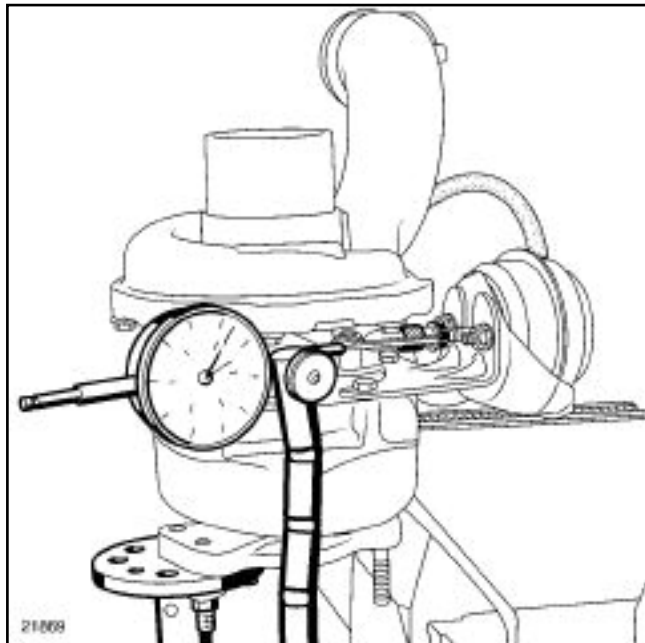
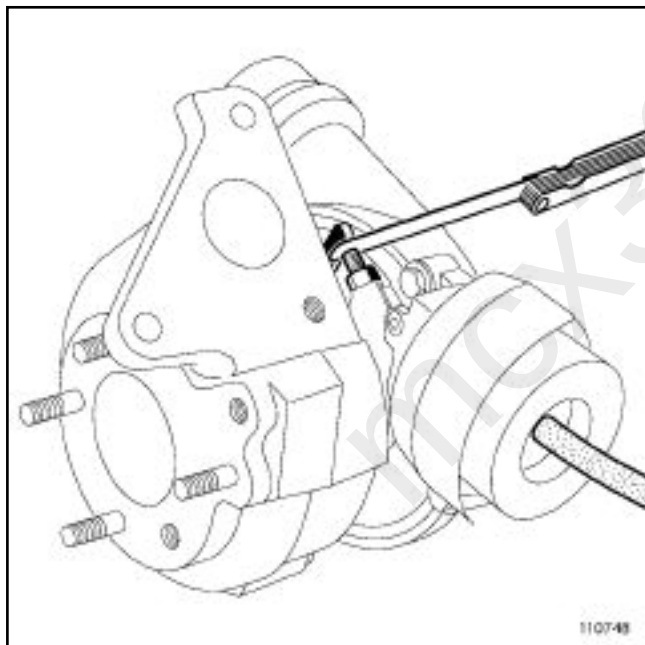


Upper engine: Checking

14 - Turbocharger



21869



110748

Check the turbocharger pressure valve.

Use a magnetic holder fitted with a dial gauge or a set of shims positioned at the end of the regulating valve stem or between the regulating valve stem and the valve guard (in the axis of the stem).

Progressively apply pressure or a vacuum to the regulation valve using a pressure/vacuum pump (see **10A, Engine and lower engine assembly, Upper engine: Specifications**, page 10A-28) .

15 - Heater plugs

Check the resistance of the plug using a multimeter.
The resistance should be **0.6 ω** .

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

Special tooling required	
Mot. 1511-01	Valve stem seal fitting tool adapter.
Mot. 1335	Pliers for removing valve stem seals.
Mot. 1502	Valve lifting tool for removing valves.
Mot. 799-01	Timing gear wheel immobiliser.
Mot. 856-02	Dial gauge support.
Mot. 252-01	Dial gauge support thrust plate.
Mot. 1632	Tool for fitting PTFE camshaft seal
Mot. 1567	Long nose pliers for EGR duct clips.
Mot. 1746	Offset spanner for tightening high pressure pump pipes.
Mot. 1566	Spanner for removing high pressure pipes.

Tightening torques 	
the crankshaft bearing cap mounting bolts	11 ± 1.1 Nm
the camshaft pulley mounting stud	12 ± 2 Nm
the crankshaft bearing cap mounting bolts	11 ± 1.1 Nm
the mounting nut for the camshaft pulley	30 ± 3 Nm + 86° ± 6°
exhaust manifold mounting nuts	26 ± 2.6 Nm
EGR recirculation unit mounting bolts	21 ± 2.1 Nm
the inlet duct mounting bolt	21 ± 2.1 Nm

Tightening torques 	
the engine lifting eye mounting bolts (timing end)	M8 to 21 ± 2.1 Nm or M6 to 10 ± 1 Nm
the cylinder head coolant outlet unit mounting bolts	11 ± 1.1 Nm
the vacuum pump bolts	21 ± 2.1 Nm
the heater plugs	15 ± 1.5 Nm
the engine lifting eye mounting bolts (flywheel end)	13 ± 1.3 Nm
the injector bracket bolts	28 ± 2.8 Nm
the high-pressure pump mounting bolts	21 ± 2.1 Nm
injector rail mounting nuts	28 ± 2.8 Nm
the pump-rail high-pressure pipe nuts	24 ± 2.4 or 38 ± 3.8 Nm
the rail-injectors high-pressure pipe nuts	24 ± 2.4 or 38 ± 3.8 Nm

I - RECOMMENDATIONS FOR REPAIR

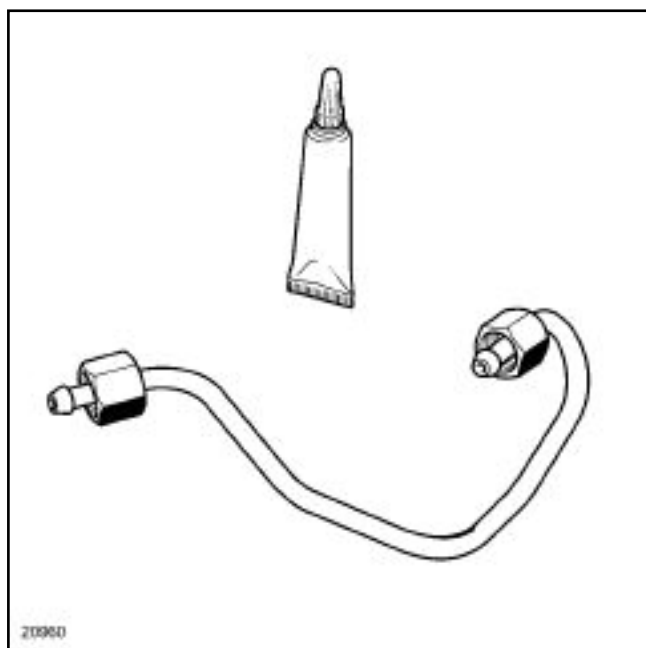
IMPORTANT

It is essential to follow the cleanliness guidelines (see **Engine: Precautions during repair**).

Wear latex gloves while using the cleaning product.

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



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 vacuum pump seal,

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

- The cylinder head coolant outlet unit seal,
- The exhaust manifold gasket,
- The inlet tube gasket,
- The exhaust gas recirculation pipe,
- The EGR solenoid valve seal,
- Valve stem seals

Consumables

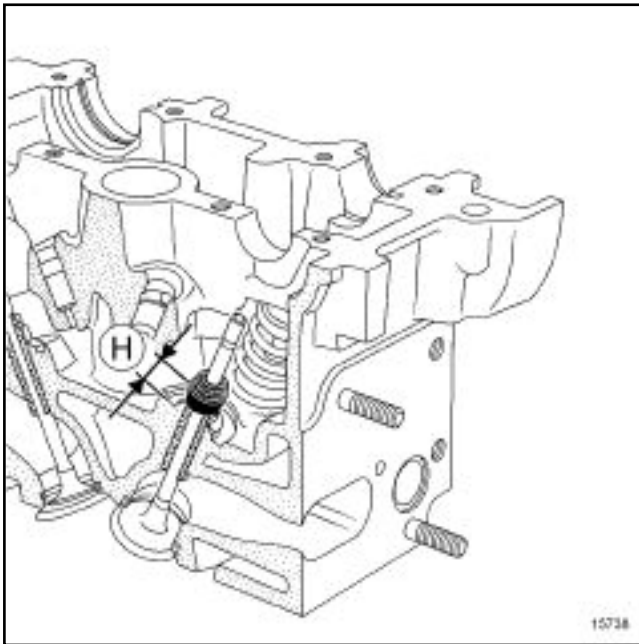
- Loctite 518, part no. **77 01 421 162** ,
- Degreasing agent, part no. **77 11 224 559** .

III - EQUIPMENT REQUIRED

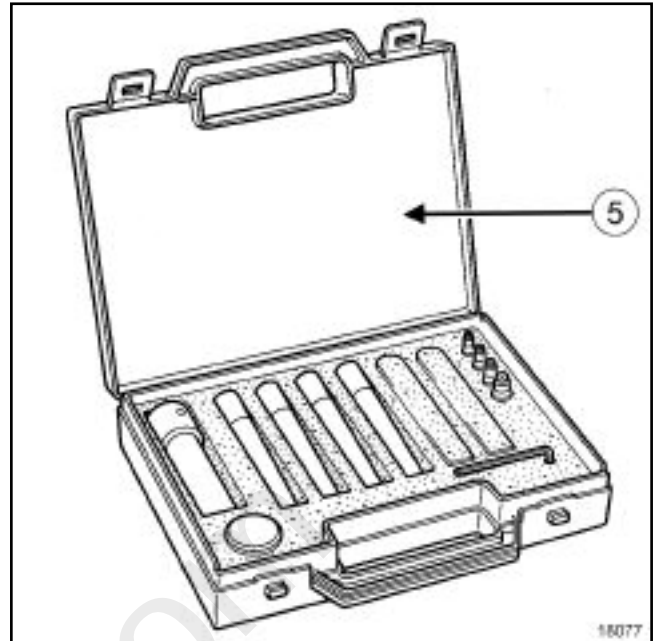
- Latex protective gloves,
- high-pressure pipes valve wrench,
- Tweezers,
- Wrench for the high-pressure pipes,
- Crow foot wrench,
- Wrench with hinge for heater plugs,
- Roller-type stud removal tool
- The valve stem seal fitting kit,
- Dial gauge,
- Magnetic holder,
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

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

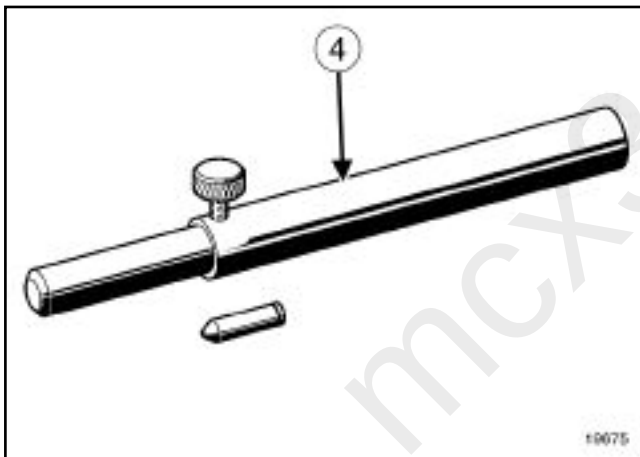
IV - REASSEMBLING THE CYLINDER HEAD



15738



18077



19675

Note:

Before removing the valve stem seals, it is essential to note the position (H) of the old seals on the inlet side, then the exhaust side as the fitting dimension of the seals may be different between the inlet and the exhaust.

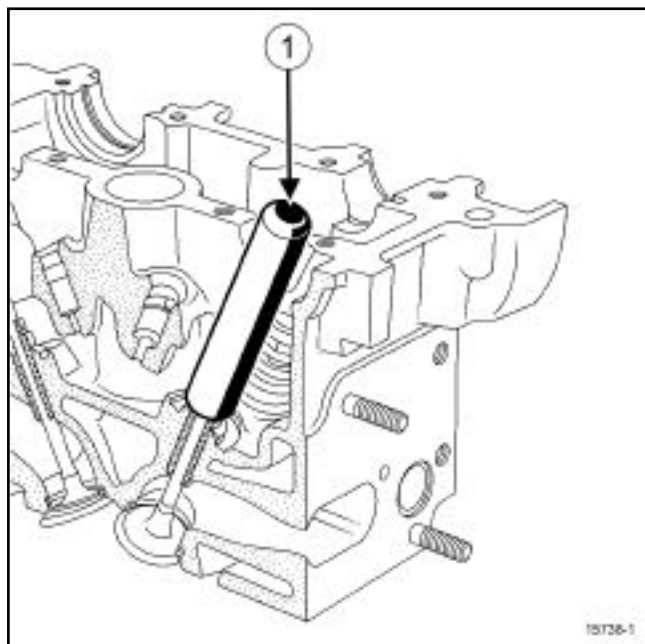
Fit a valve.

Compare dimension (H) of an old seal with the cylinder head using the (Mot. 1511-01) (4) or the valve stem seal fitting kit (5) .

Note:

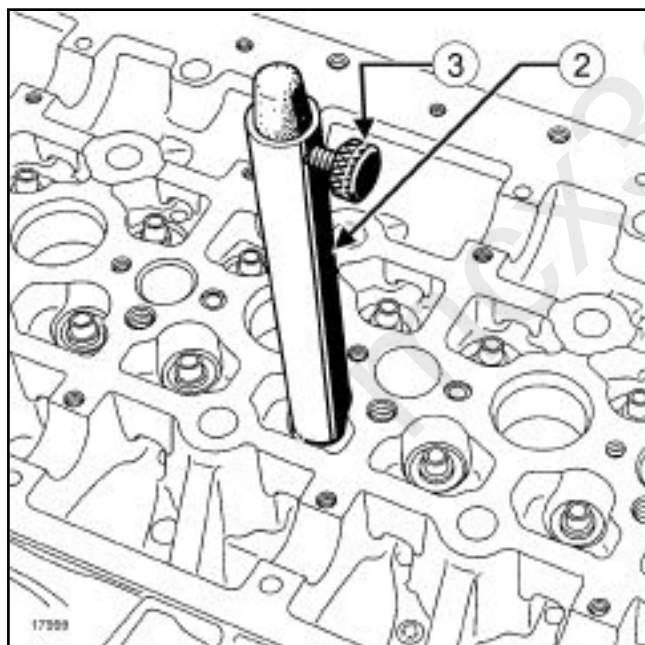
The internal diameter of the pushrod (1) should be identical to that of the valve; In addition, the bottom of the pushrod must be snug against the metal upper section of the valve stem seal.

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



15738-1

Place the pushrod (1) over the valve stem seal.



17999

Fit the guide tube (2) above the pushrod until it comes into contact with the cylinder head.

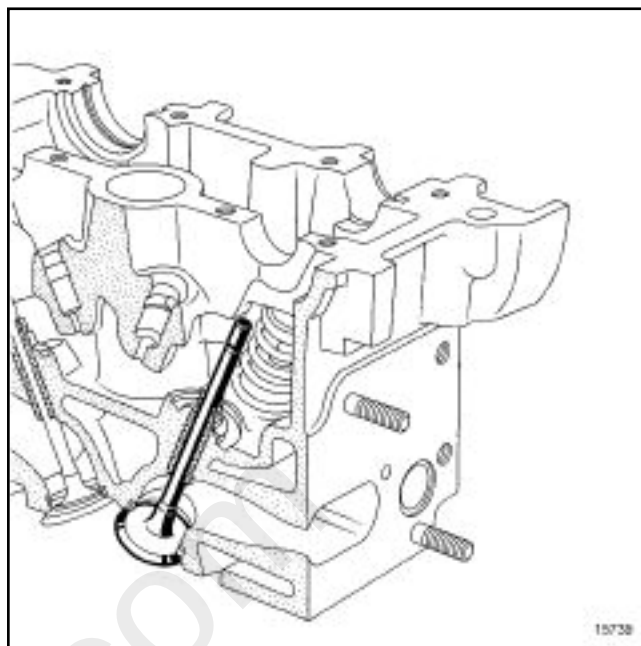
Lock the pushrod with the wheel (3) .

Remove the guide tube-pushrod assembly, being careful not to loosen the wheel.

Remove:

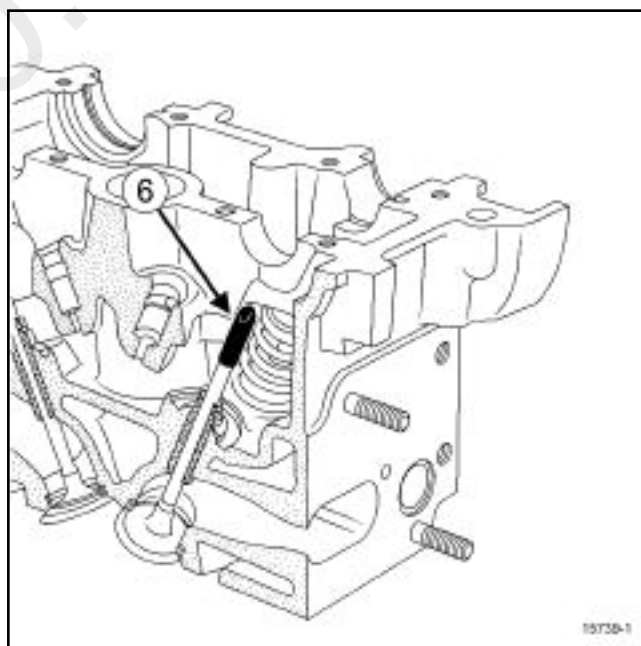
- the valve,
- the valve stem seals (inlet end then exhaust end) using the **(Mot. 1335)** .

Apply engine oil to the inside of the valve guide.



15739

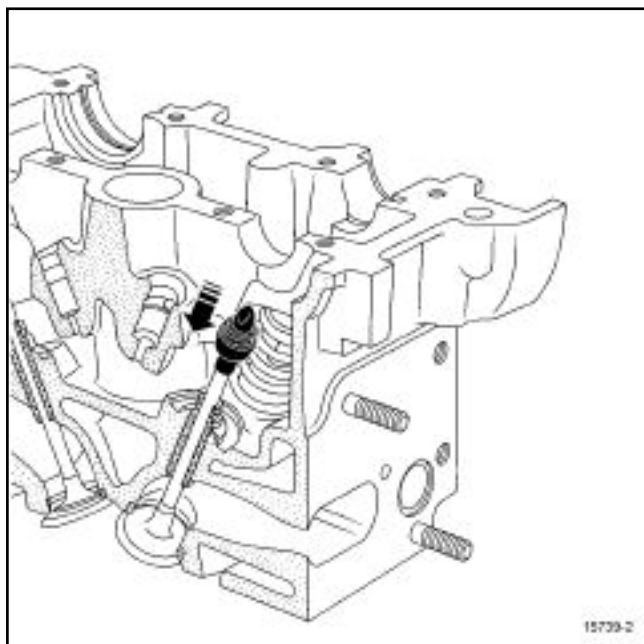
Place the valve in the cylinder head.



15739-1

Place the valve insert (6) on the valve stem (the diameter of the valve insert should be identical to that of the valve stem).

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

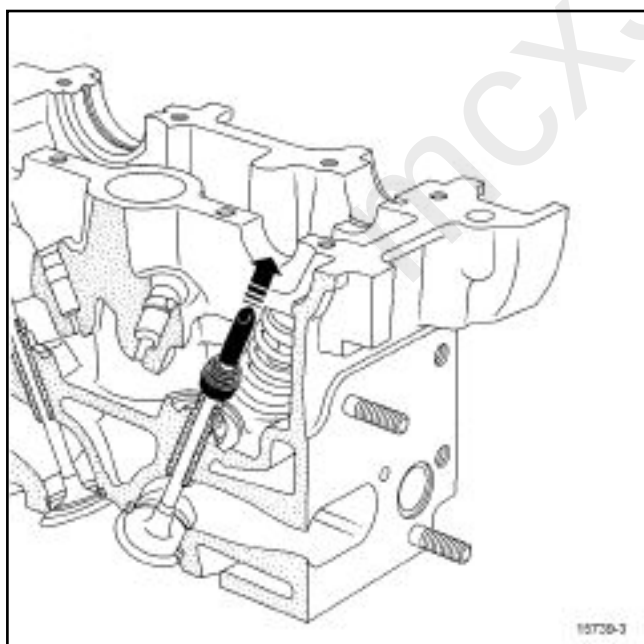


15739-2

Keep the valve pressed against its seat.

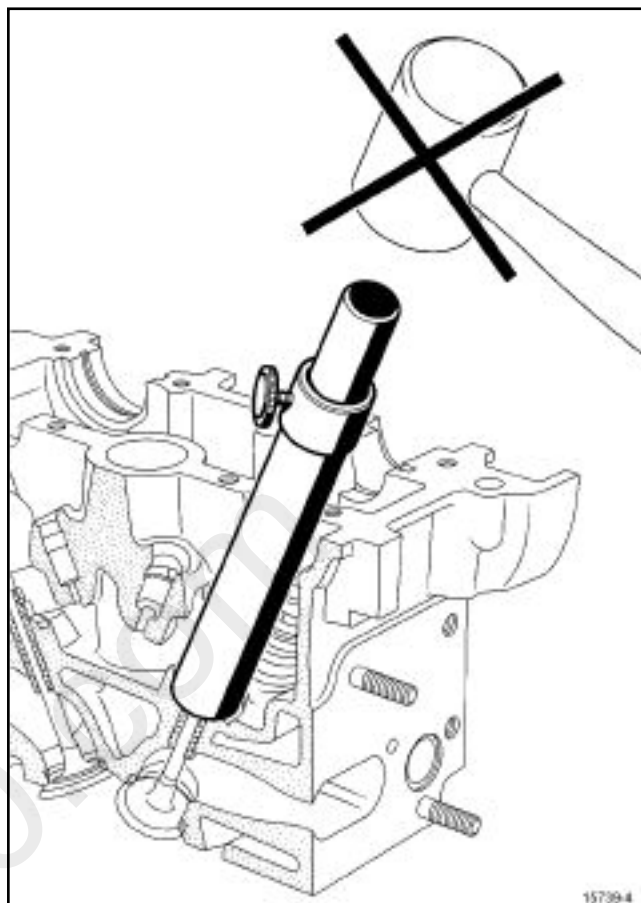
Mount the valve stem seal (not lubricated) over the valve insert.

Push the valve stem seal until it goes past the valve insert.



15739-3

Remove the valve insert.



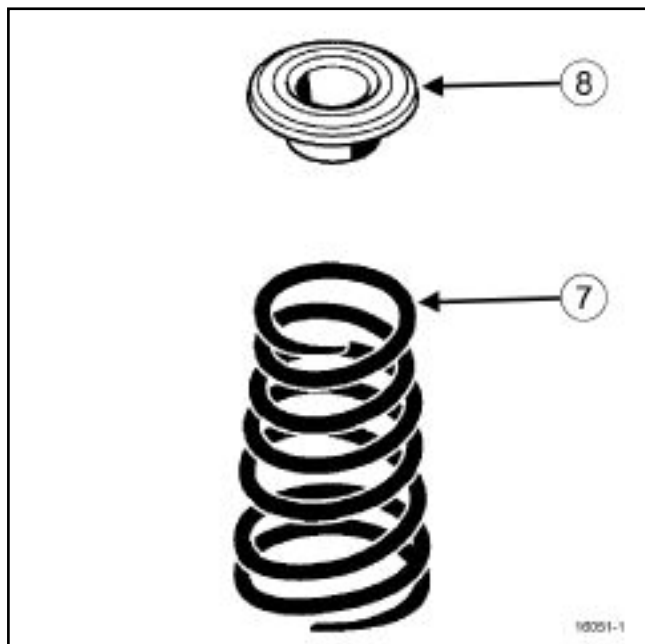
15739-4

Fit the guide tube-pushrod assembly on the valve stem seal.

Push home the valve stem seal by gently striking the pushrod with the palm of the hand, until the guide tube makes contact with the cylinder head.

Repeat the preceding operations on all the inlet and exhaust valves.

