RENAULT

Technical Note6006A

KXX, and K9K

K9K engine

Engine workshop repair manual

Edition 2

77 11 328 422 **MARCH 2004** **Edition Anglaise**

"The repair methods given by the manufacturer in this document are based on the technical specifications current when it was prepared.

The methods may be modified as a result of changes introduced by the manufacturer in the production of the various component units and accessories from which his vehicles are constructed."

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K9K engine

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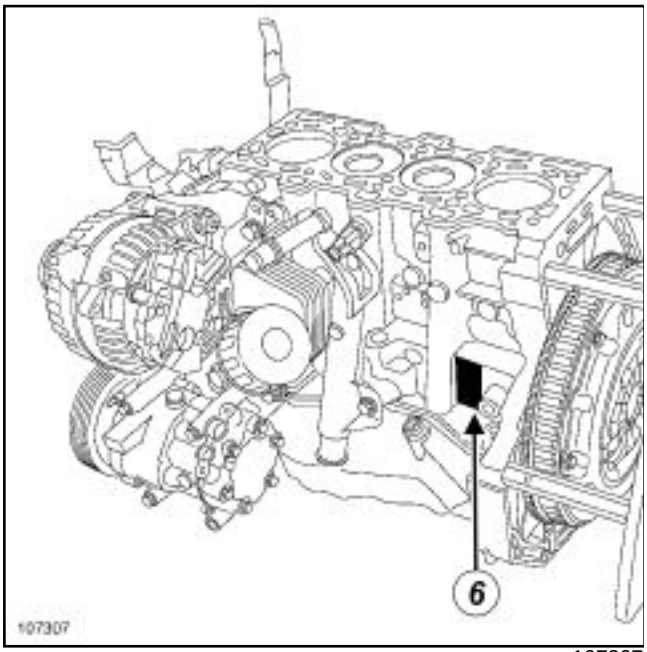
I - ENGINE IDENTIFICATION



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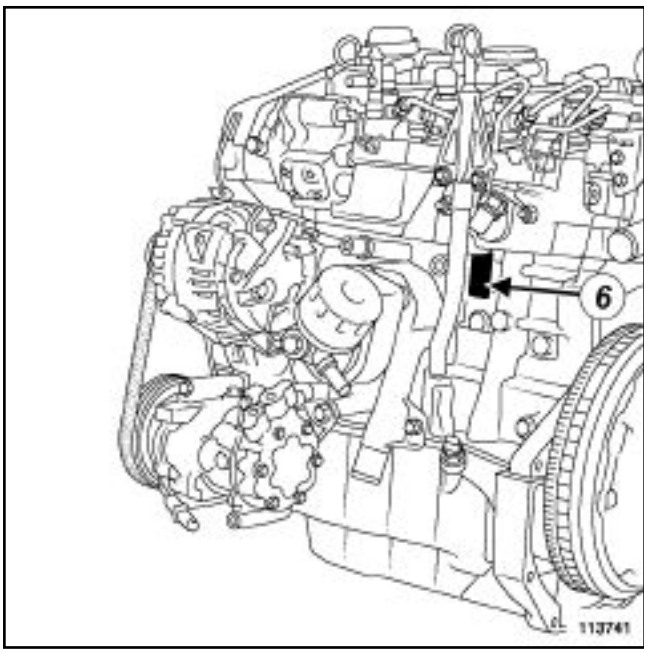

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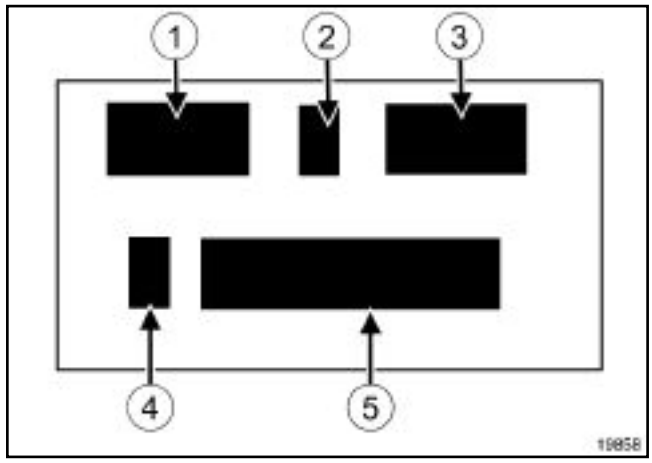
The engine can be identified by markings (**6**) located on the cylinder block.

Details of markings



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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

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II - ENGINE SPECIFICATION TABLES

Vehicle	After-Sales Type:	Engine type	Engine suffix	Cubic capacity (cc)	Bore (mm)	Stroke (mm)	Compression ratio
Renault CLIO II	XB07 XB1W XB24	K9K	700	**1461**	**76**	**80.5**	**18.25:1**
	XB08		702				
	XB07		704				
	XB24		704				**17.9:1**
	XB23 XB2E		706				
	XB09		710				**18.25:1**
	XB2G		712				**17.9:1**
Renault KANGOO	XC07	K9K	700	**1461**	**76**	**80.5**	**18.25:1**
	XC08 XC1S		702				
	XC07 XC08		704				
	XC1R		704				**17.6: 1**
	XC09		710				**18.25:1**
	XC1E		714				**17.9:1**
	XC1F		716				
	XC1G		718				
Renault MEGANE II	XM0F	K9K	722	**1461**	**76**	**80.5**	**18.25:1**
	XM0T		722				**17.6:1**
	XM1F		724				**17.9:1**
	XM02		728, 729				**17.9:1**
	XM13		728				**17.6: 1**
	XM1E		732				**15.3:1**
Renault CLIO III	XR0H	K9K	764	**1461**	**76**	**80.5**	**15.3:1**
	XR0F		766				**17.9:1**
	XR0G		768				

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Vehicle	After-Sales Type:	Engine type	Engine suffix	Cubic capacity (cc)	Bore (mm)	Stroke (mm)	Compression ratio
Renault MODUS	XP0D	K9K	750	**1461**	**76**	**80.5**	**17.6: 1**
	XP08 XP0E		752				
	XP0F		760				**17.9:1**
	XP0G		762 ,768				
	XP0H		764				**15.3:1**
	XP0F		766				**17.9:1**
Renault DACIA	XS0J	K9K	790	**1461**	**76**	**80.5**	**17.9:1**
	XS0K		792				
Nissan ALMERA	-	K9K	260	**1461**	**76**	**80.5**	**18.25:1**
Nissan MICRA	-	K9K	270, 272, 274, 276	**1461**	**76**	**80.5**	**18.25:1**

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Equipment required
offset thread repair kit

I - SAFETY

General information

All information contained in these manuals is intended exclusively for automotive industry professionals.

The documentation is intended to cover all vehicles in the **RENAULT** range throughout the world, but may not cover equipment designed for use in specific countries.

The methods and fault finding procedures recommended and described in this manual have been designed by automotive industry repair professionals.

a - General recommendations

Observe basic principles of vehicle repair.

The quality of repair depends first and foremost on the care exercised by the person in carrying it out.

To ensure good repair:

- use recommended professional products and original Renault parts,
- observe the tightening torques,
- replace the recommended roll pins, nuts or bolts, after each removal,
- clean and degrease the sections to be bonded, to ensure they bond correctly.

The design quality of our vehicles demands that nothing is left to chance in making a good repair, and it is essential to refit parts or components exactly as they were originally (for instance: heat shields, wiring routing, pipe routing).

Use professional products and apply them with care, for example do not apply too much sealant to the joint face.

b - Special tooling - ease of use

The repair procedures have been designed using special tools; they must therefore be carried out using these tools to ensure a high degree of working safety and quality of repair.

The equipment we have approved has undergone careful research and testing, and must be used and maintained with care.

c - Reliability - updating

Since component specifications are subject to change during their commercial life, it is essential to check whether there are any Technical Note updates when seeking information.

d - Safety

Certain devices and parts must be handled with particular attention to safety and cleanliness and, above all, with due care.

The safety symbol used in this manual indicates that special attention must be paid to the procedure or the tightening torque values.

WARNING
Do not use flammable products to clean parts.

Working safely:

- use appropriate tools which are in good condition (using «multipurpose» tools, such as adjustable pliers, should be avoided wherever possible),
- adopt a correct posture and technique when performing heavy work or lifting loads,
- check that the working area is clean and tidy during the operation,
- use personal protection (gloves, safety goggles, work shoes, masks, skin barrier creams, etc.),
- always follow the safety instructions associated with the operation to be performed,
- do not smoke when working on vehicles,
- do not use toxic products in unventilated rooms,
- do not ingest any chemicals (brake fluid, coolant, etc.).

Respecting the environment:

- sort waste according to its particular qualities,
- do not burn waste products (tyres, etc.).

e - Conclusion

The procedures contained in this document merit your attention. Please read them carefully in order to reduce the risk of injury, and avoid using incorrect procedures that could damage the vehicle or make it dangerous to use.

Following the recommended procedures will help you to provide a quality of service which will ensure the vehicles achieve the highest levels of performance and reliability.

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Maintenance and repair operations must be carried out under the proper conditions to ensure that our vehicles run safely and reliably.

II - CLEANLINESS

Risks relating to contamination

The high-pressure direct injection system is highly sensitive to contamination. The risks caused by contamination are:

- damage to or destruction of the high-pressure injection system,
- a component seizing,
- a component not being properly sealed.

All After-Sales operations must be performed under very clean conditions. Having carried out an operation in good conditions means that no impurities (particles a few microns in size) have penetrated the system during dismantling.

The cleanliness principle must be applied from the filter to the injectors.

What are the sources of contamination?

- metal or plastic chips,
- paint,
- fibres:
  - cardboard,
  - brushes,
  - paper,
  - clothing,
  - cloth,
- foreign bodies such as hair,
- ambient atmosphere,
- etc.

WARNING
Cleaning the engine using a high-pressure washer is prohibited because of the risk of damaging connections. In addition, moisture may collect in the connectors and create electrical connection faults.

a - Cleaning cloths

Use lint free cleaning cloths (part number **77 11 211 707**).

The use of rags or ordinary paper towels is prohibited: these produce lint and lose fibres, which then contaminate the fuel circuit.

Each cloth must only be used once.

b - Blanking plugs

The blanking plugs are used to cap the fuel circuit once it is opened and to therefore prevent contaminants from entering.

A set of blanking plugs should be used once only and used plugs must be discarded after use: once used, the plugs are soiled and cleaning them is not sufficient to make them reusable.

Unused plugs must also be discarded and not used again for any other operation on an injection system.

Blanking plug kit part number:

- K9K (**DELPHI** injection): **77 01 206 804**
- K9K (**SIEMENS** injection): **77 01 476 857**

c - Protective bags

Use hermetically resealable plastic bags, using adhesive tape, for example, to store components which will be refitted and reused. Stored parts will therefore be less subject to the risk of contamination.

These bags must be used once only: once they have been used, they are to be discarded.

d - Cleaning products

Two cleaning products can be used:

- an aerosol spray brake cleaner (part number **77 11 226 128**).
- an injector cleaner (part number **77 11 224 188**),

To use the injector cleaner, be sure to have a clean brush in good condition (the brush must not lose any bristles) as well as a clean container which has no impurities in it.

Note:
Use a new injector cleaner each time work is carried out (a used cleaning agent will contain impurities).

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III - GENERAL RECOMMENDATIONS

1 - Advice to be followed before any operation

1) Carry out the work in a clean working area and take care to protect removed components from dust using plastic bags which are hermetically resealable, for example.

2) Always order the following from the Parts Department before carrying out work:

- **a new blanking plug kit** ; these are specific to the engine
- a sufficient number of lint free **cleaning cloths** .
- one of the two **cleaning products** for fuel pipe unions,
- **the parts always to be replaced** after each removal operation mentioned in the operational procedures specific to the vehicle.

3) Wear safety goggles fitted with side shields to prevent the cleaning product from splashing the eyes.

4) Wear latex safety gloves to avoid prolonged contact with the skin.

> Note:
> If wearing leather protective gloves, cover these with latex gloves.

5) Before any operation on the injection system, using plastic bags or clean cloths, protect:

- the accessories and timing belts,
- the electrical accessories (starter, alternator, power-assisted steering pump, sensors and electrical connectors),
- the flywheel face.

2 - Instructions to be followed during the operation

Wash your hands before and while carrying out the work.

Change the latex safety gloves if they become soiled or damaged.

All components removed from the injection system must be stored in a hermetically sealed plastic bag once they have been capped.

Reseal the bag hermetically using adhesive tape, for example, even if the bag must be opened shortly afterwards: ambient air can be a source of pollution.

After opening the fuel circuit, the use of brushes, cleaning agents, air blow guns, rifle-type brushes or standard cloths is strictly prohibited: These items are likely to allow impurities to enter the system.

When replacing a component with a new one or when refitting it after storing it in a plastic bag, do not unpack it until it is time to fit it on the vehicle.

3 - Cleaning

There are currently two procedures for cleaning the fuel circuit before opening it in order to carry out work in the workshop.

These procedures enable the fuel circuit to be cleaned to prevent contamination from entering: they both have the same end result and neither is preferred over the other.

a - Using the injector cleaning agent

Clear the access to the unions that need opening, following the work procedures specific to the vehicle (see the relevant Workshop Repair Manual).

Protect sections which are sensitive to fuel leaks.

Pour the injector cleaning agent into a container which is free from impurities.

> **IMPORTANT**
> Wear latex safety gloves when using the cleaning agent.

Dip a clean brush, which is not shedding bristles, into the container of injector cleaning agent.

> **IMPORTANT**
> Wear safety goggles fitted with side shields during this operation.

Clean the unions carefully using the brush and the injector cleaning agent.

Blast the components that have been cleaned with compressed air (tools, workbench, and also parts, unions and around the injection system). Make sure there are no brush bristles remaining and that the area is clean.

Wipe the sections that were cleaned with fresh cleaning cloths.

Open the circuit at the unions and immediately fit the relevant blanking plugs.

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WARNING

Do not blast with compressed air once the fuel circuit is open, otherwise impurities may enter the system. Use cleaning cloths only, if necessary.

b - Using the brake cleaning agent

Clear the access to the unions that need opening, following the work procedures specific to the vehicle (see the relevant Workshop Repair Manual).

Protect sections which are sensitive to fuel leaks.

IMPORTANT

Wear latex safety gloves when using the cleaning agent.

IMPORTANT

Wear safety goggles fitted with side shields during this operation.

Spray the brake cleaning agent onto the unions to be opened.

Clean the unions carefully using fresh cleaning cloths.

Blast the components that have been cleaned with compressed air (tools, workbench, and also parts, unions and around the injection system). Make sure there are no brush bristles remaining and that the area is clean.

Open the circuit at the unions and immediately fit the relevant blanking plugs.

WARNING

Do not blast with compressed air once the fuel circuit is open, otherwise impurities may enter the system. Use cleaning cloths only, if necessary.

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4 - Instructions for fitting the plugs

K9K, and 732 or 764

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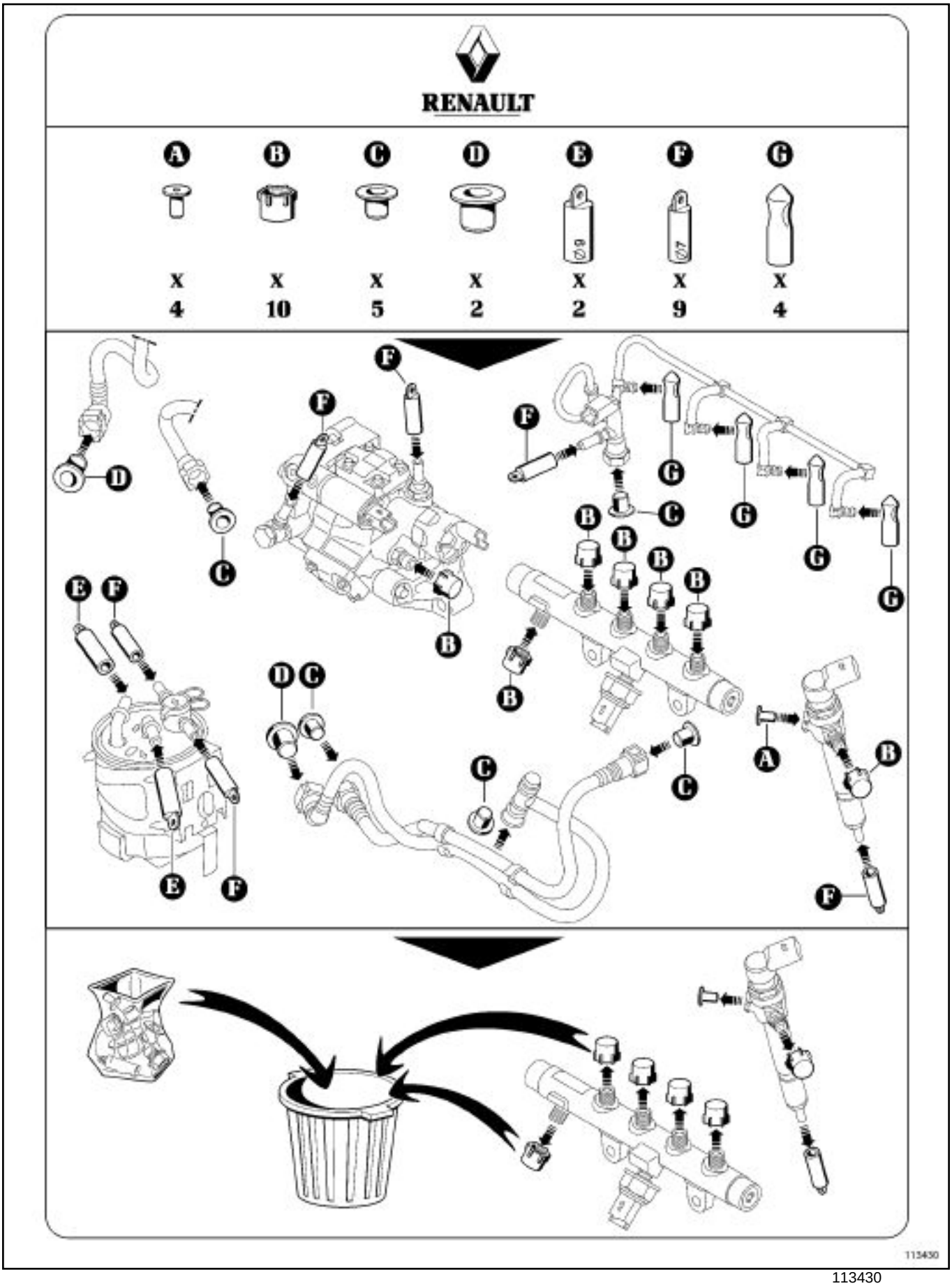
Part no. 77 01 476 857



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K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 714 or 716 or 718 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 766 or 768 or 790	

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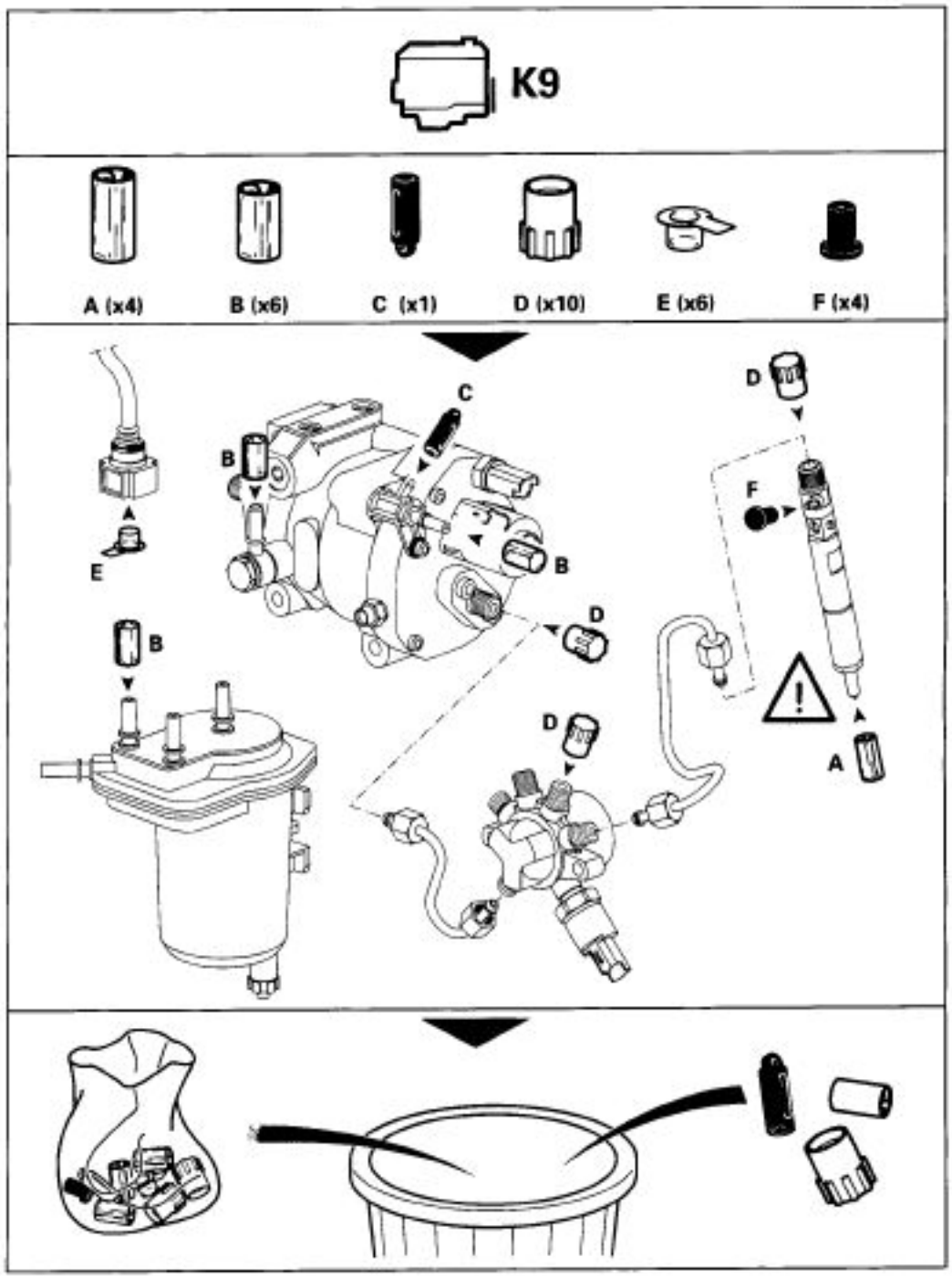
Part no. 77 01 206 804



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5 - Engine cleaning

Protect the various accessories to prevent water and cleaning products splashing on them.

Do not allow water to enter the inlet pipes.

6 - Cleaning the engine parts

WARNING
When cleaning parts, it is essential to not knock the parts against each other, or their mating faces may be damaged and therefore their adjustments may be altered, which could damage the engine.

7 - Fitting relieved threads

The tapped holes of all parts including the engine (except the rocker cover) may be repaired using the **offset thread repair kit** .

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I - PARTS ALWAYS TO BE REPLACED AFTER REPAIRING THE ENGINE

- All seals
- The oil filter
- The copper washers on the injector holders,
- The high pressure injection pipes,
- The pipe plugs,
- The valve guides
- The valve stem seals
- The cooling jets at the bottom of the piston
- The engine flywheel bolts
- The crankshaft bearing cap bolts
- The con rod cap bolts
- The camshaft pulley nut
- The tensioning rollers and pulleys for the accessories and timing belts
- The bolts for the accessories belt mechanical tensioning roller
- The accessories and timing belts
- The crankshaft accessories pulley bolt
- The cooling circuit hoses if they are damaged
- The thermostat
- The turbocharger plastic pipes.

II - CONSUMABLES

Type	Quantity	Component concerned	Part no.
DÉCAPJOINT	Coat	The joint faces	**77 01 405 952**
SILICONE ADHESIVE SEAL	Bead	Crankshaft bearing cap no. 1 Cylinder block-sump connection	**77 11 227 484**
LOCTITE 518	Bead	Camshaft bearing caps no. 1 and no. 6	**77 01 421 162**
"VARYBOND 12-71" HIGH STRENGTH THREADLOCK	1 - 2 drops	Coolant pump bolts	**77 11 230 112**
DEGREASER	Coat	The joint faces	**77 11 224 559**
CLEANING CLOTHS	-	Injection circuit	**77 11 211 707**
SET OF BLANKING PLUGS	-	Injection system **DELPHI**	**77 01 206 804**
SET OF BLANKING PLUGS	-	Injection system **SIEMENS**	**77 01 476 857**
INJECTOR CLEANING PRODUCT	Coat	Injection system	**77 11 224 188**
BRAKE CLEANER	Coat	Injection system	**77 11 226 128**
GREY SCUFF PAD	-	The joint faces	**77 01 405 943**

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UPPER ENGINE

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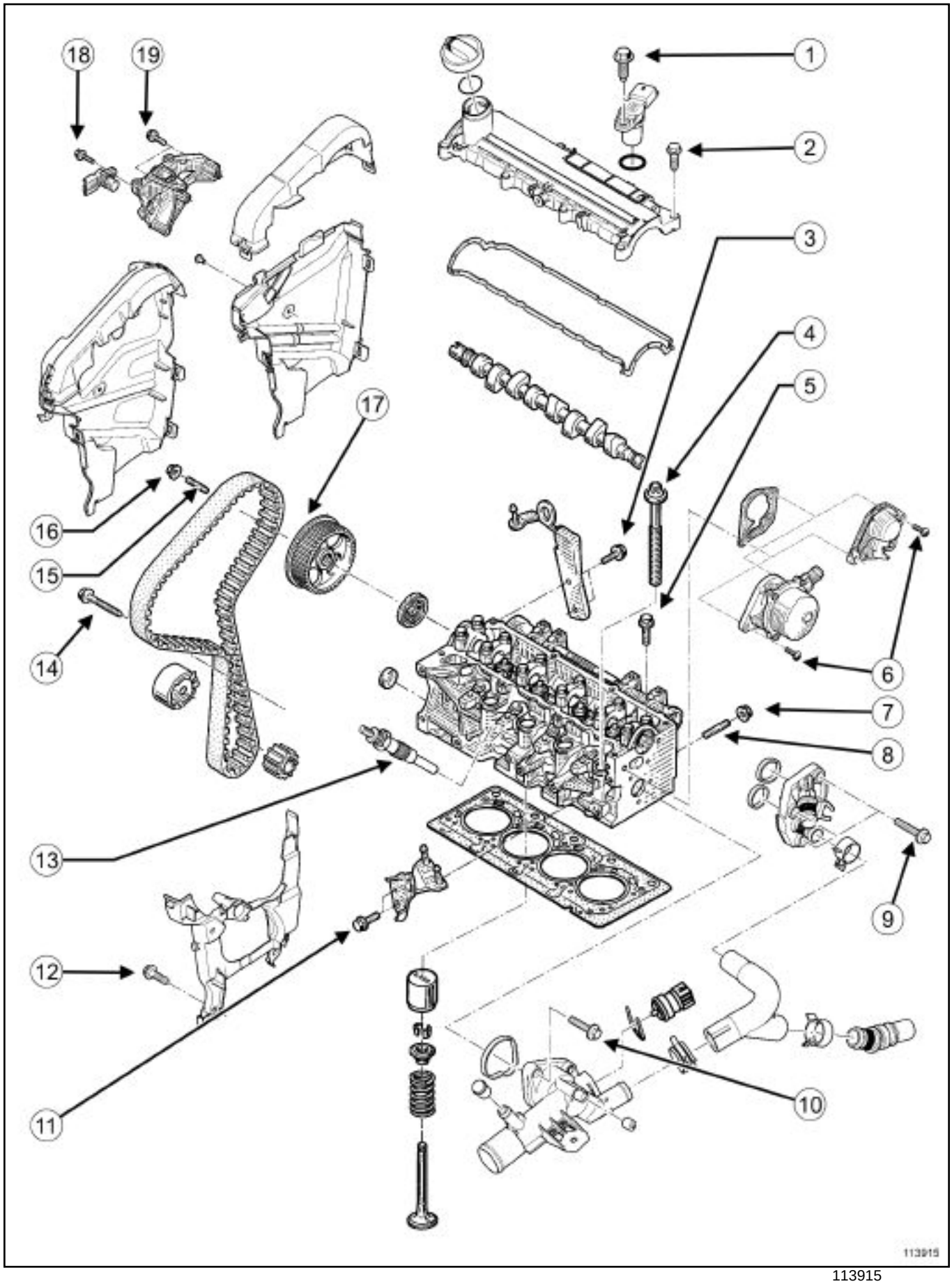

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Tightening torques in Nm and/or in degrees		
(**1**)	cylinder marking sensor bolt	**8 ± 0.8**
(**2**)	Rocker cover bolts	**12 ± 1.2**
(**3**)	Lifting eye bolts (timing end)	Bolt H M8x125-16 **21 ± 2.1** Bolt H M6x100-23 **10 ± 1**
(**4**)	Cylinder head bolts	**25 ± 2.5 + 255° ± 10°**
(**5**)	Camshaft bearing cap bolts	**11 ± 1.1**
(**6**)	Vacuum pump bolt	**21 ± 2.1**
(**7**)	Exhaust manifold nut	**26 ± 2.6**
(**8**)	Exhaust manifold stud	**8 ± 0.8**
(**9**)	EGR cooler cover bolt	**12 ± 1.2**
(**10**)	Cylinder head coolant pipe housing outlet bolt	**11 ± 1.1**
(**11**)	Engine lifting eye bolts (flywheel end)	**13 ± 1.3**
(**12**)	Inner timing cover bolt	**9 ± 0.9**
(**13**)	Heater plug	**15 ± 1.5**
(**14**)	Timing tension wheel bolt	**27 ± 2.7**
(**15**)	Camshaft pulley stud	**10 ± 1 at 14 ± 1.4**
(**16**)	Camshaft pulley nut	**30 ± 3 + 86° ± 6°**
(**17**)	Camshaft pulley ring gear bolt	**14 ± 1.4**
(**18**)	Cylinder marking sensor bolt	**8 ± 0.8**
(**19**)	Cylinder head suspended mounting bolt	**25 ± 2.5**

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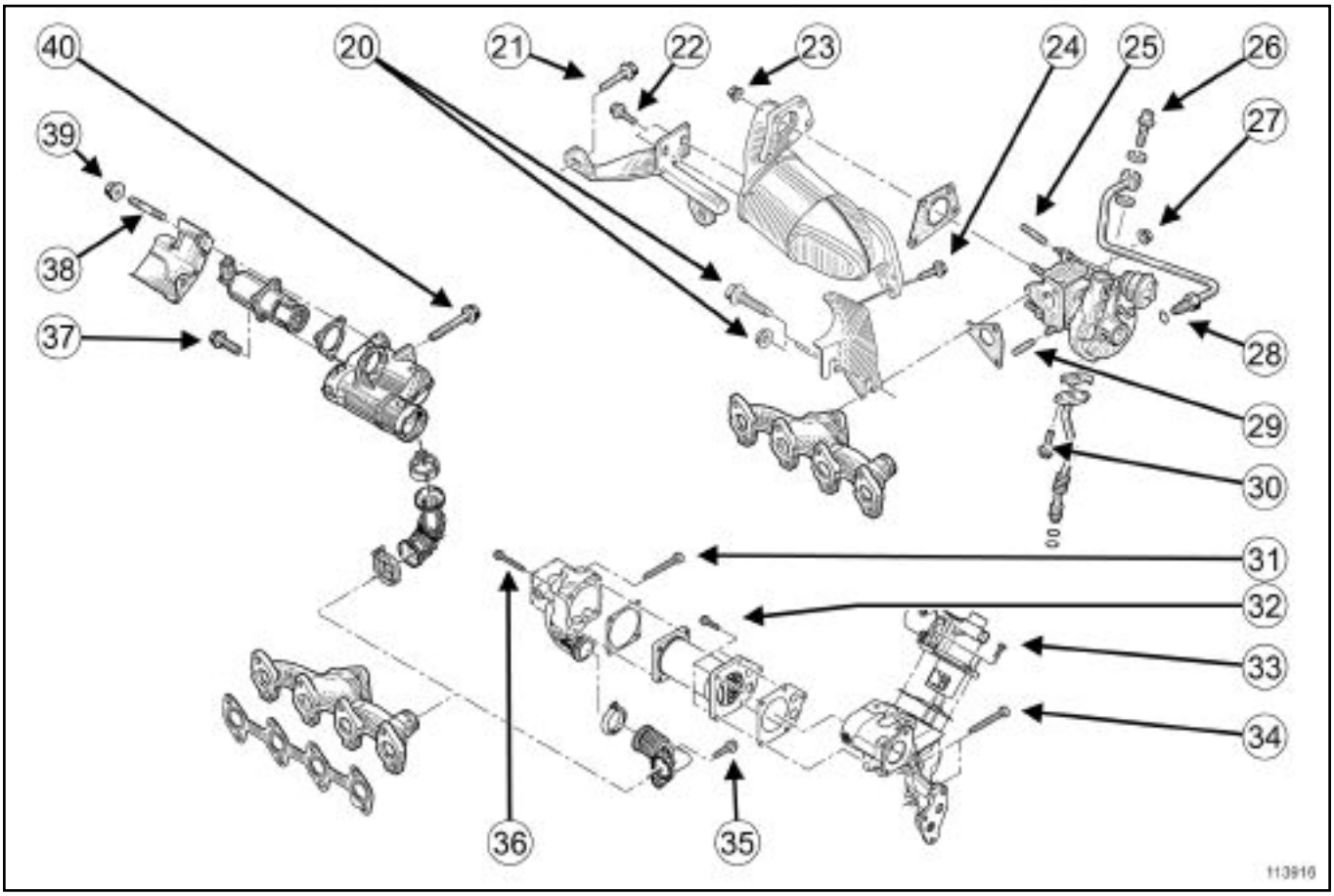

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Couple de serrage en N.m et / ou degrés		
(**20**)	Downstream catalytic converter stay nut and bolt (gearbox side)	**21 ± 2.1**
(**21**)	Upstream catalytic converter stay bolt (engine side)	**44 ± 4.4**
(**22**)	Upstream stay bolt on the catalytic converter	**26 ± 2.6**
(**23**)	Catalytic converter-turbocharger nut	**26 ± 2.6**
(**24**)	Downstream stay bolt on the catalytic converter	**21 ± 2.1**
(**25**)	Turbocharger stud	**9 ± 0.9**
(**26**)	Turbocharger oil supply pipe bolt on the turbocharger.	**23 ± 2.3**
(**27**)	Turbocharger nut on the manifold	**26 ± 2.6**
(**28**)	Turbocharger oil supply pipe bolt on the cylinder head	**Collar** nut to **35 ± 3.5 (without high strength threadlock)** **Collarless** nuts to **23 ± 2.3 (with high strength threadlock)**
(**29**)	Turbocharger stud	**9 ± 0.9**

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Couple de serrage en N.m et / ou degrés		
(**30**)	Turbocharger oil retum pipe bolt	**12 ± 1.2**
(**31**)	Timing end cooler support bolt	**25 ± 2.5**
(**32**)	Exhaust gas cooler bolt	**12 ± 1.2**
(**33**)	EGR solenoid valve bolt	**10 ± 1**
(**34**)	Flywheel end cooler support bolt	**25 ± 2.5**
(**35**)	Exhaust gas inlet pipe bolts	**35 ± 3.5**
(**36**)	Timing end cooler support bolt	**12 ± 1.2**
(**37**)	Exhaust gas recirculation solenoid valve bolt	**12 ± 1.2**
(**38**)	Exhaust gas recirculation solenoid valve stud	**4 ± 0.4**
(**39**)	Exhaust gas recirculation solenoid valve nut	**12 ± 1.2**
(**40**)	Solenoid valve support bolts	**21 ± 2.1**

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LOWER ENGINE:

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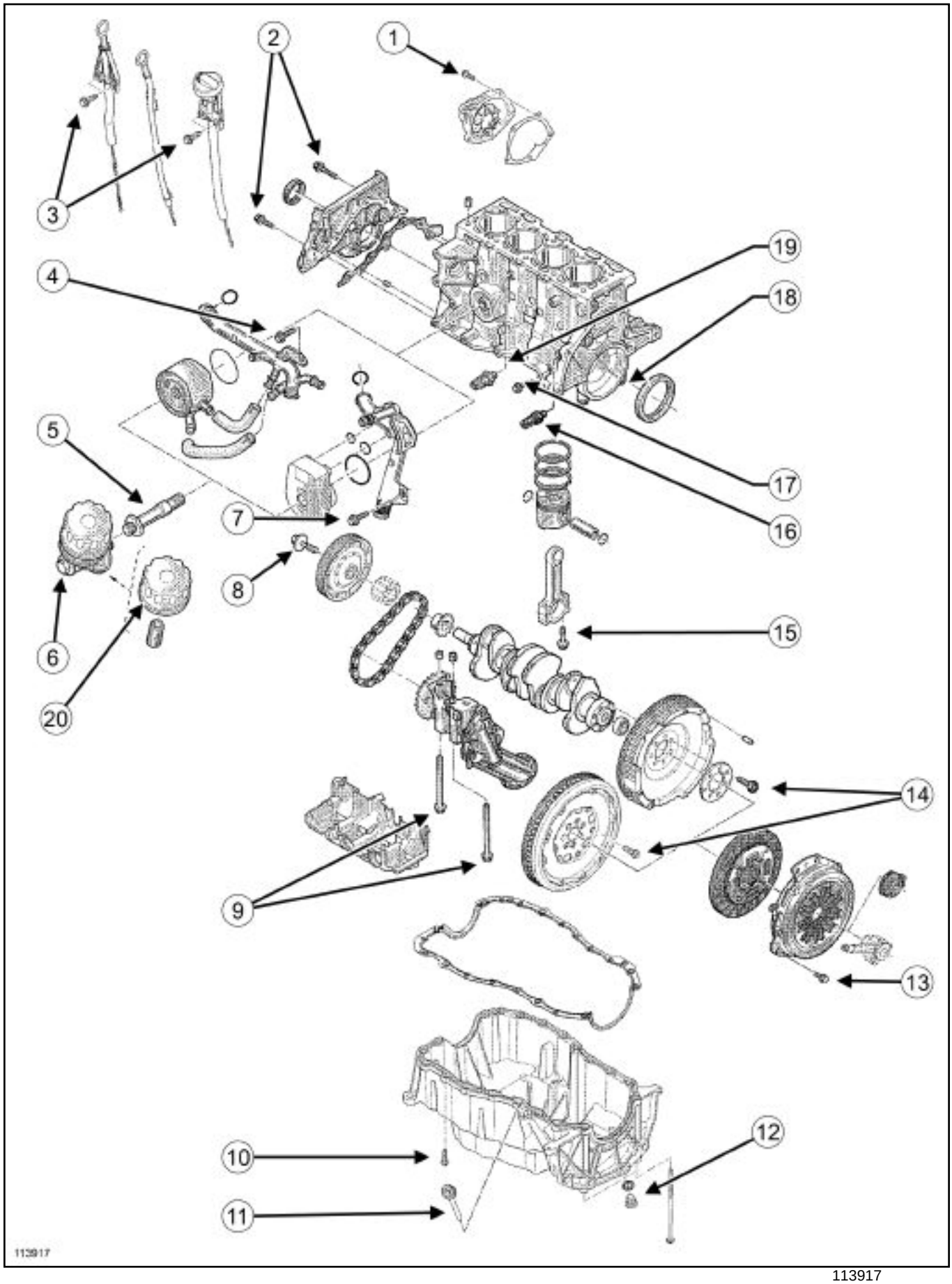

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Couple de serrage en N.m et / ou degrés		
(**1**)	coolant pump bolts	**11 ± 1.1**
(**2**)	Crankshaft cover bolts	**11 ± 1.1**
(**3**)	Dipstick guide tube bolts	**10 ± 1**
(**4**)	Coolant pump inlet pipe bolts	**22 ± 2.2**
(**5**)	The water-coolant heat exchanger union	**45 ± 4.5**
(**6**)	Oil filter bracket bolt	**45 ± 4.5**
(**7**)	Coolant pump inlet pipe bolts	**22 ± 2.2**
(**8**)	Crankshaft accessories pulley bolt	Bolt M12: **60 ± 6 +100° ± 10°** Bolt M14: **120 ± 12 + 95° ± 15°**
(**9**)	Oil pump bolts	**25 ± 2.5**
(**10**)	Oil sump bolts	**14 ± 1.4**
(**11**)	Oil level sensor	**25 ± 2.5**
(**12**)	Drain plug	**20 ± 4**
(**13**)	Clutch pressure plate bolts	Bolt H M7x100-16: **20 ± 2** Bolt CBLX M6x100-18: **14 ± 1.4**
(**14**)	Flywheel bolts Dual-mass flywheel bolts	**55 ± 5.5** **20 ± 2 + 36° ± 6°**
(**15**)	Con rod cap bolt	**20 ± 2 + 45° ± 6°**
(**16**)	Oil pressure switch	**30 ± 3 to 35 ± 3.5**
(**17**)	TDC pin plug	**20 ± 2**
(**18**)	Crankshaft bearing cap bolts	**25 ± 2.5 + 47° ± 6°**
(**19**)	Accelerometer	**20 ± 2**
(**20**)	Oil filter	**14 ± 2**

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INJECTION SYSTEM

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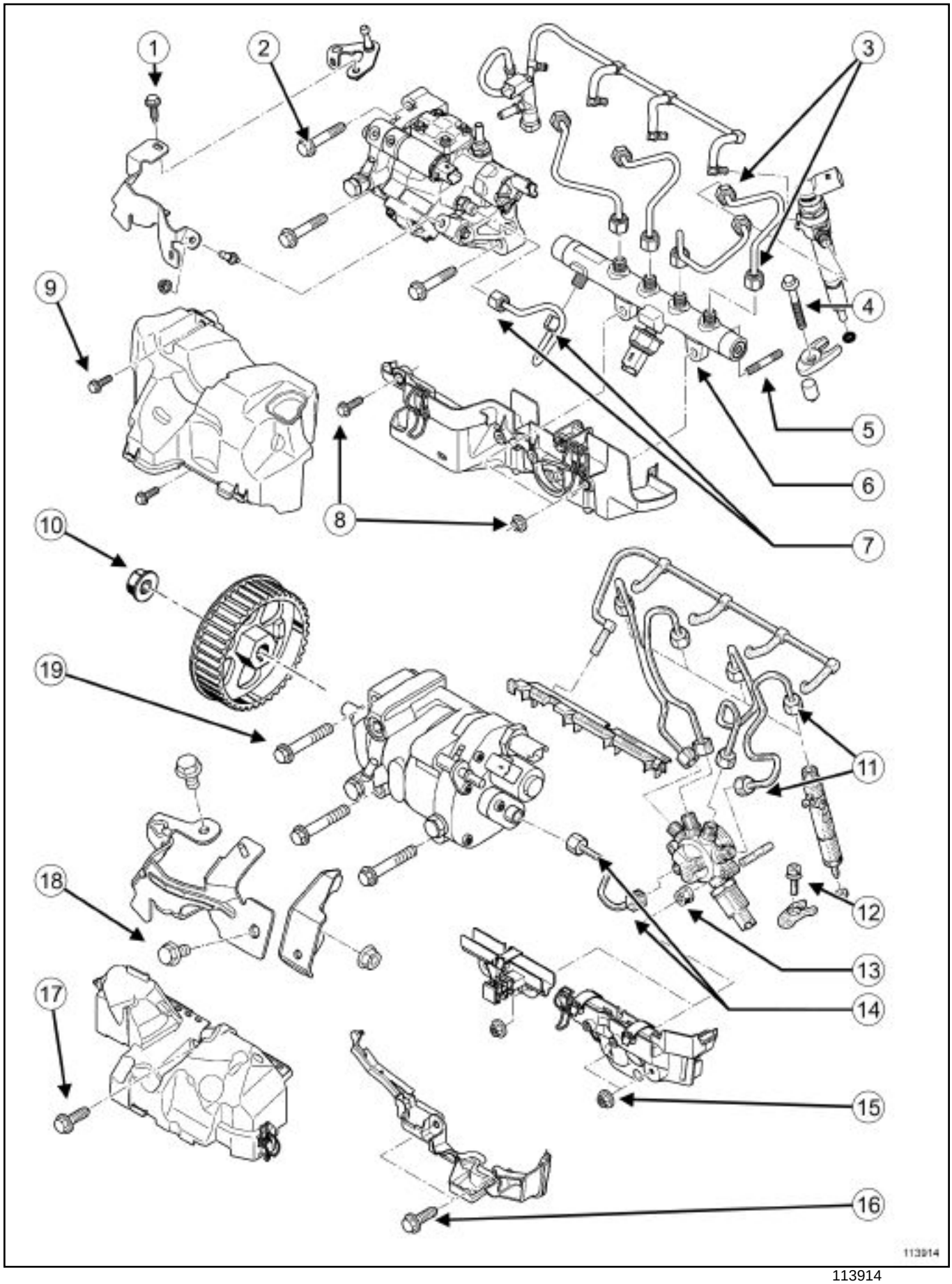

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Diesel injection: Tightening torque

Tightening torque in Nm and/or degrees		
(**1**)	High pressure guard mounting nut and bolt	**10 ± 1**
(**2**)	High pressure pump bolt	**21 ± 2.1**
(**3**)	Rail-injector high pressure pipe nuts	**See insert**
(**4**)	Injector bracket bolt	**30 ± 3**
(**5**)	High pressure rail stud	**8 ± 0.8**
(**6**)	High pressure rail nut	**28 ± 2.8**
(**7**)	High pressure pump-rail high pressure pipe	**See insert**
(**8**)	Lower high pressure guard nut and bolt	**21 ± 2.1**
(**9**)	High pressure guard cover bolt	**10 ± 1**
(**10**)	High pressure pump sprocket nut	**55 ± 5.5**
(**11**)	Rail-injector high pressure pipe nuts	**24 ± 2.4**
(**12**)	Injector bracket bolt	**28 ± 2.8**
(**13**)	High pressure rail nut	**28± 2.8**
(**14**)	High pressure pump-rail high pressure pipe	**24 ± 2.4**
(**15**)	Lower high pressure guard and hose bracket nuts	**21 ± 2.1**
(**16**)	Lower high pressure guard bolts	**10 ± 1**
(**17**)	High pressure guard cover bolt	**10 ± 1**
(**18**)	High pressure guard bracket bolts	**10 ± 1**
(**19**)	High pressure pump bolts	**21 ± 2.1**

WARNING

Tighten to a torque of **38 ± 3.8 Nm** the pump-rail and rail-injector high pressure pipes, part numbers:

- **77 01 207 025** ,
- **77 01 207 026** ,
- **77 01 207 027** ,
- **77 01 207 028** .

For high pressure pipes with different part numbers, tighten to a torque of **24 ± 2.4 Nm** .

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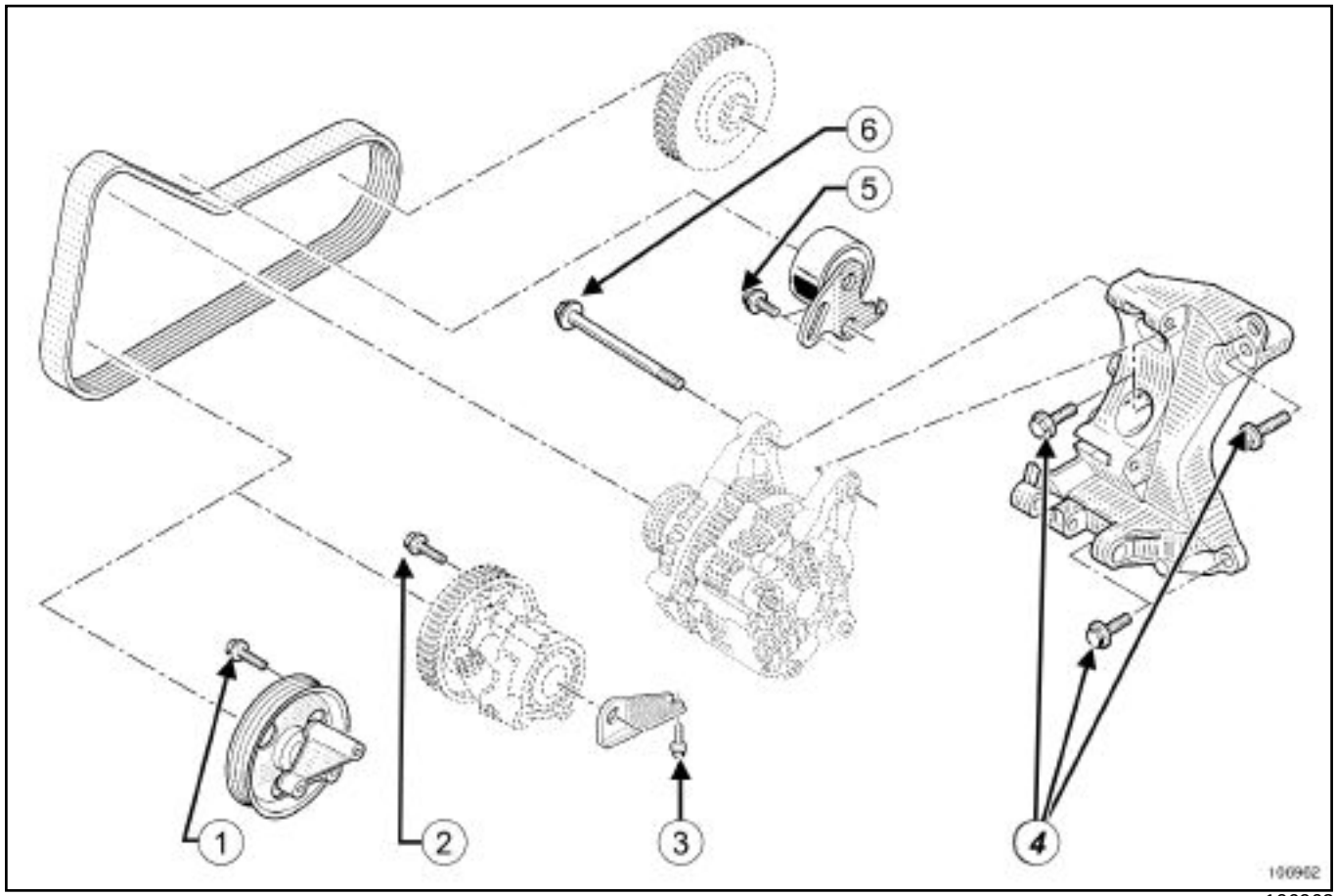
I - ACCESSORIES PANEL ON VEHICLES WITHOUT AIR CONDITIONING



106962

Tightening torque in Nm and/or degrees		
(**1**)	Pulley bolt	**21 ± 2.1**
(**2**)	Power-assisted steering pump bolt	**21 ± 2.1**
(**3**)	Power-assisted steering pump stay bolt	**21 ± 2.1**
(**4**)	Multifunction support bolts	**44 ± 4.4**
(**5**)	Tensioning roller bolts	**35 ± 3.5**
(**6**)	Alternator bolt	**21 ± 2.1**

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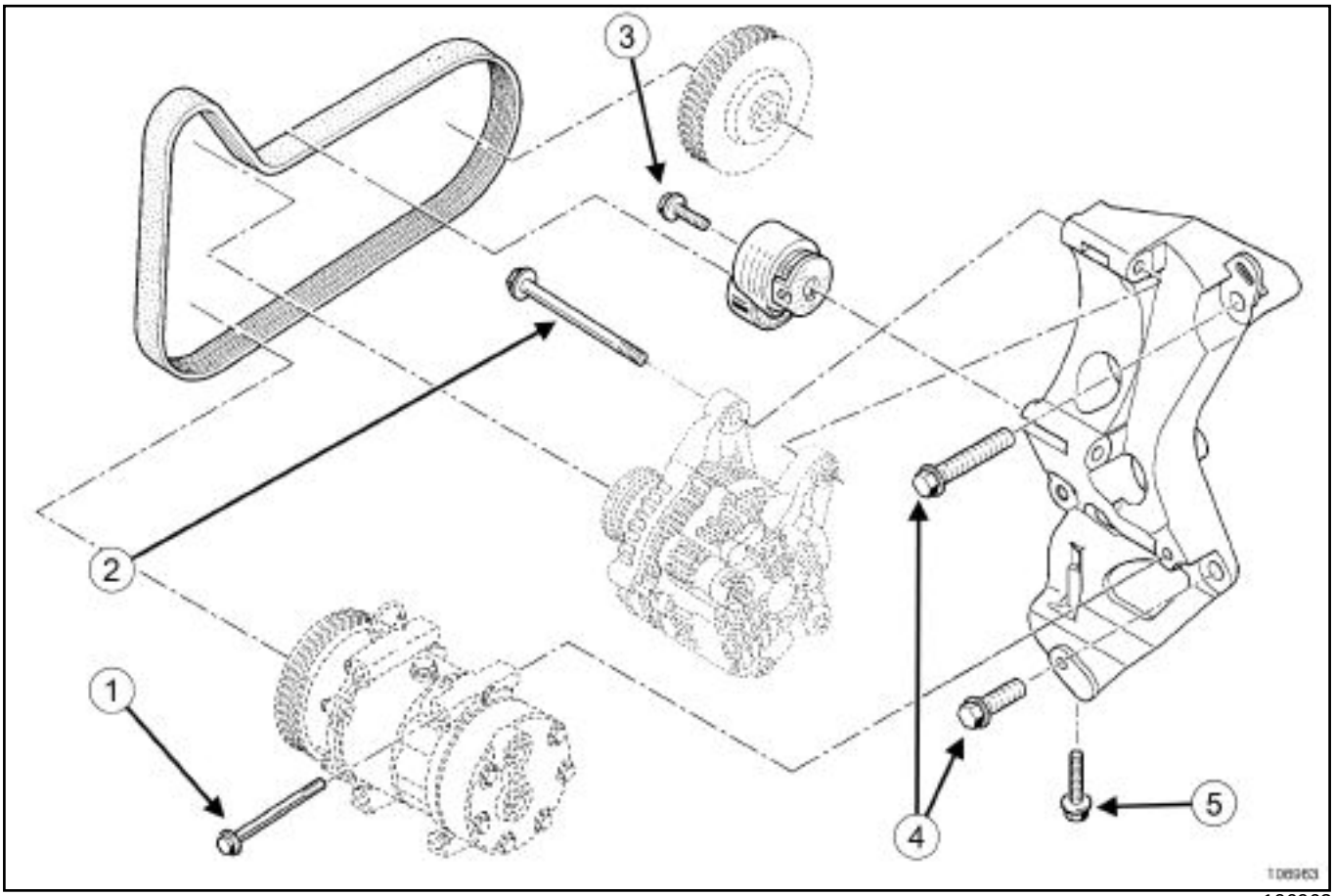
II - ACCESSORIES PANEL ON VEHICLES WITH AIR CONDITIONING



106963

Tightening torque in Nm and/or degrees		
(**1**)	Air conditioning compressor bolt	**21 ± 2.1**
(**2**)	Alternator bolts	**21 ± 2.1**
(**3**)	Auto tensioner bolts	**40 ± 4**
(**4**)	Multifunction support bolts	**44 ± 4.4**
(**5**)	Multifunction support lower bolt	**21 ± 2.1**

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I - POSITION OF THE CYLINDERS

Cylinder **no. 1** is at the flywheel end.

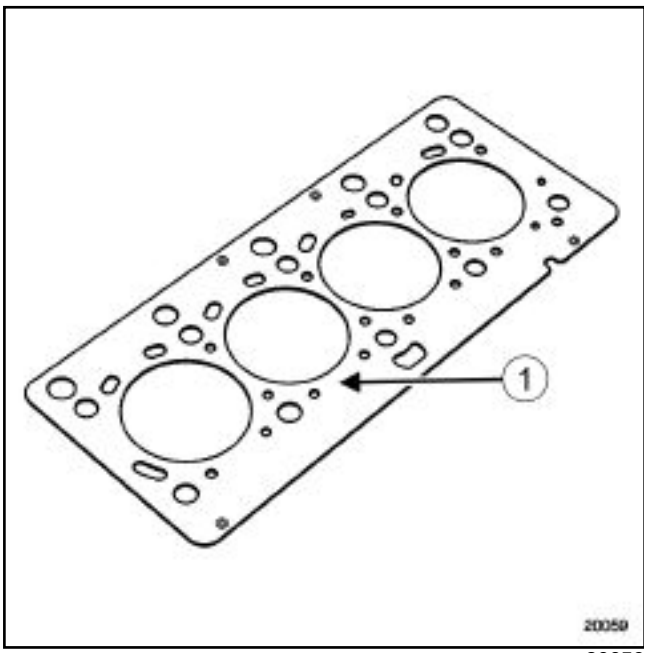
II - INJECTION SEQUENCE

The injection sequence is **1-3-4-2** .

III - HEATER PLUG

Type of plug	Resistance
BERU	**0.6 Ω**
CHAMPION	

IV - CYLINDER HEAD GASKET

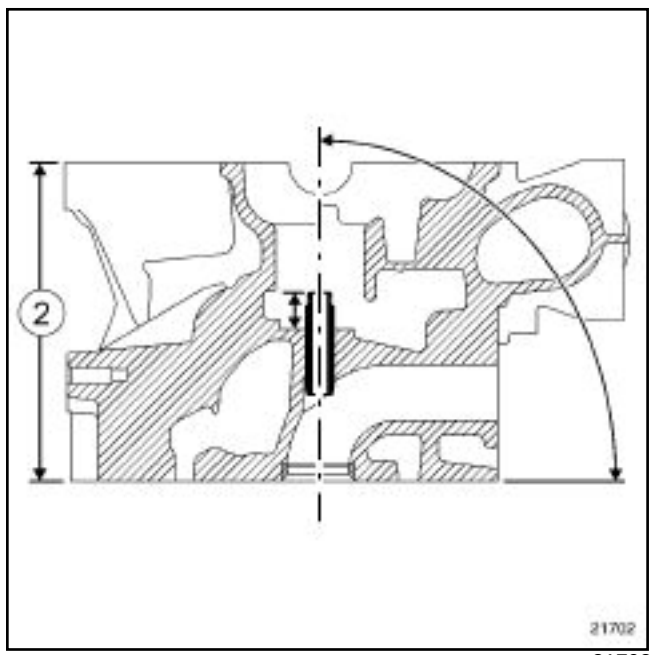


20059

The thickness of the cylinder head gasket is measured at (**1**) .

Engine type	Thickness of the cylinder head gasket in mm
K9K 260-270-272 K9K 700-702-704-710 **up until 19/05/2004** . K9K 722 **up until 16/07/2004** .	**0.68 ± 0.03**
K9K 700-702-704-710 **from 19/05/2004** . K9K 722 **from 16/07/2004** . K9K 274-276-706-712-714-716-718-724-728-729-732-750-752-760-762-764-766--768-790-792	**0.71 ± 0.03**

V - CYLINDER HEAD



21702

1 - Cylinder head height

The cylinder head height ***(2)*** is **127mm** .

2 - Cylinder head gasket face bow

The maximum cylinder head gasket face bow is **0.05mm** .

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3 - Cylinder block gasket face bow

The maximum cylinder block gasket face bow is **0.03mm** .

4 - Cylinder head testing

Test the cylinder head for possible cracks using the **cylinder head test kit** .

5 - Cylinder head regrinding

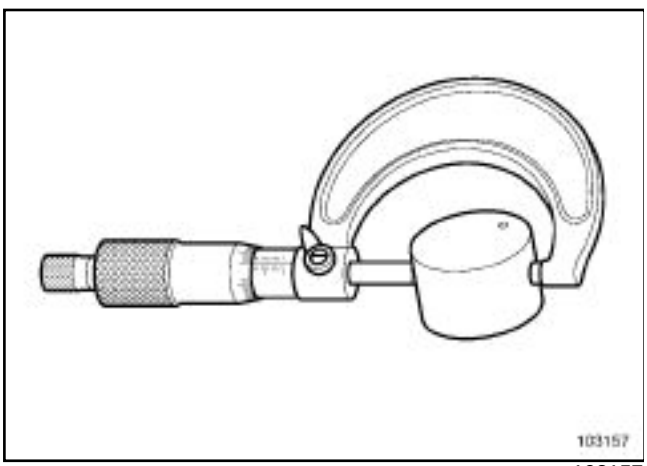
WARNING
No regrinding is permitted.

VI - TAPPET

1 - Tappet type

The tappet is the monobloc type.

2 - Outer diameter of tappet



103157

The outer diameter of the tappet is **34.975 ± 0.01mm** .

3 - Diameter of the tappet housing in the cylinder head

The diameter of the tappet housing in the cylinder head is **35.02 ± 0.02mm**

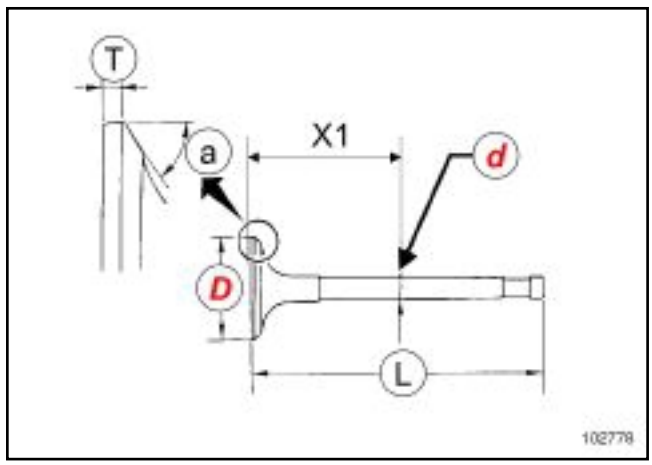
4 - Clearance between the tappet and its housing

The clearance between the tappet and its housing is between **0.015 and 0.075mm** .

VII - ADJUSTING VALVE CLEARANCES

Valves	Cold valve clearance in mm
Inlet	**0.20 + 0.05 / - 0.075**
Exhaust	**0.40 + 0.05 / - 0.075**

VIII - VALVES



102778

	Inlet valve	Exhaust valve
Diameter ***(D)*** of the valve stem is measured at point ***(X1)***	***(D)*** = **5.977 ± 0.008mm** at ***(X1)*** = **41mm** .	***(D)*** = **5.963 ± 0.008mm** at ***(X1)*** = **31mm** .
Diameter ***(D)*** of the valve face	**33.5 ± 0.12mm**	**29 ± 0.12mm**
Thickness ***(T)*** of the valve head	**1mm**	**1mm**
Length ***(L)*** of the valve	**100.95 ± 0.21mm**	**100.75 ± 0.21mm**
Valve seat angle ***(A)***	**90°**	**90°**
Valve lift	**8mm**	**8.6mm**

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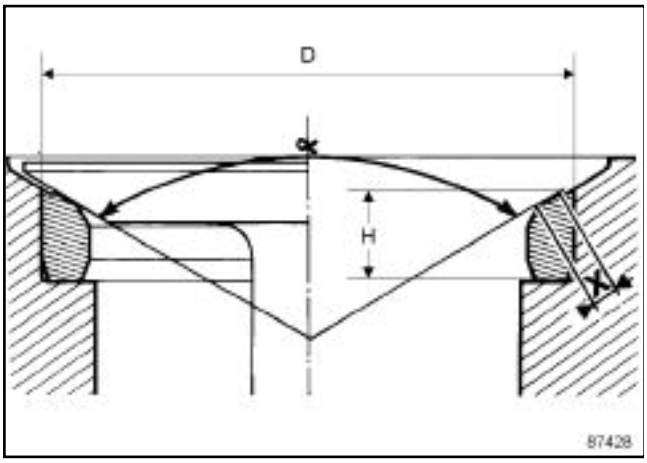
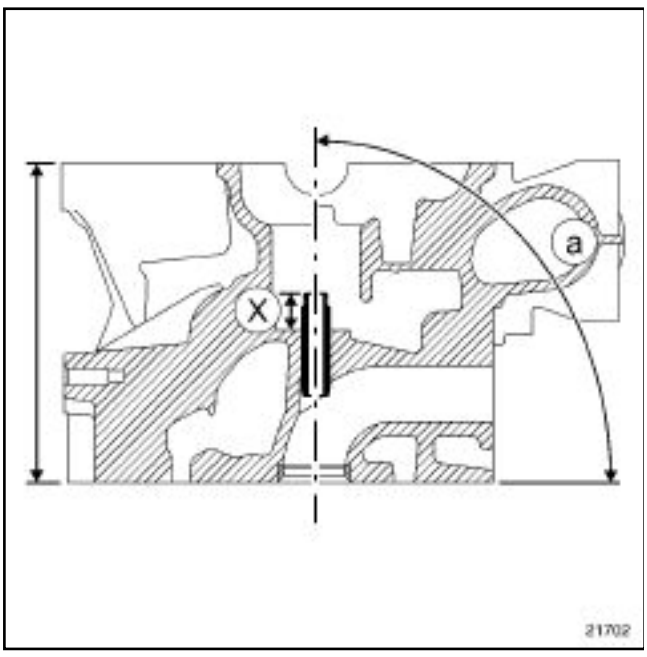
IX - VALVE SEATS



87428

	Inlet valve seat	Exhaust valve seat
Internal diameter of the valve seat housing (**D**) in the cylinder head	**34.459 ± 0.015mm**	**29.97 ± 0.015mm**
Outer diameter (**D**) of the valve seat	**34.542 ± 0.008mm**	**30.042 + 0.006 / - 0.007mm**
Valve seat housing depth (**H**) in the cylinder head	**6mm**	**7mm**
Valve seat height (**H**)	**4.65 ± 0.04mm**	**5.67 ± 0.04mm**
Width of mating faces X	**1.8mm**	**1.8mm**
Angle α of the valve seat	**89°30'**	**89°30'**

X - VALVE GUIDES



21702

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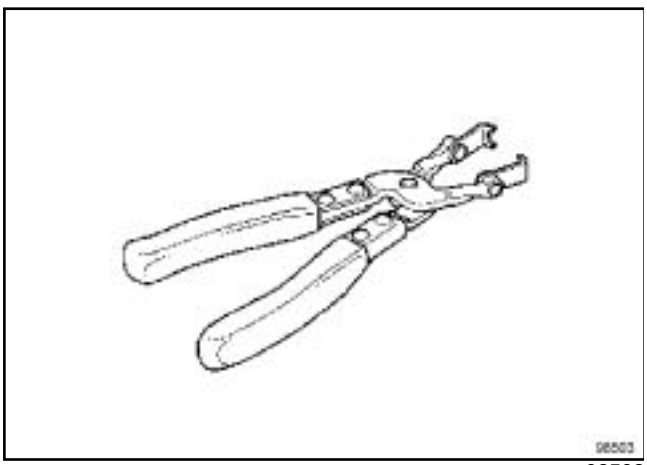
	Inlet guide	Exhaust guide
Length of the valve guide	**40.5 ± 0.15mm**	
External diameter of guide:	**11 + 0.062 / + 0.044mm**	
Diameter of the guide housing in the cylinder head:	**11mm**	
Internal diameter of the valve guide Non machined Machined *	**5 + 0.12 / 0mm** **6.009 ± 0.009mm**	
Valve guide angle of inclination (**A**)	**90°**	
Valve guide position (**X**)	**14mm**	**14.2mm**
Clearance between the valve guide and the valve	**0.02 to 0.05mm**	**0.03 to 0.063mm**

*** This dimension is measured with the guide fitted in the cylinder head.**

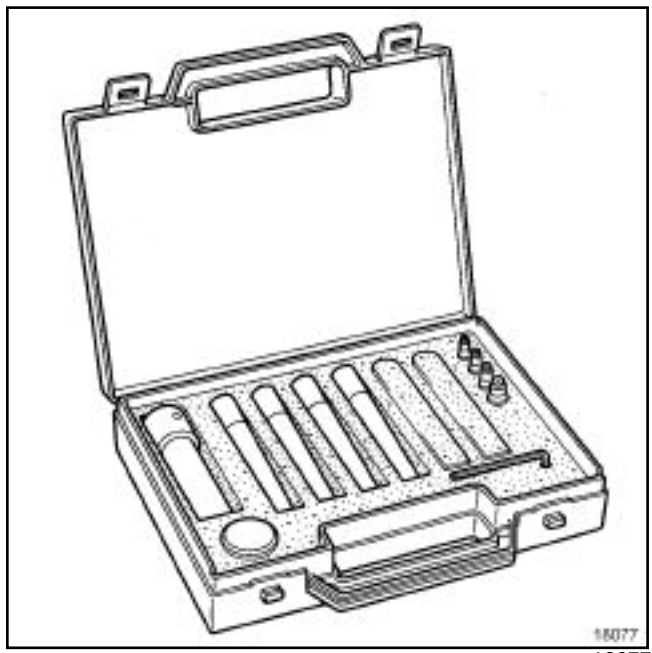
XI - VALVE STEM SEALS

The inlet and exhaust guides have valve stem seals.

These must be replaced each time the valves are removed.


98503

The removal of the valve stem seals is carried out using (**Mot. 1335**).


18077

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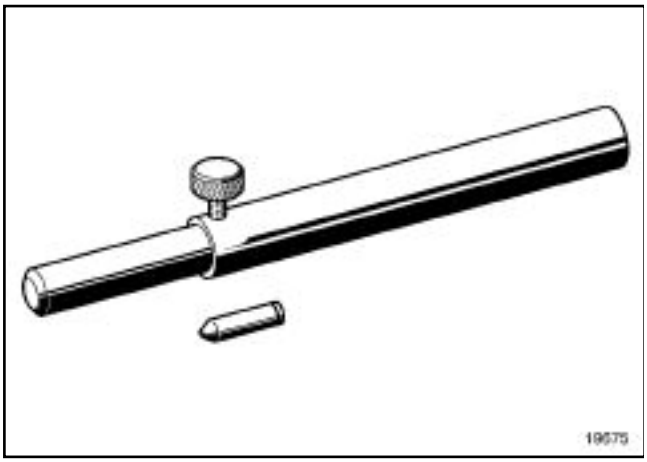
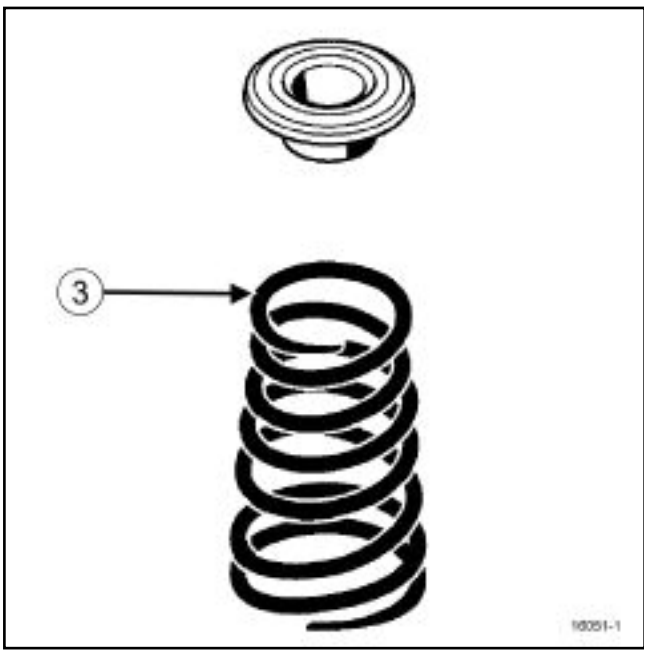


19675

The valve stem seals are refitted using either:

- a suitable tool, or
- tool (**Mot. 1511-01**).

XII - VALVE SPRINGS



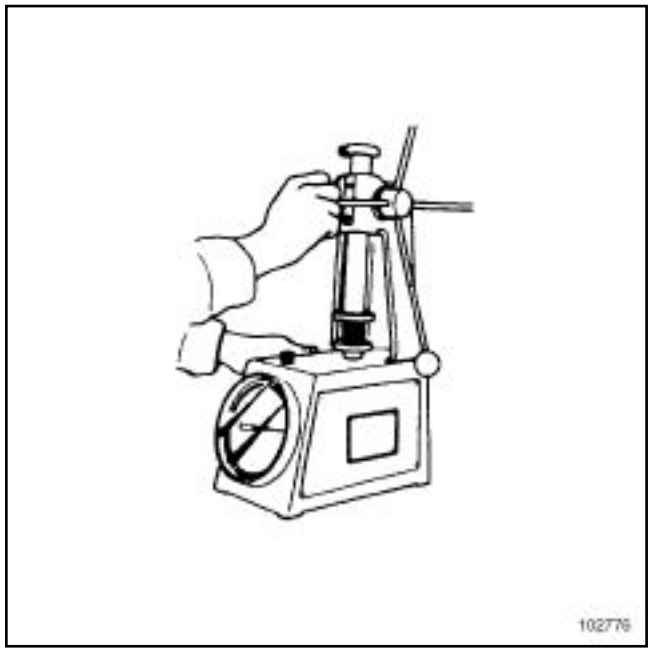
16051-1

The inlet and exhaust valve springs are identical.

The valve springs are the **conical** type and part (**3**) of the spring must face upwards.

WARNING

CE MOTEUR NE POSSEDE PAS DE RONDELLES INFERIEURES DE RESSORT DE SOUPAPE.



102776

Free length	**43.31mm**
Length under a load of: - **230 ± 12 N** - **500 ± 23 N**	 **33.80mm** **24.80mm**
Length, coils touching	**23.40mm**
Diameter of the wire	**3.45mm**
Internal diameter: - at the base of the spring - at the top of the spring	 **18.80 ± 0.2mm** **14.10 ± 0.2mm**
External diameter: - at the base of the spring - at the top of the spring	 **25.70 ± 0.2mm** **21 ± 0.2mm**

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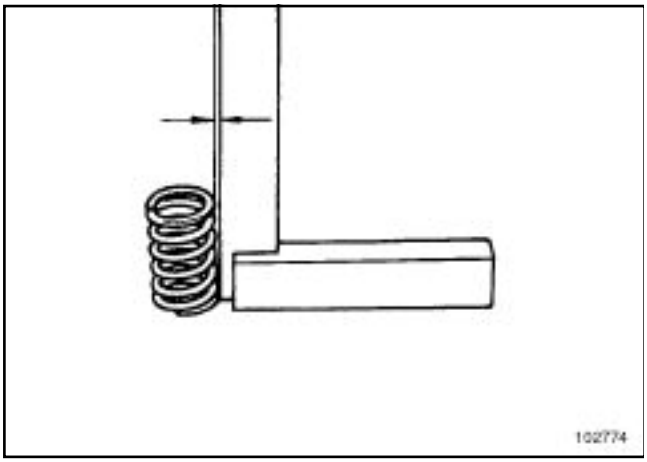
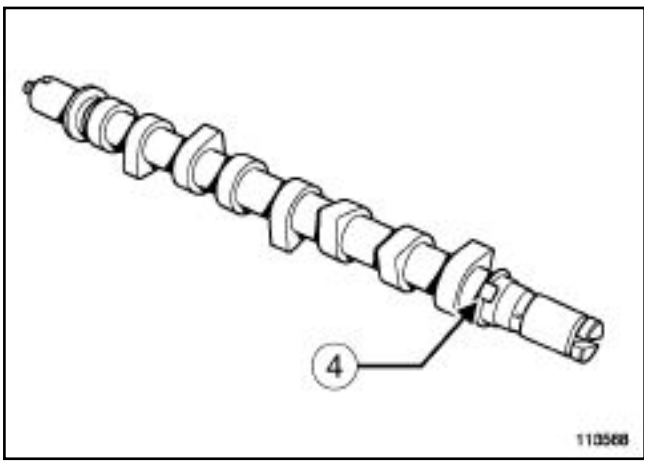


102774

Spring perpendicularity **1.2mm**

XIII - CAMSHAFT

1 - Identifying the camshaft



113568

With certain engines the camshaft has a target (**4**) for aligning the cylinders.

Engine type	Camshaft type
K9K 260-270-272-274-276-700-702-704-706-710-712-714-716-718-722-724-728-729-750-752-760-762-766-768-790-792	**WITHOUT the target (4)**
K9K 732 - 764	**WITH the target (4)**

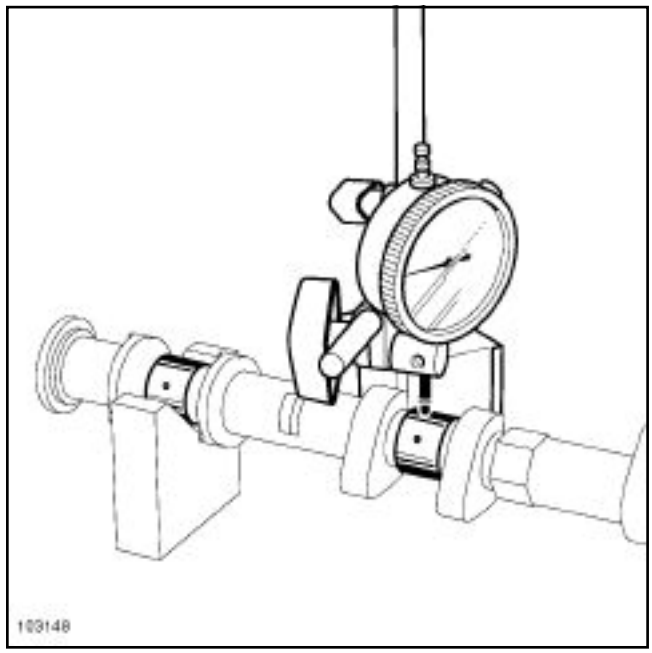
2 - Camshaft longitudinal play

The longitudinal play must be between **0.08 and 0.178mm** .

3 - Camshaft radial play

The radial play must be between **0.04 and 0.081mm** .

4 - Camshaft eccentricity.



103148

The camshaft eccentricity is **0.05mm** .

5 - Number of camshaft bearings

The camshaft has **6** bearings.

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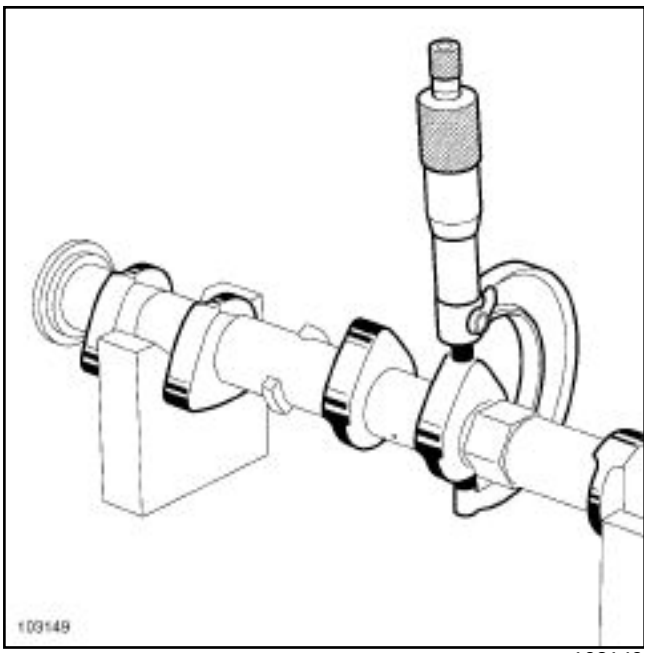
6 - Camshaft bearing diameters

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.

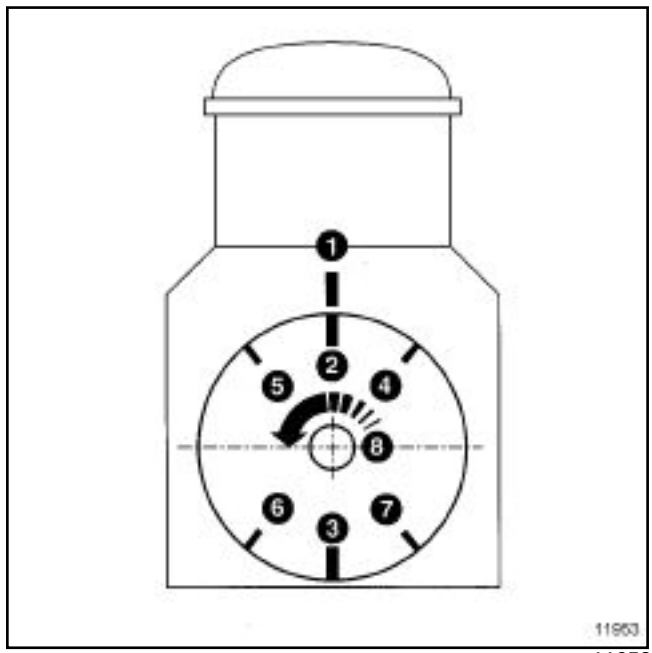
7 - Cam height



103149

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

8 - Valve timing



11953

- 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 **AFE** **,
- 6 Inlet Closing Retardation **RFA** ,
- 7 Exhaust Opening Advance **AOE** ,
- 8 Crankshaft direction of rotation (flywheel end).

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Note:

*If the TDC. **ROA** is negative, the valve will open after

If the TDC. **AFE is negative, the valve will close before

Theoretical settings for a lift of 0.7mm (no clearance)

	Inlet	Exhaust
Inlet Opening Retardation ROA	**-9°**	**-**
Inlet Closing Retardation RFA	**20°**	**-**
Exhaust Opening Advance AOE	**-**	**27°**
Exhaust Closing Advance **AFE**	**-**	**-7°**

XIV - TURBOCHARGER

Turbocharging pressure regulation valve

Engine type	Pressure regulation valve value in bar		Valve rod movement value in mm
	Pressure	Vacuum	
K9K 272-700-704-710-752-790	**1.3**	**-**	**1.95 ± 0.6**
K9K 260-270-702-706-722-750	**1.4**	**-**	**4.3 ± 0.6**
K9K 712-728-729-732-764	**-**	**0.5**	**1.7**
K9K 276-718-724-760-766	**-**	**0.6**	**7 ± 0.5**
K9K 274-714-716-762-768-792	**1.1**	**-**	**2.2 ± 0.5**

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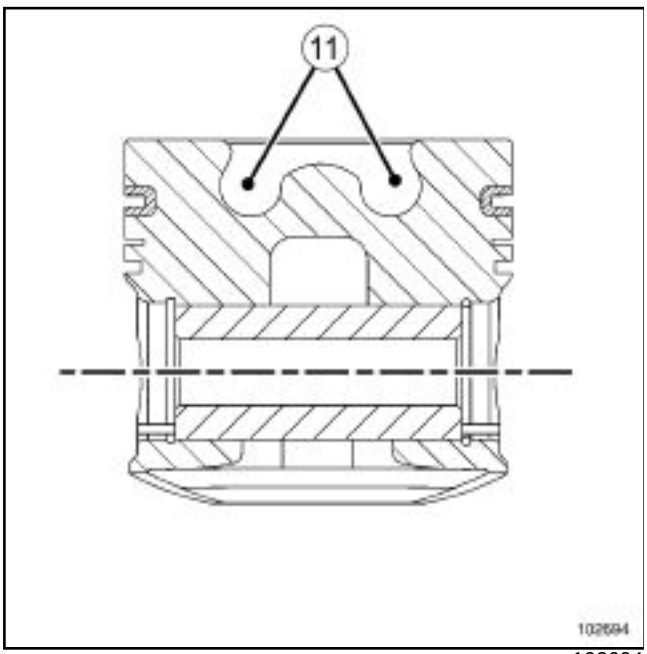
I - PISTONS

1 - Piston brand

These engines are fitted with **FEDERAL MOGUL** pistons.

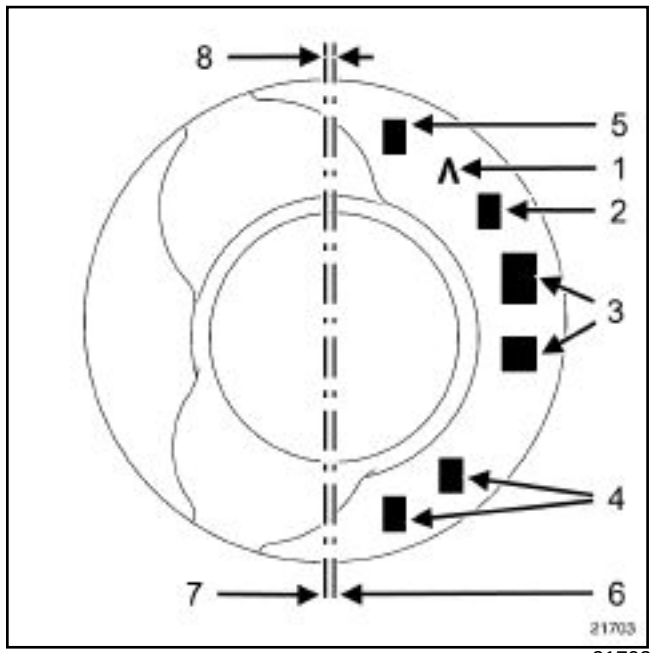
2 - Piston combustion chamber volume



102694

Engine type	Piston combustion chamber volume
K9K 260-270-272-274-276-700-702-704-706-710-712-714-716-718-722-724-728-729-750-752-760-762-766-768-790-792	**16.418 ± 0.25 cc**
K9K 732-764	**19.96 ± 0.25 cc**

3 - Piston markings



21703

(**1**) Direction of fitting the piston **Λ** facing the flywheel.

(**2**) Gudgeon pin height class which corresponds to the height between the gudgeon pin and the piston crown.

(**3**) Used by the supplier only.

(**4**) Used by the supplier only.

(**5**) Used by the supplier only.

(**6**) Piston axis of symmetry.

(**7**) Gudgeon pin hole axis.

(**8**) Offset between gudgeon pin hole and piston axis of symmetry is **0.3mm** .

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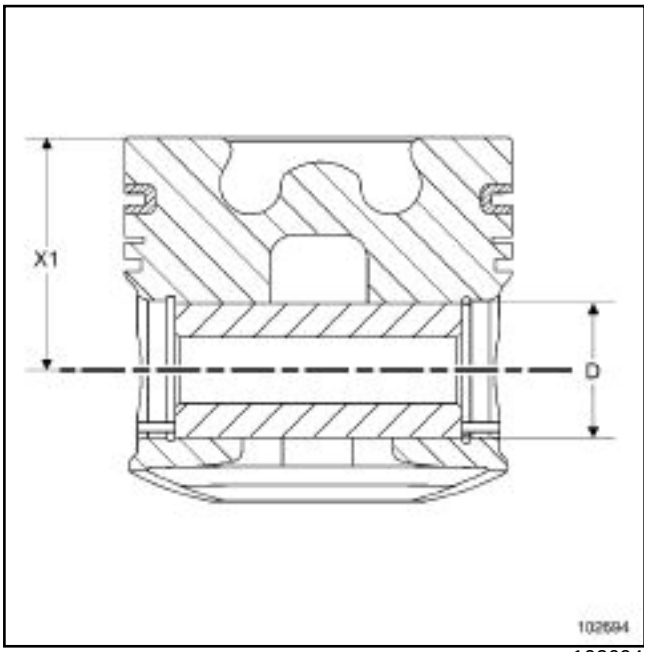
4 - Gudgeon pin height classes



102694

Dimension (**X1**) represents the height of the gudgeon pin.

Dimension (**D**) represents the gudgeon pin diameter.

Engine type	Diameter of gudgeon pin D = 25mm		Diameter of gudgeon pin D = 26mm	
	Piston category	**Gudgeon pin height in mm**	**Piston category**	**Gudgeon pin height in mm**
K9K 260-700-702-704-710-722 **up until 25/11/2002**	K*	**41.646 to 41.687**	-	-
	L*	**41.688 to 41.730**	-	-
	M*	**41.731 to 41.772**	-	-
	N*	**41.773 to 41.814**	-	-
	P	**41.815 to 41.856**	-	-
K9K 260-700-702-704-710-722 **from 25/11/2002** K9K 270-272-274-706-714-716-750-752-762-768-790-792	-	-	K*	**41.646 to 41.687**
	-	-	L*	**41.688 to 41.730**
	-	-	M*	**41.731 to 41.772**
	-	-	N*	**41.773 to 41.814**
	-	-	P	**41.815 to 41.856**

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Engine type	Diameter of gudgeon pin D = 25mm		Diameter of gudgeon pin D = 26mm	
	Piston category	Gudgeon pin height in mm	Piston category	Gudgeon pin height in mm
K9K 276-712-718-724-728-729-732-760-764-766	-	-	J	**41.605 to 41.646**
	-	-	K*	**41.647 to 41.688**
	-	-	L*	**41.689 to 41.730**
	-	-	M*	**41.731 to 41.772**
	-	-	N	**41.773 to 41.814**

Note:

***** = piston sold by the Parts Department.

WARNING

- For engines **K9K 260-270-274-700-702-704-706-710-714-716-722-750-752-762-768-790-792** fitted with gudgeon pins of diameter D = **25 or 26mm** , the Parts Department will only supply four categories of piston **K, L, M, N** .

- If the engine is fitted with a category **P** piston, replace it with a category **N** piston.

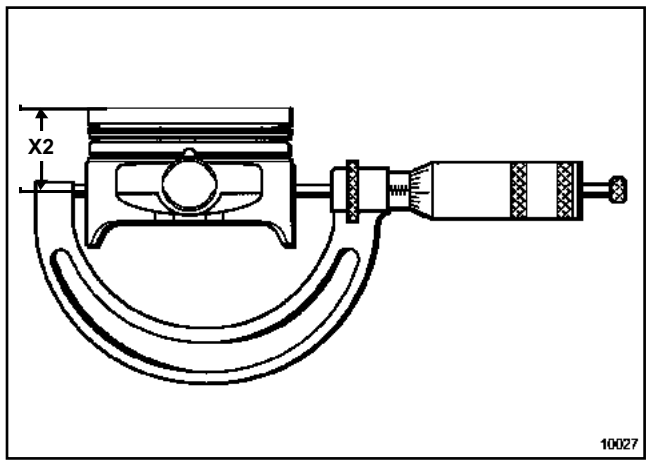
WARNING

- For engines **K9K 276-712-718-724-728-729-732-760-764-766** , the Parts Department will only supply three categories of piston **K, L, M** .

- If the engine is fitted with a category **J** piston, replace it with a category **K** piston.

- If the engine is fitted with a category **N** piston, replace it with a category **M** piston.

5 - Piston diameter



10027

The piston diameter must be measured with (**X2**) = **56mm**

Engine type	Piston diameter in mm
K9K 260-270-272-274-700-702-704-706-710-714-716-722-750-752-762-768-790-792	**75.949 ± 0.007**
K9K 276-712-718-724-728-729-732-760-764-766	**75.945 ± 0.007**

6 - Gudgeon pin

Fitting the free floating pin in the con rod and in the piston.

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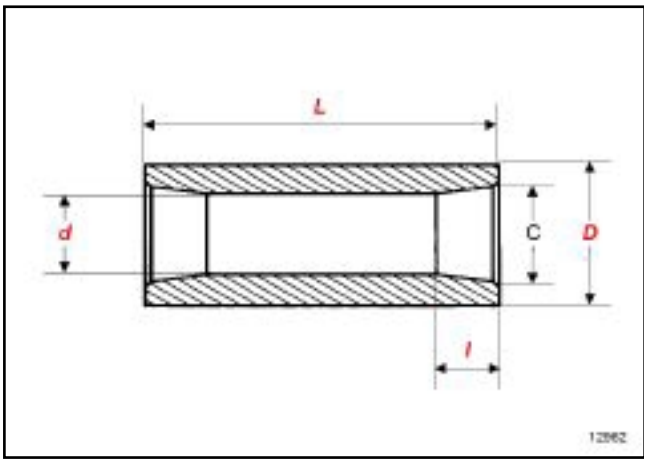
The gudgeon pin is retained by circlips.

