensioner is mounted (see page 10-22), the timing will still be the same, only the tension adjustment will change (see method for **J7R 720 engine**).

Never turn the engine anti-clockwise during this check.

Re-loosen the tensioner bolts one quarter of a turn.

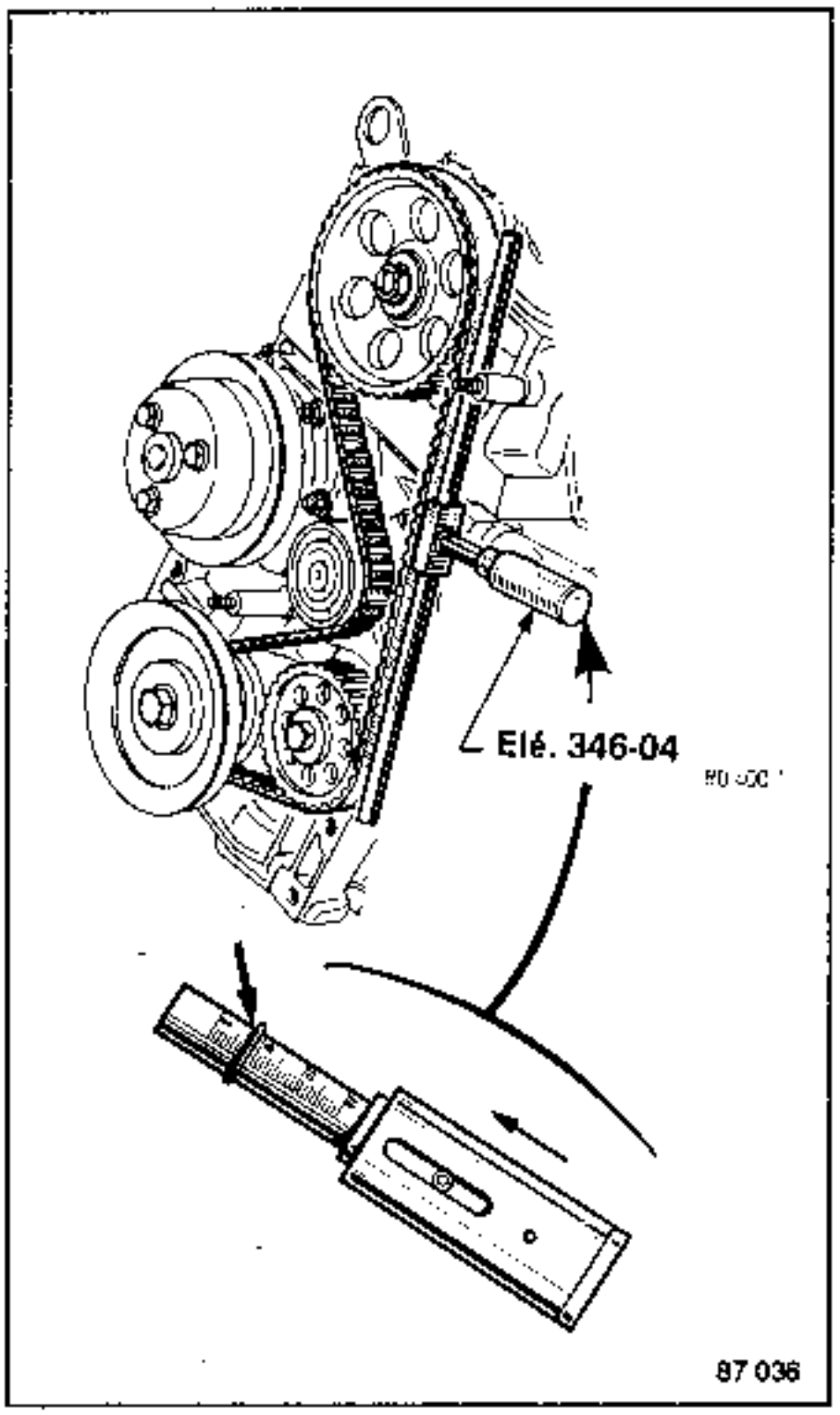
Retighten both tensioner bolts - bottom bolt first:
- retightening torque ..... **2.5 daN■.**

Check the belt tension using tool **Ele. 346-04.**

Deflection (mm):

..... 5.5 to 7

..... 6 to 8

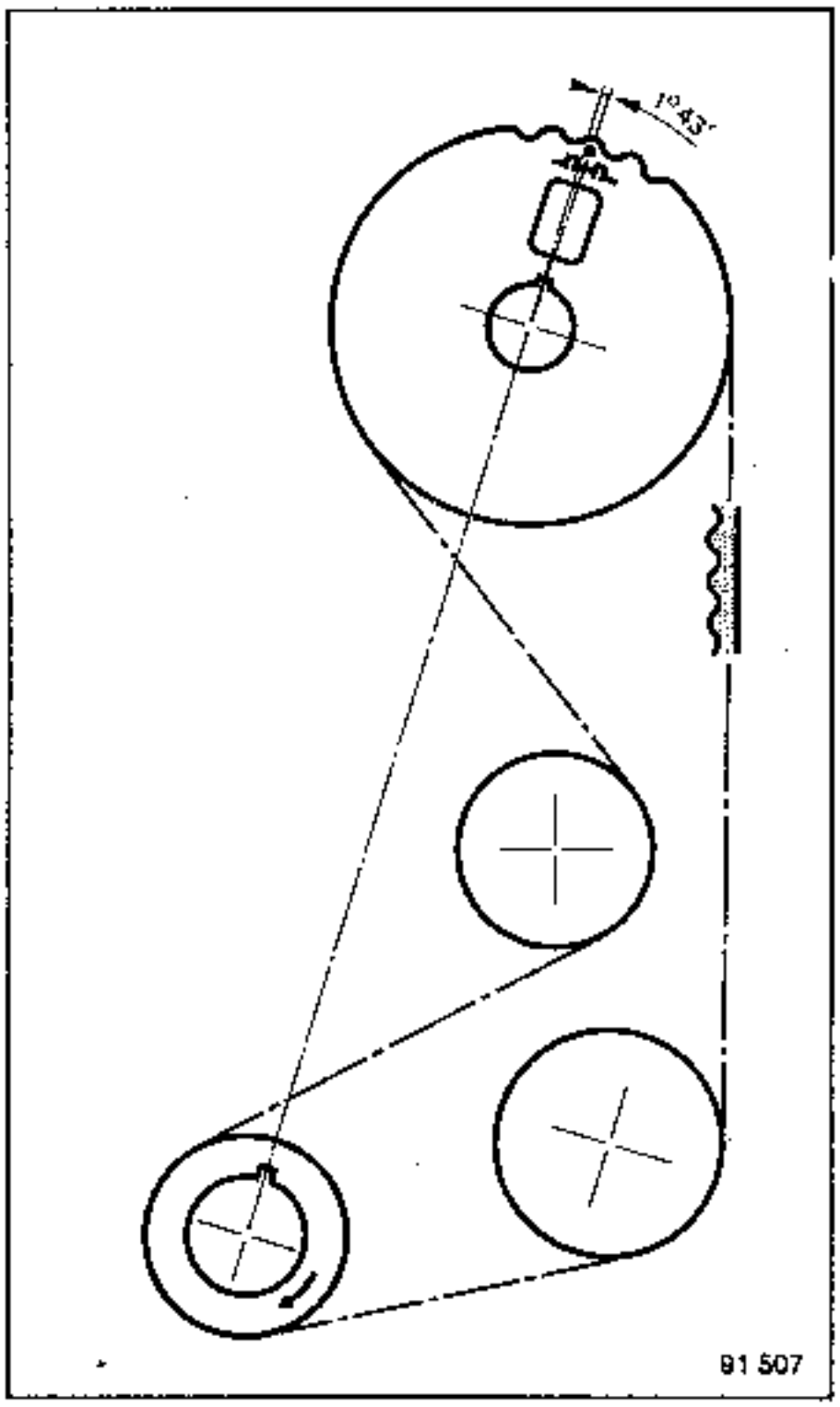


Refit the timing cover.

Special feature of J7R 752 engine

This engine is timed like other **J7T** engines, but has the following special features:

- the engine belt has **115 teeth;**
- the intermediate shaft drive gear has 24 teeth.

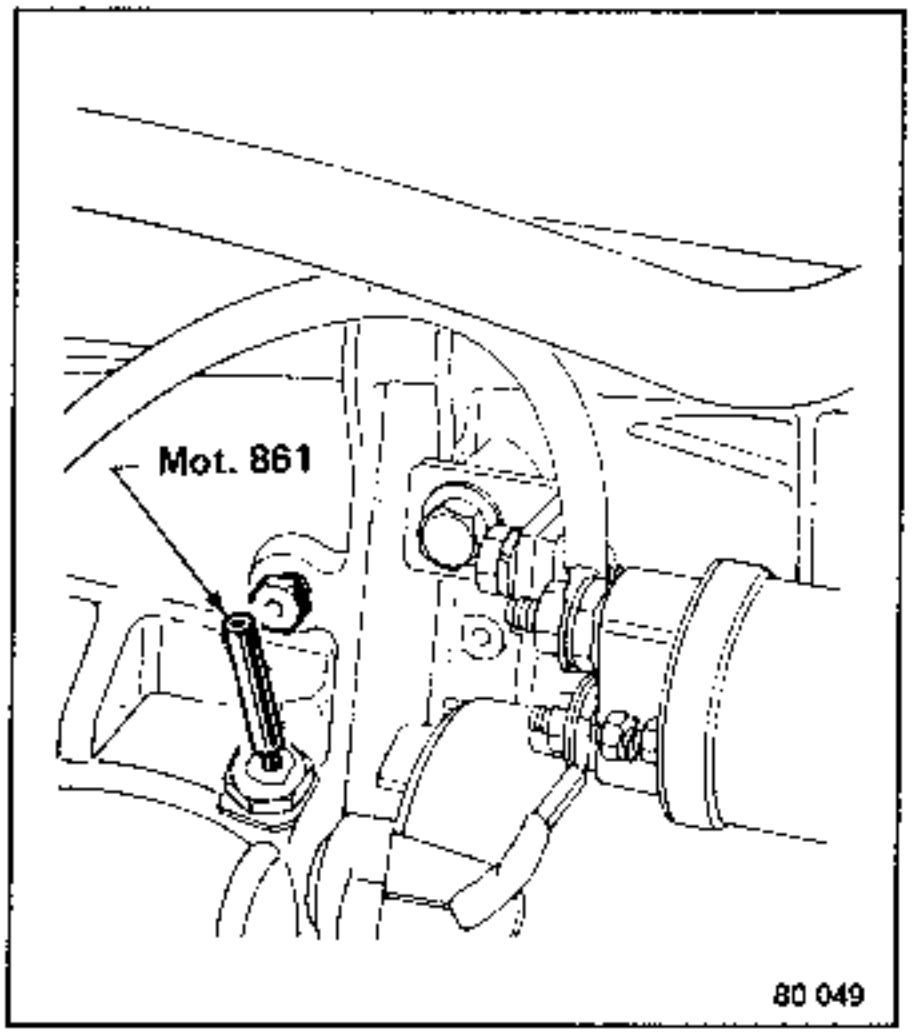


REMOVAL - REFITTING Engine J7R 720

ESSENTIAL SPECIAL TOOLING	
Mot. 251-01	Clock gauge support
Mot. 861 or Mot. 1054	T.D.C. rod Sprocket holding tool for toothed belt timing gear
Mot. 1135	Belt tensioner
Elé. 346-04	Belt tensioning tool