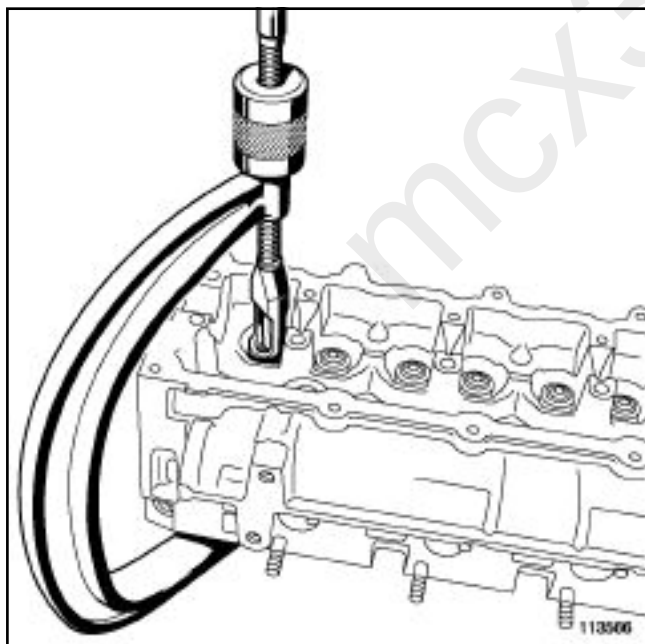
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



16051-1

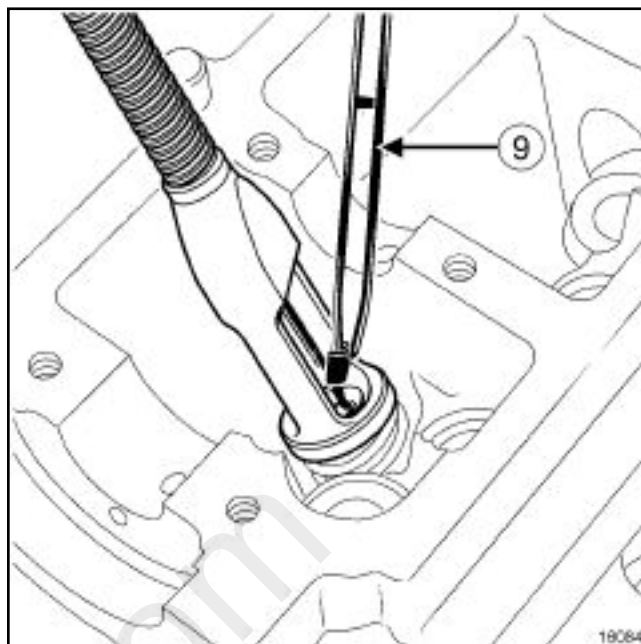
Refit:

- the valve springs, positioning the conical part (7) of the spring at the top,
- the valve spring upper cups (8) ,



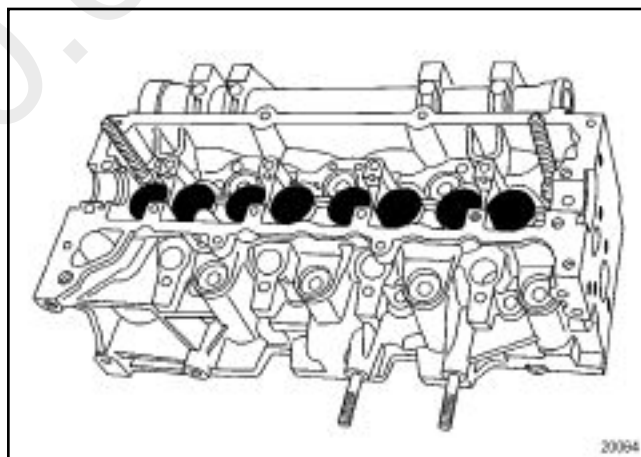
113566

Compress the valve springs using the **(Mot. 1502)** or a valve wrench.



16084

Refit the cotters using tweezers.



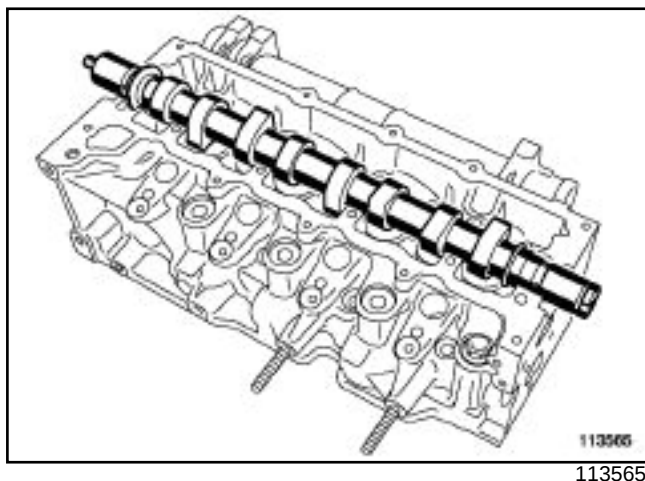
20064

Refit the pushrods observing their original position.

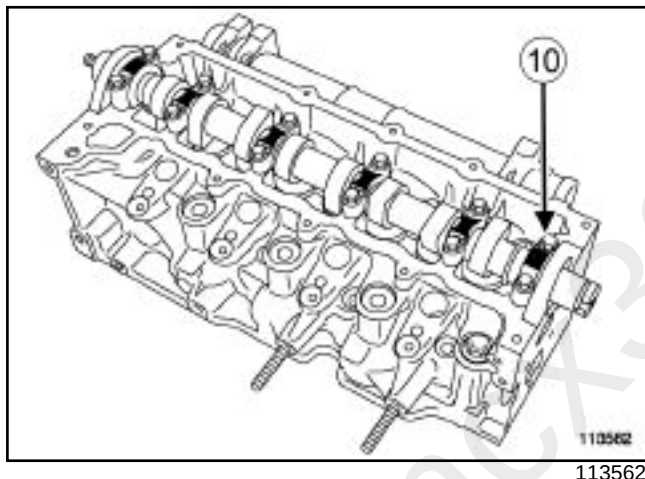
Oil the valve pushrods and the camshaft bearings with engine oil.

Cylinder head: Refitting

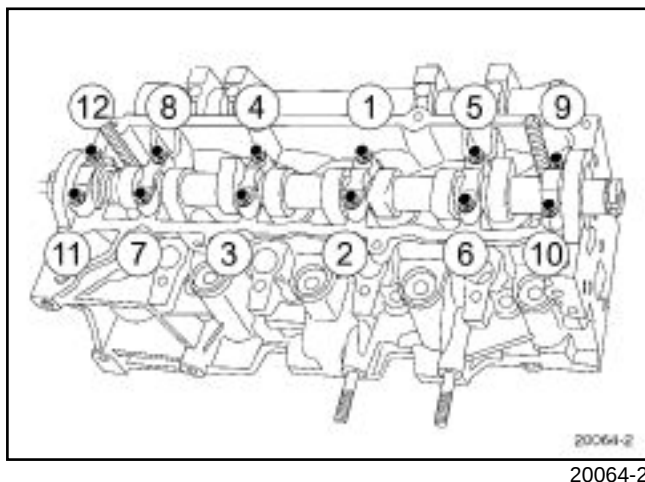
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



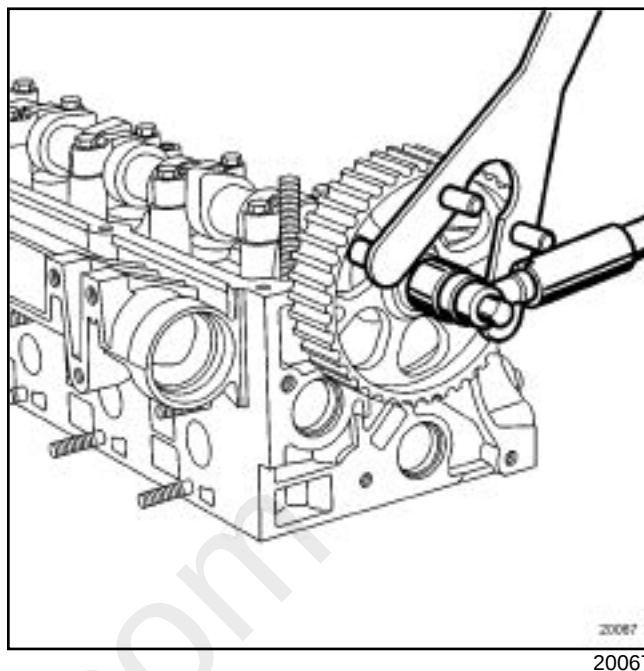
Refit the camshaft.



Refit the camshaft bearing caps (observing their original positions, bearing No. 1 (10) engine flywheel end).



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

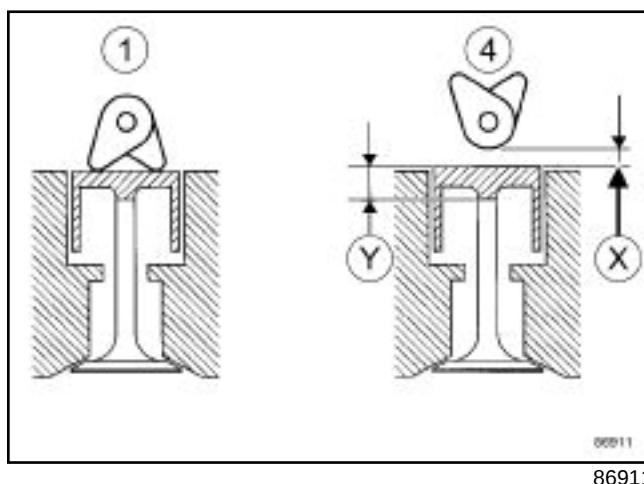


Refit:

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

Tighten to torque **the mounting nut for the camshaft pulley** (15 ± 1.5 Nm) , blocking the camshaft pulley with the (Mot. 799-01) .

Check and adjust the valve clearances following the procedure below.



Position the cylinder valves (1) in the end of exhaust stroke, beginning of inlet stroke position.

Measure the valve clearance (X) of the cylinder (4) using a set of shims.

- inlet valve clearance **0.20 mm** ,
- exhaust valve clearance **0.40 mm** ,

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

Note the clearance values.

Repeat the above operations on the other cylinders:

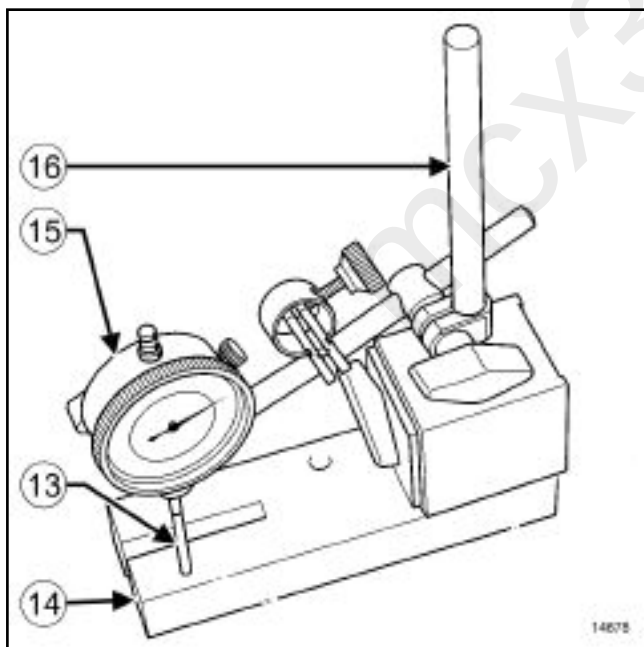
- position cylinder No. **3** at an angle and measure the clearance of cylinder No. **2** ,
- position cylinder No. **4** at an angle and measure the clearance of cylinder No. **1** ,
- position cylinder No. **2** at an angle and measure the clearance of cylinder No. **3** ,

Compare the values noted with the specified values.

Remove:

- the nut from the camshaft pulley,
- the camshaft pulley,
- the camshaft bearing caps,
- the camshaft,
- the pushrod(s) which are outside of permitted tolerance values, noting their original position.

Undertake the following installation to determine the class of thickness of the valve pushrod.



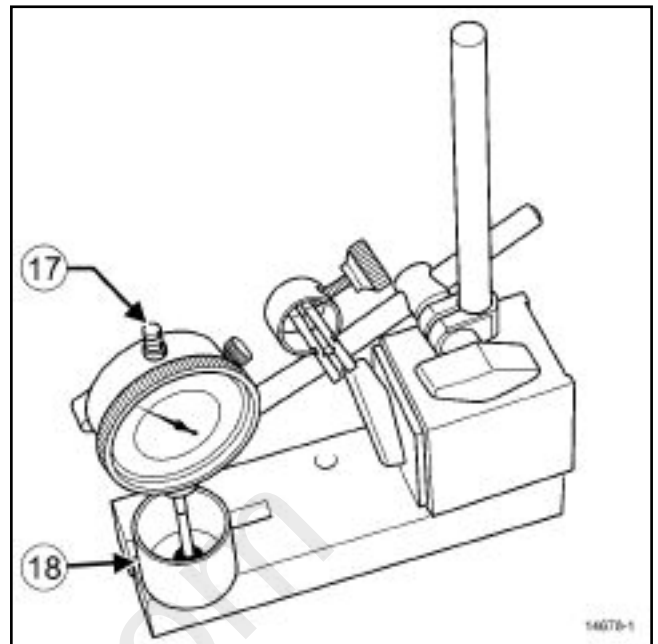
14678

Screw the extension piece (13) of the (Mot. 856-02) to a dial gauge (15) .

Fix the dial gauge (15) to a magnetic holder (16) .

Mount the dial gauge-magnetic holder assembly on the plate (14) of the tool (Mot. 252-01) .

Calibrate the dial gauge.



14678-1

Lift the top piece (17) of the dial gauge (without changing the position of the dial gauge-magnetic holder assembly).

Mount the valve pushrod (18) to be measured on the plate of the (Mot. 252-01) .

Take the measurement (Y) .

Repeat the preceding operations for the other valve pushrods to be measured.

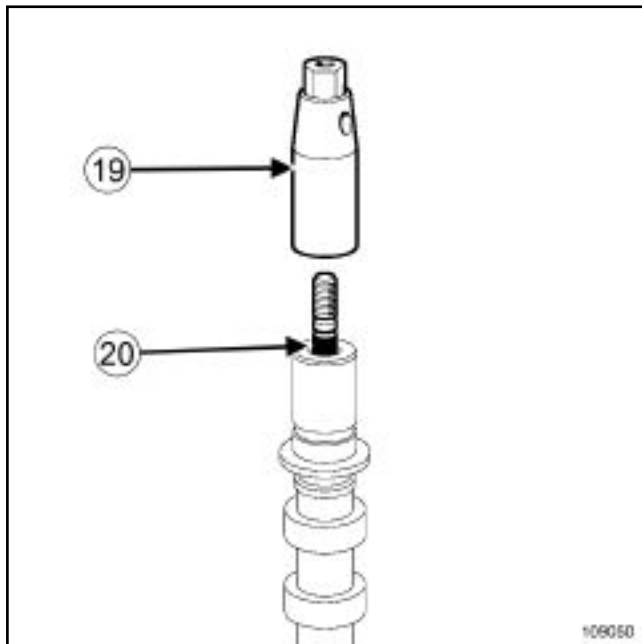
Refit the new valve pushrod(s) in the cylinder head.

Check that the camshaft pulley mounting stud has not come loose. If so, the stud must be replaced following the procedure described below.

Place the camshaft in a vice fitted with a clamping jaw.

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

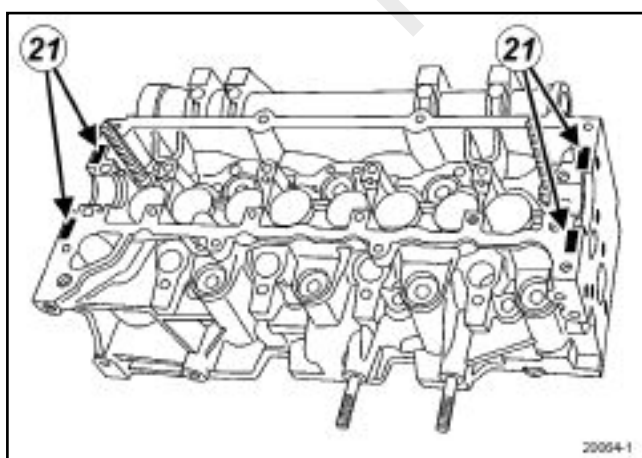
Remove the piston rings using a roller-type stud removal tool (19) .

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) .

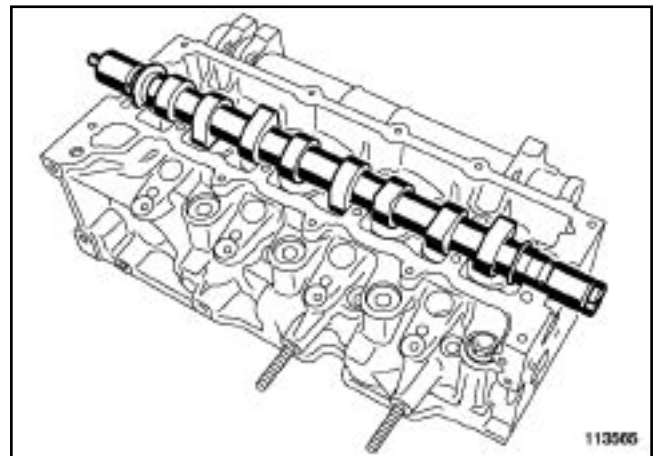
Oil the top of the valve pushrods and the camshaft bearings with engine oil.



20064-1

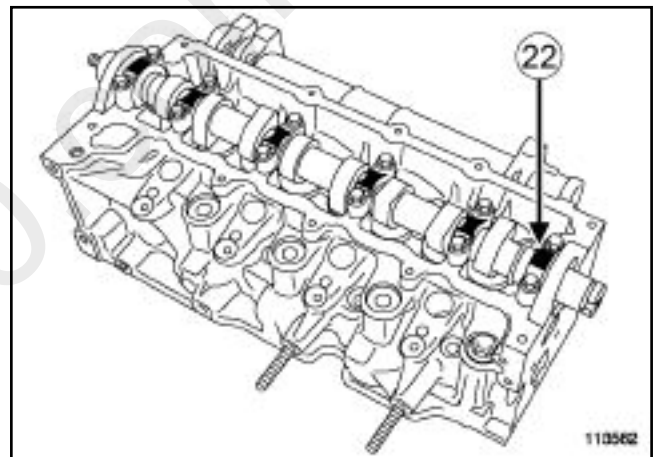
Degrease the surfaces of the camshaft bearing gas-kets nos. 1 and 6 (21) using degreaser.

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



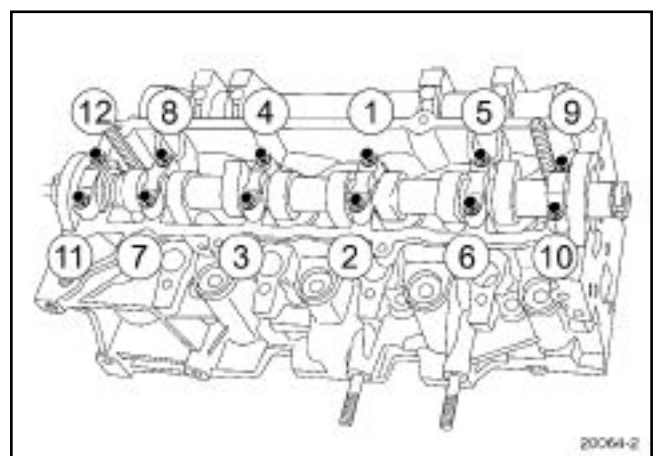
113565

Refit the camshaft.



113562

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



20064-2

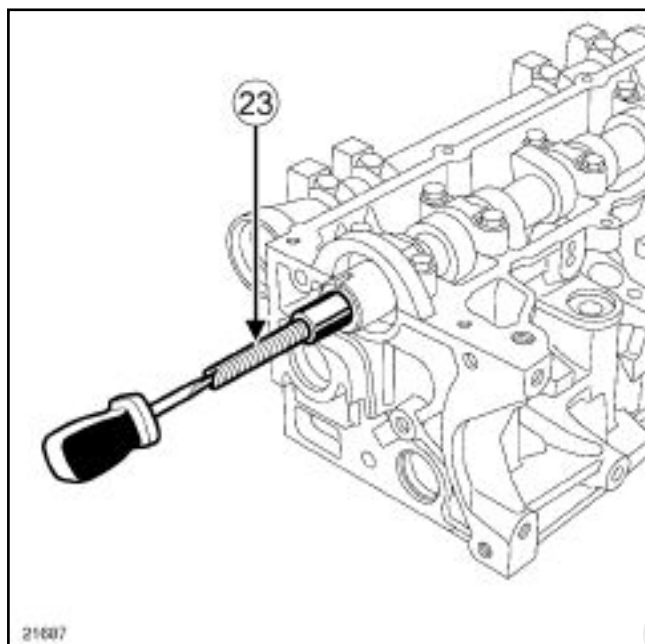
Tighten to torque and in order **the crankshaft bearing cap mounting bolts (11 ± 1.1 Nm)** .

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

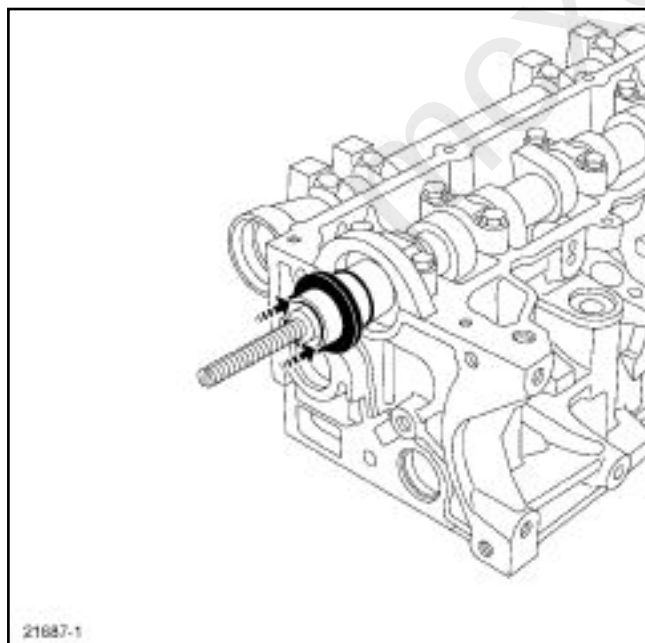
Apply degreaser to:

- the end of the camshaft at the timing end,
- the housing on the cylinder head of the camshaft gasket.



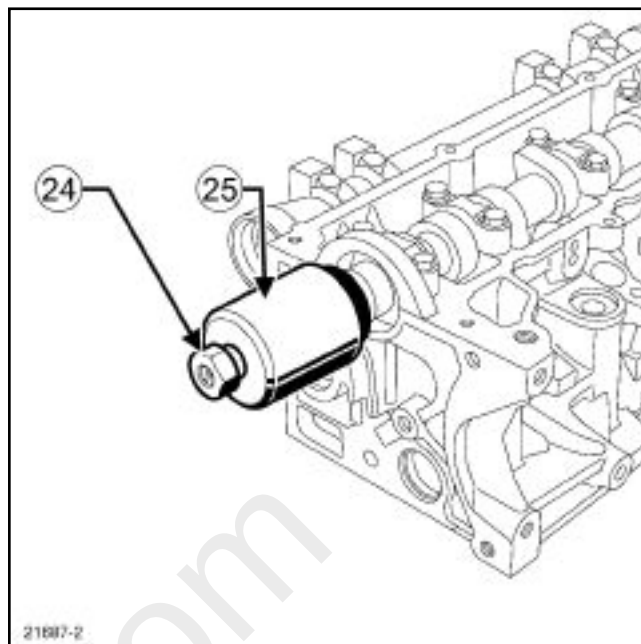
21687

Screw the shoulder stud (23) of the **(Mot. 1632)** onto the mounting stud of the camshaft pulley.



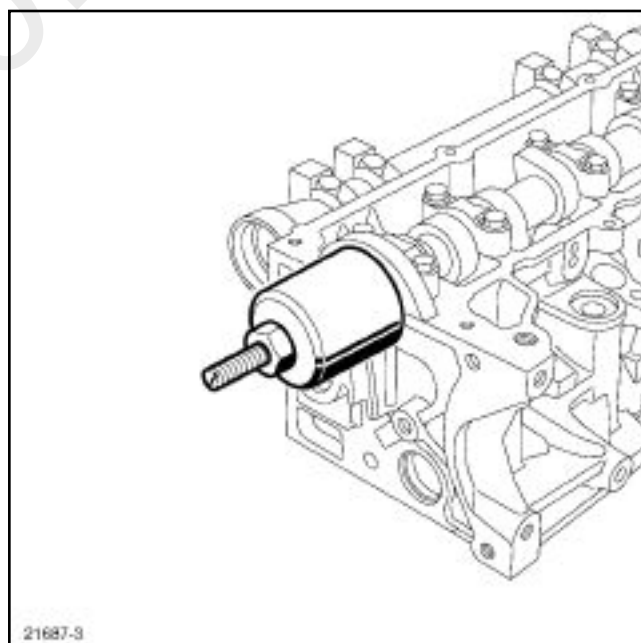
21687-1

Refit the camshaft gasket.



21687-2

Position the cover (25) and collar nut (24) of the **(Mot. 1632)**.



