

## USING THE MANUAL

There are three main sections in this manual:

- Specifications
- Dismantling the engine
- Rebuilding the engine

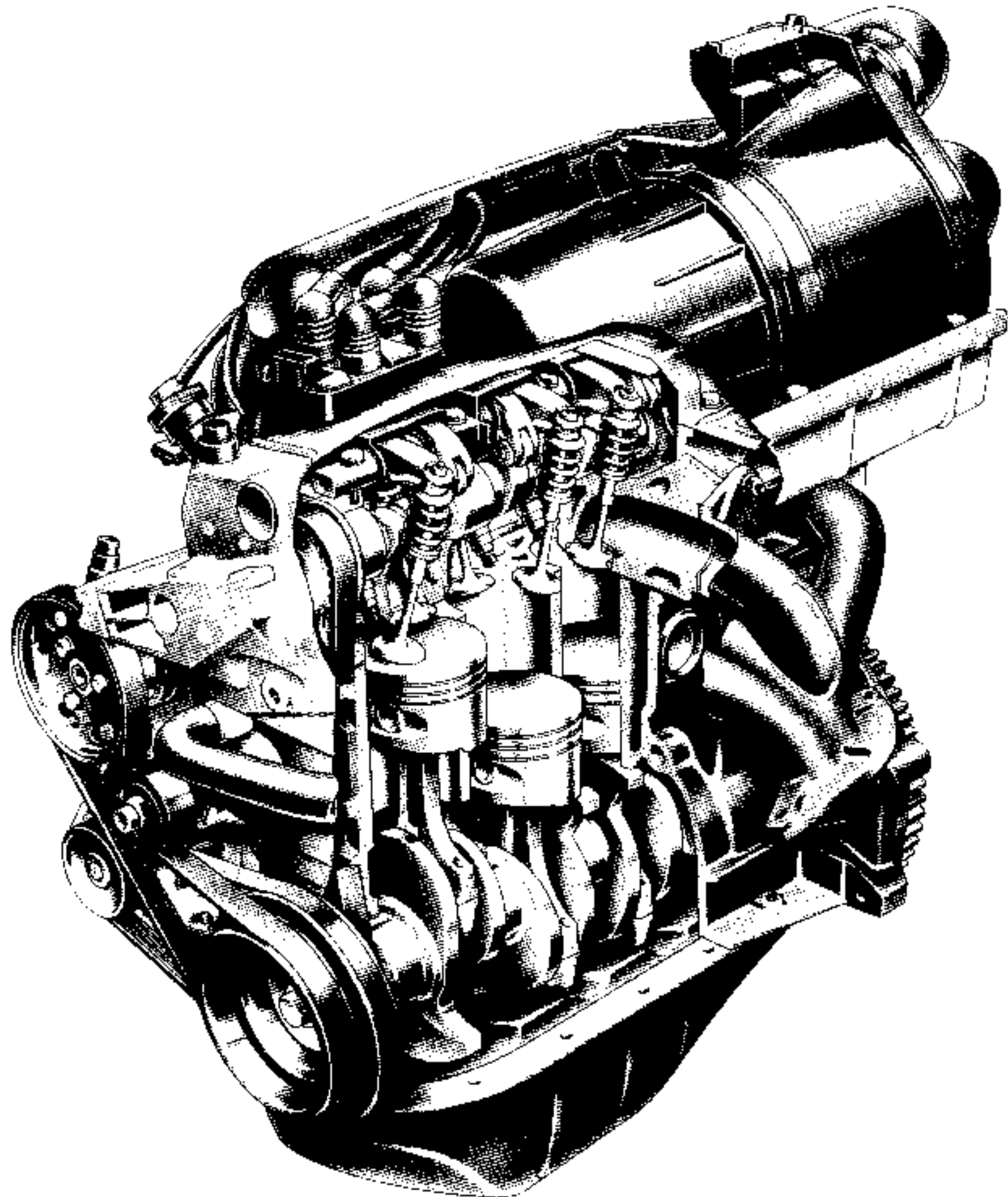
When repairing the components on the vehicle, refer to the Workshop Repair Manual.

## UNITS OF MEASUREMENT

- All dimensions are given in millimetres: mm (except otherwise indicated).
- Tightening torques are given in decaNewton-metre: **daN.m** (remember:  $1 \text{ daN.m} = 1.02 \text{ m.kg}$ ).

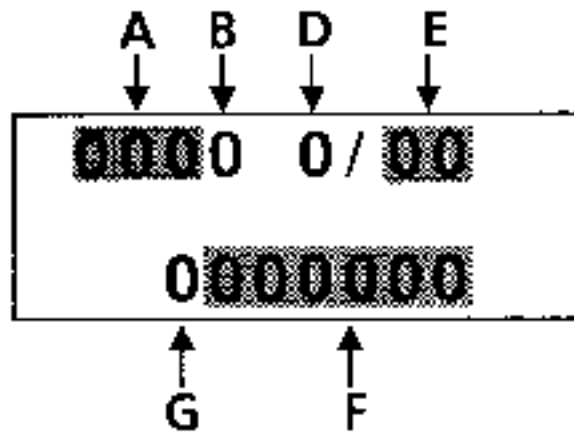
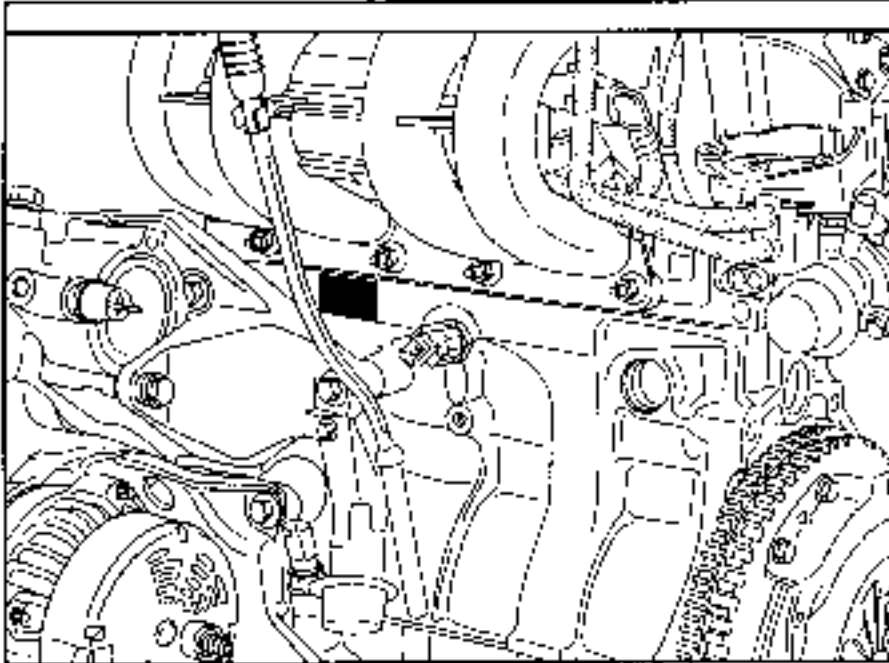
For tightening torques without tolerances, keep within  $\pm 10 \%$ .

Pressures are in **bars**.



## ENGINE IDENTIFICATION

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



104805

It contains:

**At A :**  
The type of engine.

**At B :**  
The engine type approval letter.

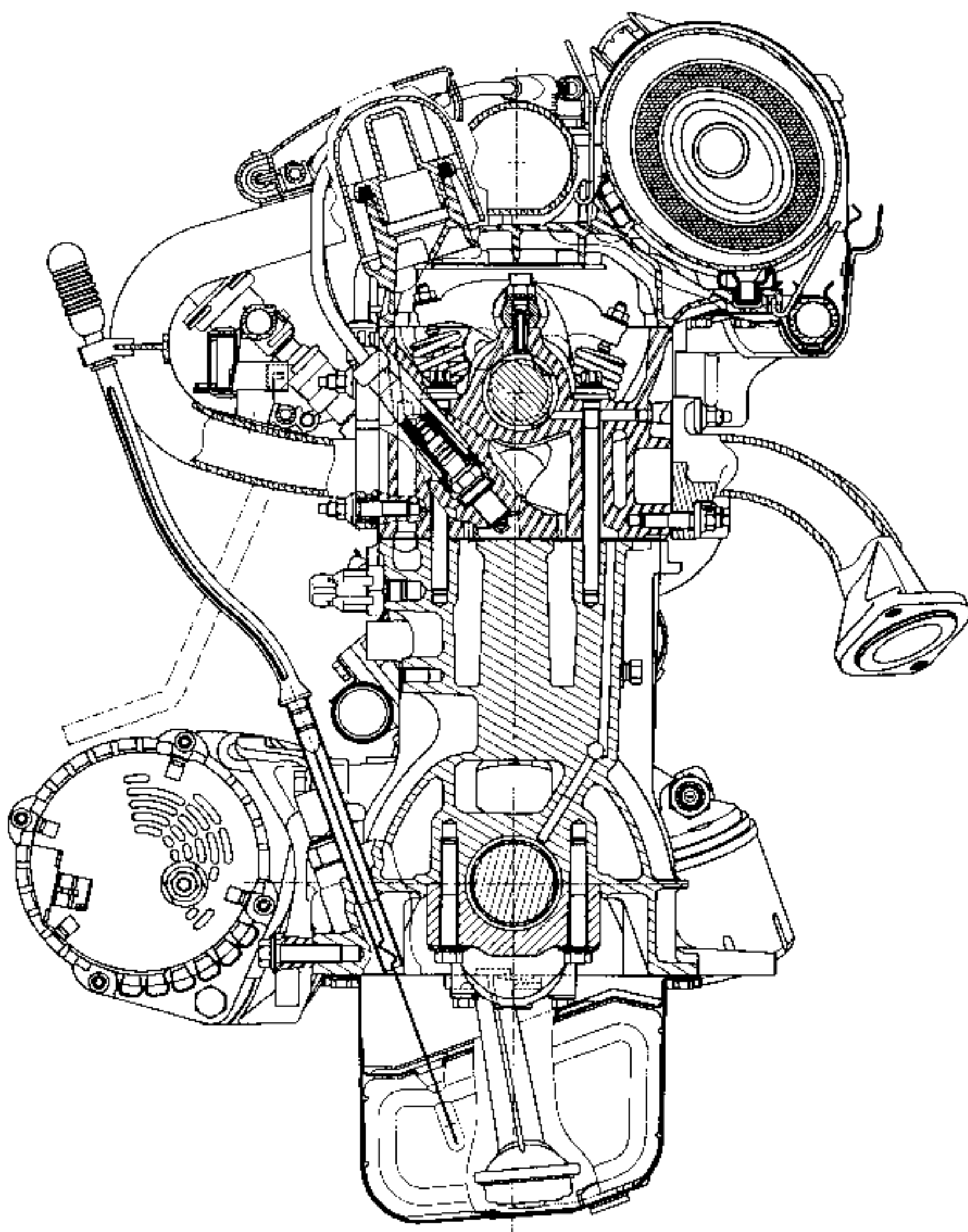
**At D :**  
The Renault SA identification.

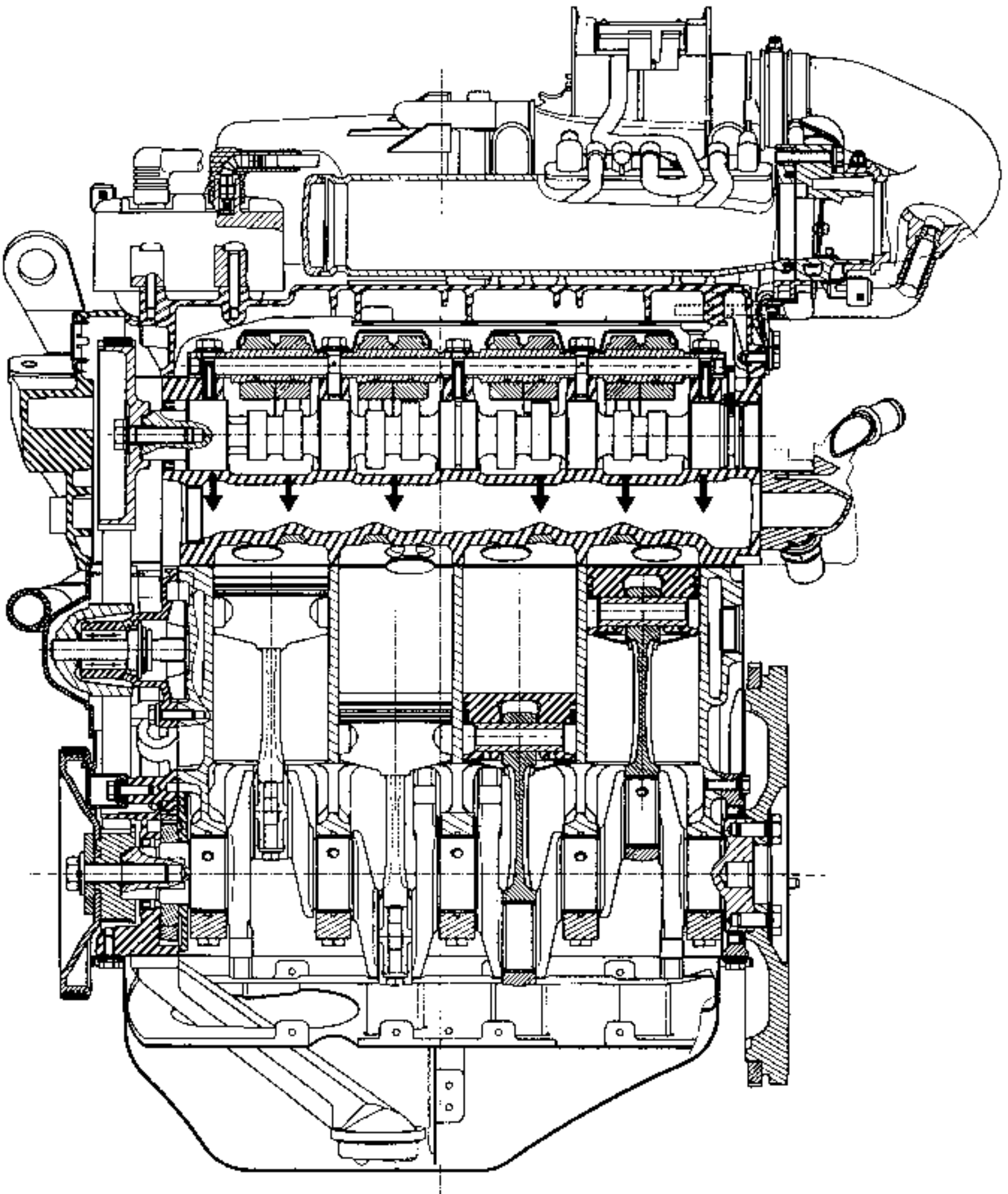
**At E :**  
The engine suffix.

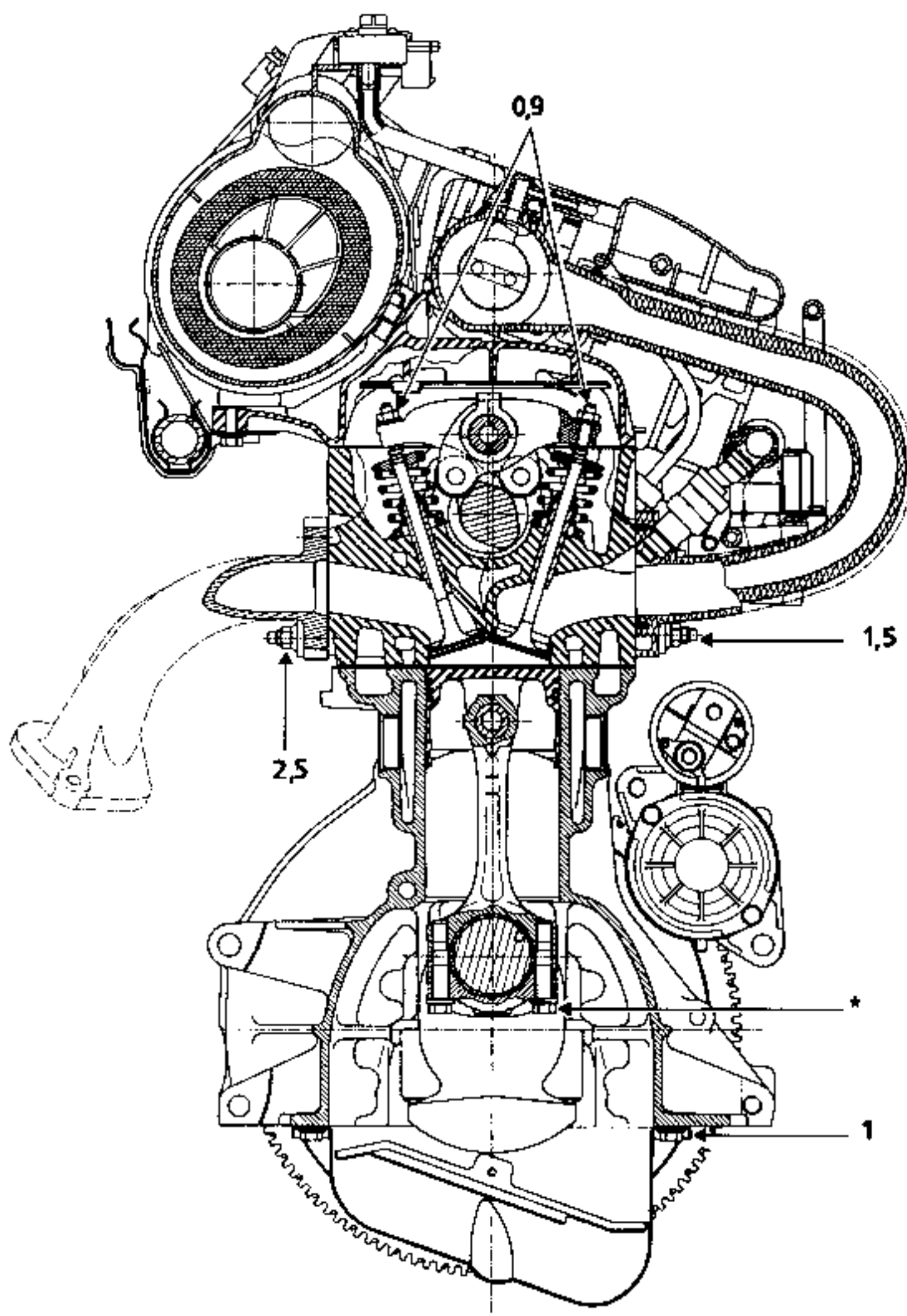
**At F :**  
The engine fabrication number.

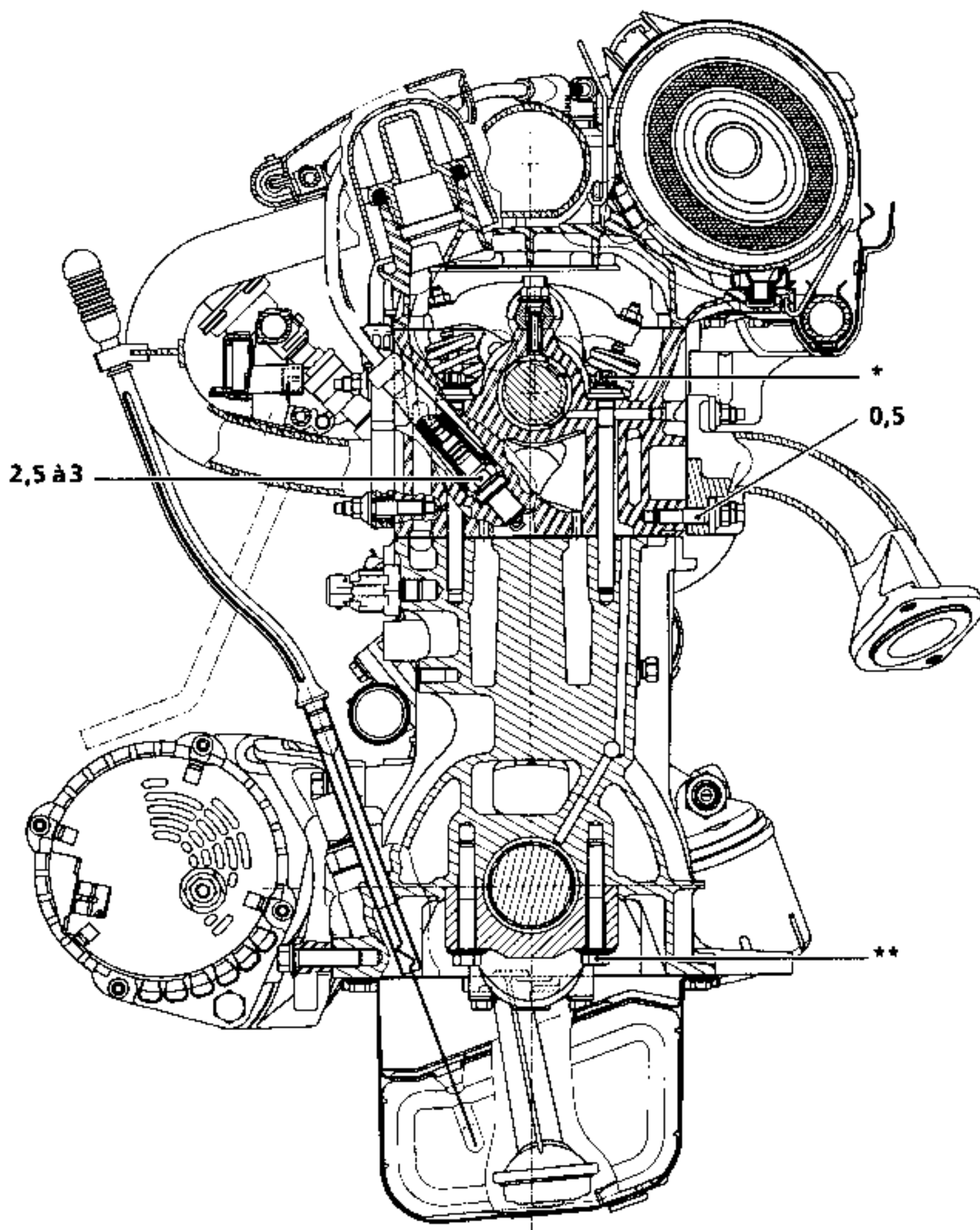
**At G :**  
The engine assembly plant.

Engine	Suffix	Vehicle	Compression ratio	Bore (mm)	Stroke (mm)	Capacity (cc)
D7F	700 701	C066 C067 S066	9.65/1	69	76.8	1149
	730	057K 057Y				



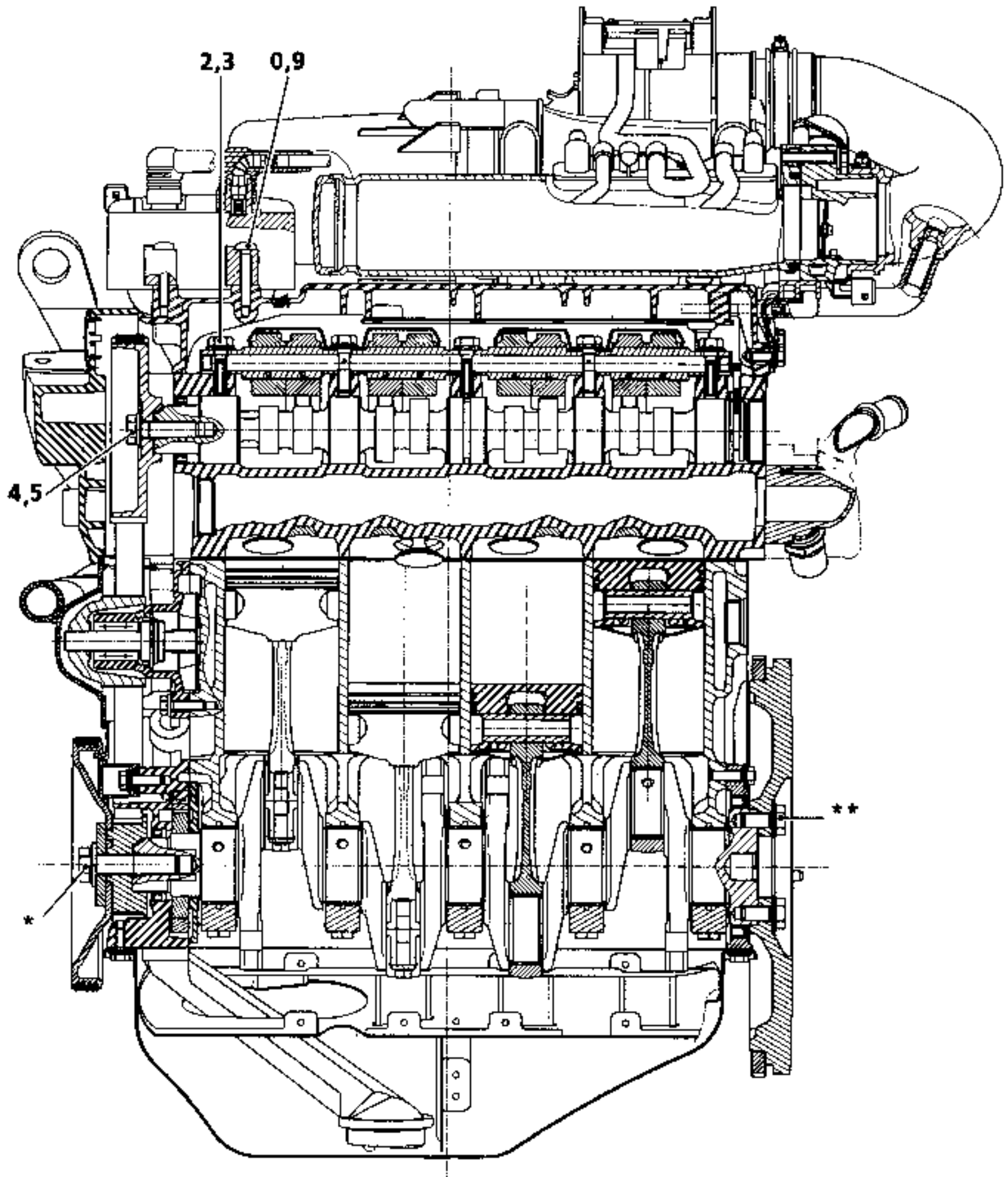






\* See page 10-9

\*\* Pretighten to 2 daN.m then through an angle of 80°.



\* Pretighten to 2 daN.m then through an angle of 90°.  
\*\* Pretighten to 1.7 daN.m then through an angle of 110°.

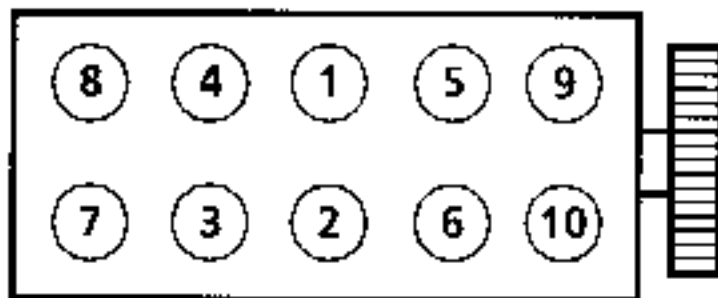


**CYLINDER HEAD TIGHTENING METHOD**

The cylinder head must be cold for adjusting the rocker arms and tightening the cylinder head.

