

HOW TO USE THE MANUAL

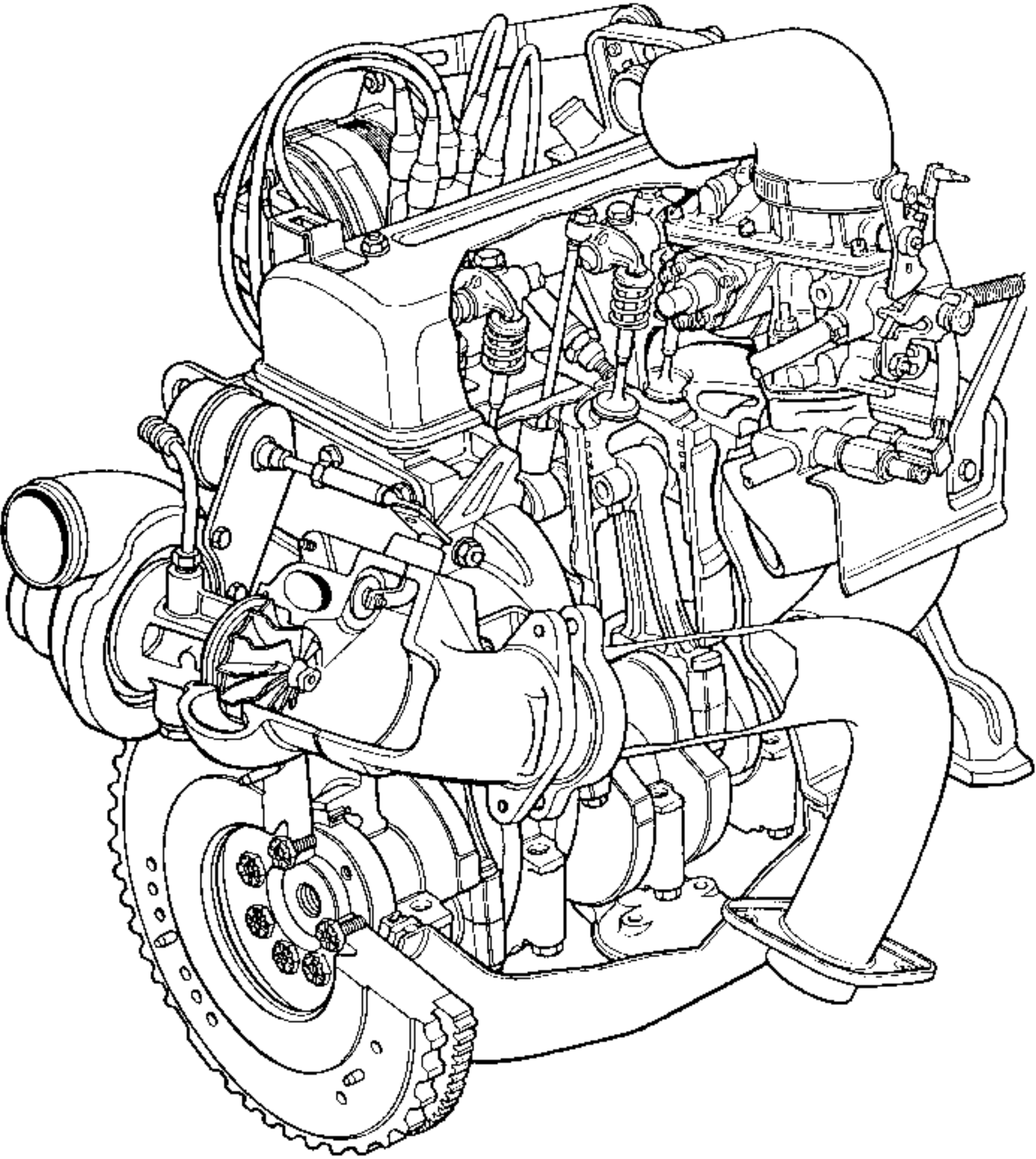
There are three main sections in this manual:

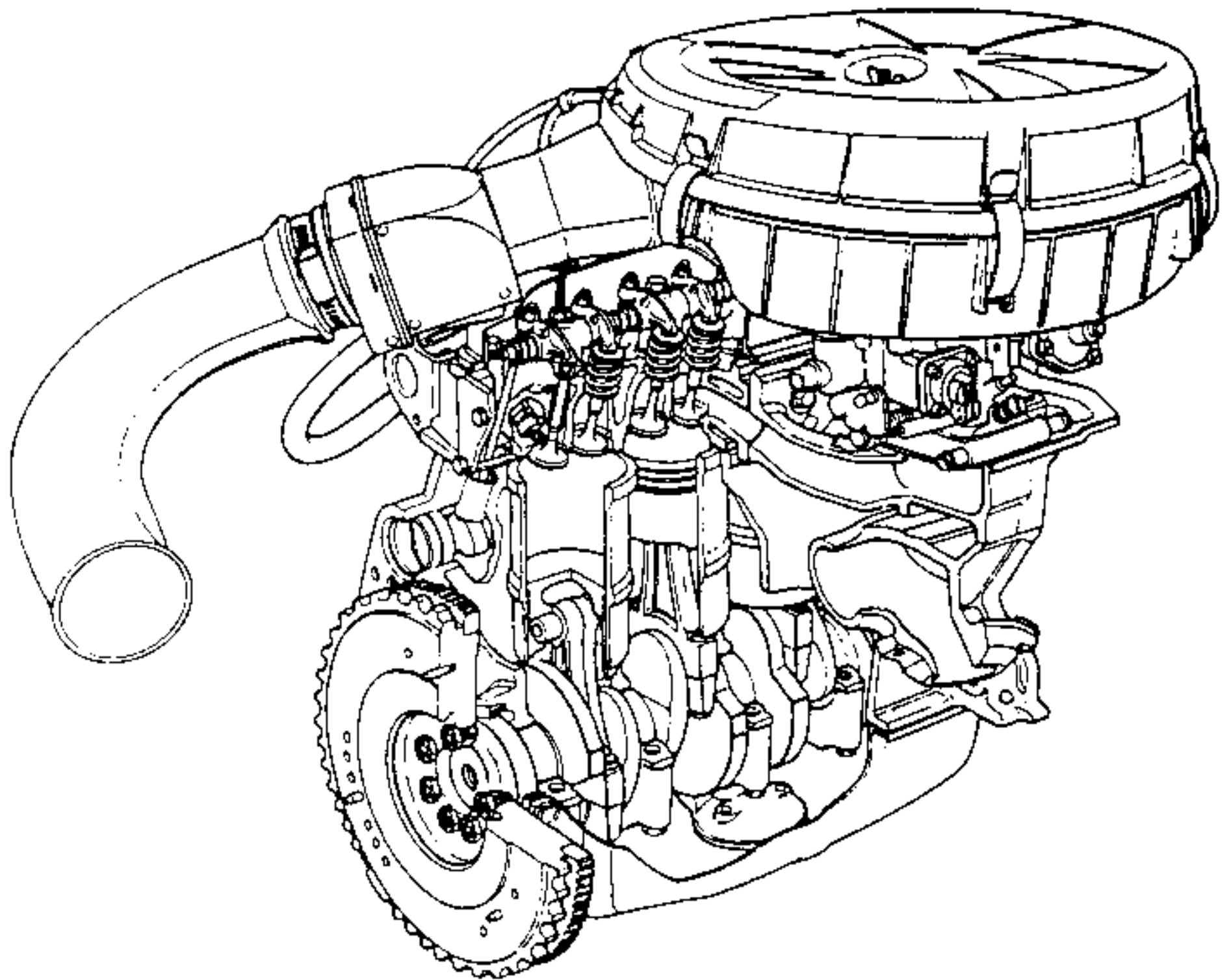
- Specifications
- Dismantling engine
- Reassembling engine

When repairing the components on the vehicle, refer to the Workshop Repair Manual and technical notes for the vehicle.

UNITS OF MEASUREMENT

- All dimensions are given in millimetres (mm) except otherwise indicated.
- Tightening torques are given in decaNewtonmetre : daN.m. (remember: 1 daN.m = 1.02 m.kg)
- For tightening torques without tolerances, keep within $\pm 10\%$.
- Pressures in bar.





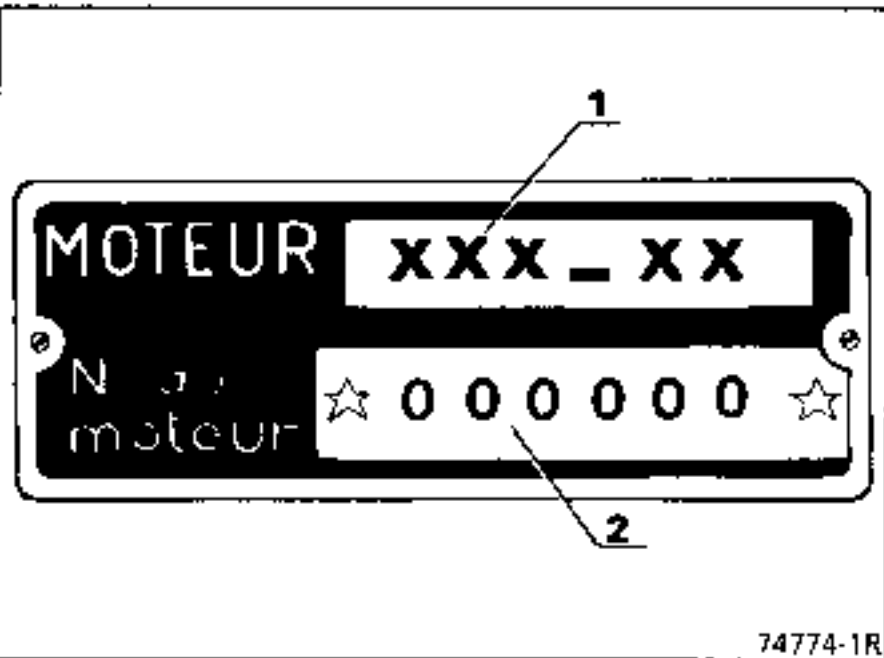
The engine is identified by a plate riveted to the cylinder block.

1st model

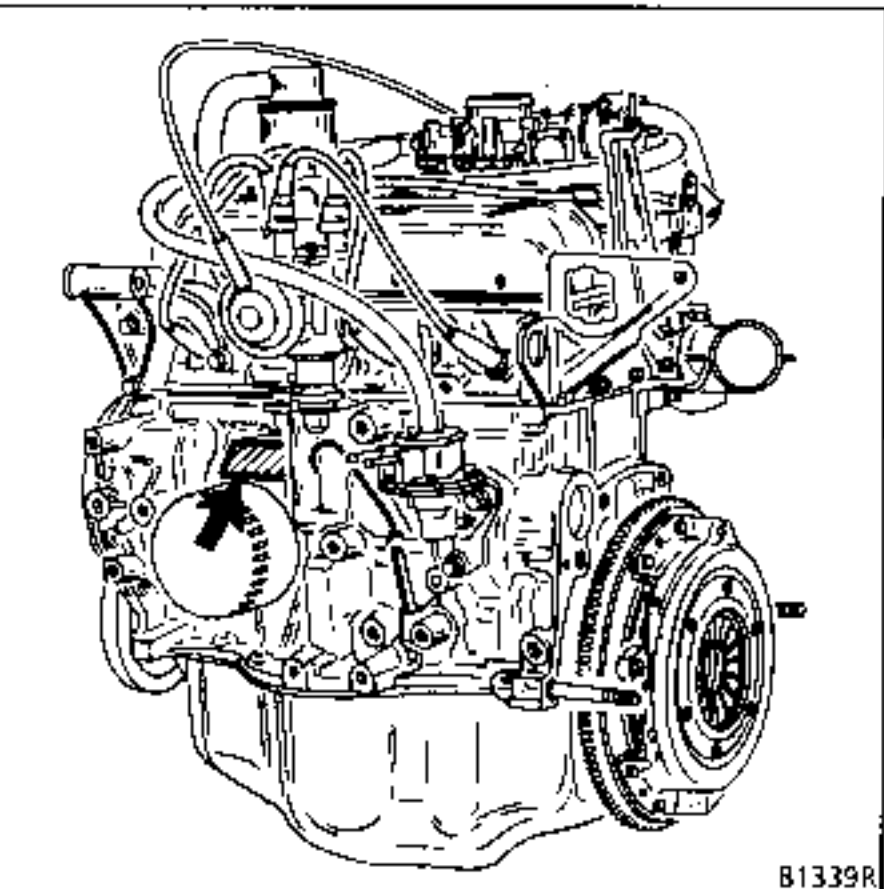
This shows :

At 1 :
Type number followed by the engine suffix.

At 2 :
The fabrication number.



74774-1R



B1339R

2nd, 3rd and 4th models

This shows:

At A :
The type of engine.

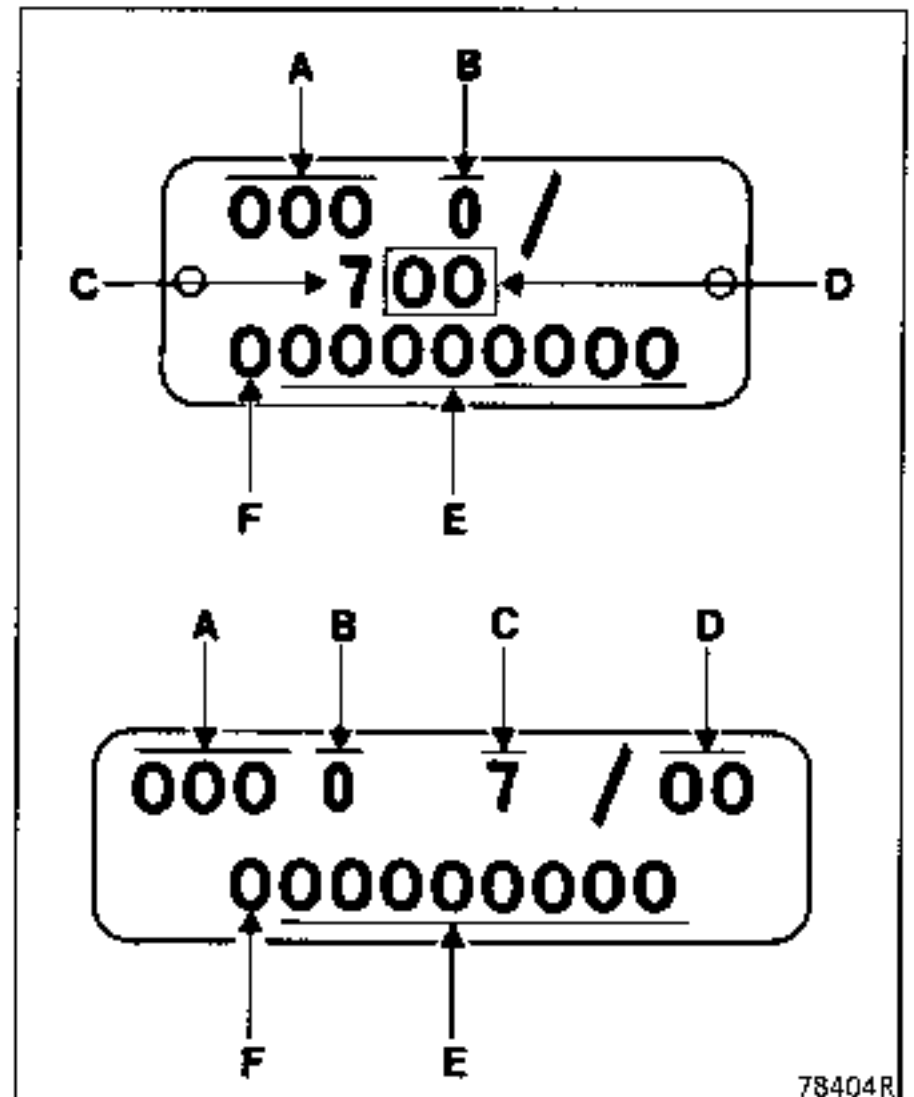
At B :
The engine homologation letter.

At C :
The RNUR identity.

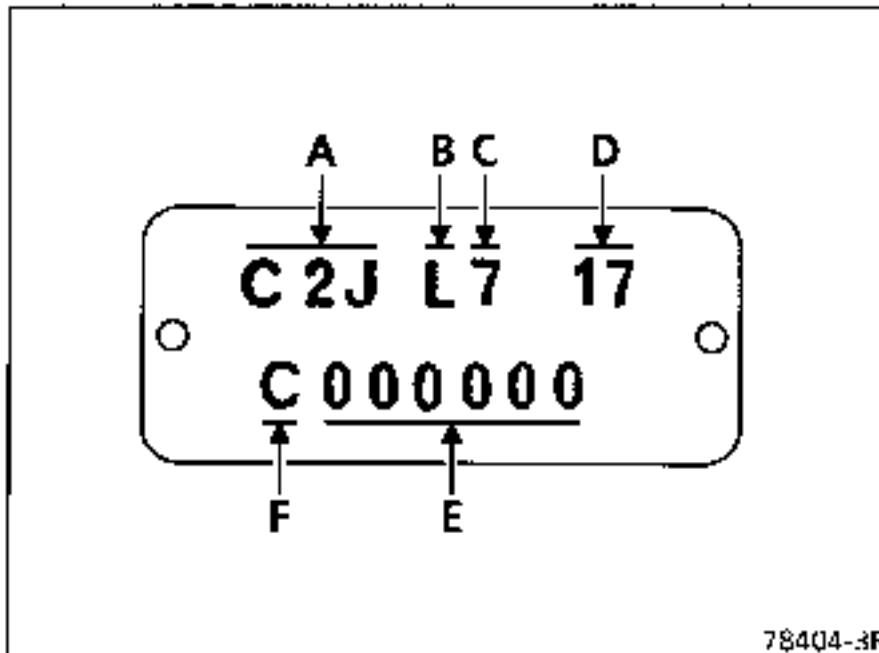
At D :
The engine suffix.

At E :
The engine fabrication number (preceded by the suffix reminder).

At F :
Reference of manufacturing plant.



78404R



Identification letters for the individual manufacturing plants

- A CACIA
- B Choisy le Roi
- C Cléon
- D Fasa
- E Fasa CKD
- F Française de Mécanique
- G Grand Couronne
- H Renault Marine (MECAGIR)
- I Renault Mexico
- J Billancourt
- K South Africa
- L Argentina
- M Colombia
- N Mexico
- P Taiwan
- R Turkey
- S Uruguay
- T Venezuela

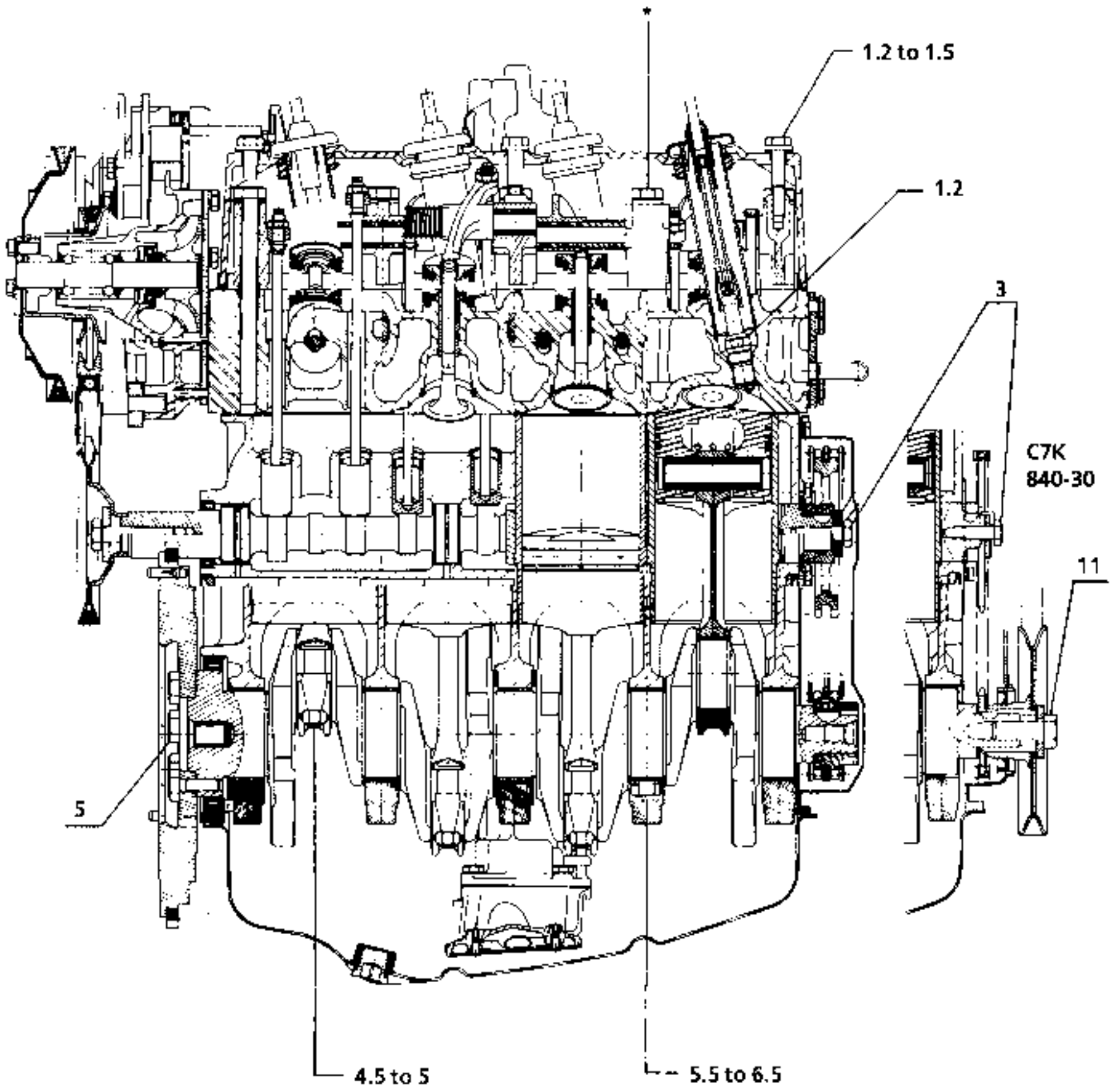
Engine	Suffix	Vehicle	Compression ratio X/1	Bore (mm)	Stroke (mm)	Capacity (cc)
688	A-7-10	1181	8,3	70	72	1108
	C-7-11	2370-2430	8,3			
	D-7-12	1128-1128(GPL)-210B-S128	9,5			
	E-7-13	210B(GPL)-2370(GPL)	9,5			
	7-93	1227-1397-2387-1247	9,5			
	10	1247-1397	8,3			
	B-7-10	1181	9,3			
		1181	7,25			
C1E	H-7-14	1128-2370-3C2370	9,5	70	72	1108
	F-7-15	B/C/S371-L421	9,2			
	J-7-18	210B-2370-239B-1128-3C2370	8,3			
	7-19	210B(GPL)-2370(GPL)	8,3			
	7-20	B/C371-L421	9,2			
	7-26	1227-1397-2387	9,5			
	G-7-50	B/C/F/S401	9,5			
	7-52	B/C/F401	9,5			
	7-00	B/C/S571	8,8			
	7-60	B/C/F/S401	8,8			
	7-54	B/F401	8,3 or 8,8			
	7-62	F401	8,8			
	7-64	F40T	8,8			
7-56	B/C/F40H	8,8				
689	A-7-10	1222-1392	9,2	65	72	956
	7-10	1222-1392-2382	9,5			
	7-10	1222	8,3			
	7-95	1242	9,5			
C1C	B-7-06	F400	8,6	65	72	956
	C-7-08	112C-210C	8,3			
	A-7-00	B/C/S400	9,2			
	A-7-00	B/C/S400	9,7			
810	M-7-19	1225-1395	8,2	73	77	1289
	K-7-24	1226-1396-2386	8			
	D-7-25	1224-1394	9,5			
	G-7-26	1225	9,5			
	H-7-29	1225TA-1395TA	9,5			
	7-94	1244	9,5			
840	7-25	1223	10	76	77	1397
	C-7-26	122B	8,6			
	7-30	8220	7			
	B-7-30	8220	7,3			
C6J	7-28	122B	8,6	76	77	1397
	7-50	122B	8,6			
C7K	A-7-00	8221	7,3	76	79	1430

GPL : Liquid petroleum gas

TA: Automatic transmission

Engine	Suffix	Vehicle	Compression ratio X/1	Bore (mm)	Stroke (mm)	Capacity (cc)
847	D-7-00	TXX0	8,2	76	77	1397
	G-7-01	PXX0	8,2			
	M-7-12	1229TA-1399TA	9,2			
	A-7-20	1340-1350-1360-2350	9,2			
	A-7-20	1340	9,5			
	E-7-20	1340	8,2			
	B-7-21	1340TA	9,2			
	B-7-21	1340TA	8,2			
	7-22	1359	9,2			
	7-25	1229-1399	8,8			
7-29	1229TA-1399-TA	8,8				
C1J	J-7-15	B/C/S372-L422	9,2	76	77	1397
	L-7-60	B/C/L375	8			
	7-64					
	7-70					
	A-7-68	B/C/F402	9,2			
	7-82	C405	7,9			
	7-84	C405	8			
	7-80	B/C/F402	9,2			
	7-42	B/C/L531	9,2			
	7-00	TXX0	8,2			
7-88	C405	7,9				
C2J	P-7-13	1229-1249	9,2	76	77	1397
	L-7-17	B373-L423	9,2			
	N-7-18	B/C373TA-L423TA	9,2			
	7-56	B373-L423	9			
	7-57	B/C373TA-L423TA	9			
	7-66	B/C373-L423-B/L53H	9,2			
	7-67	B/C373TA-L423TA	9,2			
	M-7-80	C403	9,2			
	7-88	C403	9,2			
	Q-7-81	C403TA	9,2			
	7-70	B/L48D	9,2			
	7-98	C403	9,2			
	7-94	B/C373 L423	9,2			
	7-68	B/C373 L423	9,2			
	7-20	B/C37R L42R	9			
	7-76	B/L53H	9,2			
	7-72	B/C/L53P	9			
	730	B/C37C L42C	9			
	784	B/C40M	9			
	782	B/C40J	9			
789	B/C40J	9,2				
C3J	700 702	B/C/F407	9	7,6	77	1397
C3J	760 762 710 756	B/C/F407 F407 B/C/L/S532 B/C37A L37A	9	75,8	77	1390
C1G	700 710 722 726 730 702	B/C/L/S375 B/C/S40F F40F X530 B/C/S40F	9,2 9,2 9,2 9,2 9,2	71,5	77	1237
C3G	700 702 720 710	C063-S063 C064-S064 B/C/S577 F406	9,2	74	72	1239

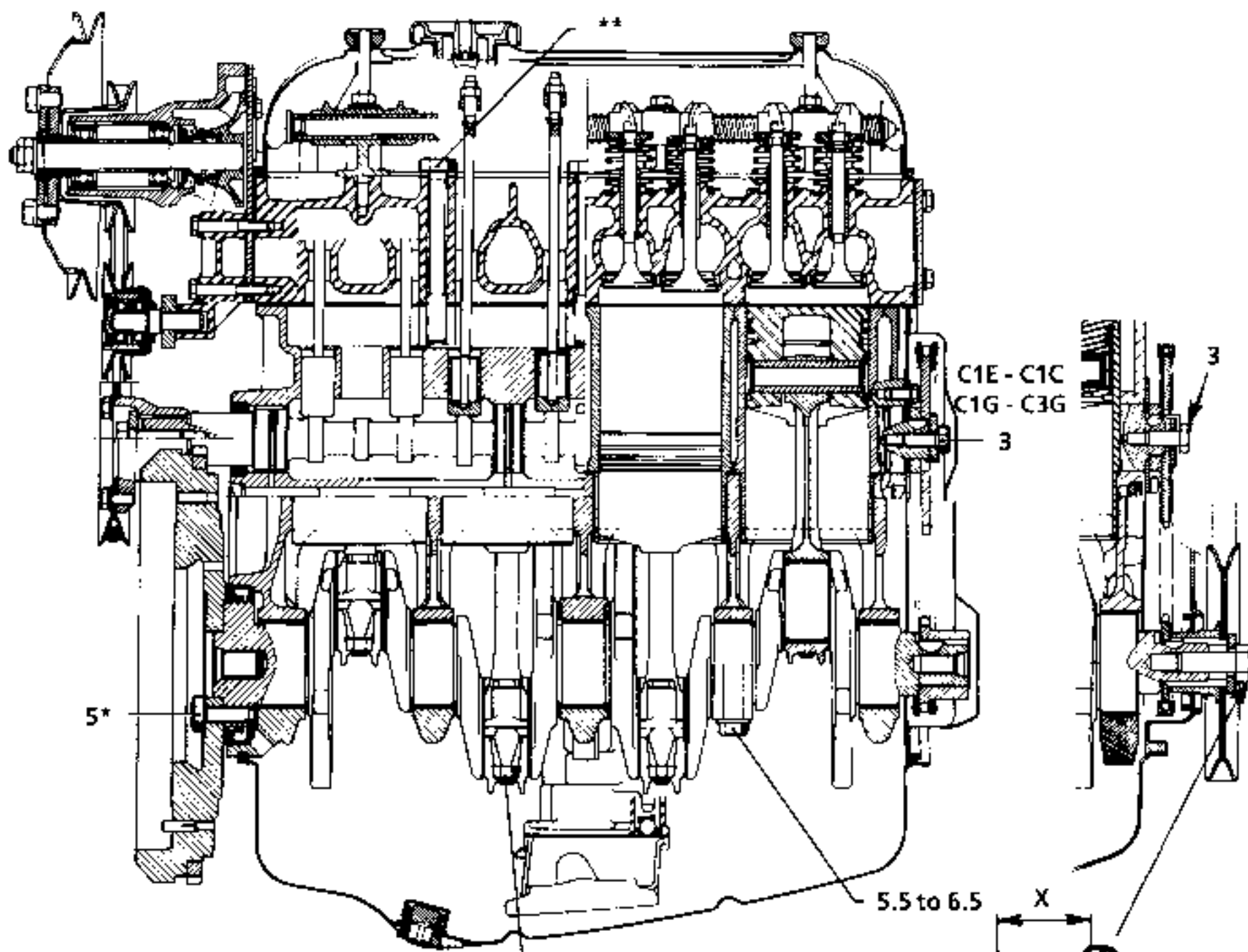
Engines : 840 - C6J - C7K



88237G

* See pages 15 and 16

Engines: 688/C1E - 689/C1C - 810 - C1G - C3G



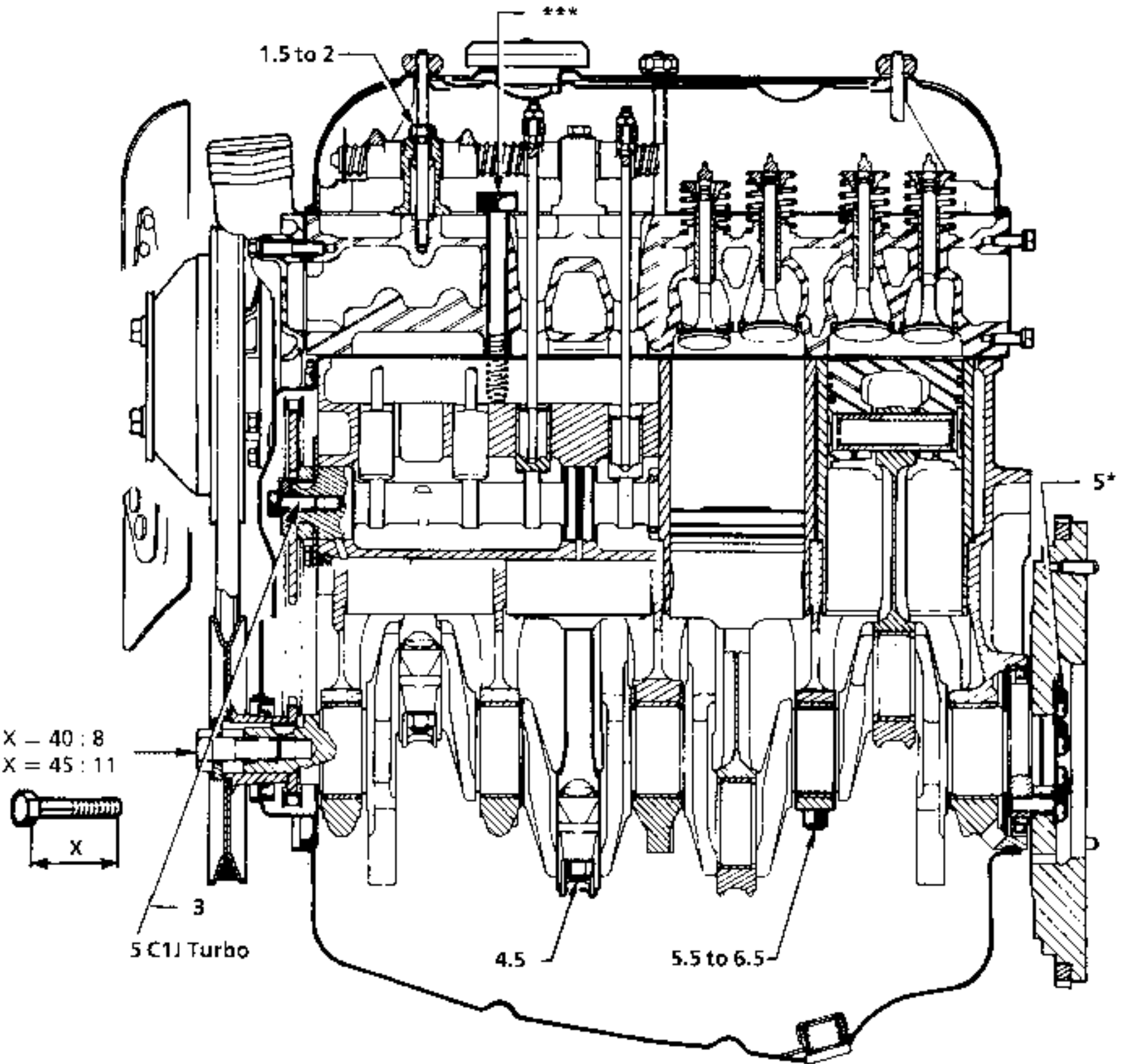
Engines: 688/C1E - C1G - 689/C1C : 3.5
 Engine : 810 C3G : 4.5

X = 40 : 8
 X = 45 : 11
 80443G

* 6.5 to 7 for automatic transmission 4139
 * 4.5 to 5 for automatic transmission MB1

** See pages 15 and 16

Engines : 847 - C1J - C2J - C3J

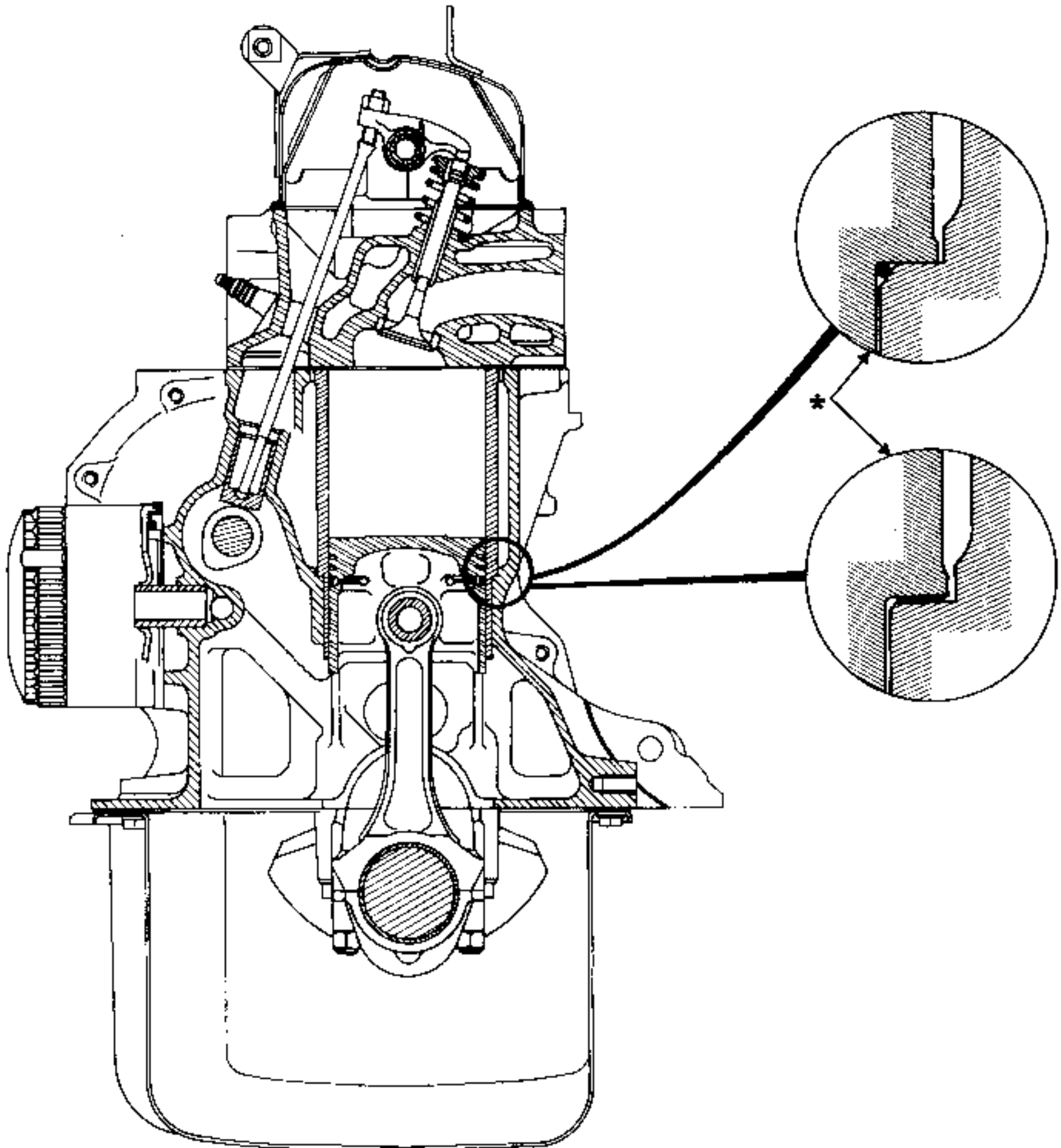


74896-3G

* 6.5 to 7 for automatic transmission 4139
* 4.5 to 5 for automatic transmission MB1

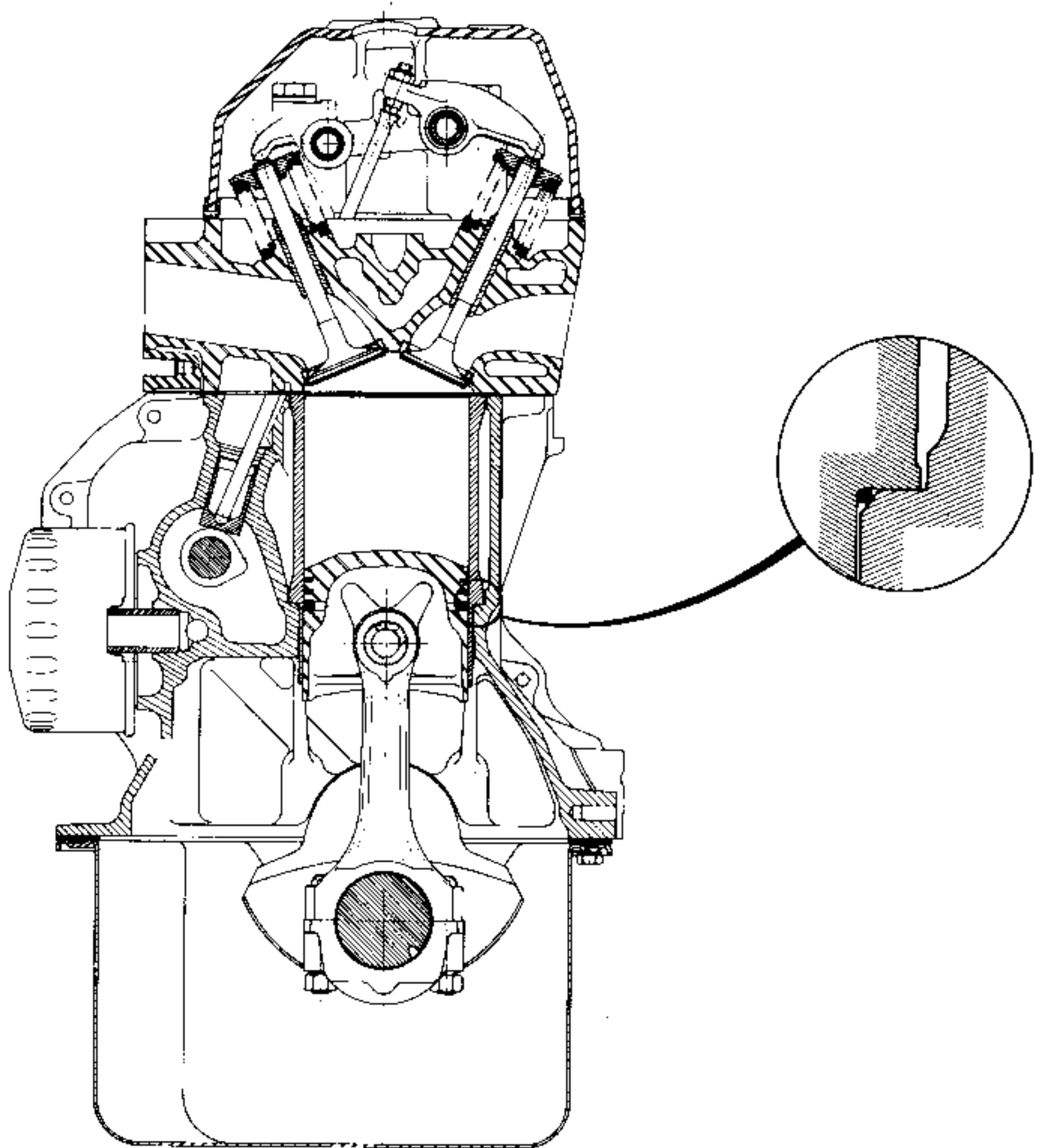
*** See pages 15 and 16

Engines : All types except 840 - C6J - C7K



* Depending on version

Engines : 840 - C6J - C7K





CYLINDER HEAD

Engine: All Types

The cylinder head bolts are not retightened and valve clearance will not be adjusted as part of the first service.

COMMENT :

There is a red or green label on the cylinder head gasket packs which provides information about the gasket (with or without asbestos). This allows the correct method for tightening the cylinder head to be selected.



CAUTION - CONTAINS ASBESTOS
Breathing in asbestos dust can damage your health.
Follow the safety instructions.

(RED)

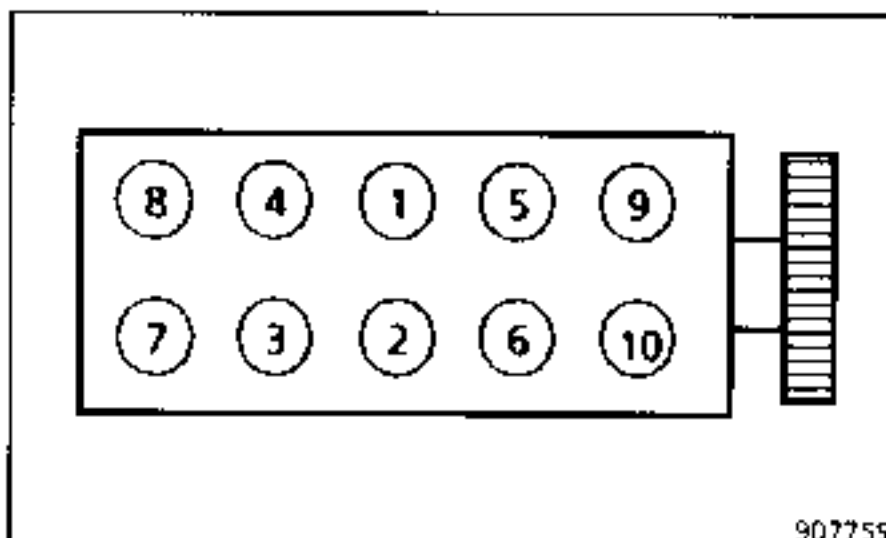


DOES NOT CONTAIN ASBESTOS

(GREEN)

TIGHTENING CYLINDER HEAD BOLTS

TIGHTENING ORDER (All Types)



CYLINDER HEAD TIGHTENING METHOD

Cylinder head gasket with asbestos.

Use engine oil to lubricate the threads and under the heads of bolts.

Reminder :

In order to tighten the bolts correctly, use a syringe to remove any oil from the cylinder head mounting holes.

Tighten in the following order :

1st tightening (see table)

Engines	Tightening torque (daN.m)
C1G - C3G 688 - C1E 689 - C1C 810 - 847 C2J - C3J C1J except Turbo	5.5 to 6.5
C1J Turbo	6 to 6.5
840-25 840-26 - C6J	7
C7K 840-30	7.5

Adjusting valve clearance.

Run the engine for 20 minutes.

After the engine has been switched off for 2.5 hours, retighten the cylinder head:

- Slacken off bolt no. 1 half a turn and torque tighten it again.
- Repeat the above on all the other bolts in the correct sequence.

Adjust the valve clearance.

Do not retighten the cylinder head bolts.

Cylinder head gasket without asbestos.

Use engine oil to lubricate the threads and under the heads of bolts.

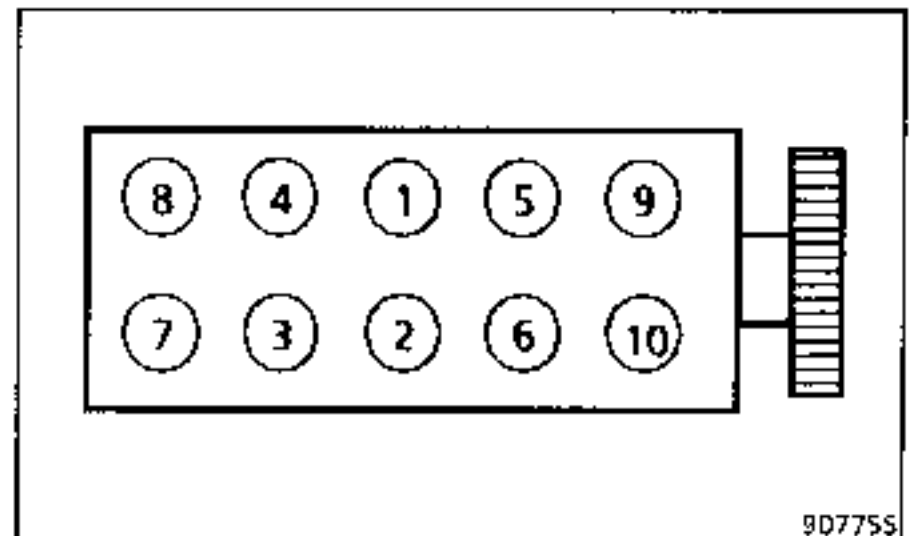
Reminder :

In order to tighten the bolts correctly, use a syringe to remove any oil from the cylinder head mounting holes.

Tighten in the following order :

1st tightening: 2 daN.m

2nd tightening (angle): $90^\circ \pm 4^\circ$



9D775S

Wait a minimum of 3 minutes.

Slacken off bolt number 1 and then carry out the following operations:

1st retightening: 2 daN.m

2nd retightening (angle): $90^\circ \pm 4^\circ$

Repeat the above on all the other bolts in the correct sequence.

Adjust the valve clearance.

Do not retighten the cylinder head bolts.

CYLINDER HEAD

ENGINE TYPE	810			840-C6J				
ENGINE SUFFIX	M-7-19	K-7-24	D-7-25 G-7-26 H-7-29 7-94	7-25	7-50 (1st model) ***	C-7-26 7-28 7-50 (2nd model) **	7-30	B-7-30
ROCKER ARM CLEARANCE (mm)								
- INLET	COLD 0.15	HOT 0.18		COLD 0.20	COLD 0.25		COLD 0.30	
- EXHAUST	0.20	0.25		0.25	0.30		0.40	
GASKET FACE BOW (mm)	0.05							
CYLINDER HEAD HEIGHT (mm)							*	
- NORMAL	72.80	74.40	72	79.30	79.80	79.30	80.20	80.80
- REPAIR	72.05	73.90	71.50	-	-	-	-	-
MAX. REGRINDING PERMITTED (mm)	0.50			-				
COMBUSTION CHAMBER VOLUME (cc)	39.20	40.90	33.80	43.00	45.30	43.00	47.20	50.00

* Ignition timing : $6^{\circ} < X < 10^{\circ}$

** Mark (J) on cylinder head, cylinder head gasket thicker: 1.9 mm

*** Thickness of cylinder head gasket: 1.4 mm

CYLINDER HEAD

ENGINE TYPE	C1G	688 - C1E				689 - C1C					
ENGINE SUFFIX	7-00 7-22 7-26 7-30 7-10 7-02	B-7-10	C-7-11 J-7-18 A-7-10 7-19	7-00 -10 D-7-12 E-7-13 H-7-14 F-7-15 G-7-50 7-20, 7-26 7-52, 7-93	7-54 7-56 7-62 7-64 7-60	7-10 (72 model)	7-10 (from 73 model)	A-7-10 7-95	A-7-00	7-06	7-08
ROCKER ARM CLEARANCE (mm)											
- INLET				COLD 0.15				HOT 0.18			
- EXHAUST				0.20				0.25			
GASKET FACE BOW (mm)						0.05					
CYLINDER HEAD HEIGHT (mm)											
- NORMAL	70.60	74.10	72.00	70.15	70.90	72.00	72.80	71.55	70.90	72.20	72.80
- REPAIR	70.10	73.60	71.50	69.65	70.40	71.50	72.30	71.25	70.40	71.70	72.30
MAX. REGRINDING PERMITTED (mm)	-			0.50				-	0.30		0.50
COMBUSTION CHAMBER VOLUME (cc)	31.90	39.60	33.80	27.80	30.07	33.30	36.00	32.20	30.07	34.04	35.98

CYLINDER HEAD

ENGINE TYPE	847-C1J-C2J										C3G	C3J	C7K	
	D-7-00	M-7-12	7-67	7-22	A-7-20	7-25	7-20	L-7-60	7-94	7-68				
Engine suffix	G-7-01	P-7-13	A-7-68			7-29	7-56	7-64		7-72	7-00	7-60***	A-7-00	
	E-7-20	J-7-15	7-70				7-57	7-70		7-76	7-02	7-62***	**	
	B-7-21	N-7-1B	M-7-80				7-30	7-82		7-80	7-10	7-10		
	C1J700	A-7-20	Q-7-81				7-82	7-84		7-88	7-20	7-00		
		B-7-21					7-84	7-42		7-98		7-02		
		7-66						7-88		7-89		7-56		
										L717				
Rocker arm clearance (mm)	Cold					Hot			Cold	Cold		Hot		Cold
- inlet	0.15					0.18			0.20	0.15		0.18		0.30
- exhaust	0.20					0.25			0.25	0.20		0.25		0.40
Gasket face bow (mm)	0.05													
Cylinder head height (mm)	73.4	71.70	71.70	72.85	71.80	72.80	72.50	*73.50	72.50	72.20	71.45	72.50	81.00	
- normal	72.9			71.85	71.30	72.30	72.00	-	72.00	71.70	70.95	72.00	-	
- repair														
Max. regrinding permitted (mm)	0.50							-	0.50					
Combustion chamber volume (cc)	42,90	37,10	37,10	37,10	35,50	39,20	38,30	43,40	38,32	37,10	31,75	38,32	50,90	

* C1J-60-64-70-84 ratio 8 Thickness of cylinder head gasket: 1.4 mm
 C1J-82 ratio 7.9 Thickness of cylinder head gasket: 1.8 mm

** Cylinder head gasket, thickness 2.4 mm

*** Essential to fit thicker cylinder head gasket (· 0.5 mm)

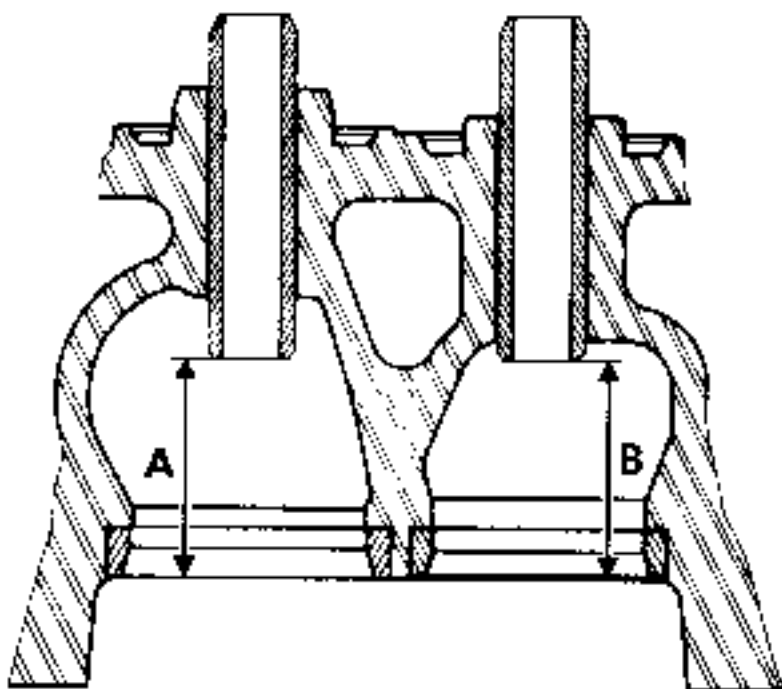
VALVE GUIDES

	688 689 810 C1E C3J	C1G-C3G C1C 700 847-00-01-12-20-21-22- 25-29-05-06-99 C1J-15 C2J-13-17-18-56-57-66- 67-68-80-88	840-25 840-26 (1st model)	840-26 (2nd model) C6J	840-30 C7K-00
Inside diameter (mm)	7		8		
Guide diameter Nominal repair	11 or 11.25		13.1 or 13.25		
Guide angle: - Inlet - Exhaust	17°		23° 25°		
Position of guide in relation to seat (mm) - Inlet - Exhaust	A : 30.5 or 27.2 B : 25.2		C : 37.5 (1) D : 28.8	C : 37 (2) D : 28.8	C : 34.5 D : 28.8

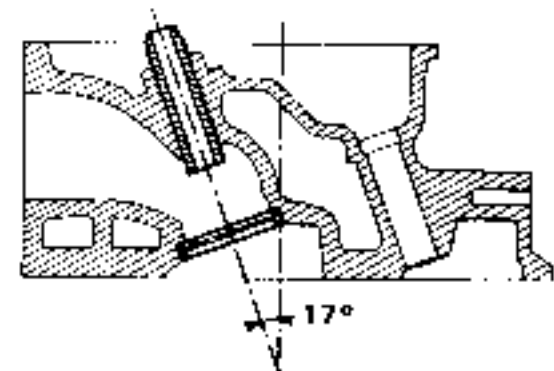
(1) Guide L : 45 mm

(2) Guide L : 44.5 mm

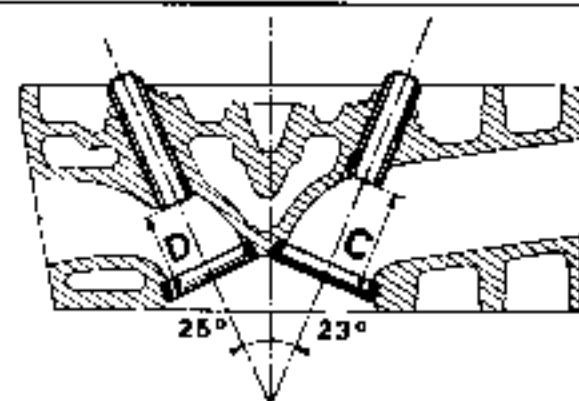
In order for correct tightening to be achieved, the position of the valve guide in the cylinder head must be less than approx. 0.1 mm.



73530R



71865R



78664R

EXHAUST VALVES

	688 689 810 847 C1E C2J C3J C1G C1C C1J C2J C3G	840-25-26-30 C6J-28-50 C7K-00
Valve stem diameter	7	8
Seat angle	90	
Head diameter	30.3 or 29	34.5

INLET VALVES

	810 847 C1J C2J C3J C1G 688 689 C1E C1C C3G	840-25-26-30 C6J-28-50 C7K-00	
Valve stem diameter	7	8	
Seat angle	1st model 120	2nd model 90	90
Head diameter	34.2	34.2 or 33.5	38.7

VALVE SPRINGS

- The inlet and exhaust valve springs are identical.
- The closest coil must face down towards the cylinder head.

	688 C1E C1J C2J 689 810 C1C C1G C3G 847 C3J		840 - C6J - C7K	
	1st model	2nd model	Exterior spring	Interior spring
Wire diameter (mm)	3.4	3.4	4.2	2.4
Inside diameter (mm)	21.6	21.6	25	18.6
Free length (mm) (approx.)	42.2	46.9	44.1	38.9
Length (mm) under load of:				
- 6 daN				31
- 13.1 daN				23.4
- 20 daN	32			
- 21 daN			37	
- 25.2 daN		32		
- 36 daN	25			
- 38 daN		24.5		
- 50 daN			29.4	
Coil winding direction	right			left

CAMSHAFT

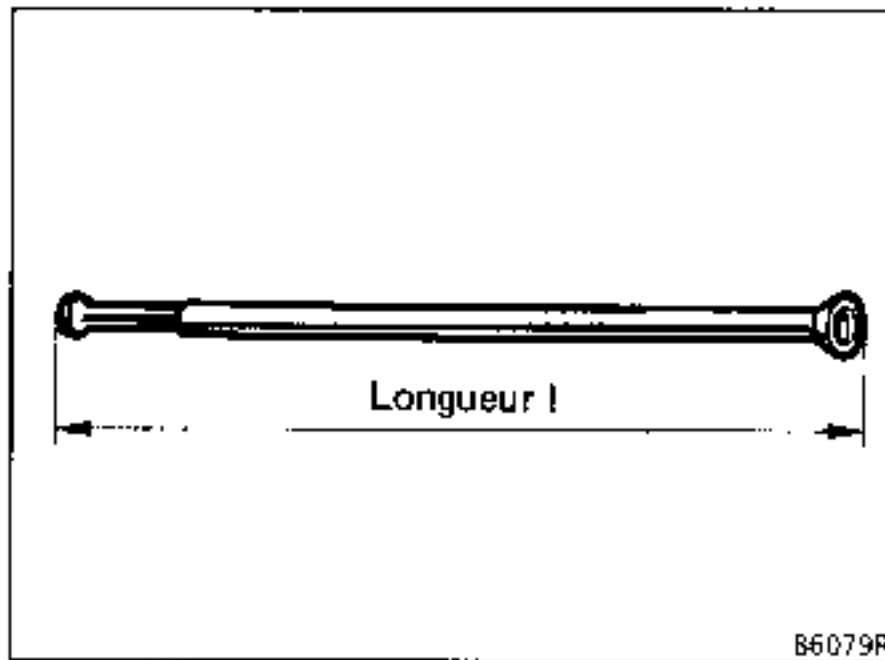
	688-11	810-19-94 688-12-13 847-12-29 C1E-14-15-18-7-19 20-26-50-52-54-56	C1C-00-7-06-7-08 C1J-15-60-64-68-84-42-80 C2J-13-18-56-57-67-81-76-42-94-70-72-720-730-782-784-7-68-7-89 C3J-762-760-7-10-756 C1G C3G C1E 700 760 762 764	689-10-95 847-25 688-10	810-24-25-26-29 847-20-21-22 C2J-17-66-80-88	840-25 C6J-28	840-26 C6J-28-50	840-30 C7K-00	847-00-01 C1J700	C1J-82-88-70
End play (mm)	0.05 to 0.12									
Timing diagram (°)										
- Inlet valve opens BTDC	14	12	12	18	22	30	10	28	15	14
- Inlet valve closes ABDC	38	48	56	54	62	72	54	52	45	66
- Exhaust valve opens BBDC	53	52	56	53	65	72	54	66	53	54
- Exhaust valve closes ATDC	15	8	12	23	25	30	10	14	15	26
Rocker arm theoretical clearance (mm)										
- Inlet	0.35	0.30	0.30	0.30	0.30	0.30	0.40	0.50	0.20	0.30
- Exhaust	0.50		0.35	0.35	0.35	0.30			0.30	0.35

Theoretical rocker arm clearances are only valid for a valve timing check and are not related to normal rocker arm running clearances.

