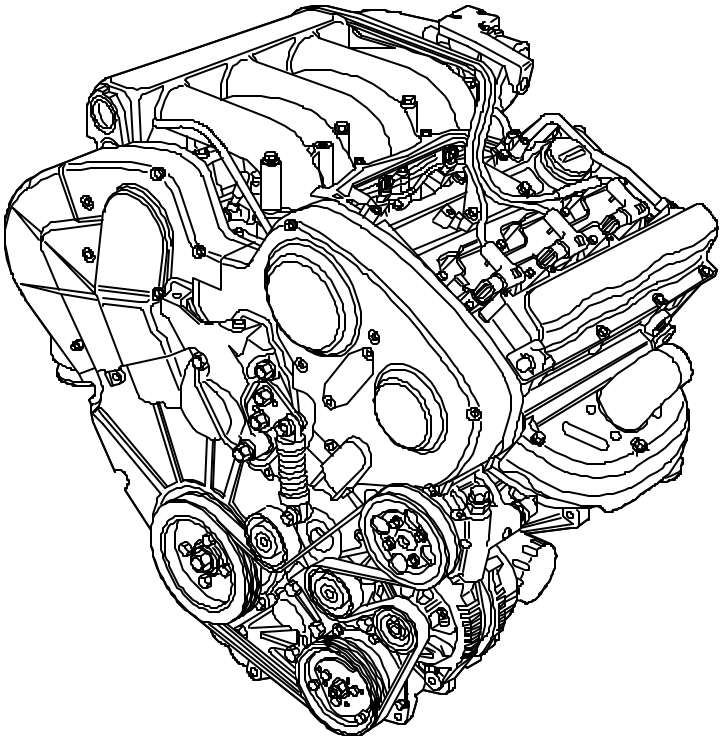
presentation : ES9J4 engine

INJECTION ES9J4

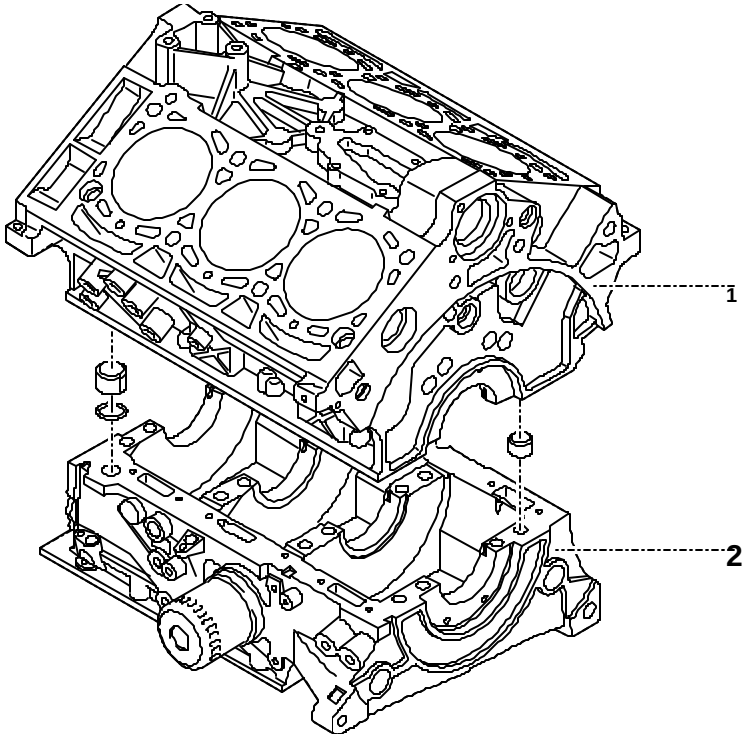


- Fig. : 1 -

Principal structural features of the ES9J4 engine :

- petrol engine with 6 cylinders in 60° Vee formation
- 24 valve engine with 4 overhead camshafts driven by a toothed belt

1 Cylinder block



- Fig. : 2 -

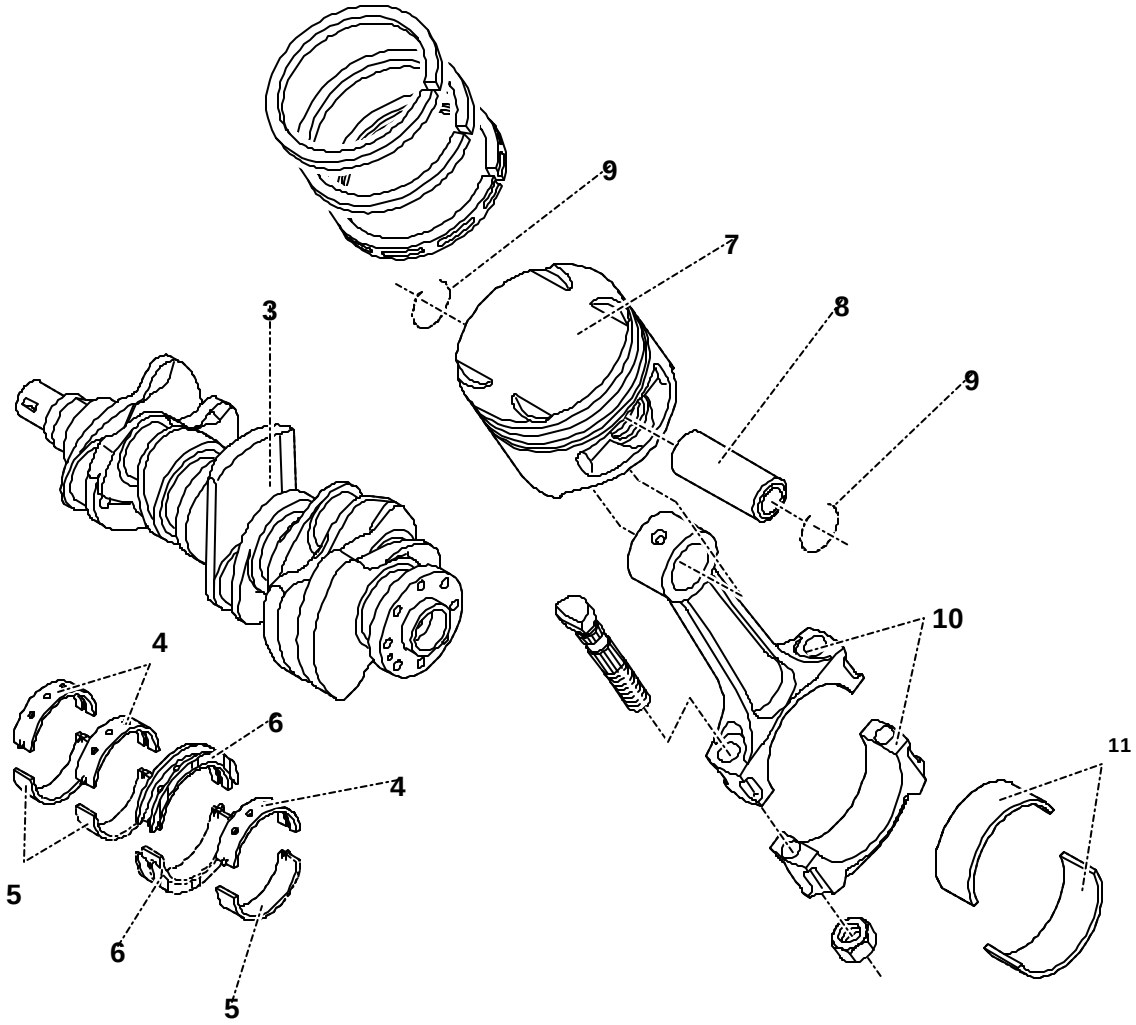
(1) cylinder block.