**Preseating the gasket**

- Tighten all bolts to 2 daN.m then tighten through an angle of 90° in the order specified below,



90775

- Wait three minutes to allow the gasket to settle.

**Tightening cylinder head bolts**

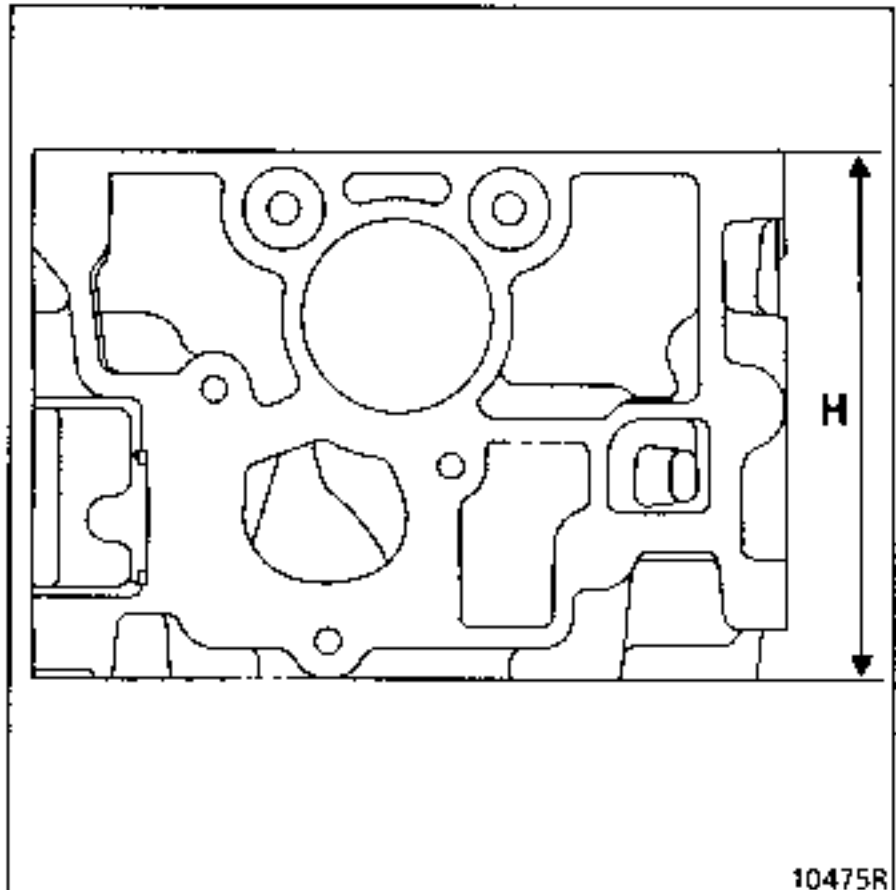
- Slacken off bolts marked (1) and (2) until they are entirely free.
- Tighten bolts (1) and (2) to 2 daN.m and then turn through an angle of 200°.
- Tighten bolts (3) (4) (5) (6) until they are entirely free.
- Tighten bolts (3) (4) (5) (6) to 2 daN.m and then through an angle of 200°.
- Slacken off bolts (7) (8) (9) (10) until they are entirely free.
- Tighten bolts (7) (8) (9) (10) to 2 daN.m and then through an angle of 200°.

**Cylinder head gasket :**

Thickness of gasket (mm) :  $1.2 \pm 0.05$

**CYLINDER HEAD**

Height of cylinder head (mm) :  $H = 113.5$



10475R

Max. bow of gasket face (mm) : 0.05

Volume of chamber with valves and spark plugs:  $27.68 \pm 0.65$  cc

Max. difference between chambers : 0.8 cc

## VALVE GUIDES

Inside diameter (mm)  $6^{+0.018}_0$

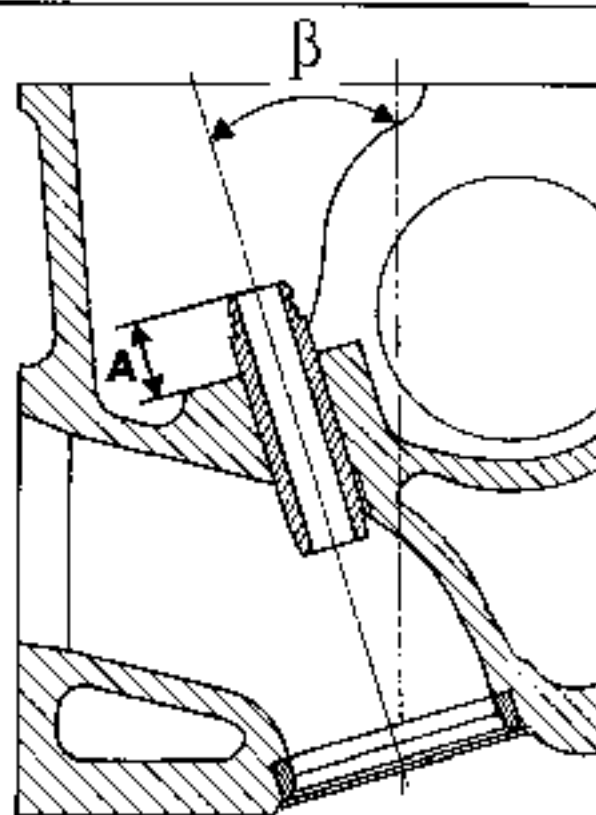
Guide diameter (mm) :  
 - normal 11  
 - repair 11.2

The inlet and exhaust guides have valve stem seals which must be renewed when the valves are removed.

Angle of inlet and exhaust guides:  $\beta = 17.50^\circ$

Position of inlet and exhaust guides in relation to lower contact surface of valve springs :

Dimension (A) =  $15 \pm 0.15$  mm



91881R

## VALVE SPRINGS

Free length (mm) : 43

Length under load of (mm) :  
 - 24 daN  $\pm 1.35$  37  
 - 48.3 daN  $\pm 3$  31  
 Coils touching 25.6

Wire diameter (mm) : 3.90

Coil internal diameter (mm) : 20.2

## ADJUSTING VALVE CLEARANCE (mm)

- Inlet : 0.1  
 - Exhaust : 0.2

## VALVES

Stem diameter (mm) :  
 - Inlet :  $5.98^{+0}_{-0.015}$   
 - Exhaust:  $5.97^{+0}_{-0.015}$

Seat angle :  
 - Inlet :  $120^\circ$   
 - Exhaust :  $90^\circ$

Head diameter (mm) :  
 - Inlet :  $32.88 \pm 0.12$   
 - Exhaust :  $29.88 \pm 0.12$

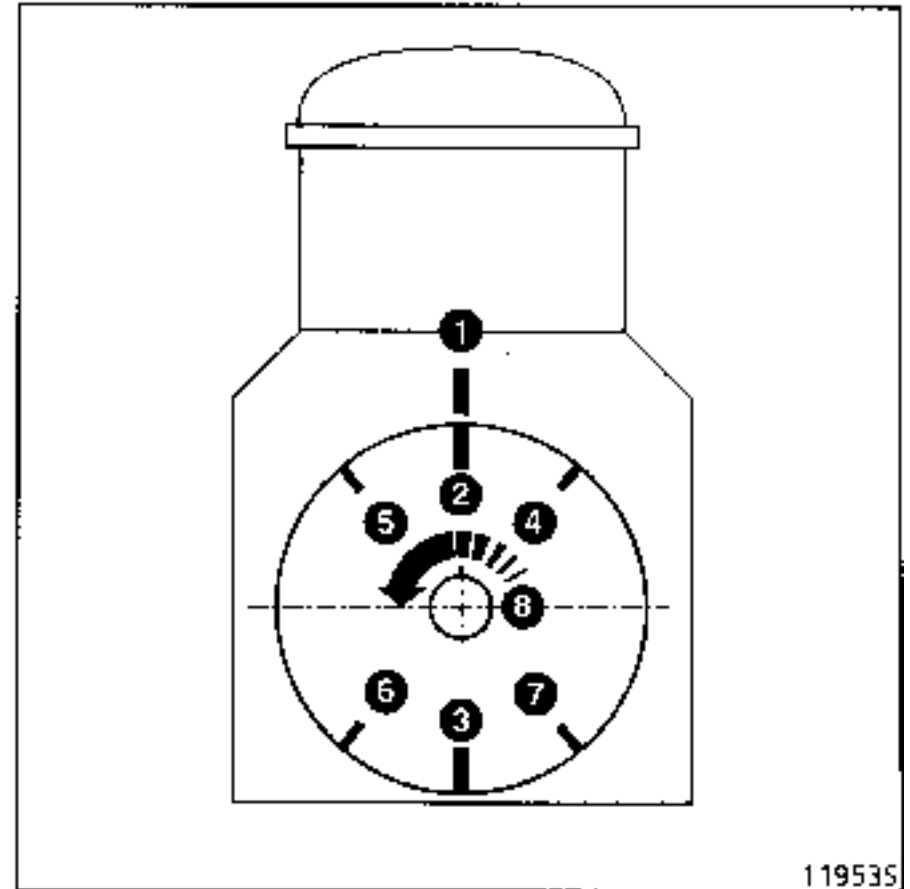
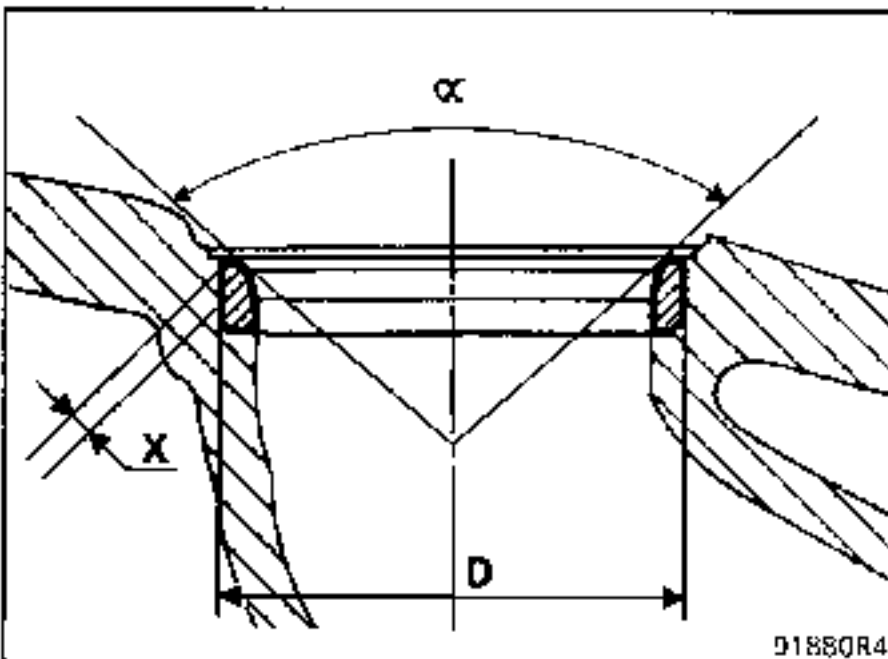
**VALVE SEATS**Seat angle  $\alpha$  :

- Inlet:  $120^\circ$
- Exhaust:  $90^\circ$

Seat width (mm)  $X = 1.7 \pm 0.1$ 

Outside diameter (D) (mm) :

- inlet:  $33.5 \begin{matrix} + 0.05 \\ + 0.034 \end{matrix}$
- exhaust:  $30.5 \begin{matrix} + 0.05 \\ + 0.034 \end{matrix}$



- 1 Fixed TDC mark, cylinder block.
- 2 Moving TDC mark, flywheel.
- 3 Moving BDC mark, flywheel.
- 4 Retard opening - inlet
- 5 Advance closing - exhaust
- 6 Retard closing - inlet
- 7 Advance opening - exhaust
- 8 Direction of engine rotation (flywheel end).

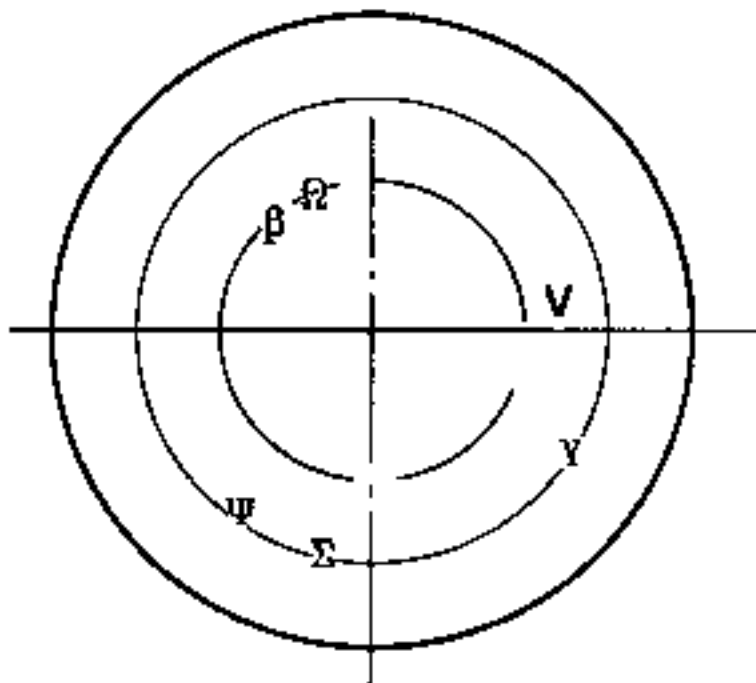
**CAMSHAFT**End play (mm) :  $0.07$  to  $0.148$ Number of bearings:  $5$ **Timing diagram with theoretical clearance of zero**

- Retard opening - inlet\*  $- 10^\circ$
- Retard closing - inlet  $39^\circ$
- Advance opening - exhaust  $32^\circ$
- Advance closing - exhaust\*\*  $- 6^\circ$

\* As "retard opening - inlet" is negative, the valve is opened after TDC.

\*\* As "advance closing - exhaust" is negative, the valve is closed before TDC.

## PISTONS



B9D23-1R

- Ω Skirt shape (\*)
- β Version (\*)
- ψ Week of manufacture (\*)
- Σ Modification suffix (\*)
- y Diameter class marking (see table below)
- V Marking flywheel

(\*) Not used by after sales

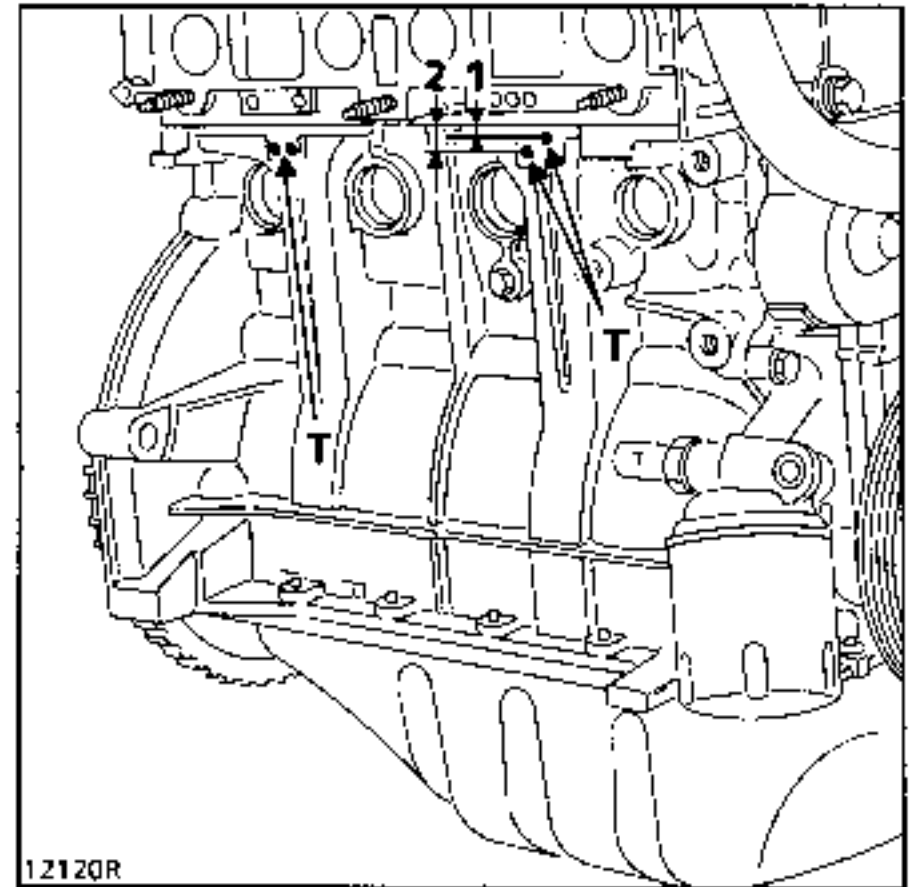
## MATCHING PISTON/LINER

y Piston diameter class	Liner diameter	Piston diameter
A	69 to 69.015	68.965 ± 0.005
B	69.015 to 69.030	68.975 ± 0.005

## CLASS OF CYLINDER BLOCK LINERS

**ATTENTION :** It is essential to match the diameters of the pistons and cylinder block liners. To do this :

The position of holes T, in relation to the cylinder block gasket face, enables the liner tolerance class to be identified (by means of the nominal diameter) and hence the diameters of the corresponding pistons (see following table with information about matching).



## NOTE :

The marking area includes :

1 & 2 : Marks diameter class (A or B).

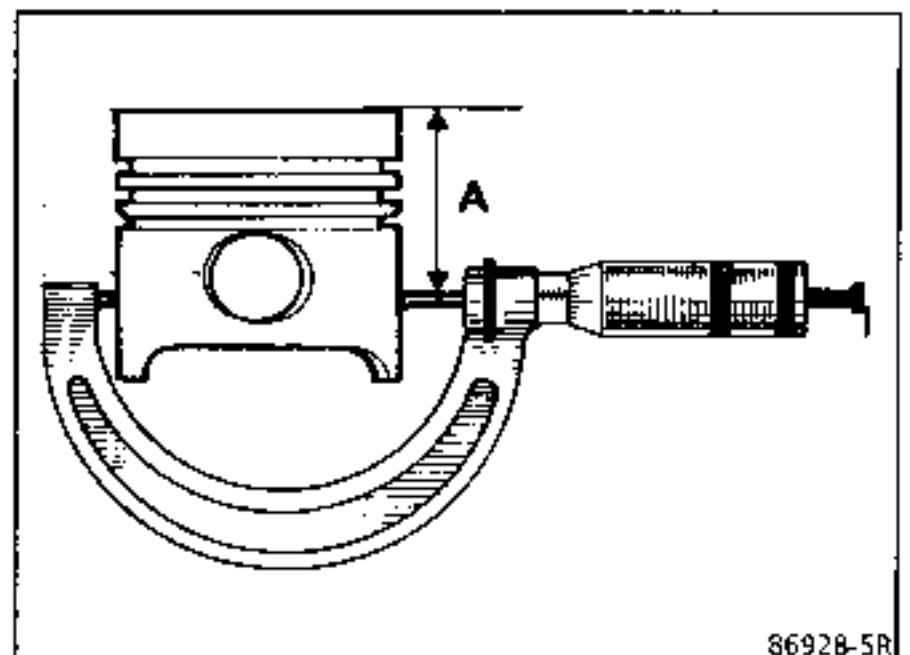
T : Indicates the position of the class for each cylinder.

Repair dimension :

- Increase of 0.25 mm in liner and piston diameter.

## MEASURING PISTON

The piston diameter must be measured at  
A = 40 mm

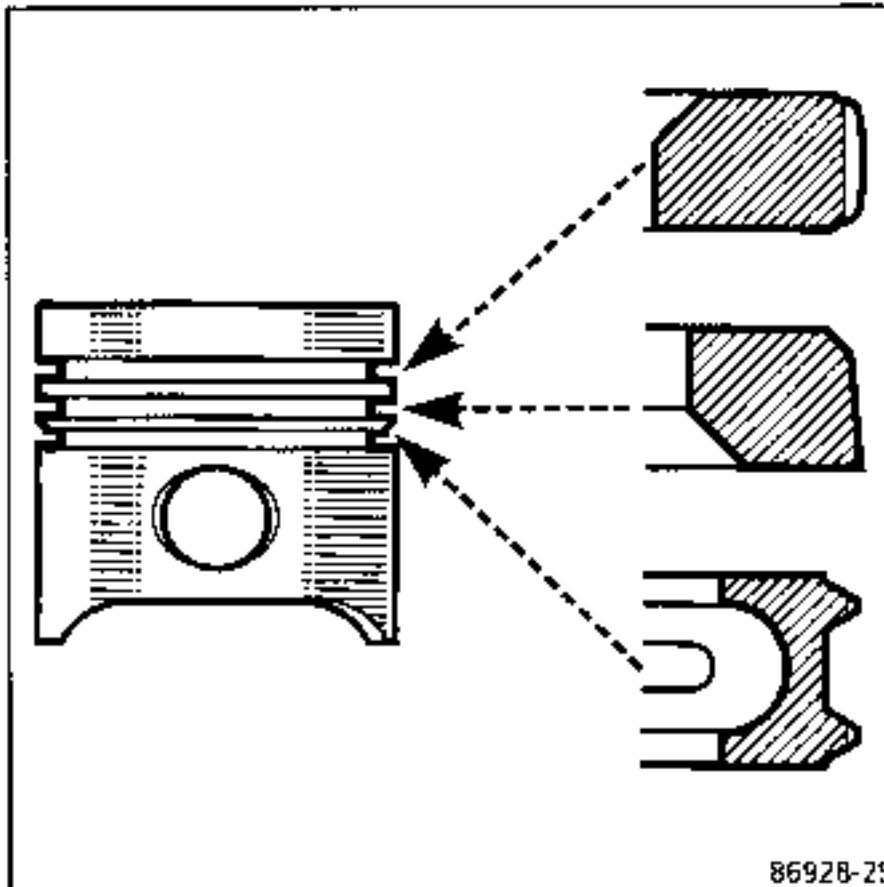


86928-5R

**PISTON RINGS**

Three piston rings (thickness in mm) :

- Heat protection 1.47 to 1.49
- Tapered sealing 1.47 to 1.49
- Scraper 2.47 to 2.49



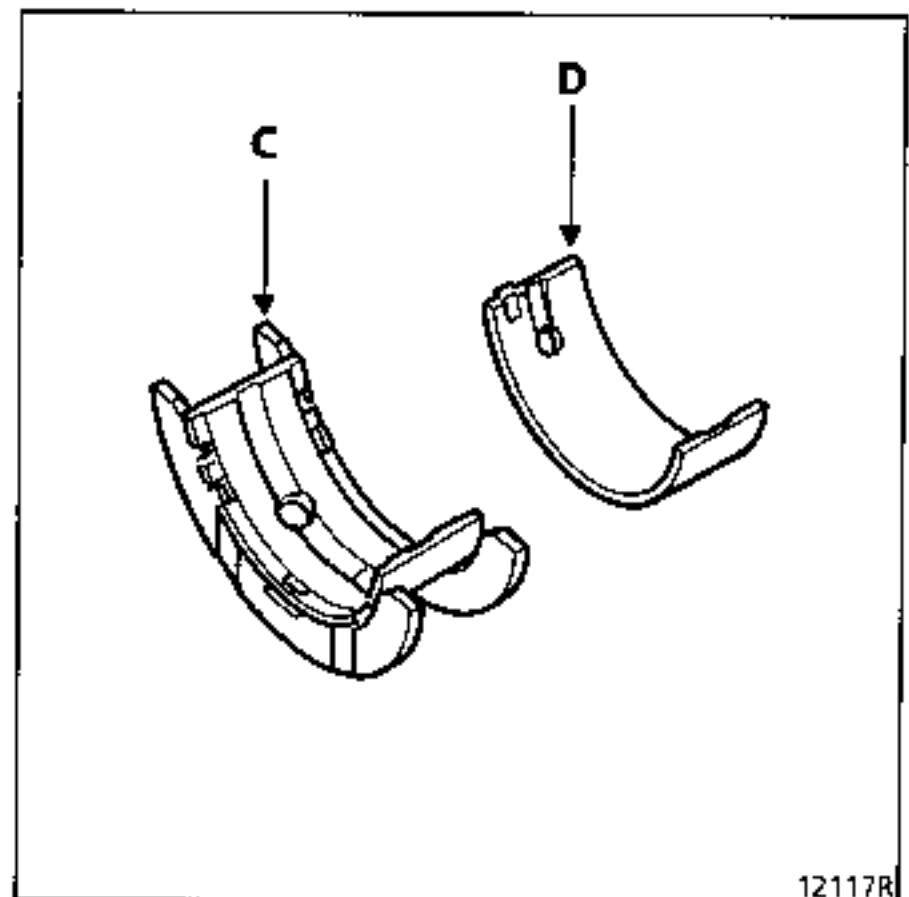
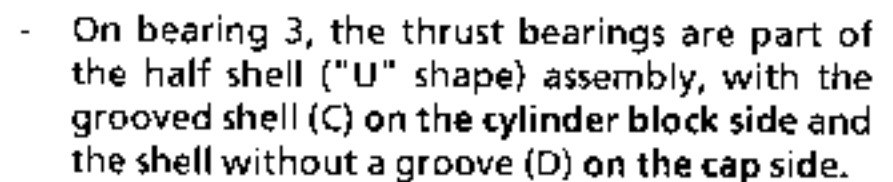
**Conrod big end side play**                      **0.21 to 0.453 mm**

<b>Number of bearings</b>	<b>5</b>
---------------------------	----------

<b>Roll-hardened crankpins : (mm)</b>	
- Nominal diameter	$40 \begin{smallmatrix} 0 \\ -0.016 \end{smallmatrix}$
- Repair diameter	$39.75 \begin{smallmatrix} 0 \\ -0.016 \end{smallmatrix}$
- End float (mm)	0.06 to 0.235

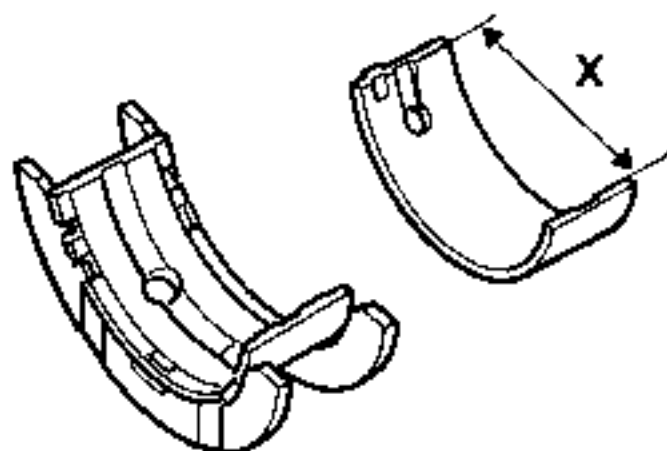
### Direction of installation

- For bearings 1-2-4-5, fit bearing shell with grooves (A) on the cylinder block side and the bearing shell without a groove (B) on the cap side.