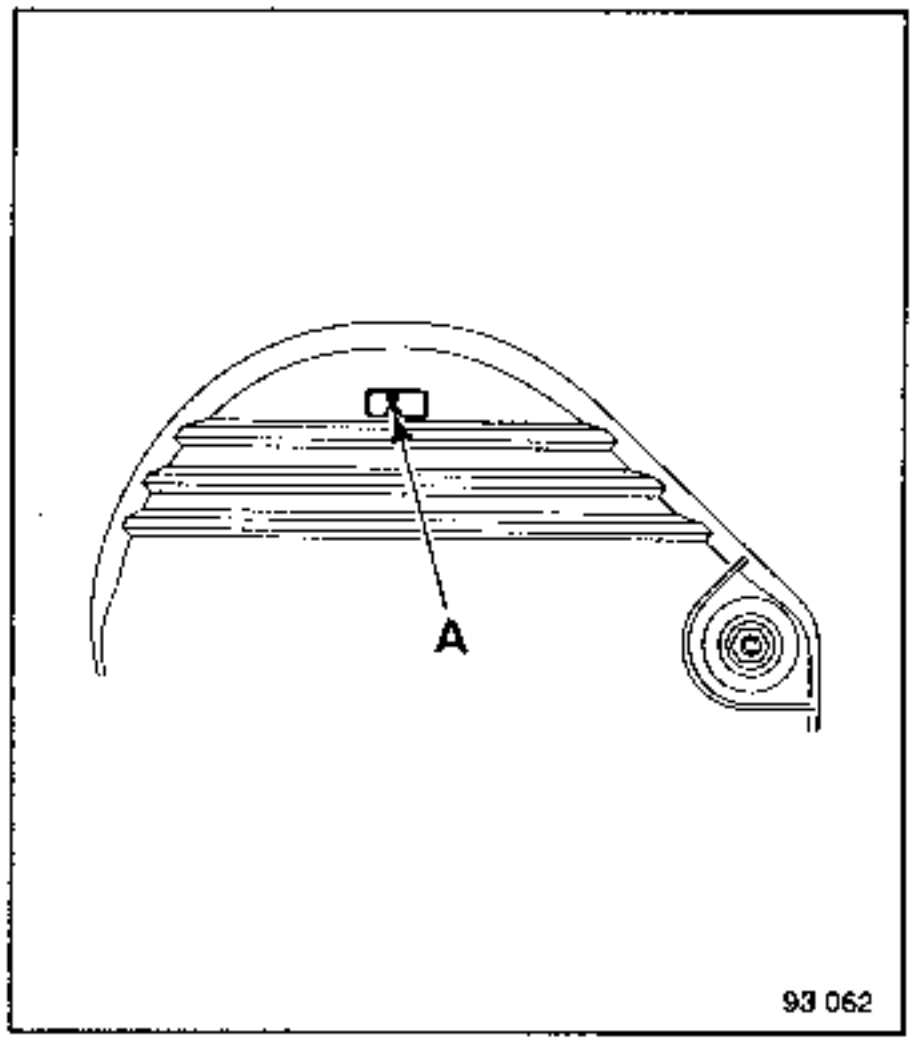
REMOVAL

Position the crankshaft (with No. 1 piston on TDC) using gauge rod **Mot. 861** or **Mot. 1054.**



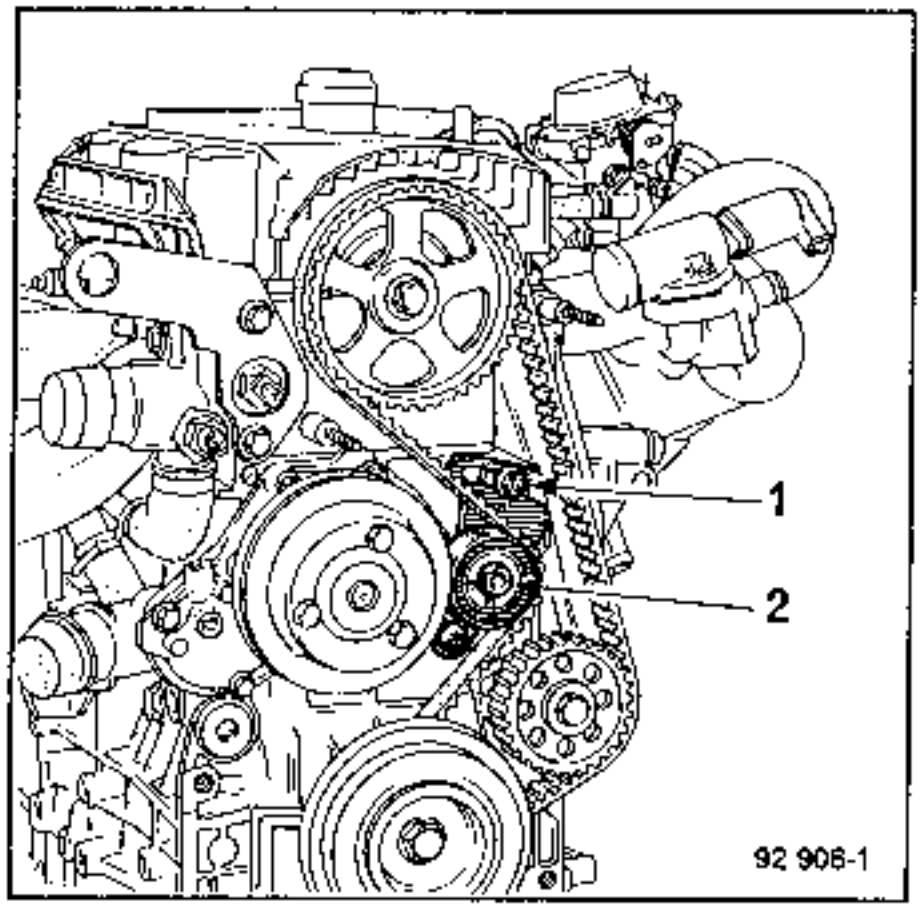
Do not use this gauge rod to stop the crankshaft from turning when slackening the bolts.

Check that the pad on the camshaft pulley is in the centre of the gap in the timer belt cover **(A).**



Disconnect the coolant hose sensors.

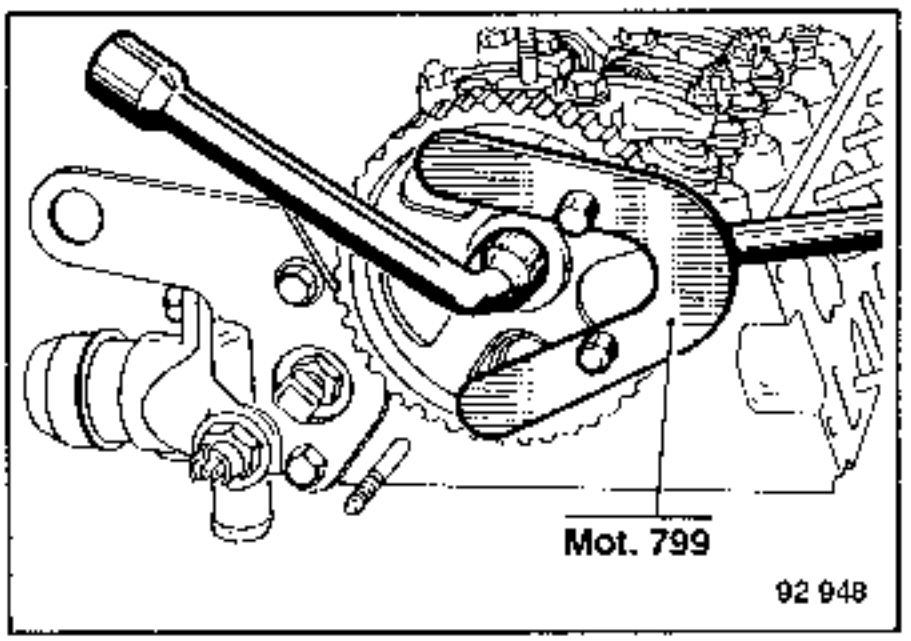
Remove:
- the harness mounting from the timing cover;
- the alternator and PAS drive belts;
- the timing gear covers.



Slacken nut 1 then nut 2 and tilt the tensioner mounting.

Refit the timing belt.

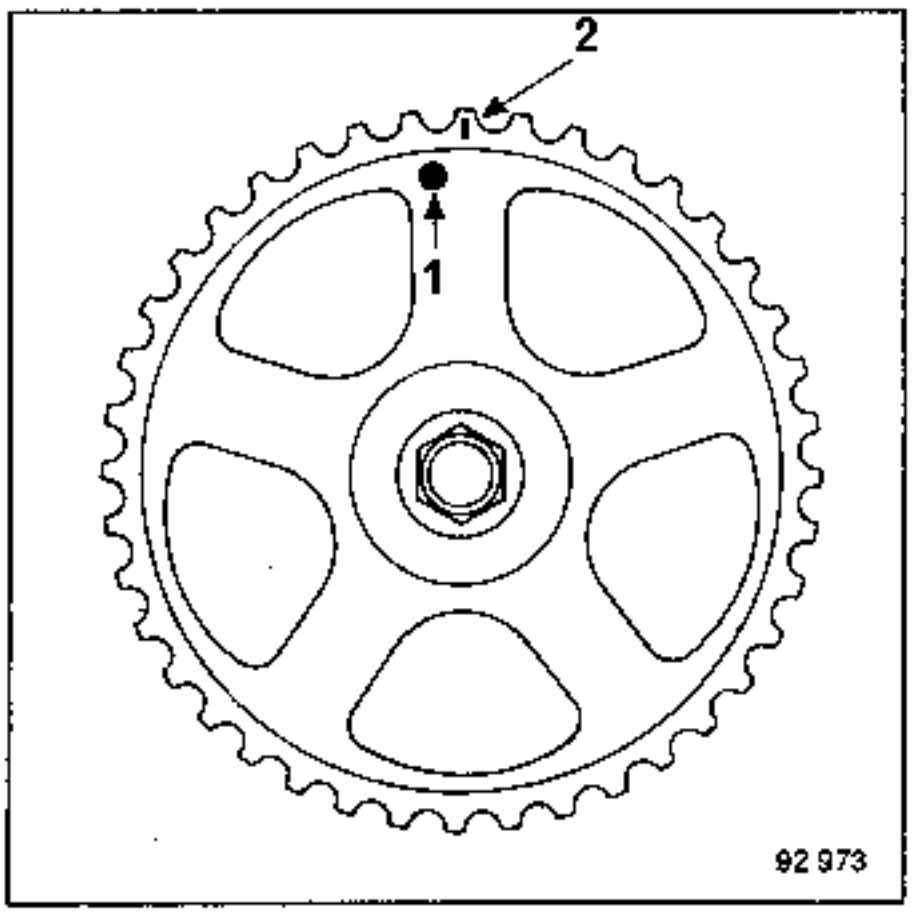
Removing the timing pulley from the camshaft



Slacken the pulley nut using tool **Mot.799** to look the pulley.

The belt has **116** teeth.

Pulley



Marks:

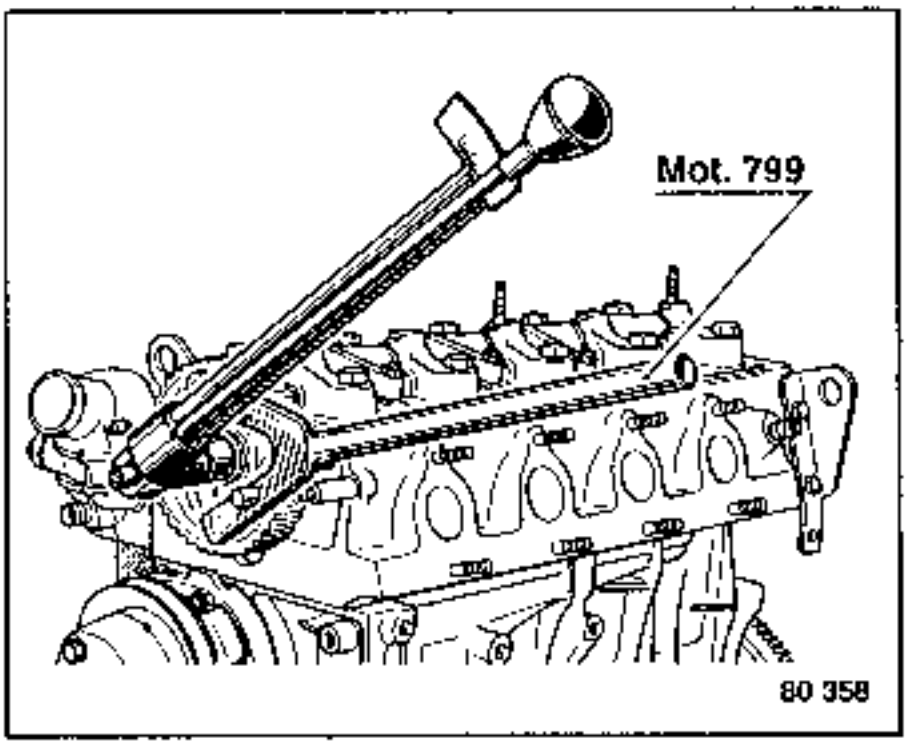
(1) for timing via the gap in the timing gear cover;

(2) for timing using the mark on the rocker cover.