PUSHRODS

	688 - C1E 689 - C1C 810 C1G - C3G 847 - C1J - C3J			840-25-26 C6J	840-30 C7K
	1st model	2nd model	3rd model		
Length (mm) (l)					
- Inlet	172.3	176.3	173.5 (1)	176	177.5
- Exhaust				203.5	205

(1) Replace first and second model



B6079R

Longueur = Length

TAPPETS

Outside diameter (mm) :

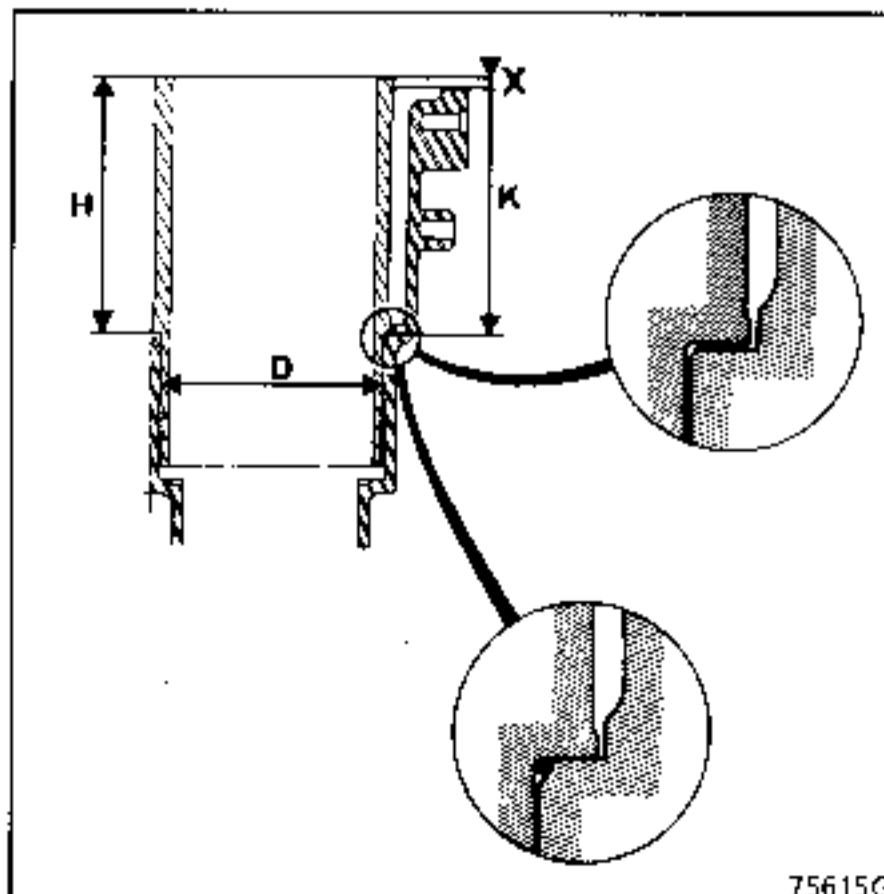
- Normal 19.00
- Repair 19.20

LINERS

	688 C1E	C1G	689 C1C	810	840 C6J - C7K 847 C1J - C2J - C3J	C3J	C3G
Bore (mm)	70	71.5	65	73	76	75.8	74
Base locating diameter (D) (mm)	75.5			78.5	80.6		78.6
Liner protrusion (X) (mm)	0.04 to 0.12				0.02 to 0.09 (excluding seal)		
Base seal type	Excelnyl (paper)				O-ring		
Thickness of base seals (mm)	Blue mark 0.08 Red mark 0.10 Green mark 0.12		-				

LINER - CYLINDER BLOCK ASSEMBLY

	688 - C1E 689 - C1C 810 C1G 847 - C1J - C2J - C3J 840 - C6J C7K	C3G
Liner height (H) (mm)	95.005 to 95.035	94.910 to 94.880
Cylinder block depth (K)(mm)	94.945 to 94.985	-



PISTONS

	688 C1E	689 C1C	810	C1G	847 C1J - C2J 840-25 840-26 (2) C3J	C1J 60-64 82-84 70-88	840-26 (1) C6J-28-50	840-30 C7K	C3G (3)	
Gudgeon pin length (mm)	59	57	62 and 64	62	60.4			60.7	62	
Outside dia. of gudgeon pin (mm)	18		20					18		
Gudgeon pin bore (mm)	11		13 and 12	12					11	
Gudgeon pin fit	Press fit in small end of conrod and free-turning in piston.							Free-turning in conrod and piston	Press fit in conrod and free-turning in piston	
Fitting direction	Arrow pointing towards flywheel					Gudgeon pin is central			-	
Three piston rings: - 1 upper (thickness mm) - 1 compression (thickness mm) - 1 scraper (thickness mm)	1.75 2 3.5	1.75 2 4					1.5 1.75 3			
Gap	Supplied pre-set									

- (1) MAHLE piston
- (2) FLOQUET - MONOPOLE (FM) piston
- (3) SMP piston

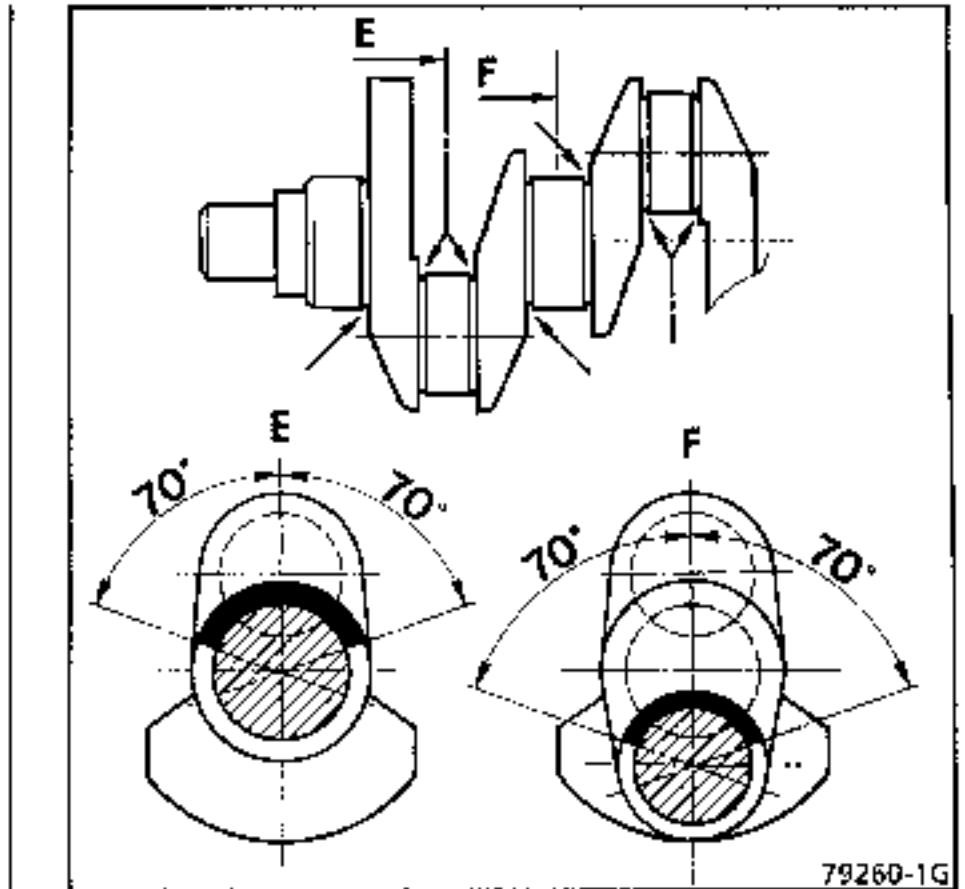
CRANKSHAFT

	689 - C1C 1st model - 2nd model	810	688 - C1E	840 - C6J - C7K	C1G 847 - C1J - C2J - C3J - C3G
Number of bearings	5				
Bearing shell material	aluminium/tin				
Tightening torque for main bearing cap bolts (daN.m)	5.5 to 6.5				
End play (mm)	0.05 to 0.23				
Thrust washer thickness (mm)	2.78 - 2.88 - 2.93 then 2.80 - 2.85 - 2.90 - 2.95		2.78 2.88 2.93		2.80 - 2.85 2.90 - 2.95
Roll-hardened main bearing journals:					
Nominal diameter (mm)	46		54.795		54.795
Regrind diameter (mm)	45.75	then	54.545		54.545
Regrind tolerance (mm)	0 - 0.02		± 0.01		± 0.01
Roll-hardened crankpins :					
Nominal diameter (mm)			43.98		
Regrind diameter (mm)			43.73		
Regrind diameter (mm)			0		
Regrind tolerance (mm)			- 0.02		

Note : There is a standard factory replacement part dimension (- 0.50 less than the nominal dimension).

After regrinding, the roll-hardened zones must still be intact over the 140° sectors shown by the arrows below.

These zones are defined by sections (E) and (F) in the example shown.



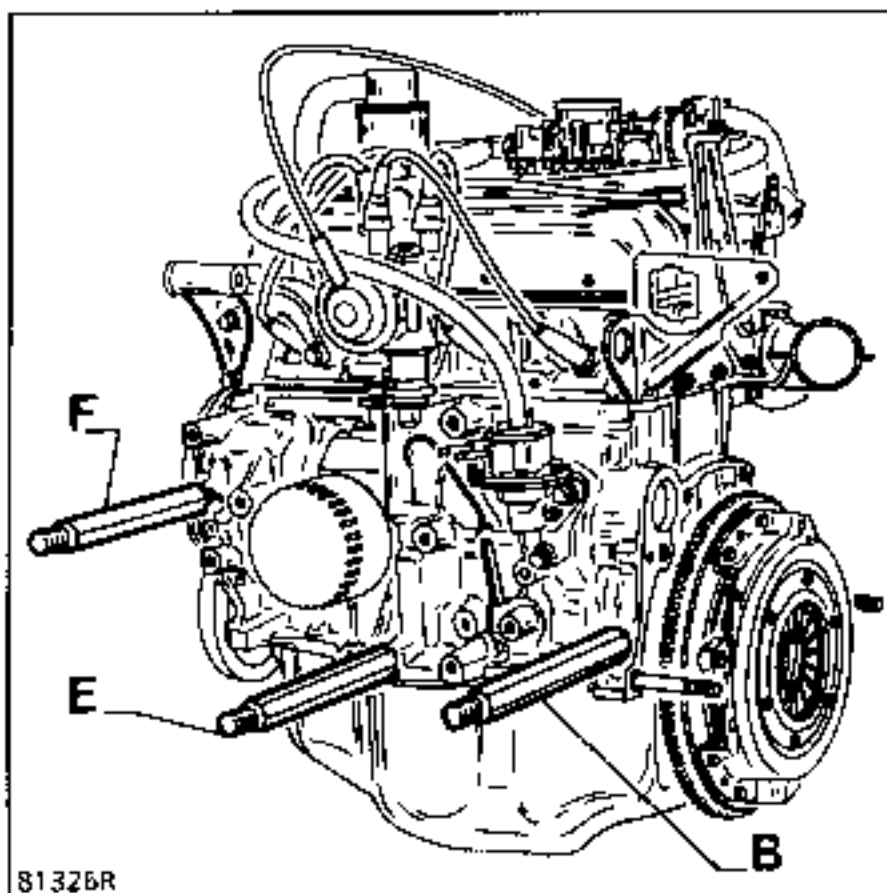
CONNECTING RODS

	<p>688 - C1E 689 - C1C</p>	<p>810 C1G C3G 840 - C6J C7K 847 - C1J - C2J - C3J</p>
Connecting rod big end caps tightening torque (daN.m)	3.5	4.5
Connecting rod width (mm)	25	22.2
Bearing shell material	aluminium-tin	
Connecting rod big end play (mm)	0.31 to 0.60	

- 840-30 - C7K
- Bushes are fitted to the small end of the conrod.
 - The conrod big end and its half-shell are drilled for an oil cooling jet.

Adapting stand Mot. 792-03

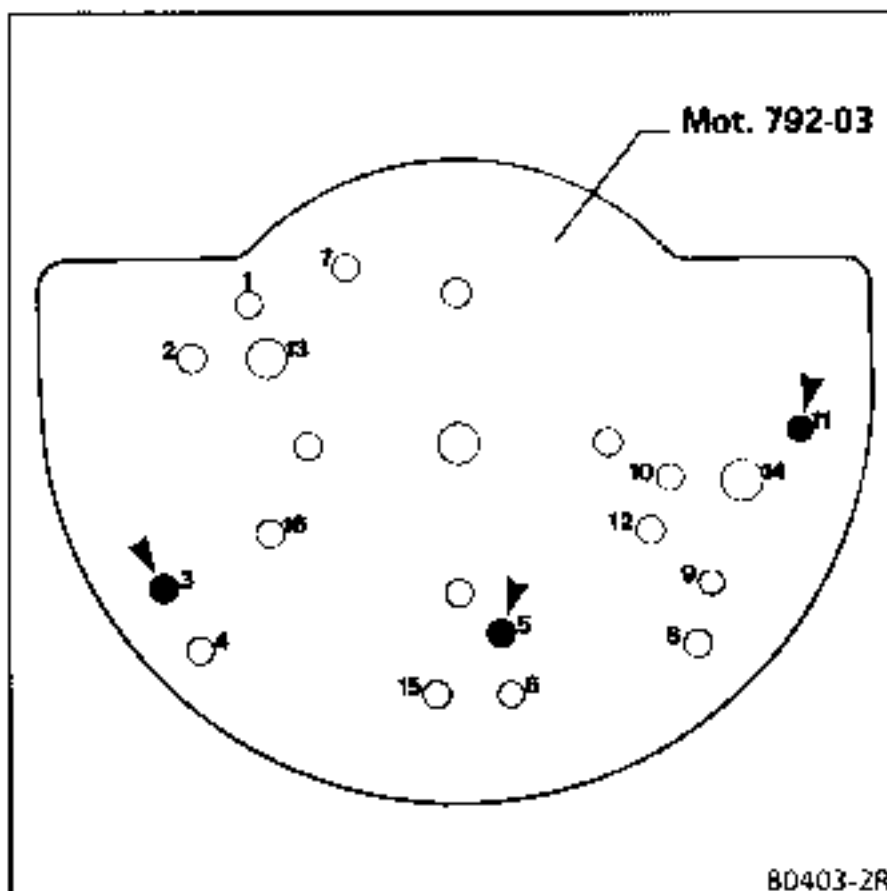
Screw the mounting studs on to the engine, making sure they are in the correct position.



Fit the engine on the stand :

- stud B in hole no. 3,
- stud E in hole no. 5,
- stud F in hole no. 11.

Tighten the mounting nuts.



FITTING THREADED INSERTS

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

CONSUMABLES

Type	Quantity	Unit concerned	Part Nos. (SODICAM)
Ravitol 556	1 litre	Cleaning parts.	77 01 421 513
Décapjoint	Coat	Cleaning gasket faces.	77 01 405 952
Loctite FRENETANCH (locking and sealing resin)	1 to 2 drops	Crankshaft sprocket mounting bolt. Sealing no. 1 bearing on crankshaft.	77 01 394 070
Loctite AUTOFORM	1 to 2 drops	Flywheel - crankshaft joint face.	77 01 400 309
Loctite FRENBLOC (locking and sealing resin)	1 to 2 drops	Mounting bolts for: - flywheel, - torque converter drive plate, - crankshaft, - camshaft sprocket.	77 01 394 071
Loctite SCELBLOC (bonding and sealing resin)	1 to 2 drops	Camshaft housing sealing plug. Plug for lubrication channel.	77 01 394 072
RHODORSEAL 5661	-	Sealing sump and valve timing cover	77 01 421 042 77 01 404 452

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 or the drive plate,
- the clutch plate and mechanism,
- the fuel pump,
- the water pump and gear,
- the crankshaft sprocket,
- the cylinder head,
- the spark plugs,
- the belt tensioner,
- the pressure switch and thermostat,
- the oil filter.

Do not forget to remove :

- All coolant hoses
- The belt or belts

NEW EXCHANGE ENGINE

When fitting a new engine, certain checks should be made :

- Check the condition of the radiator and the various pipes which were not supplied with the new engine.
- Check that there are no foreign bodies in the manifolds.

The cylinder heads of the new engine are tightened and retightened in the factory of manufacture. There is no need to retighten the cylinder heads when the engine is delivered.

PRECAUTIONS TO BE TAKEN WHEN STARTING UP A NEW ENGINE WITH TURBOCHARGER


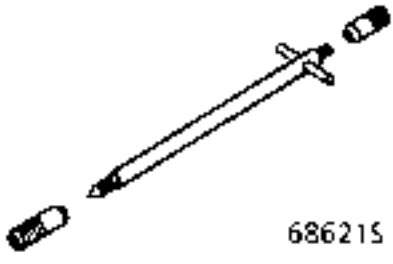
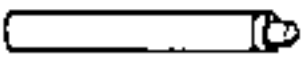
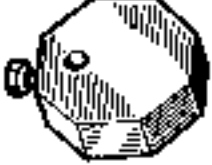
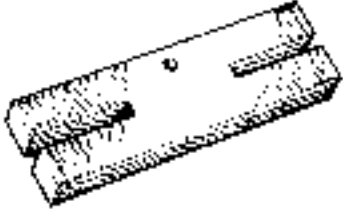
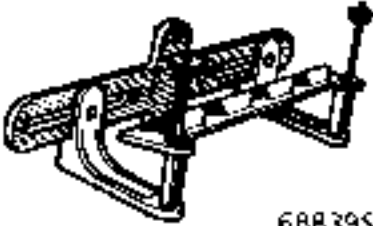
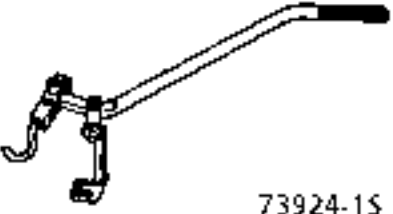
After an operation on the engine which made it necessary to disconnect the oil pipes, the oil circuit for the turbocharger must be reprimed under the following conditions :

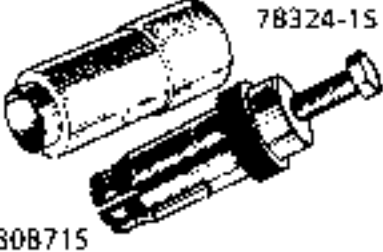
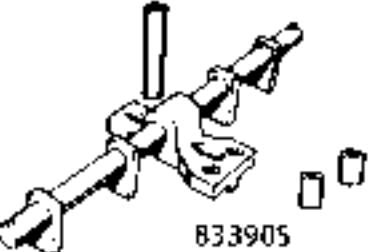


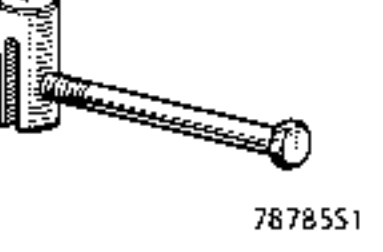


- Disconnect the turbocharger oil inlet hose and fill the turbocharger with engine oil.
- Activate the starter to reprime the turbocharger oil circuit until the oil flows out of the turbocharger oil inlet hose.
- Reconnect the oil inlet hose to the turbocharger.
- Start the engine and let it run at idle speed until the oil circuit is re-established in the turbocharger.

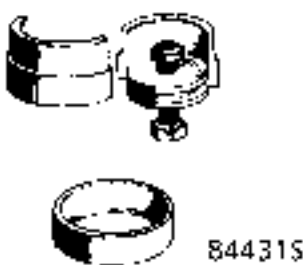
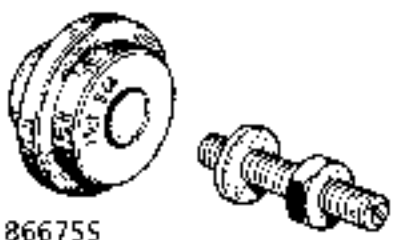

PRECAUTIONS TO BE TAKEN WHEN STOPPING THE ENGINE

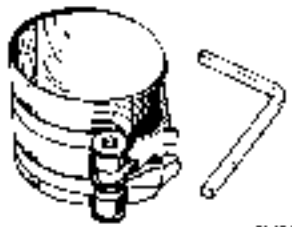
Let the engine idle for approximately 30 seconds before turning the ignition off.

Otherwise, if the engine accelerates causing the turbocharger to be activated and the ignition is switched off, the turbocharger will continue to operate under its own inertia but will not be lubricated (as the engine has stopped). There is then a risk of the turbine shaft seizing.

Drawing	Method Number	Part Number	Description
 <p>686165</p>	Mot. 61	00 01 199 900	Valve retaining finger
 <p>686215</p>	Mot. 104	00 01 309 900	Cylinder head and gasket locating dowels
 <p>686255</p>	Mot. 111	00 01 320 300	Inserting punch
 <p>838125</p>	Mot. 251-01	00 00 251 101	Clock gauge support (liner protrusion)
 <p>8381251</p>	Mot. 252-01	00 00 025 201	Thrust plate for liner protrusion check
 <p>688395</p>	Mot. 330-02	00 00 033 002	Cylinder head support for DESVIL stand
 <p>73924-1S</p>	Mot. 382	00 00 038 200	Valve spring compressor

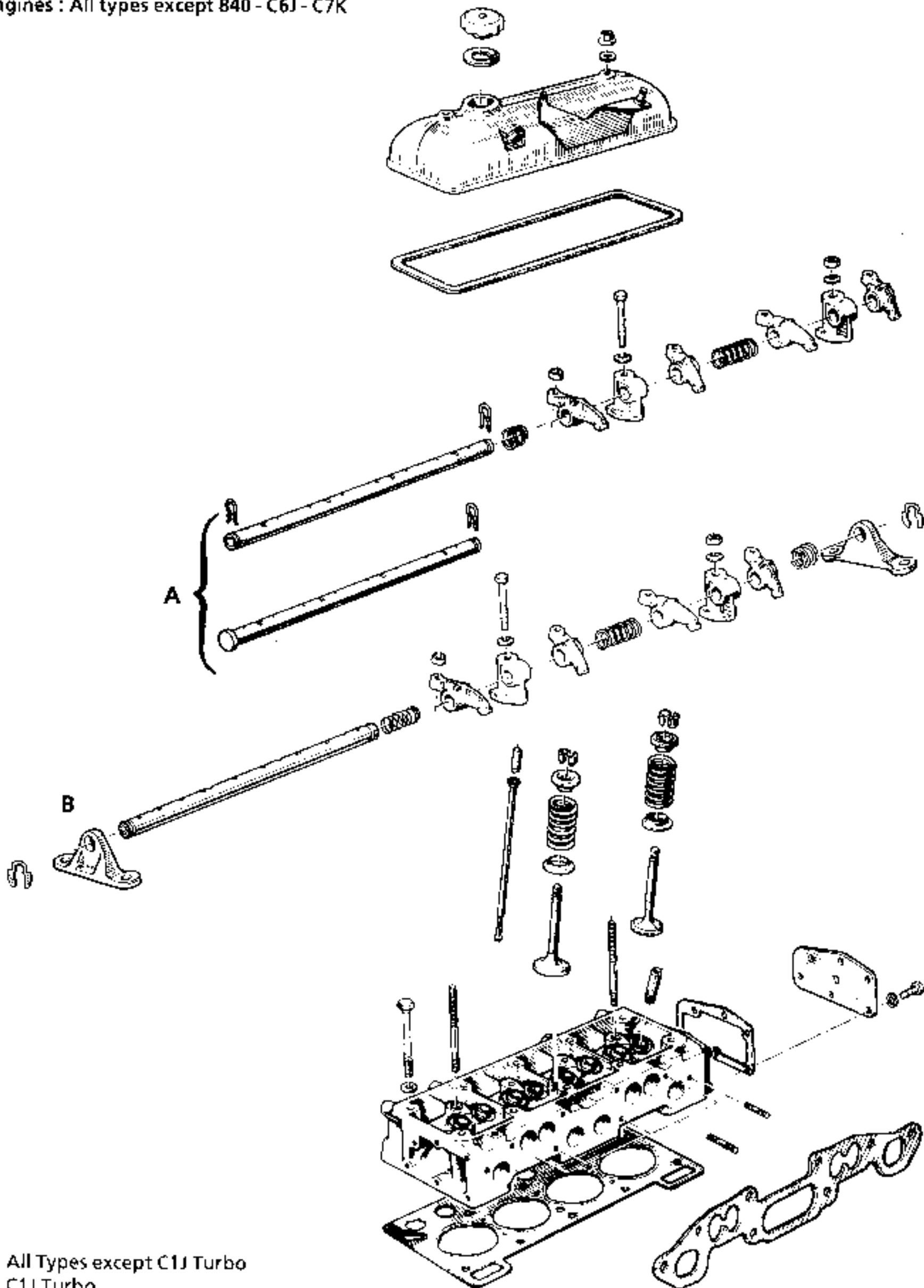
Drawing	Method Number	Part Number	Description
 <p>78324-1S 808715</p>	Mot. 500-03	00 00 050 003	Camshaft oil seal inserting and extracting tool
 <p>833905</p>	Mot. 521-01	00 00 052 101	Liner clamp
 <p>76641-1S1</p>	Mot. 574-22	00 00 057 422	Gudgeon pin inserting and extracting tooling
 <p>77121S1</p>	Mot. 582	00 00 058 200	Flywheel locking tool
 <p>78785S1</p>	Mot. 720	00 00 072 000	Cylinder head locating tool
 <p>79923S</p>	Mot. 761	00 00 076 100	Fitting and removing tool for timing chain mechanical tensioner
 <p>82919S1</p>	Mot. 792-03	00 00 079 203	Adaptable engine support plate for a DESVIL stand

Drawing	Method number	Part Number	Description
	Mot. 876	00 00 087 600	Camshaft bearing extractor (5th bearing)
	Mot. 964	00 00 096 400	Timing gear cover seal positioning and centring tool
	Mot. 1 158	00 00 115 800	Tool for fitting camshaft seal (timing end)
	Mot. 1 129-01 + Mot. 1 129-02	00 00 112 901 00 00 112 902	Tool for fitting crankshaft seal (clutch end)
	Mot. 1 335	00 00 133 500	Pliers for removing seals

Drawing	Method Number	Part Number	Description
 <p>833915</p>			Clamp for fitting piston with rings in the liner (all types)
			Set of milling tools for rectifying valve seats (example : CERGYDIS C108 NEWAY)
			Valve spring tool

EXPLODED VIEW OF CYLINDER HEAD

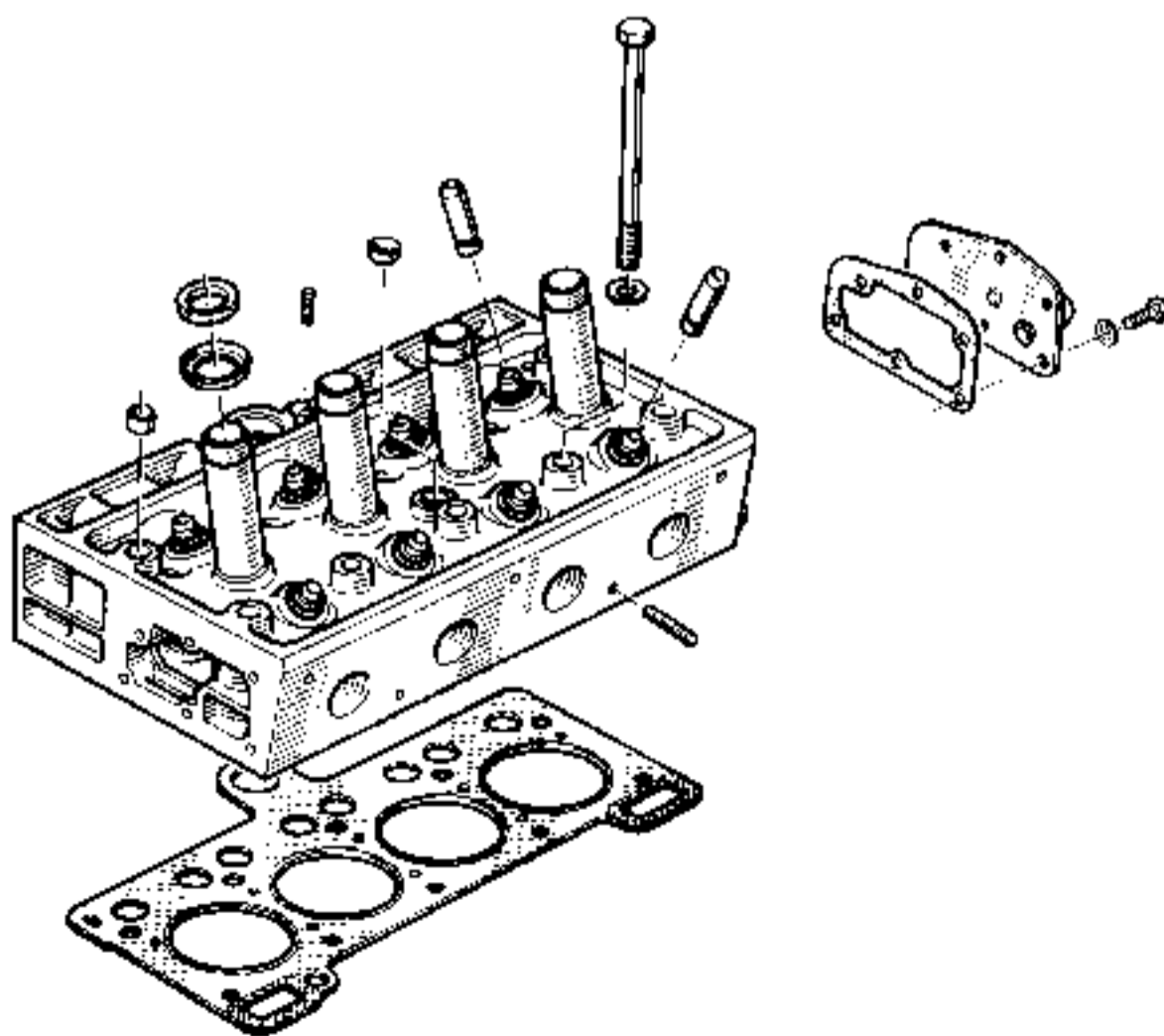
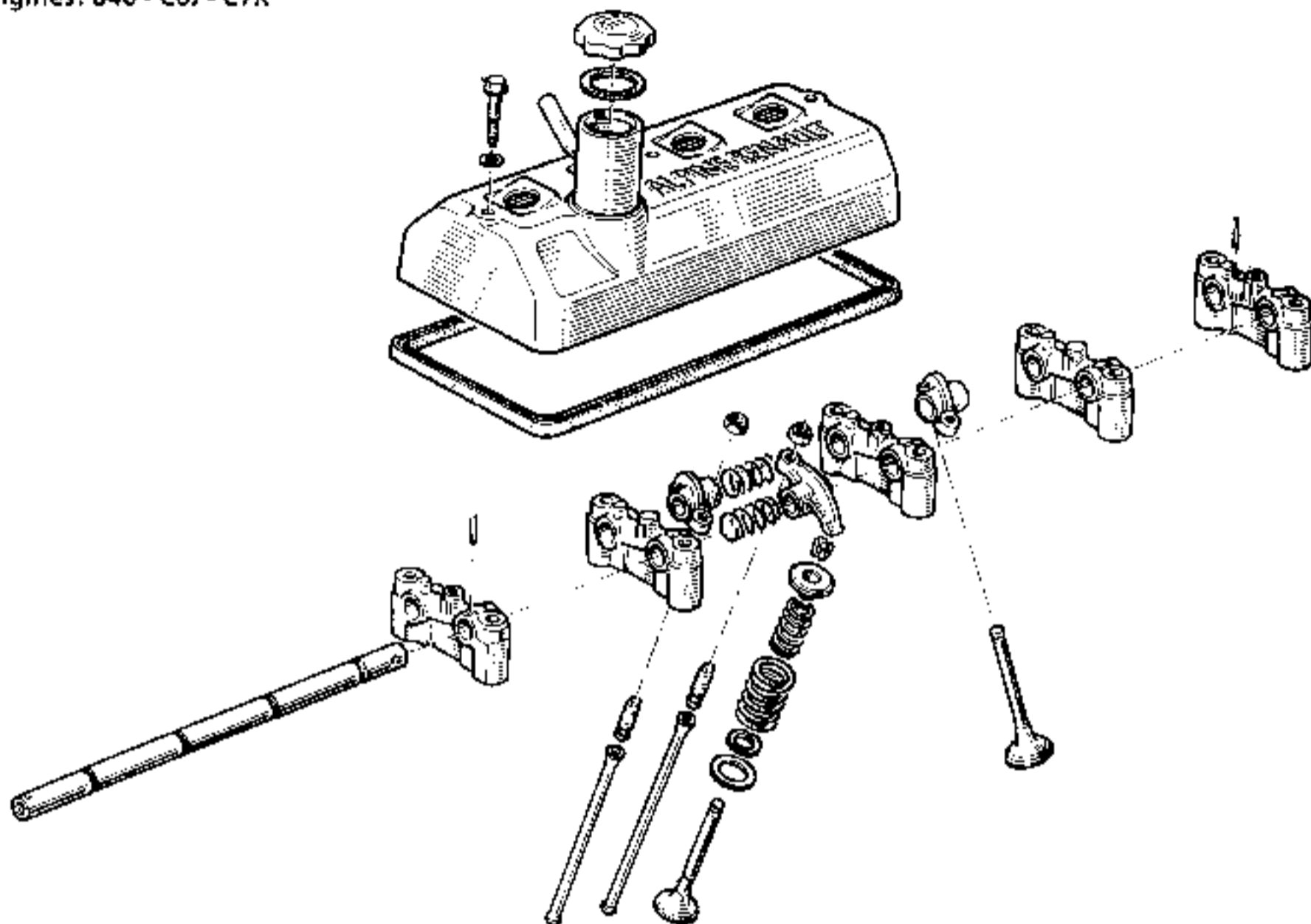
Engines : All types except 840 - C6J - C7K



A - All Types except C1J Turbo
B - C1J Turbo

EXPLODED VIEW OF CYLINDER HEAD

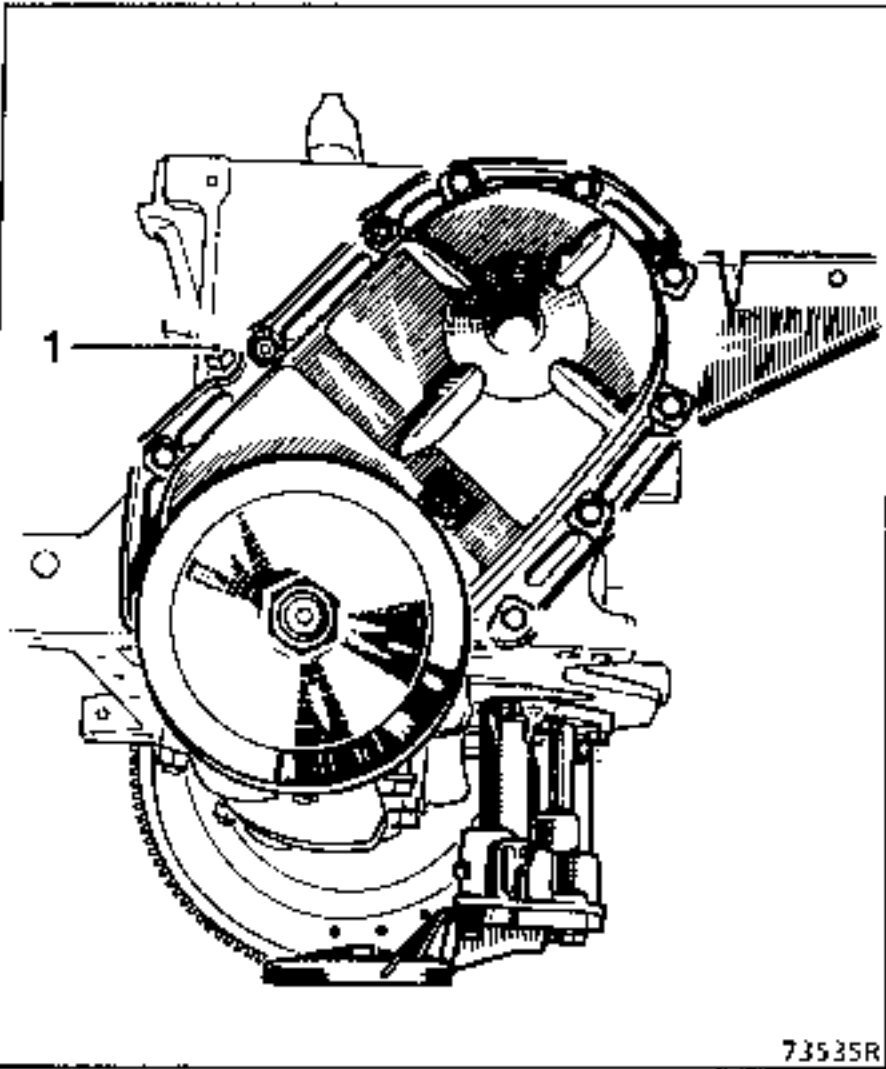
Engines: 840 - C6J - C7K



REMOVING THE ENGINE

Drain:

- the engine oil from the sump,
- the coolant remaining in the cylinder block via screw (1).



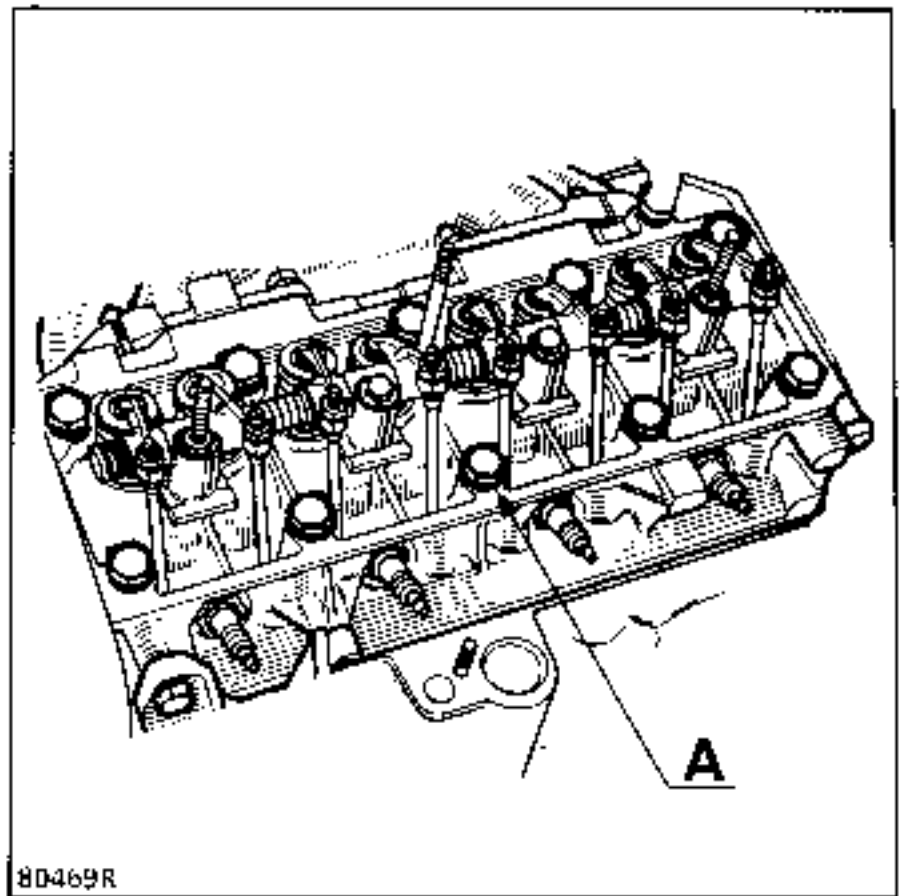
73535R

Do not forget to replace and tighten screw (1) after the coolant has drained from the cylinder block.

Remove :

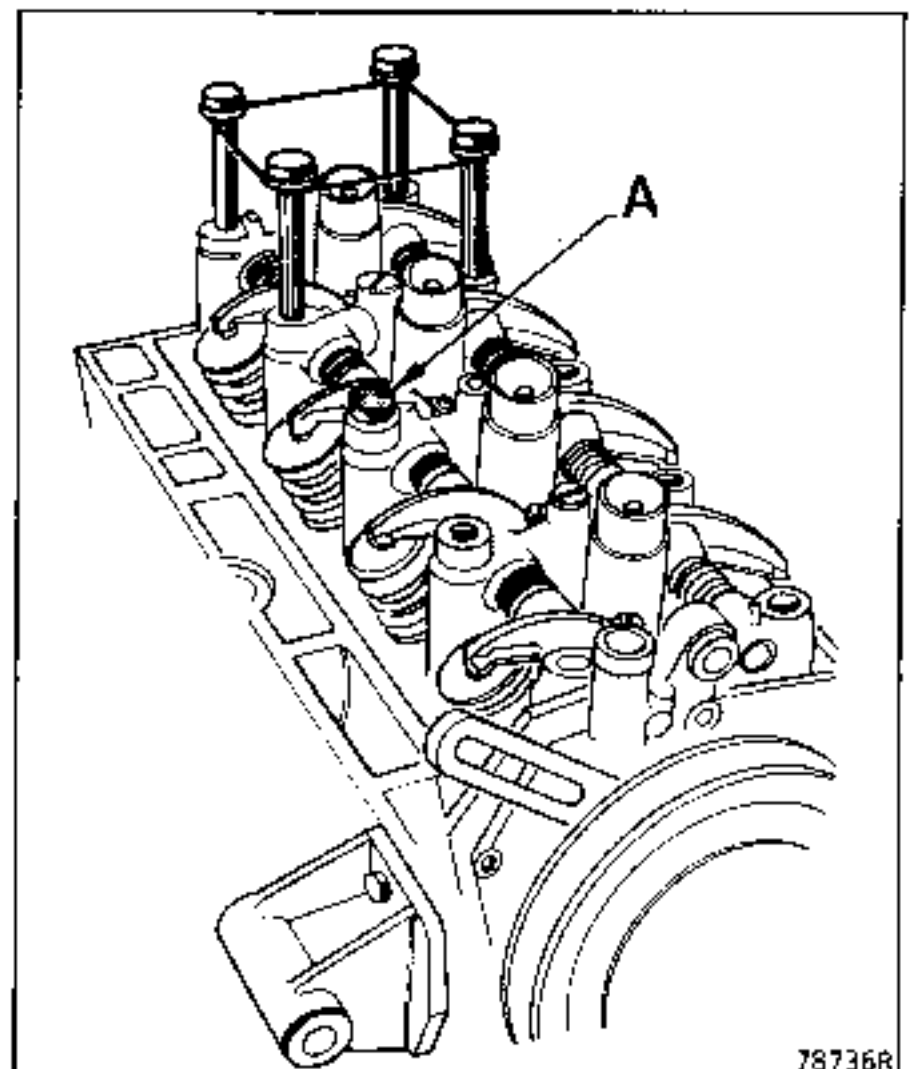
- Auxiliary components on the cylinder head (e.g. inlet manifolds, exhaust manifolds, turbo-charger, ignition or distributor).
- The rocker cover.
- The pushrods and lay them out in order.
- The cylinder head bolts except bolt (A) which is only slacked off because the locating dowel on the cylinder head is under centre bolt (A) on the ignition distributor side.

Engines : All types except 840 - C6J - C7K



8D469R

Engines: 840 - C6J - C7K

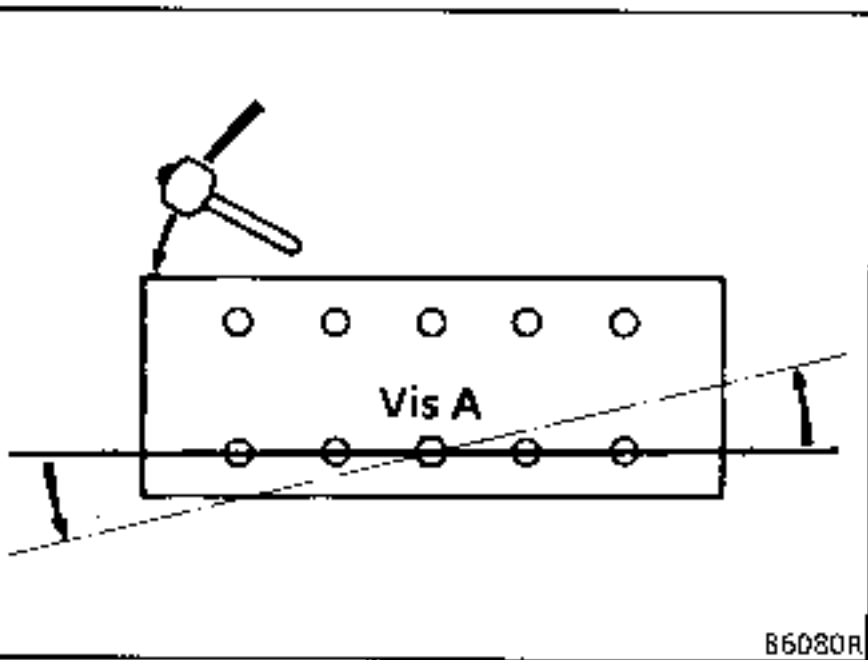


78736R

The cylinder head must not be lifted as the gasket adheres to the head, block and liners. Any attempt to lift the block would break the watertight seal at the bottom of the liners and allow foreign bodies to enter the sump.

The cylinder head must be pivoted round the locating dowel (bolt still in position) in order to unstick it from the block.

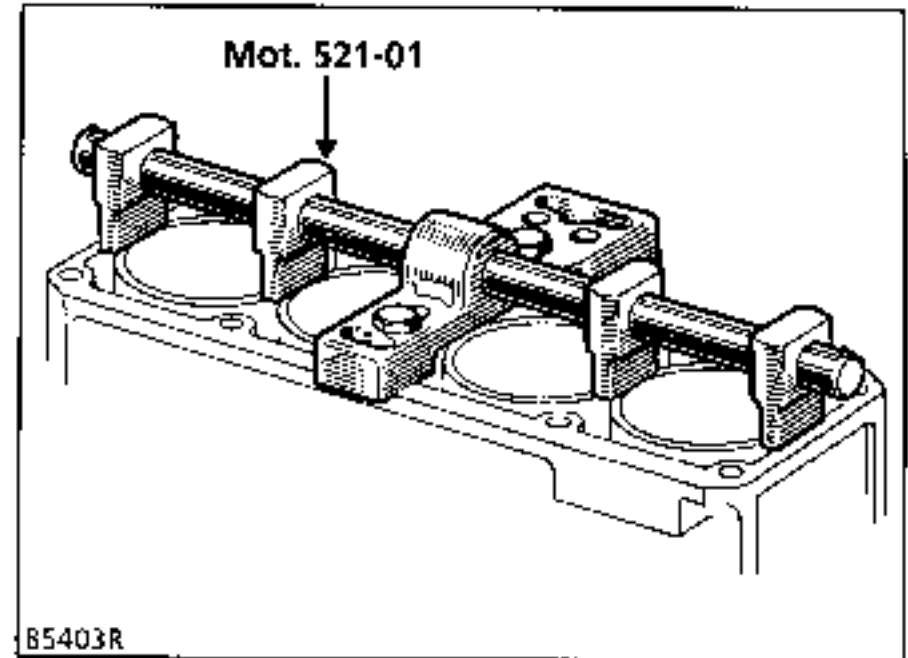
Tap each end of the cylinder head on the side with the plastic hammer to unstick it, applying the hammer so that rotation will be in a horizontal direction.



Remove the mounting bolt (A).

Remove the cylinder head.

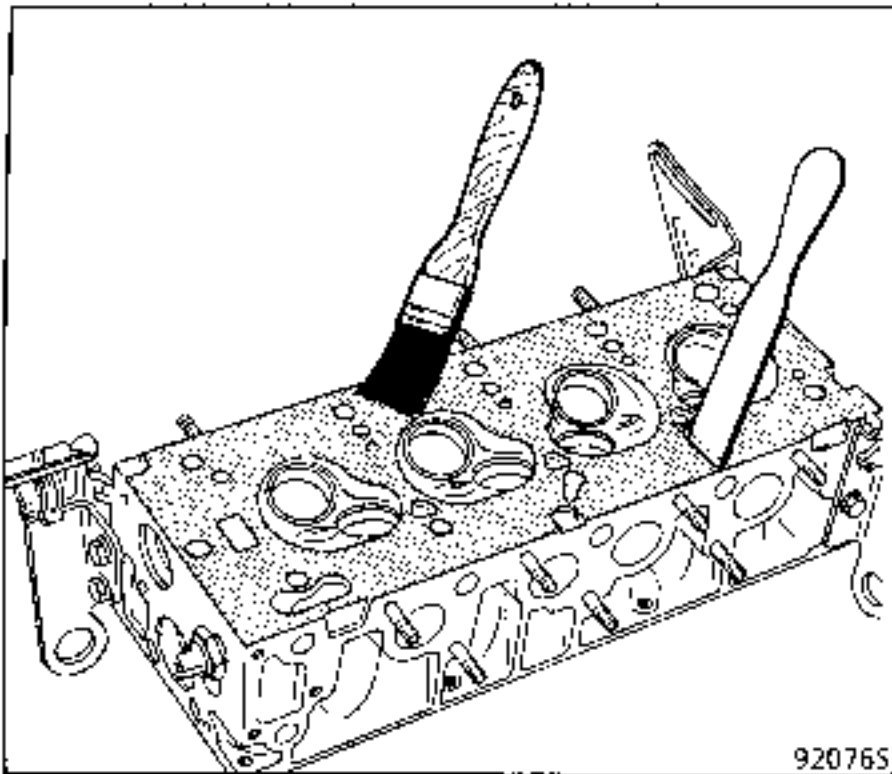
Fit the liner clamp Mot. 521-01.



Remove the rocker shaft.

CLEANING

- It is very important not to scratch the surfaces of aluminium parts.
- Use Décapjoint to dissolve any remains of gasket.
- Apply the product to the area to be cleaned; wait for about 10 minutes then remove using a wooden spatula.



- Gloves should be worn during this operation.

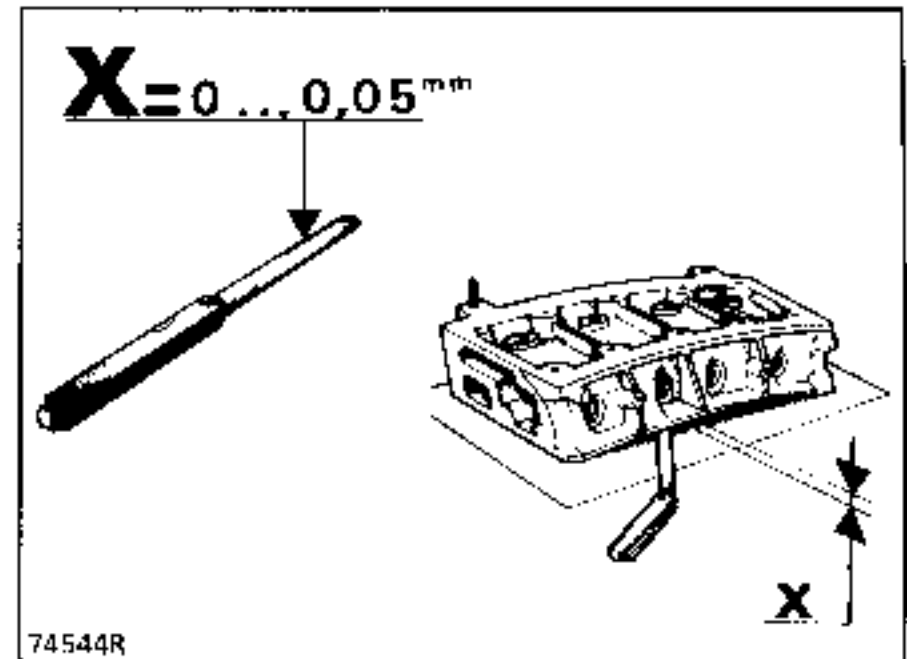
This operation should be carried out with extreme care, so that foreign bodies are not introduced into the oilways that bring oil, under pressure, to the rocker shaft (the oilways are located in both the cylinder block and the cylinder head).

If these instructions are not followed, the jets on the rockers may become blocked and this will cause the cams and rocker shoes to deteriorate quickly.

CHECKING CYLINDER HEAD BOW

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

Max. deformation (X) = 0.05 mm.



Engines : All Types except 840 - C6J - C7K

Resurface if necessary.

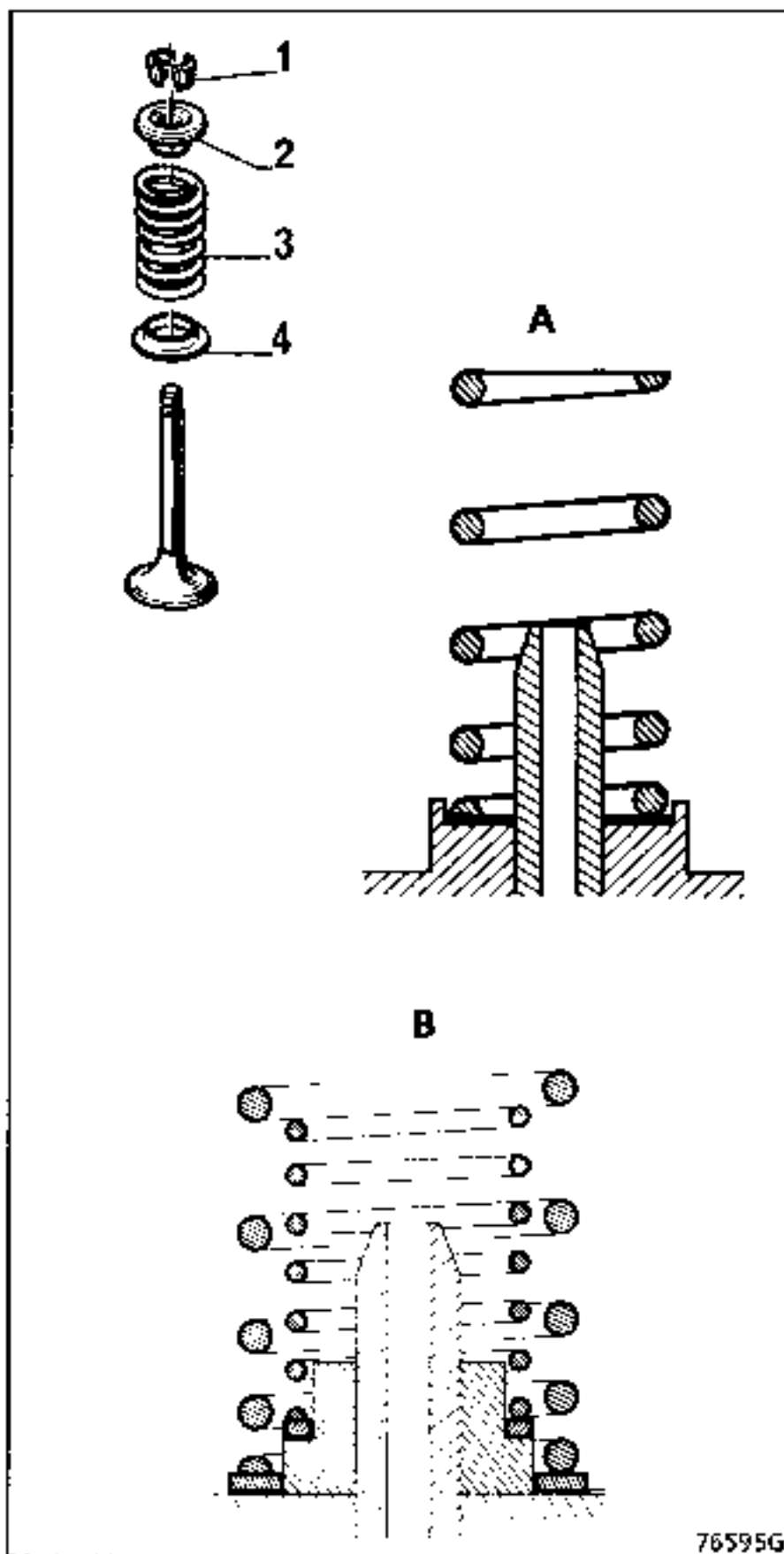
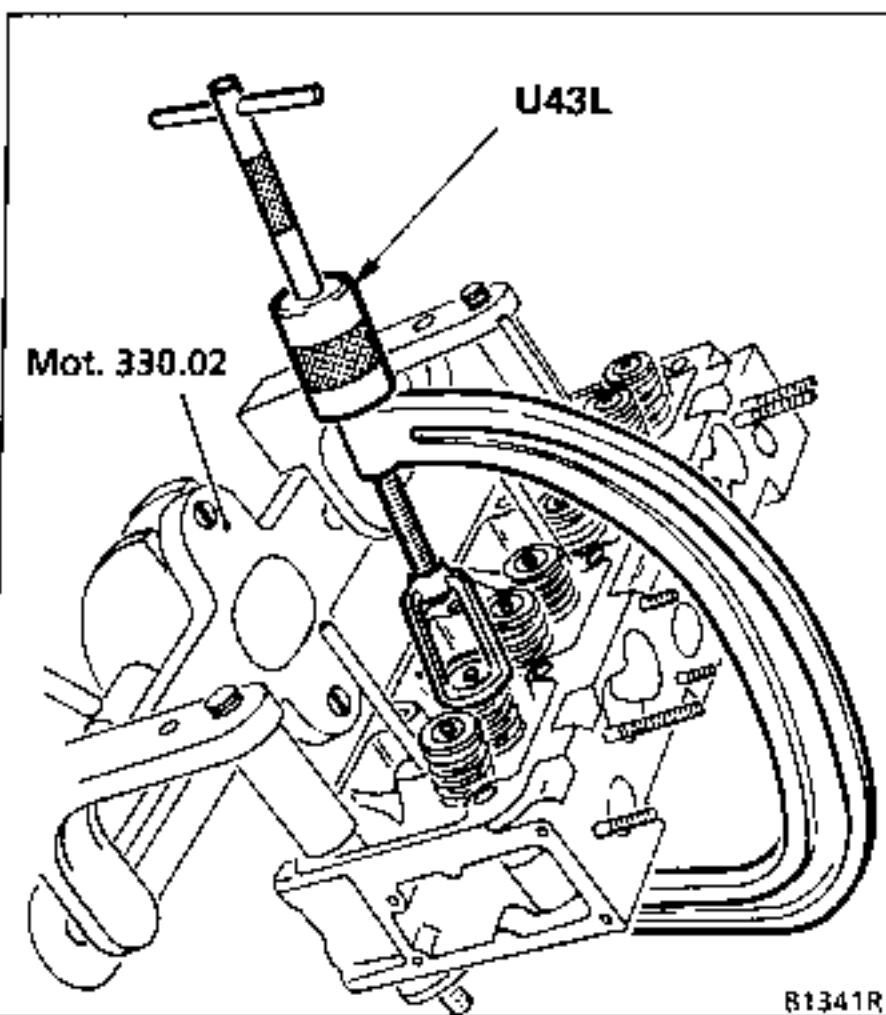
Engines: 840 - C6J - C7K

No resurfacing permitted.

- Fit the cylinder head on the support Mot. 330-02.

Use a tool of the Facom U43L type:

- To compress the valve springs and remove:
 - the half-collets (1),
 - top cups (2),
 - springs (3) with the closest coil towards the cylinder head,
 - the base washers (4).