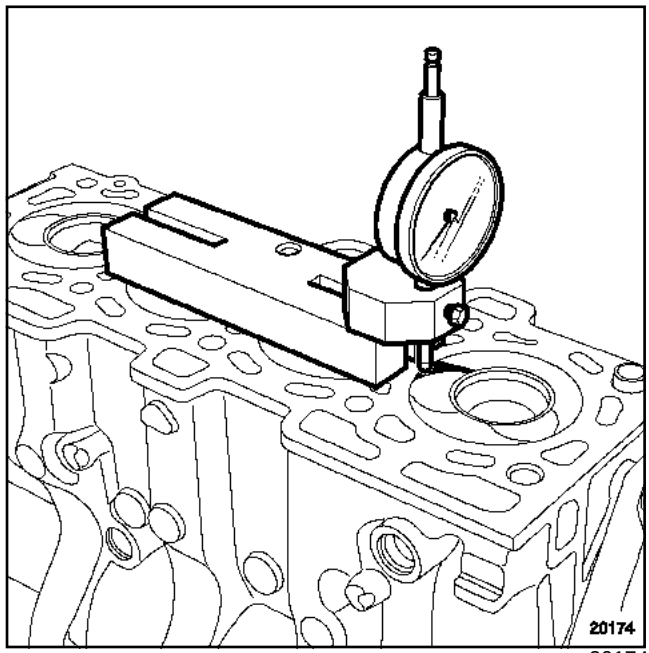


12962

	Gudgeon pin dimensions in mm	Engine type
Length (**L**)	**60 +0 / -0.3**	All K9K
External diameter (**D**)	**25 +0 / -0.005**	K9K 260-700-702-704-710-722 **up until 25/11/2002**
	26 +0 / -0.005	K9K 260-700-702-704-710-722 **from 25/11/2002** K9K 270-272-274-276-706-712-714-716-718-724-728-729-732-750-752-760-762-764-766-768-790-792
Internal diameter (**d**)	**13.75 +0.1 / -0.2**	K9K 260-700-702-704-710-722 **up until 25/11/2002**
	13.5 +0.1 / -0.2	K9K 260-700-702-704-710-722 **from 25/11/2002** K9K 270-272-274-276-706-712-714-716-718-724-728-729-732-750-752-760-762-764-766-768-790-792
Chamfer diameter (**C**)	**20 ± 0.25**	K9K 732-764
Chamfer length (**l**)	**6**	

7 - Piston protrusion

WARNING
The dial gauge rod must not be in a valve clearance.



20174

Engine type	Piston protrusion in mm
K9K 260-700-702-704-710-722 **up until 25/11/2002**	**0.192 ± 0.093**
K9K 260-700-702-704-710-722 **from 25/11/2002** K9K 270-272-706-750-752-790	**0.154 ± 0.130**
K9K 274-276-712-714-716-718-724-728-729-732-760-762-764-766-768-792	**0.159 ± 0.129**

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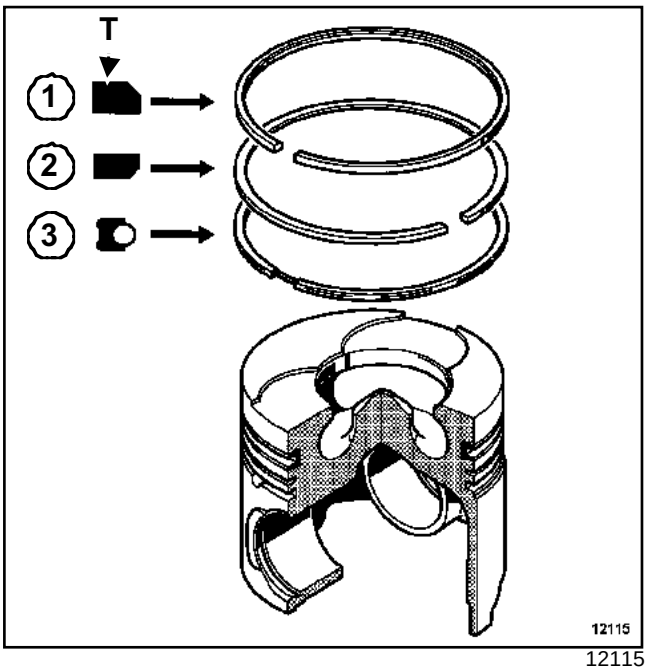
II - PISTON RINGS



12115

Piston rings are supplied ready adjusted.

(**T**) = TOP

1 - Thickness of the piston rings

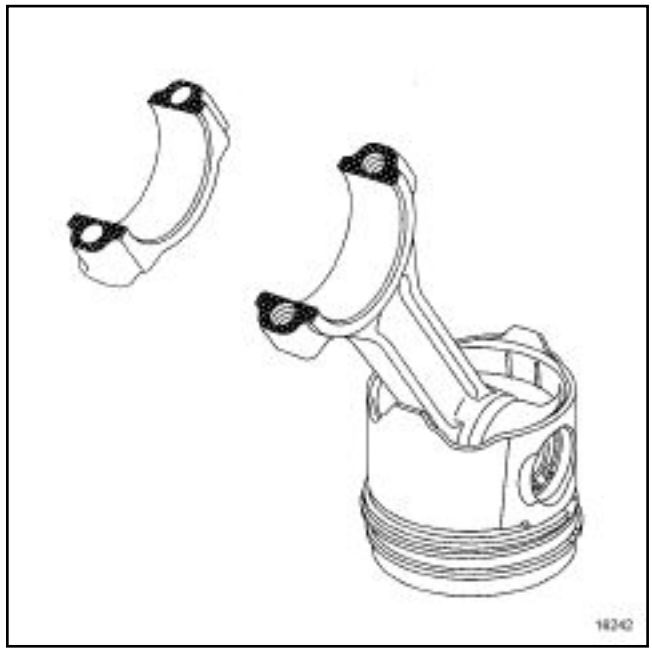
Piston rings	Thickness (in mm)
Compression ring ***(1)***	**2 -0.01 / -0.03**
Sealing ring ***(2)***	**2 -0.01 / -0.03**
Scraper ring ***(3)***	**2.5 -0.01 / -0.03**

2 - Piston ring clearance in groove

Piston rings	Piston ring clearance in mm
Compression	**0.2 to 0.35**
Sealing	**0.7 to 0.9**
Scraper	**0.25 to 0.5**

III - CON RODS

1 - Type of con rod

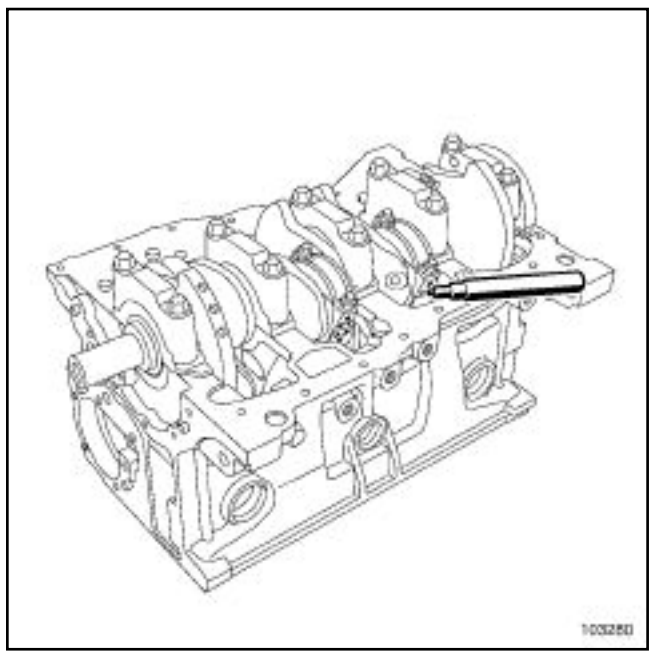


16242

The con rods are of the "SPLIT" type.

Note: The con rod small end bushes cannot be replaced.

2 - Guidelines for marking con rods



103280

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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.

3 - Weigh difference for the con rod-piston-gudgeon pin assembly

The maximum weight difference for the con rod-piston-gudgeon pin assembly for the same engine must be **25 g** .

4 - Con rod dimensions

	Con rod dimensions in mm	**Engine type**
Distance between big end and little end centres	**133.75**	All K9K
Big end diameter	**47.619 ± 0.009**	All K9K
Small end diameter (with bush)	**25.019 ± 0.006**	K9K 260-700-702-704-710-722 **up until 25/11/2002**
	26.019 ± 0.006	K9K 260-700-702-704-710-722 **from 25/11/2002** K9K 270-272-274-276-706-712-714-716-718-724-728-729-732-750-752-760-762-764-766-768-790-792

5 - Big end longitudinal play

The longitudinal play must be between **0.205 and 0.467mm** .

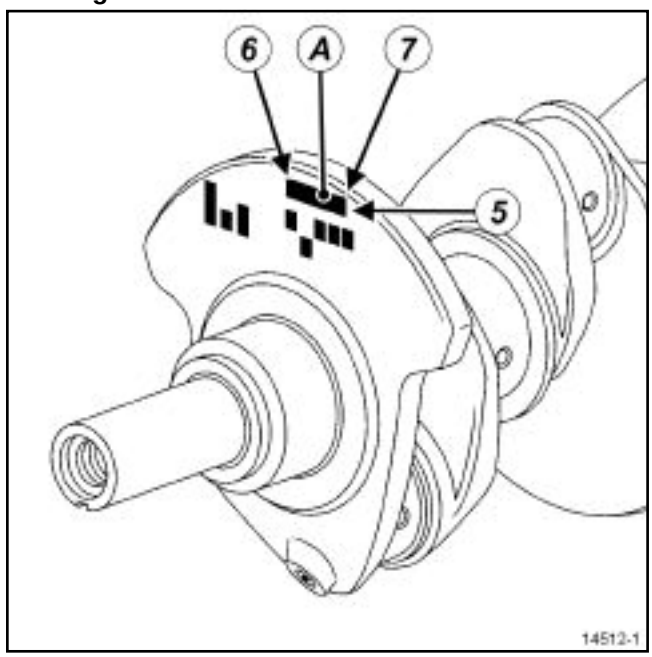
6 - Big end radial play

The radial play must be between **0.010 and 0.064mm** .

IV - CRANKSHAFT

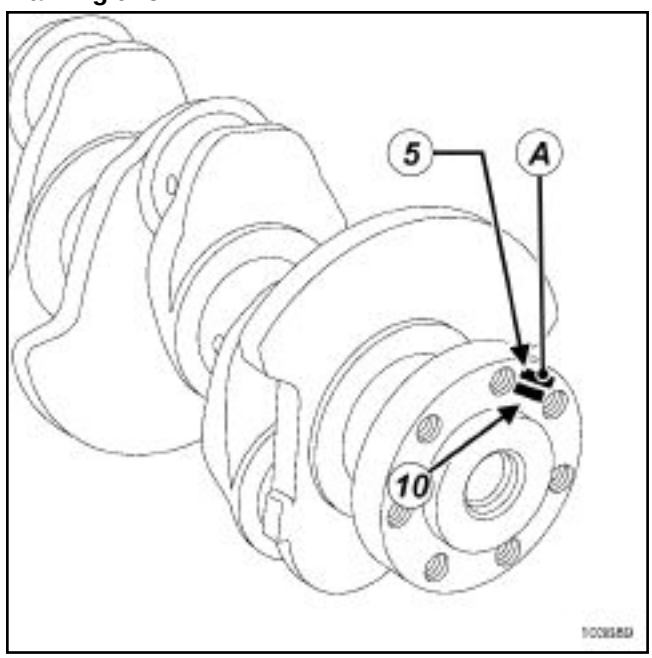
1 - Crankshaft markings

Marking one



14512-1

Marking two



103689

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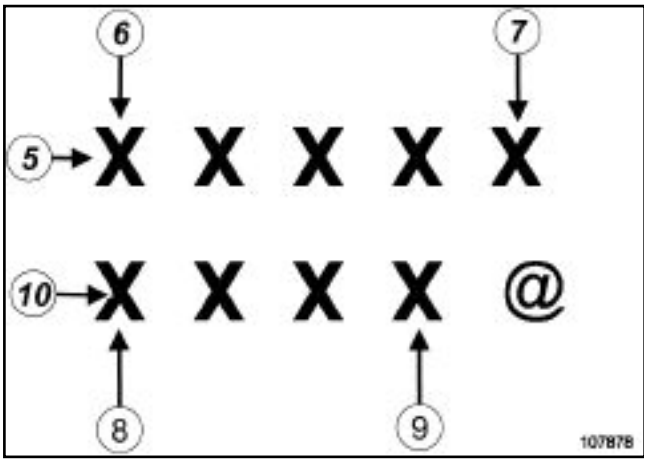
Marking "A" in detail



107878

(**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 ± 0.01mm**
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

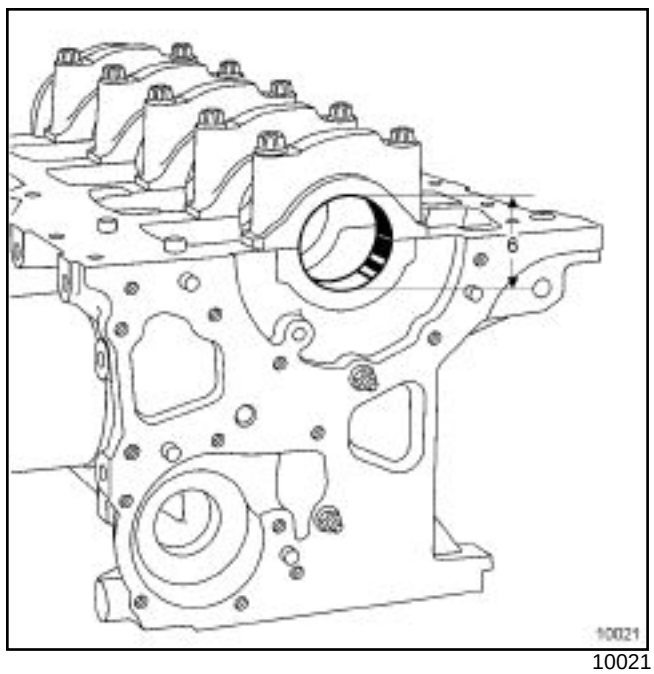
There are **5** journals.

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

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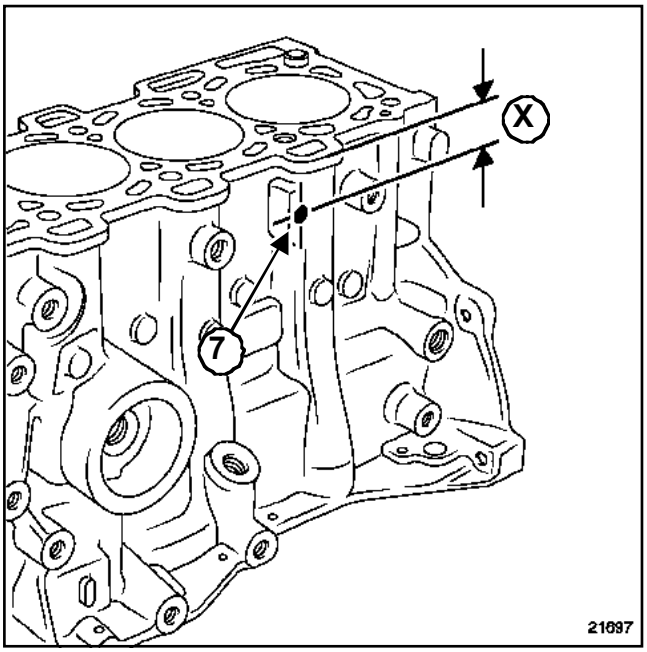


21697

The cylinder block bearing diameters (**6**) are marked with a drill hole on it (**7**) located above the oil filter.

For every engine there can only be one category of crankshaft bearing diameter.

3 - Table of bearing diameter classes

Positions of hole (7)	Category marking	Cylinder block bearing diameter (mm)
X = 33mm	1 or Blue	**51.936 to 51.942 exclusive**
X = 43mm	2 or Red	**51.942 inclusive to 51.949**

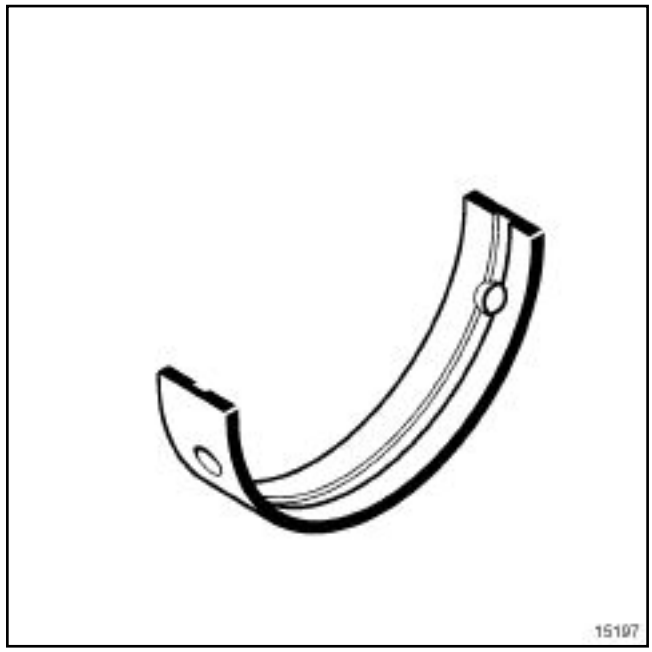
4 - Cylinder block gasket face bow

The maximum cylinder block gasket face bow is **0.03mm** .

VI - BEARING SHELLS

1 - Crankshaft bearing shells

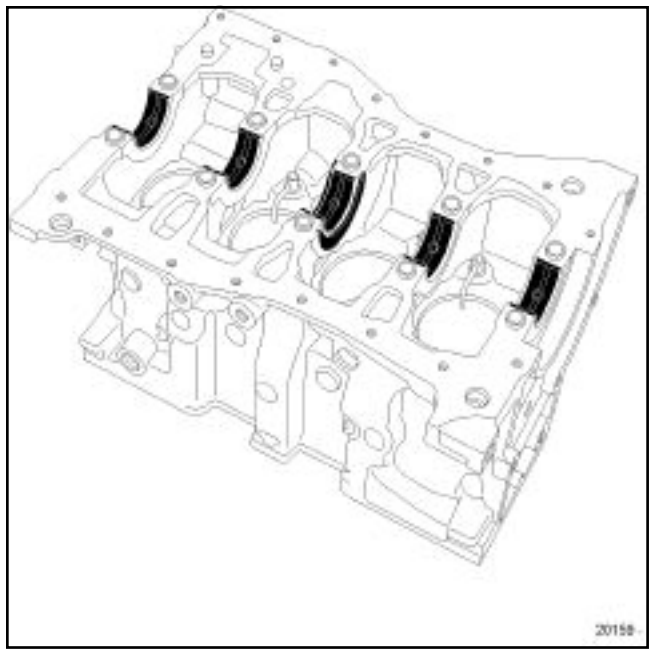
The engine is fitted with bearing shells without fool-proofing.



15197

The crankshaft bearing shells are fitted on the cylinder block and the bearings using the **Mot. 1493-01** .

a - Direction of fitting the journal shells



20159

Fit the **grooved** bearing shells on all the bearings on the cylinder block

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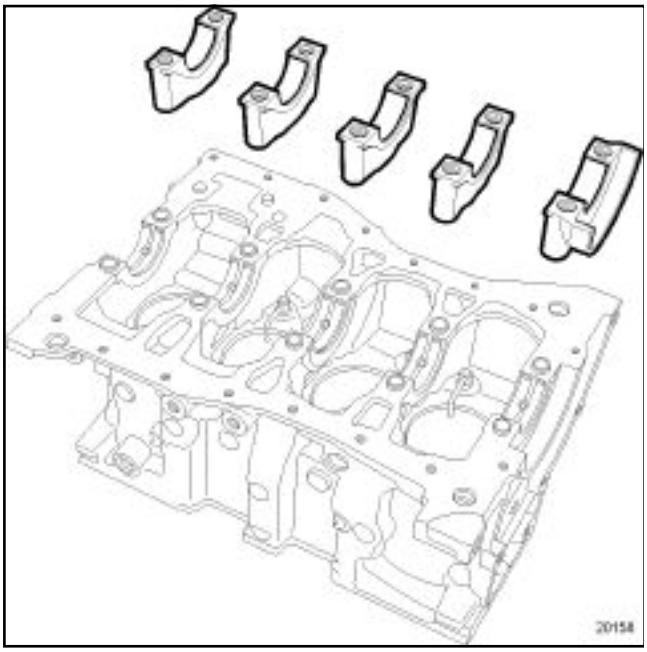

20158

Fit the **non-grooved** bearing shells on the bearing caps.

b - Matching the journal shells to the cylinder block

Cylinder block bearing diameter categories	Crankshaft journal diameter category		
	D1	**D2**	**D3**
1	C1 1.949 to 1.955 Yellow	C2 1.946 to 1.952 Blue	C3 1.943 to 1.949 Black
2	C4 1.953 to 1.959 Red	C1 1.949 to 1.955 Yellow	C2 1.946 to 1.952 Blue
	Bearing shell thickness and category		

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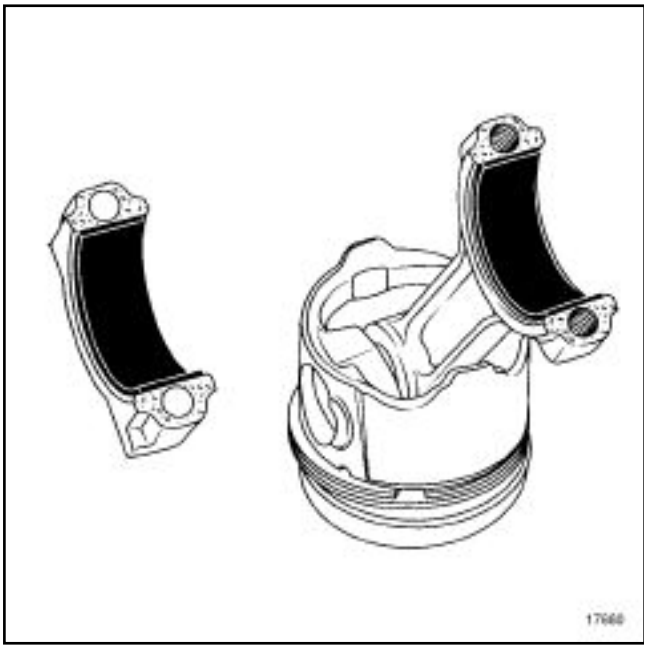
2 - Conrod bearing shells



17680

The engine is fitted with bearing shells without fool-proofing.

The con rod bearing shells are fitted using tools (**Mot. 1492**) and (**Mot. 1492-03**).

Bearing shell width

Note:
The upper and lower con rod bearing shells are not the same width.

Bearing shell width:

- Con rod shank bearing: **20.625 ± 0.125mm** ,
- Con rod cap bearing: **17.625 ± 0.125mm** .

3 - Crankshaft lateral shims

a - Direction of fitting of lateral shims

Position the **lateral shim grooves facing the crankshaft** .

b - Position of lateral shims

The lateral shims are located on crankshaft bearing **no. 3** .

c - Thickness of lateral shims

There are two lateral shim thicknesses: **2.80mm** and **2.85mm** .

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STANDARD EXCHANGE ENGINE

1 - Preparation of the old engine for return

Clean the engine.

Drain the oil and coolant from the old engine.

Secure the old engine to the stand and in the same conditions as the standard exchange engine:

- fit plastic plugs and covers,
- fit the cardboard cover over the whole assembly.

2 - Parts to leave on the old engine

Parts to leave on the old engine or to include in the return box:

- the dipstick,
- the oil filter,
- the oil filter seat,
- the oil cooler,
- the oil level sensor,
- the rocker cover,
- the coolant pump,
- the vacuum pump,
- the high-pressure pump,
- the injector rail,
- the injectors,
- the heater plugs,
- the entire timing end (crankshaft sprocket, belt, tensioner, camshaft sprocket),
- the timing covers,
- the crankshaft accessories pulley,
- the flywheel or the drive plate,
- the clutch pressure plate and driven plate,
- the lifting eyes,
- the cylinder head suspended mounting.

3 - Parts to remove from the old engine

Parts to remember to remove from the old engine:

- all the coolant system pipes,
- the oil pressure switch,
- the pinking sensor,
- the coolant inlet hose,
- the coolant outlet unit,
- the inlet manifold,
- the exhaust manifold,
- the turbocharger,
- the exhaust gas recirculation valve,
- the catalytic converter,
- the accessories (alternator, air conditioning compressor, power-assisted steering pump),
- the accessories multifunction support.

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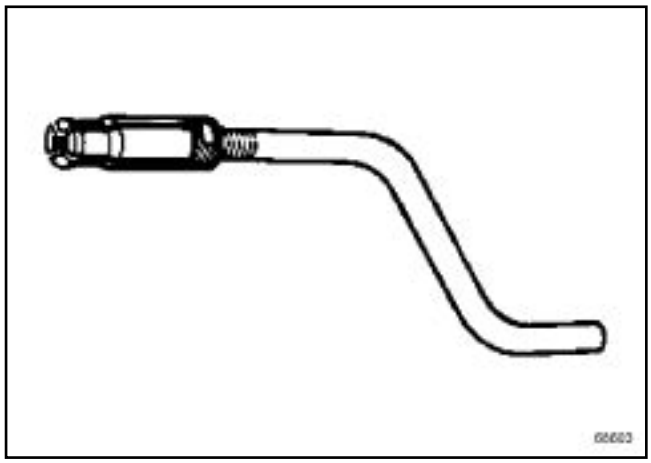
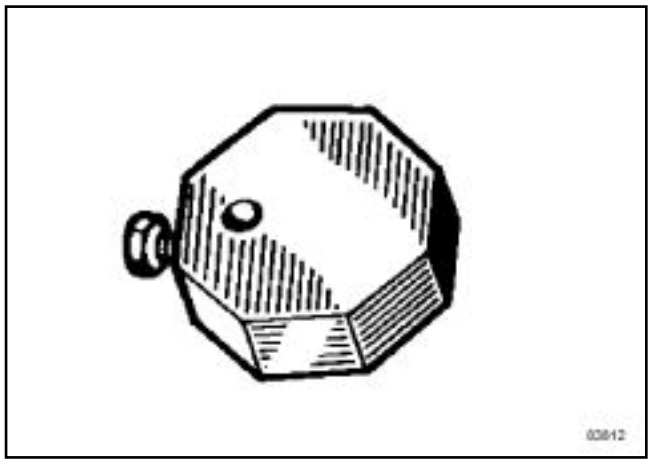
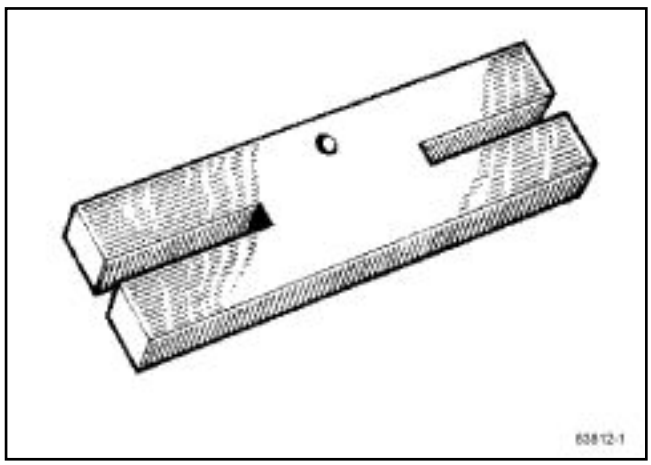
Illustration	Tool number	Tool part number	Description
 68603	**Mot. 11**	No longer available from the Parts Department (see Equipment required)	Crankshaft spigot bush extractor
 83812	**Mot. 251-01**	00 00 025 101	Dial gauge support used with **Mot. 252-01**
 83812-1	**Mot. 252-01**	00 00 025 201	Pressure plate for measuring piston protrusion, which is to be used with **Mot. 251-01** .

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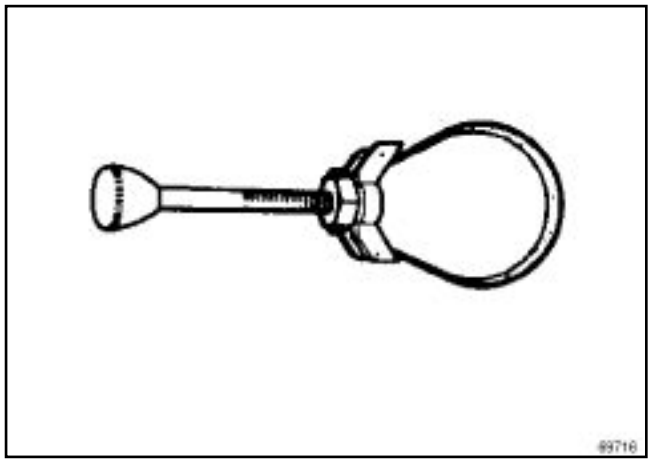
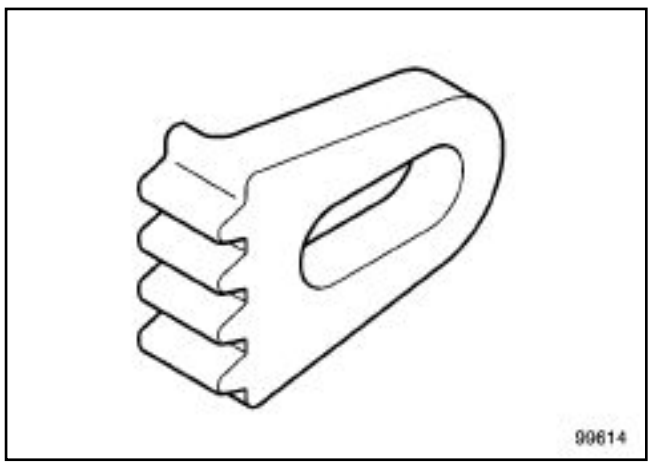
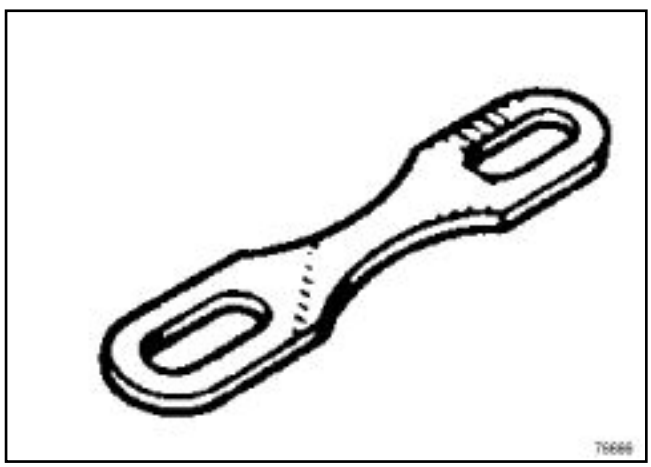
Illustration	Tool number	Tool part number	Description
 69716	**Mot. 445**	00 00 044 500	Oil filter strap wrench.
 99614	**Mot. 582-01**	00 00 058 201	Flywheel locking tool.
 76666	**Mot. 588**	00 00 058 800	Cylinder block liner clamps.

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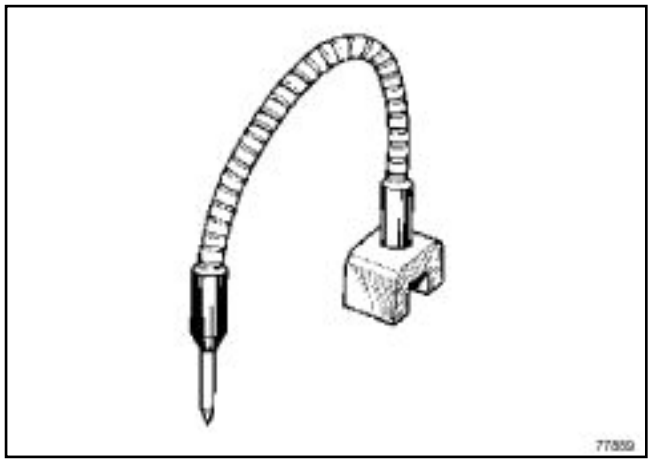
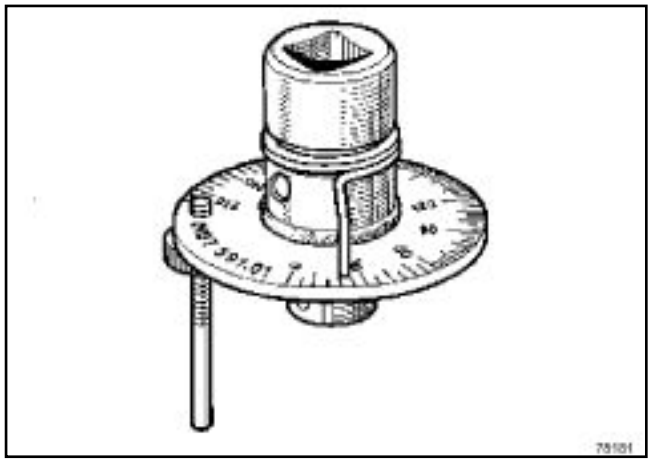
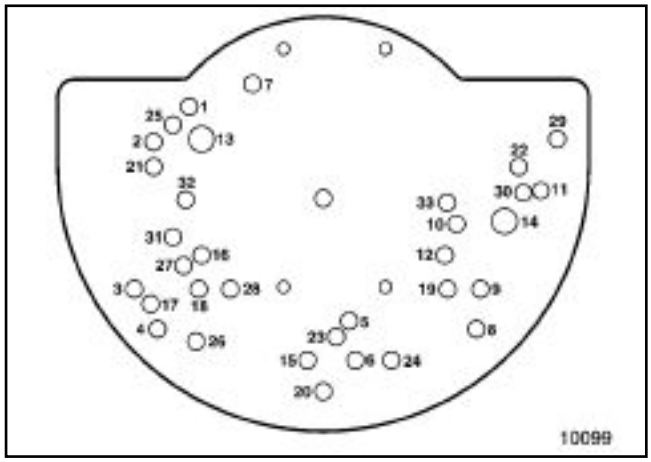
Illustration	Tool number	Tool part number	Description
 77889	**Mot. 591-02**	00 00 059 102	Magnetic hose for angle tightening.
 78181	**Mot. 591-04**	00 00 059 104	Cylinder Head bolt tightening gauge (1/2" drive).
 10099	**Mot. 792-03**	00 00 079 203	Engine stand plate.

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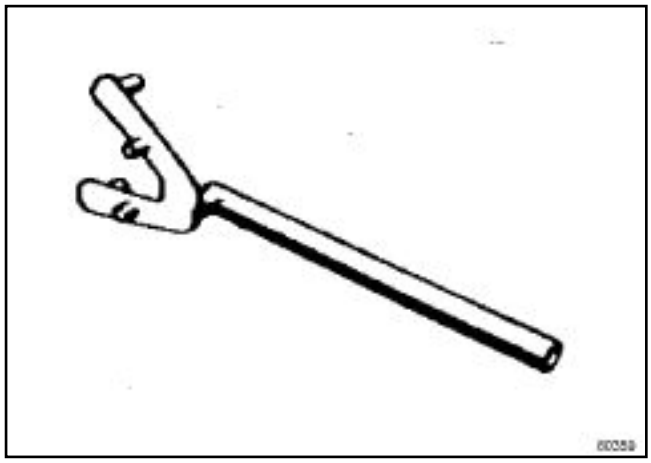
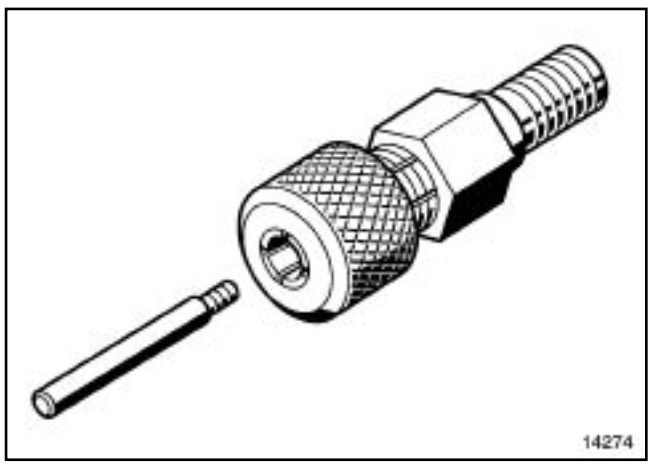
Illustration	Tool number	Tool part number	Description
 80359	**Mot. 799-01**	00 00 079 901	Pinion locking tool.
 14274	**Mot. 856-02**	00 00 085 602	Dial gauge support.

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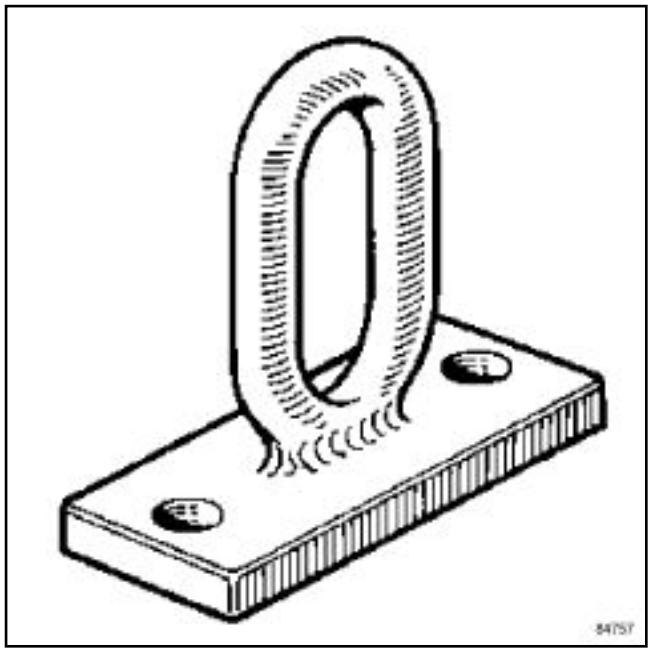
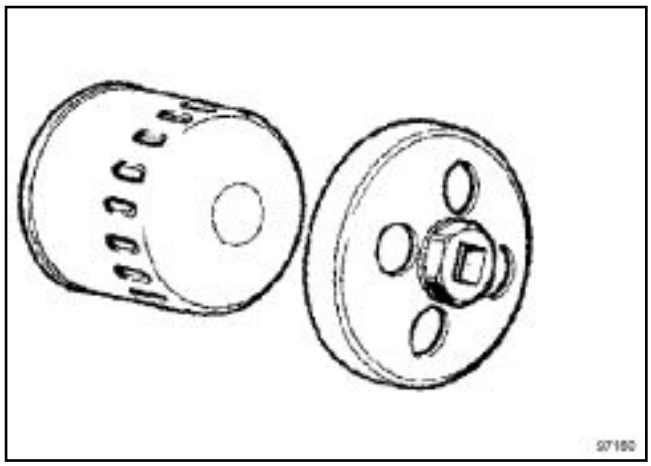
Illustration	Tool number	Tool part number	Description
 84757	**Mot. 923**	00 00 092 300	Engine lifting eye.
	Mot. 1018	00 00 101 800	Oil change wrench
	Mot. 1319-01	00 00 131 901	Crankpin height measuring tool.
 97160	**Mot. 1329**	00 00 132 900	Oil filter removing tool - 76mm diameter.

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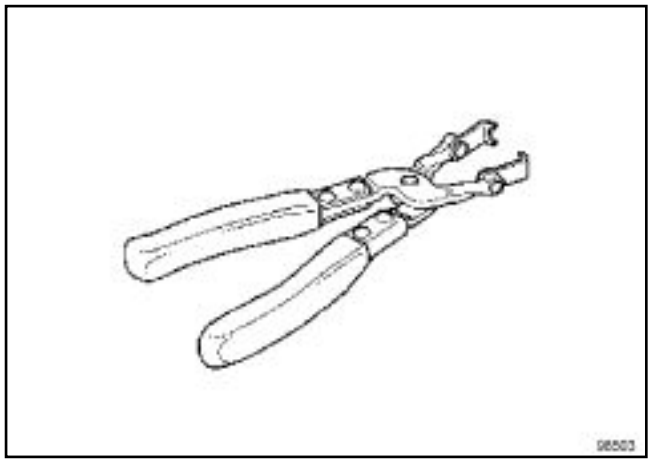
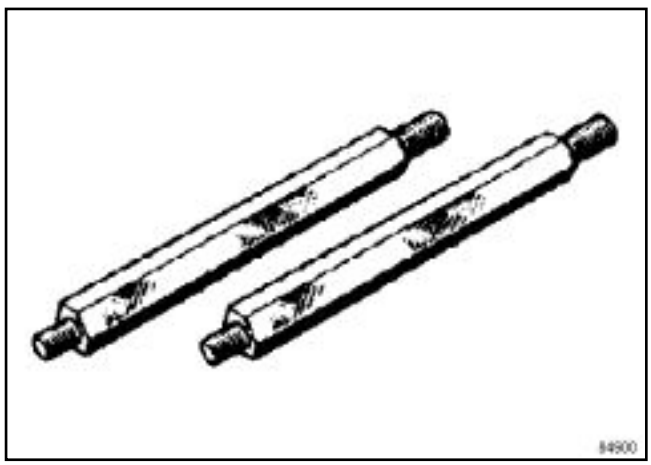
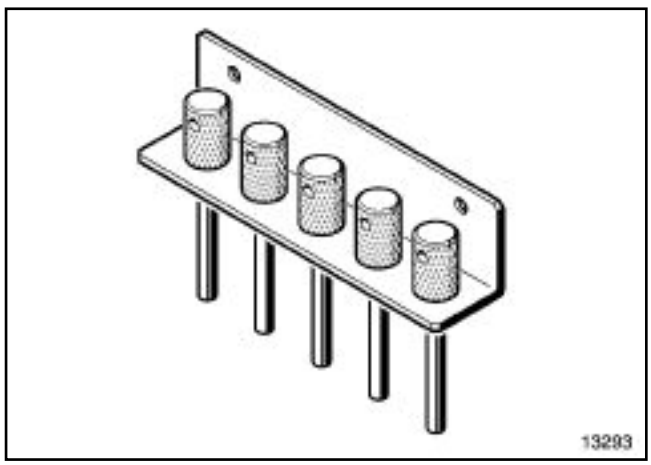
Illustration	Tool number	Tool part number	Description
 98503	**Mot. 1335**	00 00 133 500	Pliers for removing valve stem seals.
 84900	**Mot. 1378**	00 00 137 800	Support studs X and Y which can be fitted to the engine stand plate **Mot. 792-03** .
 13293	**Mot. 1430**	00 00 143 000	Pin set for timing adjustment.

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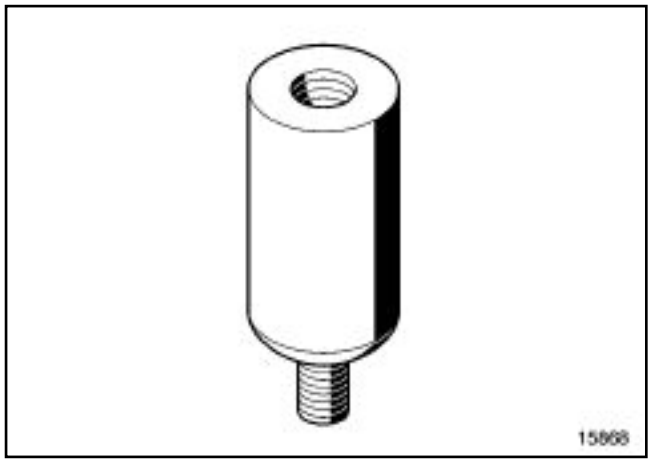
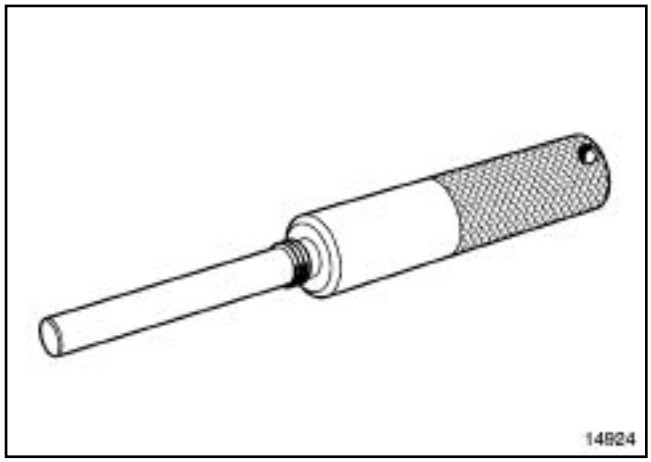
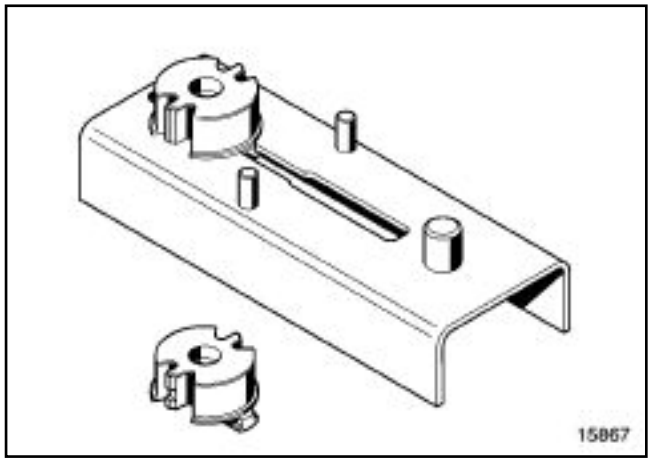
Illustration	Tool number	Tool part number	Description
 15868	**Mot. 1485-01**	00 00 148 501	Tool for removing piston cooling jets.
 14924	**Mot. 1489**	00 00 148 900	TDC setting pin.
 15867	**Mot. 1492**	00 00 149 200	Tool for fitting main bearing shells.

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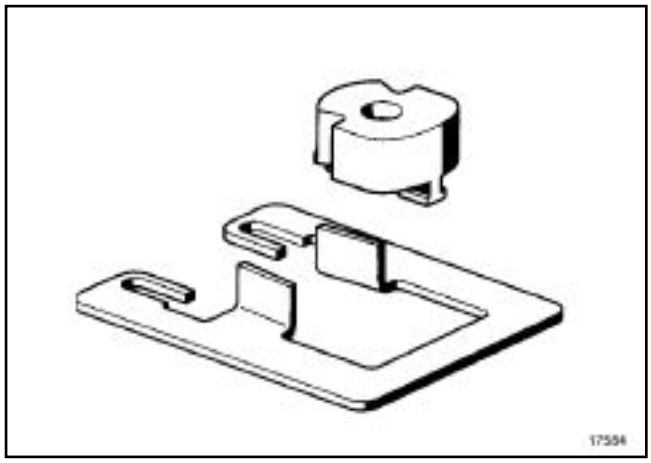
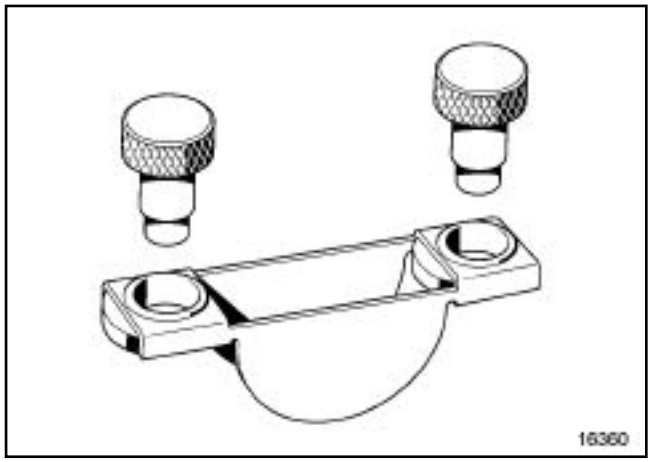
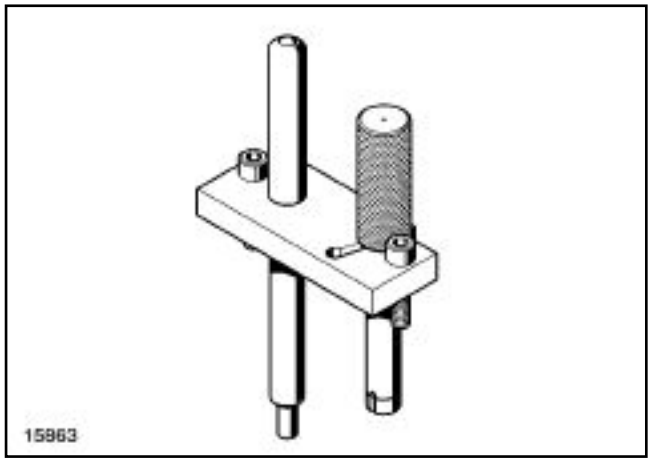
Illustration	Tool number	Tool part number	Description
 17584	**Mot. 1492-03**	00 00 149 203	Adapter kit for fitting the con-rod bearing shells.
 16360	**Mot. 1493-01**	00 00 149 301	Tool for fitting crankshaft bearing shells.
 15863	**Mot. 1494**	00 00 149 400	Tool for fitting piston cooling jets.

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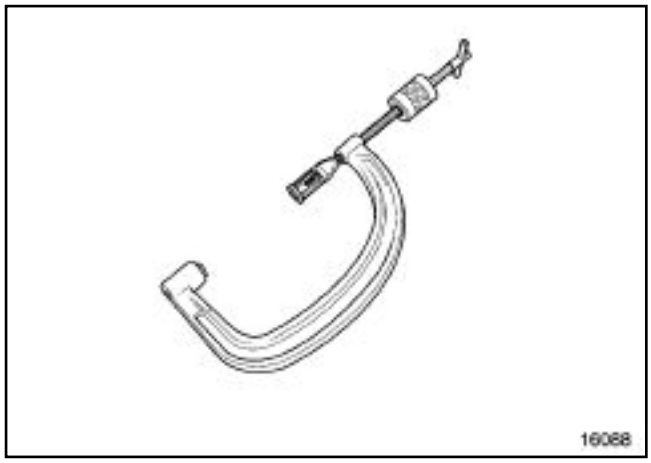
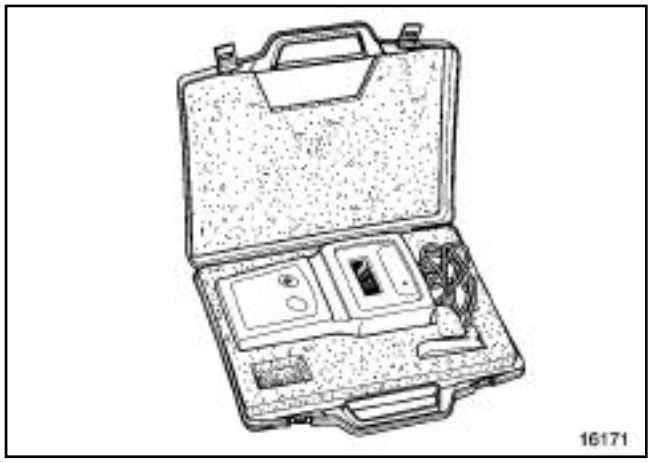
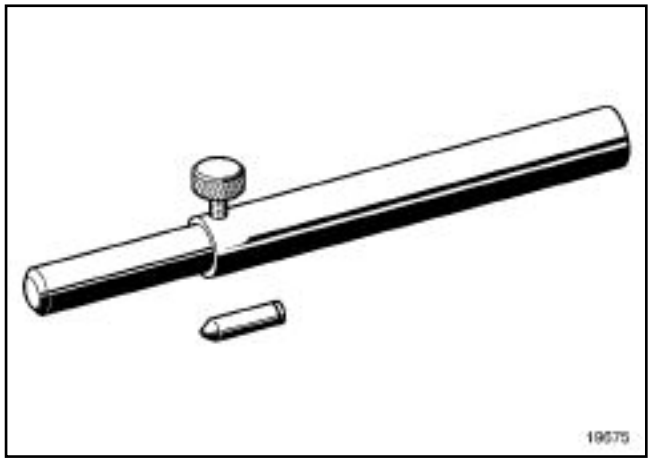
Illustration	Tool number	Tool part number	Description
 16088	**Mot. 1502**	00 00 150 200	Valve spring compression tool.
 16171	**Mot. 1505**	No longer available in the Parts Department, replaced by **Mot. 1715**	Frequency meter for belt tension.
 19675	**Mot. 1511-01**	00 00 151 101	Valve stem seal tool.

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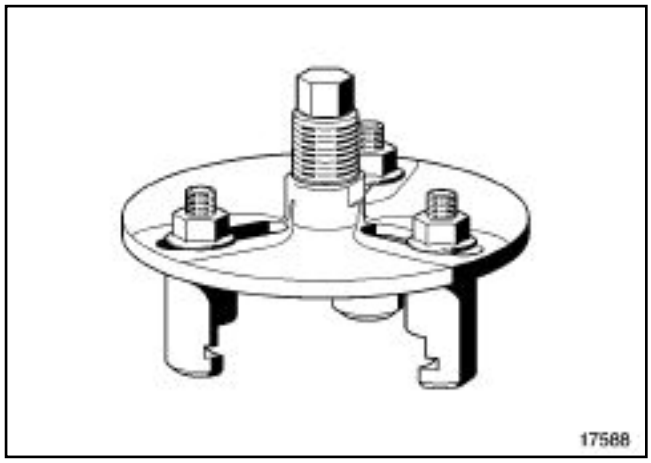
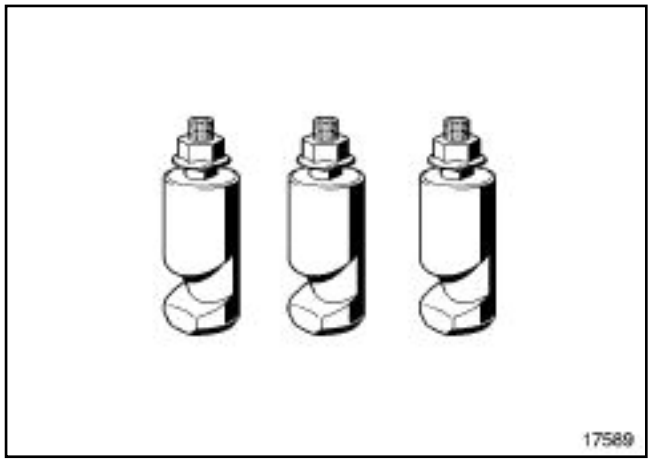
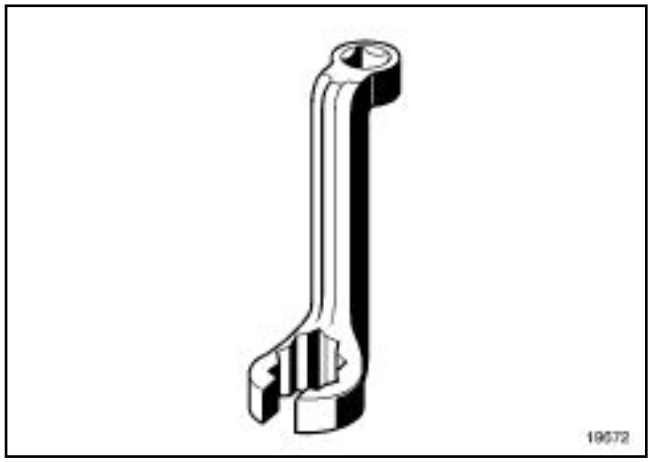
Illustration	Tool number	Tool part number	Description
 17588	**Mot. 1525**	00 00 152 500	High pressure pump sprocket extractor.
 17589	**Mot. 1525-02**	00 00 152 502	High pressure pump sprocket extractor claws.
 19672	**Mot. 1566**	00 00 156 600	Spanner for high pressure pipe nuts.

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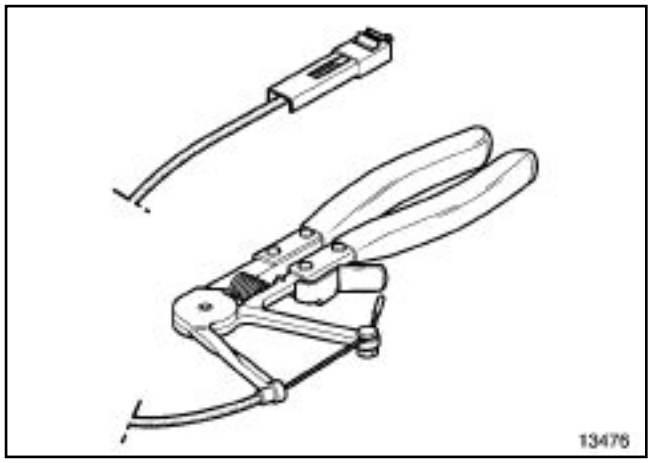
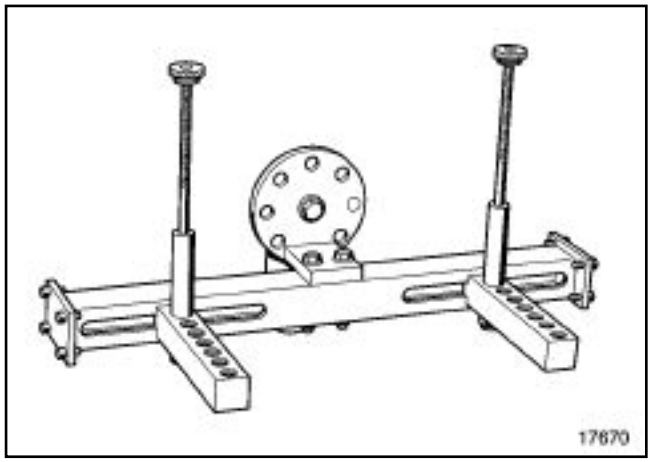
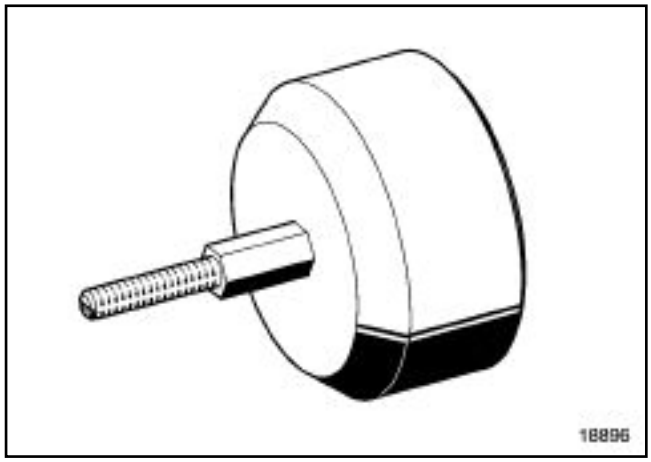
Illustration	Tool number	Tool part number	Description
 13476	**Mot. 1567**	00 00 151 300	Long reach EGR clip pliers.
 17670	**Mot. 1573**	00 00 157 300	Cylinder head support.
 18896	**Mot. 1585**	00 00 158 500	Tool for fitting crankshaft seal (flywheel end).

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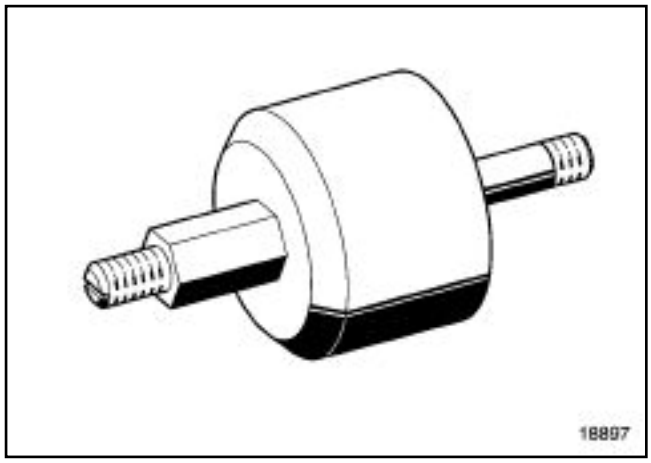
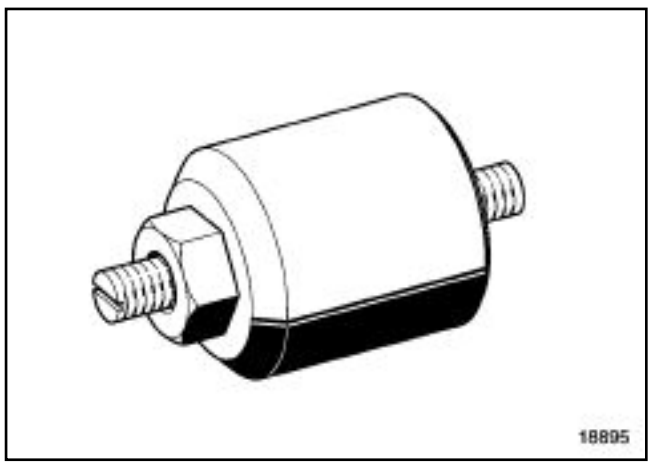
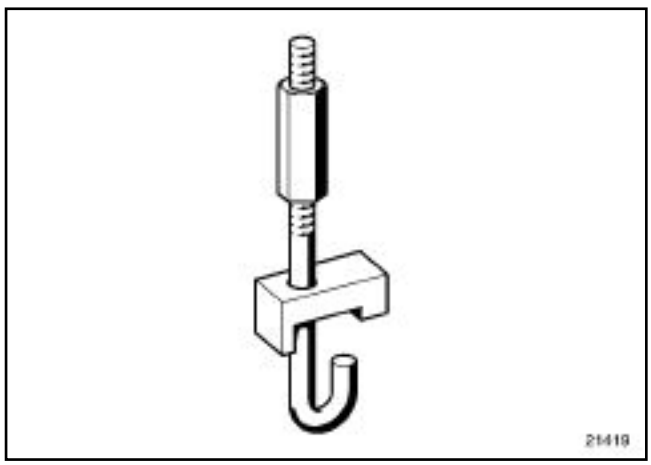
Illustration	Tool number	Tool part number	Description
 18897	**Mot. 1586**	00 00 158 600	Tool for fitting crankshaft seal (timing end).
 18895	**Mot. 1632**	00 00 163 200	Camshaft oil seal fitting tool (timing end).
 21419	**Mot. 1638**	00 00 163 800	Accessories belt tension tool.

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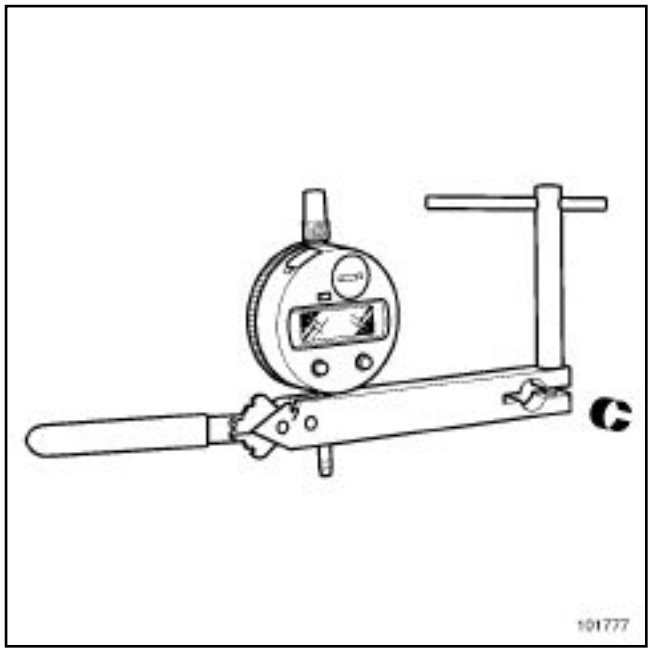
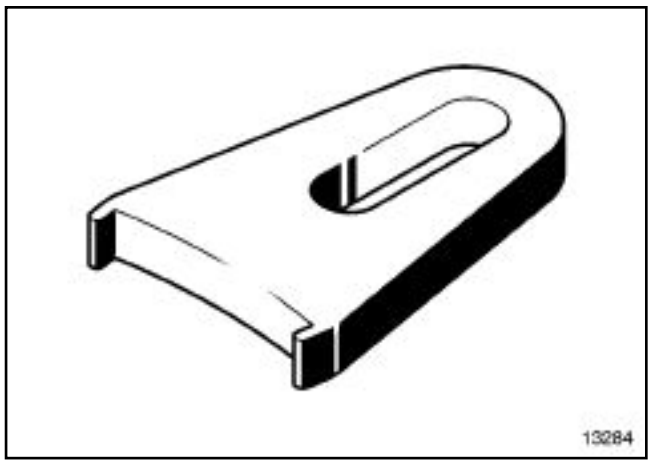
Illustration	Tool number	Tool part number	Description
 101777	**Mot. 1666**	00 00 166 600	Balancing shaft timing tool.
 13284	**Mot. 1677**	00 00 167 700	Flywheel locking tool.
	Mot. 1714	77 11 381 714	Adapter for **Mot. 1586** for cranks-hafts with M14 thread hole.

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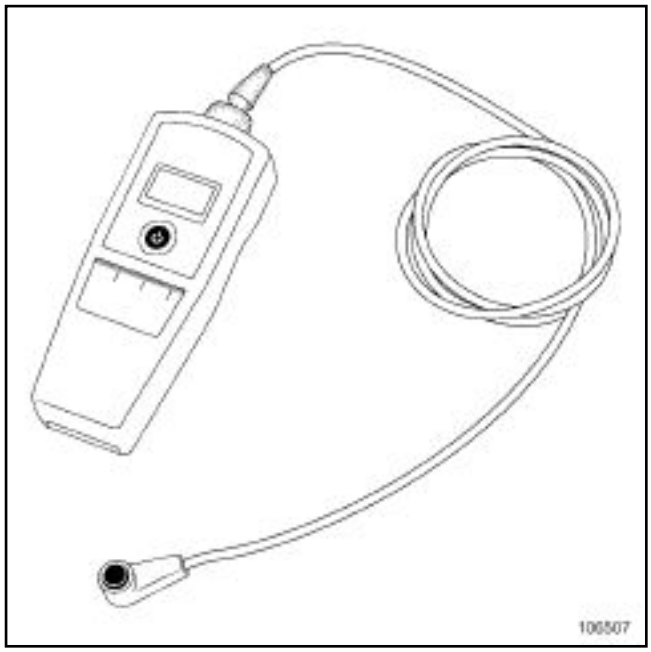
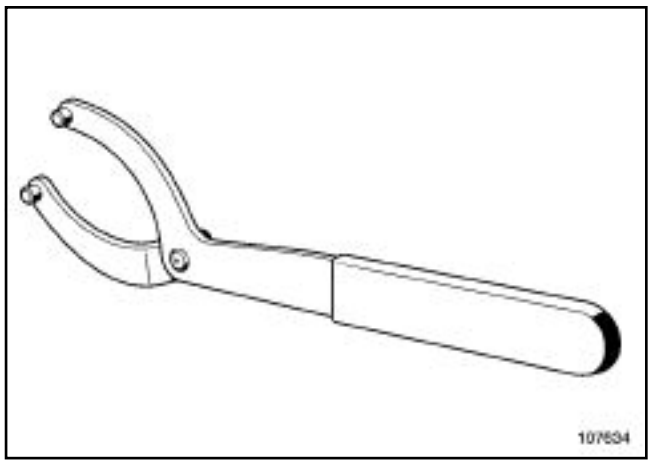
Illustration	Tool number	Tool part number	Description
 106507	**Mot. 1715**	77 11 381 715	Frequency meter for belt tension.
 107634	**Mot. 1729**	77 11 381 729	E G R valve removal spanner.

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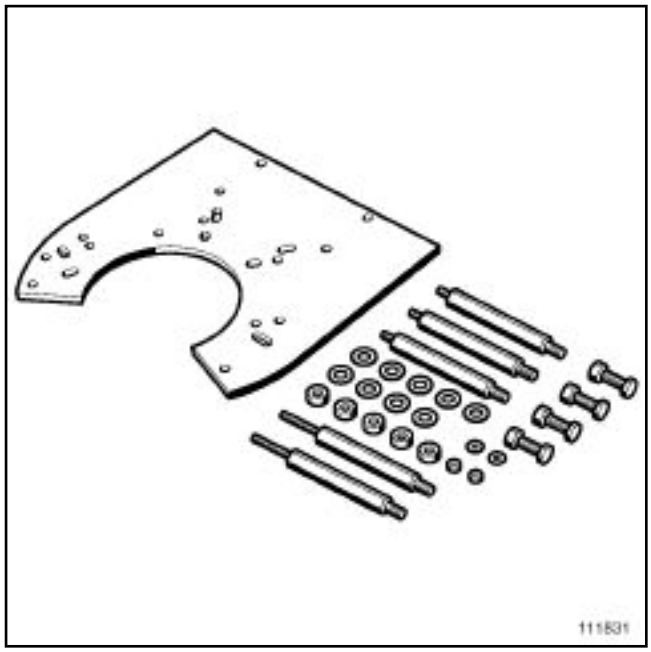
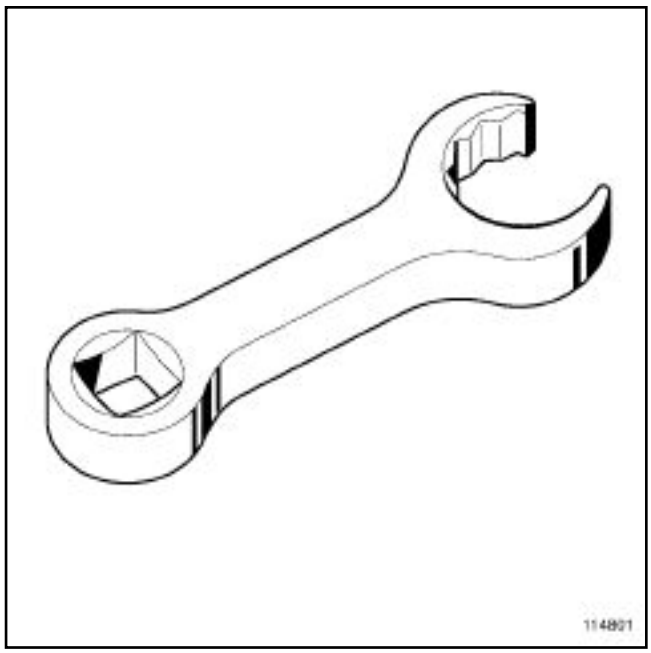
Illustration	Tool number	Tool part number	Description
 111831	**Mot. 1723**	77 11 381 723	Engine stand.
 114801	**Mot. 1746**	77 11 381 746	Offset spanner for high pressure pipes

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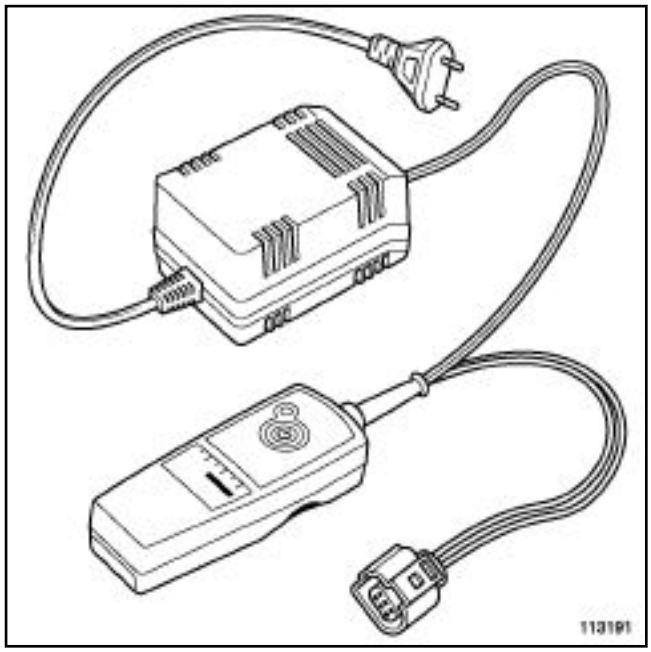
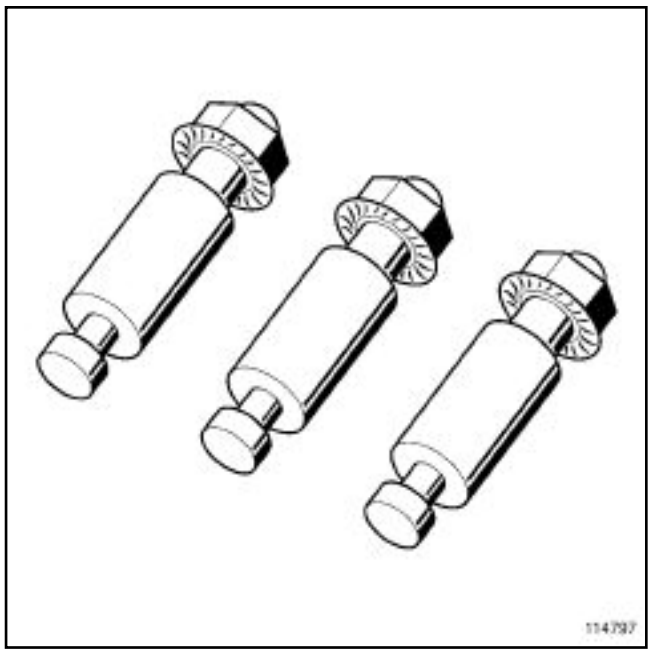
Illustration	Tool number	Tool part number	Description
 113191	**Mot. 1757**	77 11 381 757	EGR valve cleaning tool.
 114797	**Mot. 1768**	77 11 381 768	High pressure pump sprocket extractor claws.

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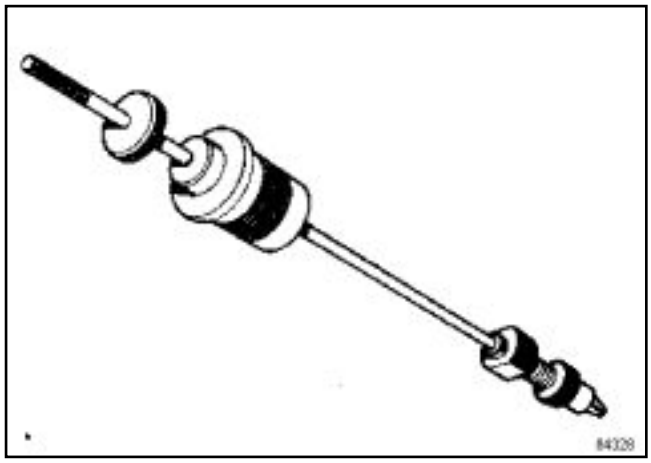
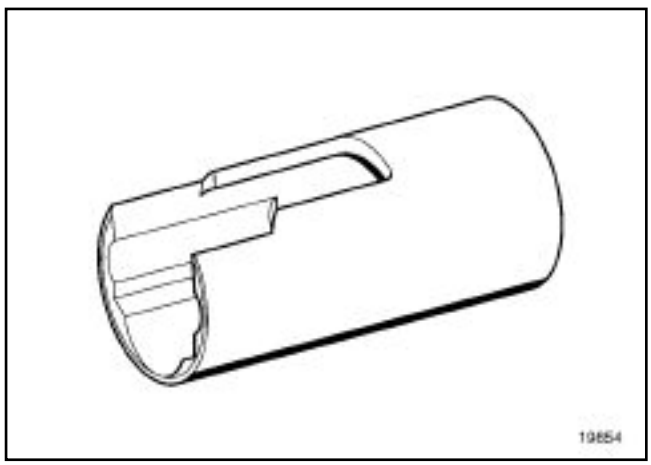
Illustration	Tool number	Tool part number	Description
 84328	**Emb. 880**	00 00 088 000	Pin extractor.
 19854	**Emb. 1596**	00 00 159 600	24mm socket.

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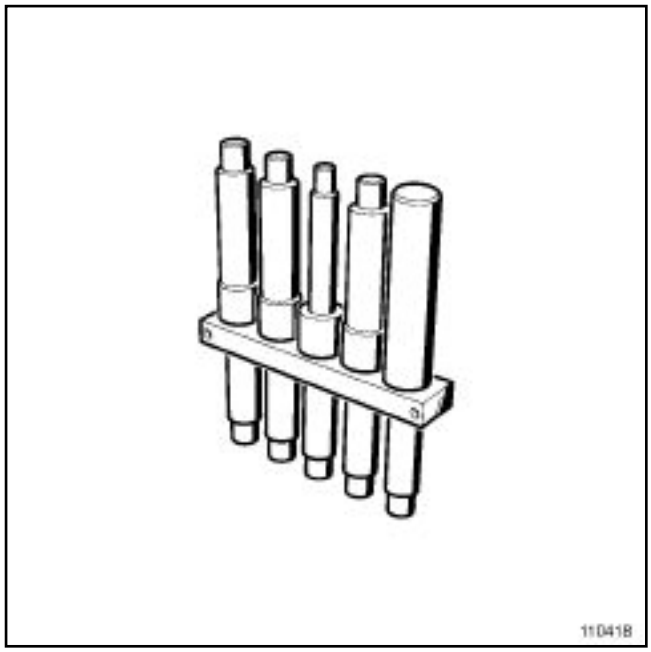
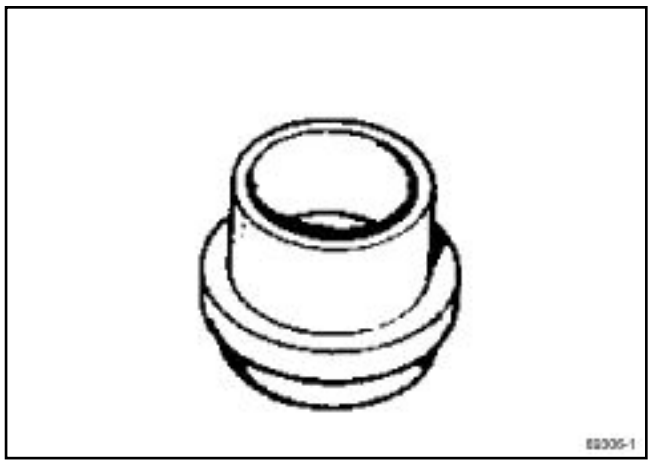
Illustration	Tool number	Tool part number	Description
 110418	**Emb. 1780**	77 11 381 780	Clutch centring device.
 69306-1	**Rou. 15-01**	00 01 331 601	Protective end piece.

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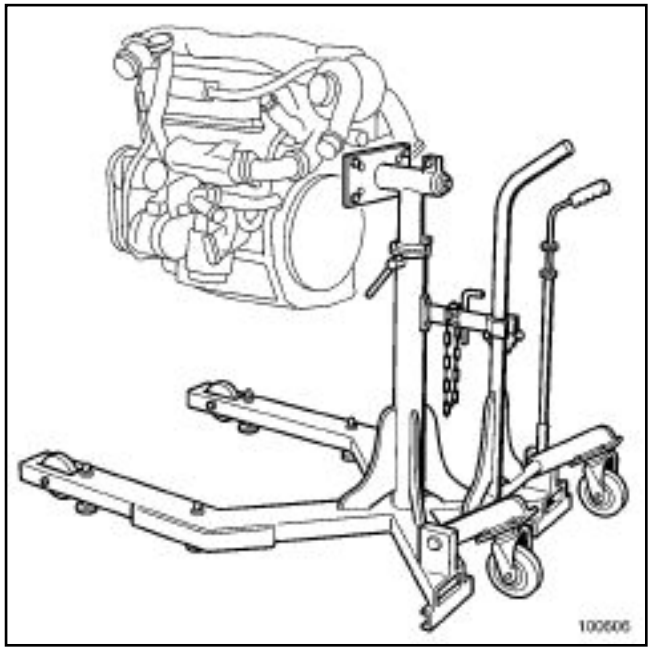
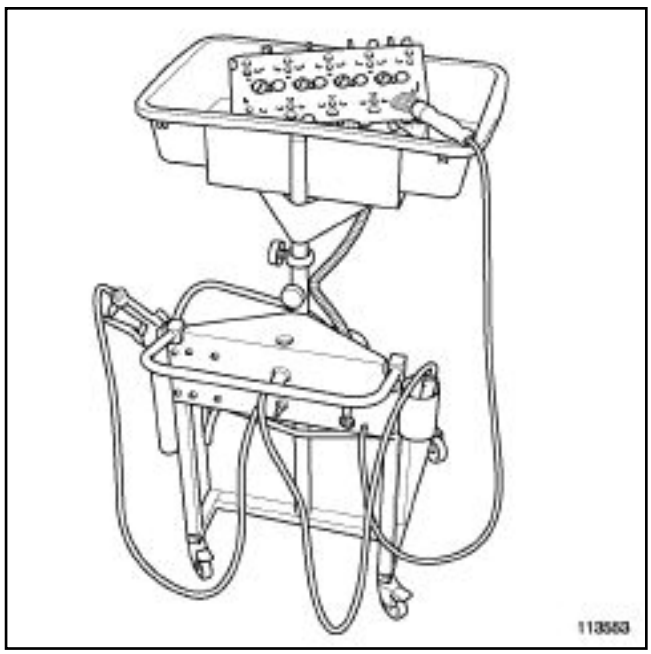
Illustration	Description
 100606	Engine stand.
 113553	Cleaning bench.

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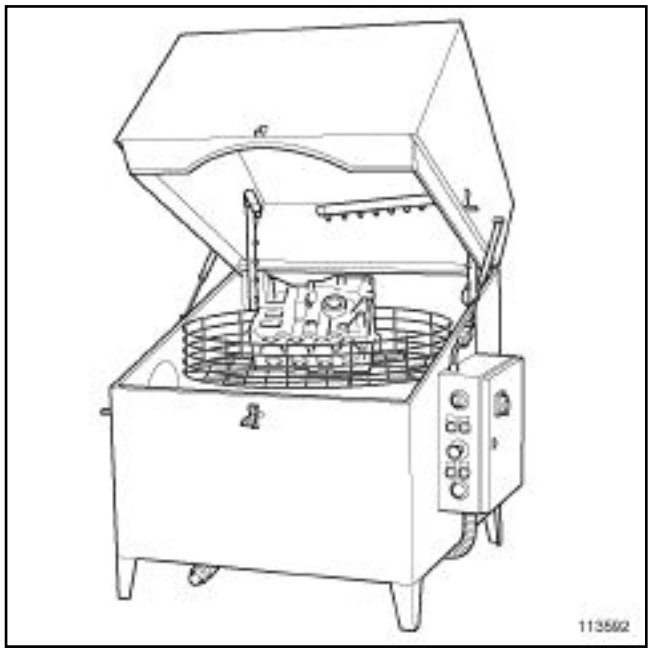
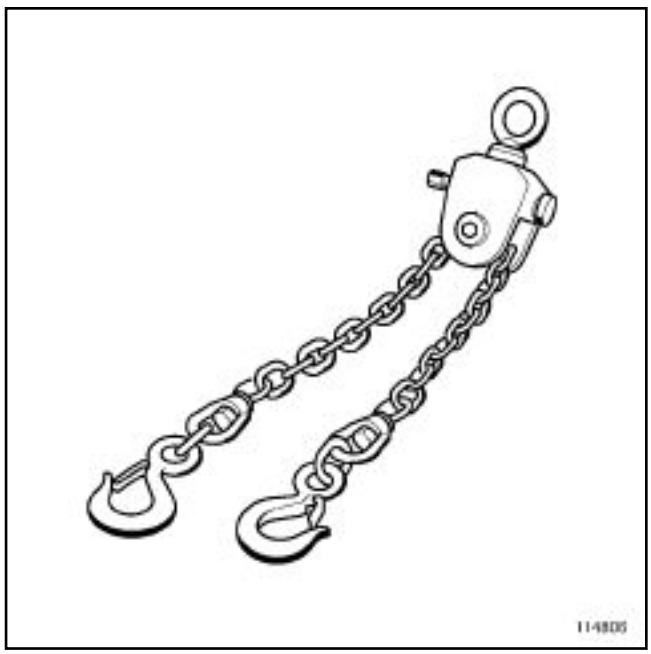
Illustration	Description
 113592	Cleaning fountain.
	Portable crane.
 114806	Load positioner.

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Illustration	Description
114792	Relieved thread kit.
114790	Stud extractor kit.

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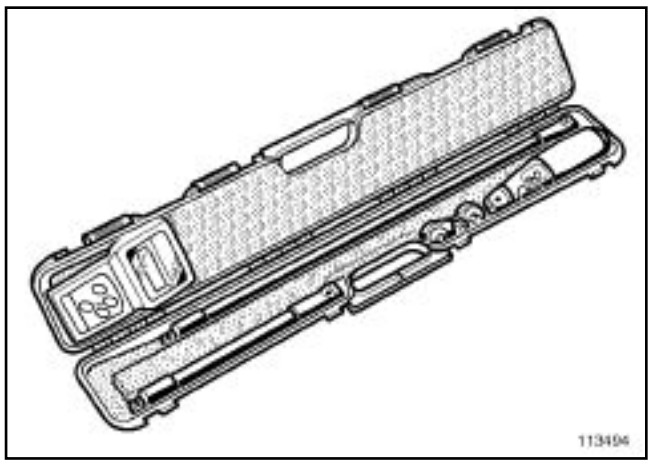
Illustration	Description
 114786	Bearing extractor kit.
 113494	Torque/angle torque wrench.

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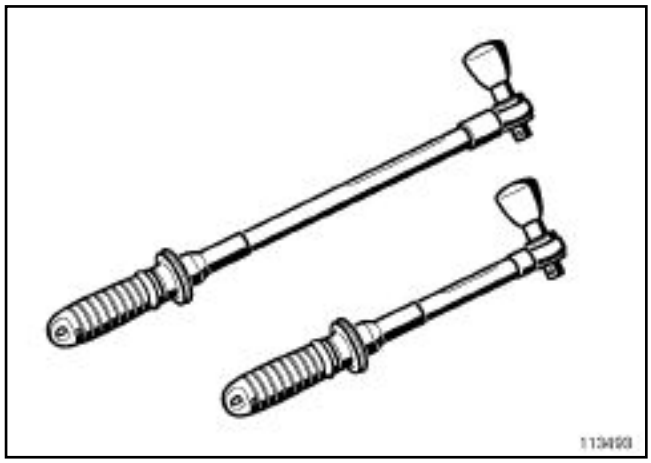
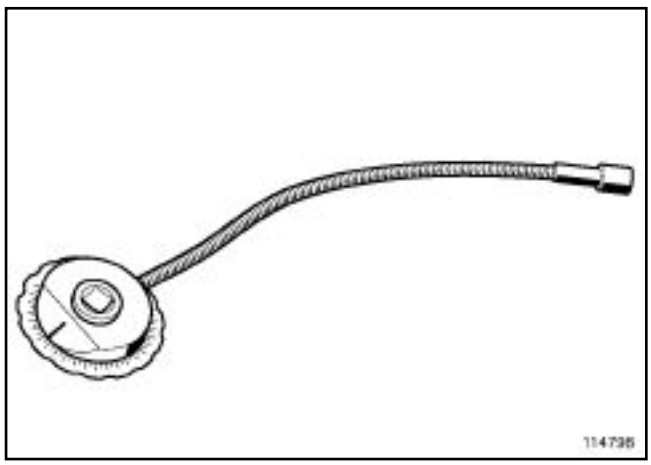
Illustration	Description
 113493	Torque wrench.
 114798	Bolt tightening gauge (angular measuring type).

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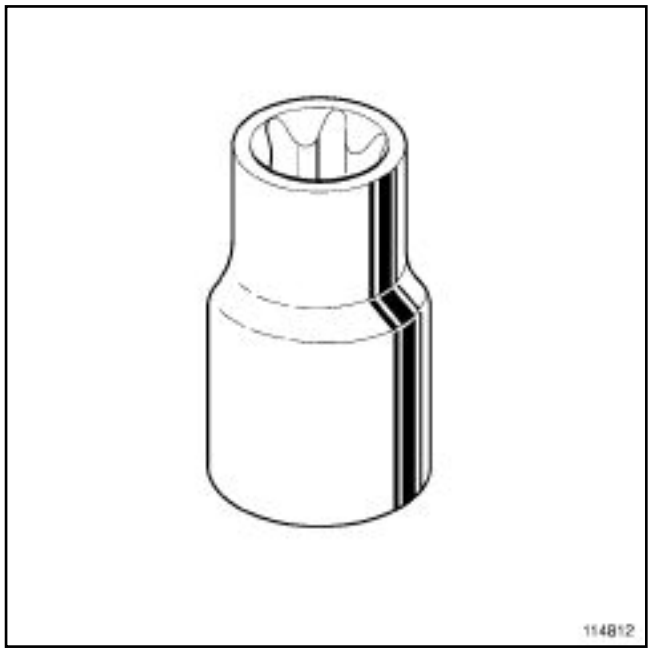
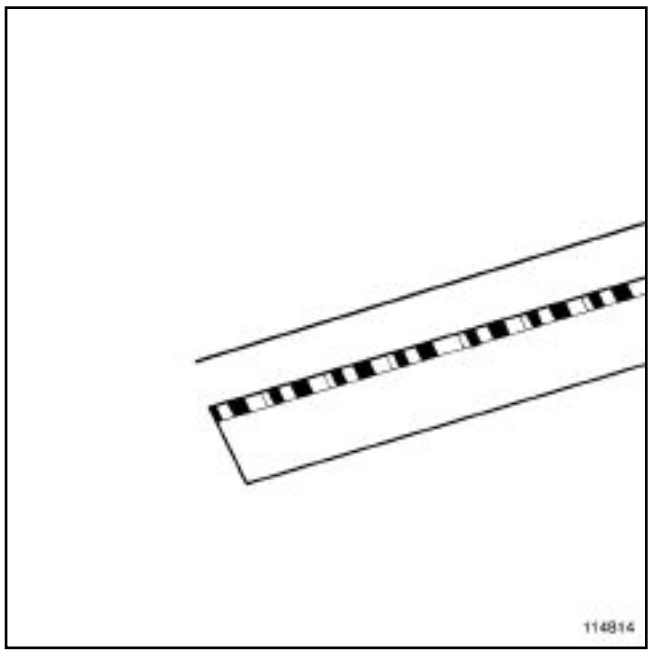
Illustration	Description
 114812	Standard 1/2" (12.7mm) square drive 8/12/14 female torx socket .
 114814	Radial play measuring tape.
	Oil change end piece fitted with an **8mm** square drive
	Engine oil change wrench
	Pair of protective gloves
	Protective goggles
	Tool for checking the valve spring loading

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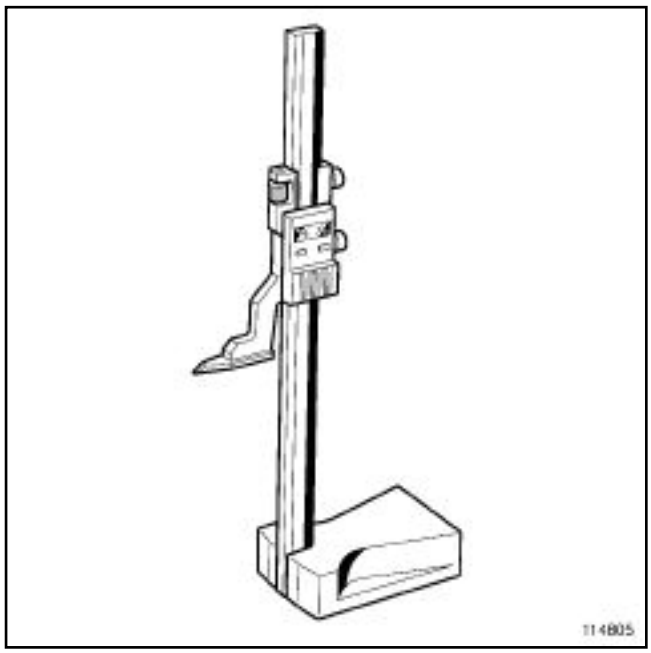
Illustration	Description
	Indelible marker
	Brushes with plastic or non-scratch metal (brass) bristles
	Compressed air gun
	Pressure/vacuum pump
 114805	Marking gauge

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Illustration	Description
 114791 114783	Sliding calliper.