(2) crankshaft main bearing cap casing.

The light alloy cylinder block is fitted with cast iron liners on assembly.

The light alloy crankshaft bearing cap casing incorporates the 4 cast iron bearing caps.

2 Reciprocating gear



- Fig. : 3 -

(3) crankshaft.

(4) upper bearing shells.

(5) lower bearing shells.

(6) bearing shell on bearing no. 2.

(7) piston.

(8) gudgeon pin.

(9) circlip.

(10) connecting rod.

(11) big-end bearing shells.

2.1 Crankshaft

4 bearing steel crankshaft.

Crankshaft endfloat is controlled by the integral thrust washers of the no. 2 main bearing shells.

2.2 Crankshaft bearing shells

Plain shell bearings bearing cap casing side.

Grooved shell bearings (cylinder block side).

The crankshaft and main bearings (cylinder block and bearing cap casing) are matched from markings on both the block and crankshaft.

The matching is achieved by 4 different thicknesses of plain shell bearings.

N.B. : There is one only class, for the upper, grooved bearing shells.

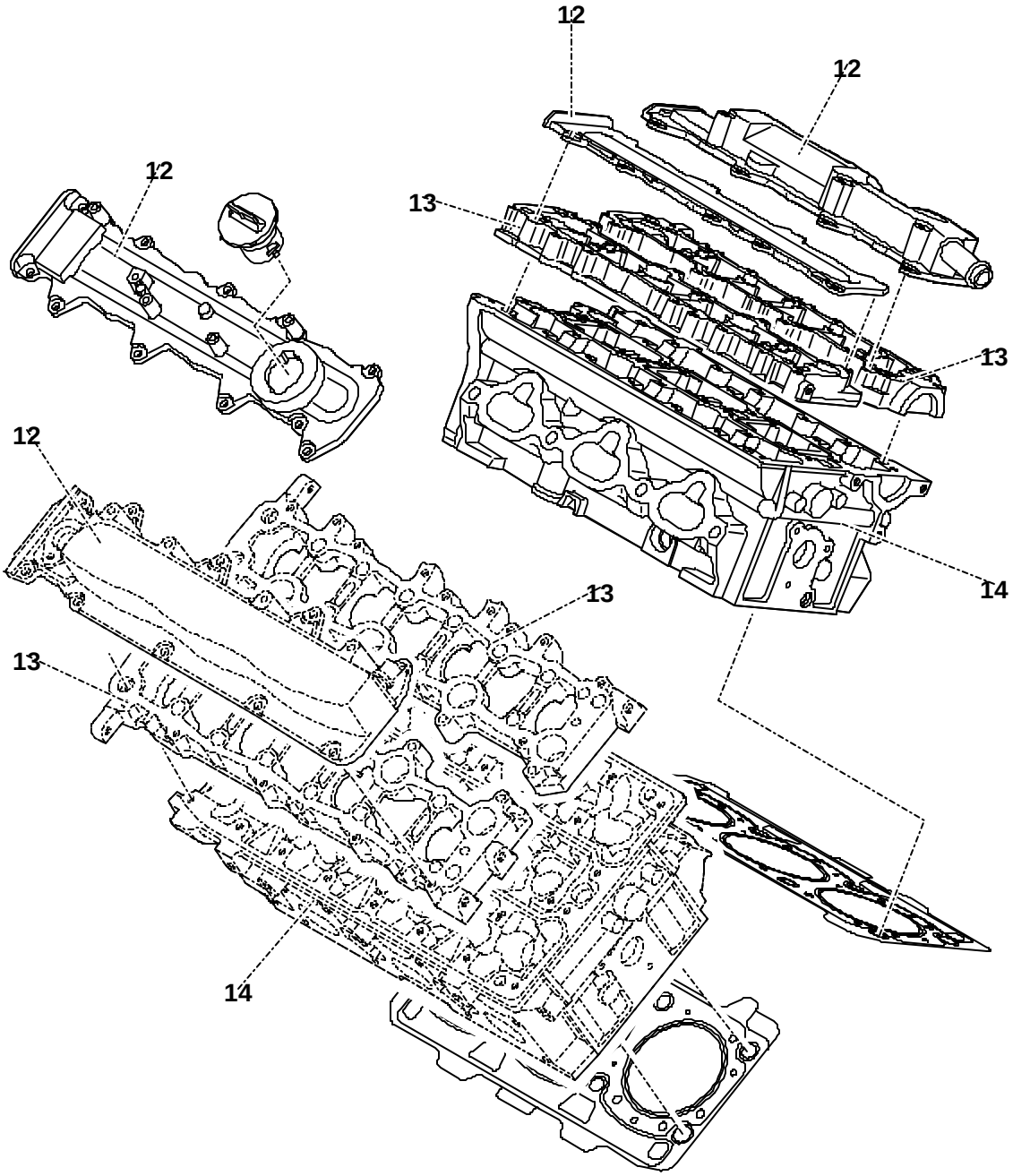
2.3 Connecting rods / pistons

New connecting rods with a dimension of 154 mm between centres.

New light alloy pistons with valve recesses.

The gudgeon pins are free in the connecting rod small ends.

3 Cylinder head assembly



- Fig. : 4 -

(12) cylinder head cover.

(13) camshaft bearing cap casing.

(14) cylinder head.

N.B. : The cylinder head houses the valve gear.

The camshaft bearing cap casings are in light alloy.

3.1 Camshaft bearing cap casings

The camshaft bearing cap casings house the 4 bearings of the 2 shafts of 6 lobes.

The camshaft bearings are lubricated under pressure and the cams by oil baths.