A : All types except 840 - C6J - C7K
B : 840 - C6J - C7K

IDENTIFYING THE HALF-COLLETS

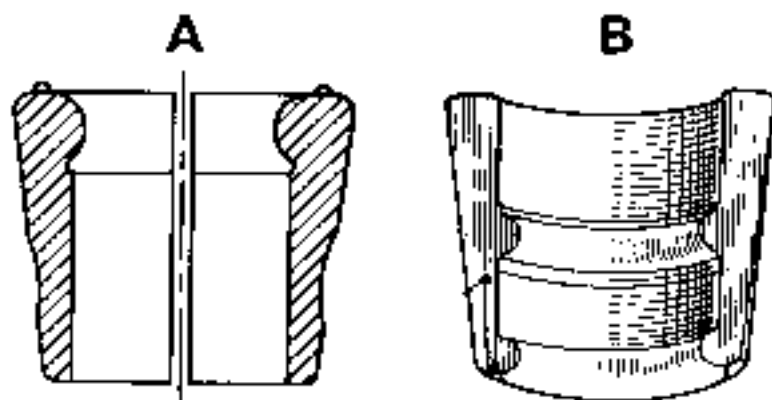
Engines : All types except 840 - C6J - C7K

Two types of assembly :

The valve stems are retained by half-collets (A) for the inlet, and half-collets (B) for the exhaust.

or

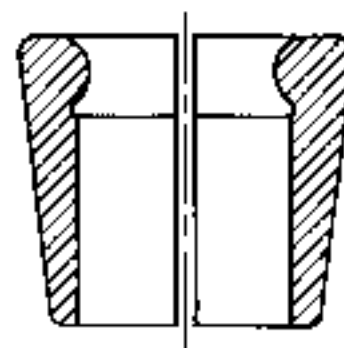
The inlet and exhaust valve stems are equipped with identical half-collets (B).



88555-1R

Engines : 840 - C6J - C7K

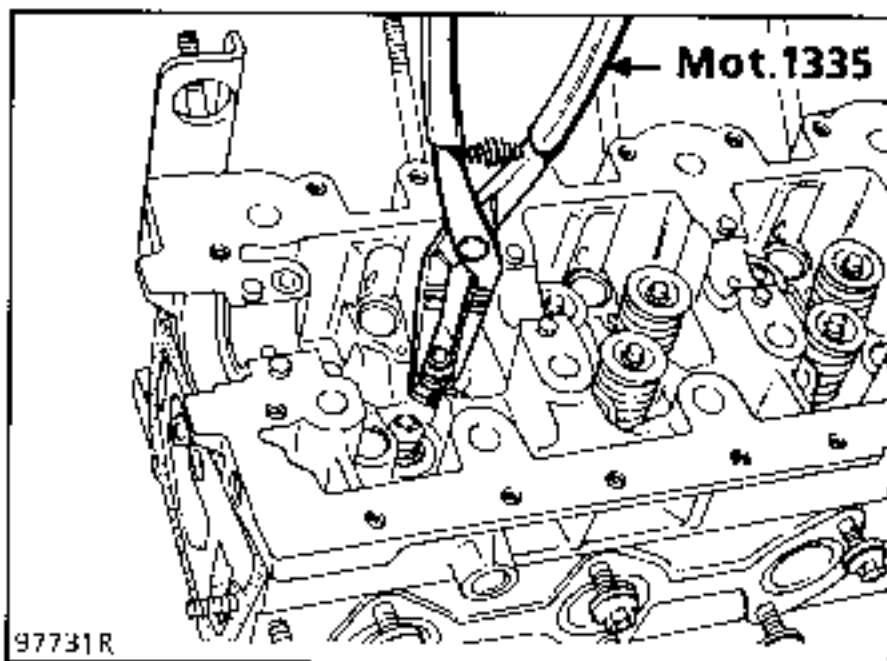
The inlet and exhaust half-collets are identical.



88555S

Remove :

The half-collets, upper cups, springs, valves, valve stem seals using pliers (Mot. 1335) and the lower cups.



97731R

Place the parts in the correct order.

RESURFACING THE VALVE SEATS

INLET AND EXHAUST

Engines : All types except 840 - C6J - C7K

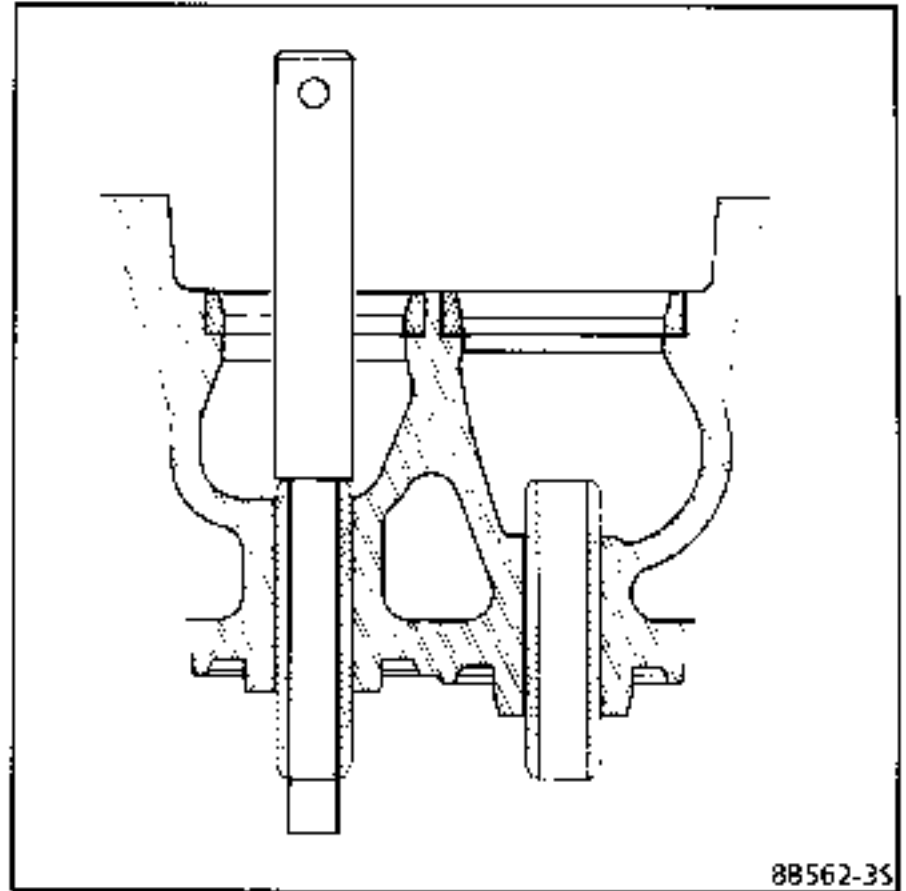
	1st model	2nd model
Seat angle: (α)	120°	90°
- Inlet		
- Exhaust		90°
Seat width (mm) (X):		
- Inlet	1.1 to 1.5	
- Exhaust		

Engines : 840 - C6J - C7K

Seat angle: (α)	
- Inlet	90°
- Exhaust	
Seat width (mm) (X):	
- Inlet	1.5 to 1.8
- Exhaust	1.7 to 2

- The seat is resurfaced using 7 and 8 mm dia. pilots and cutters 208 and 213 (depending on version).

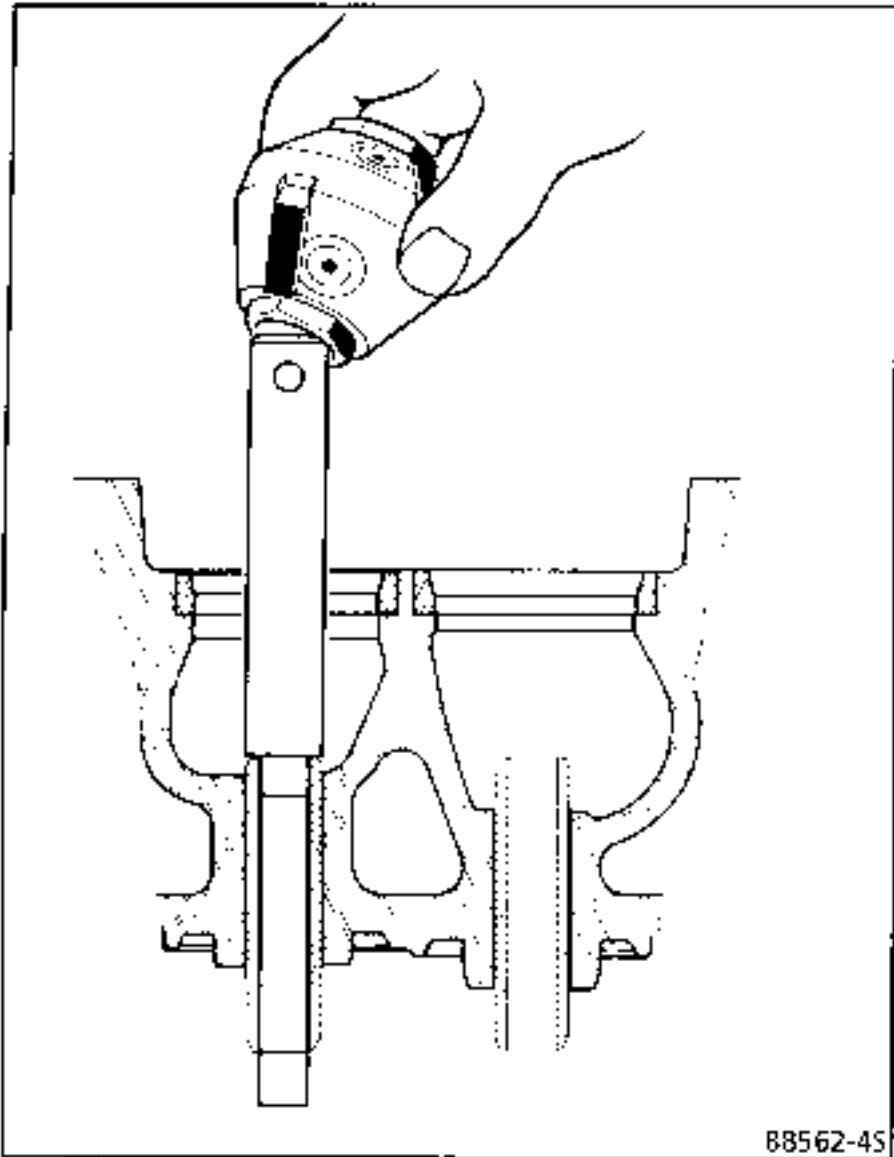
Insert the correct pilot in the valve guide.



Select a cutter to match the type of seat to be re-cut.

Adjust the position of the blades to suit seat diameter.

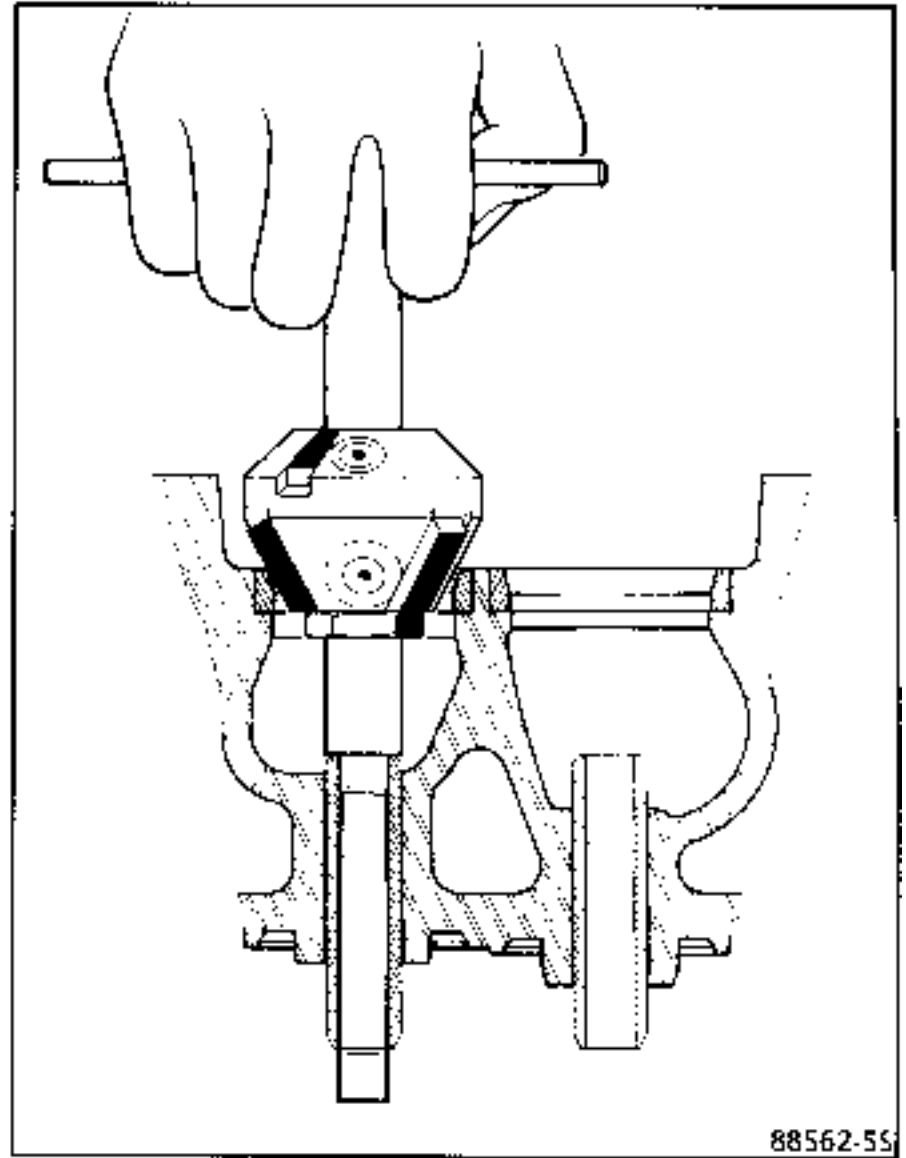
Slip the cutter over the pilot; do not let it fall on to the seat.



88562-4S

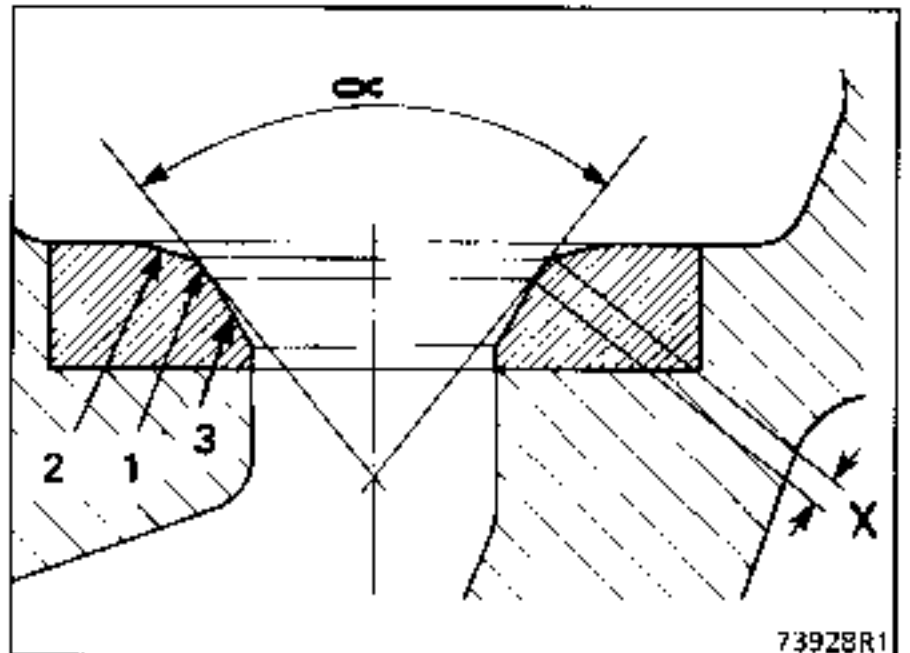
Fit the "T"-handle.

Rotate the "T" handle and press lightly.



88562-5S

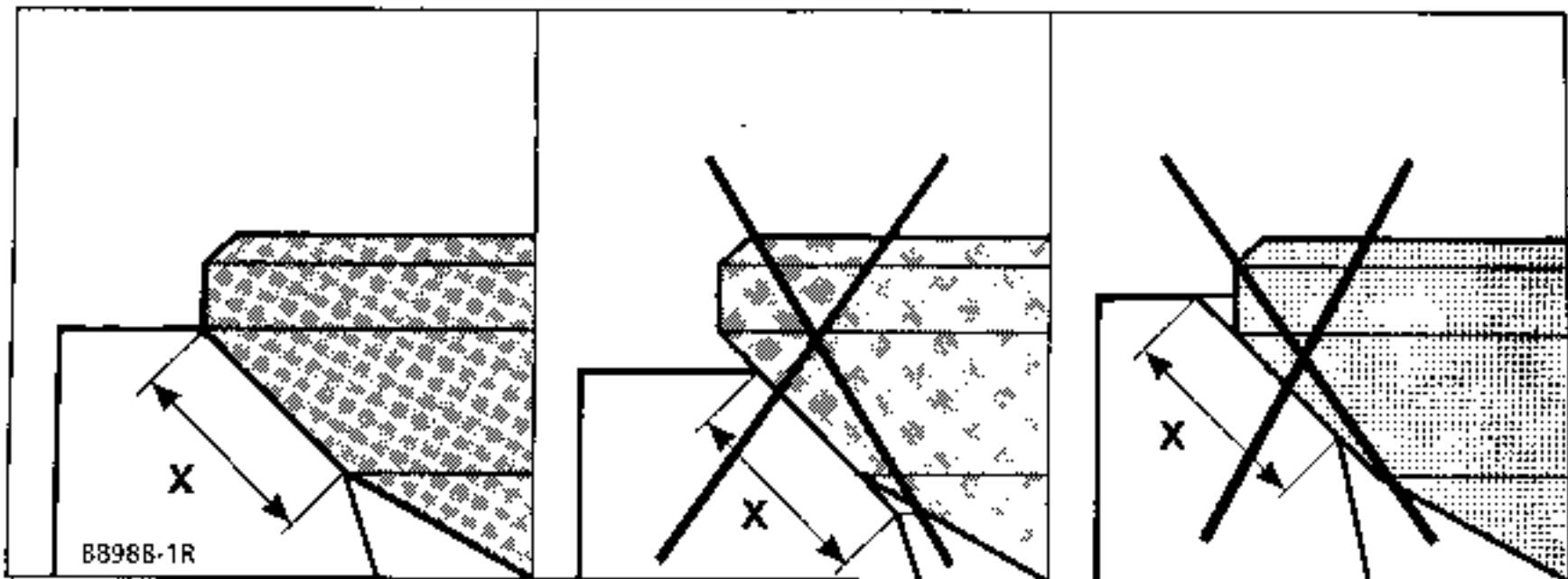
Once a good seat width has been obtained (1) make cuts at (2) and (3) to obtain the width (X) (as indicated on the previous page).



73928R1

Carefully clean the cylinder head.

NOTE : Ensure the valve is seated correctly as shown below.



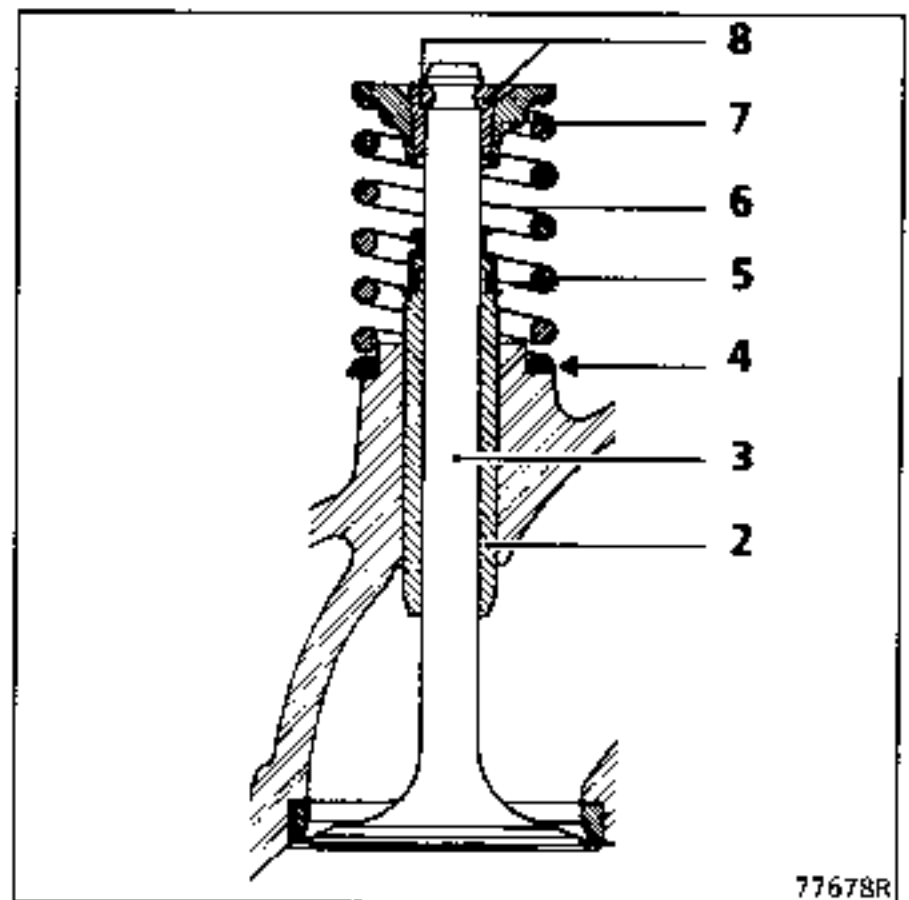
REFITTING THE CYLINDER HEAD

For a new cylinder head:

- Fit manifold mounting bolts to the new cylinder head.

For a reused cylinder head:

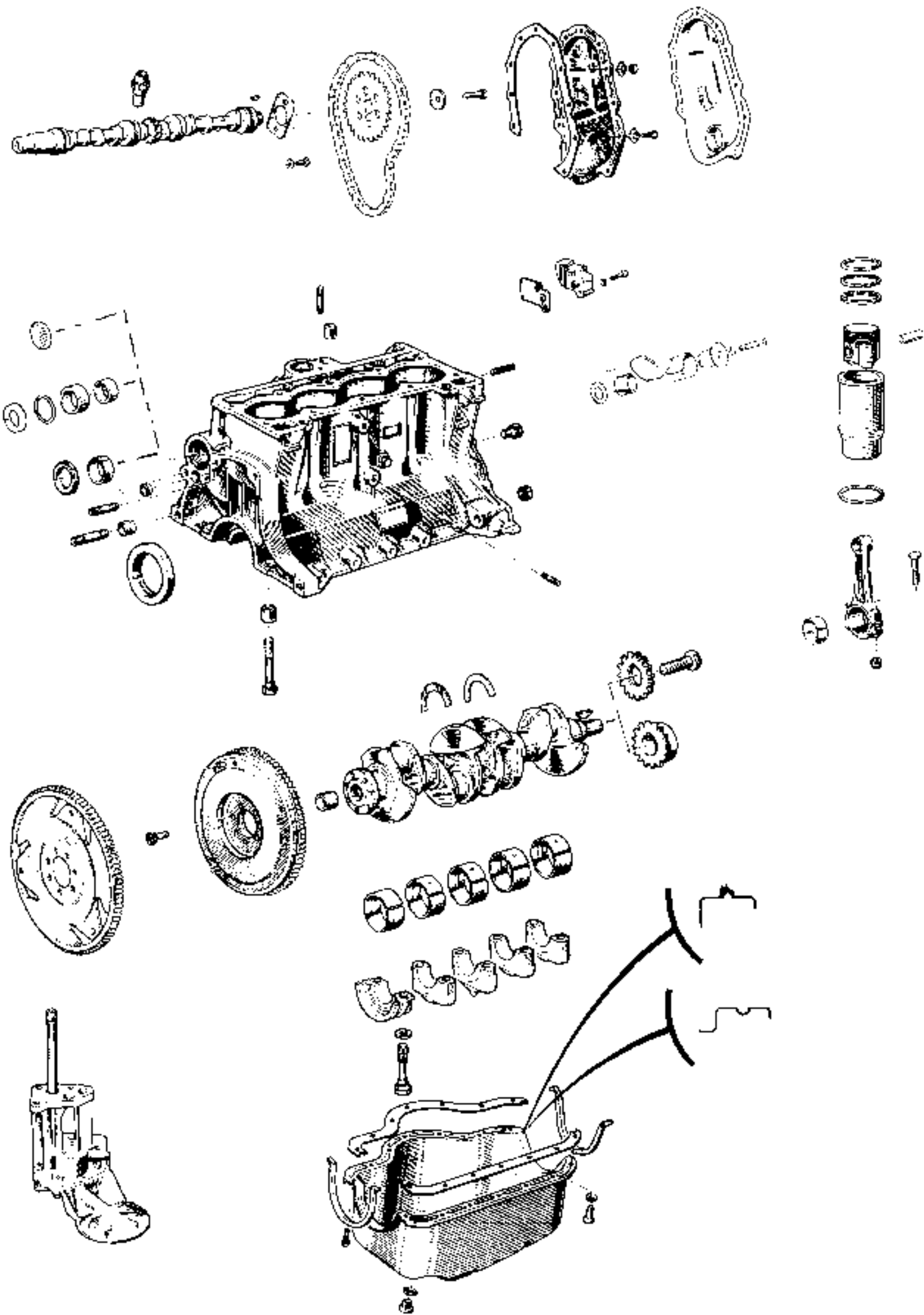
- Fit new valves (3) and grind them gently on to the corresponding seat. Clean them thoroughly and then mark all the parts before refitting them.
- Lubricate all the parts.
- Fit the base washers (4) for the springs.
- Fit the seals (5) on the valve guides (2).
- Fit the new valves in order (3).
- Fit the springs (6) (identical for inlet and exhaust).
- Fit the cups (7).
- Compress the springs.
- Fit the half-collets (8).



77678R

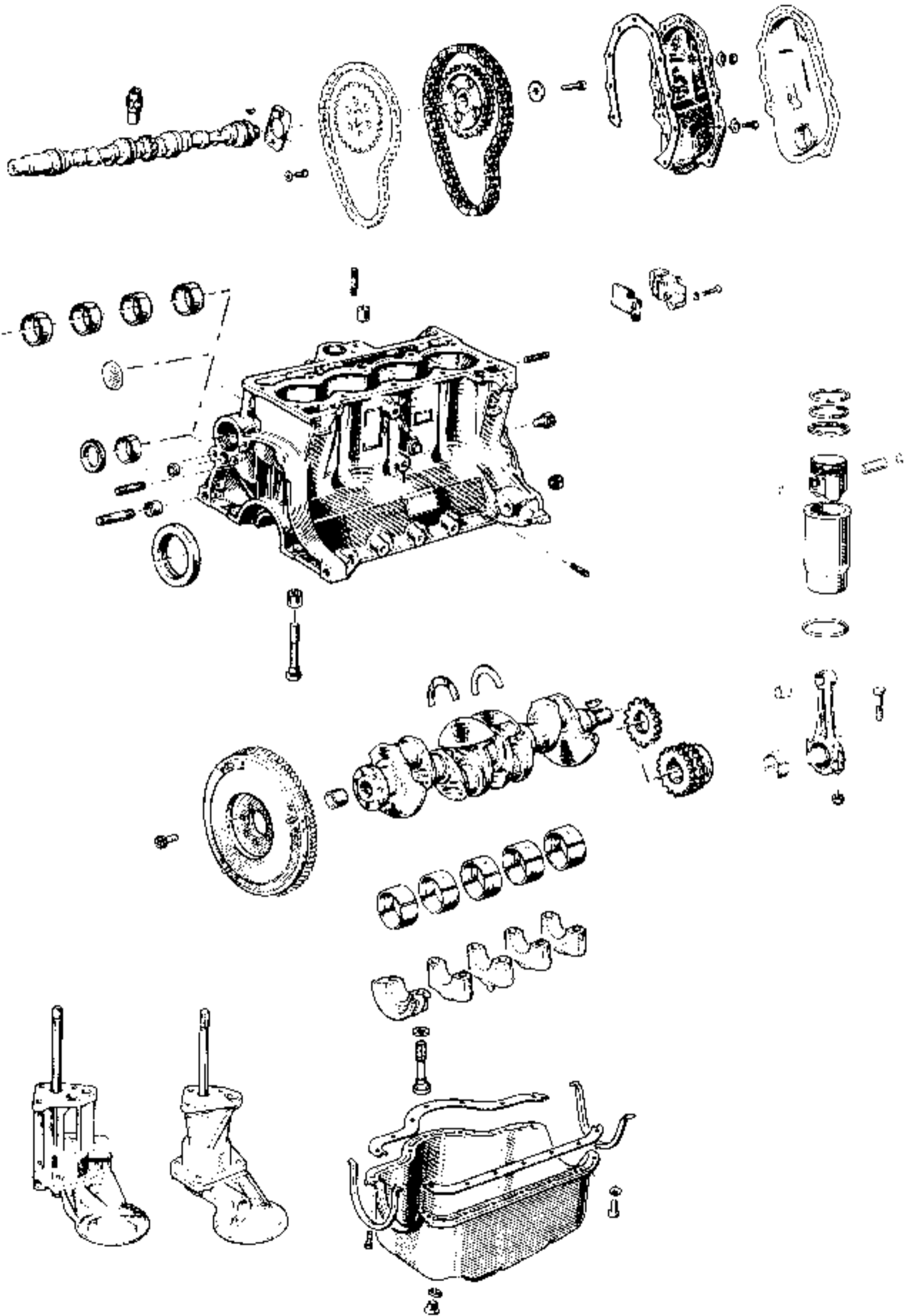
EXPLODED VIEW OF CYLINDER BLOCK

Engines : All types except 840 - C6J - C7K



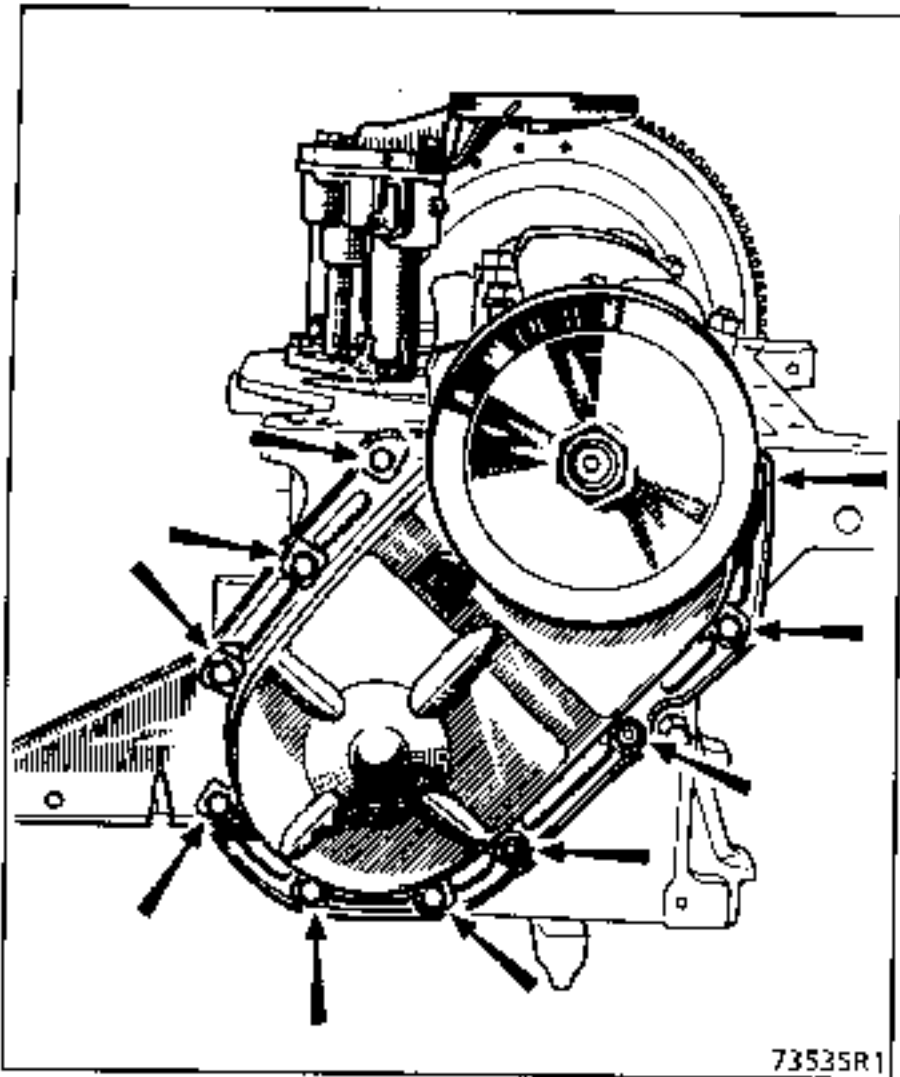
EXPLODED VIEW OF CYLINDER BLOCK

Engines: 840 - C6J - C7K



Remove :

- The sump
- The crankshaft sprocket (if the engine is fitted with one),
- the timing cover.



Clean the various seal and gasket mating surfaces.

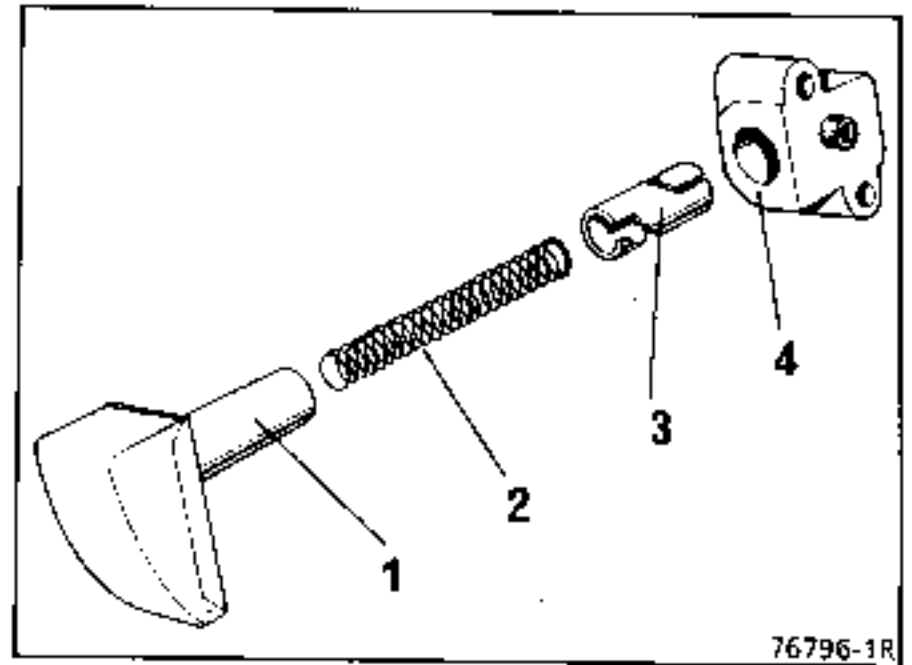
REMOVING THE CHAIN TENSIONER

Attention :

There are two different chain tensioners fitted :

- 1) Hydraulic tensioner with automatic pre-setting.
- 2) Mechanical tensioner.

1) Hydraulic tensioner with automatic pre-setting

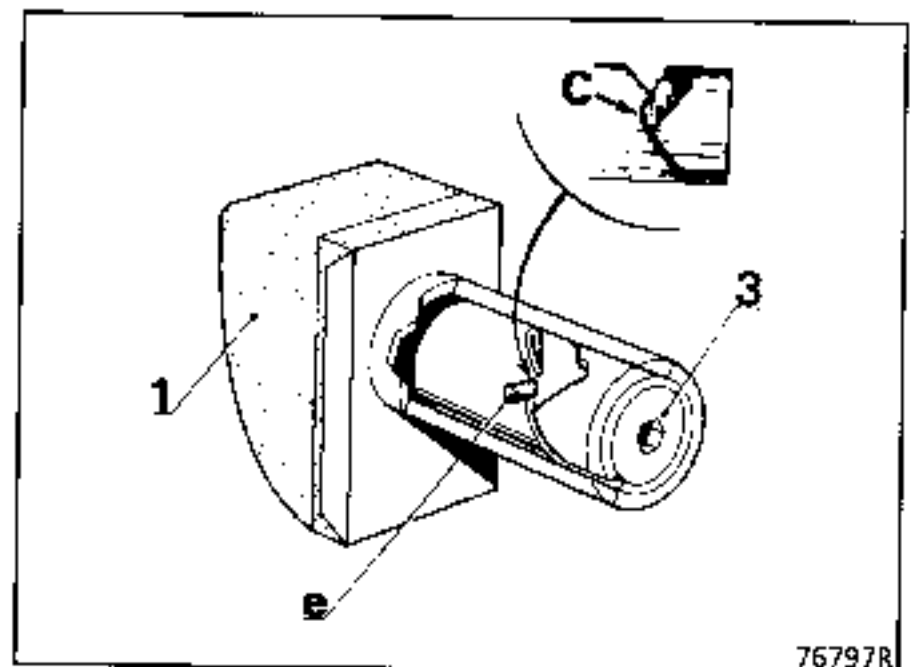


- 1 - Shoe
- 2 - Spring
- 3 - Piston
- 4 - Tensioner body

The helix keeps piston (3) locked when peg (e) in the shoe stem locates in slot (c) in the piston.

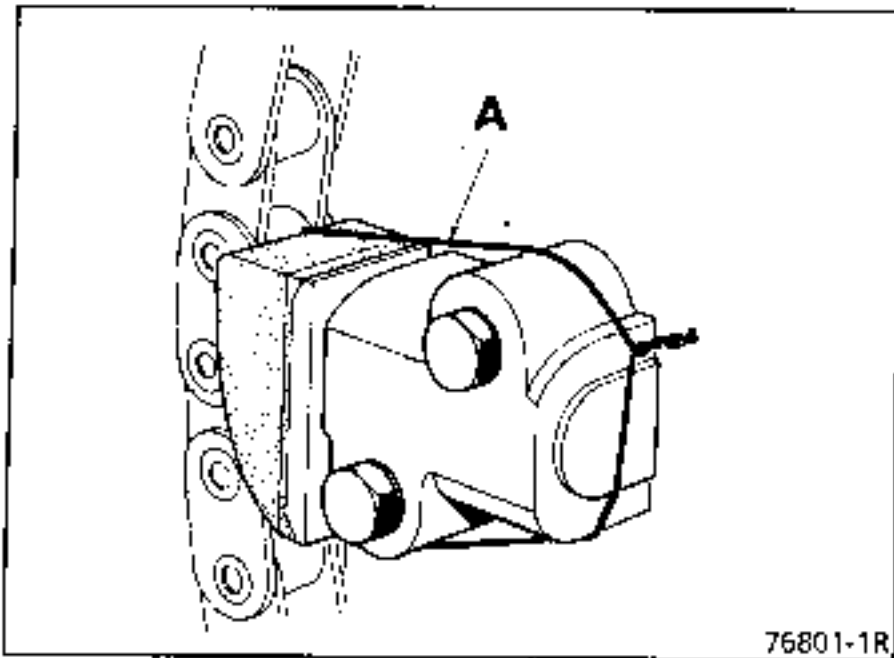
It is a few millimetres proud of shoe stem (1) when the parts are assembled.

The tensioner is set automatically owing to the pressure of piston (3) at the bottom of its location in body (4).



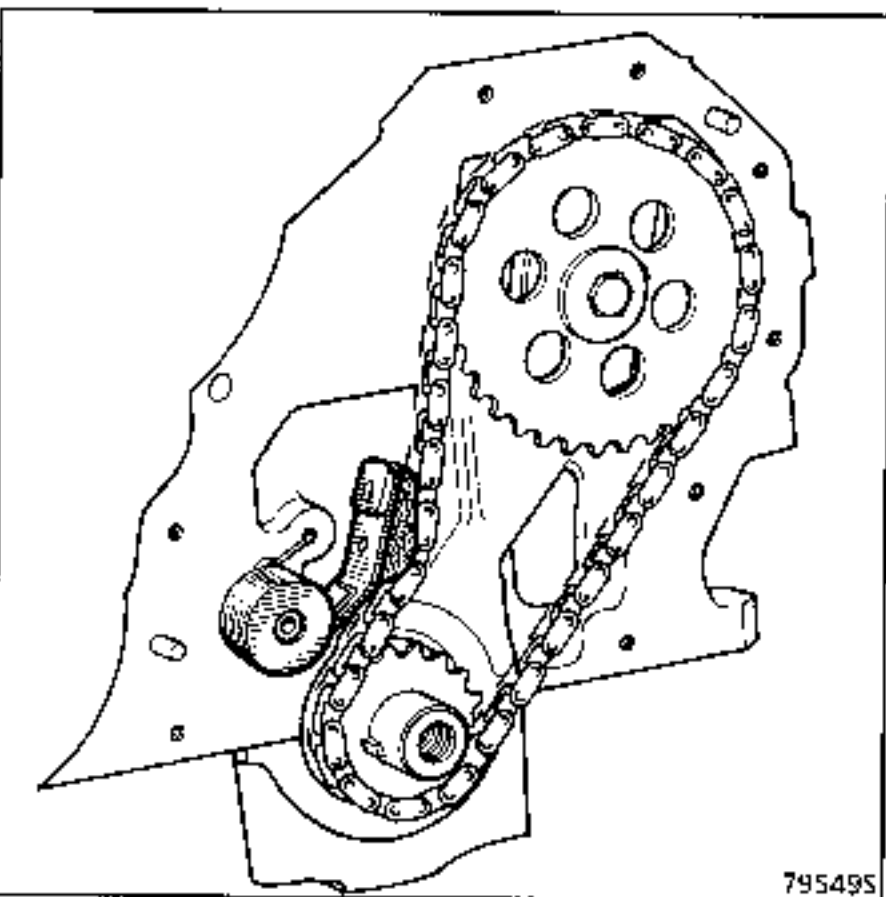
Remove the tensioner and its thrust plate.

Lock the shoe in position with a piece of soft iron wire (A) if the timing chain has to be removed during an operation.



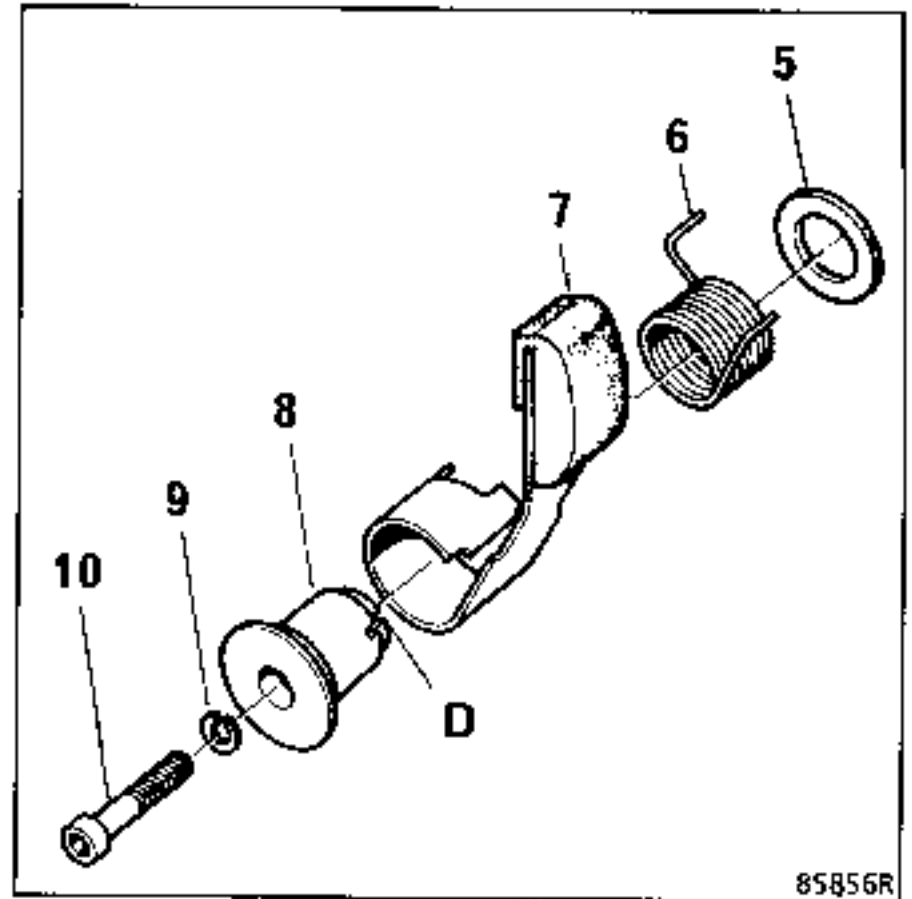
2) Mechanical tensioner

A spring bearing on the cylinder block exerts a load on the shoe which presses against the chain to keep it tensioned.



This tensioner consists of :

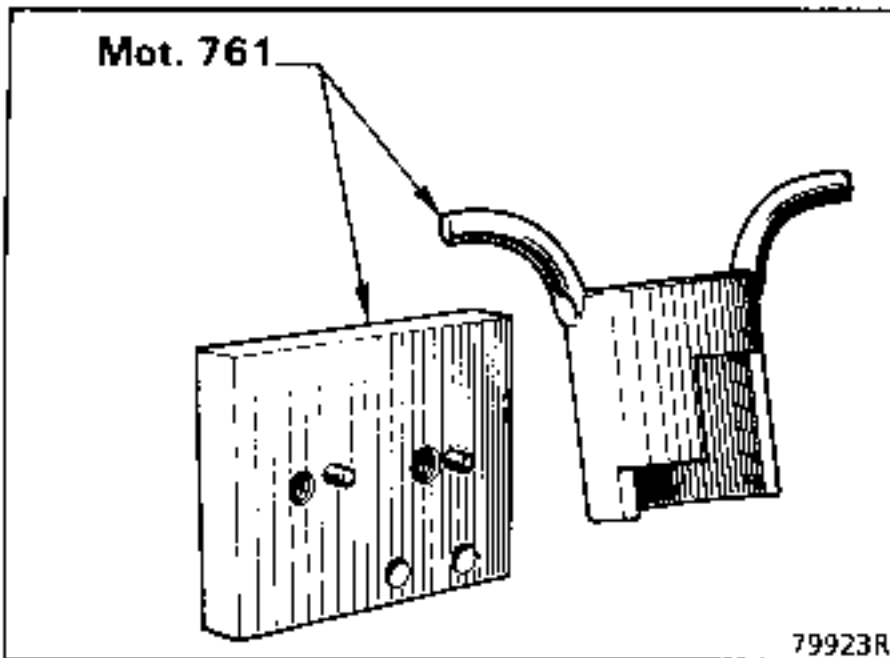
- a shoe (7) resting on the chain,
- a tensioning spring (6),
- a spindle (8) holding the assembly,
- a closing washer (5),
- a screw (10) and spring washer (9).



Tooling

This type of tensioner is fitted and removed more easily by making use of tool **Mot. 761** which comprises:

- an assembly plate for putting the various components together,
- a tool to keep the tensioner compressed when the cylinder block is being fitted or removed.



ADAPTATION OF THIS PATTERN OF TENSIONER

The following modifications are required if this type of tensioner is fitted. The information below is given as a guide:

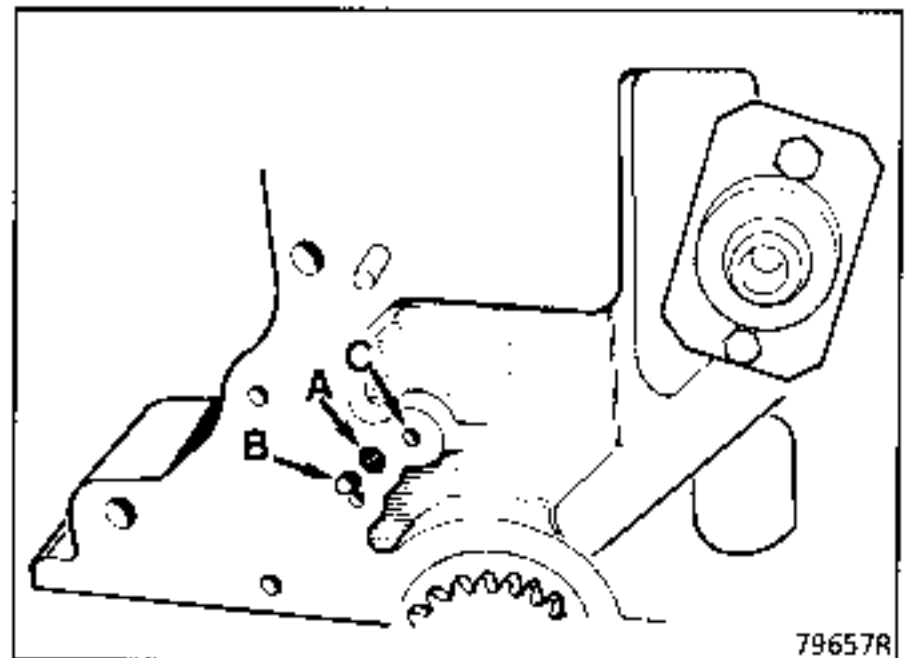
This type of tensioner may only be fitted to a cylinder block which has the camshaft oilbath.

The timing chain is lubricated by the oil return from the oilbath.

The following modifications must be made to the cylinder block:

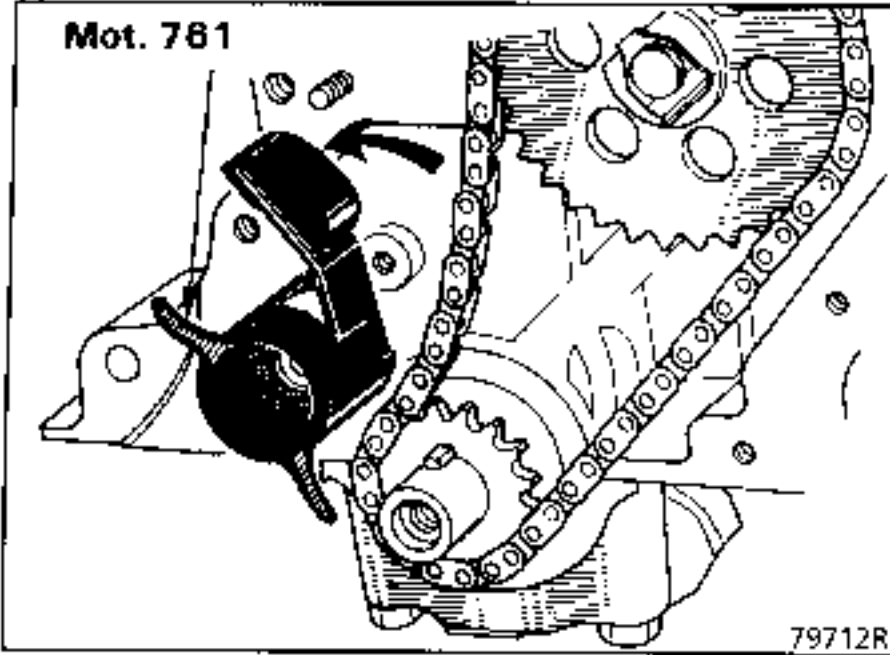
- oilway (A) feeding the hydraulic tensioner must be plugged,
- a 3mm dia. peg (B) must be fitted to prevent the tensioner spindle from rotating.

The end of the spring is hooked into hole (C).



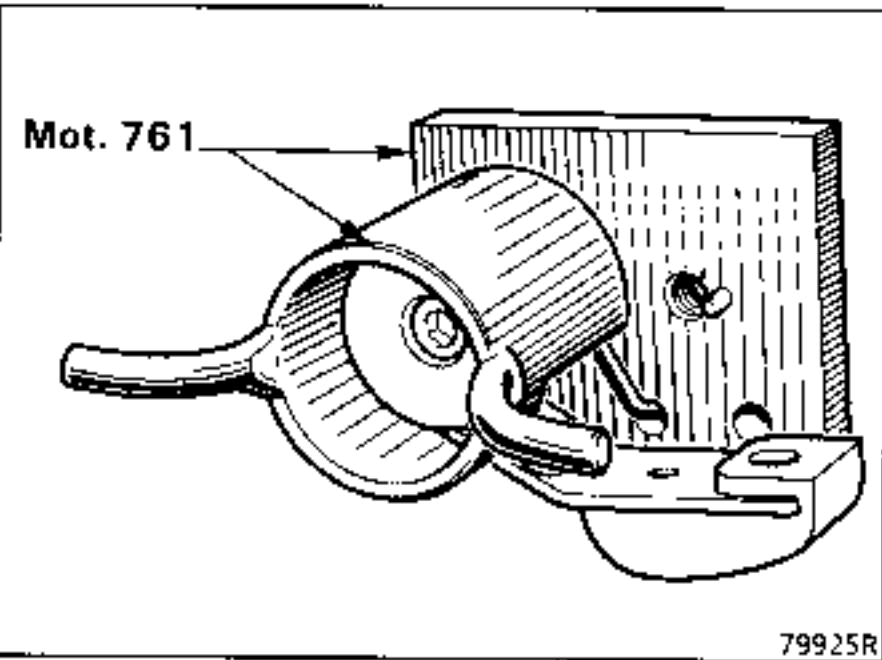
Tilt the tensioner as far as it will go and fit retainer Mot. 761.

Remove the tensioner retaining tool.



Use the assembly plate from Mot. 761 to disconnect the tensioner from the retaining plate.

Fit the assembly to this plate and remove the retaining tool by tilting the tensioner as far as it will go.



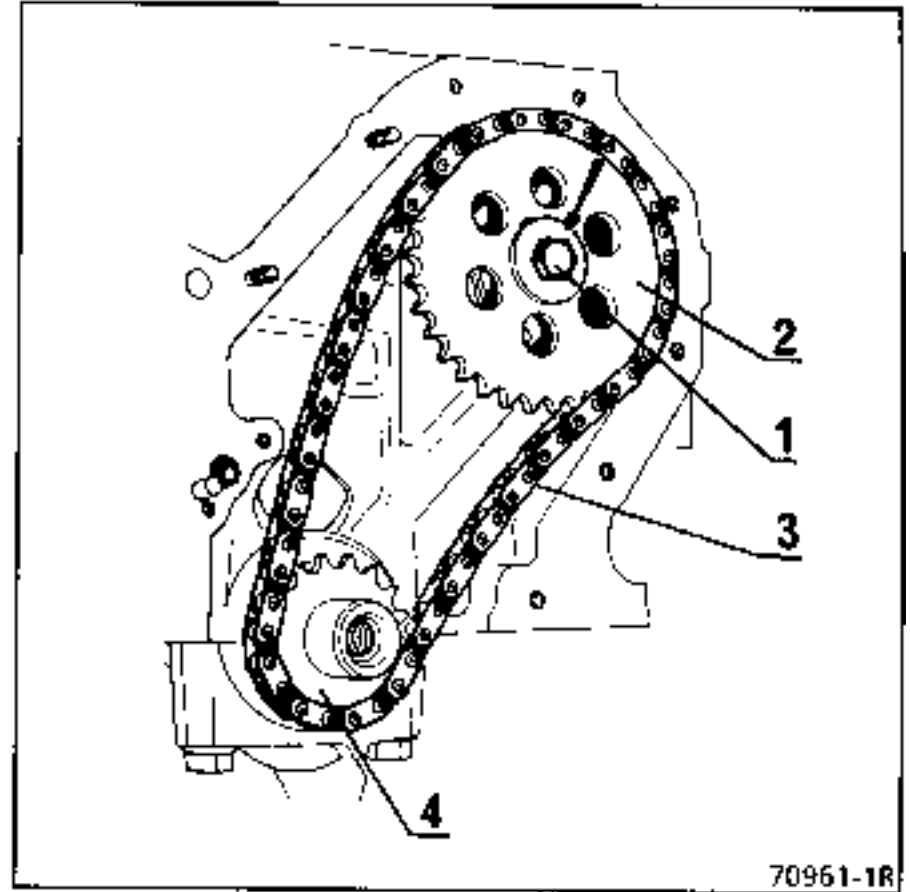
REMOVING THE TIMING CHAIN AND SPROCKETS

There are two types of timing chains:

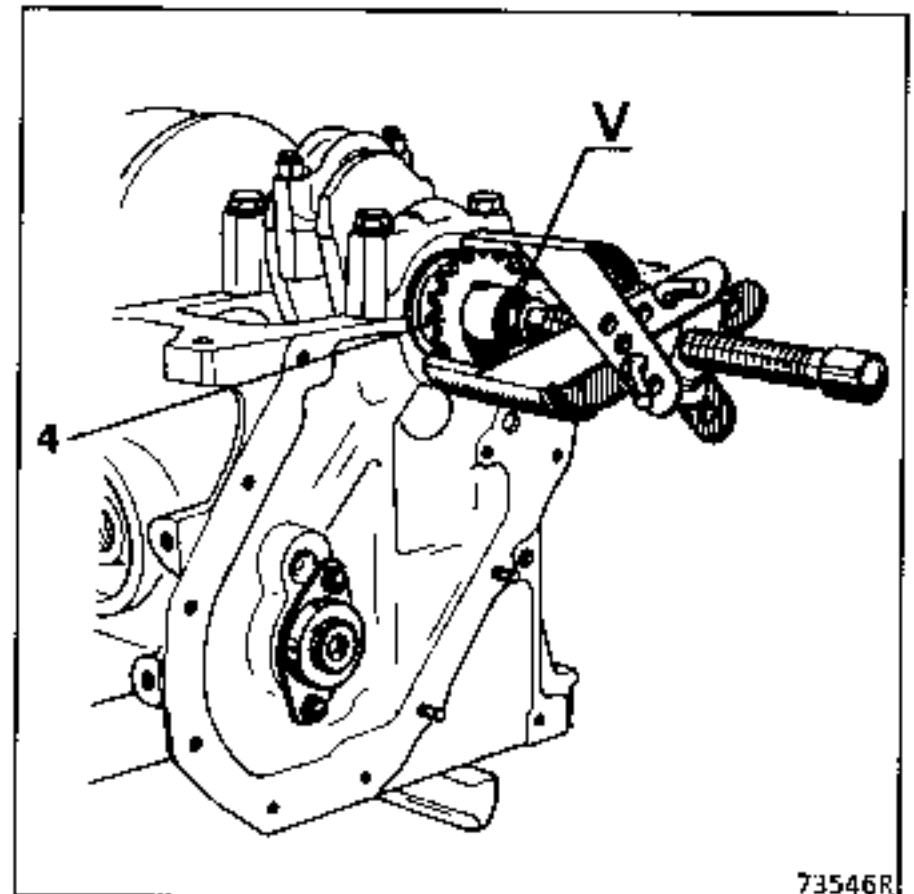
- and single chain, and
- a duplex chain.

Single chain

Remove bolt (1), washer, camshaft sprocket (2) and then the chain (3).



Remove crankshaft sprocket (4) using an extractor, if required. (Insert a bolt (V) which must be centred with a drill bit.)



Remove the key.