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Illustration	Description
 114789 114782	Depth gauge

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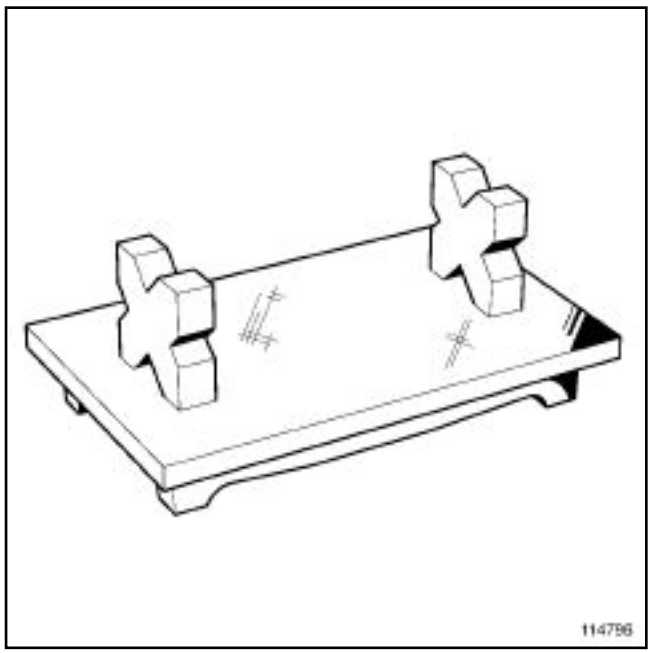
Illustration	Description
114787	Micrometer.
 114796	Body jig bench and a pair of v-blocks.

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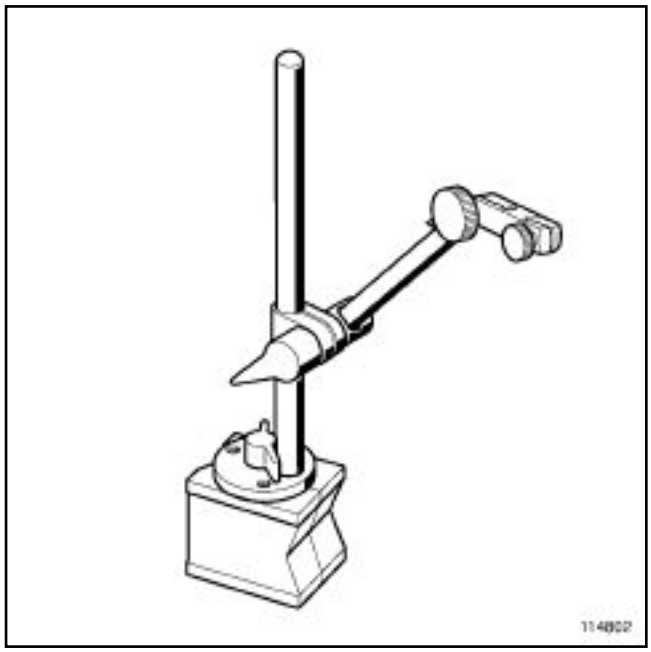
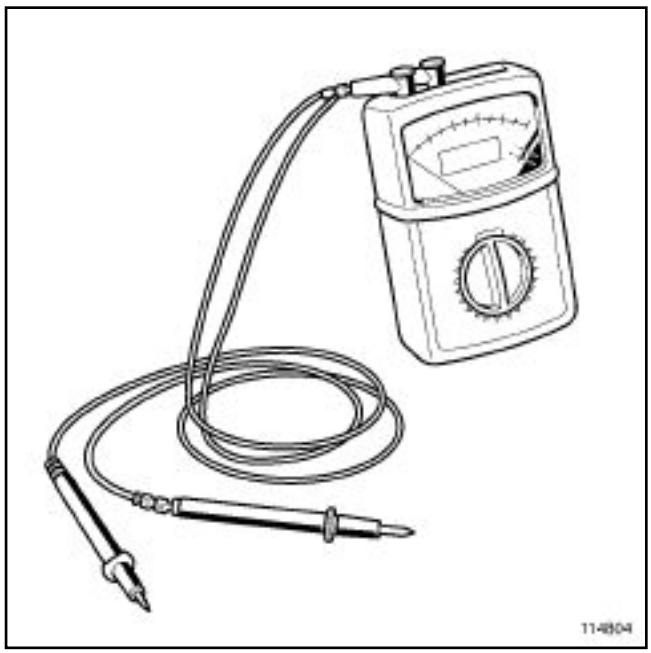
Illustration	Description
 114802	Magnetic holder.
 114804	Multimeter.

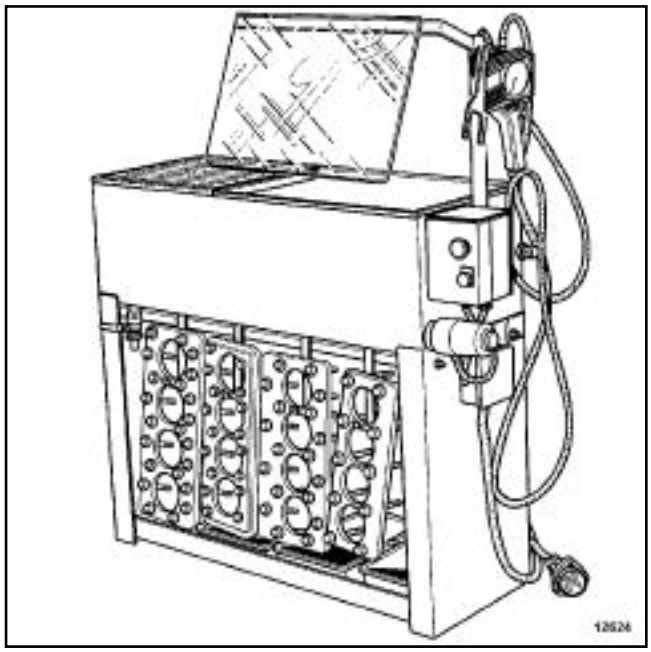
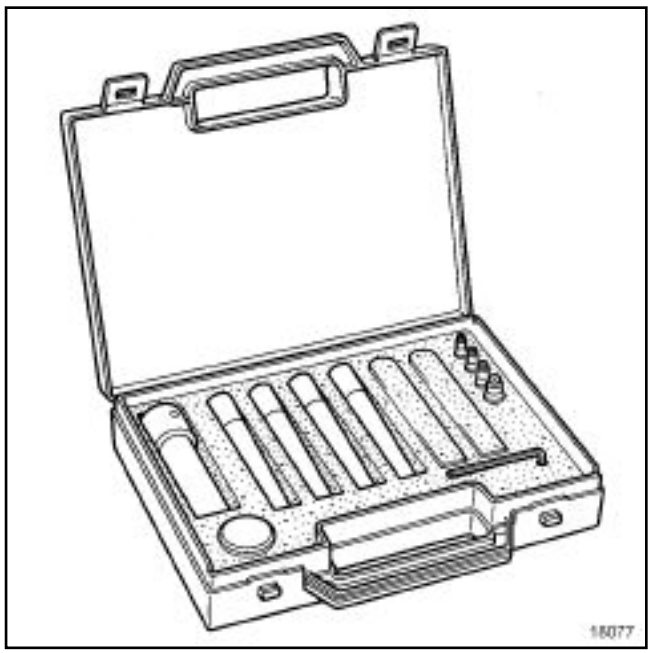
Illustration	Description
 12624	Cylinder head testing tool.
 18077	Toolkit for fitting valve stem seals

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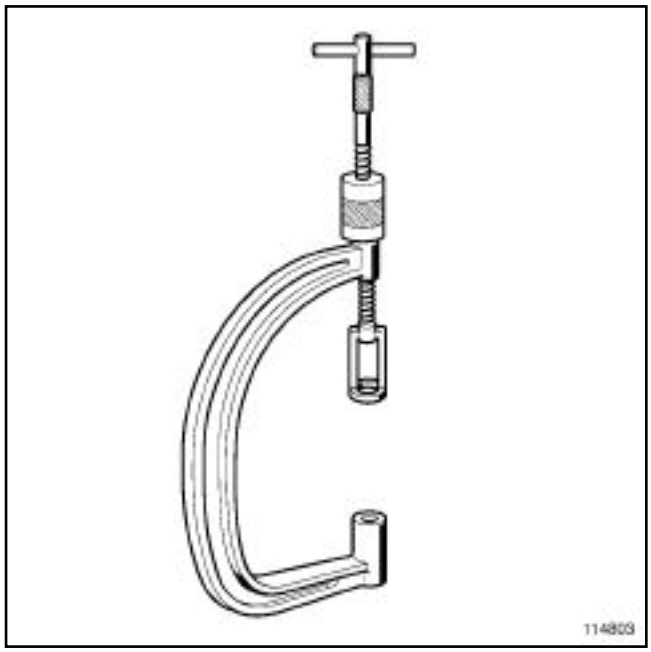
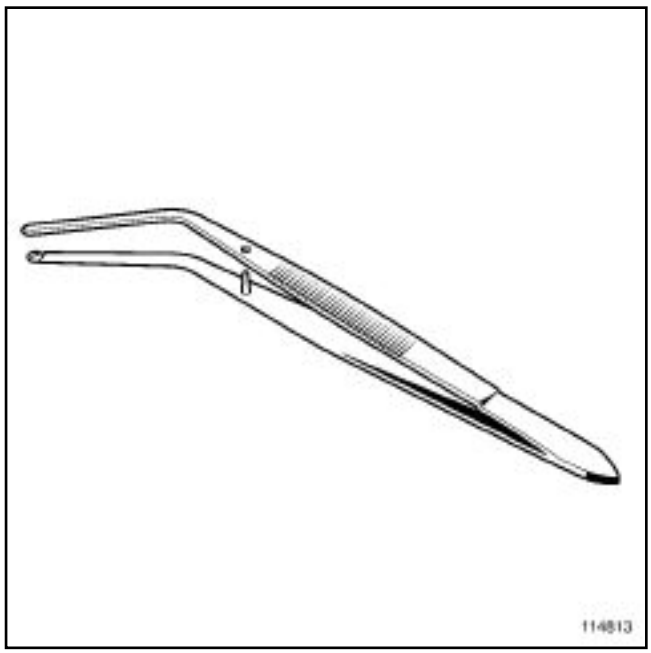
Illustration	Description
 114803	Valve spring compressor.
 114813	Tweezers.

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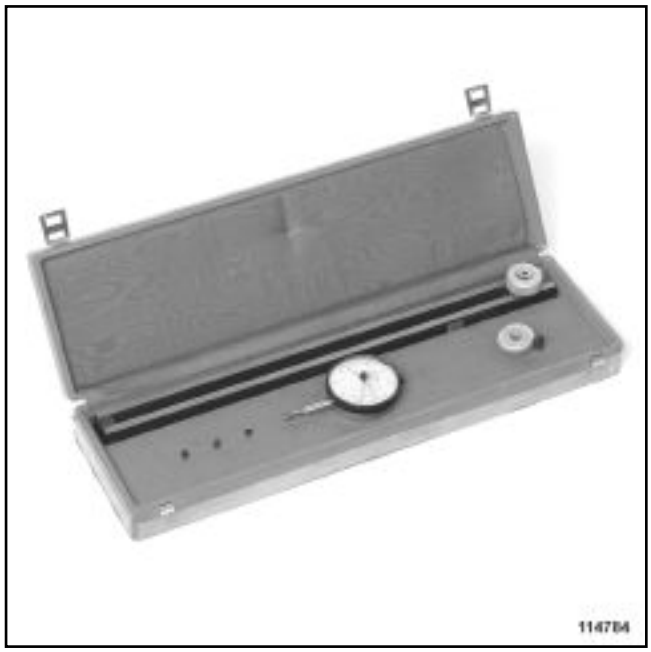
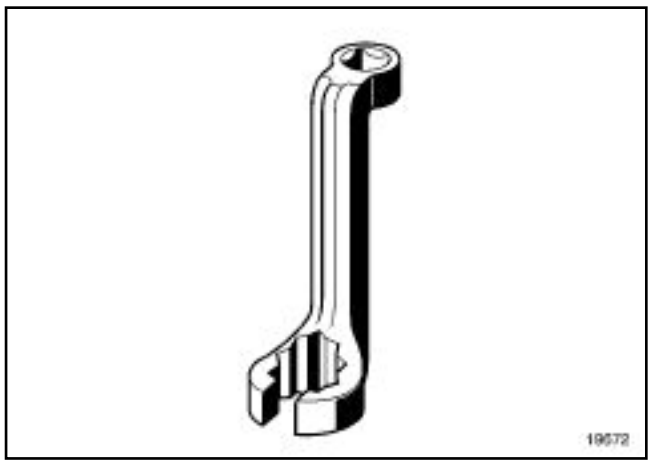
Illustration	Description
 114784	Cylinder head straight edge.
 19672	Spanner for the high pressure pipes.

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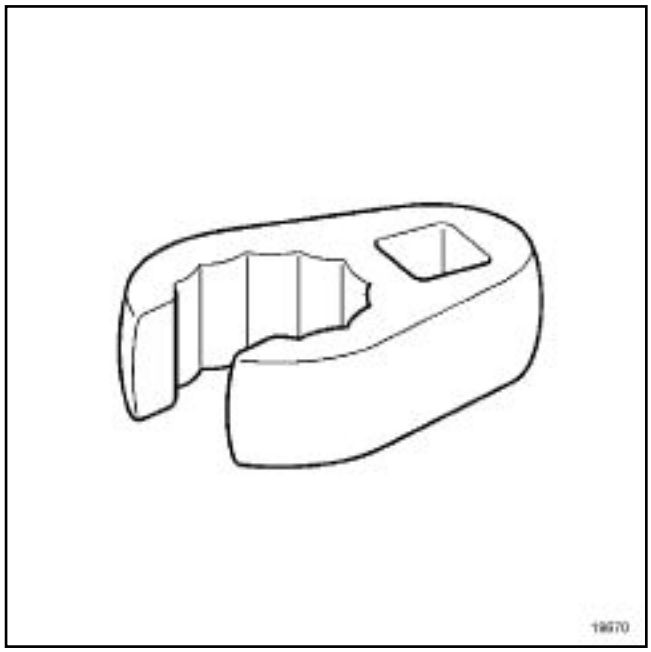
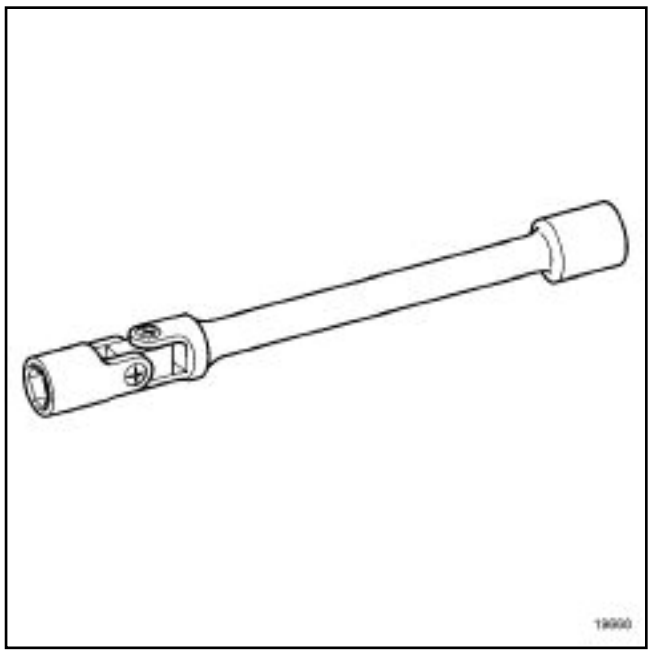
Illustration	Description
 19670	Crow foot spanner.
 19668	Wrench with hinge for heater plugs.

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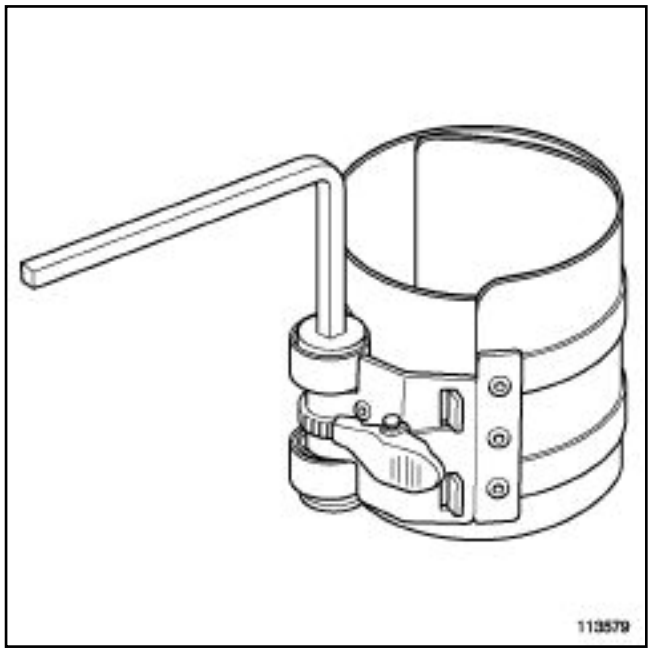
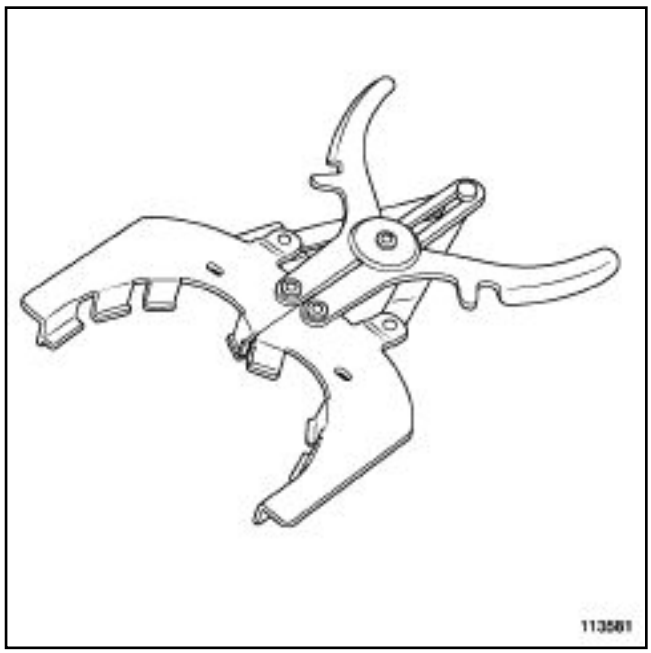
Illustration	Description
 113579	Ring for fitting pistons in the cylinder block.
 113581	Tool for removing and refitting piston rings.

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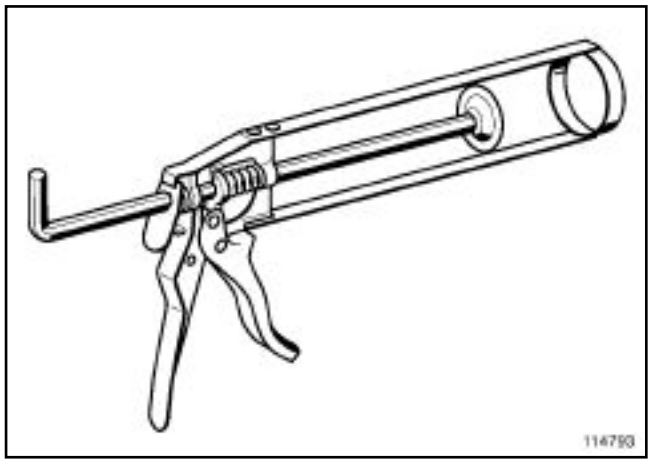
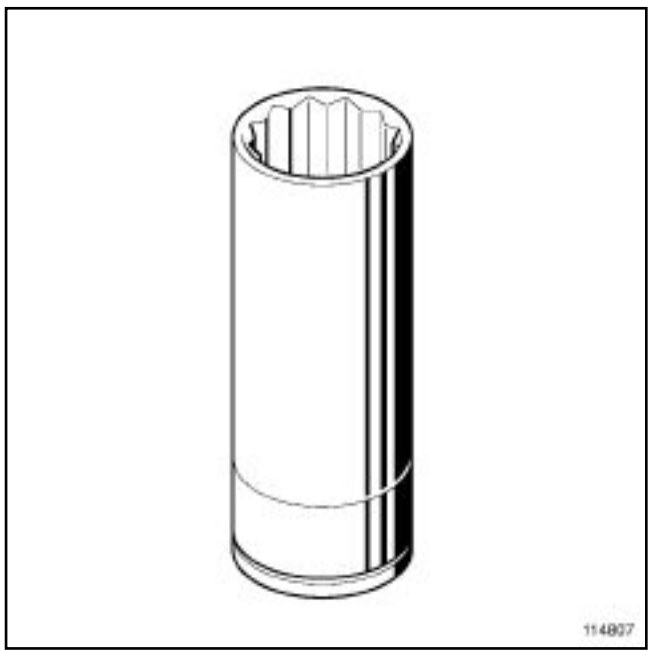
Illustration	Description
 114793	Gun for adhesive silicone seal cartridges.
 114807	Standard 1/2" 22mm long socket (12.7mm square drive)

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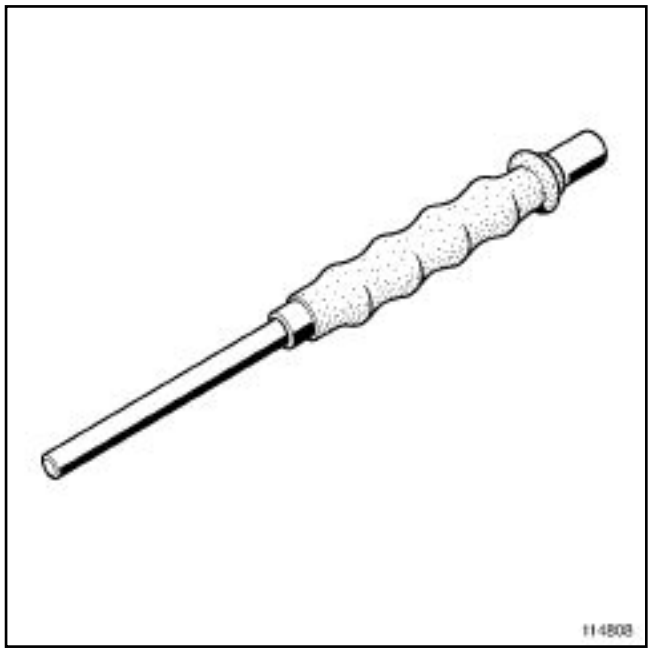
Illustration	Description
 114808	Roll pin punch.

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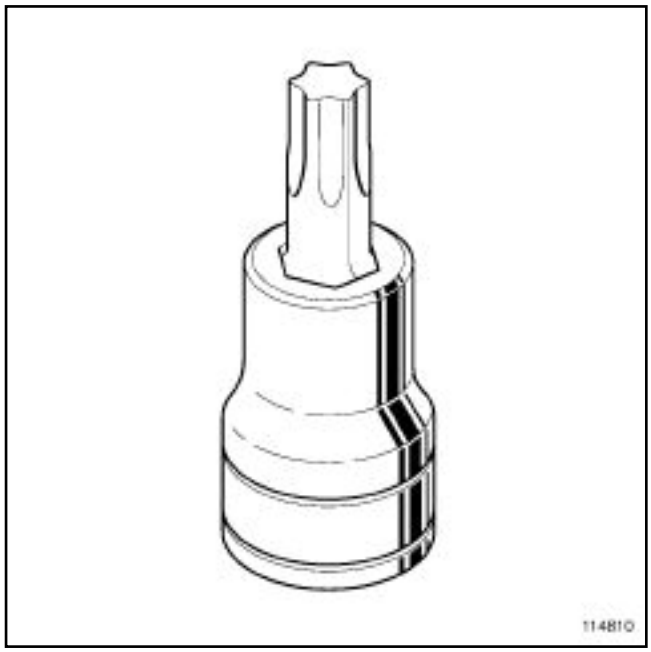
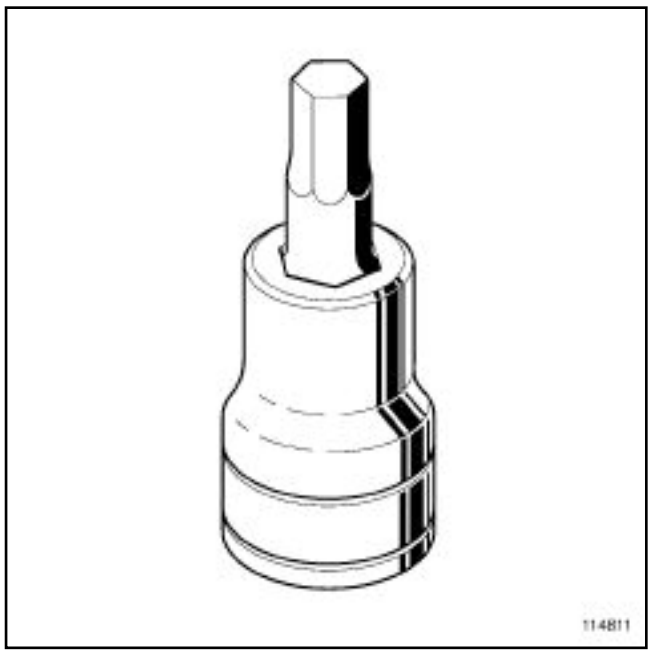
Illustration	Description
 114810	Male torx socket.
 114811	Hexagon drive socket.

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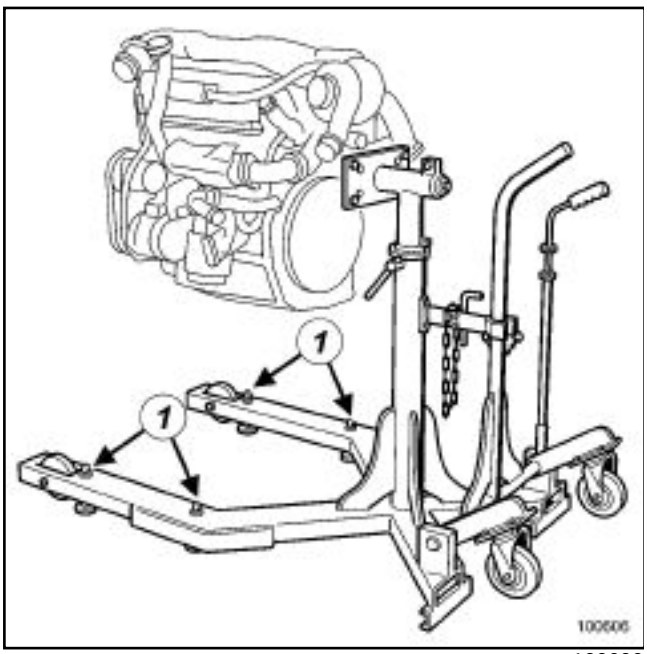
Special tooling required	
Mot. 1378	Engine support studs X & Y for use with stud A for Desvil engine support
Mot. 792-03	Engine support plate for Desvil engine stand
Mot. 582-01	Flywheel locking tool.
Mot. 1677	Flywheel locking tool.
Mot. 1723	Engine support for DESVIL engine support stand.
Mot. 1018	Sump plug tool.

I - RECOMMENDATIONS FOR REPAIR



100606

IMPORTANT
In order to work on the engine in complete safety, it is essential to use the new stand, or have the old stand modified by the manufacturer. When the engine is on the stand, it is essential to fit mounting pads (**1**) .

II - EQUIPMENT REQUIRED

- Engine stand,
- Workshop crane,
- Load positioner
- Male torx socket,
- **8mm** Square drive drain plug spanner
- Protective gloves.

III - PREPARING THE ENGINE TO BE MOUNTED ON THE STAND

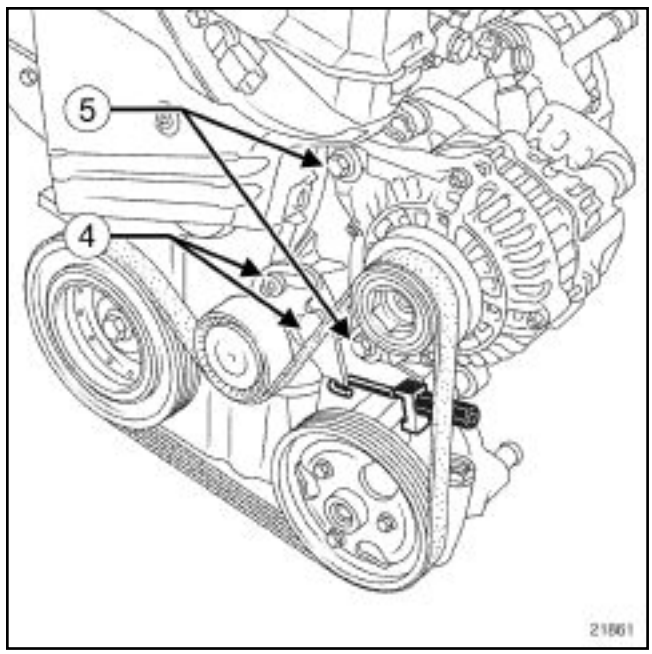
There are two procedures for securing the engine to the stand:

- by fitting tool (**Mot. 792-03**) to the cylinder block (oil filter end),
- by fitting tool (**Mot. 1723**) to the cylinder block (flywheel end).

1 - Fitting the engine to the stand fitted with Mot. 792-03 (oil filter end)

This mounting refers to the following engines only: K9K 260-270-272-700-702-704-706-710-722-750-752-790.

a - Engine without air conditioning



21861

Loosen the tensioning roller mounting bolts (**4**) .

Remove:

- the accessories belt,
- the accessory belt tensioning roller,
- the alternator mounting bolts (**5**) ,
- the alternator.

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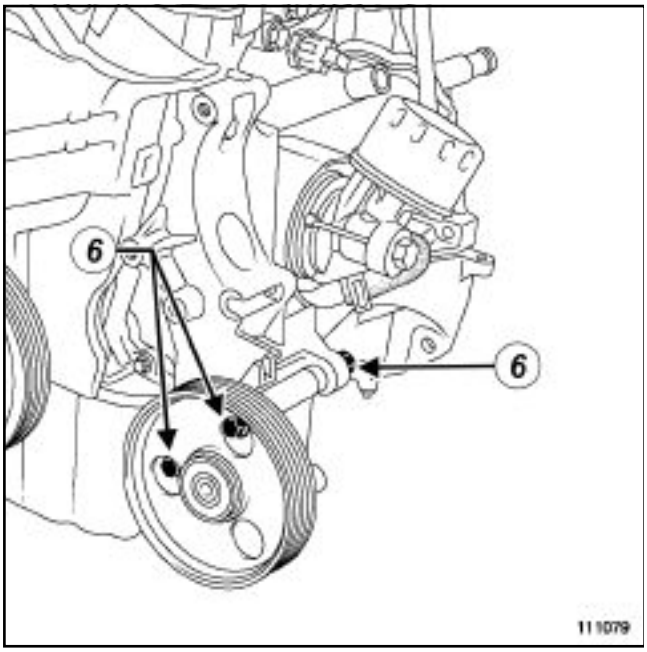
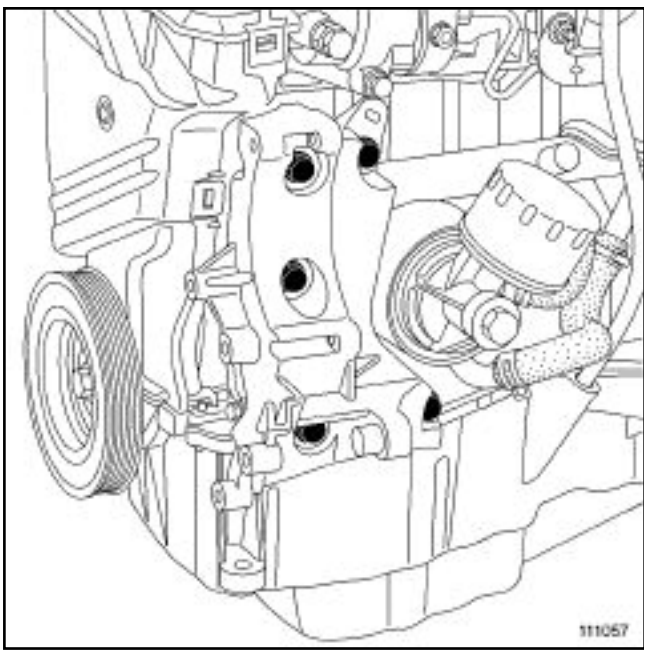


111079

Remove:

- the power-assisted steering pump or dummy pulley mounting bolts (**6**) ,
- the power-assisted steering pump or dummy pulley.

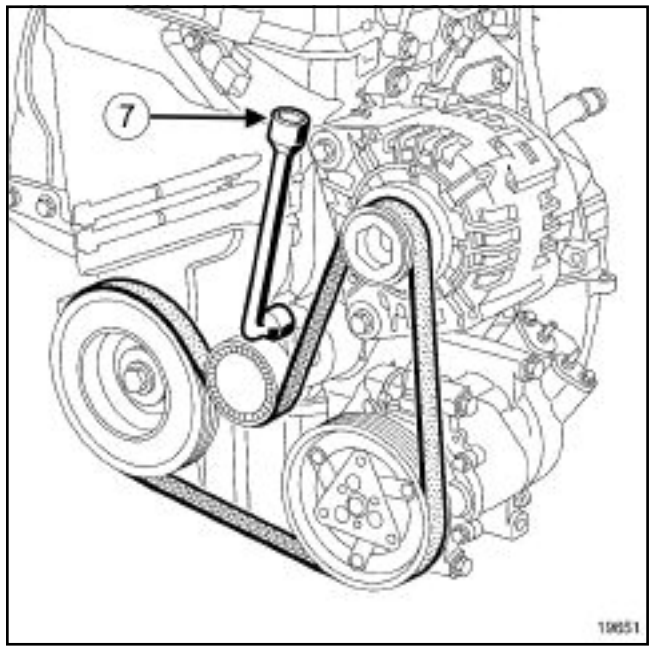


111057

Remove:

- the multifunction support mounting bolts,
- the multifunction support.

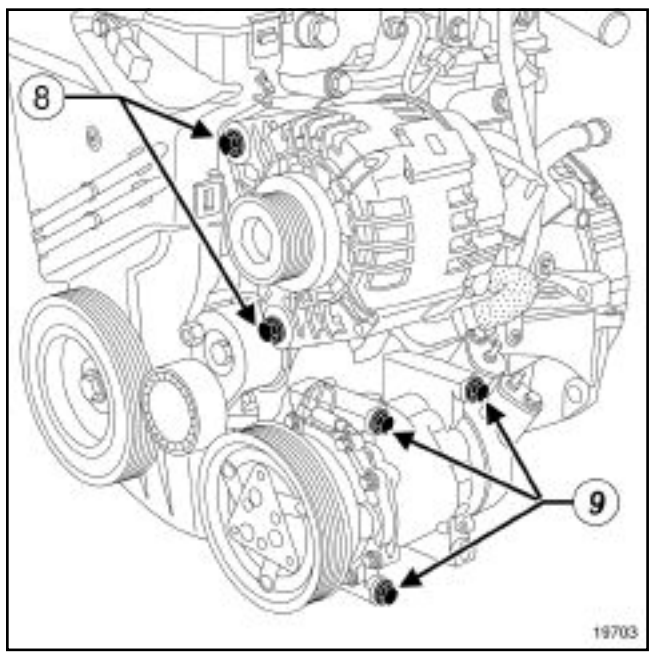
b - Engine with air conditioning



19651

Rotate the tensioning roller using a wrench (**7**) to slacken the belt.

Remove the accessories belt.



19703

Remove:

- the alternator mounting bolts (**8**) ,
- the alternator,
- the air conditioning compressor mounting bolts (**9**) ,
- the air conditioning compressor.

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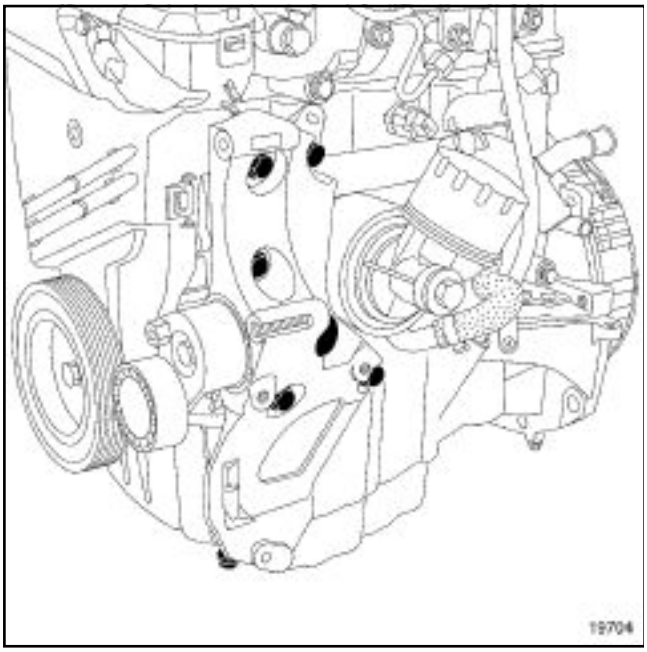
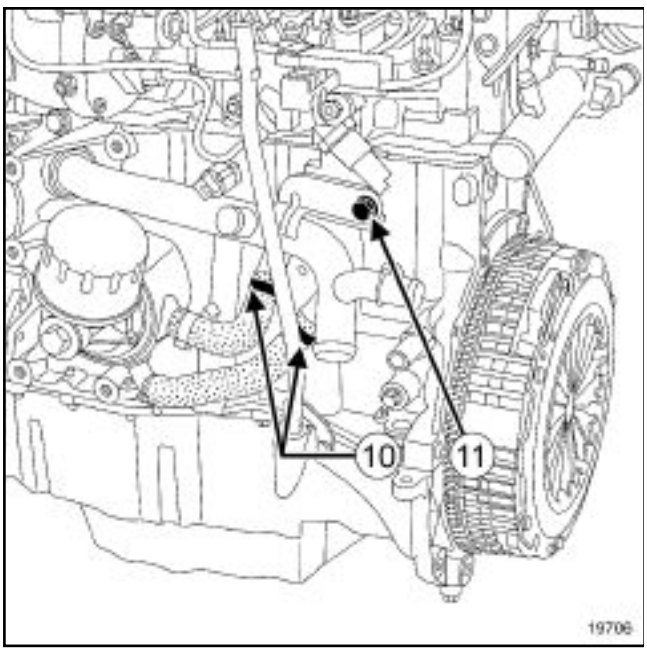


19704

Remove:

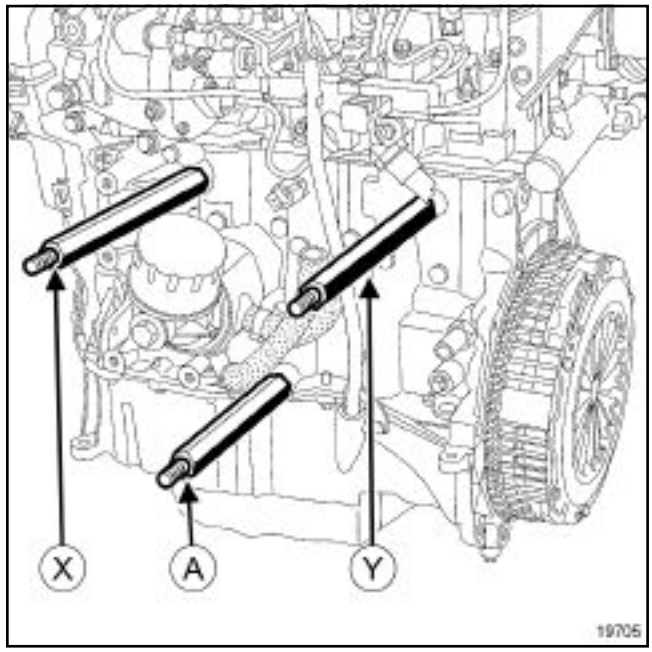
- the auto tensioner,
- the multifunction support mounting bolts,
- the multifunction support.



19706

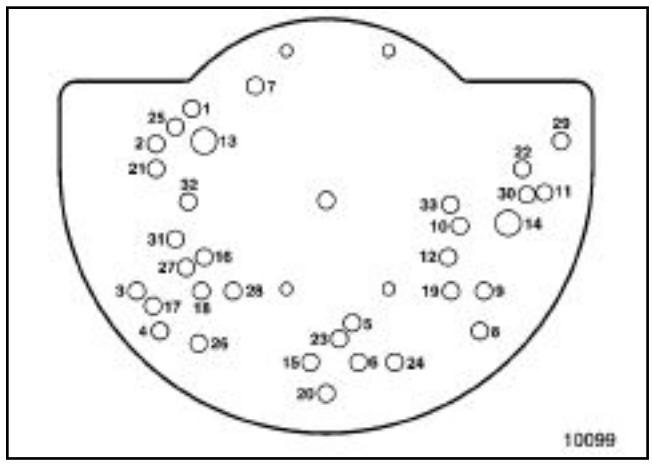
Remove:

- the coolant hoses (**10**) from the coolant pump inlet pipe,
- the coolant pump inlet pipe mounting bolt (**11**) ,
- the coolant pump inlet pipe.



19705

Fit the support studs (**X**) , (**Y**) of **(Mot. 1378)** and the support stud (**A**) of **(Mot. 792-03)** to the cylinder block.



10099

Fit the (**Mot. 792-03**) plate onto the engine fitted with support studs by lining up:

- the support stud ***(A)*** with hole **20** on the plate,
- the support stud ***(X)*** with hole **33** on the plate,
- the support stud ***(Y)*** with hole **32** on the plate.

Fit the engine complete with plate onto the engine stand.

2 - Fitting the engine to the stand fitted with Mot. 1723 (flywheel end)

This fitting relates to all K9K engines .

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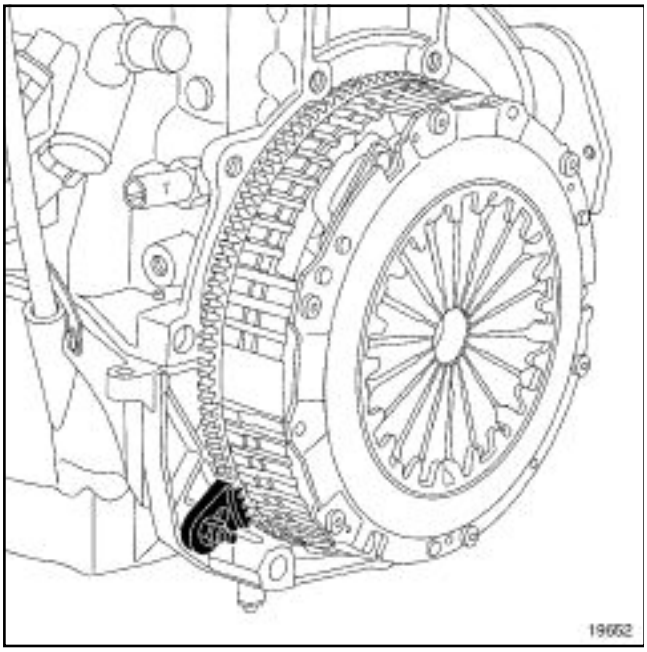
Note:

The flywheel must be removed on engines with the starter motor at the exhaust end.

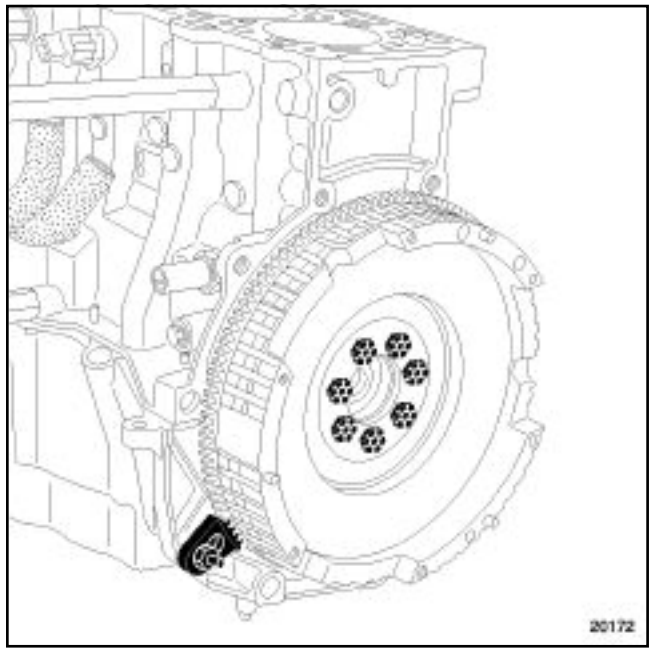


19652

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

Remove:

- the clutch pressure plate securing bolt,
- the clutch pressure plate,
- the friction plate.



20172

Remove:

- the flywheel mounting bolts,
- the flywheel,
- the flywheel locking tool (**Mot. 582-01**) or (**Mot. 1677**).

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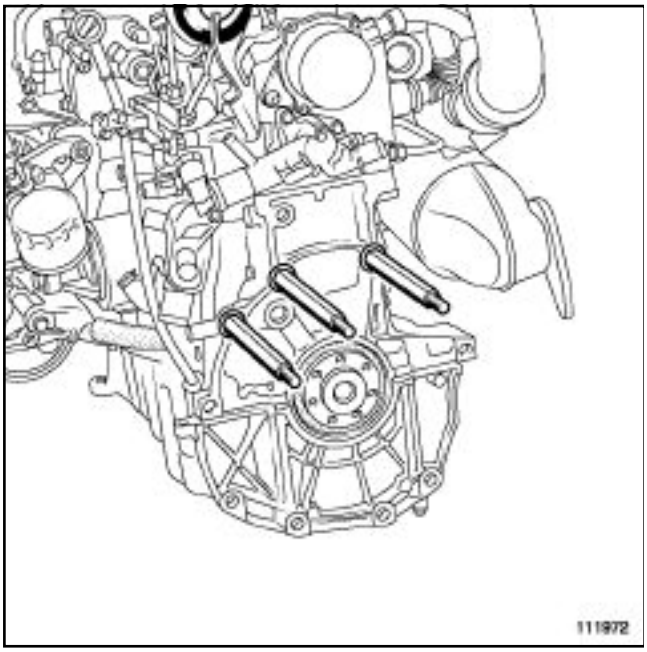
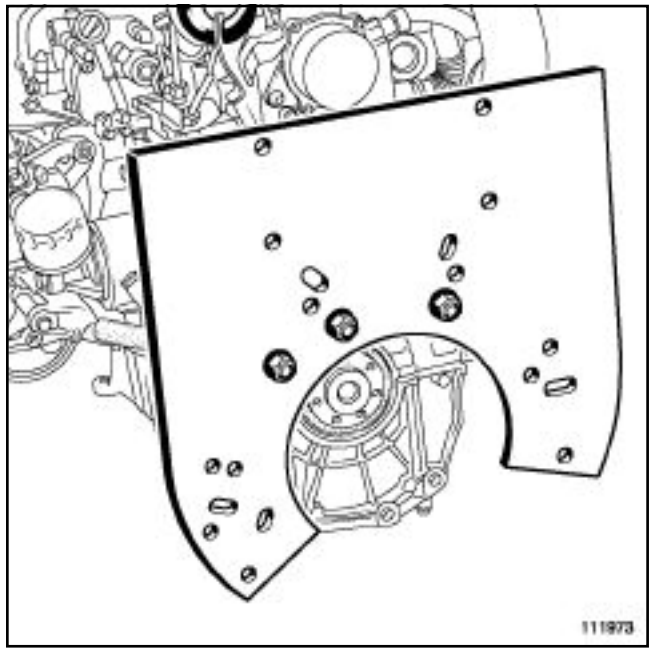
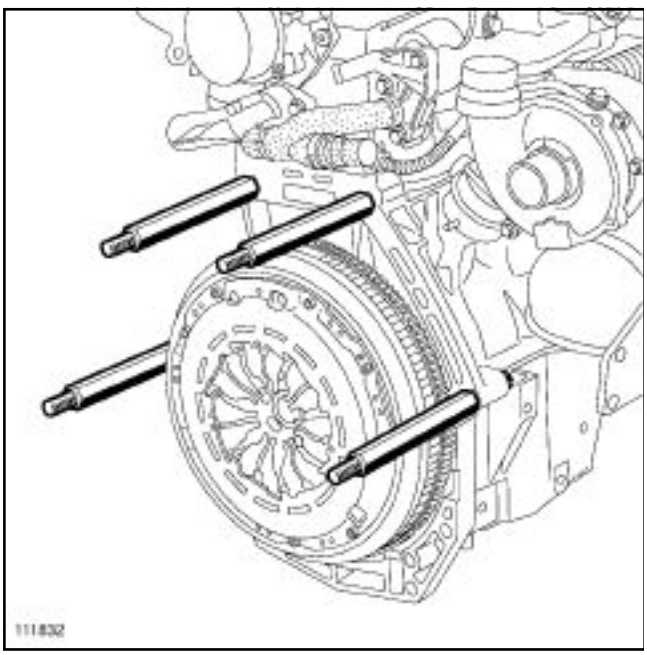


111972

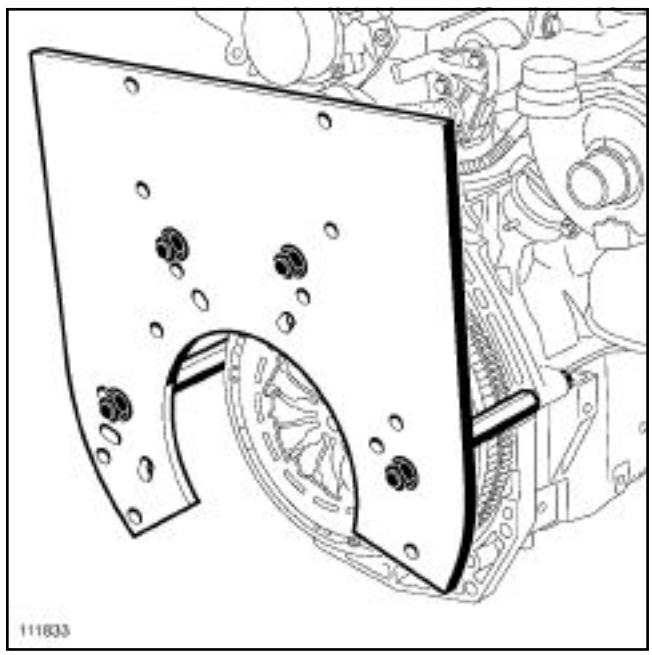


111973



111832

Fit the support stud of **(Mot. 1723)** to the cylinder block.



111833

Fit the (**Mot. 1723**) plate onto the engine fitted with support studs by lining up:

- the support studs with holes **5, 6 and 7** on the plate (for engines with starter on the exhaust side),
- the support studs with holes **1, 2, 10 and 12** on the plate (for engines with starter on the oil filter side).

Fit the engine complete with plate onto the engine stand.

Remove the engine wiring harness.

Remove the drain plug from the sump using **(Mot. 1018)** or using **a drain plug spanner (8mm square drive)** .

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I - RECOMMENDATIONS FOR REPAIR

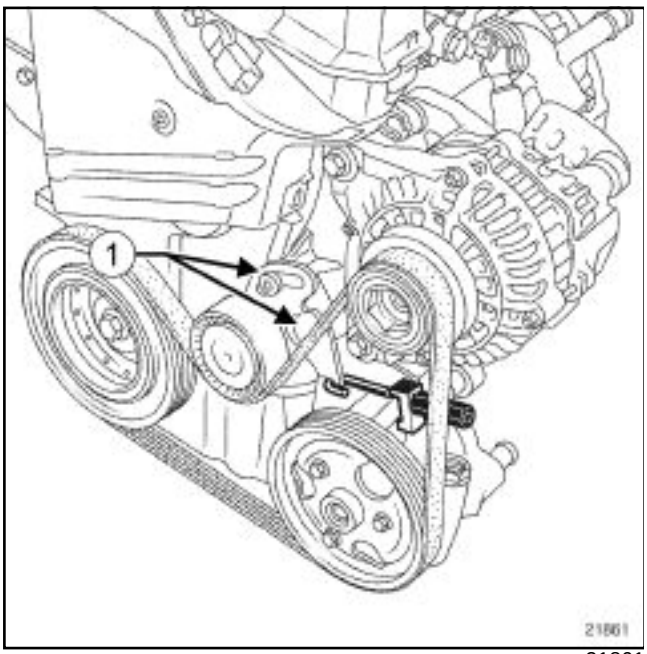
IMPORTANT
Wear protective gloves during every operation.

II - EQUIPMENT REQUIRED

- Protective gloves.

III - REMOVAL

1 - Engine without air conditioning



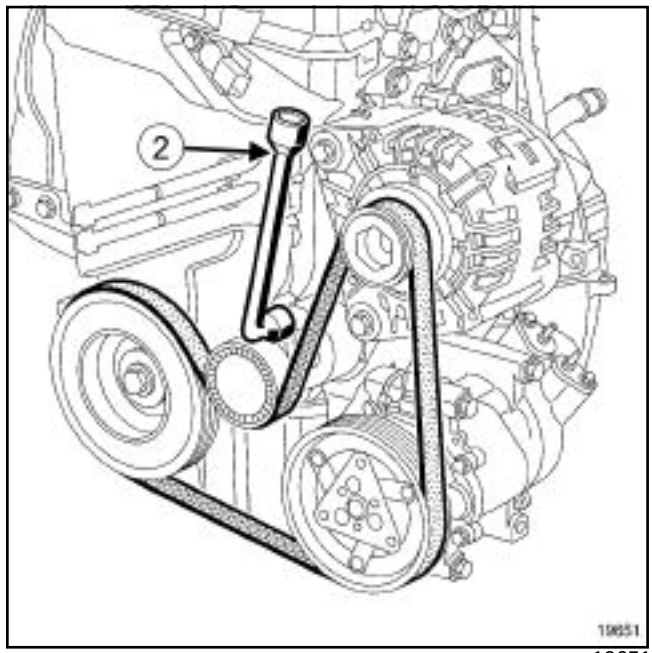
21861

Undo the tensioning roller mounting bolts (**1**) .

Remove:

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

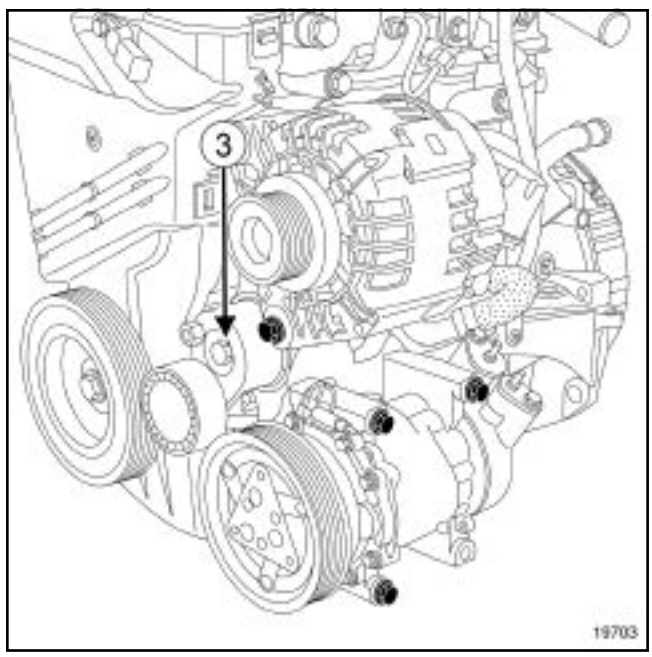
2 - Engine with air conditioning



19651

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

Remove the accessories belt.



19703

Remove:

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

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Timing - cylinder head: Removal

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. 1489	TDC locating pin.
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.
Mot. 582-01	Flywheel locking tool.
Mot. 1677	Flywheel locking tool.
Mot. 1573	Cylinder head support

I - TIMING GEAR REMOVAL

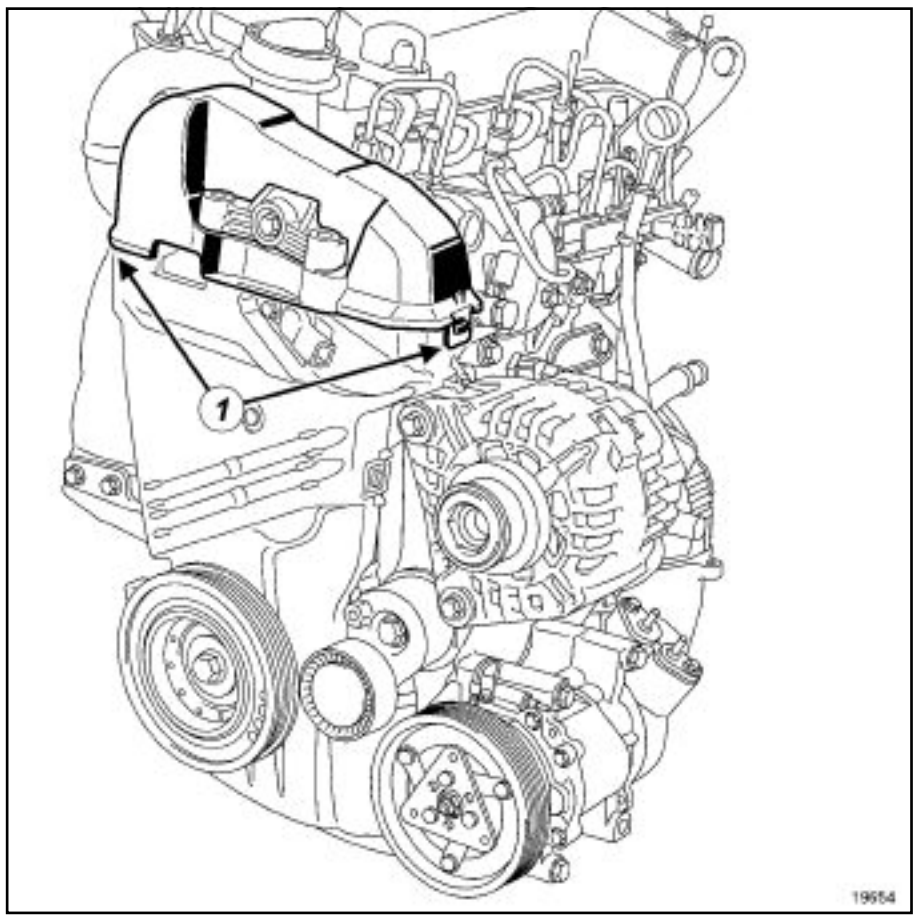
II - GUIDELINES FOR REPAIRS TO THE TIMING GEAR

IMPORTANT
Wear protective gloves during every operation.

III - EQUIPMENT REQUIRED FOR THE TIMING GEAR

- Protective gloves,
- Large screwdriver,
- Allen key (**6mm**),
- Female torx socket (**14**).

IV - REMOVAL



19654

Remove the upper timing cover by unclipping both tabs (**1**) .

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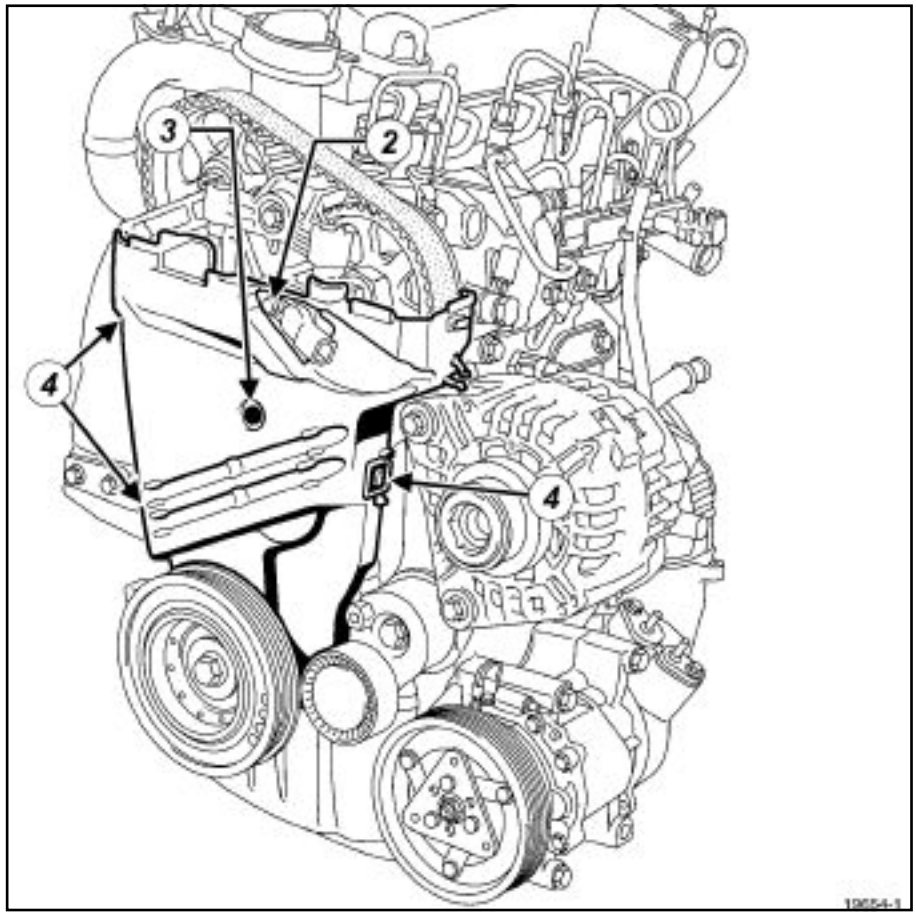
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19654-1

Remove:

- the high pressure pump position sensor (**2**) ,
- the plastic bolt (**3**) .

Unclip the three tabs (**4**) .

Remove the lower timing cover.

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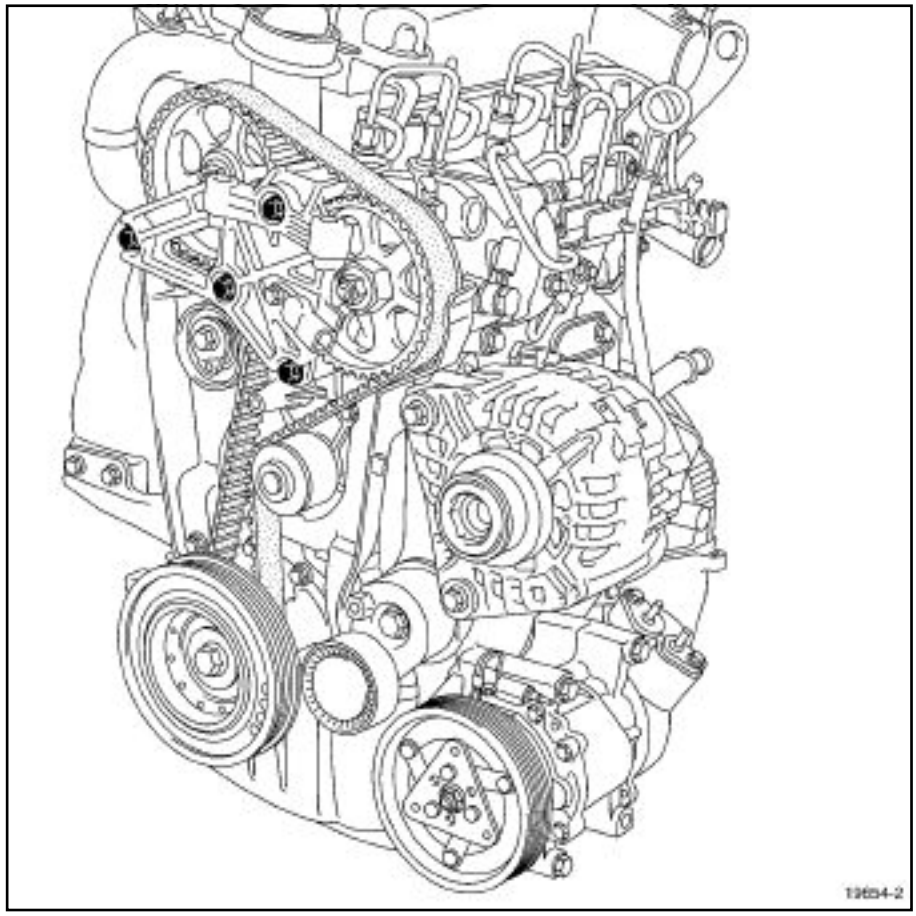
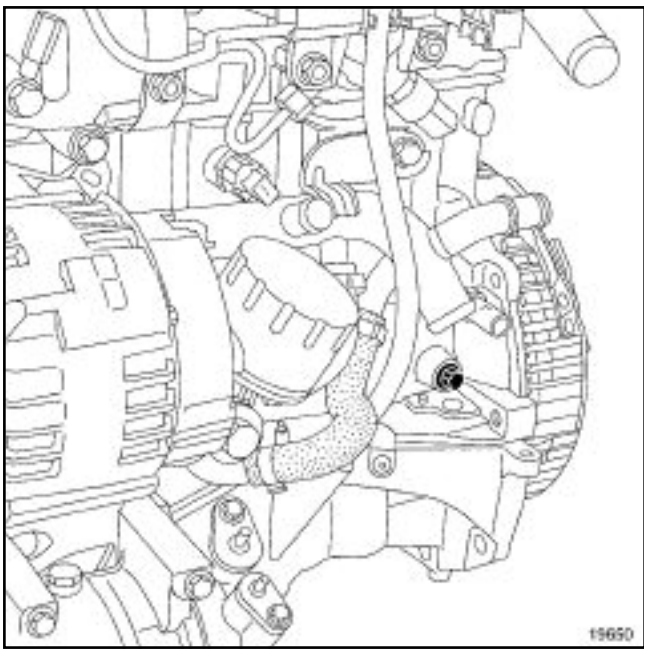
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



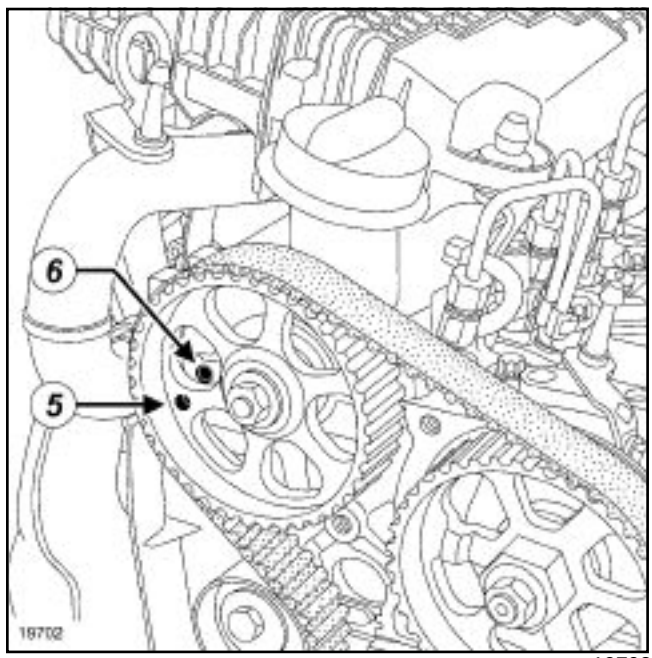
19654-2

Remove the cylinder head suspended mounting.



19650

Remove the TDC setting pin plug using a number **14** female torx socket.



19702

Turn the crankshaft to position the hole (**5**) of the camshaft pulley almost opposite the hole (**6**) in the cylinder head.

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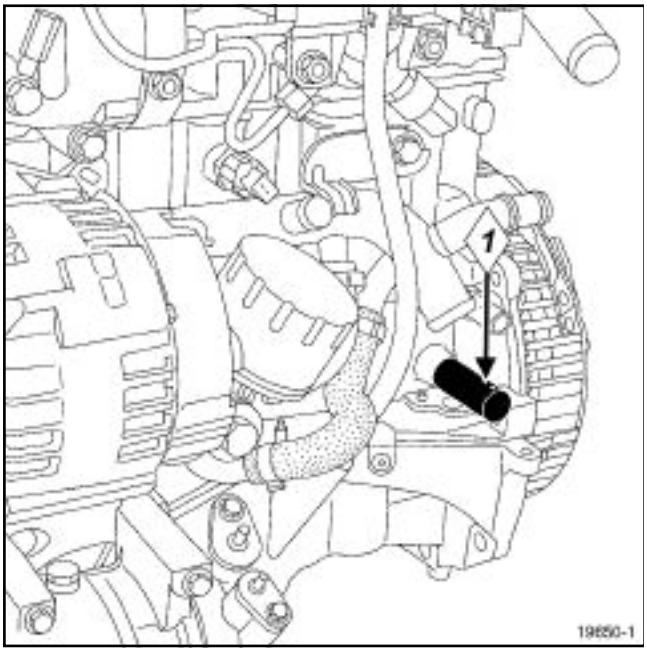
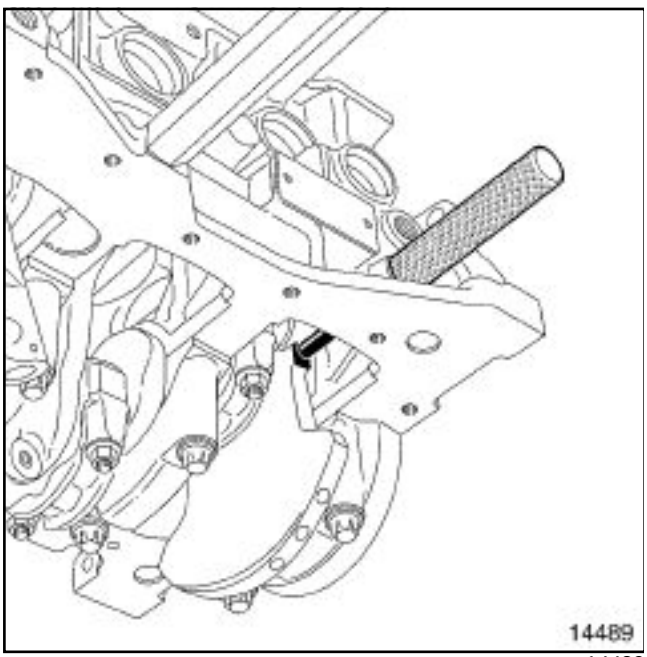
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



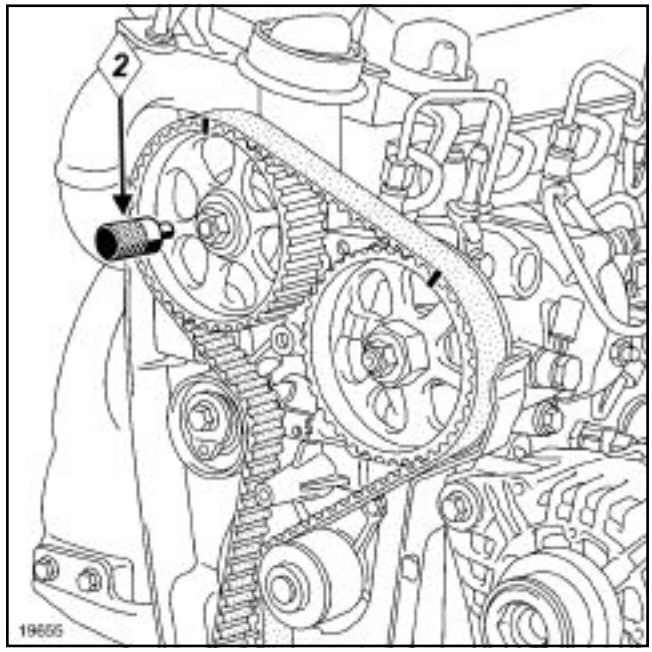
19650-1

Screw in the TDC setting pin (**1**) **(Mot. 1489)** .



14489

Turn the crankshaft clockwise (timing end) smoothly until the crankshaft comes into contact with the TDC setting pin.



19655

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)**

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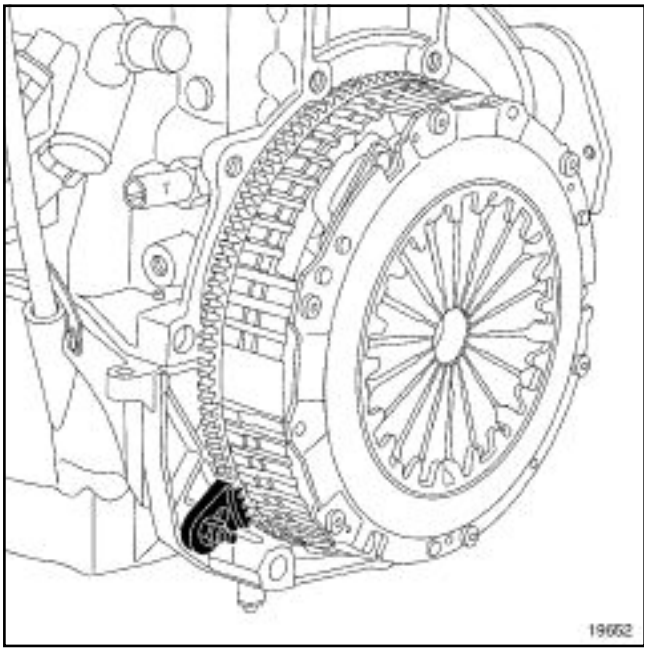
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19652

Fit 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.

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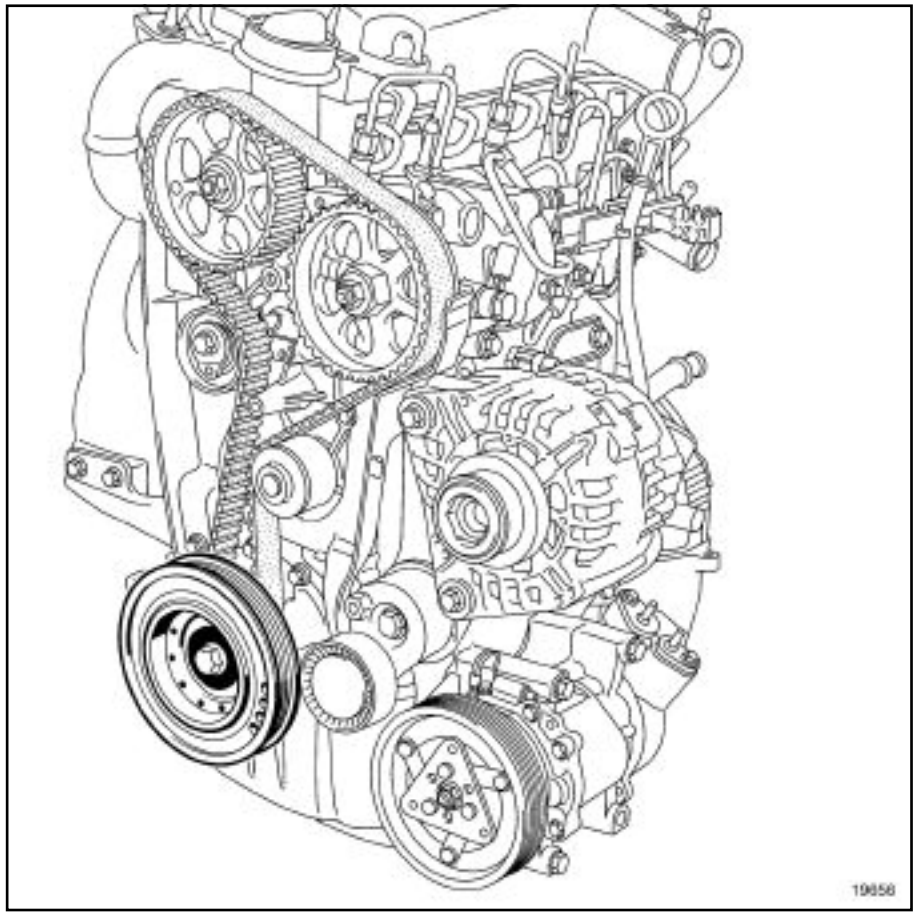
Timing - cylinder head: Removal

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



19656

Remove the crankshaft accessories pulley.

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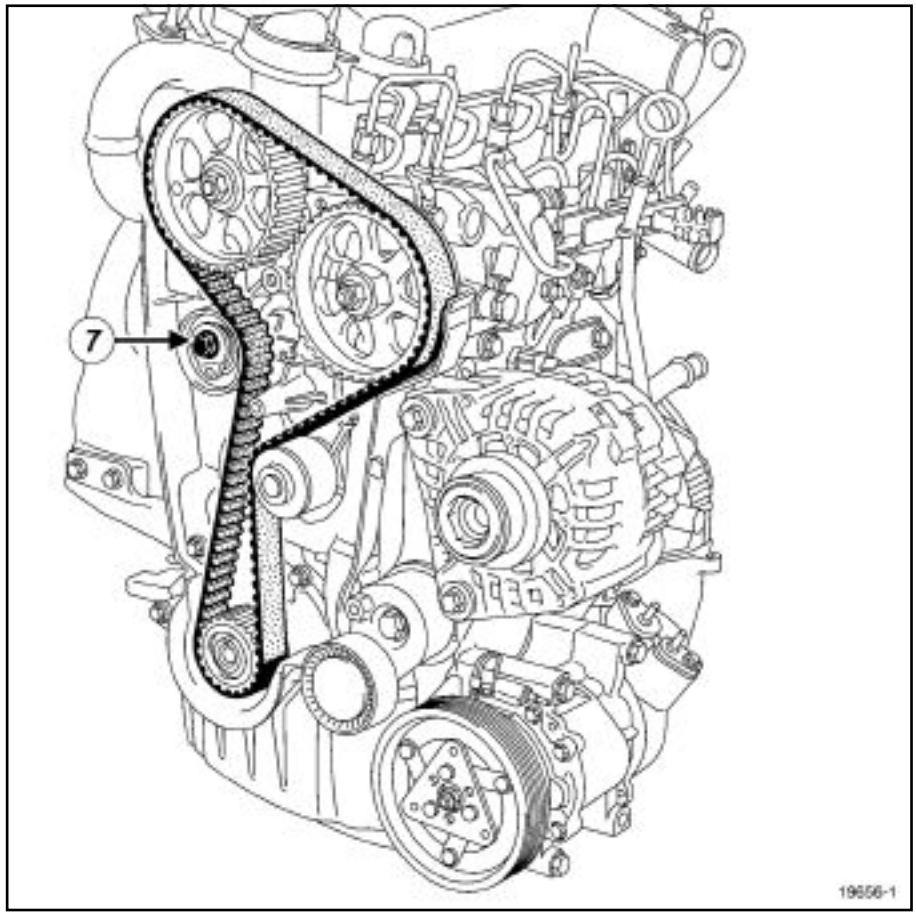
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19656-1

Slacken the tensioning roller bolt (**7**) .

Loosen the timing tensioning roller by turning the eccentric cam using a **6mm** Allen key.

Remove:

- the timing belt taking care not to let the crankshaft timing sprocket fall out,
- the timing tensioning roller.

V - CYLINDER HEAD REMOVAL

VI - GUIDELINES FOR REPAIRS TO THE CYLINDER HEAD

IMPORTANT
Wear protective gloves during every operation.

VII - EQUIPMENT REQUIRED FOR THE CYLINDER HEAD

- Male torx socket,
- Female torx socket.

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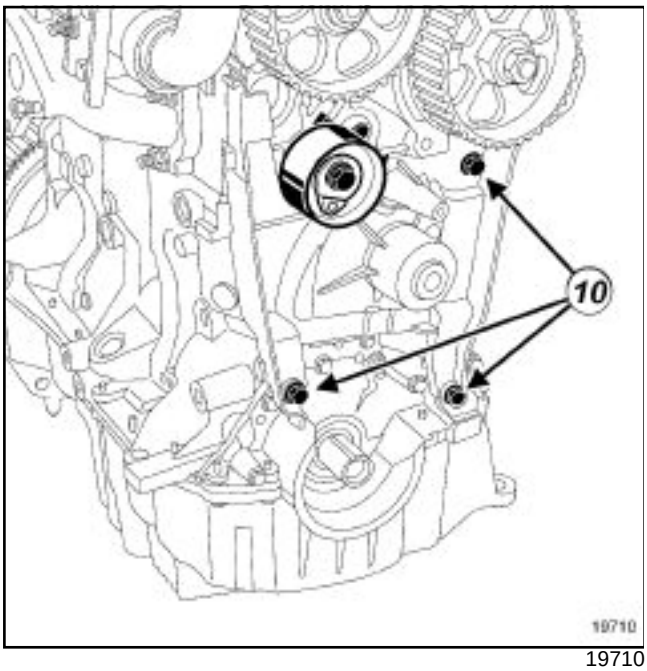
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

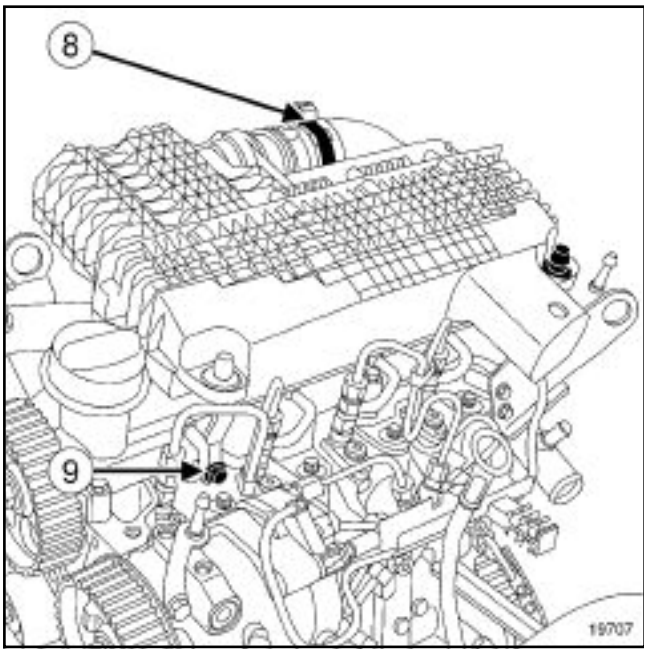
VIII - REMOVAL



19710

Remove:

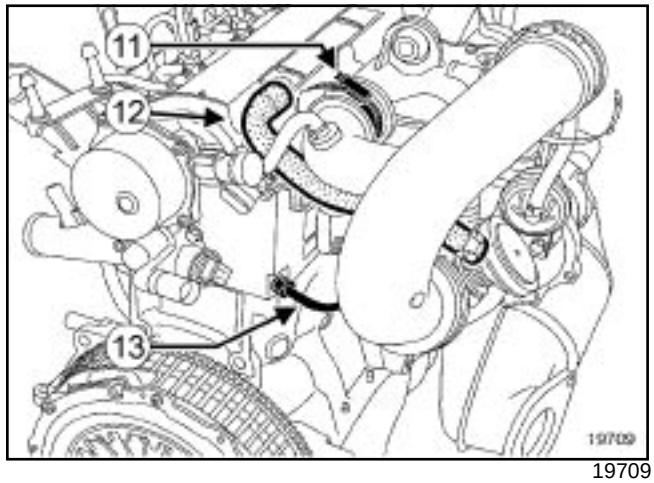
- the inner timing cover mounting bolts (**10**) ,
- the inner timing cover (by tilting the alternator if necessary).



19707

Remove:

- the clip (**8**) ,
- the air filter unit mounting bolt (**9**) ,
- the air filter unit.

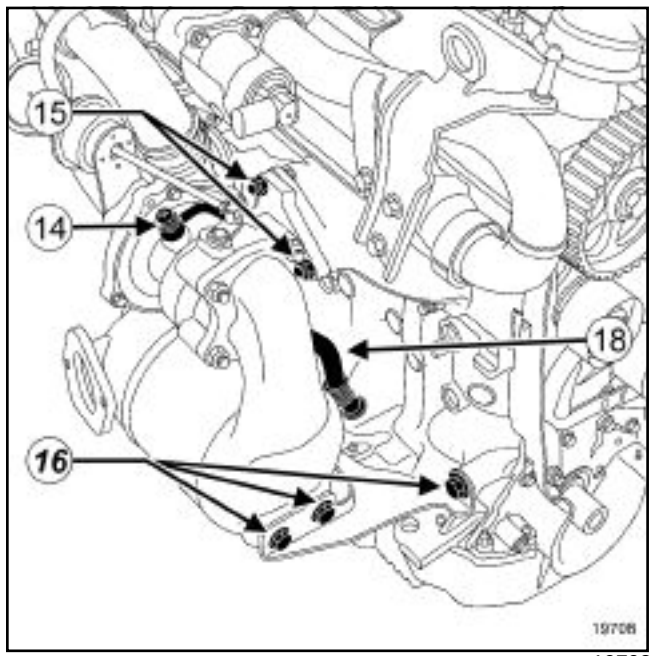


19709

Loosen the clip (**11**) .

Remove the oil vapour rebreathing pipe (**12**) from the rocker cover.

Undo the turbocharger oil supply pipe nut (**13**) .



19708

Remove:

- the turbocharger oil supply pipe bolt (**14**) using a male torx socket,
- the turbocharger oil supply pipe.

Remove:

- the turbocharger oil return pipe bolts (**18**) ,
- the catalytic convertor stay bolts (**16**) ,
- the exhaust flange bolts (**15**) on the turbocharger.

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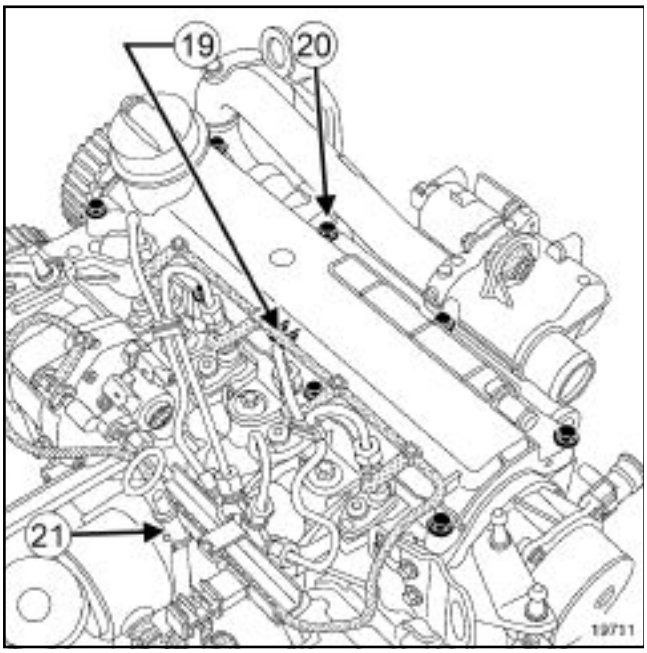
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

Remove the turbocharger-catalytic converter assembly, taking care **not to damage the turbocharger oil return pipe** ***(18)*** .

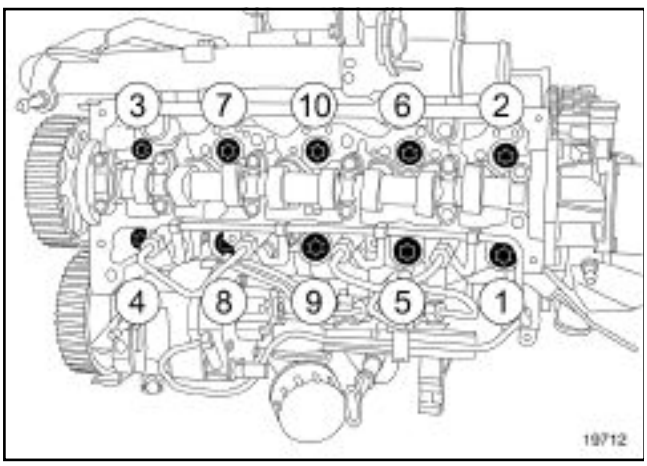


19711

Unclip the fuel return pipe from the rocker cover (**19**) .

Remove:

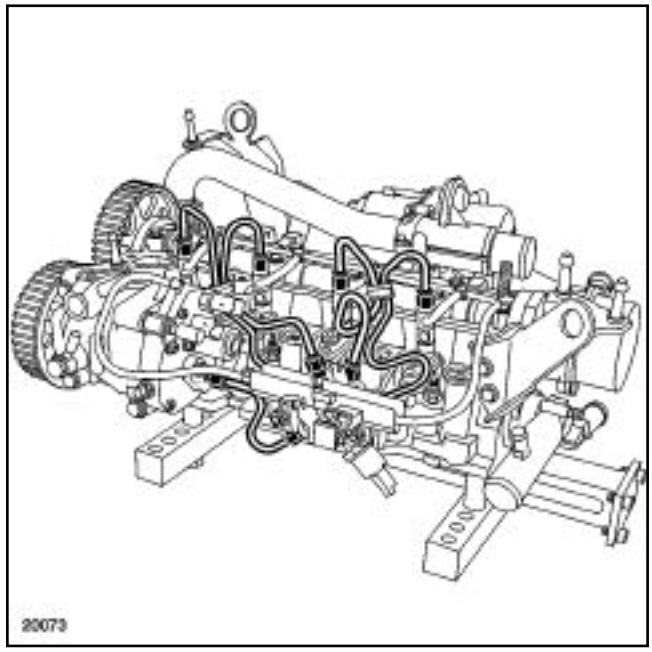
- the dipstick guide tube (**21**) ,
- the rocker cover mounting bolts (**20**) ,
- the rocker cover.



19712

Remove:

- the cylinder head bolts in the order specified using a female torx socket,
- the cylinder head.



20073

Fit the cylinder head onto the cylinder head support **(Mot. 1573)** .

Remove the cylinder head gasket from the cylinder block.