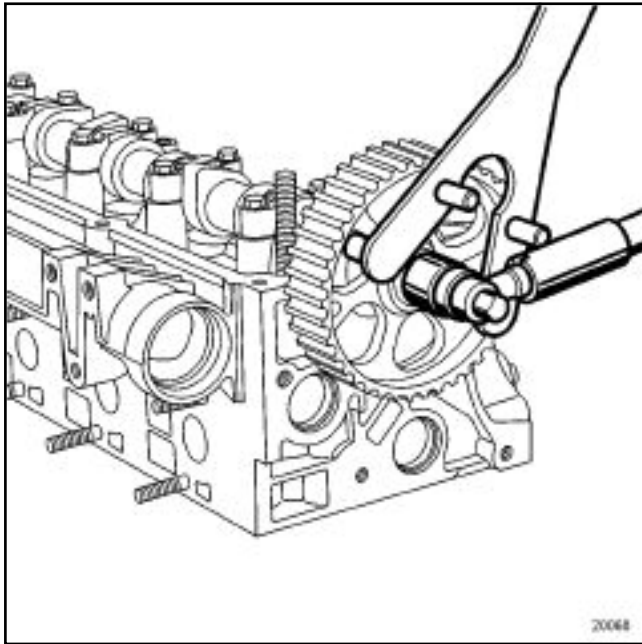
21687-3

Screw on the collar nut until the cover touches the cylinder head.

Remove:

- the collar nut,
- the cap,
- the shoulder stud.

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



20068

Refit:

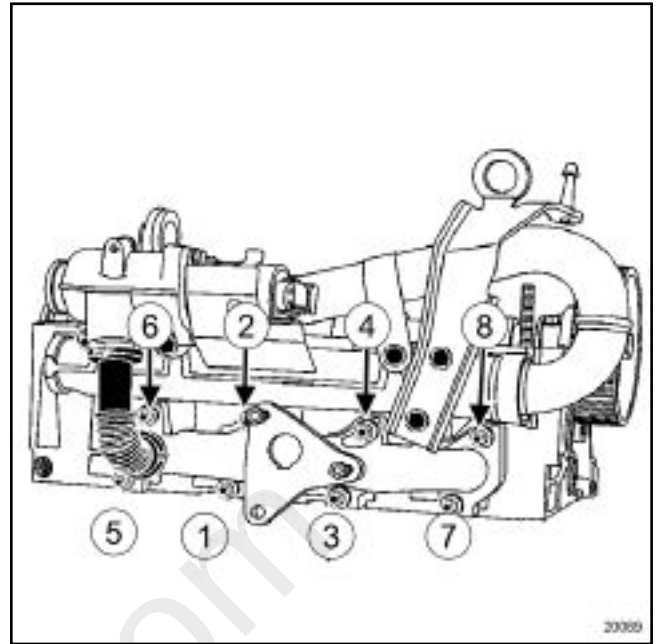
- the camshaft pulley,
- the new camshaft pulley mounting nut.

Tighten to torque and angle **the mounting nut for the camshaft pulley** ($30 \pm 3 \text{ Nm} + 86^\circ \pm 6^\circ$), blocking the camshaft pulley with the **(Mot. 799-01)**.

Using degreaser, degrease the surfaces of the exhaust manifold and cylinder head gaskets at the exhaust end.

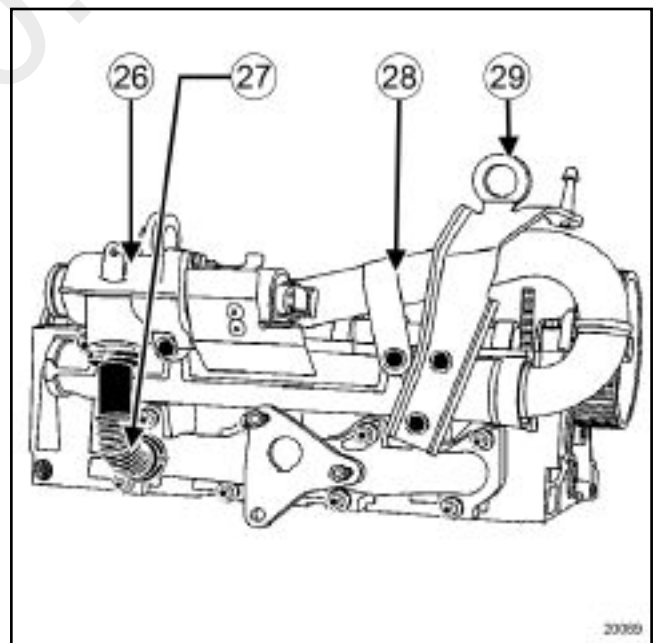
Refit:

- a new turbocharger-exhaust manifold gasket,
- the exhaust manifold,
- the exhaust manifold mounting nuts.



20069

Tighten to torque and in order the **exhaust manifold mounting nuts** ($26 \pm 2.6 \text{ Nm}$).



20069

Refit:

- the EGR recirculation unit **(26)** without tightening the bolts,
- the exhaust gas recirculation pipe **(27)**,
- the mounting clips of the exhaust gas recirculation pipe.

Tighten the clips of the exhaust gas recirculation pipe using the **(Mot. 1567)**.

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

Tighten to torque the **EGR recirculation unit mounting bolts (21 ± 2.1 Nm)** .

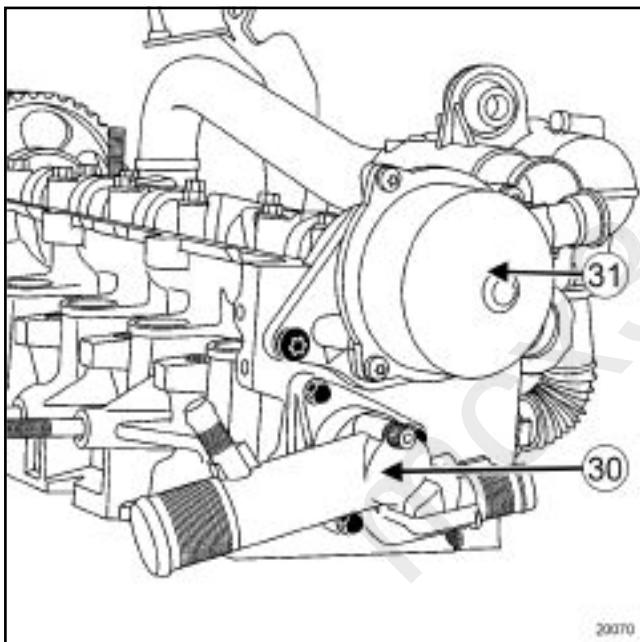
Refit:

- a new seal on the inlet duct,
- the inlet duct **(28)** ,
- the engine lifting eye **(29)** (timing end).

Tighten to torque:

- **the inlet duct mounting bolt (21 ± 2.1 Nm)** ,
- **the engine lifting eye mounting bolts (timing end) (M8 to 21 ± 2.1 Nm or M6 to 10 ± 1 Nm)** .

Using degreaser, degrease the seal surfaces where the vacuum pump enters and at the cylinder head coolant outlet.



20070

Refit:

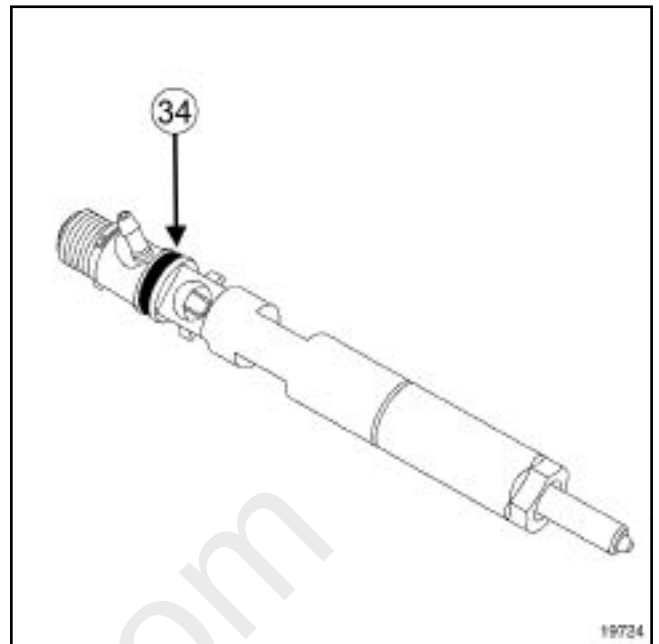
- the cylinder head coolant outlet unit **(30)** fitted with a new seal,
- the vacuum pump **(31)** fitted with a new seal.

Tighten to torque:

- **the cylinder head coolant outlet unit mounting bolts (11 ± 1.1 Nm)** ,
- **the vacuum pump bolts (21 ± 2.1 Nm)** .

Refit the heater plugs.

Tighten to torque **the heater plugs (15 ± 1.5 Nm)** using a wrench with hinge.



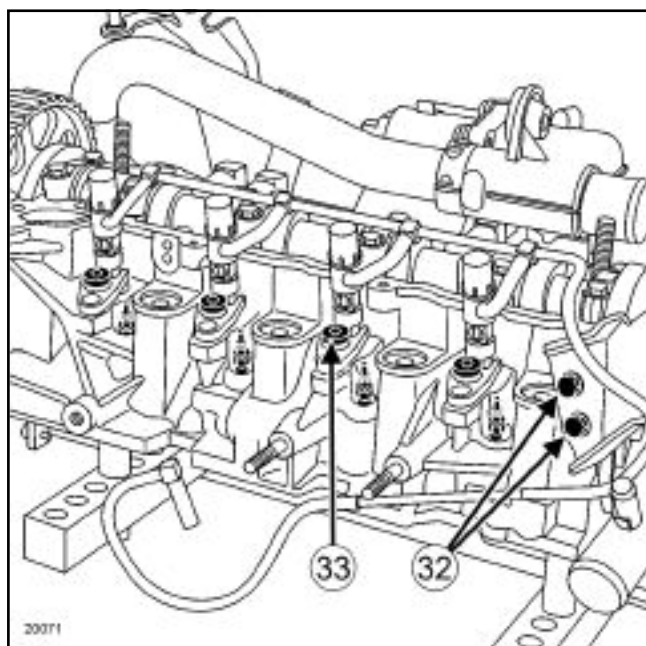
19724

Note:

If one or more injectors are replaced, note the alphanumeric code (C2I) **(34)** and the number of the cylinder on which it is fitted.

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



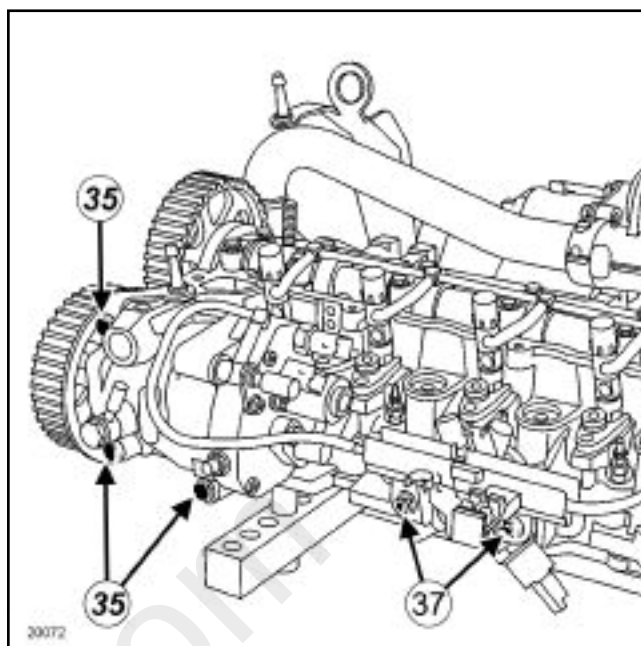
20071

Refit:

- engine lifting eye (flywheel end),
- the new heat protection washers,
- the injectors (observing their positions),
- the injector brackets.

Tighten to torque:

- **the engine lifting eye mounting bolts (flywheel end) (13 ± 1.3 Nm) (32) ,**
- **the injector bracket bolts (28 ± 2.8 Nm) (33) .**



20072

Refit:

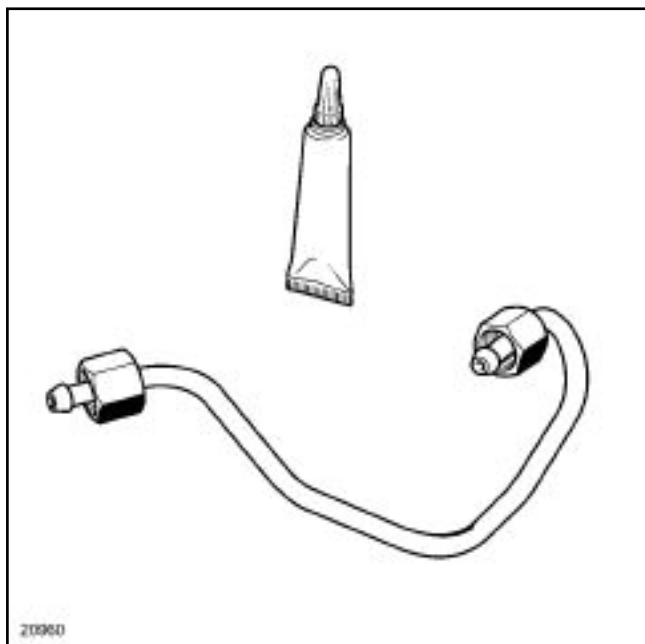
- the high-pressure pump,
- the injector rail (**without tightening the nuts**) .

Tighten to torque **the high-pressure pump mounting bolts (21 ± 2.1 Nm) .**

Note:

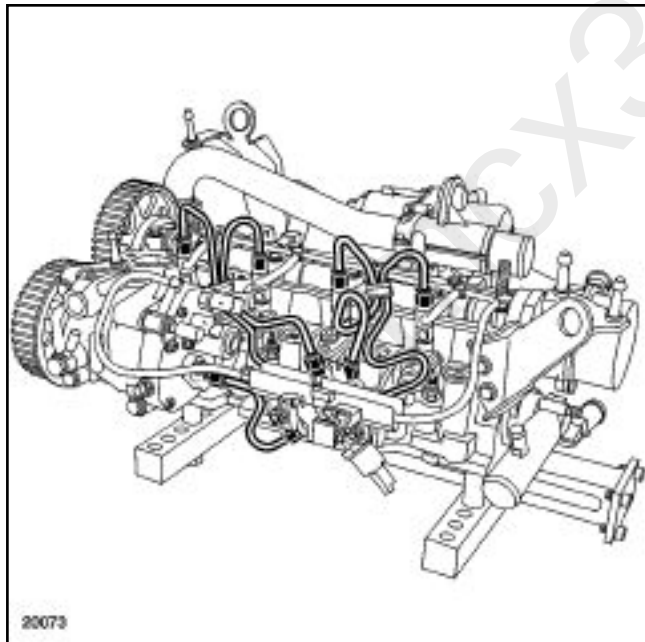
Do not lubricate high-pressure pipes **supplied without an applicator; these pipes are self-lubricating.**

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



20960

Lightly lubricate the nut threads with oil from the applicator supplied with the new part, taking care not to insert it in the pipe.



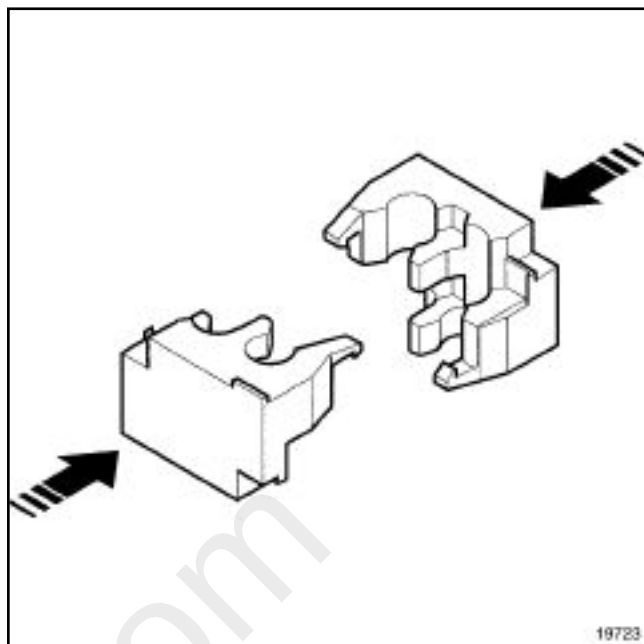
20073

Insert the high-pressure pipe olive in the injector high-pressure inlet taper.

Insert the high-pressure pipe olive in the rail high-pressure outlet taper.

Finger tighten the high-pressure pipe nuts, starting with the one located on the injector end.

Lightly tighten the nuts of the high-pressure pipes.



19723

Fit the new clip provided with the new high-pressure pipe.

Tighten to torque the **injector rail mounting nuts** ($28 \pm 2.8 \text{ Nm}$) .

Note:

Completely tighten one high-pressure pipe before moving to the next one.

Tighten to torque and in order (according to the part no. of the pipe) **the pump-rail high-pressure pipe nuts** (24 ± 2.4 or $38 \pm 3.8 \text{ Nm}$) :

- high-pressure pump side, using the **(Mot. 1746)** or a crow foot wrench,
- injector rail side, using the **(Mot. 1746)** or a crow foot wrench,

Tighten to torque and in order (according to the part no. of the pipe) **the rail-injectors high-pressure pipe nuts** (24 ± 2.4 or $38 \pm 3.8 \text{ Nm}$) :

- injector side using the **(Mot. 1566)** or with a wrench for high-pressure pipes.
- injector rail side, using the **(Mot. 1566)** or a crow foot wrench,

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

Special tooling required	
Mot. 1511-01	Valve stem seal fitting tool adapter.
Mot. 1335	Pliers for removing valve stem seals.
Mot. 1502	Valve lifting tool for removing valves.
Mot. 799-01	Timing gear wheel immobiliser.
Mot. 856-02	Dial gauge support.
Mot. 252-01	Dial gauge support thrust plate.
Mot. 1632	Tool for fitting PTFE camshaft seal
Mot. 1567	Long nose pliers for EGR duct clips.
Mot. 1746	Offset spanner for tightening high pressure pump pipes.
Mot. 1566	Spanner for removing high pressure pipes.

Tightening torques 	
the crankshaft bearing cap mounting bolts	11 ± 1.1 Nm
the camshaft pulley mounting stud	12 ± 2 Nm
the crankshaft bearing cap mounting bolts	11 ± 1.1 Nm
exhaust manifold mounting nuts	26 ± 2.6 Nm
turbocharger mounting nuts	26 ± 2.6 Nm
the turbocharger oil supply pipe mounting bolt (turbocharger end)	23 ± 2.3 Nm
the turbocharger oil supply pipe mounting nut (cylinder head end)	collar nut 35 ± 3.5 Nm or no collar nut 23 ± 2.3 Nm

Tightening torques 	
EGR valve-exchanger mounting bolts	25 ± 2.5 Nm
mounting bolts of the exhaust gas recirculation pipe	35 ± 3.5 Nm
engine lifting eye mounting bolts (timing end)	21 ± 2.1 Nm
camshaft pulley hub nut	30 ± 3 Nm + 86° ± 6°
the cylinder head coolant outlet bolt	11 ± 1.1 Nm
the EGR exchanger cover mounting bolt	12 ± 1.2 Nm
vacuum pump mounting bolts	21 ± 2.1 Nm
the heater plugs	15 ± 1.5 Nm
the engine lifting eye mounting bolts (flywheel end)	13 ± 1.3 Nm
the injector bracket bolts	28 ± 2.8 Nm
high-pressure pump mounting bolts	21 ± 2.1 Nm
injector rail mounting nuts	28 ± 2.8 Nm
the pump-rail high-pressure pipe nuts	24 ± 2.4 or 38 ± 3.8 Nm
the rail-injectors high-pressure pipe nuts	24 ± 2.4 or 38 ± 3.8 Nm

I - RECOMMENDATIONS FOR REPAIR

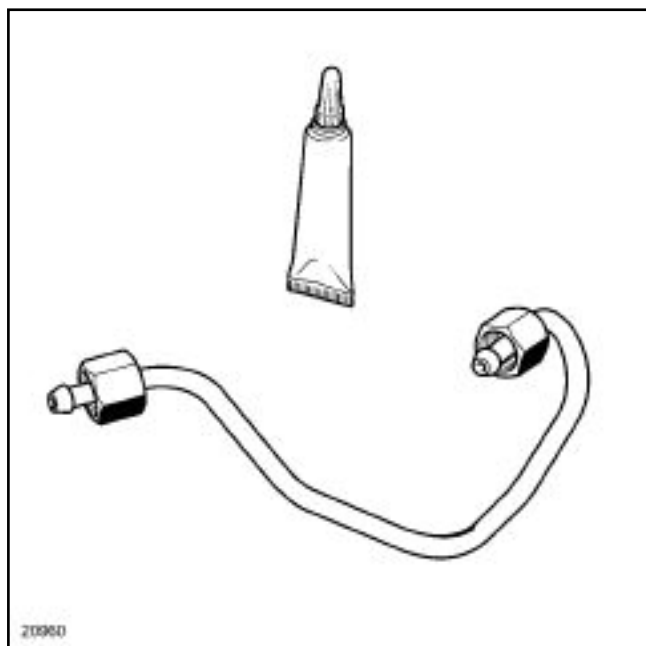
IMPORTANT

It is essential to follow the cleanliness guidelines (see **Engine: Precautions during repair**).

Wear latex gloves while using the cleaning product.

Cylinder head: Refitting

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



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 torque ($24 \pm 2.4 \text{ Nm}$).

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,

Cylinder head: Refitting

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

- The cylinder head coolant outlet unit seal,
- The exhaust manifold gasket,
- The turbocharger seal
- The inlet duct gasket,
- The exhaust gas recirculation pipe,
- The EGR solenoid valve seal,
- Valve stem seals

Consumables

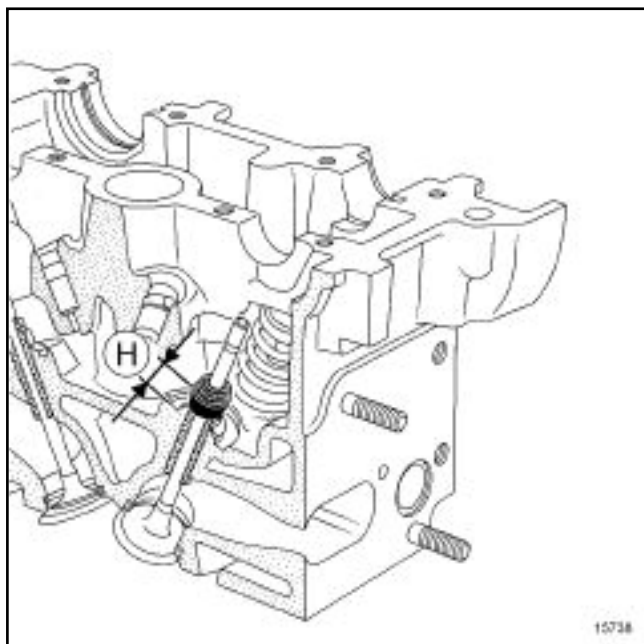
- Loctite 518 part no. **77 01 421 162** ,
- High-resistance bolt locking product, part no. **77 11 230 112** ,
- Degreasing agent, part no. **77 11 224 559** .

III - EQUIPMENT REQUIRED

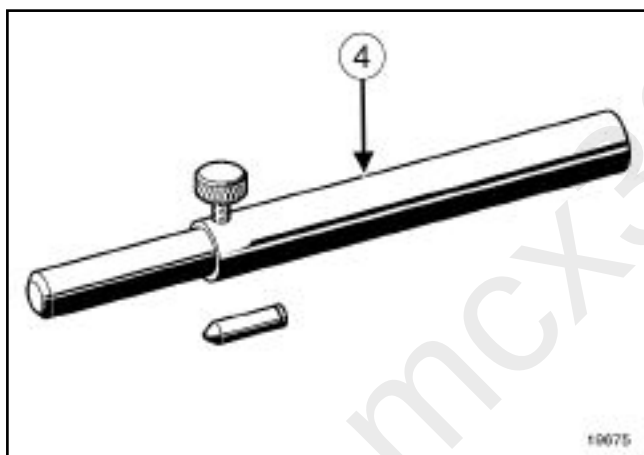
- Latex protective gloves,
- Valve wrench,
- Tweezers,
- Wrench for the high-pressure pipes,
- Crow foot wrench,
- Wrench with hinge for heater plugs,
- Roller-type stud removal tool
- Oil can,
- The valve stem seal fitting kit,
- Dial gauge,
- Magnetic holder,
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

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

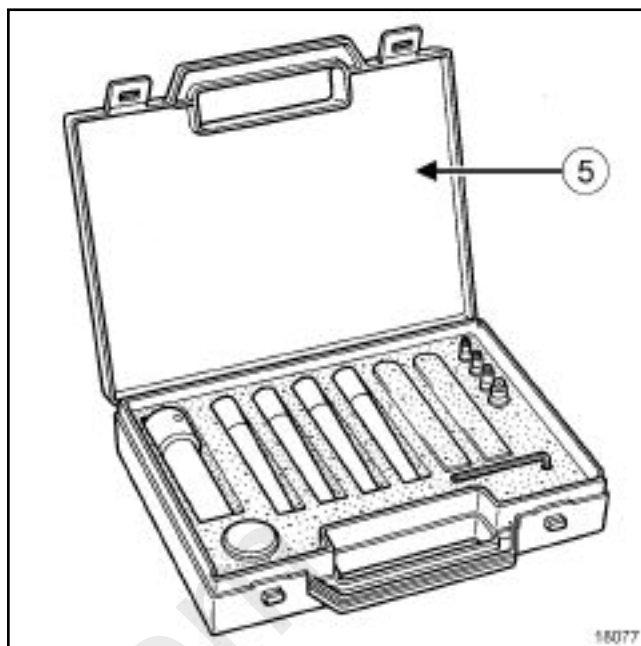
IV - REASSEMBLING THE CYLINDER HEAD



15738



19675



18077

Note:

Before removing the valve stem seals, it is essential to note the position (H) of the old seals on the inlet side, then the exhaust side, as the fitting dimensions of the seals may be different between the inlet and the exhaust.