Refitting the camshaft timing pulley

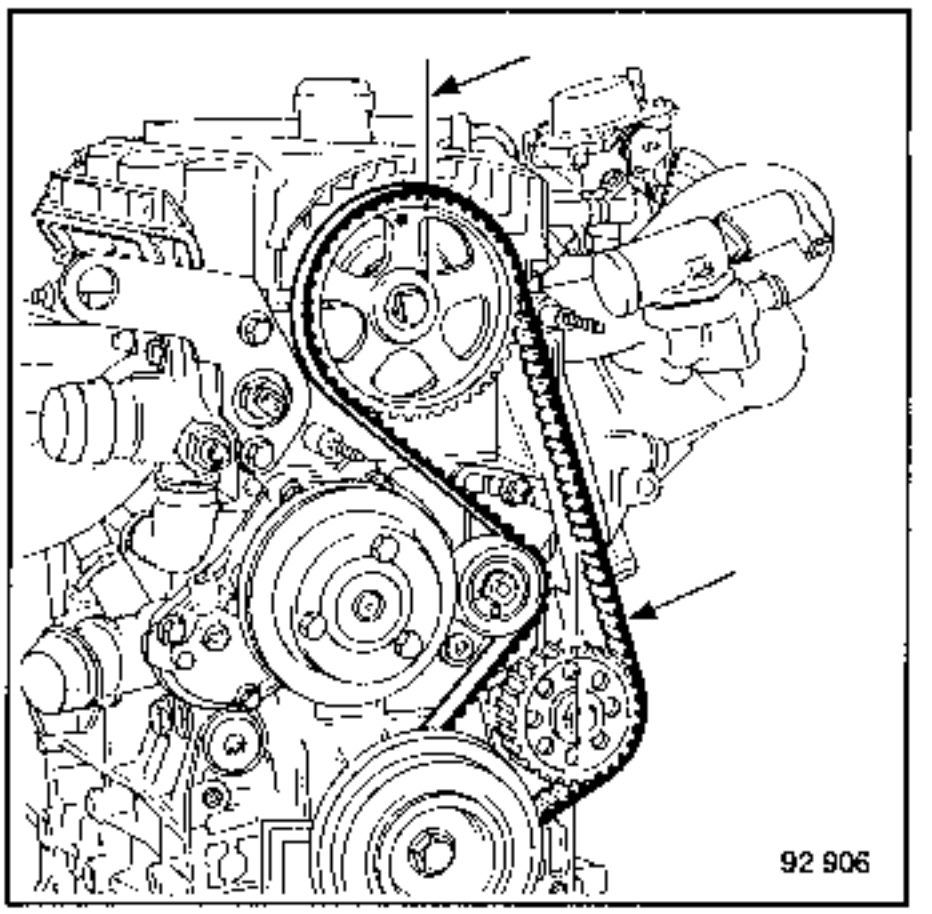
Position the moulded key on the pulley opposite the notch in the camshaft.

Smear the bolt with **Loctite FRENBLOC** and torque tighten it to 5 **daNm**, locking the pulley with tool **Mot. 799 (do not turn the camshaft as there is a risk of breaking the key).**

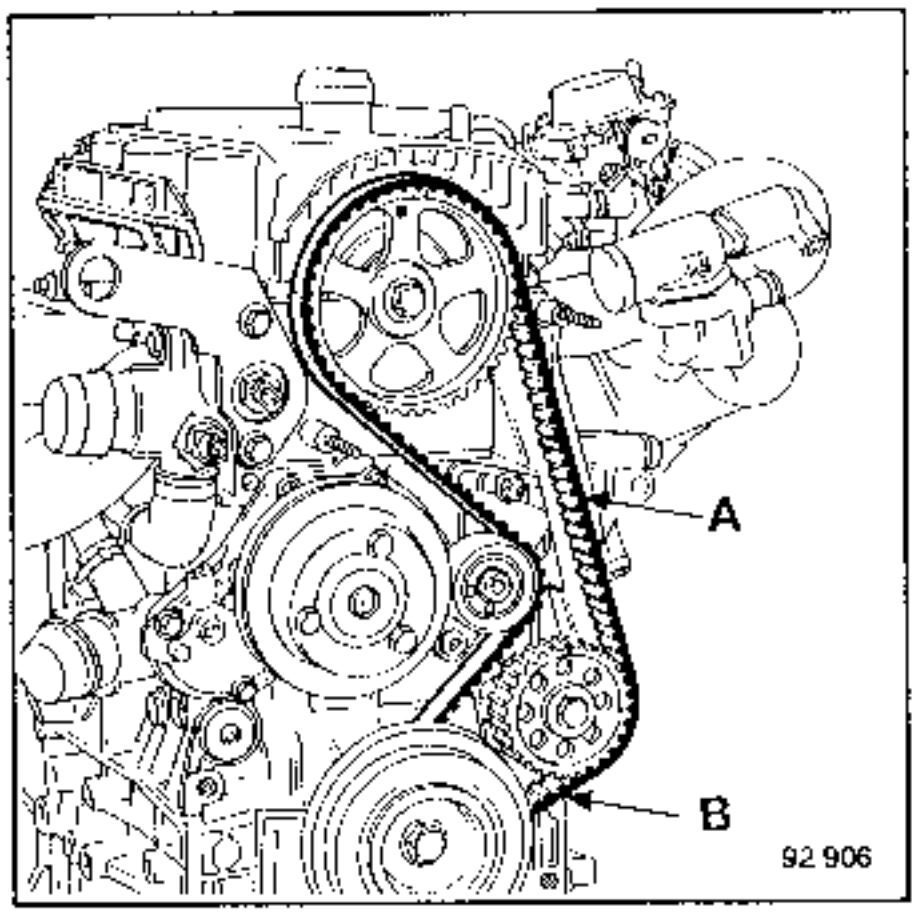


Fitting the belt

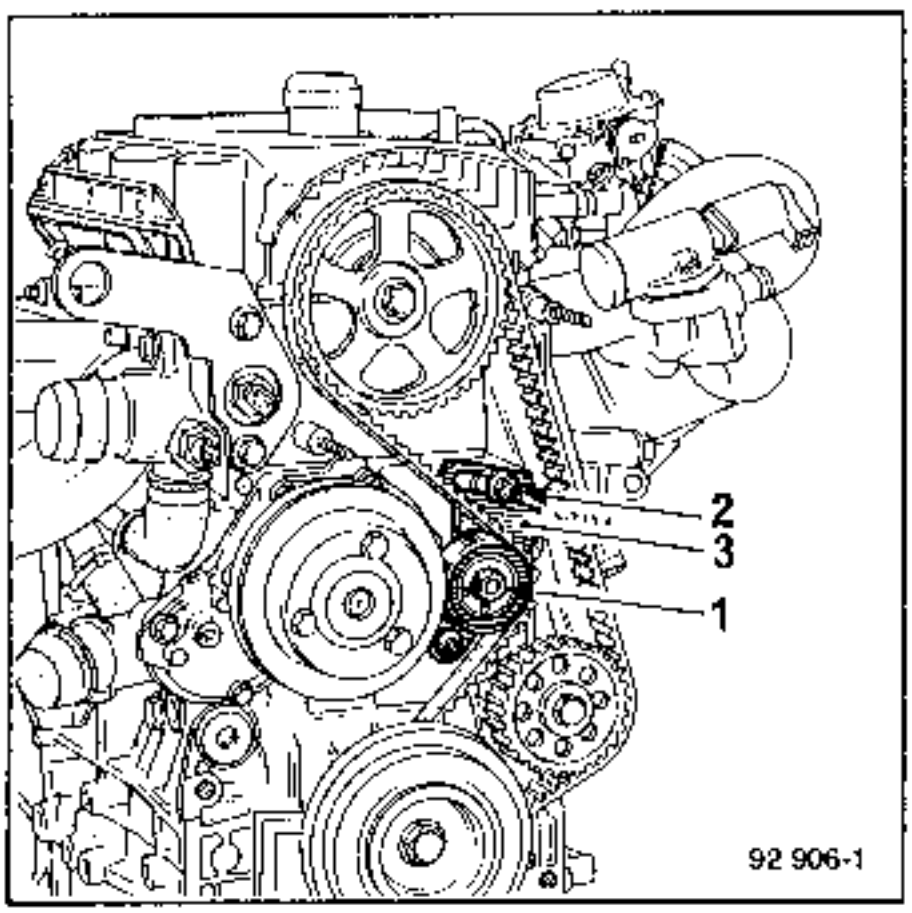
Position the intermediate shaft pulley and the camshaft pulley, using the marks to fit them correctly.



With gauge rod **Mot. 861** fitted and no. 1 piston on TDC, fit the toothed belt with ends **A** and **B** taut. (Take no account of the marks on the belt, except the one showing the direction of running ⇄).



Lock nut 2 in the centre of the gap in mounting 3 (2.5 daNm).

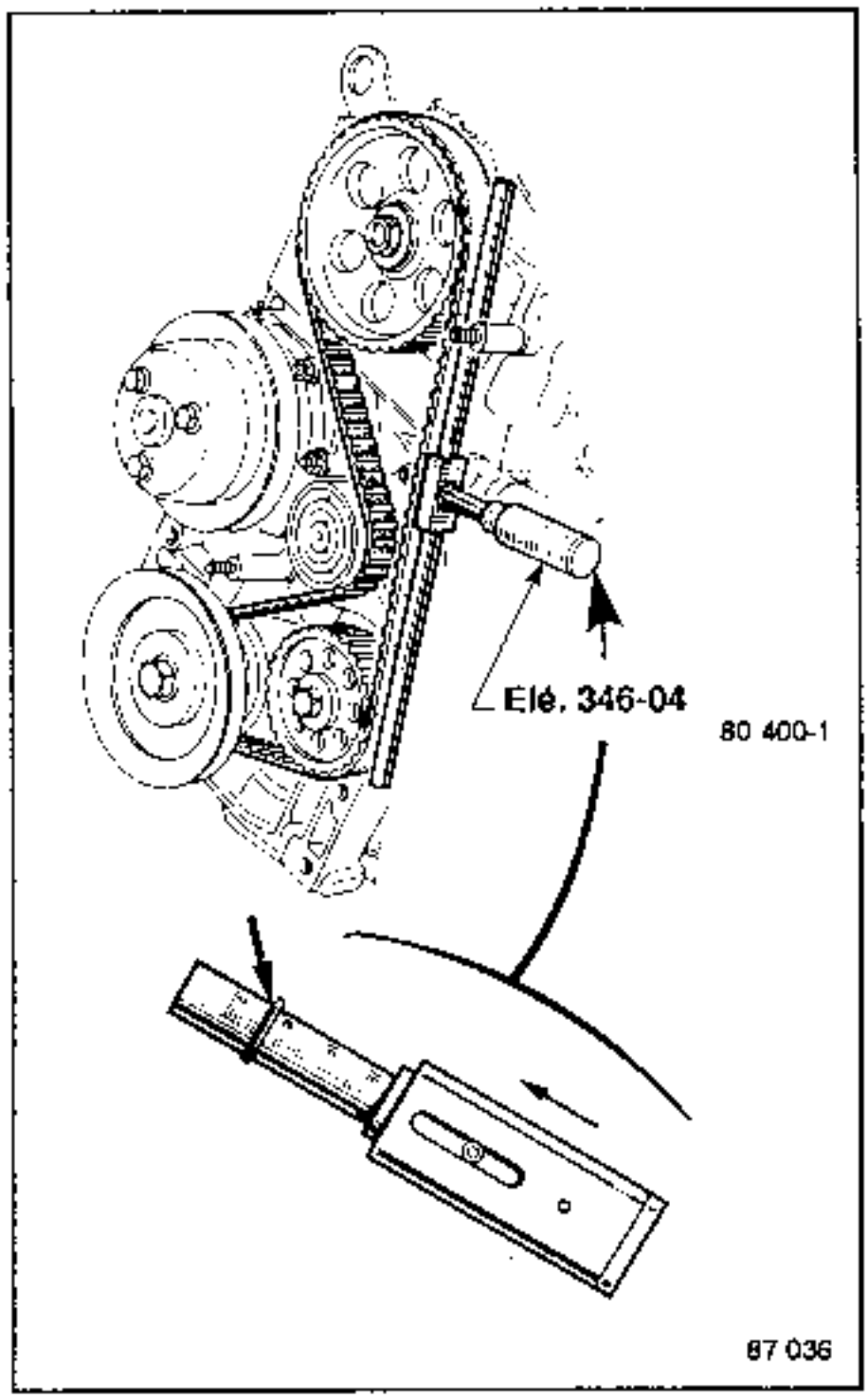


Using tool **Mot. 1135**, turn the tensioner roller until a deflection of **8.5 ± 0.5 mm** is obtained. Lock nut **1**.

