

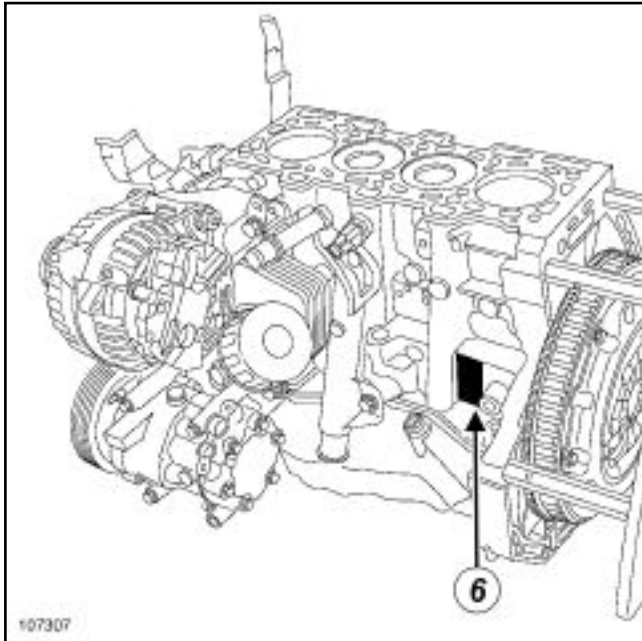
K9K engine

Contents

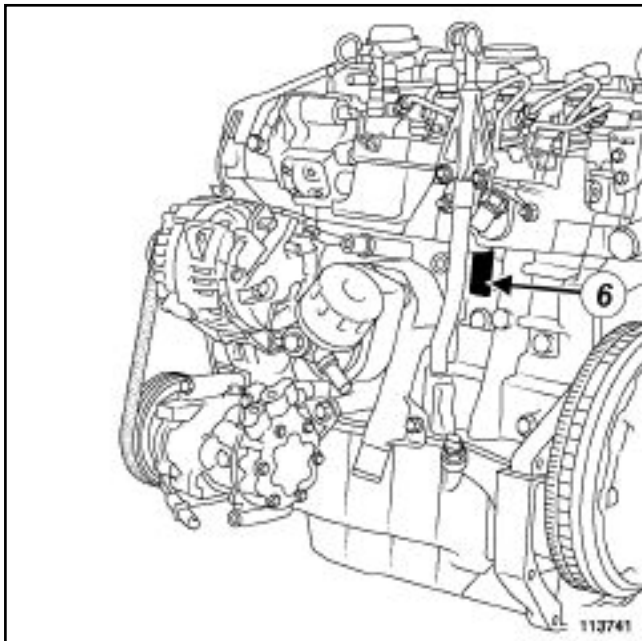
Page

10A	ENGINE AND LOWER ENGINE ASSEMBLY		10A	ENGINE AND LOWER ENGINE ASSEMBLY	
	Engine: Specifications	10A-1		Piston base cooling jet: Removal	10A-207
	Engine: Precautions for repair	10A-4		Lower engine: Cleaning	10A-209
	Engine: Parts and consumables for the repair work	10A-14		Lower engine: Check	10A-211
	Upper engine: Tightening torque	10A-15		Piston base cooling jet: Refitting	10A-224
	Lower engine: Tightening torque	10A-20		Running gear Refitting	10A-227
	Diesel injection: Tightening torque	10A-23		Cylinder block: Refitting	10A-239
	Accessories belt: Tightening torque	10A-26		Timing - cylinder head: Refitting	10A-280
	Upper engine: Specifications	10A-28		Accessories belt: Refitting	10A-326
	Engine peripherals: Specifications	10A-36		Engine: Refitting	10A-329
	Standard replacement	10A-46		Timing belt: Removal	10A-336
	Special tooling	10A-47		Timing belts: Refitting	10A-351
	Equipment	10A-65			
	Engine: Dismantling	10A-84			
	Accessories belt: Removal	10A-89			
	Timing - cylinder head: Removal	10A-90			
	Cylinder head: Dismantling	10A-113			
	Upper engine: Cleaning	10A-129			
	Upper engine: Checking	10A-135			
	Cylinder head: Refitting	10A-144			
	Cylinder block: Dismantling	10A-192			
	Running gear:Removal	10A-204			

I - ENGINE IDENTIFICATION



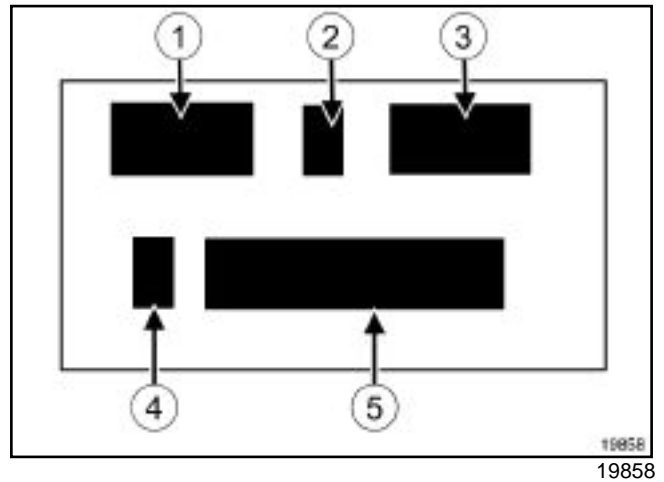
107307



113741

The engine can be identified by markings (6) located on the cylinder block.