Duplex chain

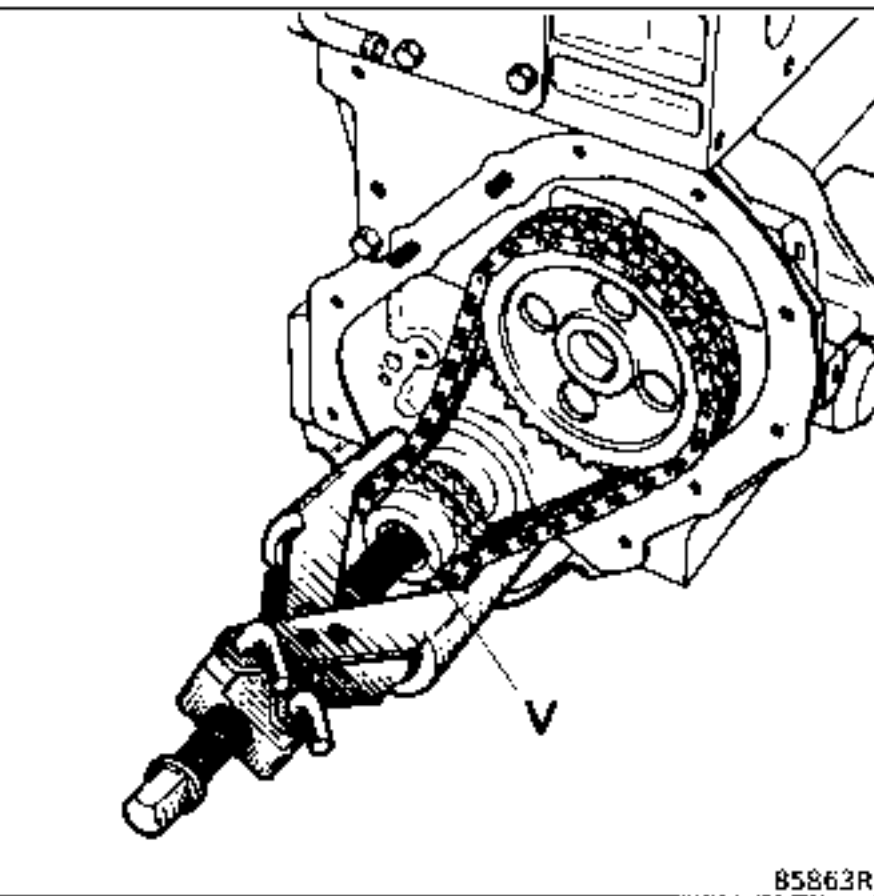
The camshaft sprocket is fixed :

- either as a press-fit (non-drilled camshaft),
- or as a press-fit and held by a bolt and a washer (drilled camshaft).

When carrying out any operation requiring the timing gear (chain, sprockets) to be changed, without any work being necessary on the camshaft, make a 1st drilling of 6 mm dia. and 30 mm deep then a 2nd drilling of 6.75 mm dia. then tap to M8 pitch 1.25 mm.

This is to facilitate positioning of the camshaft sprocket when refitting it.

Use an extractor to withdraw the crankshaft sprocket and camshaft sprocket together. (Insert a bolt (V) with a centre point formed by a drill bit.)



Remove the key.

REPLACING THE CAMSHAFT

Special points

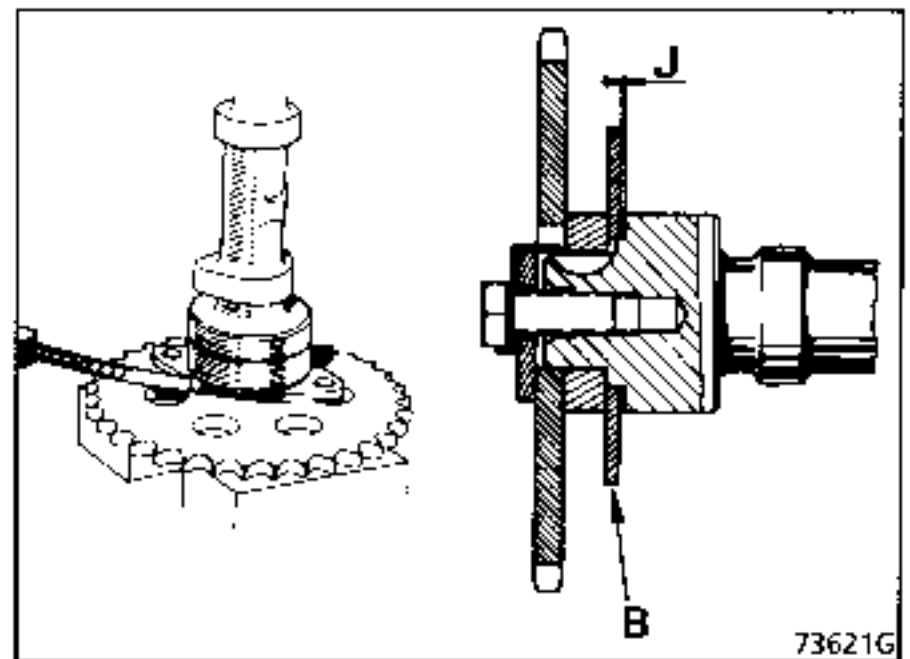
If the camshaft has to be removed, it is advisable to remove the cylinder head, the distributor drive gear or the rotor drive gear and the tappets.

Remove the camshaft.

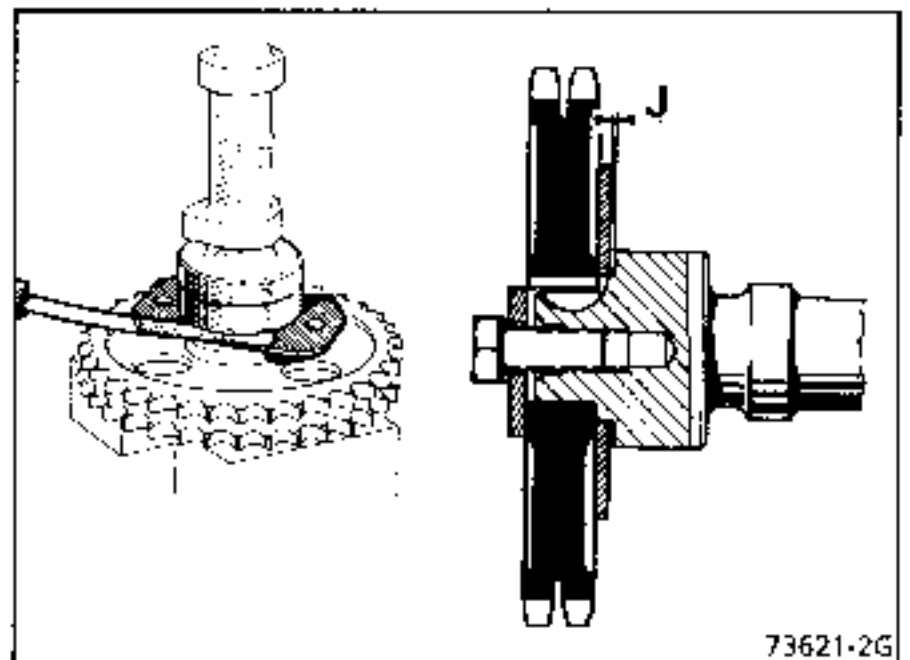
After a camshaft or its flange has been replaced, it is necessary to check firing (J) after the sprocket has been fitted (timing mark facing outwards) and the bolt torque tightened.

$$J = 0.06 \text{ to } 0.11 \text{ mm}$$

Single chain

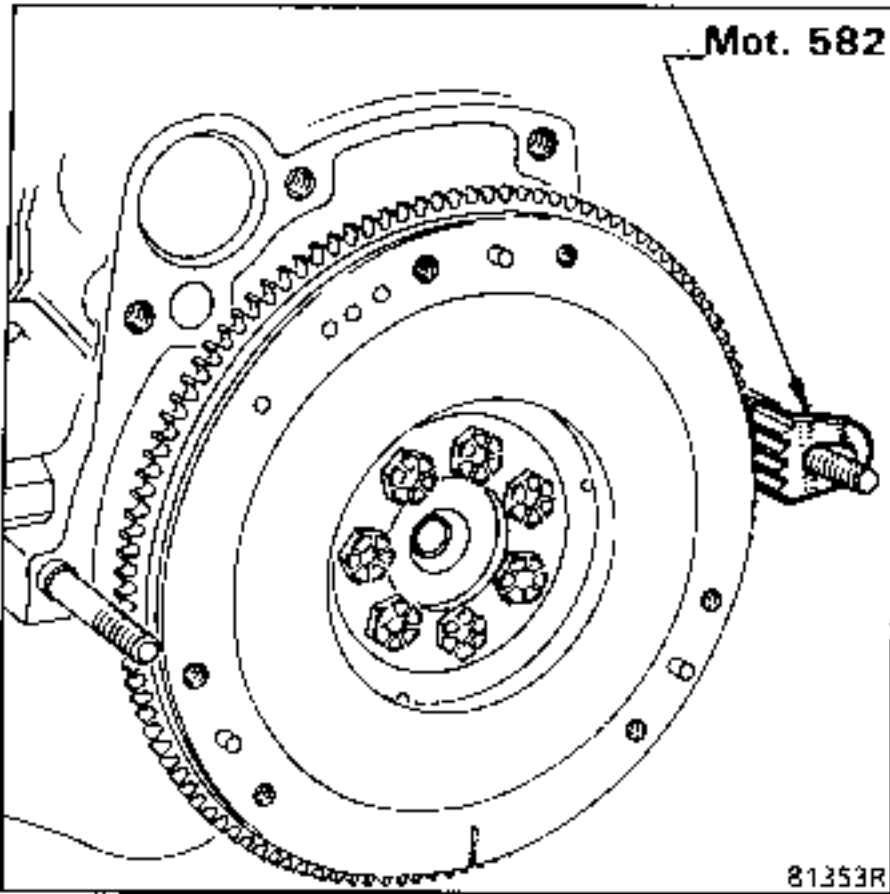


Duplex chain



REMOVING THE CRANKSHAFT

- Prevent the flywheel from turning using tool Mot. 582.



Remove :

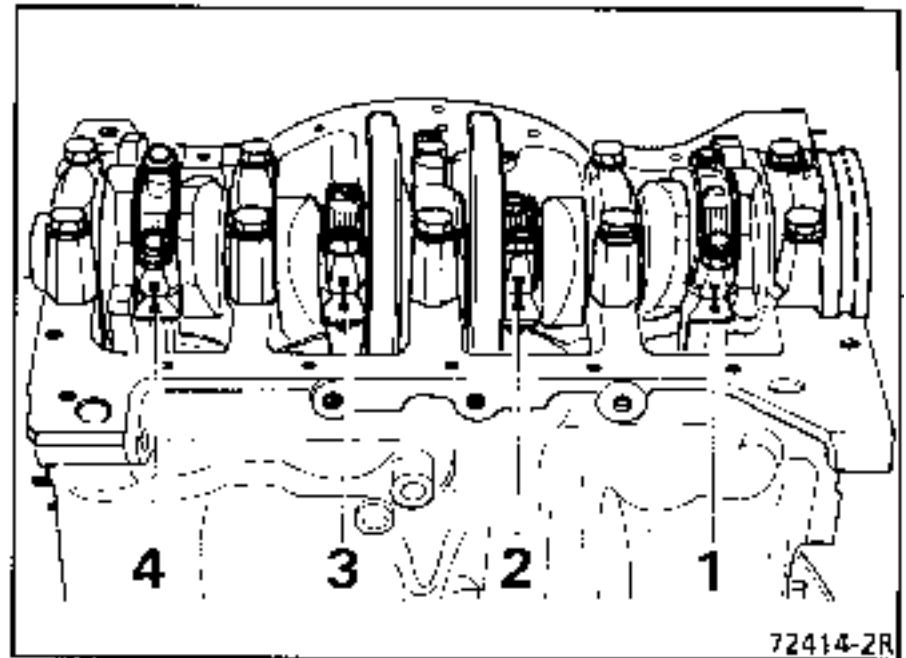
- the clutch disc and mechanism,
- the flywheel or converter drive plate,
- the crankshaft seal,
- the oil pump.

Mark the connecting rods and caps :

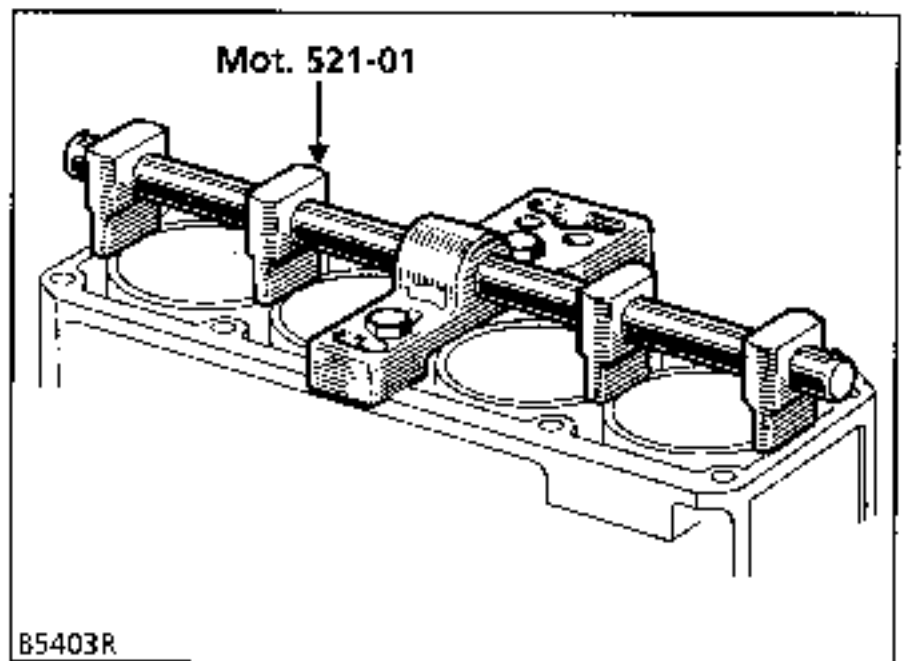
No. 1 on the flywheel end and on the side opposite to the camshaft.

Unscrew the big end cap nuts.

Remove the big end caps and bearing shells.



Remove tool Mot. 521-01 holding the liners.

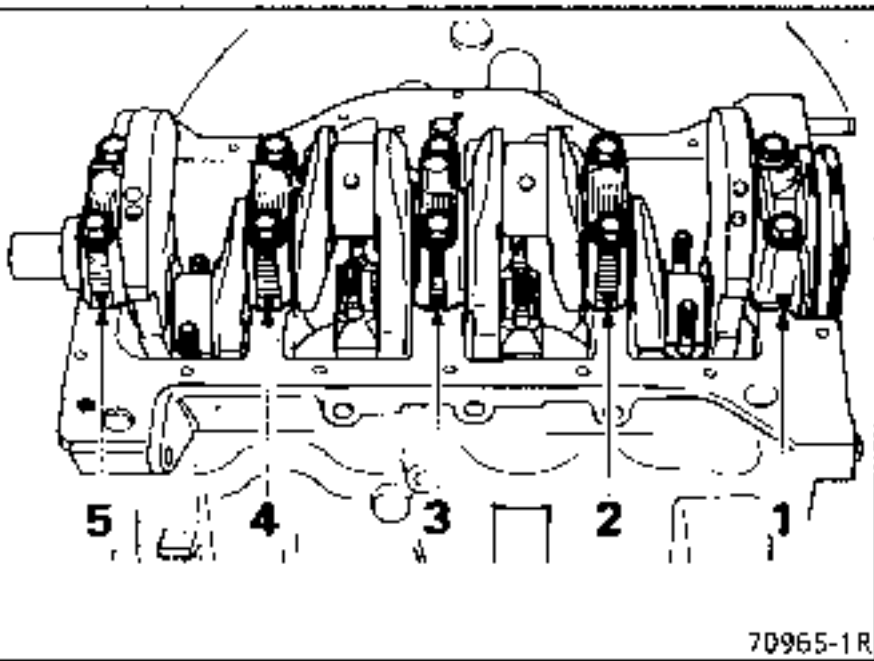


Take out the assemblies (liner, piston, conrod).

Mark the main bearing caps in relation to the cylinder block.

Unscrew the bolts securing the main bearing caps and remove them with their bearing shells.

Remove the crankshaft, thrust washers, main bearing shells and connecting rod shells.



70965-1R

Clean :

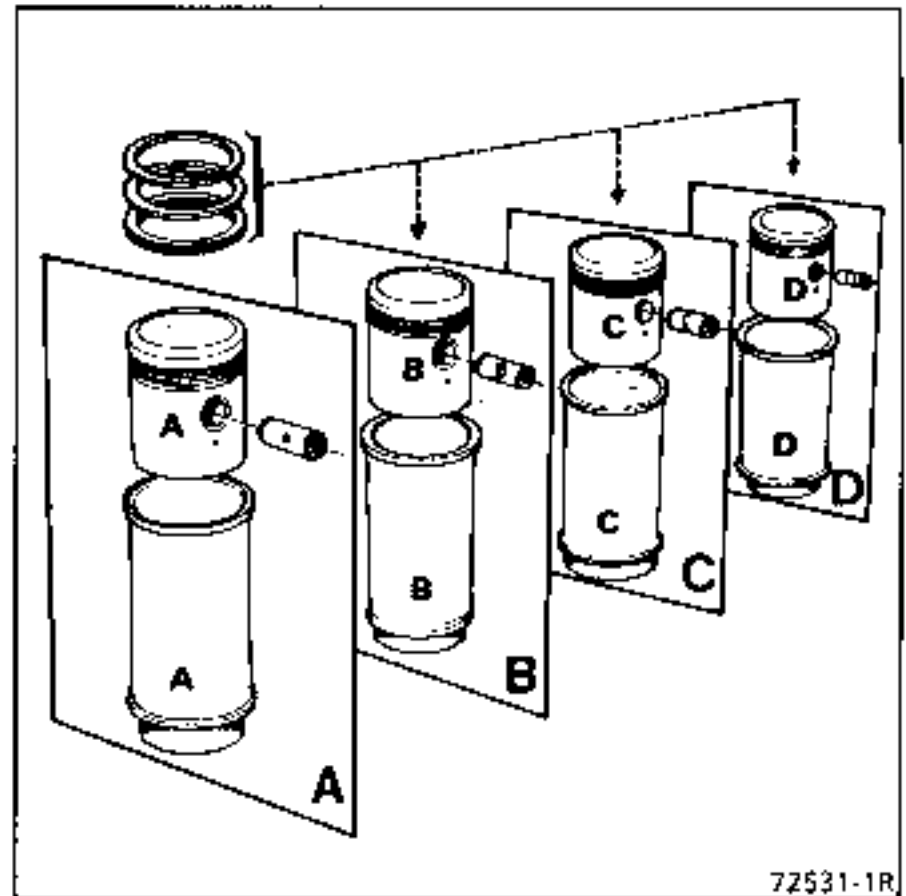
- inside the cylinder block,
- the seats of the liner base seals,
- the crankshaft.

PREPARATION

The components supplied in the "piston - liner" sets are matched.

Mark the parts in each of the containers A to D in order to ensure that they remain matched.

Dissolve the anti-rust film: never scrape the parts.



72531-1R

LINER PROTRUSION

Engines : 688 - C1E - 689 - C1C - 810 - C1G

The above engines are fitted with paper liner base seals (Excelnyl).

Select a blue base seal first and fit one to each liner.

There are three thicknesses of liner base seals:

Colour code	Excelnyl
Blue	0.08 mm
Red	0.10 mm
Green	0.12 mm

Place each liner in the cylinder block.

Press down with your hand to make sure that liner and seal are seating.

Check liner protrusion above the cylinder block face using thrust plate Mot. 252-01 and clock gauge Mot. 251-01.

The correct protrusion should be between 0.04 and 0.12 mm.

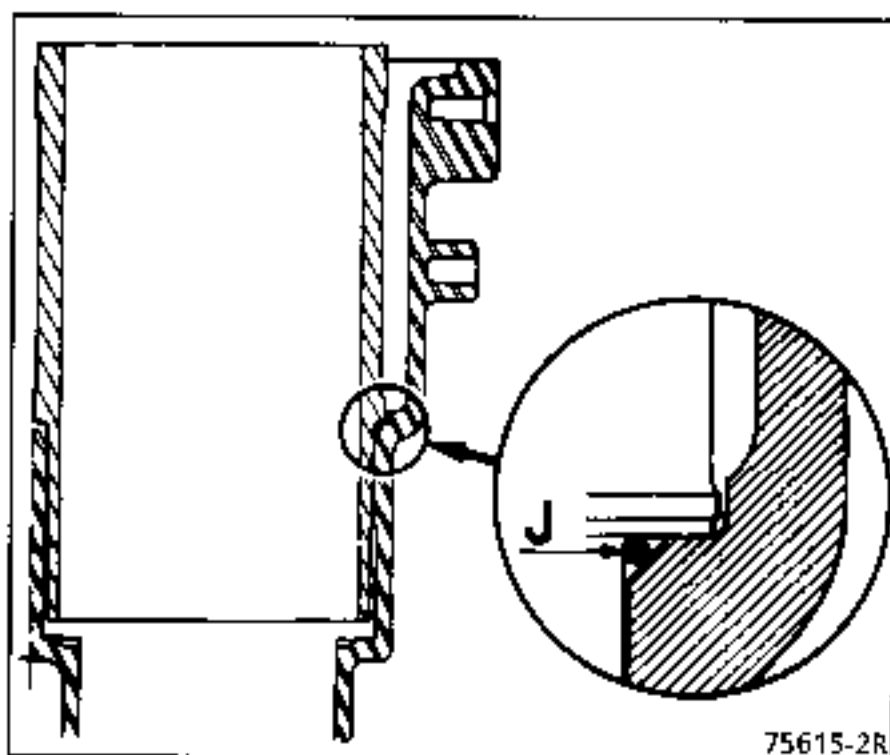
If it is not, use red or green seals instead of the blue ones.

Engines: 840 - C6J - C7K - 847 - C1J - C2J - C3J - C3G

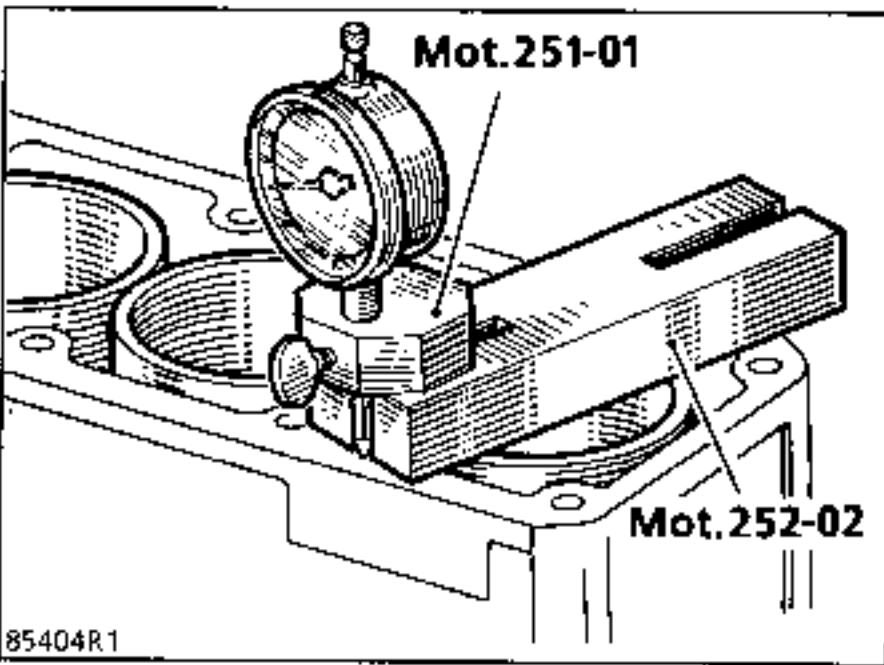
These engines are fitted with an O-ring at the base of each liner.

These O-rings act as coolant seals only.

The liners rest directly on the cylinder block and the correct protrusion is obtained by close tolerance machining dimensions.



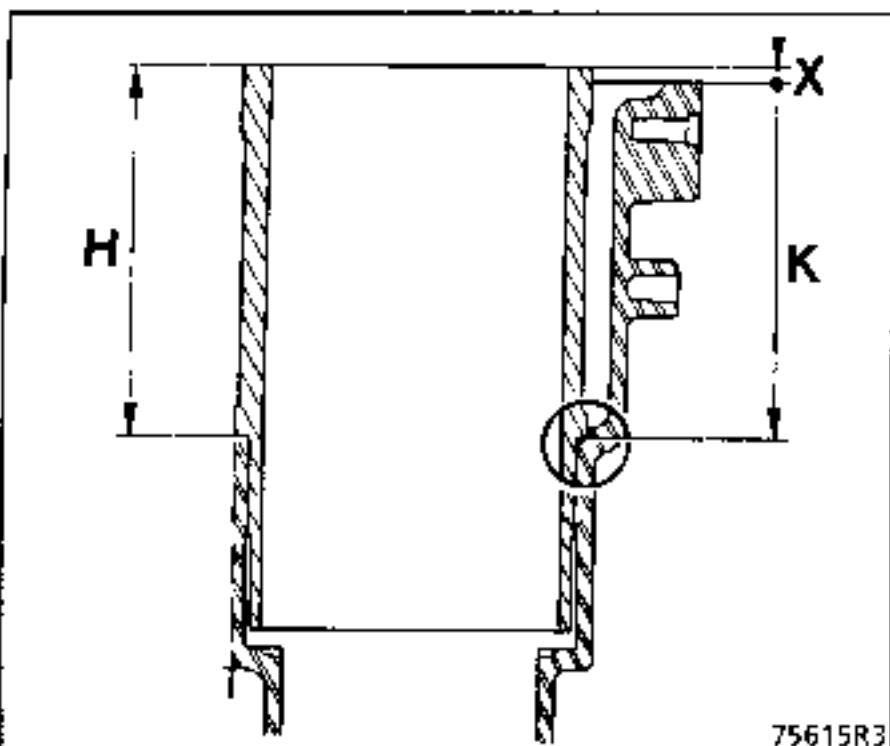
75615-2R



85404R1

Protrusion (X) should be checked as follows:

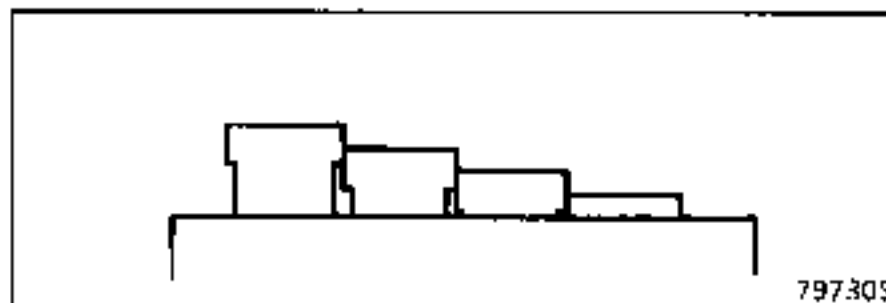
- Place the liner, **without its O-ring (J)**, in the cylinder block.
- Check protrusion (X) using tools **Mot. 251-01** and **Mot. 252-01**: it should be between **0.02** and **0.09** mm.



Engines : All Types

Position the liners so that:

- The difference between two adjacent liners does not exceed **0.04** mm (within the permitted tolerance),
- protrusion may be stepped downwards from No. 1 cylinder to No. 4 cylinder or vice versa.



Once the correct protrusions have been obtained, refit assemblies A, B, C, D and then number the liners, pistons and gudgeon pins 1 to 4 (no. 1 at fly-wheel end) so that they match their connecting rods.

If incorrect protrusion is found, check with a new set of liners to establish whether the cylinder block or liners are at fault.

The Drawing Office dimensions are given purely as a guide:

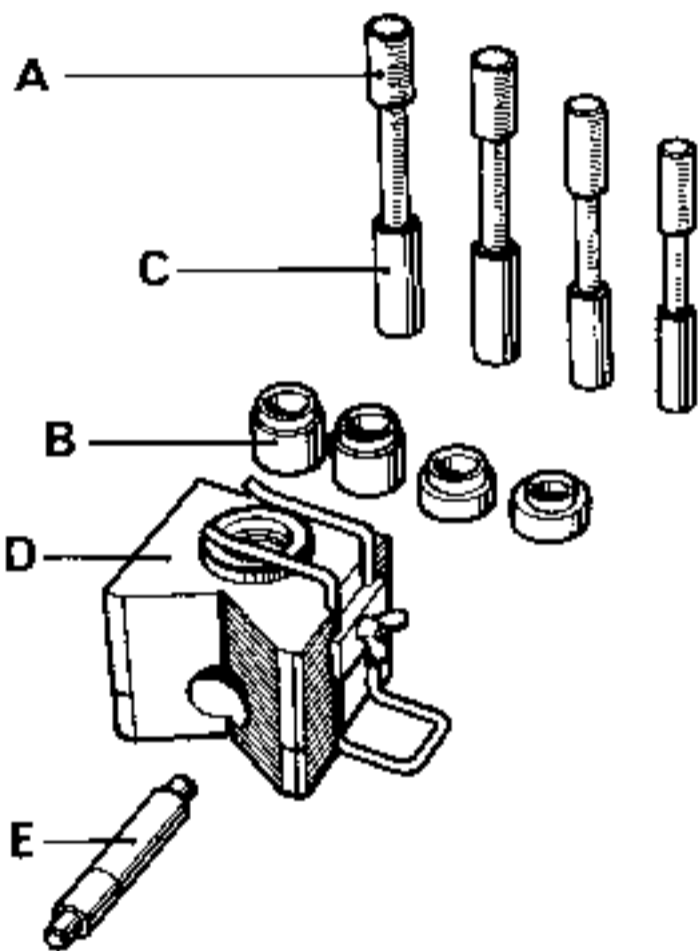
- liner height (H) between top face and bottom locating face $H = 95.005$ to 95.035 mm,
- cylinder block height (K) between top face and liner locating face $K = 94.945$ to 94.985 mm.

FITTING THE GUDGEON PINS

Engines : All Types except 840-30 and C7K

Gudgeon pins are a press-fit in their small ends and free-running in their pistons. Use tooling Mot. 574-22 which is delivered as a kit containing :

- gudgeon pins, marked A, followed by a suffix,
- collars, marked B, followed by a suffix,
- locating mandrels, marked C, followed by a suffix,
- a supporting block marked D,
- a set of extractors, marked E, for removing the gudgeon pins.



Mot. 574-22

76554R

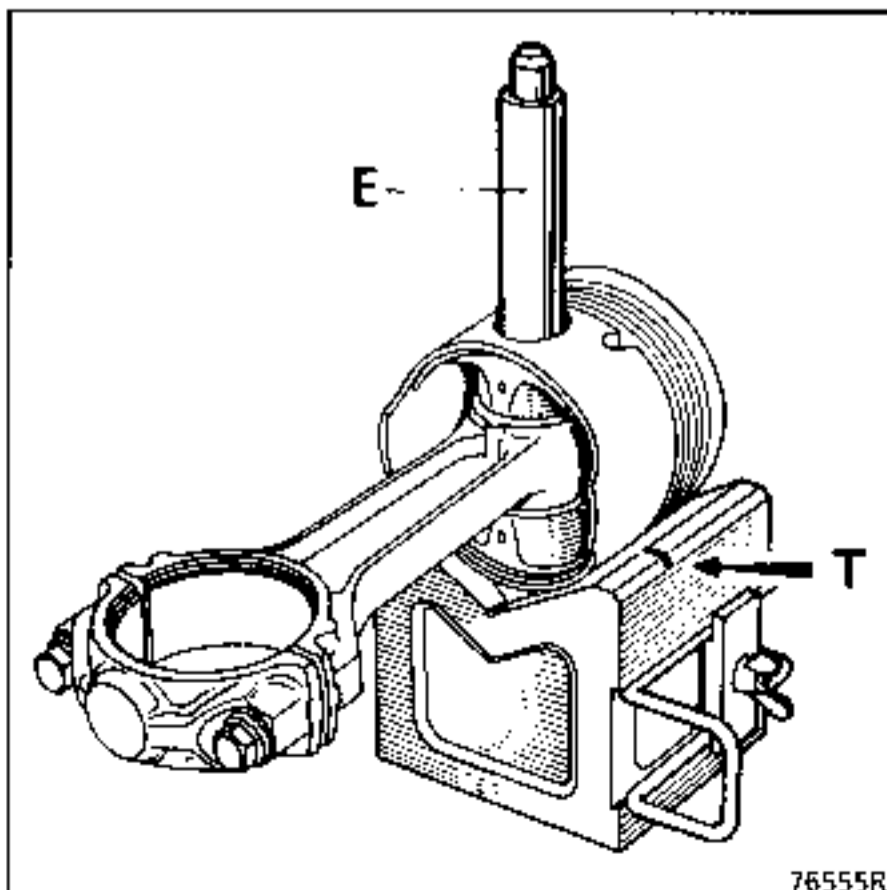
Tools to be used depending on the engine type

688 C1E 689 C1C	11	18	A2	B2	C2	
840-25-26 C6J-28-50	12	20	A3	B10	C5	
810 847 C1J-C2J C3J-C1G	12	20	A3	B5	C5	
C3G	10.5	18	A2	B16	C2	
840-30 C7K						

Extracting the gudgeon pin

Lay the piston in the "V" in the support with the gudgeon pin bore in line with the clearance hole. (The support has 2 grooves (T) to assist alignment.)

Press out the gudgeon pin with the extracting mandrel (E).



76555R

Preparing the conrods

Check :

- the connecting rods for twist and out-of-square),
- mating of the big-end caps to their rods (de-burr if necessary to obtain good cap seating).

Use a 1500 W hotplate (see equipment catalogue).

Space the small ends out round the hotplate.

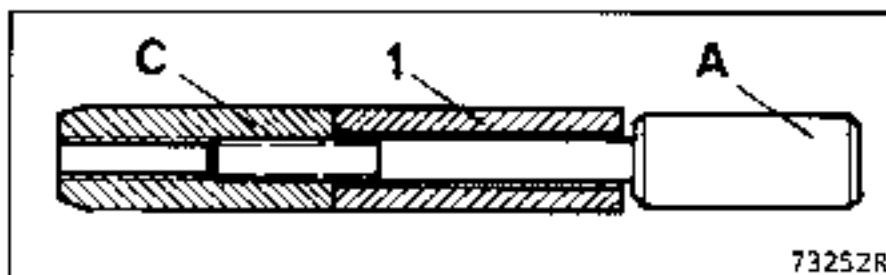
Make sure that they are lying flat for maximum heat transfer.

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

Heat each small end until the solder is seen to melt.

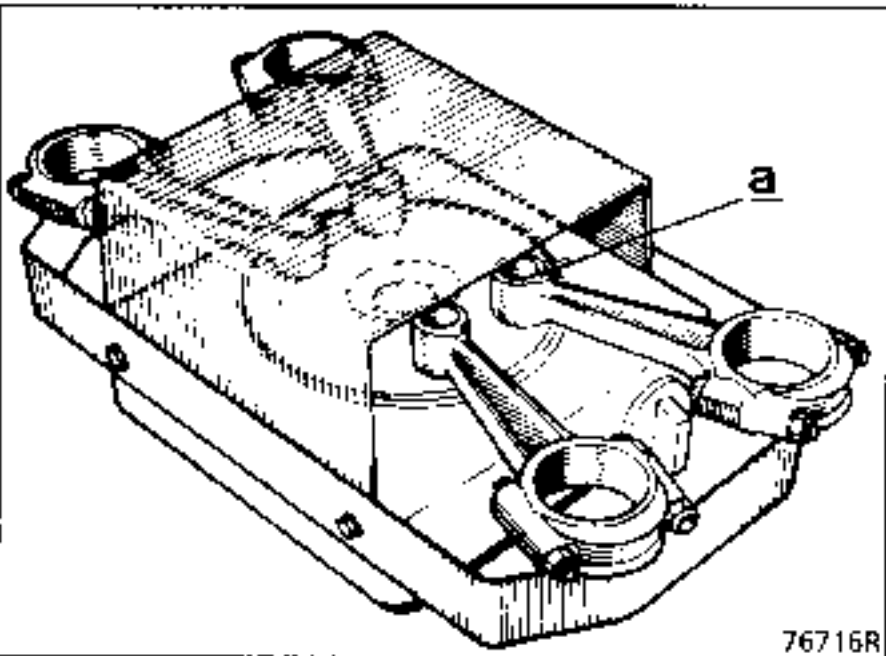
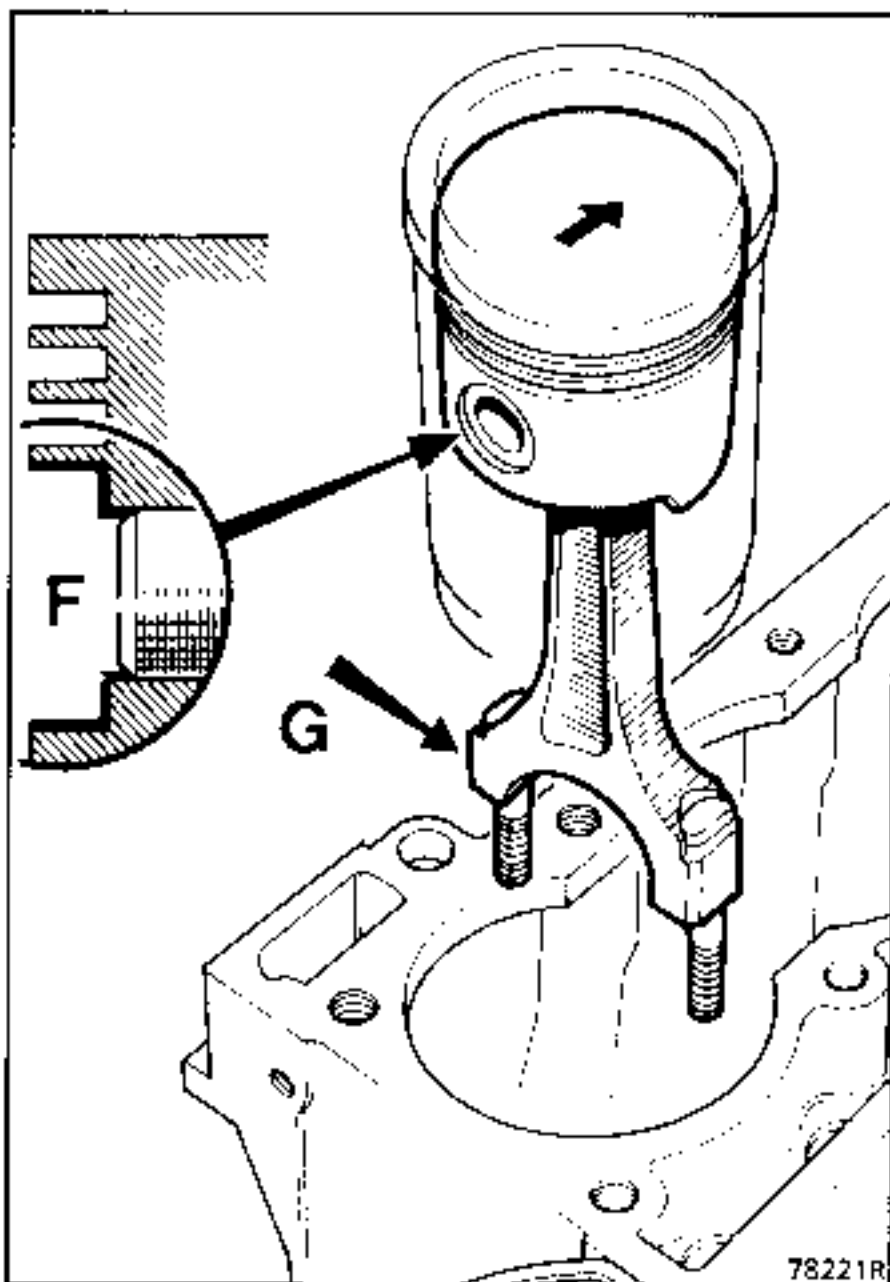
Fitting the gudgeon pins

Fit gudgeon pin 1 to inserting mandrel. (Do not tighten as the gudgeon pin must be free to move between mandrel (A) and guide (C).)



Coat the assembly with engine oil.

Each piston crown is marked with an arrow which must point towards the flywheel; spotfacing (F) must face the other end.



Preparing the gudgeon pins

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

Proceed as follows to assemble a piston and conrod:

- Fit thrust pad (B) corresponding to the gudgeon pin diameter on the support and clamp the piston to it with the clip. The spotfacing on the piston must rest on the pad,
- Big end mark (G) made on dismantling must face the side away from the camshaft.

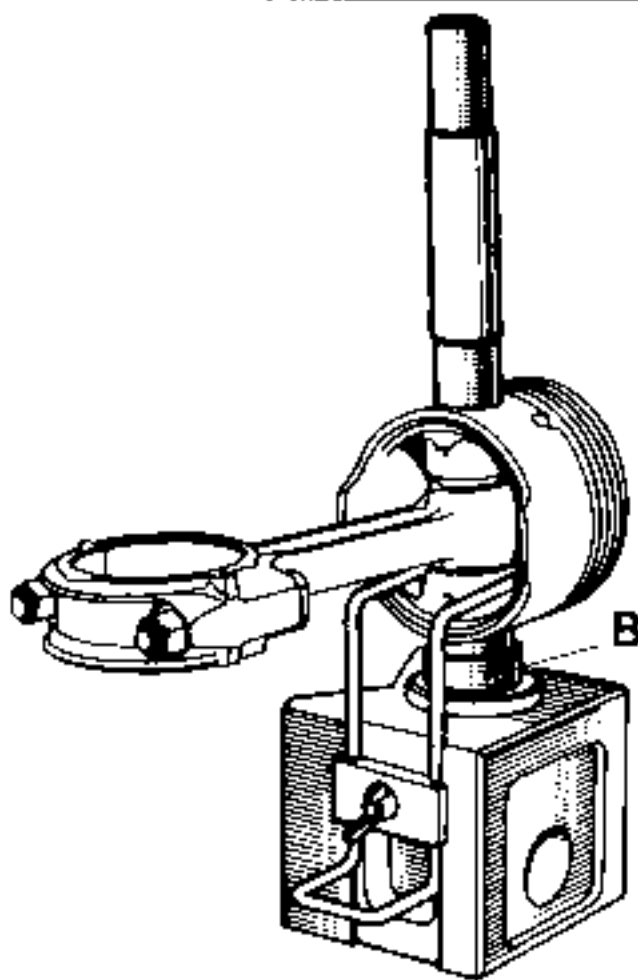
The following operations must be carried out rapidly so that the heat loss is kept to a minimum.

As soon as the drop of solder reaches melting point (becomes a droplet):

- Wipe off solder.
- Insert the locating guide in the piston.
- Fit the connecting rod to the piston with their marks in line.
- Press the gudgeon pin in quickly until the guide butts up against the bottom of the support.

After a few seconds, remove the conrod - pistons assembly from the support, unscrew the guide and remove the inserting mandrel.

Check that the gudgeon pin is recessed in the piston skirt on both sides in any position of the conrod in the piston.



76253R

Engines: 840-30 - C7K-00

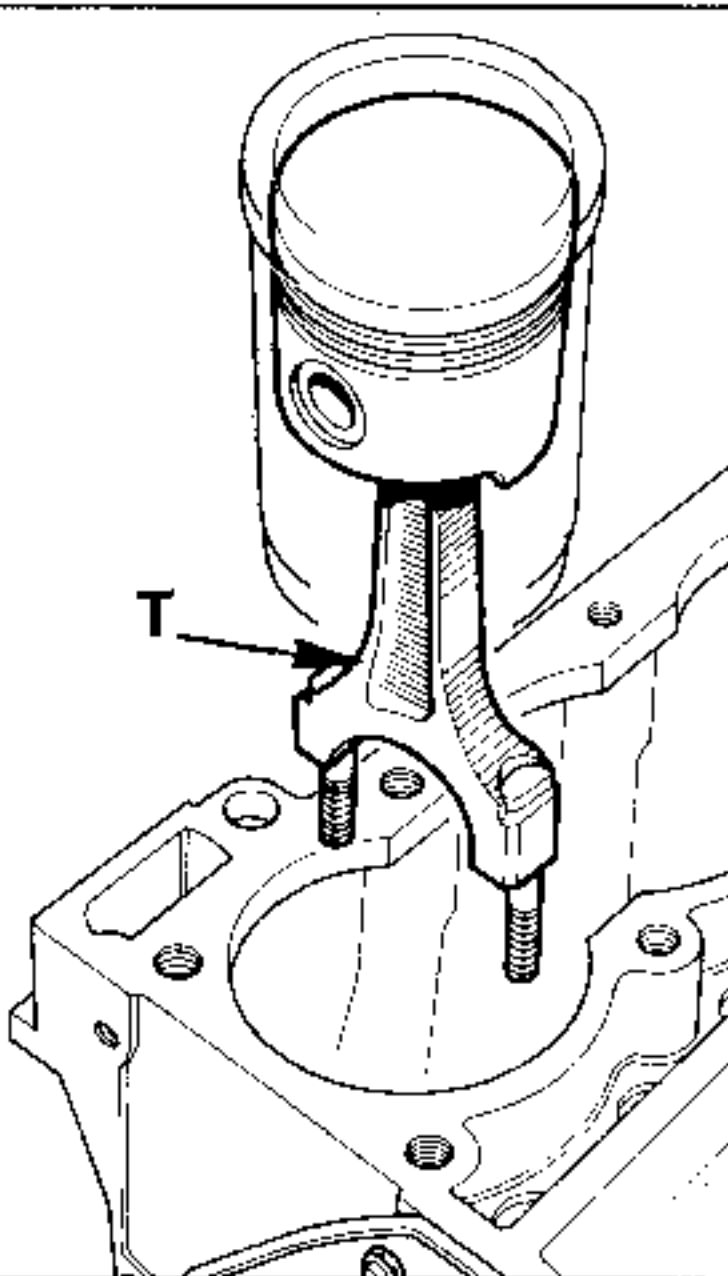
Direction for fitting the liner - piston - conrod assemblies

The gudgeon pin :

- is fully floating in the piston and conrod,
- is secured by circlips,
- is central in the piston.

The piston may be fitted to its conrod either way round.

Fit the liner - piston - conrod assemblies in the cylinder block so that the oil jet hole (T) faces the side away from the camshaft.



78221R1

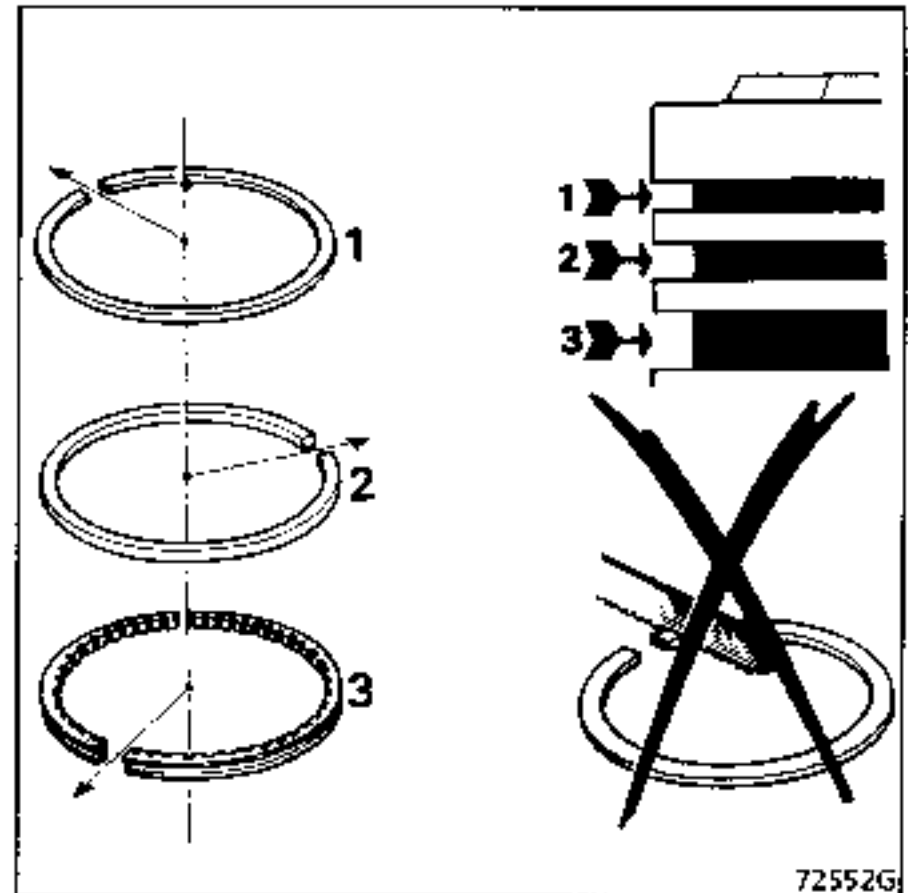
Engines: All Types

Fit to the piston :

- the oil scraper ring,
- the compression ring (mark towards combustion chamber),
- the top ring.

The piston rings are supplied pre-gapped and this must not be altered.

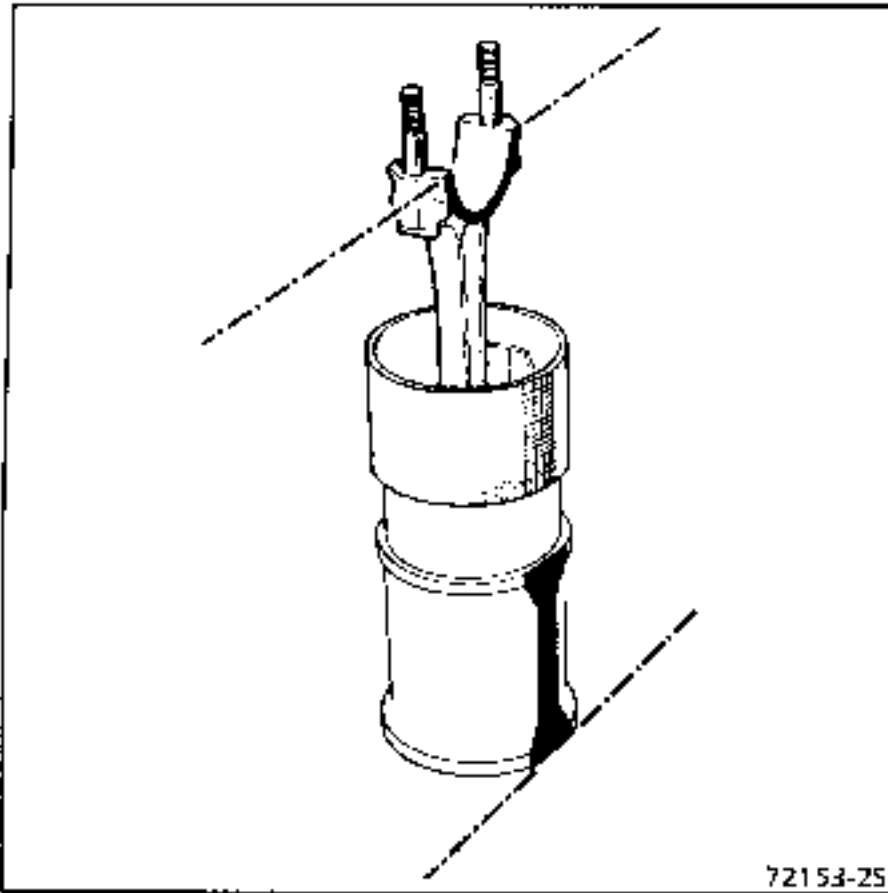
Lubricate the rings and space them with their gaps at 120° to each other with the scraper ring opposite a plain portion of each groove.



72552G

Lubricate the pistons.

Fit the conrod - piston assemblies in their respective liners using a sleeve of the FACOM 750 TB type.



The machined sides of the big end must be parallel to the flat on the top of the liner.

Remember to fit each liner with its selected base seal (no twist) before inserting the liner - piston - conrod assemblies.

Fit the shell bearings to the conrods.

REPLACING THE CAMSHAFT BEARING BUSHES (depending on version) except 840-30 and C7K

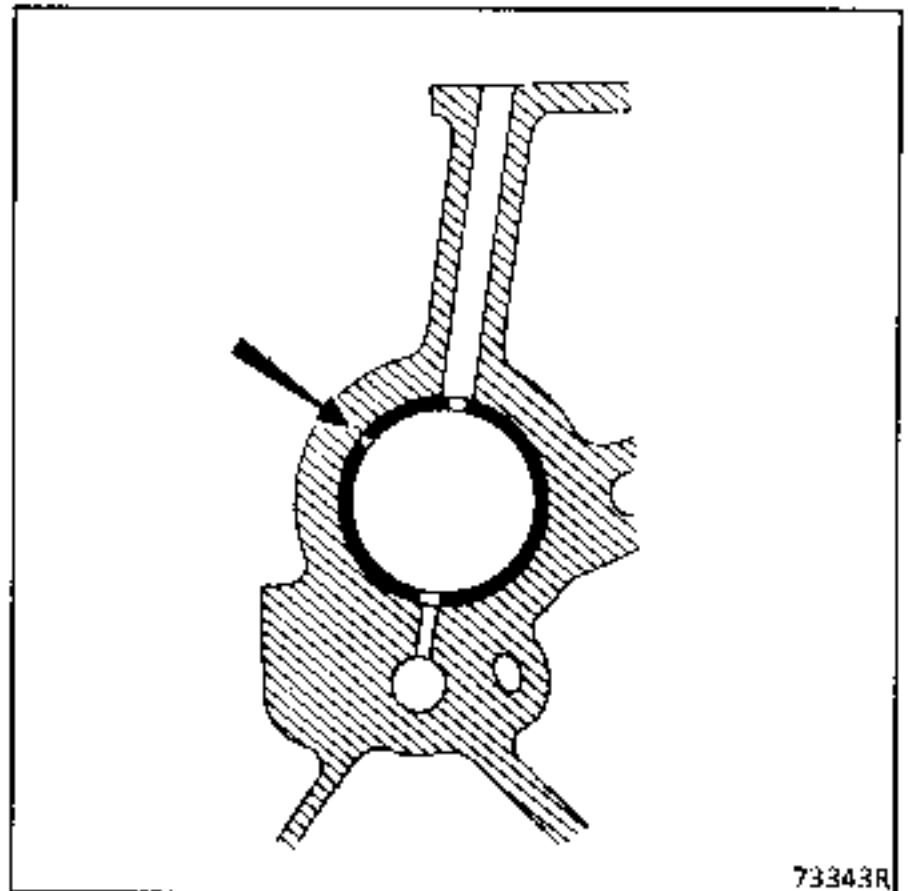
This operation is performed when the camshaft has been removed. There is only one detachable camshaft bush on these engines (at flywheel end).

Drive the old bush in towards the inside of the engine.

Lift up the edges and collapse it to remove it.

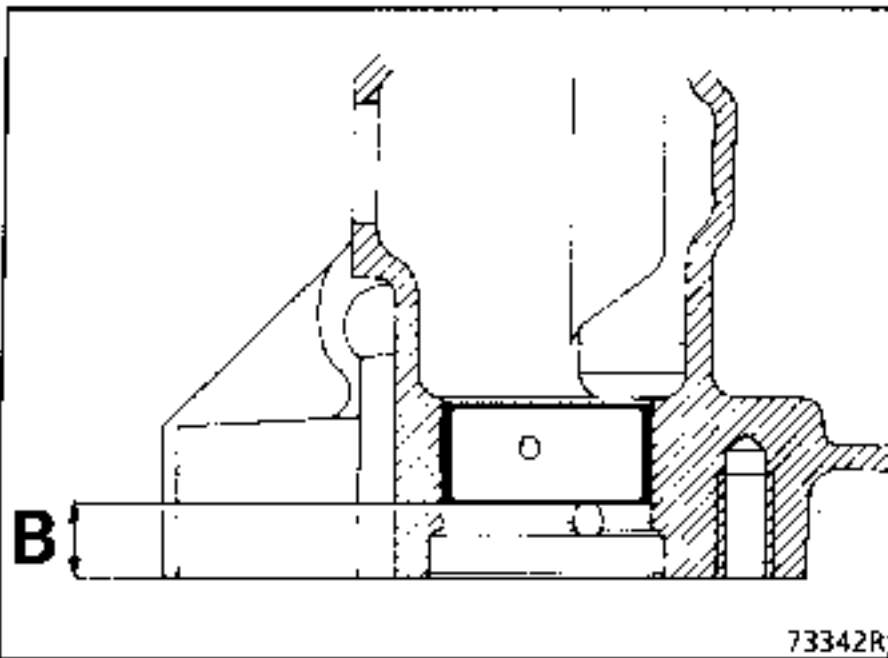
When fitting the new bush note:

- the position of the longitudinal slot:
 - 8 × 4 mm slot to top,
 - 6 × 4 mm slot to bottom,
- the position of the longitudinal slit (arrow).

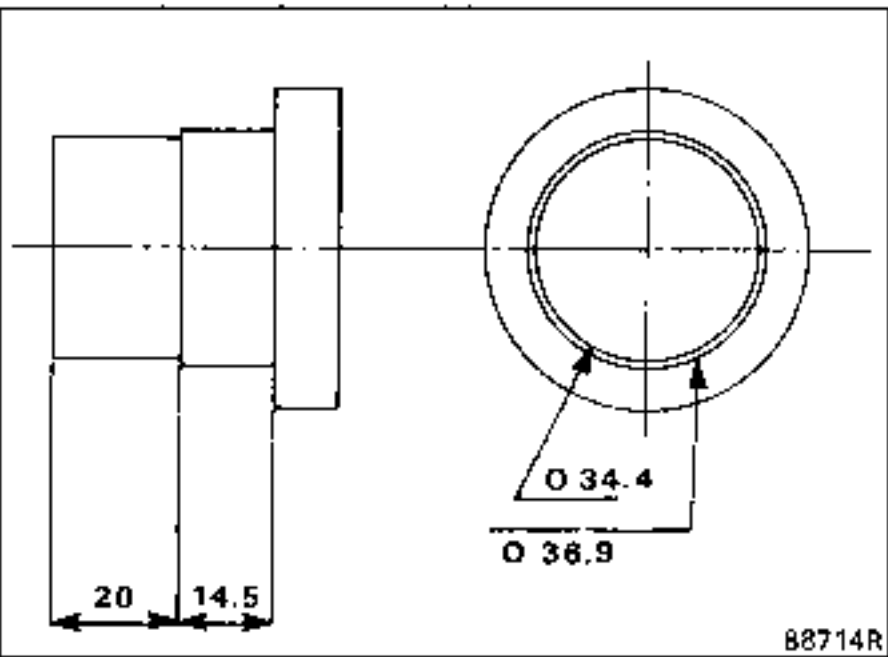


- dimension B = 14.5 mm recessed from the block face.

No reaming is necessary once the new bush is in position.



Use a locally made up tool (dimensions in mm).



Engines : 840-30 - C7K

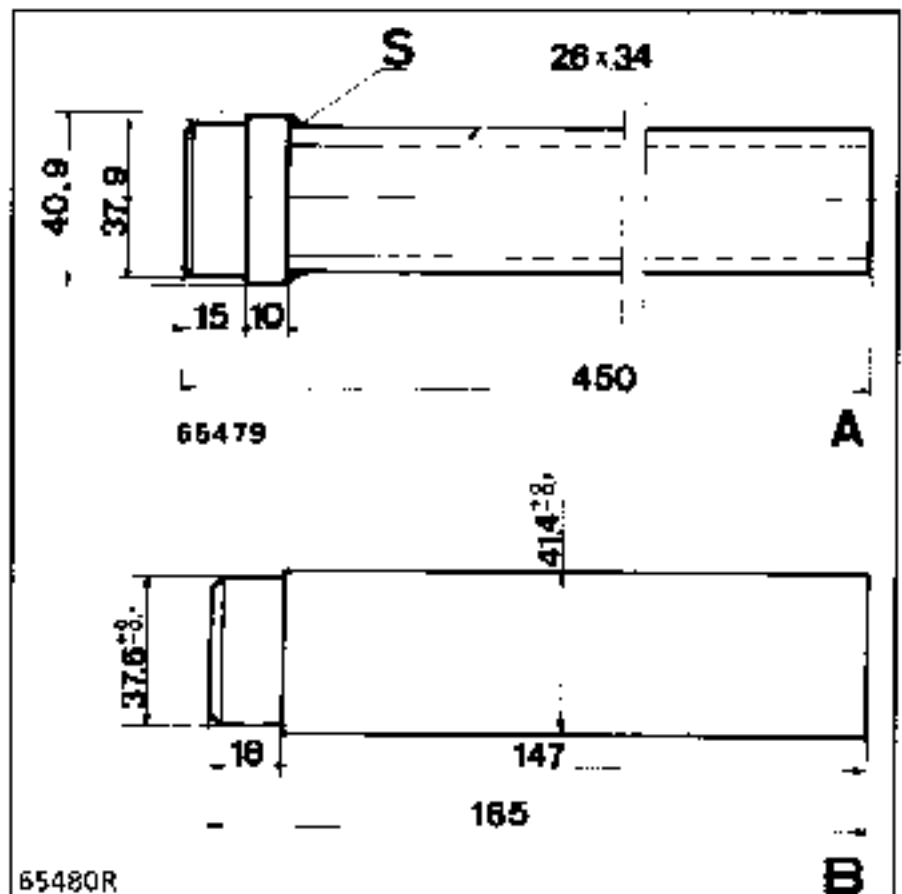
The cylinder block is equipped with four camshaft bearing bushes. These can be changed.