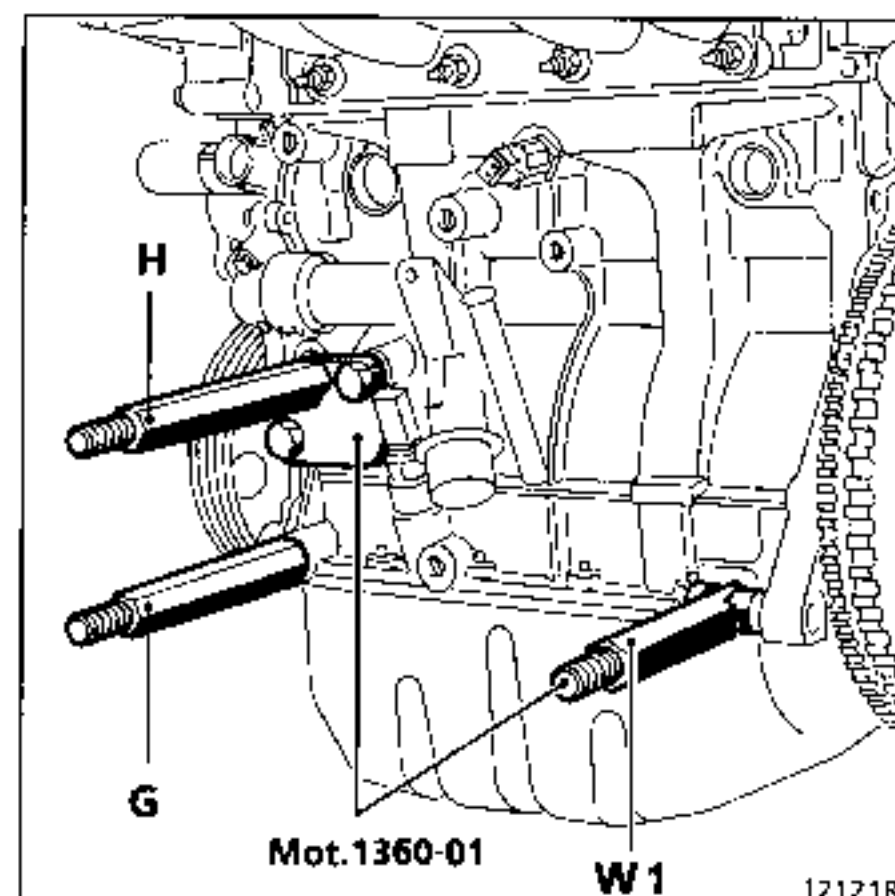


Original dimension and dimension after main bearing journal/crankpin bearing shell regrinding.

	Original diameter (X) in mm	Regrind diameter (X) in mm
Main bearing journal bearing shells	$44 \pm 0.01$	$43.75 \pm 0.01$
Crankpin bearing shells	$40 - 0.016$	$39.75 - 0.016$



12117R1

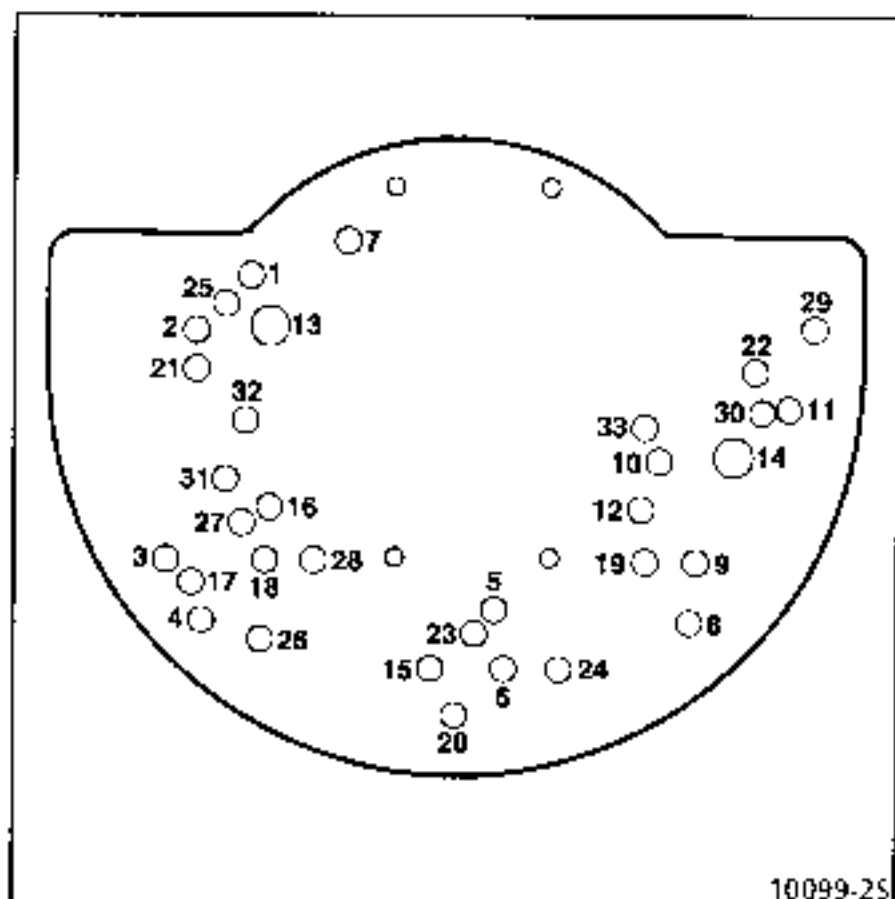


Mot. 1360-01, consisting of stud W1 and plate H1, is an accessory for Mot. 792-03

#### NOTE :

Stud W1 can be obtained from the Parts Department as a replacement for stud W.

Lock mounting nuts.



10099-25

**NOTE:** The following components must be removed before securing the studs to the engine:

- Auxiliary belts
- Alternator and bracket
- Power steering pump and bracket
- Dipstick guide

#### ADAPTING STAND Mot. 792-03

Studs (H), (G) and (W1) are fitted on to the cylinder block so that they fit in holes (10, 8, 4) in the plate.

## CONSUMABLES

Type	Quantity	Component concerned	SODICAM Part No.
Ravitol S 56	—	Cleaning parts.	77 01 421 513
Décapjoint	Coat	Cleaning gasket faces.	77 01 405 952
Rhodorseal 5661	Coat	Oil pump - water pump. Crankshaft casing.	77 01 404 452
Loctite 518	Coat	Water pump inlet elbow Cylinder head outlet coolant unit.	77 01 421 162

## PRECAUTIONS

## WASHING THE ENGINE

Protect the timing belt and the alternator drive belt from splashes of water and cleaning fluids.

Do not allow water to enter the air inlet ducts.

## FITTING THREADED INSERTS

Any threaded holes in engine parts may be repaired by using threaded inserts.

## PARTS TO BE RENEWED WHEN THEY ARE REMOVED

- All seals.
- Rigid pipe in coolant circuit.
- Flywheel mounting bolt.
- Valve guides.
- Camshaft pulley bolt.
- Bolts for conrod bearing caps.
- Crankshaft bearing bolts.



## **PREPARATION OF THE ENGINE FOR RETURN**

The engine must be cleaned and drained (water and oil).

Leave the following parts on the engine or enclose them in the return packaging:

- the dipstick and its guide,
- the flywheel,
- the clutch plate and mechanism,
- the water pump,
- the cylinder head cover,
- the belt tensioner,
- the pressure switch and thermostat,
- the timing cover,
- the oil filter.

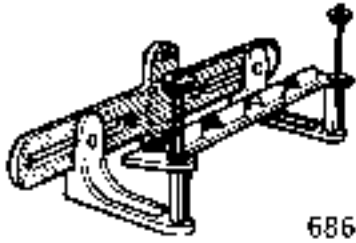
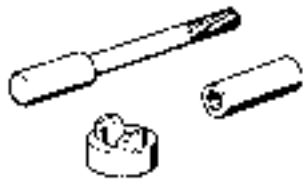

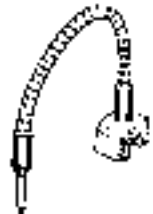
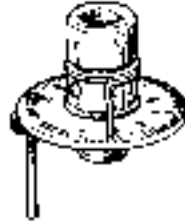
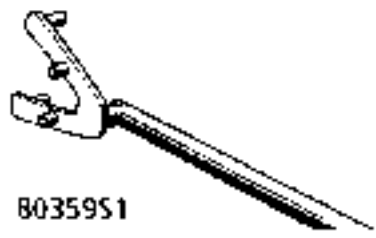


**Remember to remove :**

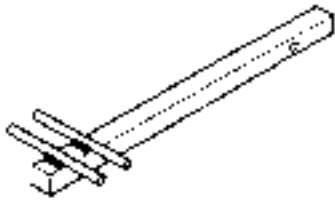

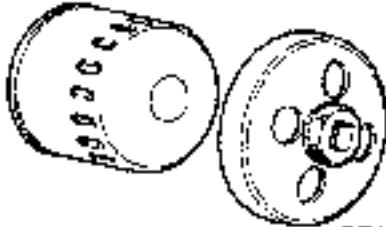

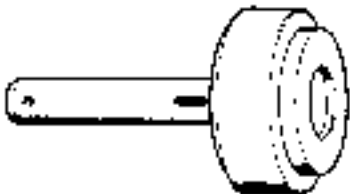


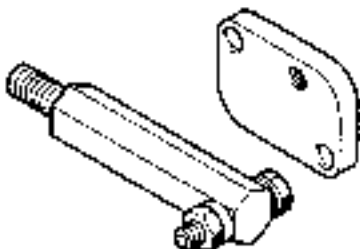
- all coolant hoses,
- the belt or belts (except the timing belt).




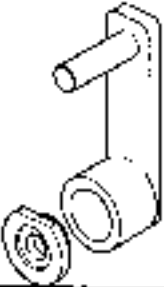
The used engine should be mounted on the wooden base in the same condition as the new engine:

- plastic plugs and covers in place,
- box over the entire assembly.

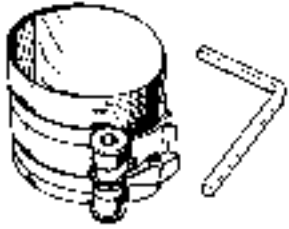
**ATTENTION :** Never position the engine on the sump (strainer for oil pump may be irreparably damaged).

Drawing	Method Number	Part Number	Description
 68666S1	Mot. 330-01	00 00 033 001	Cylinder head stand
 998135	Mot. 574-21	00 00 057 421	Bushes B17, centring tool C17, pin A17. Fitting gudgeon pins
 99614S	Mot.582-01	00 00 058 201	Flywheel locking tool
 77889S1	Mot. 591-02	00 00 059 102	Magnetic flexible tool for angular wrench used for tightening cylinder head .
 7B181S	Mot. 591-04	00 00 059 104	Angular wrench.
 80359S1	Mot. 799	00 00 079 900	Sprocket immobilising tool for toothed timing belt.
 82258S	Mot. 836-05	00 00 083 605	Kit in case for measuring oil pressure.
 90277S1	Mot. 1054	00 00 105 400	TDC setting tool

Drawing	Method Number	Part Number	Description
 92645-151	Mot. 1135-01	00 00 113 501	Tensioning tool for timing gear tensioner
 96508S1	Mot. 1273	00 00 127 300	Tool for checking belt tension
 97160-151	Mot. 1330	00 00 133 000	Tool for removing Purflux oil filter, 66 mm dia.
 98503S	Mot. 1335	00 00 133 500	Pliers for removing valve stem seals
 96898S	Mot. 1354	00 00 135 400	Tool for fitting crankshaft seal (flywheel end).
 96897S	Mot. 1355	00 00 135 500	Tool for fitting oil pump seal.
 96897S	Mot. 1356	00 00 135 600	Tool for fitting camshaft seal.
 12146S1	Mot. 1360-01	00 00 136 001	Stud W1 and plates H1, accessory for Mot. 792-03. Engine stand. (Can be fitted on DESVIL stand.)

Drawing	Method Number	Part Number	Description
 100395	Mot. 1374	00 00 137 400	Tool for removing oil pump seal
 101585	Mot. 1377	00 00 137 700	Tool for removing crankshaft seal (flywheel end)
 100395	Mot. 1381	00 00 138 100	Tool for removing camshaft seal
 1088551	Mot. 1386	00 00 138 600	Tool for pretensioning timing belt

## Designation



833915

Clamp for fitting piston with rings in the liner (all types)

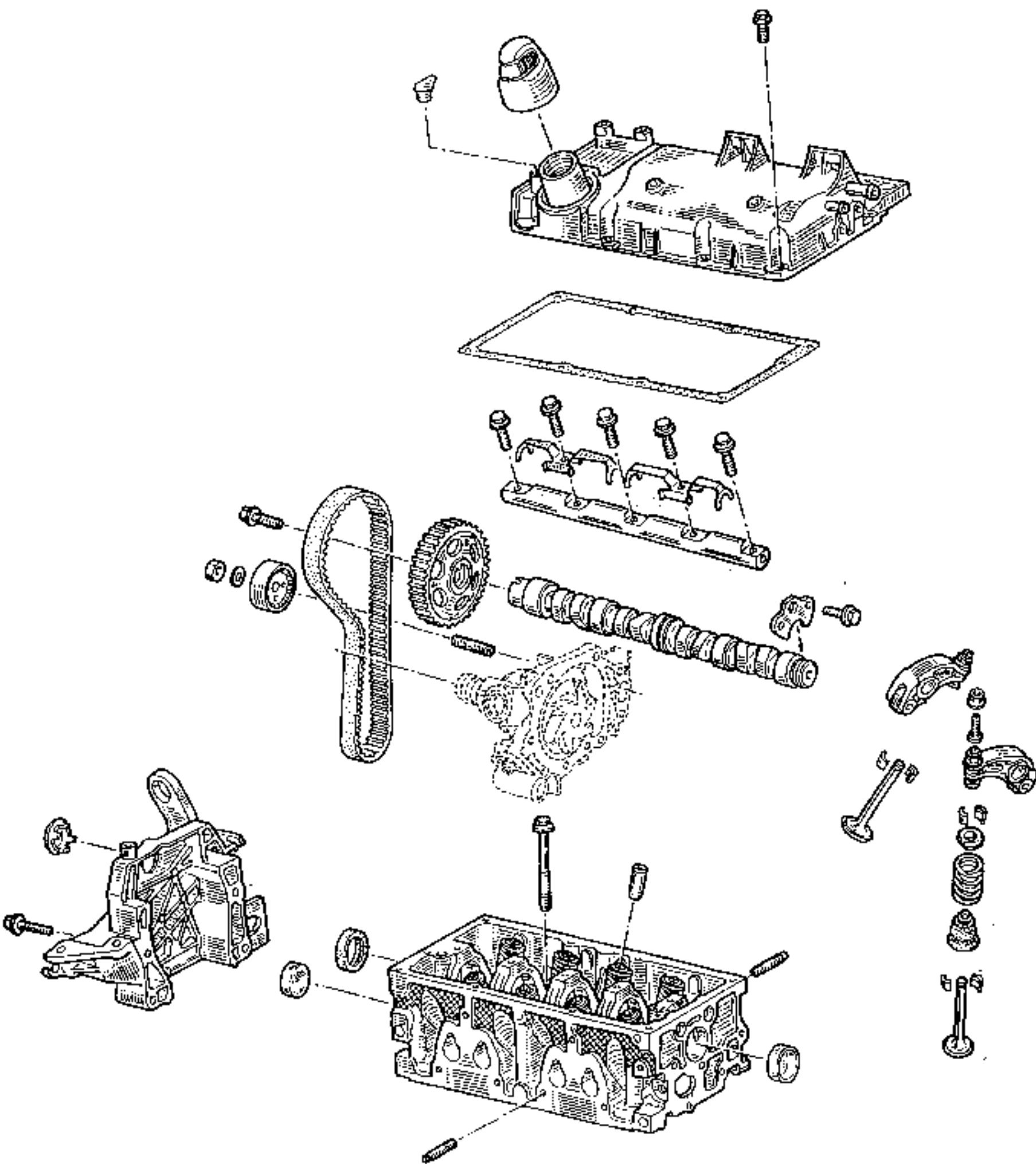
Set of milling tools for rectifying valve seats  
CERGYSDIS C 108 NEWAY

Valve spring tool

Torx socket, 12 mm (Example: Facom STX12)

Angular tightening tool, for example:  
( Example: STAHLWILLE No. 7380)

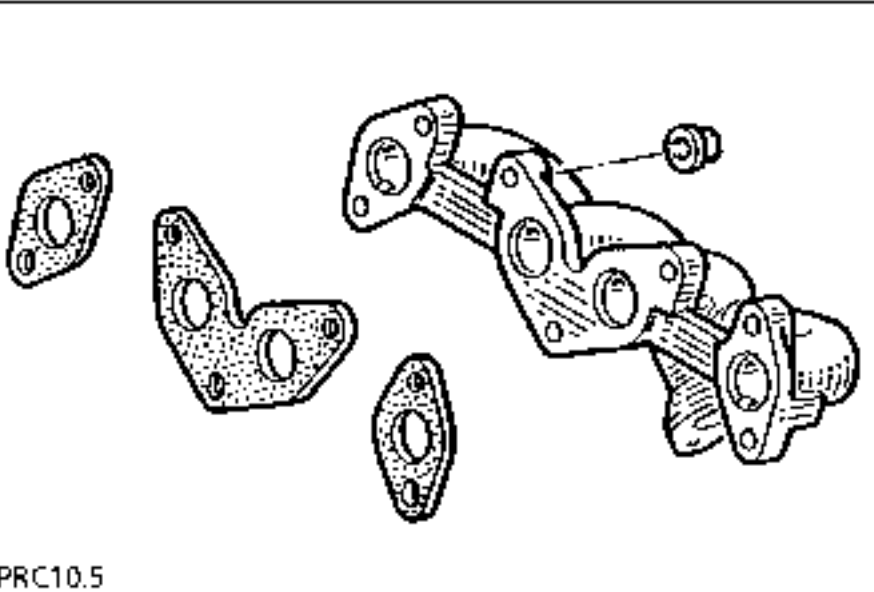
EXPLODED VIEW OF CYLINDER HEAD



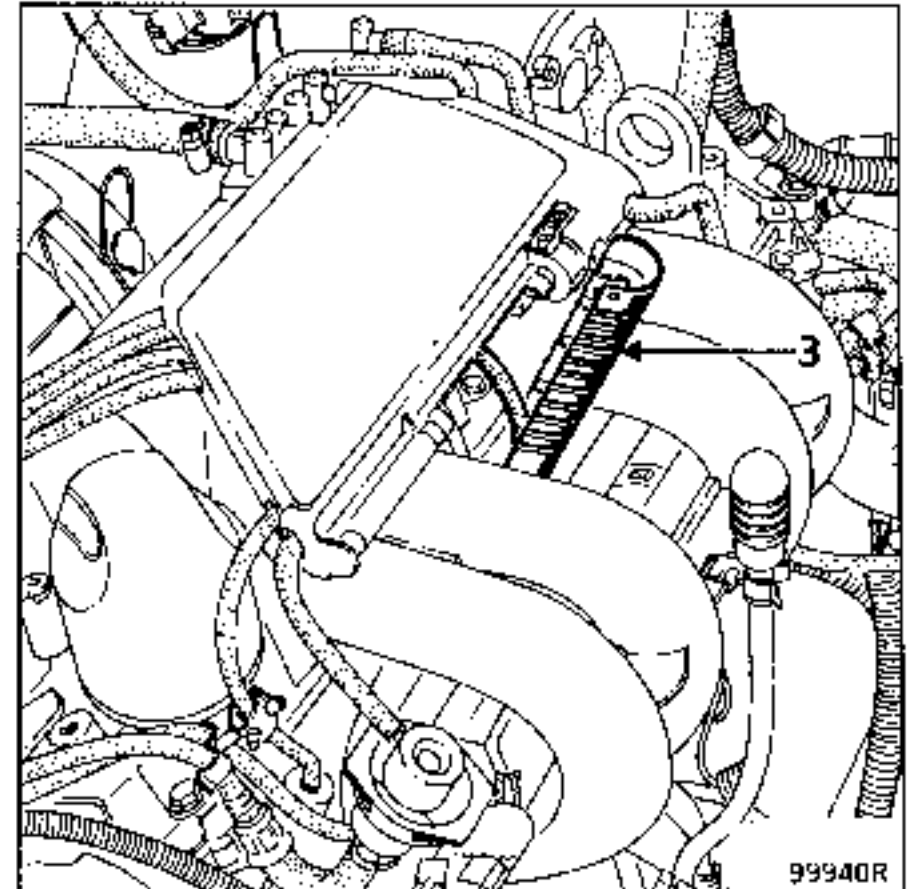
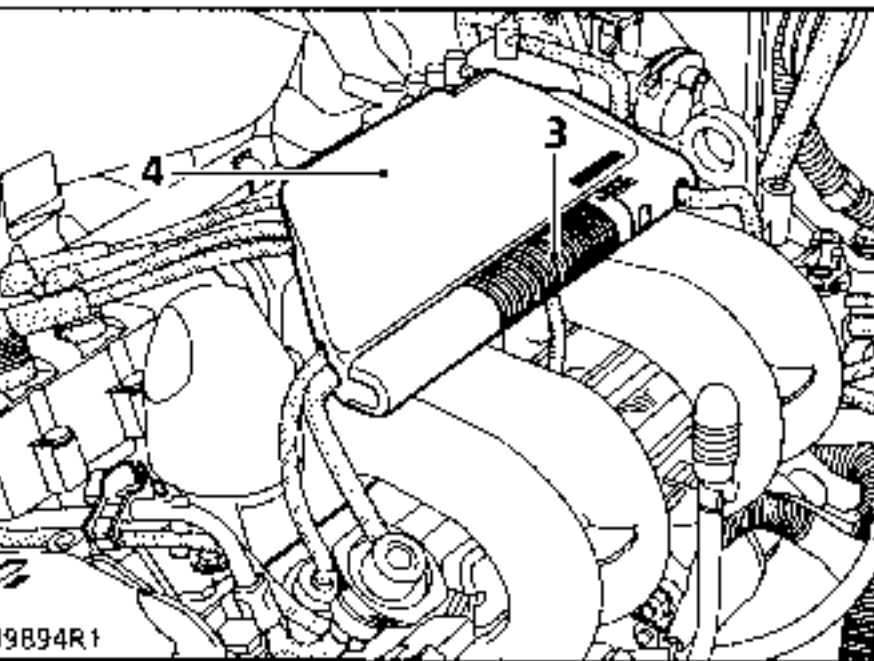
## DISMANTLING ENGINE

Remove :

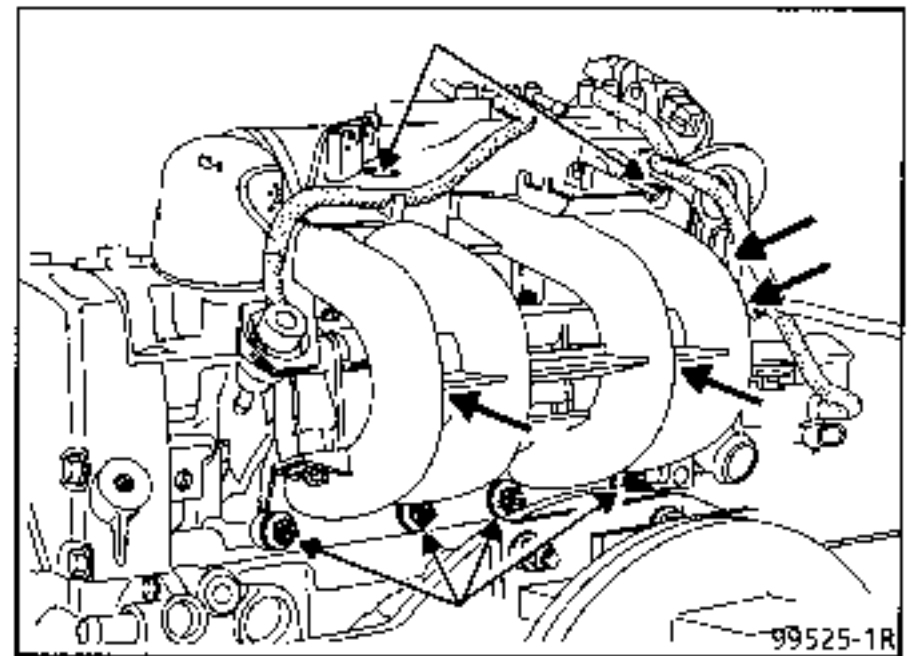
- the air filter
- the exhaust manifold and its gaskets,



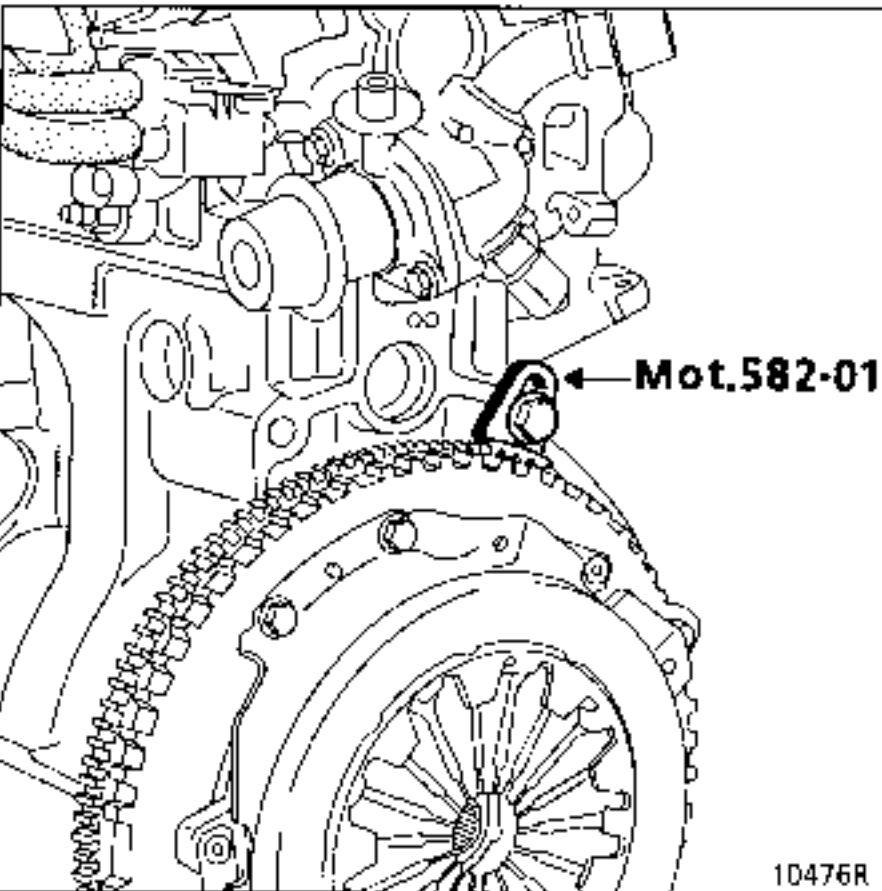
Disconnect the spark plug wires using tool (3) integrated in the protective plastic cover (4).



- Disconnect the assembly comprising the intake manifold, throttle body and injector gallery.