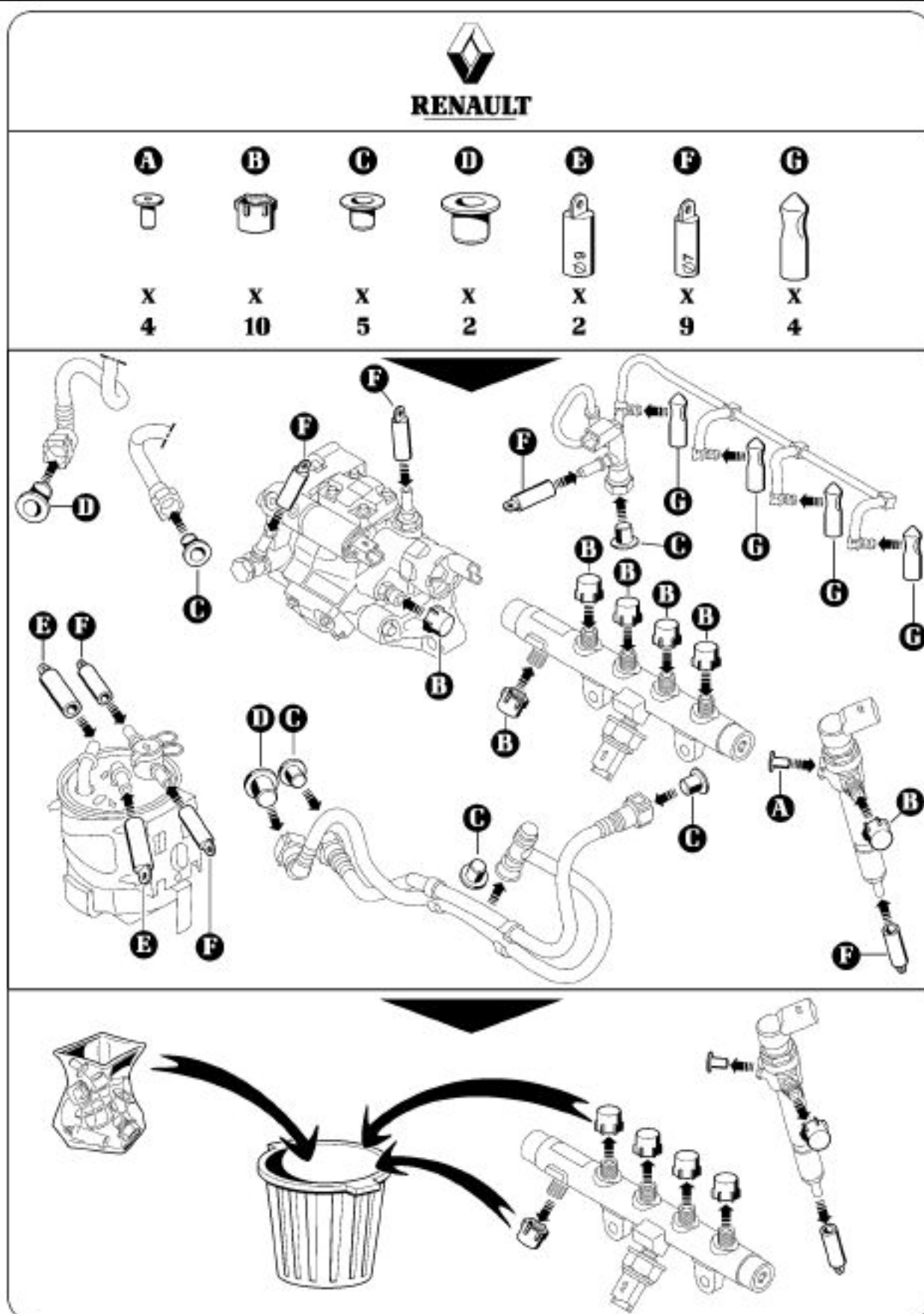
Details of markings



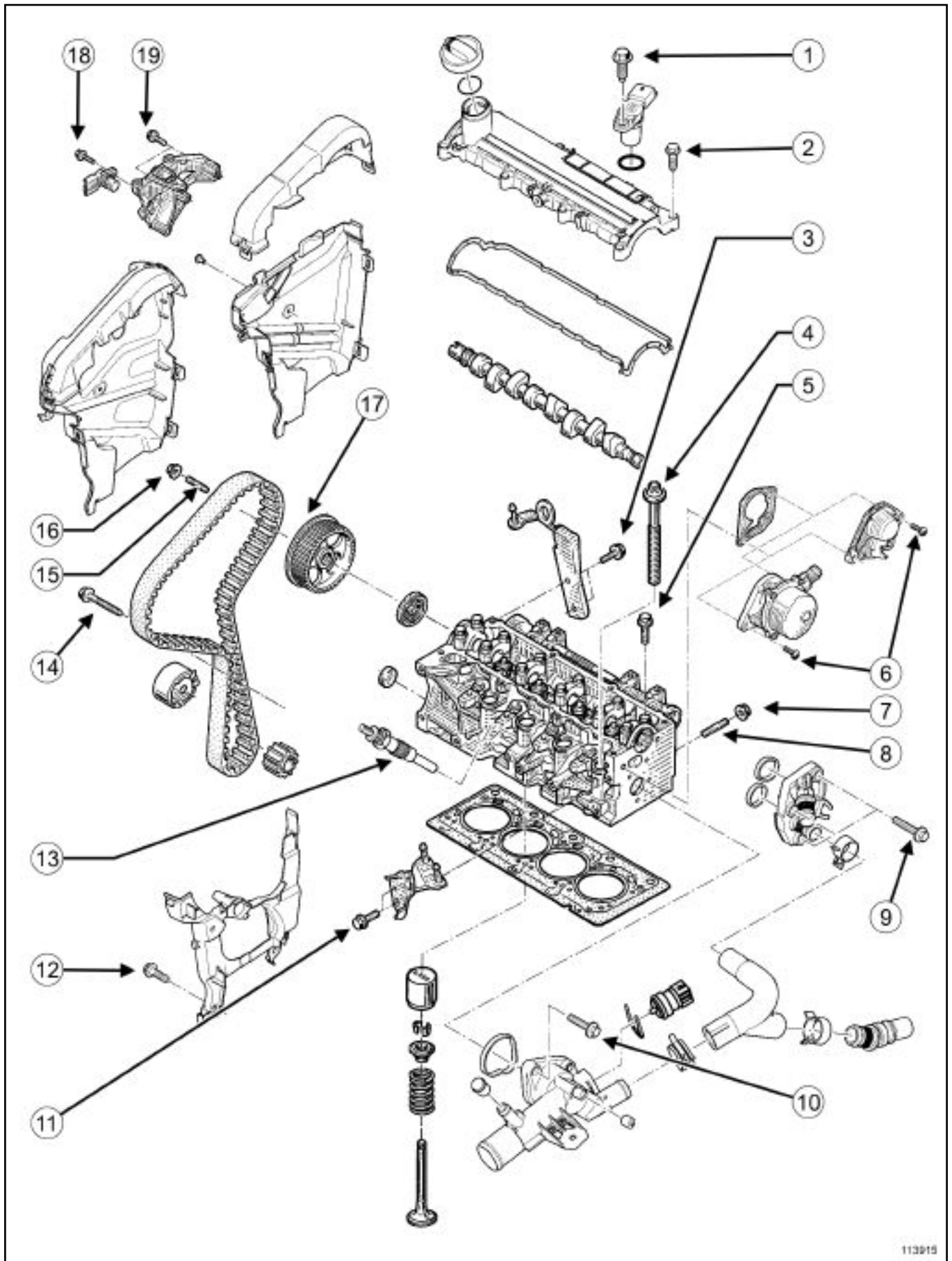
The markings consist of:

- (1) : the engine type
- (2) : the engine approval letter
- (3) : the engine suffix
- (4) : the factory where the engine was fitted
- (5) : the engine production number

Part no. 77 01 476 857



113430



Upper engine: Specifications

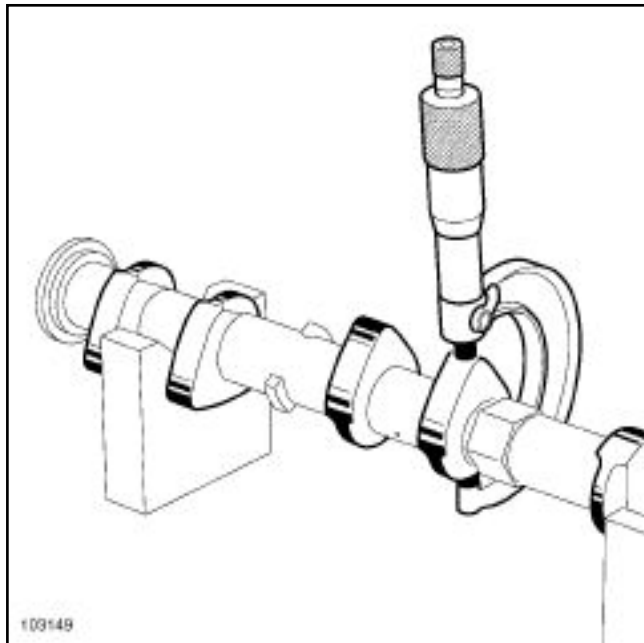
6 - Camshaft bearing diameters

Number of bearings	Diameter of camshaft bearings on the camshaft	Diameter of camshaft bearings on the cylinder head
No. 1	24.9895 ± 0.0105mm	25.05 ± 0.01mm
No. 2		
No. 3		
No. 4		
No. 5		
No. 6	27.9895 ± 0.0105mm	28.05 ± 0.01mm

Note:

The no. 1 camshaft bearing is located at the flywheel end.