3.2 Cylinder head

New light alloy cylinder heads.

4 valves per cylinder (2 for inlet, 2 for exhaust) with automatically adjusted hydraulic cam followers.

The sparking plugs are offset by 3 mm towards the exhaust side of the combustion chambers.

The front cylinder head houses the (BBC 3.2) ignition coil assembly (Compact Coil Unit).

The rear cylinder head houses the ignition HT harness cassette.

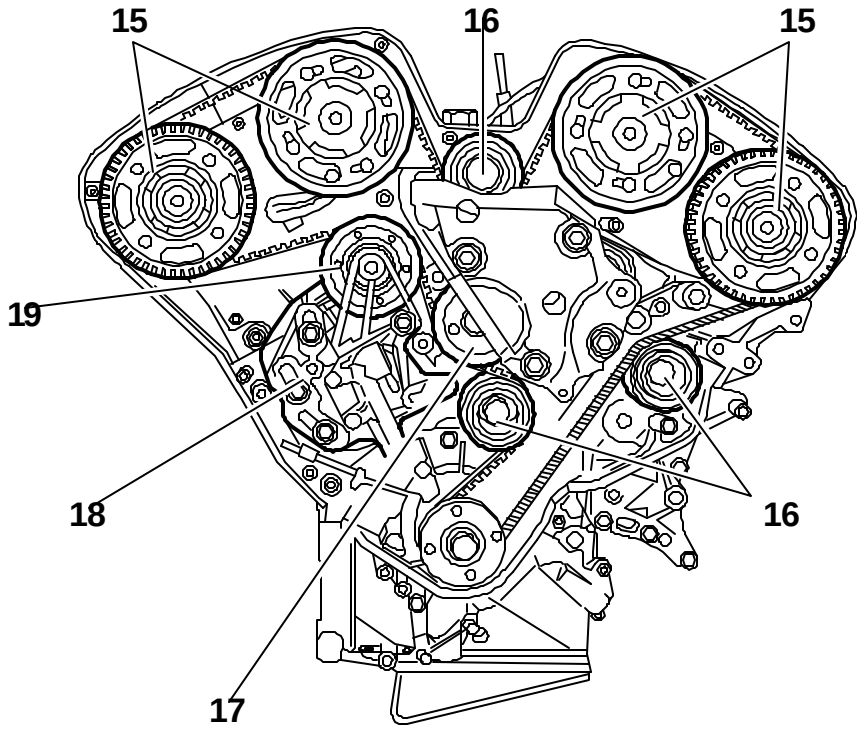
The cylinder heads are attached to the cylinder block by 8 bolts.

3.3 Camshafts

The new cast iron camshafts comprise 6 lobes and 4 bearings.

The 4 camshafts are specific and act directly on the hydraulic cam followers.

4 Timing



- Fig. : 5 -

(15) camshaft gear wheel.

(16) guide roller.

(17) water pump drive pinion.

(18) dynamic tensioner.

(19) roller tensioner.

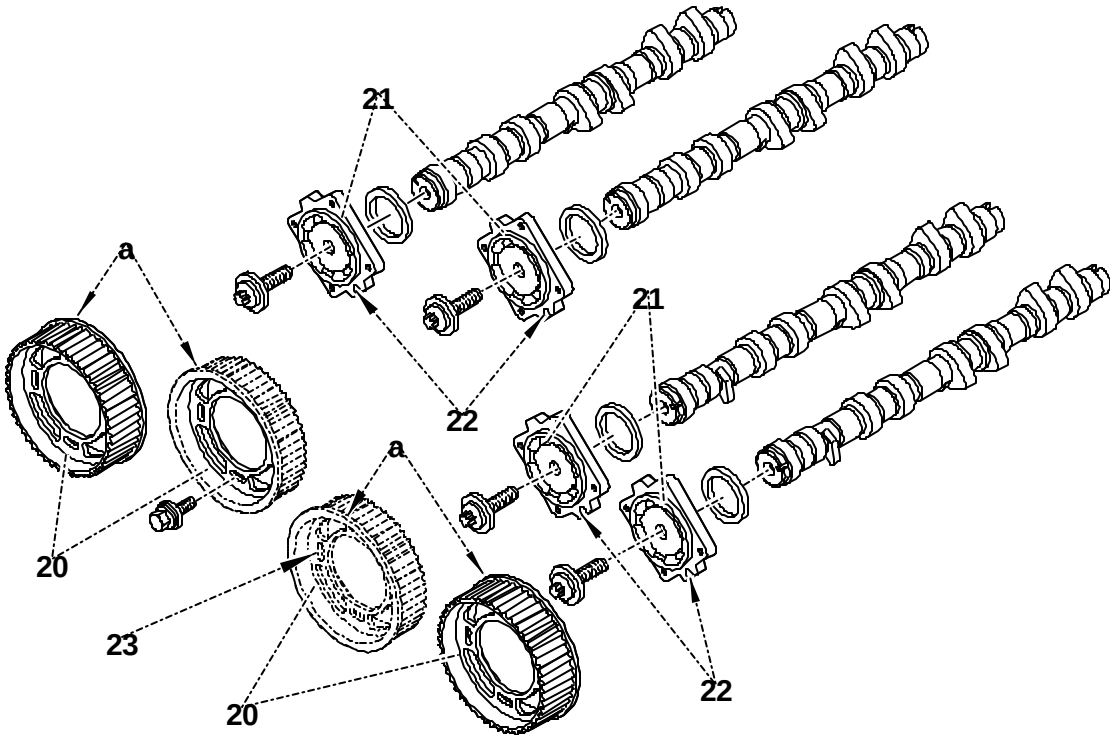
The valve gear comprises 4 direct operation camshafts.

4.1 Timing belt

Engine code.	XFZ.
Width.	32 mm.
Number of teeth.	259.
Material.	HSN quality.
Supplier.	DAYCO.
Engraving enabling the identification.	None.

Replacement intervals.	
Normal conditions of use.	150 000 km.
Severe driving conditions.	120 000 km.

4.2 Camshaft gear wheel



- Fig. : 6 -

(20) camshaft gear wheel.

(21) camshaft hub.

(22) locating peg notch.

(23) elongated hole.

The locating of the camshafts is achieved by using the hubs (21) keyed to the shafts.

The pinions are fixed to the camshaft hubs by the bolts 4.

When the 4 pinion fixing bolts are slackened, the pinions are free to rotate within the bounds of the elongated holes.

This method of fitting of the pinions allows :

- a more precise setting of the valve timing
- a more evenly distributed tension of the camshaft drive belt between the various belt pulleys

The hubs of the camshafts are identical.