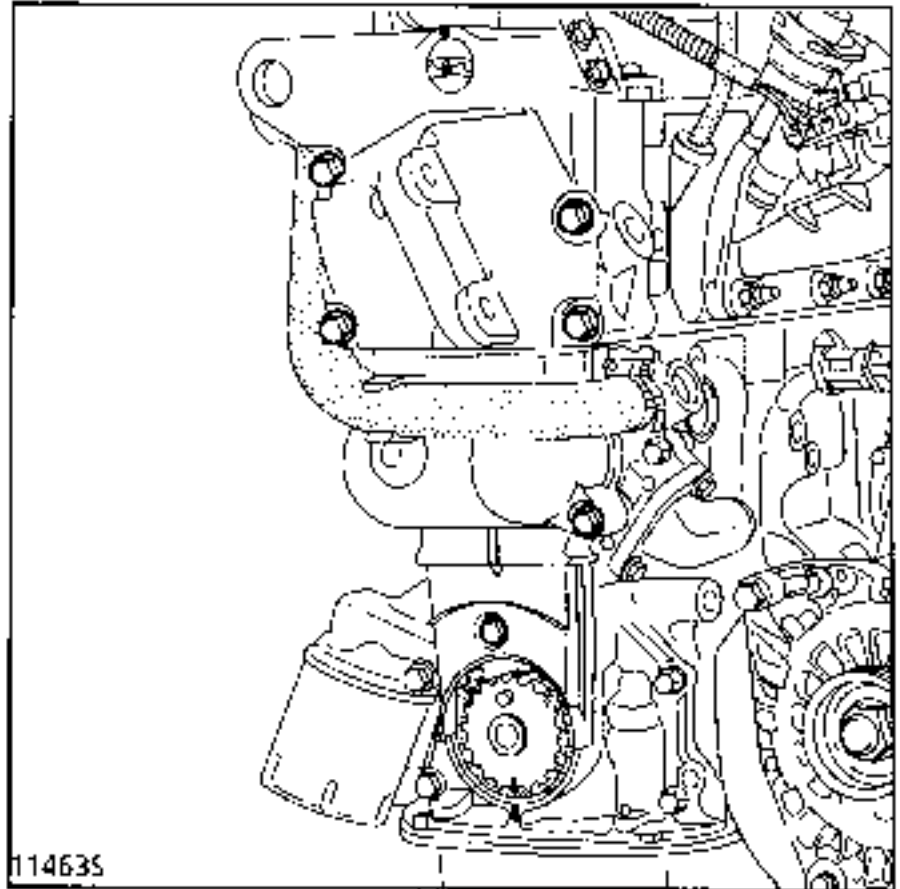
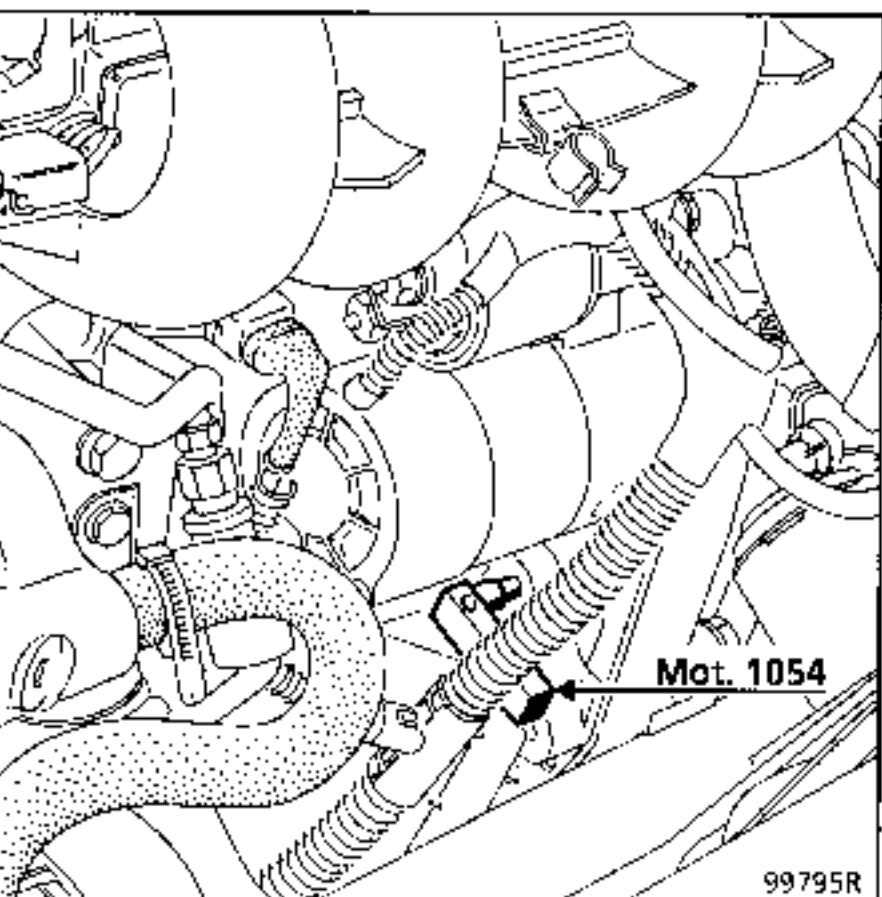
Fit flywheel locking tool Mot. 582-01.



Remove:

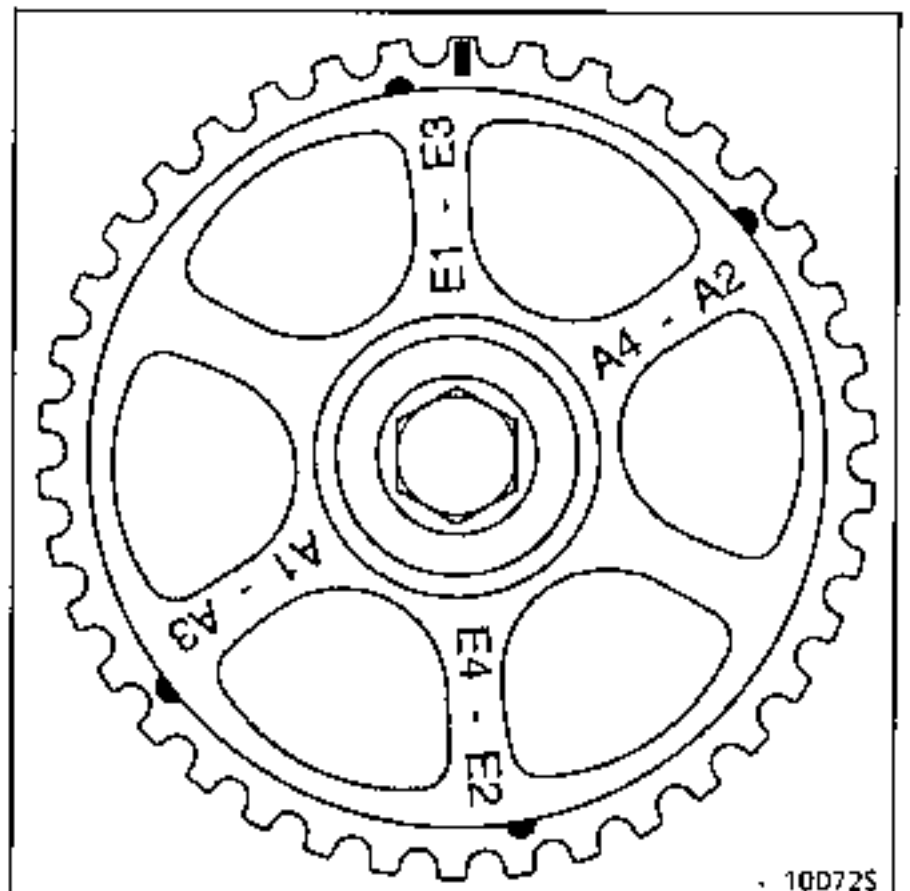
- the crankshaft output pulley,
- the lower timing gear cover.

Lock the engine at TDC using Mot. 1054, aligning the marks on the crankshaft and camshaft sprockets with the fixed marks.



Remove the timing gear covers and the timing belt.

**ATTENTION :** There are five marks on the camshaft sprocket but only the rectangular mark on the front of the tooth indicates TDC; the other marks are used to adjust the rockers.



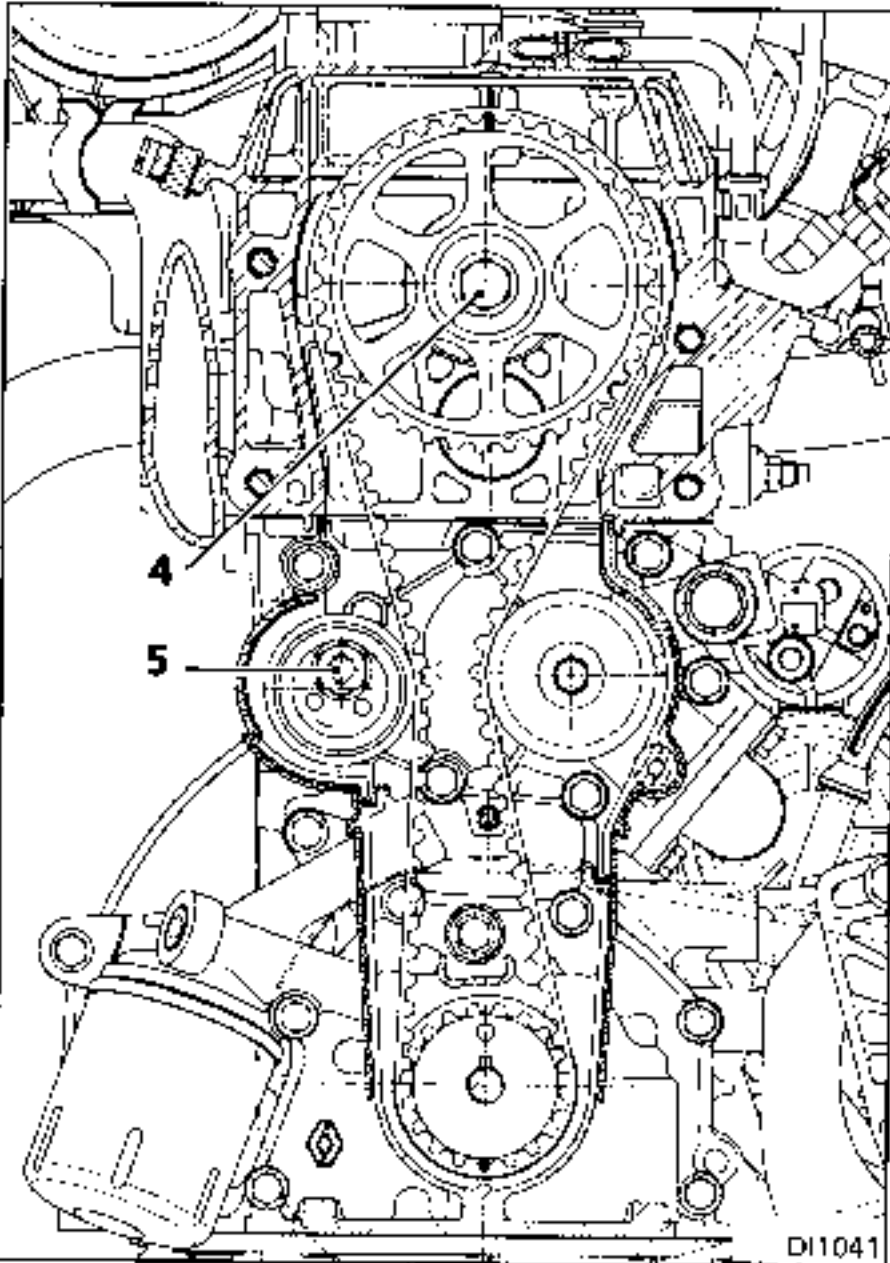


Slacken off :

- the camshaft sprocket bolt (4),
- the nut (5) for the timing gear belt tensioner roller.

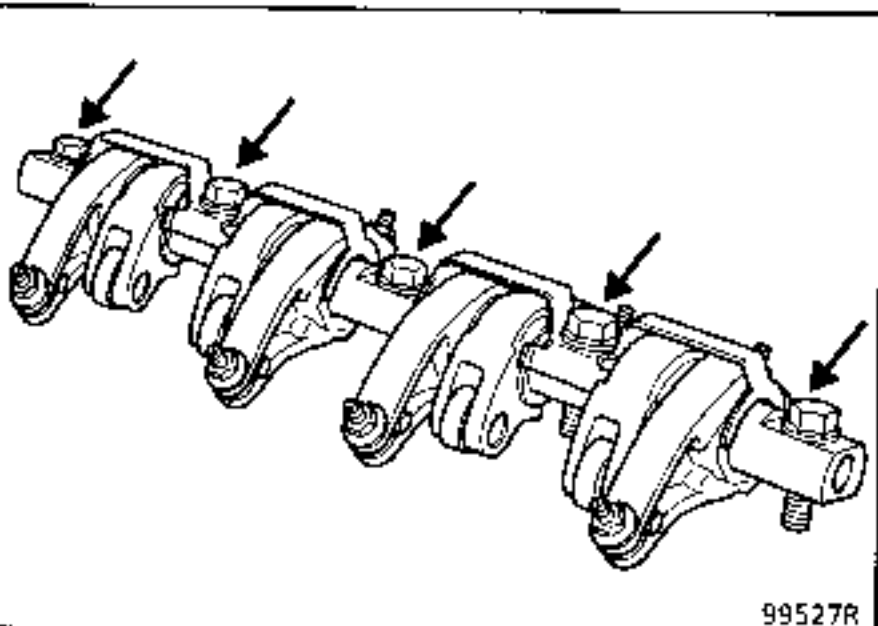
Remove:

- the timing gear belt.



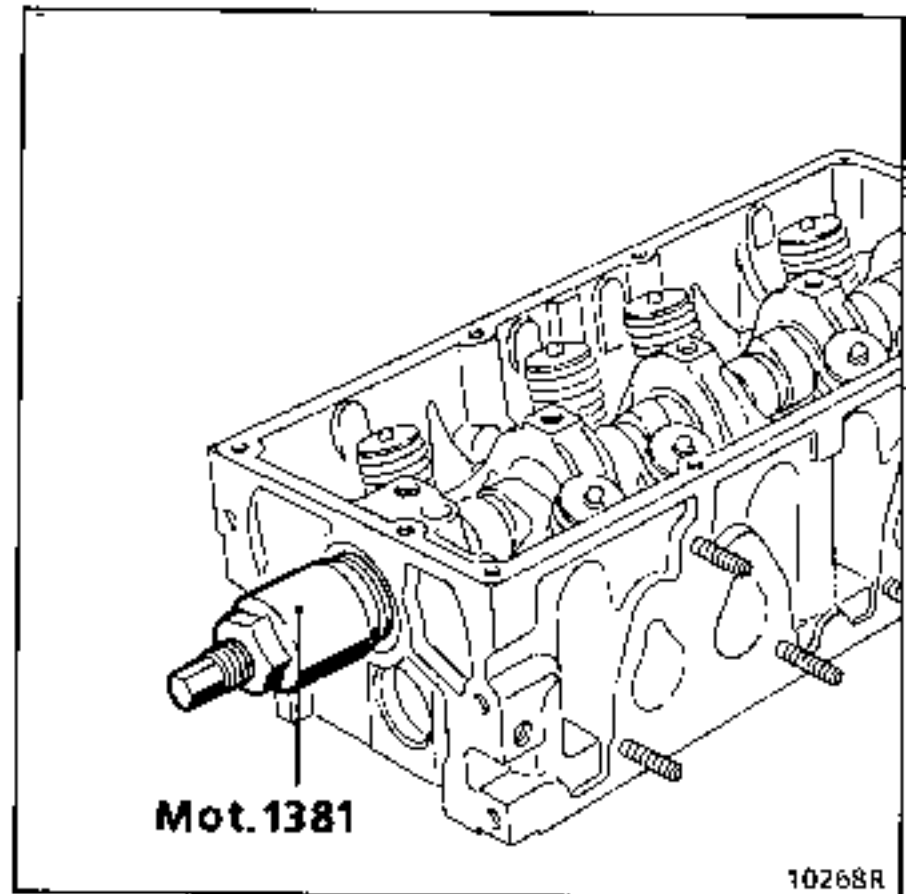
Remove:

- the rocker cover,
- the rocker shaft mounting bolts,



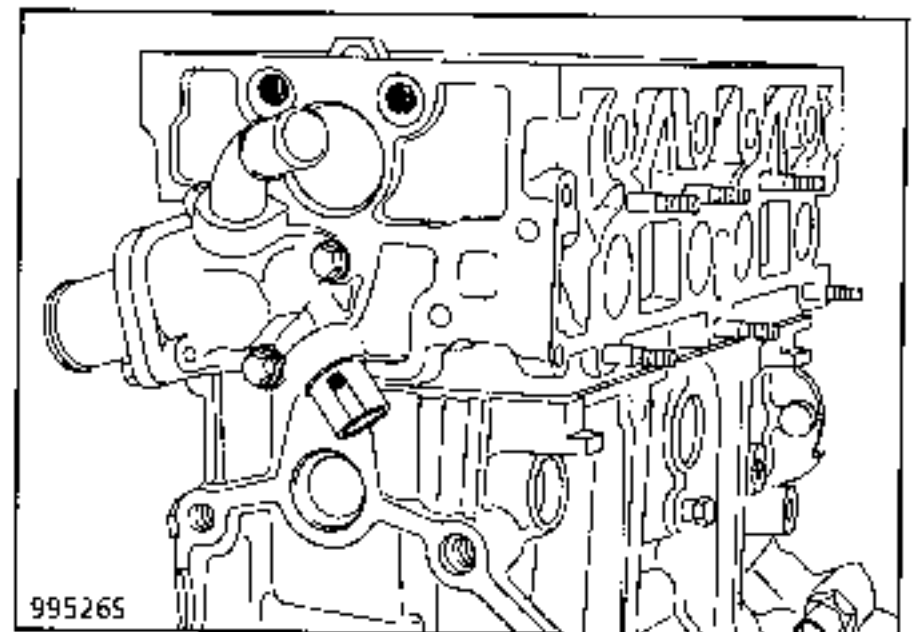
- the camshaft pulley,

Use tool **Mot. 1381** to remove the camshaft seal.



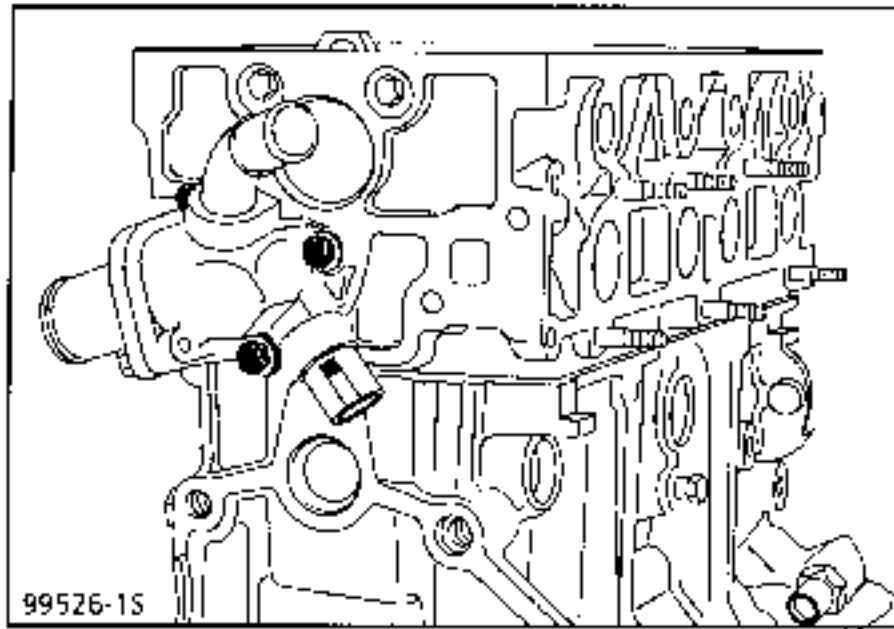
Remove :

- the bolts for the camshaft mounting flange,



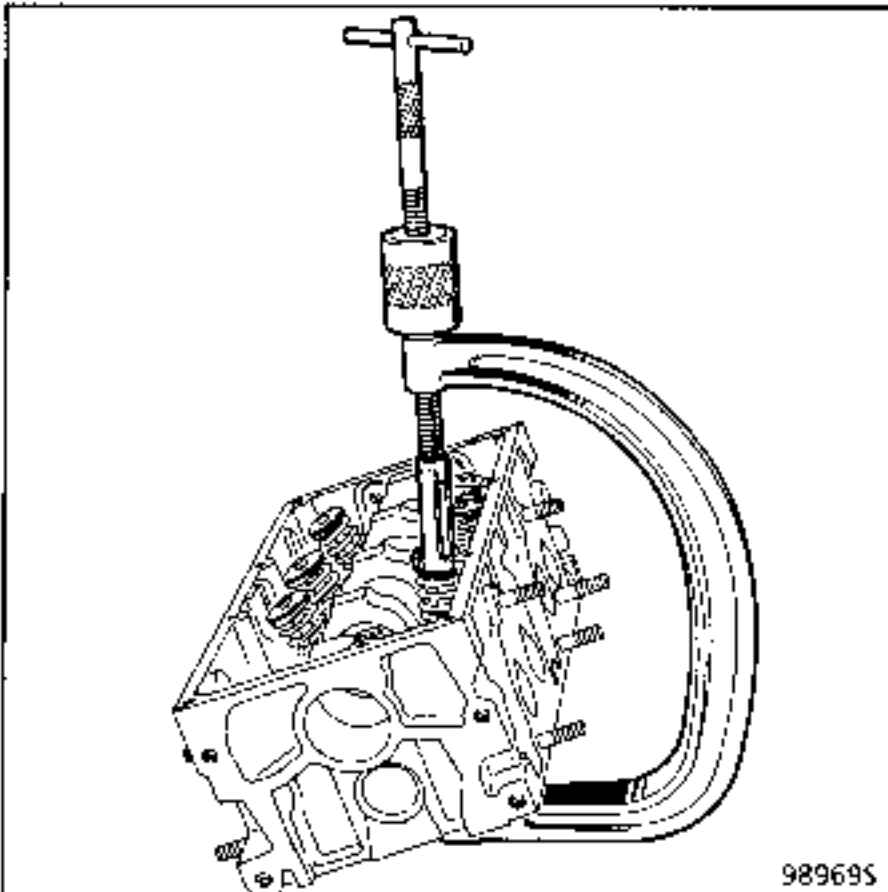
- the camshaft.

- Remove the thermostat housing.

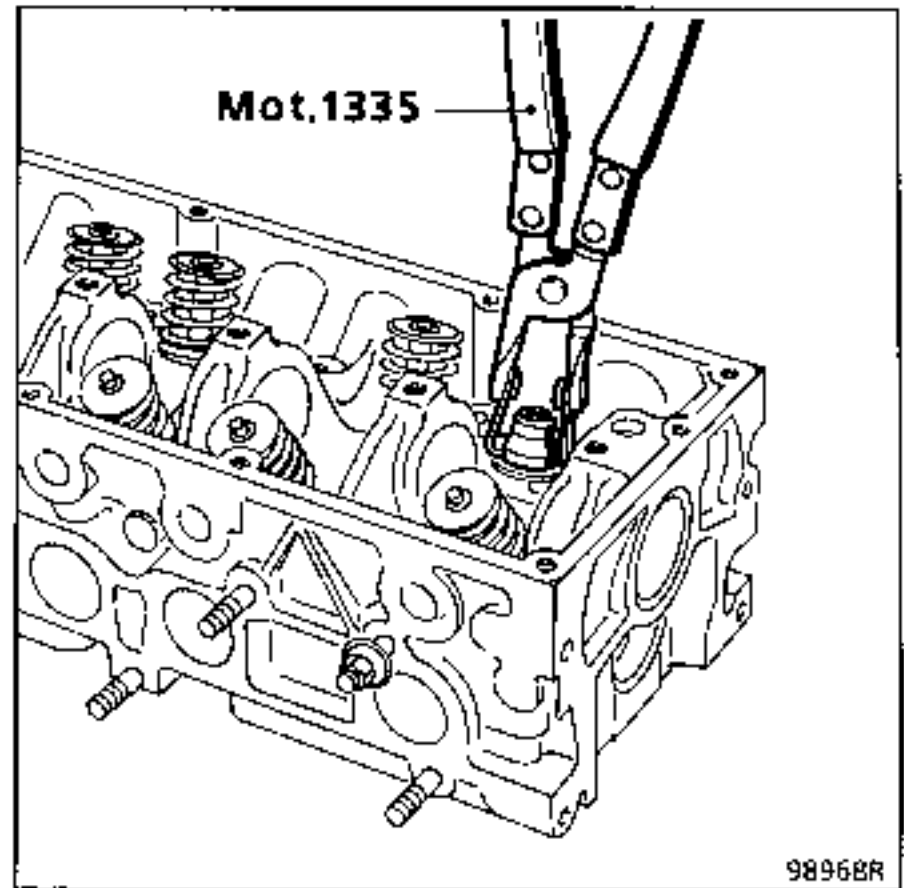


- the cylinder head using a 12 torx socket.

Use a valve spring tool to compress the valve springs.



Remove the collets, upper cups, springs, valves, valve guide seals, using pliers Mot. 1335.



## Cleaning

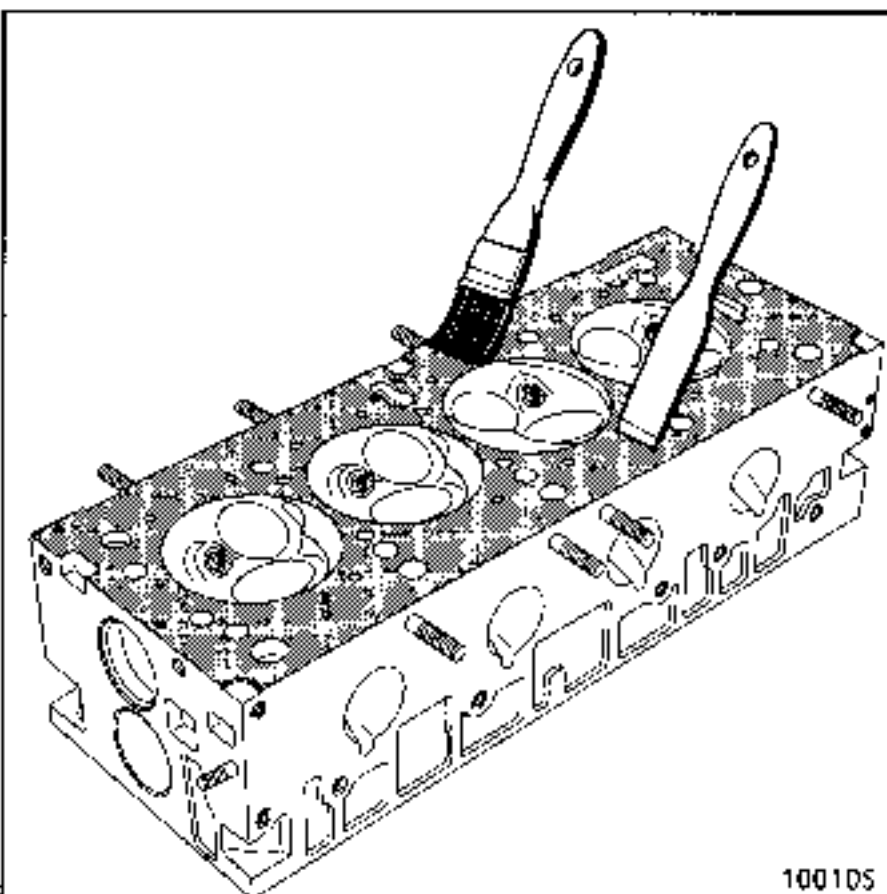
It is very important not to scratch the gasket surfaces of aluminium parts.