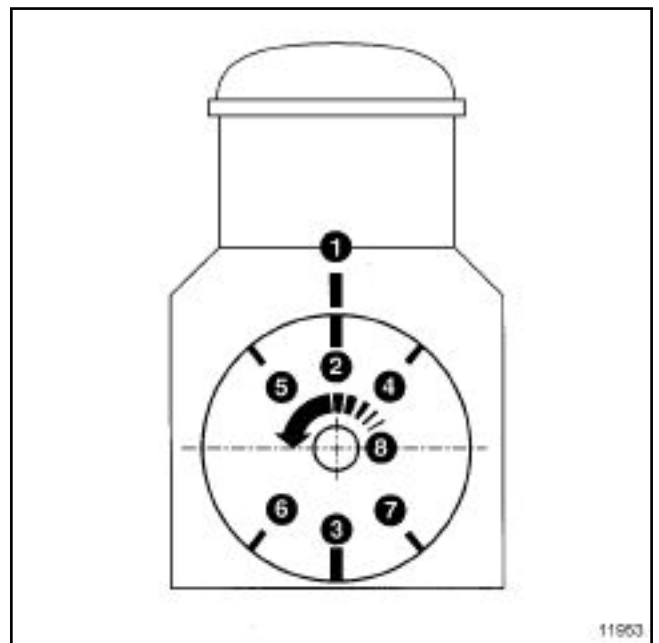
7 - Cam height



103149

	Inlet	Exhaust
Cam height	44.015 ± 0.03mm	44.595 ± 0.03mm

8 - Valve timing

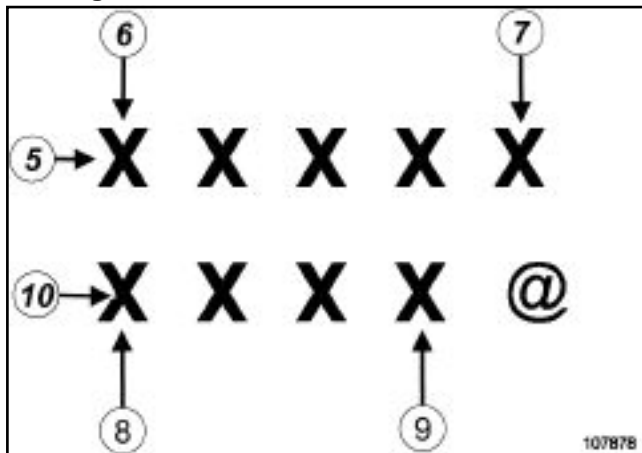


11953

11953

- 1 TDC fixed marking on the cylinder block,
- 2 TDC movable marking on the flywheel,
- 3 BDC movable marking on the flywheel,
- 4 Inlet Opening Retardation **ROA** *
- 5 Exhaust Closing Advance **AFC** **,
- 6 Inlet Closing Retardation **RFA** ,
- 7 Exhaust Opening Advance **AOE** ,
- 8 Crankshaft direction of rotation (flywheel end).

Marking "A" in detail



(5) : line indicating the diameter category of the journals,

(6) : diameter category of journal no. 1, flywheel end,

(7) : diameter category of journal no. 5, timing end,

(8) : diameter category of crankpin no. 1, flywheel end,

(9) : diameter category of crankpin no. 4, timing end,

(10) : line indicating the diameter category of the crankpins.

2 - Categories of journal diameters

Table of journal diameter categories

Journal category mark on the crankshaft	Journal diameter categories (mm)
A, G, K, R, W	D1 = 47.990 to 47.997 exclusive
B, H, L, S, Y	D2 = 47.997 inclusive to 48.003 exclusive
C, J, O, T, Z	D3 = 48.003 inclusive to 48.010

3 - Crankshaft dimensions

Diameter of the journals	$48 \pm 0.01\text{mm}$
Crankpin diameter	43.97 ± 0.01
Maximum run-out allowed on the flywheel bearing face of the flywheel	0.6mm

4 - Crankshaft lateral play:

The lateral play of the crankshaft must be between:

- Without crankshaft lateral shim wear **0.045 and 0.252mm** ,
- With crankshaft lateral shim wear **0.045 and 0.852mm** .

5 - Journal radial play

The radial play of the journals must be between **0.010 and 0.054mm** .

6 - Number of journals

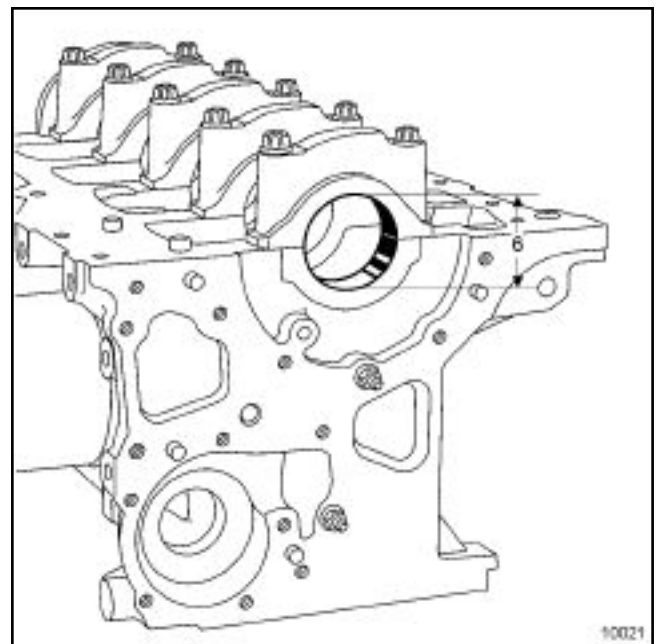
There are 5 journals.

V - CYLINDER BLOCK

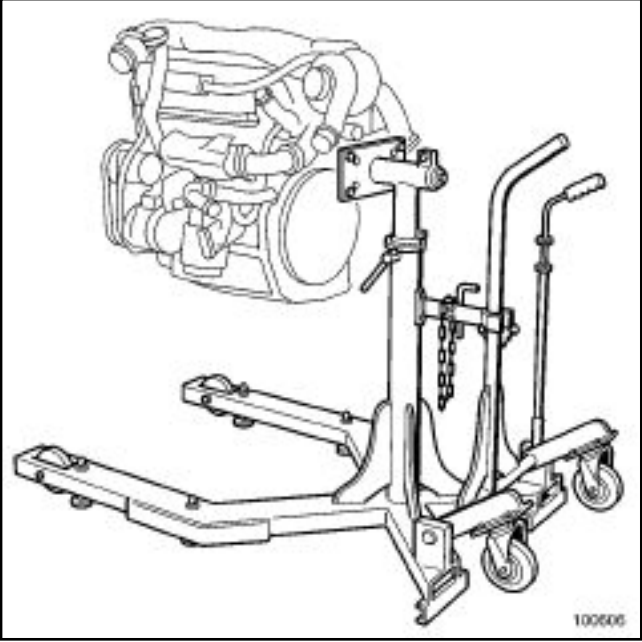
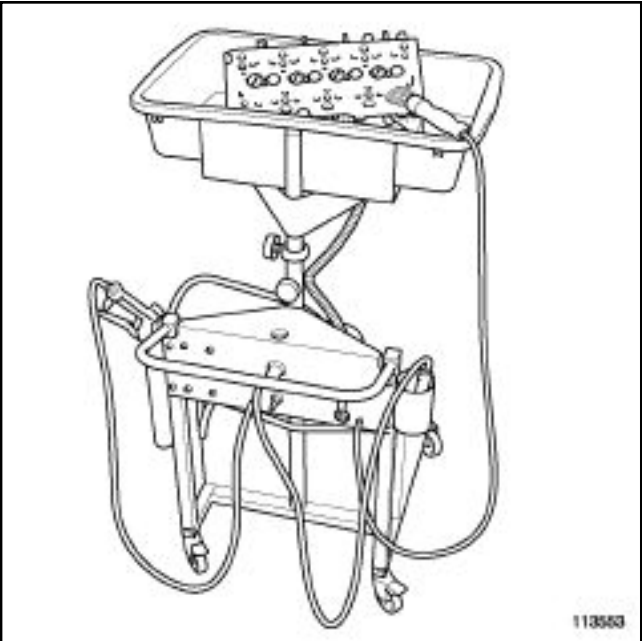
1 - Diameter of the shafts