The camshaft pinions are all identical.

Direction of fitting of the camshaft pulleys :

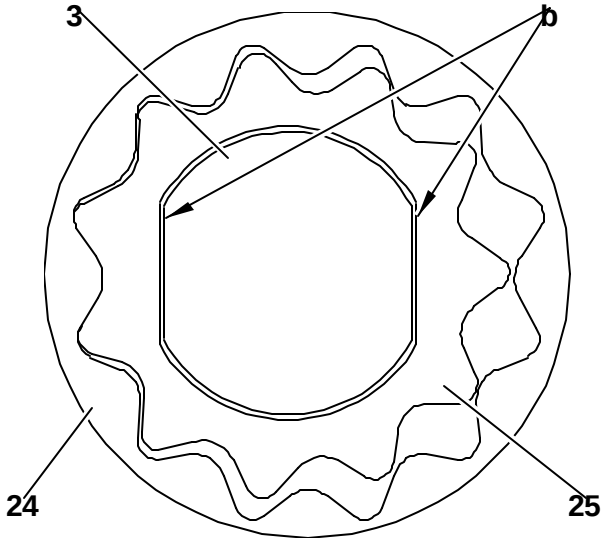
- inlet camshaft : flange " a " towards the outside
- exhaust camshaft : flange " a " towards the inside

5 Lubrication

5.1 Oil capacity

Engine legislation type.	XFZ.
Oil filter change.	5,5 litres.
No oil filter change.	4,8 litres.
Capacity of the gauge between the min. and max. marks.	2 litres.

5.2 Lubrication circuit



- Fig. : 7 -

(3) crankshaft.

(24) oil pump outer rotor.

(25) oil pump inner rotor.

The pressure-fed lubrication is provided by a dual eccentric gear type oil pump (inner and outer rotors).

The oil pump is driven by the end of the crankshaft by two flats " b ".

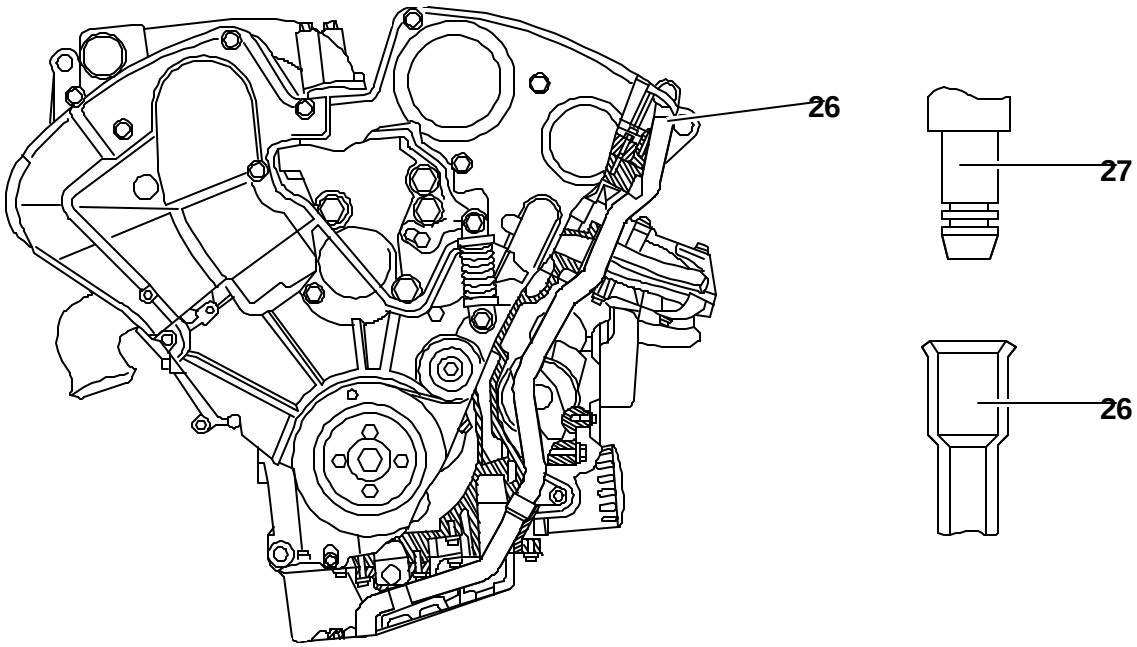
5.3 Engine draining

The draining operation should be carried out when hot, immediately after the engine has been switched off.

It is possible to drain the engines via a suction device.

The end of the dipstick guide tube has been enlarged, which enables a tube to be connected to a suction draining device.

N.B. : Engines can still be drained by taking out the oil sump drain plug.



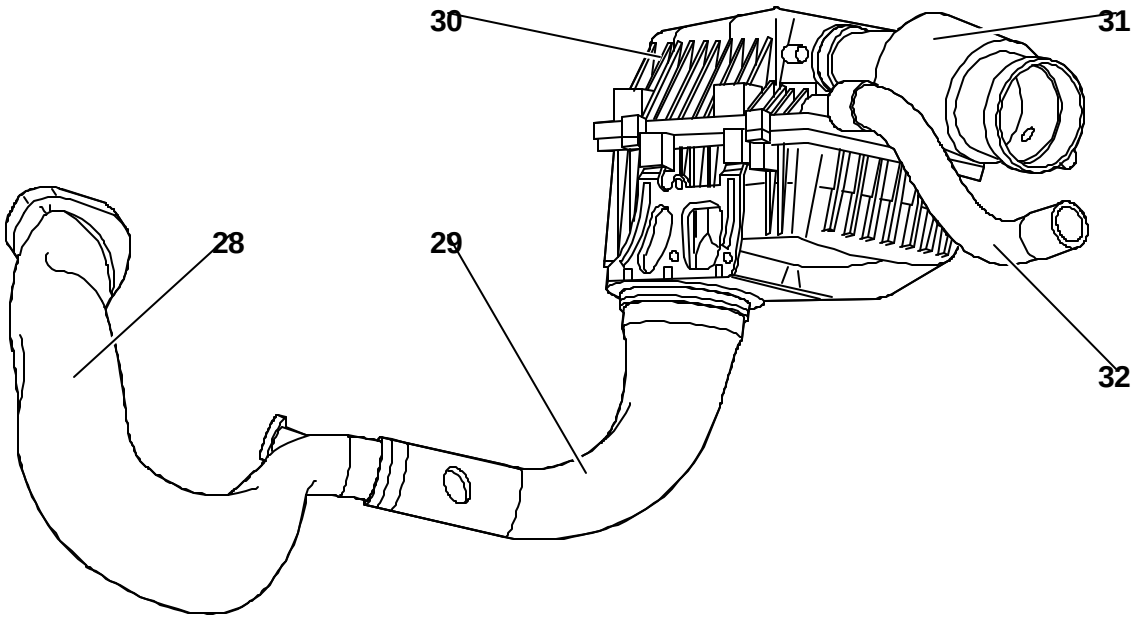
- Fig. : 8 -

(26) dipstick guide tube extremity.