Use Decapjoint to dissolve any remaining traces of gasket.

Apply the product to the area to be cleaned; wait for about ten minutes then remove using a wooden spatula.

Gloves should be worn during this operation.

Do not allow the product to spill on to paintwork.



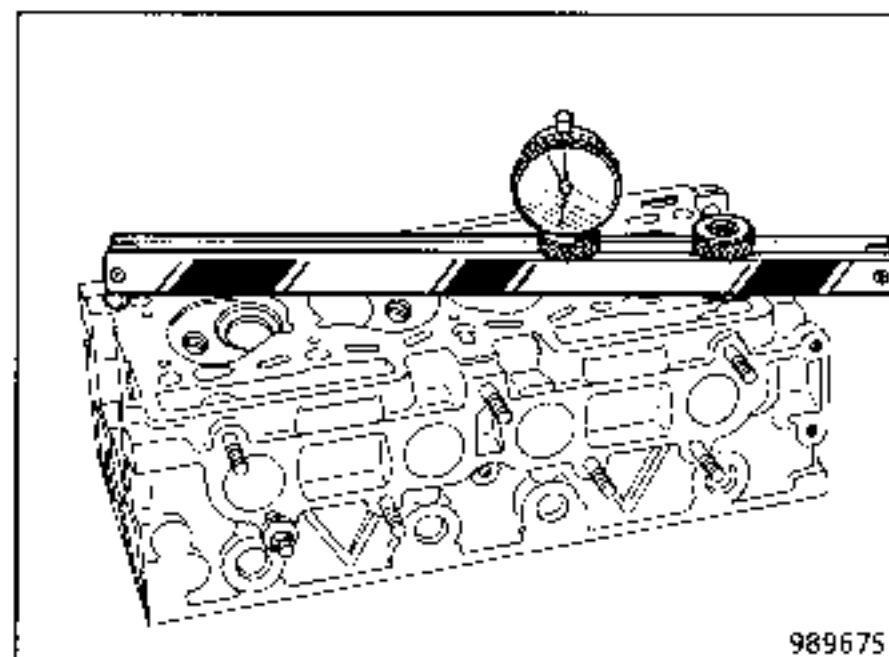
This operation should be carried out with extreme care, so that foreign bodies are not introduced into the oilways that bring oil, under pressure, to the camshaft (the oilways are located in both the cylinder block and the cylinder head) and the oil return pipe.

## CHECKING CYLINDER HEAD BOW

Use a straight edge and a set of feeler gauges or dial gauge to check for cylinder head bow.

Maximum deformation 0.05mm.

The cylinder head must not be reground.



## REGROUNDING OF VALVE SEATS

## INLET

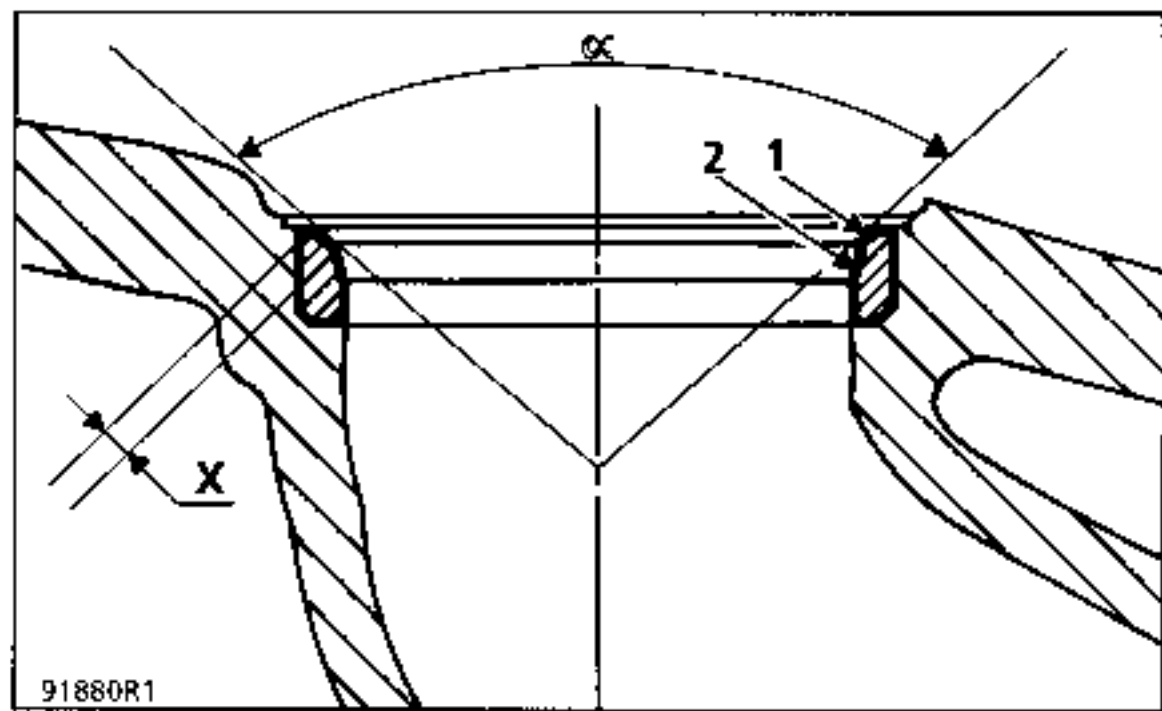
- Seat width  $X = 1.7$
- Angle  $\alpha = 120^\circ$

Seat rectification 1 is carried out using a milling tool no. N 208 at  $31^\circ$ . The seat width at 2 is reduced using milling tool no. 211 at  $75^\circ$  until width X is obtained.

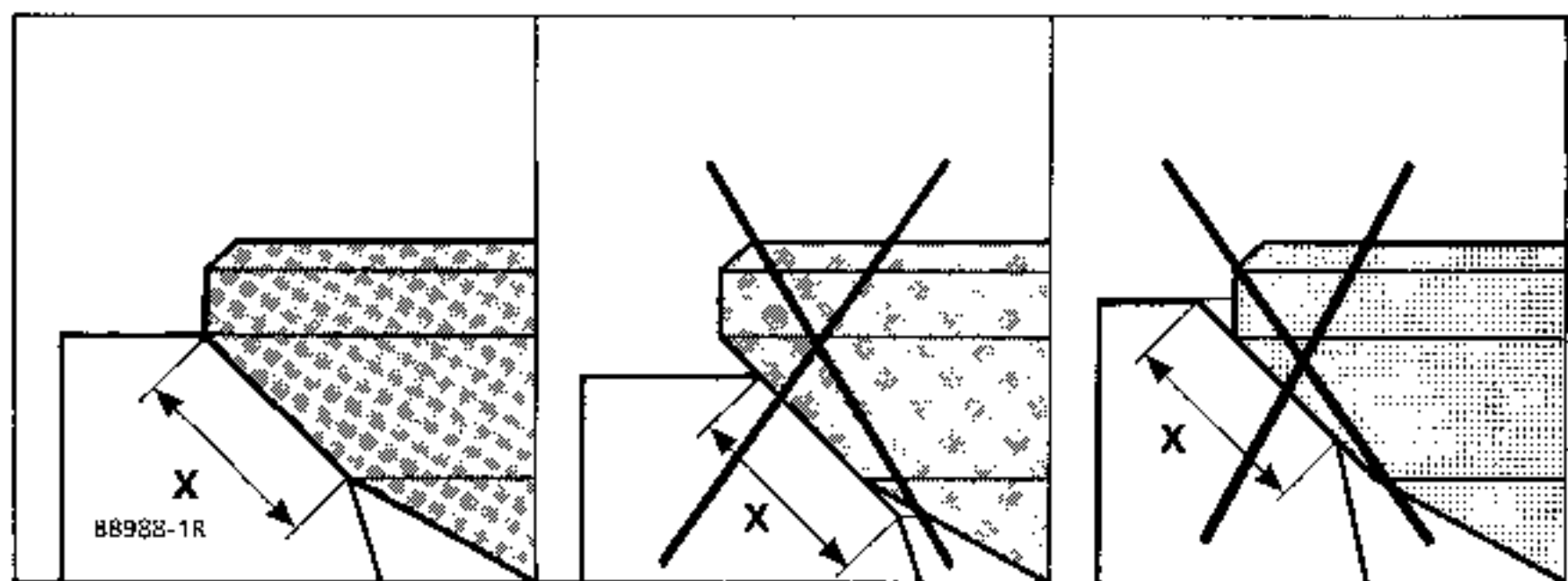
## EXHAUST

- Seat width  $X = 1.7$
- Exhaust seat angle  $\alpha = 90^\circ$

Seat rectification 1 using a milling tool no. N 204 at  $46^\circ$ . The seat width at 2 is reduced with milling tool no. 605 at  $65^\circ$  until width X is obtained.

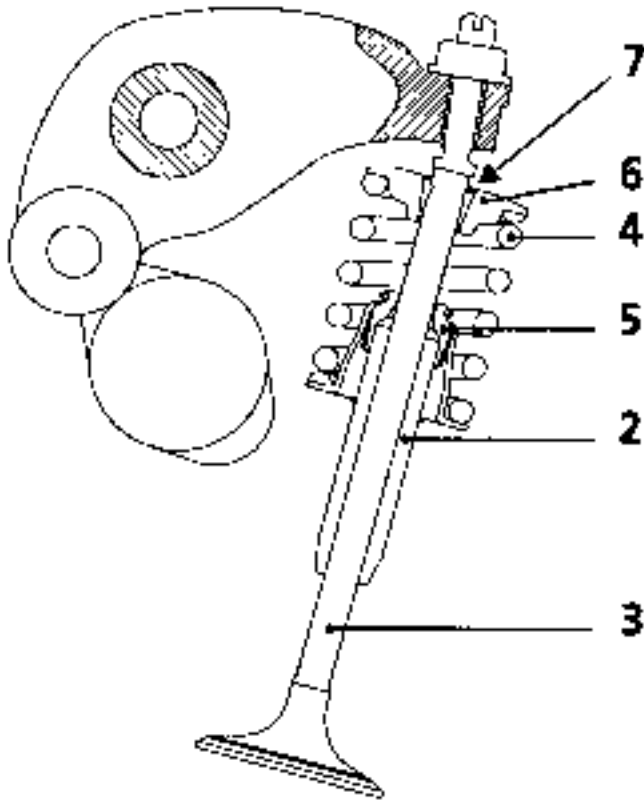


NOTE : Ensure the valve is seated correctly as shown below



**REFITTING THE CYLINDER HEAD**

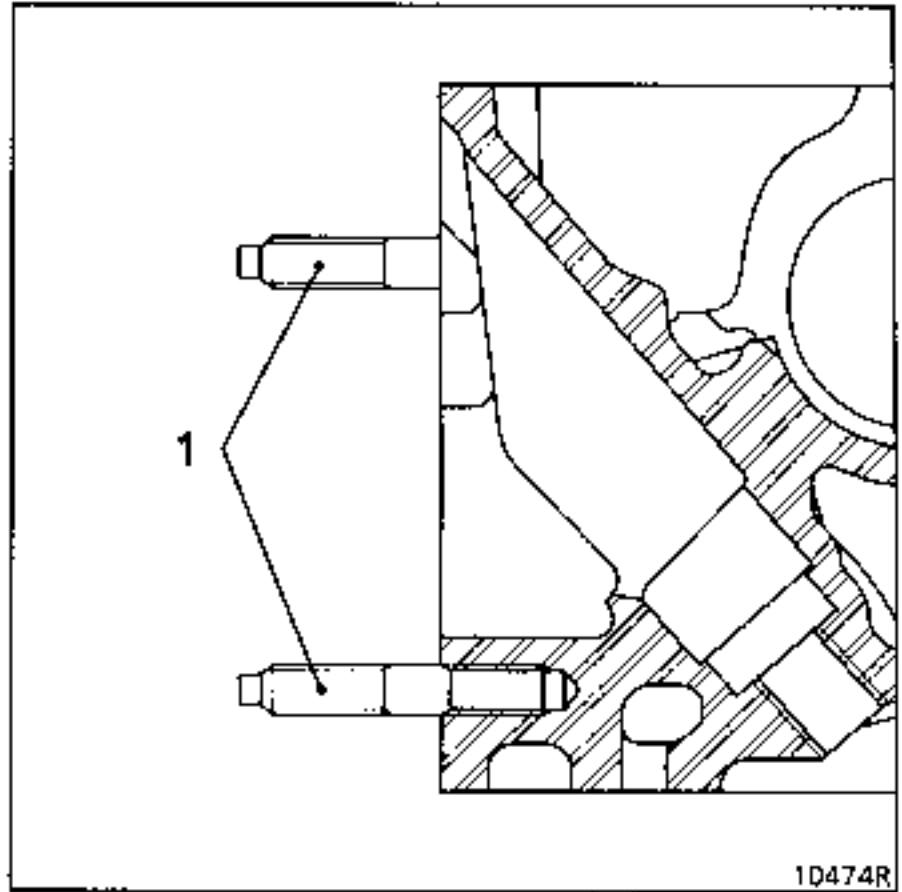
- Fit new valves (3), and lightly grind each valve into its seat. Clean thoroughly, mark all the parts and then start refitting work,
- Lubricate all the parts.
- Fit the seals (5) on the valve guides (2).
- Fit in turn the new valves (3),
- the springs (4) (identical for inlet and exhaust valves), and
- the cups (6).
- Compress the springs.
- Fit the collets (7) (identical for inlet and exhaust valves).



10472R

**NOTE :**

- Fit new studs (1) to the cylinder head and coat them with a drop of Loctite Frenetanch.
- New cylinder heads supplied by the Parts Department are equipped with valves.



10474R

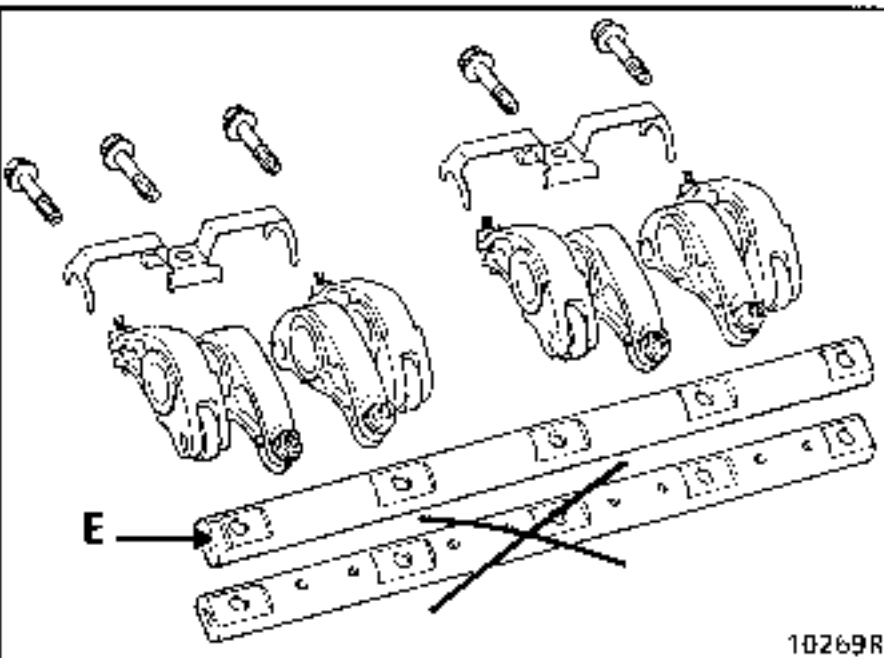
**INSPECTION AND REPAIR OF ROCKER SHAFT**

Dismantle the rocker shaft, making sure the position of the rockers are marked on the shaft.

Examine the condition of the rollers and the rocker bolts.

Check that the lubrication holes between the cams and the rocker shoes are not blocked.

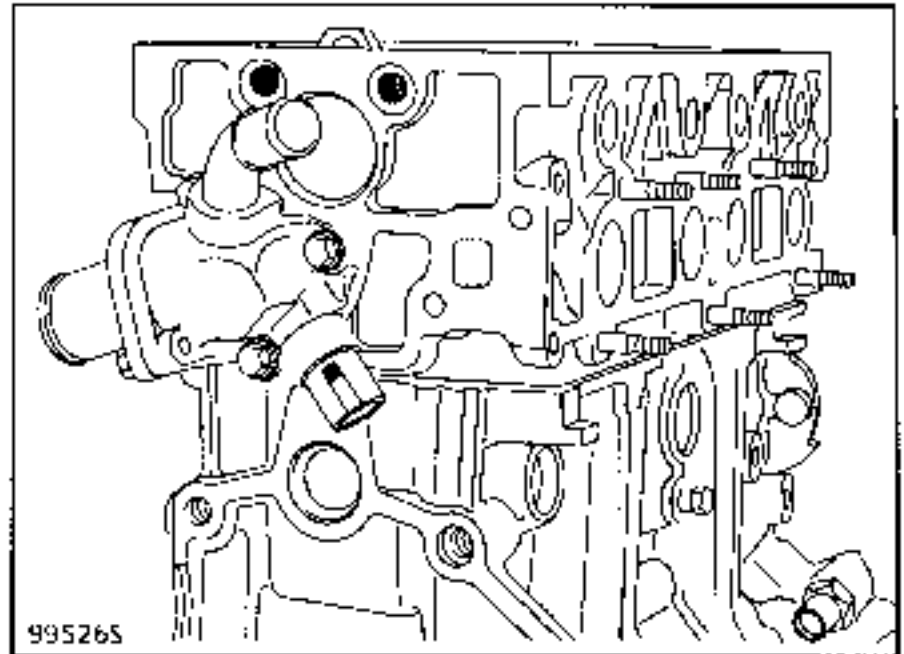
Renew worn parts.



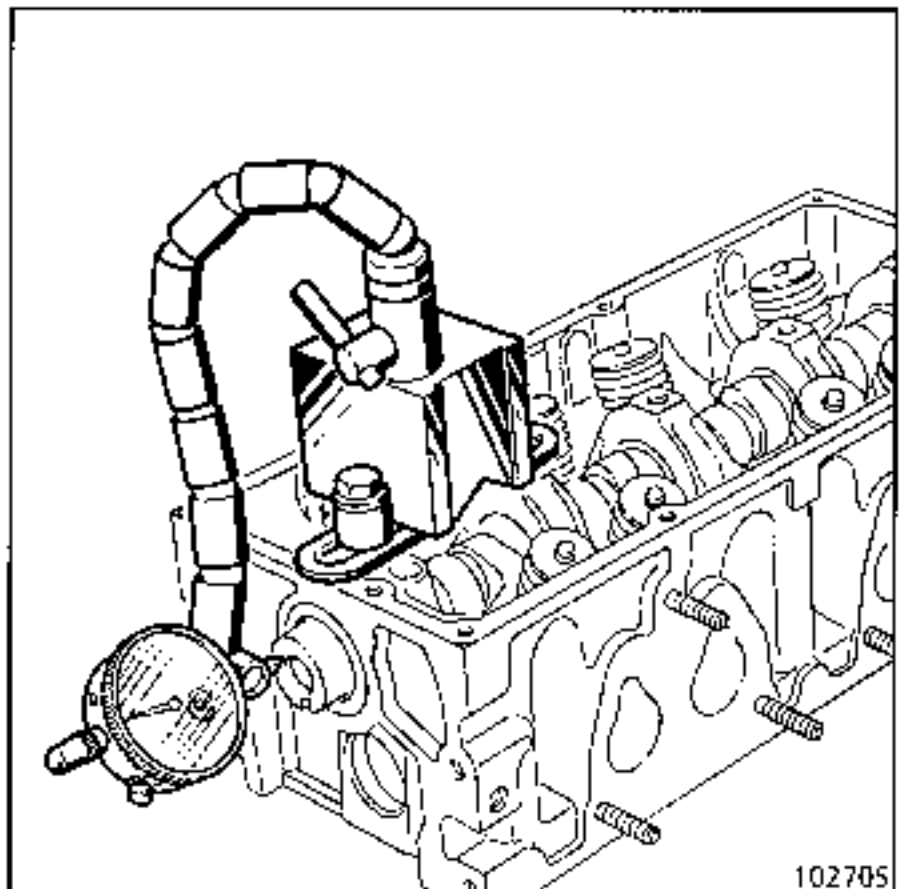
Refit the rocker shaft, positioning mark (E) at the timing gear end.

**REFITTING CAMSHAFT**

- Oil the camshaft.
- Fit it in the cylinder head.
- Fit the camshaft flange and its locking flange in position (without applying **Loctite** to the bolts).

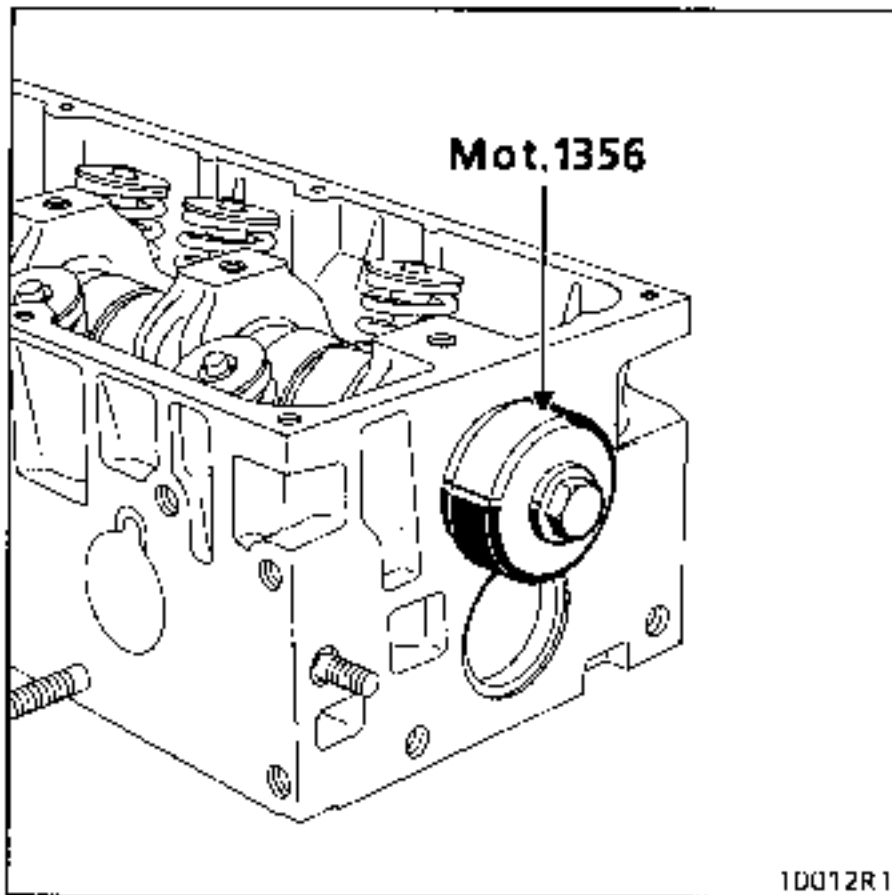


- Fit the magnetic angular tightening tool in position.
- Check that the end play is between 0.07 and 0.148 mm.



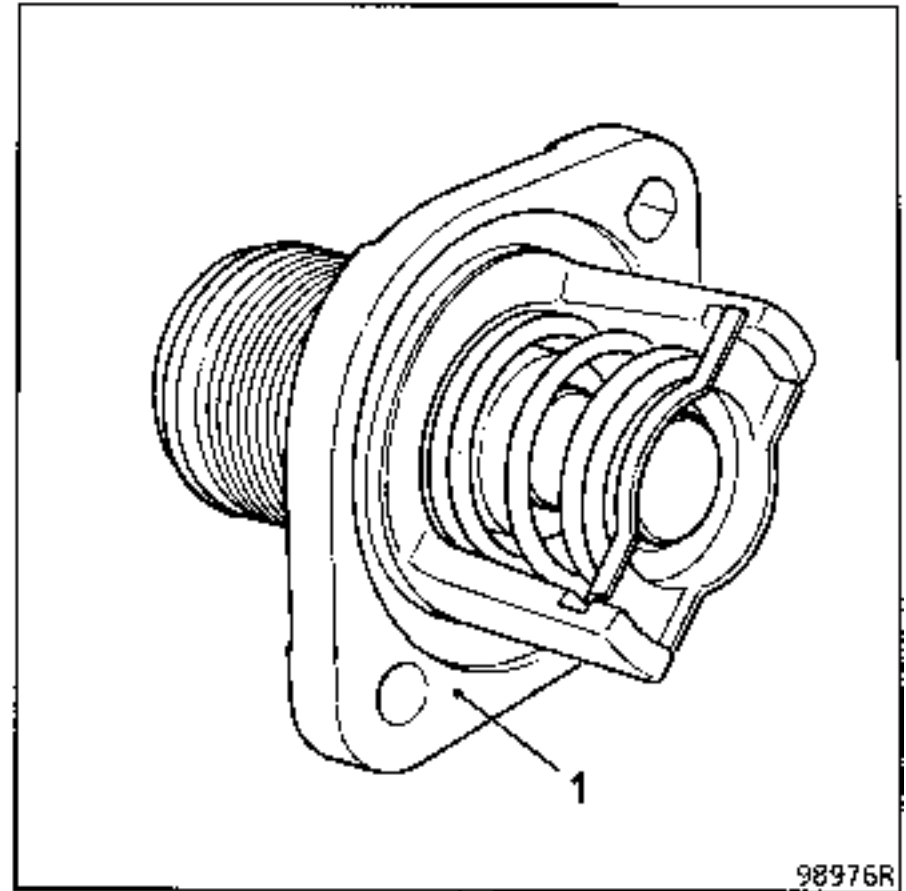
Remove and refit the locking flange bolts and coat them with a drop of **Loctite Frenetanch**.

Reposition the seal using mounting bush **Mot. 1356**. This tool is designed to give an offset between the seal and the seat.