This engine only has one category of shaft diameter **76.009 ± 0.015mm**

2 - Identifying the bearing journal diameters on the cylinder block



10021

Illustration	Description
 <p>100606</p>	<p>Engine stand.</p>
 <p>113553</p>	<p>Cleaning bench.</p>

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT

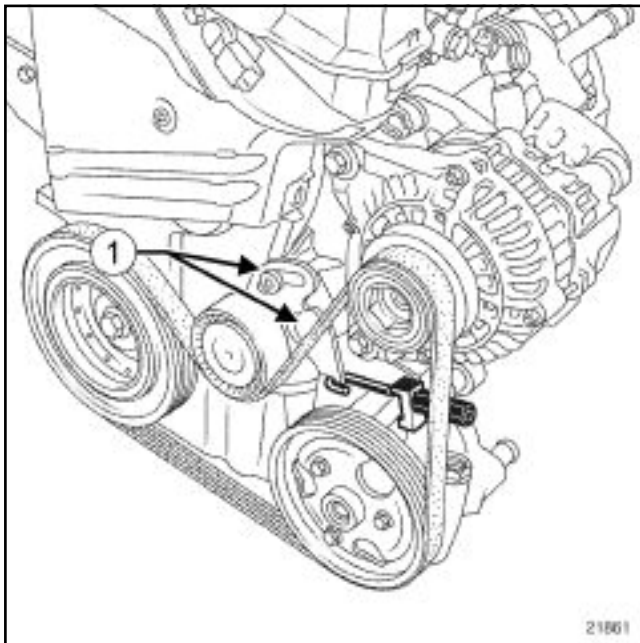
Wear protective gloves during every operation.

II - EQUIPMENT REQUIRED

- Protective gloves.

III - REMOVAL

1 - Engine without air conditioning



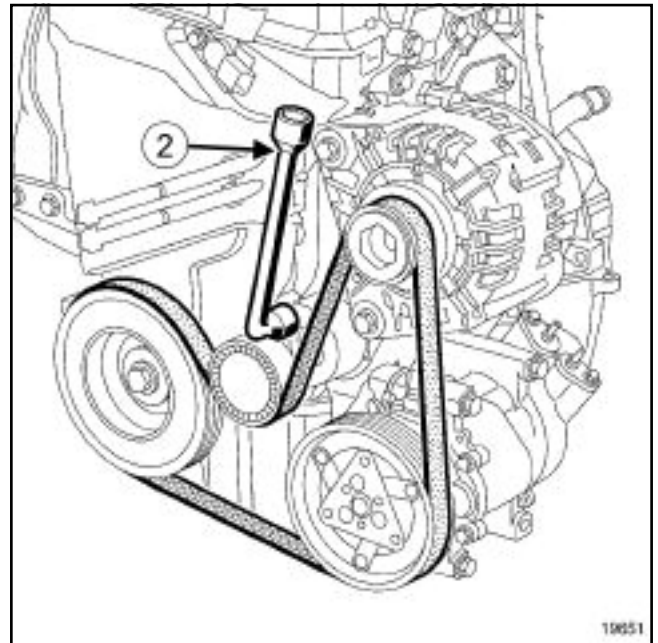
21861

Undo the tensioning roller mounting bolts (1) .

Remove:

- the accessories belt,
- the accessories belt tensioning roller.

2 - Engine with air conditioning

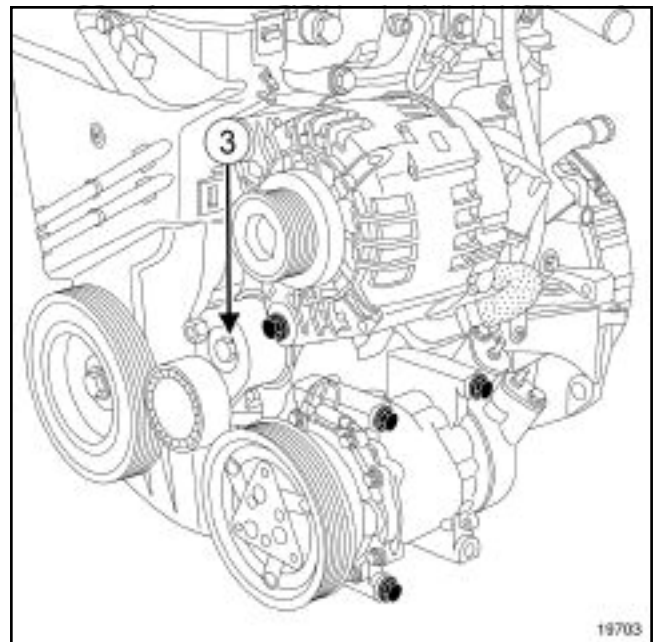


19651

19651

Rotate the tensioning roller using a wrench (2) to slacken the belt.

Remove the accessories belt.



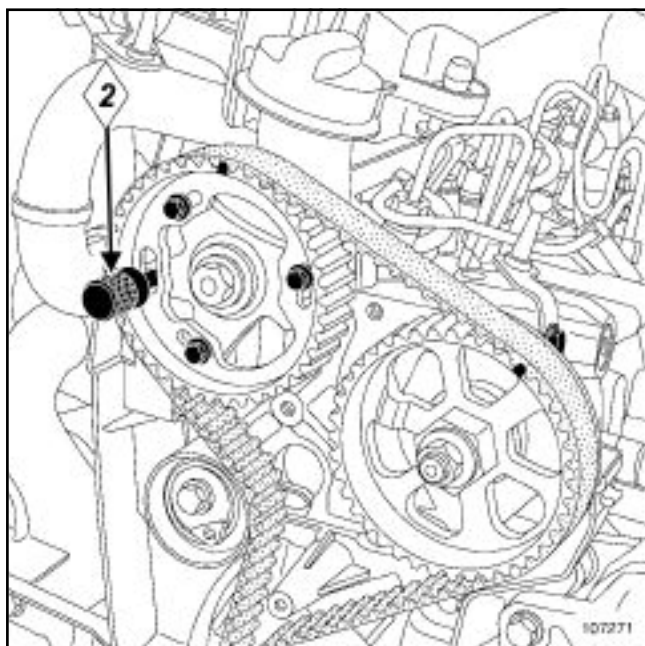
19703

19703

Remove:

- the accessories belt tensioning roller mounting bolt (3) ,
- the accessories belt tensioning roller.