(27) 14 mm dia. union.

6 Air supply circuit

The air induction system also serves as an induction silencer.



- Fig. : 9 -

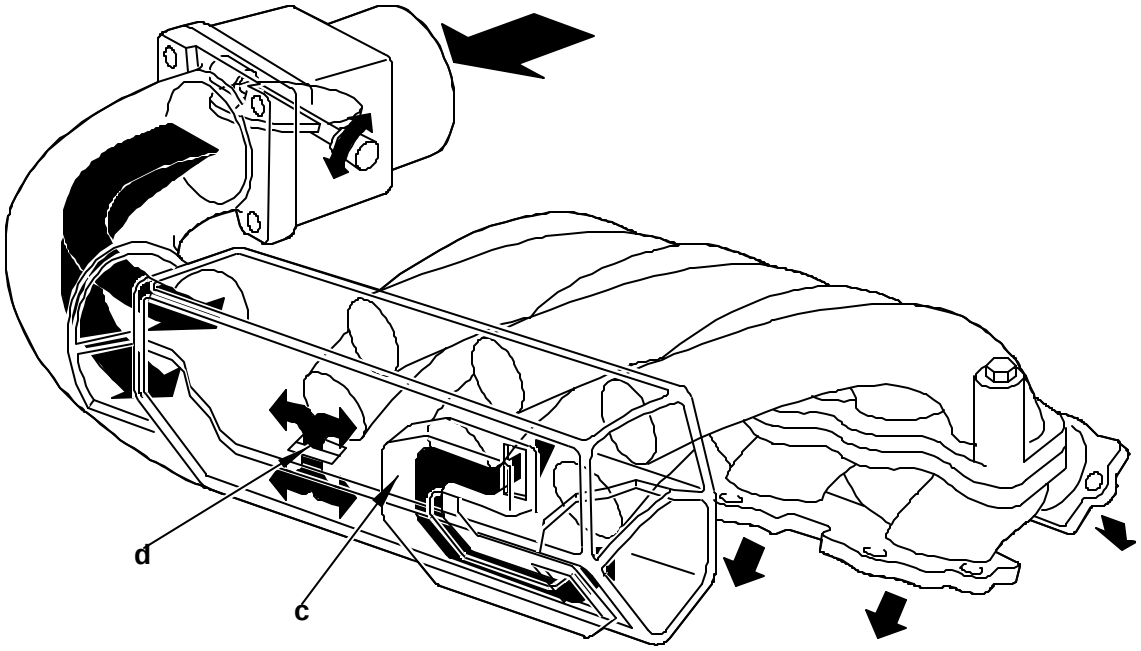
(28) air inlet elbow.

(29) air inlet elbow/air filter duct.

(30) air filter unit.

(31) air filter/throttle butterfly housing duct.

(32) additionnal air duct.



- Fig. : 10 -

Light alloy inlet manifold.

The interior gas flow of the inlet manifold enables high engine torque to be achieved at low engine speed and a smooth progressive torque curve (a volume for each cylinder bank with an interconnection between these 2 volumes for a long induction link " c " and a short induction link " d ").

7 Injection system

Supplier : BOSCH.

Type : MP7.0.

7.1 Injection ECU

The ECU also controls the following functions :

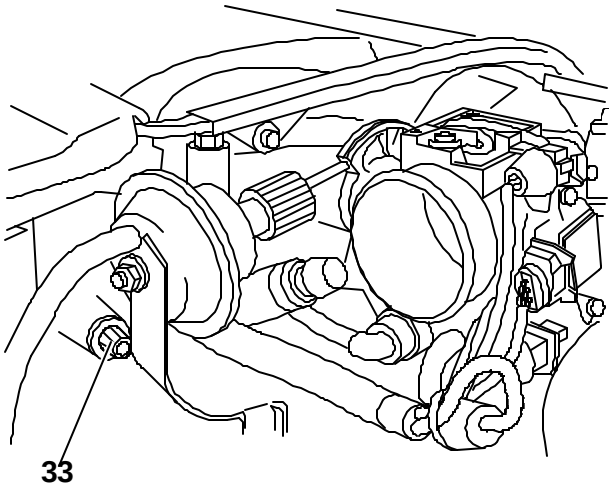
- air fuel mixture
- ignition system
- autodiagnosis
- richness adjustment
- adjustment of idling speed
- anti-knock adjustment

This ignition injection ECU is equipped with a "FLASH-EPROM" memory.

This type of memory permits, in the case of a change in calibration, the memory of the ECU to be modified without remove or replacing the ECU.

Instead of replacing the ECU or the eprom, the operation consists in "downloading" the ECU program into its memory, using an appropriate after sales tool, through the diagnostic socket : " ELIT " test unit.

7.2 Fuel supply system



- Fig. : 11 -

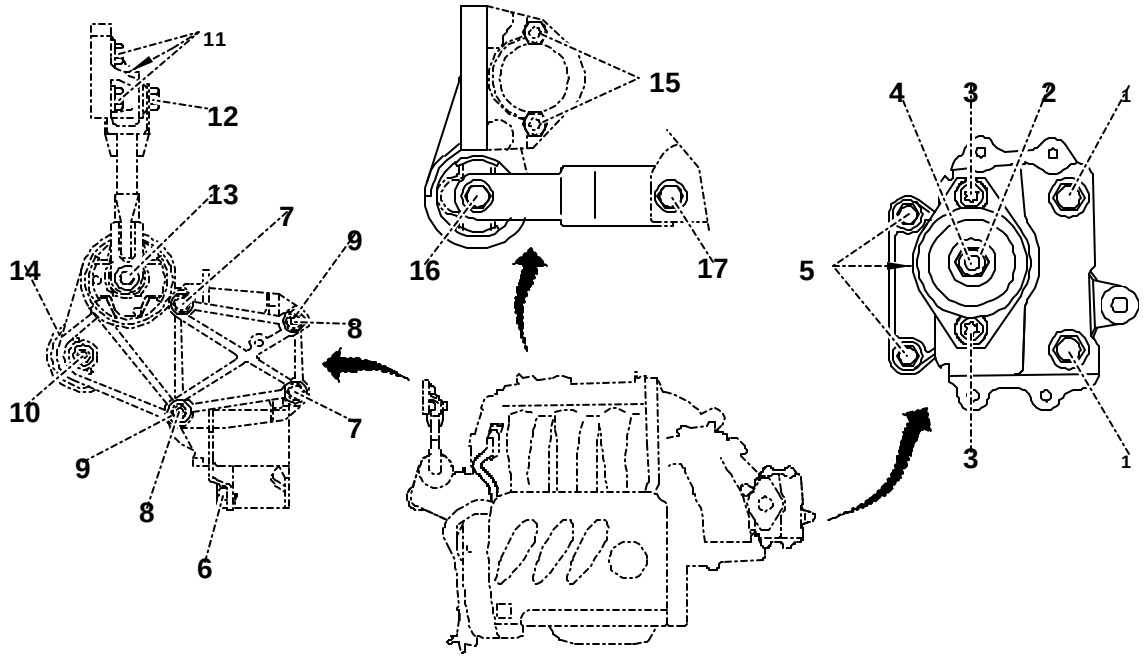
The left hand injector rail is equipped with SCHRADER (33) valve to enable the following checks to be carried out :