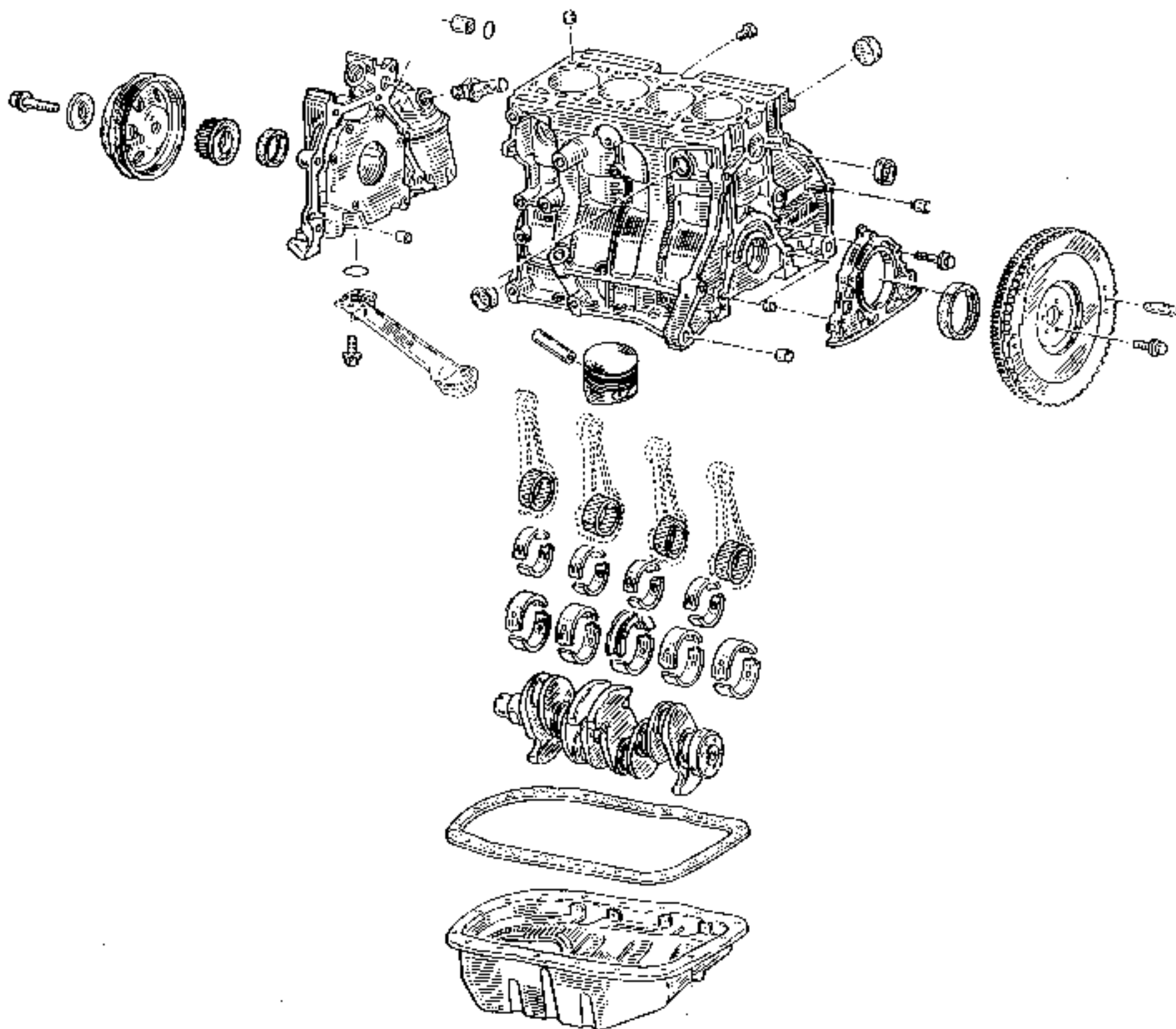
## THERMOSTAT

The Parts Department will supply a complete thermostat.



Apply a bead of **Loctite 518** at (1) and on the cylinder head outlet coolant unit.

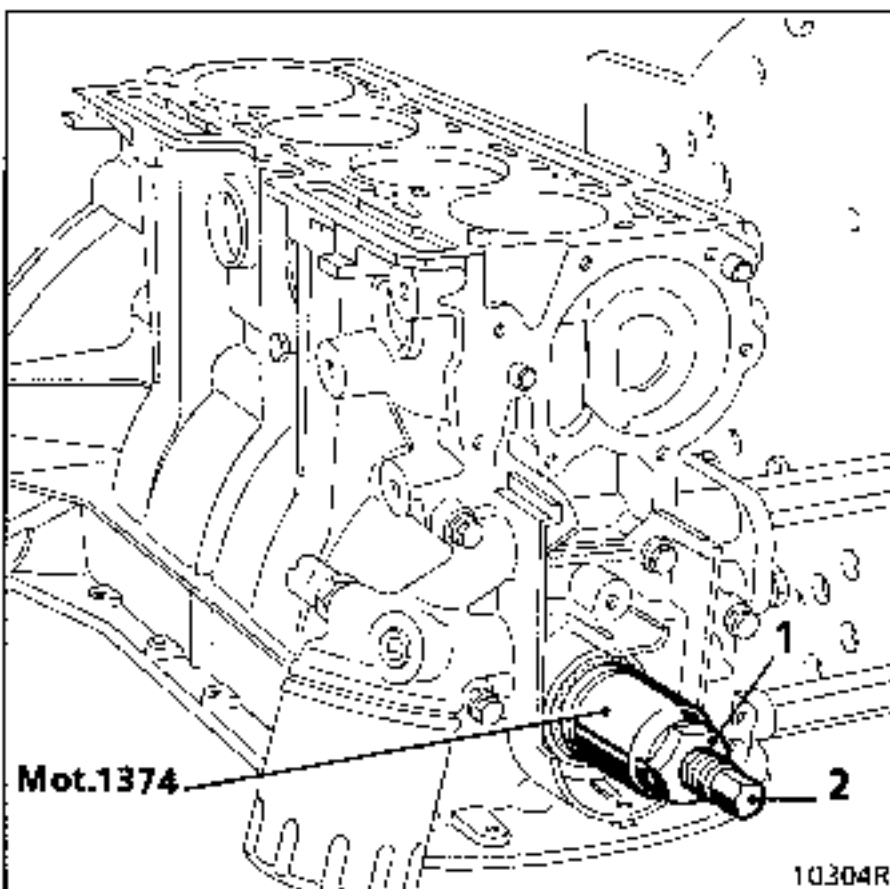
EXPLODED VIEW CYLINDER BLOCK





## REMOVE

- The clutch mechanism and plate.
- The flywheel. Use tool **Mot. 582-01** to lock this assembly.
- The sump with its gasket (silicone gasket or metal/plastic for After Sales part).
- The timing gear sprocket.
- The oil pump seal, using tool **Mot. 1374**.

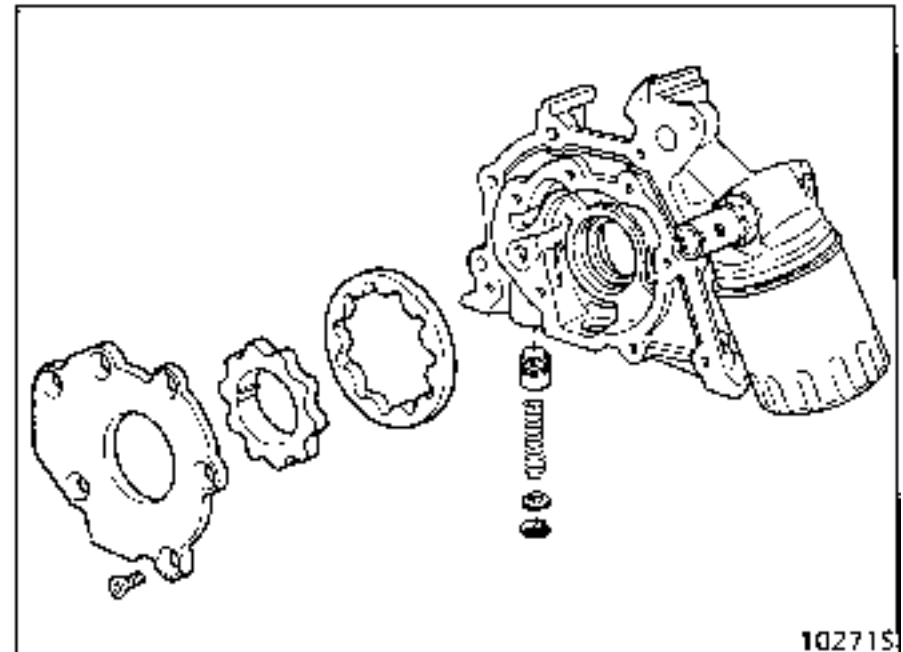


Screw the body of the tool into the seal using nut (1). Then turn bolt (2) to extract the seal.

Remove:

- the strainer and its seal,
- the oil pump.

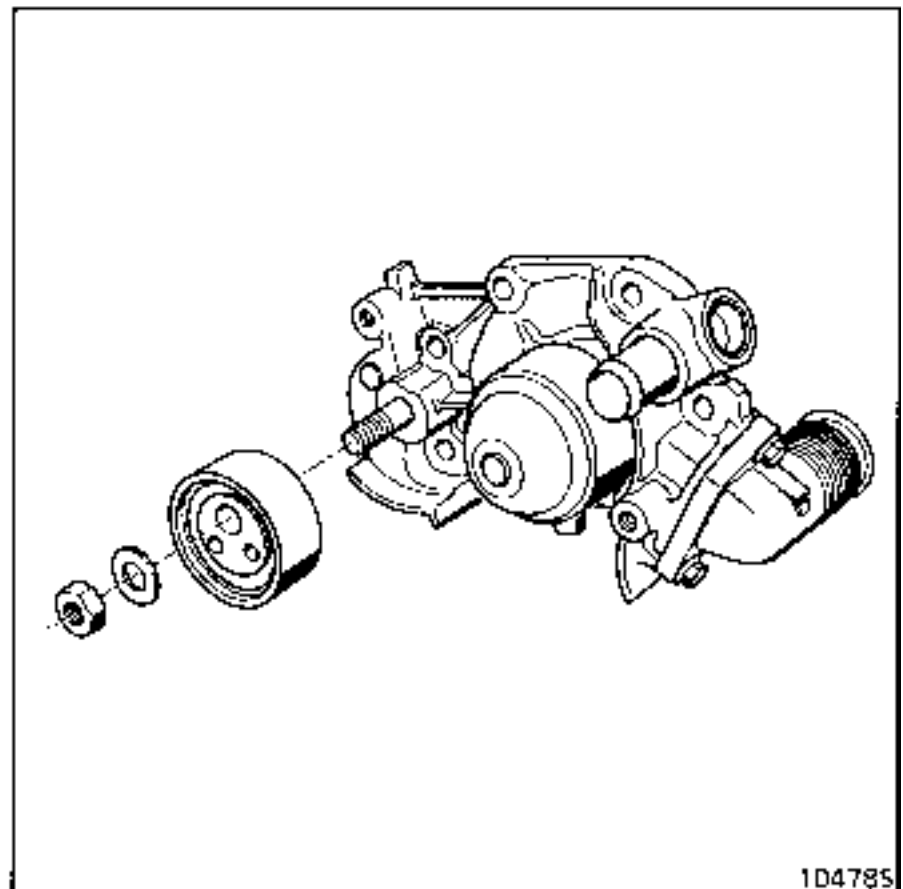
## EXPLODED VIEW OF OIL PUMP



**NOTE :** It is not possible to repair the oil pump.

Remove:

- the timing gear tensioner roller and then the water pump.



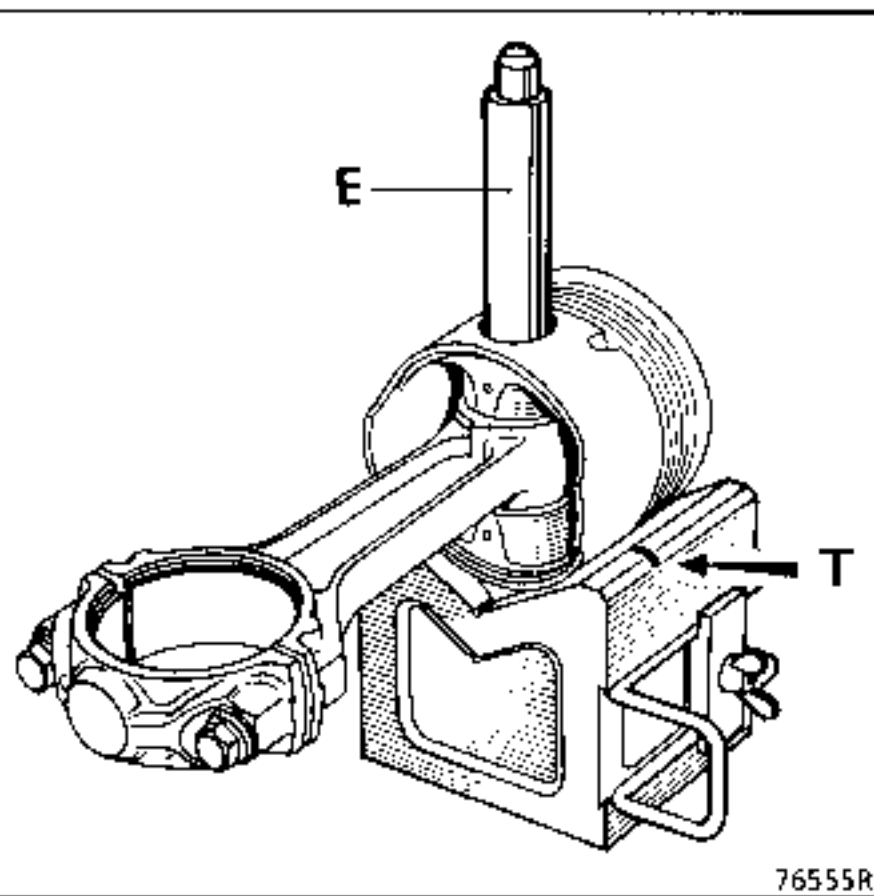
Remove:

- The conrod bearing caps and shells.
- The piston/conrod assemblies.
- The bearing caps, including the shells.
- The crankshaft.
- The crankshaft shells on the cylinder block.

### REMOVING THE GUDGEON PINS

Mount the piston on the V-shaped block with the gudgeon pin in line with the release hole. (The centre of the hole is marked by two straight lines (T) to make alignment easier.)

Using extraction tool (E), drive out the gudgeon pin.



### REBUILDING THE ENGINE

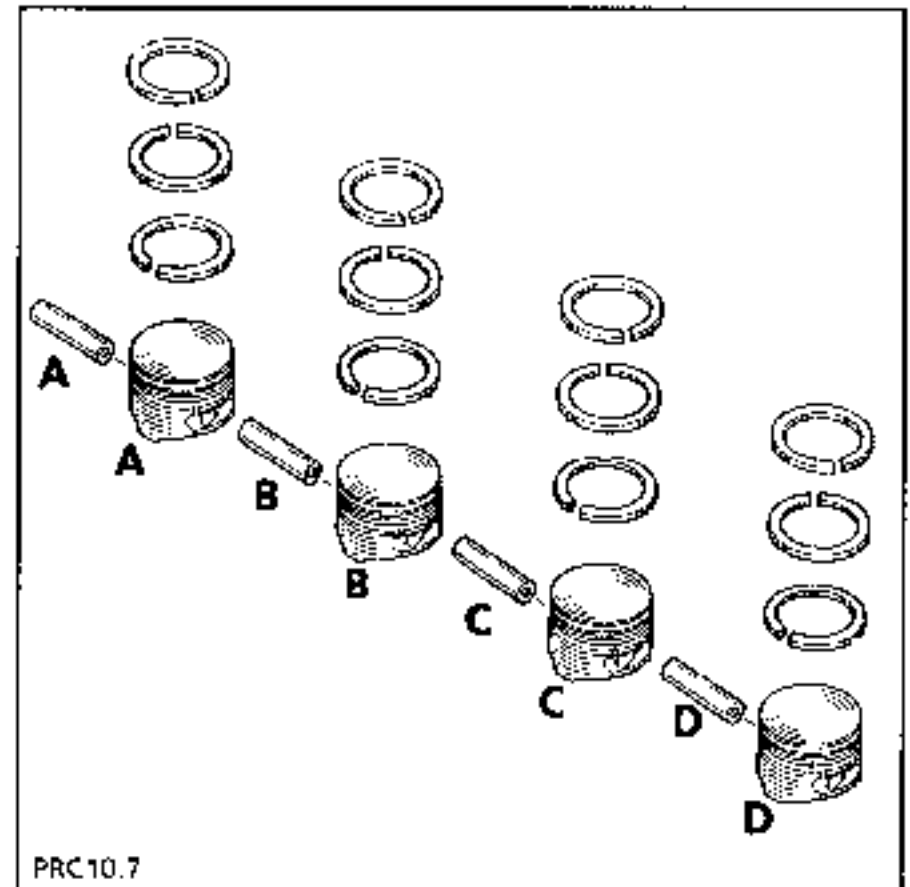
Clean the cylinder block.

### PREPARING THE "PISTON/GUDGEON PIN" ASSEMBLY

The parts supplied in the kit are matched.

Mark all the parts contained in each box with the letters A to D so that they stay as matched sets.

Dissolve the anti-rust film completely but never scrape the parts.



**FITTING GUDGEON PINS**

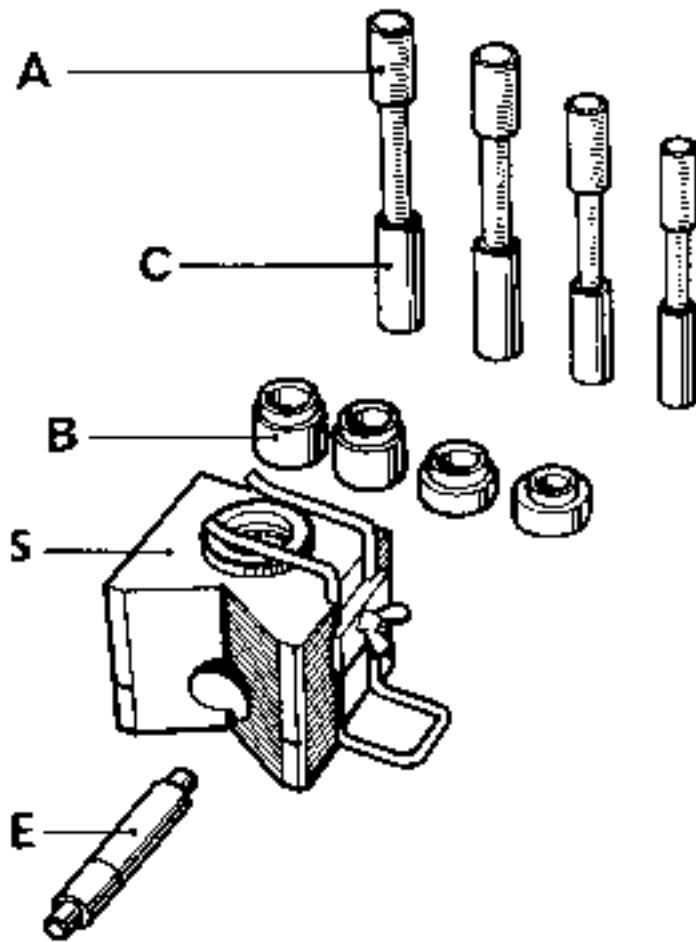
The gudgeon pins are tightly fitted in the conrods and are fitted in the pistons so that they rotate. Use tool Mot. 574-21 (to be ordered from the Parts Department as an accessory for Mot. 574-22).

**A** : Mounting pins incorporating centring tools  
(C)

**B** : Piston support bushes

**E** : Extraction tool

**S** : Piston holder



76554R1

**PREPARING CONRODS**

Make a visual check of the following:

- Condition of the conrods (twisting, misalignment)
- Contact between the caps and conrods (if necessary, remove burrs with a honing stone to obtain correct seating)

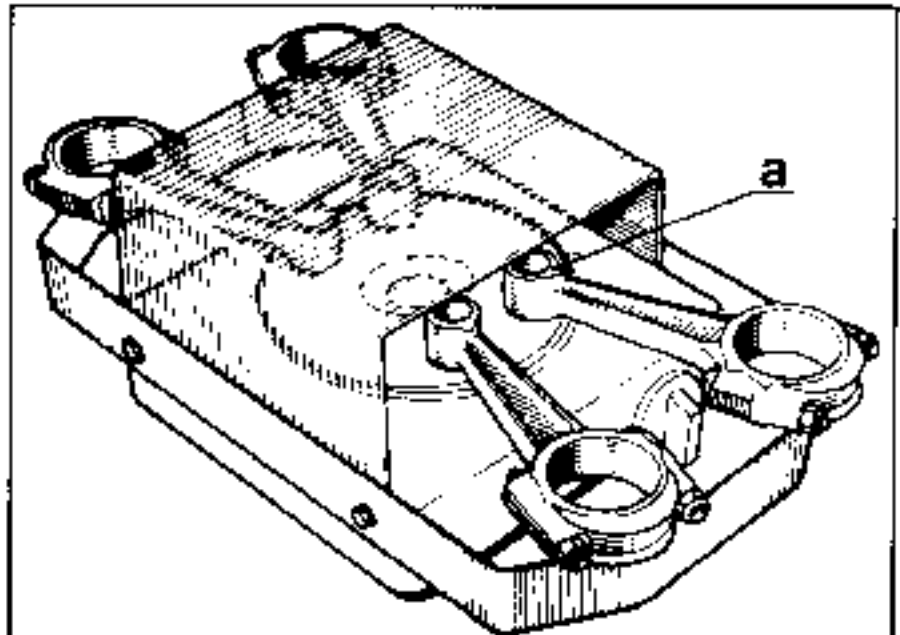
Use a heated plate powered by 1500 W.

Apply the small end of the conrod to the heated plate.

Make sure the entire surface of the small end makes contact with the plate.

In order to monitor the temperature, place a piece of tin solder with a melting temperature of about 250° C at (a) on each small end.

Heat the small end of the conrod until the solder melts.



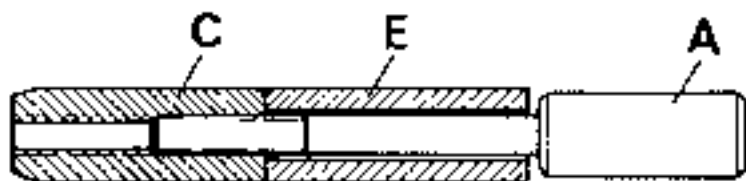
76716R

### PREPARING GUDGEON PINS

Check that the gudgeon pins move freely in the corresponding new pistons.

Use the centring tool C17 and the fitting pin A17.

Fit the gudgeon pin (E) on the fitting pin (A). Screw in centring tool (C) until contact is made and slacken off a quarter of a turn.



PRC10.8

### "CONROD-PISTON" ASSEMBLY

The pistons are marked with an arrow stamped on their heads to indicate the flywheel end.

The direction for fitting the conrod is marked by a boss (1) which should be on the dipstick side.

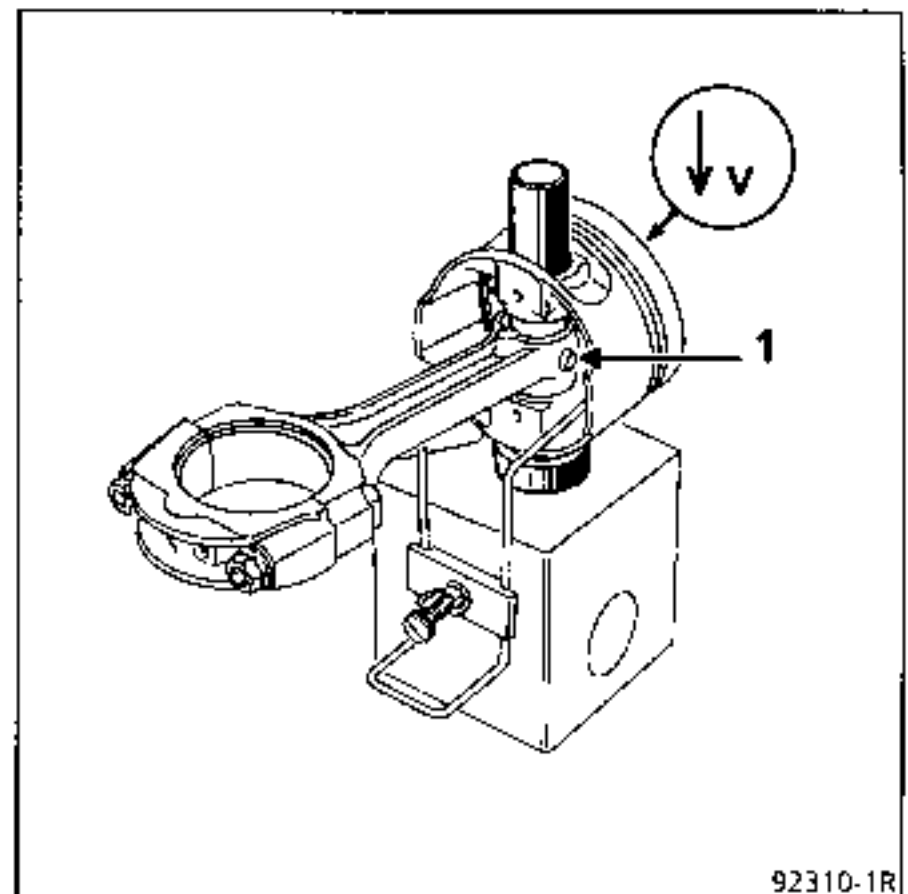
Keep to the following instructions to assembly the piston and conrod:

- Fit bush B17 in position on the holder and then fit the piston (arrow pointed upwards) on the bush with a pin.
- Use engine oil to lubricate the centring tool and gudgeon pin.
- Insert the gudgeon pin into the assembly to check that it slides freely and recentre the piston if necessary.

Perform the following operations as quickly as possible in order to keep heat loss to a minimum.

When the piece of solder reaches melting point (changes to molten metal) :

- Wipe away the molten solder.
- Insert the centring guide in the piston.
- Insert the conrod in the piston.
- Rapidly insert the gudgeon pin until the guide makes contact with the base of the holder.



92310-1R

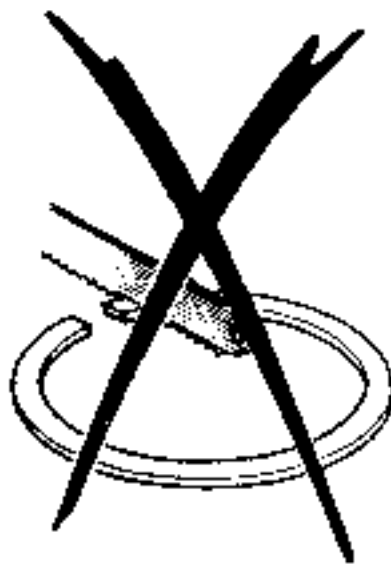
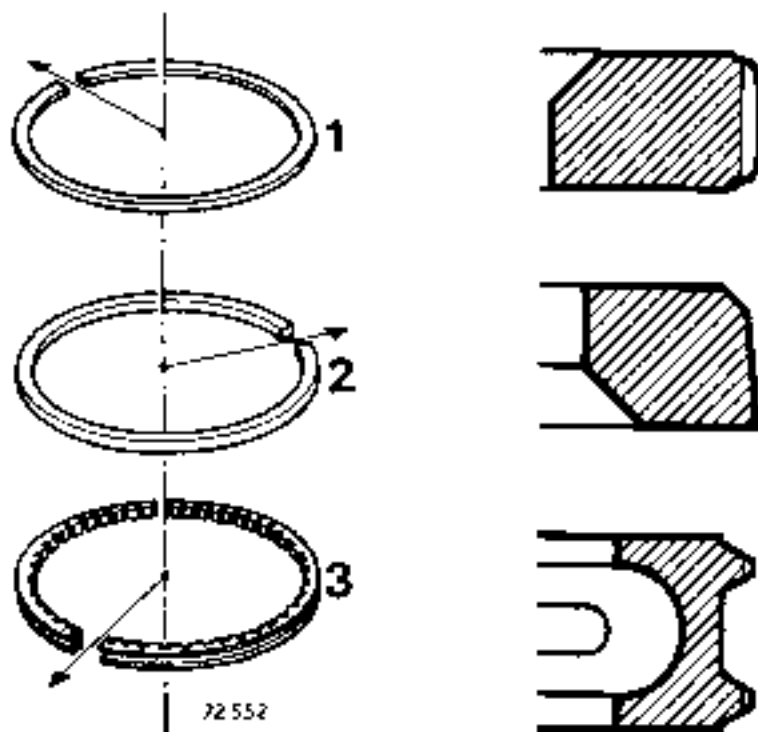
Check that the gudgeon pin is recessed inside the piston for any position of the conrod in the piston.