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Timing - cylinder head: Removal

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

Special tooling required	
Mot. 1489	TDC locating pin.
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.
Mot. 582-01	Flywheel locking tool.
Mot. 1677	Flywheel locking tool.
Mot. 1573	Cylinder head support

I - TIMING GEAR REMOVAL

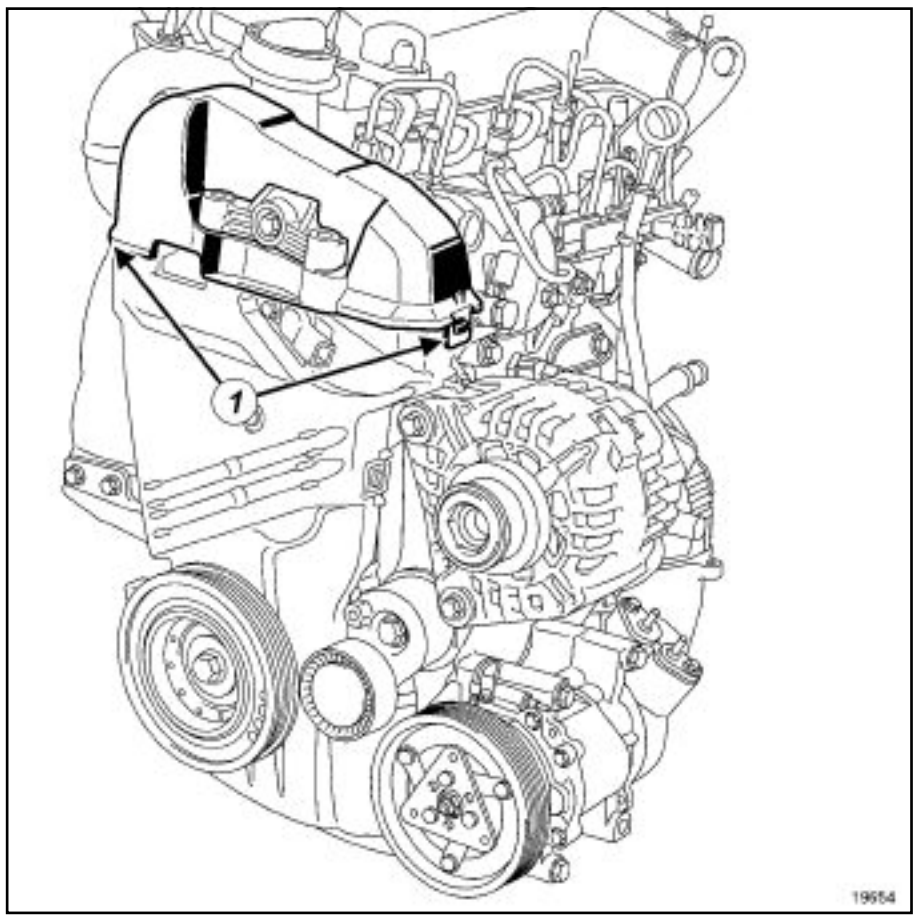
II - GUIDELINES FOR REPAIRS TO THE TIMING GEAR

IMPORTANT
Wear protective gloves during every operation.

III - EQUIPMENT REQUIRED FOR THE TIMING GEAR

- Protective gloves,
- Large screwdriver,
- Allen key (**6mm**),
- Number **14** torx socket.

IV - REMOVAL



19654

Remove the upper timing cover by unclipping both tabs (**1**) .

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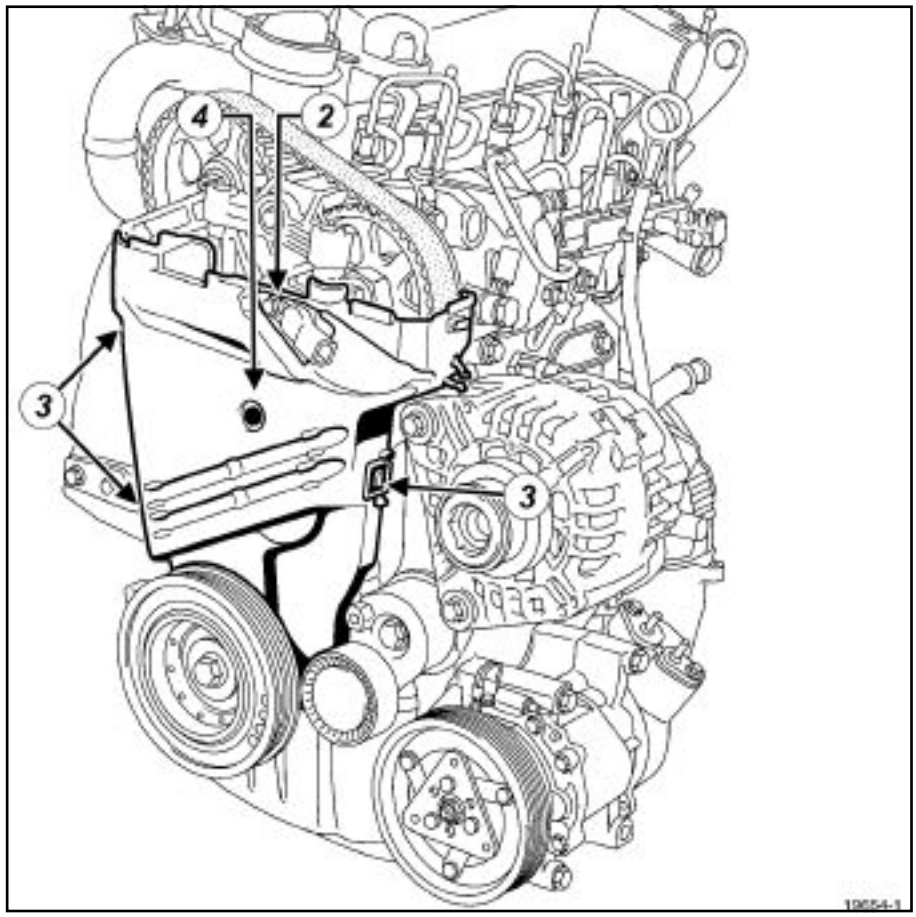
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



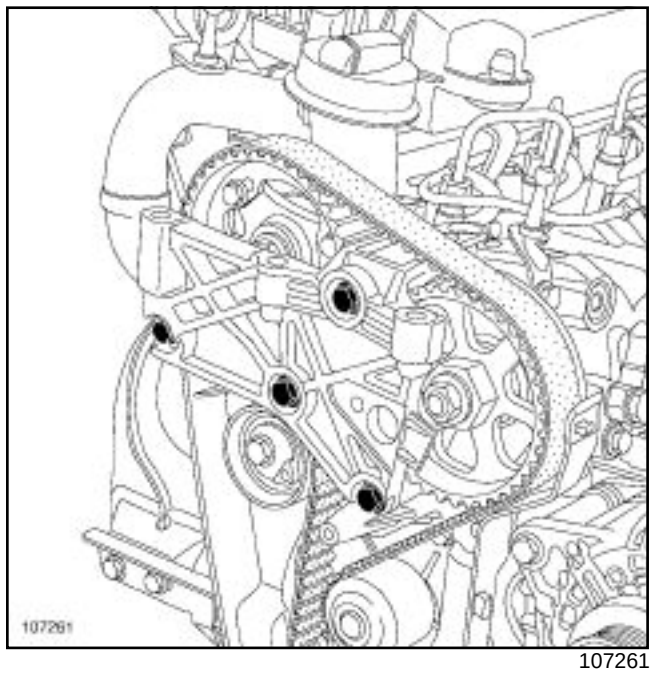
19654-1

Remove:

- the high pressure pump position sensor (**2**) ,
- the plastic bolt (**4**) .

Unclip the three tabs (**3**) .

Remove the lower timing cover.



107261

Remove the cylinder head suspended mounting.

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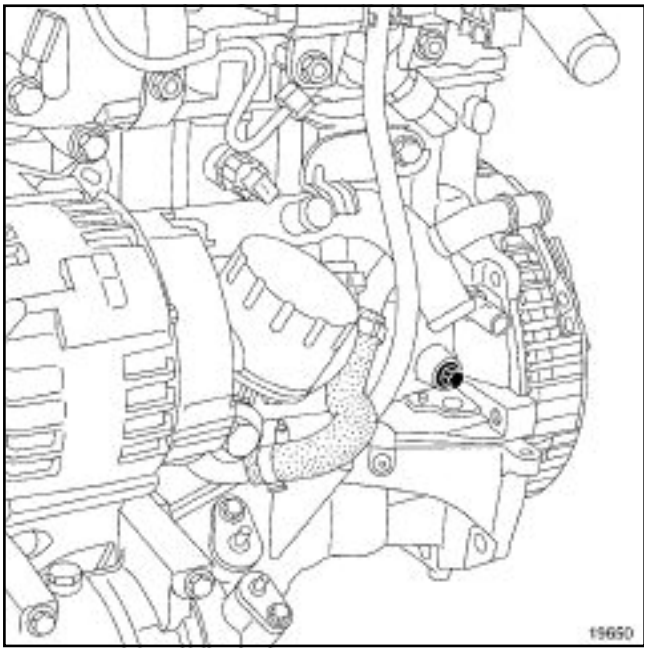
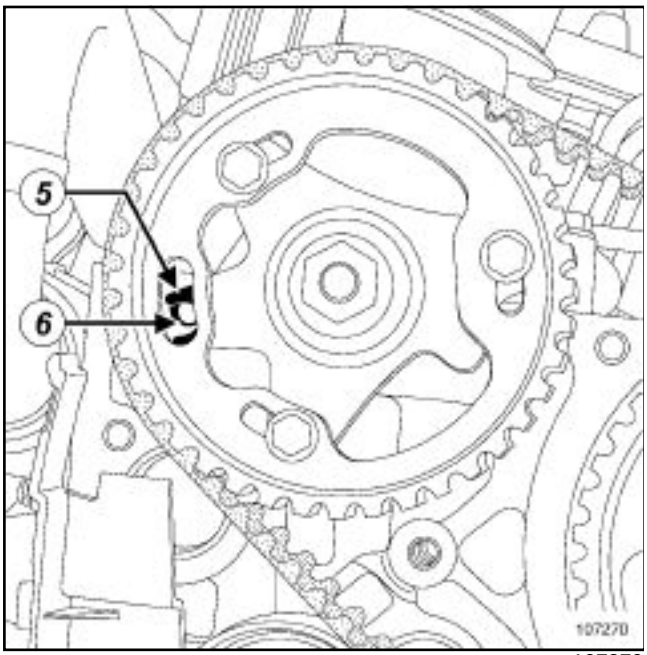
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



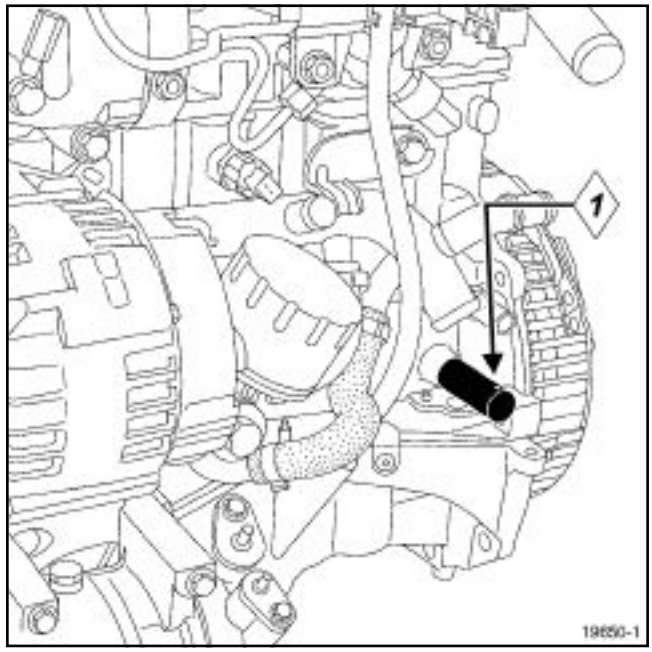
19650

Remove the TDC setting pin plug using a female torx socket (**14**).



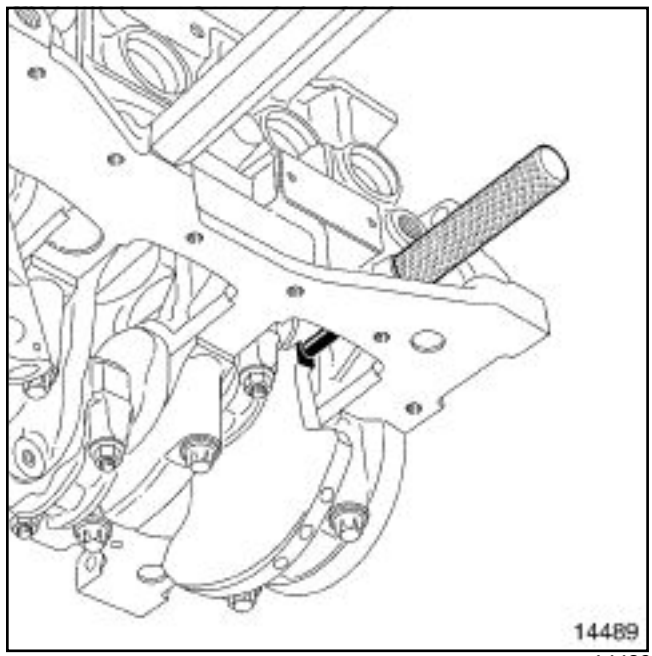
107270

Turn the crankshaft to position the hole (**5**) of the camshaft pulley almost opposite the hole (**6**) in the cylinder head.



19650-1

Screw in the TDC setting pin (**1**) **(Mot. 1489)** .



14489

Turn the crankshaft clockwise (timing end) smoothly until the crankshaft comes into contact with the TDC setting pin.

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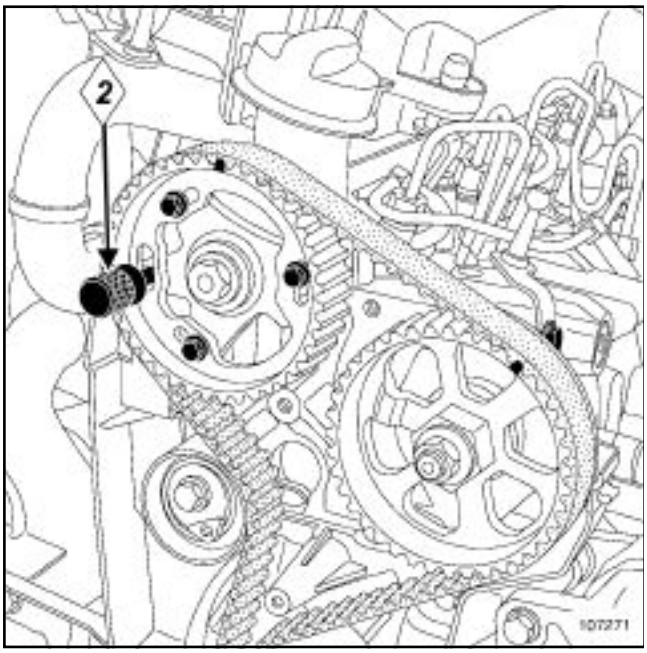
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

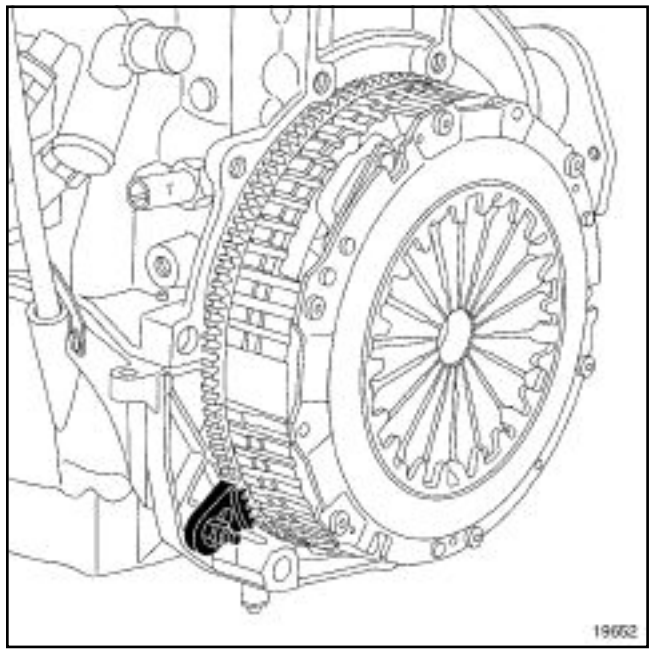


107271

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)** .

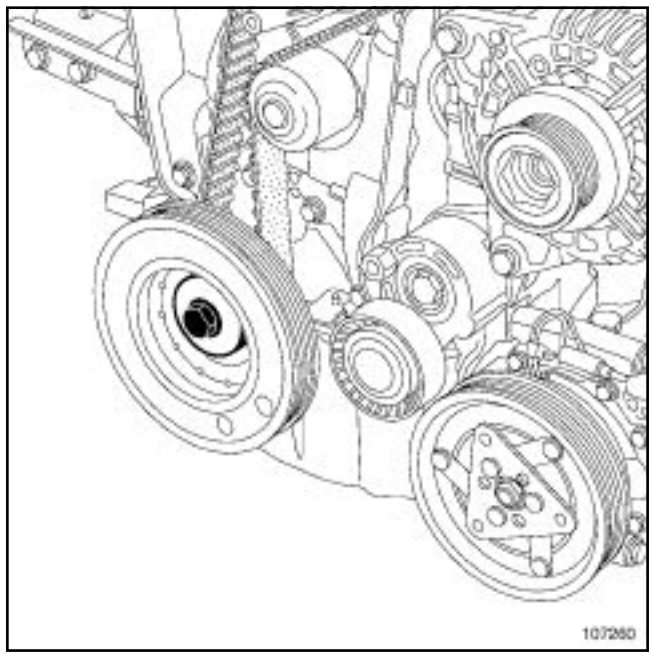


19652

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

Remove the crankshaft accessories pulley.

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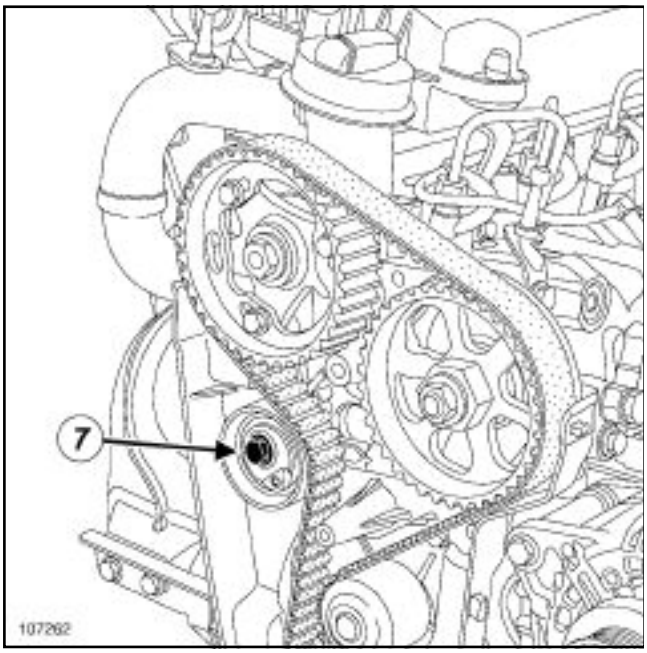
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



107262

Slacken the tensioning roller bolt (**7**) .

Loosen the timing tensioning roller by turning the eccentric cam using a **6mm** Allen key.

Remove:

- the timing belt,
- the timing tensioning roller.

V - CYLINDER HEAD REMOVAL

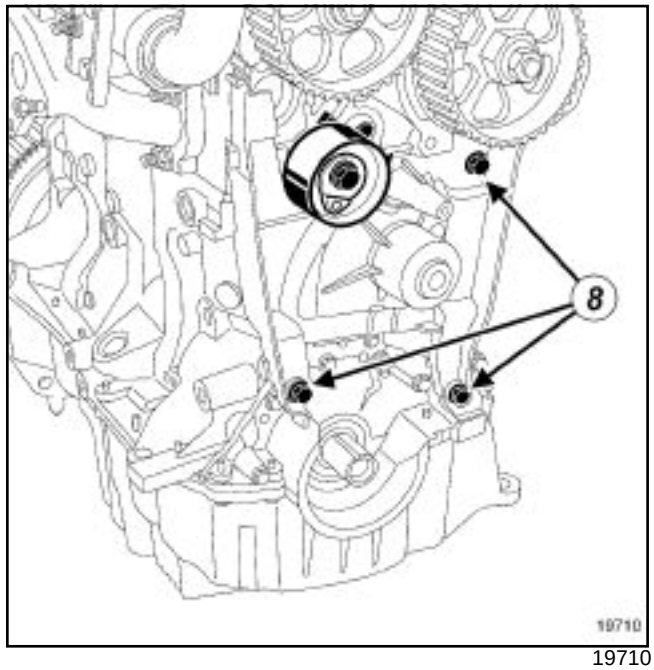
VI - GUIDELINES FOR REPAIRS TO THE CYLINDER HEAD

IMPORTANT
Wear protective gloves during every operation.

VII - EQUIPMENT REQUIRED FOR THE CYLINDER HEAD

- Female torx socket.

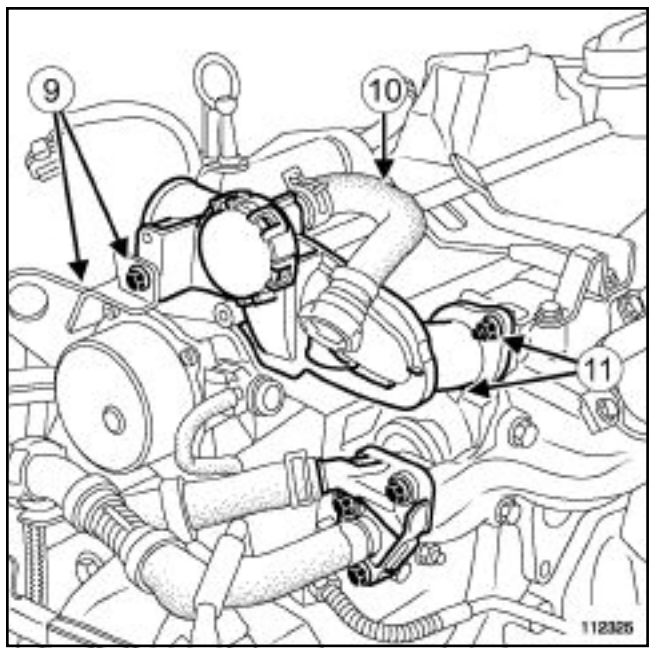
VIII - REMOVAL



19710

Remove:

- the inner timing cover mounting bolts (**8**) ,
- the inner timing cover (by tilting the alternator if necessary).



112325

Disconnect the oil vapour recirculation pipe (**10**) .

Remove:

- the oil vapour recirculation valve bolts (**11**) ,
- the oil vapour recirculation valve mounting bracket bolts (**9**) ,

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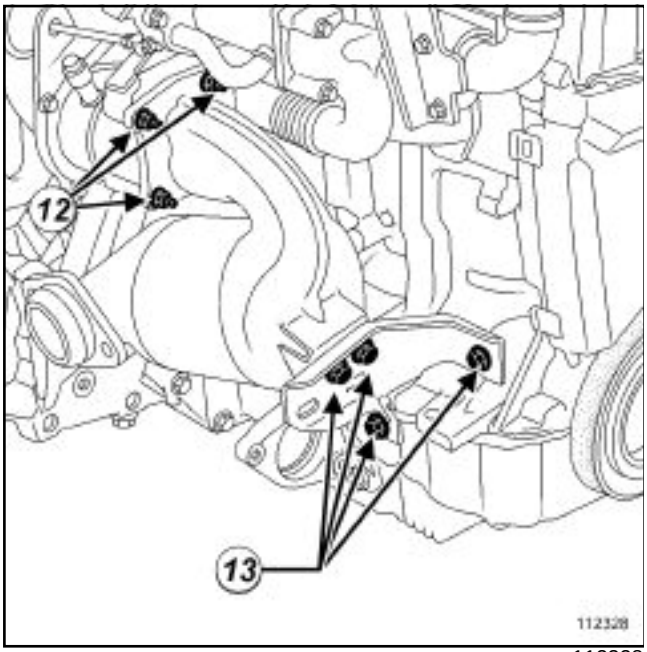
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

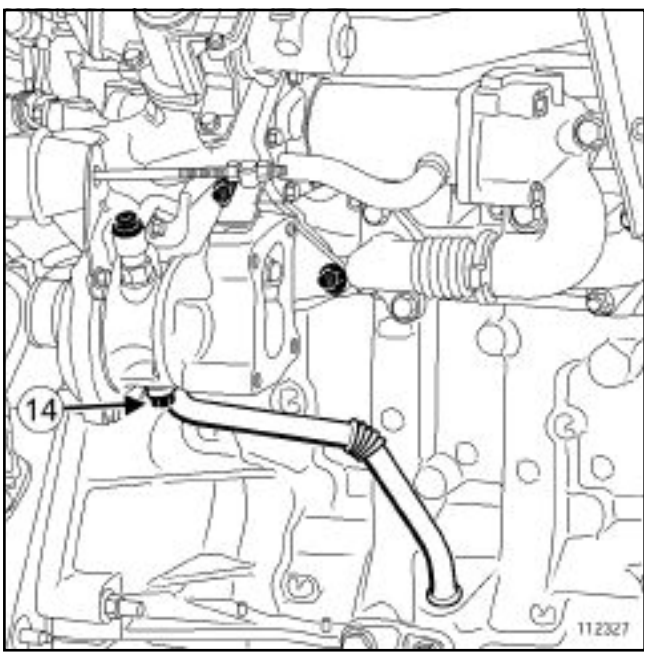
- the oil vapour recirculation valve.



112328

Remove:

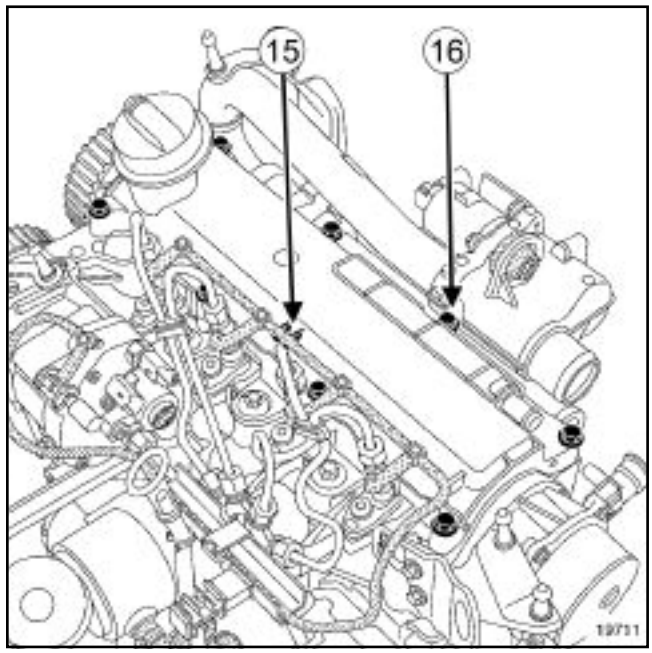
- the catalytic convertor stay bolts (**13**) ,
- the catalytic convertor nuts (**12**) on the turbocharger,
- the catalytic converter.



112327

Remove:

- the turbocharger oil return pipe mounting bolts (**14**) ,
- the turbocharger oil return pipe.

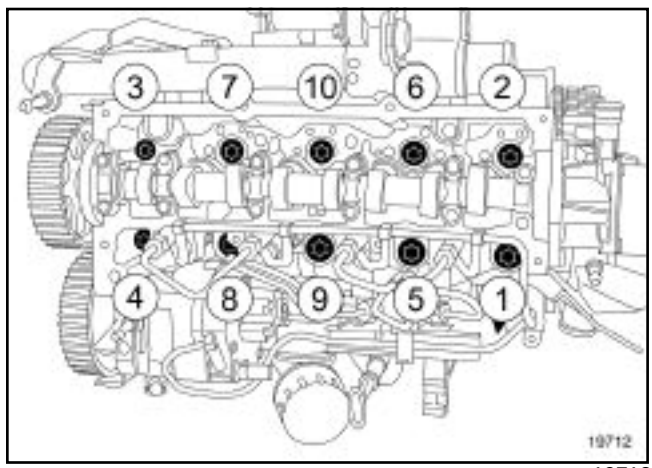


19711

Unclip the fuel return pipe from the rocker cover (**15**) .

Remove:

- the dipstick guide,
- the rocker cover mounting bolts (**16**) ,
- the rocker cover.



19712

Remove:

- the cylinder head bolts in the order specified using a female torx socket,
- the cylinder head.

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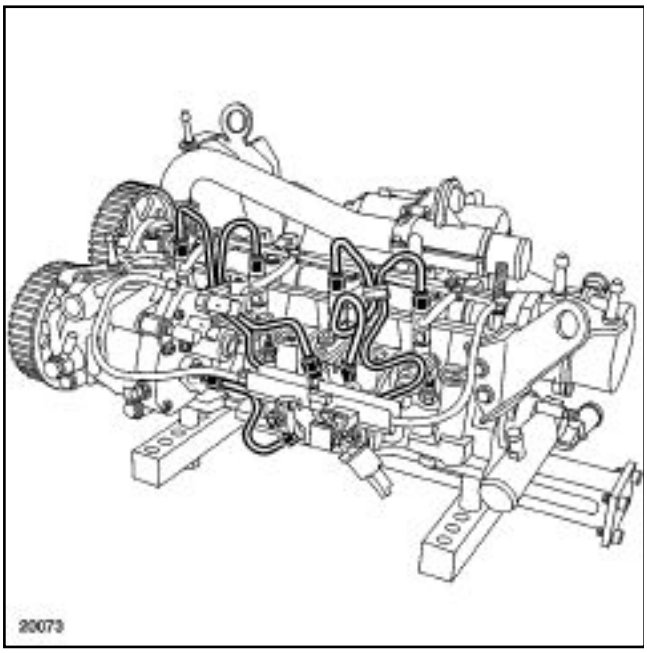
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



20073

Fit the cylinder head onto the cylinder head support **(Mot. 1573)** .

Remove the cylinder head gasket from the cylinder block.

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Timing - cylinder head: Removal

K9K, and 732 or 764

Special tooling required	
Mot. 1489	TDC locating pin.
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.
Mot. 1677	Flywheel locking tool.
Mot. 1573	Cylinder head support

I - TIMING GEAR REMOVAL

II - GUIDELINES FOR REPAIRS TO THE TIMING GEAR

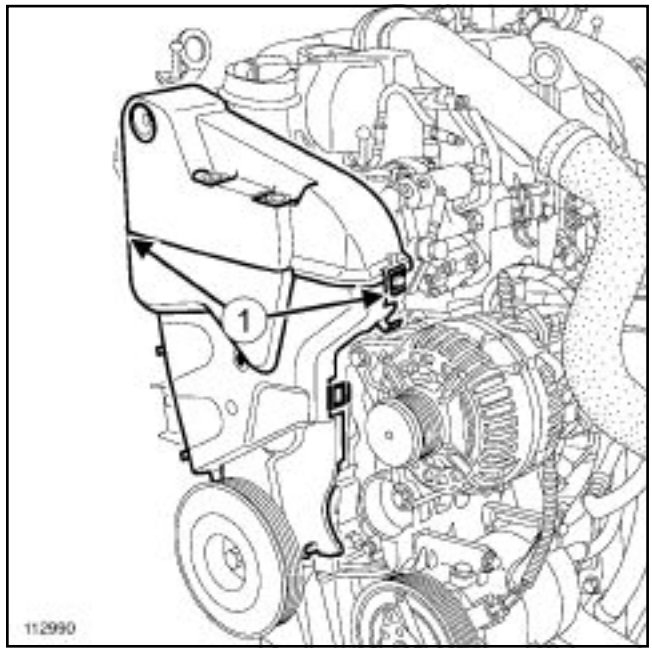
IMPORTANT
Wear protective gloves during every operation.

III - EQUIPMENT REQUIRED FOR THE TIMING GEAR

- Protective gloves,
- Large screwdriver,
- Allen key **(6mm),**
- Torx socket (**14**).

IV - REMOVAL

K9K, and 732



112990

Remove the upper timing cover by unclipping both tabs (**1**) .

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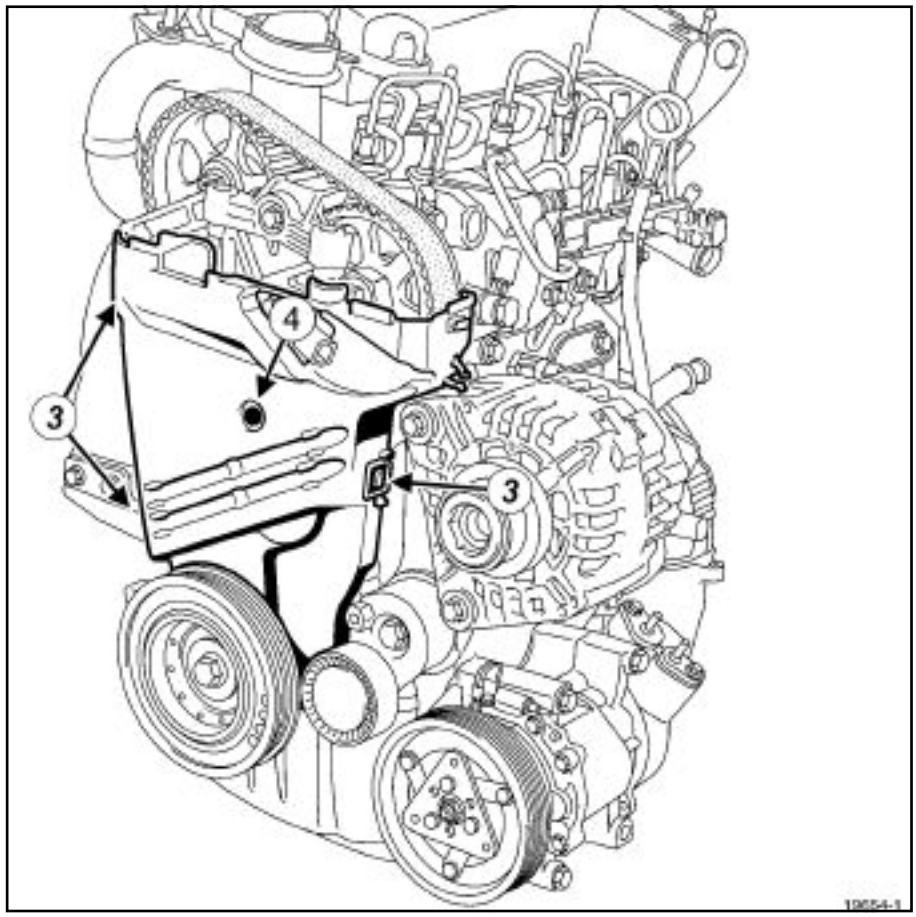
K9K, and 732 or 764

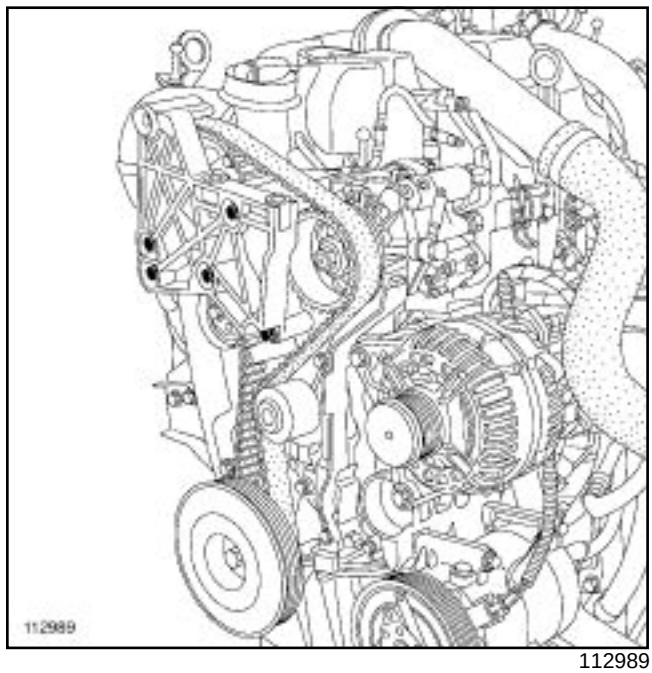


19654-1

Remove the plastic bolt (**4**) .

Unclip the three tabs (**3**) .

Remove the lower timing cover.



112989

Remove the cylinder head suspended mounting.

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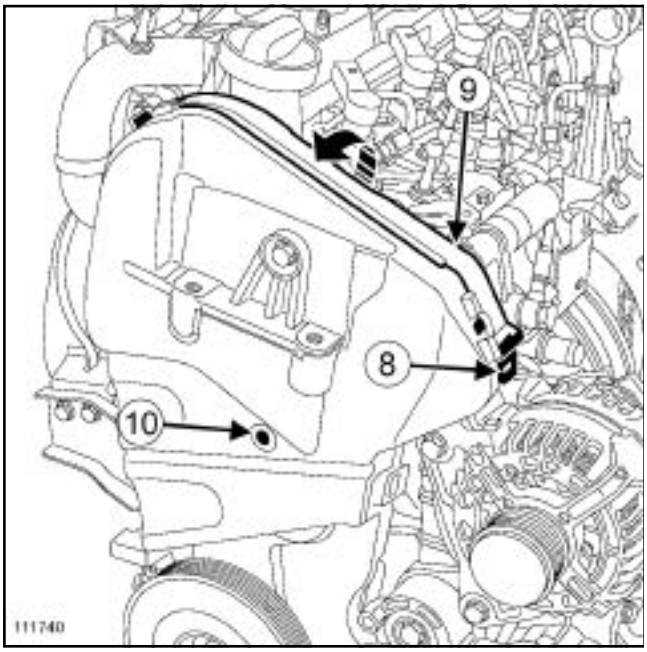
K9K, and 732 or 764

K9K, and 764

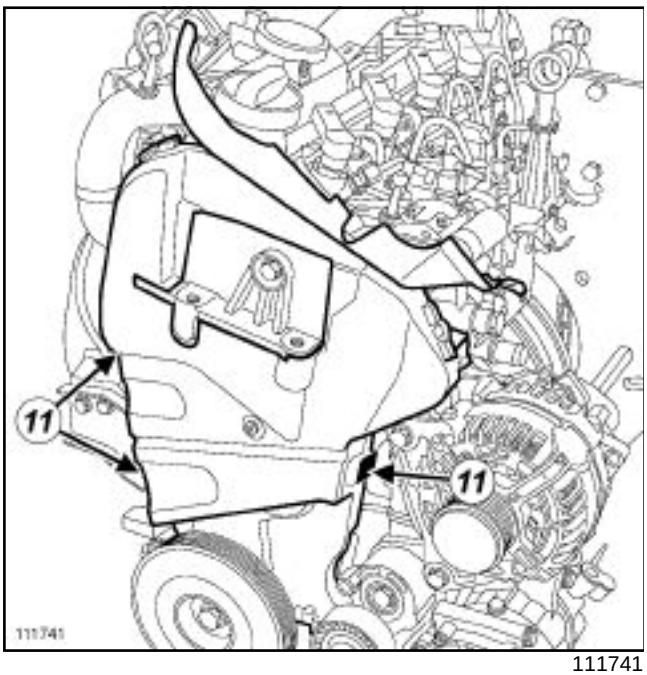


111740

Unclip the tab (**8**) .

Rotate the timing cover (**9**) in the direction of the arrow.

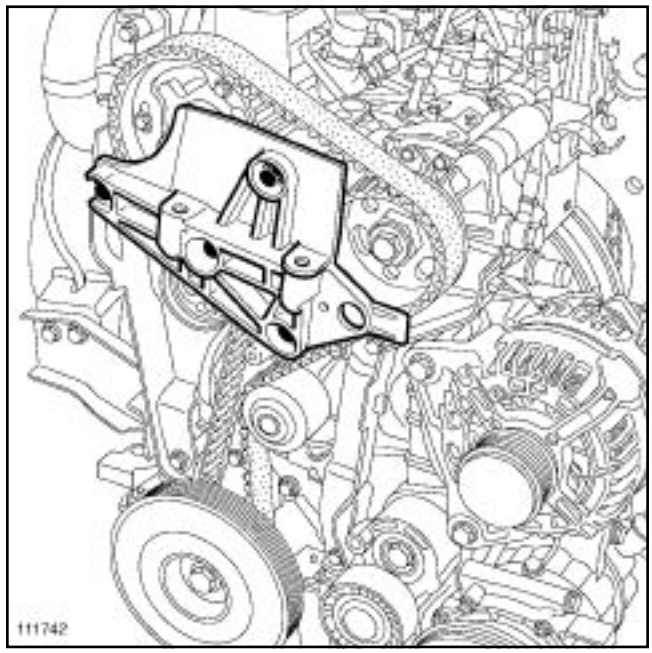
Remove the plastic bolt (**10**) .



111741

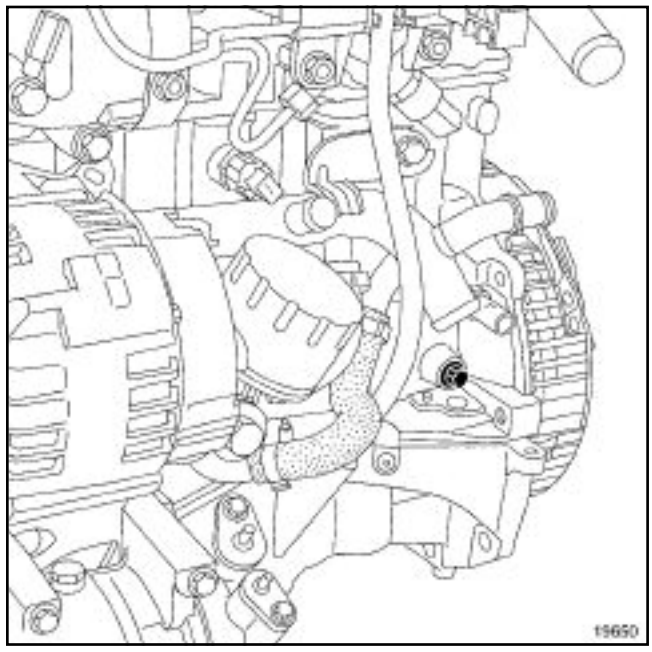
Unclip the three tabs (**11**) .

Remove the timing cover.



111742

Remove the cylinder head suspended mounting.



19650

Remove the TDC setting pin plug using a female torx socket (**14**).

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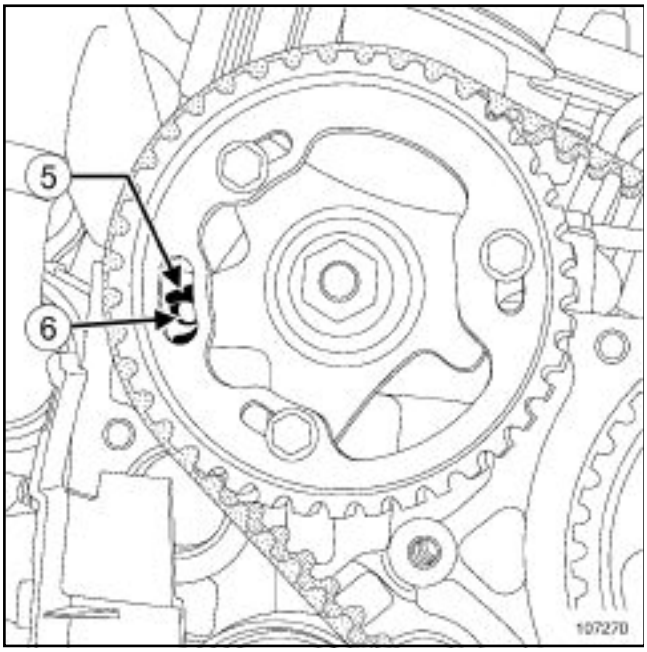
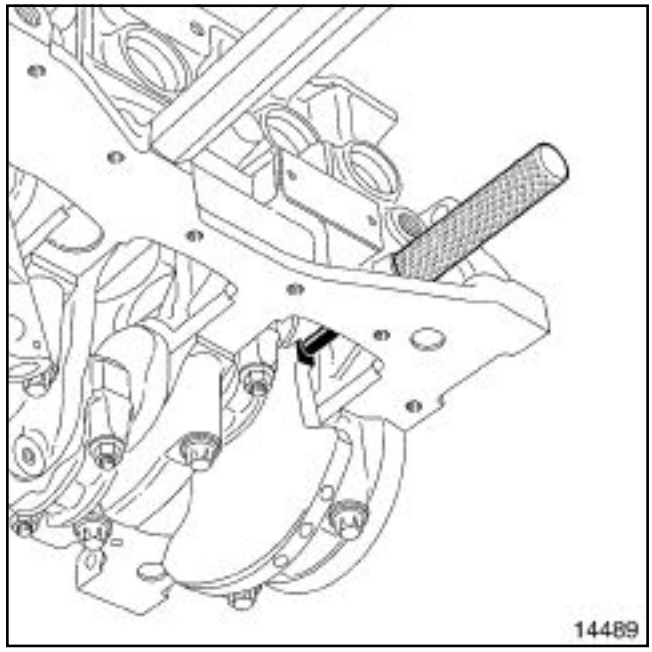
K9K, and 732 or 764



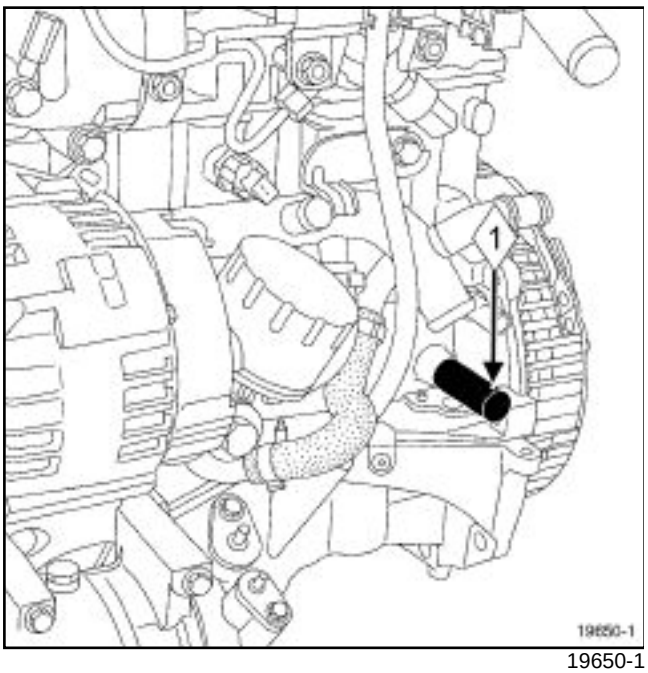
107270

Turn the crankshaft to position the hole (**5**) of the camshaft pulley almost opposite the hole (**6**) in the cylinder head.



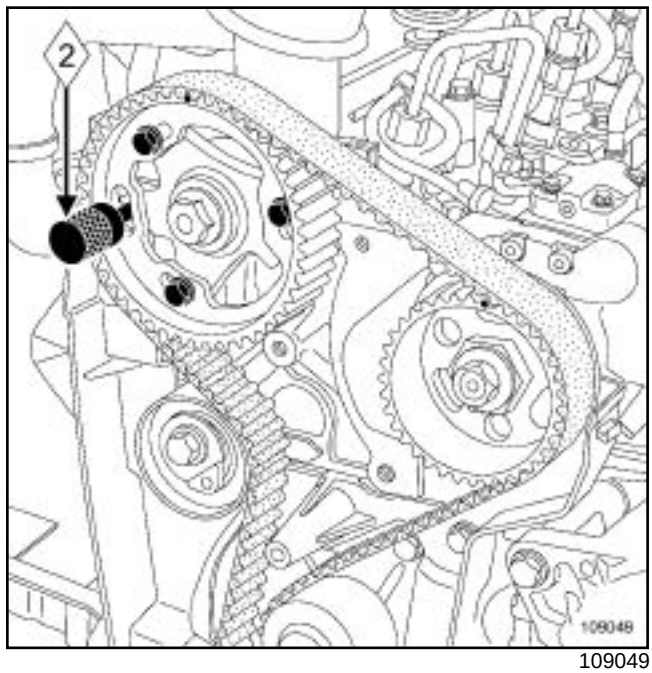
14489

Turn the crankshaft clockwise (timing end) smoothly until the crankshaft comes into contact with the TDC setting pin.



19650-1

Screw in the TDC setting pin (**1**) **(Mot. 1489)** .



109049

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)** .

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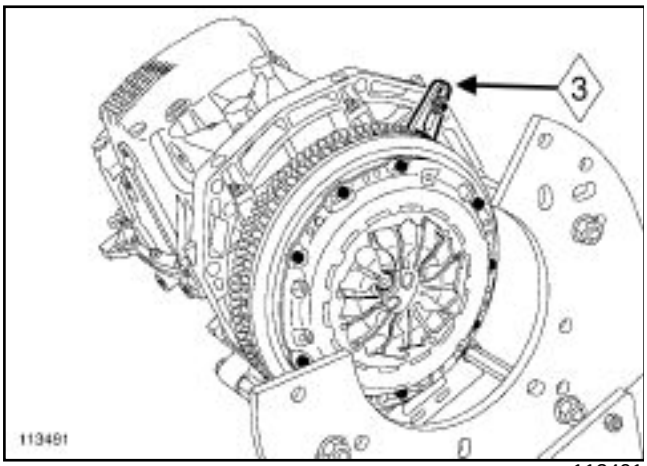
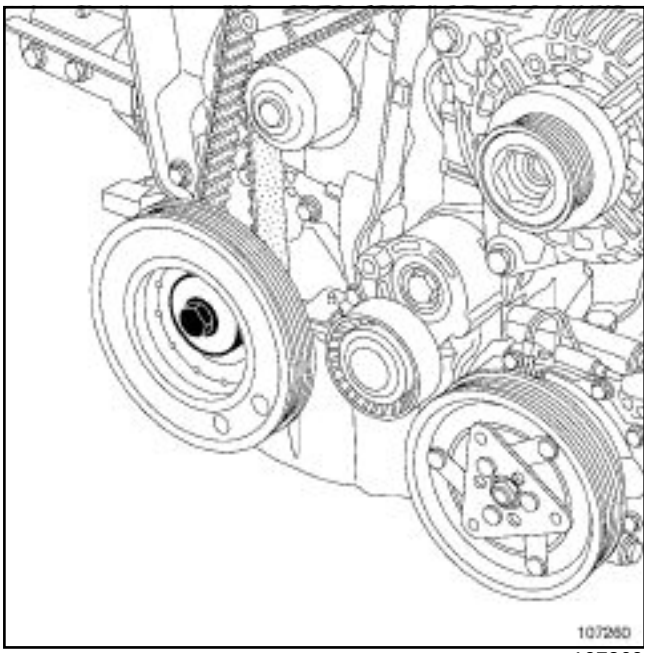
K9K, and 732 or 764



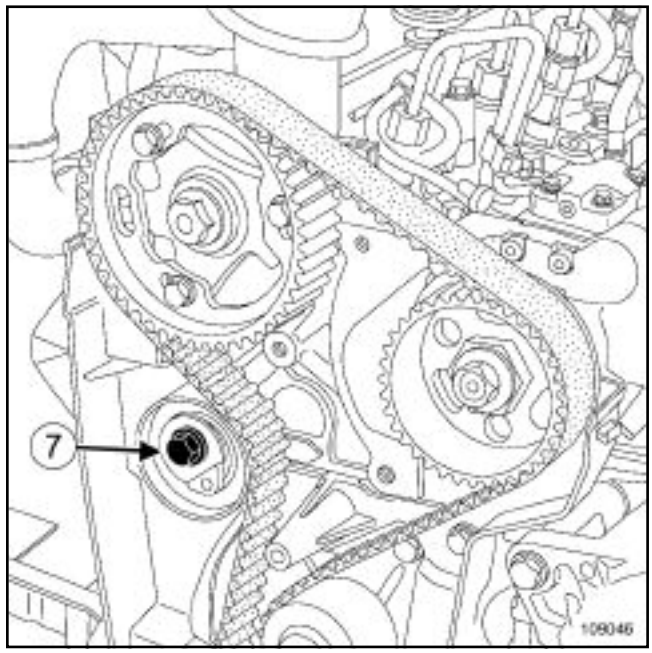
113491

Fit the flywheel locking tool (**3**) **(Mot. 1677)** .



107260

Remove the crankshaft accessories pulley.



109046

Slacken the tensioning roller bolt (**7**) .

Slacken the timing tension wheel by turning the eccentric cam using a **6mm** allen key

Remove:

- the timing belt,

- the timing tensioning roller.

V - CYLINDER HEAD REMOVAL

VI - GUIDELINES FOR REPAIRS TO THE CYLINDER HEAD

IMPORTANT
Wear protective gloves during every operation.

VII - EQUIPMENT REQUIRED FOR THE CYLINDER HEAD

- Female torx socket.

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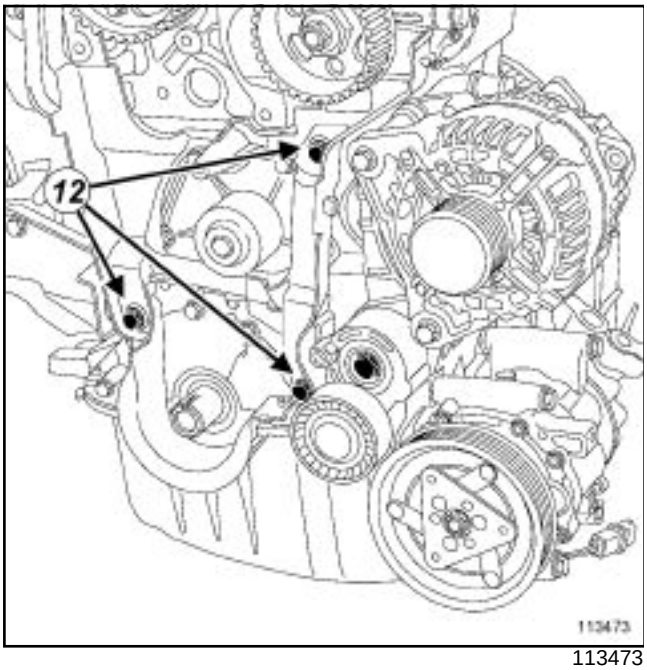
K9K, and 732 or 764

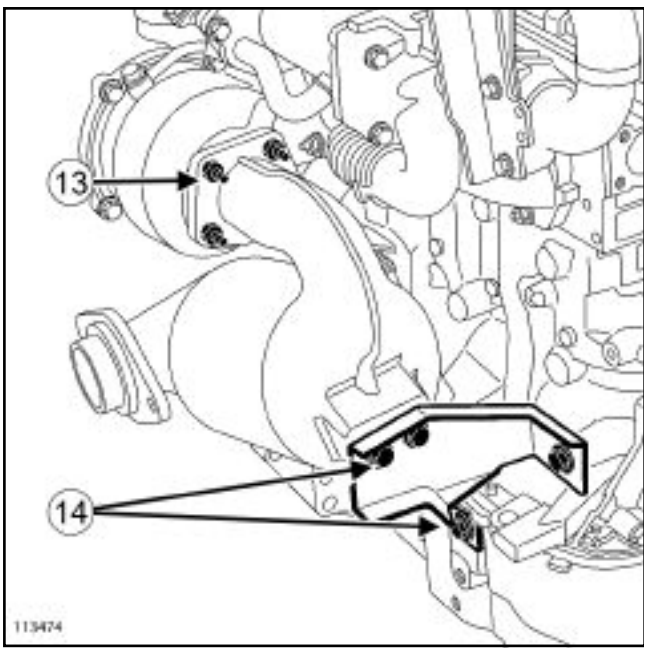
VIII - REMOVAL



113473

Remove:

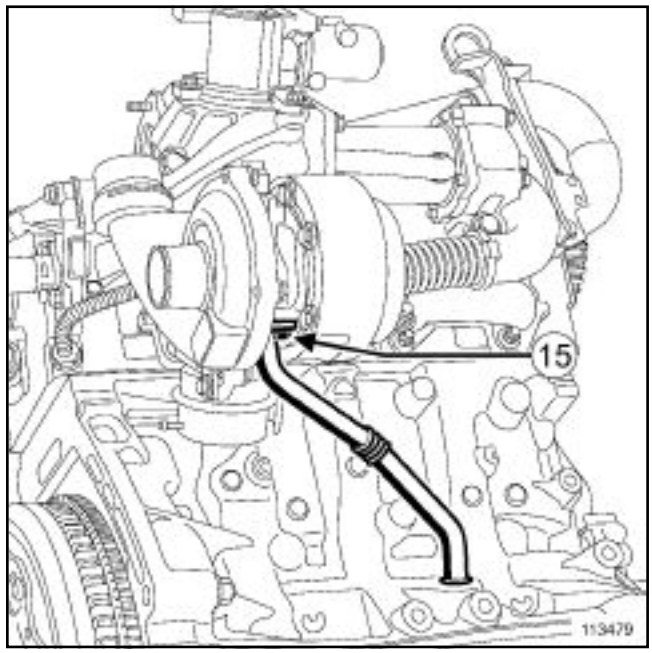
- the inner timing cover mounting bolts (**12**) ,
- the inner timing cover (by tilting the alternator if necessary).



113474

Remove:

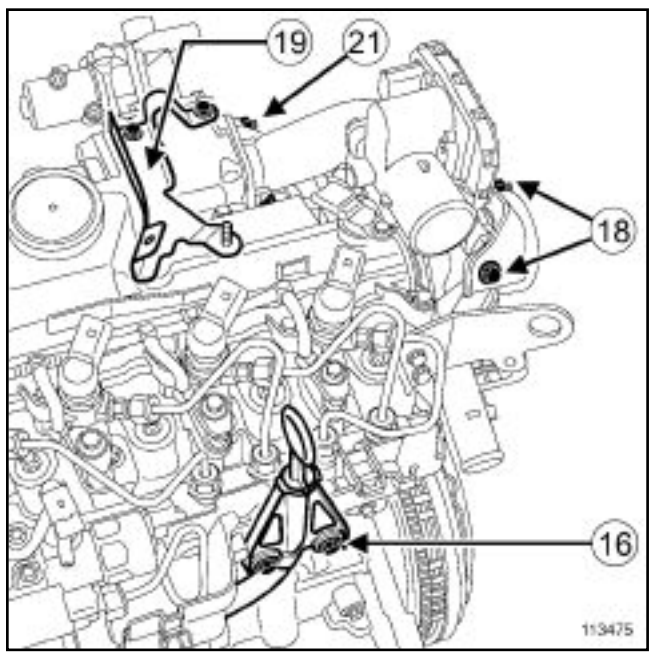
- the catalytic convertor mounting bolts (**14**) ,
- the catalytic convertor nuts (**13**) on the turbocharger,
- the catalytic converter.



113479

Remove:

- the turbocharger oil return pipe mounting bolts (**15**) ,
- the turbocharger oil return pipe.



113475

Remove:

- the dipstick guide mounting nuts (**16**) ,
- the dipstick guide,
- the damper valve mounting bracket bolts (**18**) ,
- the damper valve mounting bolts (**21**) ,
- the damper valve,

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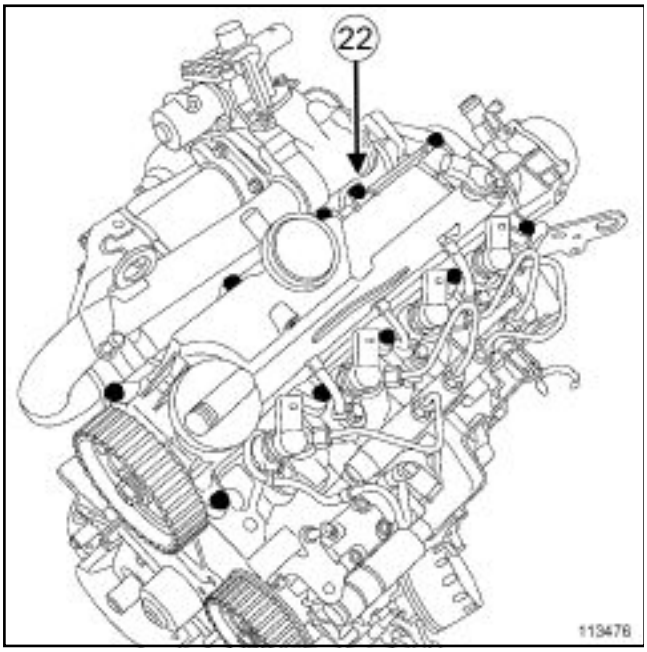
K9K, and 732 or 764

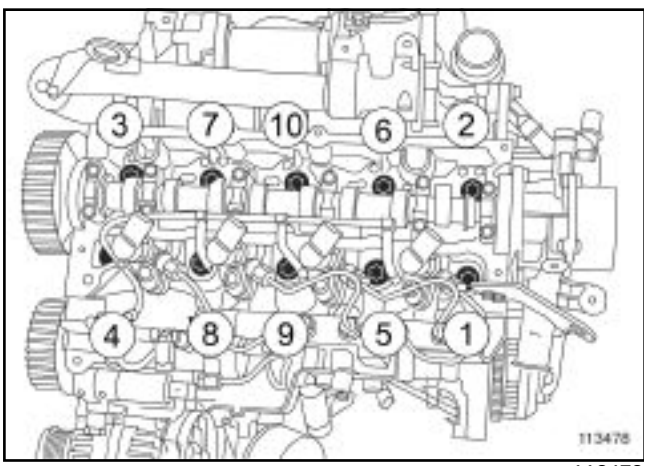
- the EGR valve retaining bracket (**19**) .



113476

Remove:

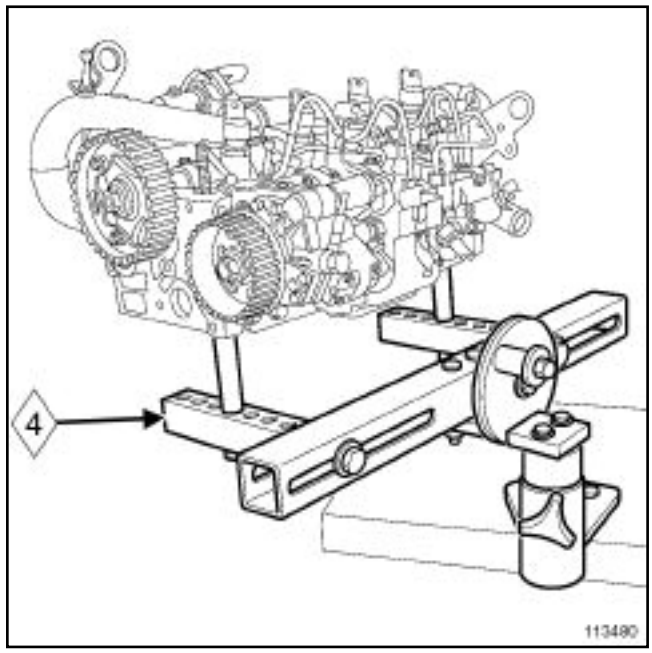
- the rocker cover mounting bolts (**22**) ,
- the rocker cover.



113478

Remove:

- the cylinder head bolts in the order specified using a female torx socket,
- the cylinder head.



113480

Fit the cylinder head onto the cylinder head support (**4**) **(Mot. 1573)** .

Remove the cylinder head gasket from the cylinder block.

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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. 1566	Spanner for removing high pressure pipes.
Mot. 1746	Offset spanner for tightening high pressure pump pipes.
Mot. 1567	Long nose pliers for EGR duct clips.
Mot. 799-01	Timing gear wheel immobiliser.
Mot. 1502	Valve lifting tool for removing valves.

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT

- It is essential to follow the cleanliness guidelines (see **10A**, **Engine and lower engine assembly**, **Engine: Precautions for repair**, page **10A-4**) ,
- Wear latex safety gloves when using the cleaning agent,
- Wear safety goggles fitted with side shields.

WARNING

Do not blast with compressed air once the fuel circuit is open, otherwise impurities may enter the system. Use cleaning cloths only, if necessary.

II - PARTS AND CONSUMABLES FOR THE REPAIRS

Consumables

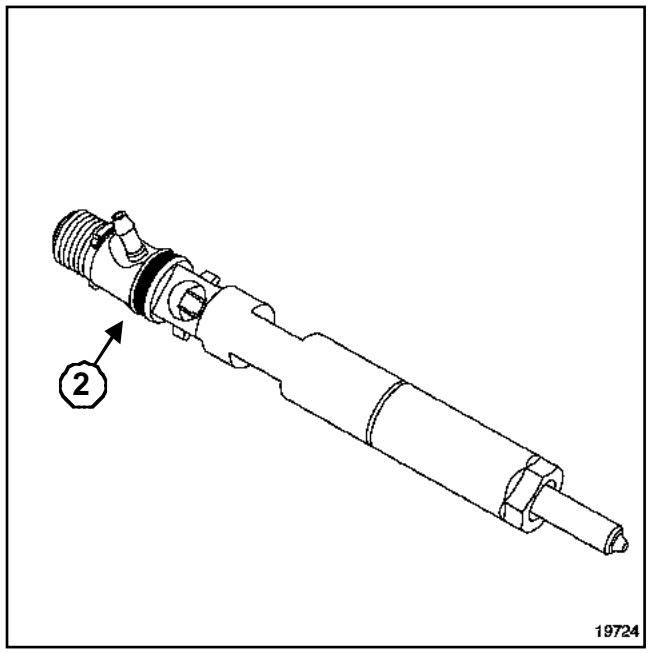
- Set of blanking plugs, part number **77 01 206 804** ,
- Cleaning cloths, part number **77 11 211 707** ,
- Brake cleaner, part number **77 11 226 128** ,
- Injector cleaner, part number **77 11 224 188** .

III - EQUIPMENT REQUIRED

- Protective goggles (with side shields),
- Latex protective gloves,
- Indelible marker,
- Plastic bags,
- Valve spring compressor,
- Tweezers,
- Spanner for the high pressure pipes,
- Crow foot spanner,
- Wrench with hinge for heater plugs,
- Male torx sockets.

IV - STRIPPING DOWN THE CYLINDER HEAD

Clean the high pressure pipe unions (see **10A**, **Engine and lower engine assembly**, **Engine: Precautions for repair**, page **10A-4**) .



19724

Note:

It is essential that the injector intermediate union (**2**) is secured when loosening the high pressure pipes.

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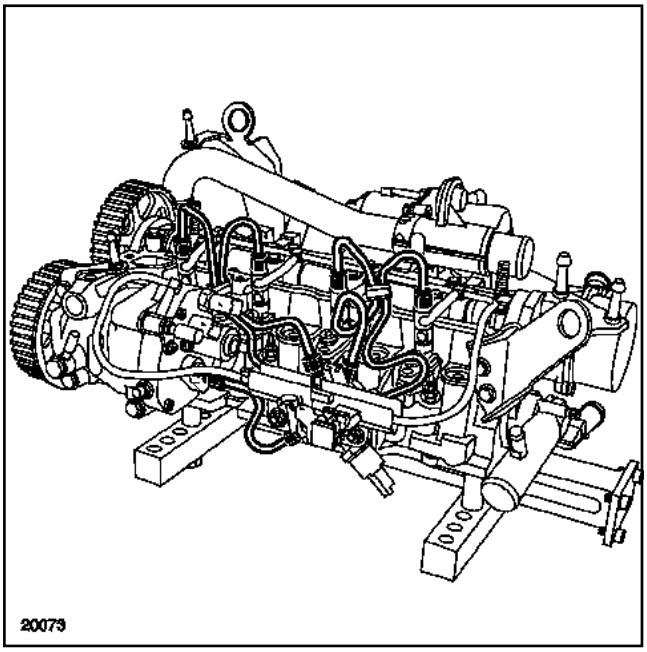
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

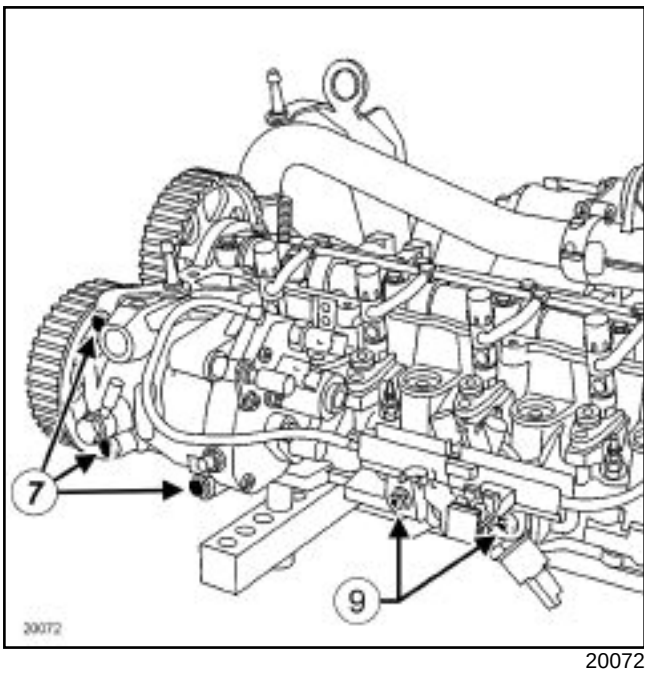


20073

Remove the high pressure pipes using the **(Mot. 1566)** and **(Mot. 1746)** or using a pipe wrench.

Fit blanking plugs:

- to the high pressure pump,
- to the rail,
- to the injectors.



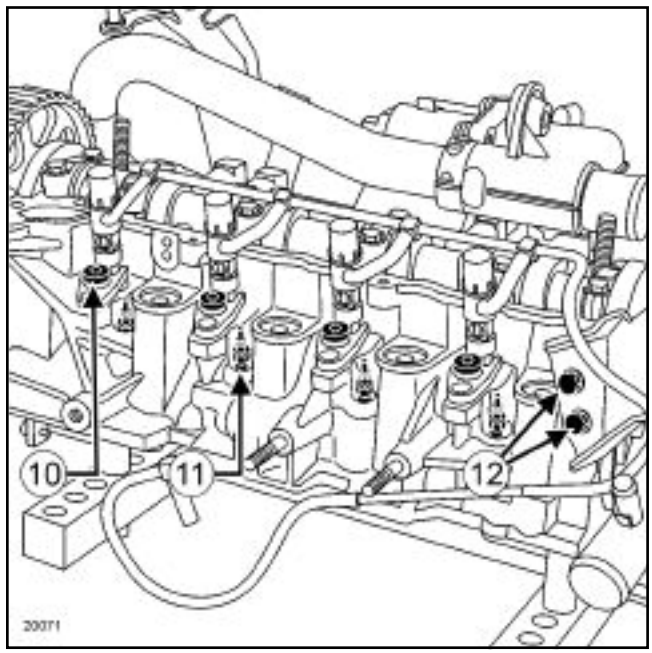
20072

Remove:

- the high pressure pump mounting bolts (**7**) ,
- the high-pressure pump,
- the high pressure rail mounting nuts (**9**) ,
- the rail.

Note:

It is essential to match the injectors to their respective cylinders using an indelible marker.



20071

Remove:

- the injector clamp bolts (**10**) ,
- the injectors,
- the heater plugs (**11**) using a hinged wrench,
- the engine lifting eye (flywheel end) bolts (**12**) ,
- the engine lifting eye (flywheel end),

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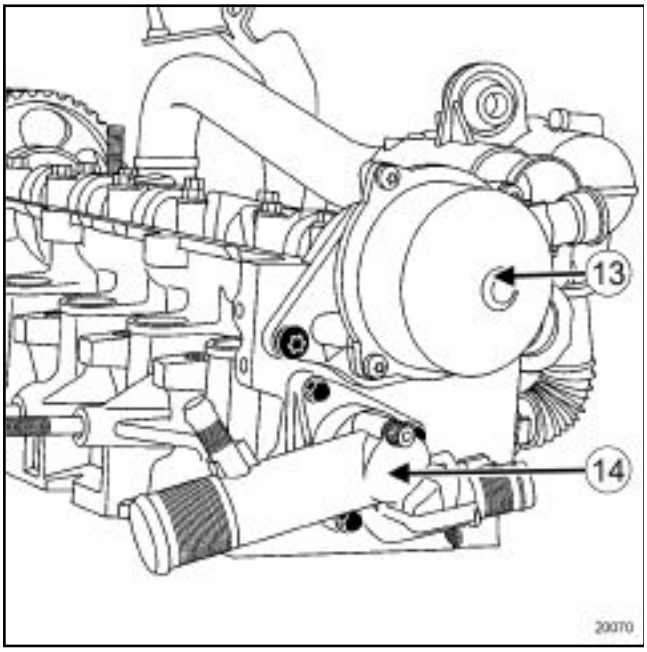
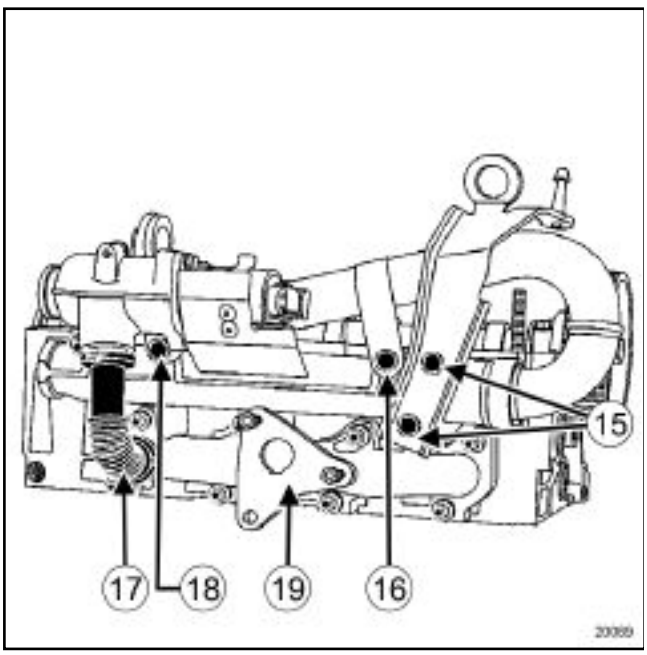
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



20070

Remove:

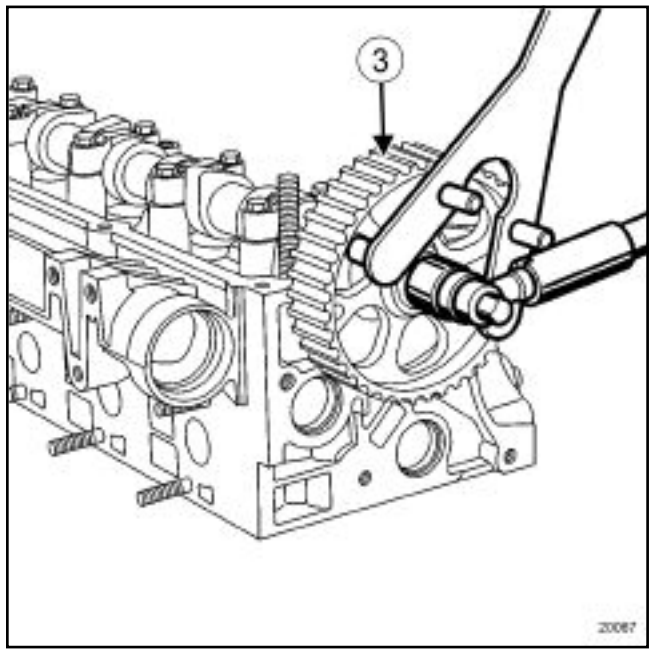
- the vacuum pump bolts (**13**) ,
- the vacuum pump,
- the cylinder head coolant outlet unit mounting bolts (**14**)
- the cylinder head coolant outlet housing



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.

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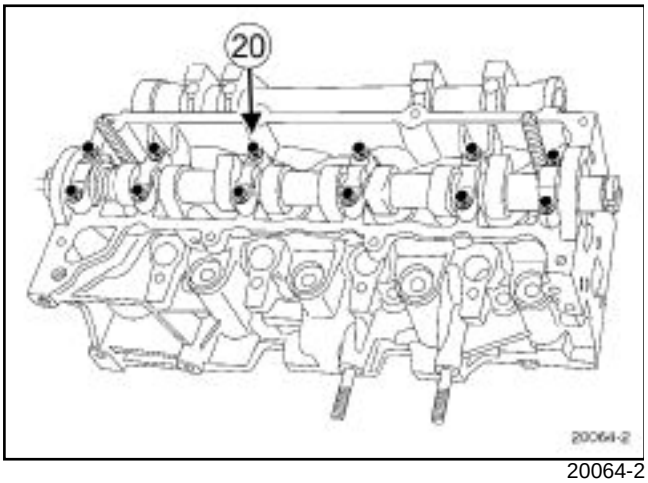
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



20064-2

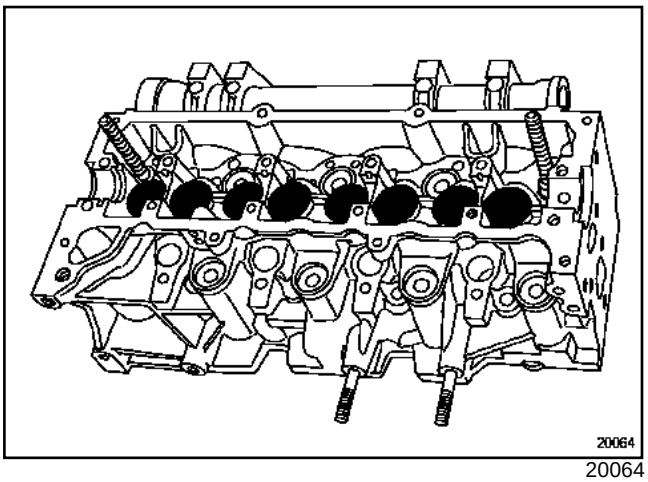
Remove:

- the camshaft bearing cap mounting bolts (**20**) ,
- the camshaft bearing caps.

Remove the camshaft.

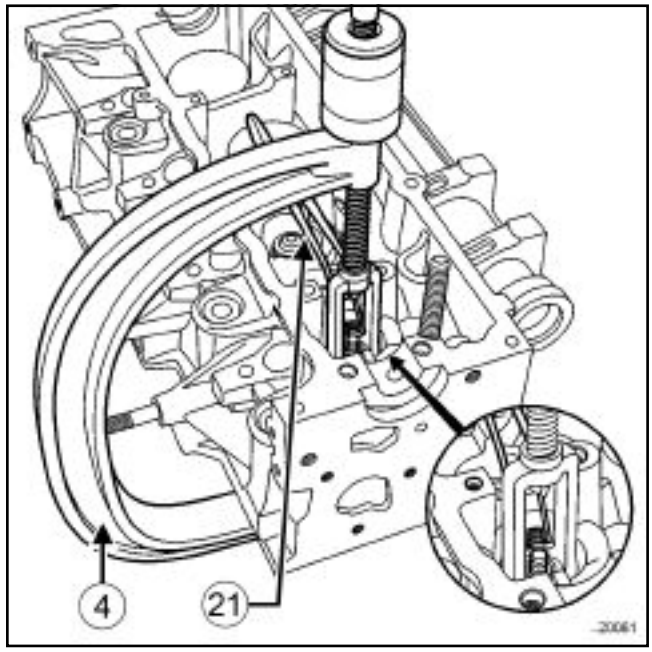
Note:

It is essential to match the valve tappets to their respective cylinders using an indelible marker.



20064

Remove the valve tappets.



20061

Compress the valve springs using the **(Mot. 1502)** (**4**) or using a valve spring compressor.

Remove:

- the collets using tweezers ***(21)*** ,
- the valve spring upper cups,
- the valve springs,
- the valves.

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Cylinder head: Dismantling

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

Special tooling required	
Mot. 1566	Spanner for removing high pressure pipes.
Mot. 1746	Offset spanner for tightening high pressure pump pipes.
Mot. 799-01	Timing gear wheel immobiliser.
Mot. 1502	Valve lifting tool for removing valves.

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT

- It is essential to follow the cleanliness guidelines (see **10A**, **Engine and lower engine assembly**, **Engine: Precautions for repair**, page **10A-4**) ,
- Wear latex gloves while using the cleaning product,
- Wear goggles with side guards,

WARNING

Do not blast with compressed air once the fuel circuit is open, otherwise impurities may enter the system. Use cleaning cloths only, if necessary.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Consumables

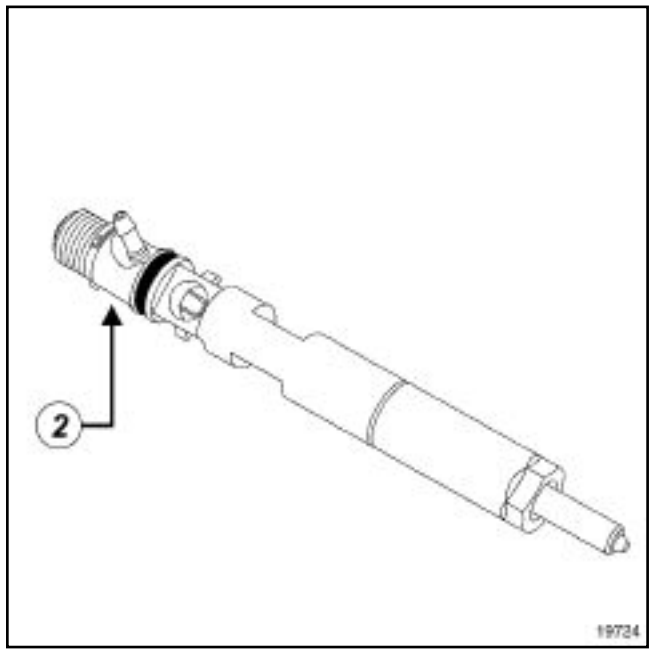
- Set of blanking plugs, part no. **77 01 206 804** ,
- Cleaning cloths, part no. **77 11 211 707** ,
- Brake cleaner, part no. **77 11 226 128** ,
- Injector cleaner, part no. **77 11 224 188** ,

III - EQUIPMENT REQUIRED

- Protective goggles (with side guards),
- Latex protective gloves,
- Indelible pencil,
- Plastic bags,
- Valve wrench,
- Tweezers,
- Wrench for the high-pressure pipes,
- Crow foot wrench,
- Wrench with hinge for heater plugs,
- Male torx sockets.

IV - STRIPPING THE CYLINDER HEAD

Cleaning the high-pressure pipe unions (see **10A**, **Engine and lower engine assembly**, **Engine: Precautions for repair**, page **10A-4**) .



19724

Note:

When loosening the high-pressure pipes, it is essential to hold injector intermediate union (2) .

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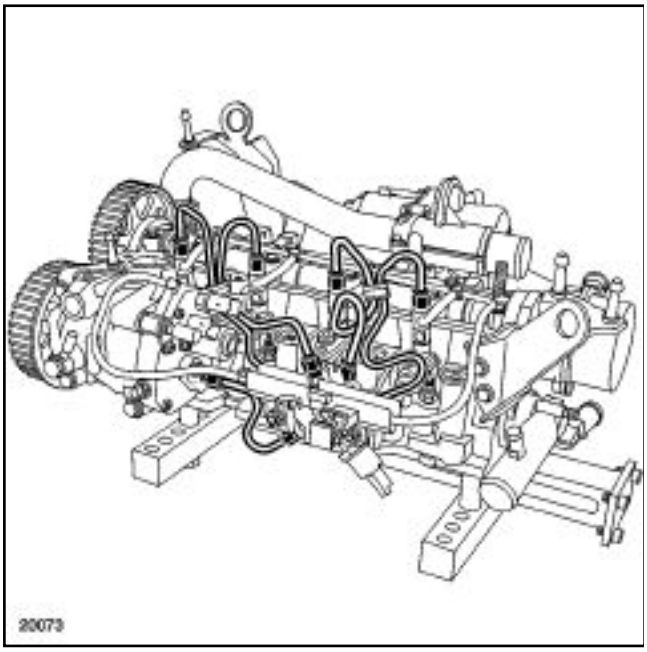
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

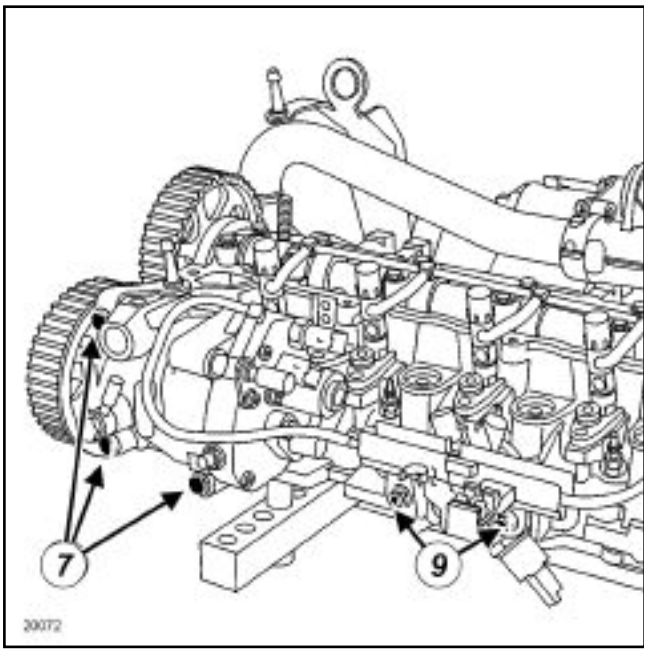


20073

Remove the high-pressure pipes using the **(Mot. 1566)** , **(Mot. 1746)** or with a pipe wrench.

Fit plugs to maintain cleanliness:

- on the high-pressure pump,
- on the rail,
- on the injectors.



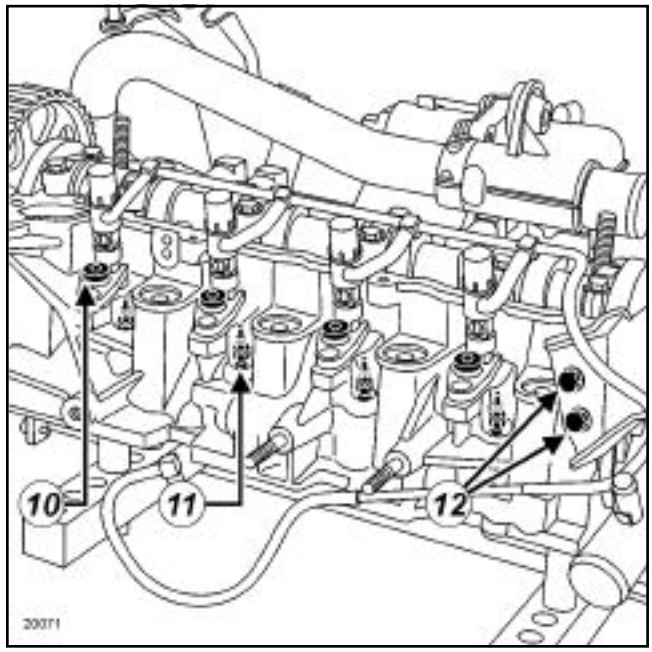
20072

Remove:

- the high-pressure pump mounting bolts (**7**) ,
- the high-pressure pump,
- the high-pressure pump mounting nuts (**9**) ,
- the rail.

Note:

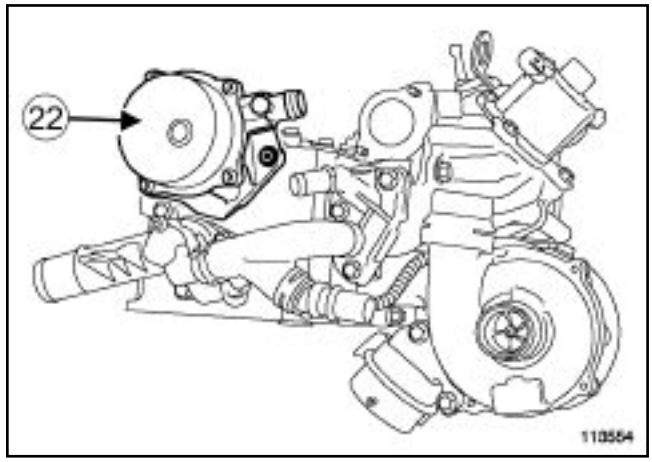
It is essential to mark the injectors relative to their cylinders using an indelible pencil.



20071

Remove:

- the injector bracket bolts (**10**) ,
- the injectors,
- the heater plugs (**11**) , using a wrench with hinge,
- the bolts (**12**) from the engine lifting eye (flywheel end),
- the engine lifting eye (flywheel end),



113554

Remove:

- the mounting bolts from the vacuum pump (**22**) ,

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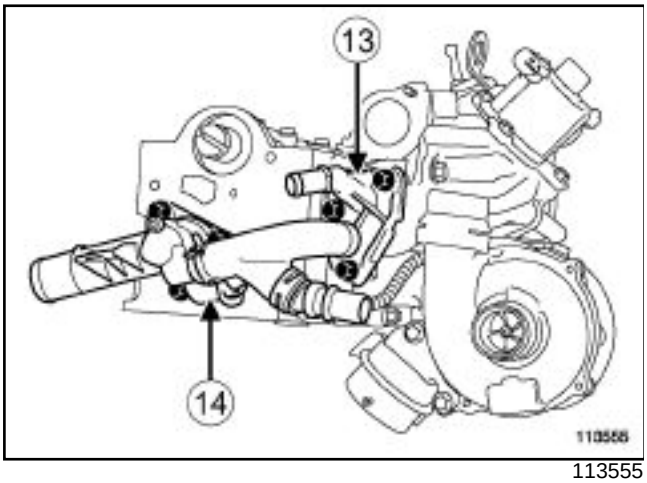
- the vacuum pump.

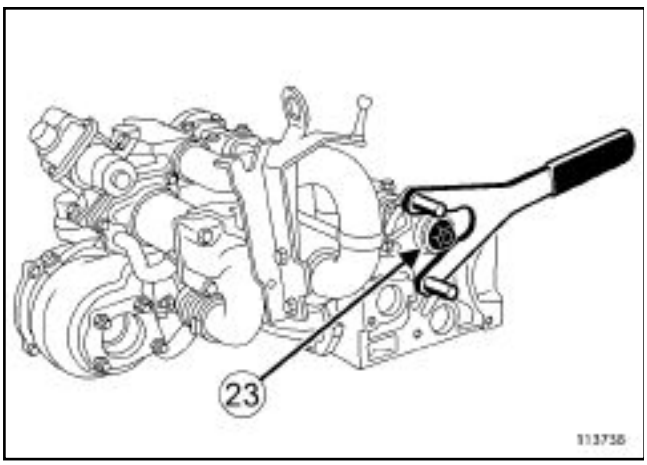


113555

Remove:

- the EGR exchanger cover bolts (**13**) ,
- the EGR exchanger cover,
- the cylinder head coolant outlet unit bolts, (**14**)
- the cylinder head coolant outlet housing

Remove the camshaft pulley.

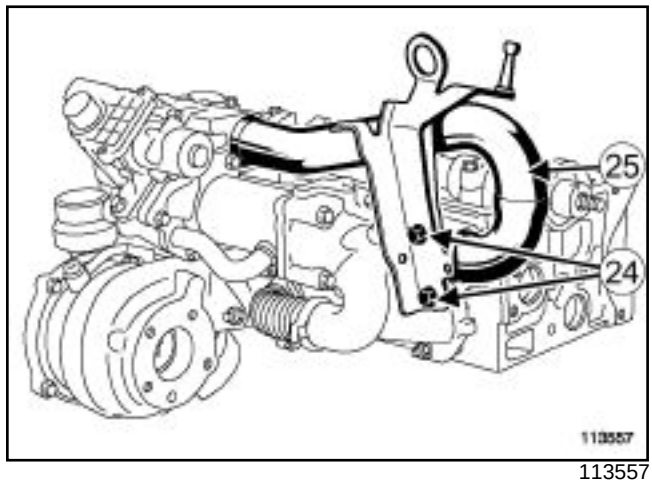


113738

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

Remove:

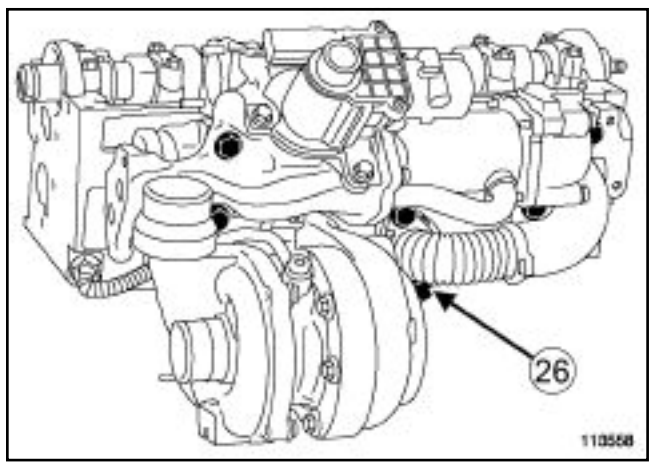
- the camshaft pulley hub mounting nut (**23**) ,
- the camshaft pulley hub.