K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

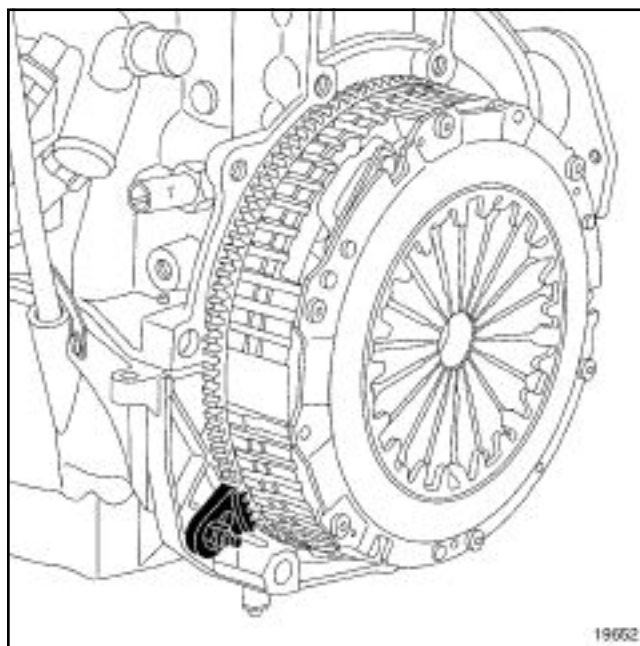


107271

Insert the pin **(Mot. 1430)** (2) in the camshaft pulley and cylinder head holes.

Remove:

- the camshaft pulley timing pin **(Mot. 1430)** ,
- the TDC setting pin **(Mot. 1489)** .



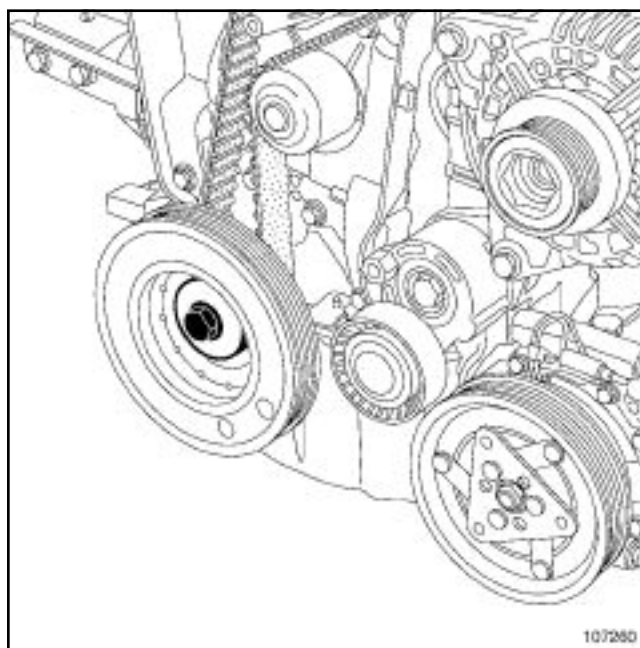
19652

19652

Fit the flywheel locking tool **(Mot. 582-01)** or **(Mot. 1677)** .

Note:

For engines that have already had the flywheel removed, screw two used flywheel bolts into the crankshaft to lock it using a large screwdriver.



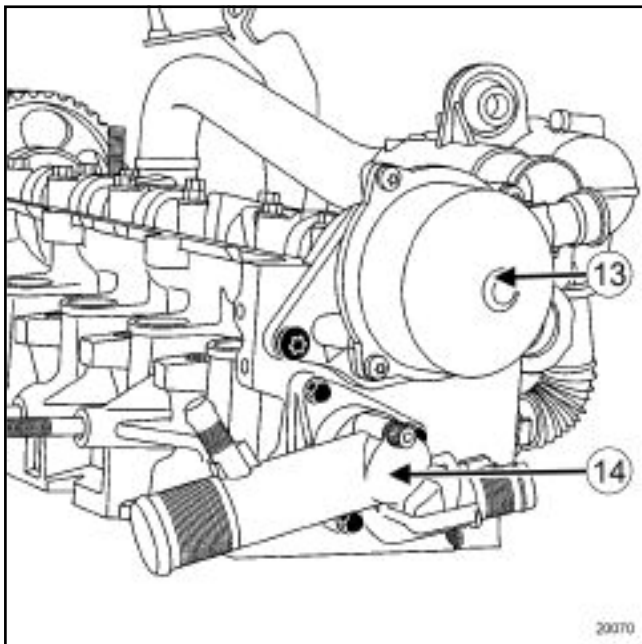
107260

107260

Remove the crankshaft accessories pulley.

Cylinder head: Dismantling

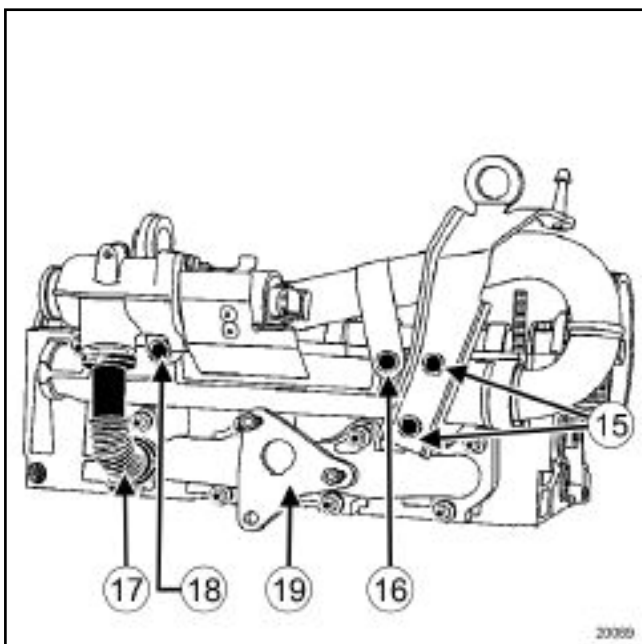
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



20070

Remove:

- the vacuum pump bolts (13) ,
- the vacuum pump,
- the cylinder head coolant outlet unit mounting bolts (14)
- the cylinder head coolant outlet housing

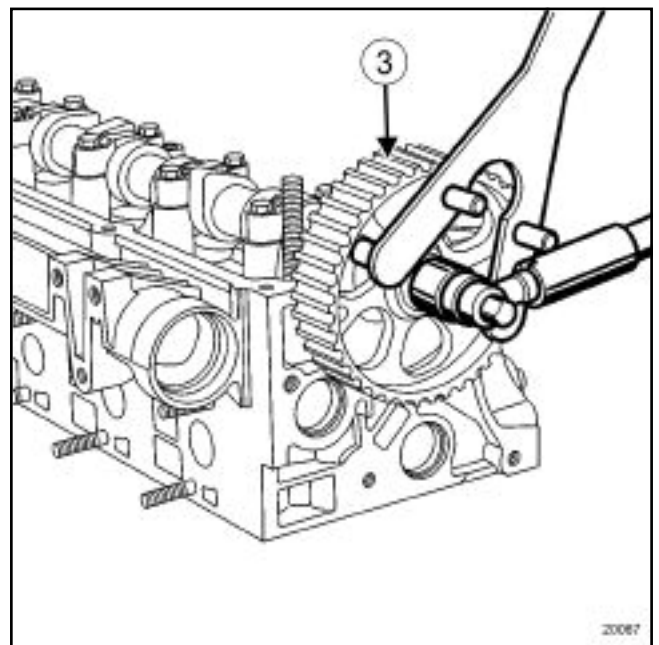


20069

Remove:

- the engine lifting eye (timing end) mounting bolts (15) ,

- the engine lifting eye (timing end),
- the exhaust gas recirculation pipe clips (17) using the (Mot. 1567) ,
- the exhaust gas recirculation pipe,
- the air inlet duct mounting bolt (16) ,
- the inlet duct,
- the exhaust gas recirculation valve mounting bolts (18) ,
- the exhaust gas recirculation valve,
- the exhaust manifold mounting nuts (19) ,
- the exhaust manifold.