- fuel pressure
- flow of injected fuel

data : tightening torques

INJECTION ES9J4

1 Engine/gearbox mountings



- Fig. : 1 -

Left hand engine mounting :

- tighten the screws (1) to 2 m.daN
- tighten nut (2) to 6,5 m.daN : coat with threadlock LOCTITE FRENETANCH
- tighten the screws (3) to 3 m.daN
- tighten the shaft (4) to 5 m.daN
- tighten the screws (5) to 4,5 m.daN

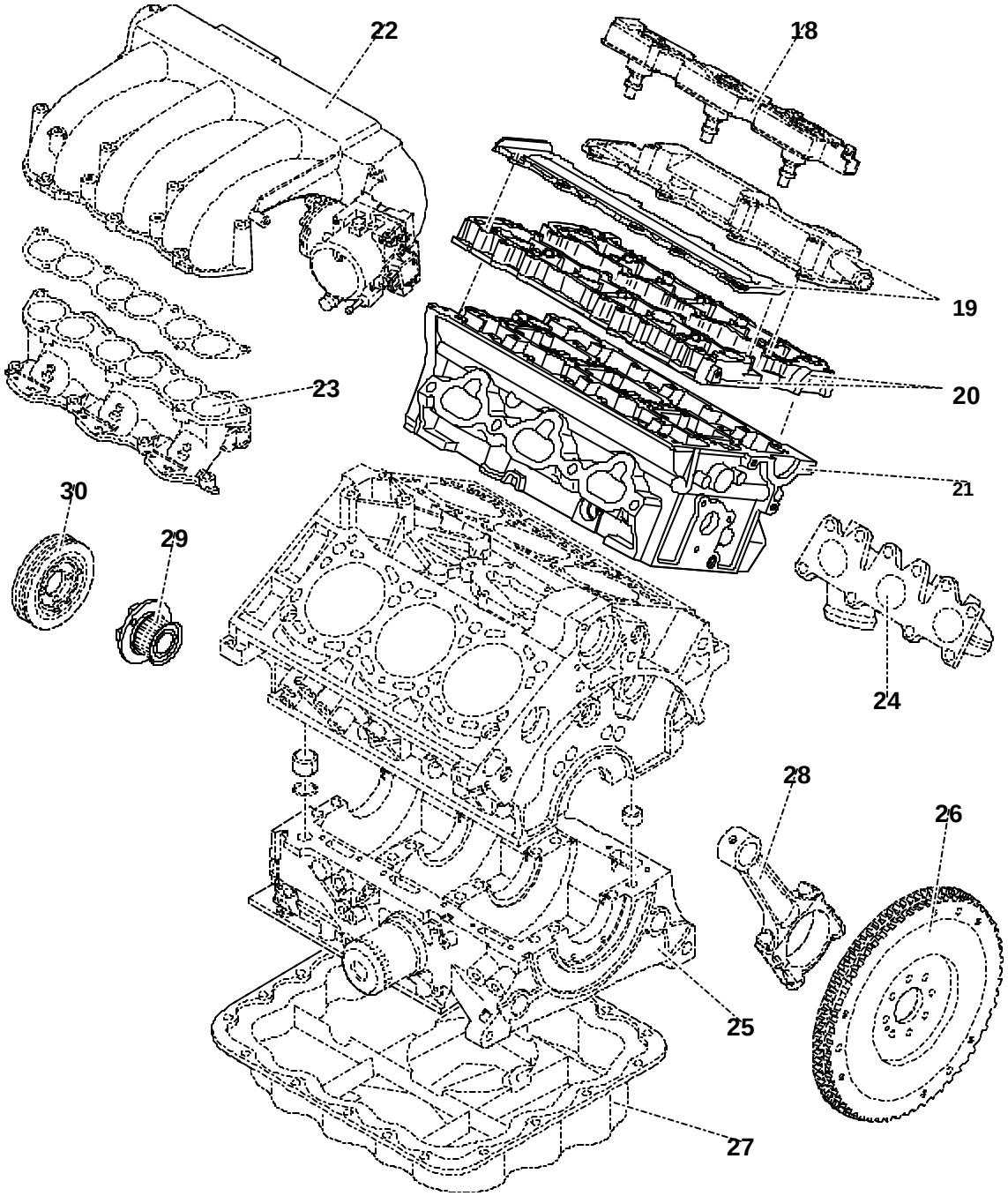
Right hand upper engine mounting :

- tighten the screws (6) to 6 m.daN
- tighten the screws (7) to 4,5 m.daN
- tighten the studs (8) to 1,3 m.daN : coat with threadlock LOCTITE FRENETANCH
- tighten the nuts (9) to 4,5 m.daN
- tighten nut (10) to 4,5 m.daN
- tighten the screws (11) to 5 m.daN
- tighten the screw (12) to 3,5 m.daN
- tighten the screw (13) to 5 m.daN
- tighten the mounting (14) to 4 m.daN

Right hand lower engine mounting :

- tighten the nuts (15) to 1 m.daN
- tighten the screw (16) to 5 m.daN
- tighten the screw (17) to 5 m.daN

2 Motor



- Fig. : 2 -

(18) compact coil unit : tighten to 1 m.daN.

(19) cylinder head cover (refer to the No.te) :

- 0,5 m.daN pre-tightening
- tightening torque = 1 m.daN

(20) camshaft bearing cap casing (refer to the No.te) :

- 0,2 m.daN pre-tightening
- tightening torque = 0,8 m.daN

(21) cylinder head (refer to the No.te).