This operation involves reaming the bushes in line after fitting. Certain special tooling is required, including an accurate reamer and means of keeping it square.

The following tooling is also necessary and should be made up locally:

- an extracting mandrel (A),
- an inserting mandrel (B)

(Dimensions in mm)



Remove the camshaft plug (5) by giving it a smart tap in the centre.

Using mandrel (A), tap out :

- bushes (1), (2), (3) towards the inside of the block - collapse them to remove them.
- bush (4) can be tapped from the inside outwards.

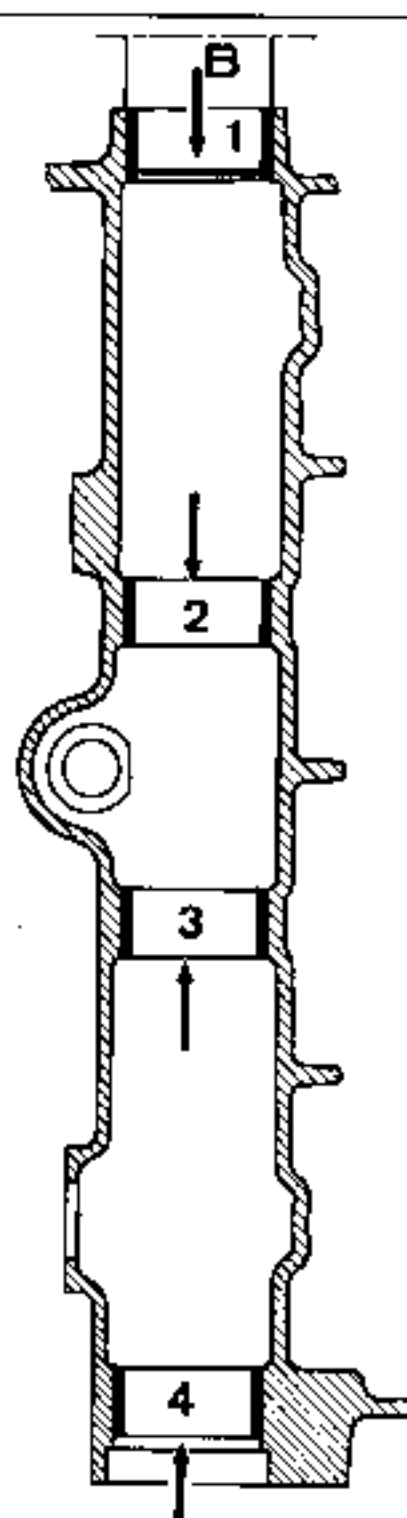
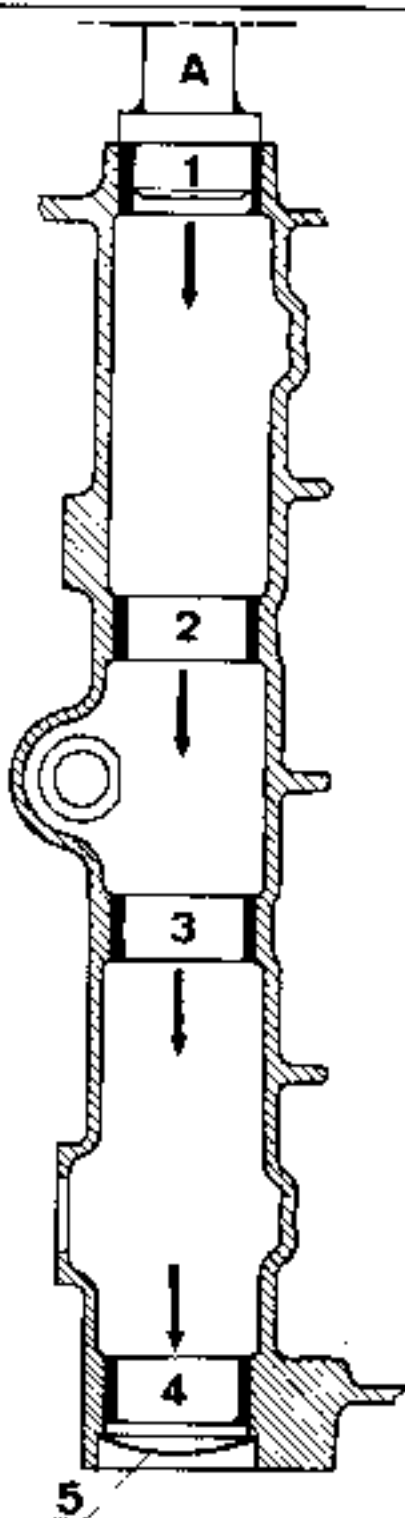
Drill out both plugs in the tappet housing.

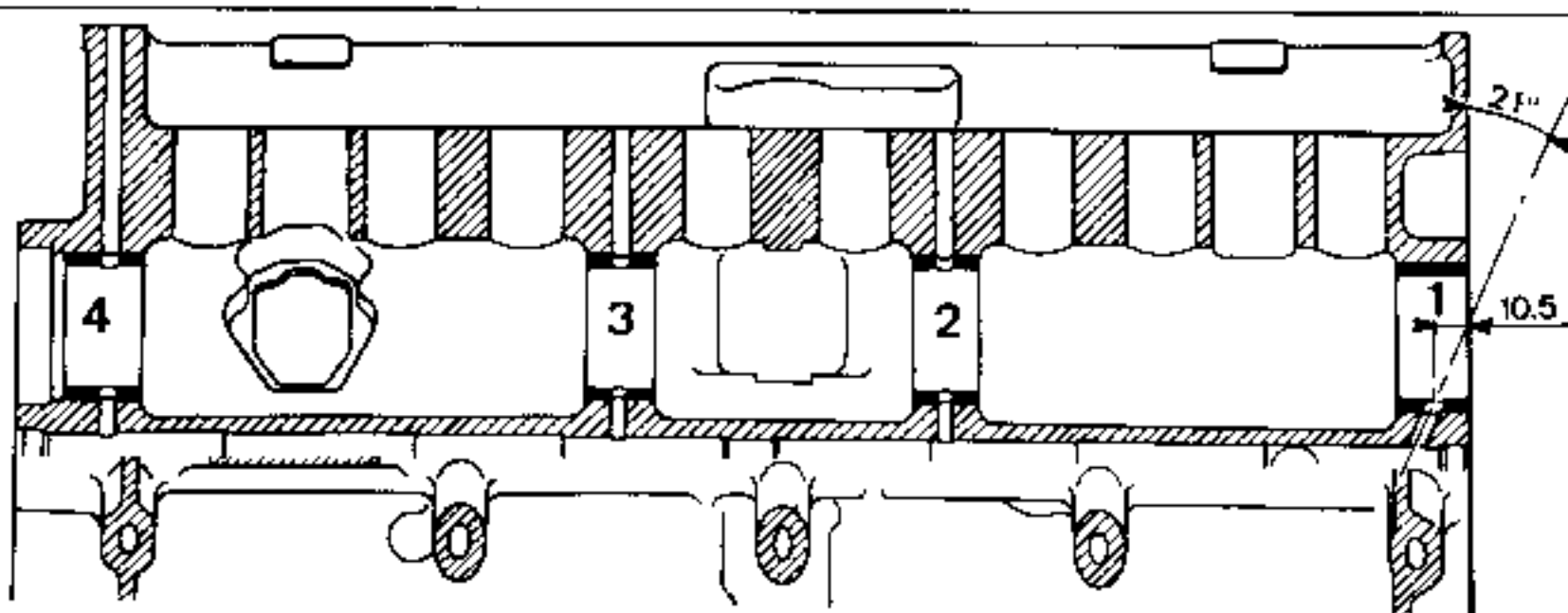
Clean the cylinder block.

The inside bushes (2 and 3) are smaller than the outside bushes (1 to 4).

Using mandrel (B), fit the new bushes as follows (according to the direction of the arrows) :

- the inner bush (2): the end (end opposite the bush) should be 17.5 mm proud of the block outside face for correct bush location,
- the inner bush (3): the end of the mandrel (end opposite the bush) must be flush with the block outside face for correct bush location,
- the outer bush (1): this should be flush with the outside face of the block,
- the outer bush (4): this should be recessed 13 mm from the block outside face.





65443R

Drill the oil holes in the bushes:

a) Bushes 2 - 3 and 4

- one 5 mm dia. hole at the top,
- one 3 mm dia. hole at the bottom.

b) Bush 1

- one 4 mm dia. hole at the bottom in line with the bottom oil holes 2 - 3 and 4.

Fit the five main bearing caps on the block.

Ream the bushes out :

$$38 \text{ mm} \begin{matrix} + 0.025 \\ 0 \end{matrix}$$

Surface finish should not be more than 3 microns.

Use the camshaft as a reference centreline:

- the centre of the camshaft is determined by the following dimensions:

$$E = 128 \text{ mm} \pm 0.05$$

$$F = 81 \text{ mm} \pm 0.05$$

- The camshaft bush bores are reamed to a finished size of :

$$58.731 \text{ mm} \begin{matrix} + 0.019 \\ 0 \end{matrix}$$

Checking

- Out-of-parallel of camshaft with line bores:
0.05 mm maximum
- Bush bores:
a checking bar of :

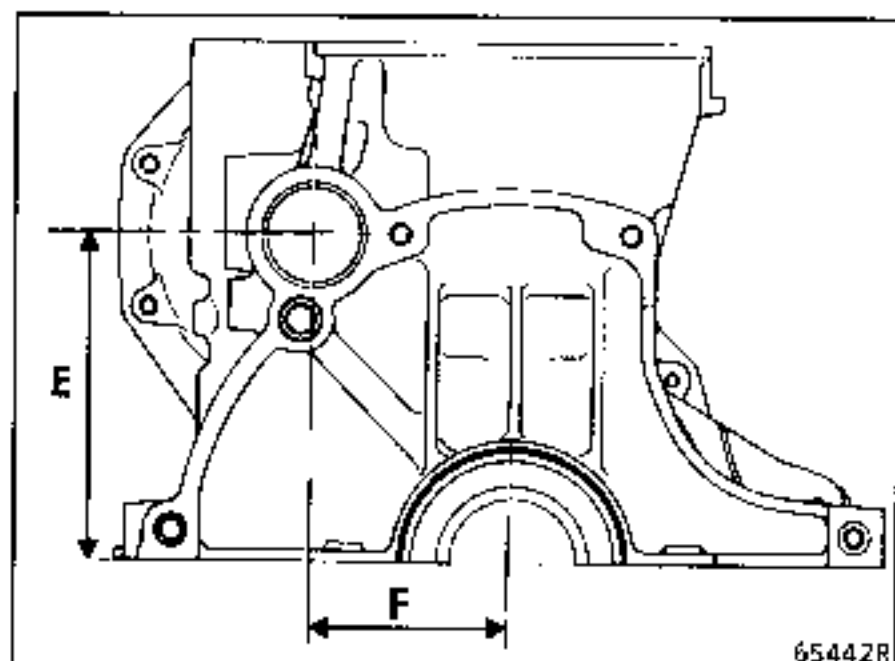
$$38 \text{ mm} \begin{matrix} - 0.005 \\ - 0.015 \end{matrix}$$

should turn in all four bushes

Coat with SCELBLOC loctite and insert a new expandable core plug (5) in the end, convex face outwards.

Give it a smart blow in the centre to secure it.

Fit the two plugs in the drilled holes of the bush and peen them over.

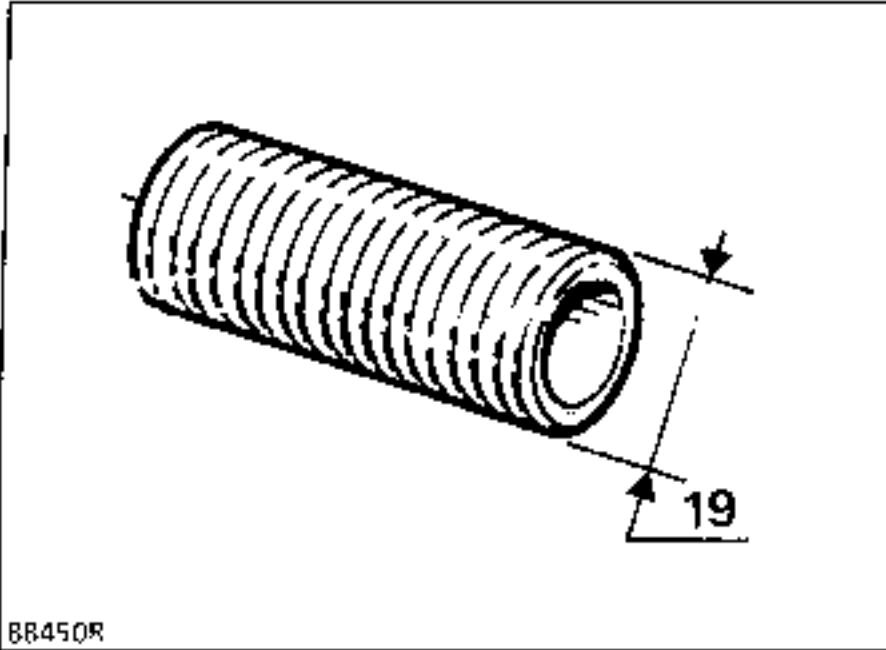


65442R

OIL FILTER THREADED UNIONS

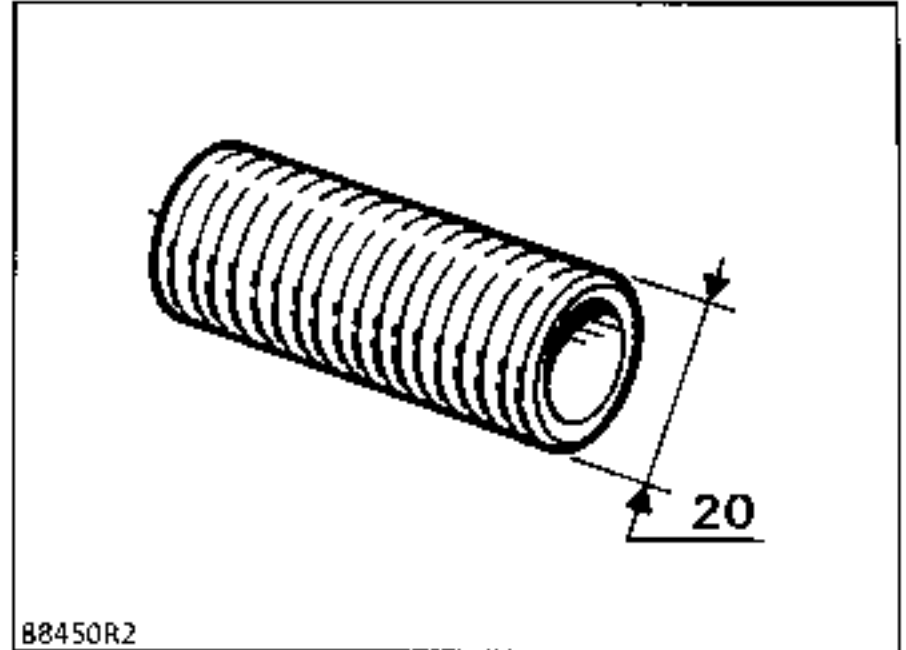
1st model : Cylindrical threaded union

19 mm dia., 1.587 pitch



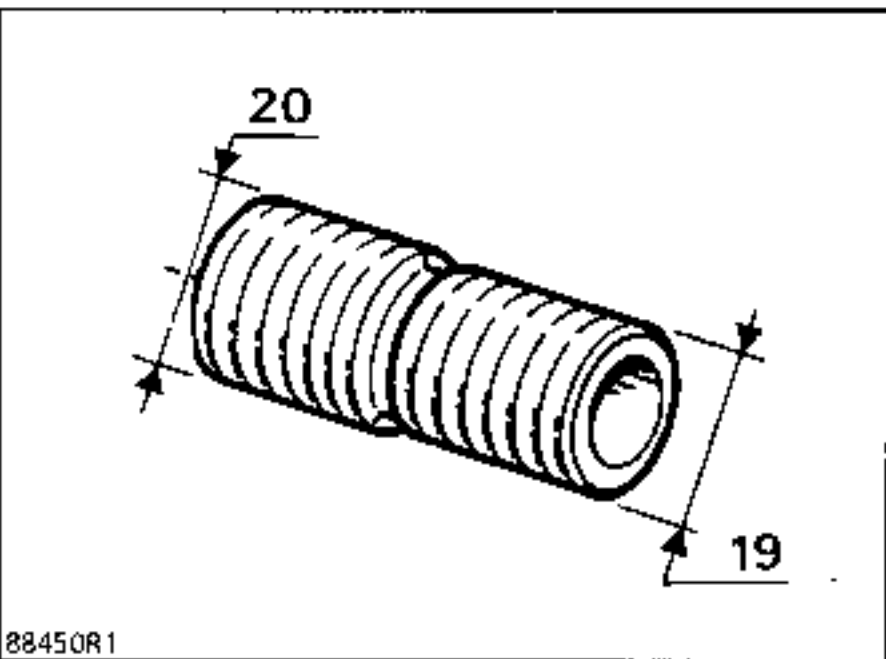
3rd model : Cylindrical threaded union

20 mm dia., 1.50 pitch



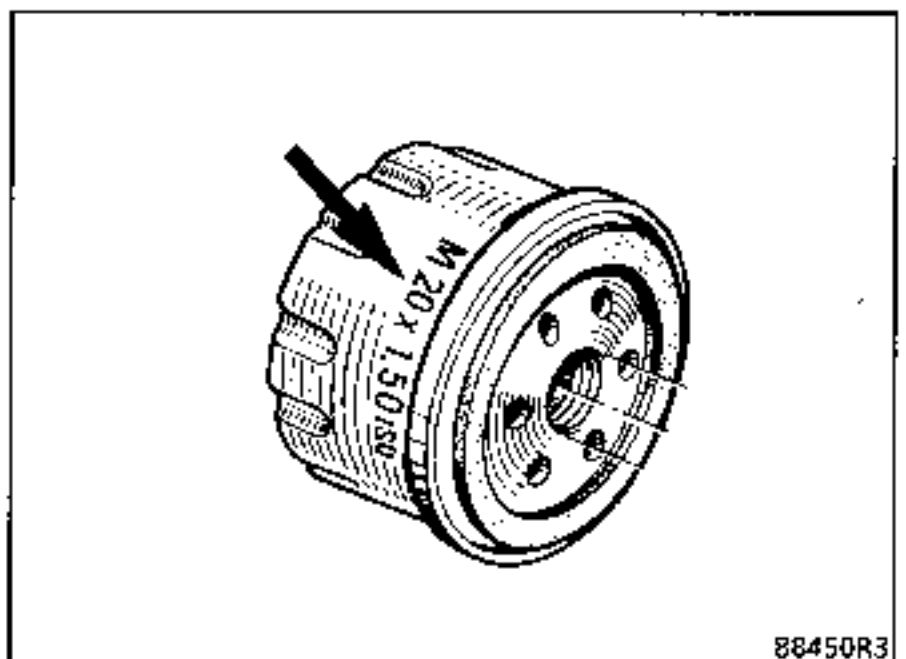
2nd model : Stepped threaded union

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



The filter stamped with 20 × 1.50 must be fitted on 20 × 1.50 threaded union with a metric pitch.

Visual identification of filter



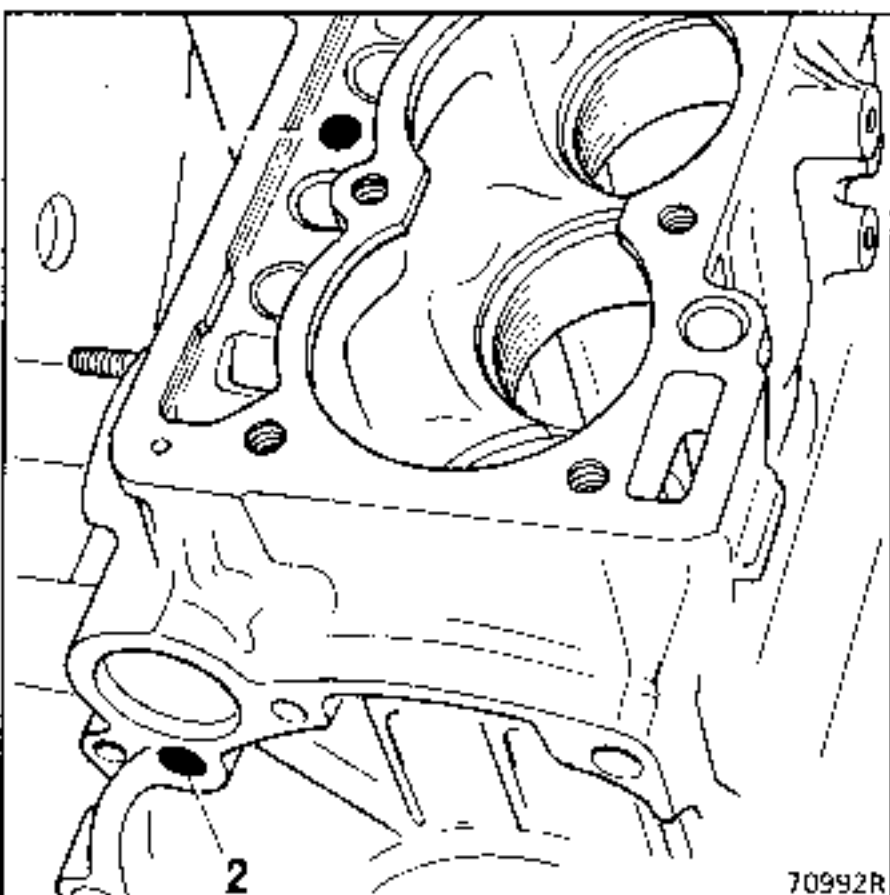
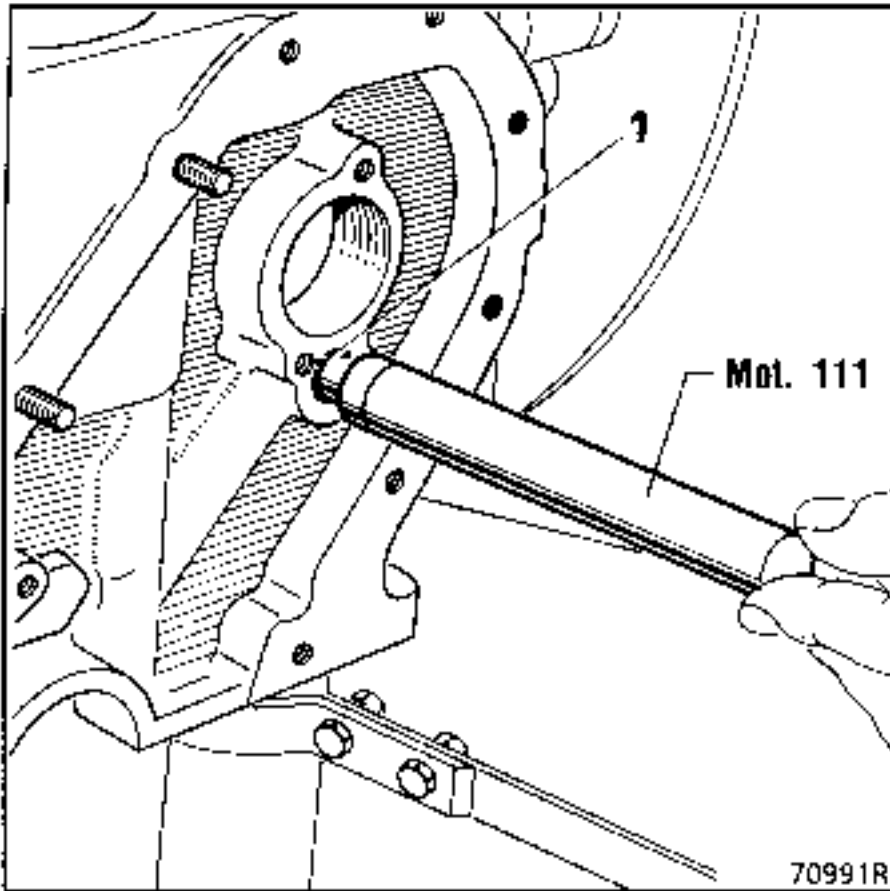
ATTENTION : It is possible in error to fit a 20 × 1.50 oil filter on a 19 × 1.587 threaded union and in such a case the oil filter loosens as a result of vibrations. Furthermore, there is abnormal clearance between the assembly and the engine block.

REPLACING THE MAIN OILWAY PLUGS

Coat the aluminium plugs with resin.

Fit the aluminium plugs (1) and (2) for the main oilways in position.

Fix them using tool Mot. 111.



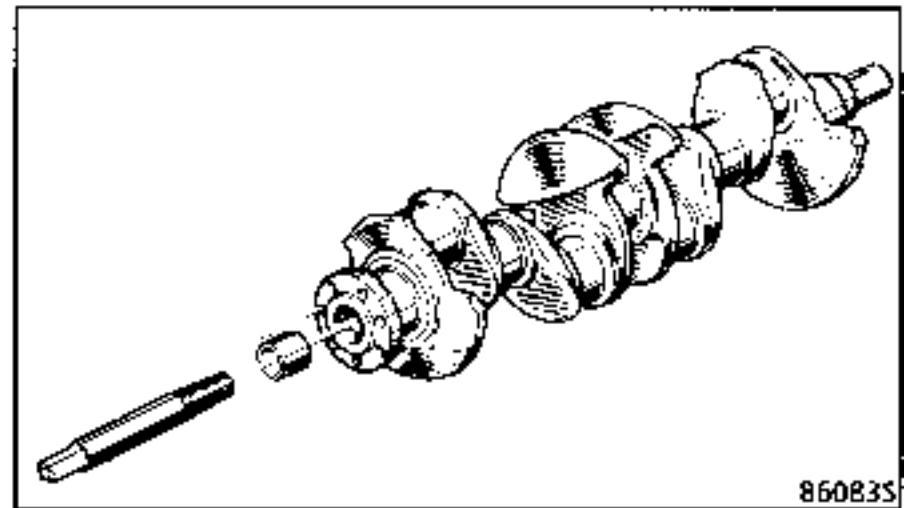
REFITTING THE CRANKSHAFT

Service crankshafts are supplied with the spigot bush already in position.

For vehicles with:

- automatic transmission,
- or with a manual gearbox having a short clutch shaft.

The spigot bush in the crankshaft must be extracted.



- Tap the bush with 14mm x 200 thread until it comes out.

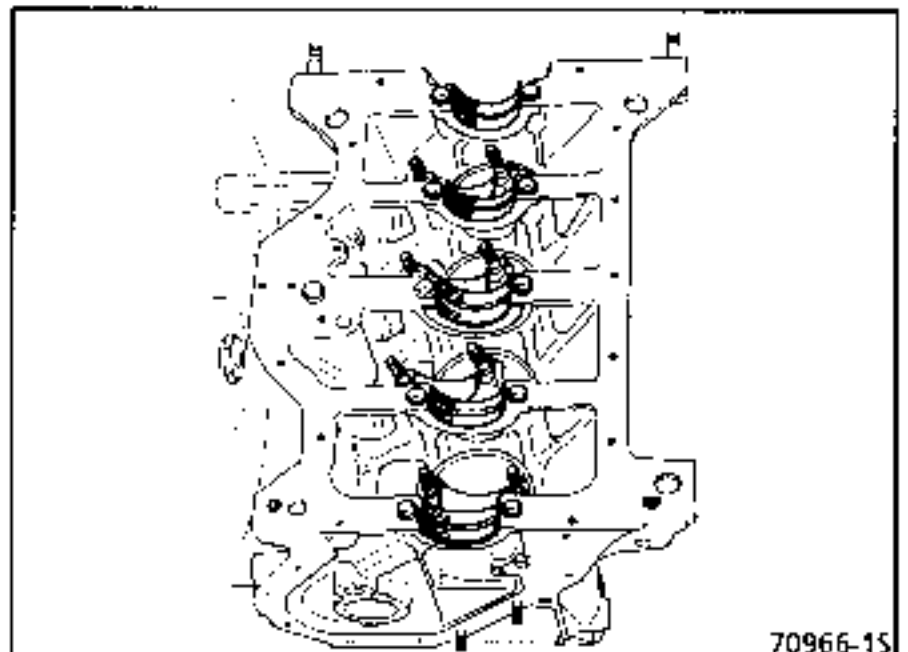
Clean the cylinder block joint face.

Fit the new bearing shells to the main bearings.

These have oil holes :

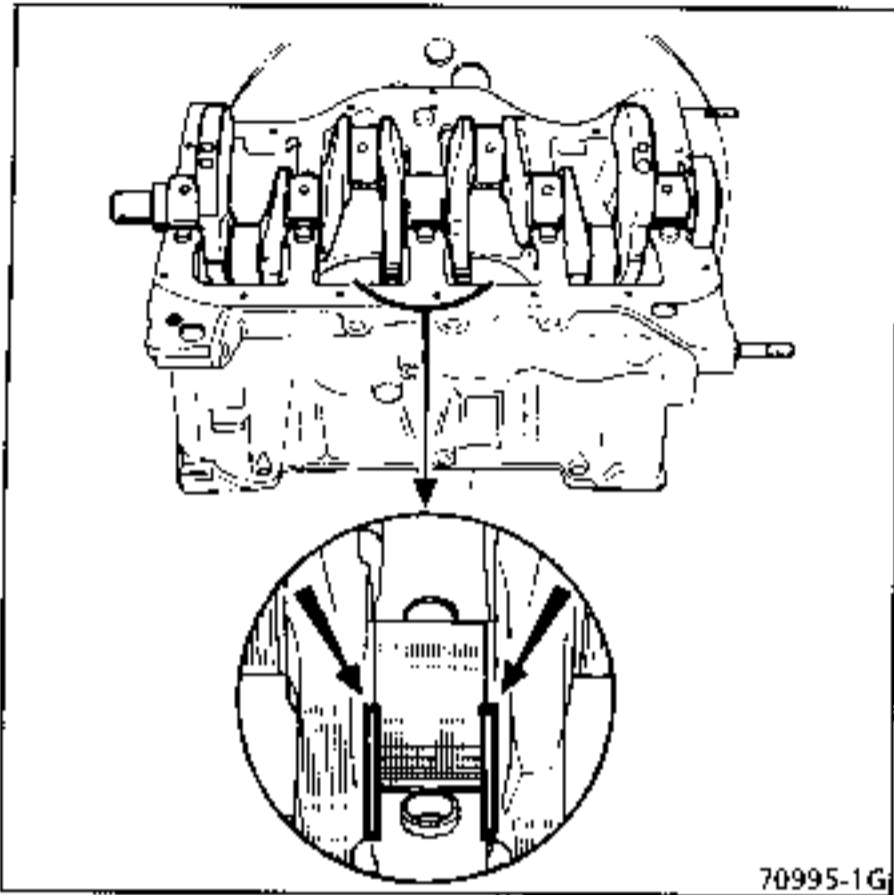
- those for main bearing 1 and 3 are identical,
- those for main bearings 2, 4 and 5 are identical.

Lubricate the bearing shells.



Lubricate the crankshaft journals and lower the new crankshaft into the block.

Insert the thrust washers, white-metalled face towards crankshaft.



70995-1G

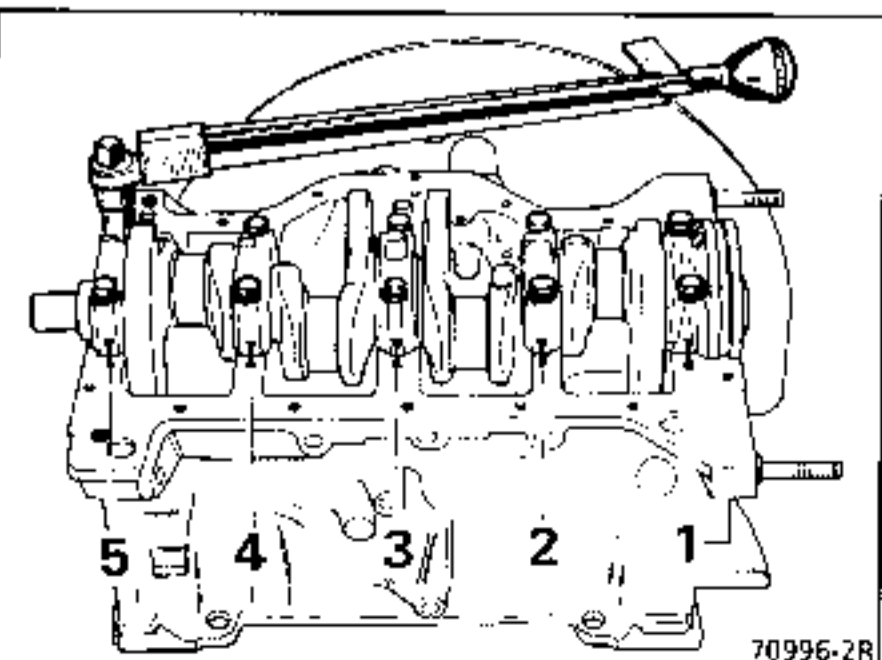
Fit the shells to the main bearing caps: they have no oil holes.

Lubricate the bearing shells.

Coat Loctite FRENETANCH on the faces of no. 1 bearing cap.

Fit the main bearing caps in their correct positions (marks made on dismantling).

Torque tighten the main bearing caps to between 5.5 and 6.5 daN.m.



70996-2R

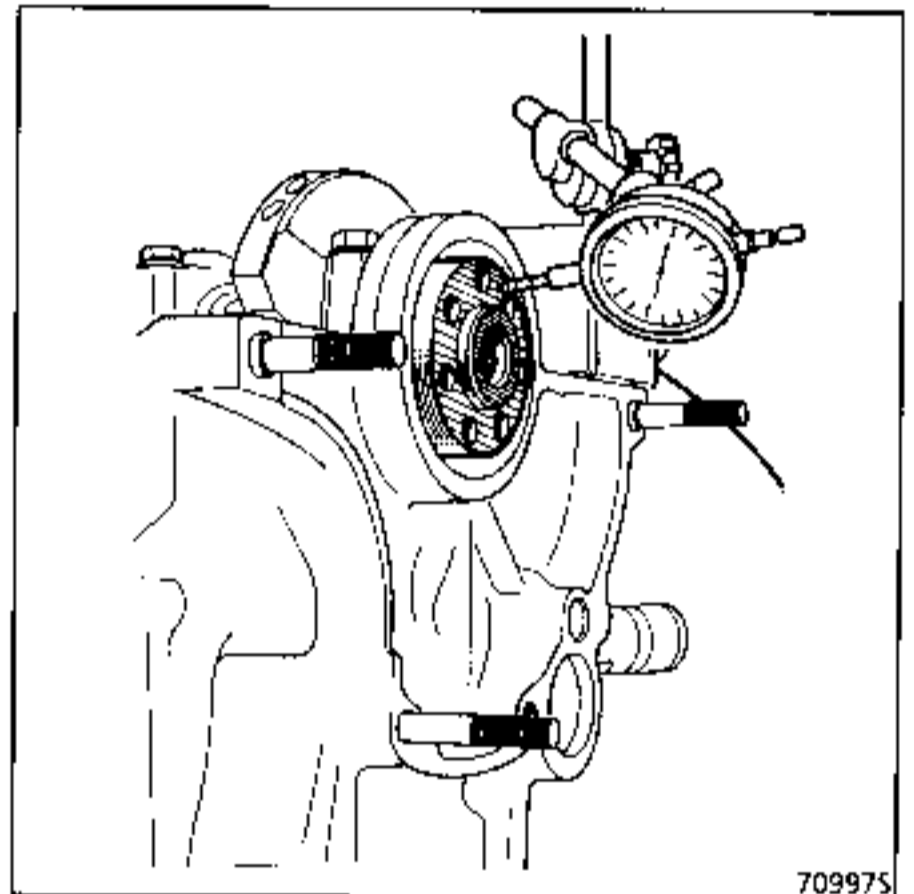
Check that the crankshaft rotates freely.

Fit a clock gauge at the end of the crankshaft.

Check crankshaft end play: 0.05 to 0.23 mm.

Change the thrust washers if the end play is incorrect.

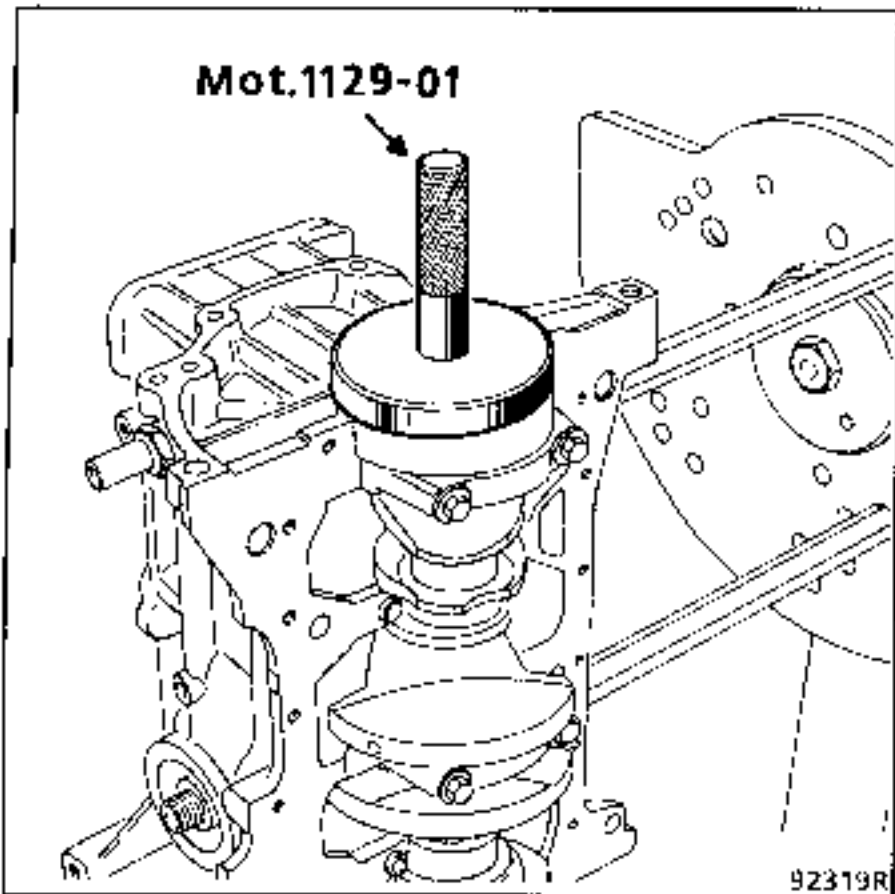
They are available in different thicknesses.



70997S

Fitting the crankshaft seal at the flywheel end

Use tools Mot. 1129-01 and 1129-02

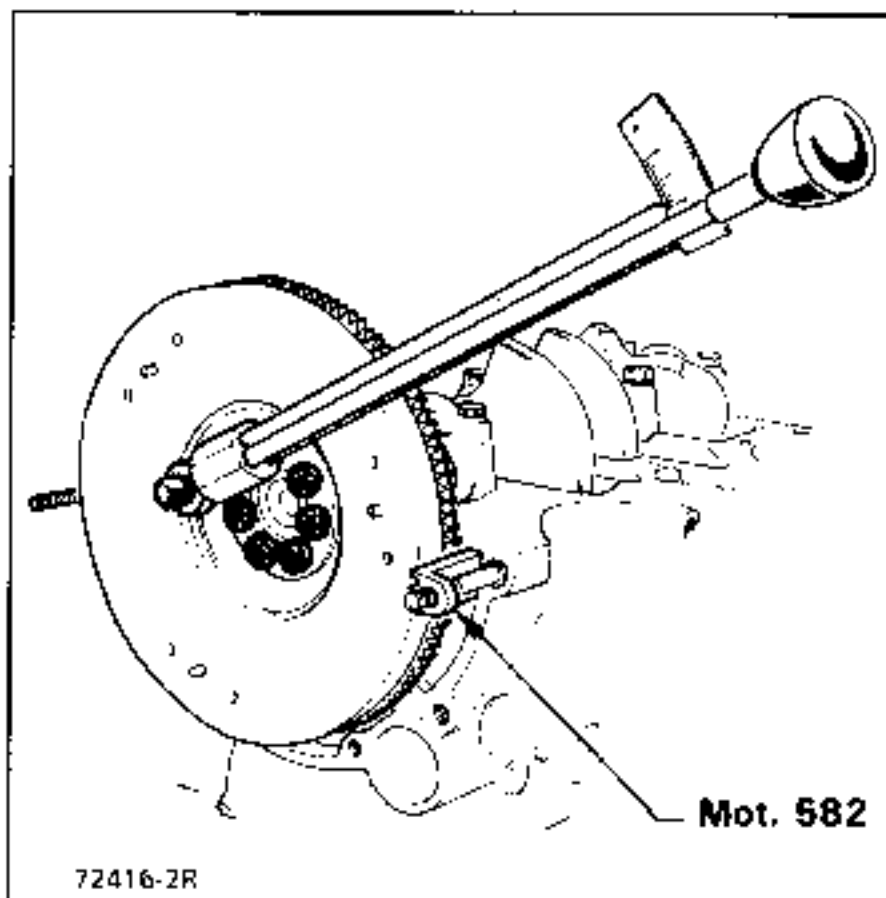


Fit the flywheel or converter driving plate. (Smear the joint face with **Loctite Autoform**.)

The bolts must be replaced each time the unit is dismantled.

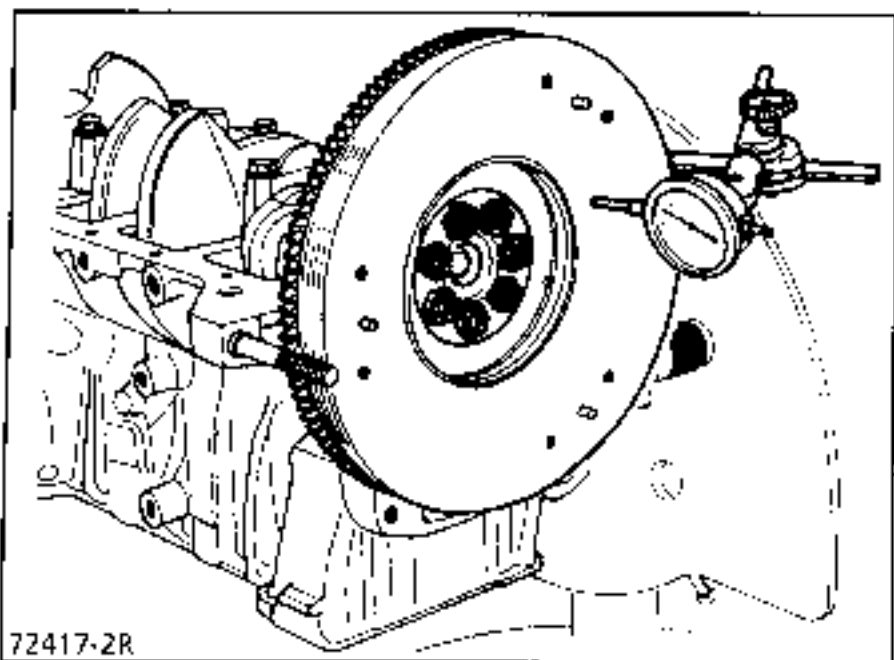
Prevent the crankshaft from turning by using flywheel locking tool **Mot. 582**.

Torque tighten the bolts after smearing a few drops of **Loctite Frenbloc** on the threads.



Remove the locking tool.

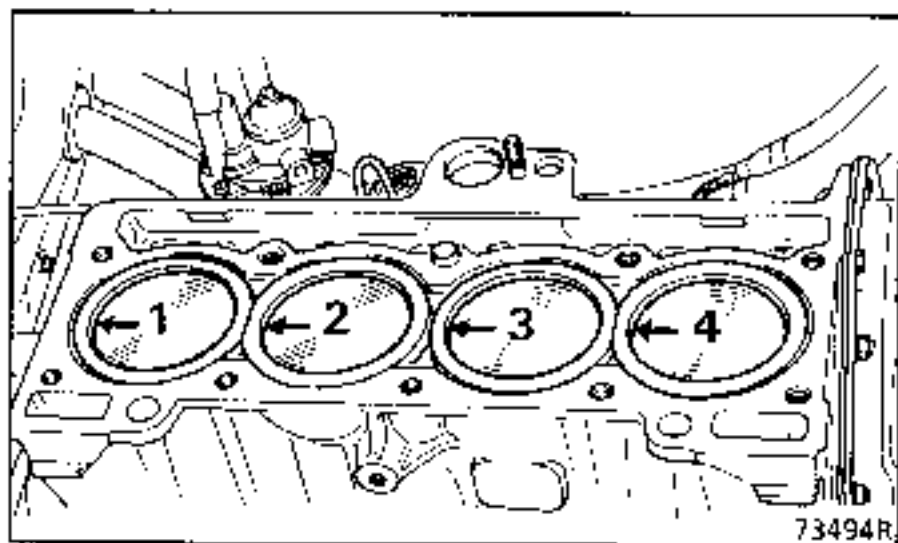
Check flywheel run-out using a clock gauge 0,06 mm maximum; 0,3 mm maximum for converter drive plates.



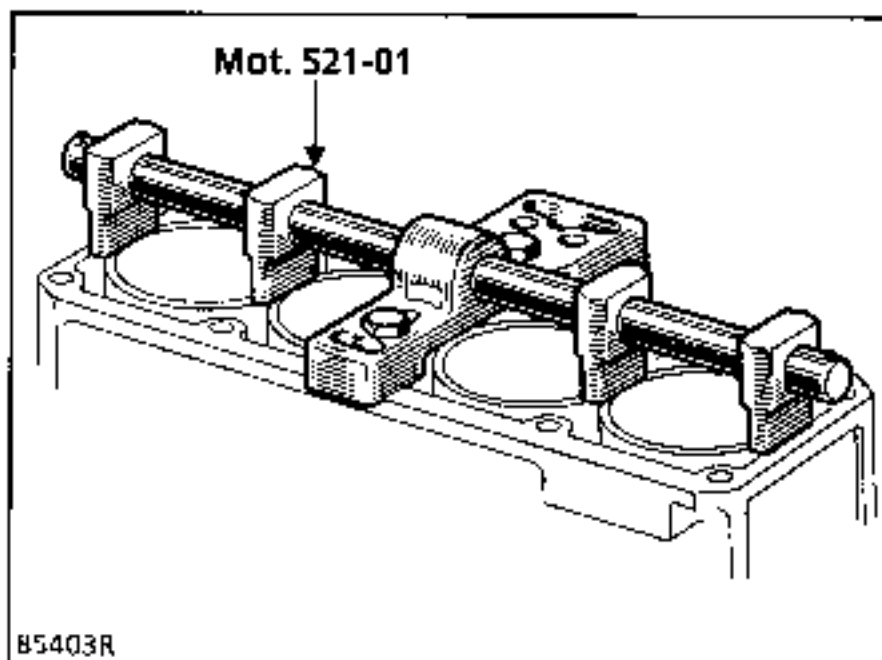
Fit the "conrod - piston - liner" assemblies into the cylinder block, ensuring that the bearing shells are fitted to the conrods and the base seals are in position.

Keep to the following positions :

- No. 1 at flywheel end,
- number mentioned on the conrod big end on the opposite side to the camshaft,
- arrow on the piston at the flywheel end.



Fit the liner retaining flange Mot. 521-01.

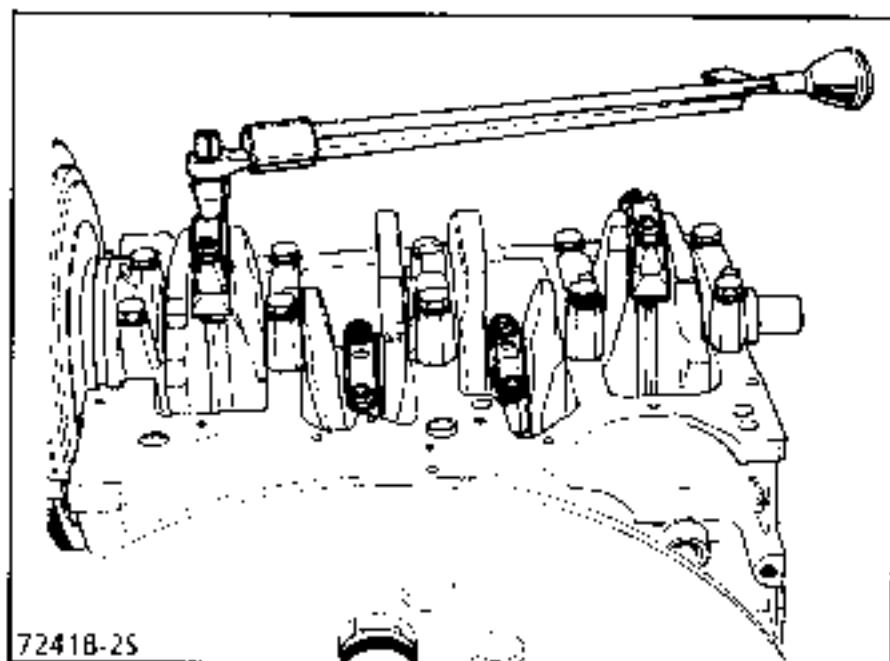


Draw the connecting rods down on to the oiled crankpins.

Fit the big end caps with their bearing shells, making sure that they are matched correctly.

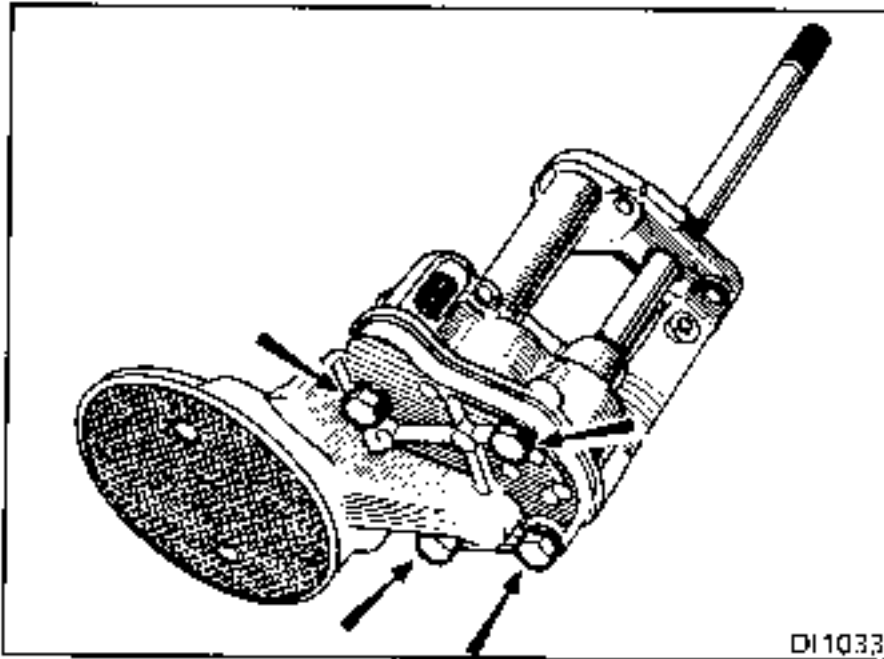
Screw on and torque tighten the big end cap nuts.

Check that the assembly rotates freely.

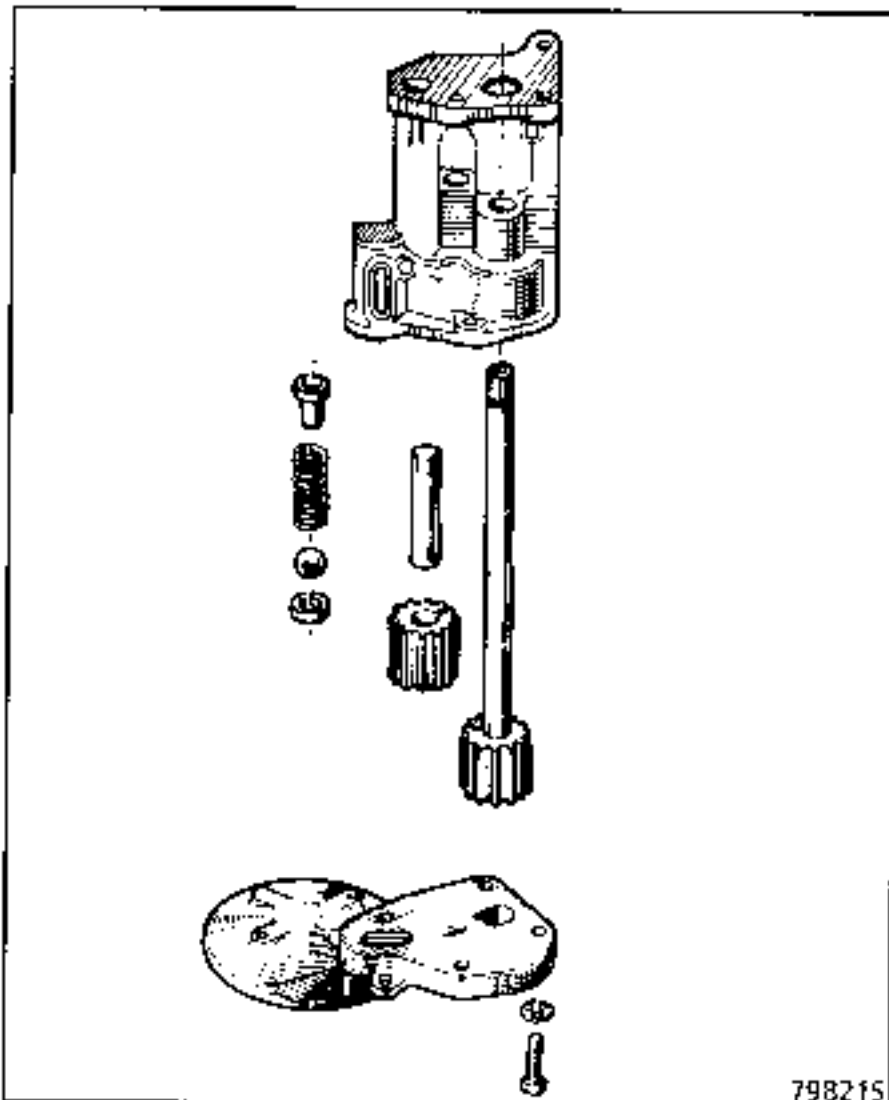


Checking the gear-type oil pump

Remove the cover mounting bolts.



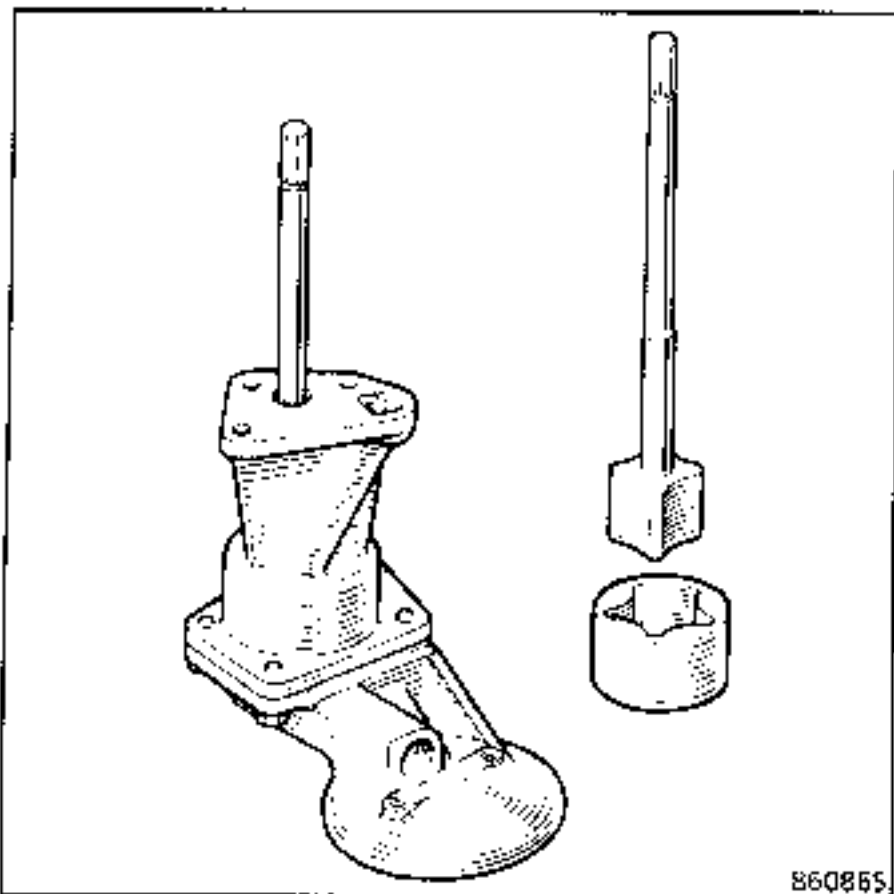
Take care to prevent the ball seat, ball and pressure limiting spring from flying out. Remove the driven gear, driving gear and its shaft.



Clean all the parts and check them.

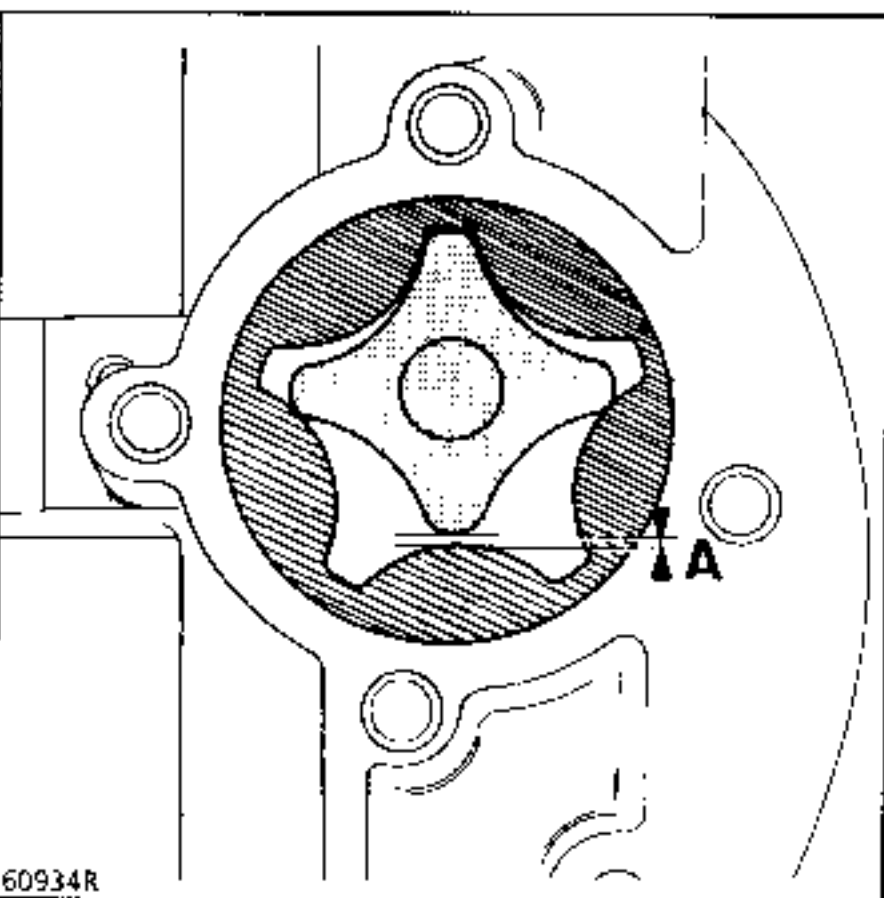
If the operating clearance between the gears and the pump casing is greater than 0.20 mm, change the pump.