113557

Remove:

- the engine lifting eye mounting bolts (**24**) (timing end),
- the engine lifting eye (timing end),
- the inlet duct.



113558

Remove:

- the six mounting bolts (**26**) from the EGR valve-exchanger assembly,
- the EGR valve-exchanger assembly.

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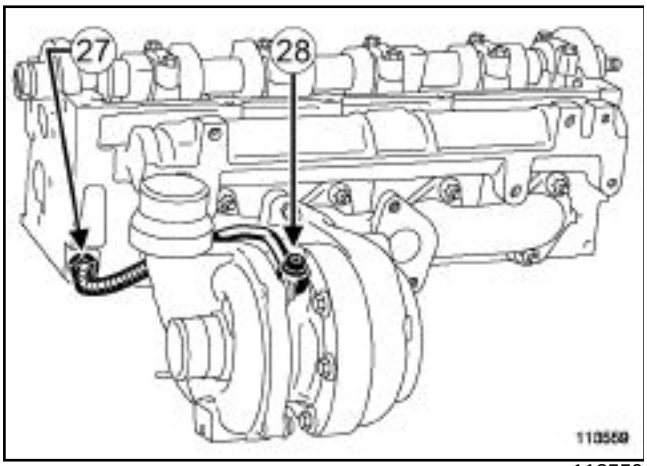
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

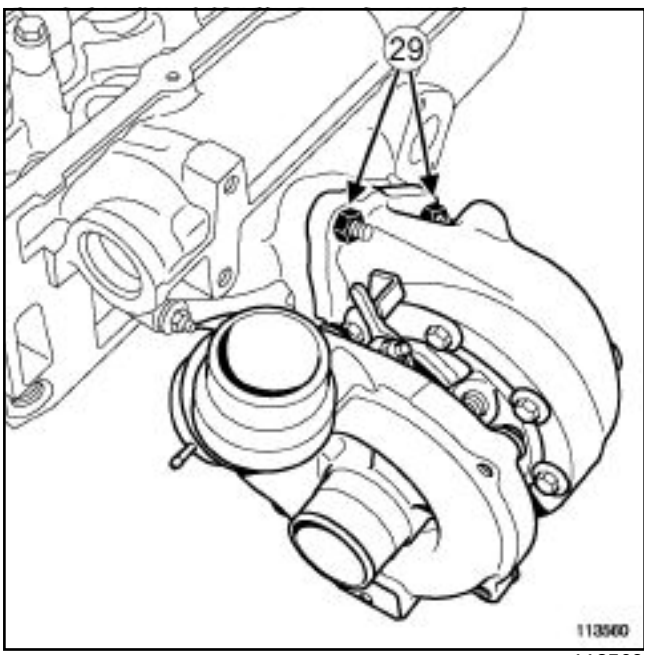


113559

Loosen the mounting nut (**27**) from the turbocharger oil supply pipe (cylinder head end).

Remove:

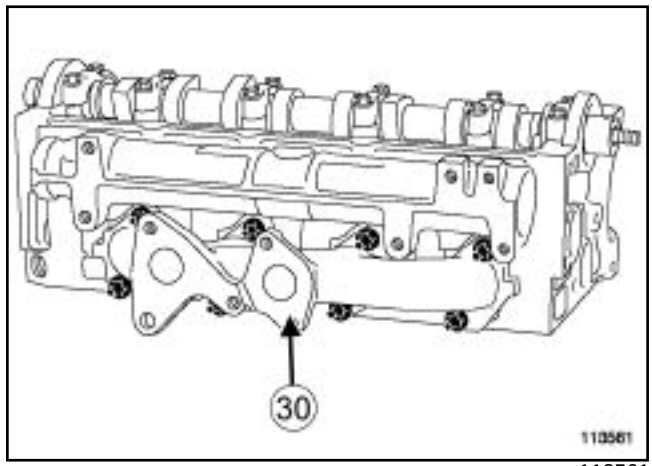
- the mounting bolt (**28**) from the turbocharger oil supply pipe (turbocharger end),
- the turbocharger oil supply pipe.



113560

Remove:

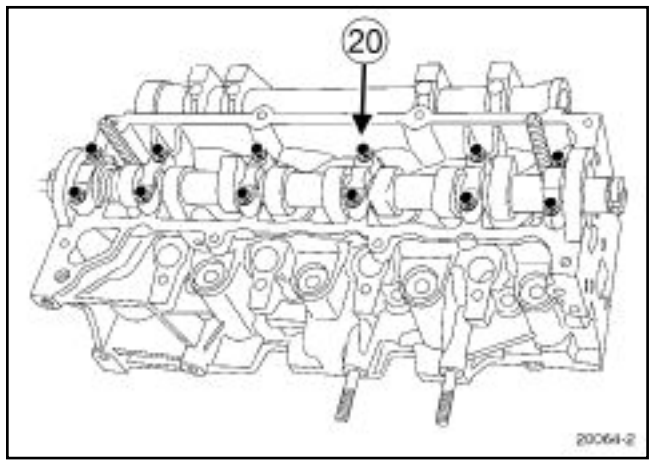
- the three turbocharger mounting nuts (**29**) ,
- the turbocharger.



113561

Remove:

- the mounting nuts from the exhaust manifold (**30**) ,
- the exhaust manifold.



20064-2

Remove:

- the mounting bolts (**20**) from the camshaft bearing caps,
- the camshaft bearing caps.

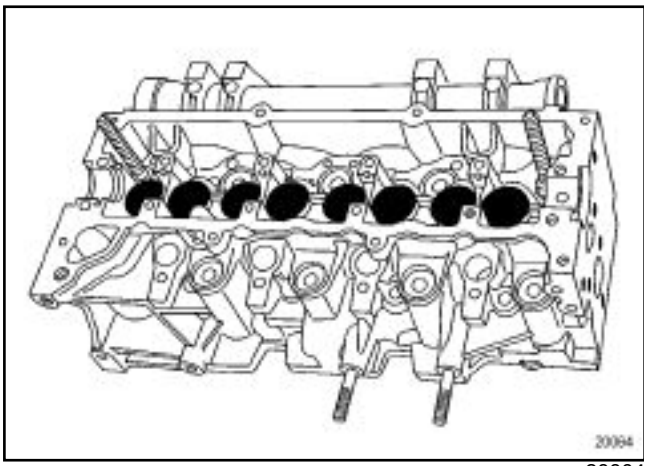
Remove the camshaft.

Note:

It is essential to mark the valve pushrods relative to their cylinders using an indelible pencil.

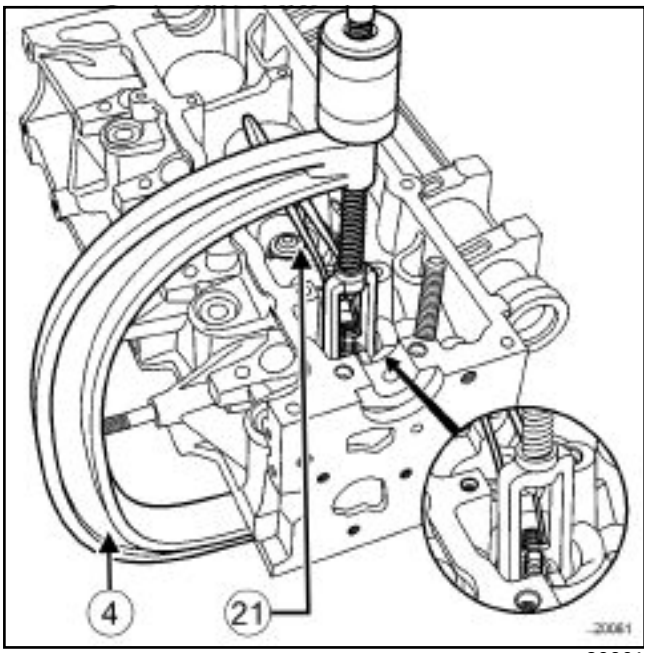
GETtheMANUALS.org

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



20064

Remove the valve pushrods.



20061

Compress the valve springs using the **(Mot. 1502)** (**4**) or a valve wrench.

Remove:

- the cotters using tweezers ***(21)*** ,
- the valve spring upper cups,
- the valve springs,
- the valves.

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K9K, and 732 or 764

Special tooling required	
Mot. 1746	Offset spanner for tightening high pressure pump pipes.
Mot. 1566	Spanner for removing high pressure pipes.
Mot. 799-01	Timing gear wheel immobiliser.
Mot. 1502	Valve lifting tool for removing valves.

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT

- It is essential to follow the cleanliness guidelines (see **10A**, **Engine and lower engine assembly**, **Engine: Precautions for repair**, page **10A-4**) ,
- Wear latex gloves while using the cleaning product,
- Wear goggles with side guards,

WARNING

Do not blast with compressed air once the fuel circuit is open, otherwise impurities may enter the system. Use cleaning cloths only, if necessary.

II - PARTS AND CONSUMABLES FOR THE REPAIRS

Consumables

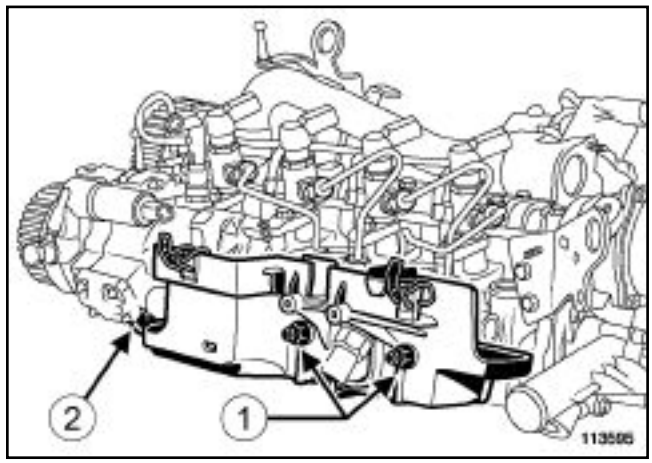
- Set of blanking plugs, part no. **77 01 476 857** ,
- Cleaning cloths, part no. **77 11 211 707** ,
- Brake cleaner, part no. **77 11 226 128** ,
- Injector cleaner, part no. **77 11 224 188** ,

III - EQUIPMENT REQUIRED

- Protective goggles (with side guards),
- Latex protective gloves,
- Indelible pencil,
- Plastic bags,
- Valve wrench,
- Tweezers,
- Flat-blade and thin screwdriver,
- Wrench for the high-pressure pipes,
- Crow foot wrench,
- Wrench with hinge for heater plugs,
- Male torx sockets.

IV - STRIPPING THE CYLINDER HEAD

Cleaning the high-pressure pipe unions (see **10A**, **Engine and lower engine assembly**, **Engine: Precautions for repair**, page **10A-4**) .



113595

Remove:

- the mounting bolt (**2**) and nuts (**1**) from the high-pressure protector,
- the high-pressure protector.

Clean the high-pressure pipe unions (see **10A**, **Engine and lower engine assembly**, **Engine: Precautions for repair**, page **10A-4**) .

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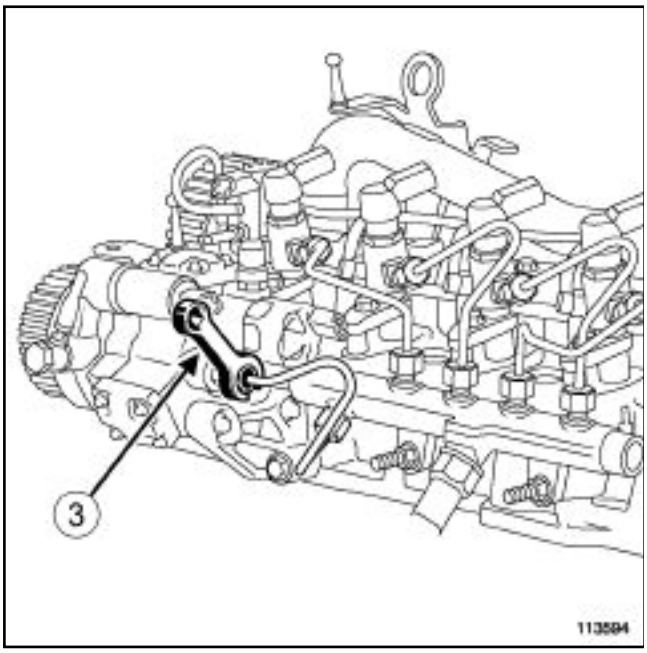
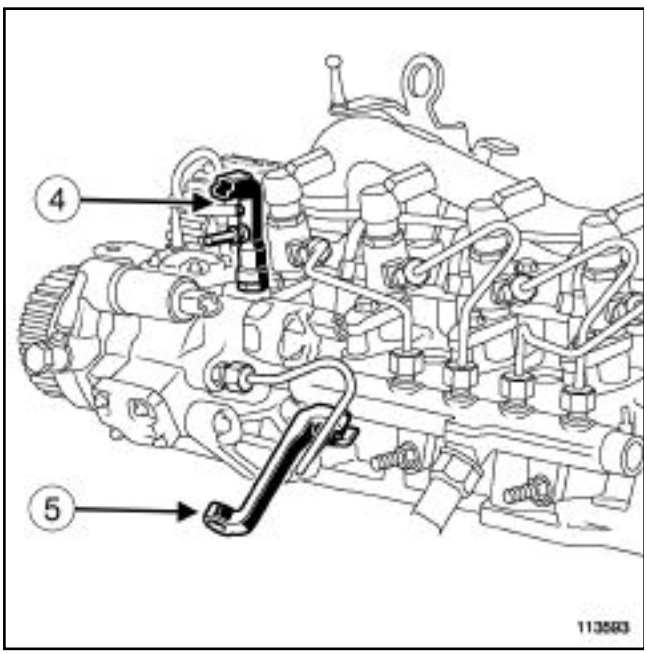
K9K, and 732 or 764



113594

Loosen the high-pressure pipe nut (high-pressure pump side) using the **(Mot. 1746)** (**3**) or a crow foot wrench.



113593

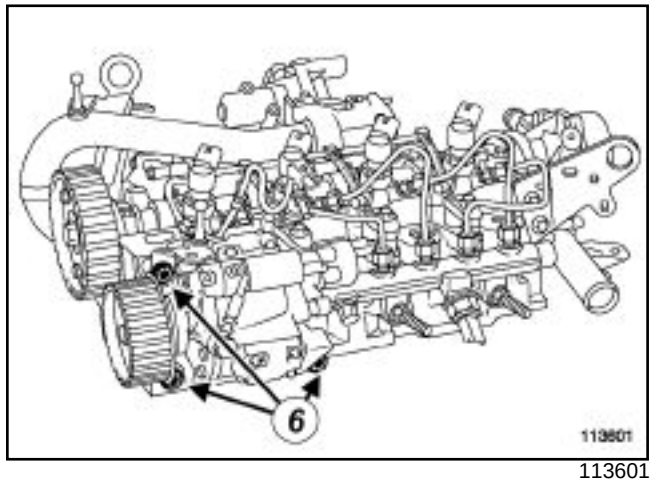
Remove the high-pressure pump fuel return union (**4**) .

Loosen the high-pressure pipe nut (high-pressure pump side) using the **(Mot. 1566)** (**5**) or a pipe wrench.

Remove the high-pressure pipe between the high-pressure pump and the rail.

Fit plugs to maintain cleanliness:

- on the high-pressure pump,
- on the rail.



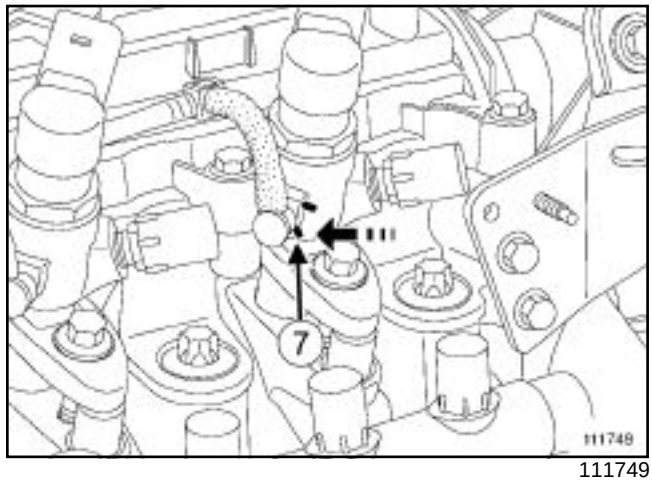
113601

Remove:

- the high-pressure pump mounting bolts (**6**) ,
- the high-pressure pump.

Note:

Take care not to completely remove the clip from its proper position as it may become deformed.



111749

Push in the direction of the arrow and at (**7**) on the lower section of the retaining clip of the fuel return pipe on the injector using a thin, flat-blade screwdriver.

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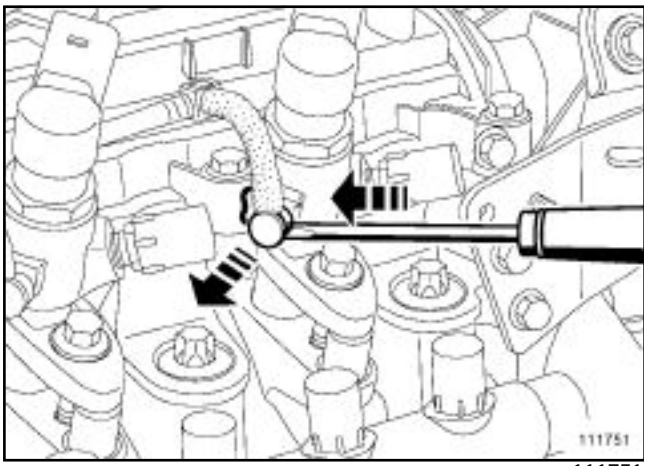
K9K, and 732 or 764



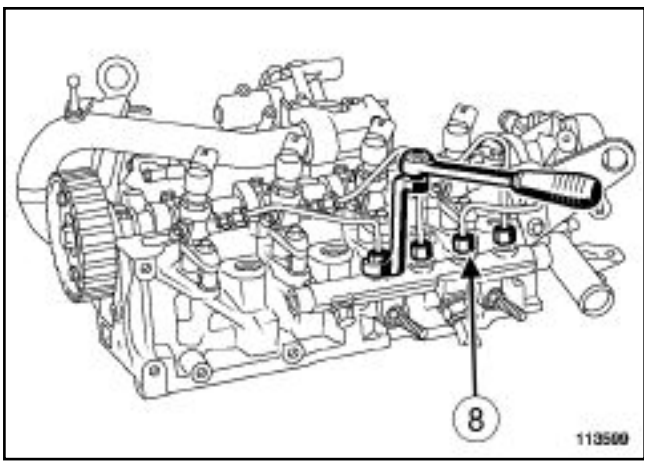
111751

Pushing the lower bracket of the retaining clip downwards, pull out the injector fuel return pipe union.

Remove the fuel return pipe from the injector.

Repeat the operation on the other fuel return pipe unions.

Fit the correct blanking plugs.

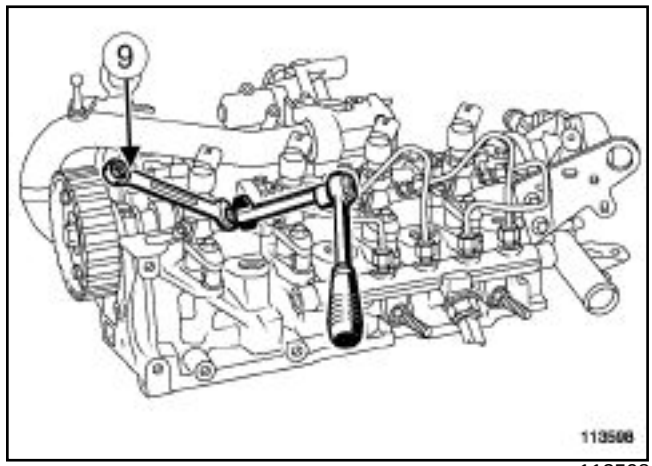


113599

Loosen the high-pressure pipe nuts on the rail side using the **(Mot. 1566)** or a pipe wrench.

Note:

When loosening the high-pressure pipe nuts, it is essential to hold the injector intermediate union with a wrench *(9)* .



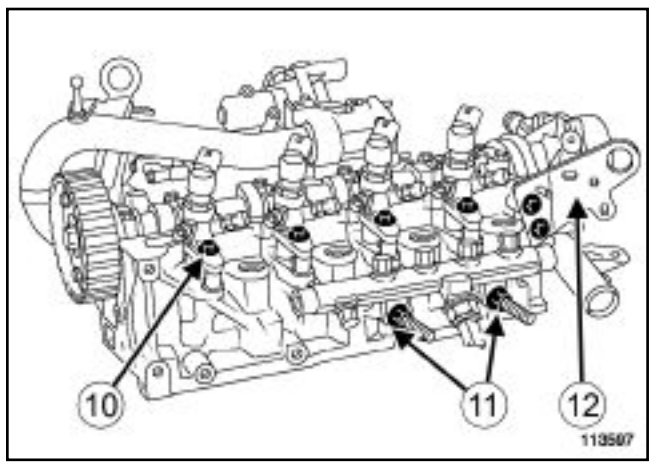
113598

Loosen the high-pressure pipe nuts on the injector side using the **(Mot. 1566)** or a pipe wrench, while holding the intermediate union with an open-jawed spanner.

Fit the correct blanking plugs.

Note:

It is essential to mark the injectors relative to their cylinders using an indelible pencil.



113597

Remove:

- the mounting bolts from the engine lifting eye (**12**) (timing end),
- the engine lifting eye,
- the high-pressure pump mounting nuts (**11**) ,
- the high-pressure rail,
- the injector bracket bolts (**10**) ,
- the injectors.

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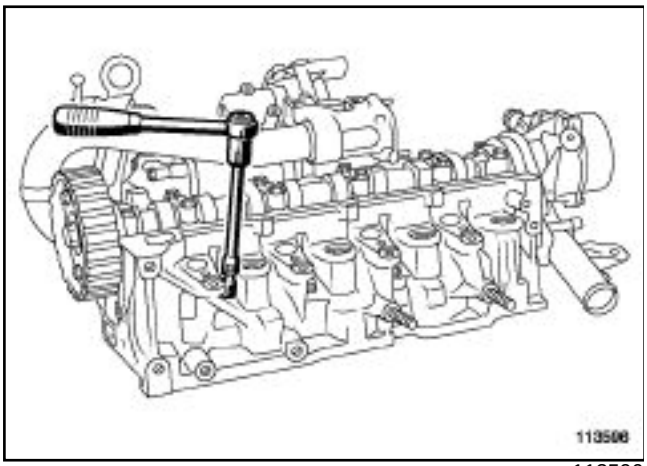
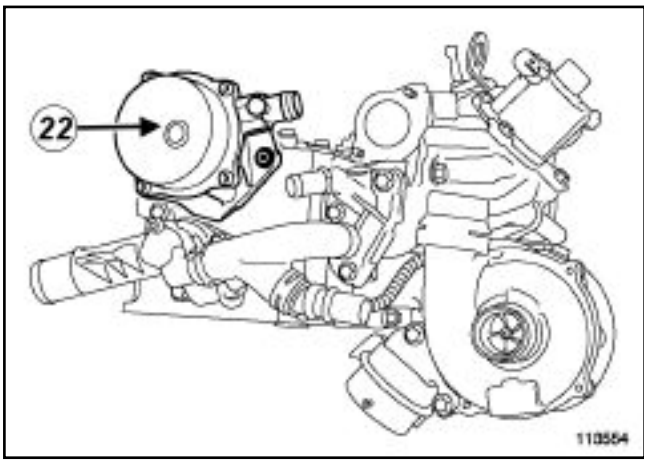
K9K, and 732 or 764



113596

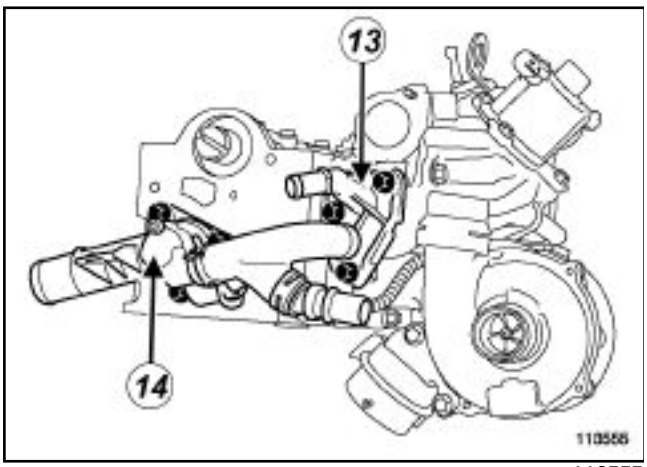
Remove the heater plugs using a wrench with hinge,



113554

Remove:

- the mounting bolts from the vacuum pump (**22**) ,
- the vacuum pump.

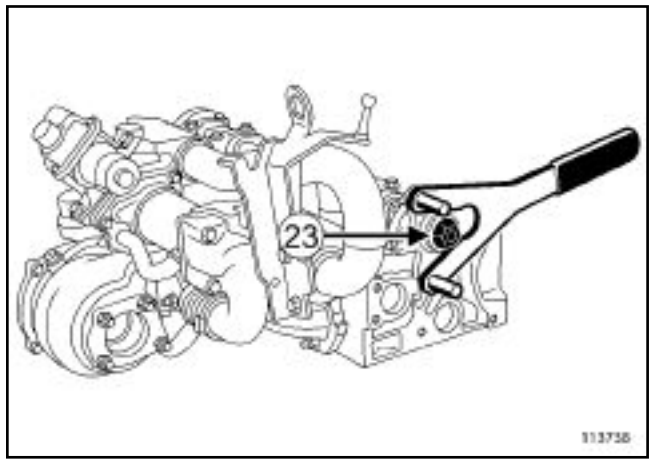


113555

Remove:

- the EGR exchanger cover bolts (**13**) ,
- the EGR exchanger cover,
- the cylinder head coolant outlet unit bolts (**14**) ,
- the cylinder head coolant outlet unit

Remove the camshaft pulley.

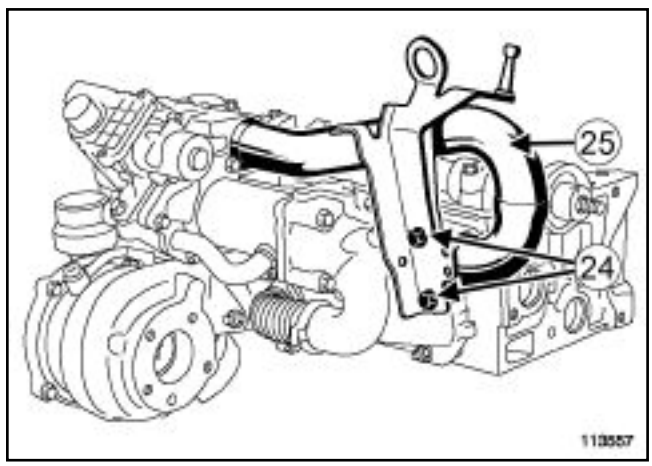


113738

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

Remove:

- the mounting nut (**23**) from the camshaft pulley hub,
- the camshaft pulley hub.



113557

Remove:

- the mounting bolts (**24**) from the engine lifting eye (timing end),
- the engine lifting eye (timing end),
- the inlet duct.

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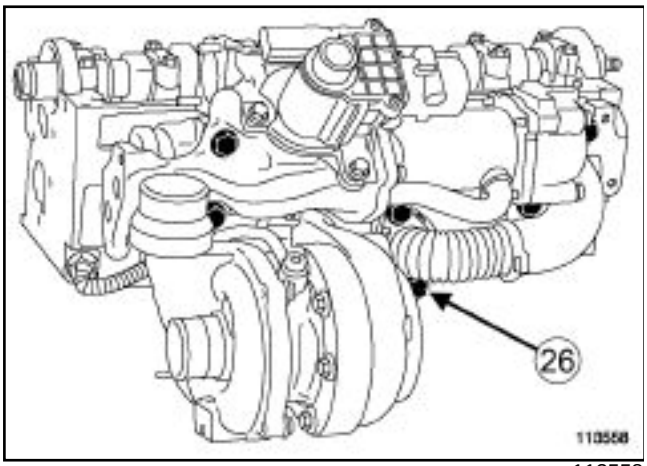
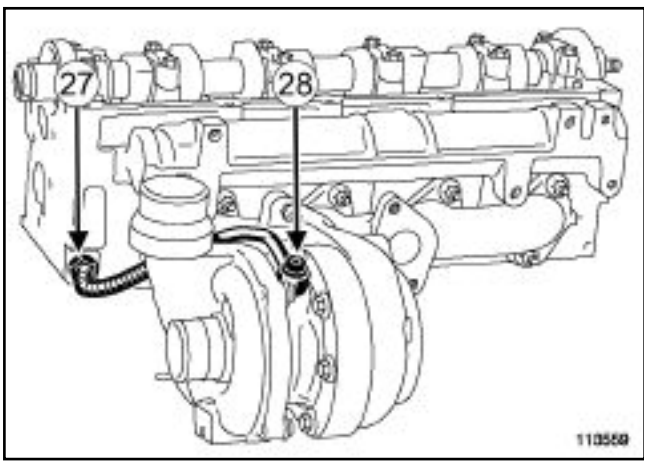
K9K, and 732 or 764



113558

Remove:

- the six mounting bolts (**26**) from the EGR valve-exchanger assembly,
- the EGR valve-exchanger assembly.

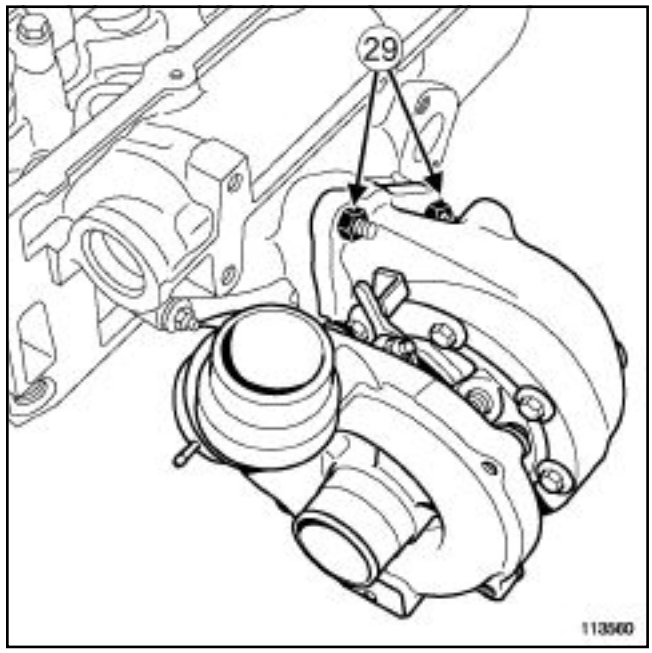


113559

Loosen the mounting nut (**27**) from the turbocharger oil supply pipe (cylinder head end).

Remove:

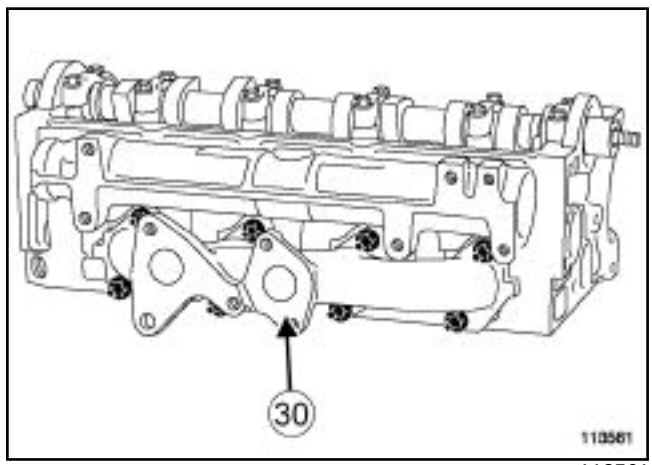
- the mounting nut (**28**) from the turbocharger oil supply pipe (turbocharger end),
- the turbocharger oil supply pipe.



113560

Remove:

- the three turbocharger mounting nuts (**29**) ,
- the turbocharger.



113561

Remove:

- the mounting nuts from the exhaust manifold (**30**) ,
- the exhaust manifold.

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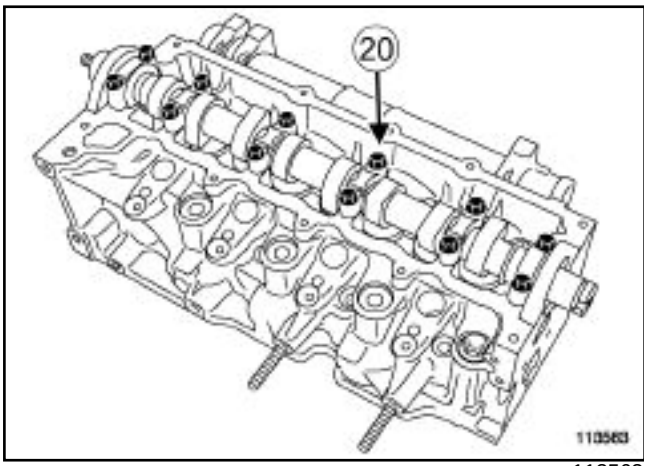
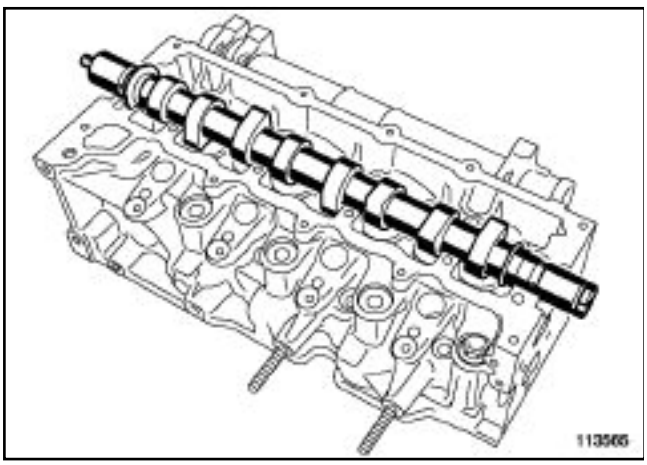
K9K, and 732 or 764



113563

Remove:

- the mounting bolts (**20**) from the camshaft bearing caps,
- the camshaft bearing caps.

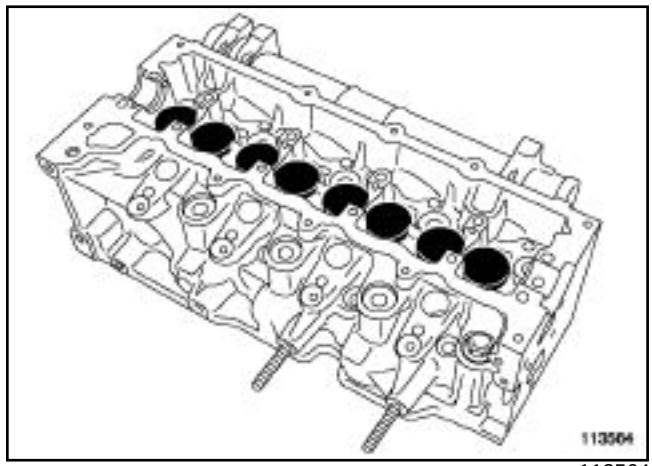


113565

Remove the camshaft.

Note:

It is essential to mark the valve pushrods relative to their cylinders using an indelible pencil.



113564

Remove the valve pushrods.

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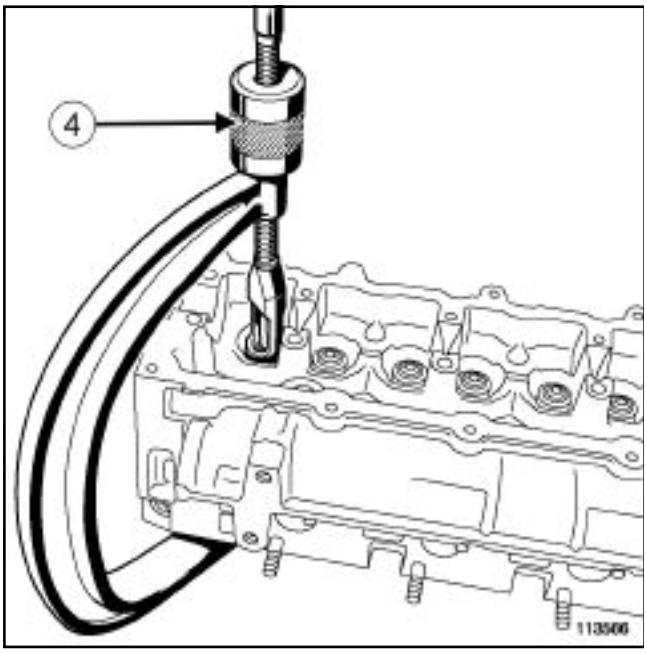
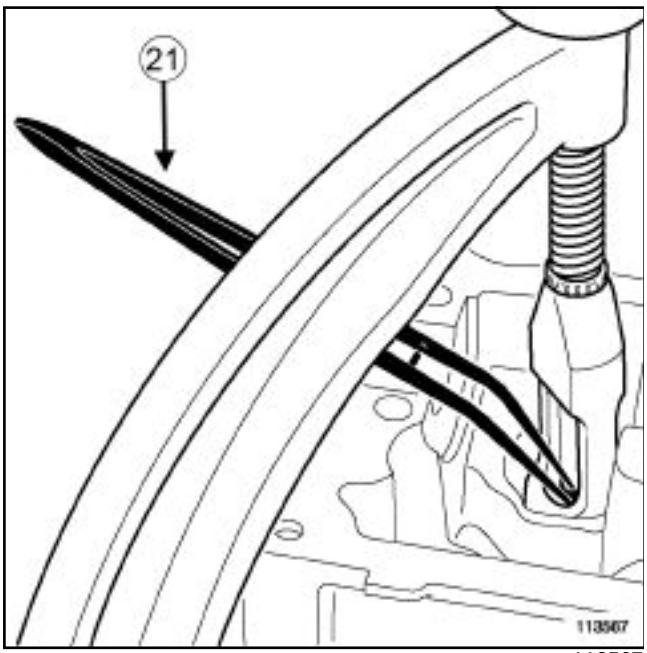
K9K, and 732 or 764



113566



113567

Compress the valve springs using the **(Mot. 1502)** (**4**) or a valve wrench.

Remove:

- the cotters using tweezers ***(21)*** ,
- the valve spring upper cups,
- the valve springs,
- the valves.

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Special tooling required	
Mot. 1729	Pin wrench for removing the EGR valve.
Mot. 1757	EGR solenoid valve actuator.

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT

Do not scratch the aluminium sealing surfaces.

Wear goggles.

Wear gloves during the operation.

WARNING

Do not allow this product to drip on to the paintwork.

Clean the cylinder head carefully to prevent foreign bodies from entering the oil supply and return galleries.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

When cleaning parts, it is essential to not knock the parts against each other, or their mating faces may be damaged and therefore their adjustments may be altered, which could damage the engine.

Cleaning recommendation for the EGR solenoid valve :

- do not wet the electrical part of the solenoid valve with the cleaning product.
- keep the solenoid valve tilted with the connector at the top.
- only use brushes with plastic or non-corrosive metal (brass) bristles.
- cleaning using hard or corrosive tools (e.g: screwdriver) may damage the valves or their shafts, and lead to leaking valves with a consequent loss of power. Or a loss of the upper valve leading to destruction of the engine.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Consumables

- Décapjoint, part no. **77 01 405 952** ,
- Grey sanding pad, part no. **77 01 405 943** .
- Carburettor cleaner, part no. **77 11 171 437** ,

III - EQUIPMENT REQUIRED

- Protective goggles,
- Protective gloves,
- Wooden spatula,
- Brushes with plastic or non-scratch metal (brass) bristles,
- Compressed air gun,
- Cleaning fountain,
- Cleaning bench.

IV - CLEANING THE UPPER ENGINE

Apply the **Décapjoint** product to the sections to be cleaned.

Leave for around ten minutes.

Remove residues with a wooden spatulas

Finish cleaning the parts using a grey polishing pad.

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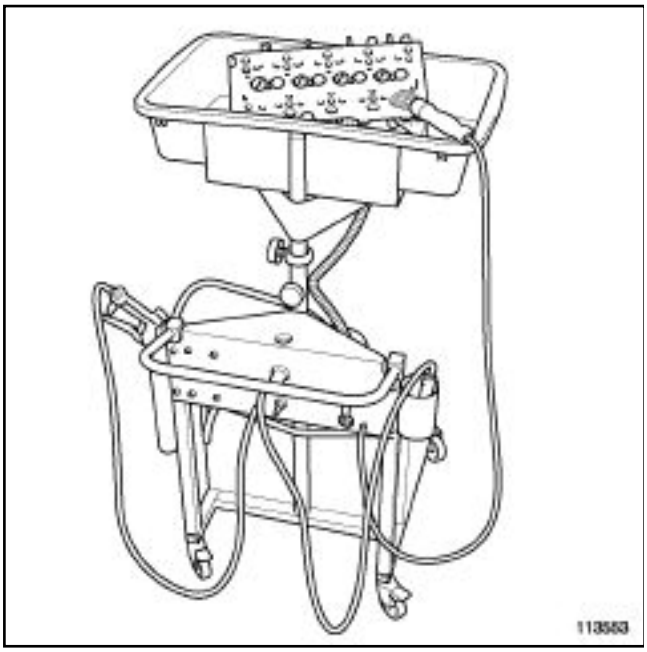
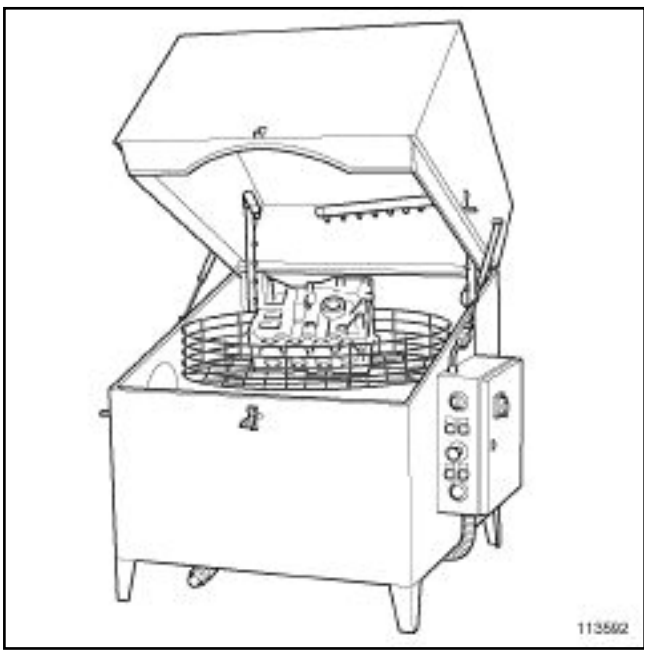


113553



113592

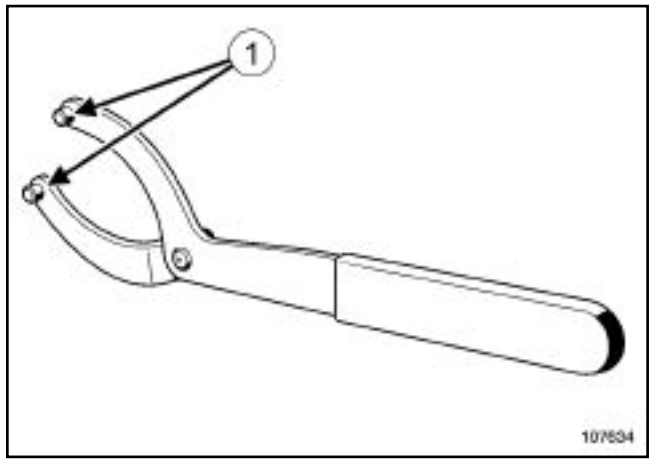
Wash the cylinder head parts using a cleaning fountain or a heated cleaning bath.

V - CLEANING THE EGR SOLENOID VALVE

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

Place the exhaust gas recirculation unit in a vice with clamping jaws.

Remove the EGR solenoid valve mounting bolts.



107634

Fully insert the spigots (**1**) of tool **(Mot. 1729)** in the mounting holes of the EGR solenoid valve.

Remove the EGR solenoid valve, with small rotating movements to detach the EGR solenoid valve from its housing.

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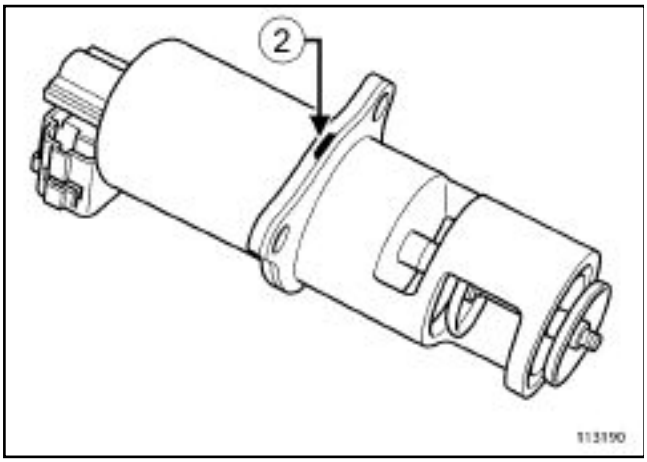
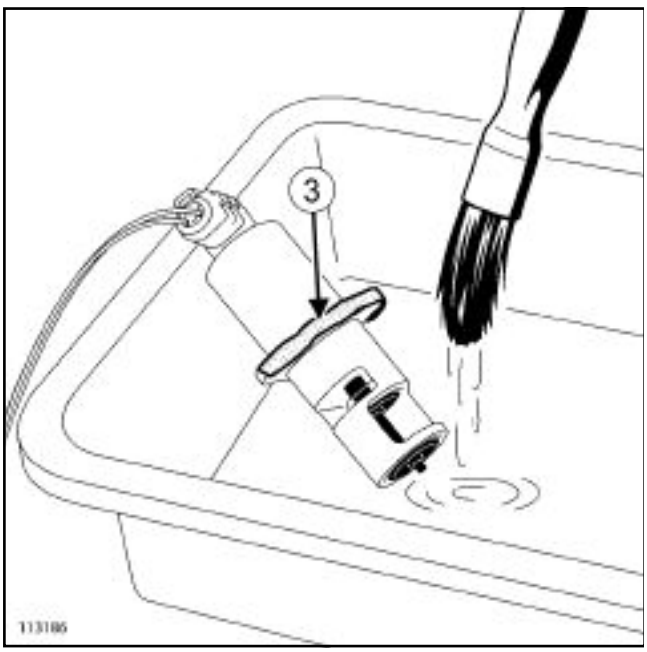


113190



113186

Protect the vent holes (**2**) of the solenoid valve using adhesive tape (**3**) .

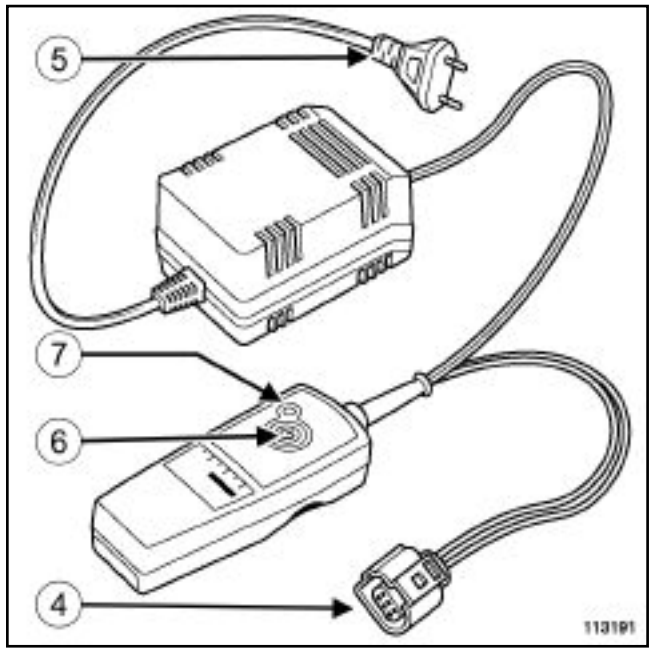
Freely wet the mechanical part only of the EGR solenoid valve with cleaning fluid, while brushing the EGR solenoid valve for **1 min** .

Note:

The EGR solenoid valve actuator tool can be used to check the solenoid valve.

An indicator will sound in case of:

- incorrect connection of the tool to the solenoid valve,
- solenoid valve short circuit,
- break in the solenoid valve circuit.



113191

Connect:

- the connector (**4**) of the **(Mot. 1757)** to the solenoid valve,
- the adaptor (**5**) of the **(Mot. 1757)** to a power supply.

Briefly press the button ***(6)*** to open the solenoid valve valves.

Note:

In the open position (with power to the solenoid valve) the warning light ***(7)*** is on.

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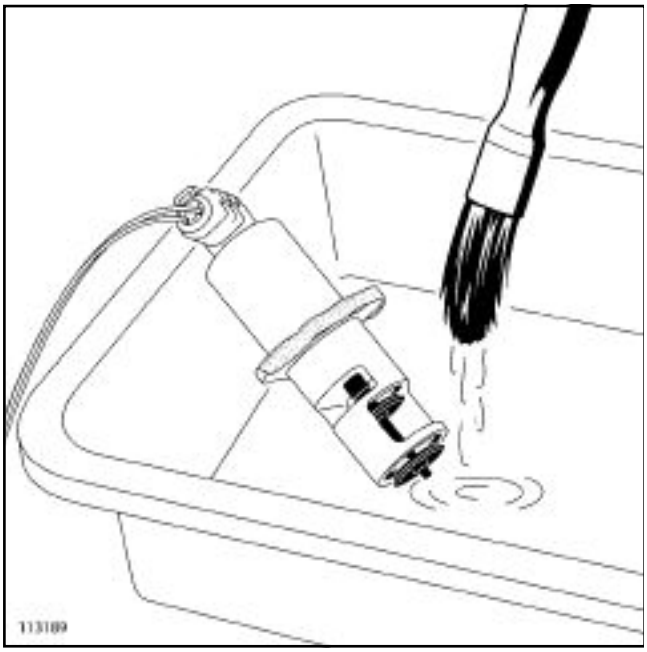


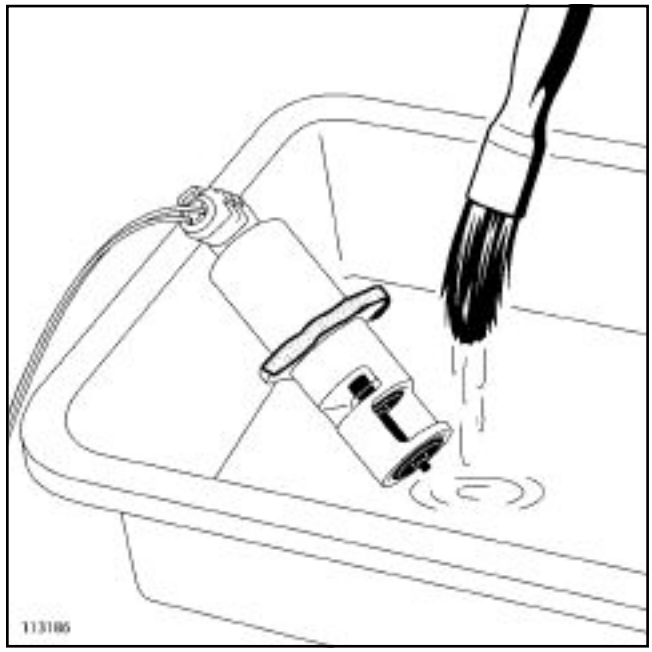
113189

Clean the mechanical part of the solenoid valve by simultaneously scrubbing and drenching with cleaning product for **2 min** , paying particular attention to:

- the valve seats,
- the surfaces of the valves,
- the shaft guide of the valves.

Briefly press the button ***(6)*** to close the solenoid valve valves.

Start an open/close cycle of the solenoid valve using the **(Mot. 1757)** keeping the button pressed ***(6)*** .



113186

Clean the mechanical section of the solenoid valve (during the open/close cycle) by scrubbing and drenching with cleaning product (simultaneously), paying attention to:

- the valve seats,
- the surfaces of the valves,
- the shaft guide of the valves.

Briefly press the button ***(6)*** to open the solenoid valve valves.

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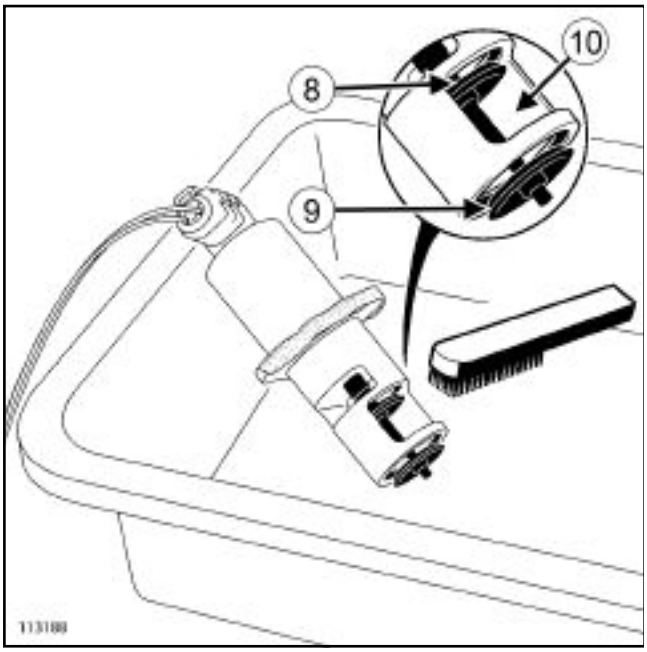


113188

Scrub the upper valve (**9**) over its entire surface and circumference.

Scrub the part of the lower valve (**8**) which is accessible through the window (**10**) .

Hold the upper valve (**9**) .

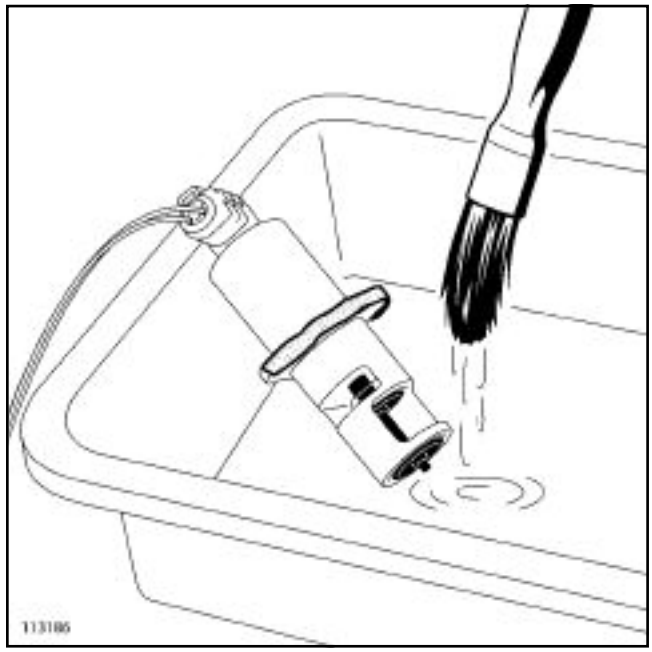
Quarter turn the valve.

Scrub the part of the lower valve (**8**) which is accessible through the window (**10**) .

Continue until the valve has been cleaned over its entire circumference.

Briefly press the button ***(6)*** to close the solenoid valve valves.

Run the open/close cycle of the solenoid valve twice using the **(Mot. 1757)** keeping the button pressed ***(6)*** .



113186

Clean the mechanical part of the solenoid valve (during the open/close cycle) by scrubbing and drenching with cleaning product (simultaneously), paying attention to:

- the valve seats,

- the surfaces of the valves,

- the shaft guide of the valves.

Check there are no bristles from the brush in the solenoid valve.

Briefly press the button ***(6)*** to open the solenoid valve valves.

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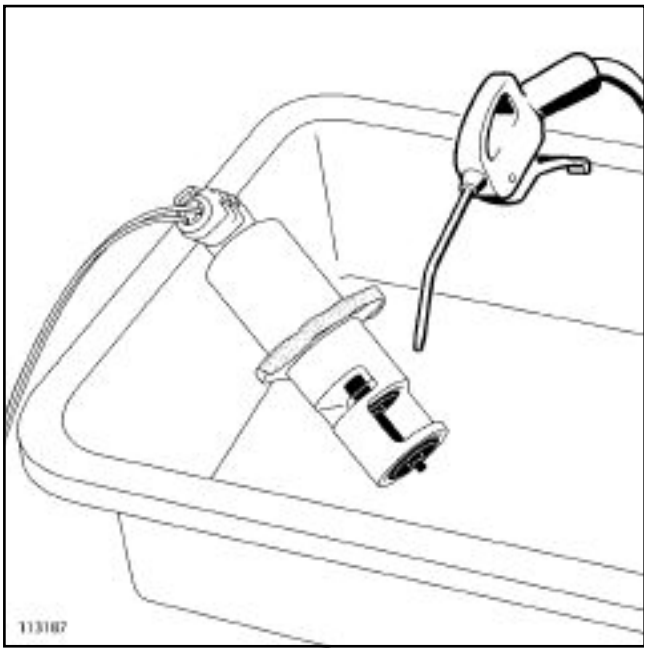

113187

Blow the solenoid valve dry using a compressed air gun.

Briefly press the button ***(6)*** to close the solenoid valve valves.

Remove the adhesive tape from the vent holes of the solenoid valve.

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Special tooling required	
Mot. 588	Cylinder block liner clamps.
Mot. 251-01	Dial gauge support.
Mot. 252-01	Dial gauge support thrust plate.

I - RECOMMENDATIONS FOR REPAIR

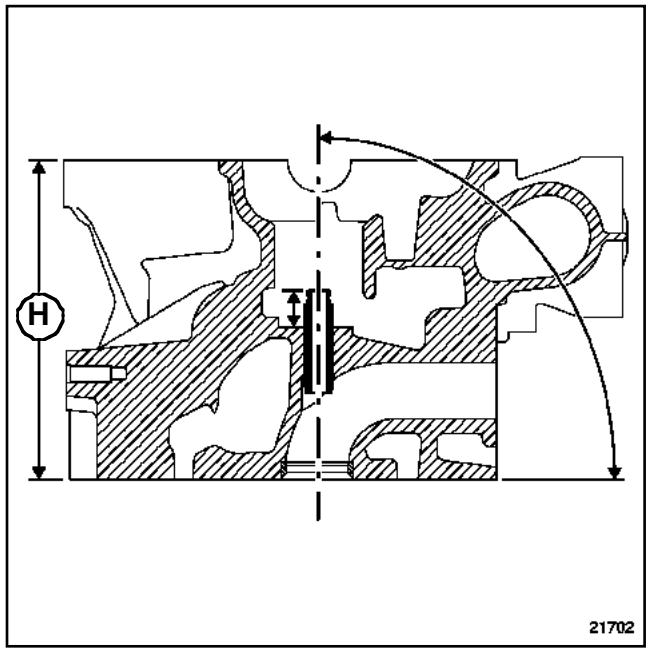
WARNING
Parts should be clean before examining and testing them.

II - EQUIPMENT REQUIRED

- Torque wrench and cylinder head bolt tightening gauge (angular measuring type),
- Torque/angle wrench,
- Radial play measuring tape.
- Tool for checking the valve spring loading
- Pressure/vacuum pump
- Sliding calliper,
- Depth gauge
- Mortice gauge,
- Micrometer,
- Dial gauge,
- Body jig bench and a pair of v-blocks.
- Magnetic holder,
- Multimeter,
- The valve stem seal fitting kit,
- The cylinder head test tools,
- Set of shims,
- Cylinder head rule.

III - CHECKING THE UPPER ENGINE

1 - Check height of cylinder head



21702

Measure the height of the cylinder head (**H**) which should be **127 mm** using a mortice gauge.

2 - Checking the cylinder head gasket face

Use a cylinder head adjuster and set of feeler gauges to check the gasket face bow.

Maximum distortion: **0.05 mm**

The cylinder head cannot be adjusted.

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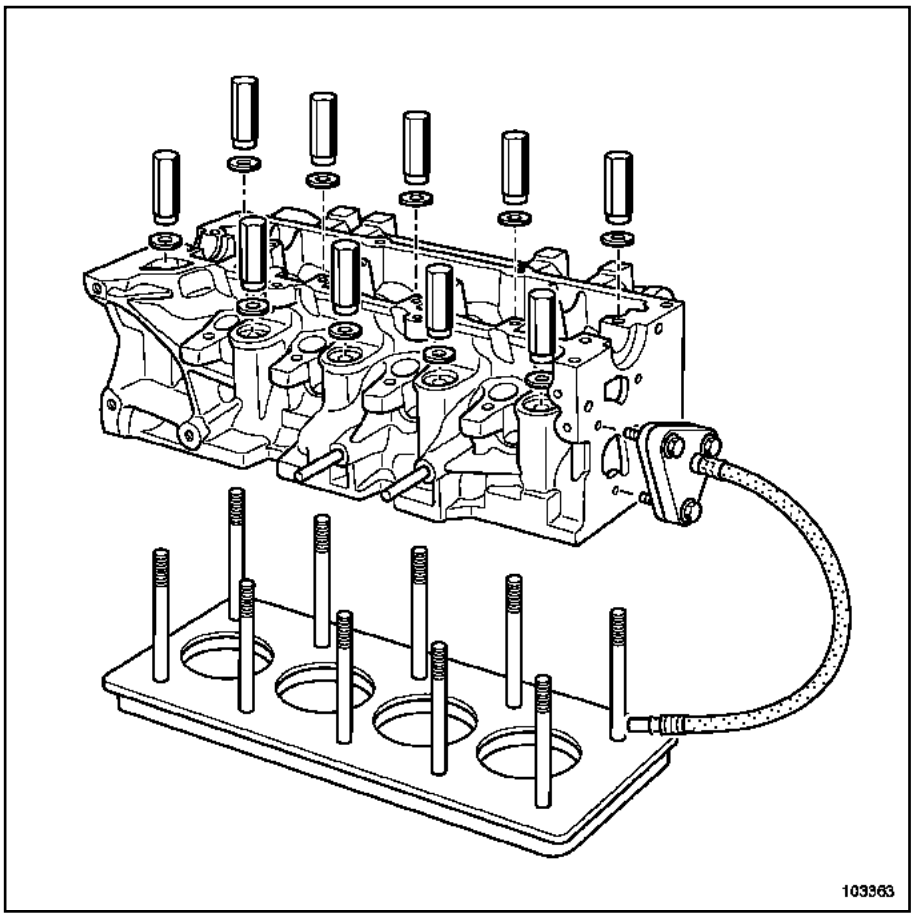
3 - Checking the cylinder head seal



103363

Test the cylinder head for possible cracks with the cylinder head test kit.

For the use of the cylinder head test unit (see **Technical Note 2781E**).

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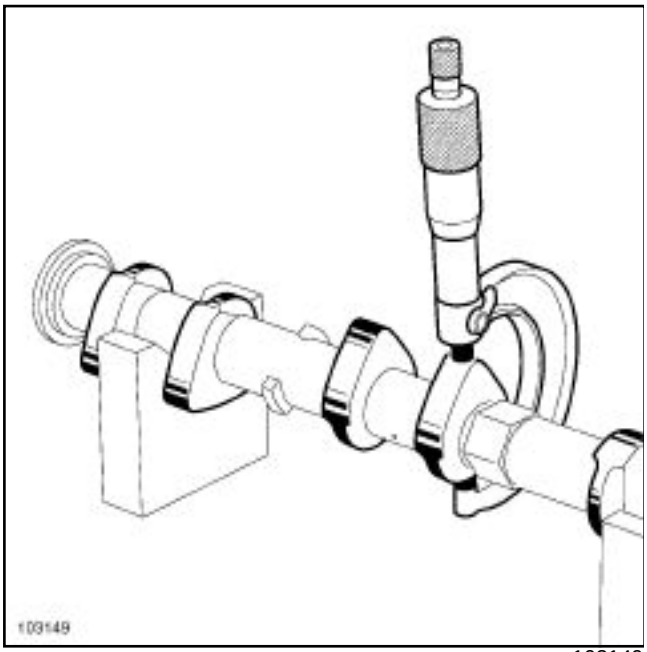
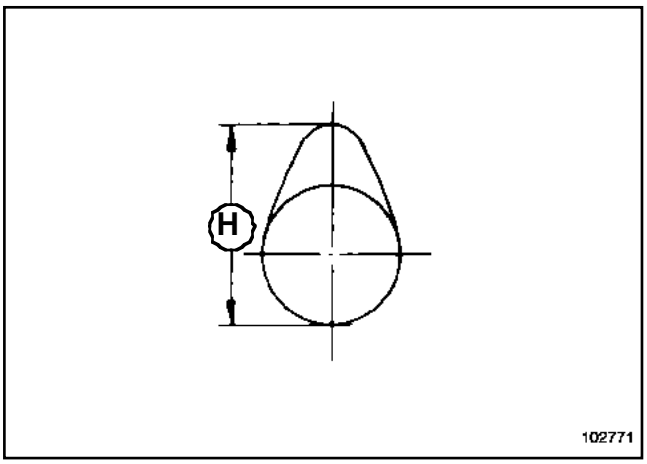
4 - Cam height checks



103149



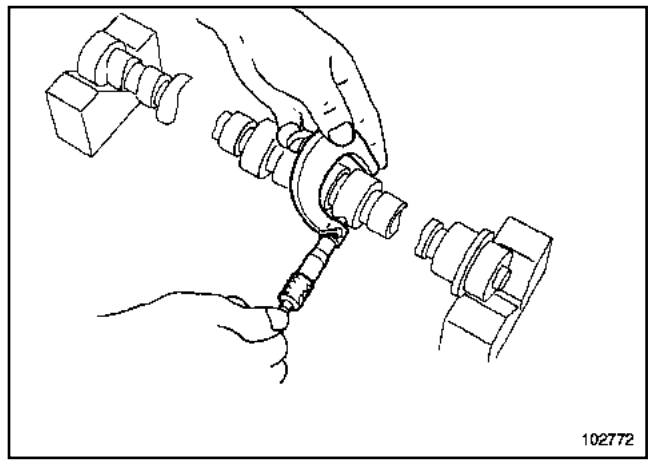
102771

Position camshaft bearings 2 and 4 on the v-blocks.

Using a micrometer, measure the height of the cams (**H**) which should be:

- Inlet: **44.015 ± 0.03 mm** ,
- Exhaust: **44.595 ± 0.03 mm** .

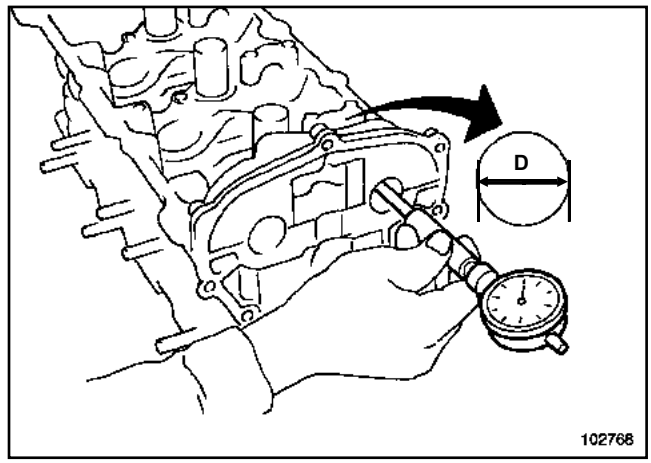
5 - Check the camshaft bearing diameters



102772

Using a micrometer, measure the external diameter of each camshaft bearing:

- bearing nos. 1,2,3,4,5: **24.9895 ± 0.0105 mm** ,
- bearing no. 6: **27.9895 ± 0.0105 mm** .



102768

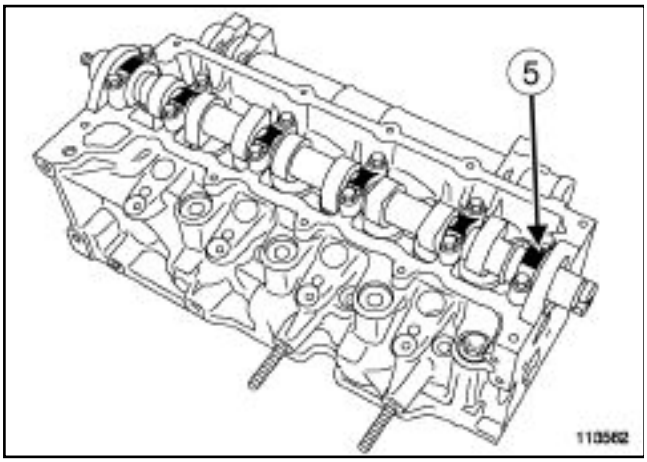
Using a micrometer, measure the internal diameter of each cylinder head bearing:

- bearings No.1, 2, 3, 4, 5: **25.05 ± 0.01 mm** ,
- bearing No.6: **28.05 ± 0.01 mm** .

6 - Checking camshaft end play

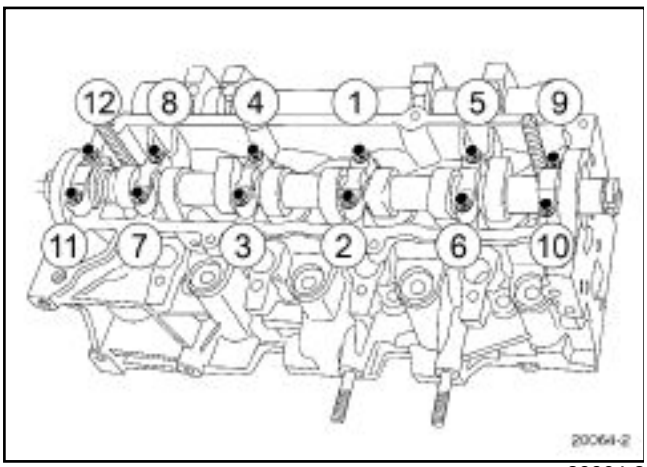
Refit the camshaft.

GETtheMANUALS.org



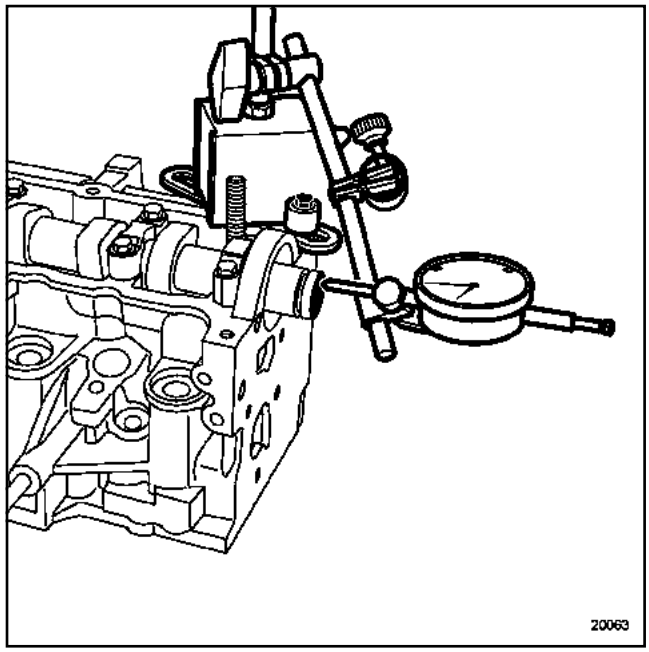
113562

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



20064-2

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



20063

Place the **(Mot. 588)** on the cylinder head, fixing it using the rocker cover bolt and a cross piece with dimensions as follows:

- external diameter **18 mm** ,
- internal diameter **9 mm** ,
- height **15 mm** .

Fix the magnetic holder to the cylinder head.

Using a dial gauge, measure the longitudinal gap which should be between **0.08 and 0.178 mm** .

Remove:

- the camshaft bearing caps,
- the camshaft.

7 - Checking the camshaft diametric clearance

Remove any oil that may be on the camshaft bearings and the camshaft bearing caps.

Refit the camshaft.

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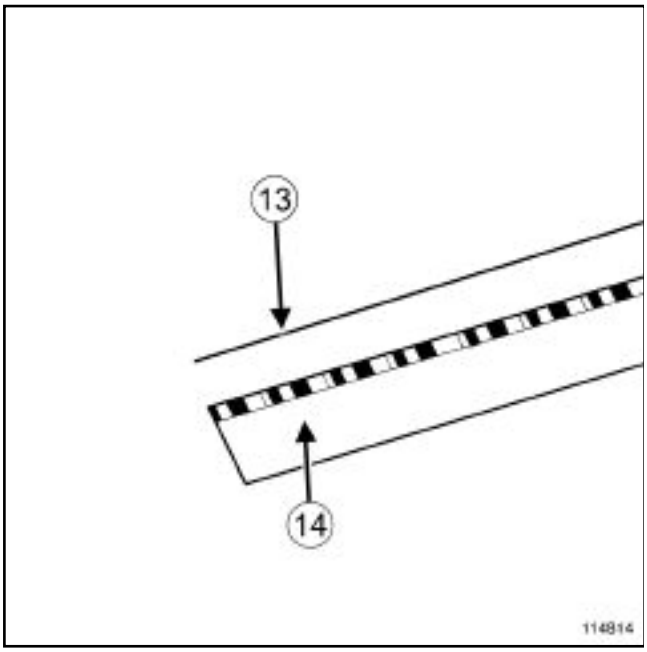


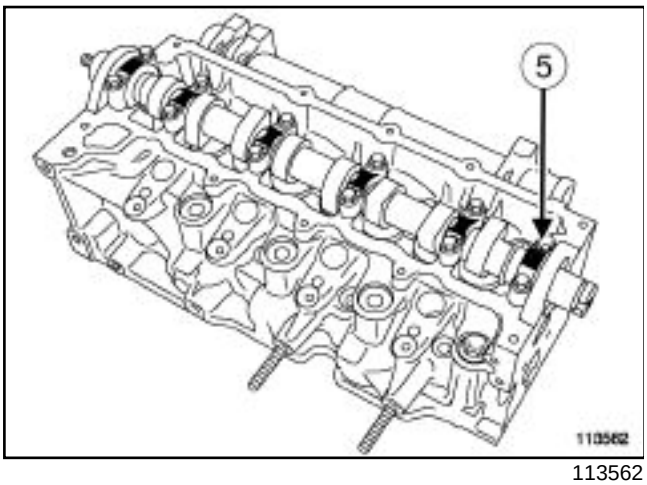
114814

Cut pieces of measuring wire (**13**) .

Place the wire in the camshaft shaft.

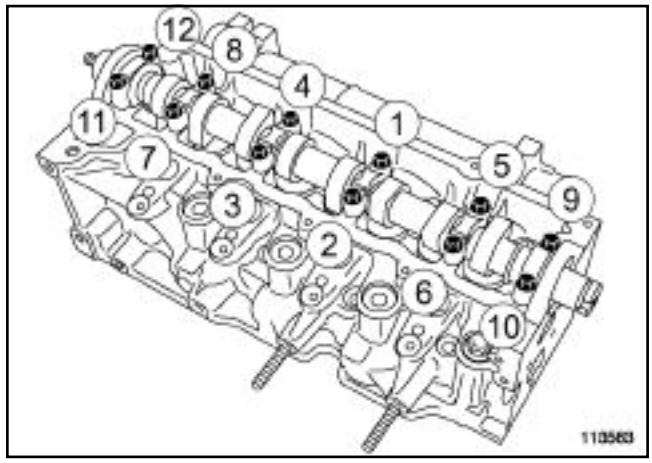
Note:

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

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

Remove:

- the camshaft bearing caps,

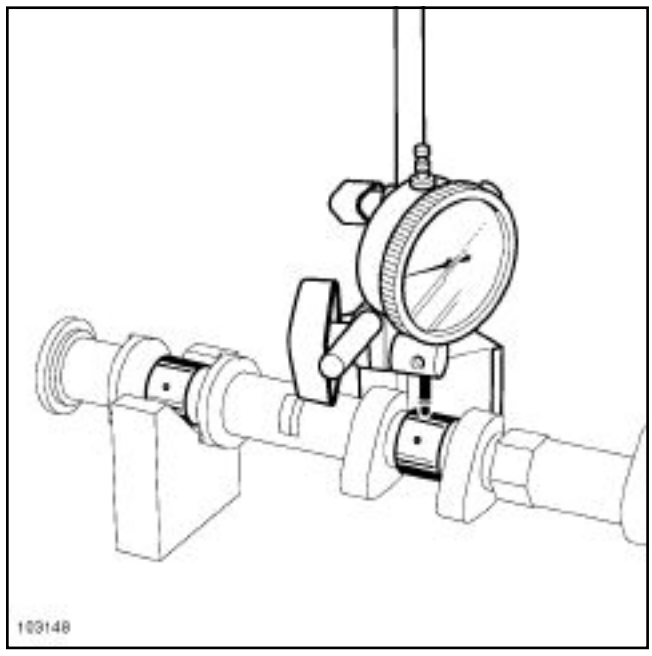
- the camshaft.

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

Position camshaft bearings 2 and 4 on the v-blocks.

Position a dial gauge vertically on camshaft bearing 3.

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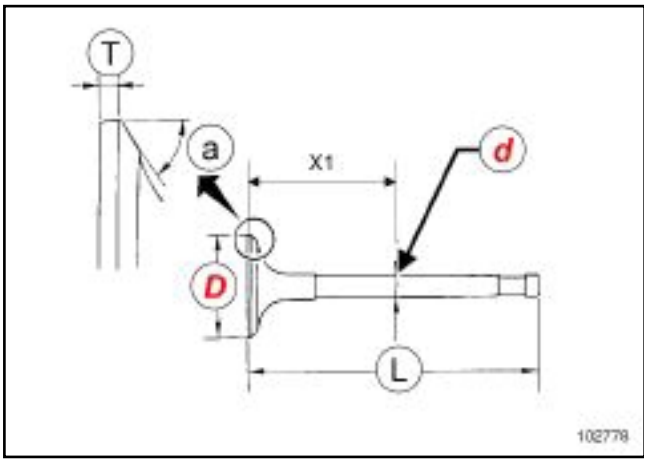
Turn the camshaft by hand.

Measure the radial deviation which should not be in excess of **0.05 mm** .

9 - Checking the valves



102778

Measure the valve stem diameter (**D**) at (**X1**) :

- Inlet: **5.977 ± 0.008 mm** at (**X1**) = **41 mm** ,
- Exhaust: **5.963 ± 0.008 mm** at (**X1**) = **41 mm** ,

Measure the valve head diameter (**D**) :

- Inlet: **33.5 ± 0.12 mm** ,
- Exhaust: **29 ± 0.12 mm** .

Measure the valve length (**L**) :

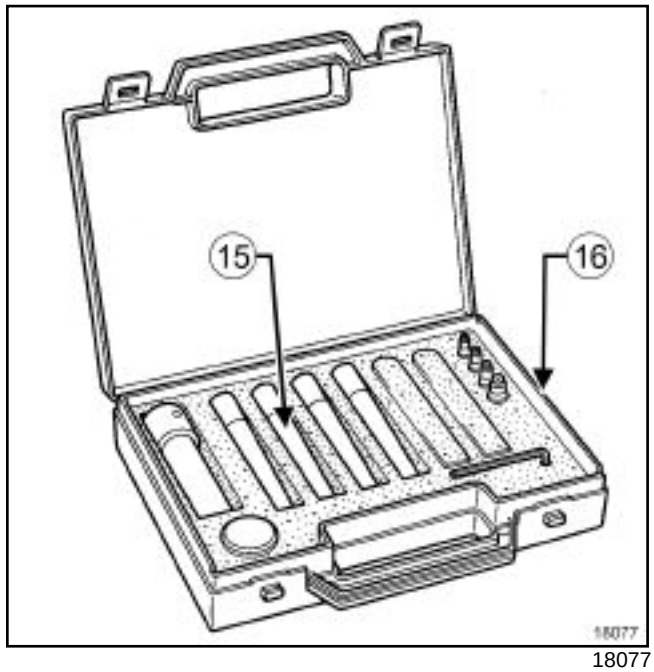
- Inlet: **100.95 ± 0.22 mm** ,
- Exhaust: **100.75 ± 0.22 mm** .

Measure the seat angle (**A**) :

- Inlet: **90˚** ,
- Exhaust: **90˚** .

Thickness (**T**) of the valve head:

- Inlet: **1 mm** ,
- Exhaust: **1 mm** .



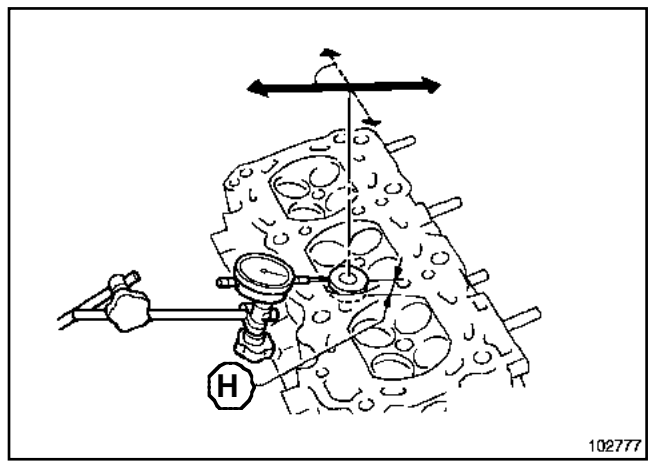
18077

Insert **(without forcing)** the valve in the guide tube (**15**) (with the same diameter as the valve) of the valve stem seal fitting set (**16**) to check:

- that the valve is not twisted,
- that the end of the valve (wedge end) is not strained.

10 - Checking the clearance between the valve and the guide

The clearance between the valve and the guide can be checked in two different ways.



102777

Press the head of the valve to a height (**H**) of **25mm** , then, using a dial gauge, take the measurement in the direction of the arrows, keeping to an angle of

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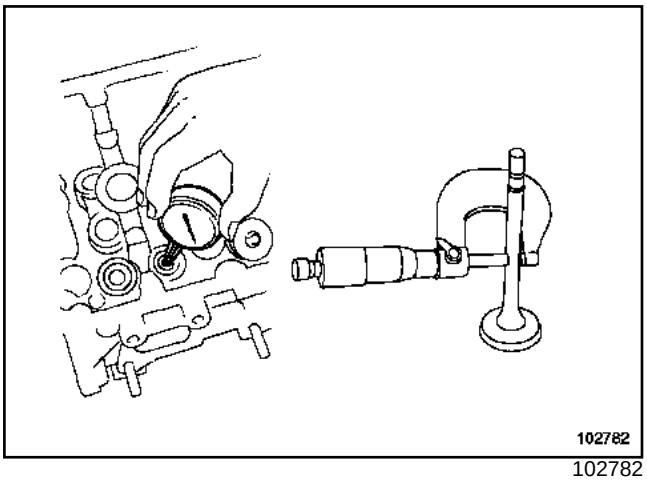
90° to the camshaft shaft. The clearance between the valve and the guide is equal to half the measured value.



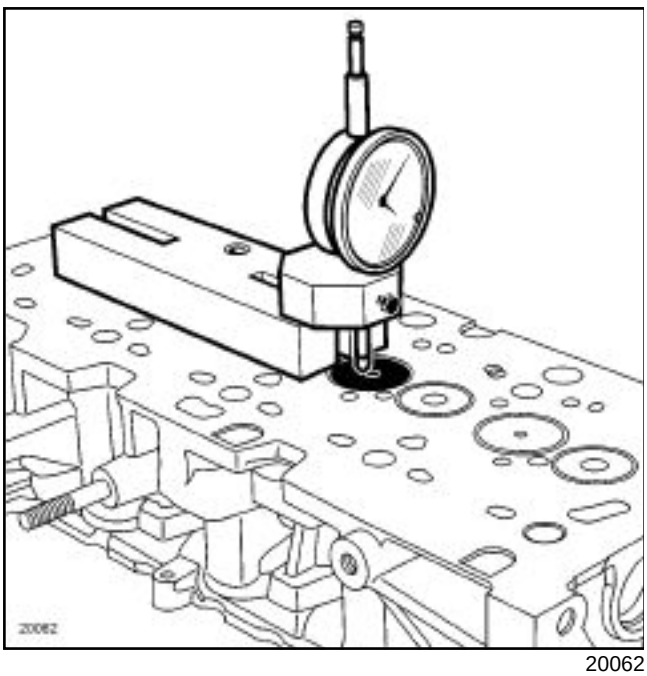
102782

Or using a micrometer measure the external diameter of the valve stem and interior diameter of the valve guide.

Clearance between the valve and the valve guide should be:

- Inlet: **0.02 to 0.05 mm** ,
- Exhaust: **0.03 to 0.063 mm** .

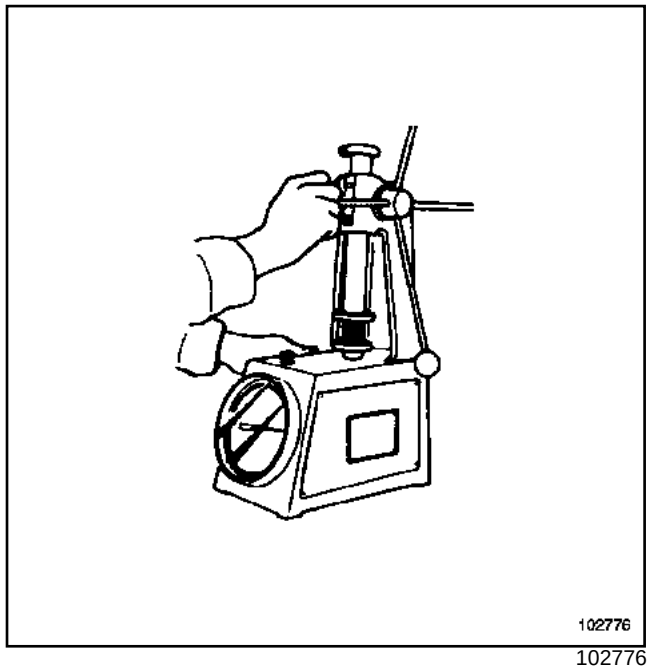
11 - Valve recess



20062

Check the valve recess using **(Mot. 251-01)** , **(Mot. 252-01)** and a dial gauge, which should be **0 ± 0.07 mm** .

12 - Checking the valve springs



102776

Checking the calibration of the springs.

Length under load:

- **230 ± 12 N** : **33.80 mm** ,
- **500 ± 23 N** : **24.80 mm** .

Length of coiled seals: **23.40 mm** .

Wire diameter: **3.45 mm** .

Internal diameter:

- at the base of the spring **18.80 ± 0.2 mm** ,
- at the top of the spring **14.10 ± 0.2 mm** ,

External diameter:

- at the base of the spring **25.70 ± 0.2 mm** ,
- at the top of the spring **21 ± 0.2 mm** ,

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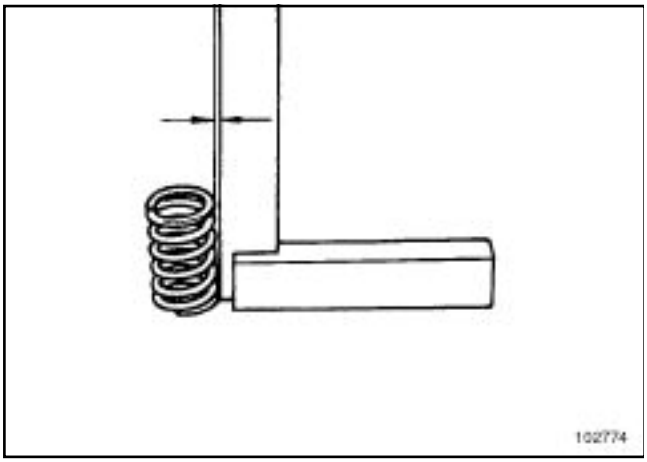
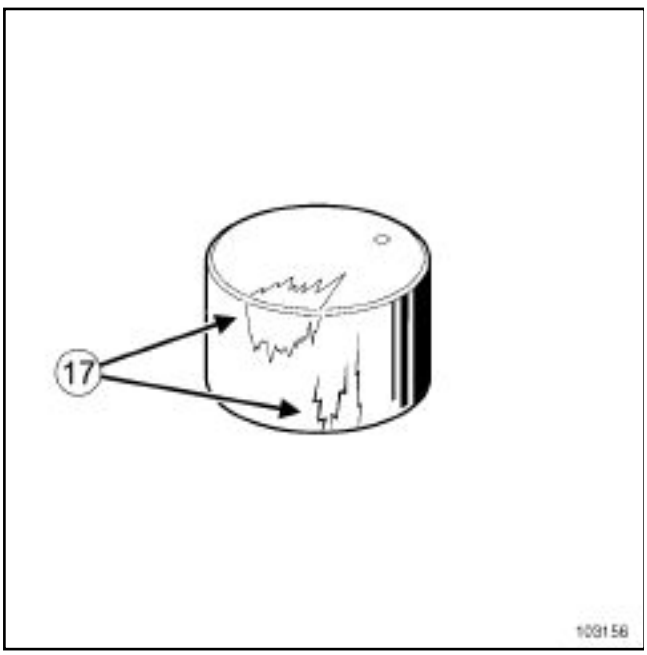


102774

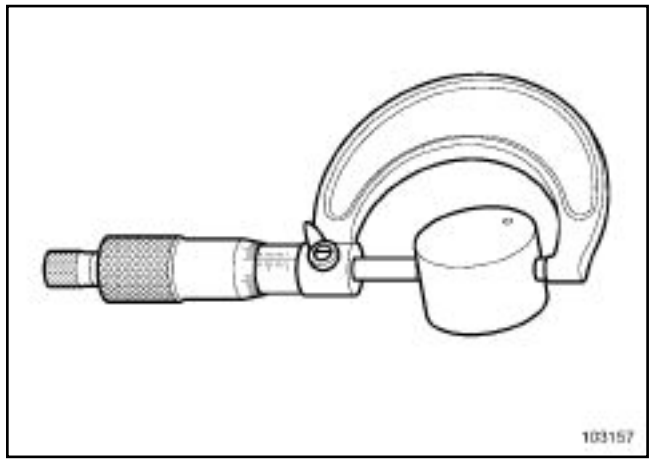
Check that the perpendicularity of the spring is not in excess of **1.2 mm** .

13 - Valve pushrod



103156

Check the condition of the tappet (worn or coating cracked (**17**)).



103157

Measure the external diameter of the tappet using a micrometer **34.975 ± 0.01 mm** .