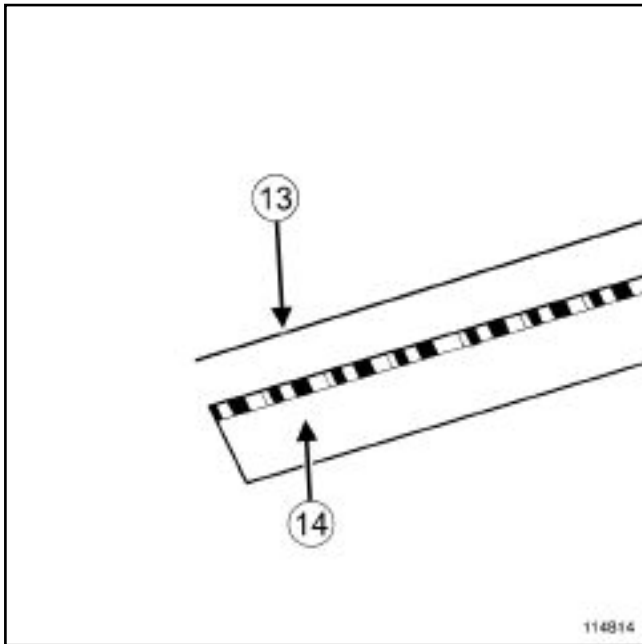


20067

Lock the camshaft pulley using the (Mot. 799-01)

Remove:

- the camshaft pulley mounting nut,
- the camshaft pulley.

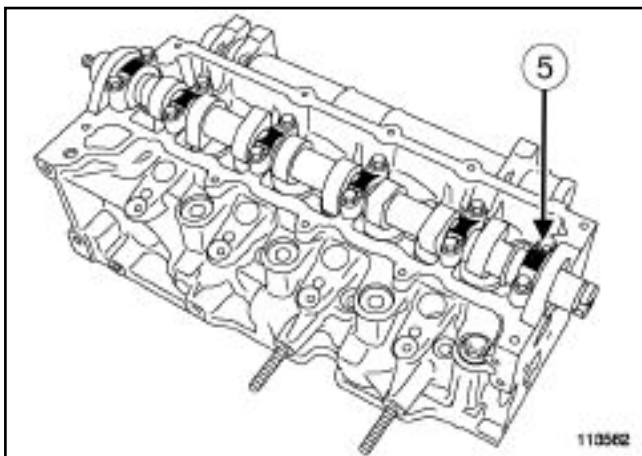


114814
114814

Cut pieces of measuring wire (13) .
Place the wire in the camshaft shaft.

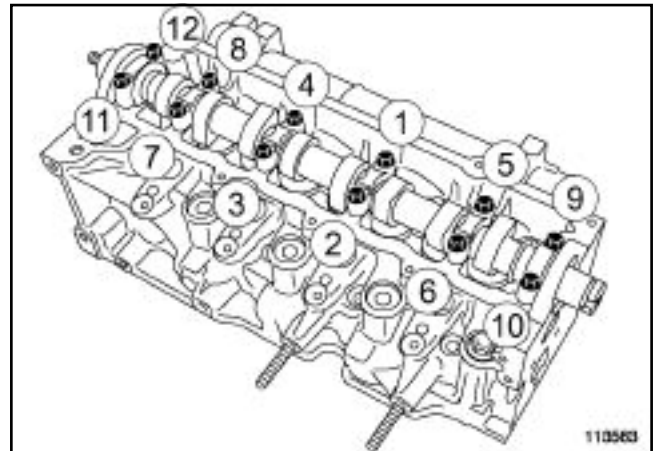
Note:

Do not allow the camshaft to turn during the operation in order to avoid distorting the measurement.



113562

Refit the camshaft bearing caps (observing their original positions, bearing No. 1 (5) engine flywheel end).



113563
113563

Tighten to torque and in order the **crankshaft bearing cap mounting bolts (11 Nm)** .

Remove:

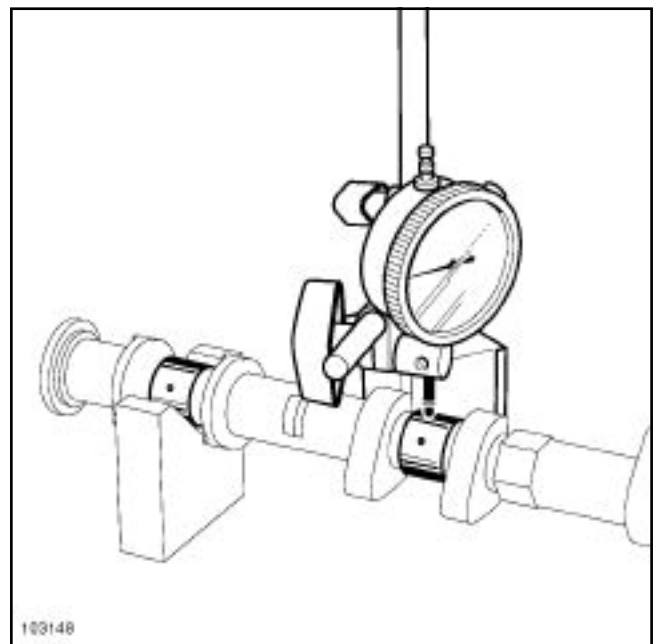
- the camshaft bearing caps,
- the camshaft.

Measure the flattening of the clearance measuring wire using the packaging paper (14) .

Check the value of the diametric clearance which should be between **0.04 and 0.081 mm** .

Clean any traces of measuring wire off the camshaft and the camshaft bearing caps.

8 - Checking the radial deviation of the camshaft



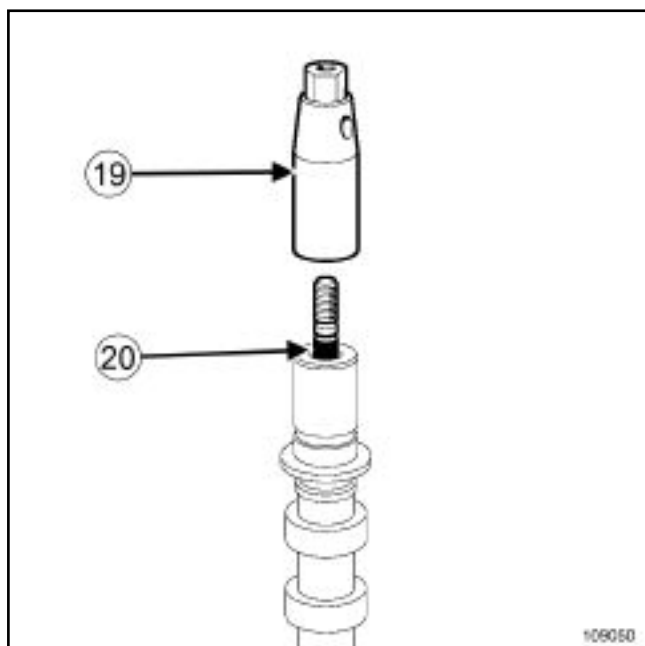
103148

103148

Position camshaft bearings 2 and 4 on the v-blocks.
Position a dial gauge vertically on camshaft bearing 3.