Rotor-type oil pump



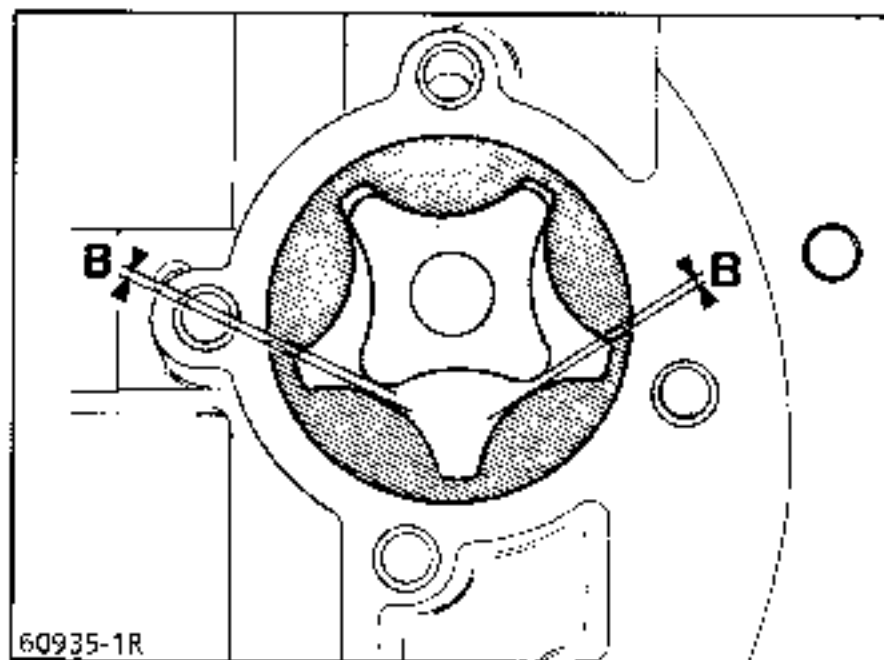
Checking rotor clearances.

Position 1



Dimension A : min. 0.04 mm
max. 0.29 mm

Position 2

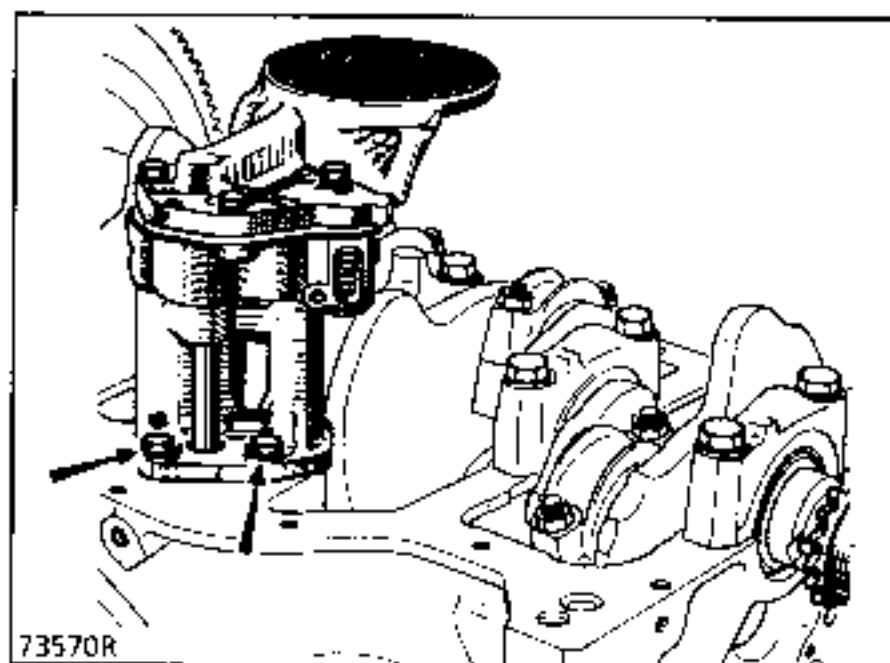


Dimension B : min. 0.02 mm
max. 0.14 mm

Replace the pump if wear exceeds these tolerances.

Refit the pump in reverse order to removal.

Fit the oil pump, with no oil seal between the casing and cylinder block.



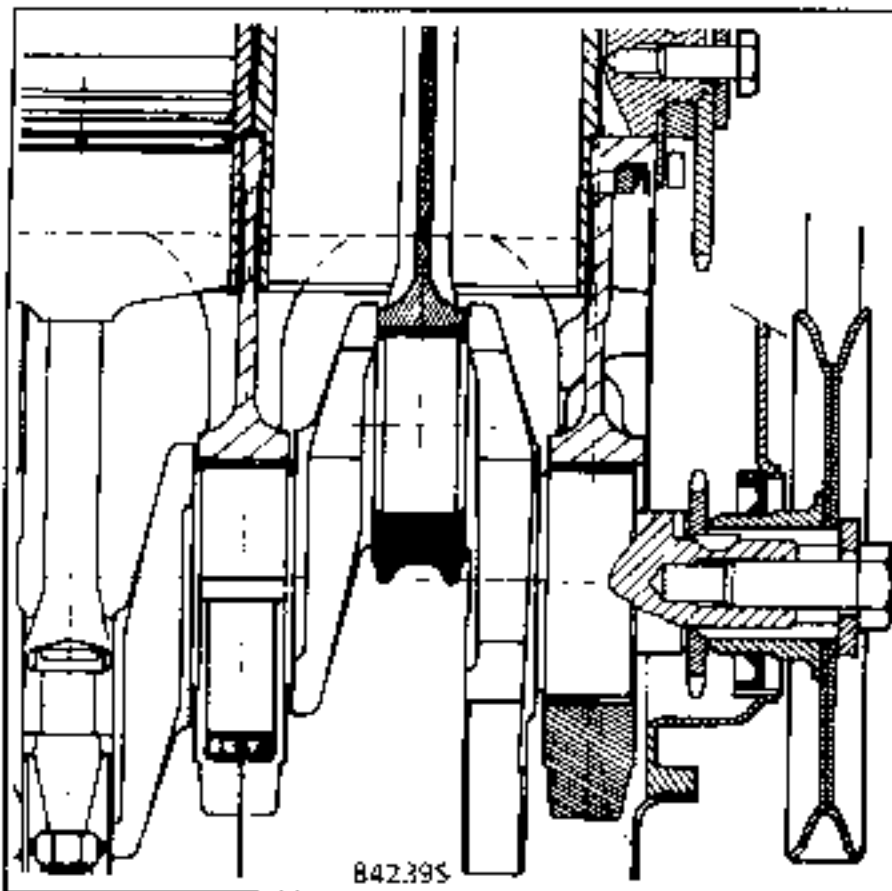
Refit the camshaft.

Refit the timing gear.

Identifying the crankshaft sprockets

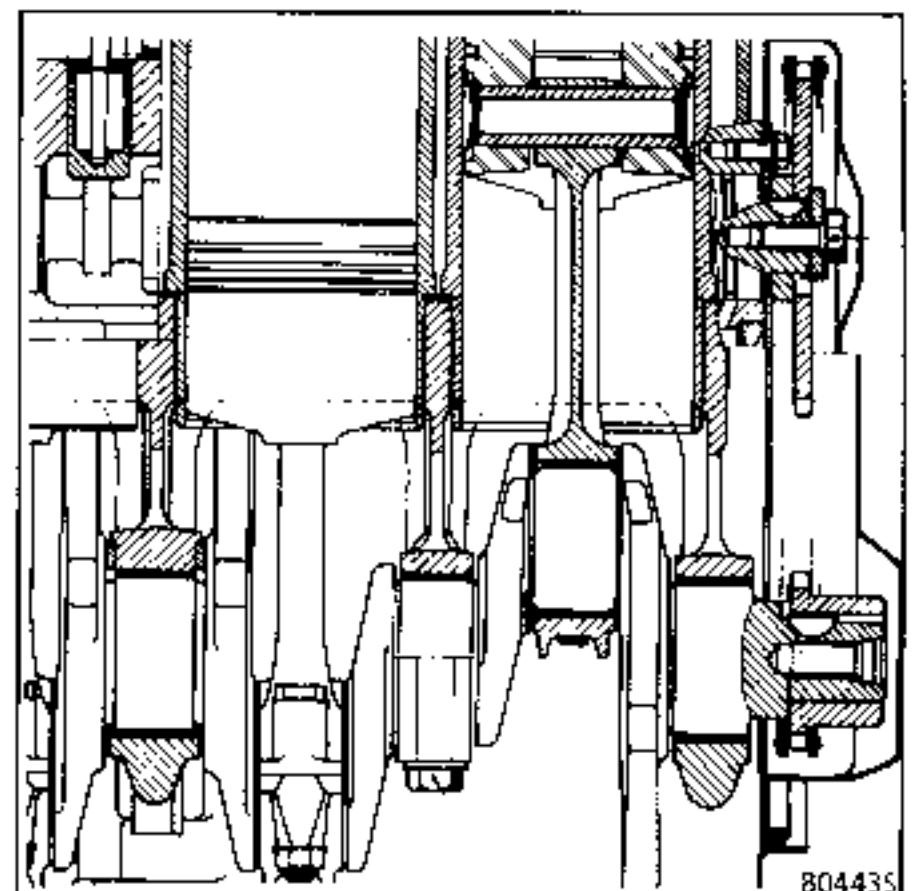
1st type

Engine with crankshaft pulley. The sprocket is flat and has no hub. With this type of assembly, the hub of the pulley holds the key and the crankshaft sprocket in position



2nd type

Engine without crankshaft pulley. The sprocket has an incorporated hub. This sprocket is a press-fit on the crankshaft.



Assembly with a single chain

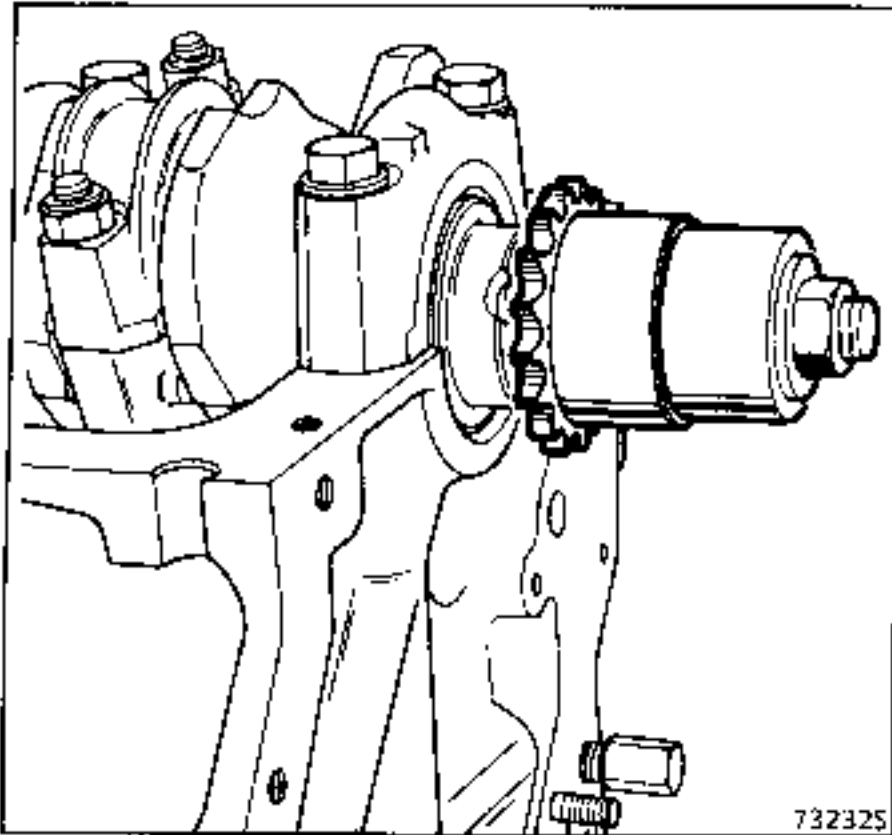
Insert the key and fit the crankshaft sprocket: timing mark on the sprocket facing outwards.

2nd type of assembly of crankshaft sprocket

Use :

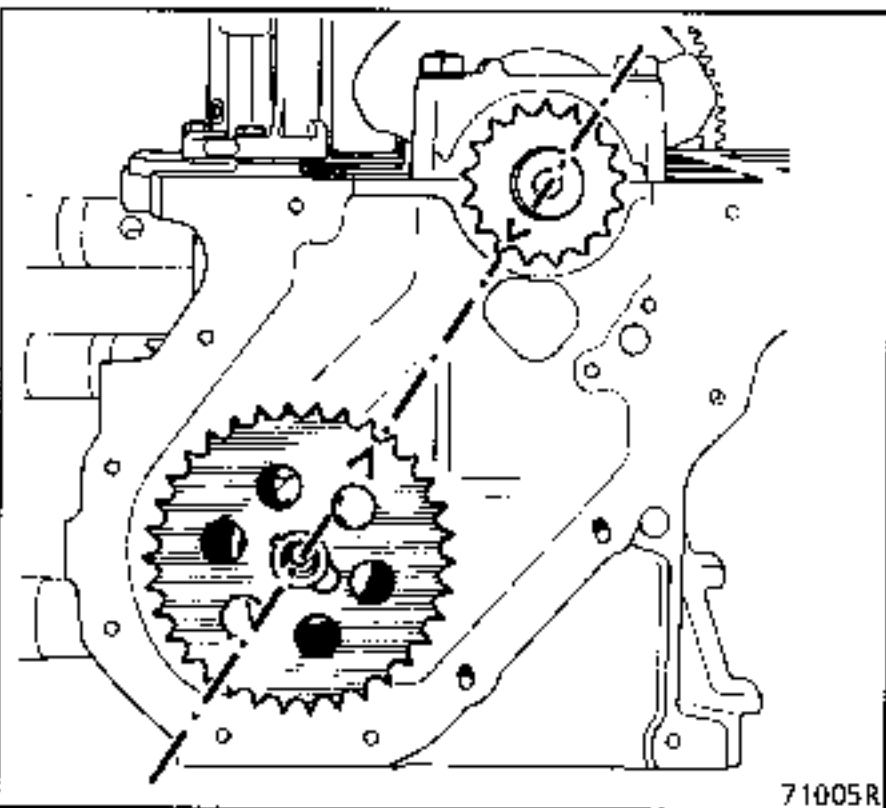
- a tube with an internal diameter of 25 mm,
- a threaded rod screwed into the crankshaft,
- a thick flat washer and nut.

Screw up the nut so as to position the sprocket.



Align the timing marks of the two sprockets with the centres of the crankshaft and the camshaft.

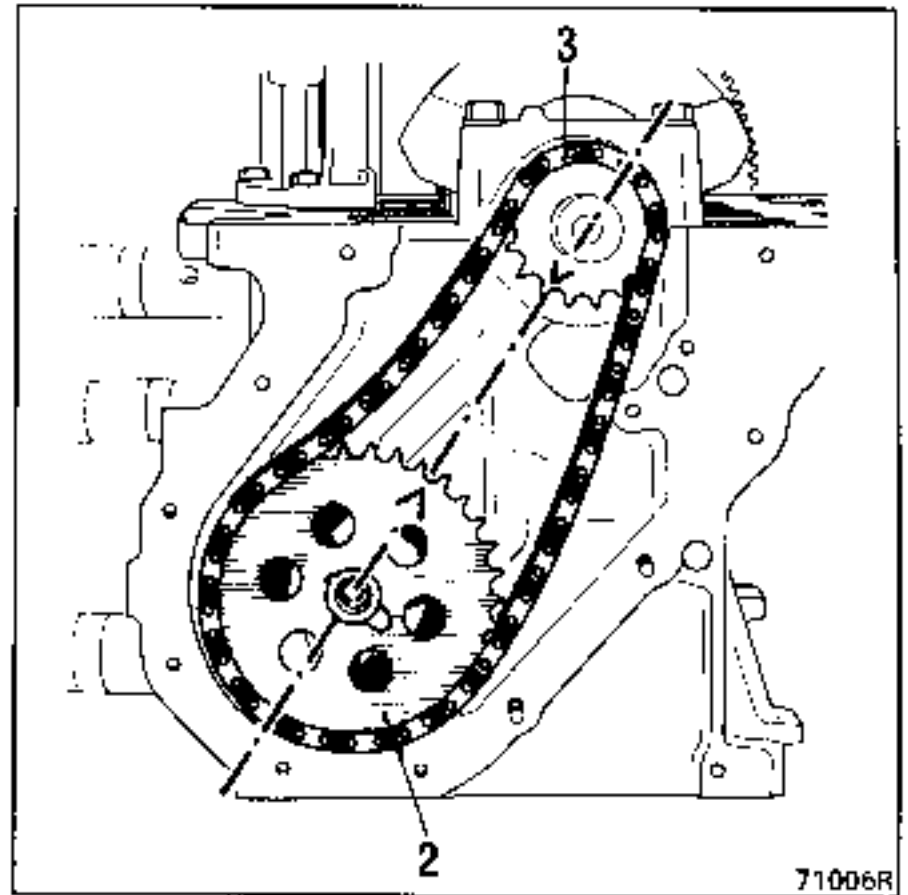
Remove the camshaft sprocket without rotating the camshaft.



Fit the timing chain (3) to the camshaft sprocket and the crankshaft sprocket.

Refit camshaft sprocket (2) with all the timing marks still in line.

Timing position for all engine types



Fit a new lockwasher and torque tighten the camshaft sprocket nut.

Bend the tab over on the lockwasher.

Assembly with duplex timing chain (special feature)

The crankshaft and camshaft sprockets equipped with the chain are fitted at the same time.

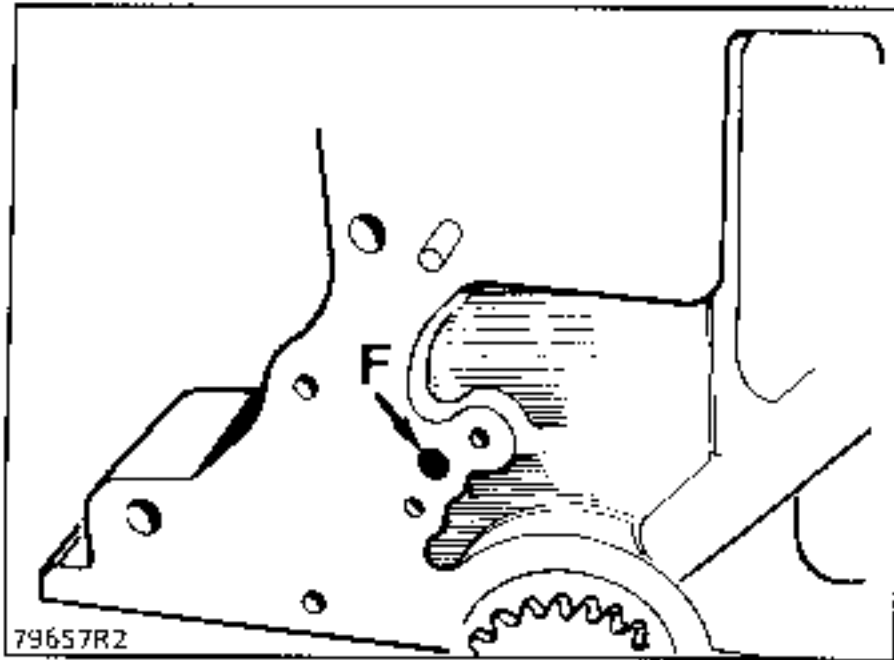
Insert one threaded rod into the camshaft and another into the crankshaft. Gradually move the two sprockets closer, checking the position of the timing marks until the sprockets bear against one another.

Remove the threaded rods from the sprockets. Fit the camshaft sprocket fixing bolt (coated with Loctite FRENBLOC) equipped with the washer and torque tighten.

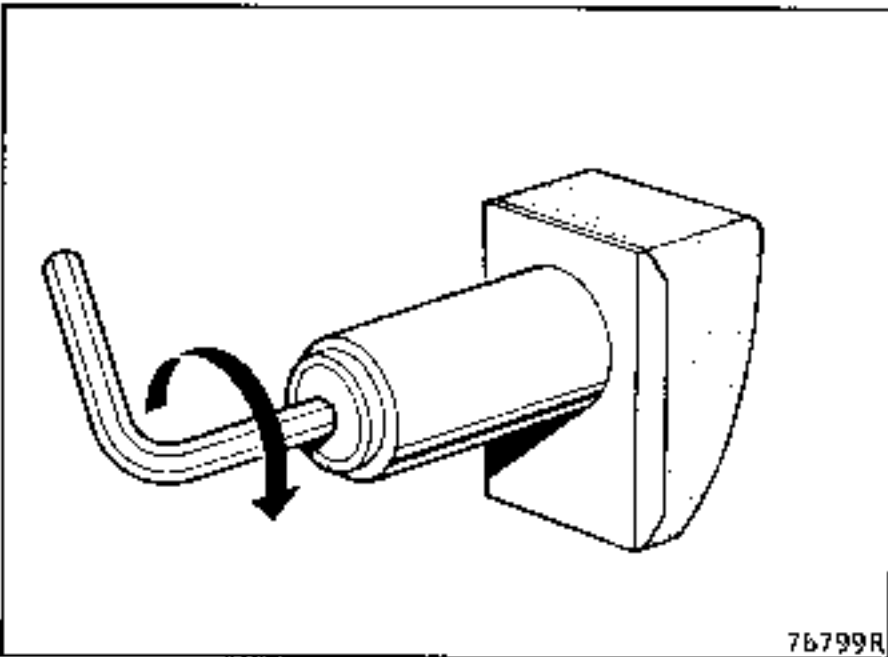
FITTING THE TENSIONER

Hydraulic tensioner with automatic setting

Fit tensioner filter (F).



Using a 3 mm male hex key, lock the piston in the shoe.

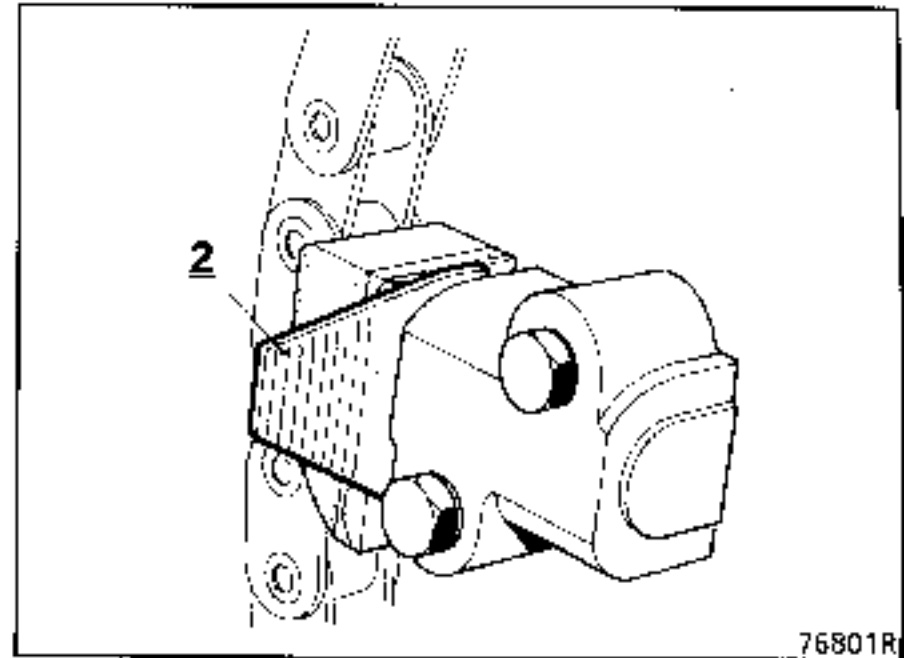


Assemble the shoe in the tensioner body.

Insert a block (2) about 2 mm thick between the tensioner body and shoe to prevent accidental setting during handling.

Remove the plastic tab (new tensioner) or other block (2) and press the shoe in until it contacts the bottom of the tensioner body.

Release the shoe without interfering with spring action.

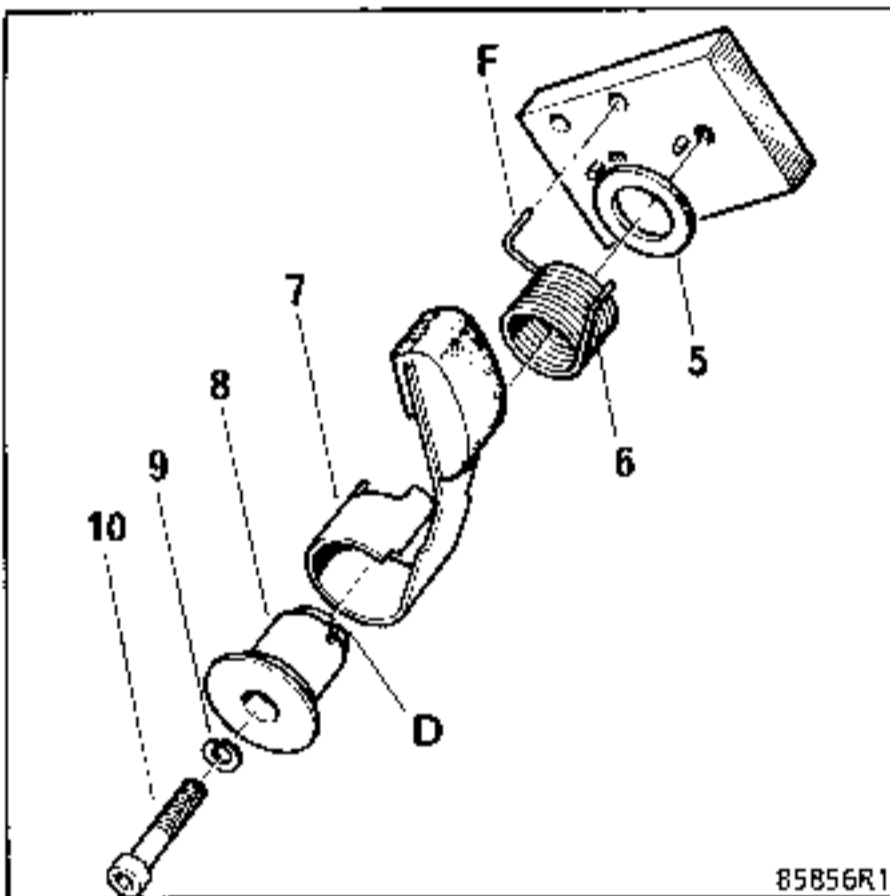


Mechanical tensioner

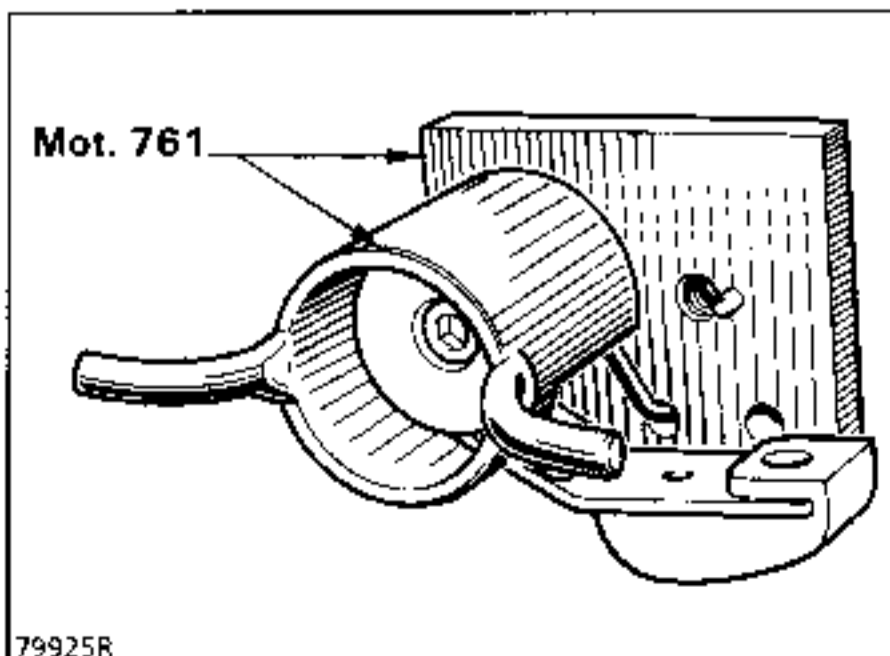
Use the assembly plate from tool Mot. 761 to assemble the chain tensioner, if necessary.

Fit the following to the plate:

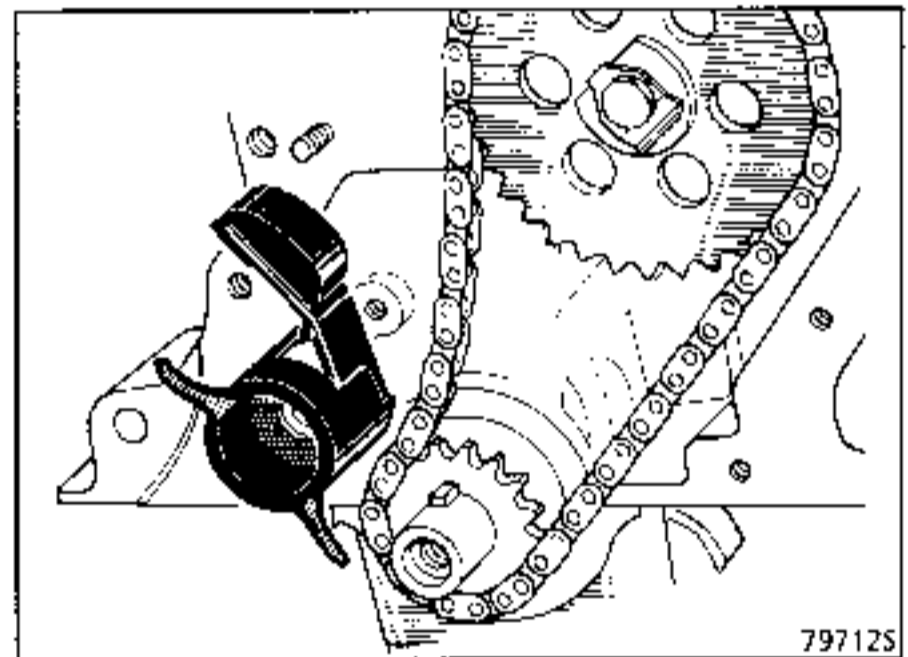
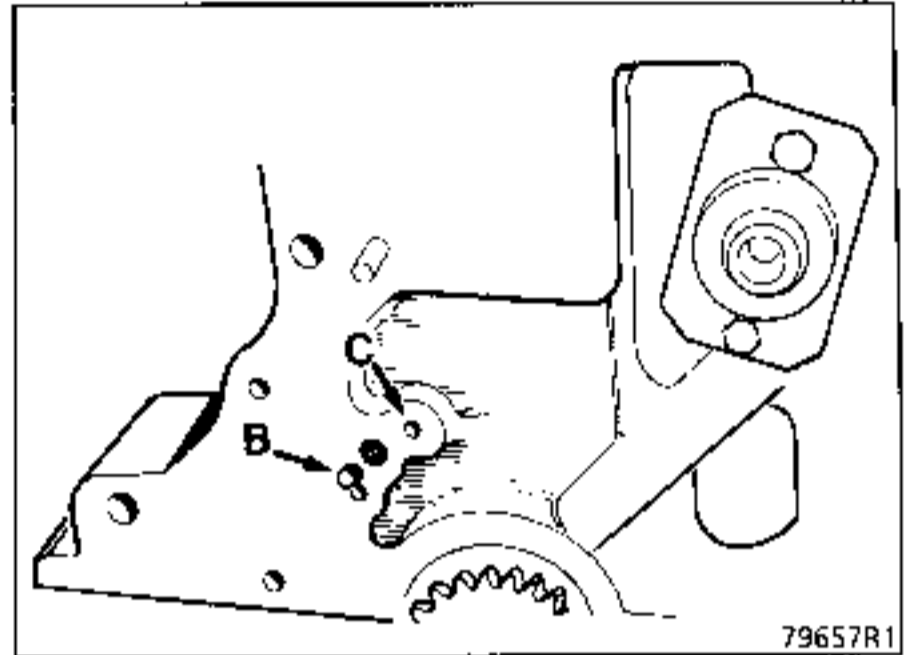
- washer (5),
- shoe (7) fitted with spring (6), insert the end of the spring in the hole provided,
- tensioner spindle (8), plate peg in its slot in the spindle,
- fit screw (10) with its washer (9).



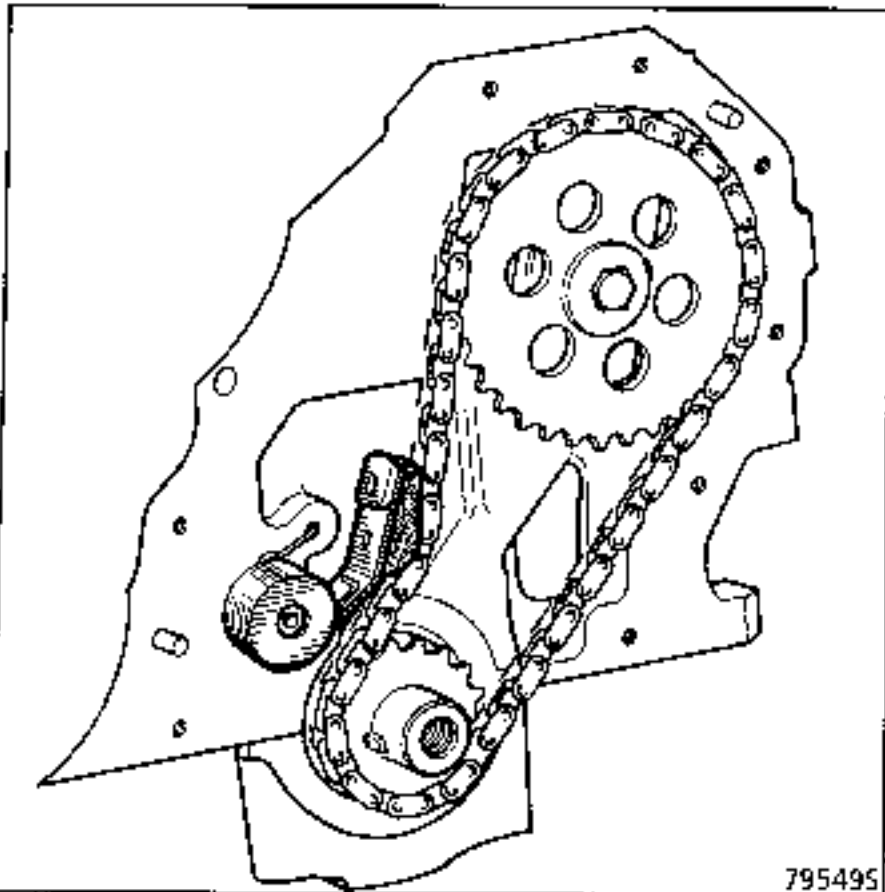
With the chain tensioner assembled and mounted on the plate, tilt the tensioner as far as it will go and fit retainer Mot. 761.



Remove the tensioner - retaining tool assembly from the plate and transfer it to the cylinder block. Peg (B) should be in slot (D) in spindle (8), and spring tag (F) should be hooked into hole (C) of the cylinder block.



Remove the retaining tool.



- Fit:
- the timing cover and sump (see chapter on "sump"),
 - the crankshaft pulley for engines equipped with one.

- Insert the distributor drive gear :
- Turn the crankshaft so that no. 1 cylinder is on TDC (no. 4 cylinder valves on balance).
 - Engage the distributor or rotor drive gear paying attention to its position. (These gears no longer have any internal thread.)

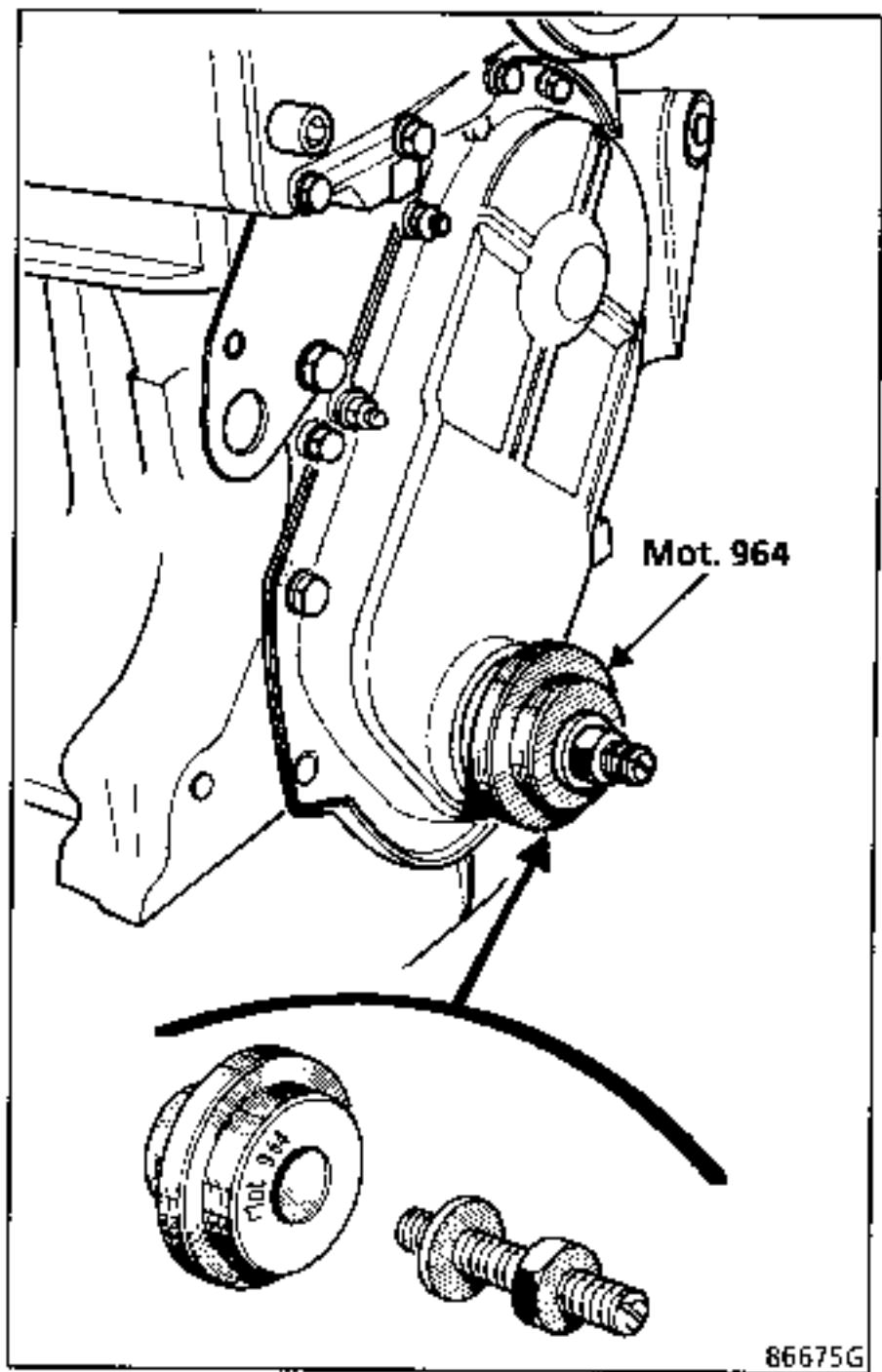
Refitting the sump and timing gear

Engines : All Types except turbocharged engine

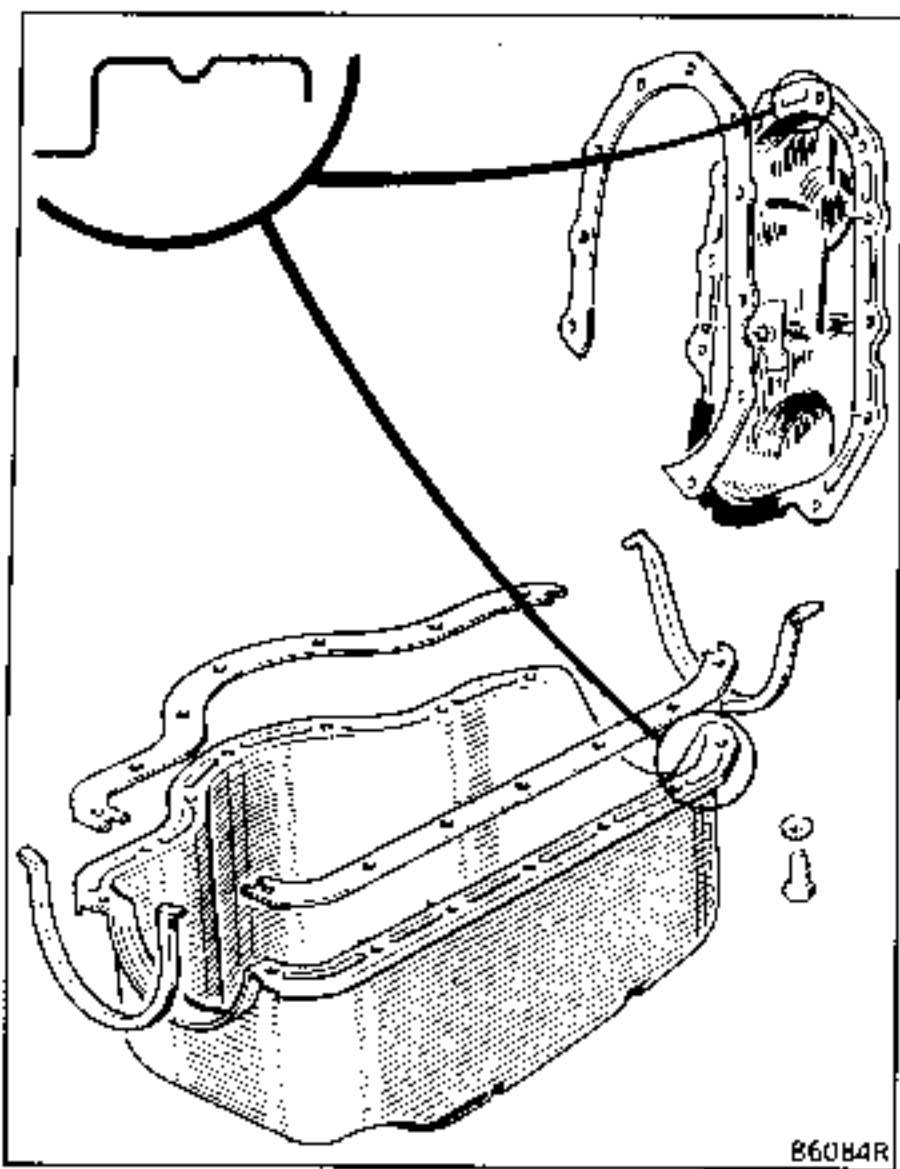
1st type

Positioning the timing cover on the engines fitted with a crankshaft pulley.

The 1st pattern timing cover must be located using tool Mot. 964 with a collar welded on the timing cover.



The cork gaskets must be fitted.

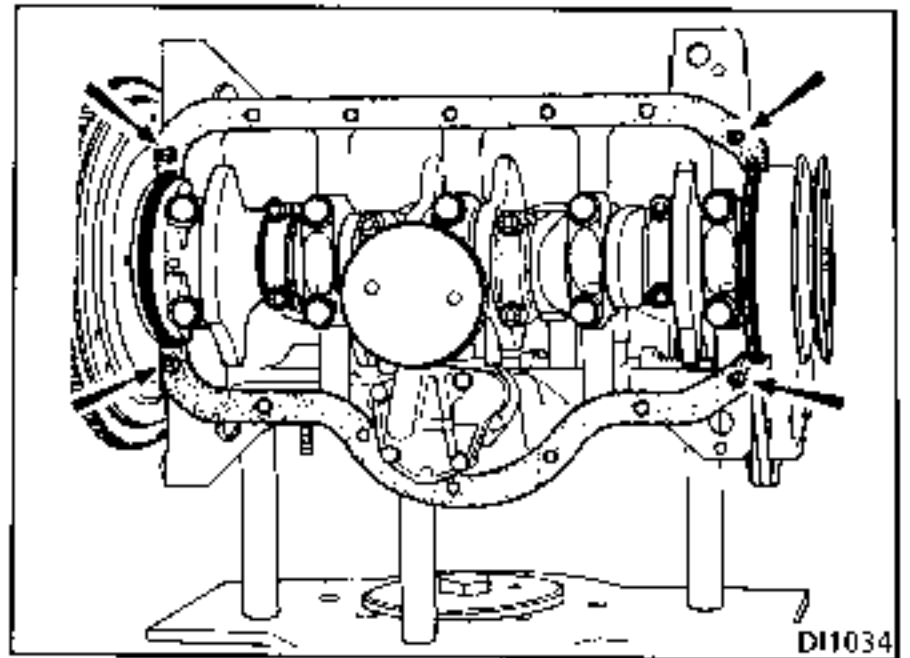


Fit the rubber seals for the front and rear main bearings.

The side gaskets must cover the ends of the bearing seals.

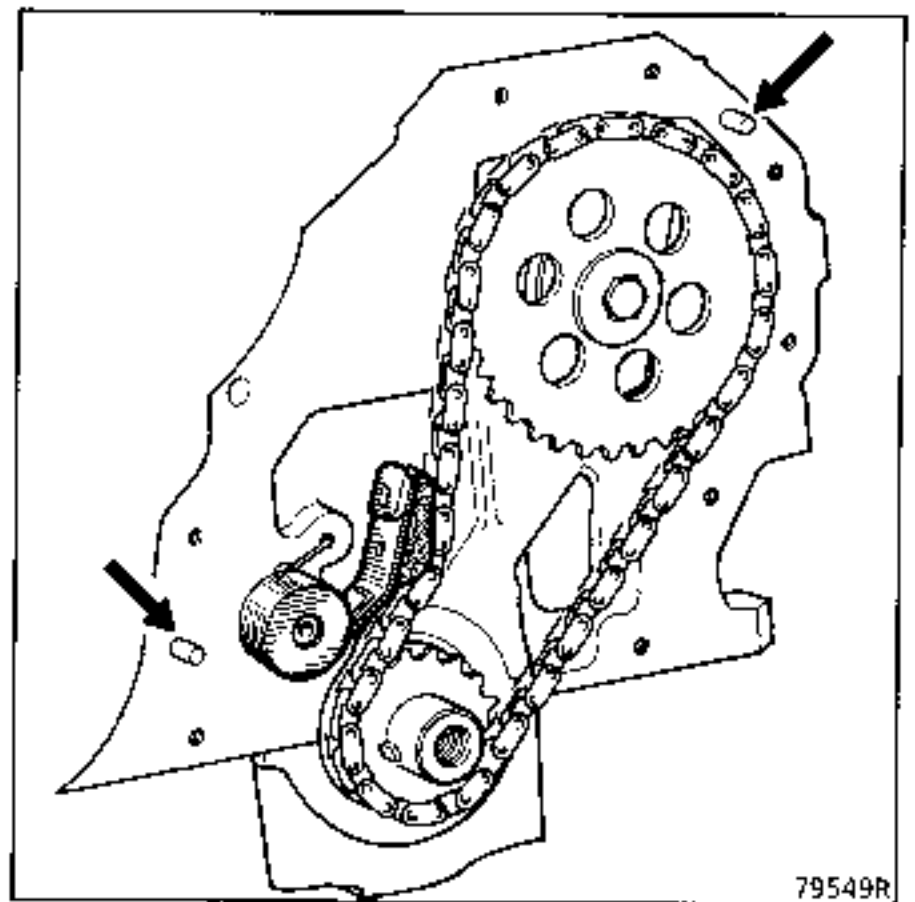
Hold the side gaskets in place using four dowels. Use rhodorseal 5661 paste at the end of each gasket.

Offer up the sump: tighten the bolts gradually and alternately taking care not to squash the gaskets.



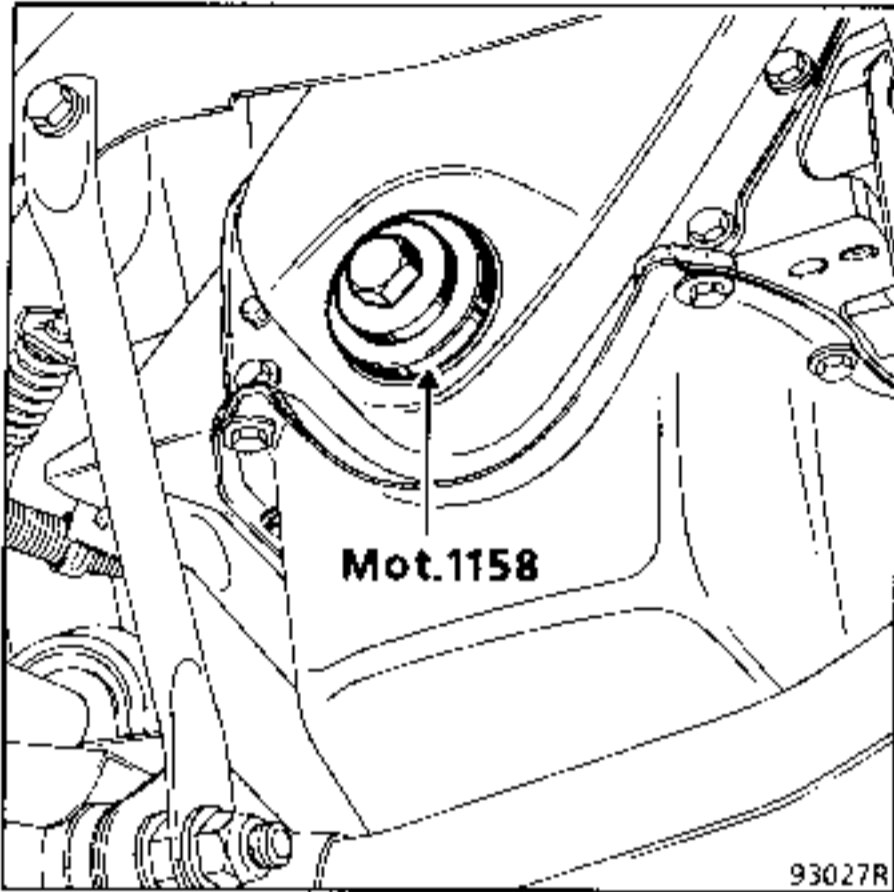
2nd pattern

The timing cover is located on the cylinder block by two dowels.

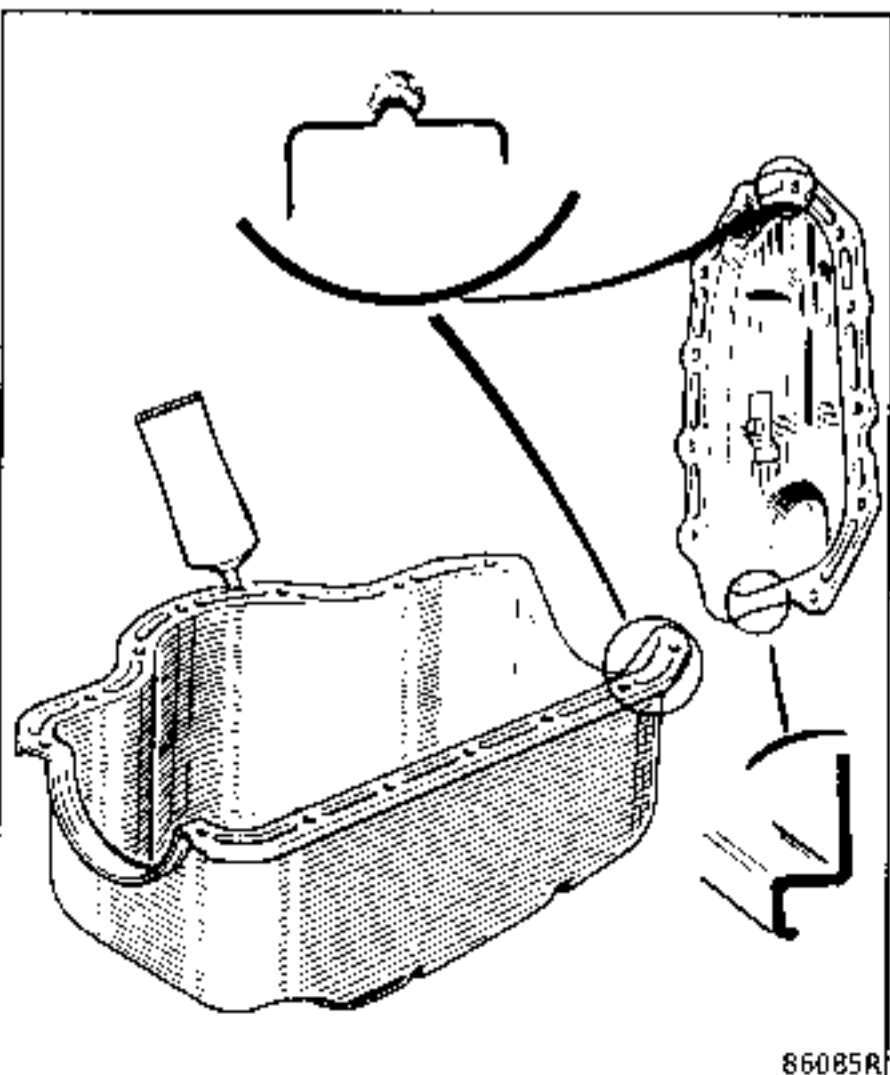


Tighten all the bolts but not excessively.

Use tool **Mot. 964** to fit the lip seal. The same applies to the first type, or use tool **Mot. 1158** for timing covers with a collar.

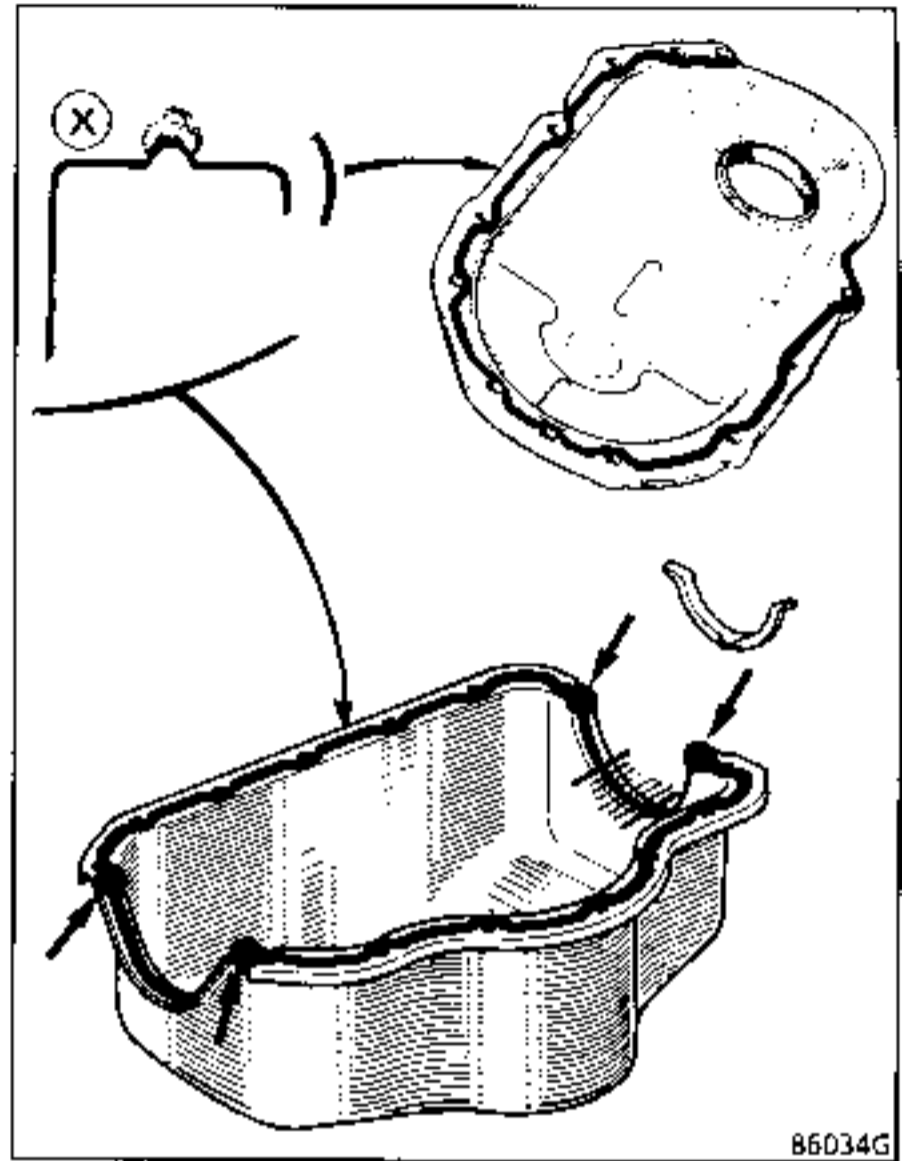


MUST BE ASSEMBLED WITH RHODORSEAL 5661 SILICONE PASTE ONLY.