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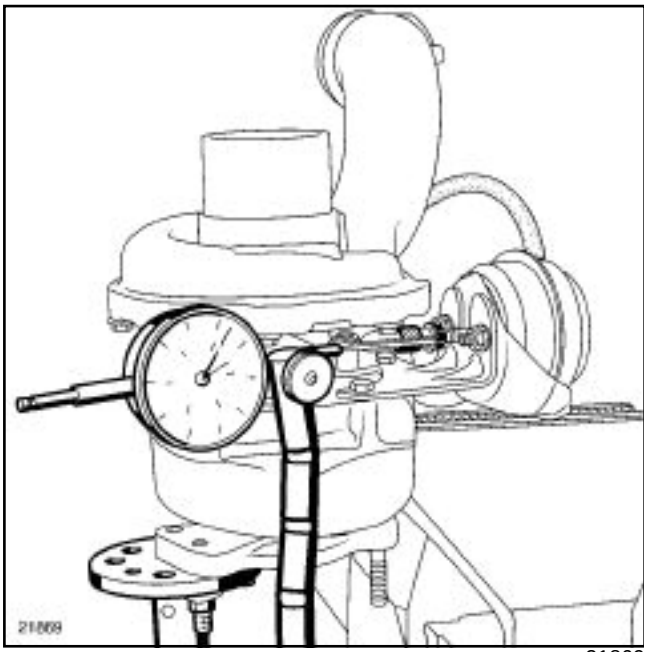
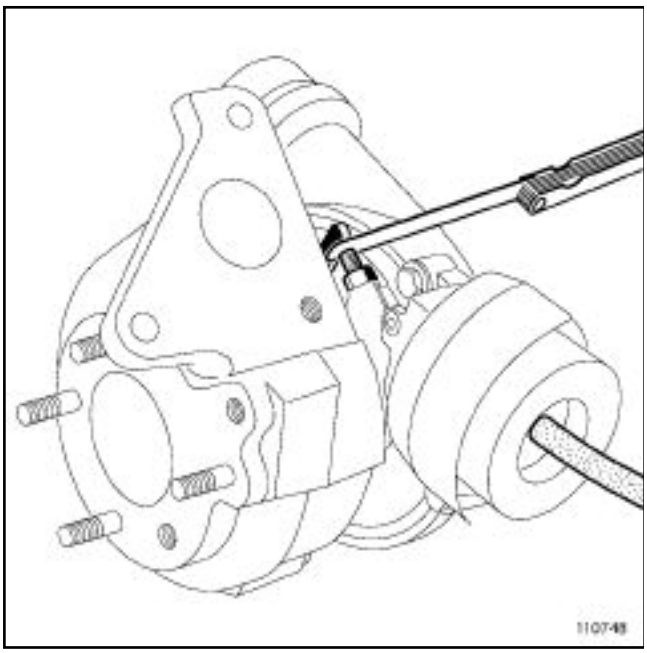
14 - Turbocharger



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** .

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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.

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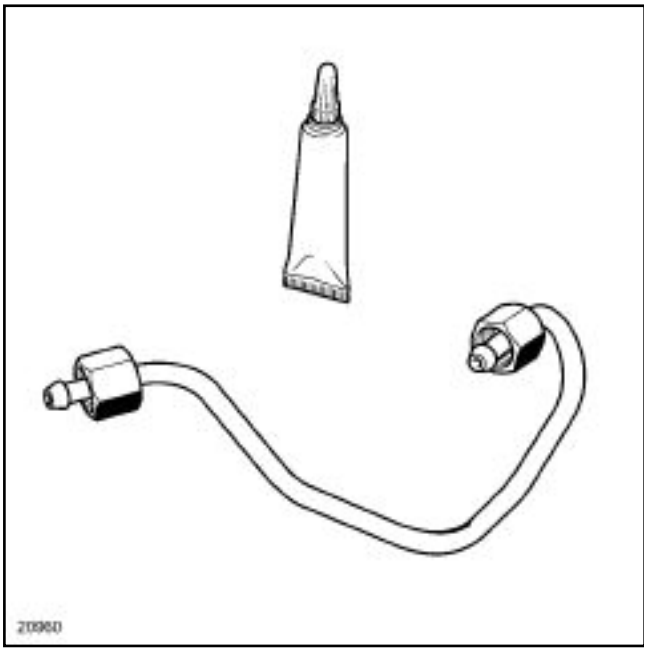
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



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 ± 3.8 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 ± 2.4 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,

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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).

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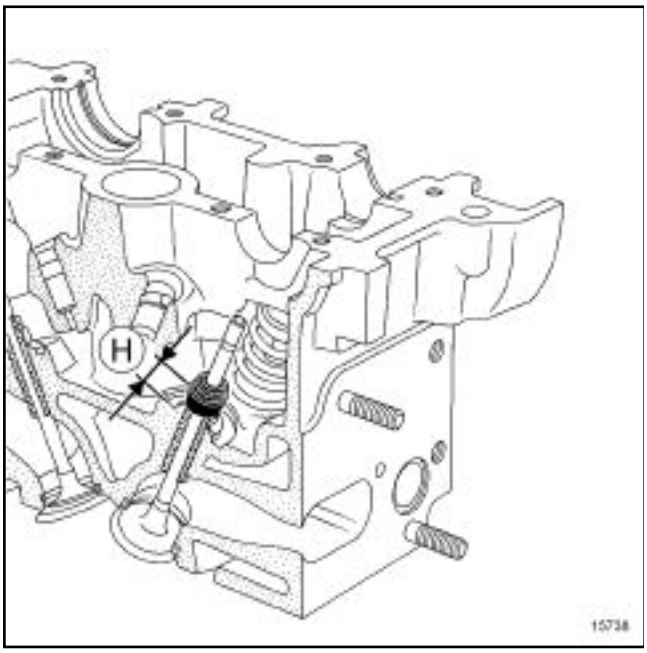
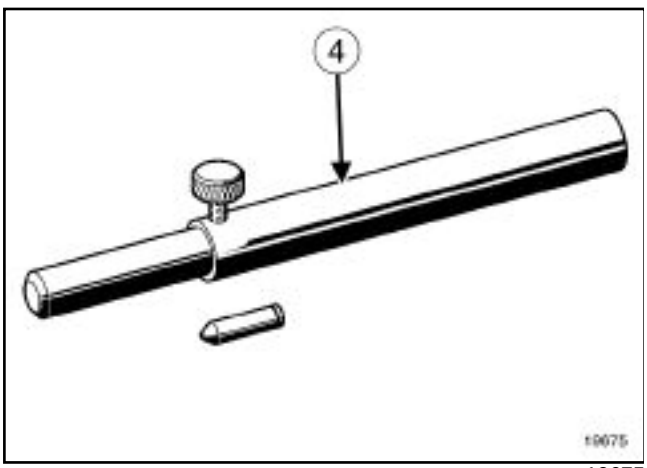
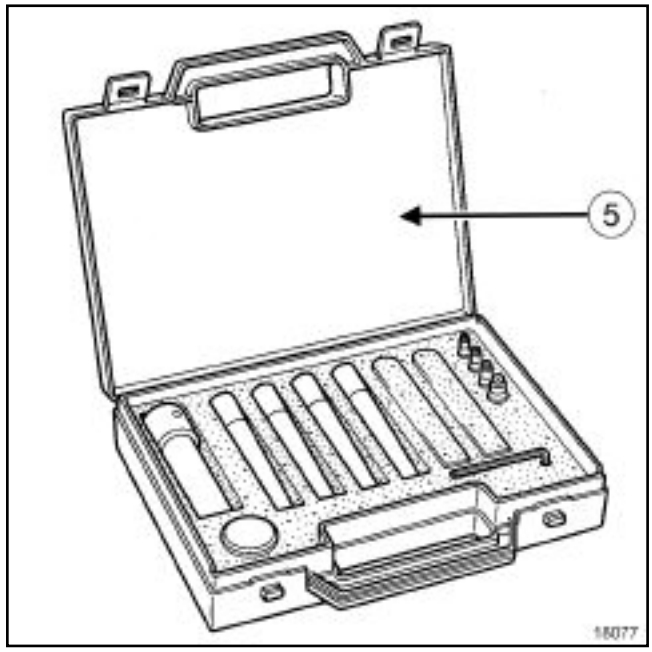
IV - REASSEMBLING THE CYLINDER HEAD



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 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.

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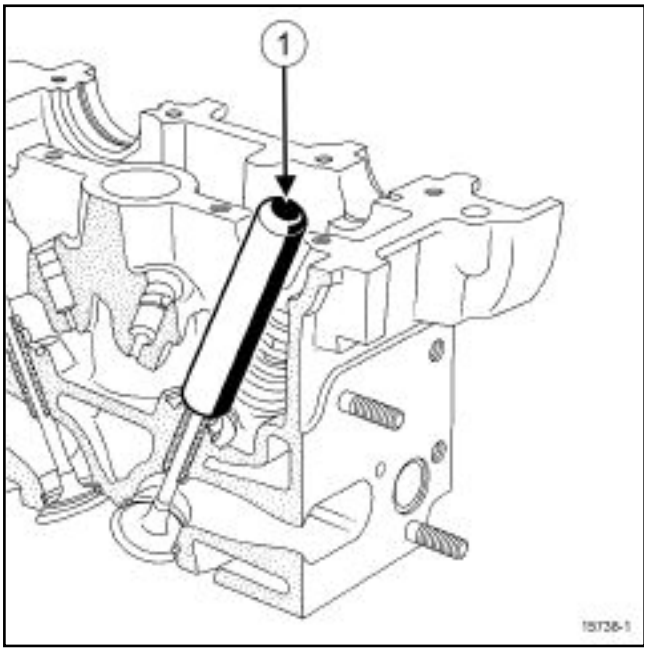
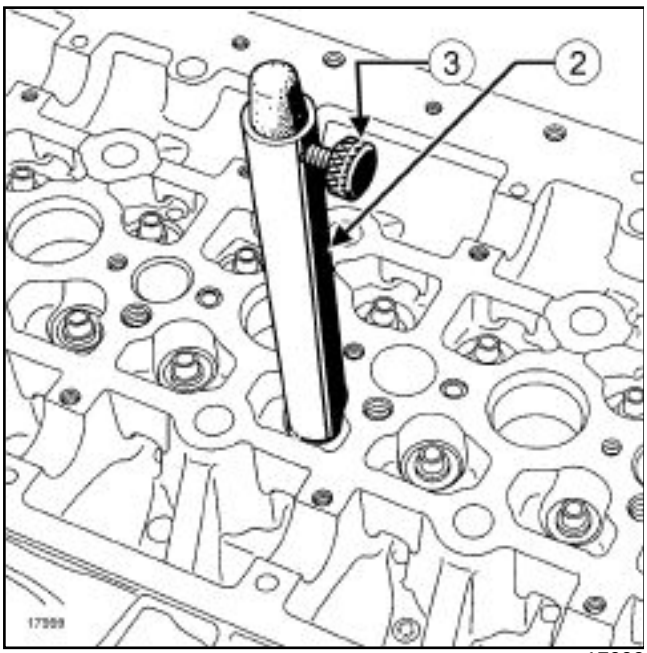
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



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.

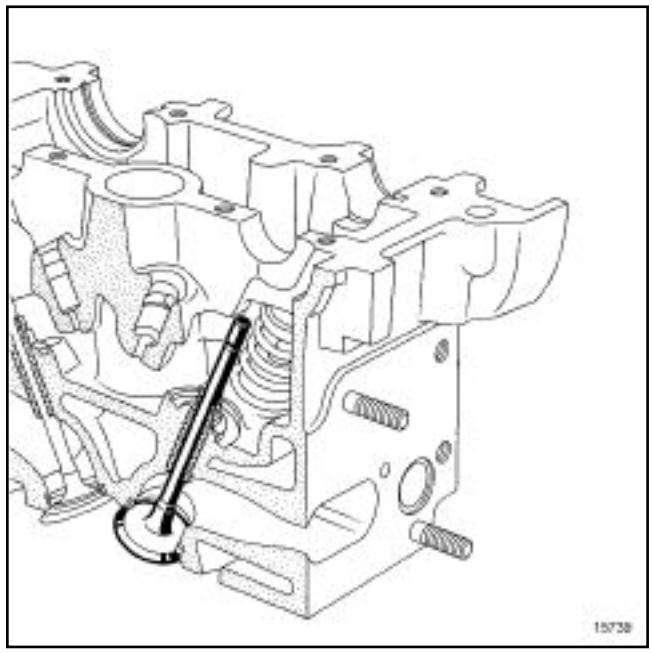
Lock the pushrod with the wheel (**3**) .

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

Remove:

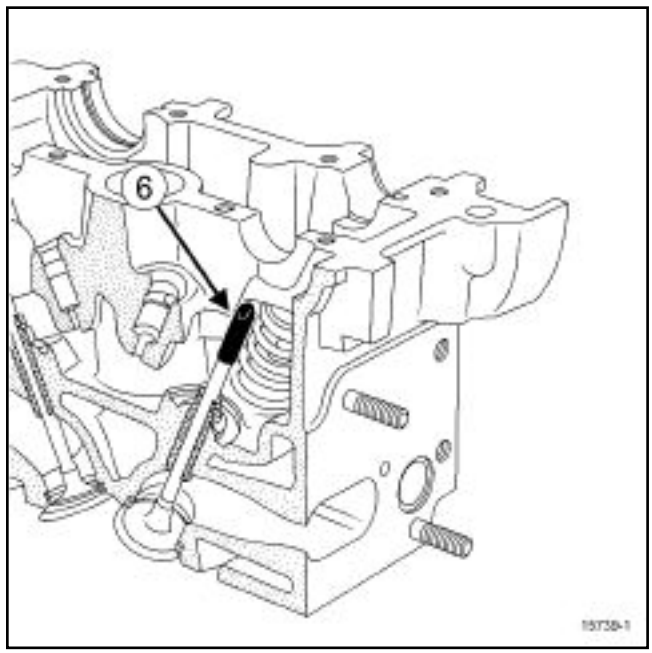
- the valve,
- the valve stem seals (inlet end then exhaust end) using the **(Mot. 1335)** .

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).

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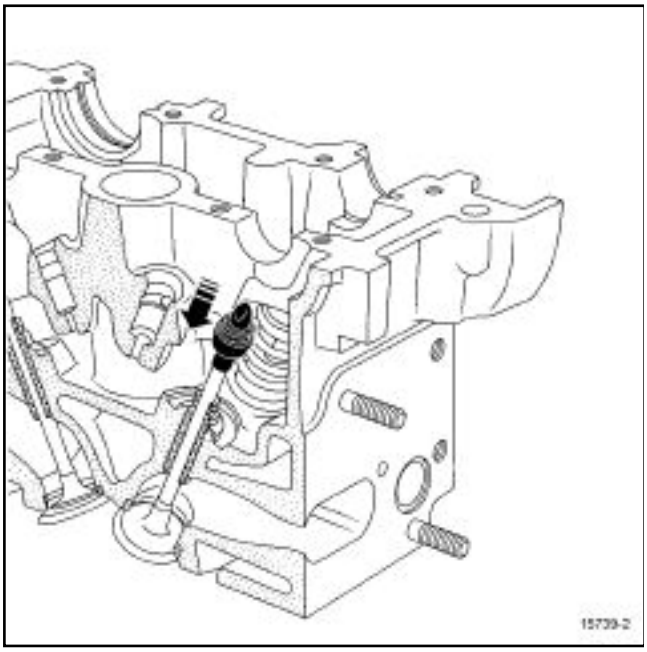
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

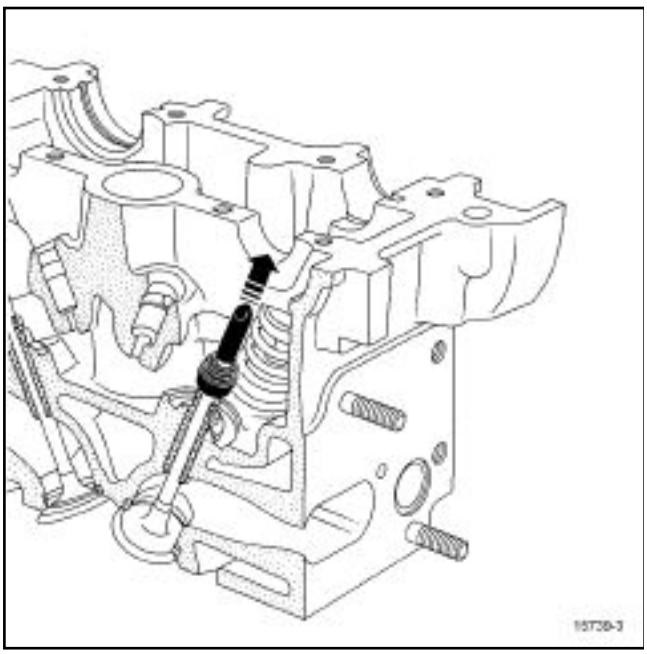


15739-2

Keep the valve pressed against its seat.

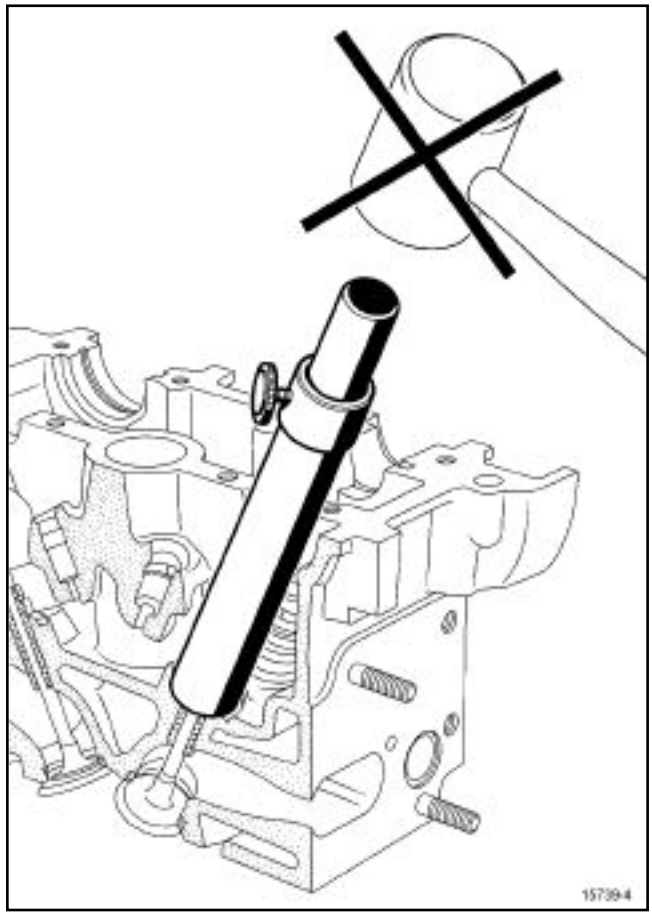
Mount the valve stem seal (not lubricated) over the valve insert.

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.

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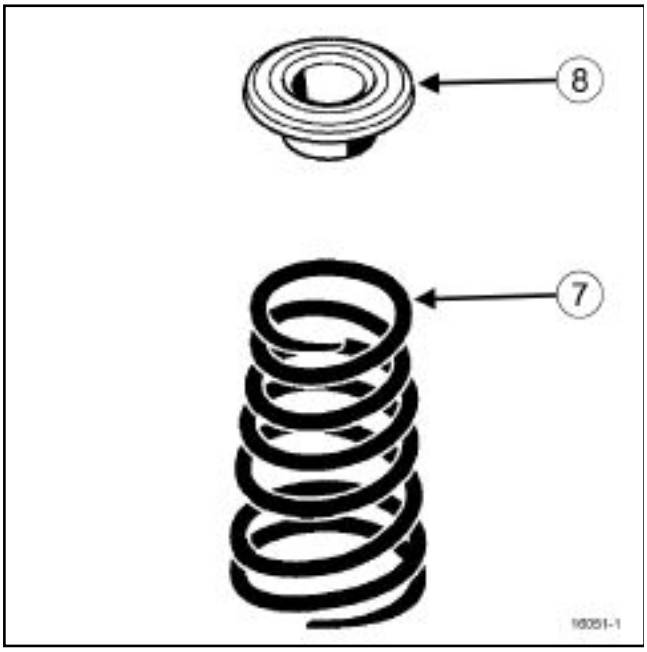
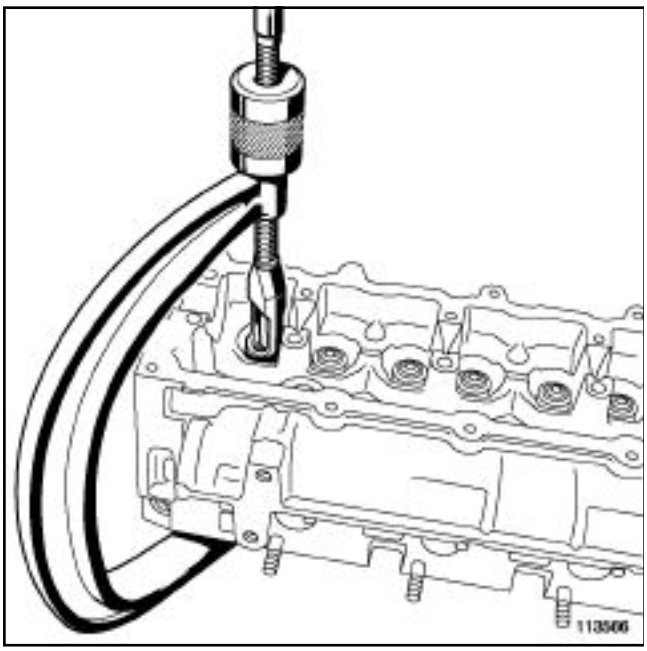
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



16051-1

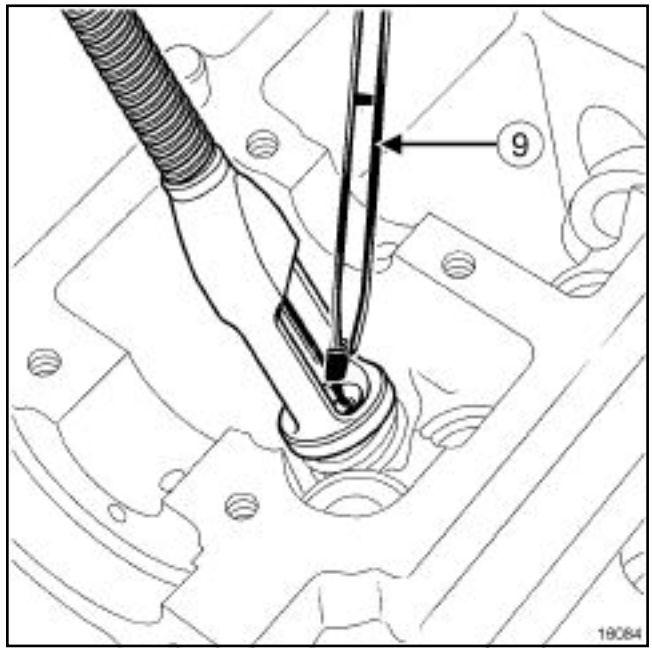
Refit:

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



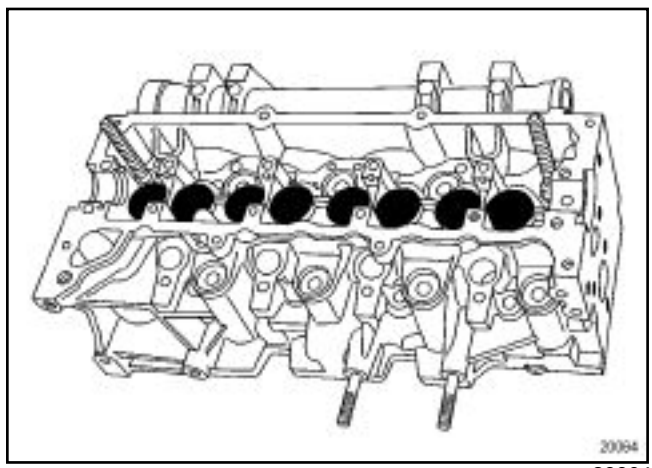
113566

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.

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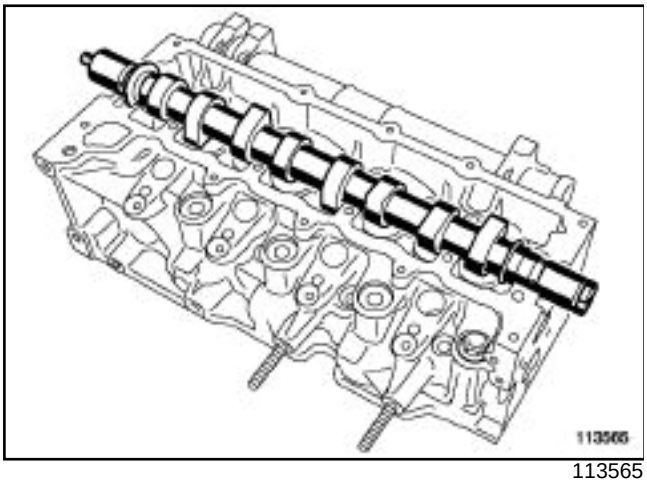
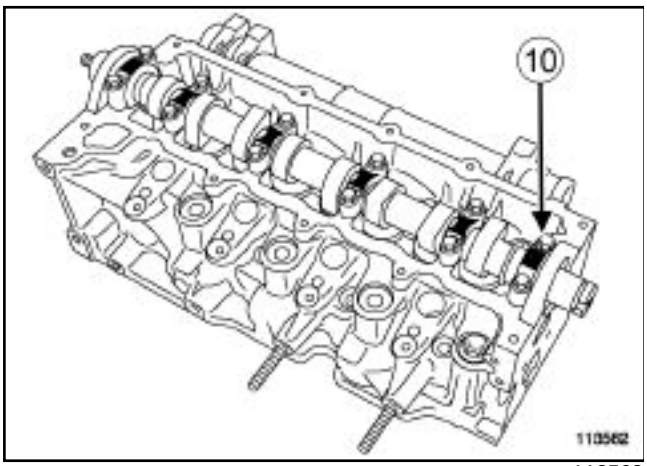
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



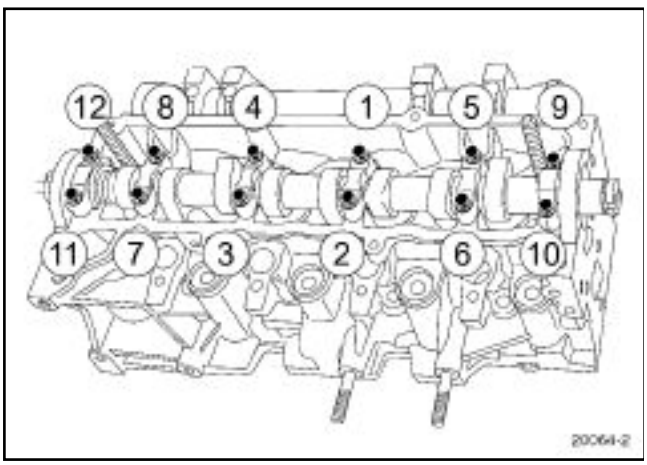
113565

Refit the camshaft.



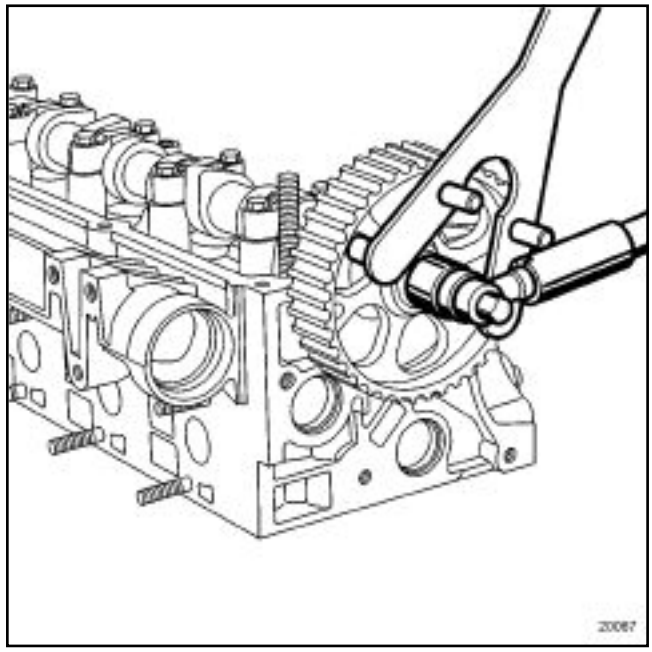
113562

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



20064-2

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



20067

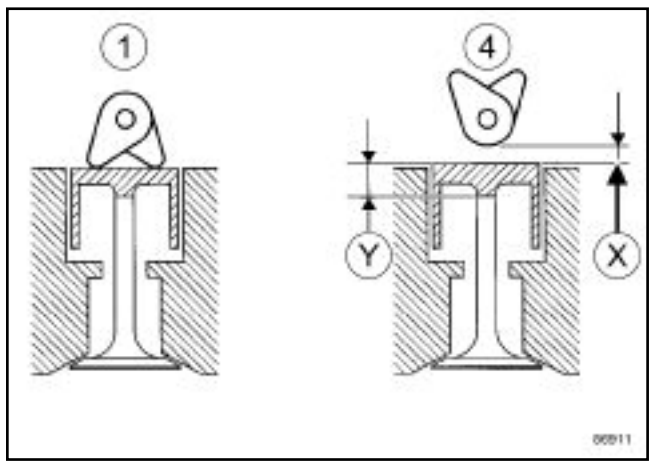
Refit:

- 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.



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** ,

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Note the clearance values.

Repeat the above operations on the other cylinders:

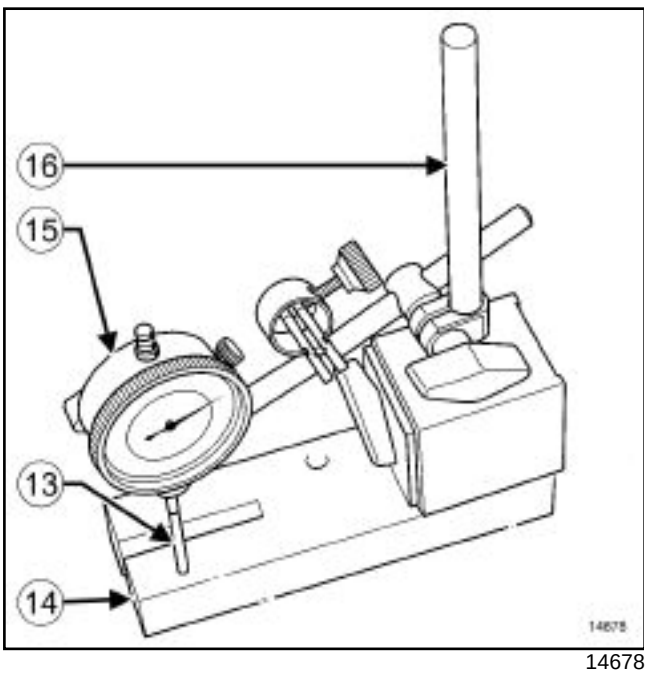
- position cylinder No. **3** at an angle and measure the clearance of cylinder No. **2** ,
- position cylinder No. **4** at an angle and measure the clearance of cylinder No. **1** ,
- position cylinder No. **2** at an angle and measure the clearance of cylinder No. **3** ,

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.



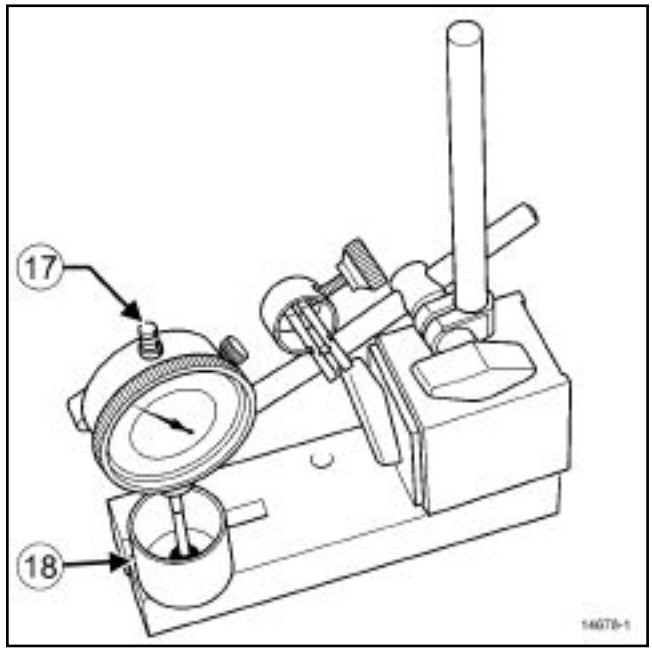
14678

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.

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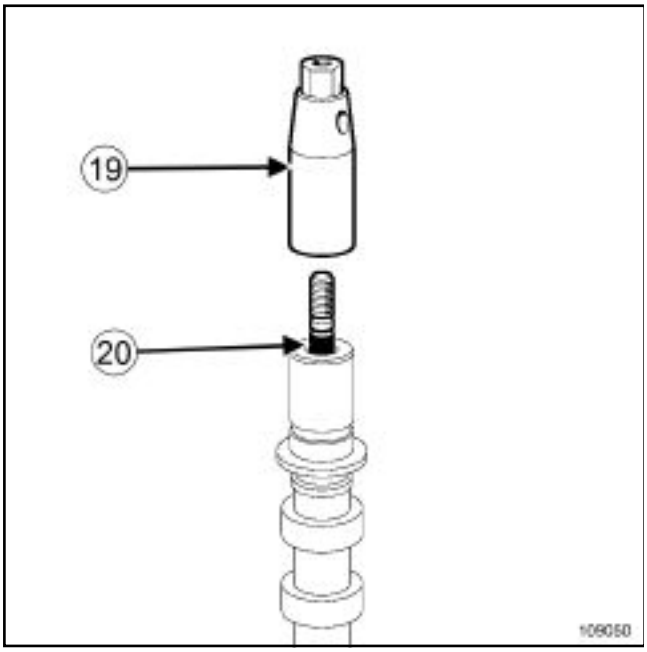


109050

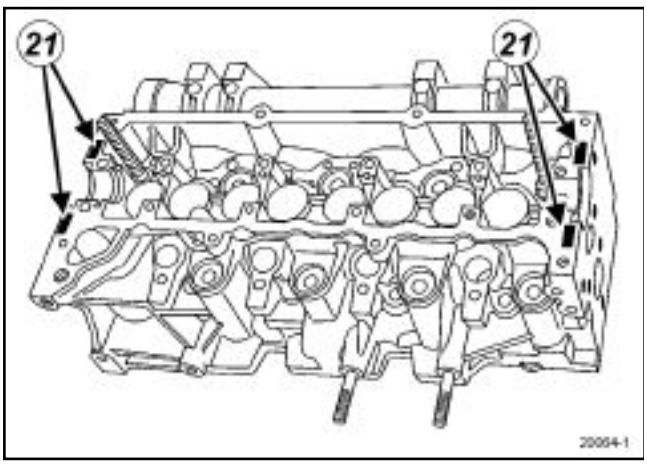
Remove the piston rings using a roller-type stud removal tool (**19**) .

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)*** .

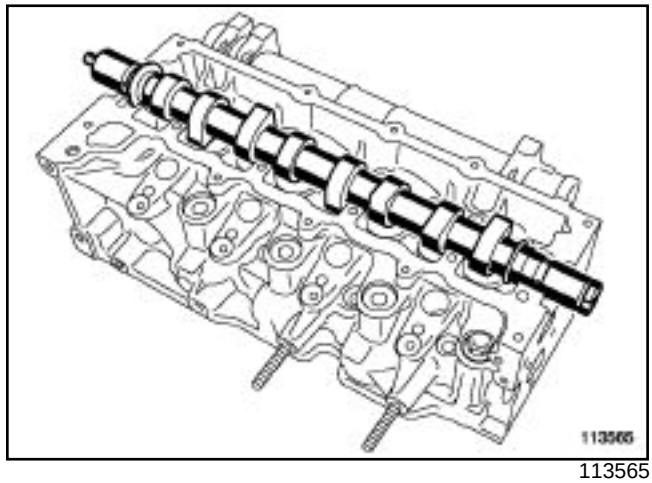
Oil the top of the valve pushrods and the camshaft bearings with engine oil.



20064-1

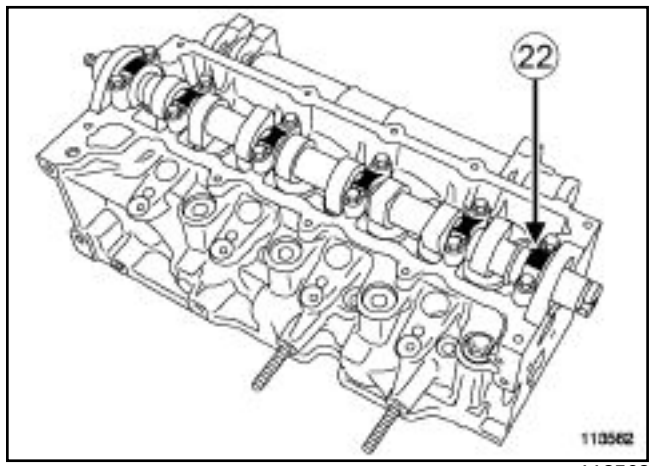
Degrease the surfaces of the camshaft bearing gaskets nos. 1 and 6 (**21**) using degreaser.

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



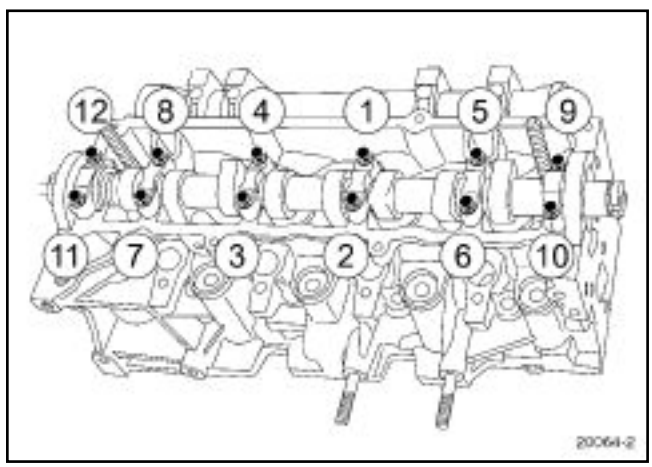
113565

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)** .

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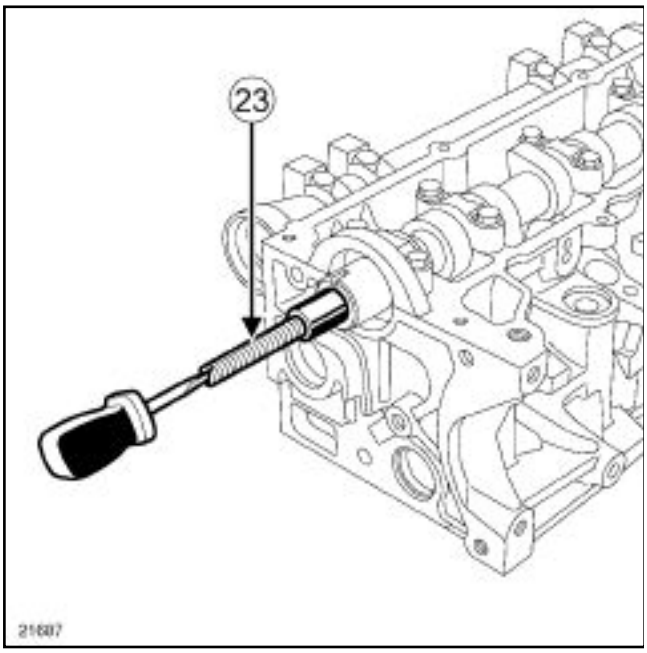
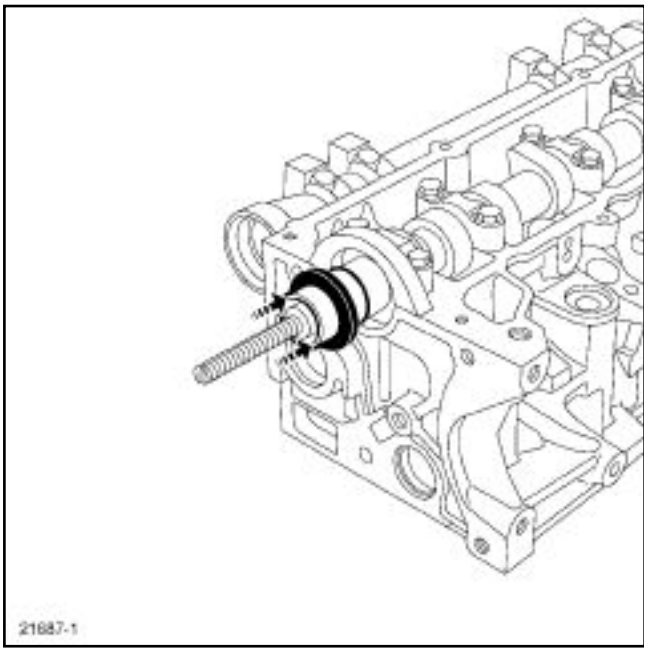
Apply degreaser to:

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



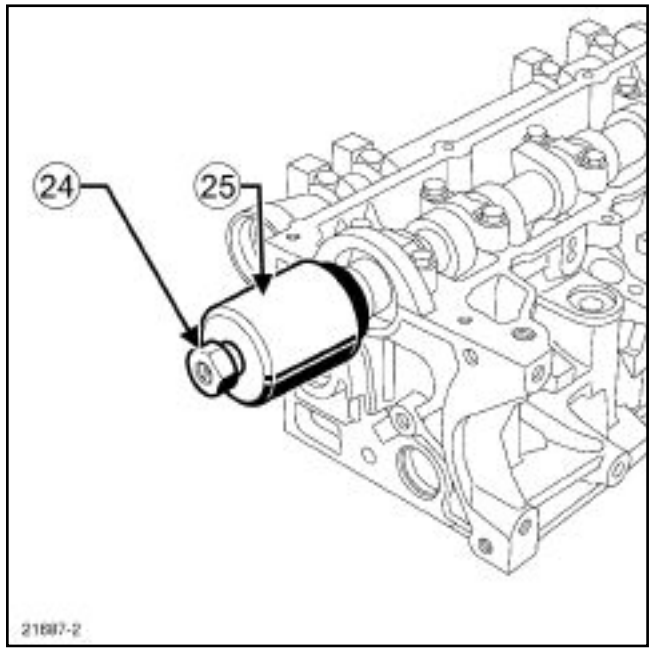
21687

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



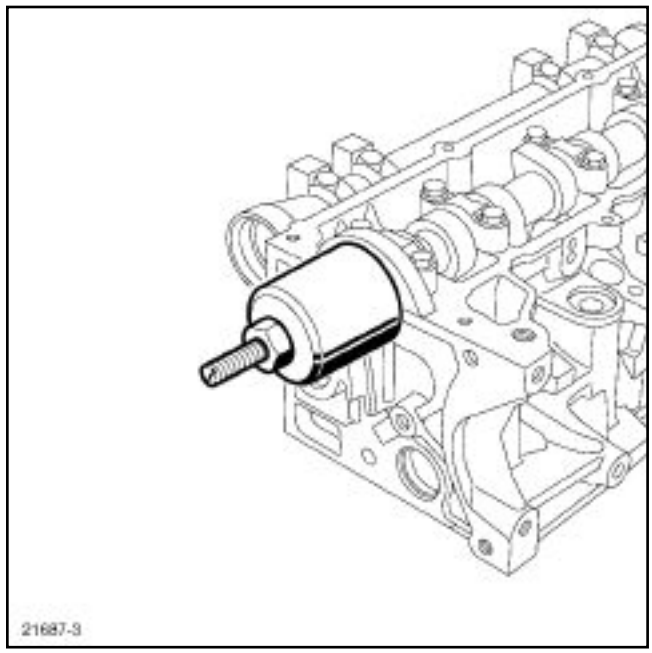
21687-1

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.

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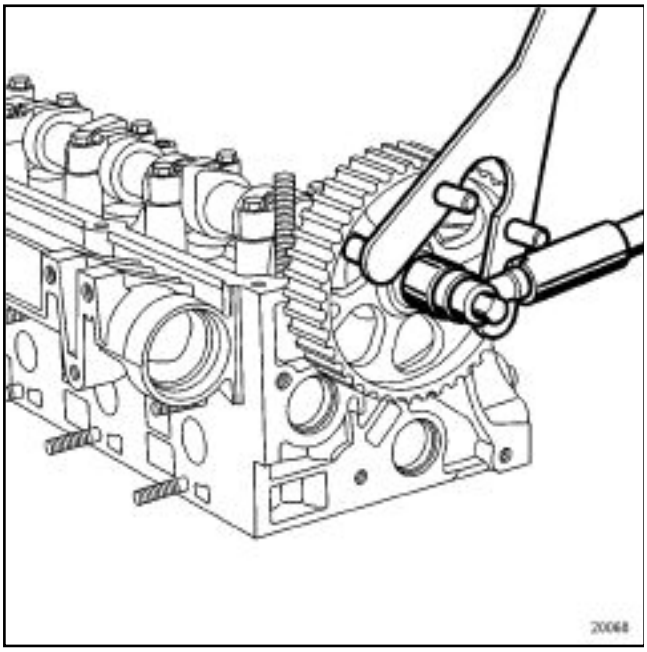


20068

Refit:

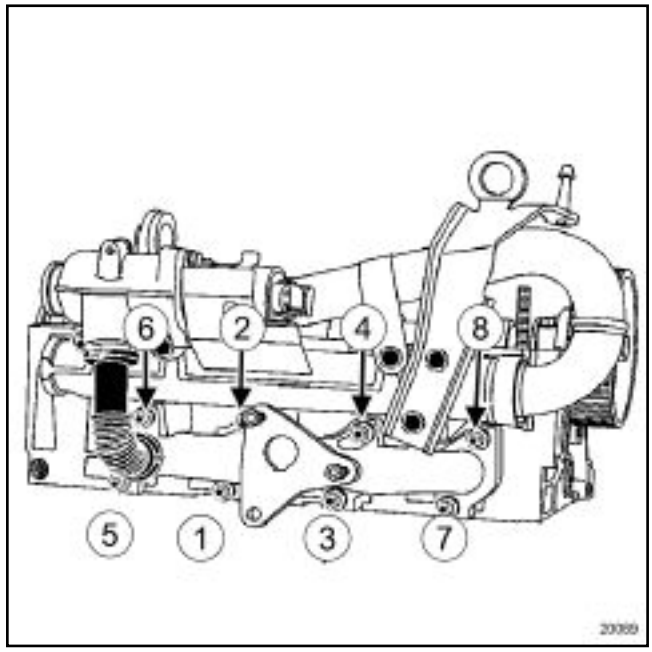
- the camshaft pulley,
- the new camshaft pulley mounting nut.

Tighten to torque and angle **the mounting nut for the camshaft pulley (30 ± 3 Nm + 86° ± 6°)** , 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.

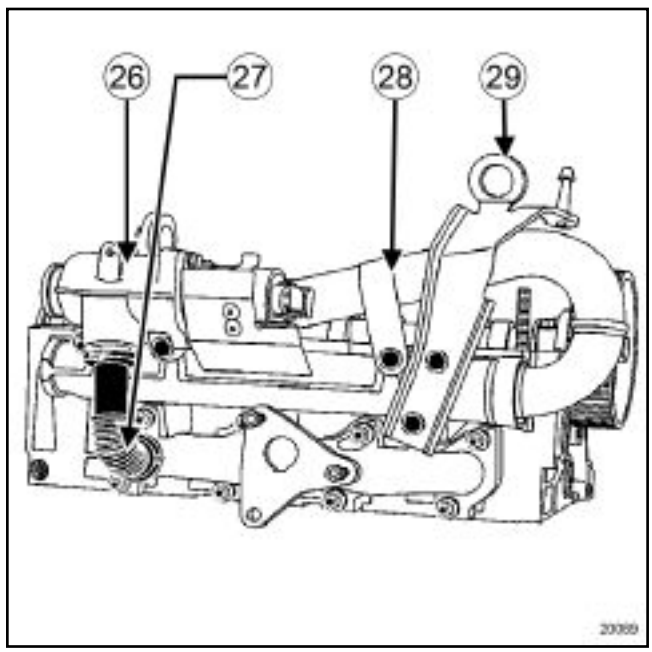
Refit:

- 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 ± 2.6 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)** .

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

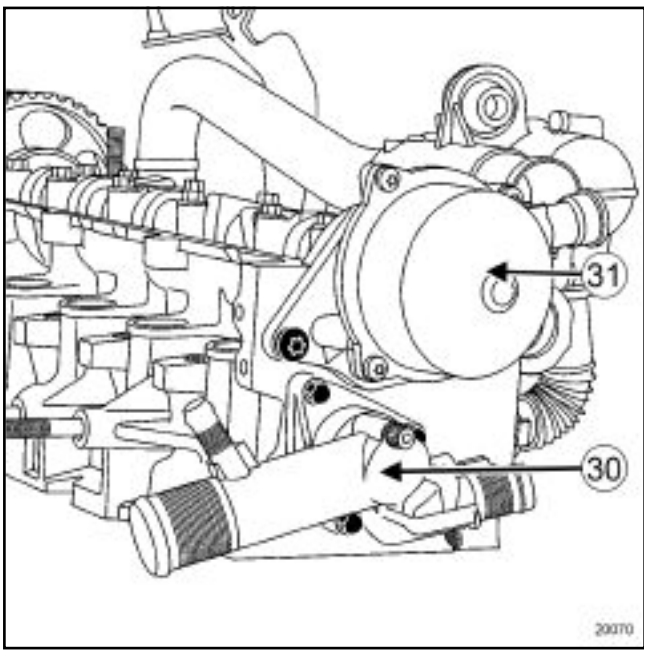
Refit:

- 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:

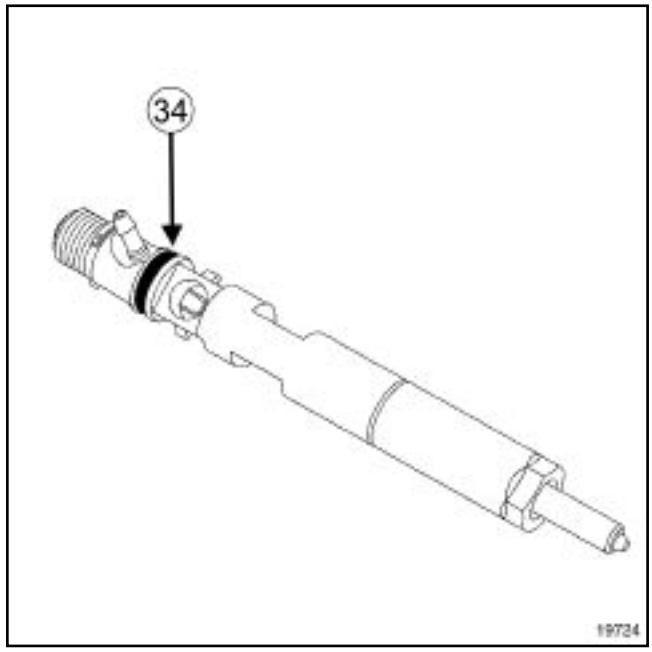
- the cylinder head coolant outlet unit (**30**) fitted with a new seal,
- the vacuum pump (**31**) fitted with a new seal.

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.

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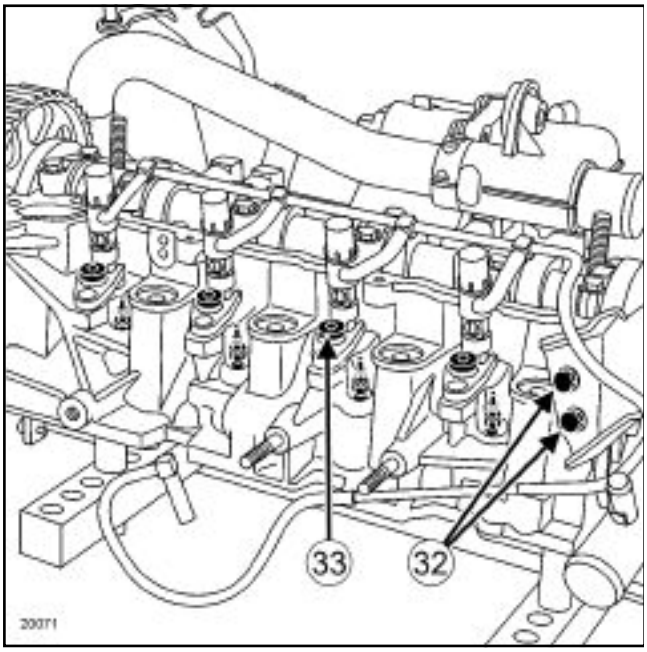


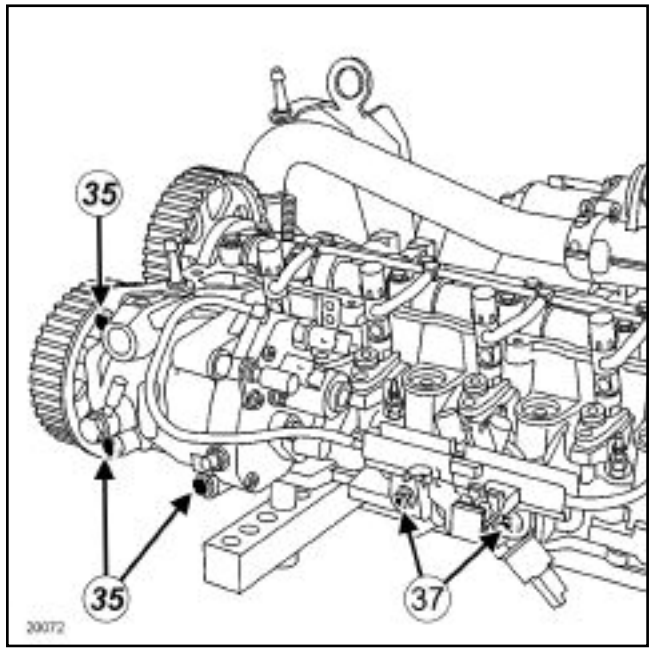
20071

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.**

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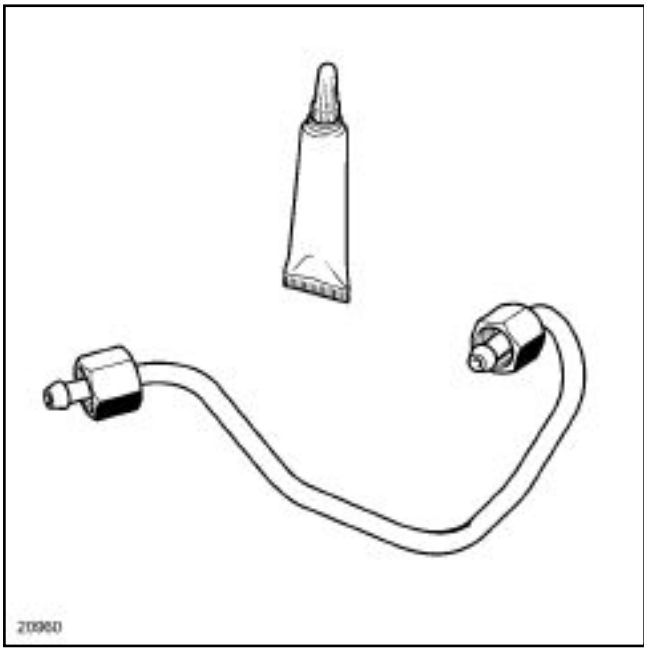
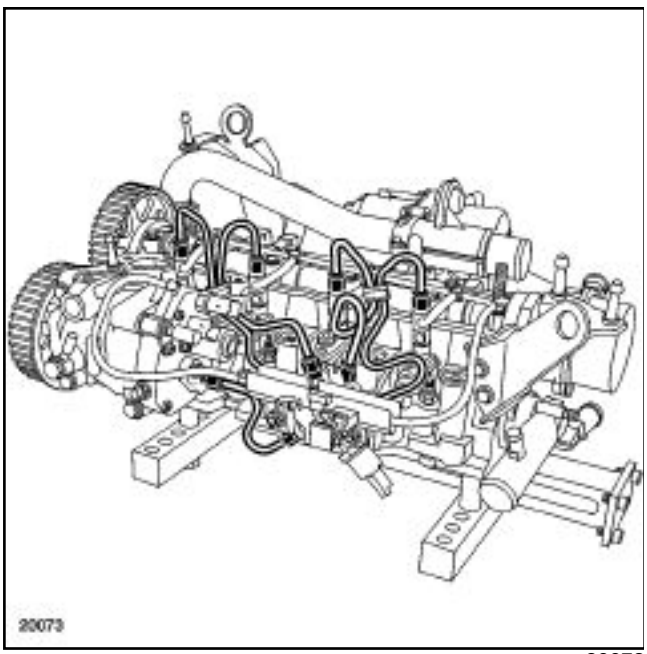


20960

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



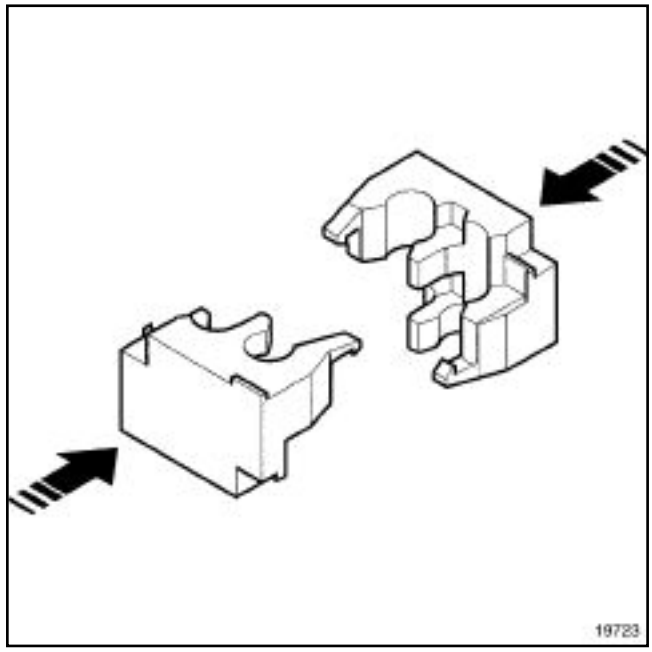
20073

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 ± 2.8 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 ± 3.8 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 ± 3.8 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,

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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.

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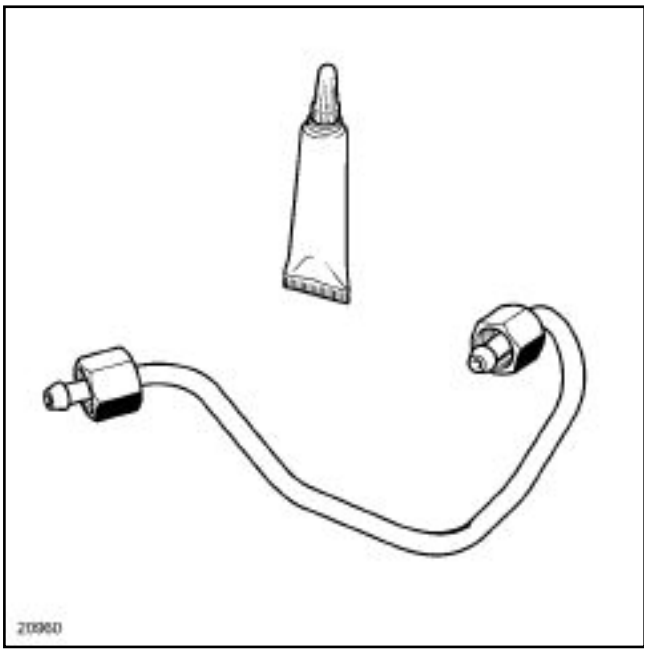

20960

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 ± 3.8 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 ± 2.4 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,

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- 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).

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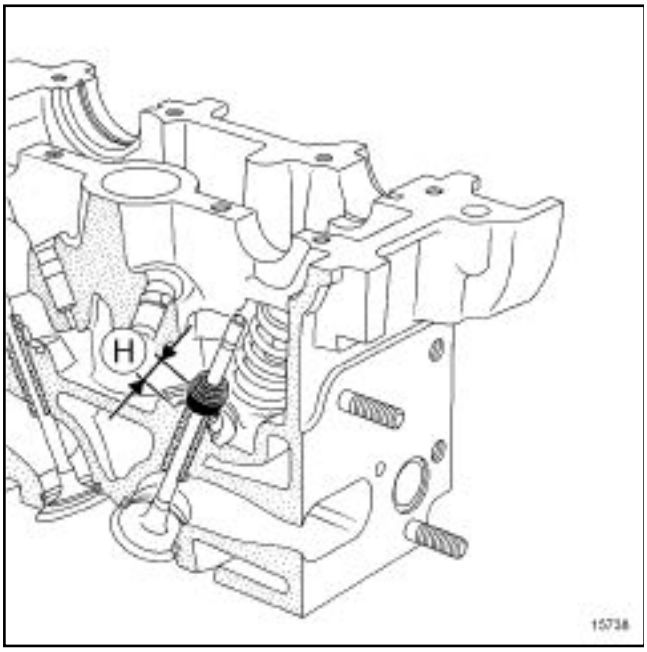
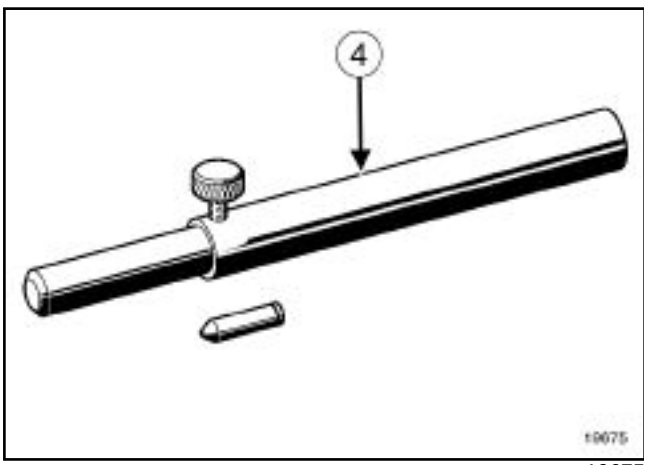
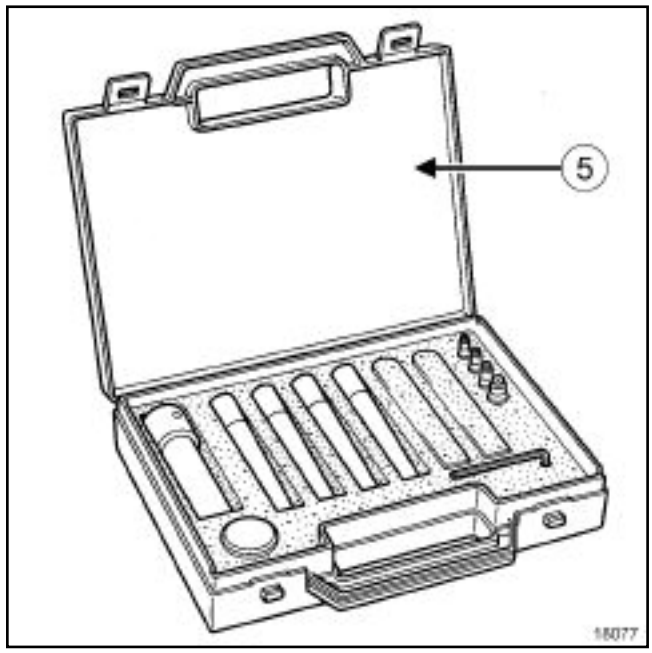
IV - REASSEMBLING THE CYLINDER HEAD



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.

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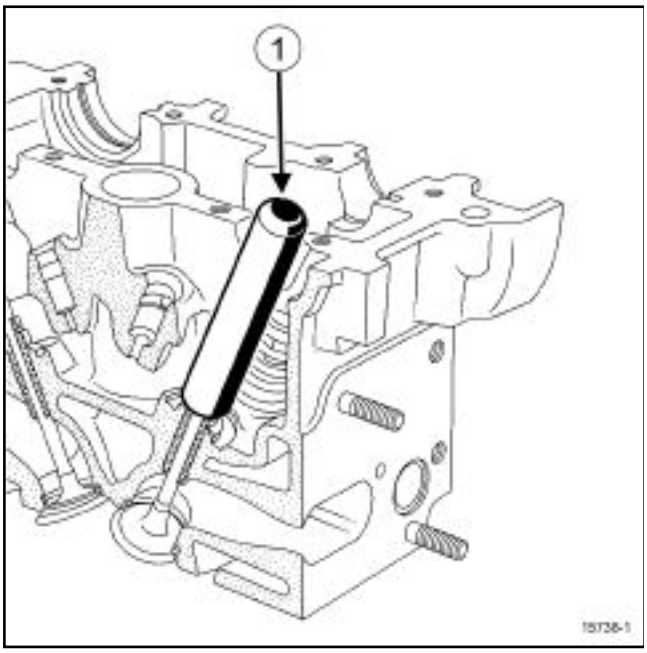
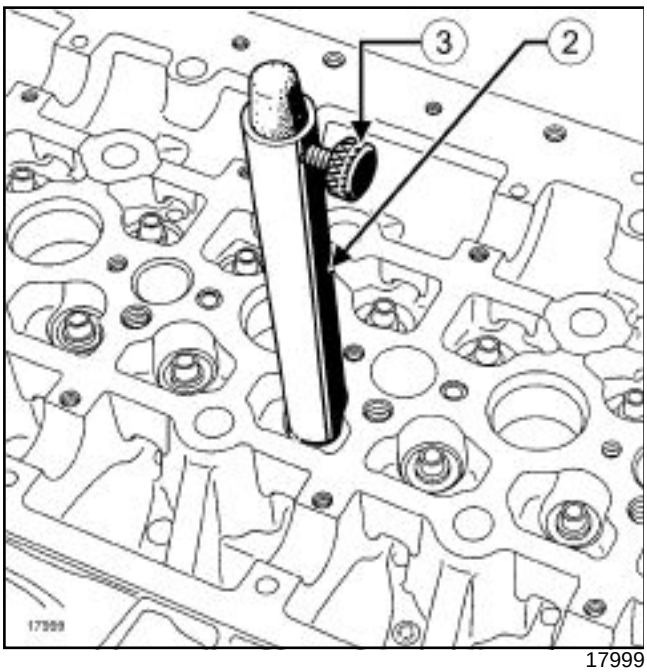


15738-1

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.

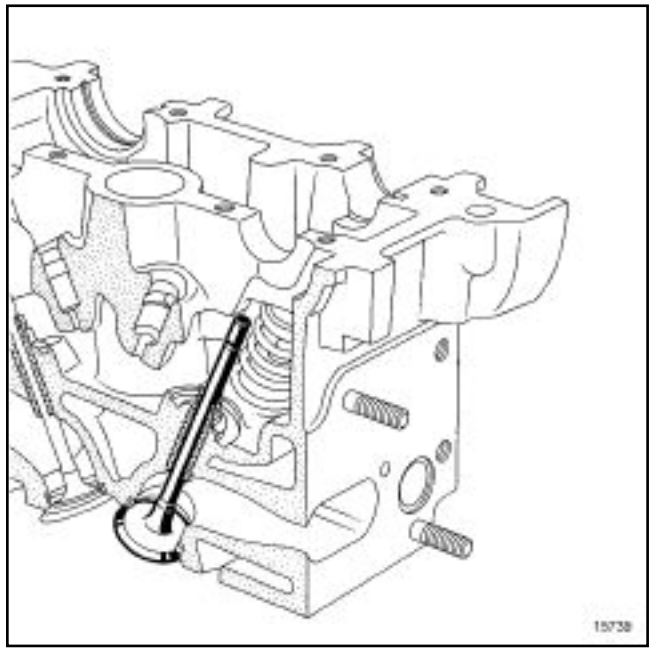
Lock the pushrod with the wheel (**3**) .

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

Remove:

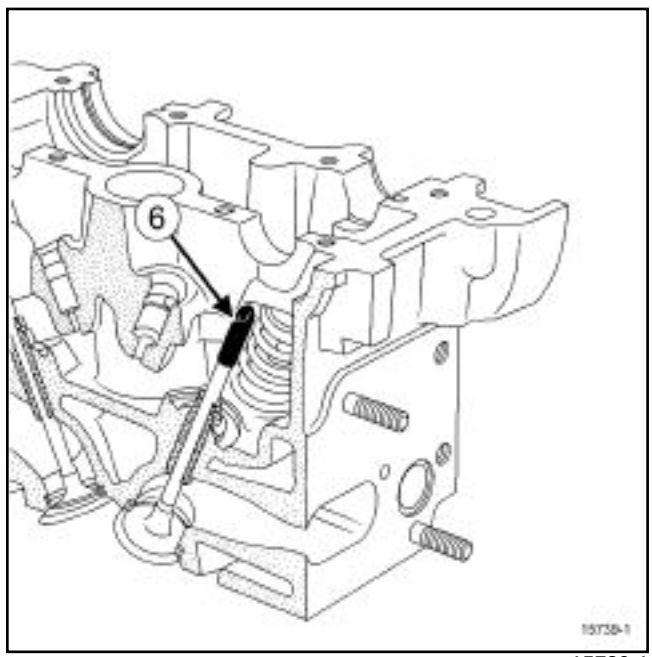
- the valve,
- the valve stem seals (inlet end then exhaust end) using the **(Mot. 1335)** .

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).

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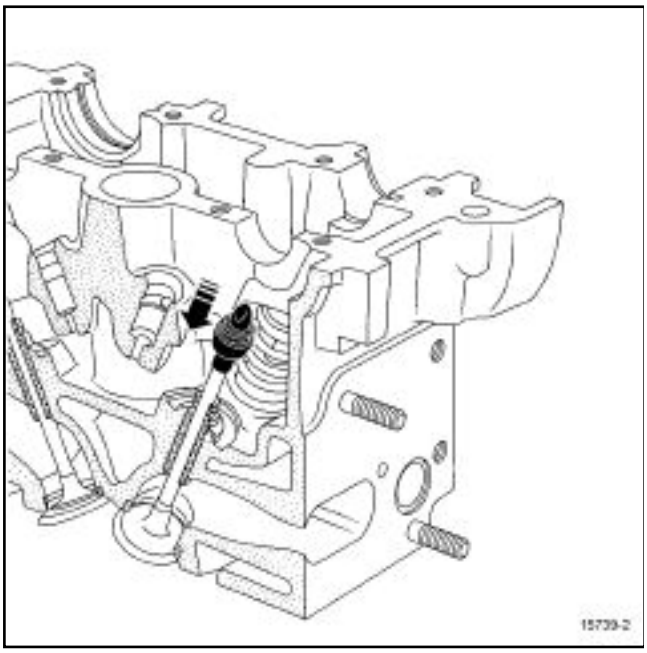
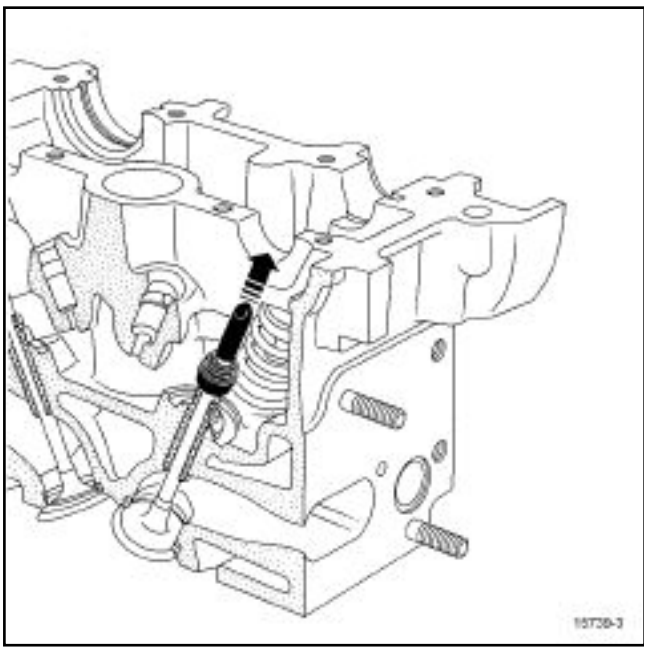


15739-2

Keep the valve pressed against its seat.

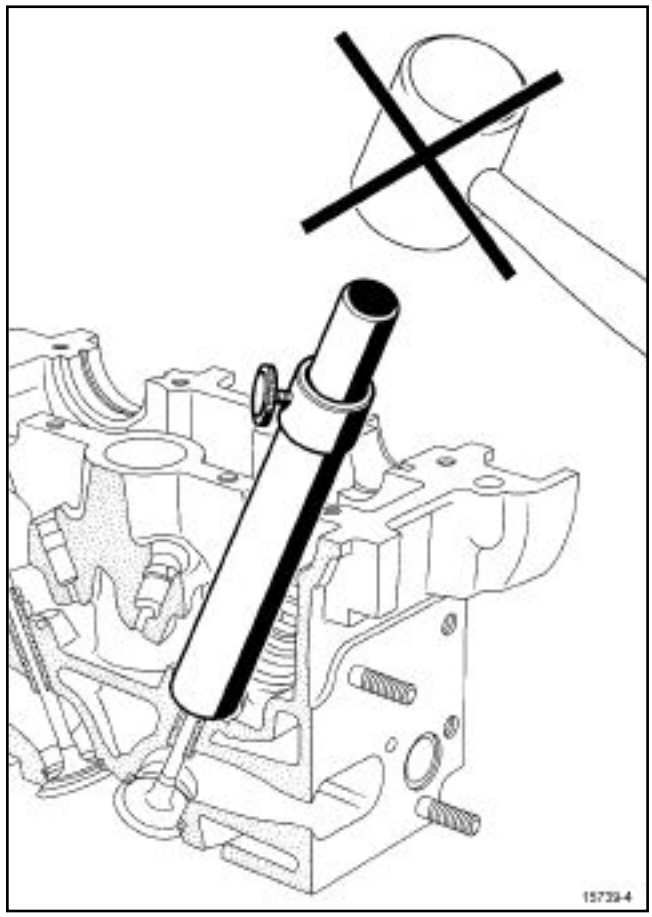
Mount the valve stem seal (not lubricated) over the valve insert.

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.

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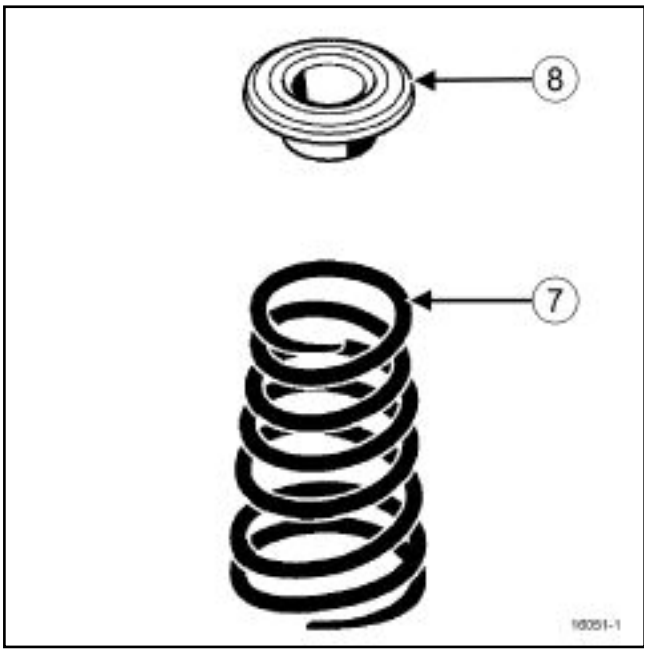
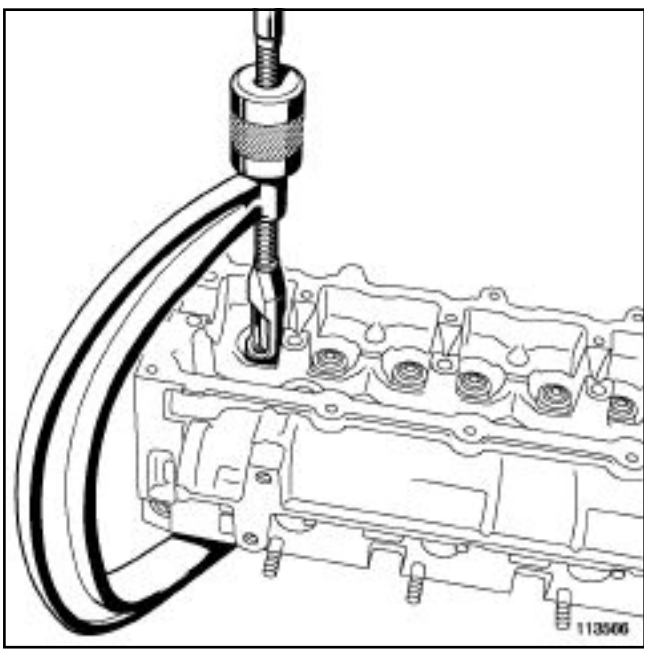


16051-1

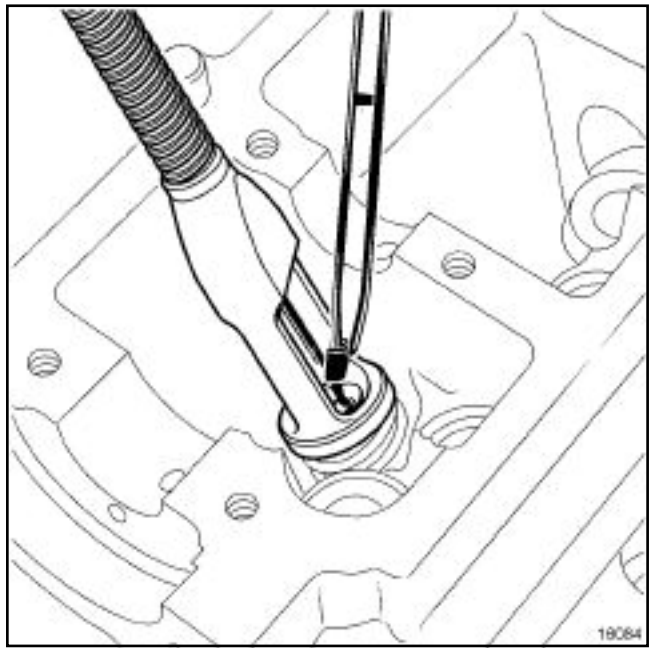
Refit:

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



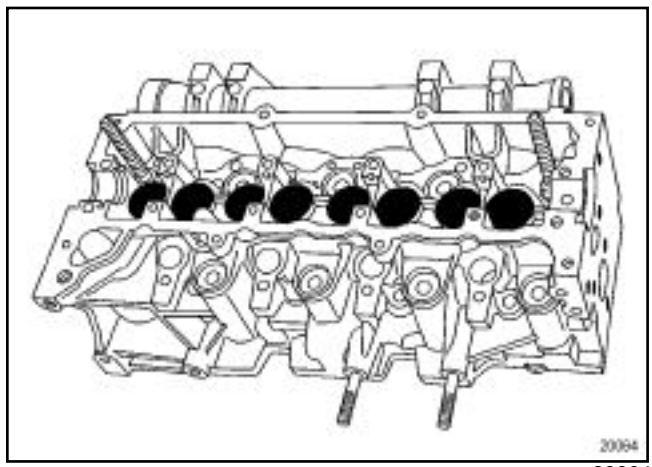
113566

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.

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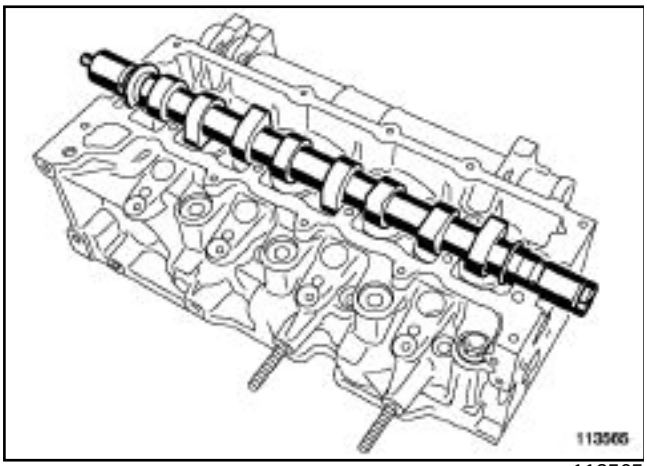
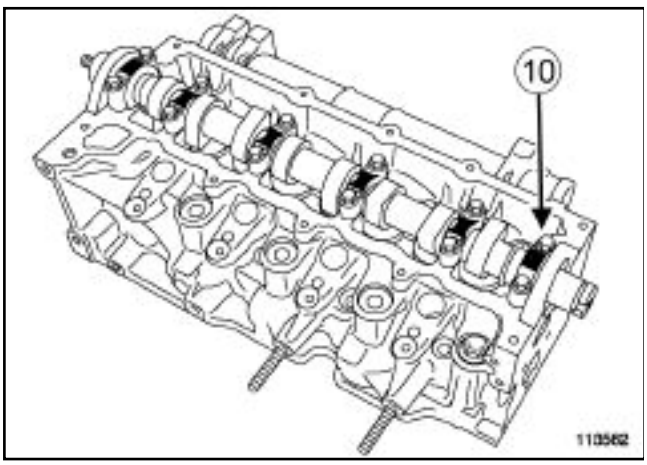


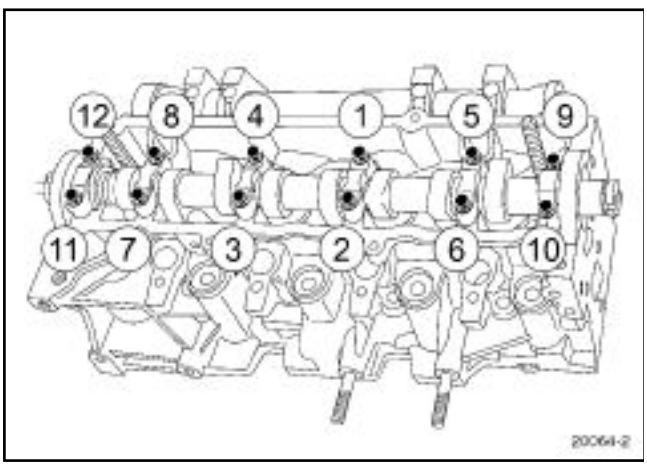
113565

Refit the camshaft.



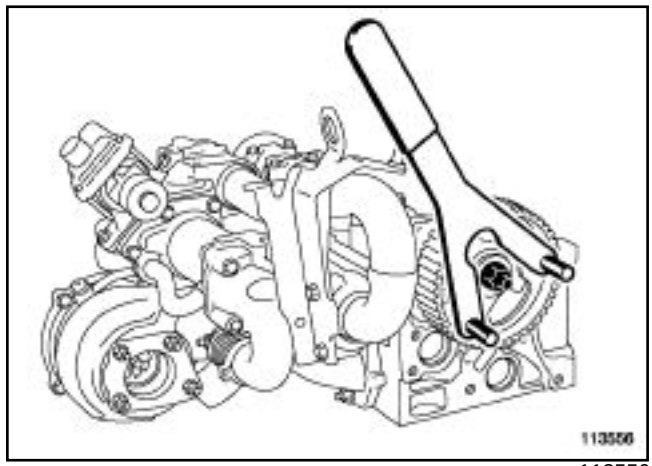
113562

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



20064-2

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



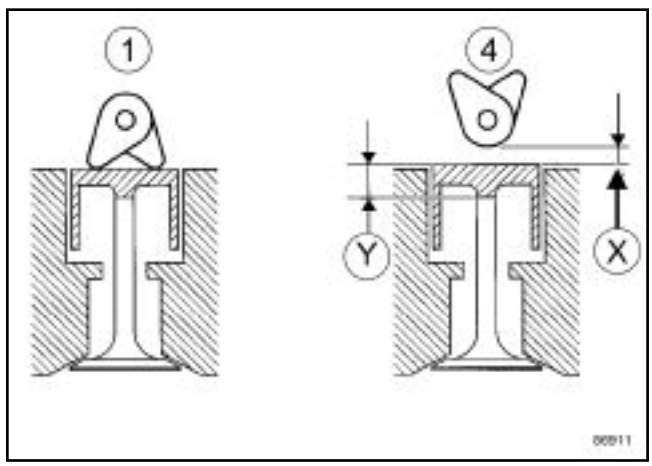
113556

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 ± 1.5 Nm)** , blocking the camshaft pulley with the **(Mot. 799-01)** .

Check and adjust the valve clearances 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** ,

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- 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,

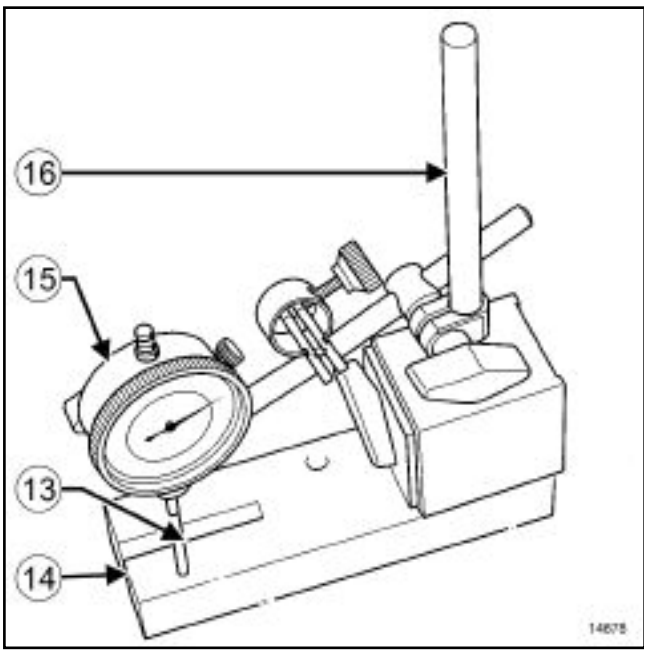
- the camshaft pulley hub,

- 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.



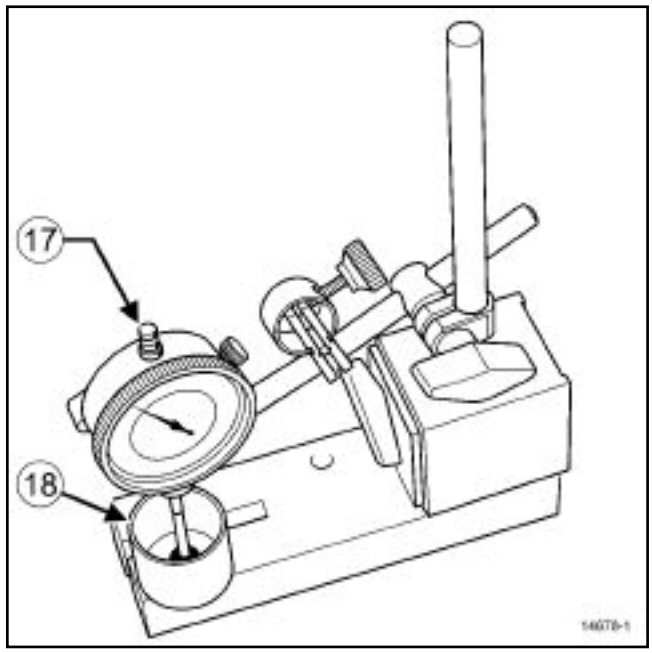
14678

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.

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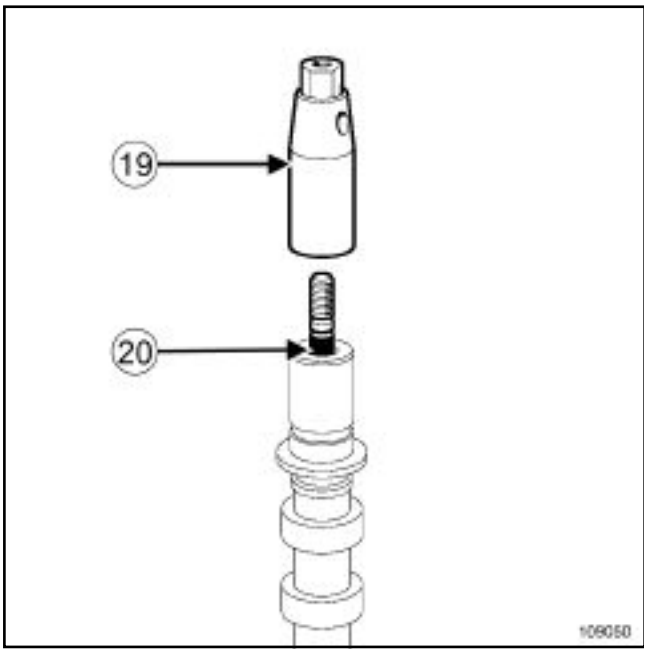


109050

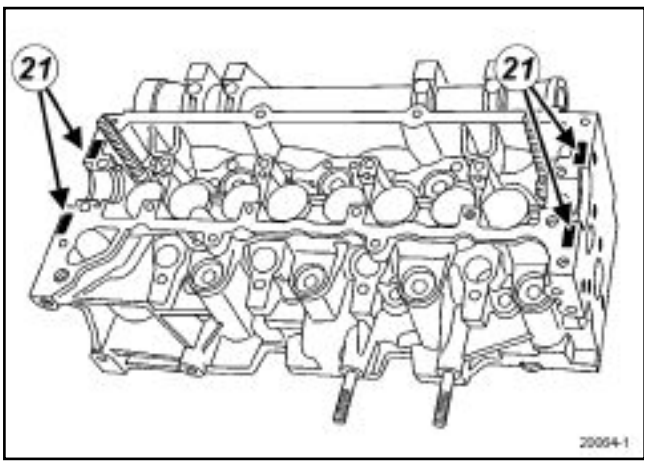
Remove the piston rings using a roller-type stud removal tool (**19**) .

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)*** .

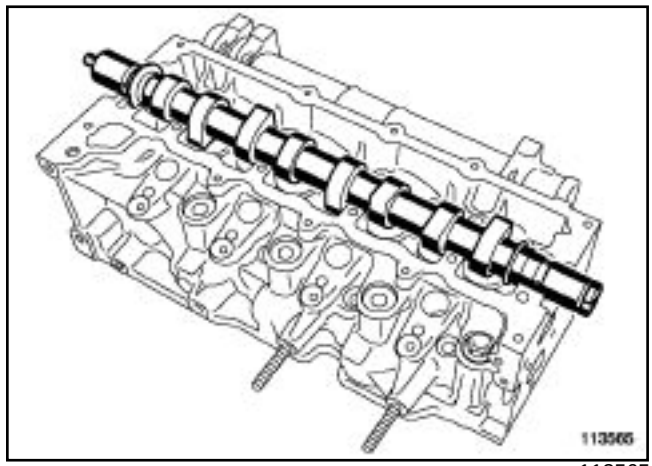
Oil the top of the valve pushrods and the camshaft bearings with engine oil.



20064-1

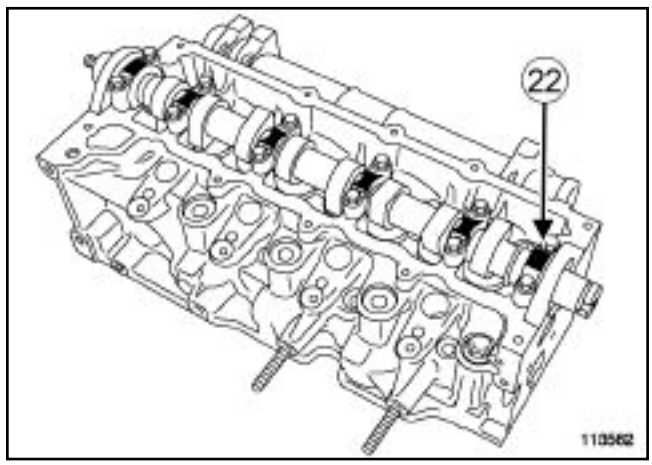
Degrease the surfaces of the camshaft bearing gaskets nos. 1 and 6 (**21**) using degreaser.