Checking the belt tension

Remove gauge rod **Mot.861** and refit the plug. Using the crankshaft pulley bolt, turn the assembly through two revolutions in the normal running direction of the engine (in a clockwise direction when the operator is in front of the crankshaft pulley).

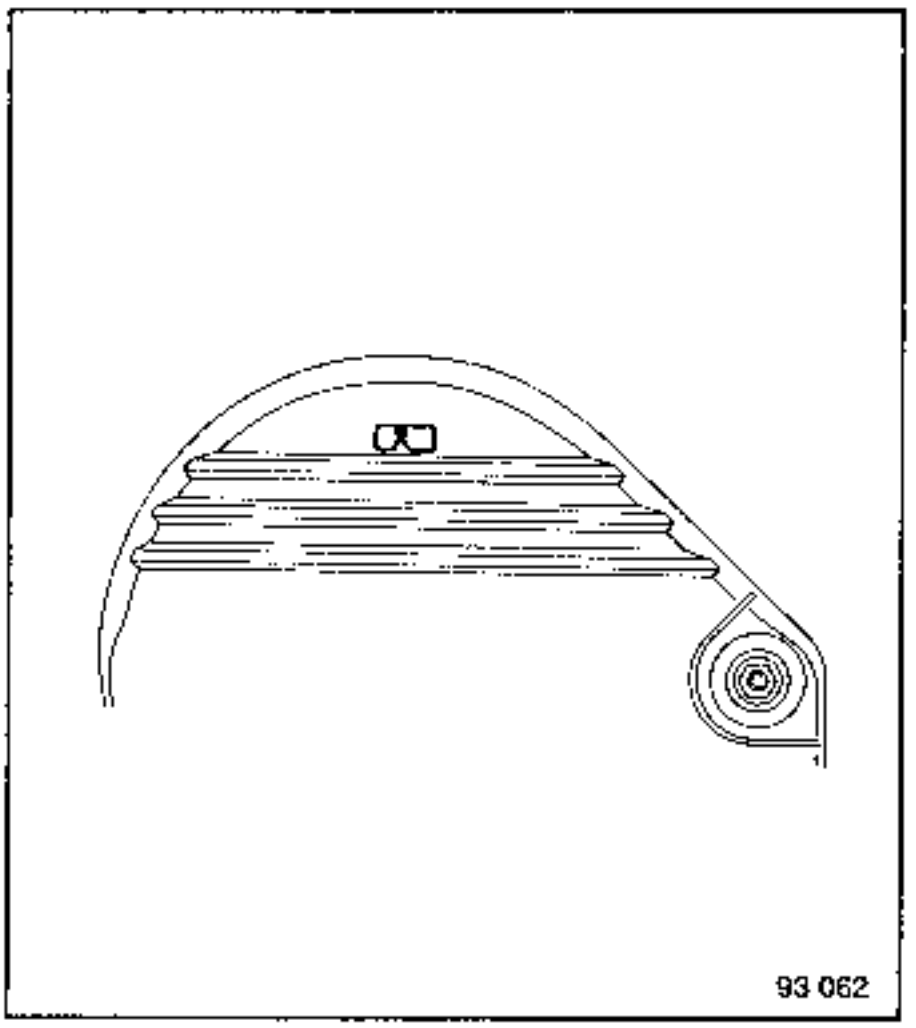
Check the belt tension using tool **Ele.346-04.**



Make sure that the tension testing tool is properly calibrated (see the instructions for use).

Refit the parts in the reverse order to dismantling.

Check the valve timing, ensuring that the pad on the camshaft pulley is located opposite, and in the centre of, the timing gear cover.



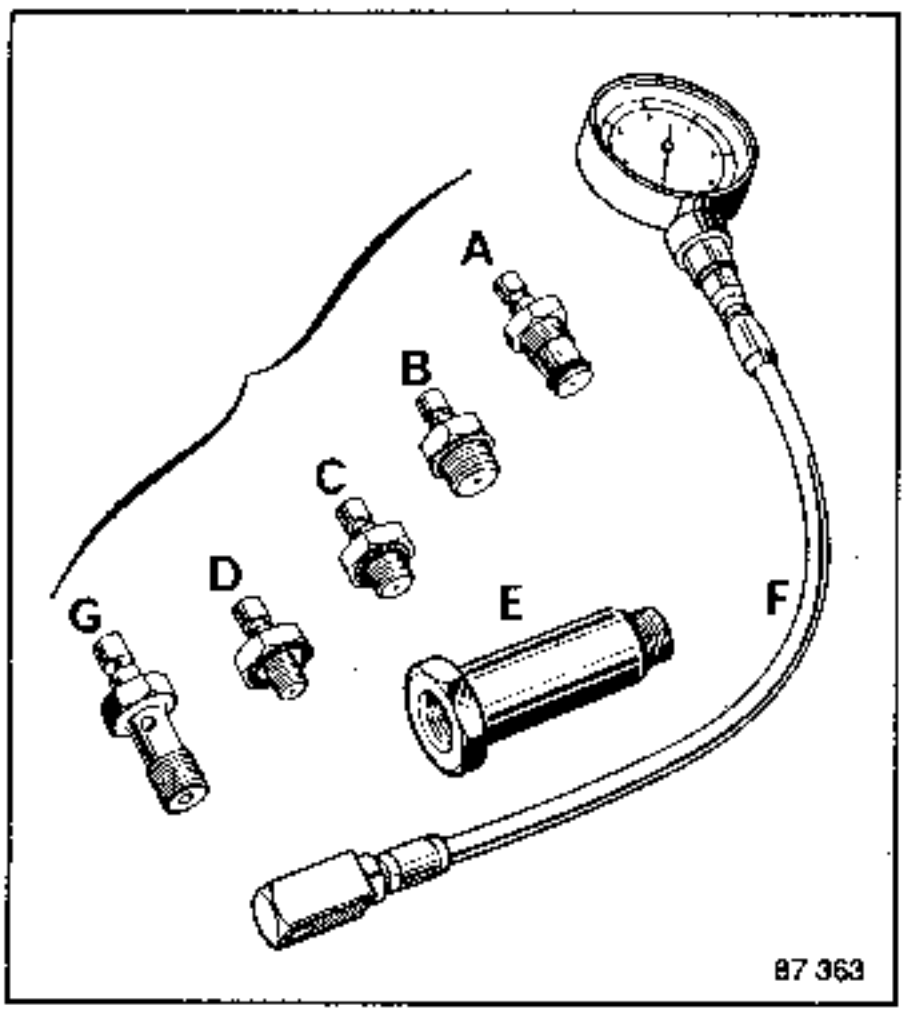
(with no. 1 piston on TDC).

CHECKING

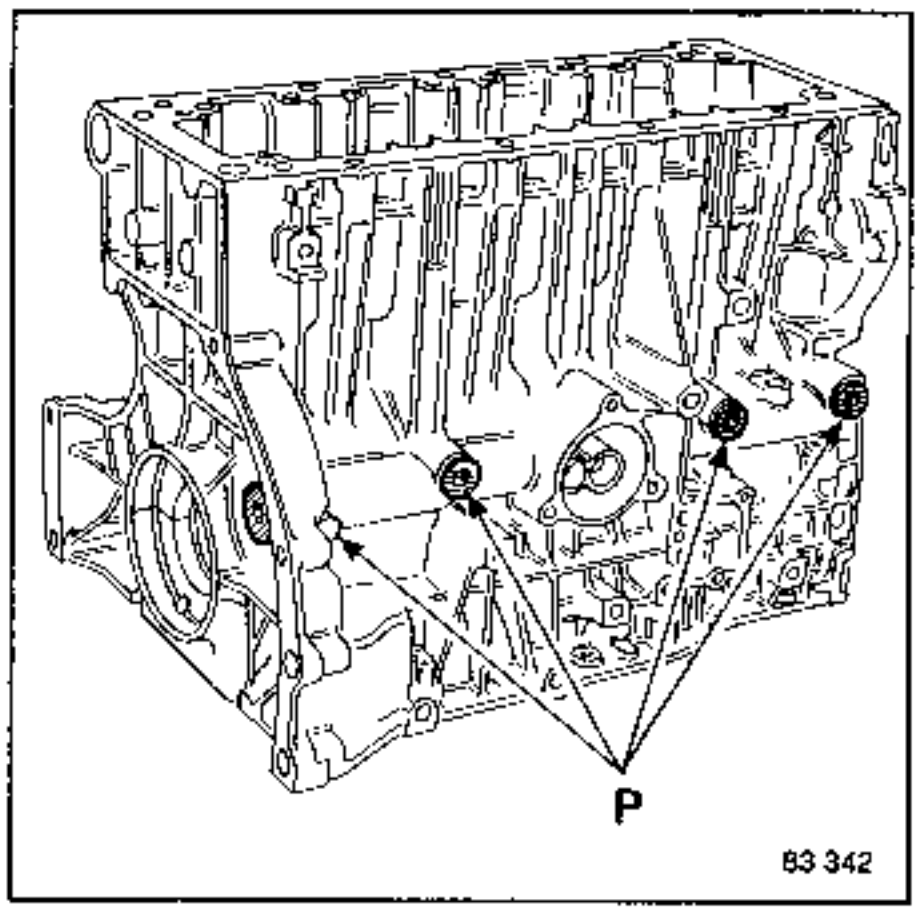
ESSENTIAL SPECIAL TOOLING	
Mot. 836-05	Oil pressure test kit

The oil pressure must be checked when **the engine is hot** (approx. **80°C**).

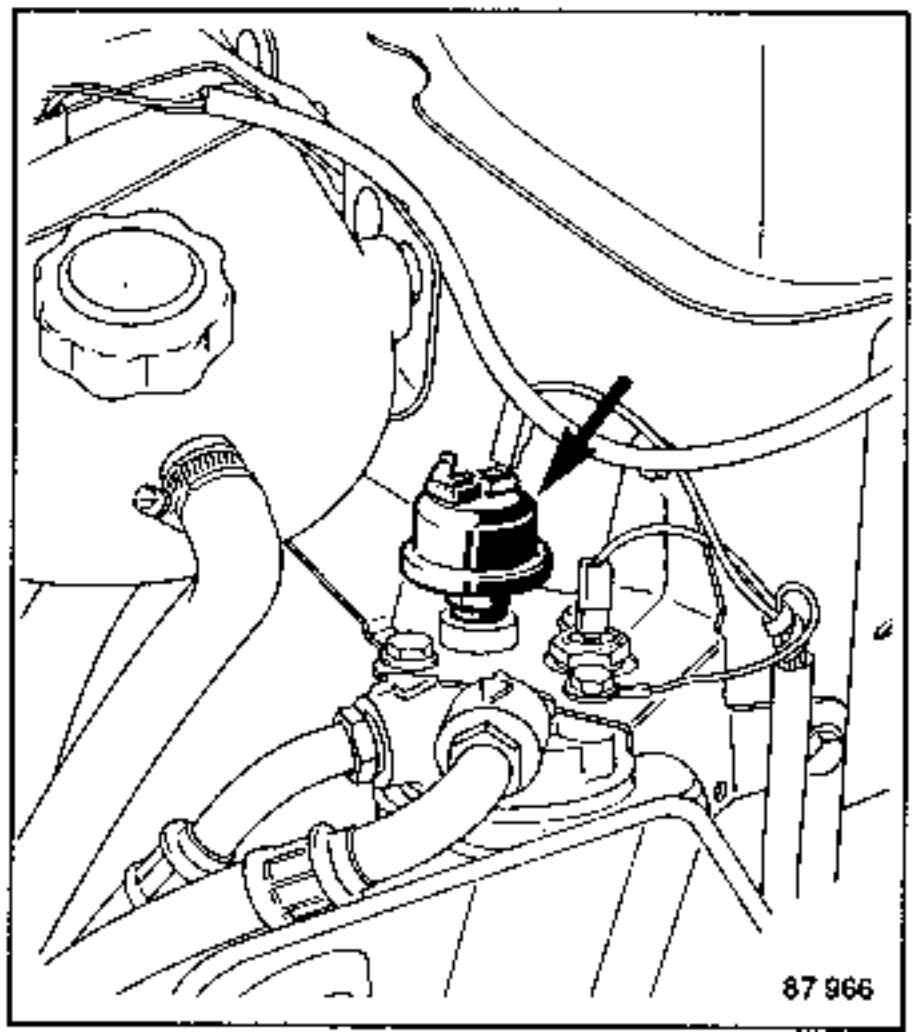
Contents of kit **Mot.836-05.**



87 363



83 342


87 966

USING THE KIT

All types: use parts F and C (14 x 150).