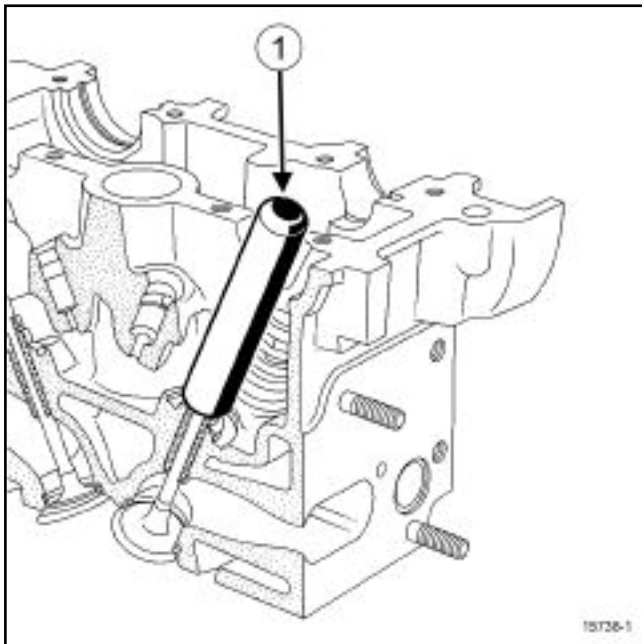
Fit a valve.

Compare dimension (H) of an old seal with the cylinder head using the (Mot. 1511-01) (4) or the valve stem seal fitting kit (5).

Note:

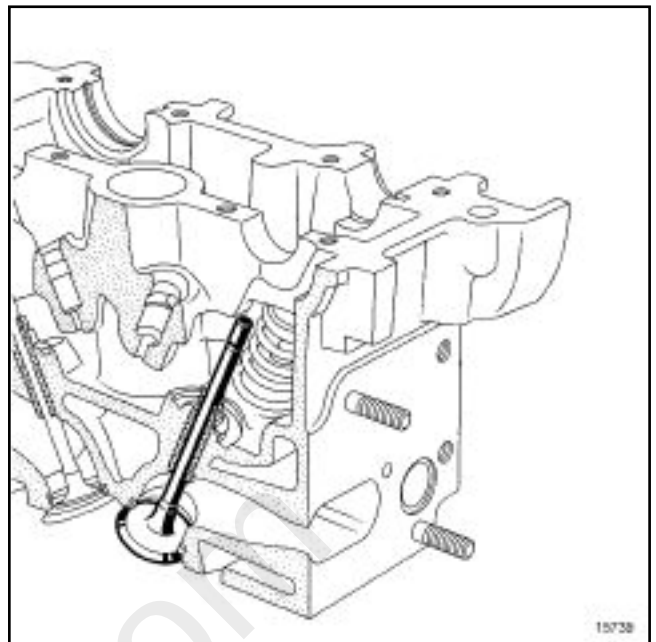
The internal diameter of the pushrod (1) should be identical to that of the valve; In addition, the bottom of the pushrod must be snug against the metal upper section of the valve stem seal.

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



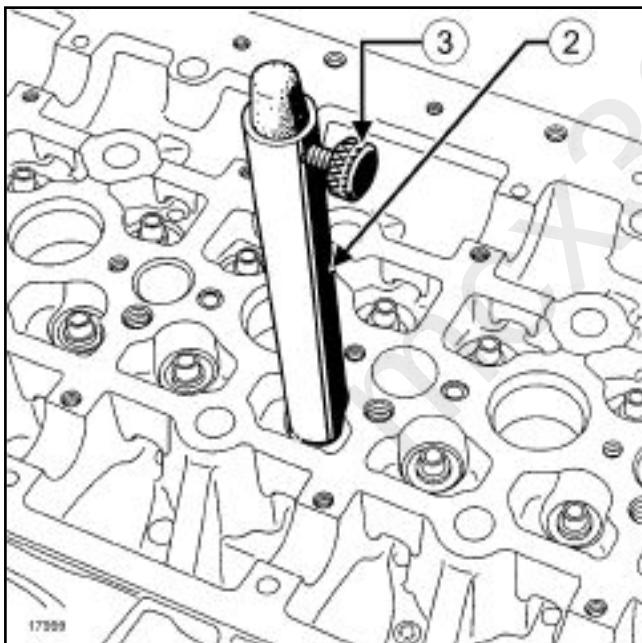
15738-1

Place the pushrod (1) over the valve stem seal.



15739

Place the valve in the cylinder head.



17999

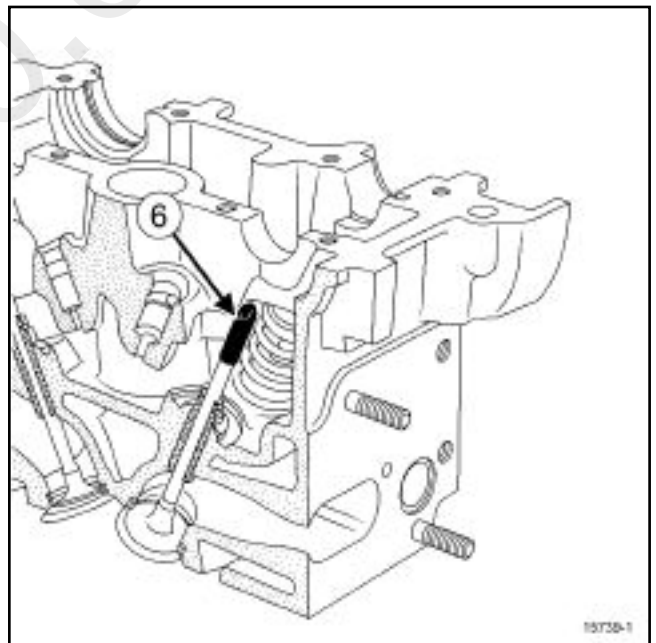
Fit the guide tube (2) above the pushrod until it comes into contact with the cylinder head.

Lock the pushrod with the wheel (3).

Remove the guide tube-pushrod assembly, being careful not to loosen the wheel.

Remove:

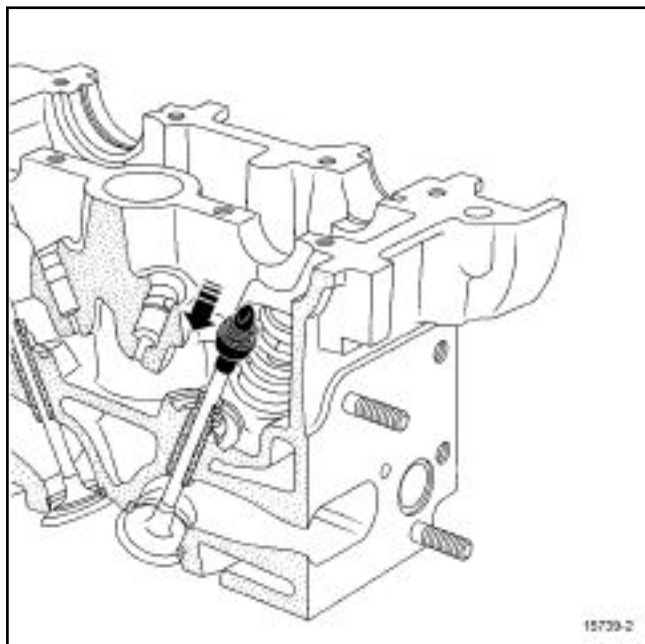
- the valve,
- the valve stem seals (inlet end then exhaust end) using the **(Mot. 1335)**.



15739-1

Place the valve insert (6) on the valve stem (the diameter of the valve insert should be identical to that of the valve stem).

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

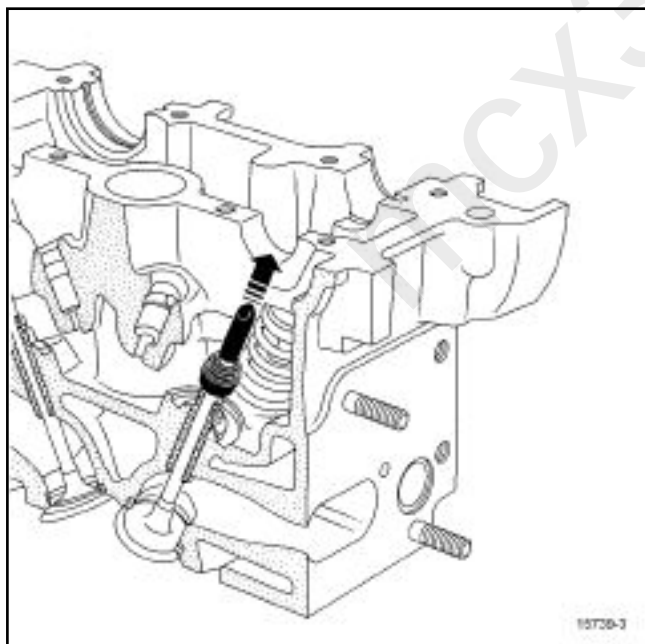


15739-2

Keep the valve pressed against its seat.

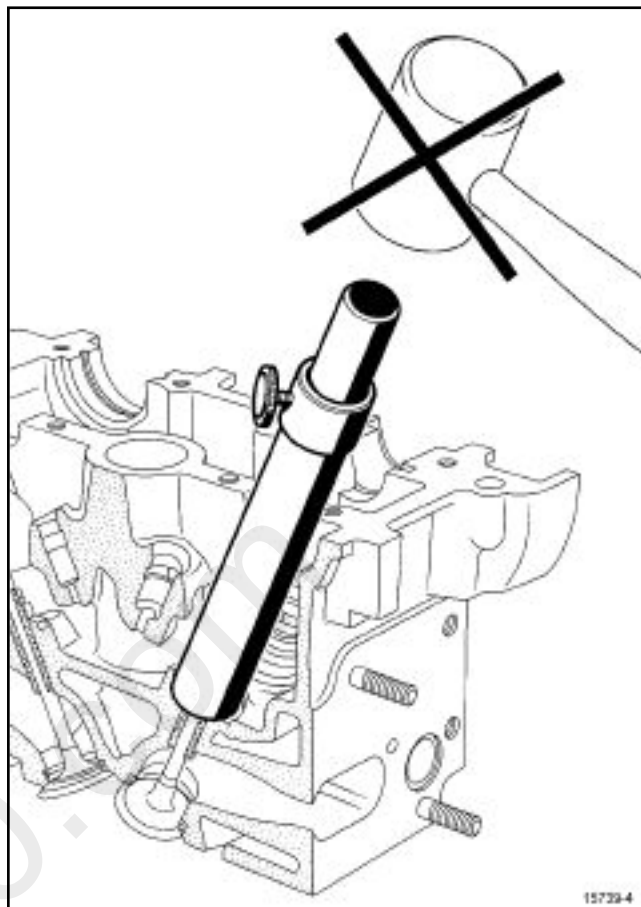
Mount the valve stem seal (not lubricated) over the valve insert.

Push the valve stem seal until it goes past the valve insert.



15739-3

Remove the valve insert.



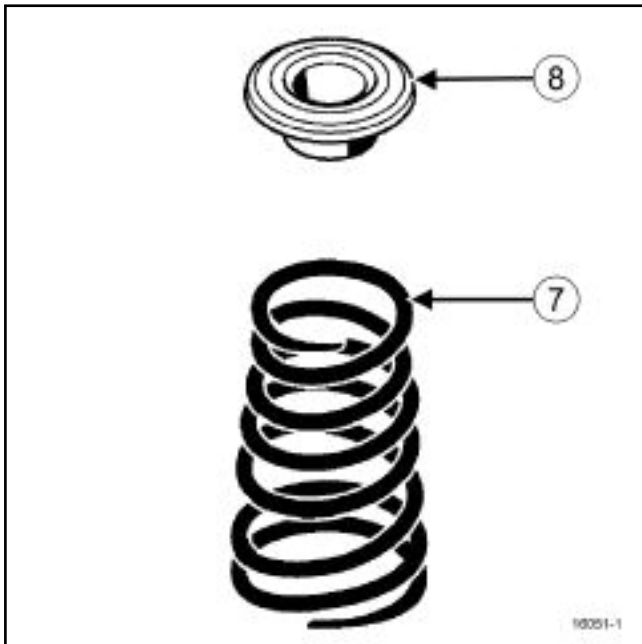
15739-4

Fit the guide tube-pushrod assembly on the valve stem seal.

Push home the valve stem seal by gently striking the pushrod with the palm of the hand, until the guide tube makes contact with the cylinder head.

Repeat the preceding operations on all the inlet and exhaust valves.

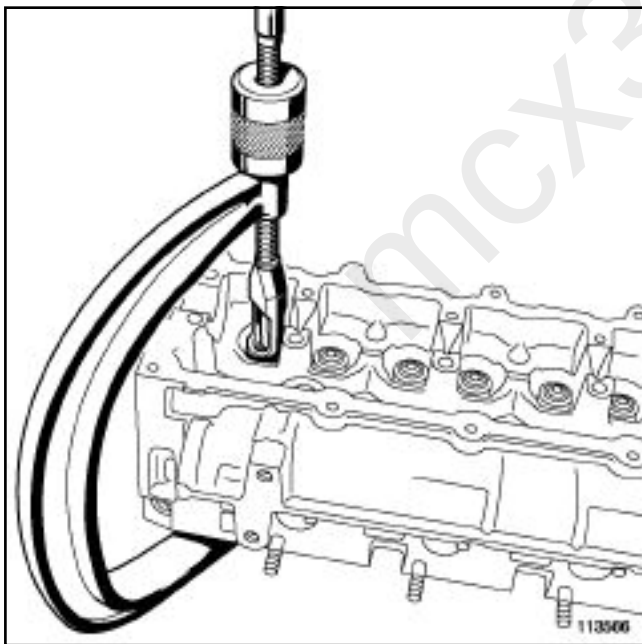
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



16051-1

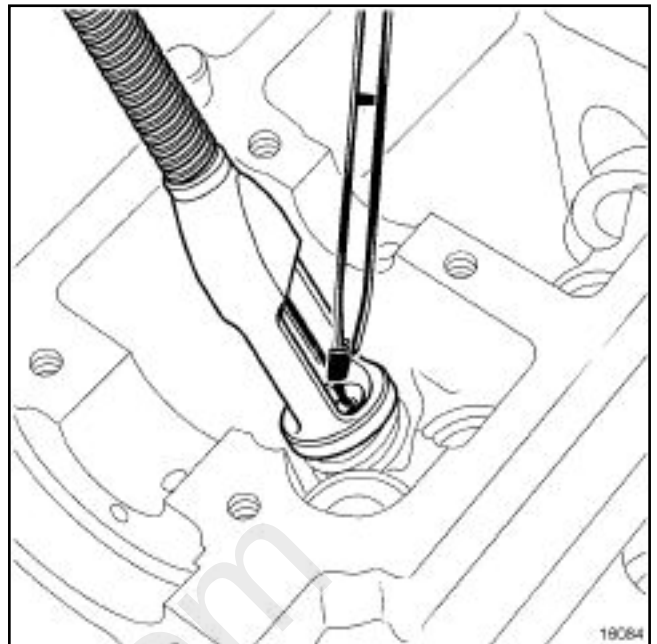
Refit:

- the valve springs, positioning the conical part (7) of the spring at the top,
- the valve spring upper cups (8) ,



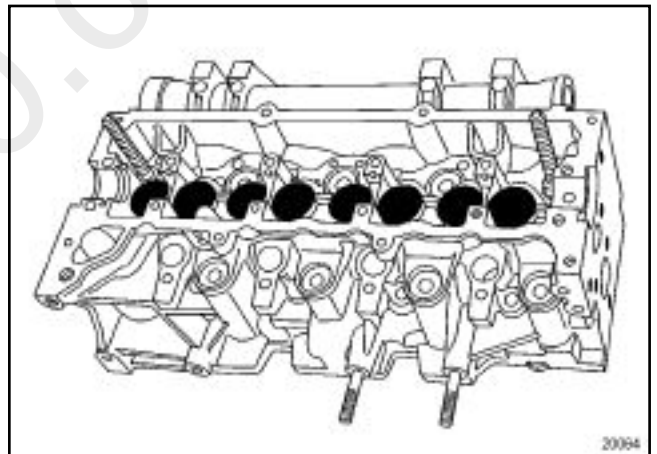
113566

Compress the valve springs using the **(Mot. 1502)** or a valve wrench.



16084

Refit the cotters using tweezers.

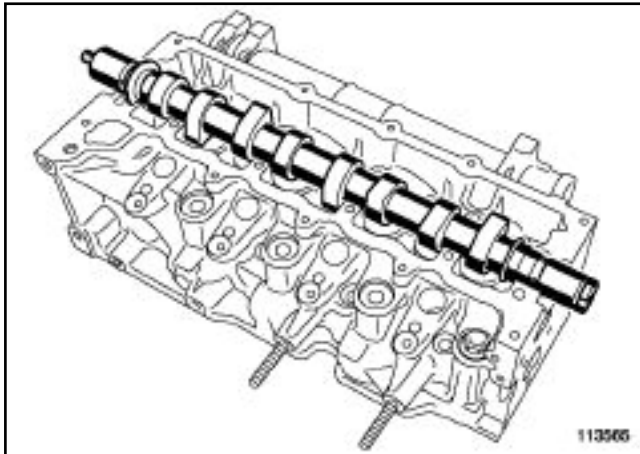


20064

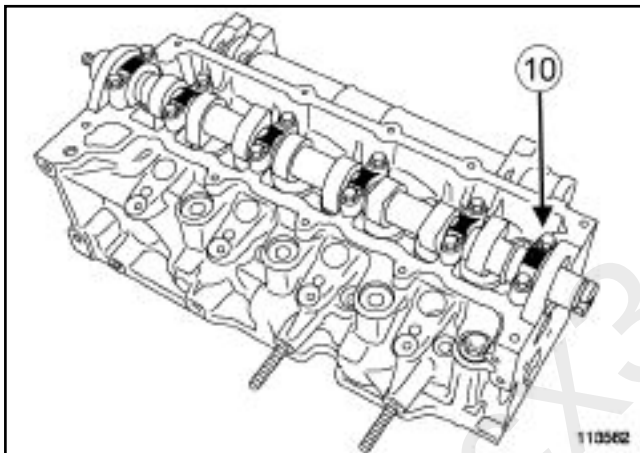
Refit the pushrods observing their original position.

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

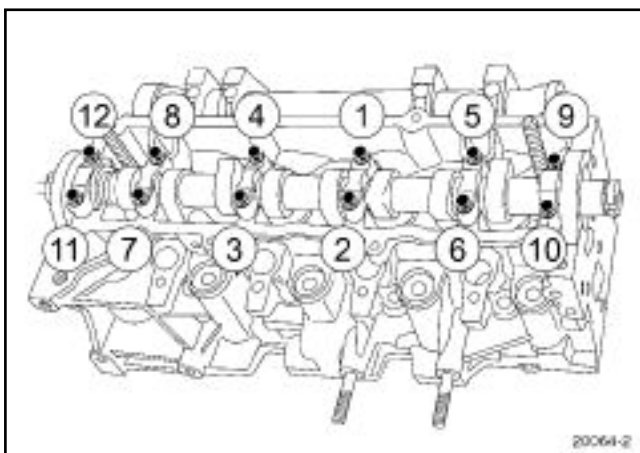
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



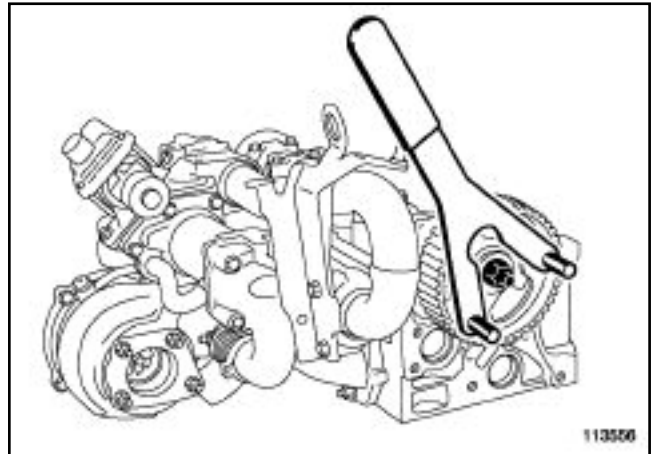
Refit the camshaft.



Refit the camshaft bearing caps (observing their original positions, bearing No. 1 (10) engine flywheel end).



Tighten to torque and in order **the crankshaft bearing cap mounting bolts** ($11 \pm 1.1 \text{ Nm}$).

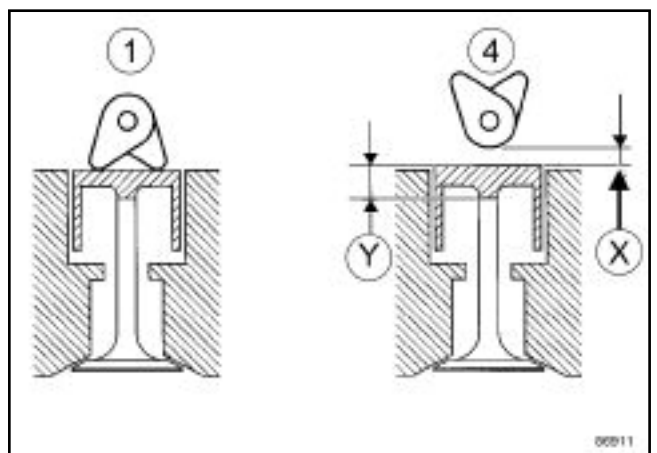


Refit:

- the camshaft pulley hub,
- the camshaft pulley,
- the old exhaust camshaft pulley mounting nut.

Tighten to torque **the mounting nut for the camshaft pulley** ($15 \pm 1.5 \text{ Nm}$), blocking the camshaft pulley with the (Mot. 799-01).

Check and adjust the valve clearances following the procedure below.



Position the cylinder valves (1) in the end of exhaust stroke, beginning of inlet stroke position.

Measure the valve clearance (X) of the cylinder (4) using a set of shims.

- inlet valve clearance **0.20 mm**,
- exhaust valve clearance **0.40 mm**,

Note the clearance values.

Repeat the above operations on the other cylinders:

- position cylinder No. 3 at an angle and measure the clearance of cylinder No. 2,

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

- position cylinder No. **4** at an angle and measure the clearance of cylinder No. **1** ,

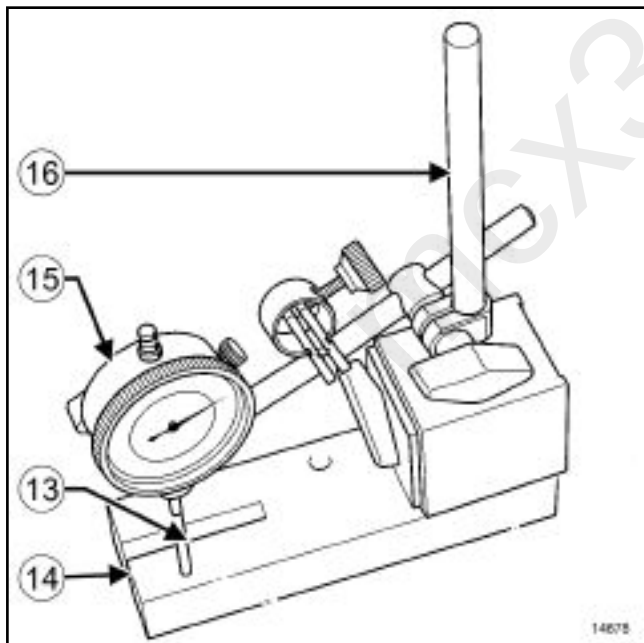
- position cylinder No. **2** at an angle and measure the clearance of cylinder No. **3** ,

Compare the values noted with the specified values.

Remove:

- the nut from the camshaft pulley,
- the camshaft pulley,
- the camshaft pulley hub,
- the camshaft bearing caps,
- the camshaft,
- the pushrod(s) which are outside of permitted tolerance values, noting their original position.

Undertake the following installation to determine the class of thickness of the valve pushrod.