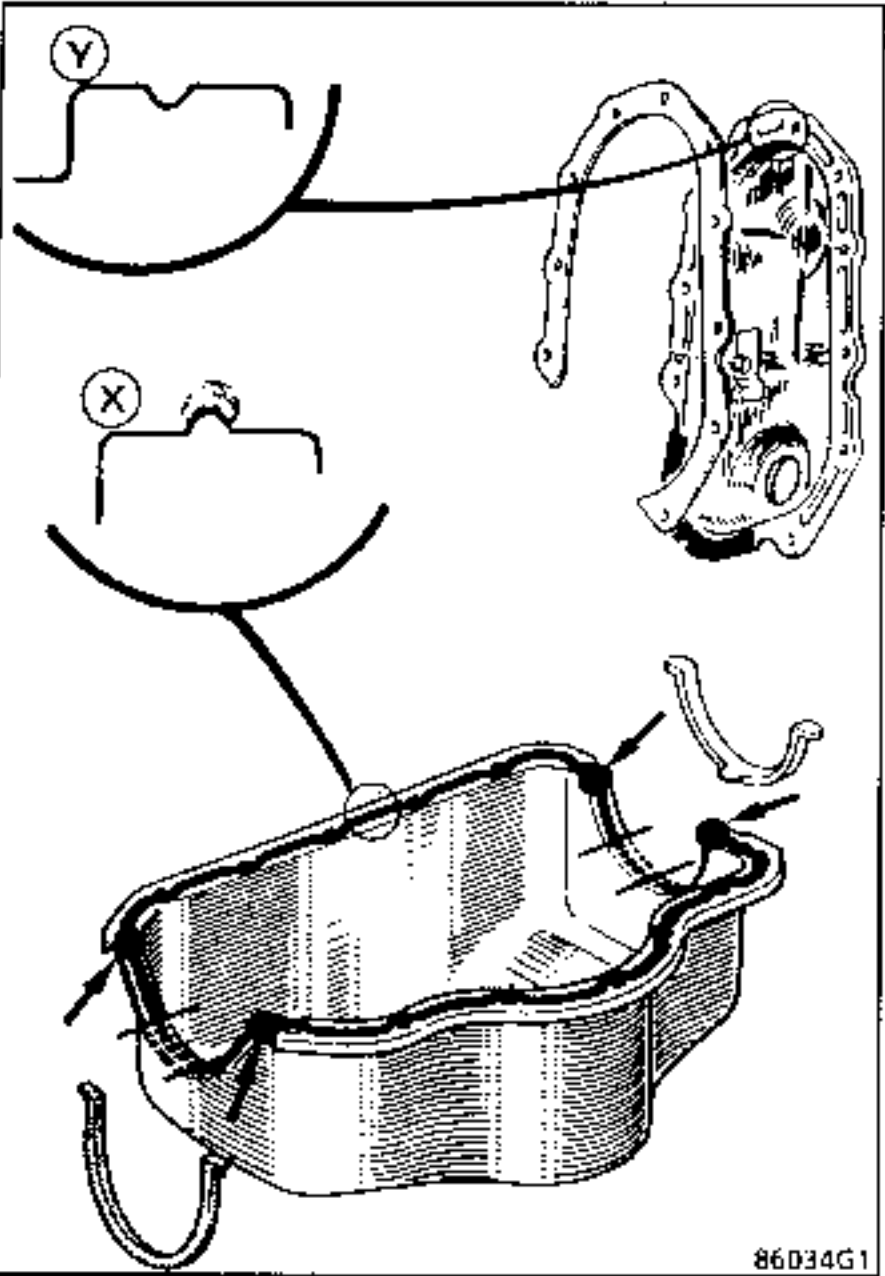
TURBOCHARGED ENGINE

1st type



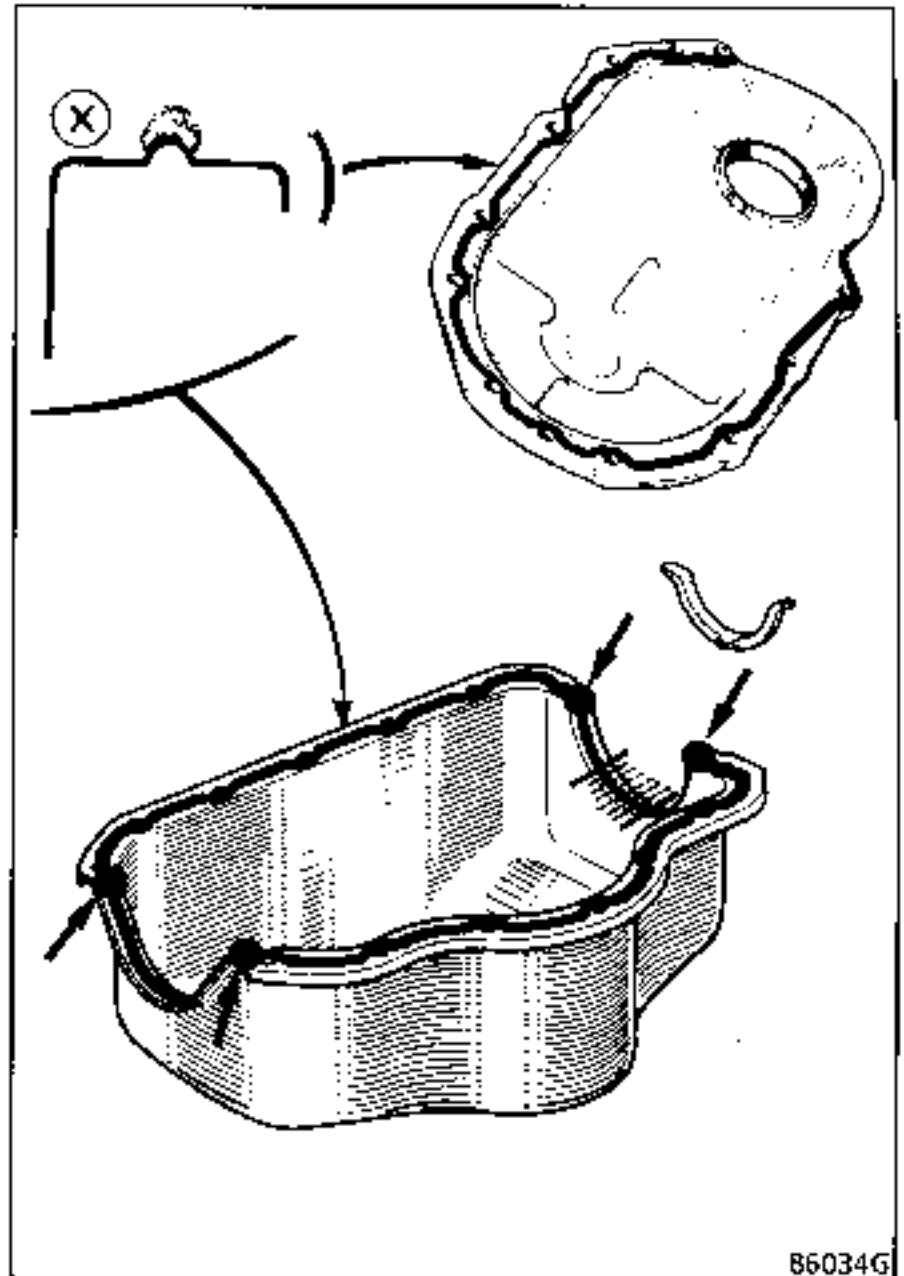
Silicone gasket on both cover and sump with one single rubber gasket on the first crankshaft bearing (flywheel end).

2nd type



Silicone gasket on the flat surface of the sump, two cradle seals and one cork seal on the timing cover.

3rd type



Silicone gasket on the flat surfaces of the sump and timing cover, and two cradle seals.

APPLICATION :

IT IS ESSENTIAL TO USE RHODORSEAL 5661 SINCE ITS PROPERTIES PROVIDE GOOD RESISTANCE TO :

- **VIBRATIONS,**
- **HIGH TEMPERATURES,**
- **OILS AND FUEL,**
- **AGEING.**

Use the following method to ensure good sealing of the joint faces of the casings:

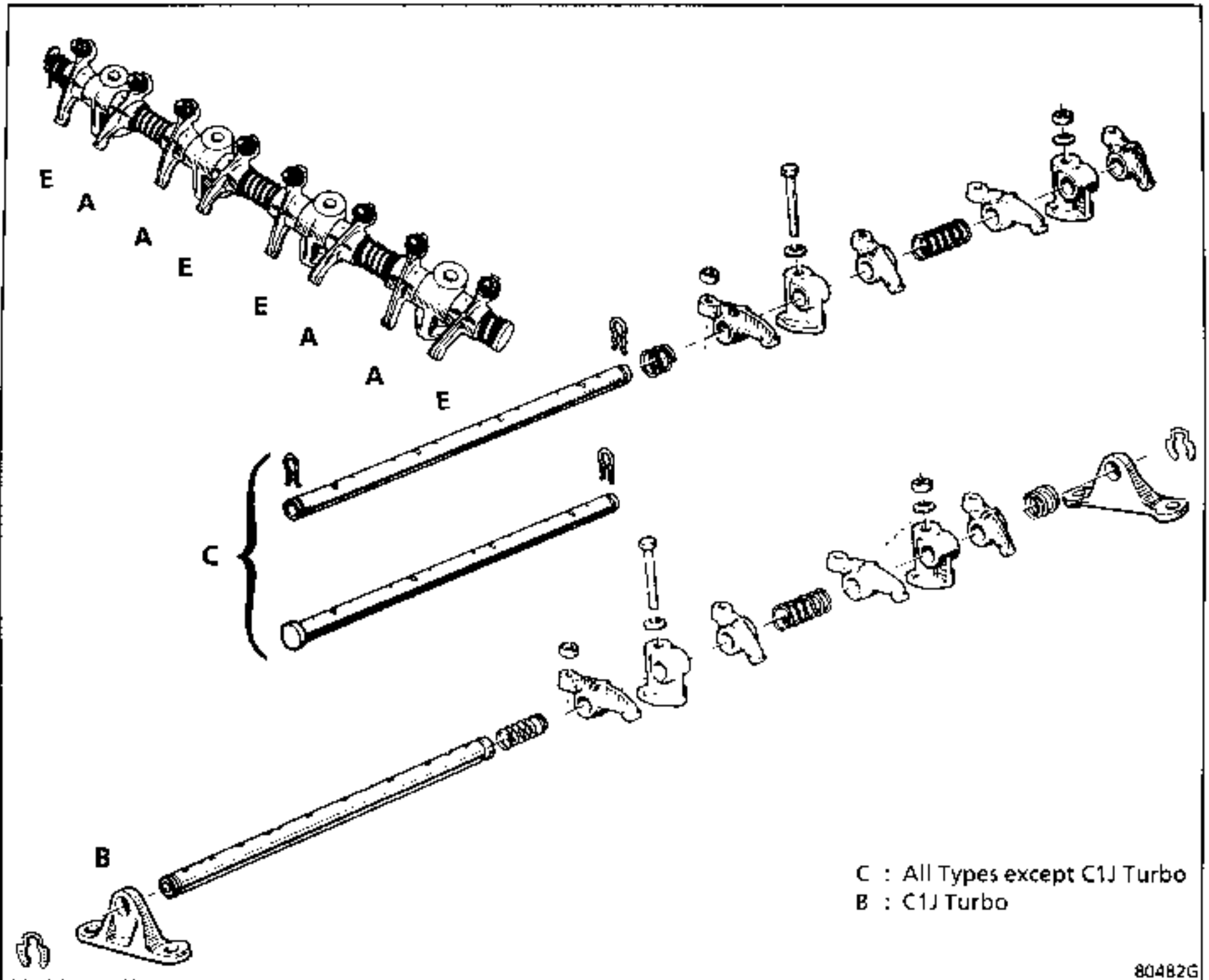
- **Clean the casings thoroughly (paste and oil).**
- **Wipe the timing cover, the movable gear and the oil pump to prevent any drips,**
- **Degrease (with a thinning agent) and dry the joint faces of the casings and the cylinder block.**
- **Apply a 3 mm strip of rhodorseal 5661 placing a large amount at the four corners of the sump.**

This product may be used in air for approximately 15 minutes.

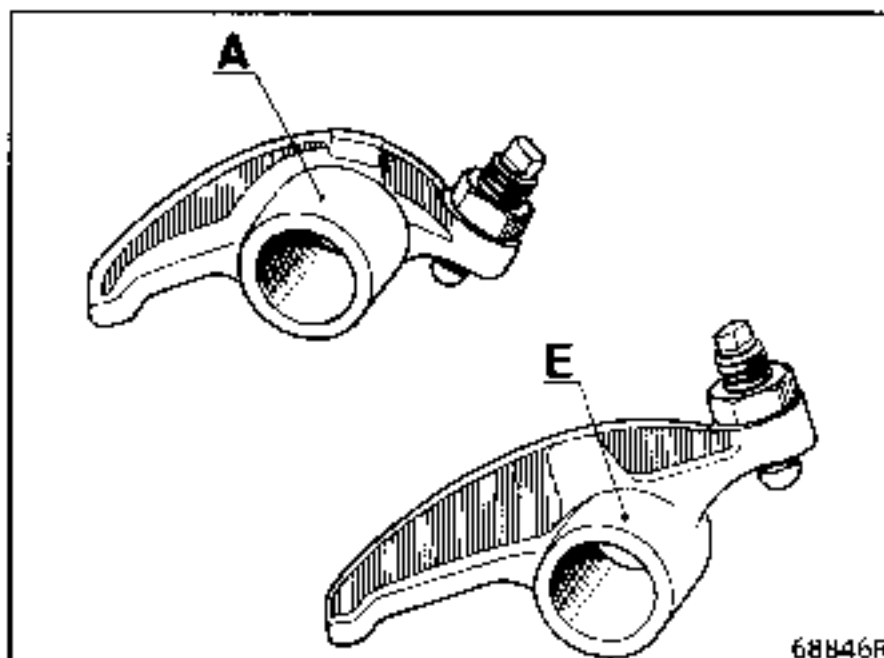
Precaution : An excess of sealing mastic at the sump cradle may block the flow of oil from the front bearing seal or the timing cover and cause incidents.

BEFORE REFITTING THE CYLINDER HEAD, CHECK THE CONDITION OF THE ROCKER SHAFT ASSEMBLY

Engines: All Types except 840 - C6J - C7K

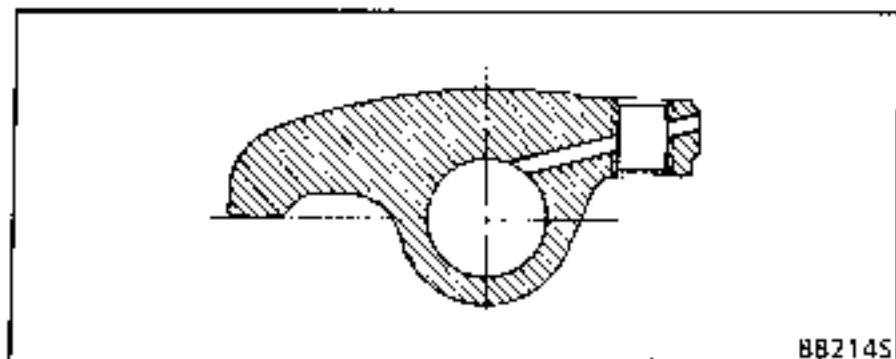


The inlet rocker arms (A) and the exhaust rocker arms (E) are different.



The oilway plugs at each end of the rocker shaft are press-fitted and must not be dismantled.

Some engines are equipped with drilled inlet and exhaust rocker arms.

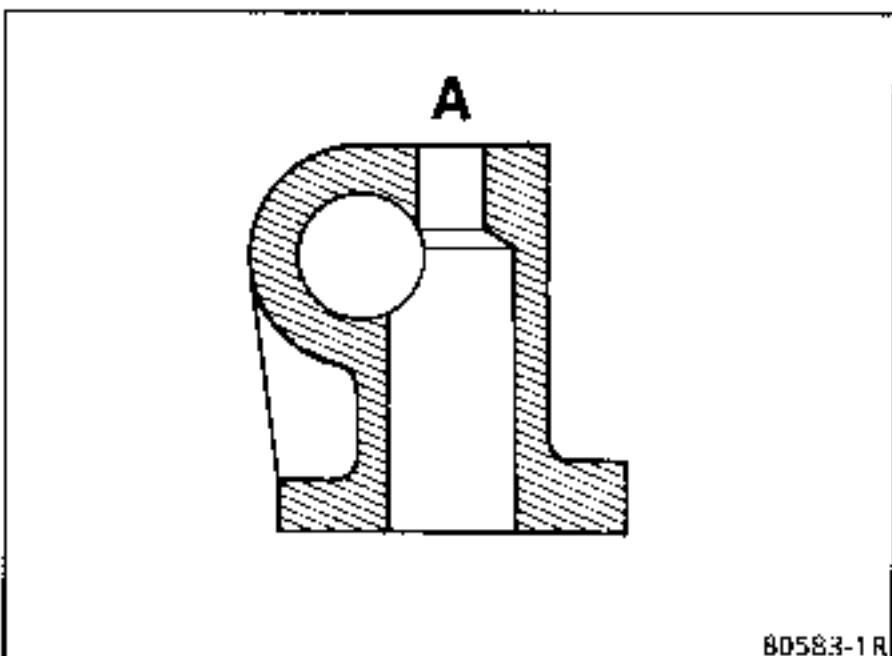


The Parts Department only supplies drilled inlet and exhaust rocker arms as service parts.

1st type of assembly

The oil is supplied by bearing (A) at the clutch end between the bolt and the bore.

The four rocker shaft bearings are identical.



2nd type of assembly

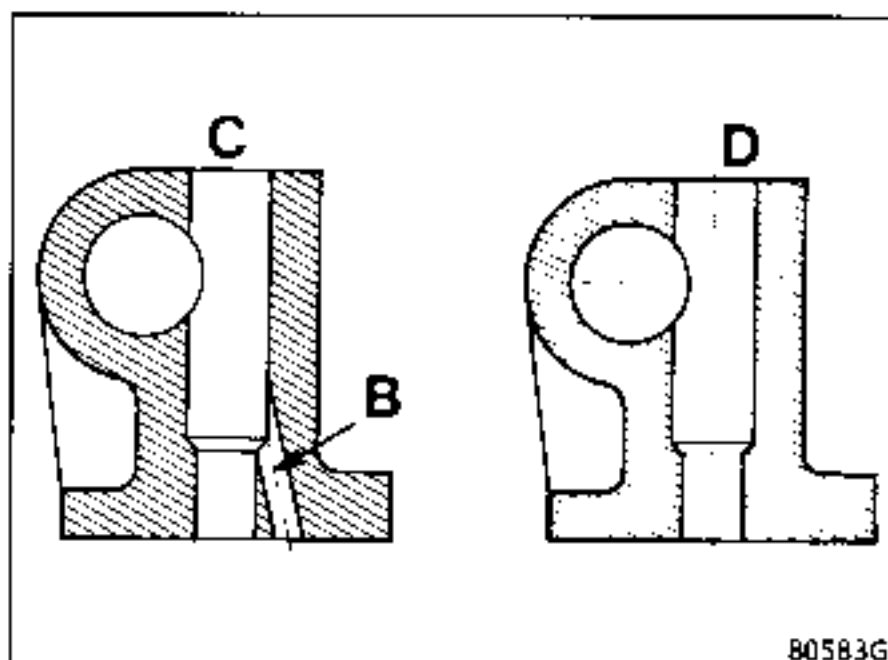
Only the bearing (C) at the clutch end has an oil hole (B) for supplying oil to the rocker shaft assembly.

Under no circumstances should the bearings be mixed up when reassembling since the others (D) are not drilled and no oil can pass through.

The Parts Department will only supply pattern (C) as a service part. This bearing is provided with an oil feed hole for lubricating the rocker shaft and may be mounted instead of bearings A or D.

Fit the parts to the rocker shaft in their correct order.

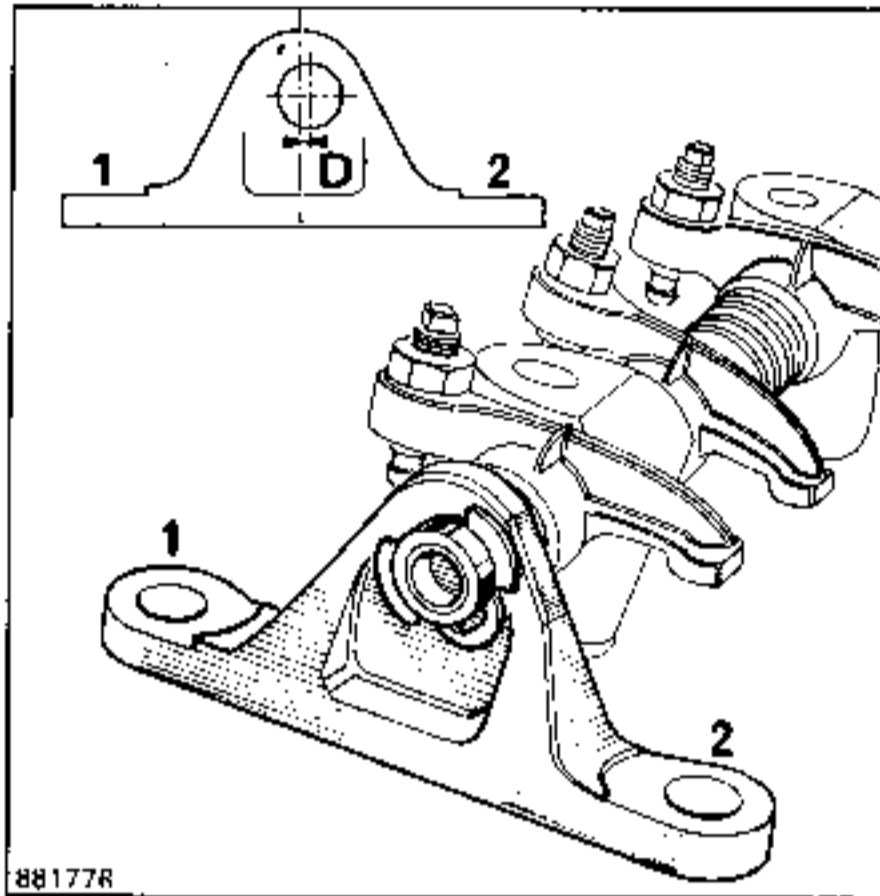
The lubrication holes in the rocker shaft must face towards the pushrods. The holes for the support fixing bolts must be aligned with those in the rocker shaft.



Special points relating to C1J turbo engines

The end bearings are different.

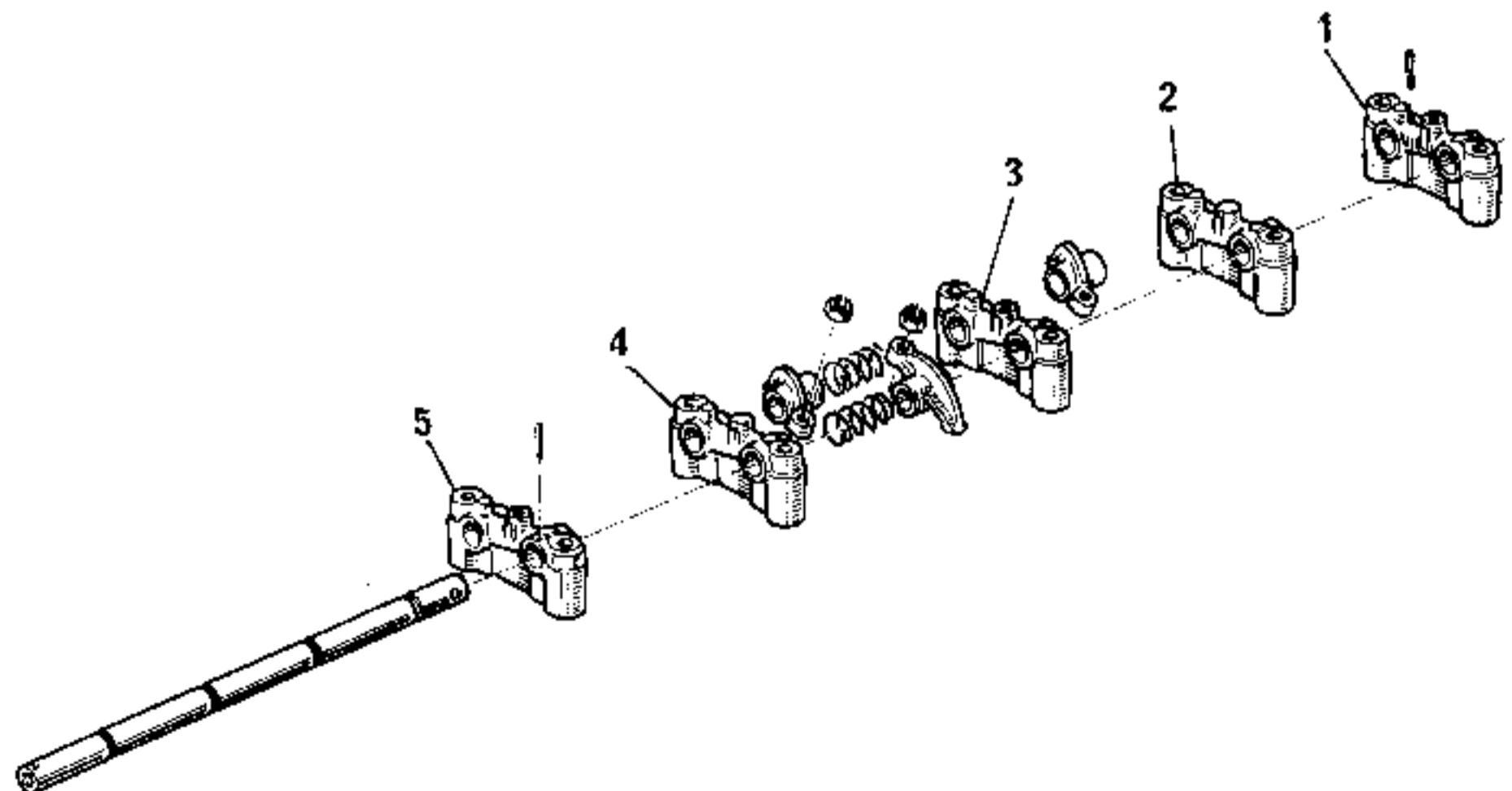
The offset (D) should be on the side away from the pushrods for both bearings.



Engines : 840 - C6J - C7K

Reassembling the rocker shafts:

- Slide both shafts through bearing (1),
- Insert the rollpin to retain the inlet rocker shaft.

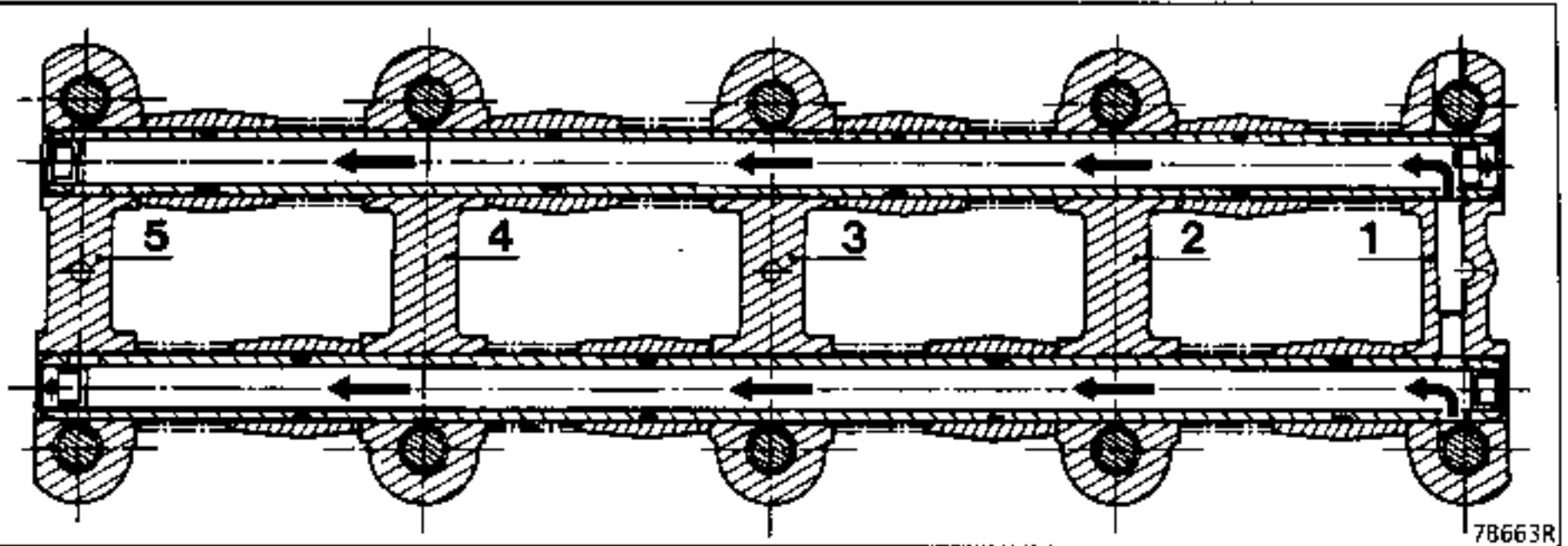


Identification of parts :

● Rocker shaft bearings :

- bearing (1) has the oil feed channel to the rocker shaft assembly,

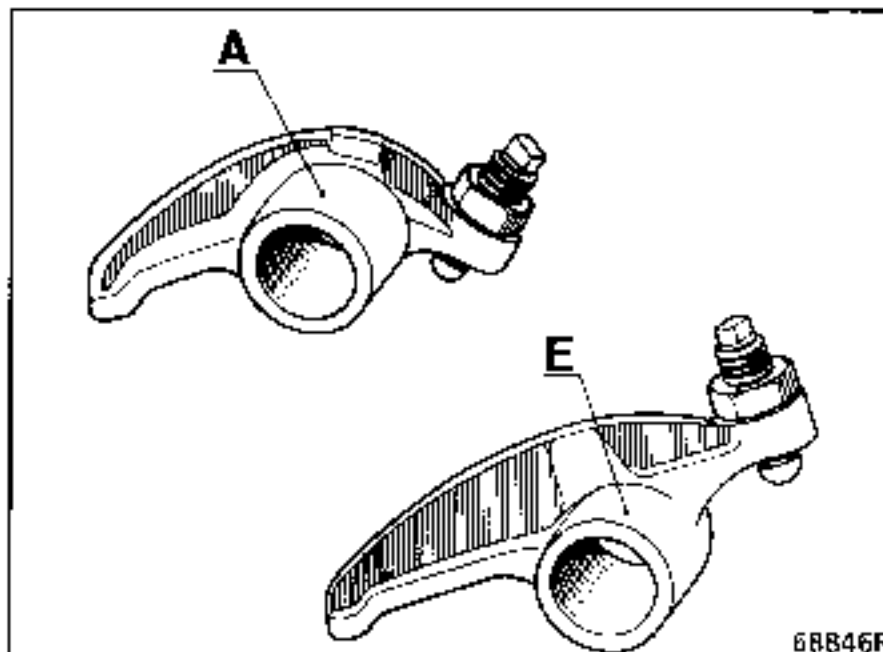
- bearing (5) is identical to bearing (1) in external appearance but it has no oil feed hole,
- bearings (2) and (4) are identical, having no threaded hole for the rocker cover bolt,
- the centre bearing (3) has a threaded hole for fixing the rocker cover bolt.



● Rocker shafts :

The two rocker shafts are identical.

- The inlet rocker arms (A) and the exhaust rocker arms (E) are different.



Check the condition of :

- the top ends of the pushrods: an unworn centre should be apparent

G : adjusting screw

T : pushrod

Z : contact-free centre

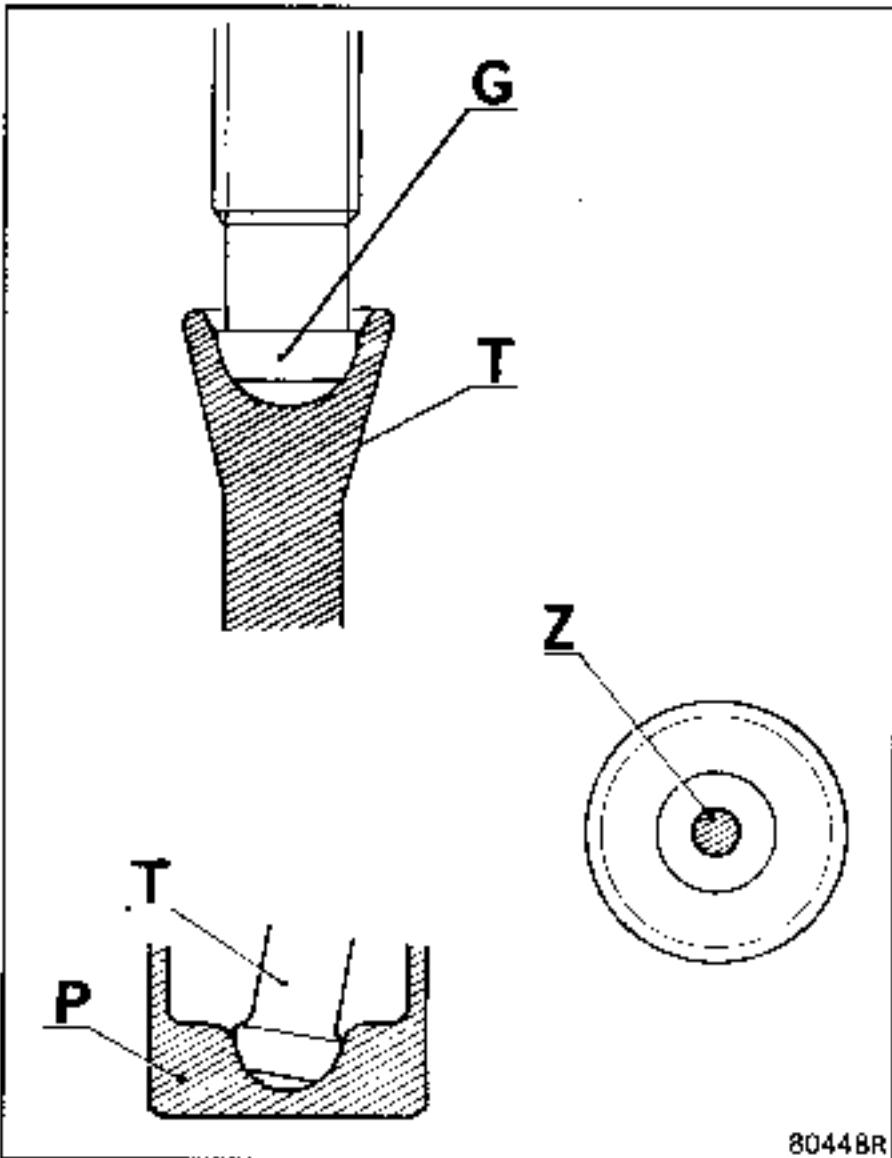
- the tappets: they should also have an unworn centre

T : pushrod

Z : contact-free centre

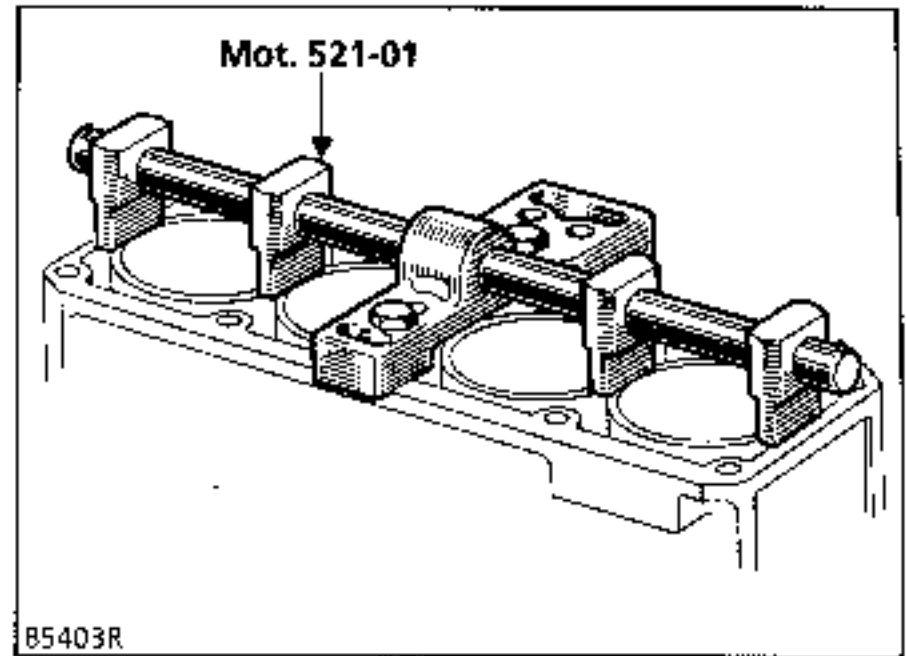
P : tappet

If the centre appears worn, the mating parts must be changed.



Refit the tappets in the appropriate places on the cylinder block.

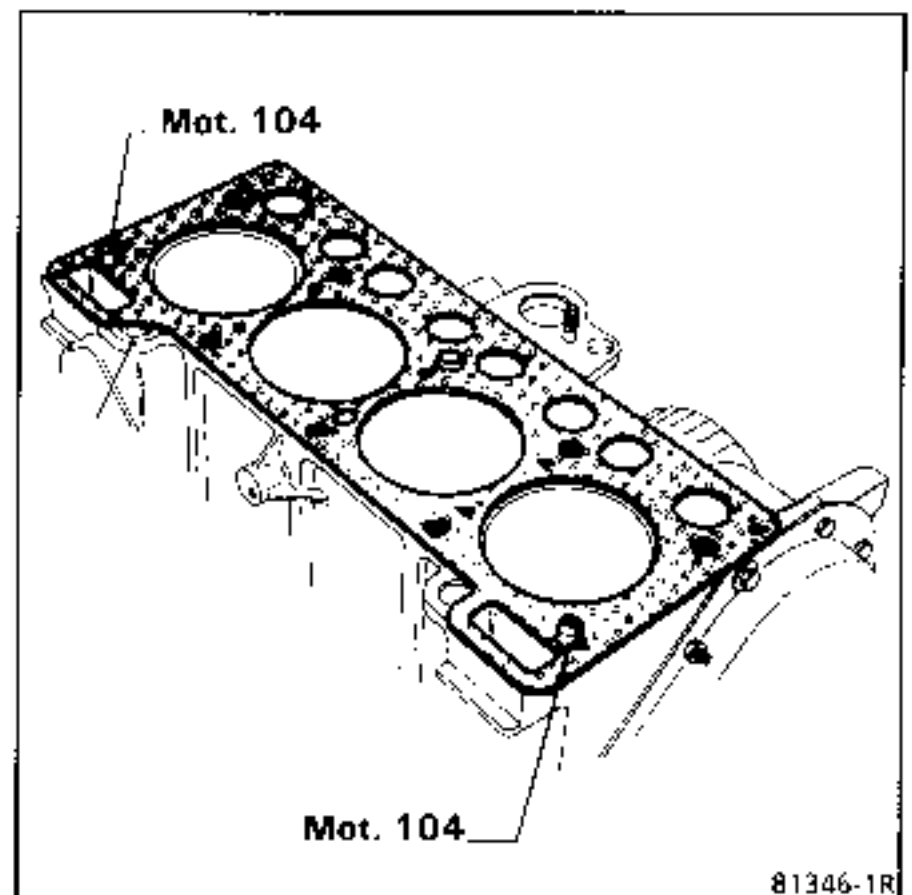
Remove the liner clamp Mot. 521-01.



REFITTING THE CYLINDER HEAD

Engines: All Types except 840 - C6J - C7K

Fit the gasket locators Mot. 104 in position.

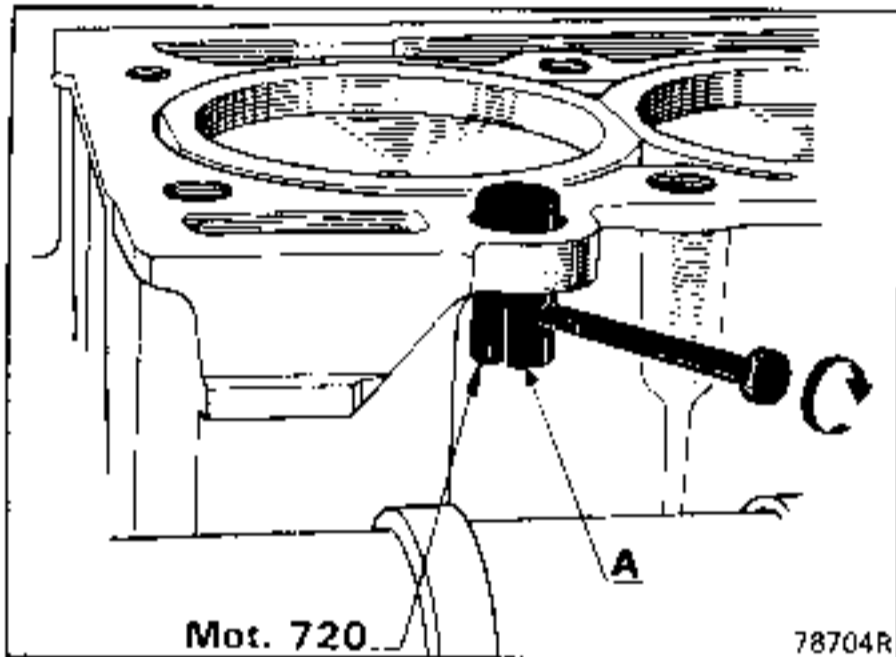


Engines: 840 - C6J - C7K

The cylinder head gasket fitting operation is very important; it determines the alignment of the distributor drive with the distributor shaft.

Positioning the cylinder head and gasket:

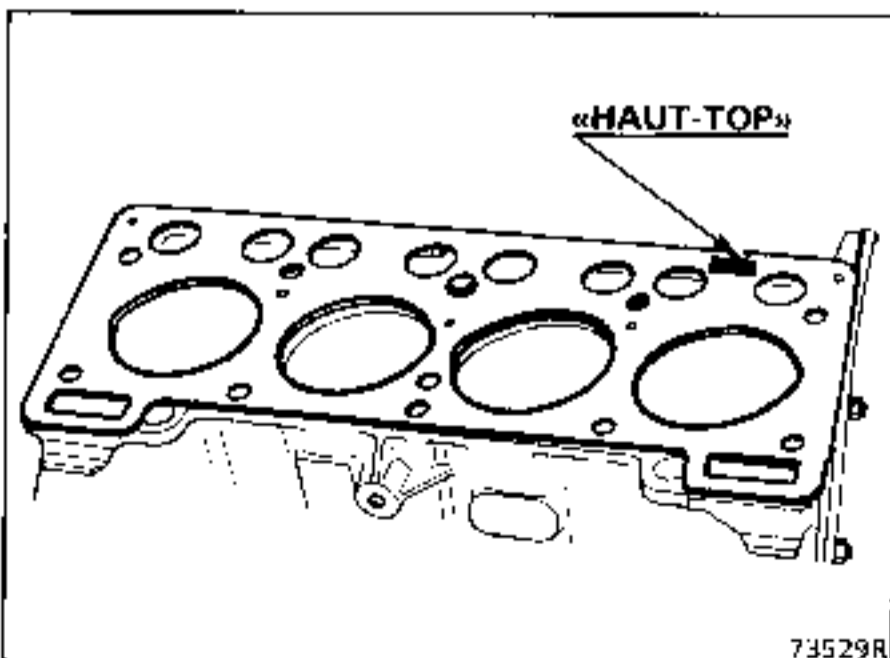
Insert the locating tool (A) Mot. 720 in the hole at the front of the cylinder block and tighten the bolt just enough to lock the tool.



Fit the cylinder head gasket dry with the "HAUT TOP" marking uppermost.

Once the gasket is in place, it must not be lifted as the adhesive varnish head cannot be reused.

This gasket must be thrown away and another gasket used if the cylinder head is misaligned.



Offer up the cylinder head with its rocker arm assembly.

ALL TYPES

Position the cylinder head and fit two bolts to prevent the cylinder head moving.

Remove dowels.

Fit remaining bolts.

Tighten the cylinder head bolts (see below)


Engines : All Types except C3G

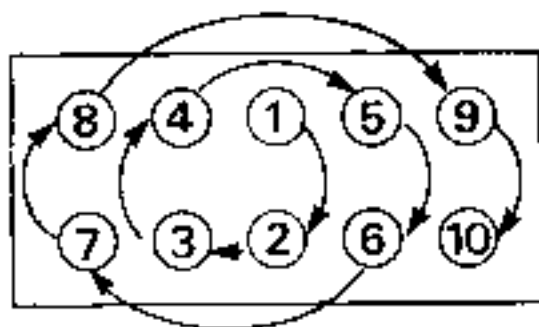
Tightening torque

Use engine oil to lubricate the threads and under the heads of the bolts.

Tighten in the order specified:

First tightening operation (see table)

Engines	Tightening torque (daN.m) 
C1J - C3J 688 - C1E 689 - C1C 810 - 847 C2J C1J except Turbo	5.5 to 6.5
C1J Turbo	6 to 6.5
840-25 840-26 - C6J	7
C7K 840-30	7.5



B1528-15

Adjusting valve clearances

Run the engine for 20 minutes.

After the engine has been switched off for 2.5 hours, retighten the cylinder head:

- Slacken off bolt No. 1 half a turn and retorque.
- Repeat the above on all the other bolts in the correct sequence.

Adjust the valve clearances.

The bolts on the cylinder head do not need to be retightened.

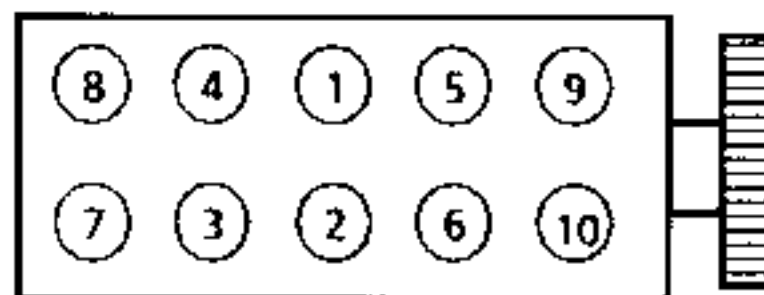
Engine: C3G

Tightening procedure

Use engine oil to lubricate the threads and under the heads of the bolts.

Tighten in the order specified :

- First tightening operation : 2 daN.m
- 2nd tightening operation (angle) : $90^\circ \pm 4^\circ$



90775S

Insert the pushrods in the correct order.

Wait for a minimum of 3 minutes.

Slacken off each bolt in turn and then carry out the following operation :

- 1st retightening operation : **2 daN.m**
- 2nd retightening operation (angle) : **90° ± 4°**

The cylinder head bolts do not need to be retightened.

Fit the pushrods in the correct sequence.

Adjusting valve clearances

Engines	Rockers			
	Inlet		Exhaust	
	Cold	Hot	Cold	Hot
688 - C1E 689 - C1C 810 - 847 C2J - C3J C1J except Turbo	0.15	0.18	0.20	0.25
C3G C1J Turbo	0.20	—	0.25	—
840-25	0.20	—	0.25	—
840-26 - C6J	0.25	—	0.30	—
C7K 840-30	0.30	—	0.40	—

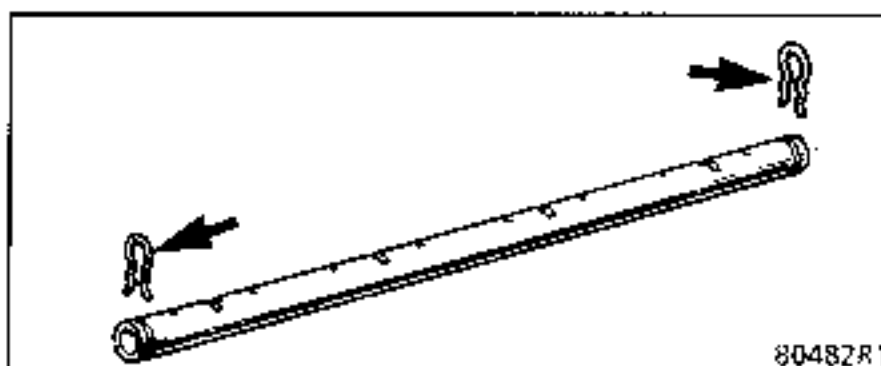
METHOD

Open No. 1 cylinder exhaust valve completely and adjust the inlet valve rocker arms of No 3 cylinder and exhaust valve of No. 4 cylinder.

Proceed in the same way for cylinders 3, 4 and 2. This will enable the rocker arms of the corresponding cylinders to be adjusted (see table).

Engines: 688 - C1E - 689 - C1C - 810 - 847 - C2J - C3J - C1J except Turbo - C3G

When refitting, check that the rocker shaft retaining clips are correctly positioned.



Exhaust valve to be opened completely	Inlet valve to be adjusted	Exhaust valve to be adjusted
1	3	4
3	4	2
4	2	1
2	1	3

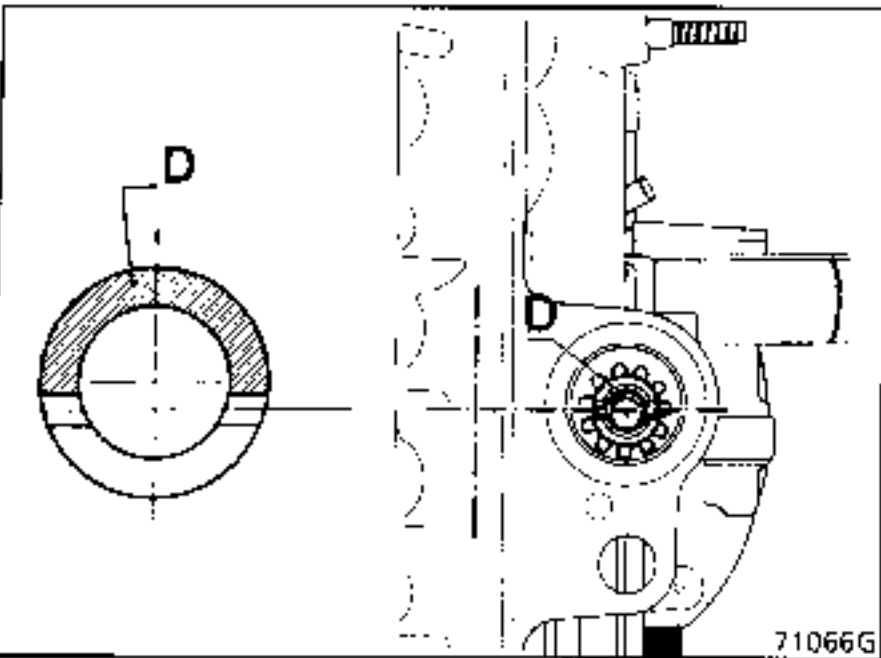
78373R

INSERTING THE DISTRIBUTOR OR ROTOR DRIVE GEAR

- Turn the crankshaft so that No. 1 cylinder is at TDC (No. 4 cylinder valves on balance).
- Engage the distributor or rotor drive gear paying attention to its position. (These gears no longer have any internal thread.)

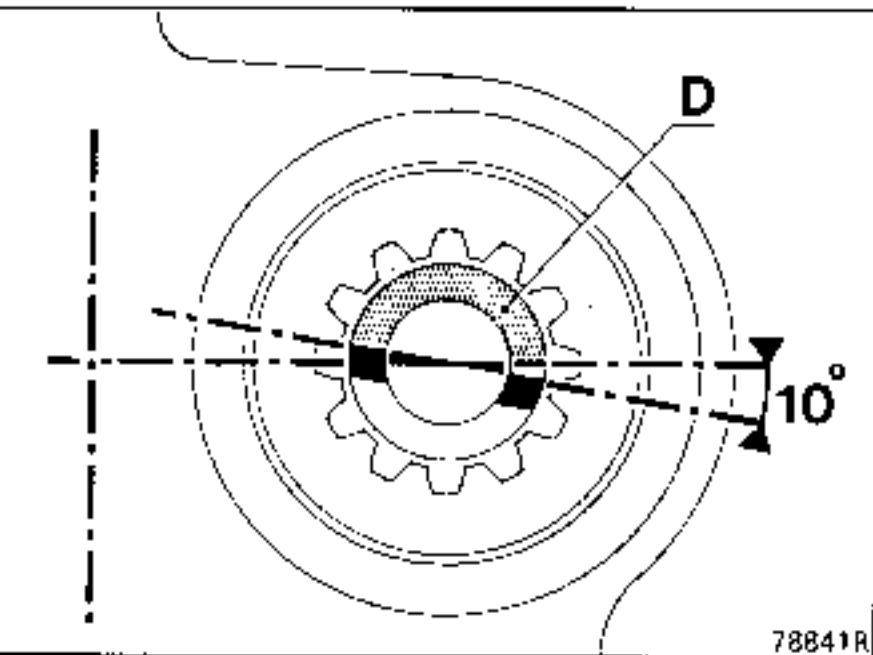
Engines: All Types except 840 - C6J - C7K

The driving slot must be at right angles to the engine longitudinal centre line and the larger offset (D) facing the flywheel.



Engines: 840 - C6J - C7K

- Larger offset (D) facing the flywheel.
- The angle formed by the slot and a perpendicular drawn from the engine longitudinal centre line = 10° .



Remove engine support Mot. 792-01.

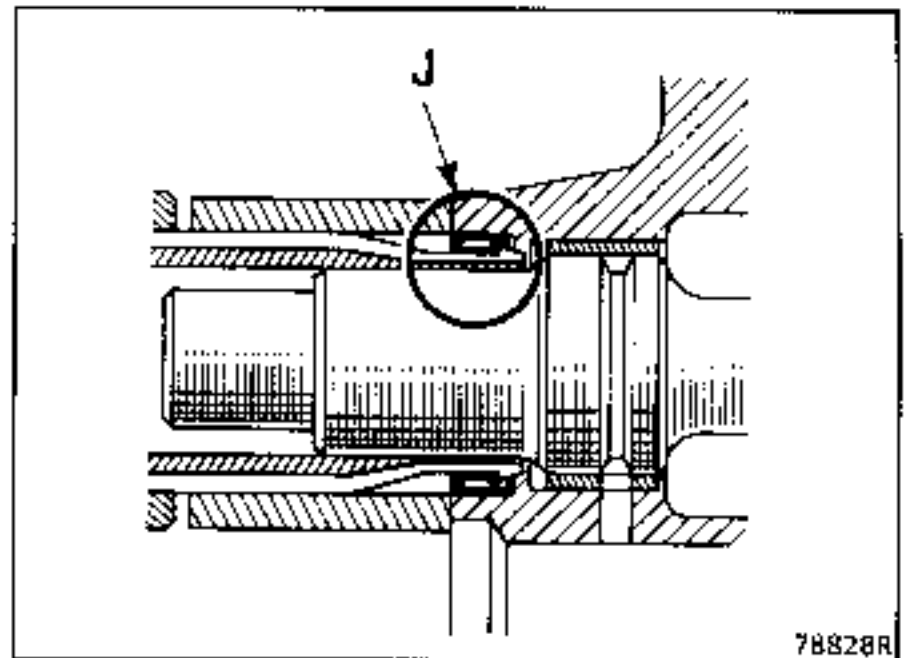
Refit auxiliary units to the engine (e.g, inlet and exhaust manifolds, turbocharger, distributor or rotor drive gear, rocker cover).

WORKING ON THE VEHICLE

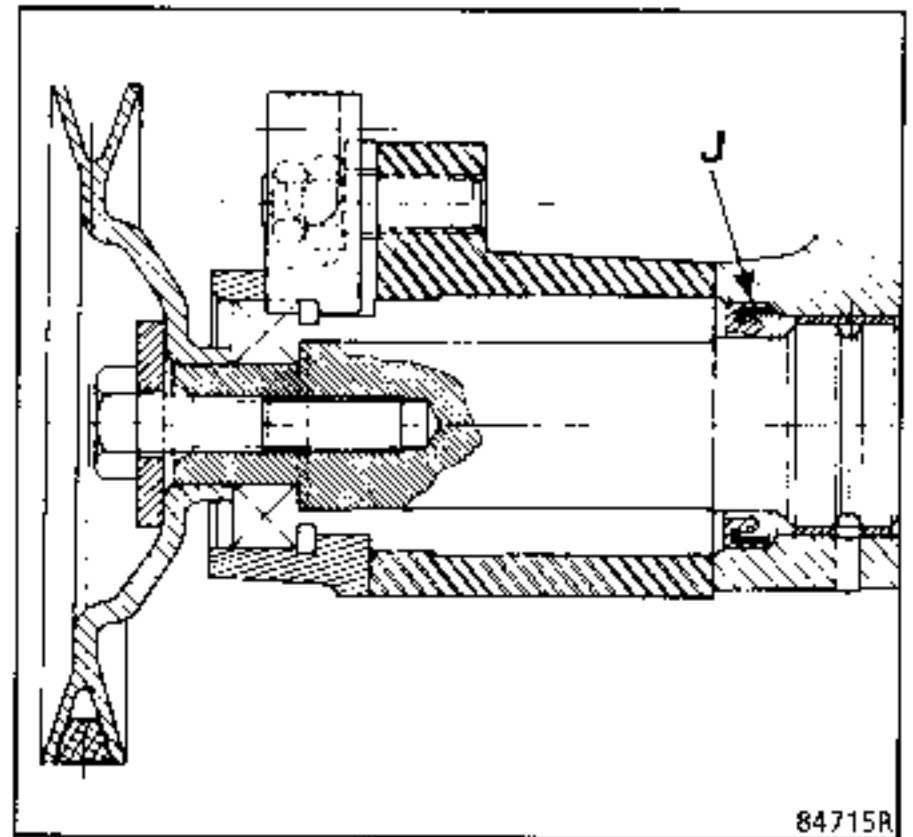
Fitting camshaft oil seal.

There are three possible types of assembly for camshaft oil seals.

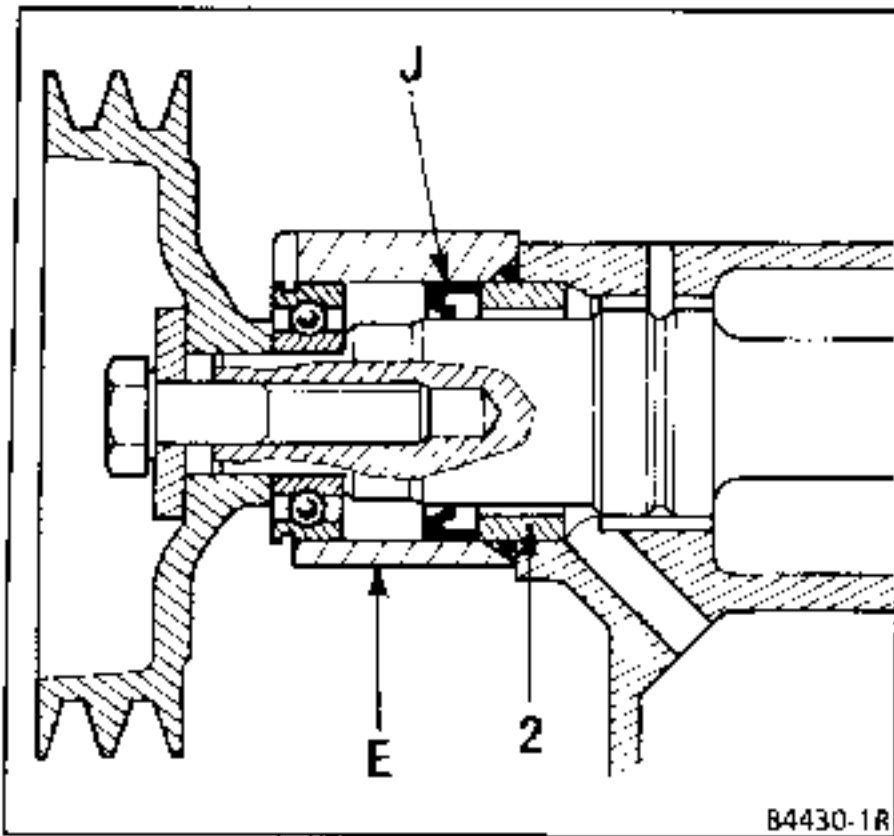
First type of assembly : without bearing



2nd type of assembly: inserted bearing



3rd type of assembly: integrated bearing

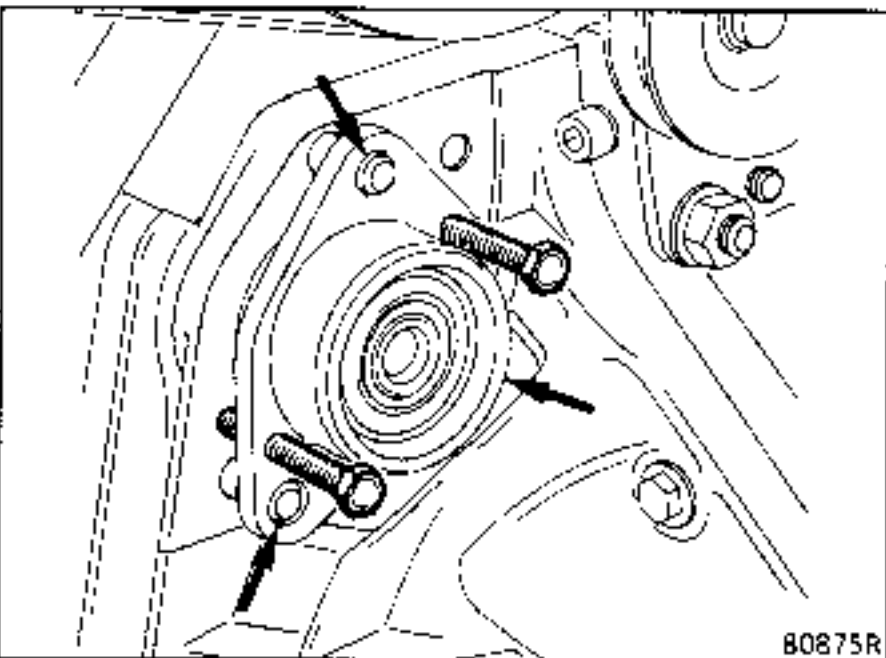


REMOVING THE BEARING

2nd type of assembly

Remove:

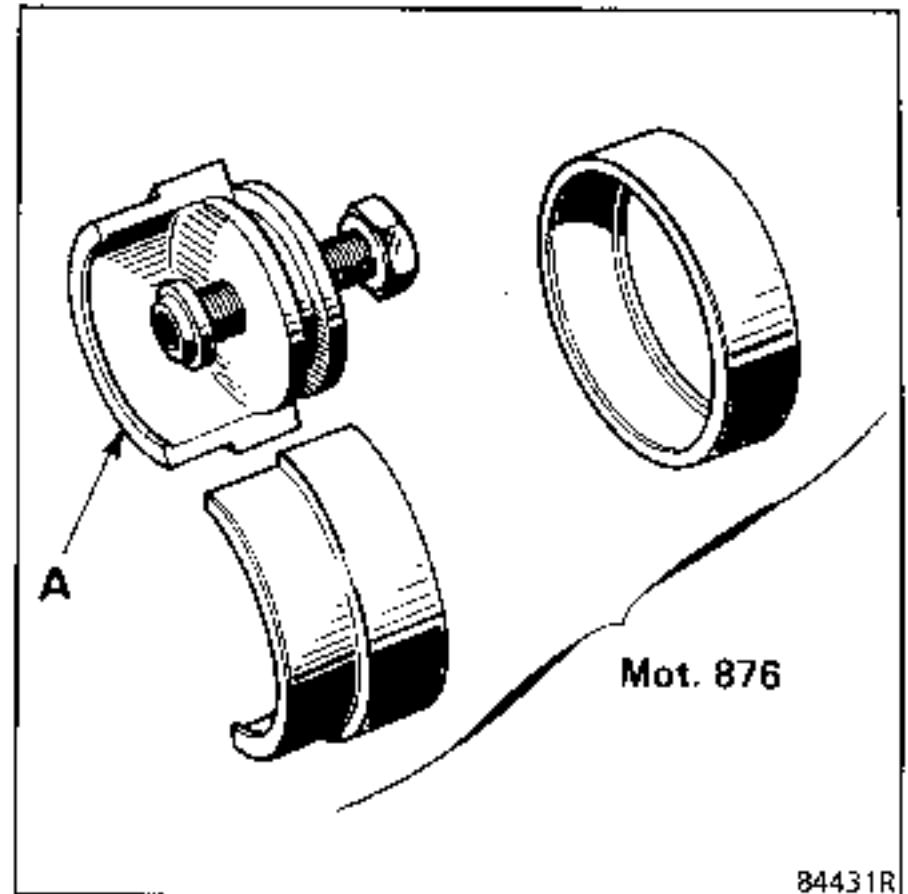
- The camshaft pulley.
- The camshaft bearing fixing nuts. (Place a rag over the clutch - or converter casing - so that nuts and washers do not fall into it.)
- The bearing using the two M6 × 50 bolts with a 35 mm thread.