J-type engines

The oil pressure can be measured:

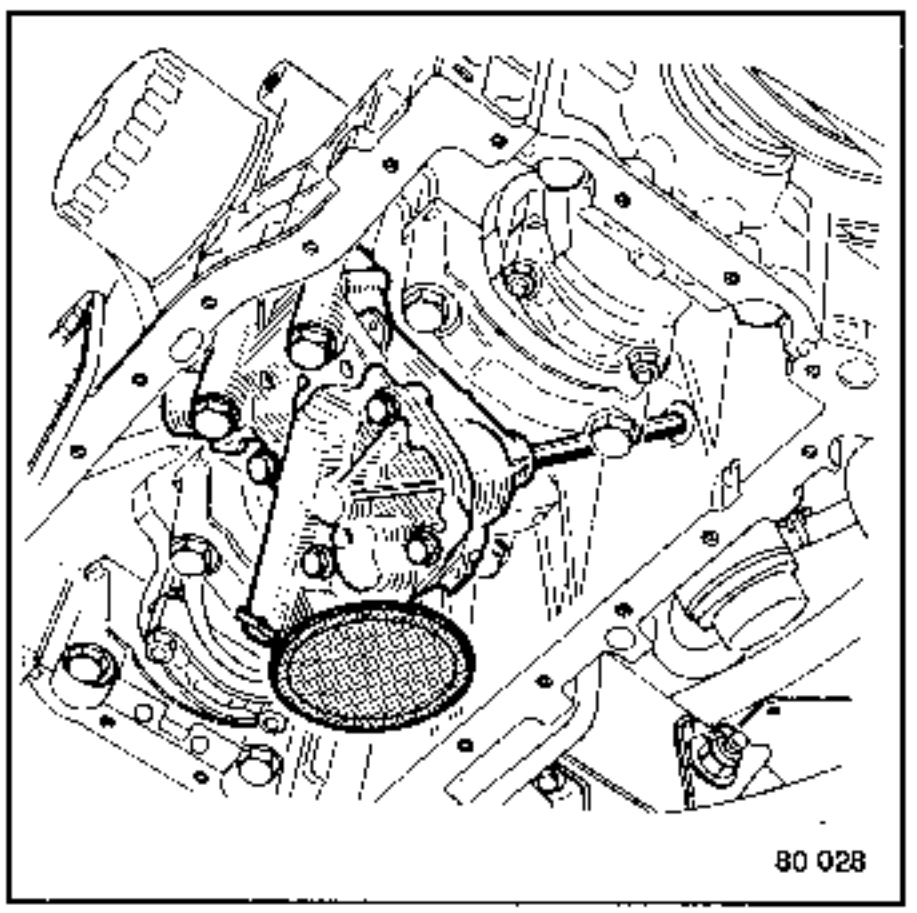
- either on the engine at **P**;
- or on the oil-to-water intercooler if one is fitted to the vehicle.

Removing

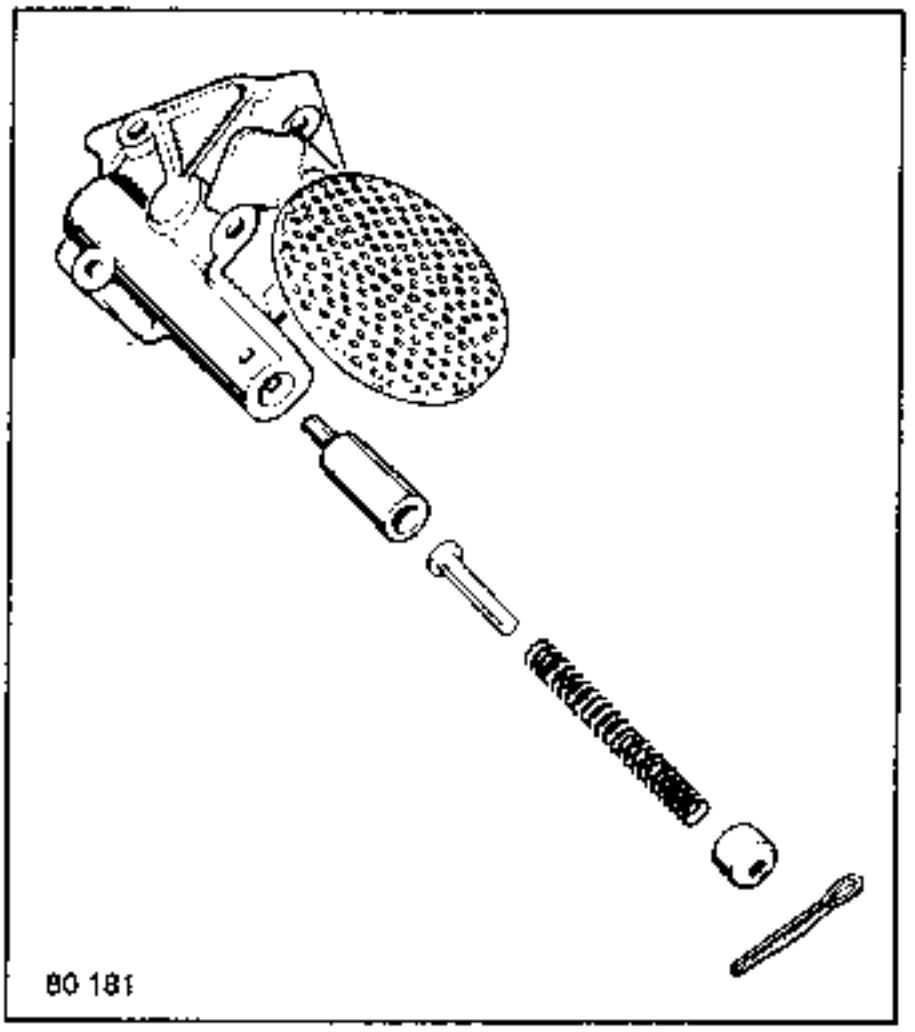
Drain the sump.
Remove the sump and the oil pump.

Sump with a crankcase stiffener
Remove:
- the sump
- the oil pump cover;
- the pump sprockets.

(See crankcase stiffener)


80 028

Dismantling the valve

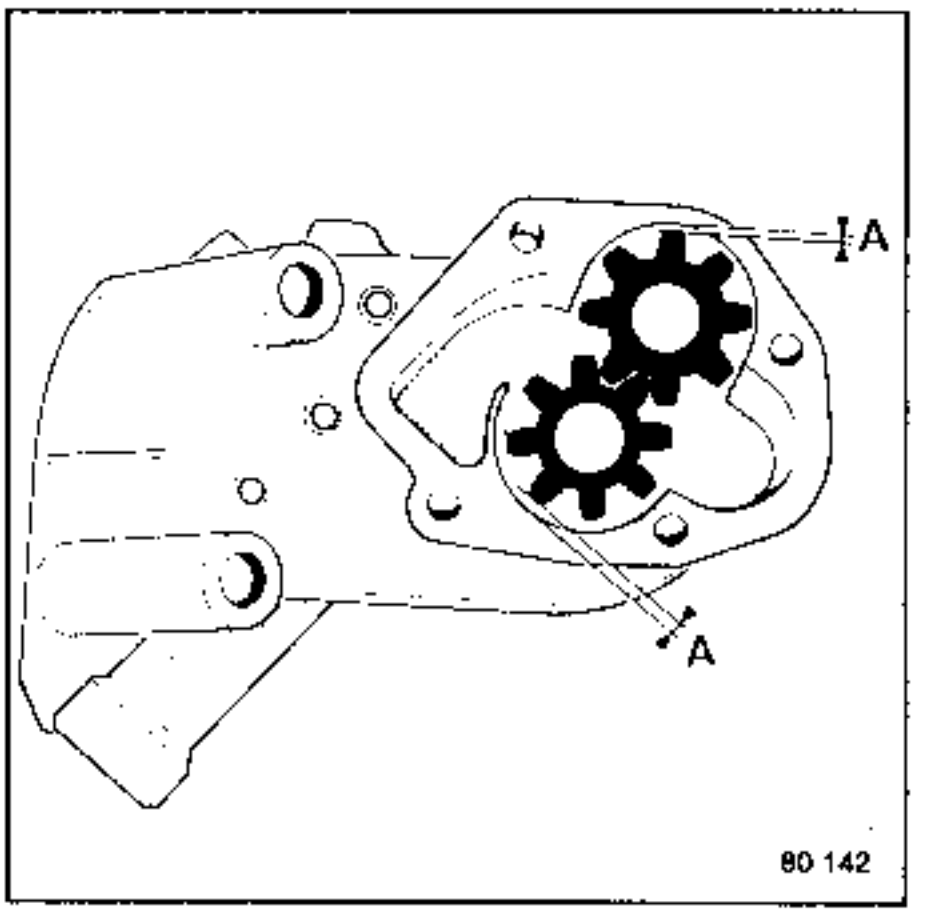

80 181

Checking the oil pump

Check the running clearances:

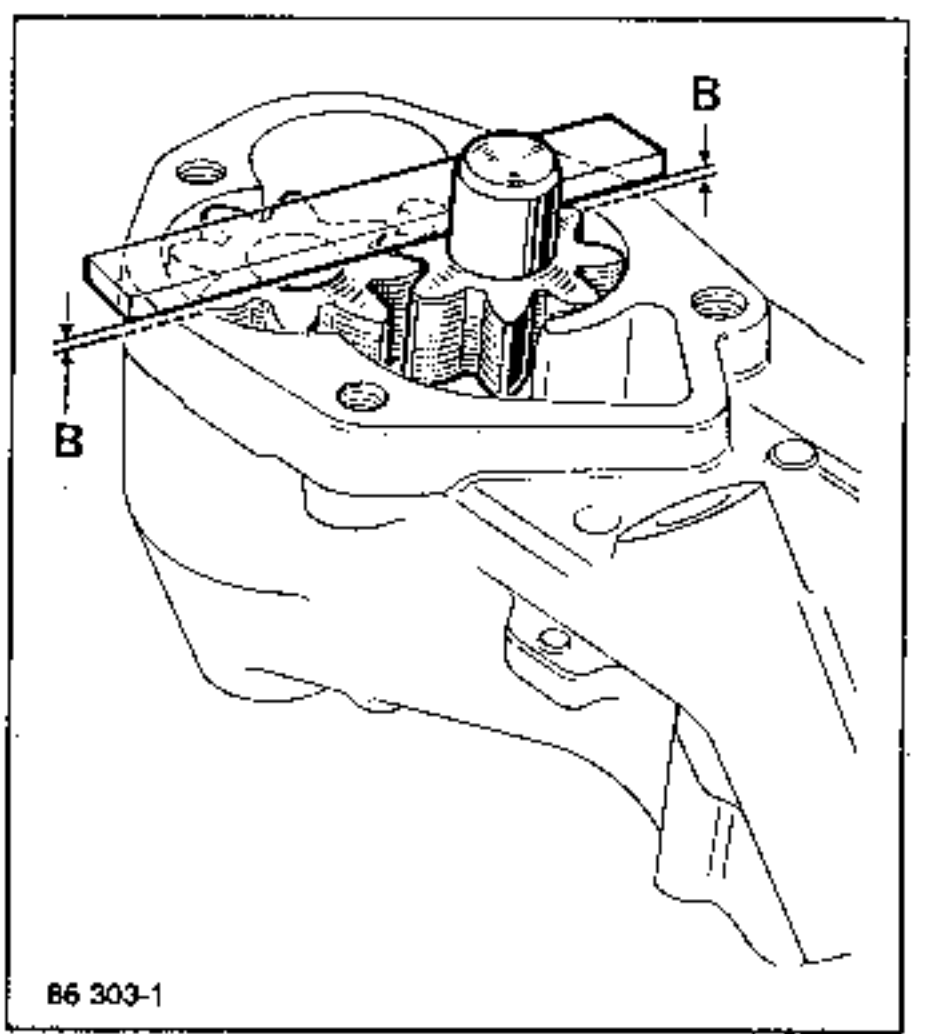
Clearance A

- min (mm) 0.05
- max (mm) 0.12



Clearance B

- min (mm) 0.02
- max (mm) 0.10

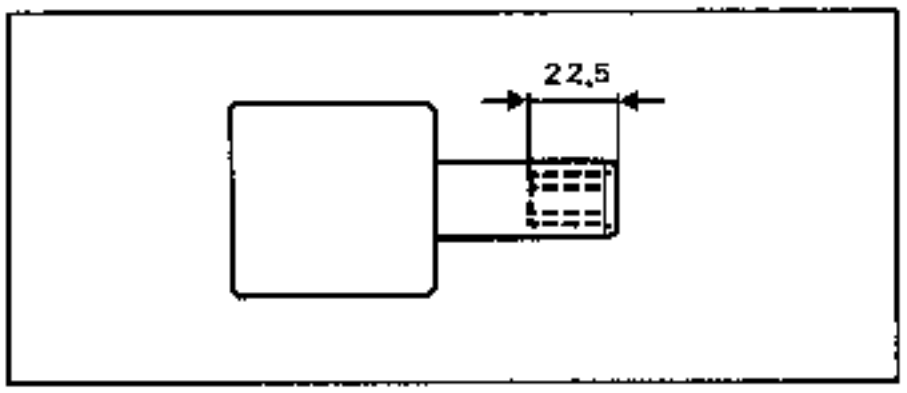


REASSEMBLING

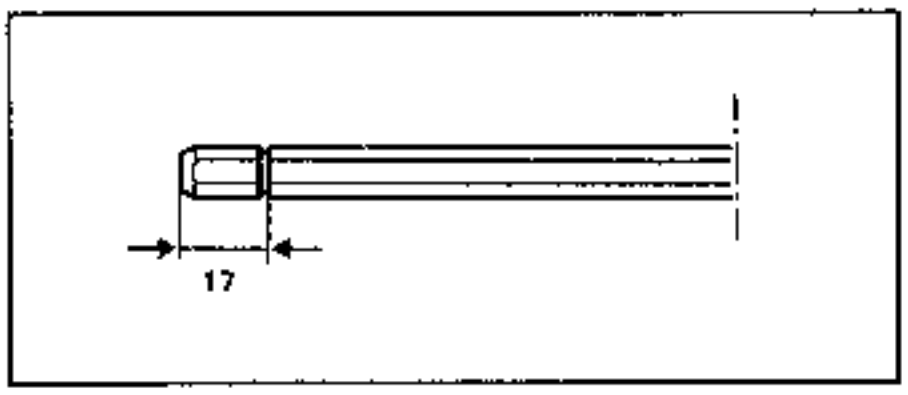
There are two types of oil pump:

1st type

Drive gear

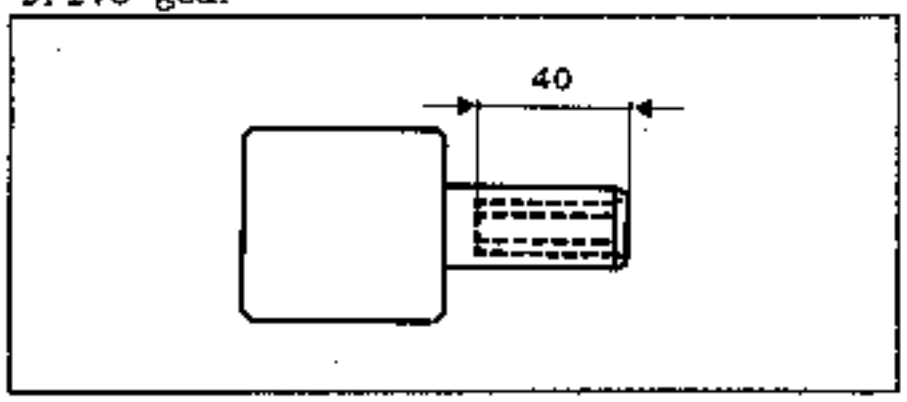


Shaft

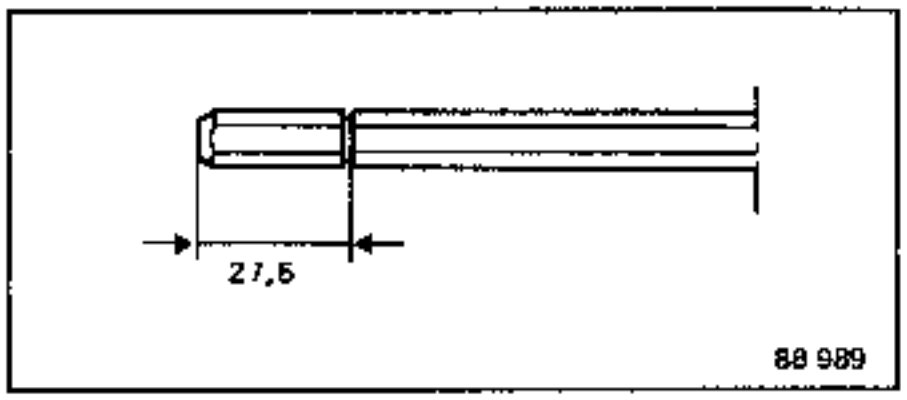


2nd type

Drive gear



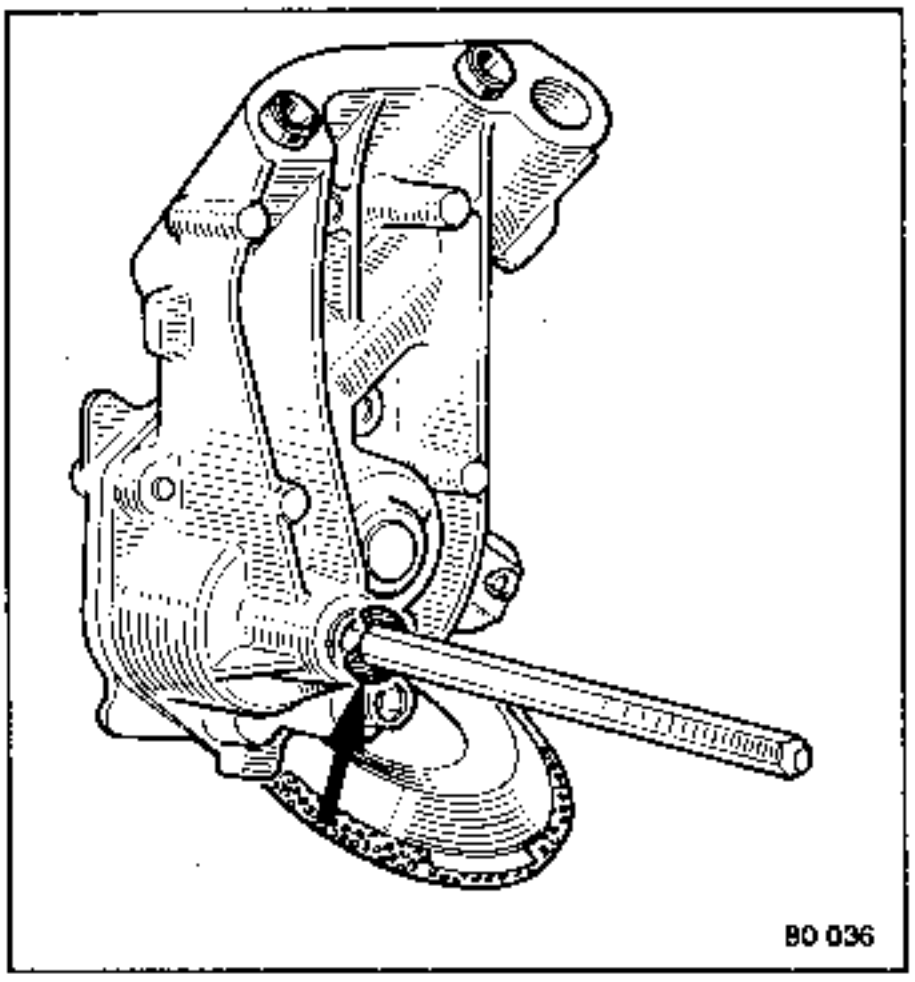
Shaft



Interchangeability

Never fit the 2nd type of shaft with the first type of drive gear.

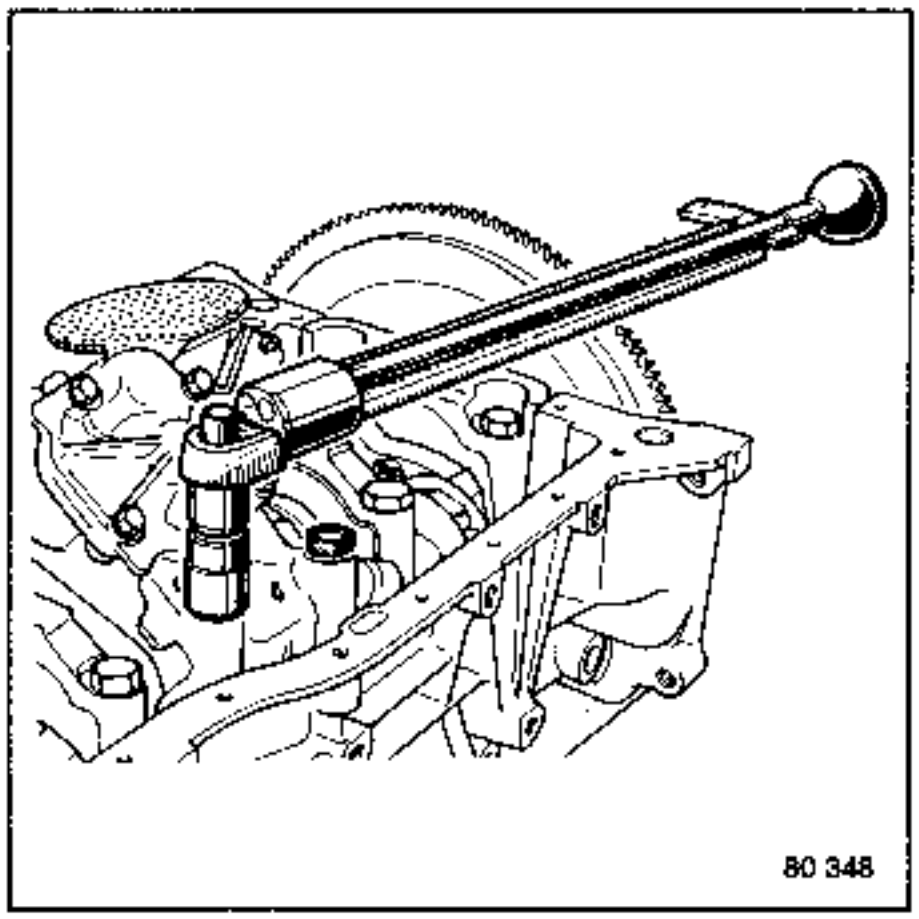
Refit the drive shaft with its circlip adjacent to the pump.



REFITTING

Refit the pump to the sump and check that the locating dowels are fitted.

- Tightening torque ..... **4 to 4.5 daNm**



Refit the sump.

REMOVING

Drain the sump.