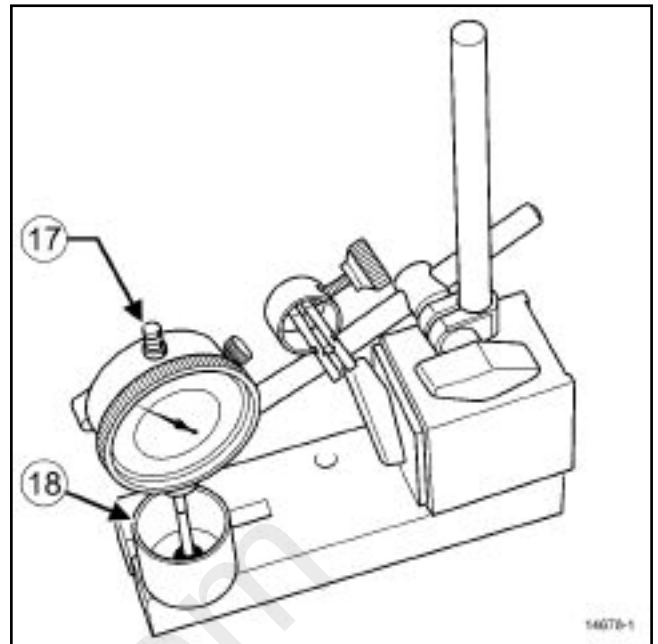
14678

Screw the extension piece (**13**) of the (**Mot. 856-02**) to a dial gauge (**15**) .

Fix the dial gauge (**15**) to a magnetic holder (**16**) .

Mount the dial gauge-magnetic holder assembly on the plate (**14**) of the tool (**Mot. 252-01**) .

Calibrate the dial gauge.



14678-1

Lift the top piece (**17**) of the dial gauge (without changing the position of the dial gauge-magnetic holder assembly).

Mount the valve pushrod (**18**) to be measured on the plate of the (**Mot. 252-01**) .

Take the measurement (**Y**) .

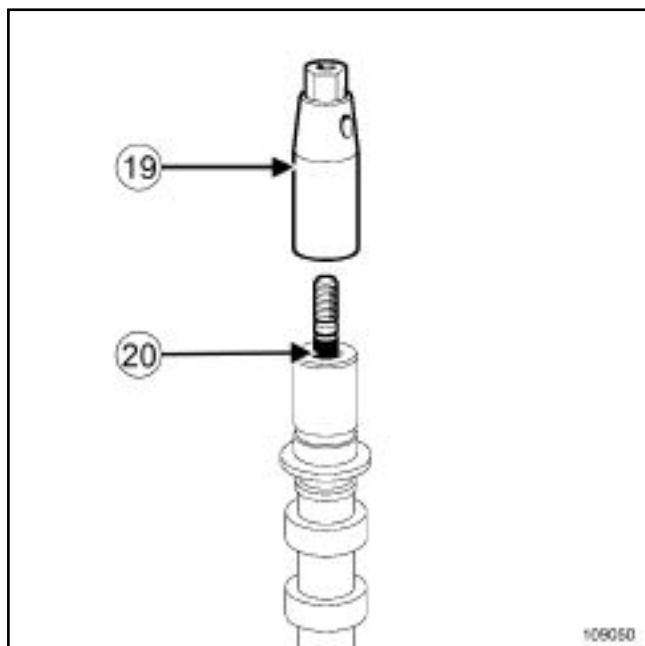
Repeat the preceding operations for the other valve pushrods to be measured.

Fit the new valve pushrod(s) in the cylinder head.

Check that the camshaft pulley mounting stud has not come loose. If so, the stud must be replaced following the procedure described below.

Place the camshaft in a vice fitted with a clamping jaw.

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



109050

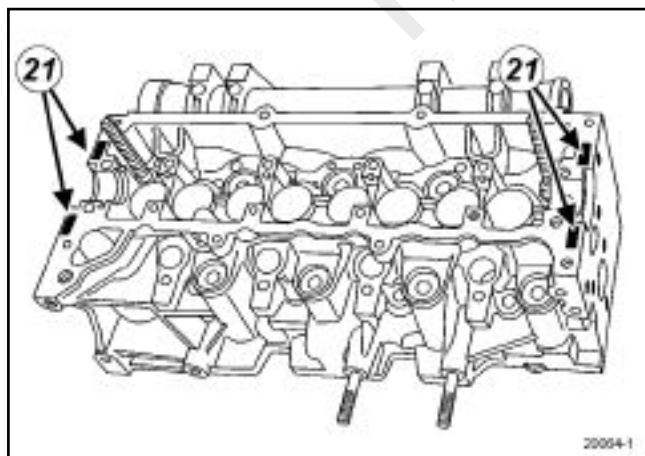
Remove the piston rings using a roller-type stud removal tool (19) .

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) .

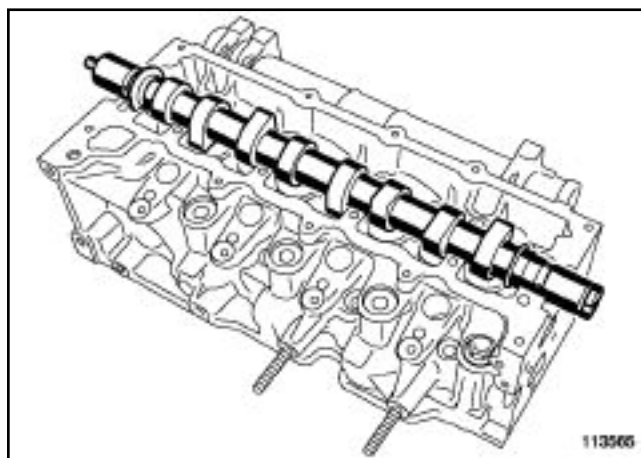
Oil the top of the valve pushrods and the camshaft bearings with engine oil.



20064-1

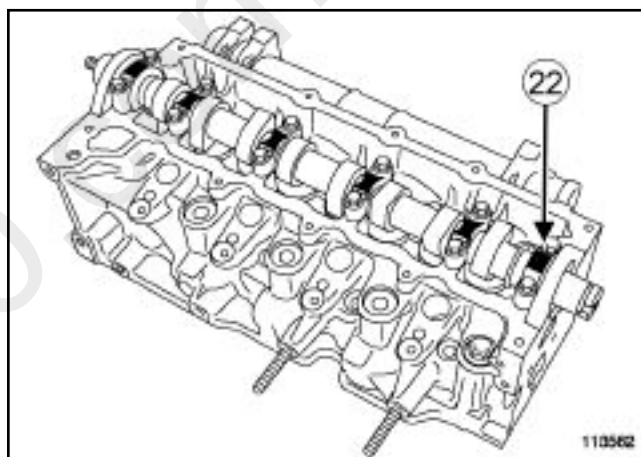
Degrease the surfaces of the camshaft bearing gas-kets nos. 1 and 6 (21) using degreaser.

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



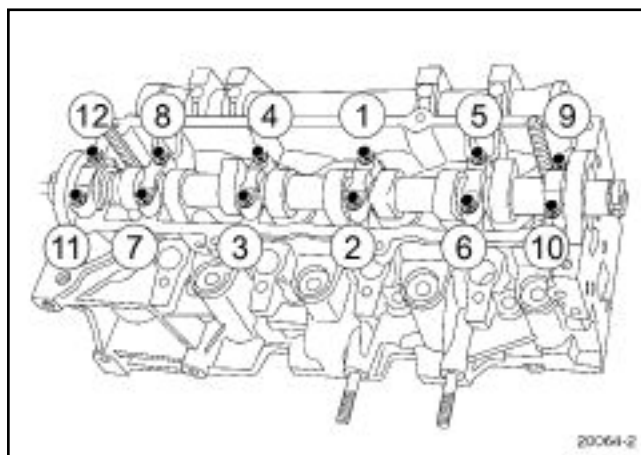
113565

Refit the camshaft.



113562

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



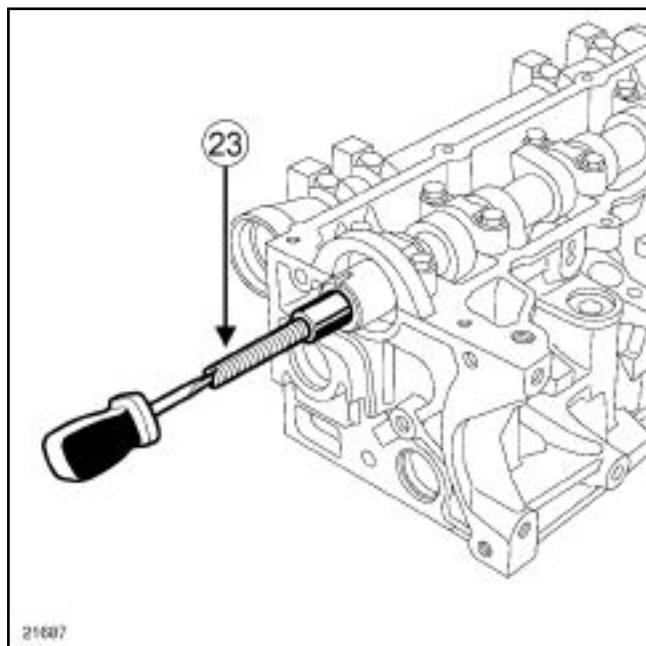
20064-2

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

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

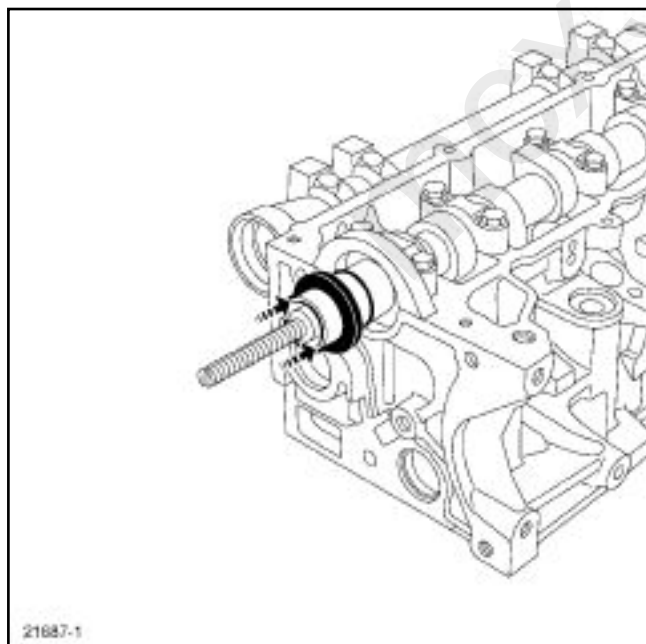
Apply degreaser to:

- the end of the camshaft at the timing end,
- the housing on the cylinder head of the camshaft gasket.



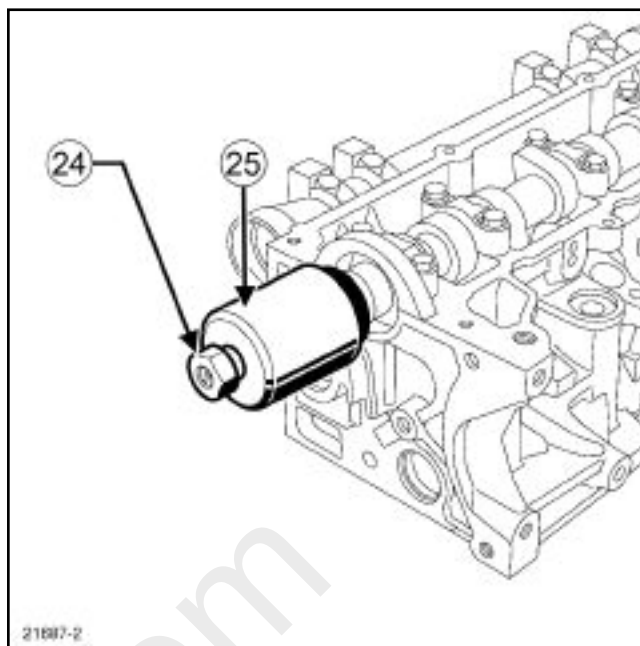
21687

Screw the shouldered stud (23) of the **(Mot. 1632)** onto the mounting stud of the camshaft pulley.



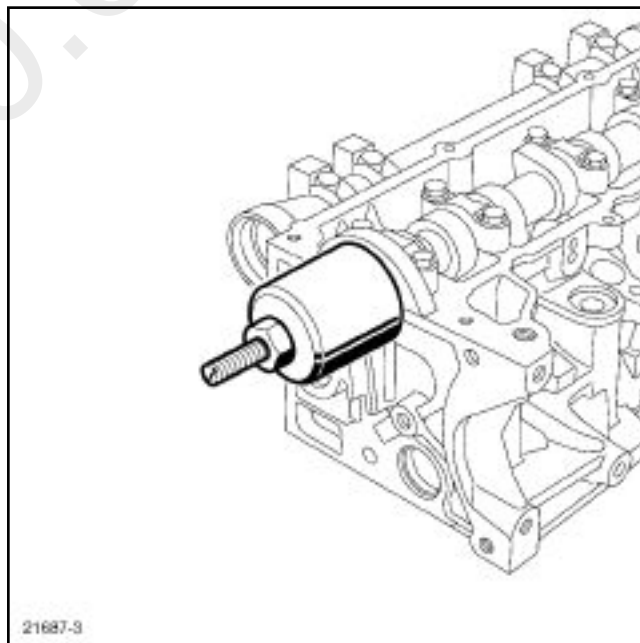
21687-1

Refit the camshaft gasket.



21687-2

Position the cover (25) and collar nut (24) of the **(Mot. 1632)**.



21687-3

Screw on the collar nut until the cover touches the cylinder head.

Remove:

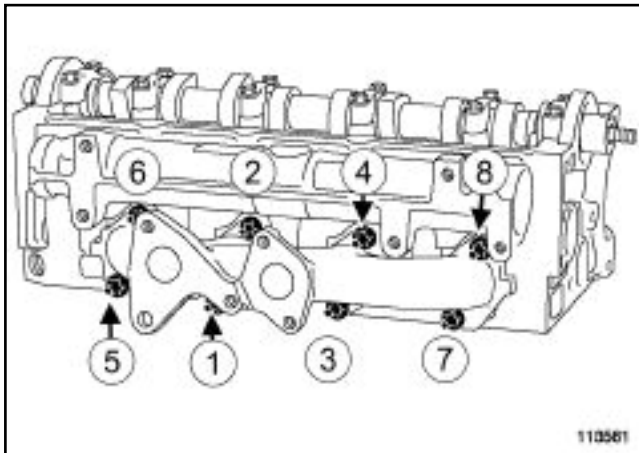
- the collar nut,
- the cap,
- the collared stud.

Using degreaser, degrease the surfaces of the exhaust manifold and cylinder head gaskets at the exhaust end.

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

Refit:

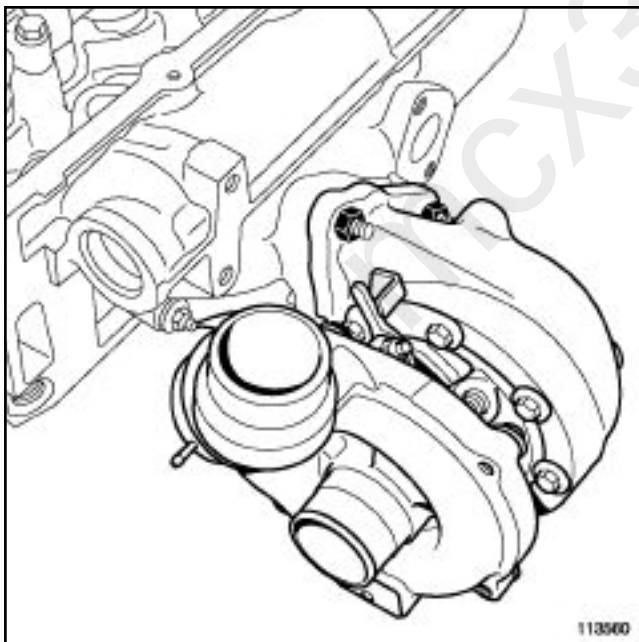
- a new exhaust manifold gasket,
- the exhaust manifold,
- the exhaust manifold mounting nuts.



113561

Tighten to torque and in order the **exhaust manifold mounting nuts** ($26 \pm 2.6 \text{ Nm}$).

Using degreaser, degrease the surfaces of the exhaust manifold (where the turbocharger enters) and the turbocharger gaskets.



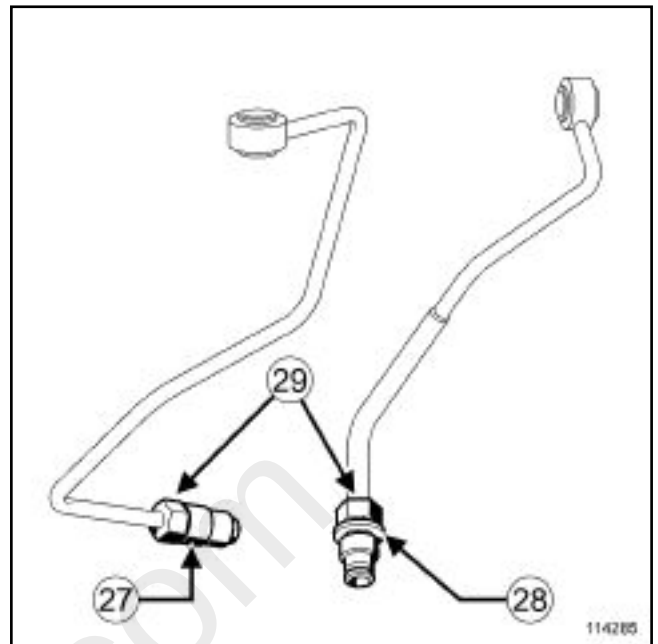
113560

Refit:

- the new turbocharger seal,
- the turbocharger.
- the turbocharger mounting nuts.

Tighten to torque the **turbocharger mounting nuts** ($26 \pm 2.6 \text{ Nm}$).

Put a little engine oil from an oil can in the oil circuit of the turbocharger.



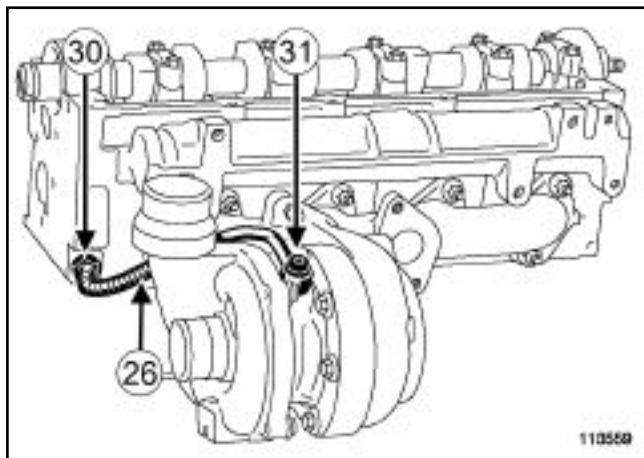
114285

Note:

These two turbocharger oil supply pipes may be used on the same engine. The tightening torque of the end pieces (29) on the cylinder head is different, depending on the following:

- if the end piece is **shouldered** (28) , in this case there will be no need to place the high-resistance bolt locking product on the end piece thread,
- if the end piece is **not shouldered** (27) , in this case it is essential to place the high-resistance bolt locking product on the end piece thread,

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



113559

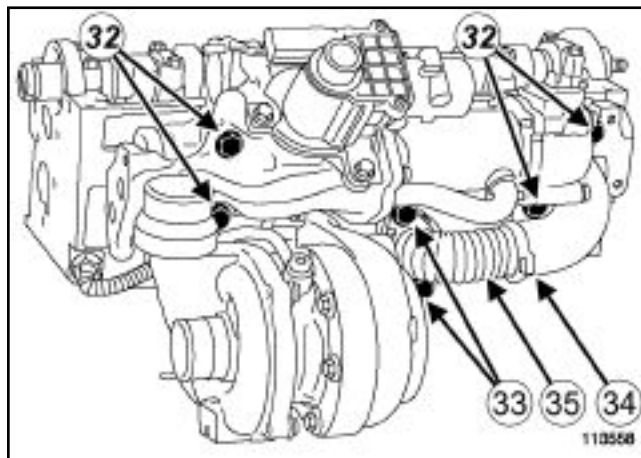
Refit the turbocharger oil supply pipe (26) .

Screw on:

- the nut (30) on the cylinder head,
- the bolt (31) on the turbocharger.

Tighten to torque:

- **the turbocharger oil supply pipe mounting bolt (turbocharger end) (23 ± 2.3 Nm) ,**
- **the turbocharger oil supply pipe mounting nut (cylinder head end) (collar nut 35 ± 3.5 Nm or no collar nut 23 ± 2.3 Nm) .**



113558

Refit:

- the EGR valve-exchanger assembly,
- the mounting bolts (32) (without tightening them) of the EGR valve-exchanger.

Tighten to torque the **EGR valve-exchanger mounting bolts (25 ± 2.5 Nm) . (32)**

Refit:

- the new exhaust gas recirculation pipe (35) fitted with its new snap-on clip (34) ,
- the mounting bolts (33) of the exhaust gas recirculation pipe.

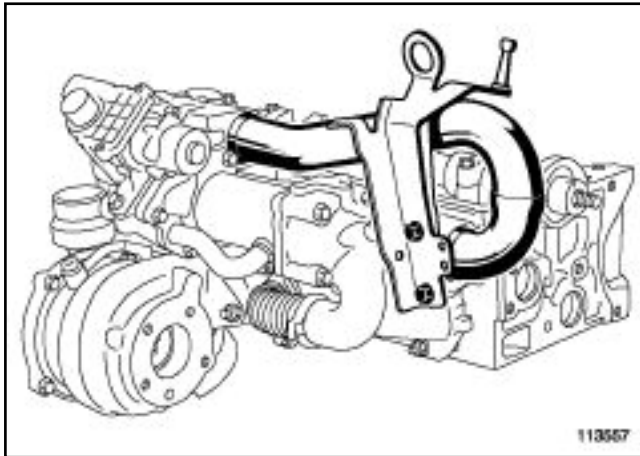
Adjust the exhaust gas recirculation pipe in relation to the cooler support.

Lock the snap-on clip of the exhaust gas recirculation pipe using the **(Mot. 1567)** .

Tighten to torque the **mounting bolts of the exhaust gas recirculation pipe (35 ± 3.5 Nm) (33) .**

Fit the new O-ring seals to the inlet pipe.

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



113557

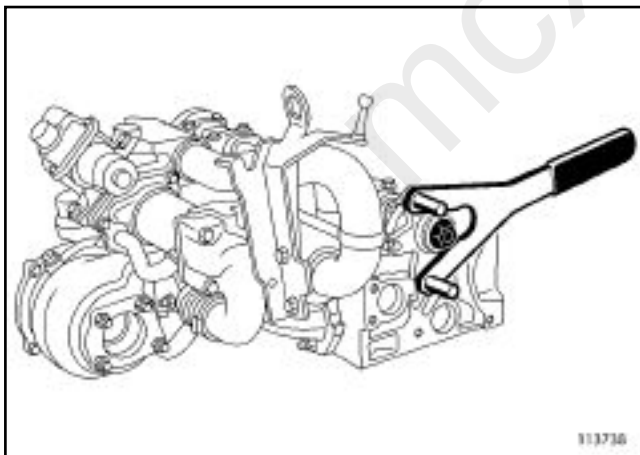
Refit:

- the inlet duct,
- the engine lifting eye (timing end),
- the engine lifting eye mounting bolts.

Tighten to torque the **engine lifting eye mounting bolts (timing end)** ($21 \pm 2.1 \text{ Nm}$).

Refit:

- the camshaft pulley hub,
- the new exhaust camshaft pulley hub mounting nut.



113738

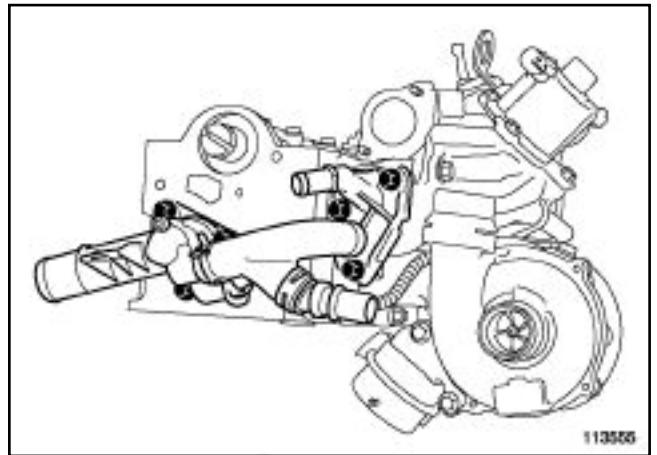
Immobilise the hub using the **(Mot. 799-01)**.

Tighten to torque and angle the **camshaft pulley hub nut** ($30 \pm 3 \text{ Nm} + 86^\circ \pm 6^\circ$).

Refit the camshaft pulley (without tightening the mounting bolts).

Using degreaser, degrease the surfaces of the seals where the vacuum pump enters, the cylinder head coolant outlet and the EGR exchanger cover.

Fit new seals to the cylinder head coolant outlet and the EGR exchanger cover.