Cylinder head: Refitting

K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



109050

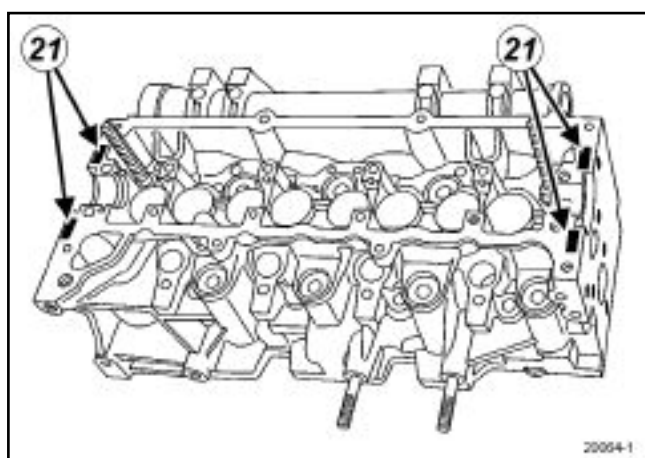
Remove the piston rings using a roller-type stud removal tool (19) .

Clean the threaded hole of the camshaft carefully to prevent foreign bodies from entering the latter.

Fit the new stud on the camshaft (precoated section (20) on the camshaft side).

Tighten to torque **the camshaft pulley mounting stud (12 ± 2 Nm)** using a roller-type stud removal tool (19) .

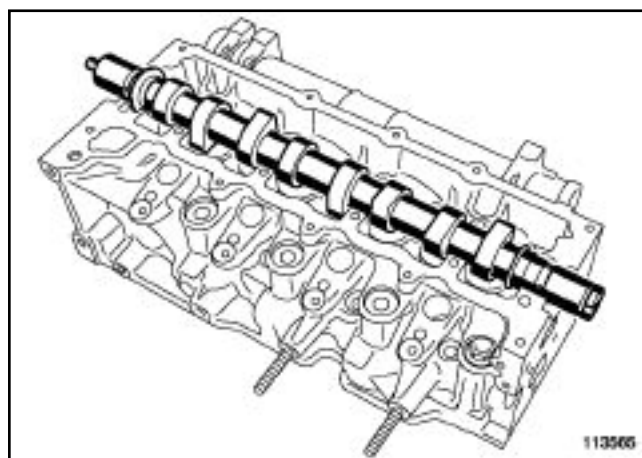
Oil the top of the valve pushrods and the camshaft bearings with engine oil.



20064-1

Degrease the surfaces of the camshaft bearing gaskets nos. 1 and 6 (21) using degreaser.

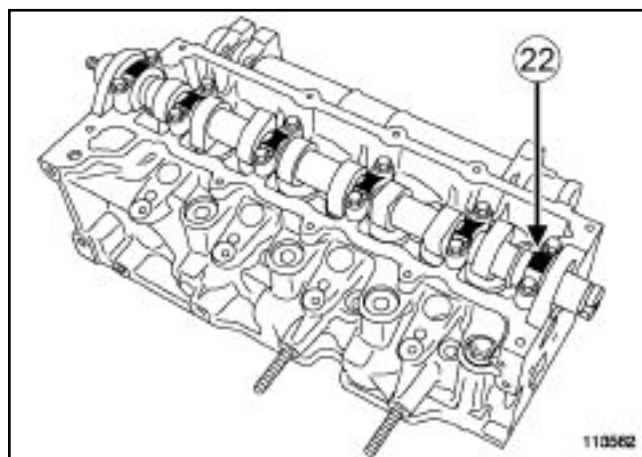
Apply four beads of **LOCTITE 518** of a width of 1 mm to camshaft bearings nos. 1 and 6 (21) .



113565

113565

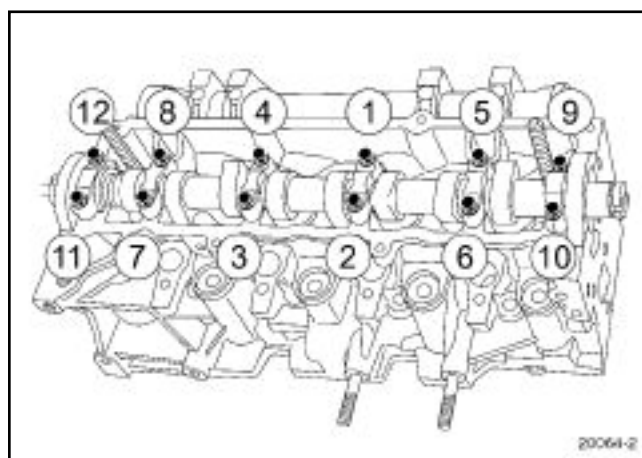
Refit the camshaft.



113562

113562

Refit the camshaft bearing caps (observing their original positions, bearing No. 1 (22) engine flywheel end).

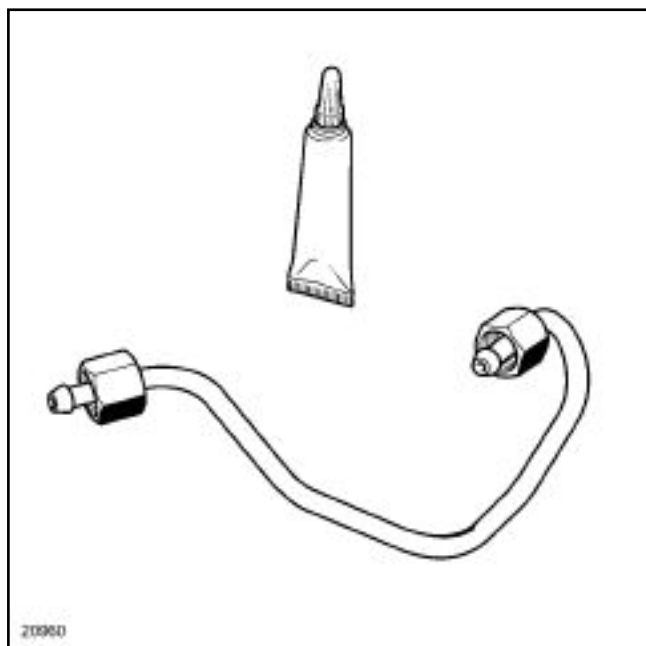


20064-2

20064-2

Tighten to torque and in order **the crankshaft bearing cap mounting bolts (11 ± 1.1 Nm)** .

K9K, and 732 or 764



20960

WARNING

Before fitting a new high-pressure pipe, lightly lubricate the nut threads with oil from the applicator provided with the new part.

Be careful not to allow oil into the high-pressure pipe.

Do not lubricate high-pressure pipes supplied without an applicator; these pipes are self-lubricating.

Do not remove the blanking plugs from each component until the last moment.

Do not blast with compressed air once the fuel circuit is open, otherwise impurities may enter the system.

Tighten to torque ($38 \pm 3.8 \text{ Nm}$) the pump-rail and rail-injectors high-pressure pipes, part nos.:

- 77 01 207 025
- 77 01 207 026
- 77 01 207 027
- 77 01 207 028
- 77 01 207 029

For the high-pressure pipes with the remaining part nos, tighten to a torque of ($24 \pm 2.4 \text{ Nm}$).

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.)

The sealing surfaces must be clean, dry and free from grease (avoid finger marks).

The gaskets must always be replaced.

The camshaft pulley mounting stud must be replaced if it comes loose as the camshaft pulley is removed.

Do not grease the valve stem seals.

II - PARTS AND CONSUMABLES FOR THE REPAIR**Parts always to be replaced**

- Camshaft pulley nut,
- Camshaft seal (timing end),
- The injector heat protection washers,
- high-pressure pipes,
- The EGR exchanger cover seal,
- The vacuum pump seal,

Running gear:Removal

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT

Wear protective gloves during every operation.