**FITTING PISTON RINGS**

The piston rings, which are adjusted when supplied, should move freely in their groove.

They must be fitted the correct way round.

Lubricate the rings and position them as shown below.

**FITTING BEARING SHELLS**

The conrod shells are identical.

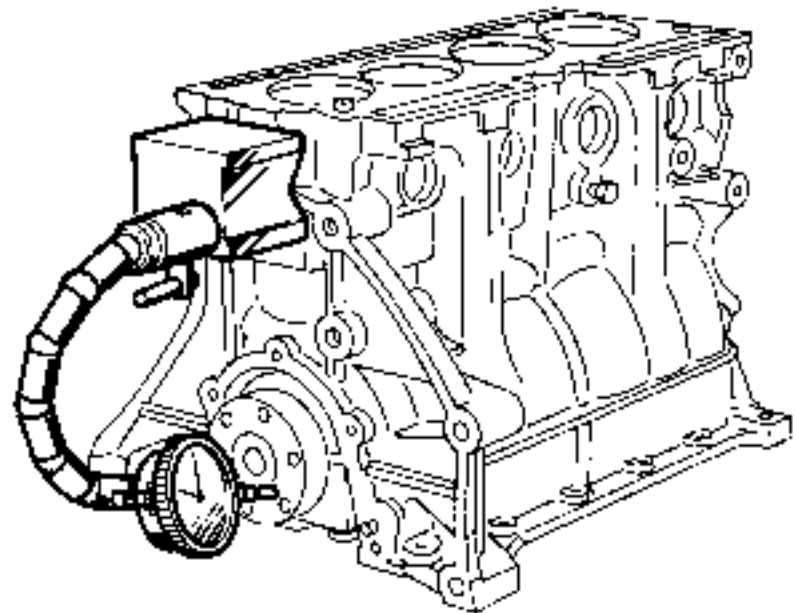
The crankshaft shells are drilled at the side where the cylinder block and caps are fitted.

The central shell in the cylinder block is used to set end play.

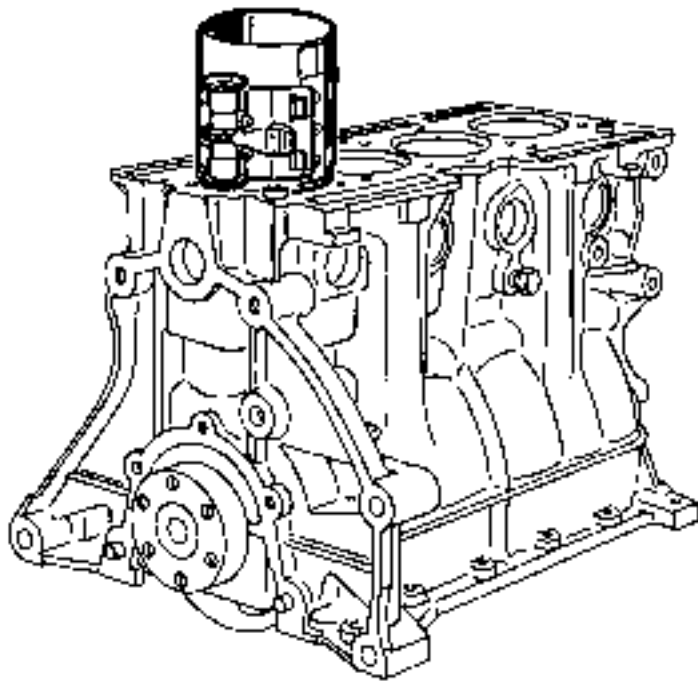
- Fit the crankshaft.
- Use engine oil to lubricate the crankpins and journals.
- Fit the bearing caps (ensuring that the threads and under the heads of the bolts are lubricated) and tighten them to a torque of 2 daN.m and then turn through an angle of 80, using an angular torque wrench.

Check that:

- the assembly rotates freely,
- crankshaft end play is between 0.06 and 0.235 mm.

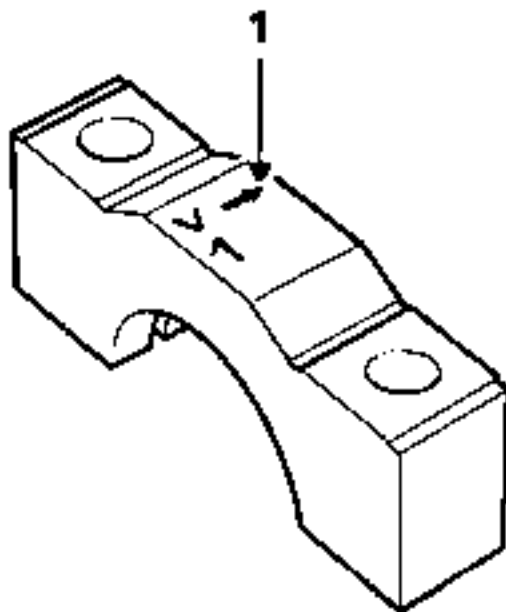


Use the piston ring clamp to fit the conrod/piston assemblies.



989655

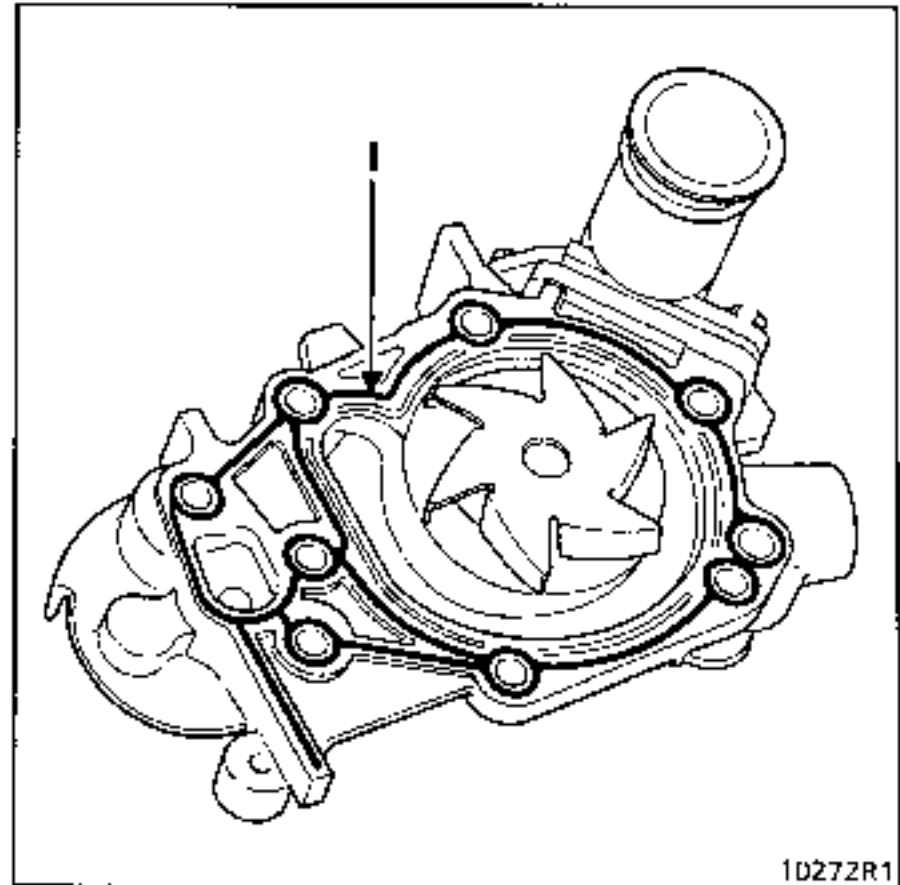
Fit the conrod caps so that mark (1) is pointing towards the flywheel.



12119R

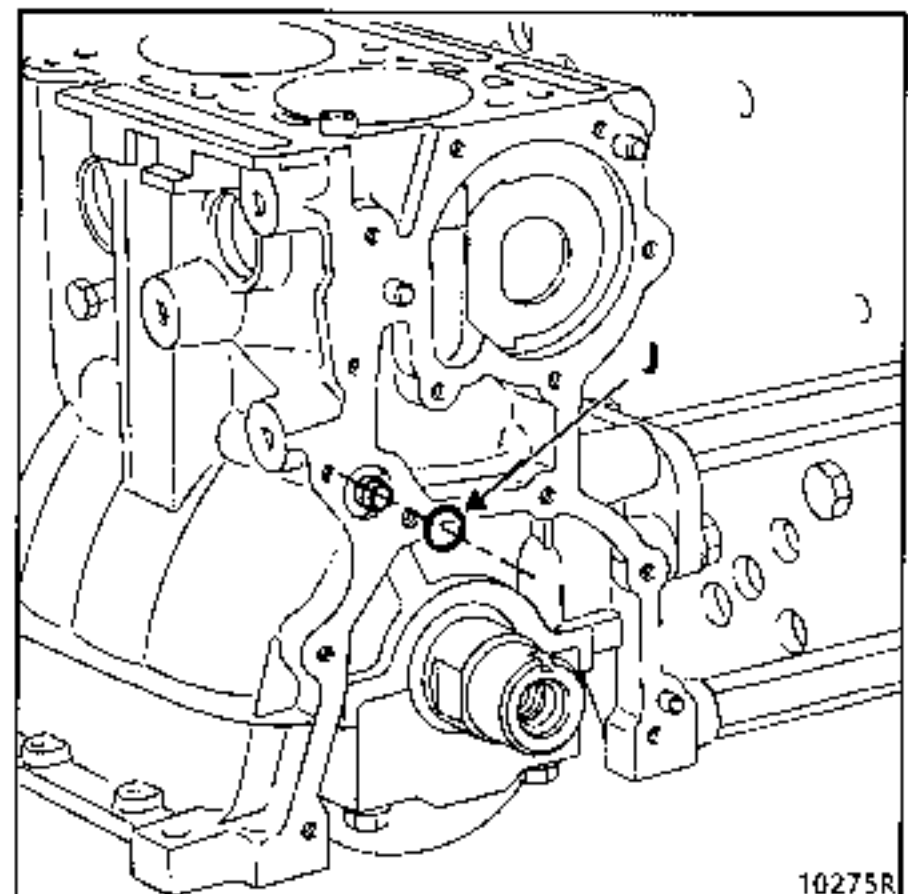
Tighten conrod cap bolts to a torque of 1.4 daN.m plus a further angle of 39°.

Apply a bead (I) of Rhodorseal 5661 on the pump seal contact surface as shown in the diagram below and refit the water pump.



10272R1

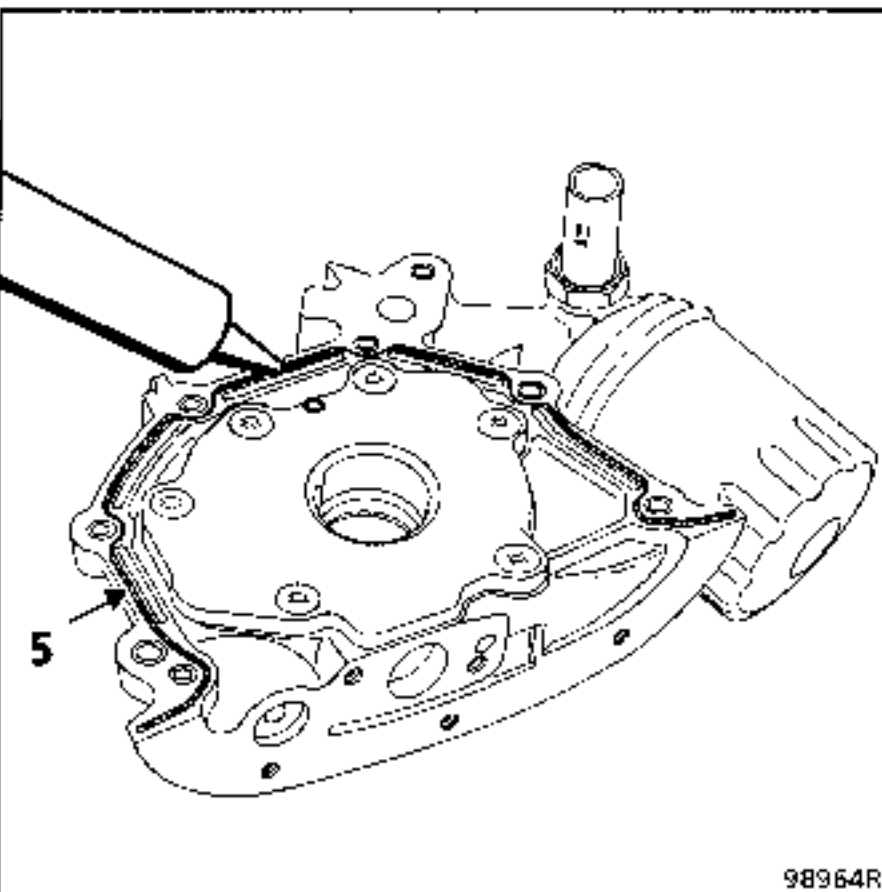
Always fit a new oil pressure supply seal (J).



10275R

**ATTENTION :** The oil pump is driven by two lugs on the crankshaft.

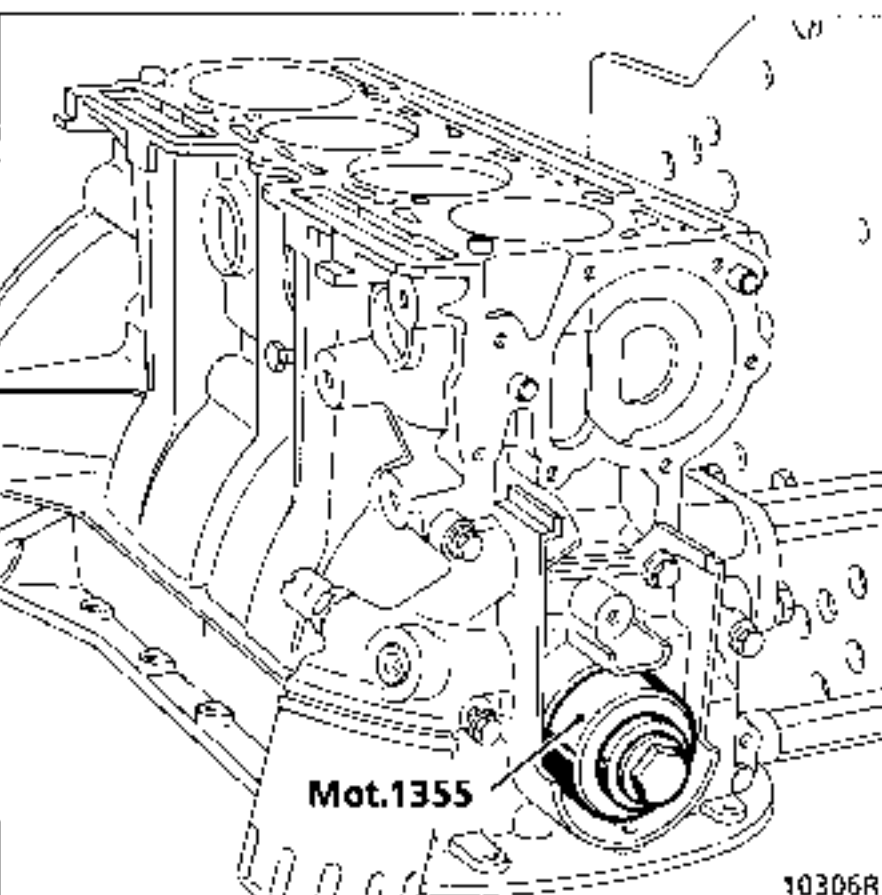
Apply a bead (5) of Rhodorseal 5661 around the circumference of the oil pump seal contact surface.



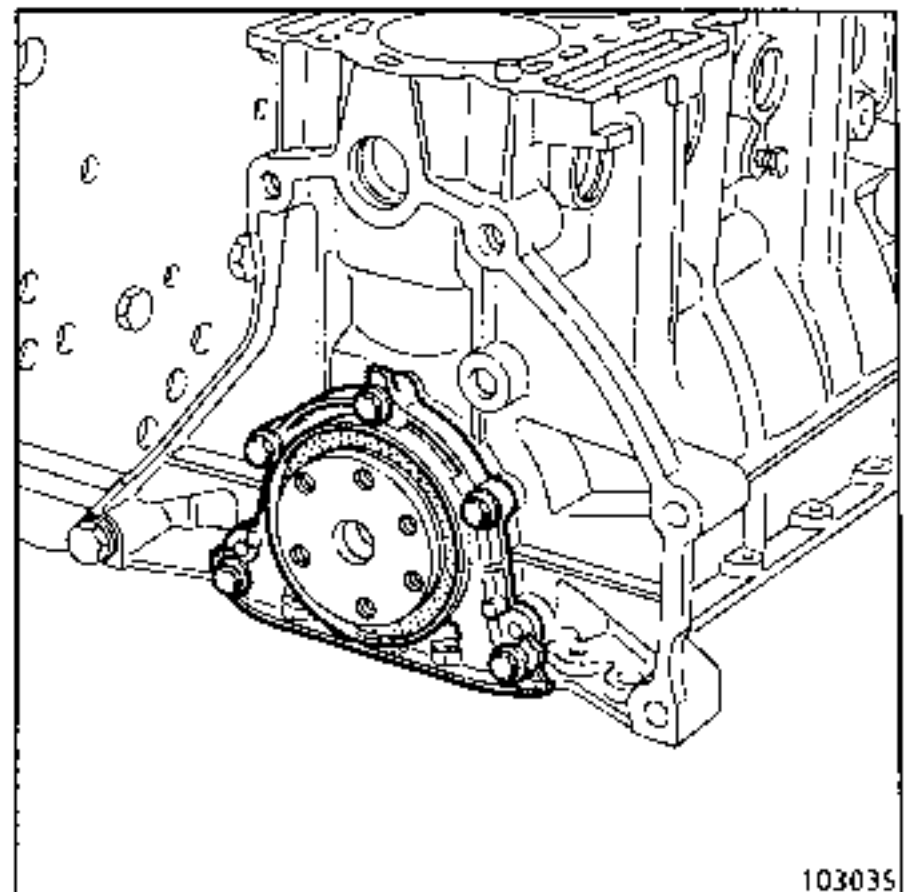
Refit:

- The oil pump on the cylinder block and tighten to a torque of 0.9 daN.m.
- The new seal on the crankshaft without damaging it at the point where the neck driving the timing gear sprocket passes through.

Fit the seal using tool Mot. 1355.

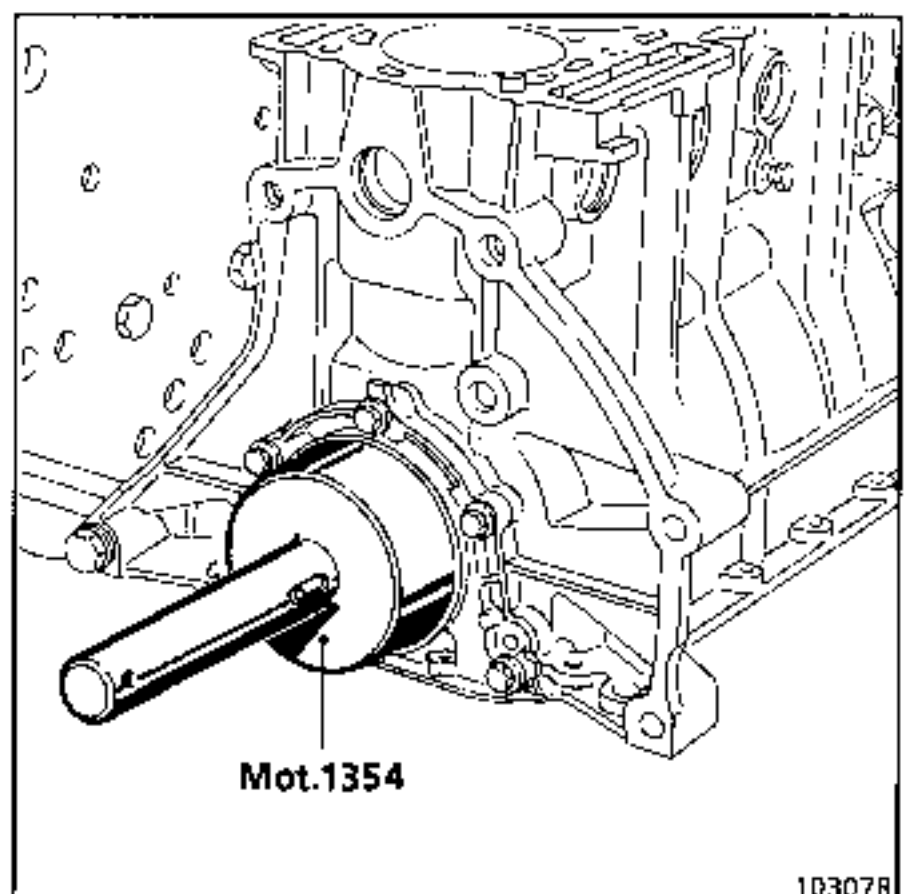


Apply a bead of Rhodorseal 5661 around the circumference of the plate seal contact surface at the flywheel end.

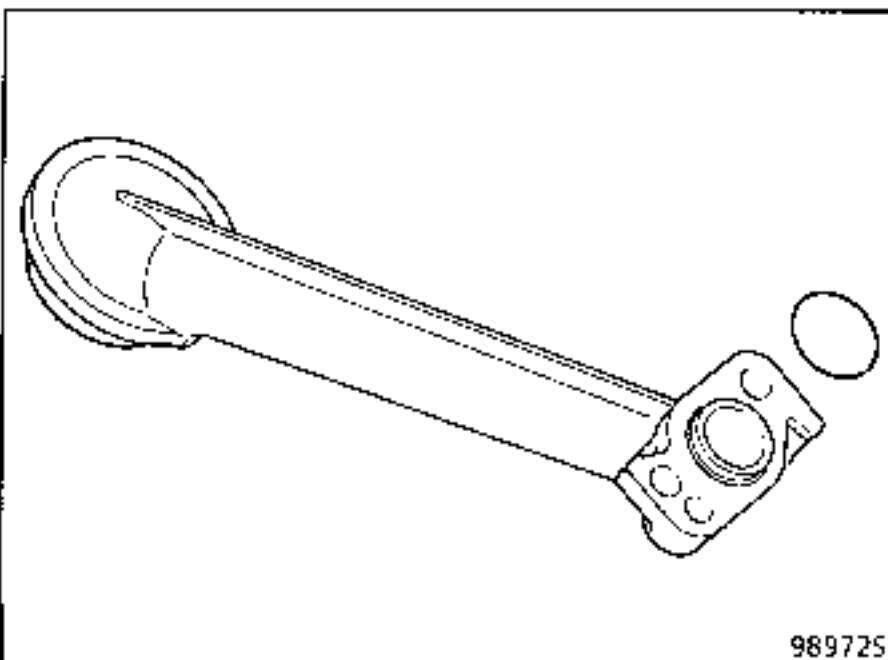


Tighten the plate to a torque of 0.9 daN.m.

Refit the crankshaft seal using tool Mot. 1354.



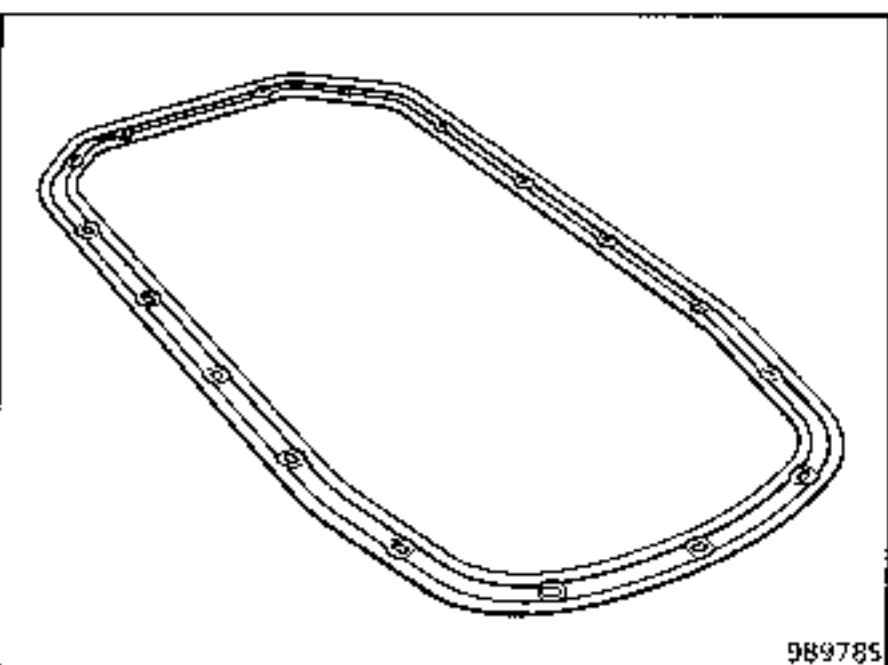
Refit the strainer with a new O-ring fitted.



Clean the gasket mating surfaces (between the cylinder block and sump).

Refit the sump and tighten the bolts to a torque of 1 daN.m.

**NOTE :** It is only possible to seal the sump correctly if the special after sales gasket is used (flat surface on cylinder block side).



## REFITTING THE CYLINDER HEAD

Position the piston in halfway position.

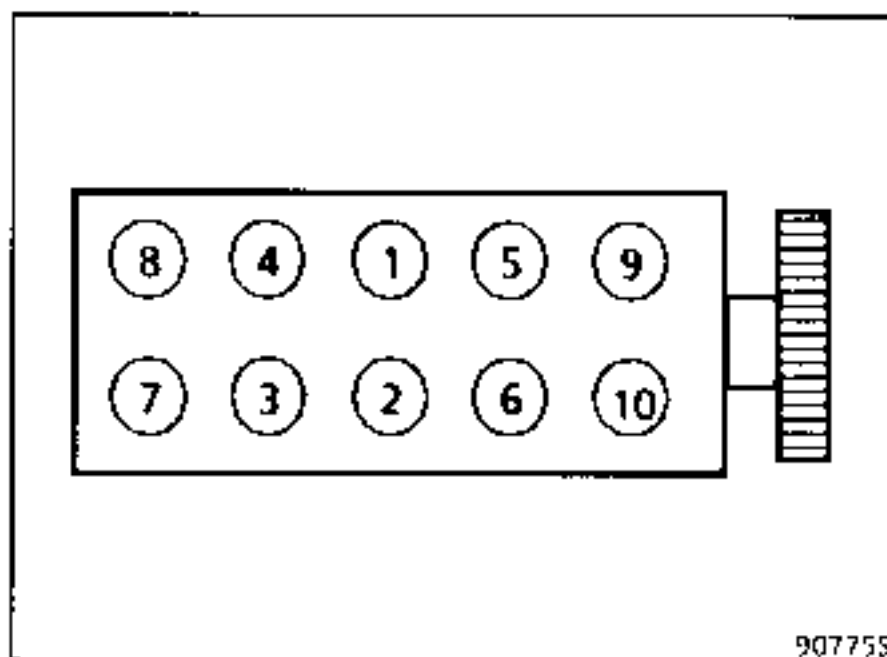
Fit the new cylinder head gasket.

All cylinder head bolts must always be replaced after they have been removed.

Lubricate the threads and under the bolt heads with engine oil.