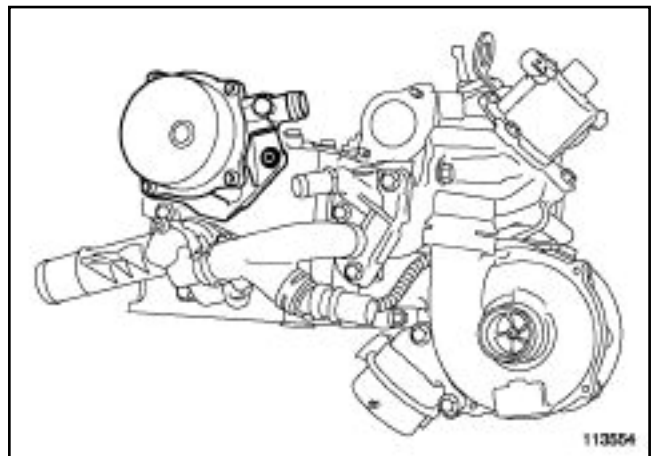
113555

Refit:

- the cylinder head coolant outlet unit-EGR exchanger cover assembly,
- the cylinder head coolant outlet unit mounting bolts,
- the EGR exchanger cover mounting bolts.

Tighten to torque:

- the **cylinder head coolant outlet bolt** ($11 \pm 1.1 \text{ Nm}$),
- the **EGR exchanger cover mounting bolt** ($12 \pm 1.2 \text{ Nm}$).



113554

Refit:

- the vacuum pump,
- the vacuum pump mounting bolts,

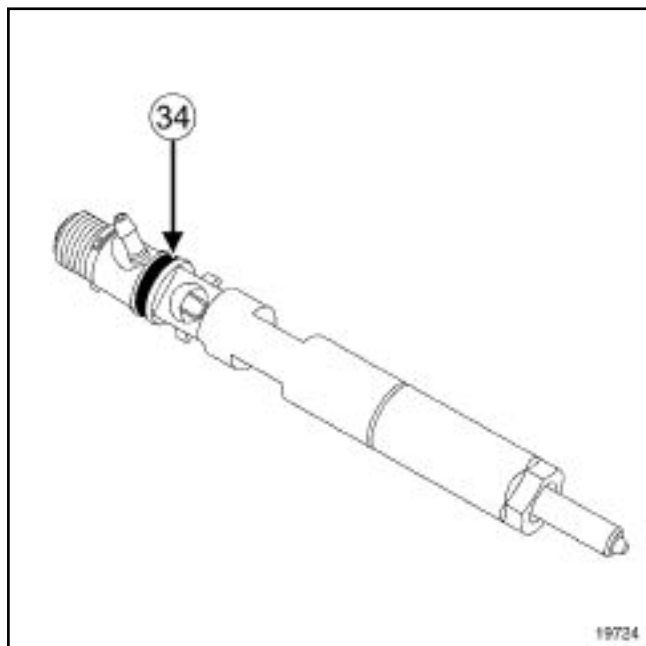
Tighten to torque the **vacuum pump mounting bolts** ($21 \pm 2.1 \text{ Nm}$).

Refit the heater plugs.

Cylinder head: Refitting

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

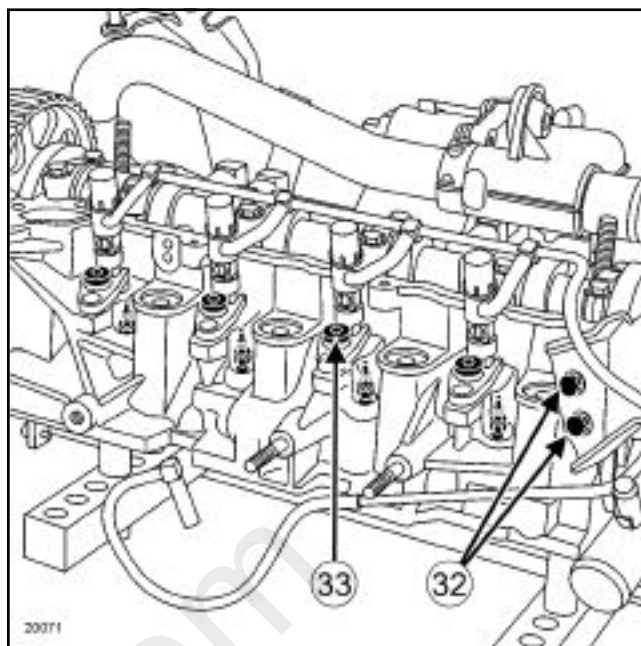
Tighten to torque **the heater plugs (15 ± 1.5 Nm)** using a wrench with hinge.



19724

Note:

If one or more injectors are replaced, note the alphanumeric code (C2I) **(34)** and the number of the cylinder on which it is fitted.



20071

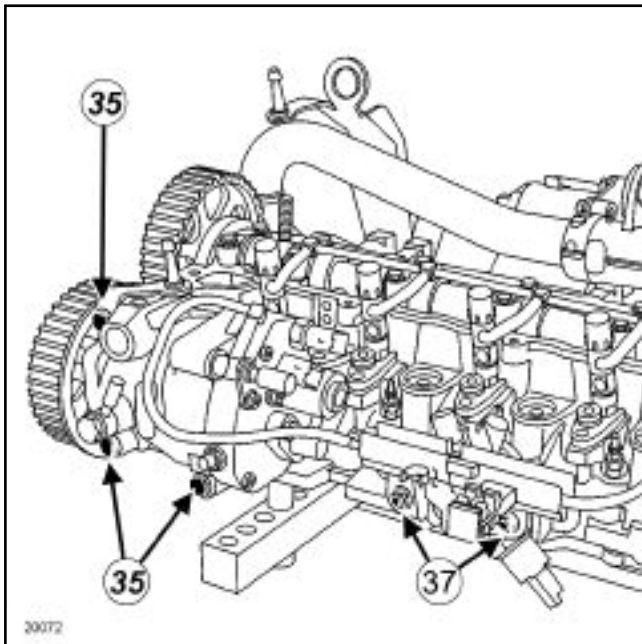
Refit:

- the engine lifting eye (flywheel end),
- the new heat protection washers,
- the injectors (observing their positions),
- the injector brackets.

Tighten to torque:

- **the engine lifting eye mounting bolts (flywheel end) (13 ± 1.3 Nm) (32) ,**
- **the injector bracket bolts (28 ± 2.8 Nm) (33) .**

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



20072

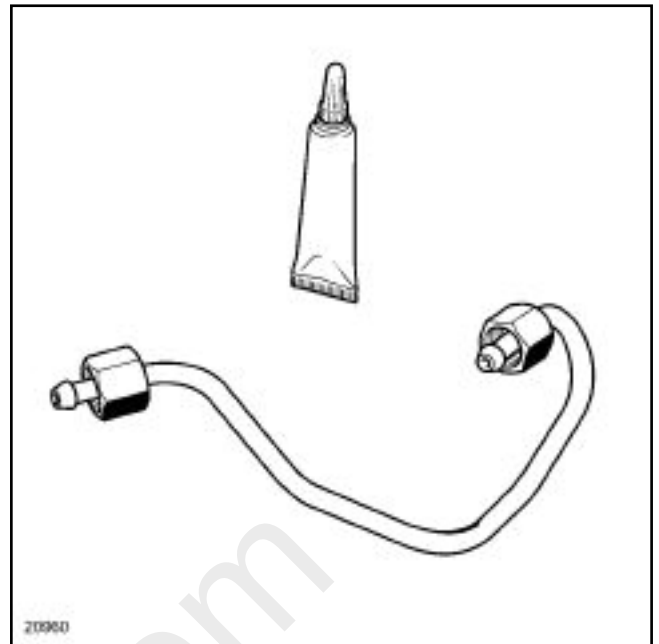
Refit:

- the high-pressure pump,
- the injector rail (**without tightening the nuts**) ,

Tighten to torque the **high-pressure pump mounting bolts** (21 ± 2.1 Nm) .

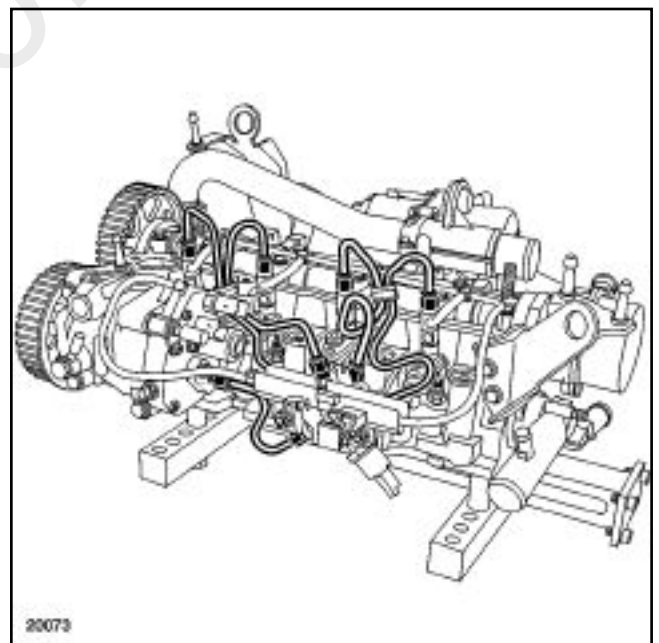
Note:

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



20960

Lightly lubricate the nut threads with oil from the applicator supplied with the new part, taking care not to insert it in the pipe.



20073

Insert the high-pressure pipe olive in the injector high-pressure inlet taper.

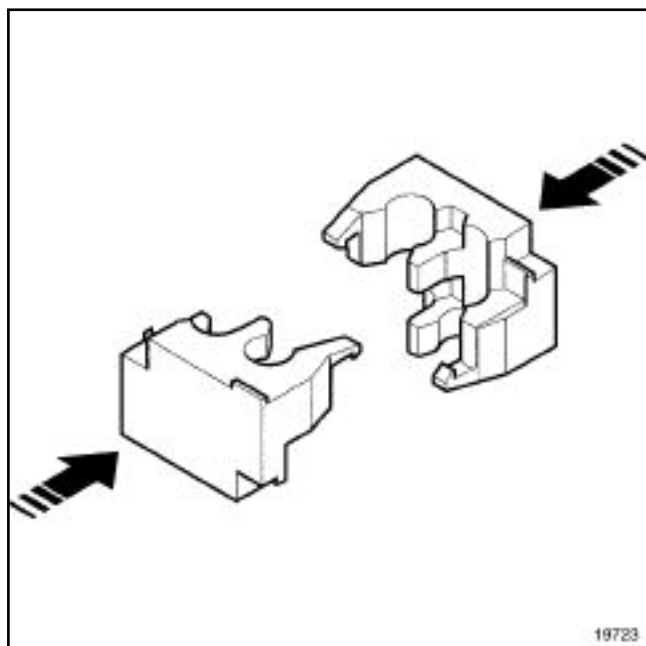
Insert the high-pressure pipe olive in the rail high-pressure outlet taper.

Finger tighten the high-pressure pipe nuts, starting with the one located on the injector end.

Lightly tighten the nuts of the high-pressure pipes.

Cylinder head: Refitting

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



19723

Fit the new clip provided with the new high-pressure pipe.

Tighten to torque the **injector rail mounting nuts** ($28 \pm 2.8 \text{ Nm}$).

Note:

Completely tighten one high-pressure pipe before moving to the next one.

Tighten to torque and in order (according to the part no. of the pipe) **the pump-rail high-pressure pipe nuts** (24 ± 2.4 or $38 \pm 3.8 \text{ Nm}$) :

- the high-pressure pump side, using the **(Mot. 1746)** or a crow foot wrench,
- the injector rail side, using the **(Mot. 1746)** or a crow foot wrench,

Tighten to torque and in order (according to the part no. of the pipe) **the rail-injectors high-pressure pipe nuts** (24 ± 2.4 or $38 \pm 3.8 \text{ Nm}$) :

- the injector side using the **(Mot. 1566)** or with a wrench for high-pressure pipes.
- the injector rail side, using the **(Mot. 1566)** or a crow foot wrench,

K9K, and 732 or 764

Special tooling required	
Mot. 1511-01	Valve stem seal fitting tool adapter.
Mot. 1335	Pliers for removing valve stem seals.
Mot. 1502	Valve lifting tool for removing valves.
Mot. 799-01	Timing gear wheel immobiliser.
Mot. 856-02	Dial gauge support.
Mot. 252-01	Dial gauge support thrust plate.
Mot. 1632	Tool for fitting PTFE camshaft seal
Mot. 1567	Long nose pliers for EGR duct clips.
Mot. 1566	Spanner for removing high pressure pipes.
Mot. 1746	Offset spanner for tightening high pressure pump pipes.

Tightening torques 	
the crankshaft bearing cap mounting bolts	11 ± 1.1 Nm
the camshaft pulley mounting stud	12 ± 2 Nm
crankshaft bearing cap mounting bolts	11 ± 1.1 Nm
exhaust manifold mounting nuts	26 ± 2.6 Nm
turbocharger mounting nuts	26 ± 2.6 Nm
the turbocharger oil supply pipe mounting bolt (turbocharger end)	23 ± 2.3 Nm
the turbocharger oil supply pipe mounting nut (cylinder head end)	35 ± 3.5 Nm

Tightening torques 	
EGR valve-exchanger mounting bolts	25 ± 2.5 Nm
mounting bolts of the exhaust gas recirculation pipe	35 ± 3.5 Nm
engine lifting eye mounting bolts (timing end)	21 ± 2.1 Nm
camshaft pulley hub nut	30 ± 3 Nm + 86° ± 6°
the cylinder head coolant outlet unit bolt	11 ± 1.1 Nm
the EGR exchanger cover mounting bolt	12 ± 1.2 Nm
vacuum pump mounting bolts	21 ± 2.1 Nm
the heater plugs	15 ± 1.5 Nm
the injector bracket mounting bolts	30 ± 3 Nm
injector rail mounting nuts	28 ± 2.8 Nm
the rail-injectors high-pressure pipe nuts	24 ± 2.4 or 38 ± 3.8 Nm
high-pressure pump mounting bolts	21 ± 2.1 Nm
the rail-injectors high-pressure pipe nuts	24 ± 2.4 or 38 ± 3.8 Nm
high-pressure protector bolts and nuts	21 ± 2.1 Nm

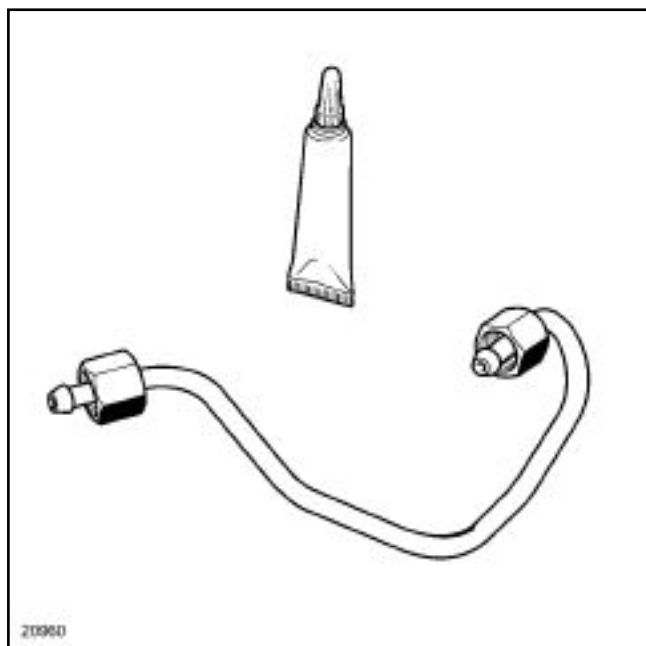
I - RECOMMENDATIONS FOR REPAIR**IMPORTANT**

It is essential to follow the cleanliness guidelines (see **Engine: Precautions during repair**).

Wear latex gloves while using the cleaning product.

Cylinder head: Refitting

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,

Cylinder head: Refitting

K9K, and 732 or 764

- The cylinder head coolant outlet unit seal,
- The exhaust manifold gasket,
- The turbocharger seal
- The inlet tube gasket,
- The exhaust gas recirculation pipe,
- The EGR solenoid valve seal,
- Valve stem seals

Consumables

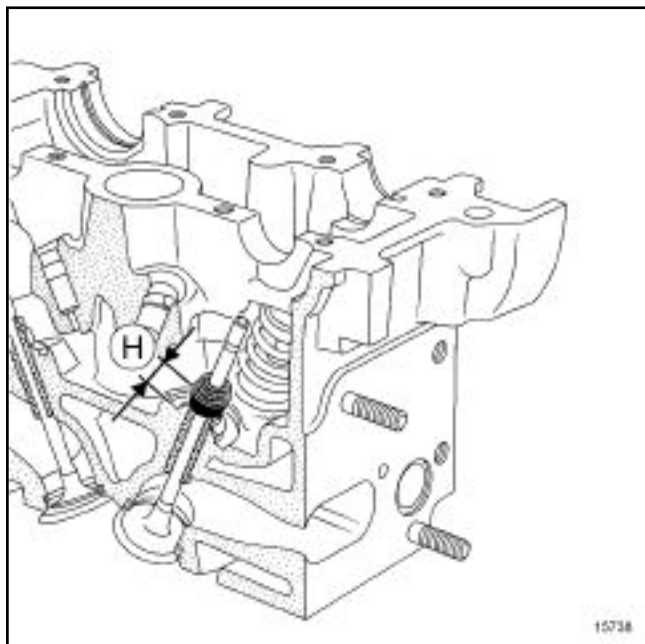
- Loctite 518, part no. **77 01 421 162** ,
- High-resistance bolt locking product, part no. **77 11 230 112** ,
- Degreasing agent, part no. **77 11 224 559** .

III - EQUIPMENT REQUIRED

- Latex protective gloves,
- Valve wrench,
- Tweezers,
- Wrench for the high-pressure pipes,
- Crow foot wrench,
- Wrench with hinge for heater plugs,
- Roller-type stud removal tool
- Oil can,
- The valve stem seal fitting kit,
- Dial gauge,
- Magnetic holder,
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

IV - REASSEMBLING THE CYLINDER HEAD

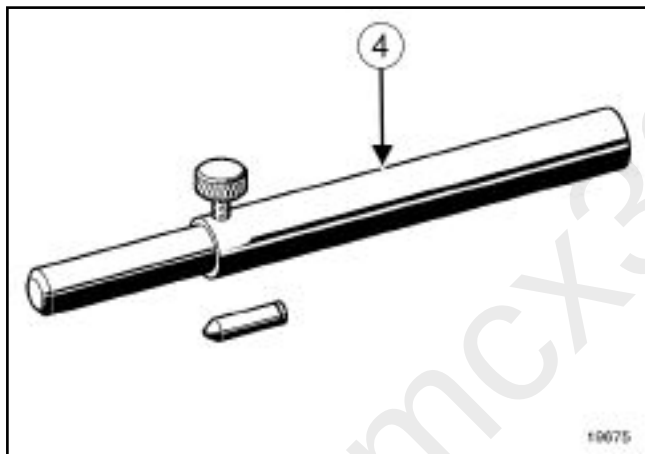
K9K, and 732 or 764



15738



18077



19675

Note:

Before removing the valve stem seals, it is essential to note the position (H) of the former seals on the inlet side, then the exhaust side as the fitting dimension of the seals may be different between the inlet and the exhaust.

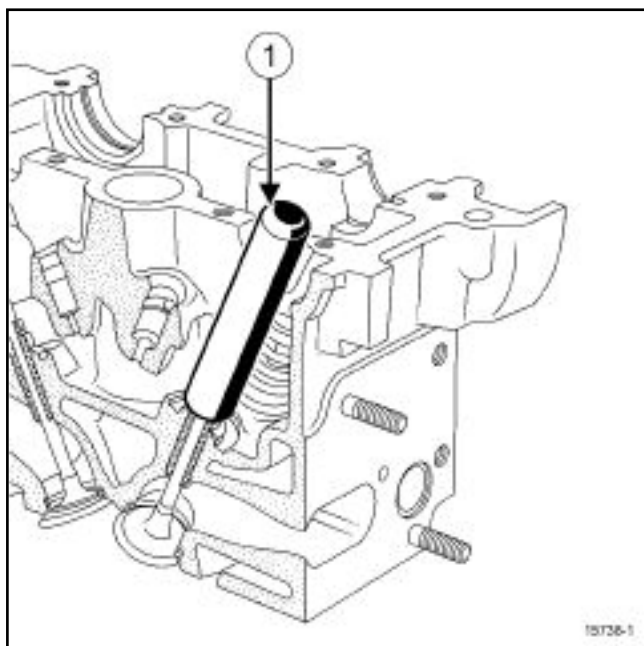
Fit a valve.

Compare the dimension (H) of an old seal with the cylinder head using the (Mot. 1511-01) (4) or the valve stem seal fitting set (5) .

Note:

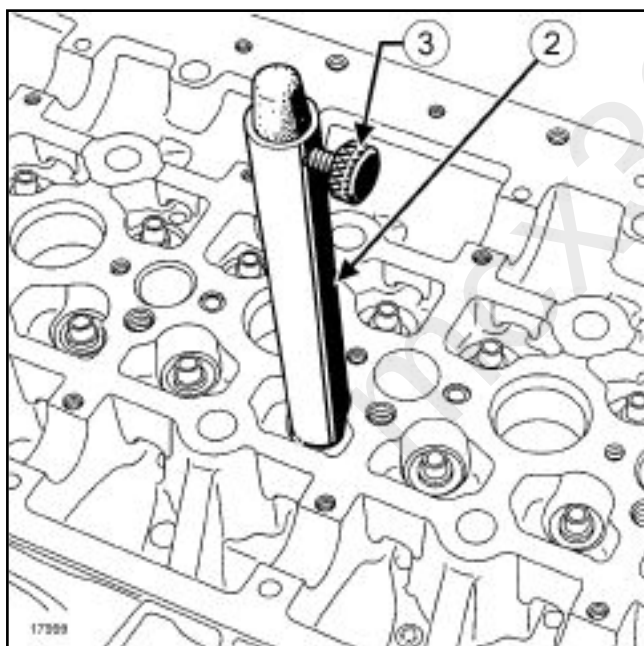
The internal diameter of the pushrod (1) should be identical to that of the valve; In addition, the bottom of the pushrod must be snug against the metal upper section of the valve stem seal.

K9K, and 732 or 764



15738-1

Place the pushrod (1) over the valve stem seal.



17999

Fit the guide tube (2) above the pushrod until it comes into contact with the cylinder head.

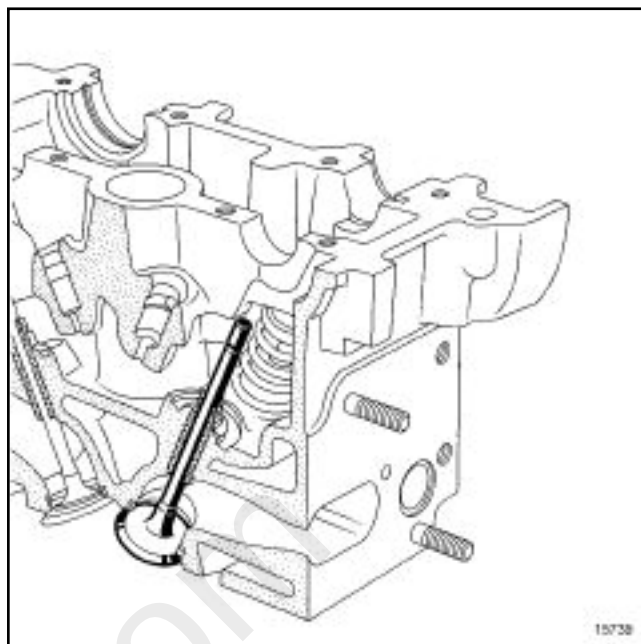
Lock the pushrod with the wheel (3) .

Remove the guide tube-pushrod assembly, being careful not to loosen the wheel.

Remove:

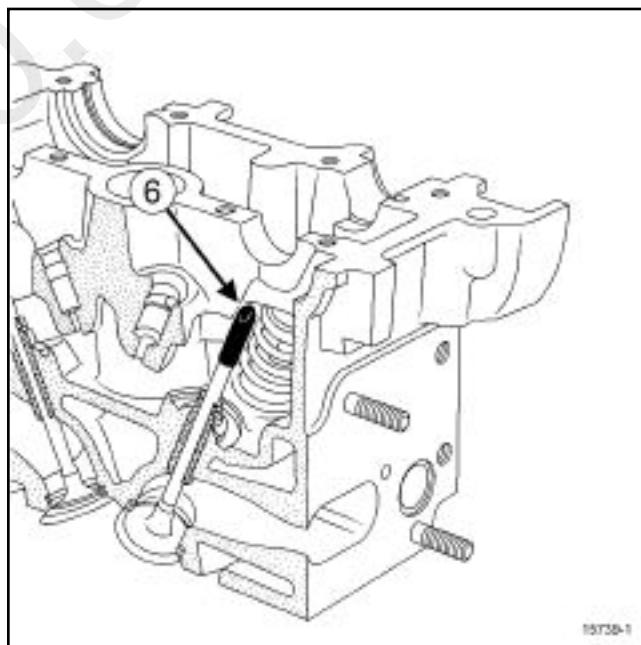
- the valve,
- the valve stem seals (inlet end then exhaust end) using the **(Mot. 1335)** .