Working one bolt at a time :

- pre-tightening to 2 m.daN
- slacken the bolts
- tighten to 1,5 m.daN
- finish with an angular tightening of 225 °

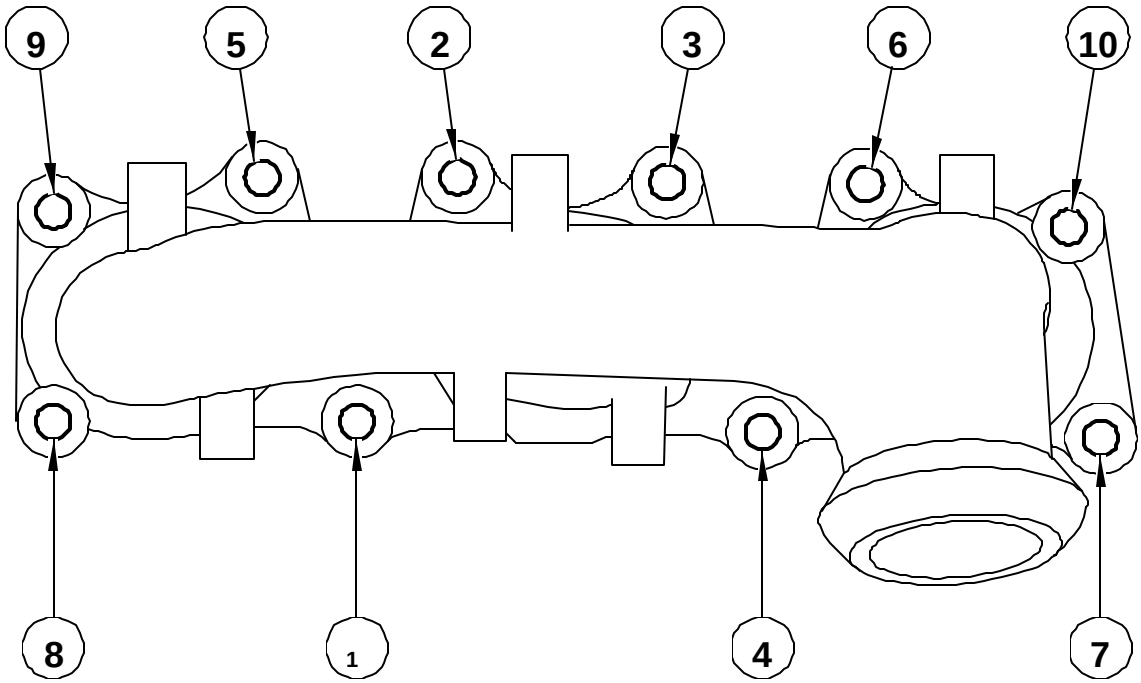
(22) air inlet manifold (refer to the No.te) :

- 1 m.daN pre-tightening
- tightening torque = 2 m.daN

(23) inlet manifold (equipped with new seals) (refer to the No.te) :

- 1 m.daN pre-tightening
- tightening torque = 2,5 m.daN

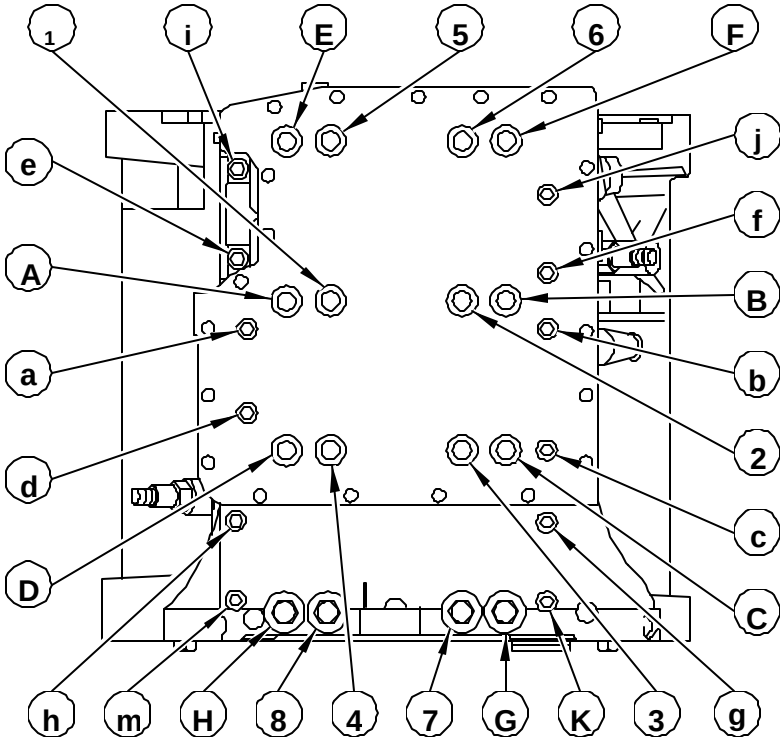
N.B. : Respect the tightening order.



- Fig. : 3 -

(24) exhaust manifold (equipped with a new seal) (refer to the No.te) :

- 1 m.daN pre-tightening
- tightening torque = 3 m.daN



- Fig. : 4 -

(25) crankshaft main bearings.

The following operations should be carried out :

- brush clean the threads of the bolts
- using grease " MOLYKOTE G RAPID PLUS ", lubricate the threads and below the heads of the bolts and refit them
- check that the 8 locating dowels are in place
- pre-tighten screws (M11) to 3 m.daN (in order from 1 to 8)
- pre-tighten screws (M8) to 1 m.daN (in order from A to H)
- tighten the screws (M6) to 1 m.daN (in order from a to m)
- loosen screws (M11) and (M8)

Working one bolt at a time :

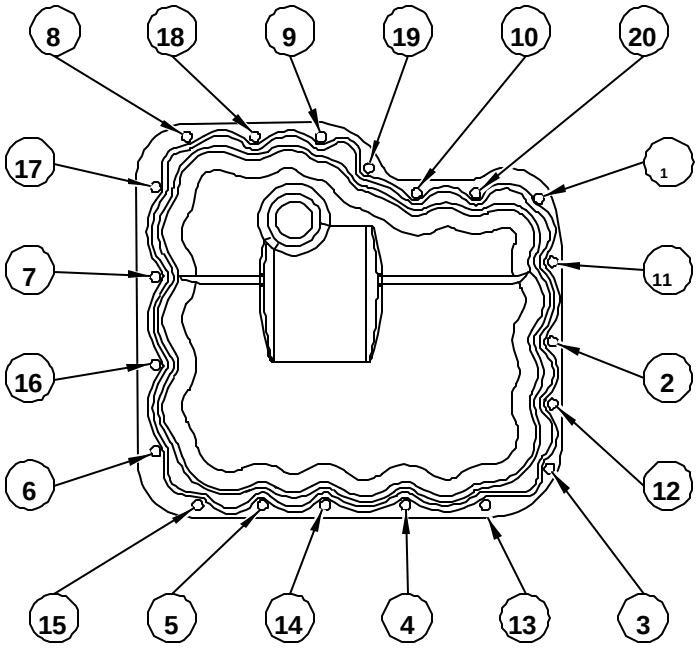
- tighten the screws (M11) to 3 m.daN (in order from 1 to 8)
- tighten the screws (M8) to 1 m.daN (in order from A to H)

Max. bolt length below head = M1 : 131,5 mm.