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



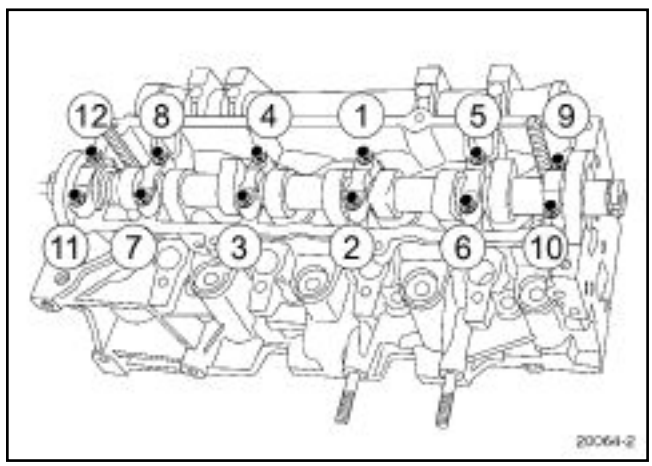
113565

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)** .

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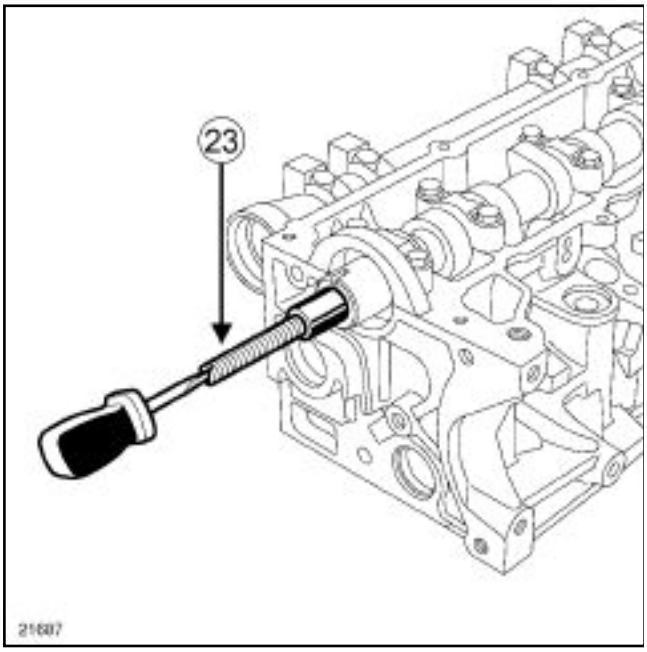
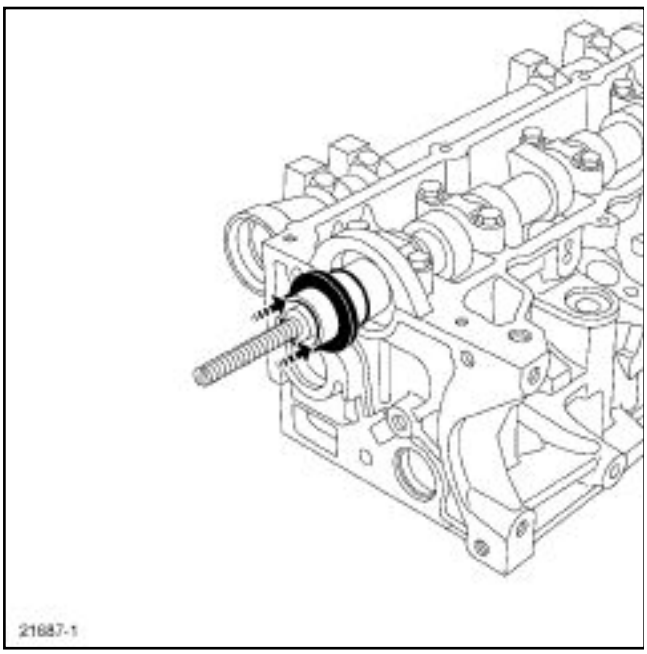
Apply degreaser to:

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



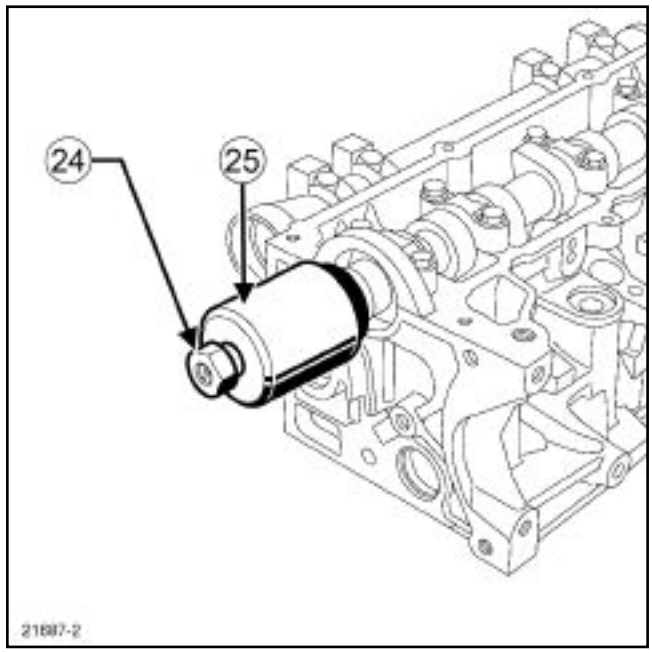
21687

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



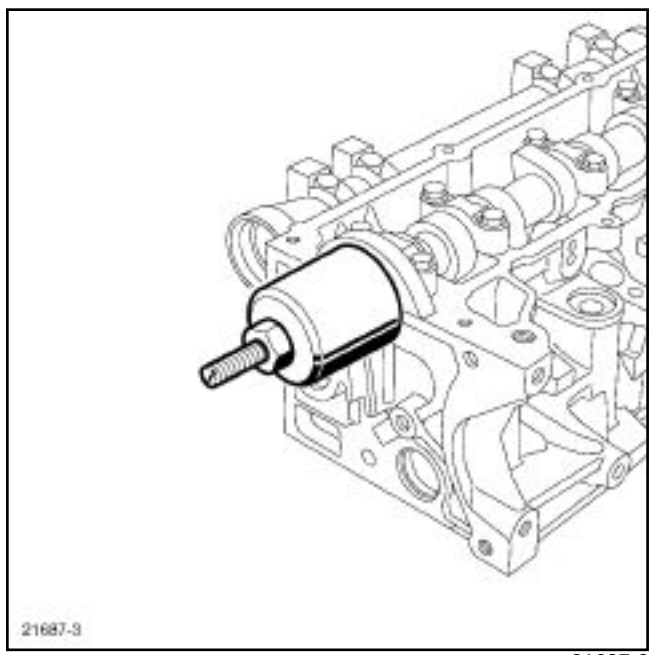
21687-1

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.

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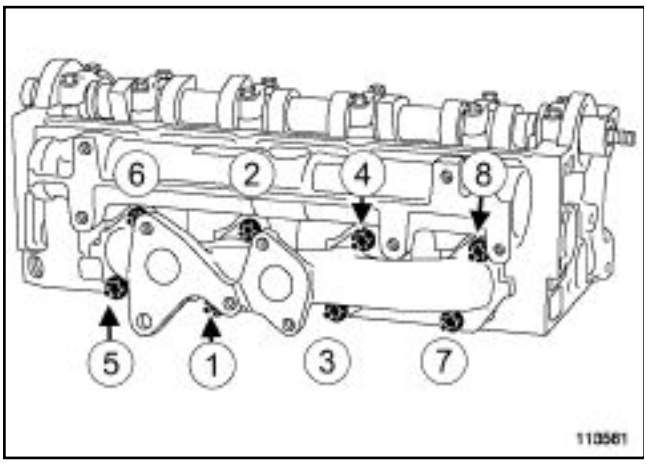
Refit:

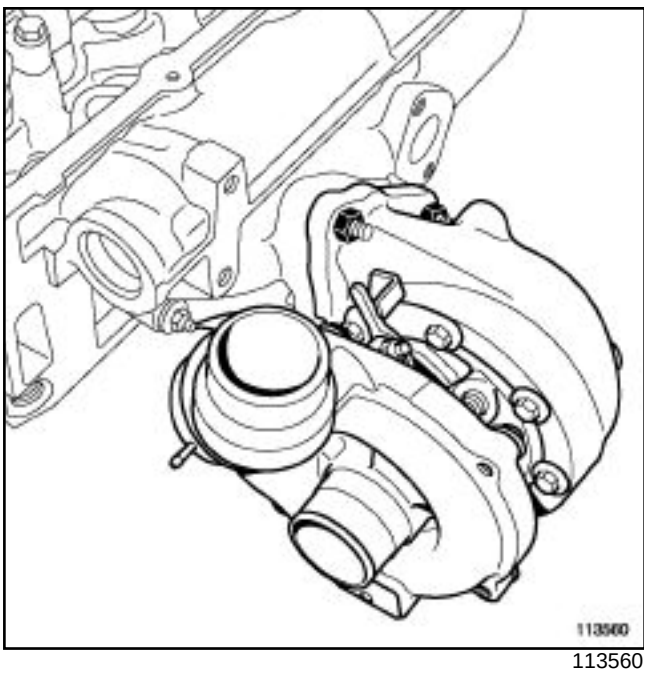
- a new exhaust manifold gasket,
- the exhaust manifold,
- the exhaust manifold mounting nuts.



113561

Tighten to torque and in order the **exhaust manifold mounting nuts (26 ± 2.6 Nm)** .

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



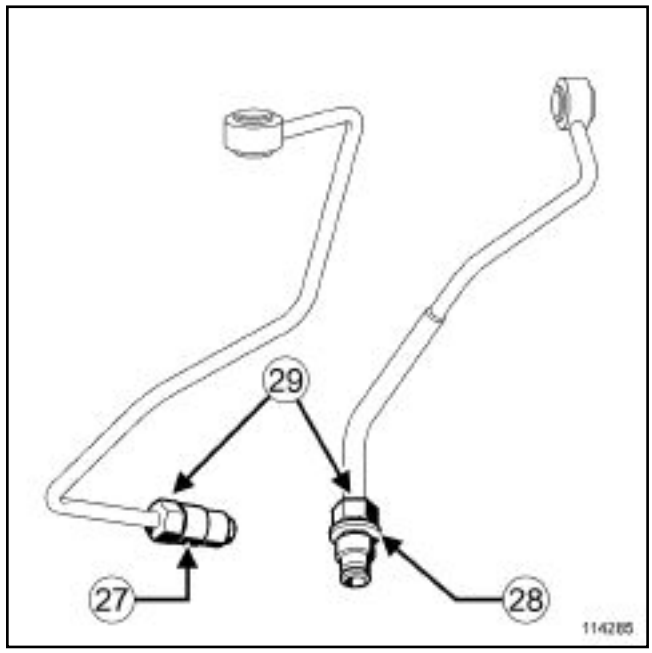
113560

Refit:

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

Tighten to torque the **turbocharger mounting nuts (26 ± 2.6 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,

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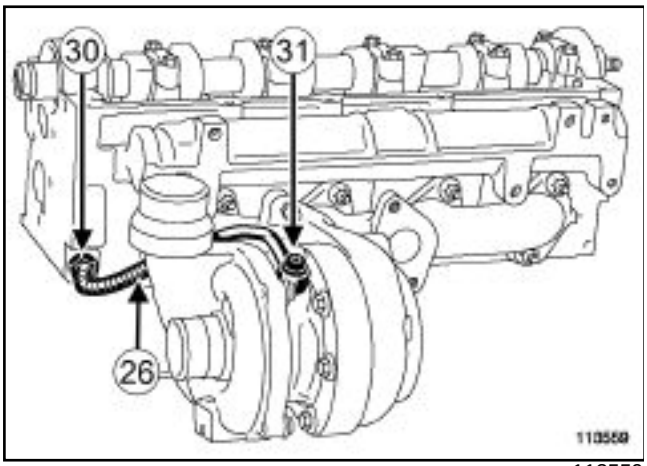


113559

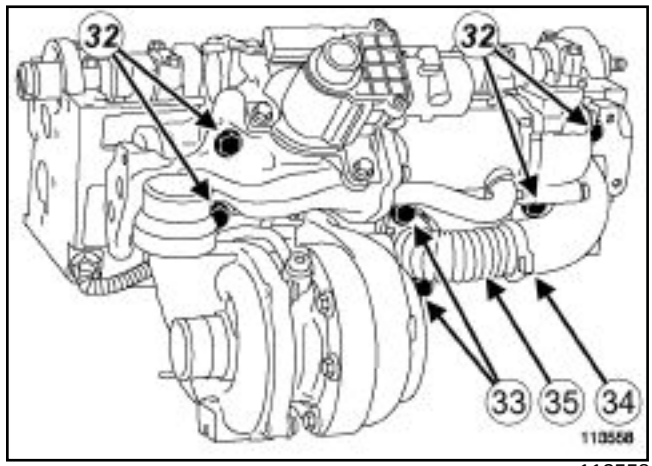
Refit the turbocharger oil supply pipe (**26**) .

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.

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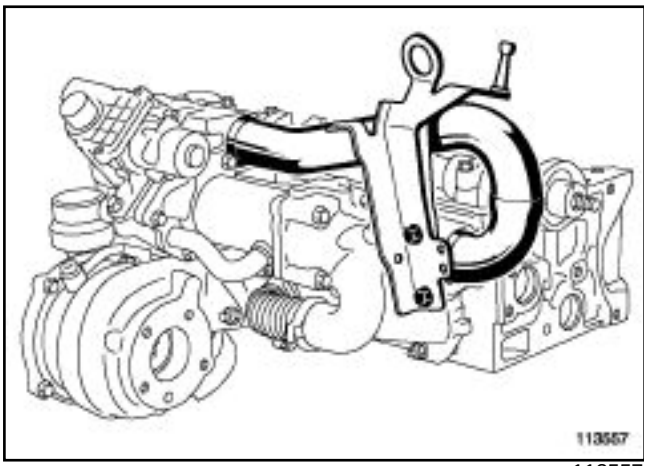


113557

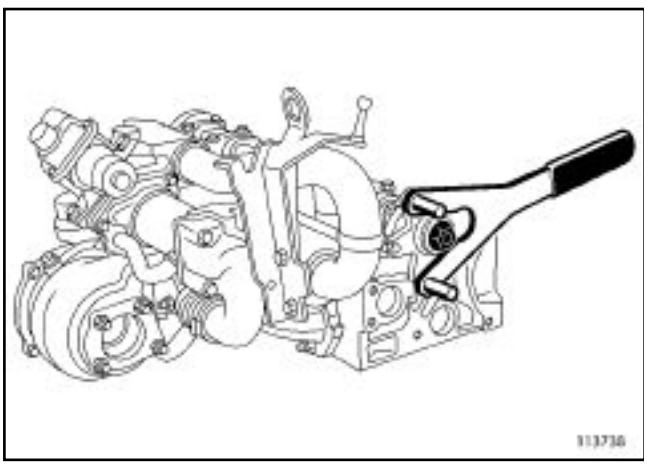
Refit:

- 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 ± 2.1 Nm)** .

Refit:

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



113738

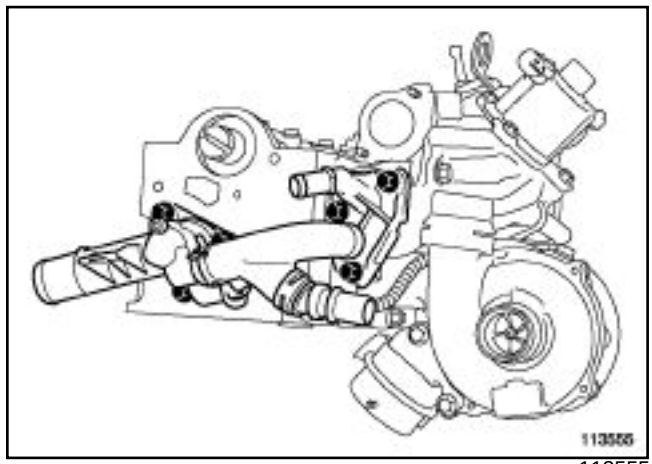
Immobilise the hub using the **(Mot. 799-01)** .

Tighten to torque and angle the **camshaft pulley hub nut (30 ± 3 Nm + 86° ± 6°)** .

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.



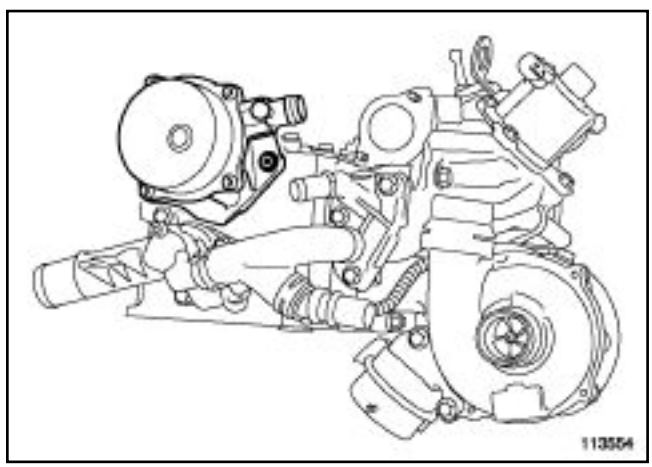
113555

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 ± 1.1 Nm)** ,
- **the EGR exchanger cover mounting bolt (12 ± 1.2 Nm)** .



113554

Refit:

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

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

Refit the heater plugs.

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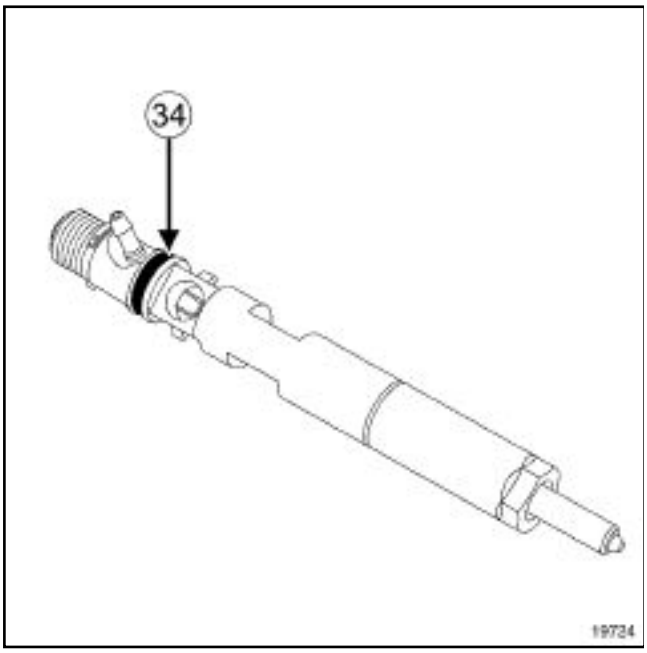
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

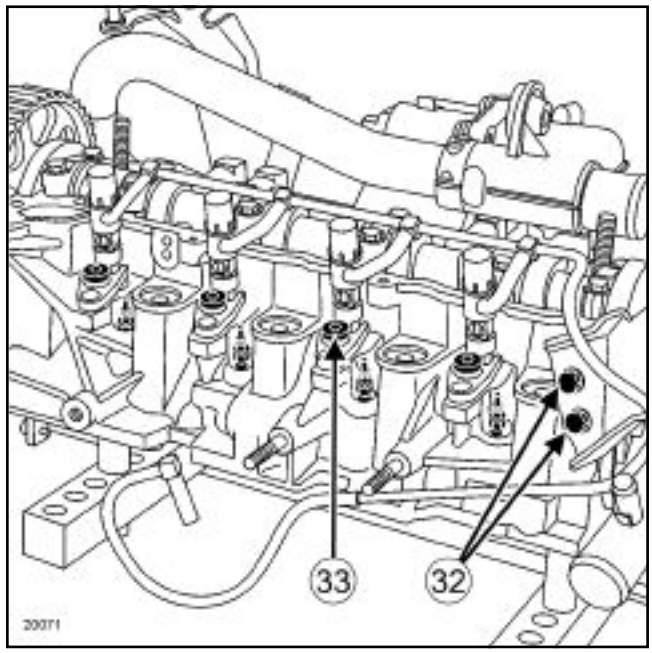
Tighten to torque **the heater plugs (15 ± 1.5 Nm)** using a wrench with hinge.



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**) .

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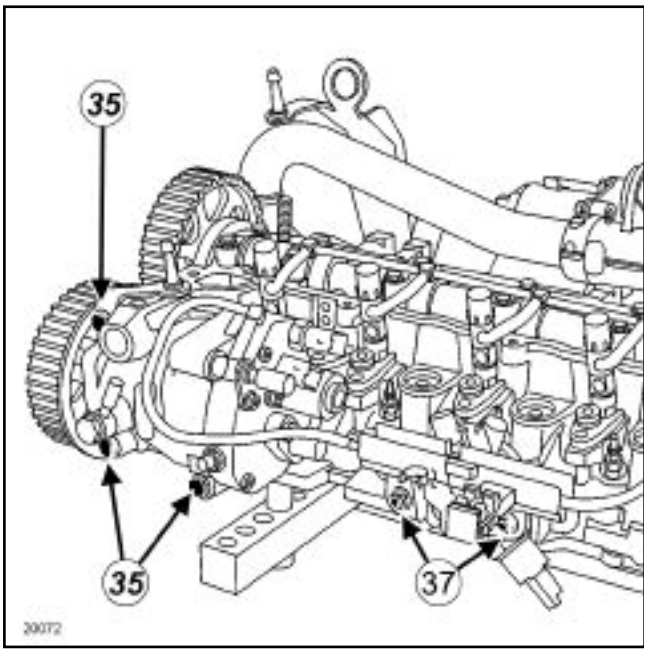


20072

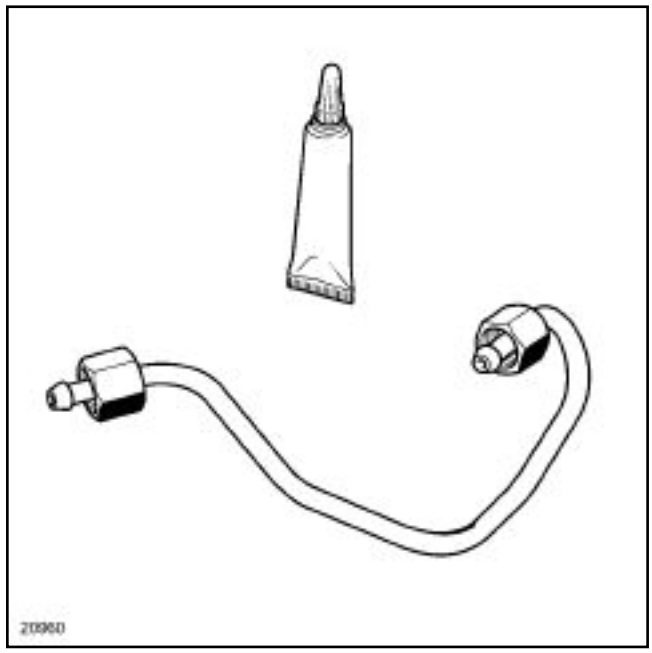
Refit:

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

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

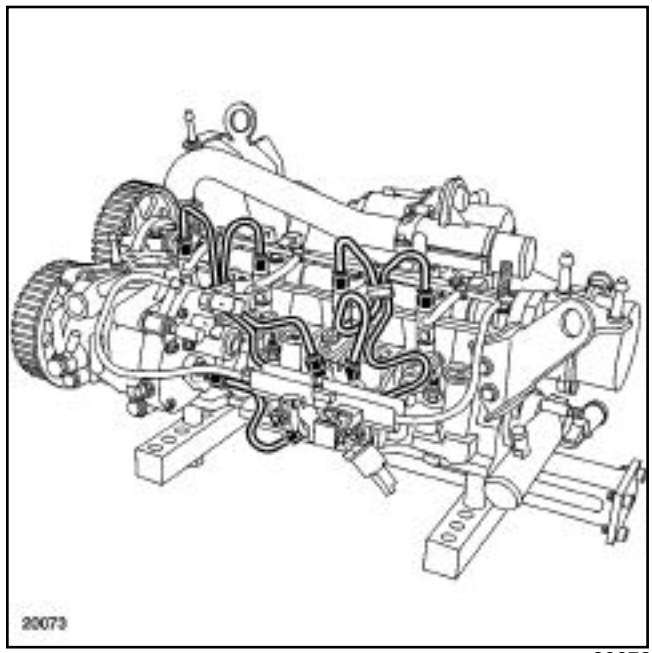
Note:

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.

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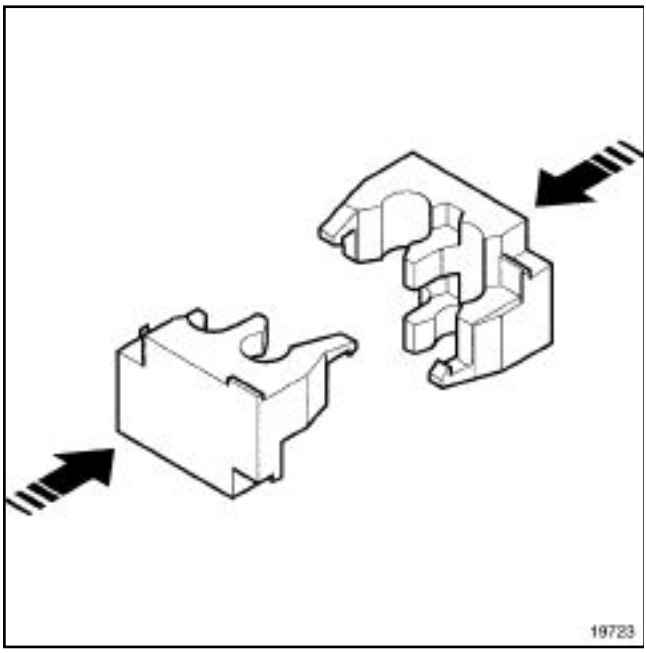

19723

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

Tighten to torque the **injector rail mounting nuts (28 ± 2.8 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 ± 3.8 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 ± 3.8 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,

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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.

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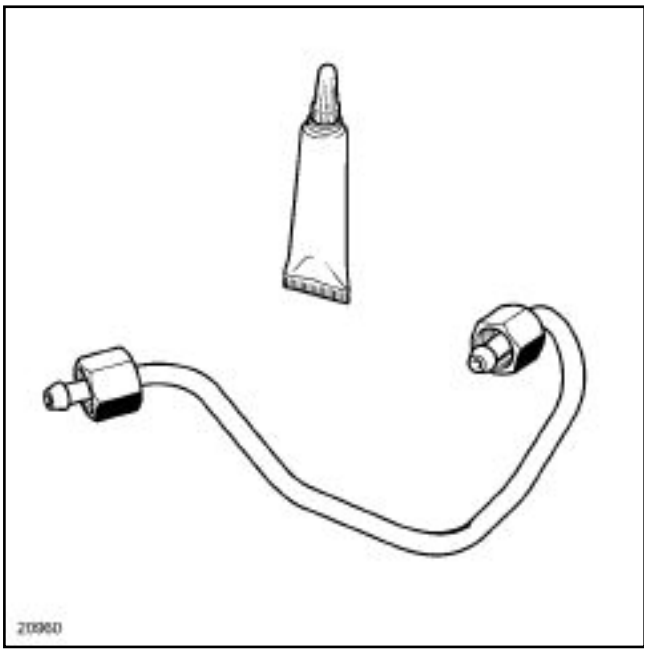

20960

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 ± 3.8 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 ± 2.4 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,

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- 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

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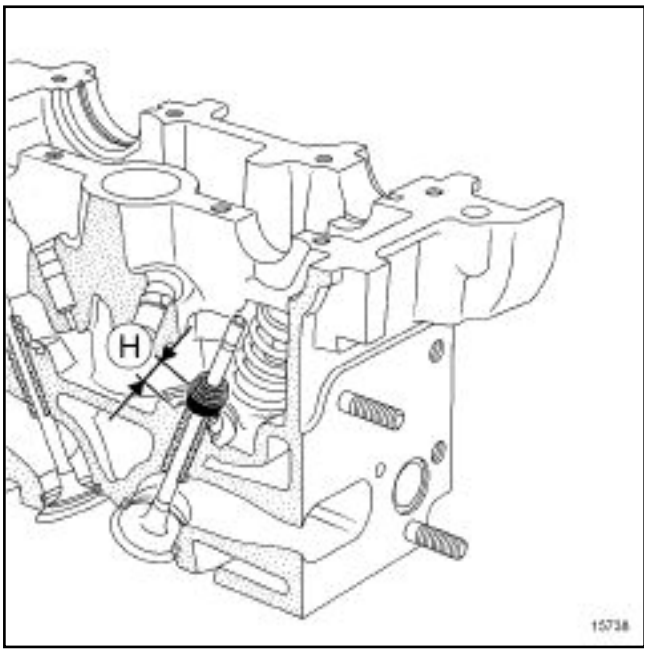
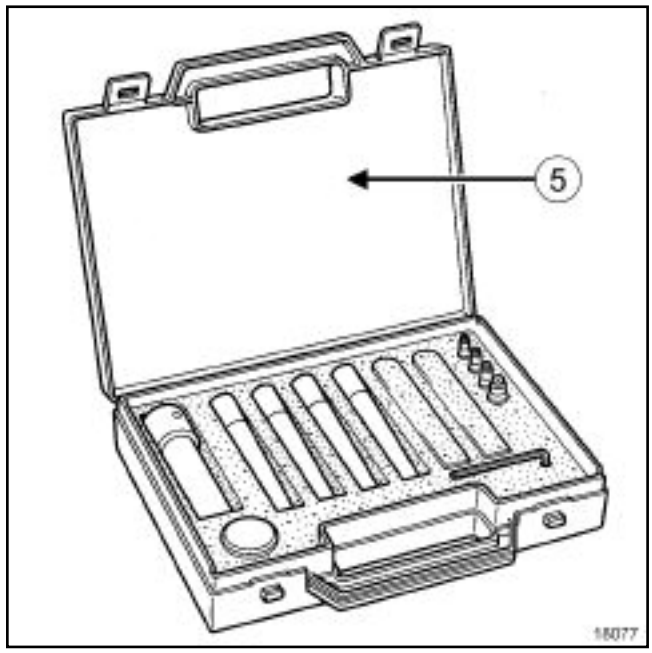
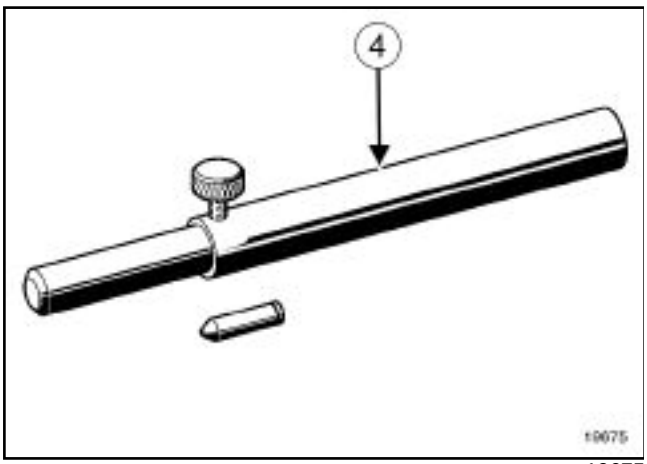


15738



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.

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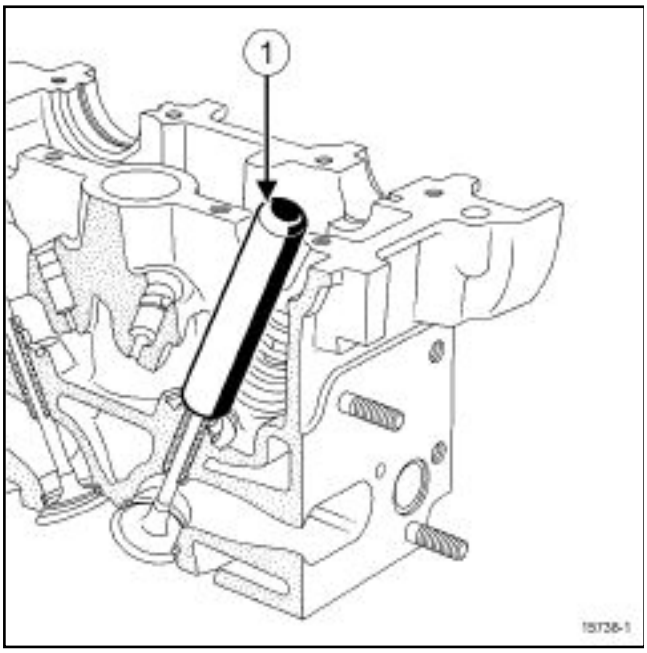
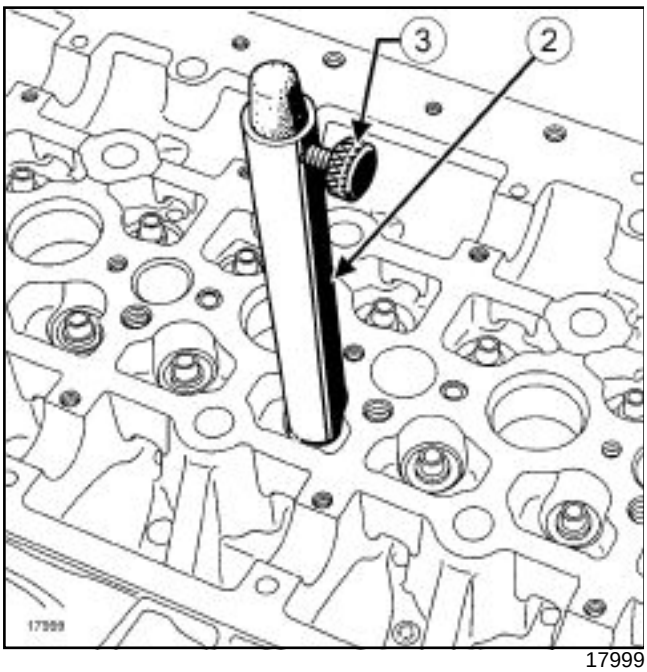


15738-1

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.

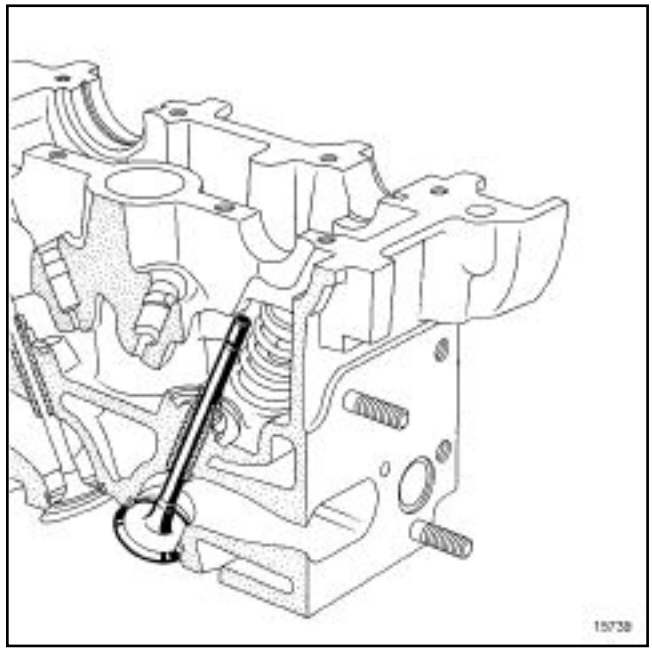
Lock the pushrod with the wheel (**3**) .

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

Remove:

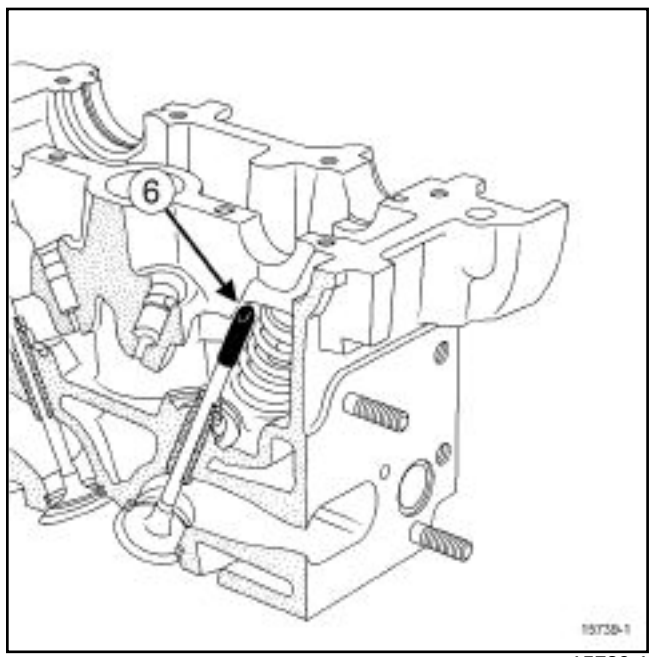
- the valve,
- the valve stem seals (inlet end then exhaust end) using the **(Mot. 1335)** .

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).

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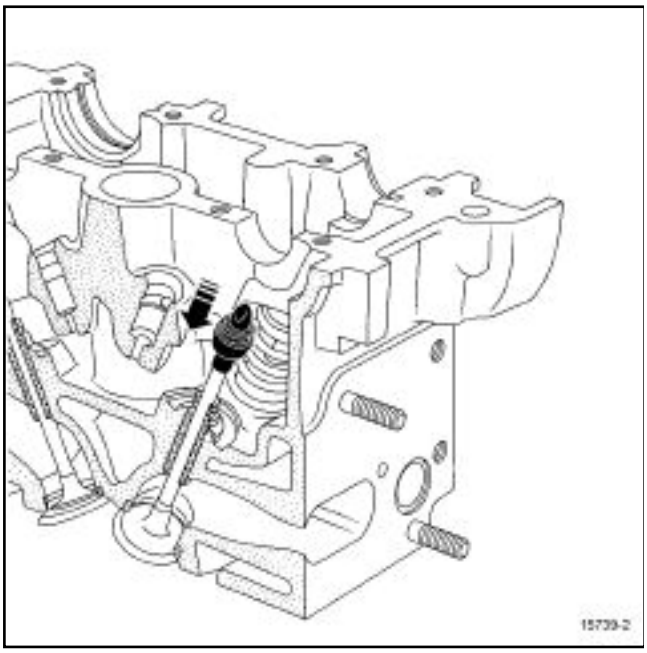
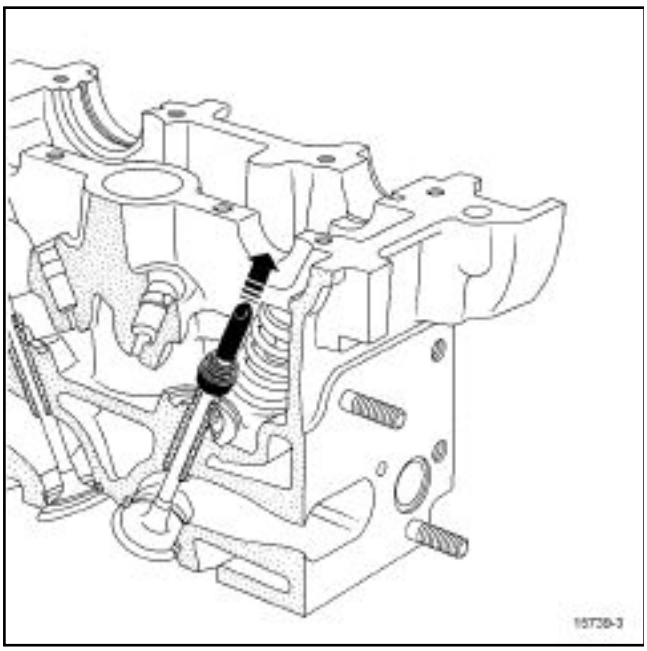


15739-2

Keep the valve pressed against its seat.

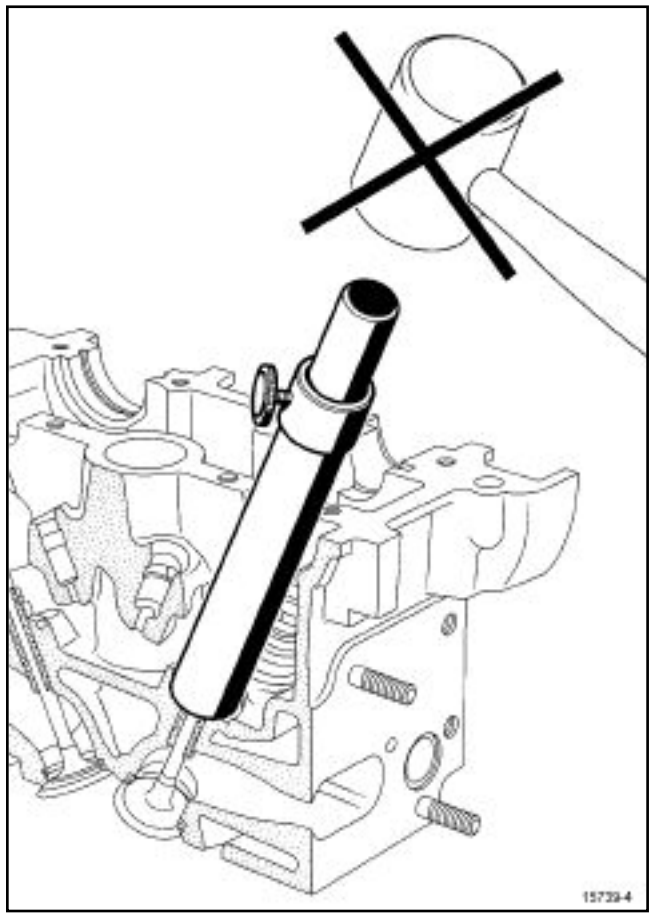
Mount the valve stem seal (not lubricated) over the valve insert.

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.

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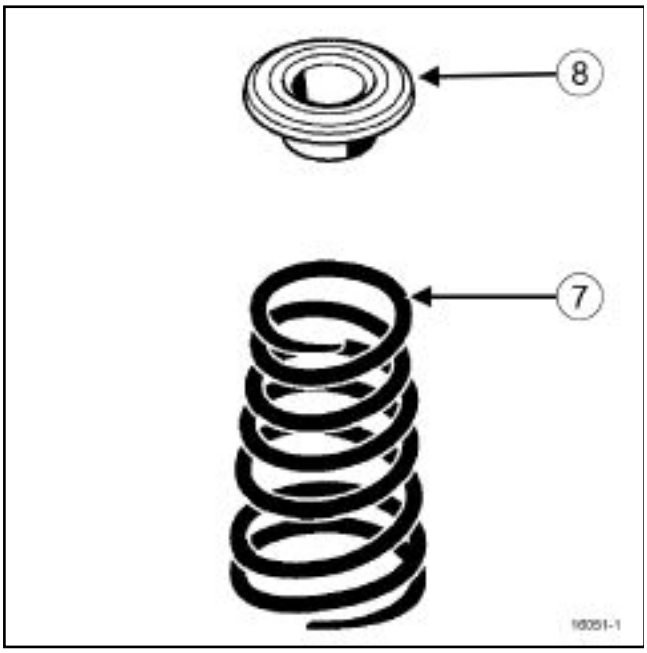
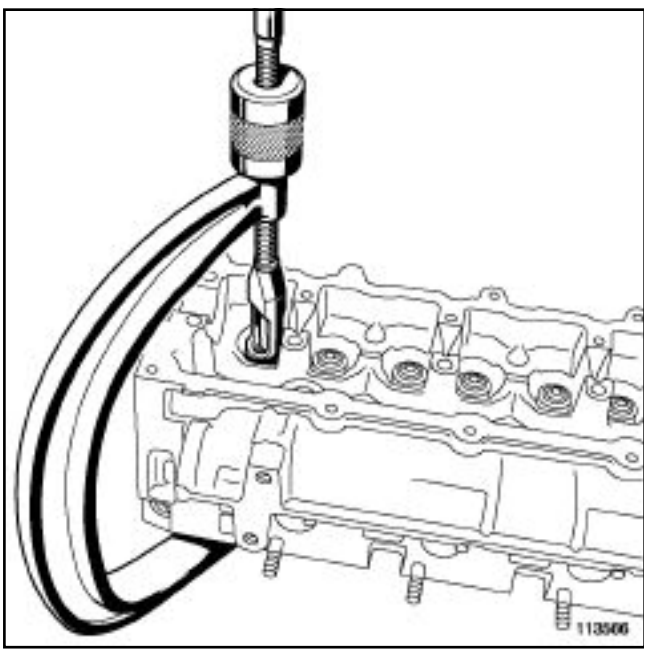


16051-1

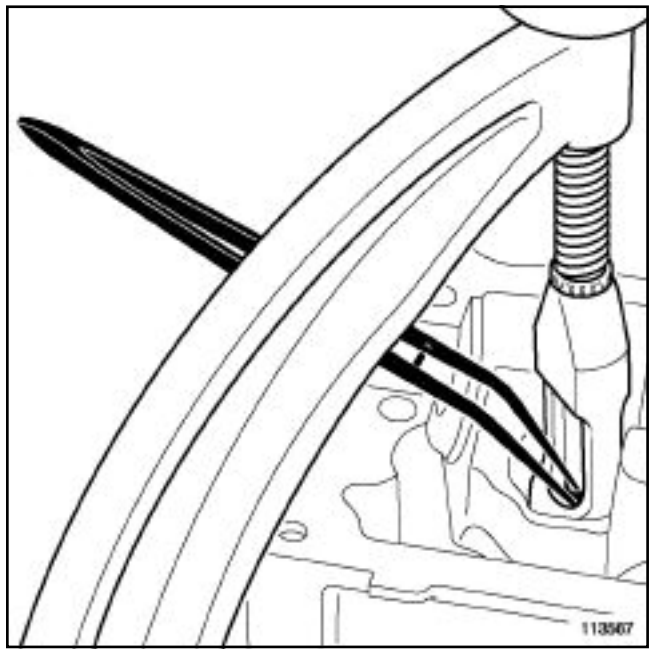
Refit:

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



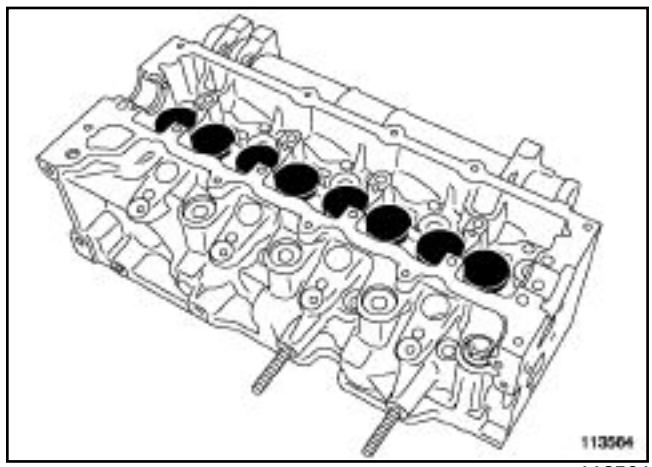
113566

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.

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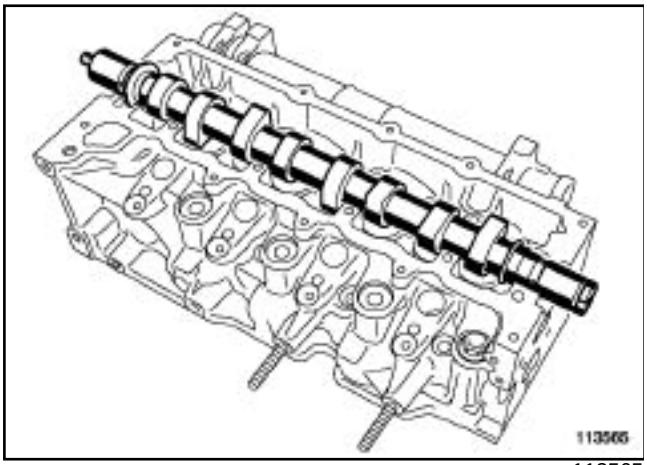
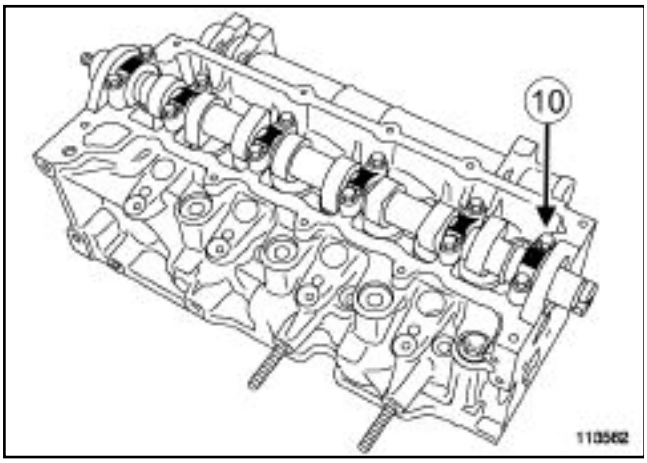


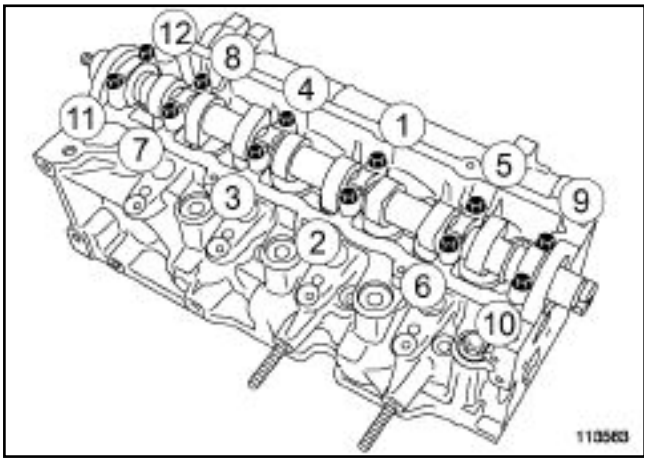
113565

Refit the camshaft.



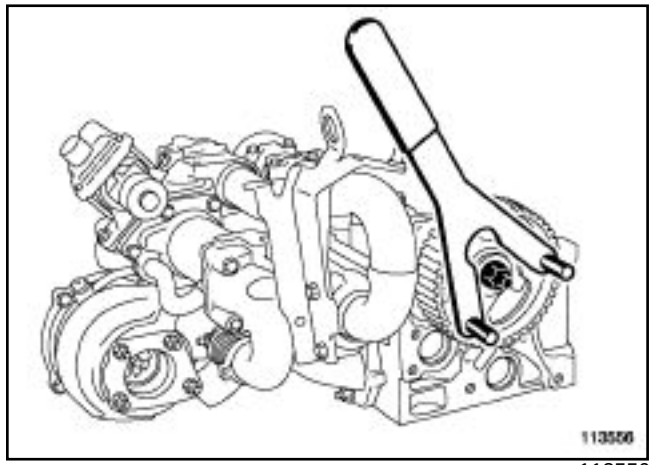
113562

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 ± 1.1 Nm)** .



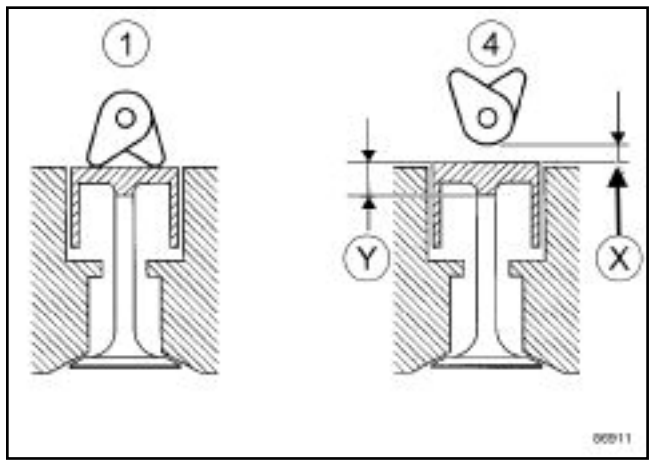
113556

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 ± 1.5 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** ,

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- 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,

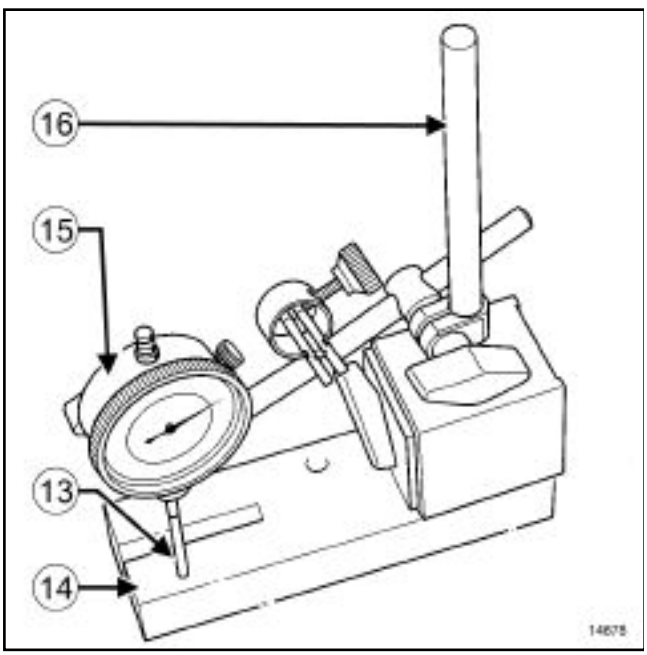
- the camshaft pulley hub,

- 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.



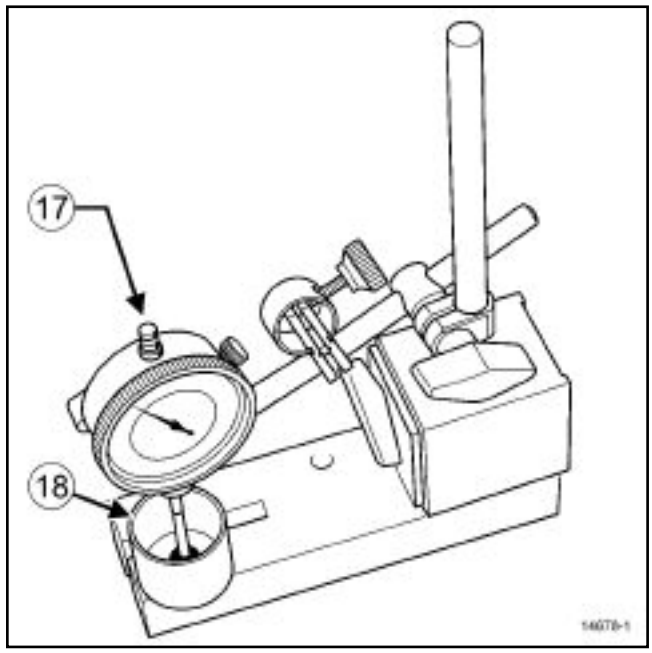
14678

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.

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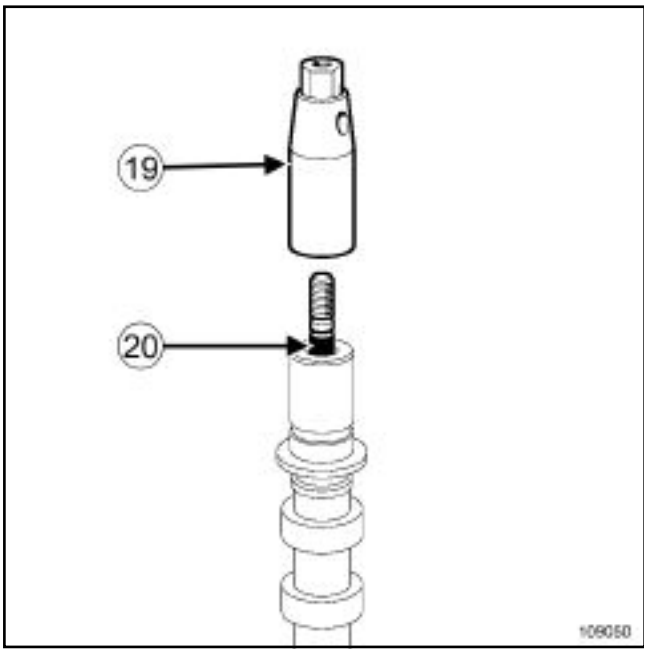
K9K, and 732 or 764



109050

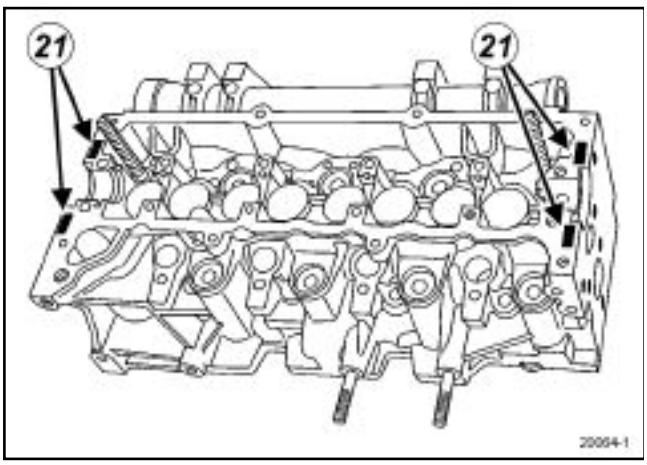
Remove the piston rings using a roller-type stud removal tool (**19**) .

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)*** .

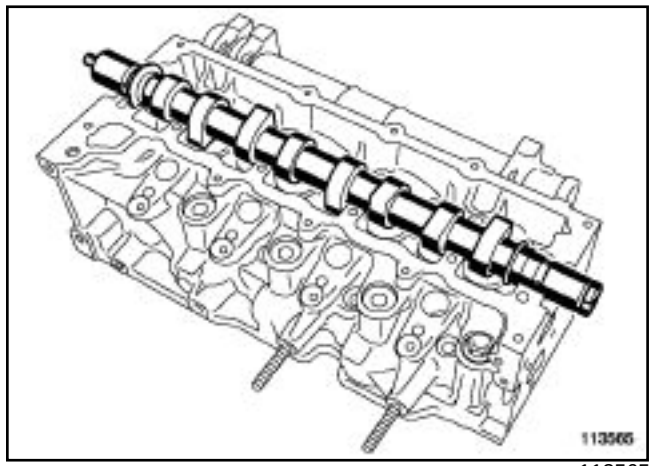
Oil the top of the valve pushrods and the camshaft bearings with engine oil.



20064-1

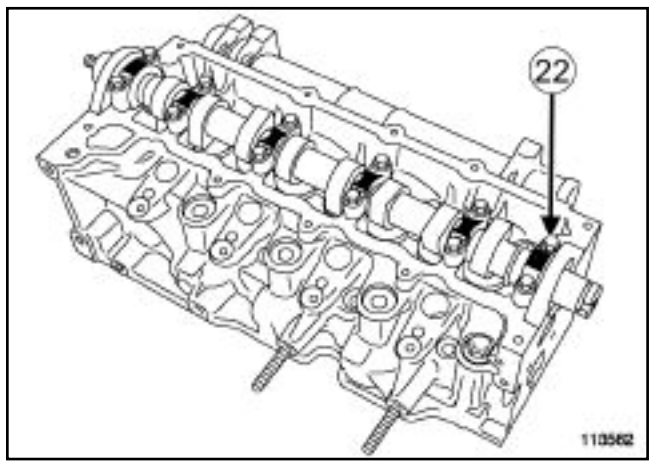
Degrease the surfaces of the camshaft bearing gaskets nos. 1 and 6 (**21**) using degreaser.

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



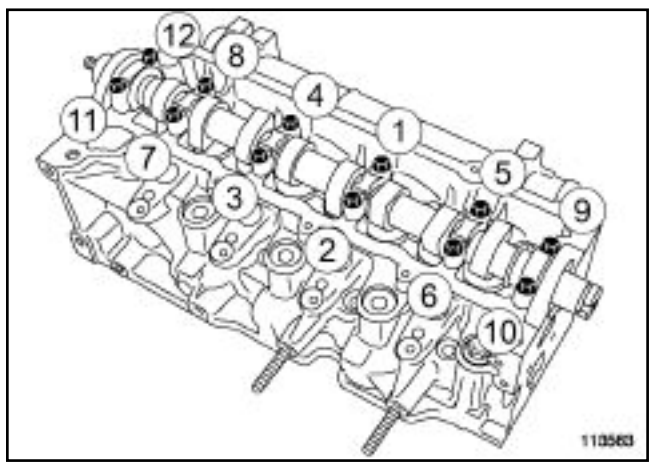
113565

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)** .

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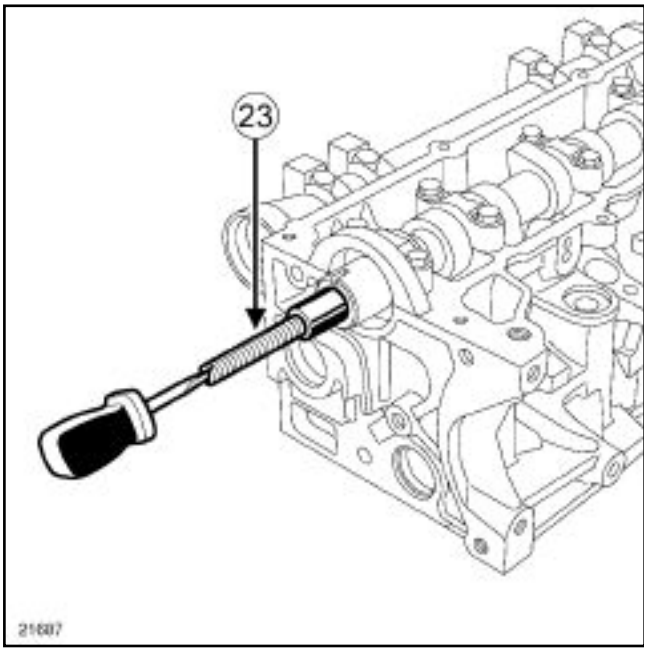
K9K, and 732 or 764

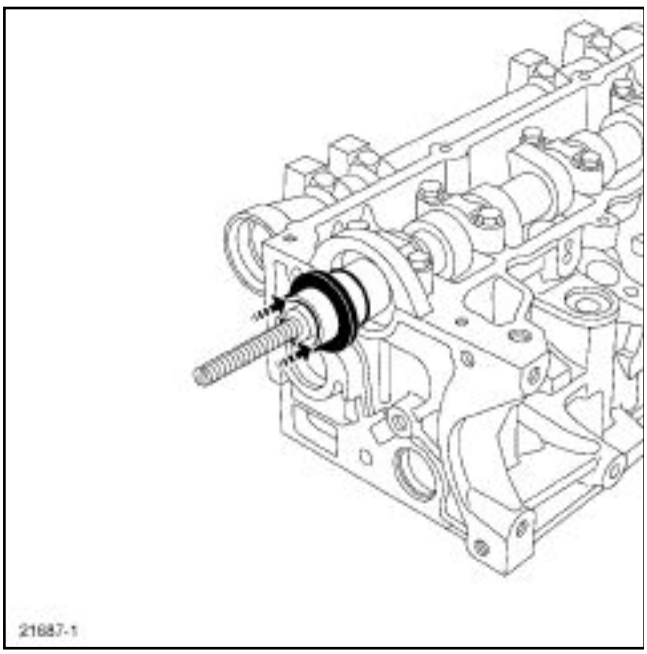
Apply degreaser to:

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



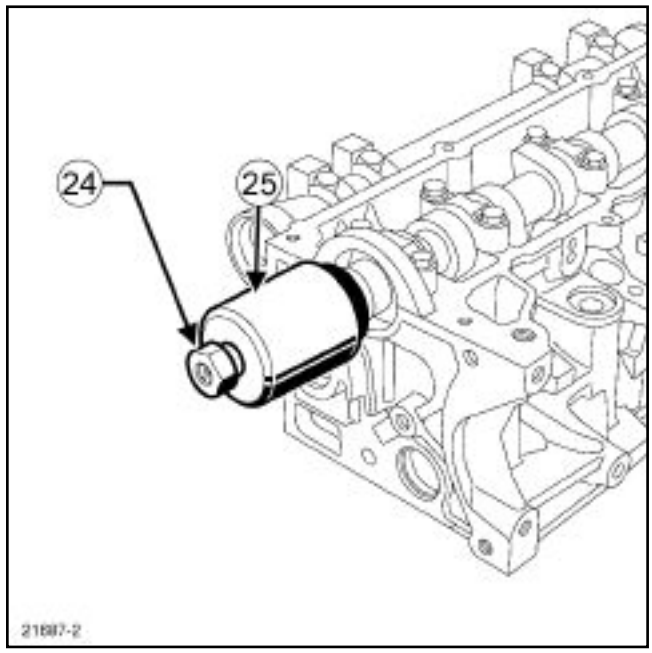
21687

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



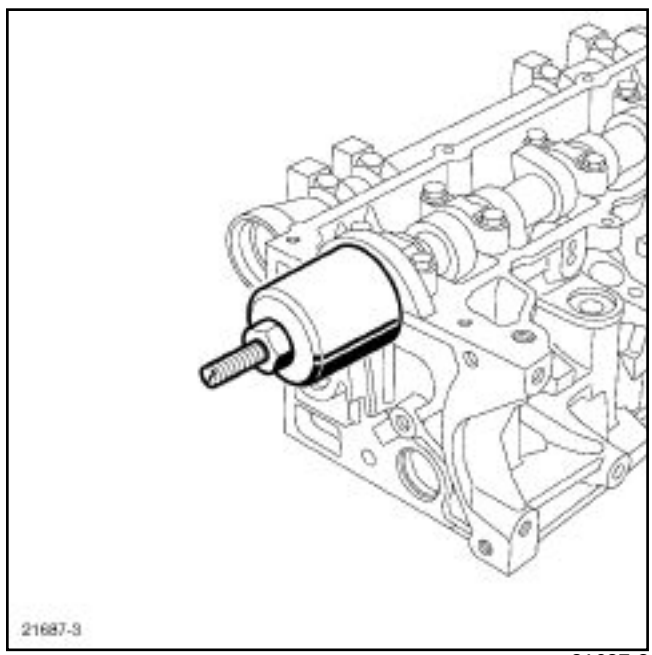
21687-1

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.

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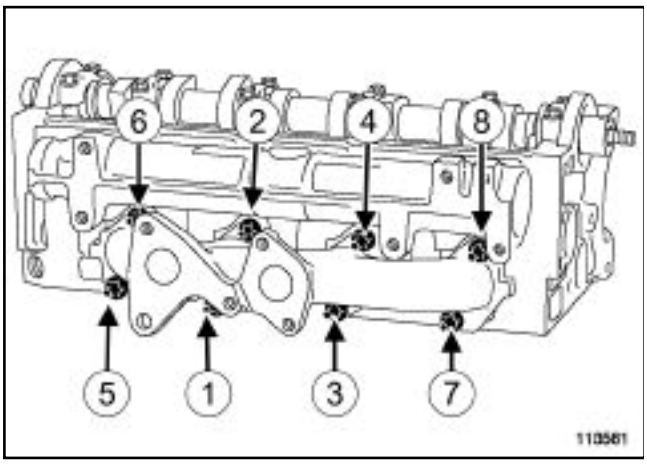
K9K, and 732 or 764

Refit:

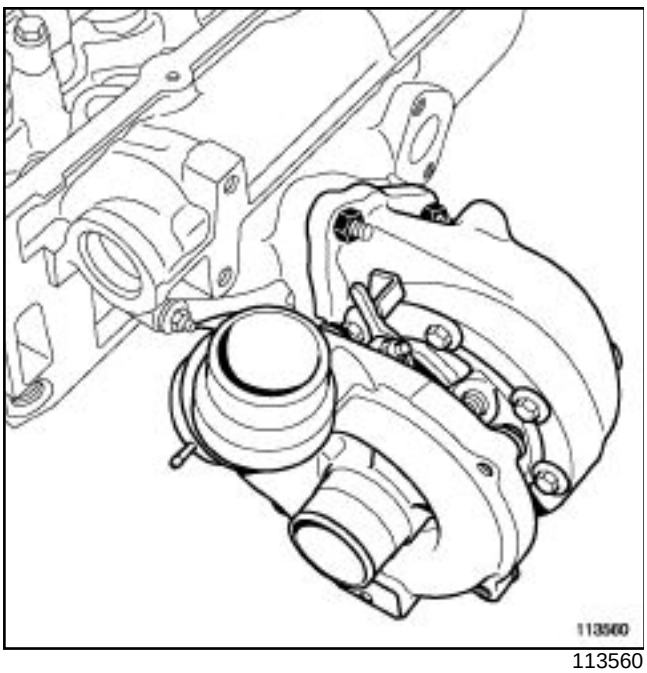
- a new turbocharger-exhaust manifold gasket,
- the exhaust manifold,
- the exhaust manifold mounting nuts.



113561

Tighten to torque and in order the **exhaust manifold mounting nuts (26 ± 2.6 Nm)** .

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

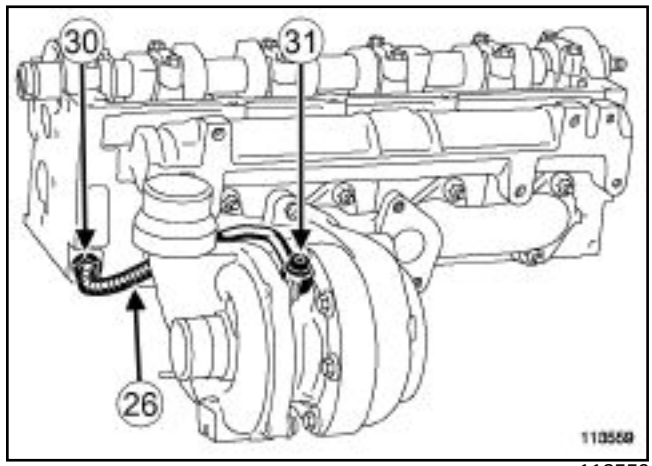

113560

Refit:

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

Tighten to torque the **turbocharger mounting nuts (26 ± 2.6 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 ± 2.3 Nm)** ,
- **the turbocharger oil supply pipe mounting nut (cylinder head end) (35 ± 3.5 Nm)** .

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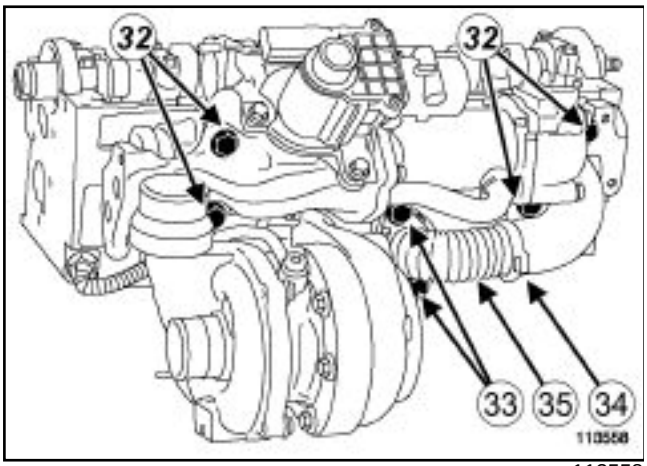
K9K, and 732 or 764



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 ± 2.5 Nm)** . (**32**)

Refit:

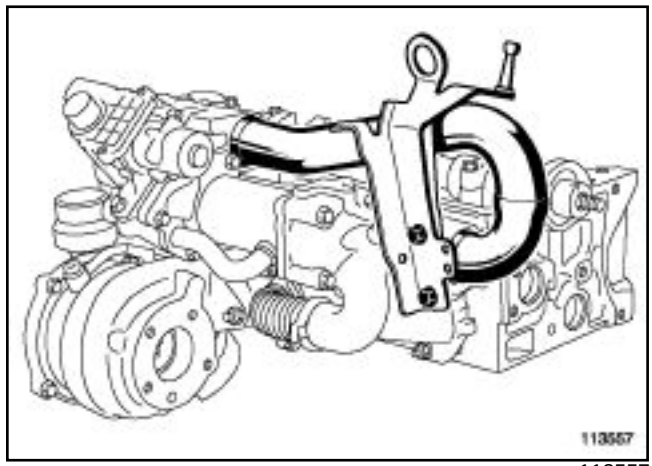
- the new exhaust gas recirculation pipe (**35**) fitted with its new snap-on clip (**34**) ,
- the mounting bolts (**33**) of the exhaust gas recirculation pipe.

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.



113557

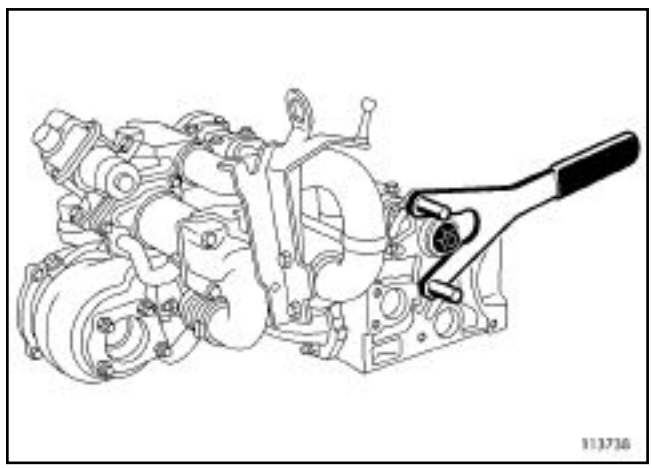
Refit:

- 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 ± 2.1 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 ± 3 Nm + 86° ± 6°)** .

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.

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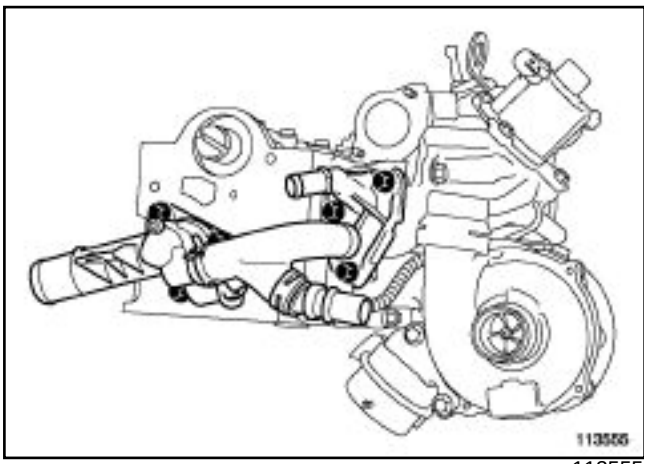
K9K, and 732 or 764

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



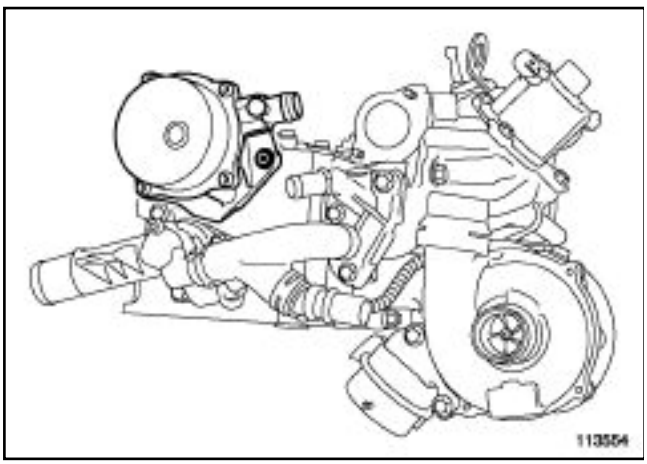
113555

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



113554

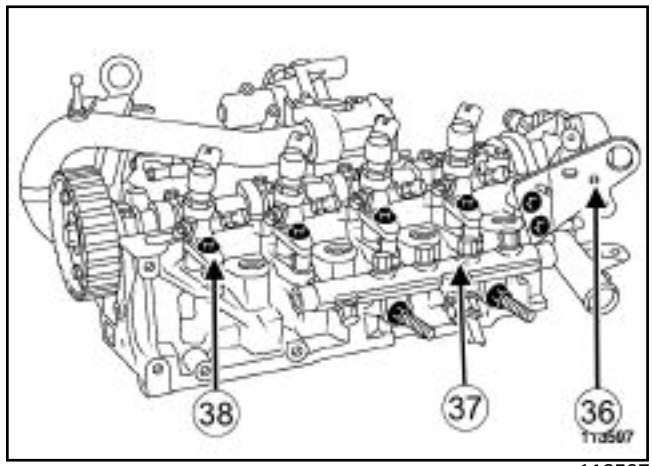
Refit:

- 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.



113597

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.**

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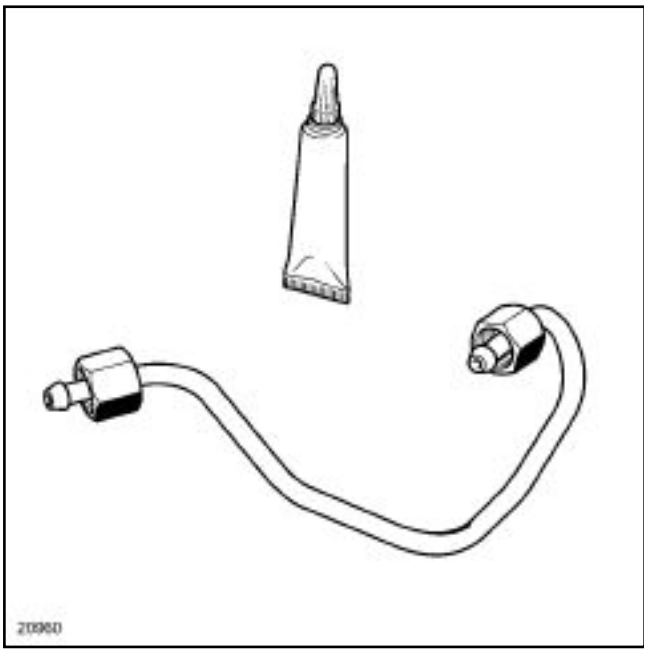
K9K, and 732 or 764



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.

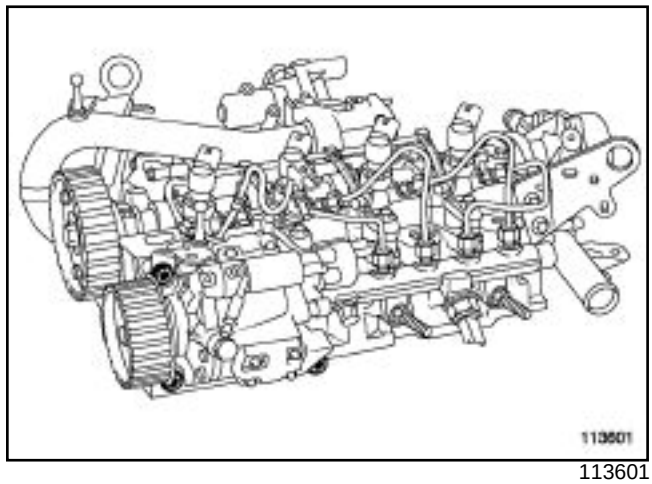
Tighten to torque the **injector rail mounting nuts (28 ± 2.8 Nm)** .

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 ± 3.8 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

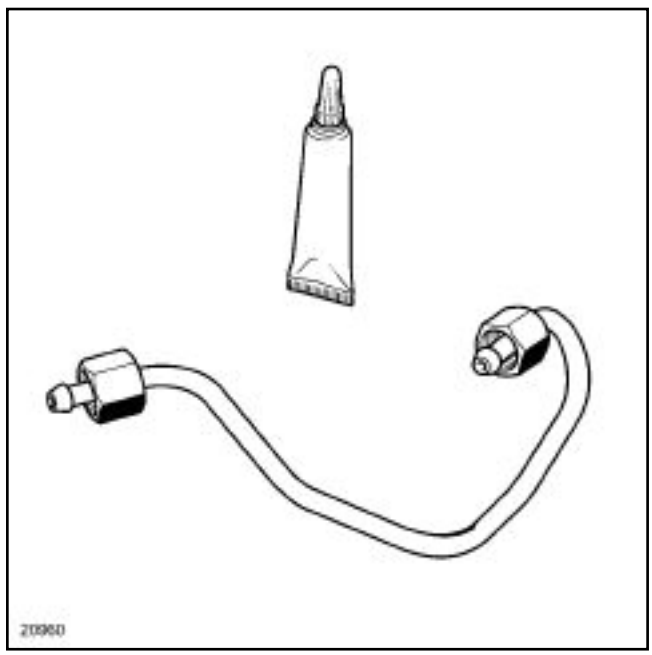
Refit:

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

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

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

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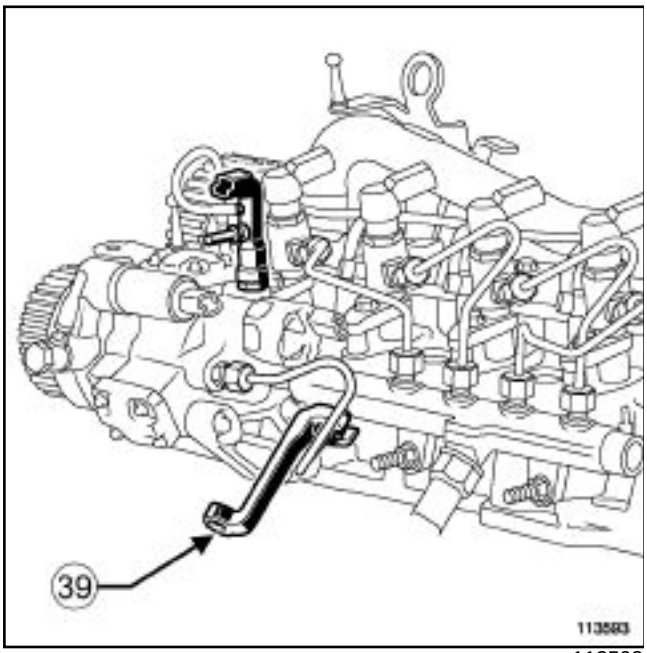
K9K, and 732 or 764

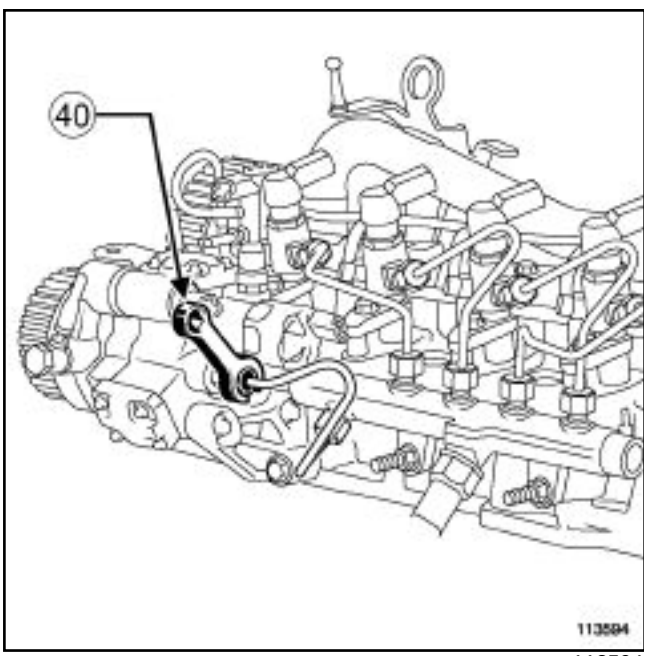
Insert the high-pressure pipe olive in the high-pressure pump high-pressure outlet taper.

Finger tighten the high-pressure pipe nuts, starting with the one at the injector rail side.

Lightly tighten the nuts of the high-pressure pipes.



113593

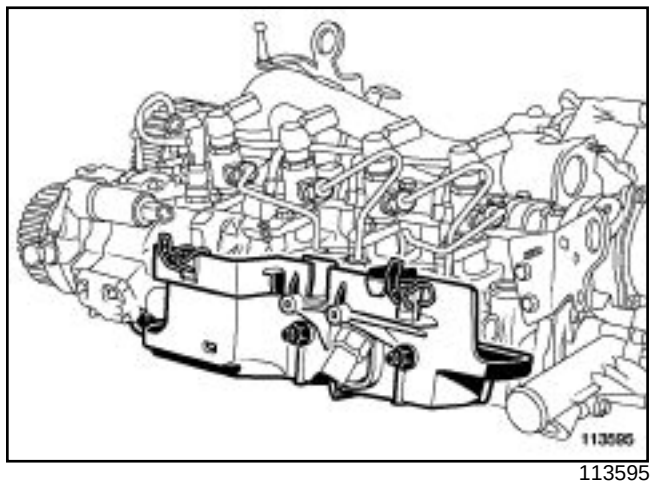


113594

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 ± 3.8 Nm)** :

- the injector rail side using the **(Mot. 1566)** (**39**) ,
- the high-pressure pump side using the **(Mot. 1746)** (**40**) .

Refit the fuel return pipe.



113595

Refit:

- the high-pressure protector,
- the mounting bolt and nuts of the high-pressure protector,

Tighten to torque the **high-pressure protector bolts and nuts (21 ± 2.1 Nm)** .

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Cylinder block: Dismantling

K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790

Special tooling required	
Mot. 582-01	Flywheel locking tool.
Mot. 1677	Flywheel locking tool.
Emb. 1596	24mm socket for removing/refitting clutch master cylinder.
Mot. 1329	Oil filter removing tool (76 mm diameter).

I - RECOMMENDATIONS FOR REPAIR

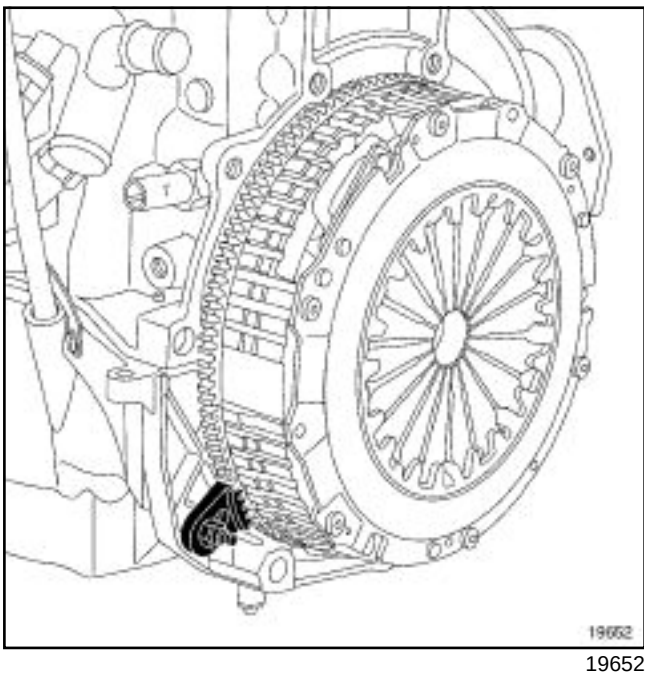
IMPORTANT
Wear protective gloves during every operation.

II - EQUIPMENT REQUIRED

- Wide, flat-blade screwdriver,
- Male torx socket.

III - STRIPPING THE CYLINDER BLOCK

1 - For engines fixed to the oil filter side

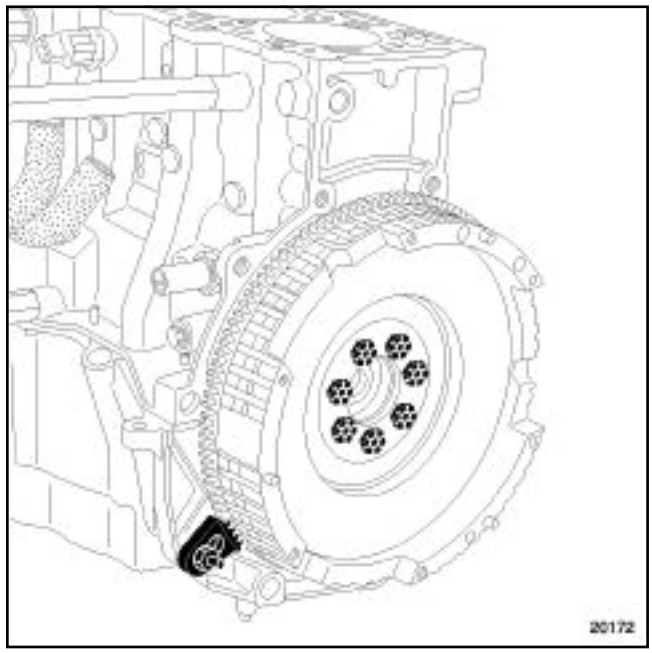


19652

Fit the engine flywheel lock **(Mot. 582-01)** or **(Mot. 1677)** .

Remove:

- the clutch mechanism mounting bolts,
- the clutch pressure plate,
- the clutch plate.



20172

Remove:

- the flywheel mounting bolts,
- the **(Mot. 582-01)** or **(Mot. 1677)** ,
- the flywheel.