Apply engine oil to the inside of the valve guide.



15739

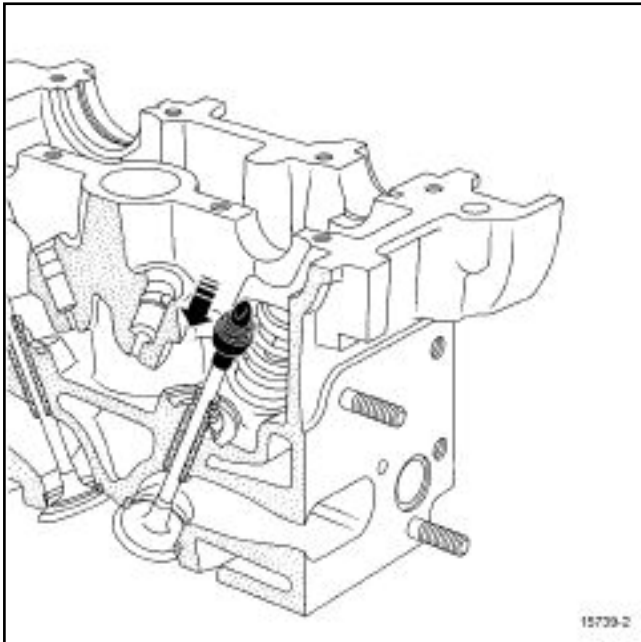
Place the valve in the cylinder head.



15739-1

Place the valve insert (6) on the valve stem (the diameter of the valve insert should be identical to that of the valve stem).

K9K, and 732 or 764

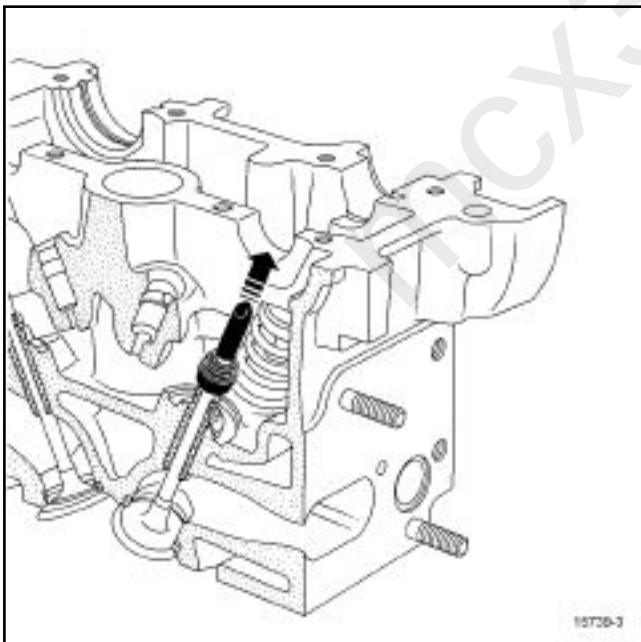


15739-2

Keep the valve pressed against its seat.

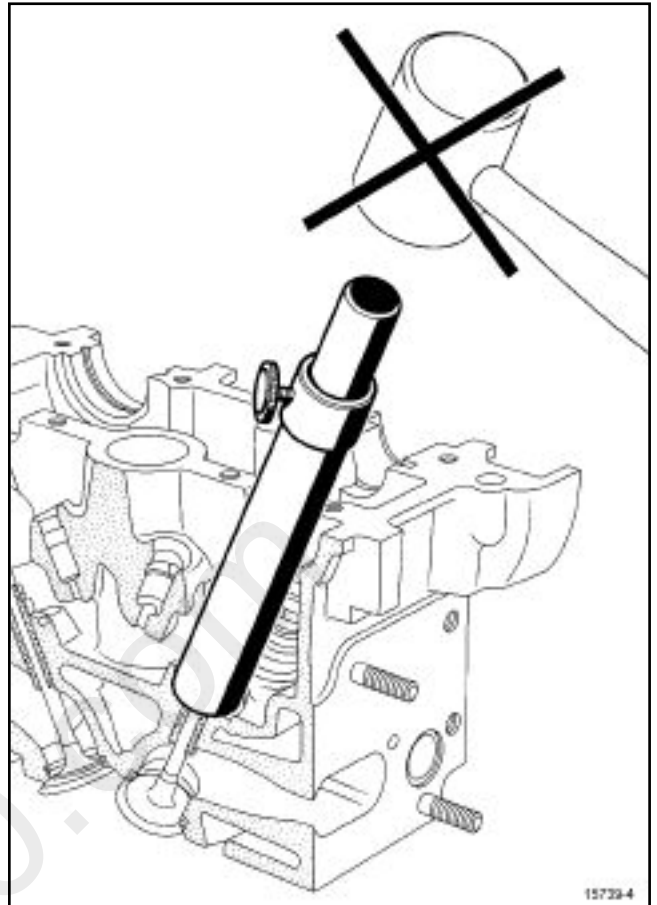
Mount the valve stem seal (not lubricated) over the valve insert.

Push the valve stem seal until it goes past the valve insert.



15739-3

Remove the valve insert.



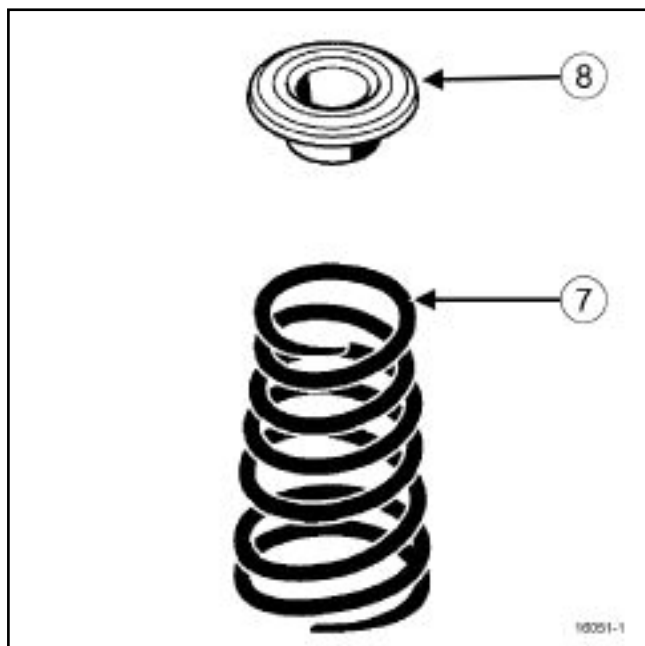
15739-4

Fit the guide tube-pushrod assembly on the valve stem seal.

Push home the valve stem seal by gently striking the pushrod with the palm of the hand, until the guide tube makes contact with the cylinder head.

Repeat the preceding operations on all the inlet and exhaust valves.

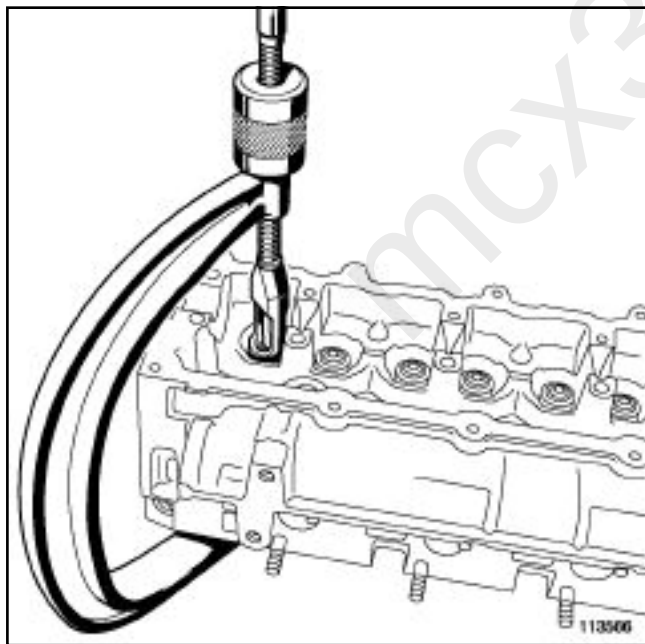
K9K, and 732 or 764



16051-1

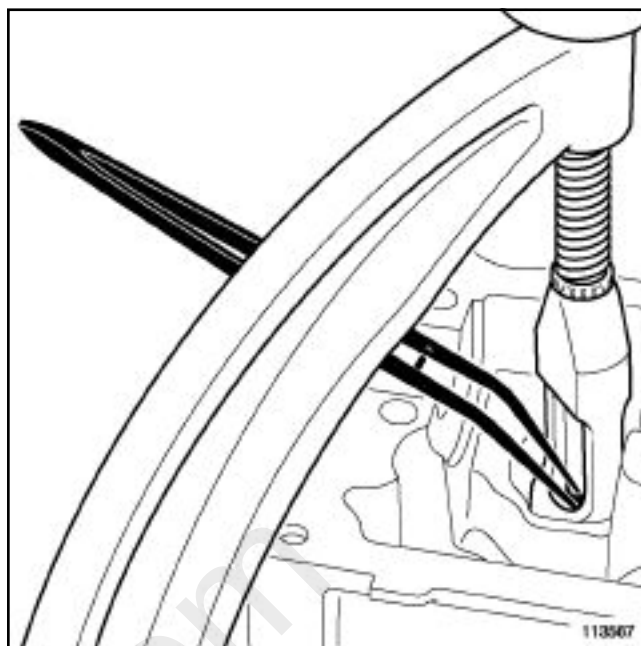
Refit:

- the valve springs, positioning the conical part (7) of the spring at the top,
- the valve spring upper cups (8) .



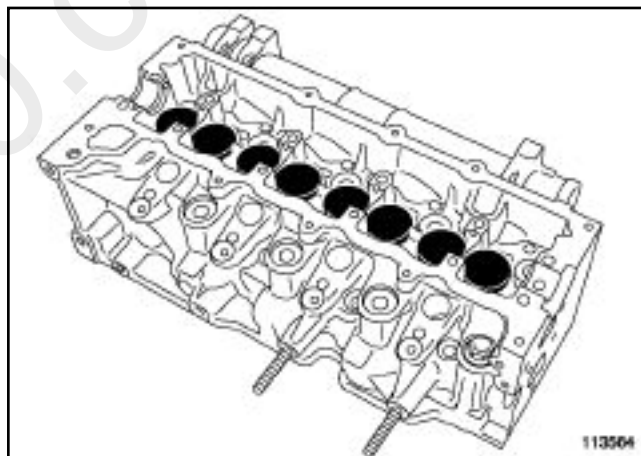
113566

Compress the valve springs using the **(Mot. 1502)** or a valve wrench.



113567

Refit the cotters using tweezers.

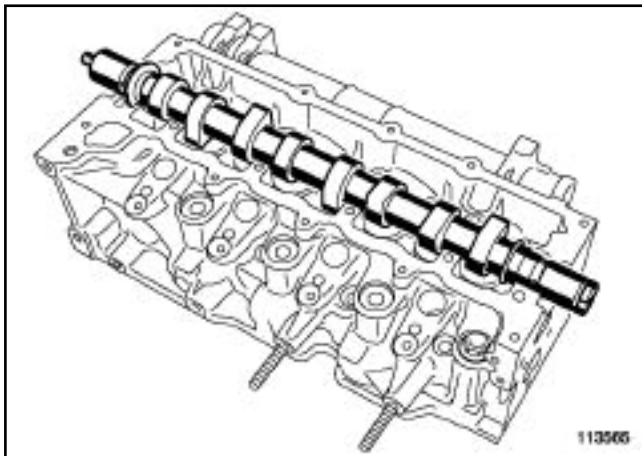


113564

Refit the pushrods observing their original position.

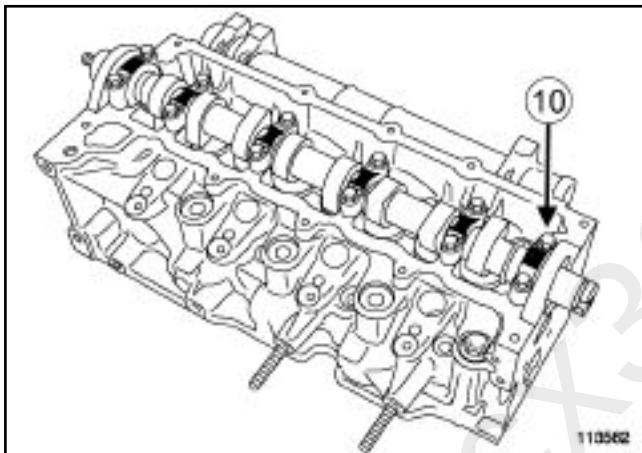
Lubricate the valve pushrods and the camshaft bearings with engine oil.

K9K, and 732 or 764



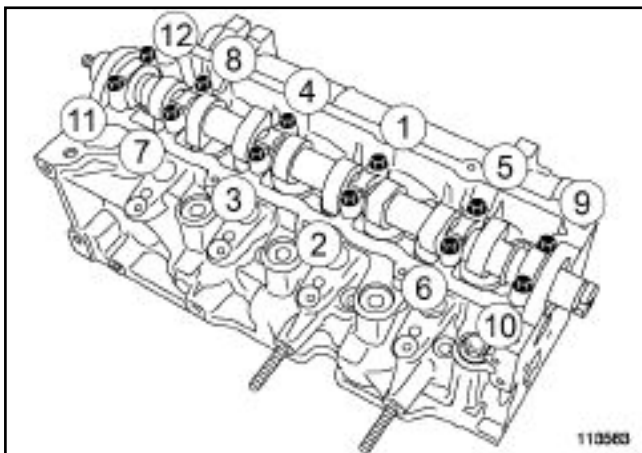
113565

Refit the camshaft.



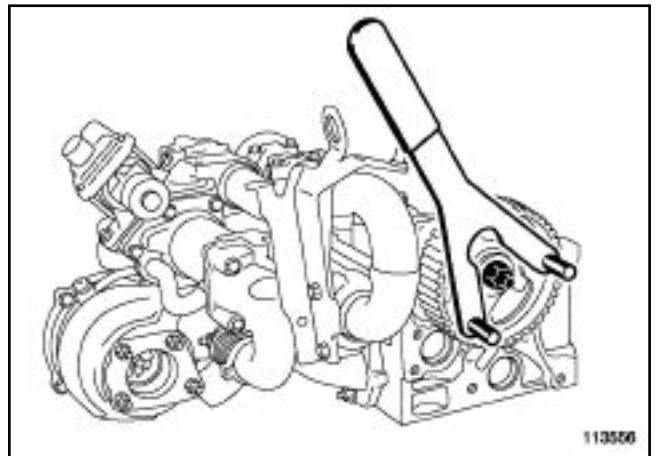
113562

Refit the camshaft bearing caps (observing their original positions, bearing No. 1 (10) engine flywheel end).



113563

Tighten to torque and in order **the crankshaft bearing cap mounting bolts** ($11 \pm 1.1 \text{ Nm}$).



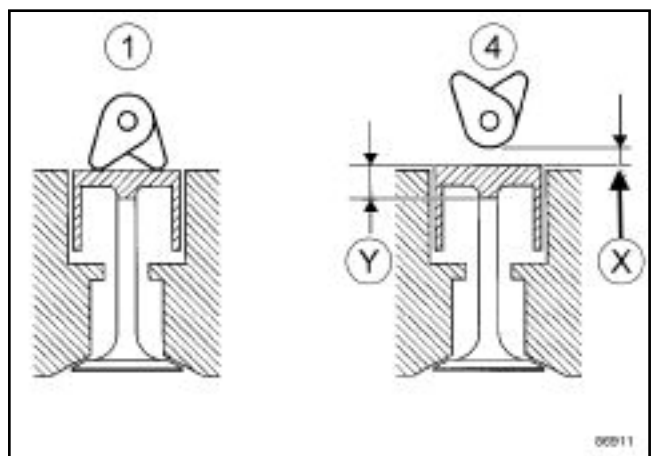
113556

Refit:

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

Tighten to torque **the mounting nut for the camshaft pulley** ($15 \pm 1.5 \text{ Nm}$), blocking the camshaft pulley with the (Mot. 799-01).

Check and adjust the valve clearance following the procedure below.



86911

Position the cylinder valves (1) in the end of exhaust stroke, beginning of inlet stroke position.

Measure the valve clearance (X) of the cylinder (4) using a set of shims:

- inlet valve clearance **0.20 mm**,
- exhaust valve clearance **0.40 mm**,

Note the clearance values.

Repeat the above operations on the other cylinders:

- position cylinder No. 3 at an angle and measure the clearance of cylinder No. 2,

K9K, and 732 or 764

- position cylinder No. **4** at an angle and measure the clearance of cylinder No. **1** ,

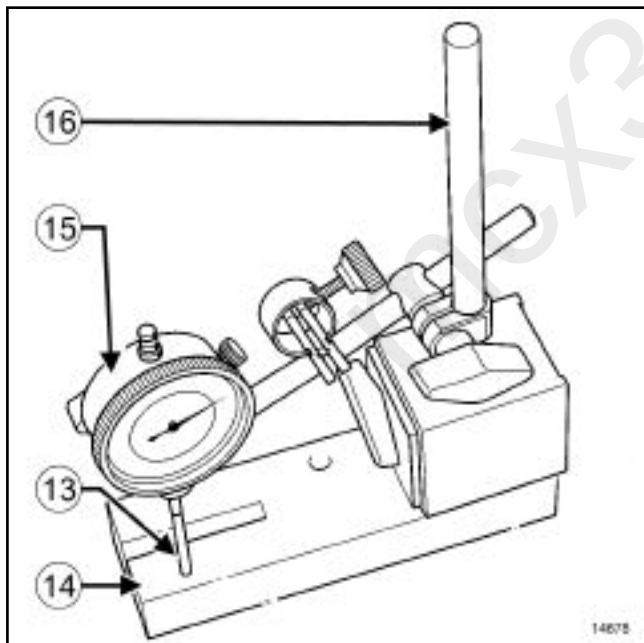
- position cylinder No. **2** at an angle and measure the clearance of cylinder No. **3** ,

Compare the values noted with the specified values.

Remove:

- the nut from the camshaft pulley,
- the camshaft pulley,
- the camshaft pulley hub,
- the camshaft bearing caps,
- the camshaft,
- the pushrod(s) which are outside of permitted tolerance values, noting their original position.

Undertake the following installation to determine the class of thickness of the valve pushrod.



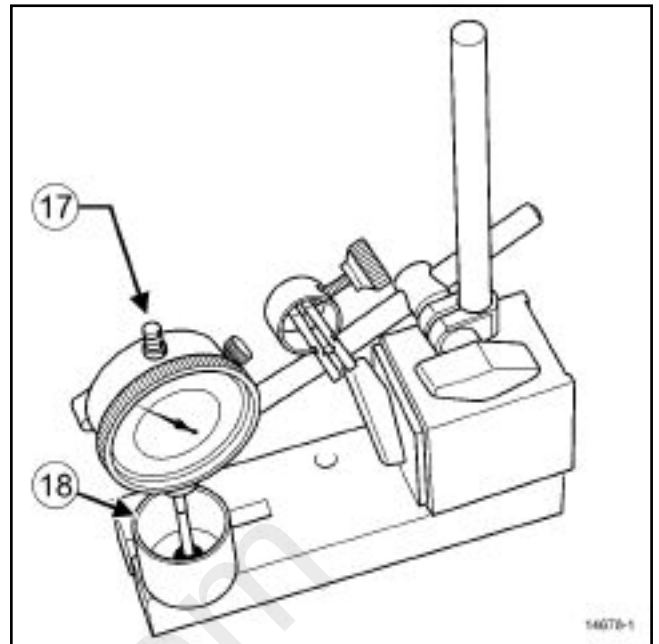
14678

Screw the extension piece (13) of the (Mot. 856-02) to a dial gauge (15) .

Fix the dial gauge (15) to a magnetic holder (16) .

Mount the dial gauge-magnetic holder assembly on the plate (14) of the (Mot. 252-01) .

Calibrate the dial gauge.



14678-1

Lift the top piece (17) of the dial gauge (without changing the position of the dial gauge-magnetic holder assembly).

Mount the valve pushrod (18) to be measured on the plate of the (Mot. 252-01) .

Take the measurement (Y) .

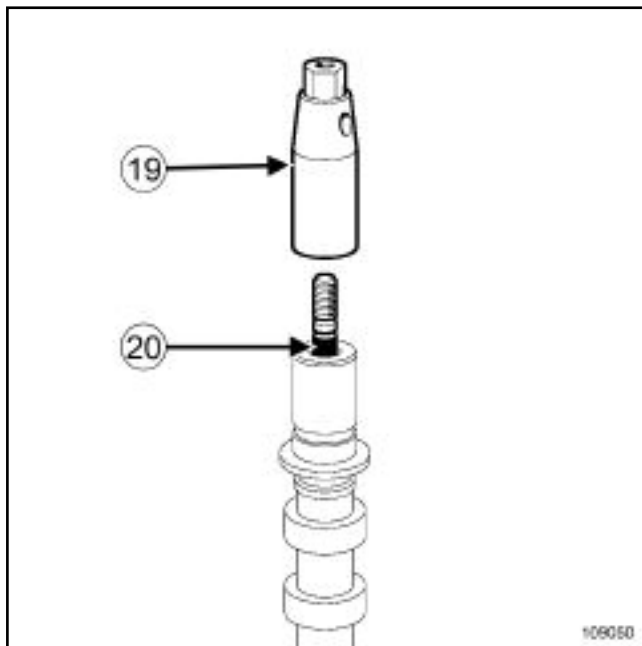
Repeat the preceding operations for the other valve pushrods to be measured.

Fit the new valve pushrod(s) in the cylinder head.

Check that the camshaft pulley mounting stud has not come loose. If so, the stud must be replaced following the procedure described below.

Place the camshaft in a vice fitted with a clamping jaw.

K9K, and 732 or 764



109050

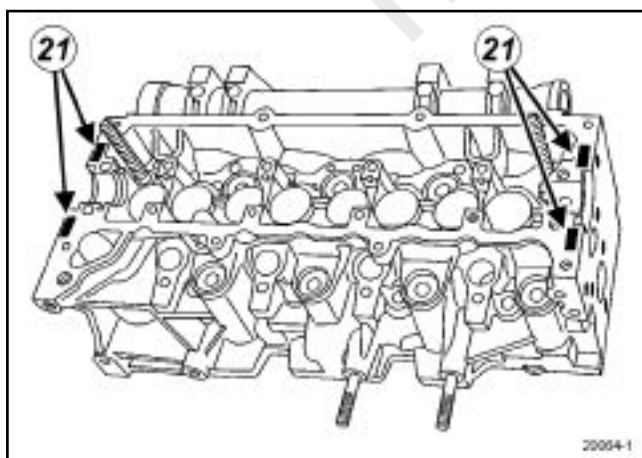
Remove the piston rings using a roller-type stud removal tool (19) .

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) .

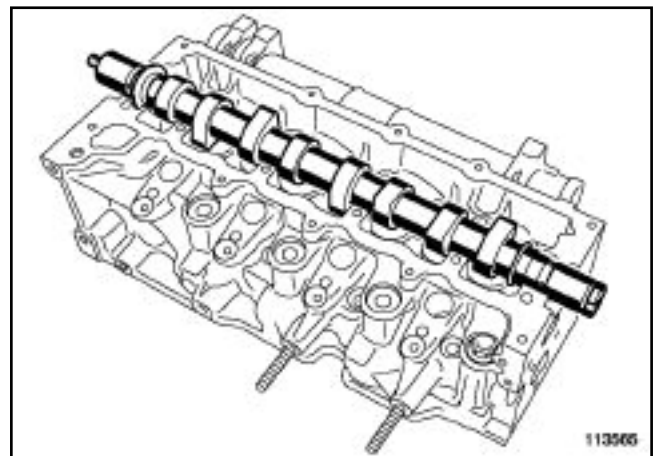
Oil the top of the valve pushrods and the camshaft bearings with engine oil.



20064-1

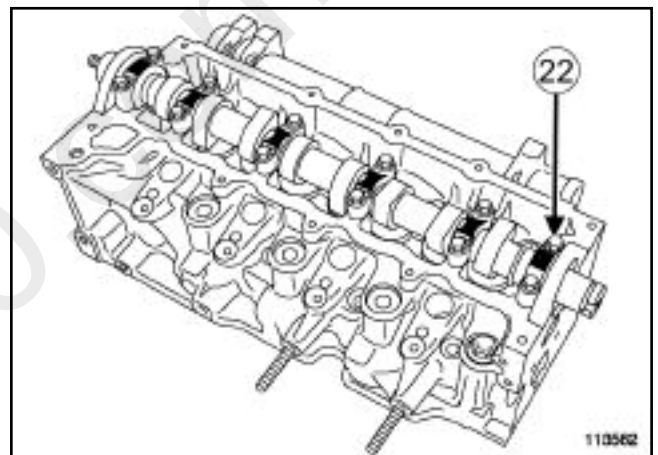
Degrease the surfaces of the camshaft bearing gas-kets nos. 1 and 6 (21) using degreaser.