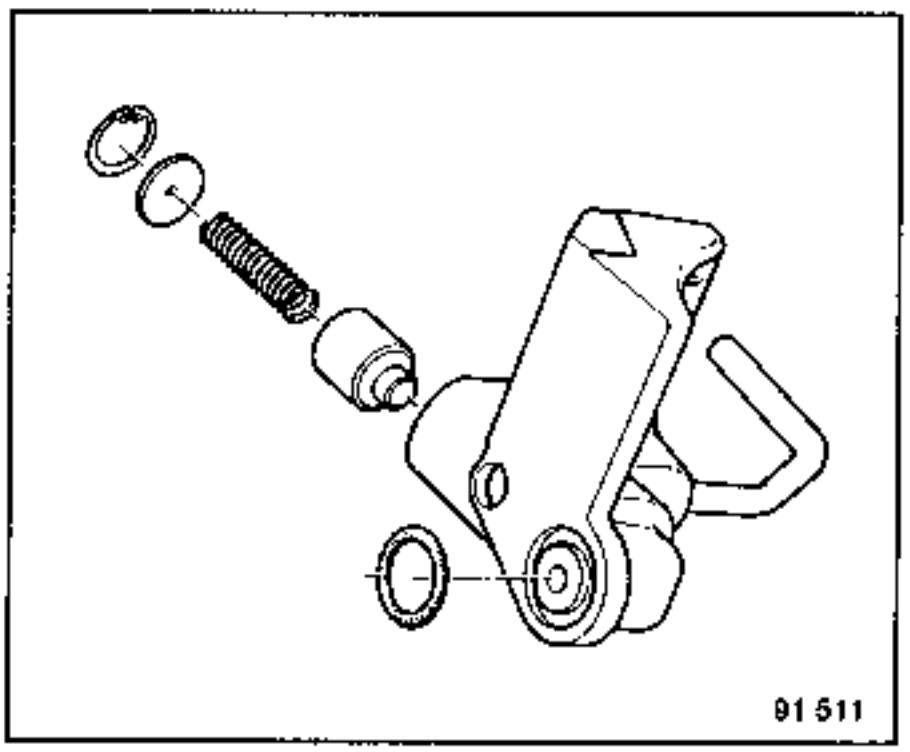
Remove:

- the sump;

- the oil pump;

- the jets at the base of the pistons.

Dismantling



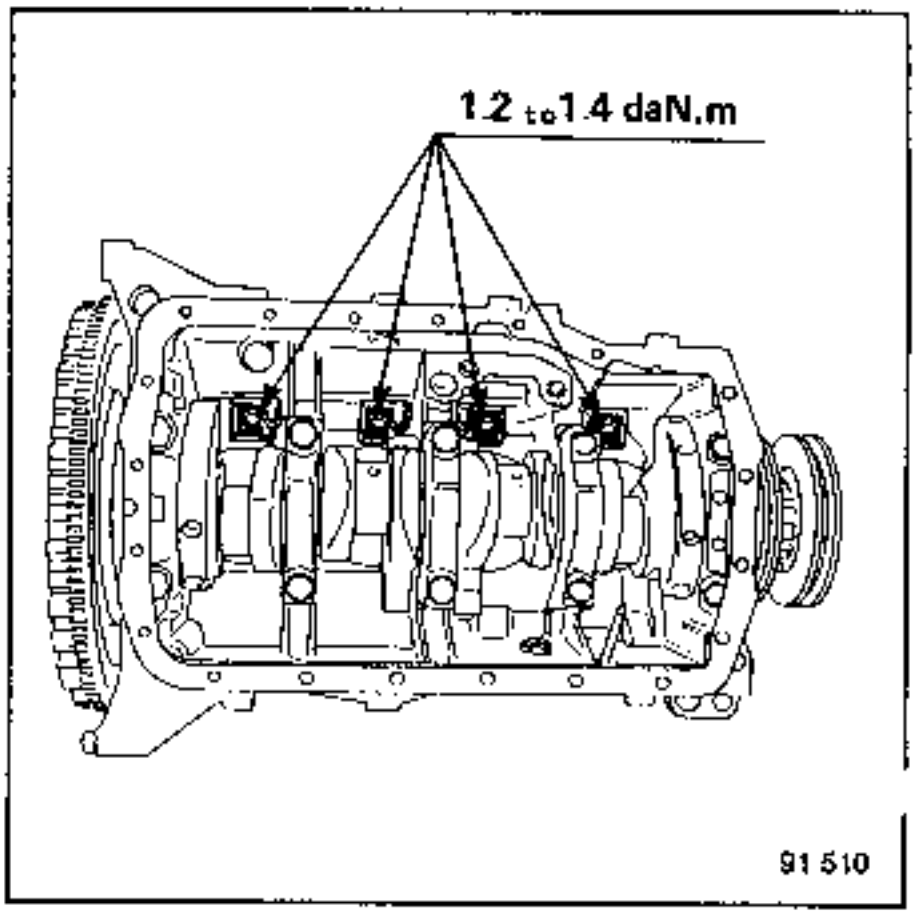
91 511

REFITTING

Check that the "O" ring seal is fitted.

Refit the jets on the cylinder block.

- Tightening torque .. 1.2 to 1.4 daNm.



91 510

Refit the oil pump and torque tighten it to between 4 and 4.5 daNm.

JTT 730, 731, 732, 733 engines
JTR 720, 752, 754 engines

This operation may be performed **in situ.**

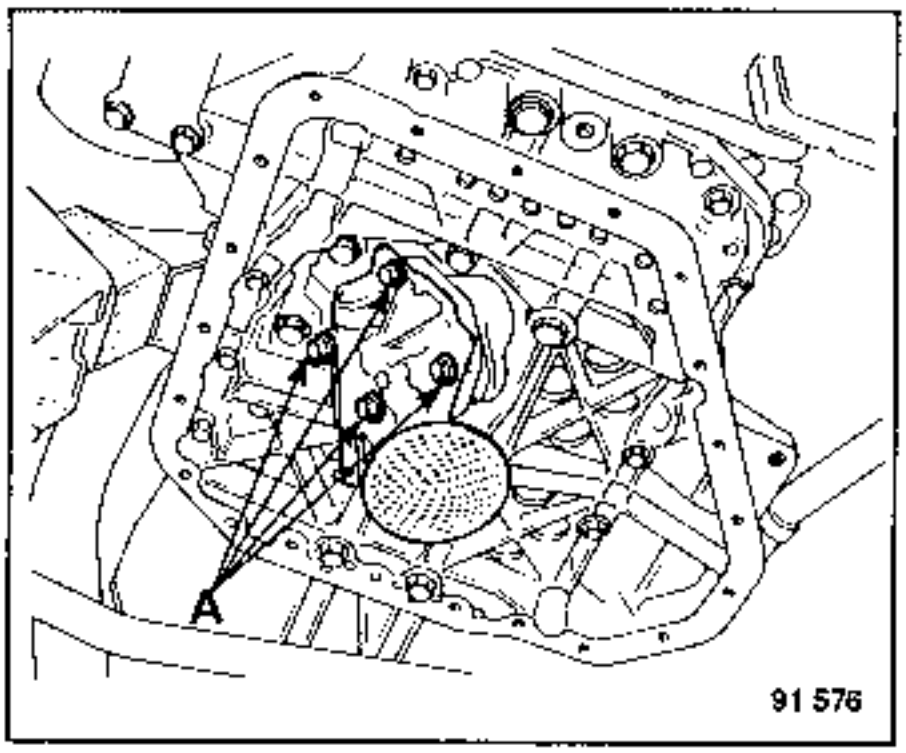
REMOVING

- Drain the engine.

Remove:

- the pressed steel sump;

- the oil filter gauze, by removing bolts **A**, and recover the pump drive gears;



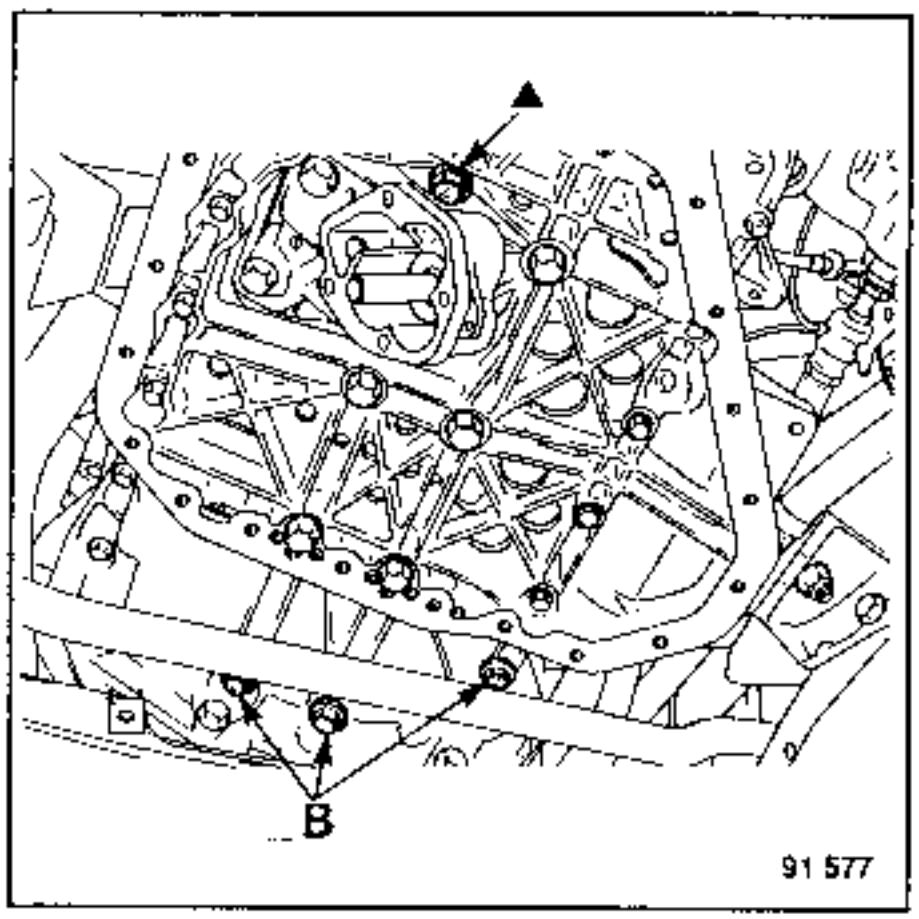
- the two bolts from the oil pump body;

- the oil pump body

- the oil level sensor (if necessary);

- the bolts securing the crankcase stiffener (see marking of bolts and tightening torques).

The 3 bolts **B** must be removed with the crankcase stiffener.



REFITTING

Thoroughly clean the cylinder block, sump and stiffener.

Hold the seal on the stiffener using a few drops of **CAF 4/60 THIXO.**

Position the oil pump drive shaft with the circlip adjacent the pump.

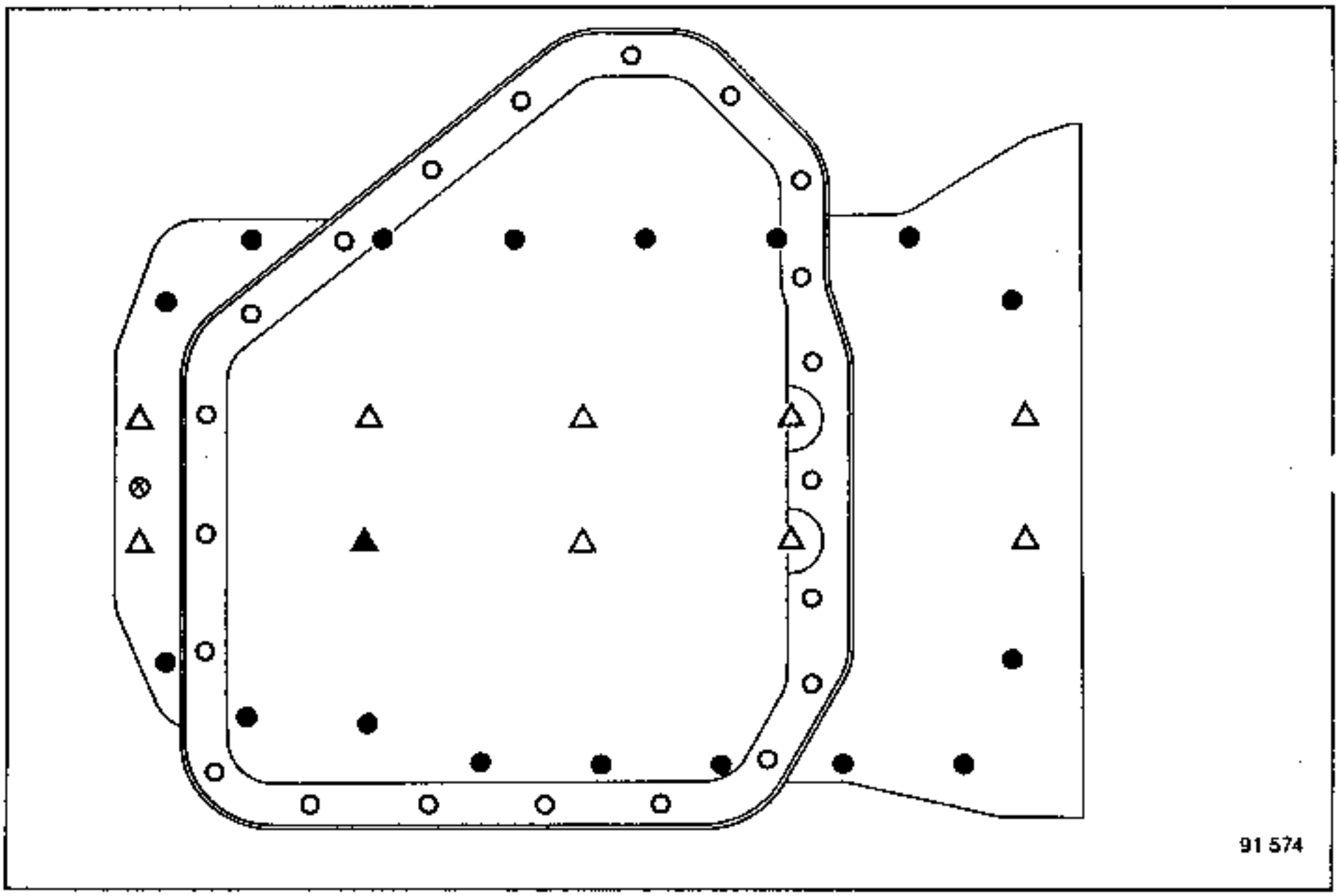
Tighten the crankcase stiffener bolts (see the marking table and tightening torques below).