**Preseating the gasket :**

- Tighten all the bolts to 2 daN.m and then angle tighten through 90° the the order specified below.



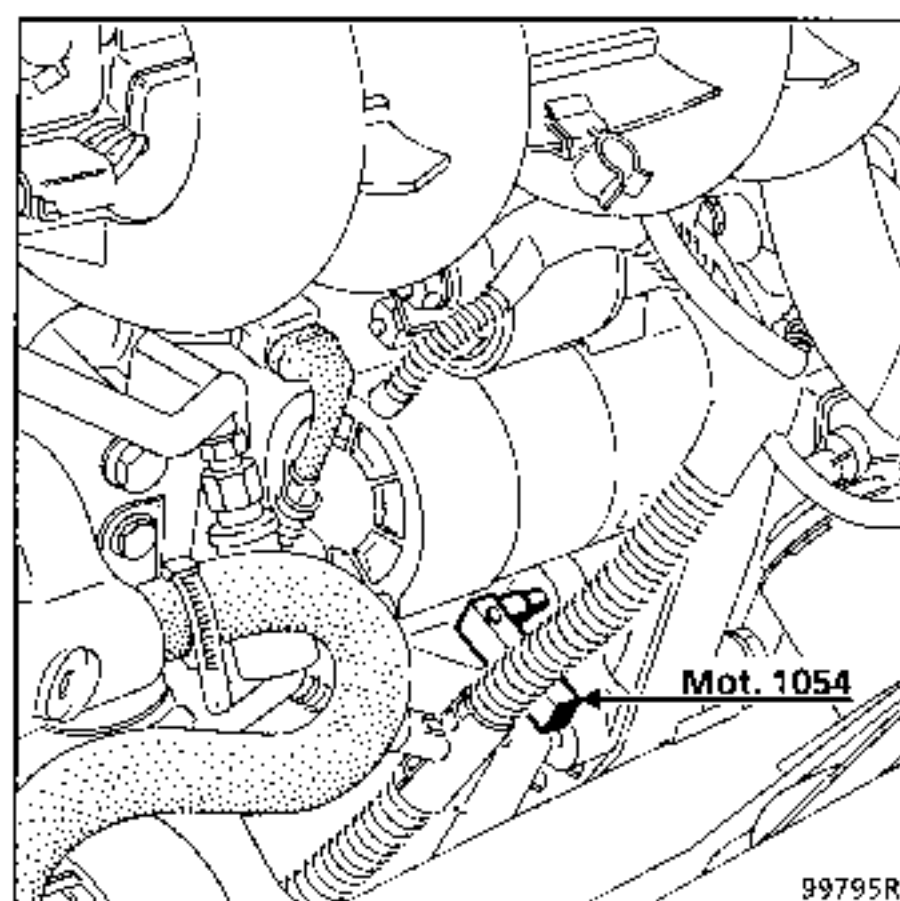
- Wait three minutes (settling period).

## Tightening the cylinder head

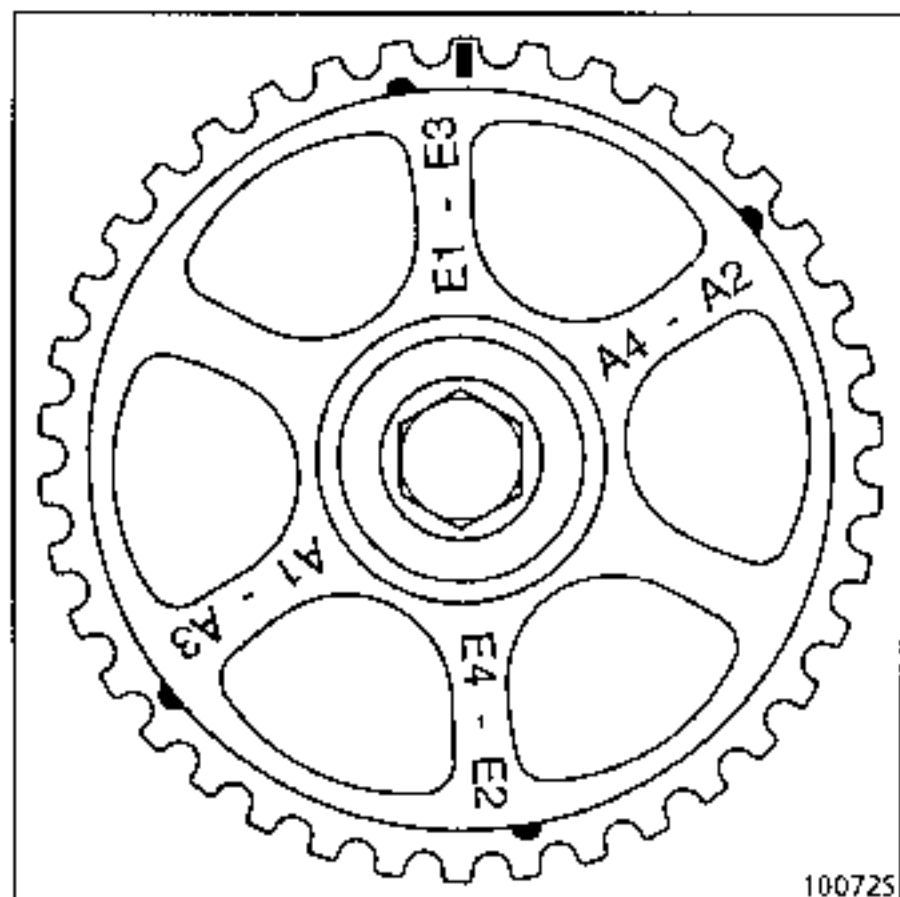
- Slacken off bolts marked (1) and (2) until they are entirely free.
- Tighten bolts (1) and (2) to 2 daN.m, and then turn through an angle of 200°.
- Slacken off bolts (3), (4), (5) and (6) until they are entirely free.
- Tighten bolts (3), (4), (5) and (6) to 2 daN.m and then turn through an angle of 200°.
- Slacken off bolts (7), (8), (9) and (10) until they are entirely free.
- Tighten bolts (7), (8), (9) and (10) to 2 daN.m and then turn through an angle of 200°.



Lock the engine at TDC using **Mot. 1054**, aligning the marks on the crankshaft and camshaft sprockets with the fixed marks.



**ATTENTION :** There are five marks on the camshaft sprocket but only the rectangular mark on the front of the tooth indicates TDC; the other marks are used to adjust the rockers.



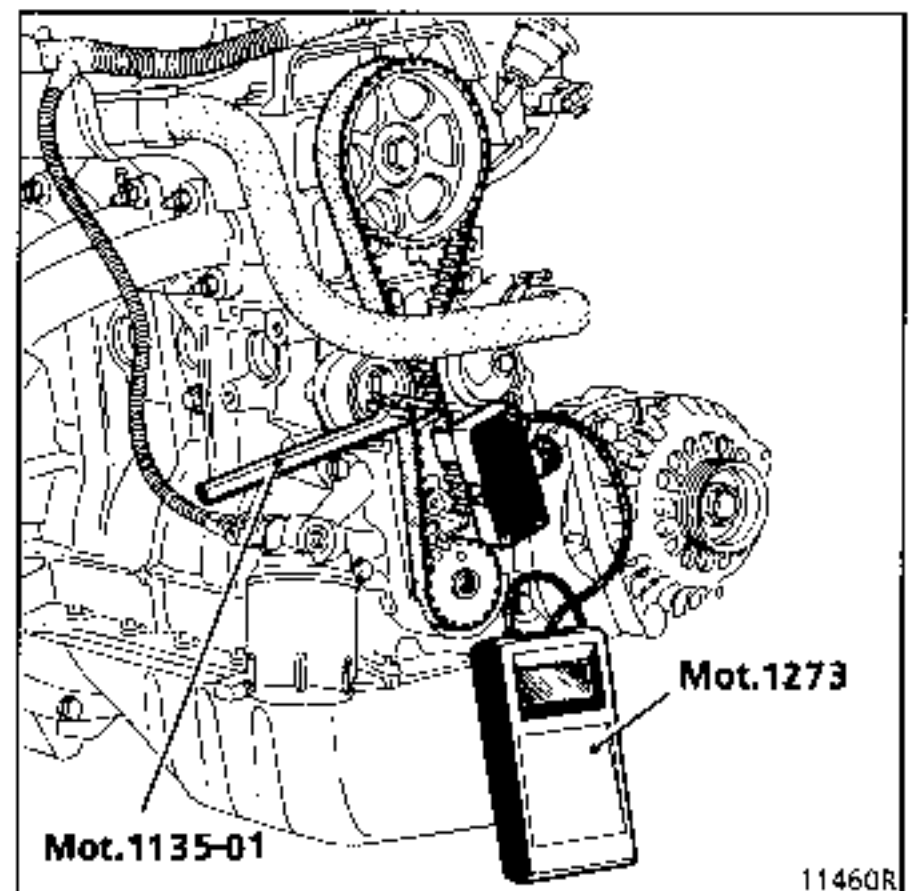
Refit the timing gear belt, aligning the marks on the timing gear belt with the marks on the crankshaft and camshaft sprockets.

#### METHOD OF TENSIONING THE TIMING BELT

Fit TDC setting tool **Mot. 1054**.

Fit a spacer (1) from **Mot. 1386** and tighten the crankshaft sprocket bolt.

a) Fit **Mot. 1273** and, using **Mot. 1135-01**, rotate the tensioner roller in an anti-clockwise direction until a value of **20 US** is obtained. (Turn the knurled screw on the sensor until three clicks are heard.)



Tighten the tensioner roller nut.

Turn the engine at least twice (but never turn it back).

Set the engine to TDC and then remove the setting tool.

Check that the timing gear is correctly positioned.

Slacken off the tensioner roller nut and turn the tensioner roller slightly in an anti-clockwise direction using **Mot. 1135-01** until the two recesses on the tensioner roller are in a horizontal position.

Retighten the roller tensioner.

- b) Turn the engine at least twice (but never turn it back).

Set the engine to TDC and then remove the setting tool.

Pretension to 10 daN.m applying tool **Mot. 1386** between the crankshaft and water pump sprockets.

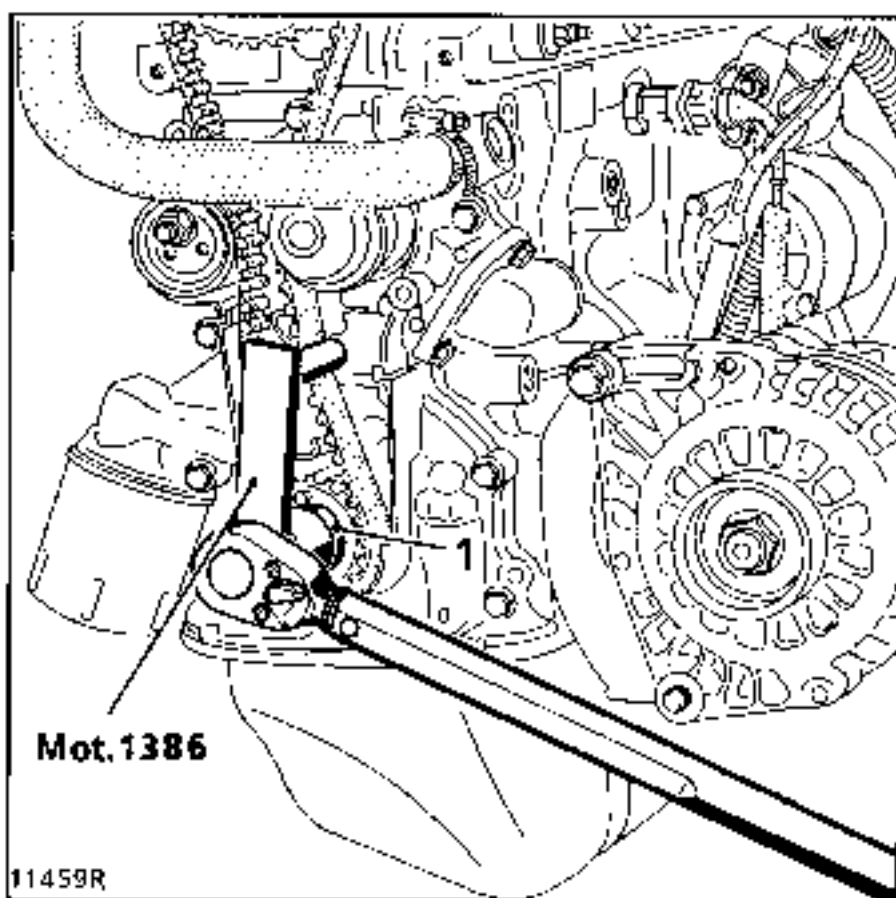
#### IMPORTANT

It is essential to:

- Turn the engine at least twice each time the position of the tensioner roller has been changed so that the tension can be measured again.
- Pretension to 10 daN.m which will eliminate any clearances relating to the belt.

#### NOTE :

- Once a belt has been removed, do not refit it.
- Replace the belt if the tension is less than the minimum operating tension (10 US).



Fit tool **Mot. 1273** and note the tension which should be  $20 \pm 3$  US (fitting tension). If this figure is not correct, adjust it by altering the position of the tensioner roller using **Mot. 1135-01** and repeat the tensioning procedure from (b) onwards.

Tighten the tensioner roller nut to a torque of 5 daN.m.

**ADJUSTING ROCKER CLEARANCES**

Set the engine to TDC, No. 1 cylinder.

Turn the crankshaft in a clockwise direction (seen from the timing gear end) until it is aligned with the first mark.

ADJUST: Exhaust 1  
Exhaust 3

Move to the second mark :

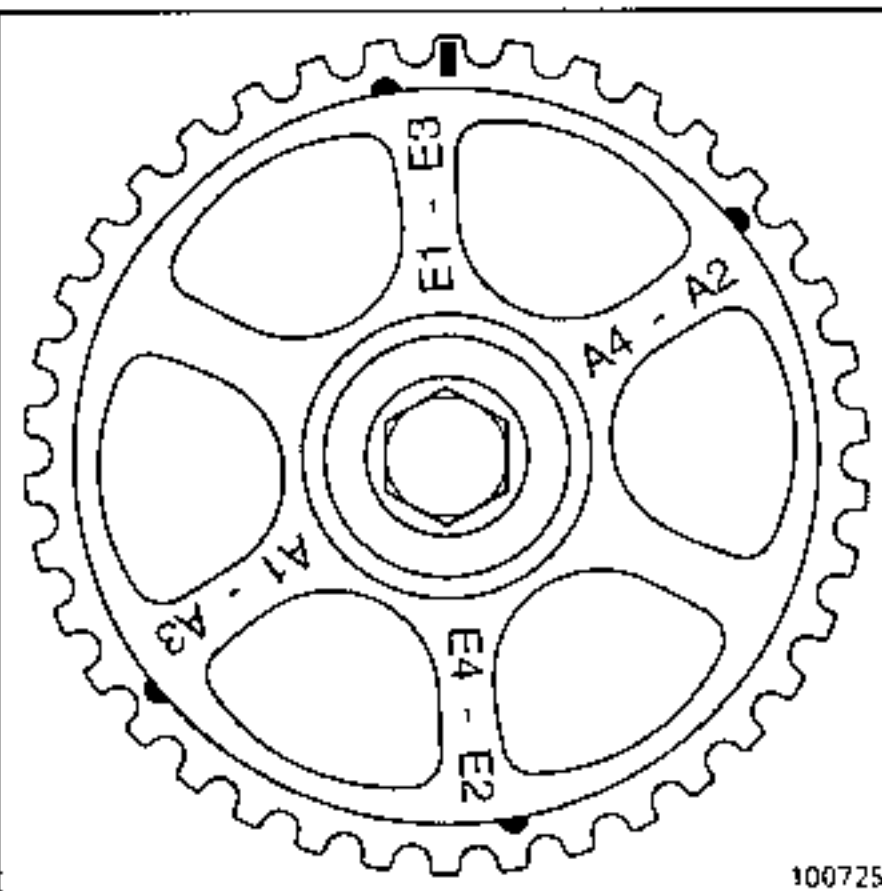
ADJUST: Inlet 1  
Inlet 3

Third mark :

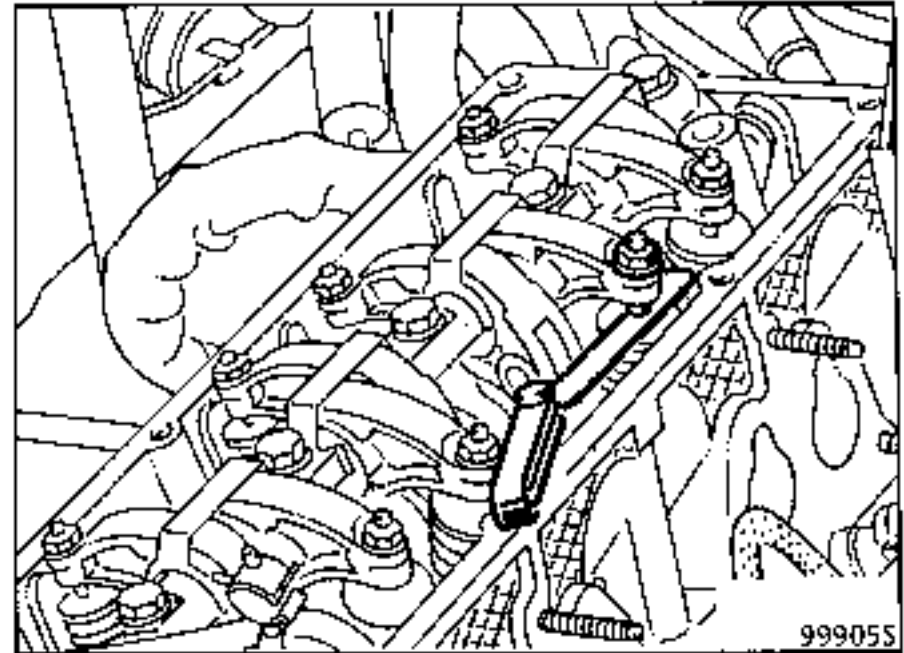
ADJUST: Exhaust 2  
Exhaust 4

Fourth mark:

ADJUST: Inlet 2  
Inlet 4

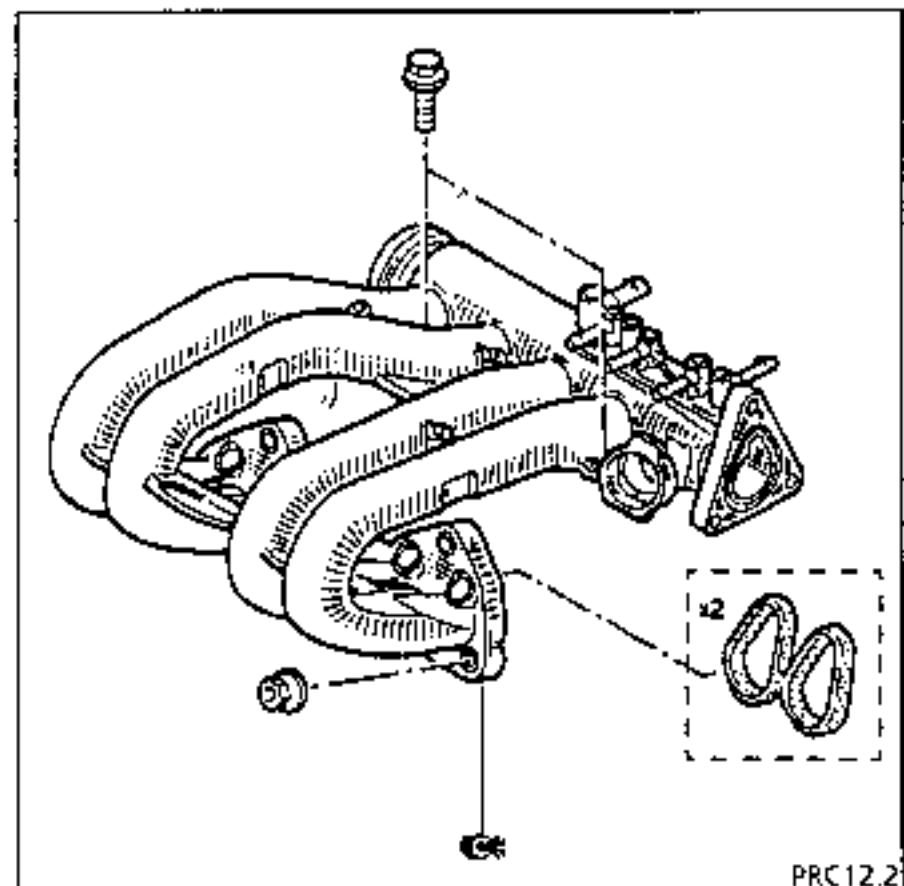
**VALVE CLEARANCE ADJUSTMENT VALUE (mm)**

Inlet	0.1
Exhaust	0.2



Refit :

- The rocker arm cover and tighten it to a torque of 1.1 daN.m
- The intake manifold and change the manifold gaskets

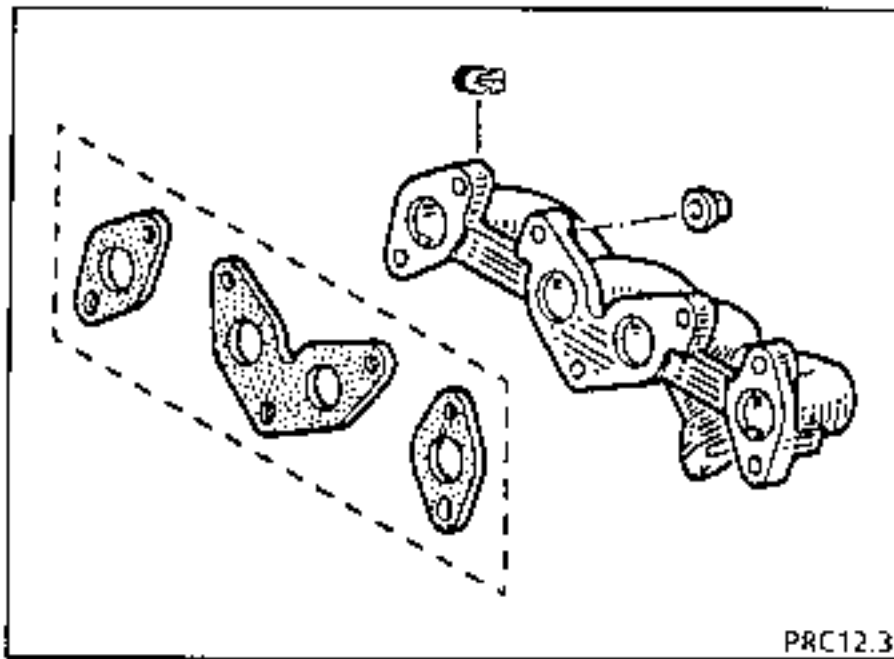


**NOTE :** Tightening the intake manifold:

- Gradually tighten the six nuts until the manifold makes contact with the cylinder head and then tighten them to a torque of 1.5 daN.m.
- Fit the upper bolts and tighten them to a torque of 0.9 daN.m.

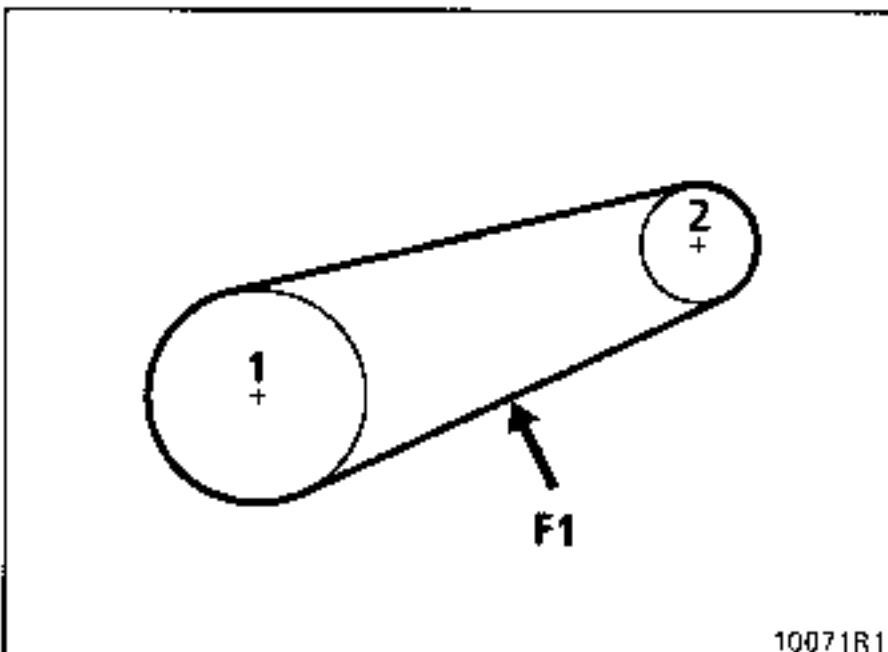
**Refit:**

- Exhaust manifold (change the gaskets)

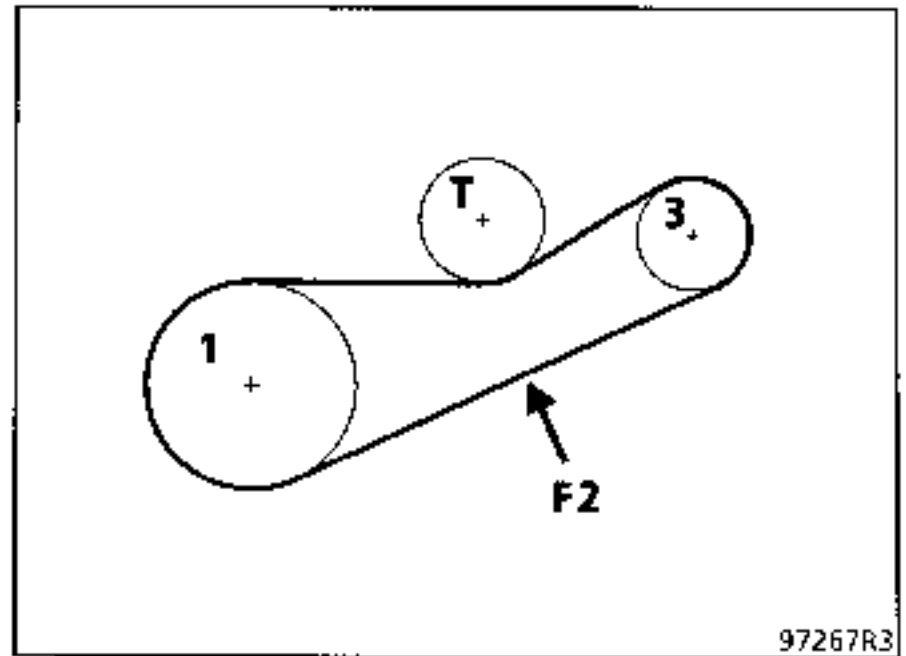


- Engine assembly
- Flywheel
- Clutch plate
- Clutch mechanism
- Alternator, power steering pump (if fitted),
- Belts

**Alternator belt**



**Power assisted steering pump belt**



- 1 Crankshaft
- 2 Alternator
- 3 Power steering pump
- T Tensioner
- Tension checking point

Tension (us – SEEM unit)	Power steering belt (F2) multi- tooth	Alternator belt (F1) multi- tooth
Fitting	$96 \pm 5$	$102 \pm 7$
Minimum for operation	43	53