WARNING

Do not use a punch or an etching tool to mark the con rod caps to match their bodies, to prevent incipient breakage of the con rod.

Use an indelible marker pen.

Note:

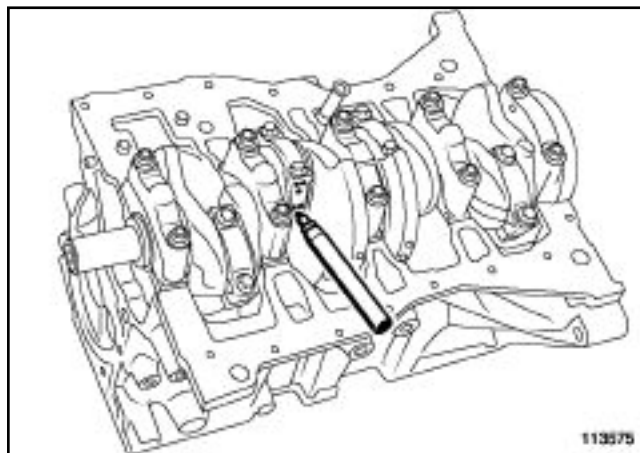
It is essential to mark:

- the position of the crankshaft bearings as the class may be different for each bearing,
- the height class of the pistons in relation to the cylinders,
- the gudgeon pin in relation to the piston.

II - EQUIPMENT REQUIRED

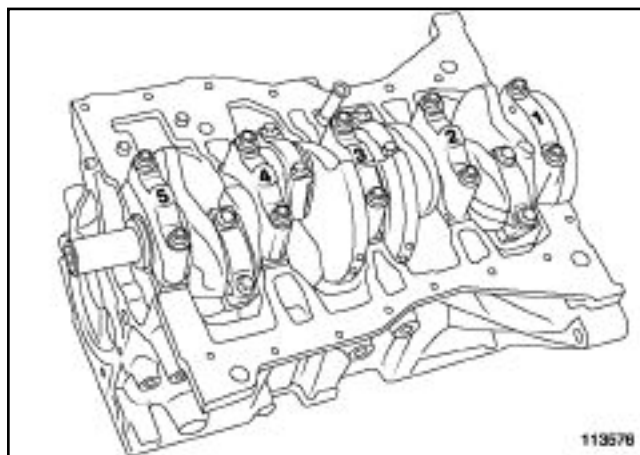
- Indelible pencil,
- Female torx socket.
- Mallet,
- Roll pin punch (**10 mm** in diameter).
- Male Allen key (**10 mm**),
- Piston ring compressor,
- Flat-blade screwdriver,

III - REMOVING THE ROTATING PARTS



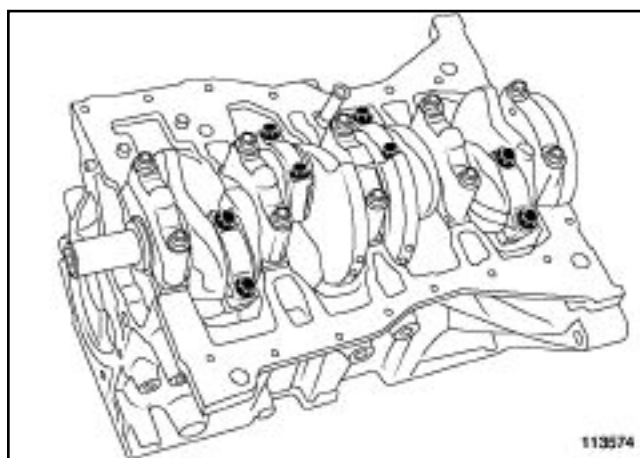
113575

Mark the con rod caps in relation to their bodies using an indelible pencil.



113576

Mark the crankshaft bearing caps (bearing No. 1 at the flywheel end) with an indelible pencil.



113574

Remove:

- the con rod cap mounting bolts.
- the con rod caps,

Special tooling required

Mot. 1485-01	Tool for removing piston coolers.
---------------------	-----------------------------------

Emb. 880	Pin extractor.
-----------------	----------------

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT

Wear:

- goggles,
- protective gloves during the whole operation.

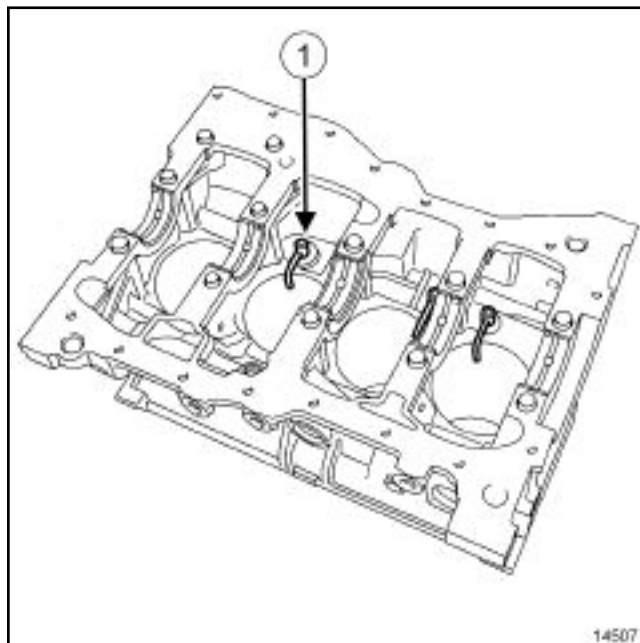
WARNING

Do not withdraw the ball of the piston base cooling nozzle, to prevent swarf falling into the oil circuit.

II - EQUIPMENT REQUIRED

- Drill bit **7 mm in diameter**
- Allen key (**6 mm**),
- Brush,
- Protective goggles,
- Compressed air gun.

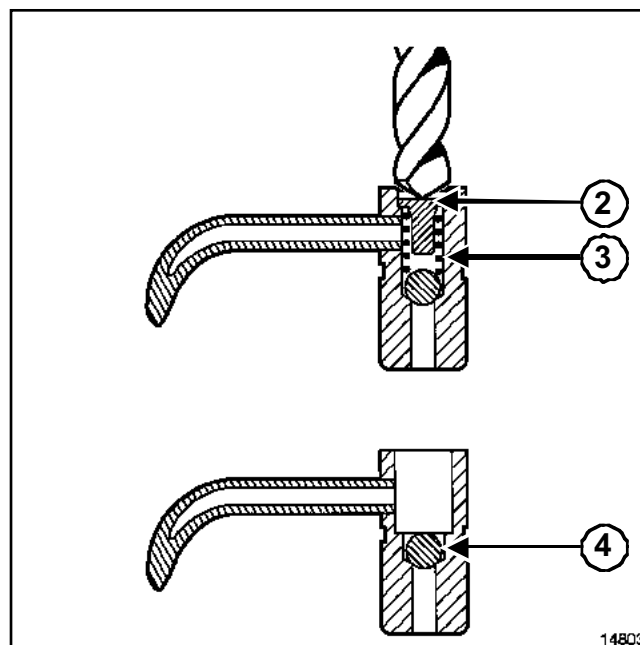
III - REMOVING THE PISTON BASE COOLING JETS



14507

14507

Drill the piston base cooling jets (1) using a **7 mm** diameter drill bit.



14803

14803

Note:

Do not remove the ball (4) .

Remove:

- the spring stop (2) ,
- the spring (3) .

Wear protective goggles.