Fit in place and torque tighten the oil pump to between **4 and 4.5 daNm** (make sure the drive shaft is correctly positioned).

Refit the sprockets and the pump cover then torque tighten it.

Refit the steel sump and torque tighten the bolts.

Markings of the bolts securing the stiffener to the cylinder block and the sump to the stiffener.

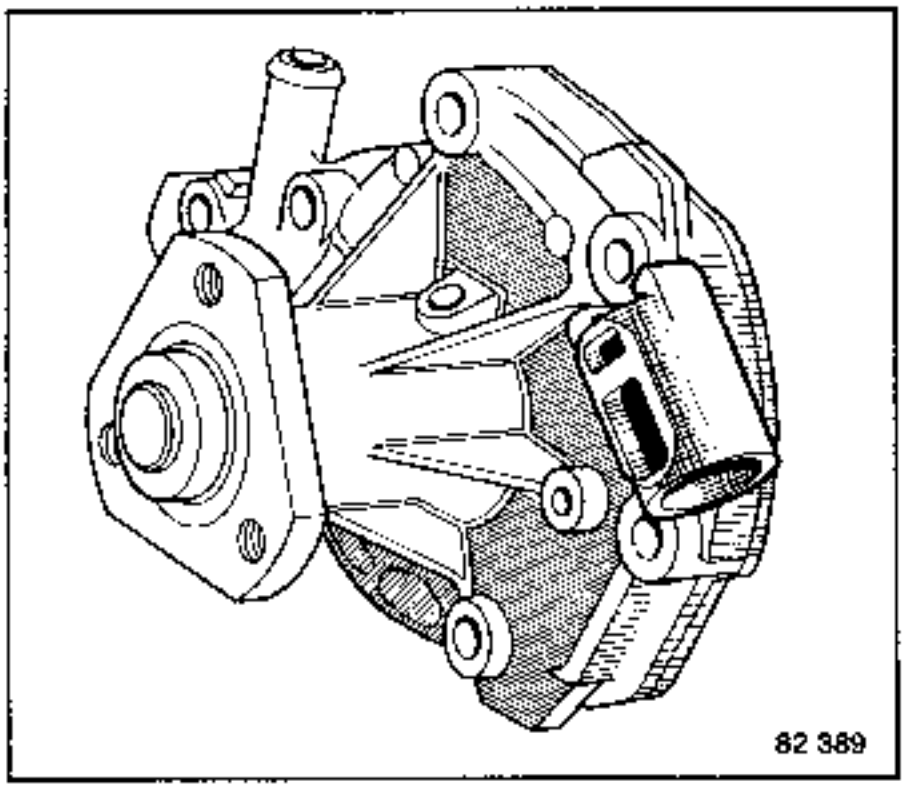


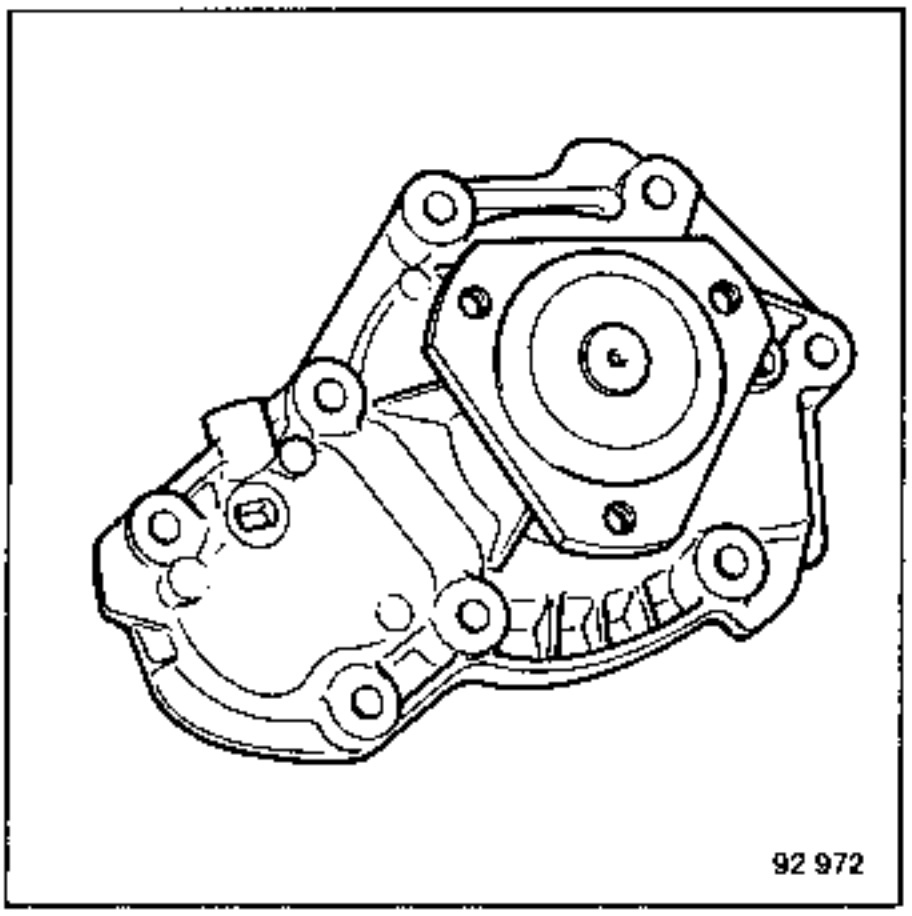
There are four types of bolt, marked as follows:

- ● : 17 bolts (M7 x 100-50), tightening torque : 1.2 to 1.8 daNm
- ○ : 21 bolts (M6 x 100-16), tightening torque : 0.7 to 1.1 daNm
- ▲ : 1 bolt (M10 x 150-40) , tightening torque : 3.2 to 4.8 daNm
- Δ : 9 bolts (M10 x 150-40), tightening torque : 3.2 to 4.8 daNm
- ⊗ : Bolt not used.

The coolant pump cannot be repaired. If any parts of it are damaged, it must be replaced.

All types except J7R 720 engine





REFITTING

The timing belt tensioner does not have to be removed:

- using a relatively long coolant flexible hose clip, hold back the timing belt tensioner pushrod;

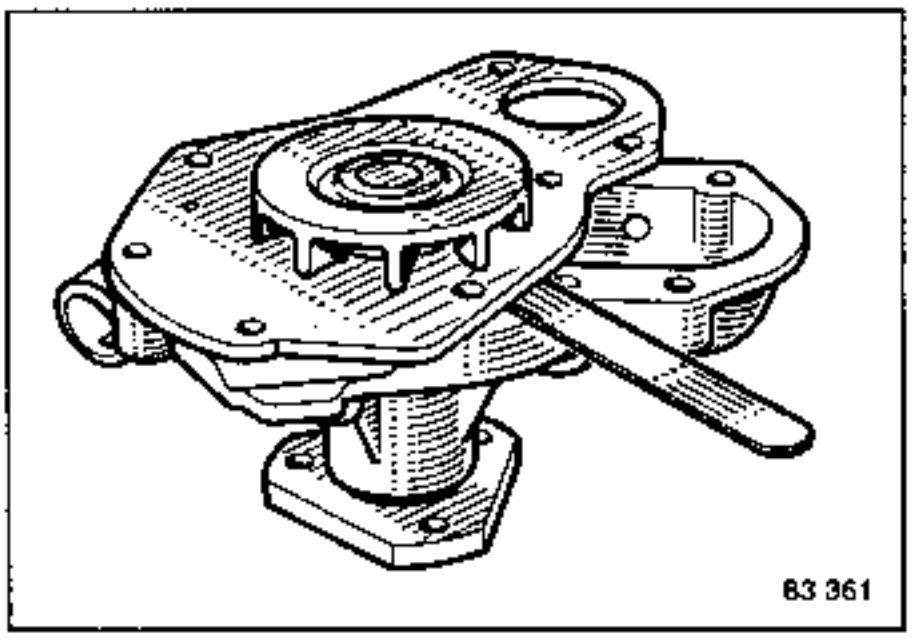
- remove the coolant pump.

J7R 720 engine

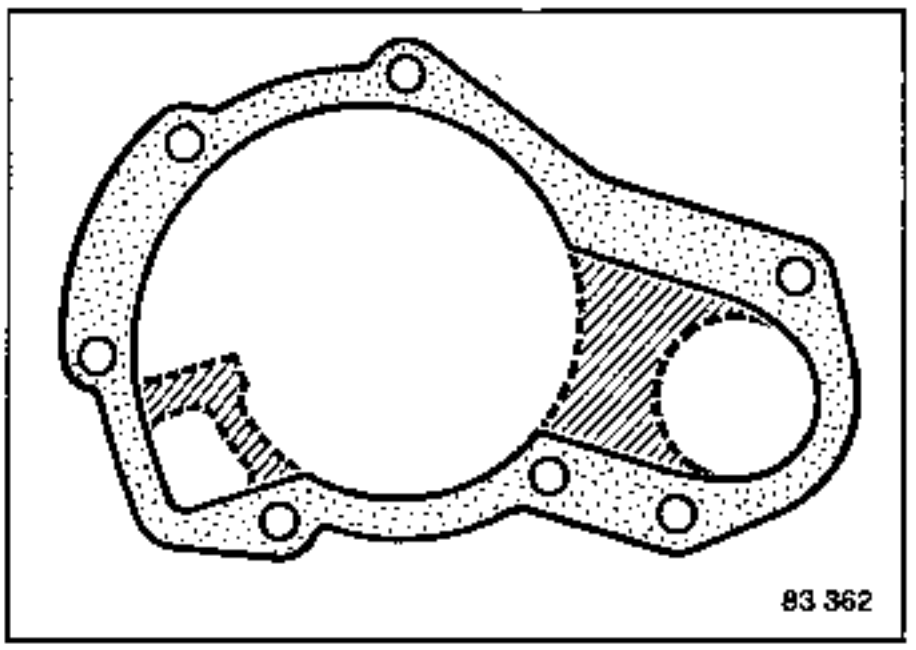
Replacing the seal between the coolant pump and backplate

Securing the coolant pump in a vice, unstick the backplate.

Clean the joint faces, turning the backplate around the coolant pump shaft.



Take a seal which is fitted between the coolant pump and the cylinder block and cut out the sections as shown in the drawing, so that it can be inserted between the coolant pump and backplate.



REFITTING

Special points

Clean the gasket faces before fitting the new seals **dry**.

As before, retain the timing belt tensioner pushrod so that the coolant pump can be refitted (except on the J7R 720 engine).

Secure the coolant pump on the cylinder block then fit the coolant delivery pipe to the pump.