Max. bolt length below head = M8 : 119 mm.

(26) flywheel :

- tightening torque = 1 m.daN
- angular tightening of 60 °



- Fig. : 5 -

(27) sump :

- 0,5 m.daN pre-tightening
- tightening torque = 0,8 m.daN

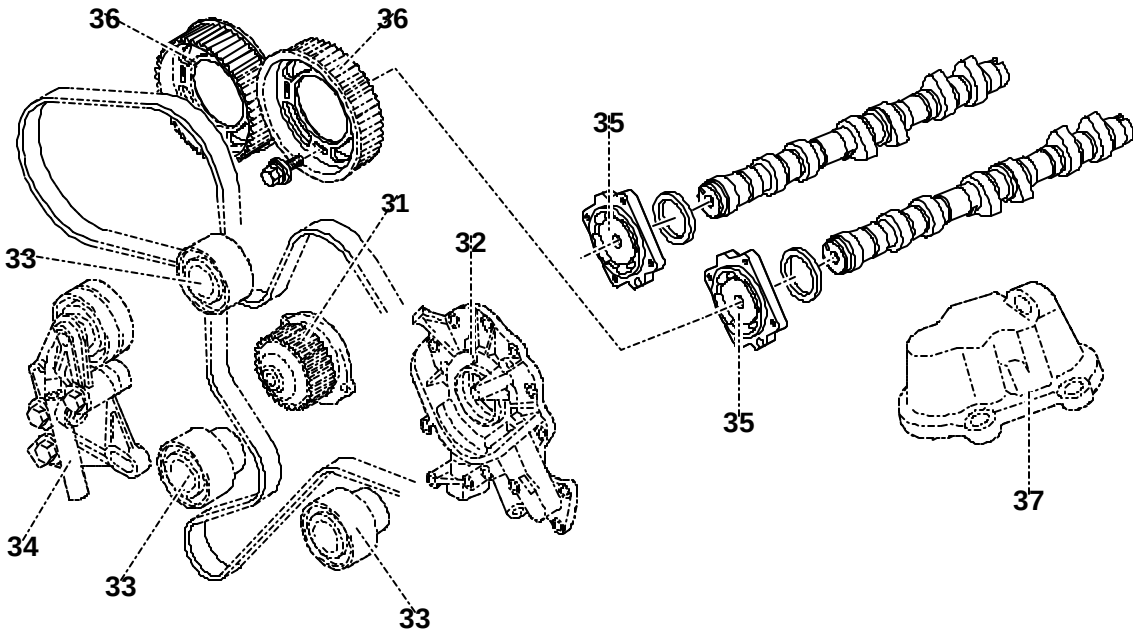
(28) connecting rod caps :

- tightening torque = 2 m.daN
- angular tightening of 74 °

(29) crankshaft pulley hub :

- tightening torque = 4 m.daN
- angular tightening of 80 °

(30) crankshaft pulley : tighten to 2,5 m.daN.



- Fig. : 6 -

(31) coolant pump (refer to the No.te) :

- 0,5 m.daN pre-tightening
- tightening torque = 0,8 m.daN

(32) oil pump coolant pump (refer to the No.te) :

- 0,5 m.daN pre-tightening
- tightening torque = 0,8 m.daN

N.B. : Respect the tightening order.

(33) guide roller : tighten to 8 m.daN.

(34) timing belt tensioner roller : tighten to 8 m.daN.

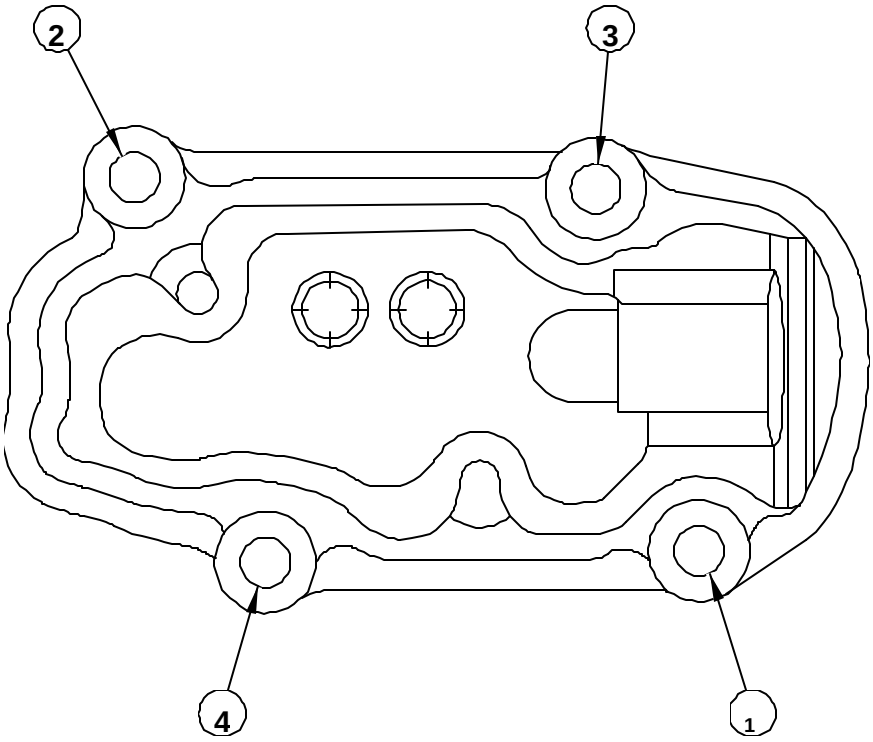
(35) camshaft hubs.

1st method (recommended method) :

- tightening torque = 2 m.daN
- angular tightening of 57 °

2nd method : tightening torque = 8 m.daN.

(36) camshaft pulleys : tighten to 1 m.daN.



- Fig. : 7 -

(37) oil vapour recovery housing (in order from 1 to 4) :

- 0,5 m.daN pre-tightening
- tightening torque = 1 m.daN