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



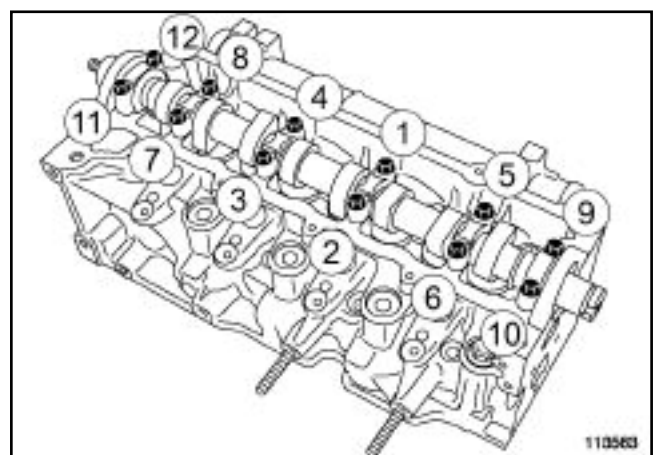
113565

Refit the camshaft.



113562

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



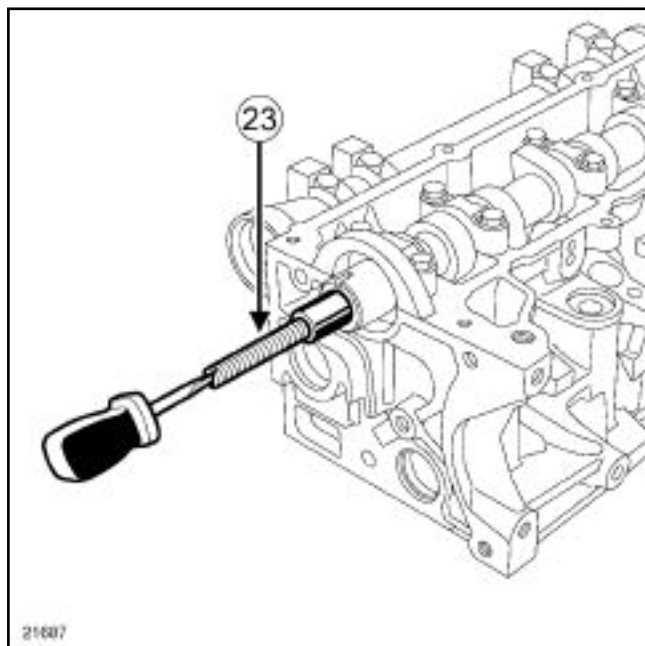
113563

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

K9K, and 732 or 764

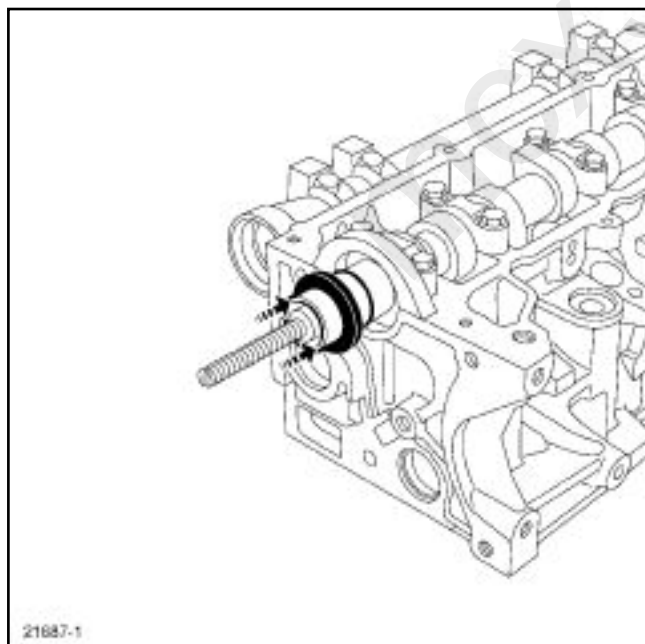
Apply degreaser to:

- the end of the camshaft at the timing end,
- the housing on the cylinder head of the camshaft gasket.



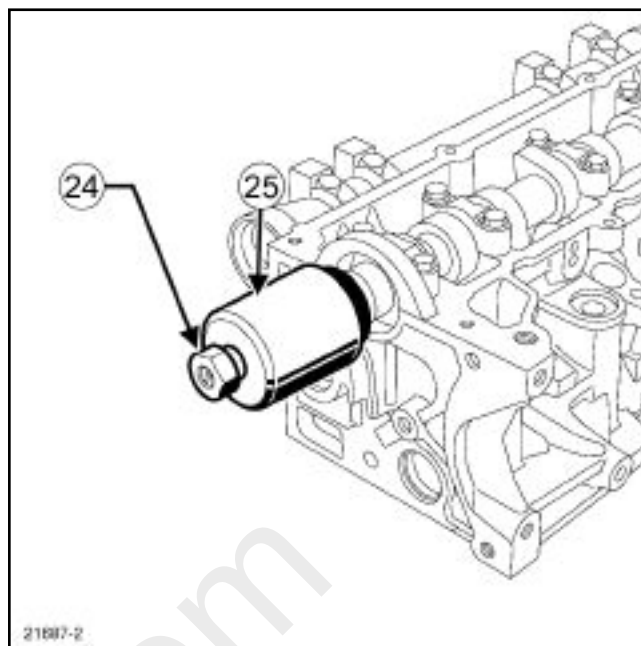
21687

Screw the shoulder stud (23) of the **(Mot. 1632)** onto the mounting stud of the camshaft pulley.



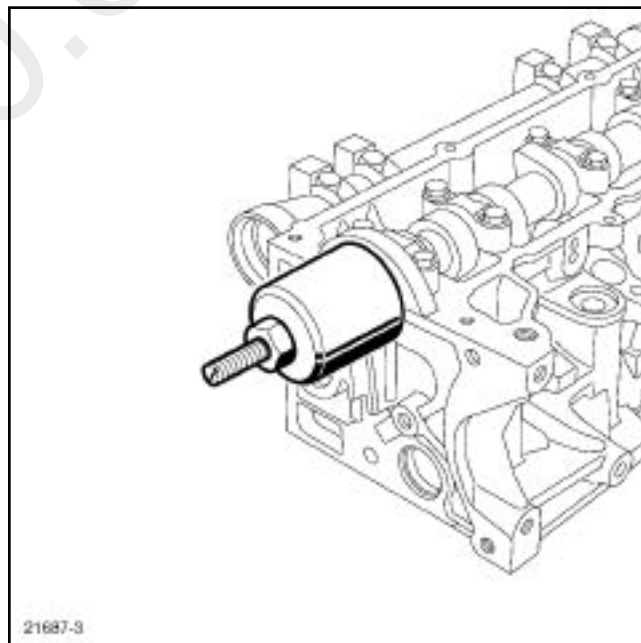
21687-1

Refit the camshaft gasket.



21687-2

Position the cover (25) and collar nut (24) of the tool **(Mot. 1632)**.



21687-3

Screw on the collar nut until the cover touches the cylinder head.

Remove:

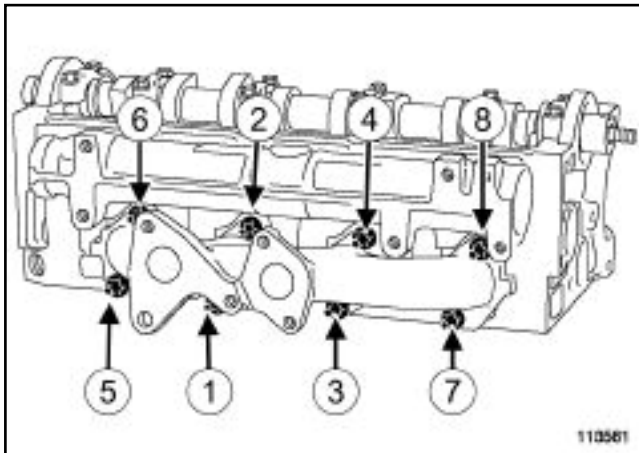
- the collar nut,
- the cap,
- the shoulder stud.

Using degreaser, degrease the surfaces of the exhaust manifold and cylinder head gaskets at the exhaust end.

K9K, and 732 or 764

Refit:

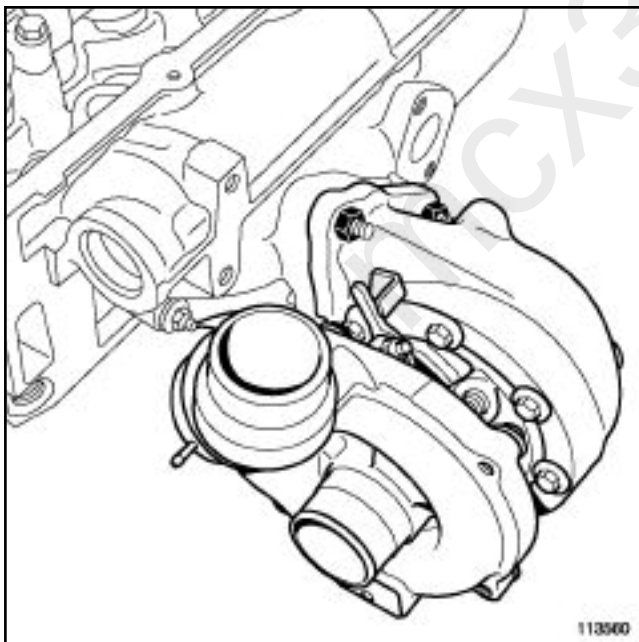
- a new turbocharger-exhaust manifold gasket,
- the exhaust manifold,
- the exhaust manifold mounting nuts.



113561

Tighten to torque and in order the **exhaust manifold mounting nuts** ($26 \pm 2.6 \text{ Nm}$).

Using degreaser, degrease the surfaces of the exhaust manifold (where the turbocharger enters) and the turbocharger gaskets.



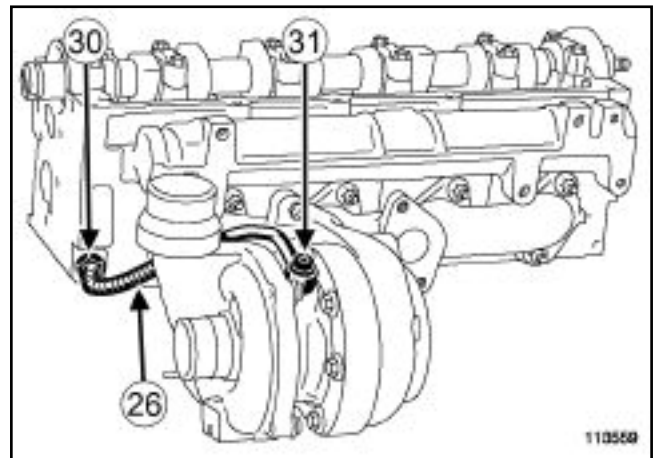
113560

Refit:

- the new turbocharger gaskets,
- the turbocharger.
- the turbocharger mounting nuts

Tighten to torque the **turbocharger mounting nuts** ($26 \pm 2.6 \text{ Nm}$).

Put a little engine oil from an oil can in the oil circuit of the turbocharger.



113559

Refit the turbocharger oil supply pipe (26) .

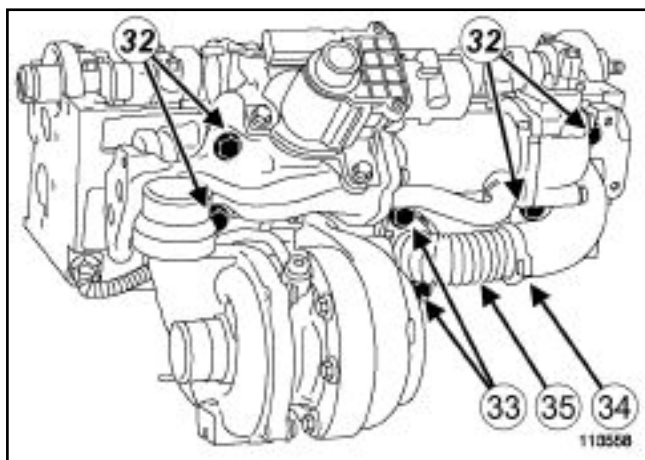
Screw:

- the cylinder head nut (30) ,
- the bolt (31) on the turbocharger.

Tighten to torque:

- the turbocharger oil supply pipe mounting bolt (turbocharger end) ($23 \pm 2.3 \text{ Nm}$) ,
- the turbocharger oil supply pipe mounting nut (cylinder head end) ($35 \pm 3.5 \text{ Nm}$) .

K9K, and 732 or 764



113558

Refit:

- the EGR valve-exchanger assembly,
- the mounting bolts (32) (without tightening them) of the EGR valve-exchanger.

Tighten to torque the **EGR valve-exchanger mounting bolts** ($25 \pm 2.5 \text{ Nm}$) . (32)

Refit:

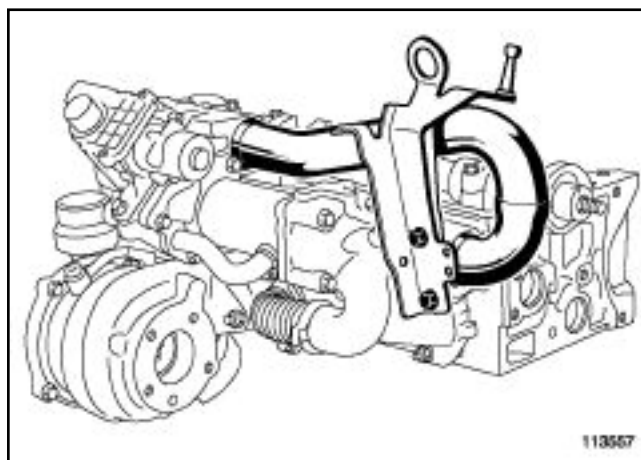
- the new exhaust gas recirculation pipe (35) fitted with its new snap-on clip (34) ,
- the mounting bolts (33) of the exhaust gas recirculation pipe.

Adjust the exhaust gas recirculation pipe in relation to the cooler support.

Lock the snap-on clip of the exhaust gas recirculation pipe using the (Mot. 1567) .

Tighten to torque the **mounting bolts of the exhaust gas recirculation pipe** ($35 \pm 3.5 \text{ Nm}$) (33) .

Fit the new O-ring seals to the inlet pipe.



113557

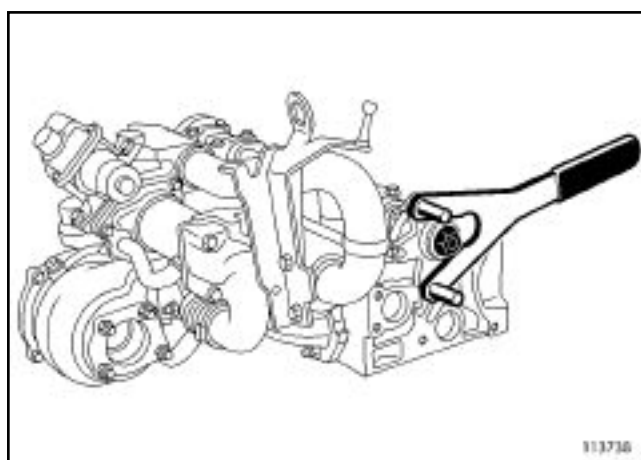
Refit:

- the inlet duct,
- the engine lifting eye (timing end),
- the engine lifting eye mounting bolts.

Tighten to torque the **engine lifting eye mounting bolts (timing end)** ($21 \pm 2.1 \text{ Nm}$) .

Refit:

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



113738

Immobilise the hub using the (Mot. 799-01) .

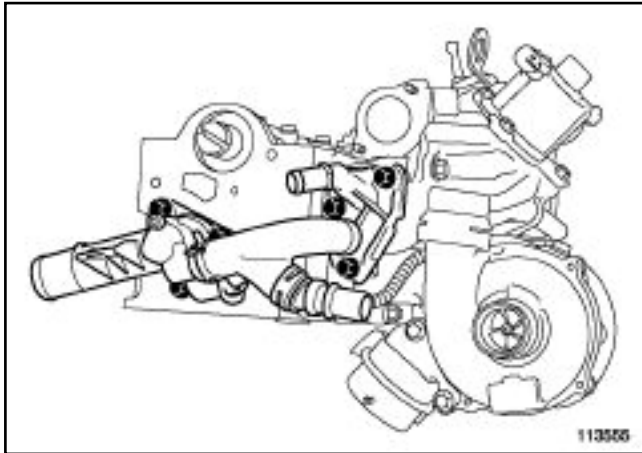
Tighten to torque and angle the **camshaft pulley hub nut** ($30 \pm 3 \text{ Nm} + 86^\circ \pm 6^\circ$) .

Refit the camshaft pulley (without tightening the mounting bolts).

Using degreaser, degrease the surfaces of the seals where the vacuum pump enters, the cylinder head coolant outlet and the EGR exchanger cover.

K9K, and 732 or 764

Refit new seals to the cylinder head coolant outlet and the EGR exchanger cover.

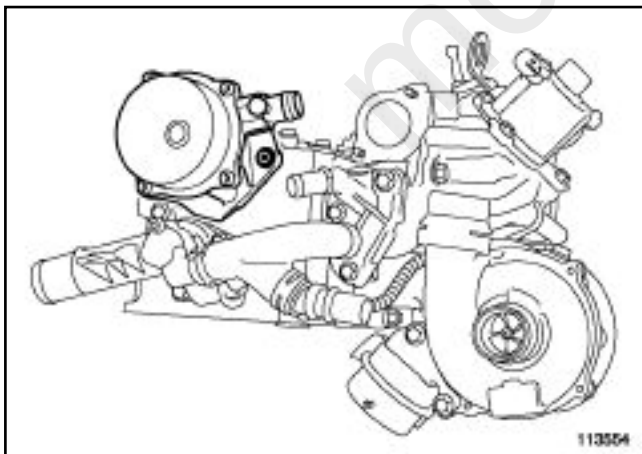


Refit:

- the cylinder head coolant outlet unit-EGR exchanger cover assembly,
- the cylinder head coolant outlet unit mounting bolts,
- the EGR exchanger cover mounting bolts.

Tighten to torque:

- **the cylinder head coolant outlet unit bolt (11 ± 1.1 Nm)**,
- **the EGR exchanger cover mounting bolt (12 ± 1.2 Nm)**.



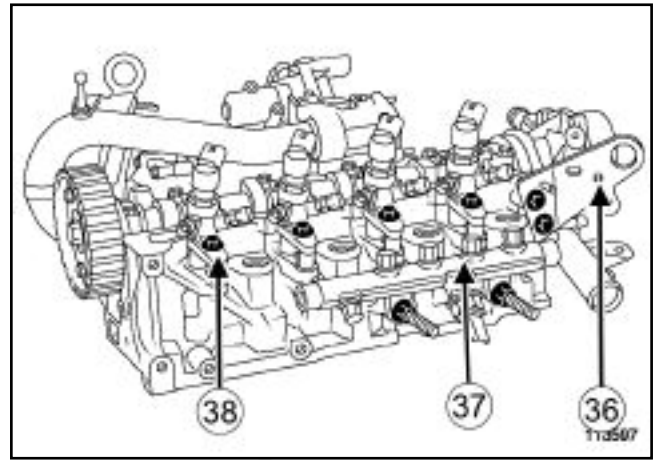
Refit:

- the vacuum pump,
- vacuum pump mounting bolts,

Tighten to torque the **vacuum pump mounting bolts (21 ± 2.1 Nm)**.

Refit the heater plugs.

Tighten to torque **the heater plugs (15 ± 1.5 Nm)** using a hinged wrench.



Refit:

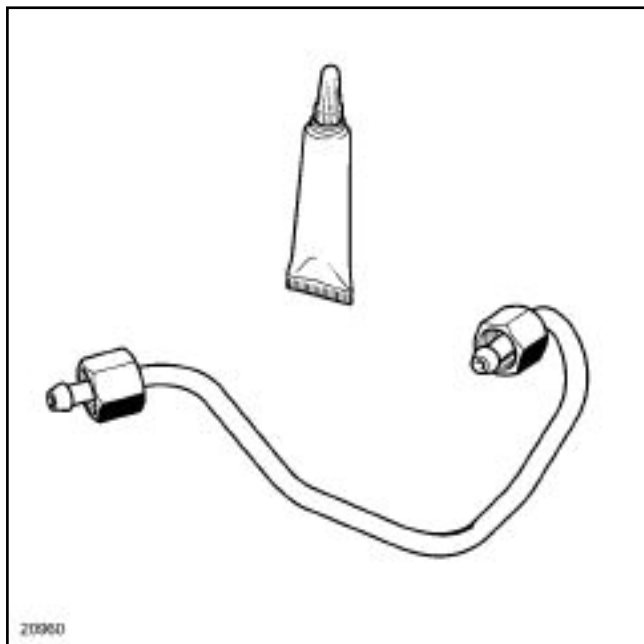
- engine lifting eye (flywheel end) (36) ,
- the injector rail (**without tightening the nuts**) ,
- the new heat protection washers,
- the injectors (observing their positions),
- the injector bracket spacer,
- the injector brackets,
- the injector bracket mounting bolts (38) .

Tighten to torque **the injector bracket mounting bolts (30 ± 3 Nm)**.

Note:

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

K9K, and 732 or 764



20960

Lightly lubricate the nut threads with oil from the applicator supplied with the new part, taking care not to insert it in the pipe.

Insert the high-pressure pipe olive in the injector high-pressure inlet taper.

Insert the high-pressure pipe olive in the rail high-pressure outlet taper.

Finger tighten the high-pressure pipe nuts, starting with the one located on the injector end.

Lightly tighten the nuts of the high-pressure pipes.

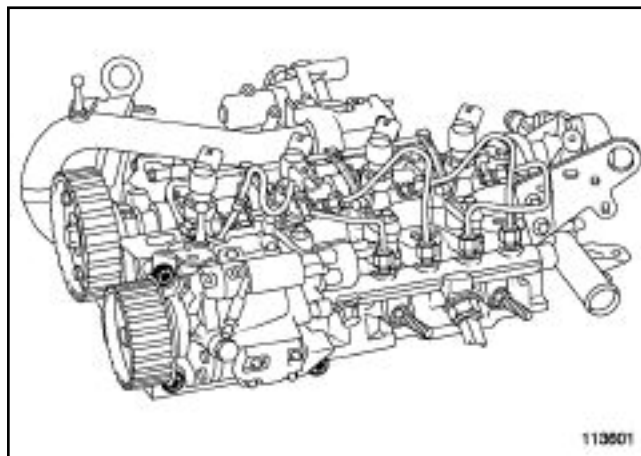
Tighten to torque the **injector rail mounting nuts** ($28 \pm 2.8 \text{ Nm}$).

Note:

Completely tighten one high-pressure pipe before moving to the next one.

Tighten to torque and in order (according to the part no. of the pipe) **the rail-injectors high-pressure pipe nuts** (24 ± 2.4 or $38 \pm 3.8 \text{ Nm}$) :

- injector rail side, using the **(Mot. 1566)** or a crow foot wrench,
- injector side using the **(Mot. 1566)** or with a wrench for high-pressure pipes.



113601

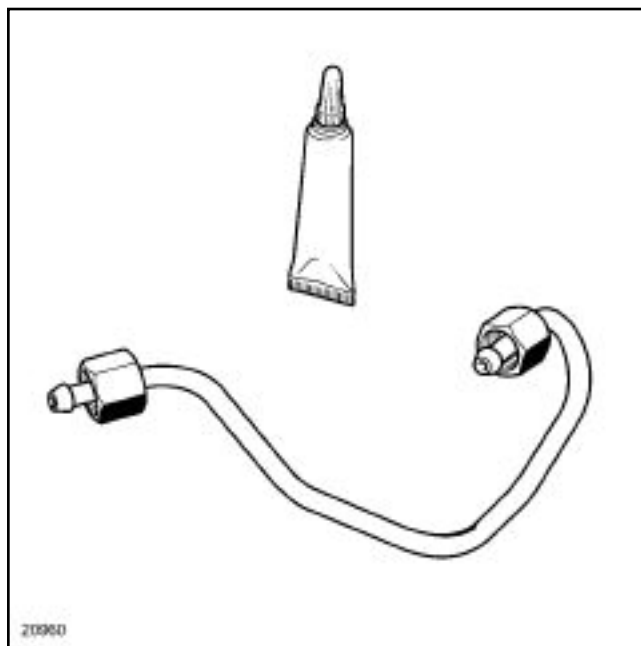
Refit:

- the high-pressure pump,
- the mounting bolts of the high-pressure pump

Tighten to torque the **high-pressure pump mounting bolts** ($21 \pm 2.1 \text{ Nm}$).

Note:

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



20960

Lightly lubricate the nut threads with oil from the applicator supplied with the new part, taking care not to insert it in the pipe.

Position the high-pressure pipe olive in the high-pressure spherical injector rail inlet.