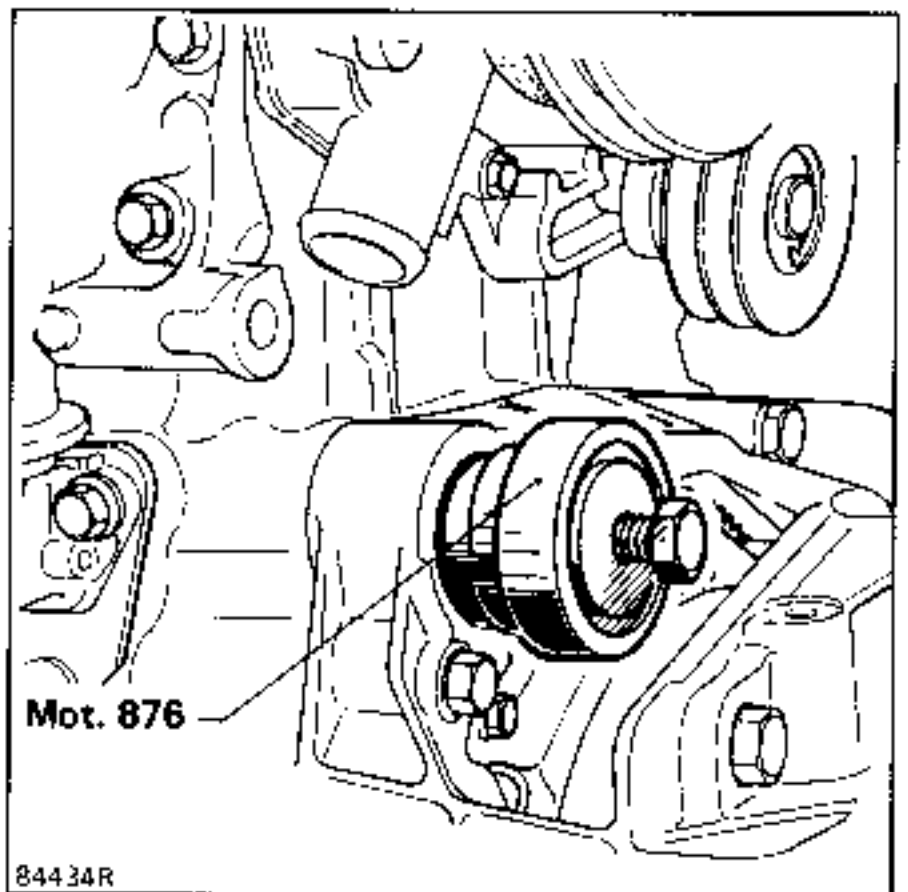
3rd assembly

Remove :

- the camshaft pulley.

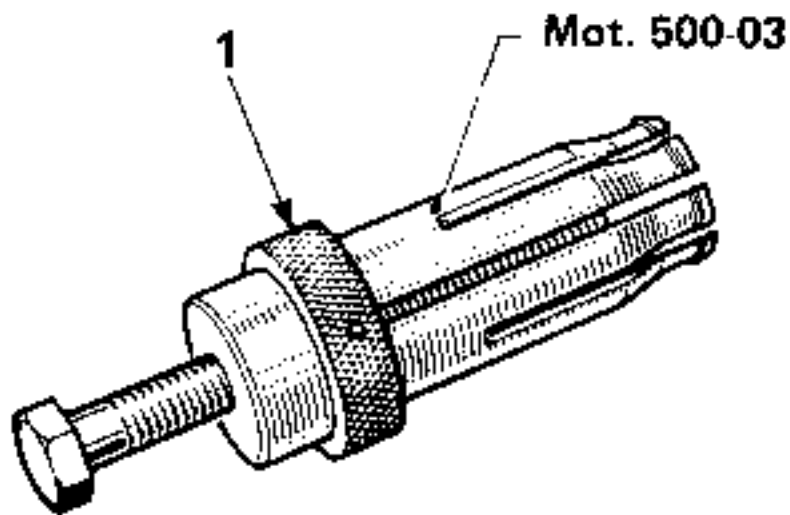


- the bearing. (Place small collar (A) of tool Mot. 876 in the bearing groove.)



REMOVING THE SEAL (J)

1st and 2nd types of assembly

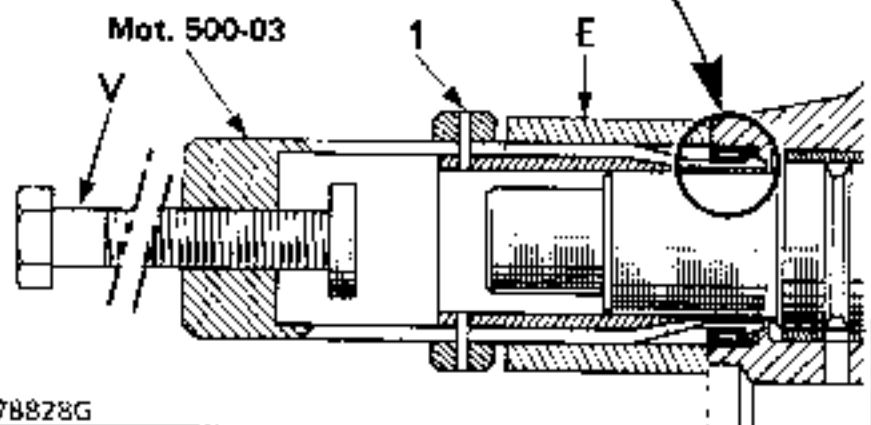
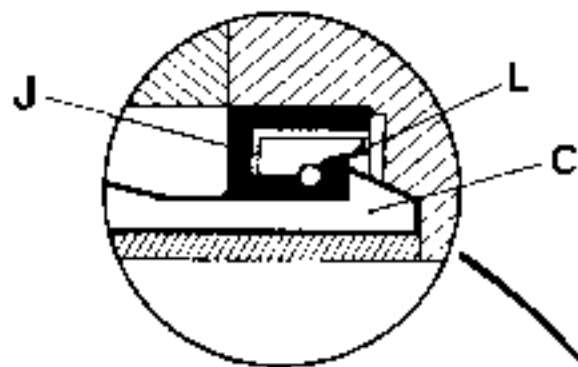


78324-1R

Fit the extractor tool Mot. 500-03 and push it on completely so that the seal lip (L) passes behind the collar (C) of the tool.

Push the serrated ring (1) to ensure that the seal lip engages properly.

Remove seal by screwing on tool bolt.



78828G

Check that the seal spring is not still on the camshaft.

SPECIAL POINTS FOR THE 3RD TYPE OF ASSEMBLY

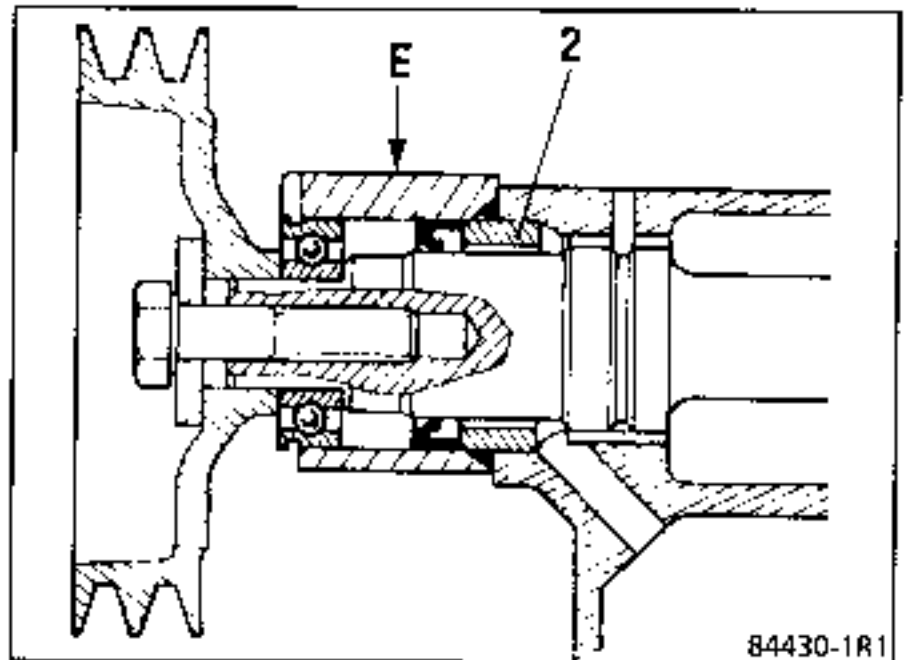
Since the seal is on the clutch or converter casing (E), do not push the extractor tool on completely.

Push on tool Mot. 500-03 :

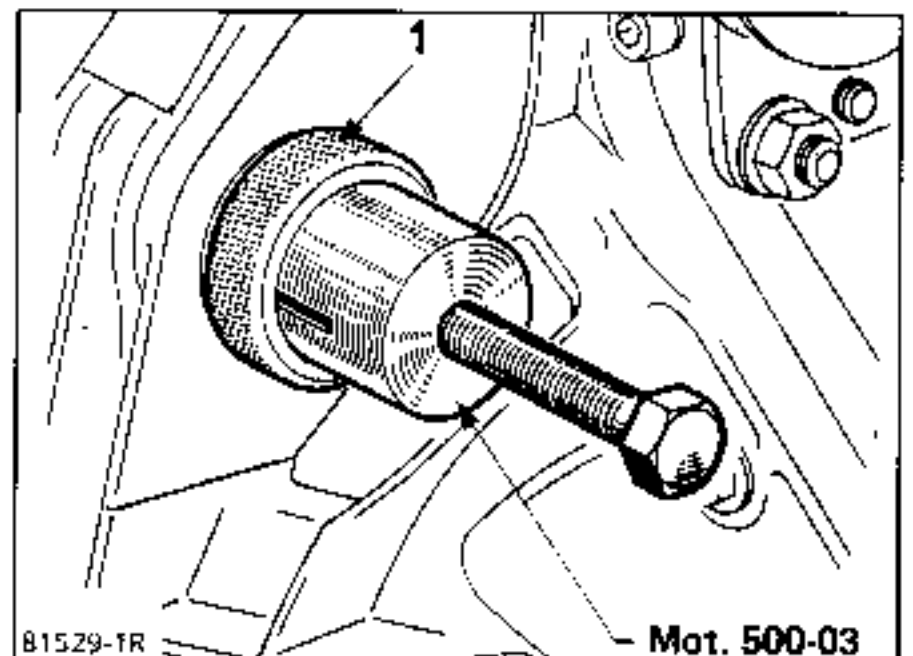
- Manual gearbox : (approx.) 30 mm
- Automatic transmission : (approx.) 50 mm

NOTE: With this type of assembly, since the length between the end of the camshaft and the seal is reduced, a 25 mm dia. spacer 45 mm long must be placed between the camshaft and the extractor bolt (V) of Mot. 500-03.

When the prongs of tool Mot. 500-03 have been passed behind the seal lip, bring the tool gently outwards so that the serrated ring (1) can slide, otherwise the prongs might become caught under the spacer (2).



84430-1R1



81529-1R

Mot. 500-03

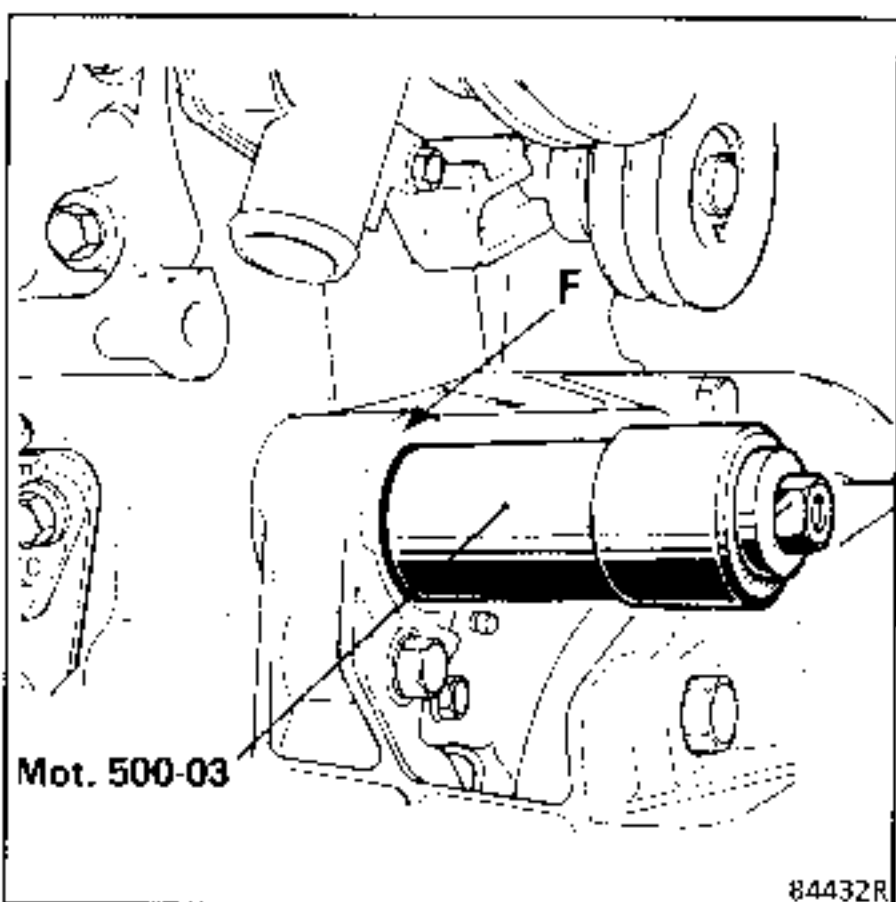
FITTING THE NEW SEAL

Fit the new seal on the end of inserting tool **Mot. 500-03**.

Lubricate the seal.

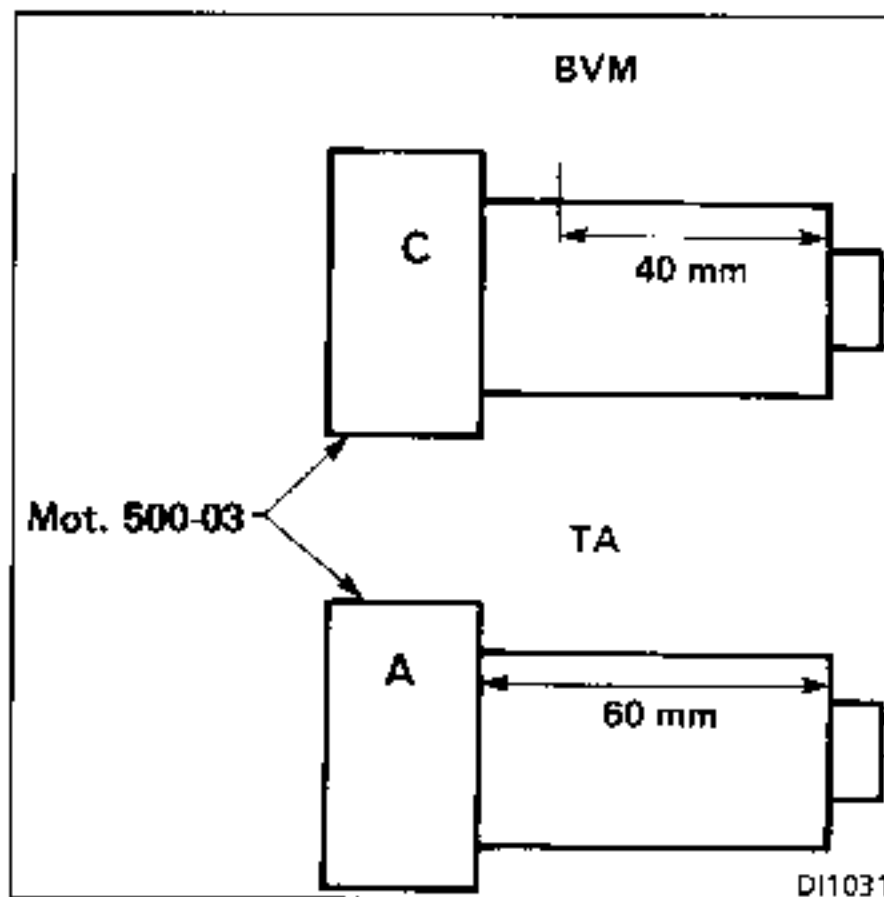
Place the tool equipped with the new seal on the camshaft.

Using a 135 mm long threaded rod, the pulley washer and a nut, push on the assembly until the seal is in the position described below, with the mark in line with face (F) of the casing.

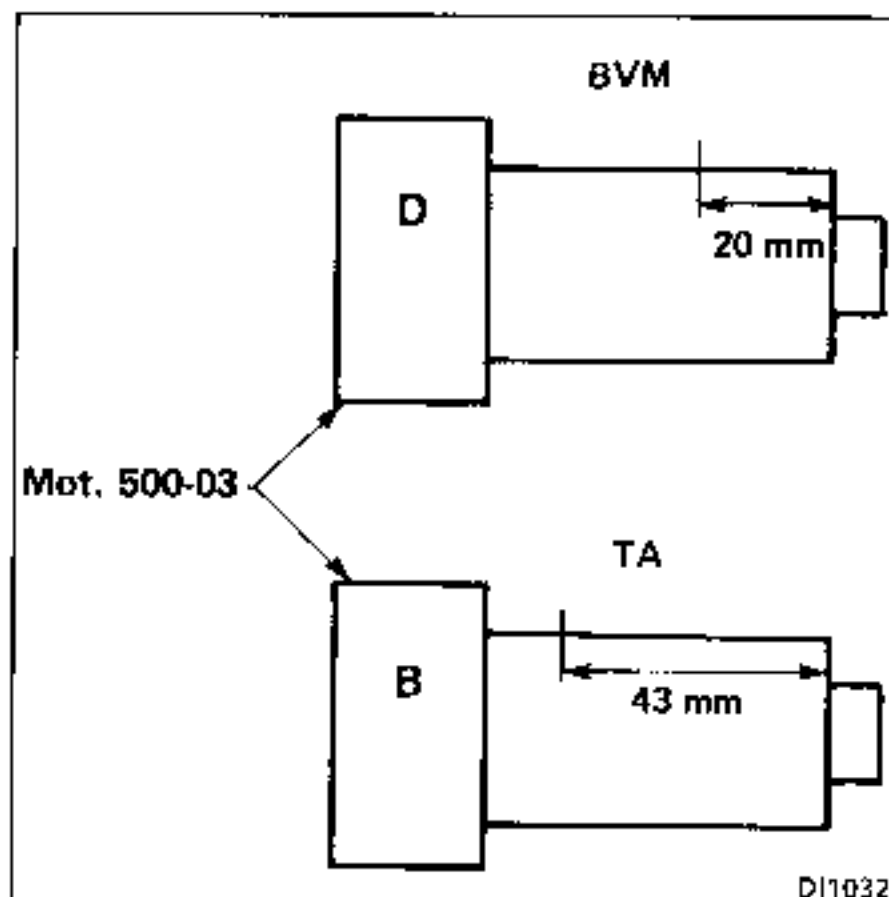


1st and 2nd types of assembly

Marks (A) - (B) - (C) and (D) are stamped, or are to be stamped, on tools **Mot. 500-03**.



3rd type

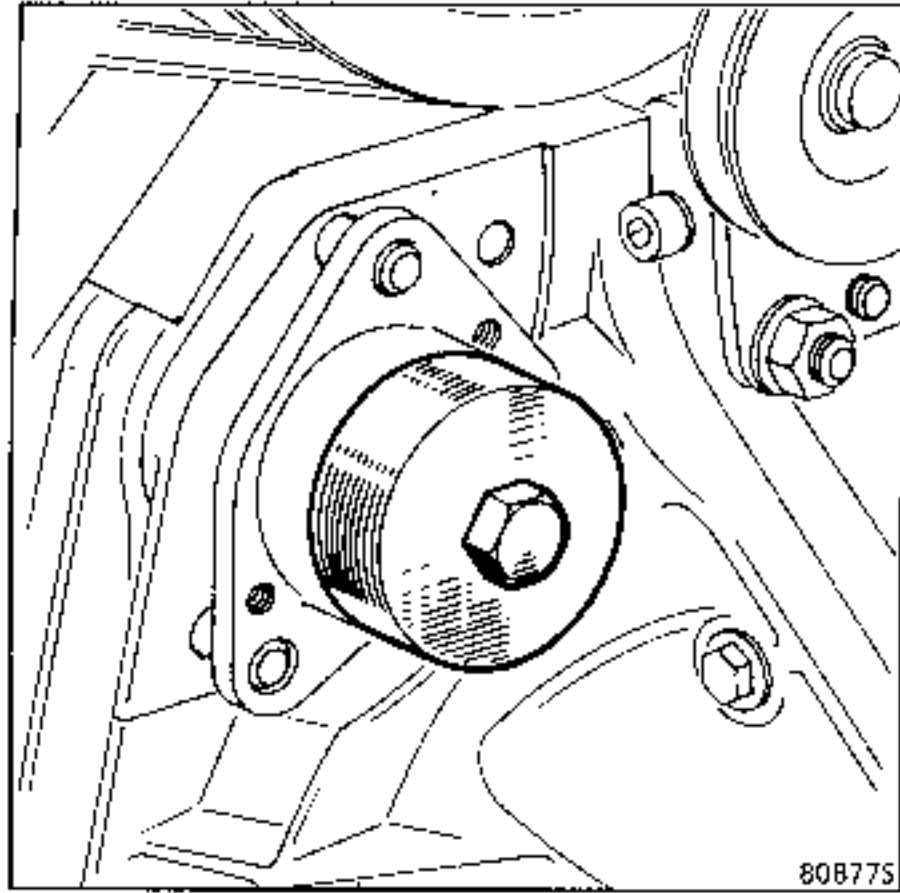


BVM = Manual gearbox
TA = Automatic transmission

FITTING THE BEARING

2nd type

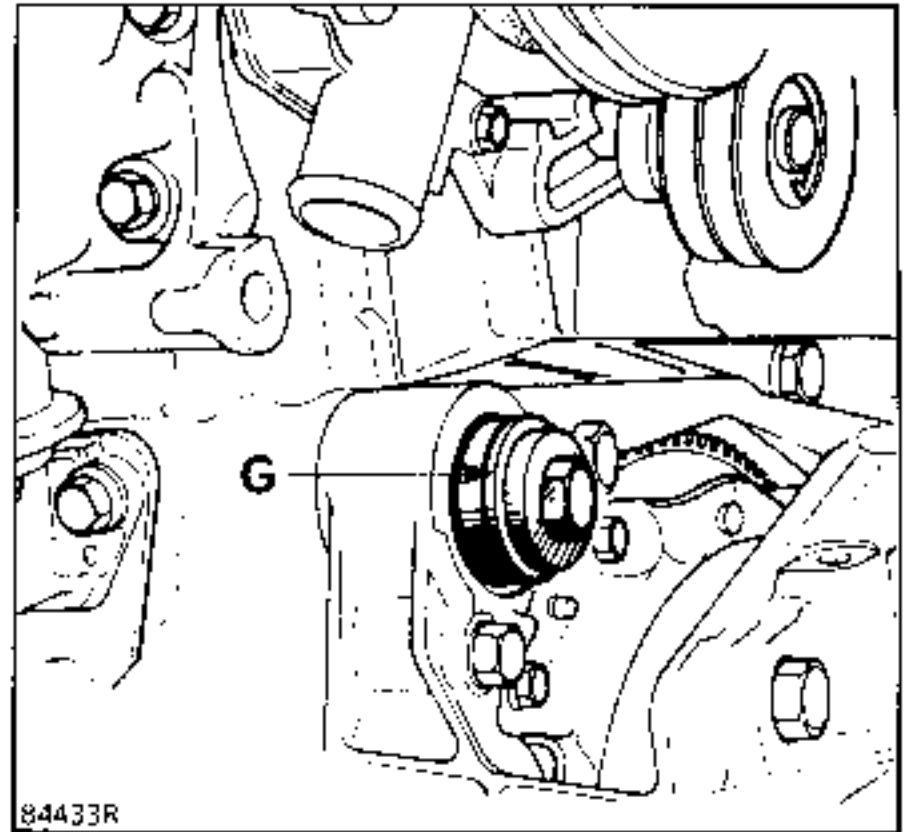
Fit the cam bearing and its roller bearing using the tube, bolt and washer for the pulley mounting.



The pulley will position the roller bearing when it is tightened.

3rd type

This is the same as the second type of assembly apart from the position of the bearing: groove (G) of the bearing should face the engine exterior.



Refit the pulley.

REPLACING VALVE KEYS, SPRINGS OR SEALS

Engines: All Types except 840 - C6J - C7K

Disconnect the battery.

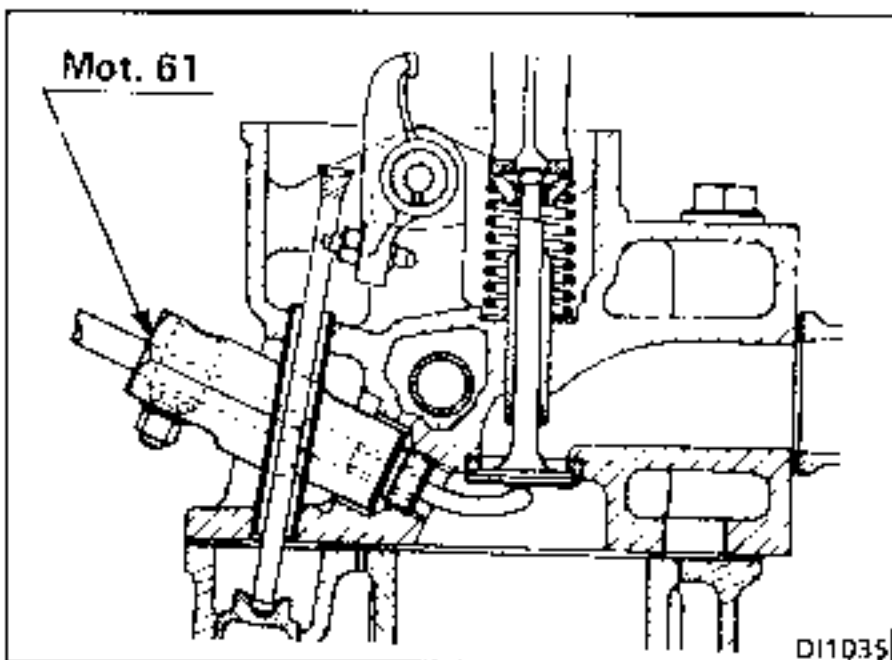
Remove :

- the rocker cover,
- the spark plugs,
- the distributor for cylinders 2 and 3.

Unscrew the rocker bolts as far as possible, tilt them and release the rod.

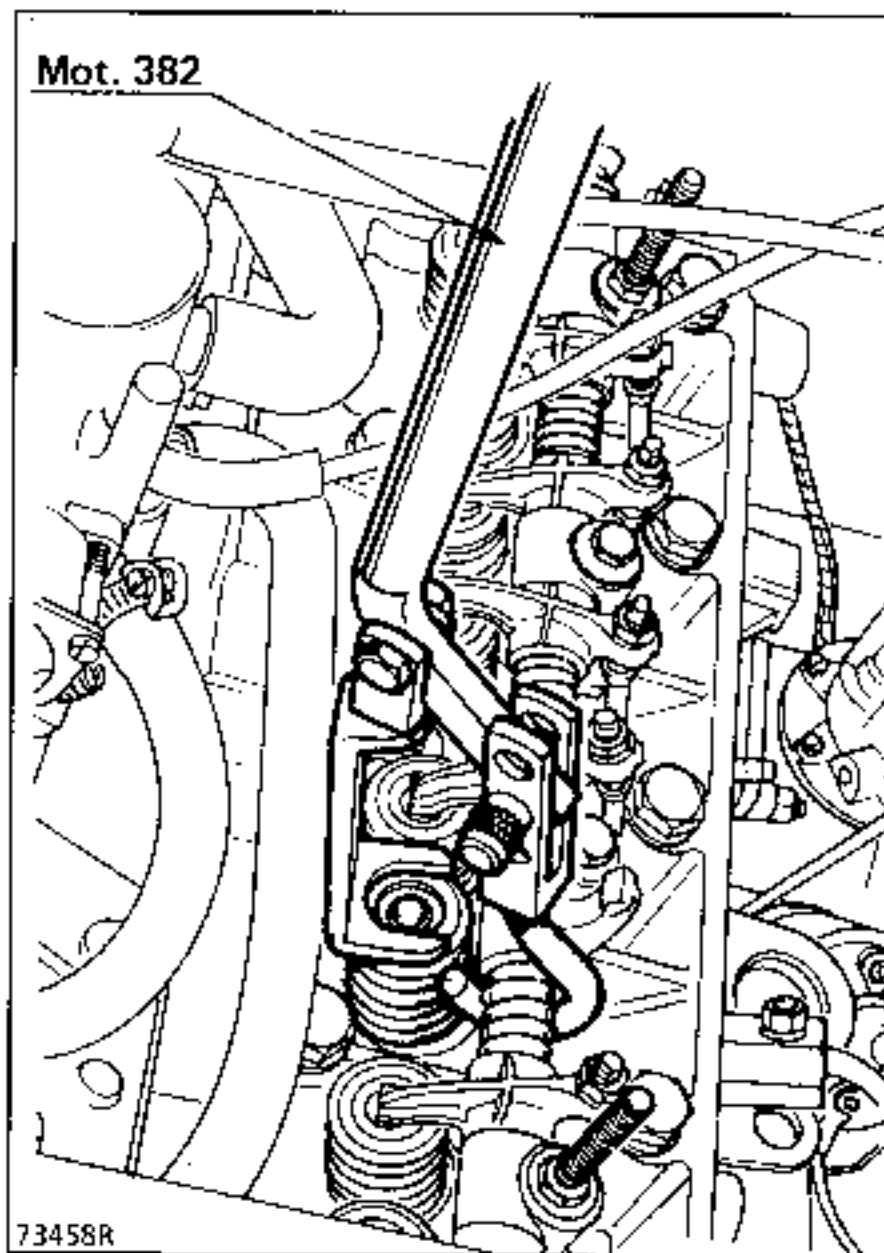
Fit valve lifter Mot. 61 in place of the spark plug.

Move the valve lifter as far as the stop under the valve head and lock in position.



Use compressor Mot. 382 to compress the spring.

Remove the valve keys, springs or seals and replace them with new ones.



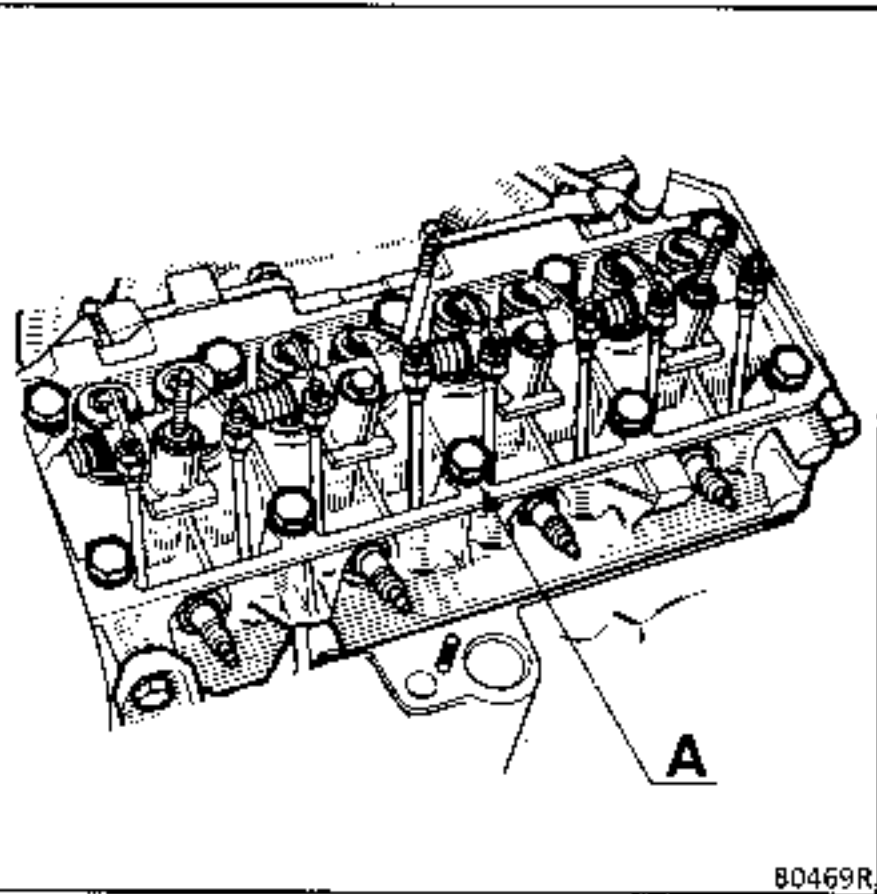
REMOVING

Remove :

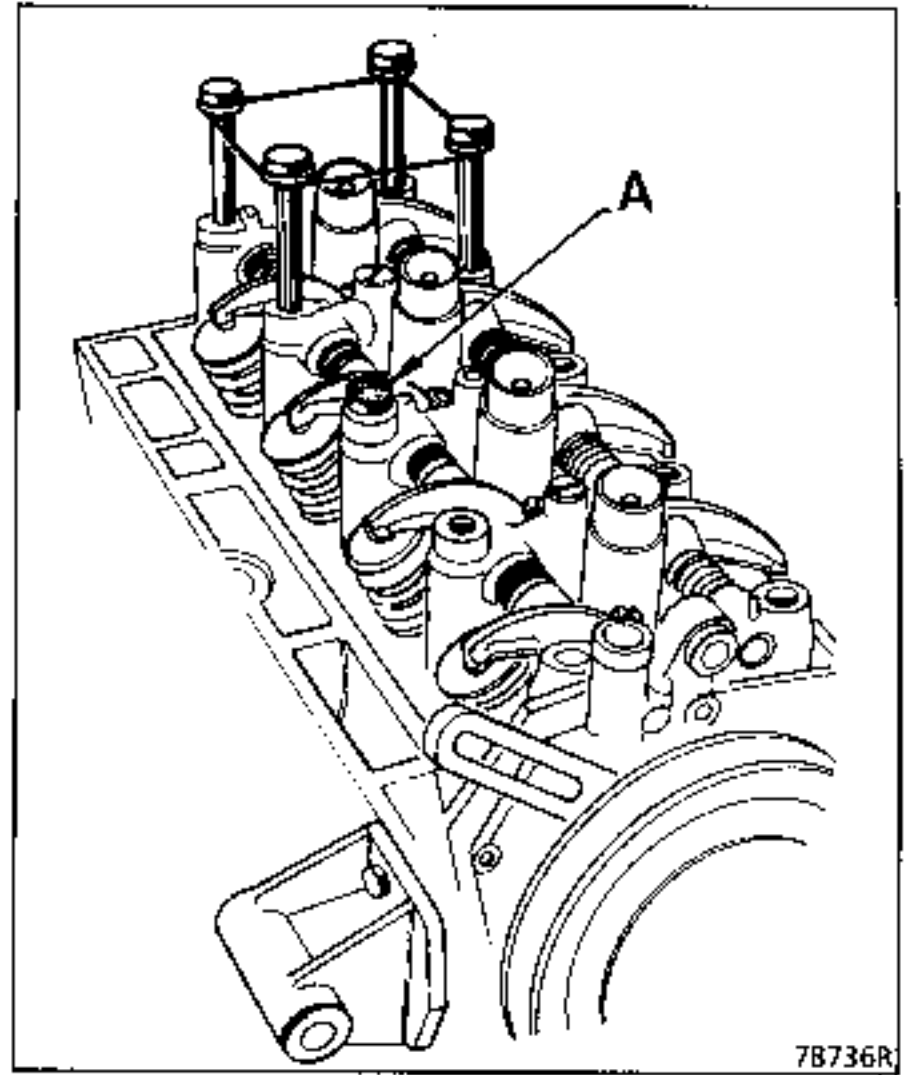
- the auxiliary components on the cylinder head,
- withdraw the pushrods and lay them out in order.

Unscrew and remove all the cylinder head bolts except bolt (A) which passes through the locating dowel near the distributor. Leave this bolt in until the head gasket is unstuck.

Engines: All types except 840 - C6J - C7K



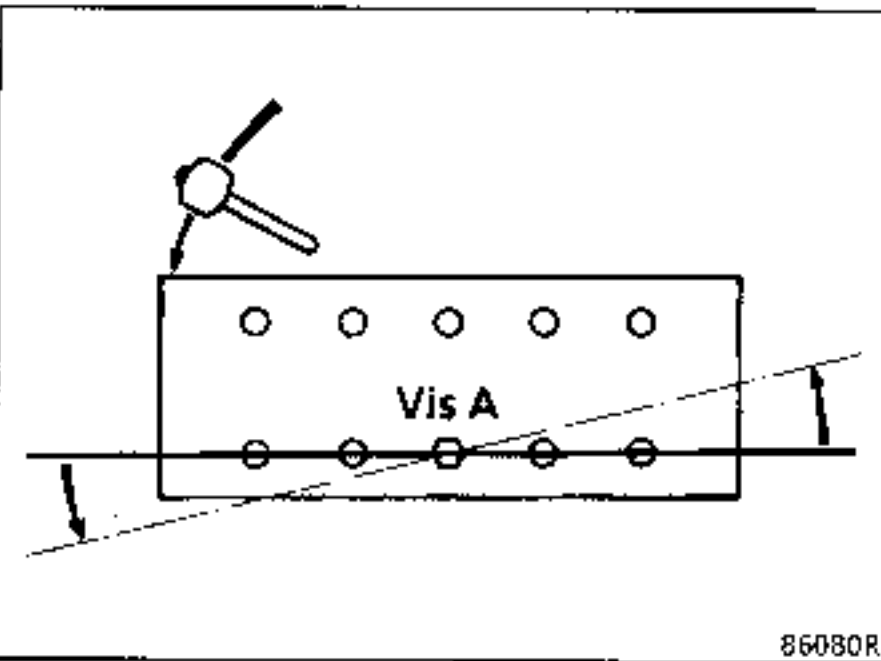
Engines: 840 - C6J - C7K



The cylinder head gasket must not be lifted as the gasket adheres to the head, block and liners. Any attempt to lift the head would break the water-tight seal at the bottom of the liners and allow foreign bodies to enter the sump.

The cylinder head must be pivoted round the locating dowel (bolt still in position in order to unstick it from the block).

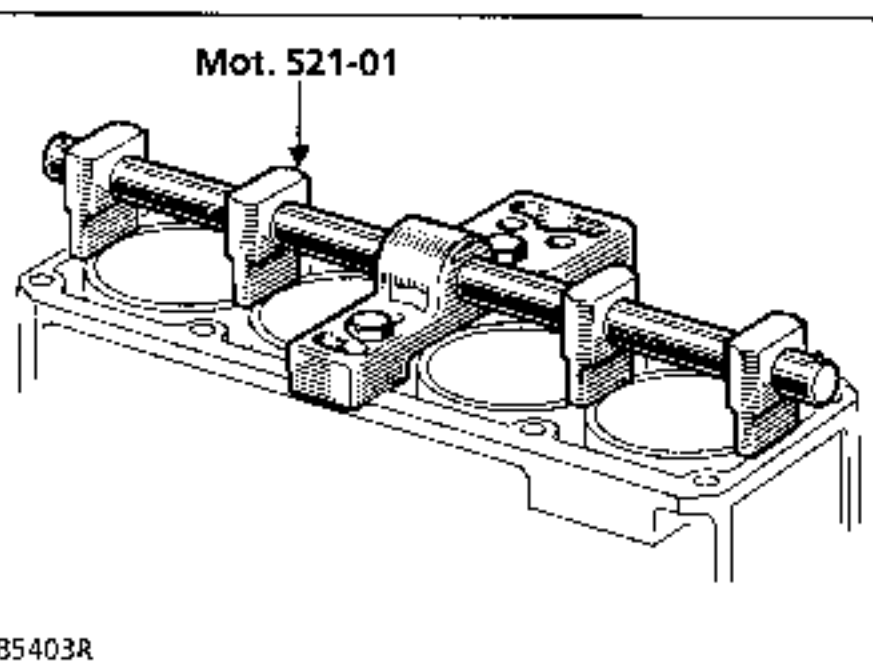
Tap each end of the cylinder head on the side with a plastic hammer to unstick it. Movement should be in the direction of horizontal rotation.



Remove the bolt (A).

Remove the cylinder head.

Fit the liner clamp Mot. 521-01.



CLEANING THE CYLINDER HEAD AND CYLINDER BLOCK

Aluminium parts must not be scraped.

Use Décapjoint to dissolve any part of the gasket remaining stuck.

Apply the liquid to the area to be cleaned; wait about 10 minutes and then lift off with a piece of wood.

Gloves must be worn for this operation.

Take great care when cleaning the gasket faces on the cylinder head and cylinder block and prevent any foreign matter entering the oilways which supply oil under pressure to the rocker shaft (oilways in cylinder block and cylinder head).

If these instructions are not followed, the jets on the rockers providing lubrication to the rocker shaft assembly may become blocked and cause the cams and rocker shoes to deteriorate quickly.

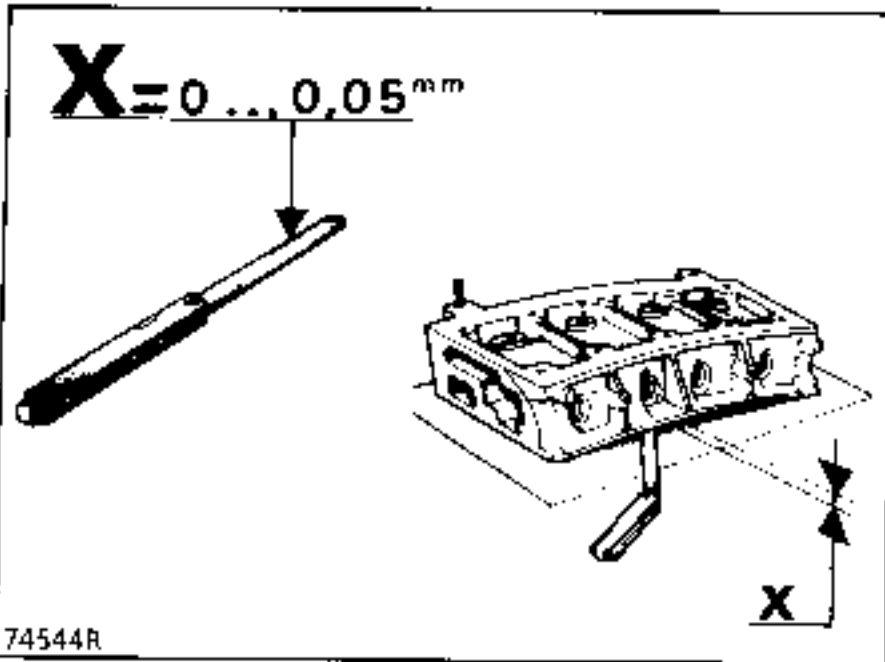
Use a syringe to suck up any oil remaining in the cylinder head bolt holes.

This is necessary in order to obtain precise torque tightening of the bolts.

CHECKING THE GASKET FACE FOR BOW

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

Maximum bow (X) = 0.05 mm



Engines : All Types except 840 - C6J - C7K

Re-face, if necessary.

Engine: 840 - C6J - C7K

No refacing permitted.

REFITTING

Special notes on refitting :

Check the condition of :

- the top ends of the pushrods: an unworn centre should be apparent

G : adjusting screw

T : pushrod

Z : contact-free centre

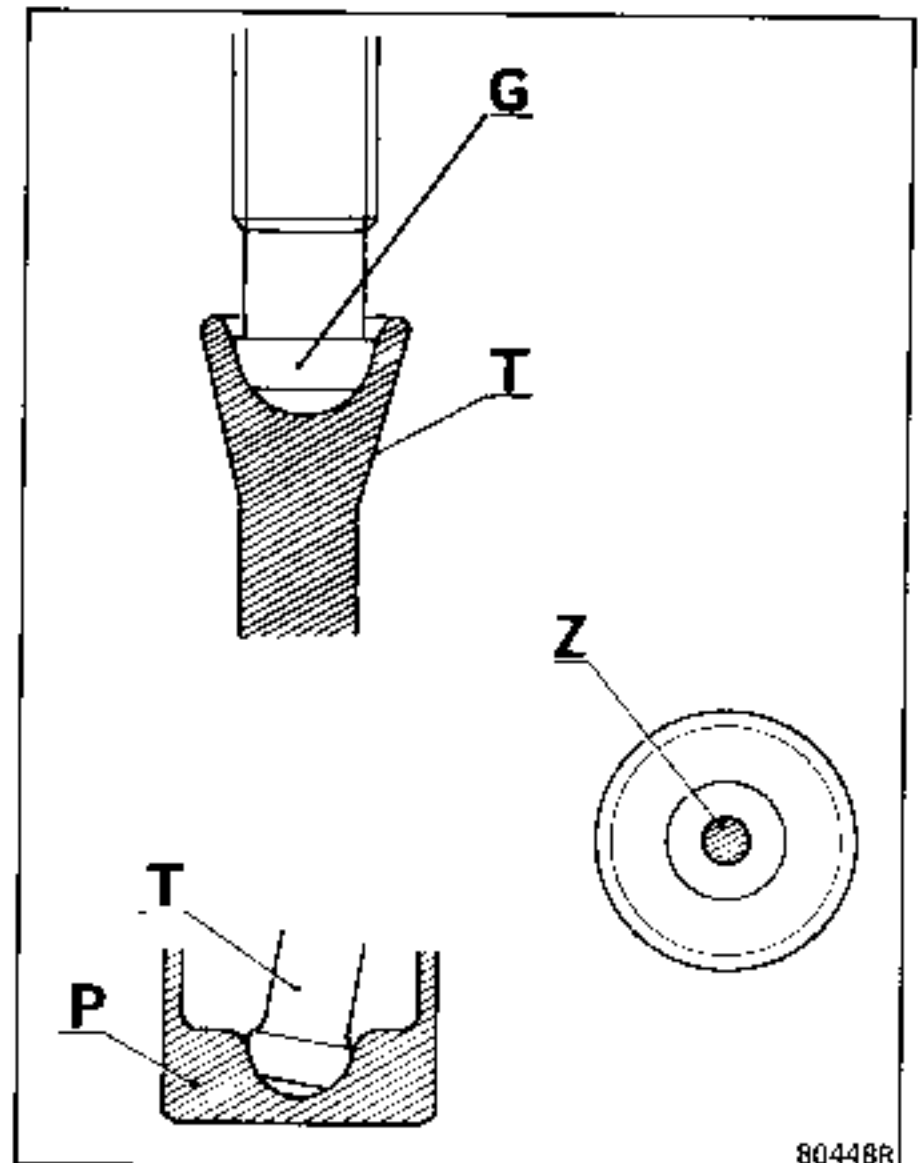
- the tappets: they should also have an unworn centre

T : pushrod

Z : contact-free centre

P : tappet

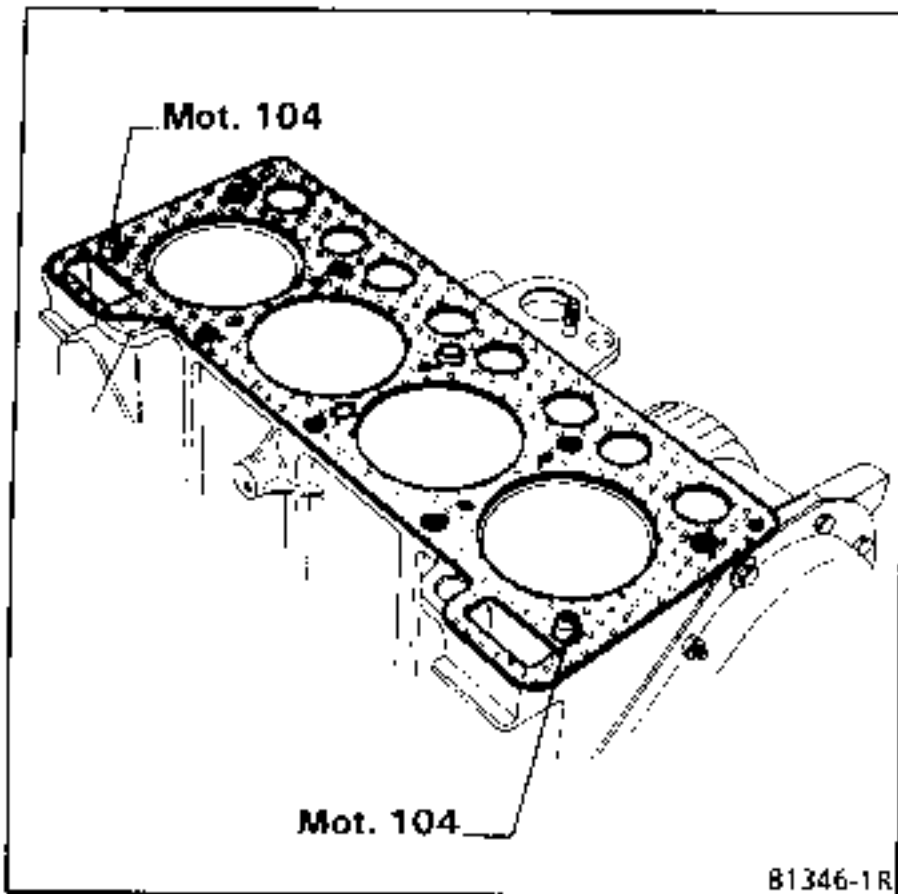
If the centre appears worn, the mating parts must be changed.



Remove the liner clamp.

Engines: All types except 840 - C6J - C7K

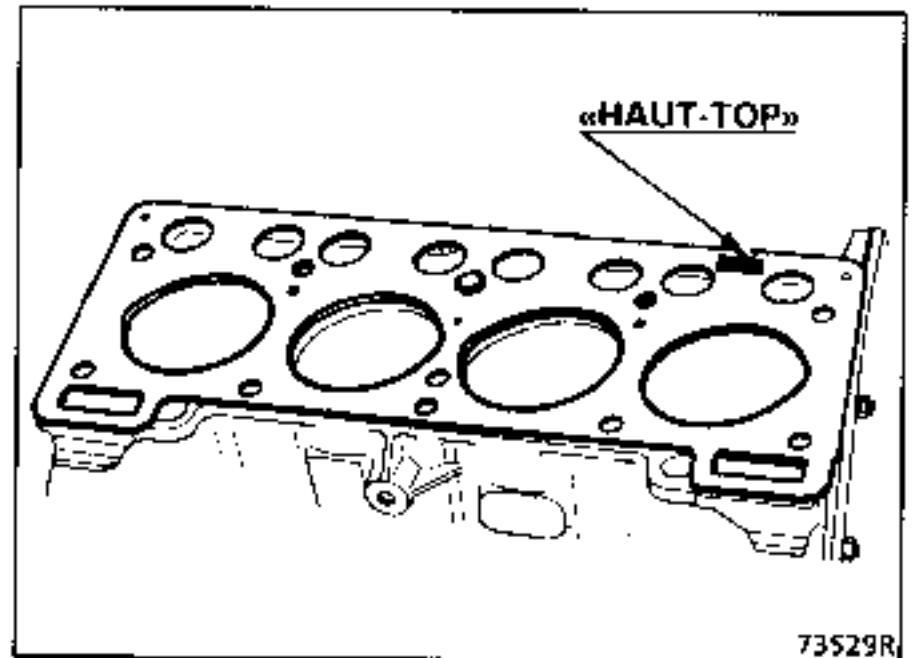
Fit the gasket locators Mot. 104 in position.



Fit the cylinder head gasket dry with the "HAUT TOP" marking uppermost.

Once the gasket is in place, it must not be lifted as the adhesive varnish head cannot be reused.

This gasket must be thrown away and another gasket used if the cylinder head is misaligned.

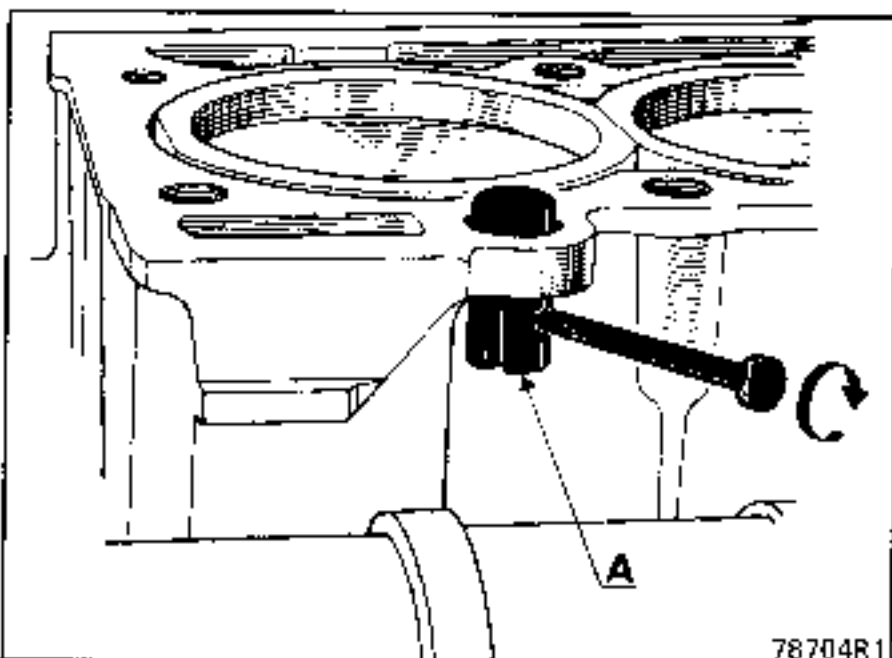


Engines: 840 - C6J - C7K

The cylinder head gasket fitting operation is very important; it determines the alignment of the distributor drive with the distributor shaft.

Positioning the cylinder head and gasket:

Insert the locating tool (A) Mot. 720 in the hole at the front of the cylinder block and tighten the bolt just enough to lock the tool.



Offer up the cylinder head with its rocker arm assembly.

ALL TYPES

Use engine oil to lubricate the threads and under the heads of the bolts.

Position the cylinder head and fit two bolts to prevent the cylinder head moving.

Remove dowels.


Fit remaining bolts.

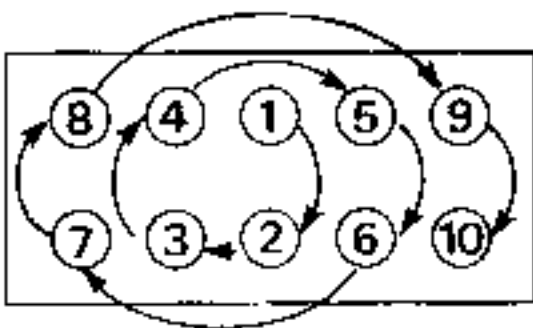
Engines: All Types except C3G

Tightening torque

Tighten in the order specified:

First tightening operation (see table)

Engines	Tightening torque (daN.m) 
C1J - C3J 688 - C1E 689 - C1C 810 - 847 C2J C1J except Turbo	5.5 to 6.5
C1J Turbo	6 to 6.5
840-25 840-26 - C6J	7
C7K 840-30	7.5



81528-15

Insert the pushrods in the correct order.

Adjusting valve clearances

Run the engine for 20 minutes.

After the engine has been switched off for 2.5 hours, retighten the cylinder head:

- Slacken off bolt No. 1 half a turn and retorque.
- Repeat the above on all the other bolts in the correct sequence.

Adjust the valve clearances.

The bolts on the cylinder head do not need to be retightened.

Engine: C3G

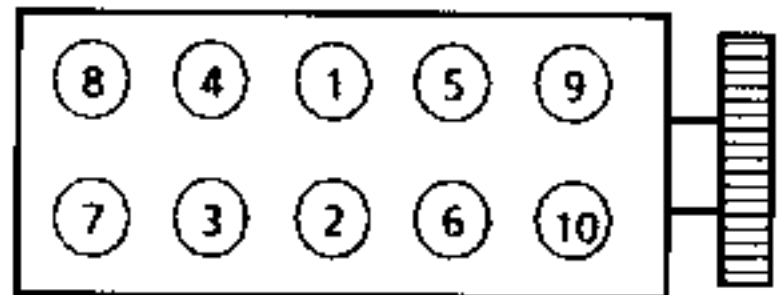
Tightening procedure

Use engine oil to lubricate the threads and under the heads of the bolts.

Tighten in the order specified :

First tightening operation : 2 daN.m

2nd tightening operation (angle) : $90^\circ \pm 4^\circ$



9D775S

Wait for a minimum of 3 minutes.

Slacken off each bolt in turn and then carry out the following operation :

1st retightening operation : **2 daN.m**

2nd retightening operation (angle) : **90° ± 4°**

The cylinder head bolts do not need to be retightened.

Fit the pushrods in the correct sequence.

Adjusting valve clearances

Engine	Rockers			
	Inlet		Exhaust	
	Cold	Hot	Cold	Hot
688 - C1E 689 - C1C 810 - 847 C2J - C3J C1J except Turbo	0.15	0.18	0.20	0.25
C3G C1J Turbo	0.20	—	0.25	—
840-25	0.20	—	0.25	—
840-26 - C6J	0.25	—	0.30	—
C7K 840-30	0.30	—	0.40	—