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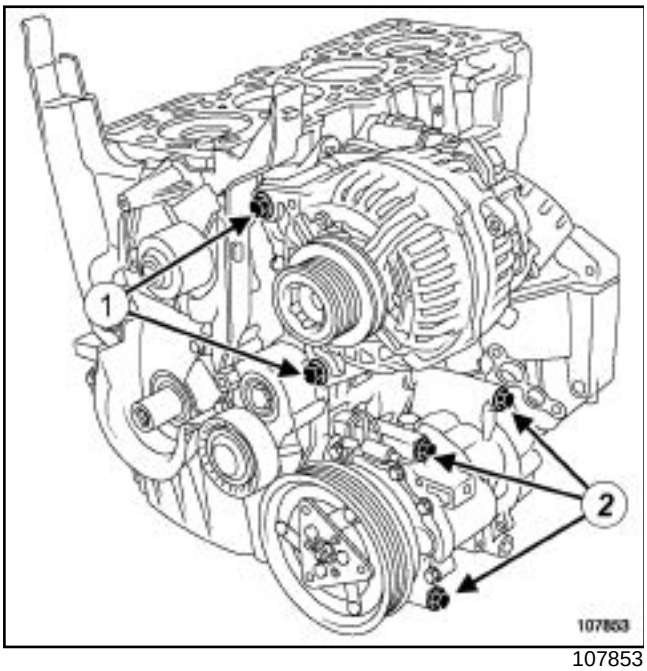
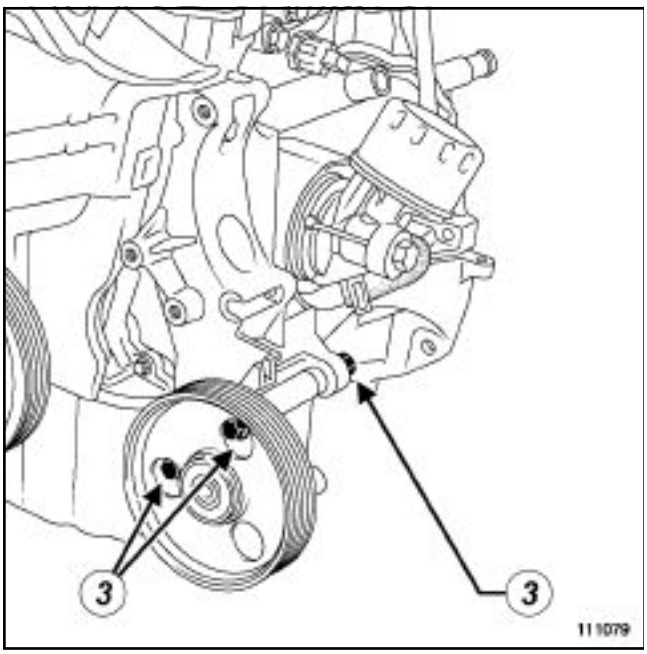
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790

2 - For engines fixed to the flywheel side



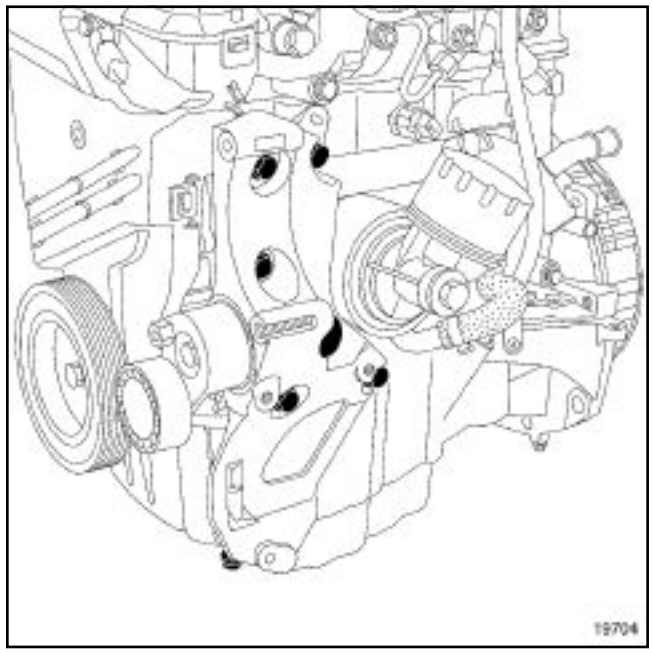
107853



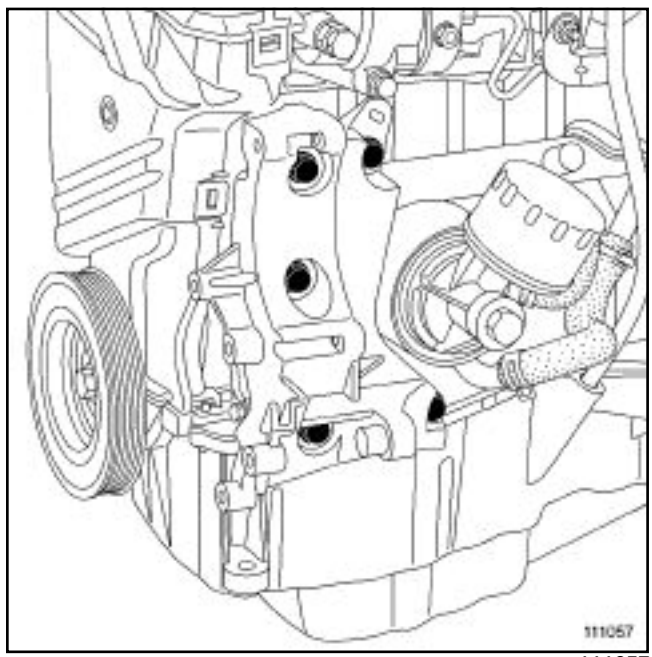
111079

Remove:

- the alternator mounting bolts (**1**) ,
- the alternator using a wide, flat-blade screwdriver (if necessary),
- the mounting bolts (**2**) of the air conditioning compressor (if fitted),
- the air conditioning compressor,
- the mounting bolts (**3**) of the power assisted steering pump or the dummy pulley (if fitted),
- the power assisted steering pump or the dummy pulley.



19704



111057

Remove:

- the multifunction support mounting bolts,
- the multifunction support.

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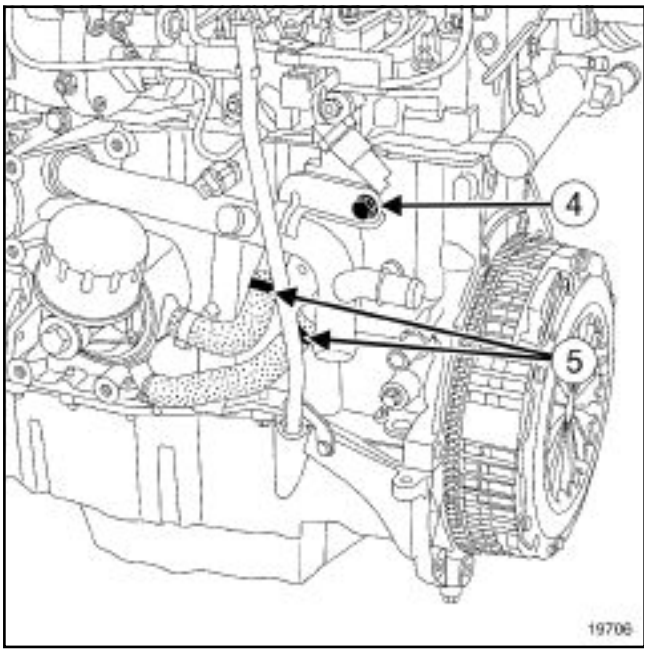
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



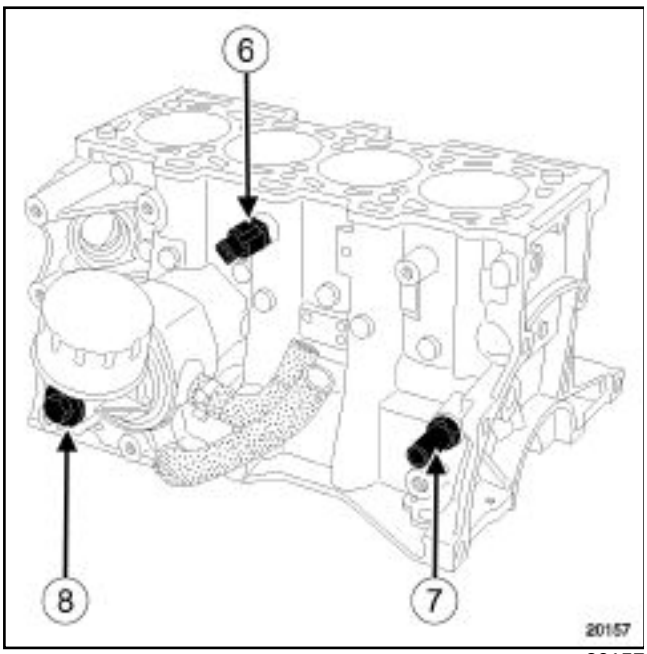
19706

Unclip the hose connections (**5**) of the coolant pump inlet pipe.

Remove:

- the mounting bolt (**4**) of the coolant pump inlet pipe,
- the coolant pump inlet pipe.

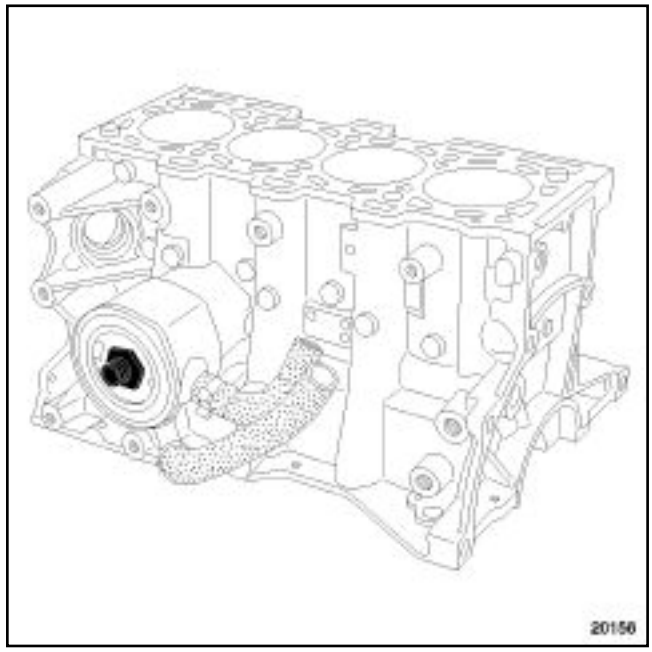
3 - For engines fixed to the oil filter side or the flywheel side



20157

Remove:

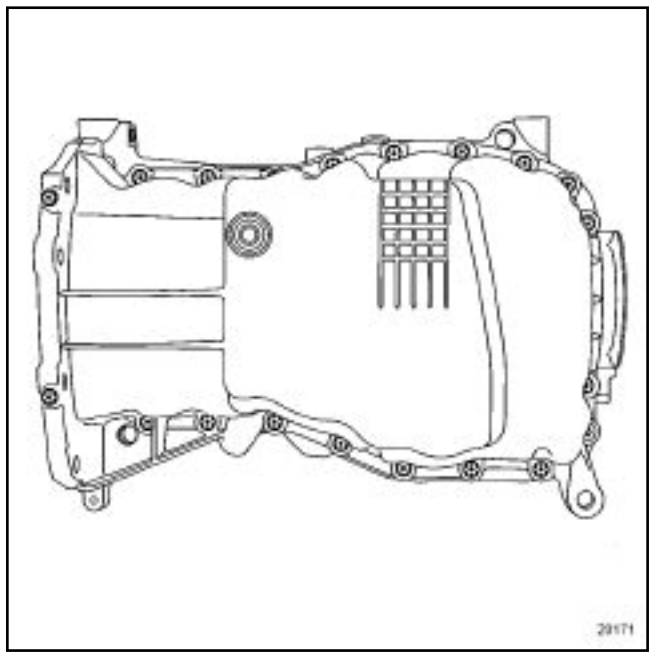
- the acceleration meter (**6**) using tool **(Emb. 1596)** ,
- the oil pressure sensor (**7**) ,
- the oil filter using the **(Mot. 1329)** ,
- the oil filter holder mounting bolt (**8**) ,



20156

Remove:

- the oil/coolant heat exchanger mounting bolt,
- the oil/coolant heat exchanger.



20171

Remove:

- the oil sump mounting bolts.
- the engine oil sump.

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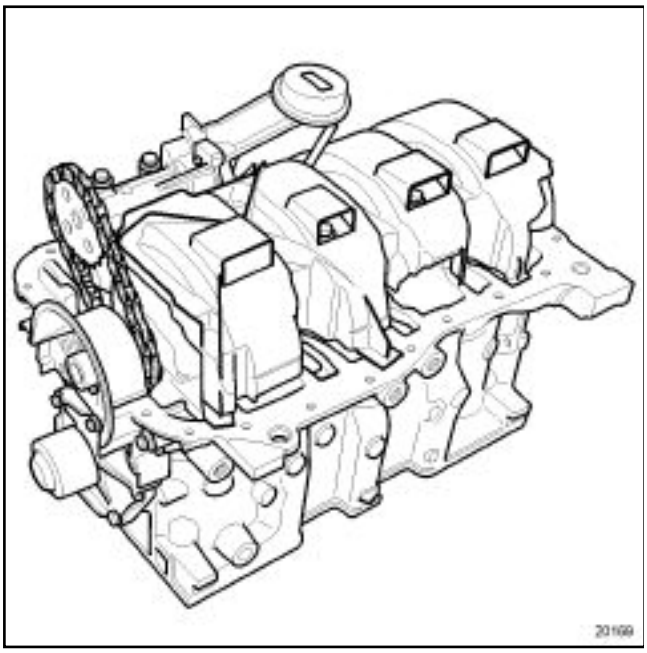
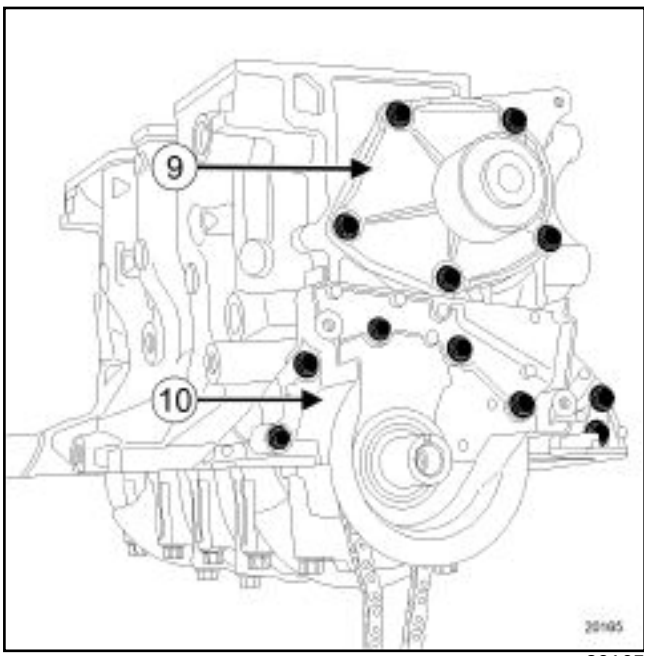
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



20169

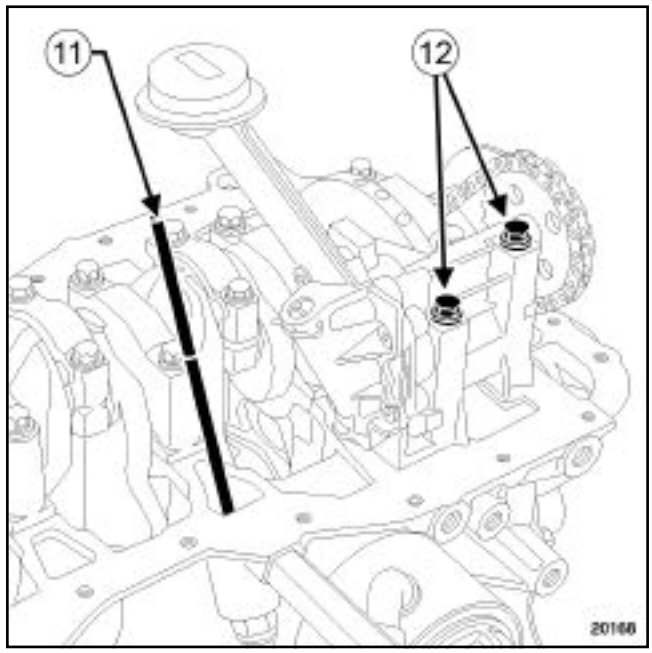
Remove the oil splash plate.



20165

Remove:

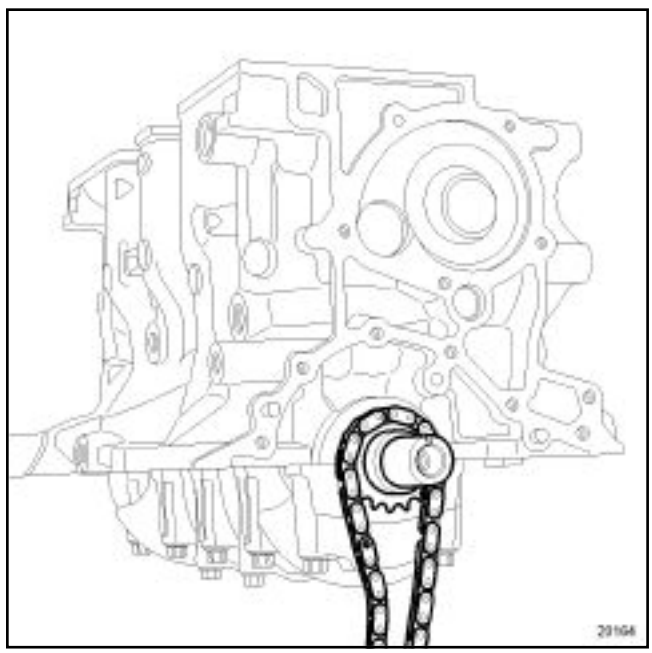
- the coolant pump mounting bolts (**9**) ,
- the coolant pump,
- the crankshaft nose closure panel mounting bolt (**10**) ,
- the crankshaft nose closure panel



20168

Remove:

- the oil level sensor (**11**) ,
- the oil pump mounting bolts (**12**) ,
- the oil pump.



20164

Remove:

- the oil pump chain,
- the oil pump drive sprocket.

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K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768

Special tooling required	
Mot. 1677	Flywheel locking tool.
Mot. 1329	Oil filter removing tool (76 mm diameter).
Emb. 1596	24 mm socket for removing/refitting clutch master cylinder.

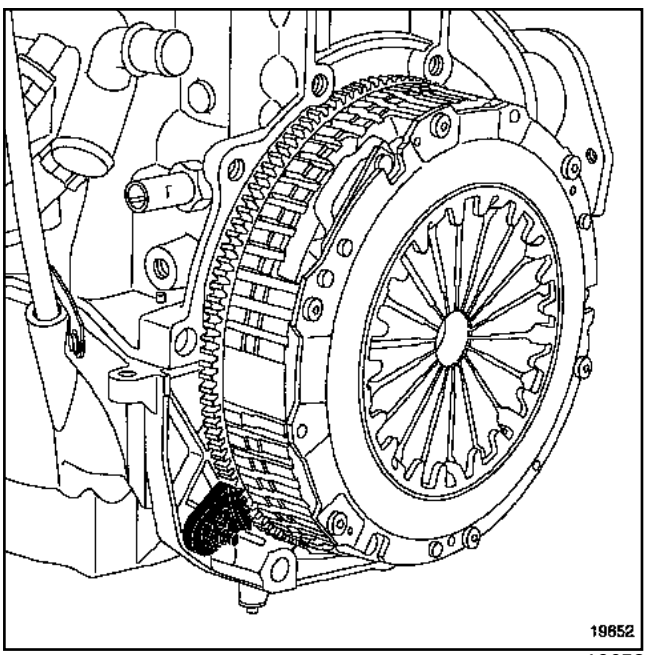
I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

II - EQUIPMENT REQUIRED

- Wide, flat-blade screwdriver,
- Male torx socket.

III - STRIPPING THE CYLINDER BLOCK

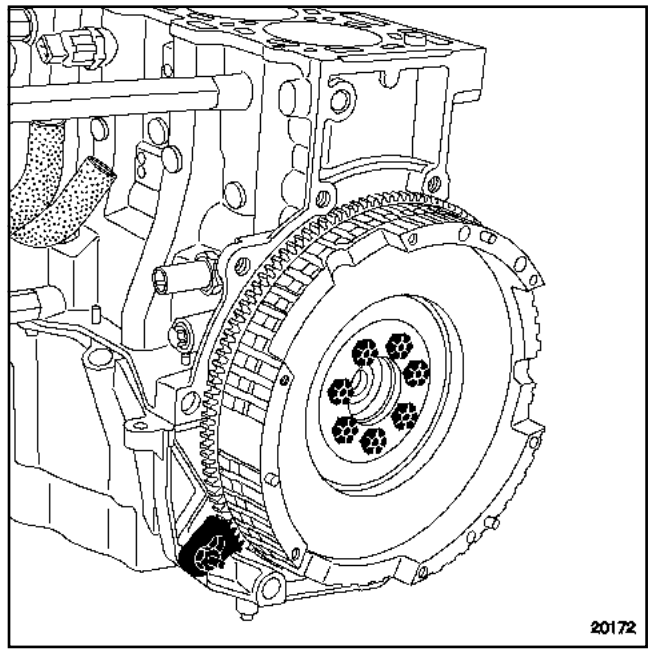


19652

Fit the engine flywheel lock **(Mot. 1677)** .

Remove:

- the clutch mechanism mounting bolts,
- the clutch pressure plate,
- the clutch plate.



20172

Remove:

- the flywheel mounting bolts,
- **(Mot. 1677)** ,
- the flywheel.

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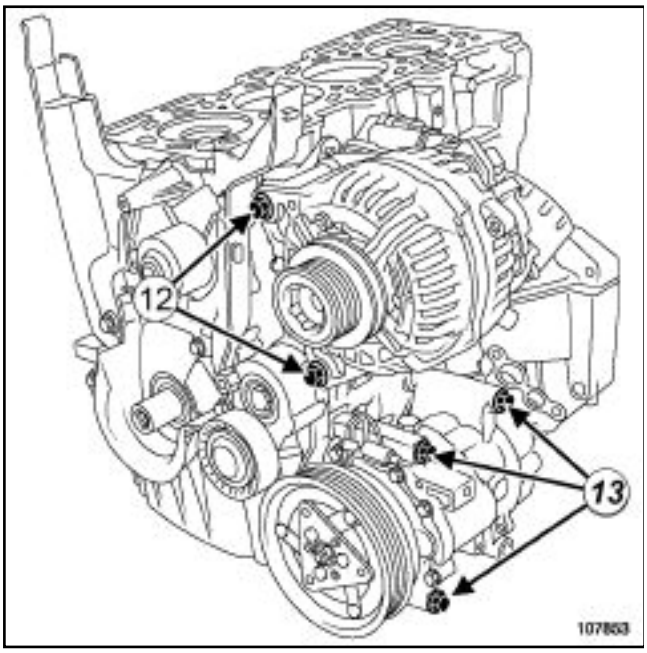
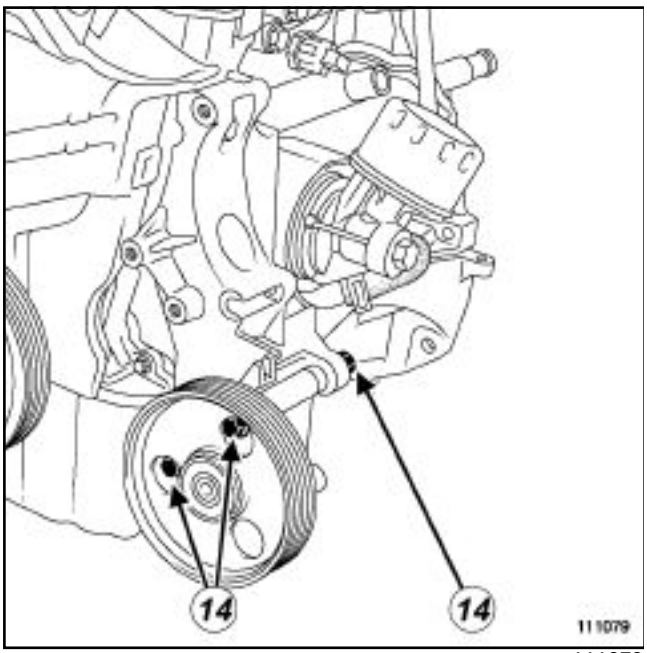
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



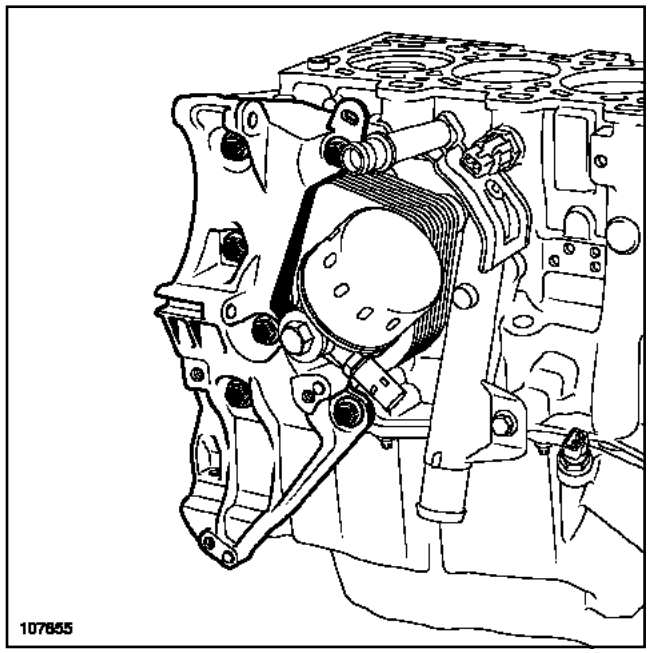
107853



111079

Remove:

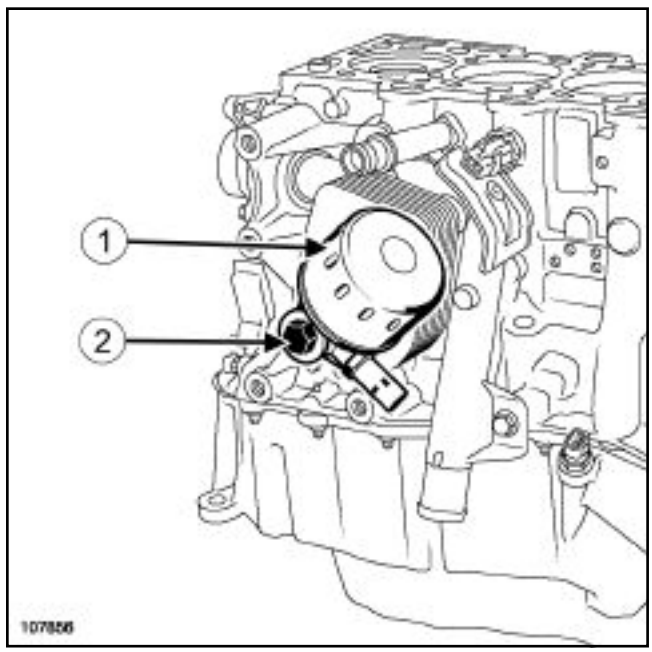
- the alternator mounting bolts (**12**) ,
- the alternator using a wide flat-blade screwdriver (if necessary),
- the mounting bolts (**13**) of the air conditioning compressor (if fitted),
- the air conditioning compressor,
- the mounting bolts (**14**) of the power assisted steering pump or the dummy pulley if fitted,
- the power assisted steering pump or the dummy pulley.



107855

Remove:

- the multifunction support mounting bolts,
- the multifunction support.



107856

Remove:

- the oil filter (**1**) using the **(Mot. 1329)** ,
- the oil filter holder mounting bolt (**2**) ,
- the oil filter holder.

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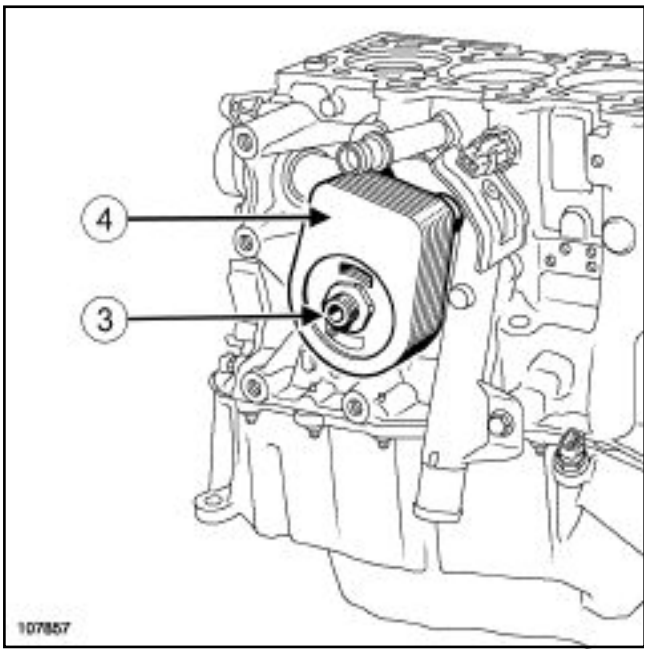
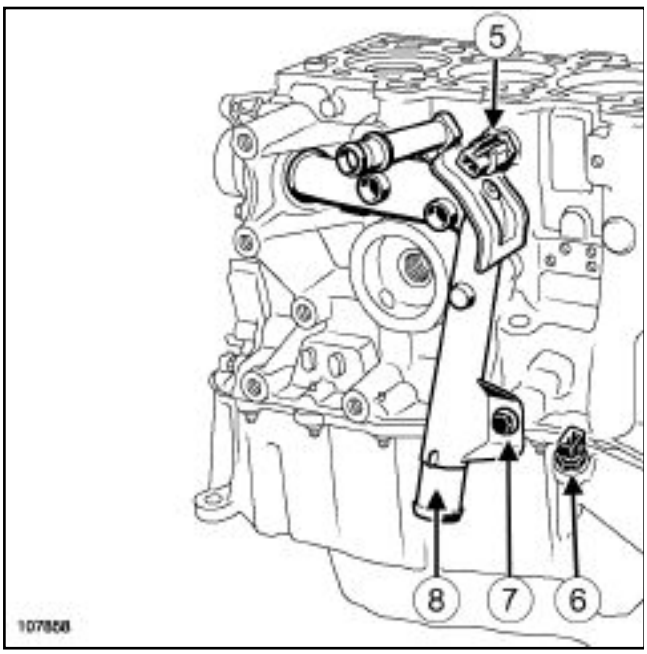
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



107857

Remove:

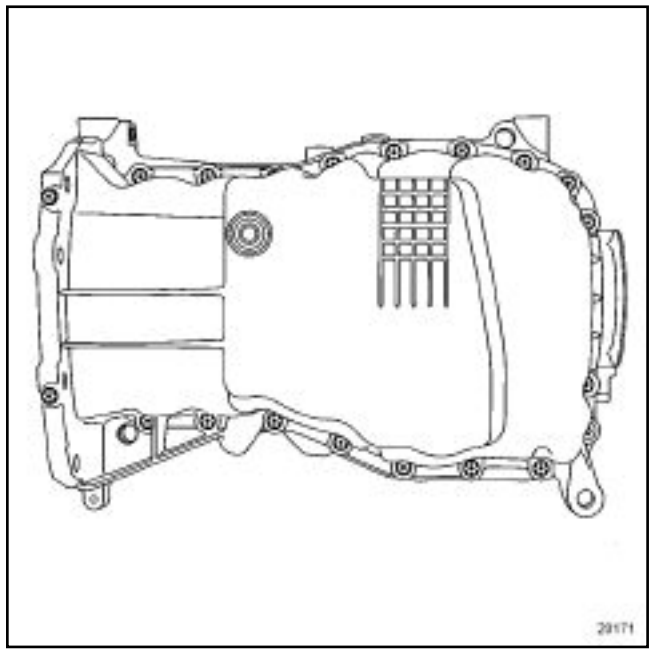
- the mounting bolt (**3**) from the oil/coolant heat exchanger,
- the oil/coolant heat exchanger (**4**) .



107858

Remove:

- the acceleration meter (**5**) using the **(Emb. 1596)** ,
- the oil level sensor (**6**) ,
- the mounting bolt (**7**) of the coolant pump inlet pipe,
- the coolant pump inlet pipe (**8**) .

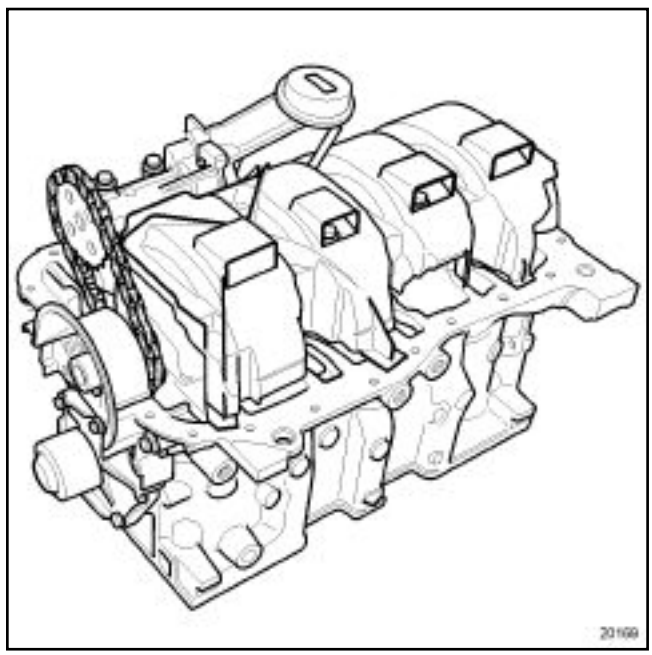


20171

Remove:

- the engine oil sump mounting bolts,
- the engine oil sump.

K9K, and 712 or 728



20169

Remove the oil splash plate.

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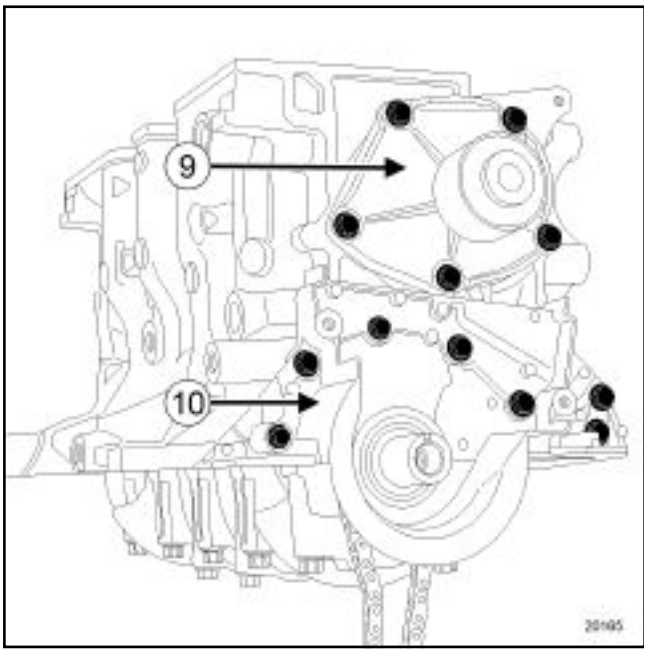
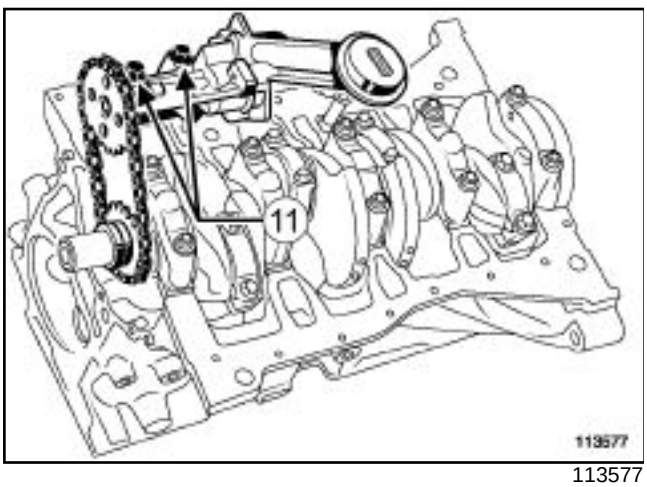
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



20165

Remove:

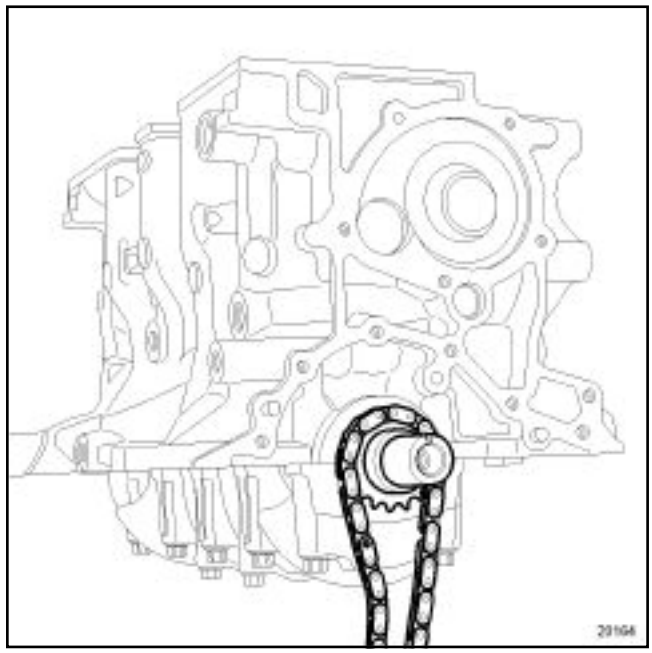
- the coolant pump mounting bolts (**9**) ,
- the coolant pump,
- the crankshaft nose closure panel mounting bolt (**10**) ,
- the crankshaft nose closure panel



113577

Remove:

- the oil pump mounting bolts (**11**) ,
- the oil pump.



20164

Remove:

- the oil pump chain,
- the oil pump drive sprocket.

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K9K, and 732 or 764

Special tooling required	
Mot. 1329	Oil filter removing tool (76 mm diameter).
Mot. 1677	Flywheel locking tool.

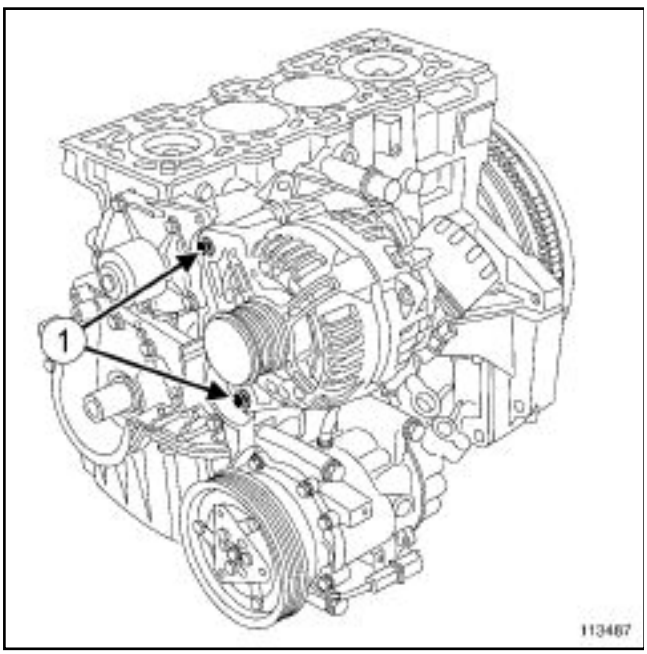
I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

II - EQUIPMENT REQUIRED

- Wide, flat-blade screwdriver,
- Male torx socket.

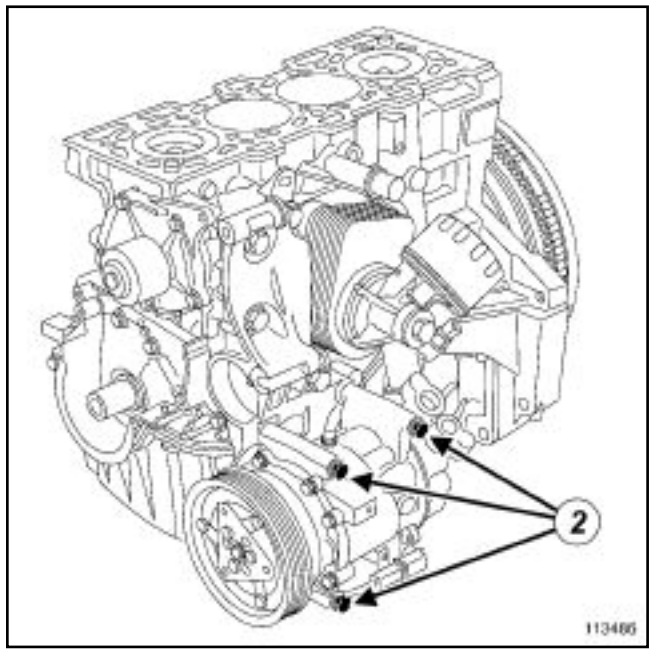
III - STRIPPING THE CYLINDER BLOCK



113487

Remove:

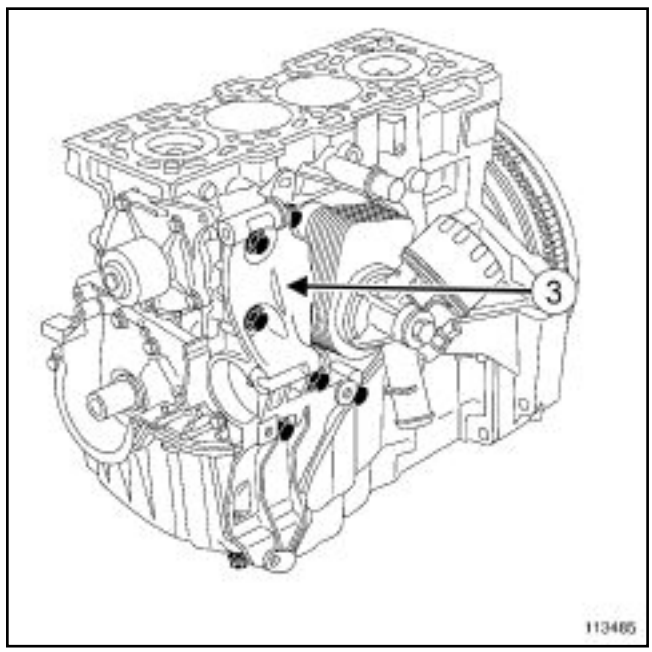
- the alternator mounting bolts (**1**) ,
- the alternator using a wide flat-blade screwdriver (if necessary),



113486

Remove:

- the air conditioning compressor mounting bolts,
- the air conditioning compressor.



113485

Remove:

- the multifunction support mounting bolts,
- the multifunction support (**3**) .

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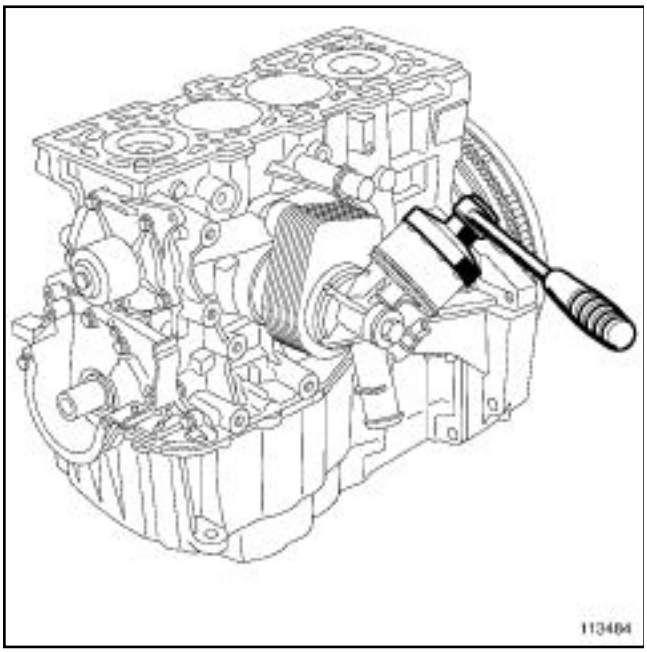
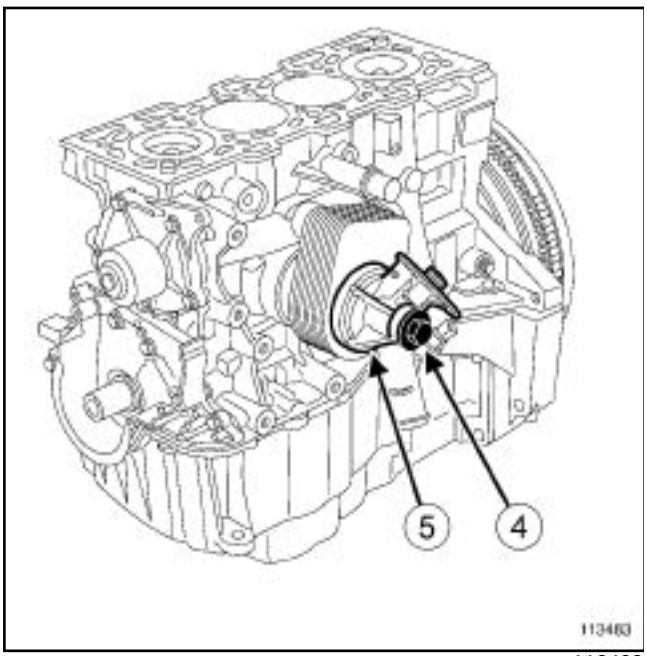
K9K, and 732 or 764



113484

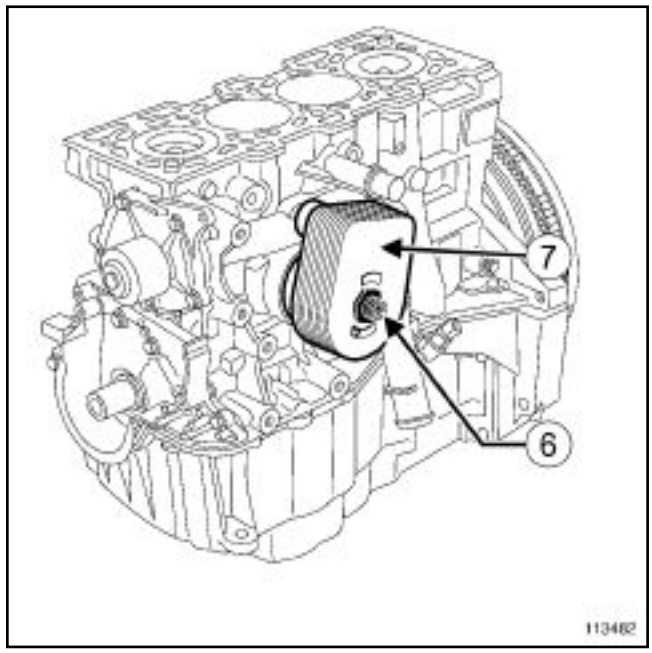
Remove the oil filter using the **(Mot. 1329)** .



113483

Remove:

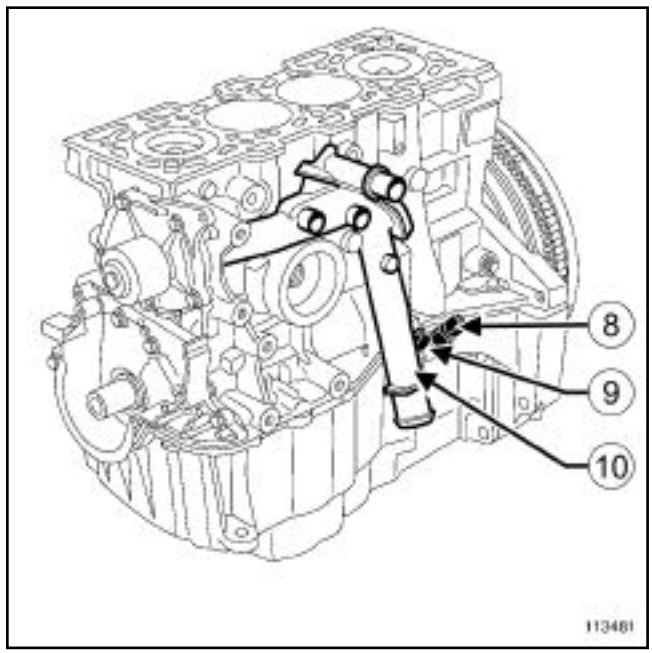
- the oil filter holder mounting bolt (**4**) ,
- the oil filter holder (**5**) .



113482

Remove:

- the mounting bolt (**6**) from the oil/coolant heat exchanger,
- the oil/coolant heat exchanger (**7**) .



113481

Remove:

- the oil level sensor (**8**) ,
- the mounting bolt (**9**) of the coolant pump inlet pipe,
- the coolant pump inlet pipe (**10**) .

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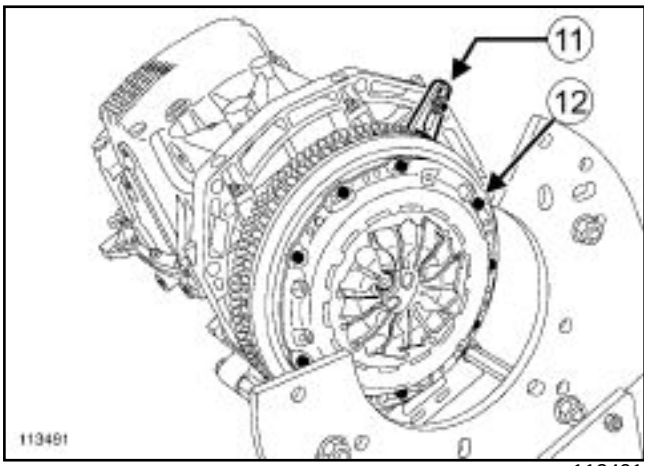
K9K, and 732 or 764

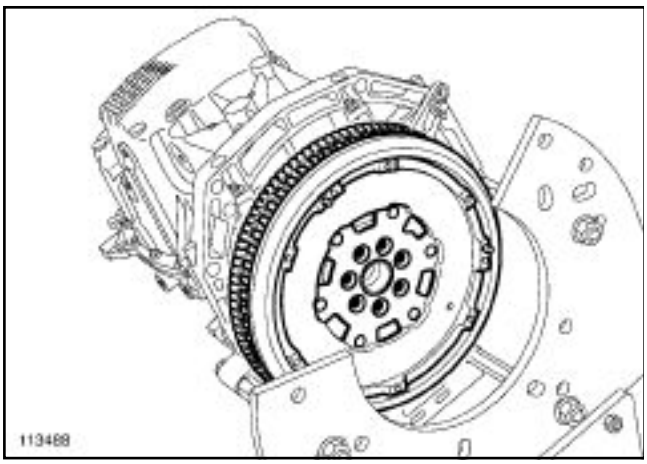


113491

Fit the engine flywheel lock **(Mot. 1677)** (**11**) .

Remove:

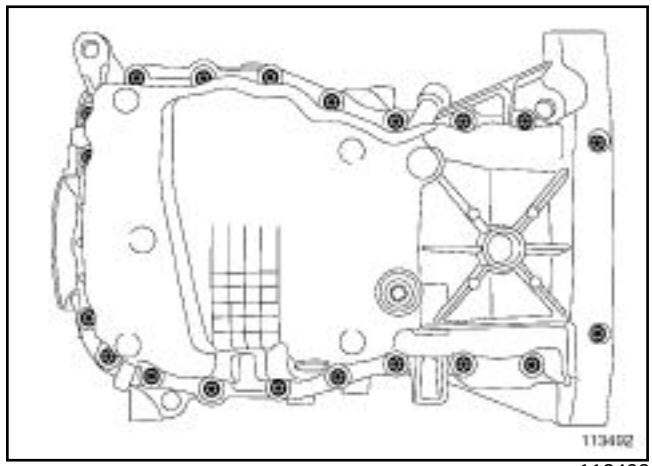
- the mounting bolts (**12**) of the clutch pressure plate, using a male torx socket,
- the clutch pressure plate,
- the friction plate.



113488

Remove:

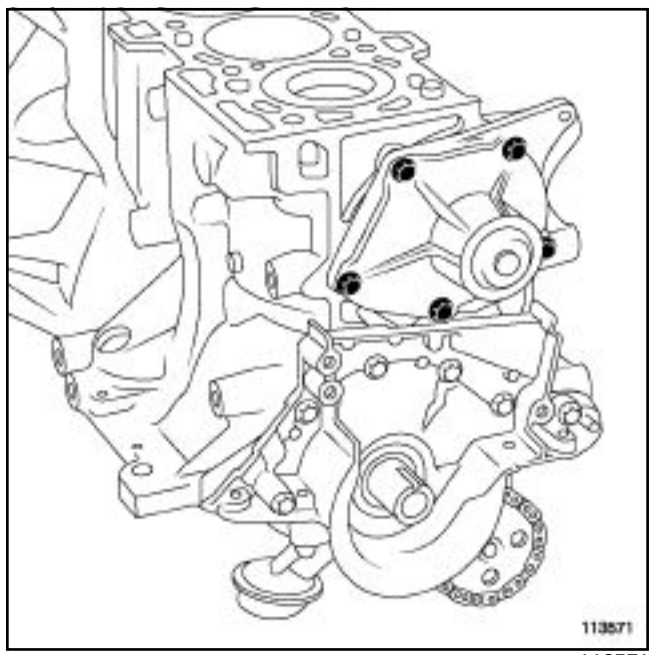
- the mounting bolts of the flywheel, using a male torx socket,
- the flywheel block **(Mot. 1677)** ,
- the flywheel.



113492

Remove:

- the engine oil sump mounting bolts,
- the engine oil sump.



113571

Remove:

- the coolant pump mounting bolts,
- the coolant pump.

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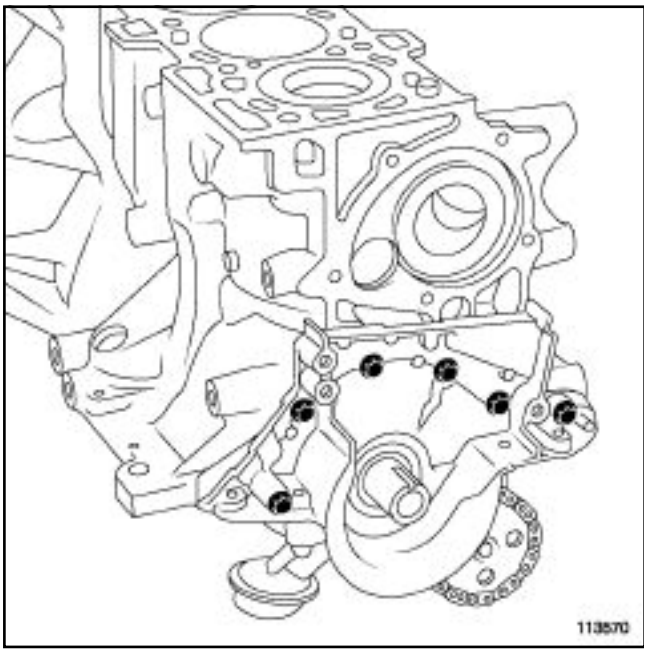
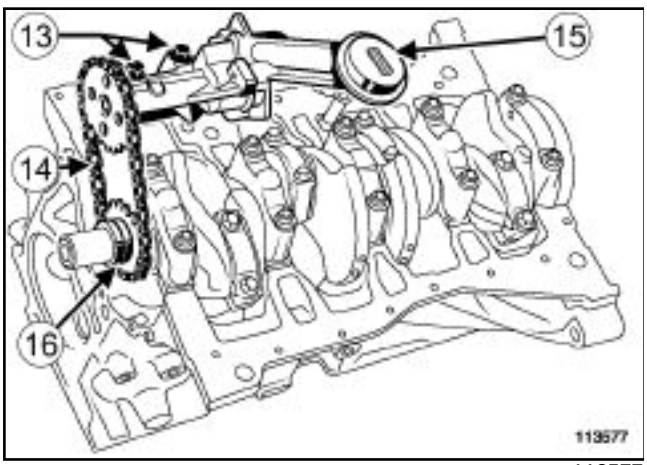
K9K, and 732 or 764



113570

Remove:

- the crankshaft nose closure panel mounting bolt,
- the crankshaft nose closure panel.



113577

Remove:

- the oil pump mounting bolts (**13**) ,
- the oil pump (**15**) ,
- the oil pump chain (**14**) ,
- the oil pump drive sprocket (**16**) .

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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:

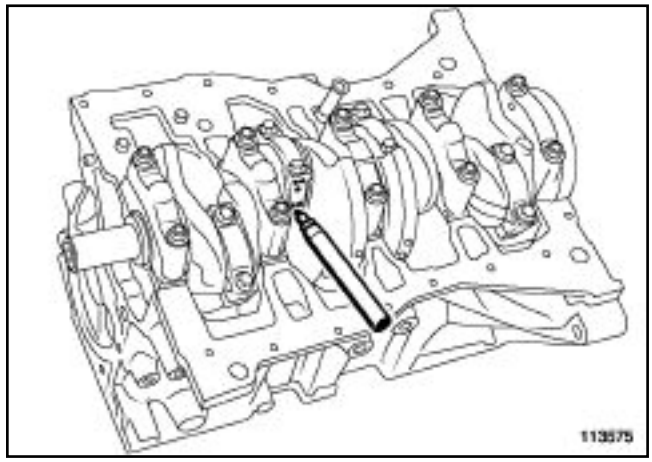
It is essential to mark:

- 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

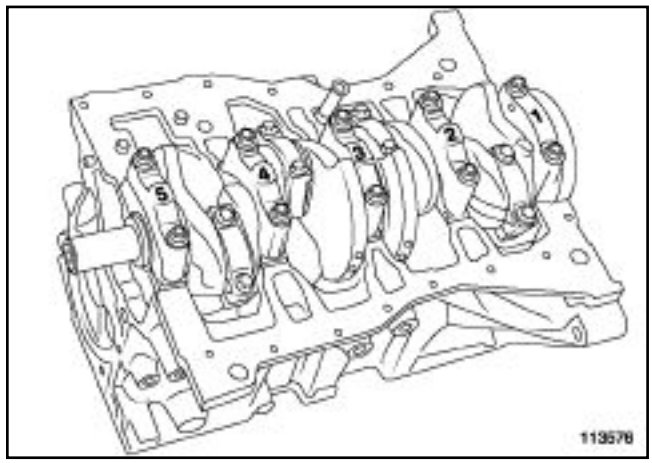
- Indelible pencil,
- Female torx socket.
- Mallet,
- Roll pin punch (**10 mm** in diameter).
- Male Allen key (**10 mm**),
- Piston ring compressor,
- Flat-blade screwdriver,

III - REMOVING THE ROTATING PARTS



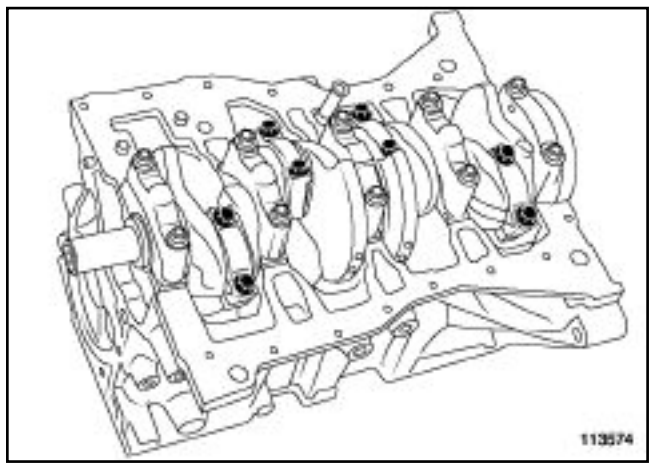
113575

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,

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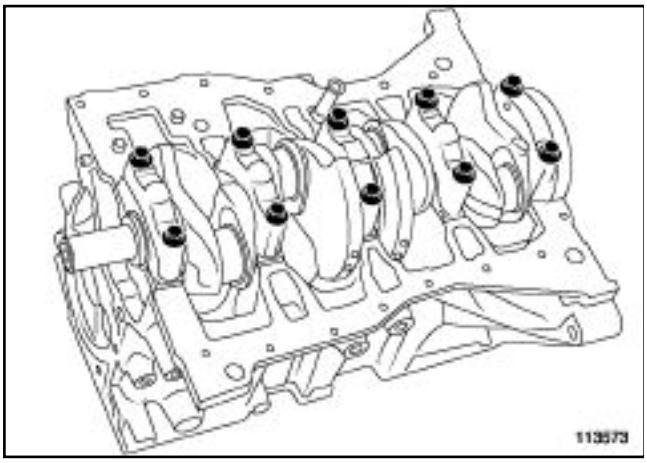
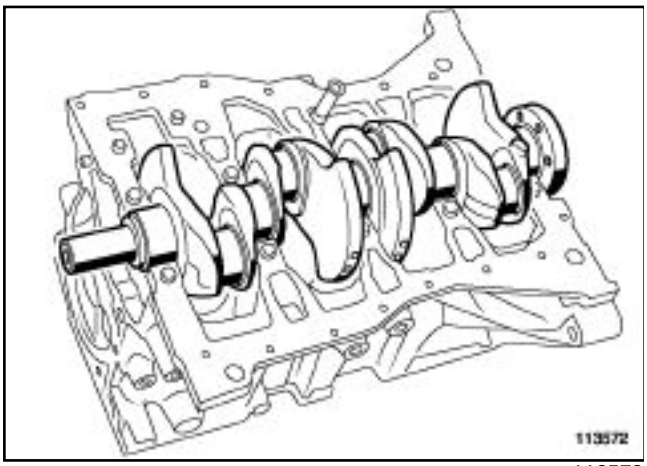
- the con rod-piston assemblies.



113573

Remove:

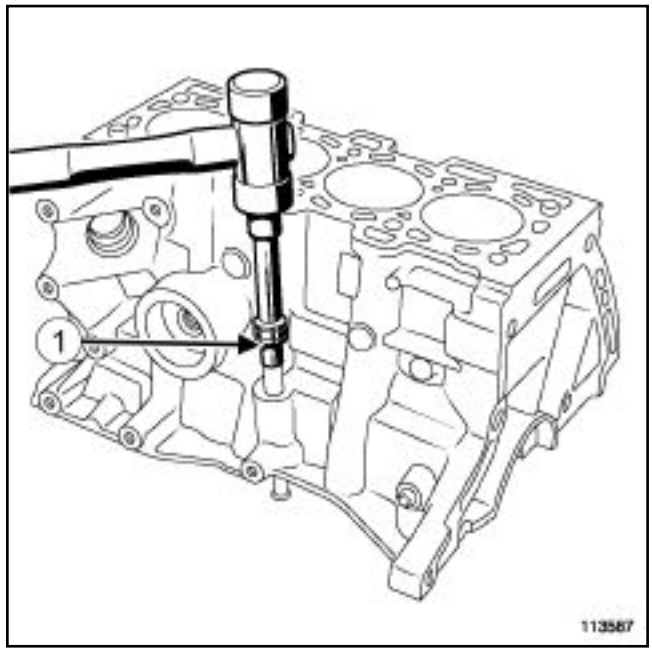
- the crankshaft bearing cap mounting bolts.
- the crankshaft bearing caps.



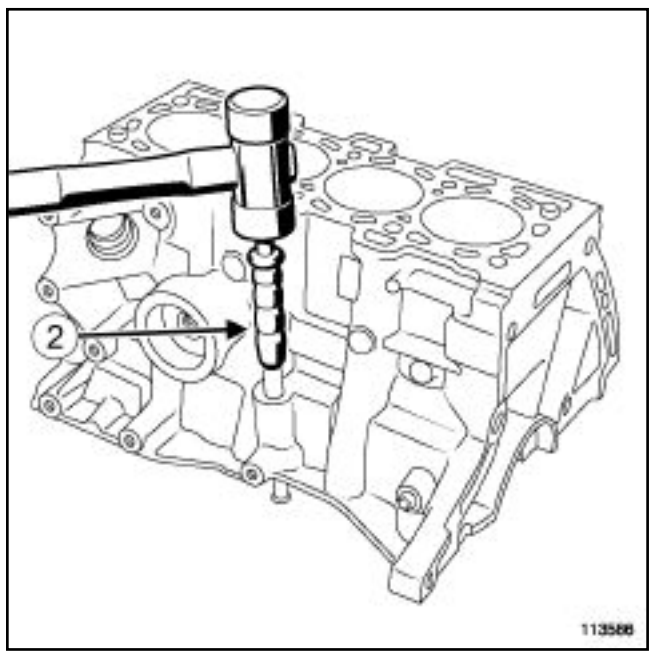
113572

Remove the crankshaft.

Remove the thrust washer from the crankshaft.



113587



113586

Remove the dipstick guide tube (if the cylinder block is fitted with one) using a **10mm** (**1**) Allen key or a **10mm** (**2**) pin punch.

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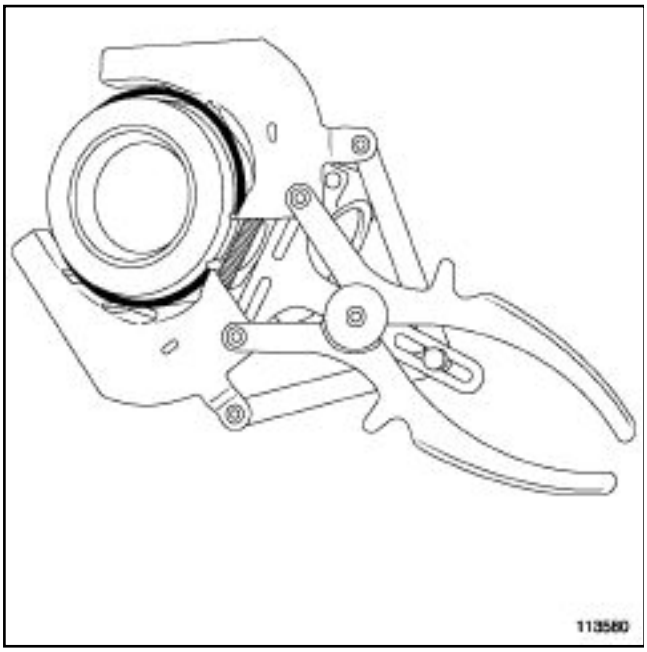
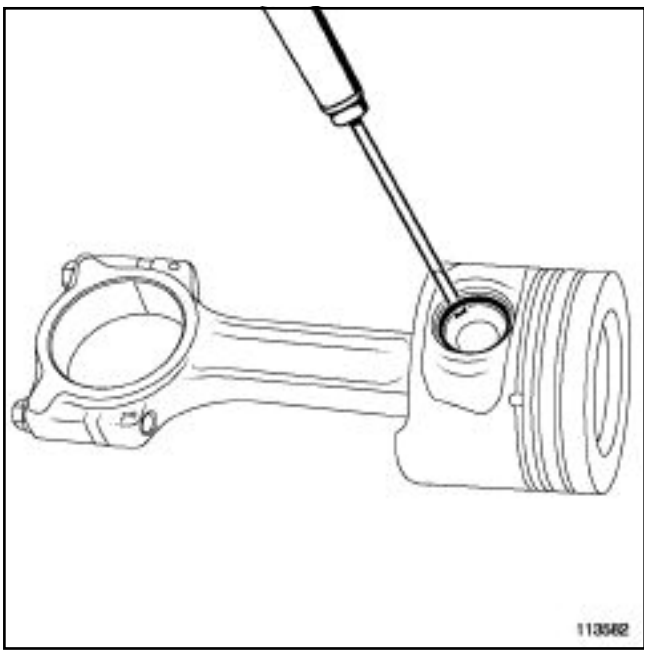


113580

Remove the piston rings using a piston ring compressor.



113582

Remove the circlip using a flat-blade screwdriver.

Mark the gudgeon pins in relation to the pistons using an indelible pencil.

Remove the gudgeon pin.

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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.

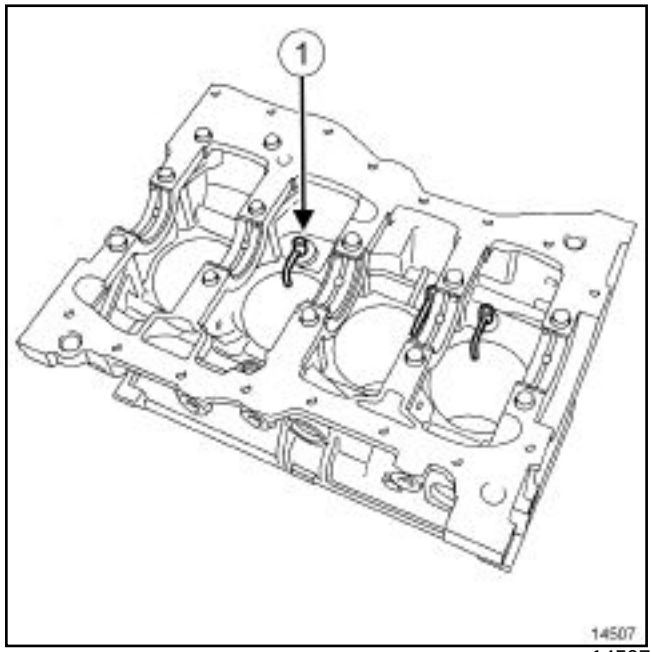
WARNING

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

II - EQUIPMENT REQUIRED

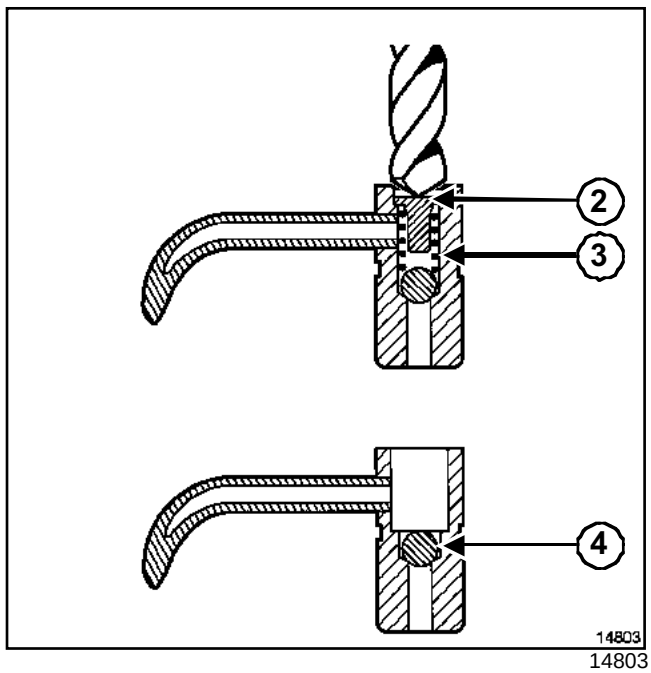
- Drill bit **7 mm in diameter**
- Allen key (**6 mm**),
- Brush,
- Protective goggles,
- Compressed air gun.

III - REMOVING THE PISTON BASE COOLING JETS



14507

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



14803

Note:

Do not remove the ball (**4**) .

Remove:

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

Wear protective goggles.

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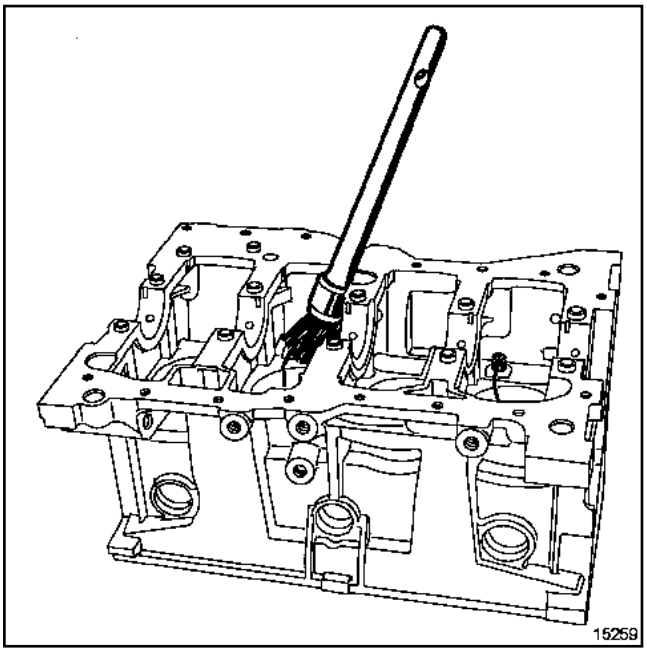
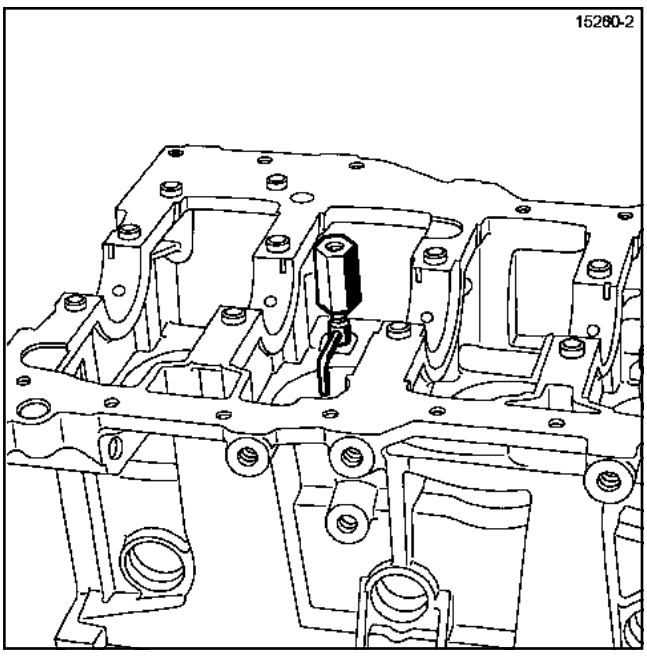


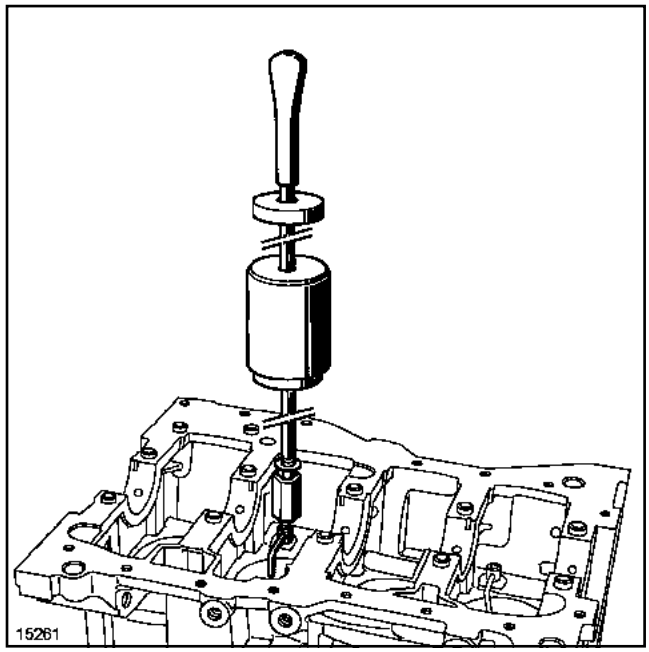
15259

Move any swarf using a brush and compressed air gun.



15260-2

Screw the **(Mot. 1485-01)** into the drilled jet with a **6 mm** Allen key, which should slide into the tool.



15261

Screw the large slide hammer **(Emb. 880)** on the **(Mot. 1485-01)** .

Remove the piston base cooling jets.

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Special tooling required	
Mot. 923	Engine lifting ring.

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT

Do not scratch the aluminium sealing surfaces.

Wear goggles.

Wear gloves during the operation.

WARNING

Do not allow this product to drip on to the paintwork.

Clean the cylinder block components carefully to prevent foreign bodies from entering the oil supply and return galleries.

Failure to follow this advice could lead to the blocking of the various oil inlet galleries, which would quickly result in engine damage.

When cleaning parts, it is essential to not knock the parts against each other, or their mating faces may be damaged and therefore their adjustments may be altered, which could damage the engine.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Consumables

- Décapjoint, part no. **77 01 405 952** ,
- Grey sanding pad, part no. **77 01 405 943** .

III - EQUIPMENT REQUIRED

- Protective goggles,
- Protective gloves,
- Wooden spatula,
- Compressed air gun,
- Load positioner,
- Workshop hoist,
- Cleaning fountain,
- Cleaning bench.

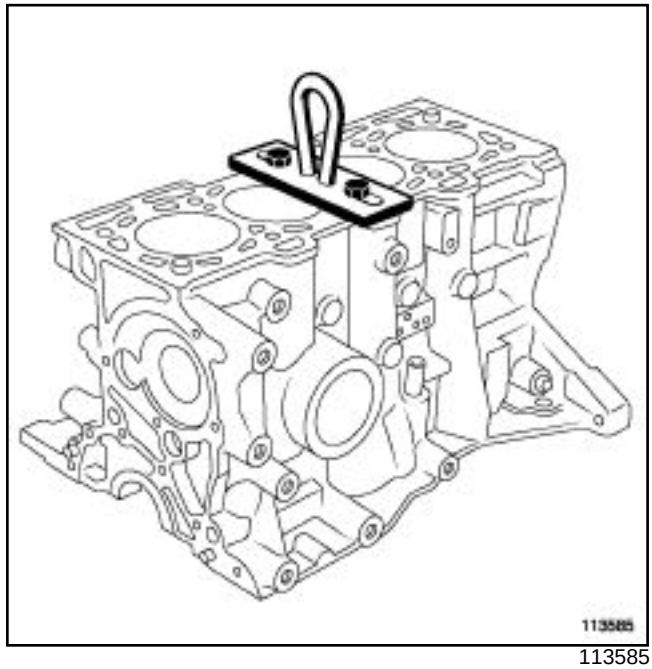
IV - CLEANING THE CYLINDER BLOCK

Apply the **DÉCAPJOINT** product to the sections to be cleaned.

Leave for around ten minutes.

Remove residues with a wooden spatula.

Finish cleaning the parts using a grey polishing pad.



113585

Position the **(Mot. 923)** on the cylinder block.

Remove the cylinder block from the engine stand using a load positioner and a workshop hoist.

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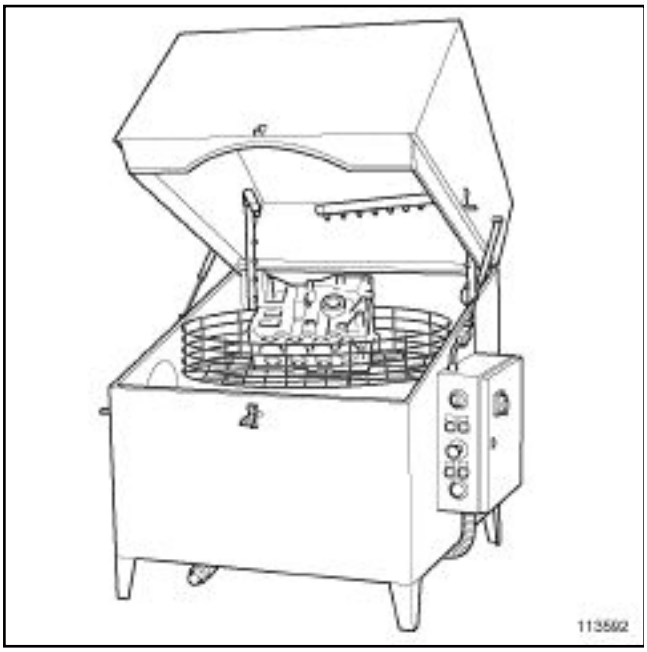
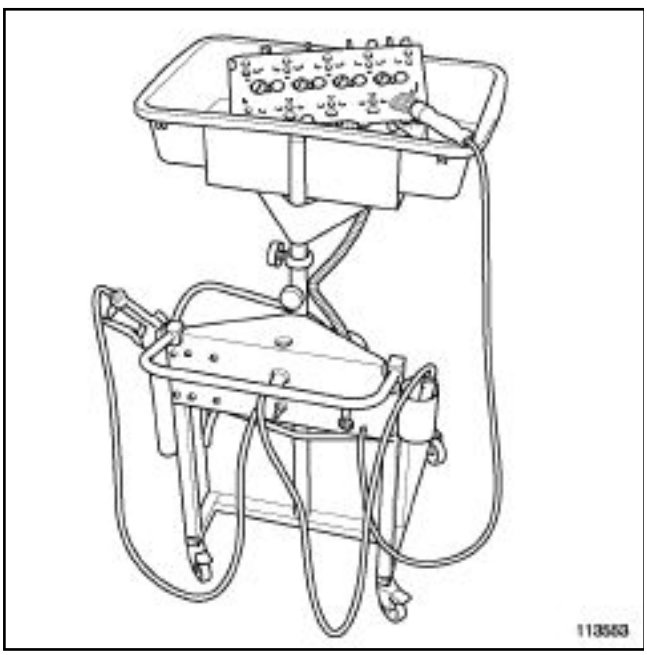


113592



113553

Wash the cylinder block parts using a cleaning fountain or a heated cleaning bath.

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Special tooling required	
Mot. 1493-01	Crankshaft bearing centring tool.
Mot. 1492-03	Tool for fitting main bearing shells.
Mot. 1492	Tool for fitting main bearing shells.

I - RECOMMENDATIONS FOR REPAIR

WARNING

Parts should be clean before examining and testing them.

No adjustment is authorised to the cylinder block or the crankshaft.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Consumables

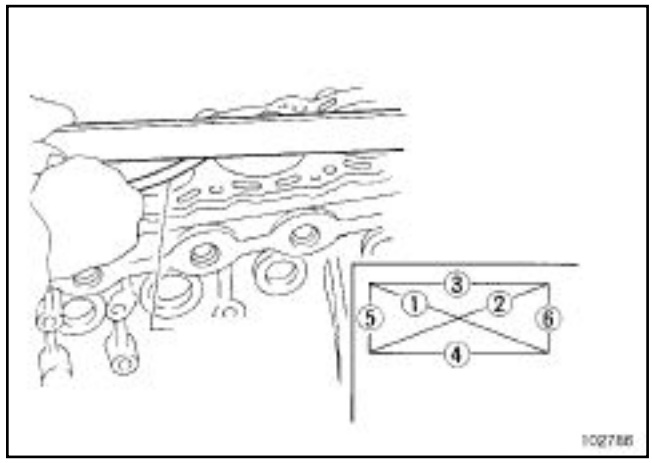
- Degreasing agent, part no. **77 11 224 559** .

III - EQUIPMENT REQUIRED

- Torque wrench and cylinder head bolt tightening gauge (angular measuring type),
- Torque/angle wrench,
- Radial play measuring tape.
- Sliding calliper,
- Micrometer,
- Dial gauge,
- Body jig bench and a pair of v-blocks.
- Magnetic holder,
- Set of shims,
- Cylinder head rule.

IV - CYLINDER BLOCK CHECK

1 - Checking the cylinder block gasket face



102786

Use a cylinder head adjuster and set of shims to check the seal face bow.

Maximum deformation: **0.03 mm** .

2 - Checking the diameter of the crankshaft bearings on the cylinder block

Refit the crankshaft bearing caps, fitting cap no. **1** at the flywheel end.

Torque and angle tighten **the main bearing cap mounting bolts (25 ± 2.5 Nm + 47° ± 6)** .

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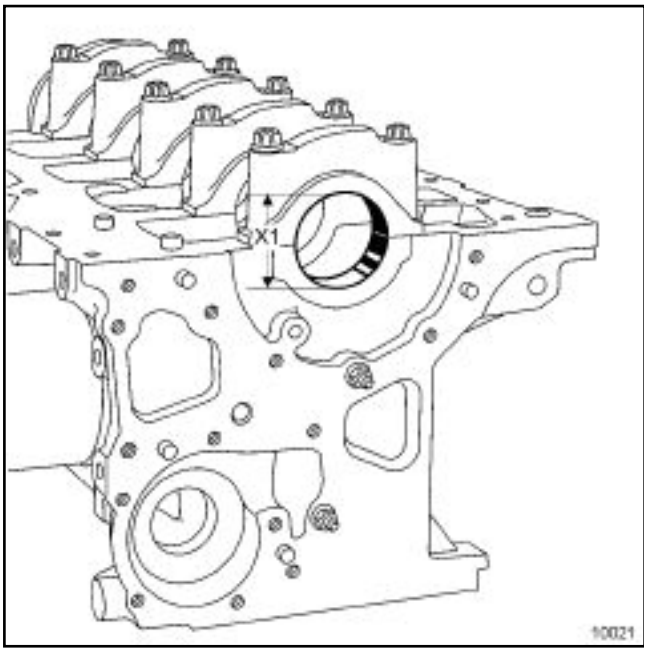
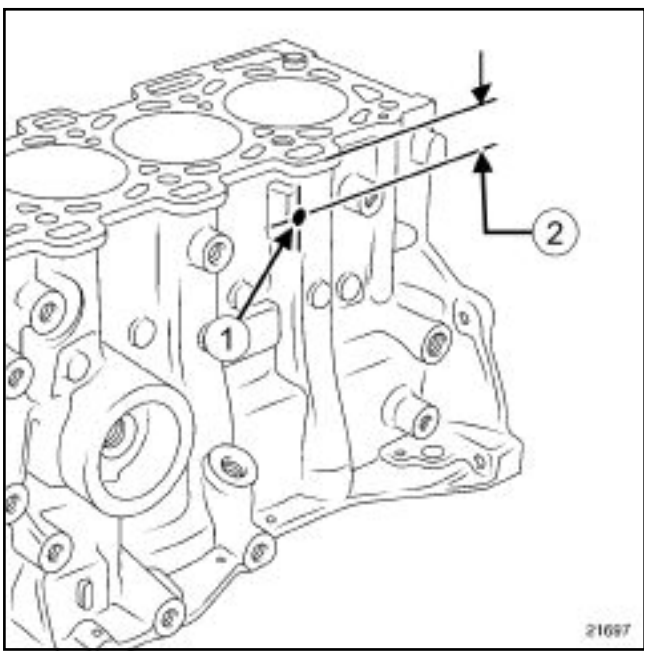


10021



21697

Note:

The hole (**1**) defines the diameter category of the crankshaft bearings on the cylinder block.

It is only possible to have one diameter category of crankshaft bearings on one engine.

Measure the dimension (**2**) to identify the diameter category of the crankshaft bearings on the cylinder block.

(2) = **33 mm** :

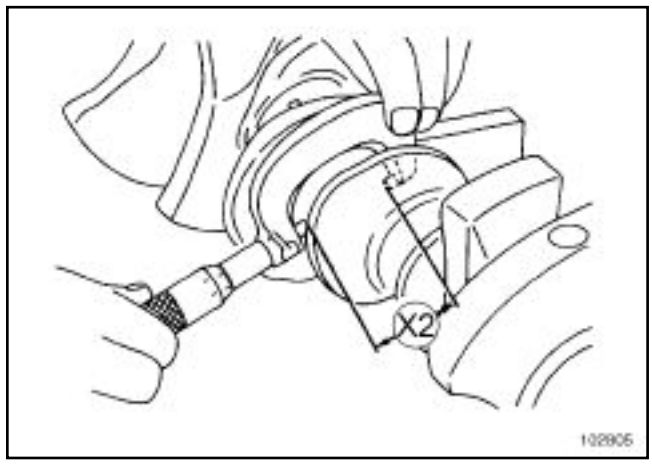
- the diameter category is **1** ,
- the diameter of the crankshaft bearings on the cylinder block is **51.936 to 51.942 mm excl.** .

(2) = **43 mm** :

- the diameter category is **2** ,
- the diameter of the crankshaft bearings on the cylinder block is **51.942 incl. to 51.949 mm** .

Remove the crankshaft bearing caps.

3 - Check the diameter of the crankshaft journals



102805

Measure the diameter of the journals using a micrometer (**X2**) .

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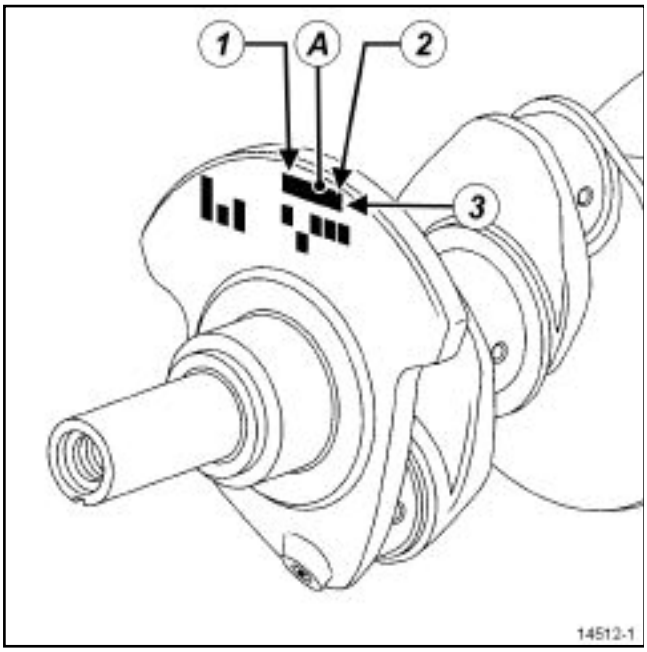
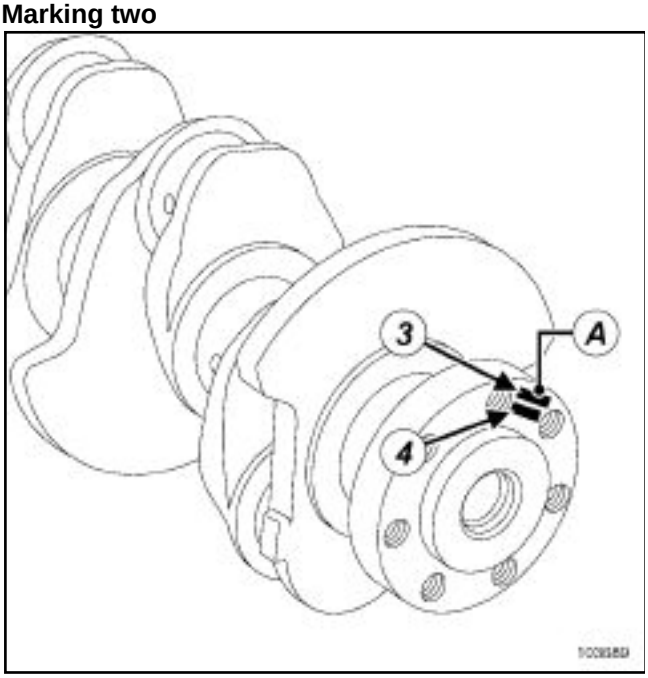
Marking one



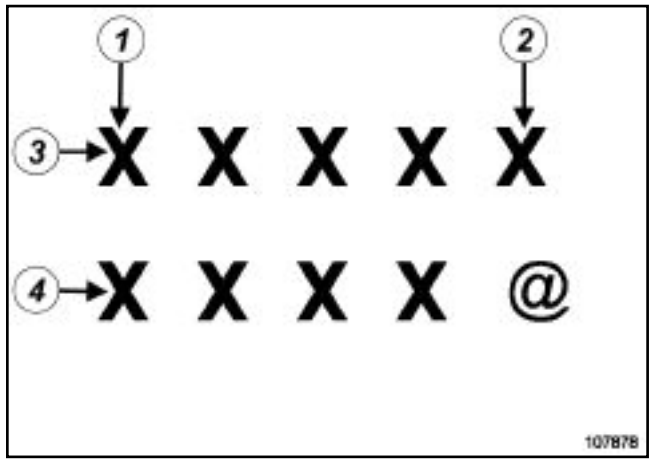
14512-1

Marking two



103689

Detail of marking "A".



107878

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

(**2**) diameter category of journal no.5, timing end,

(**3**) line indicating the diameter class of the journals,

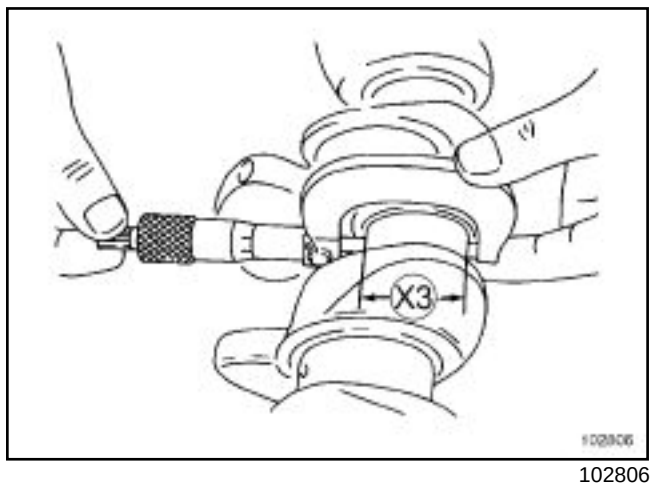
(**4**) line indicating the diameter class of the crankpins.

The marks of journal category **A, G, K, R,W** correspond to a diameter of **47.990 to 47.997 mm excl.** ,

The marks of journal category **B, H, L, S, Y** correspond to a diameter of **47.997 incl. to 48.003 mm excl.** ,

The marks of journal category **C, J, O, T, Z** correspond to a diameter of **48.003 incl. to 48.010 mm excl.** ,

4 - Check the diameter of the crankshaft crankpins



102806

Using a micrometer, measure the diameter of the crankpins (**X3**) which should be **43.97 ± 0.01 mm** .

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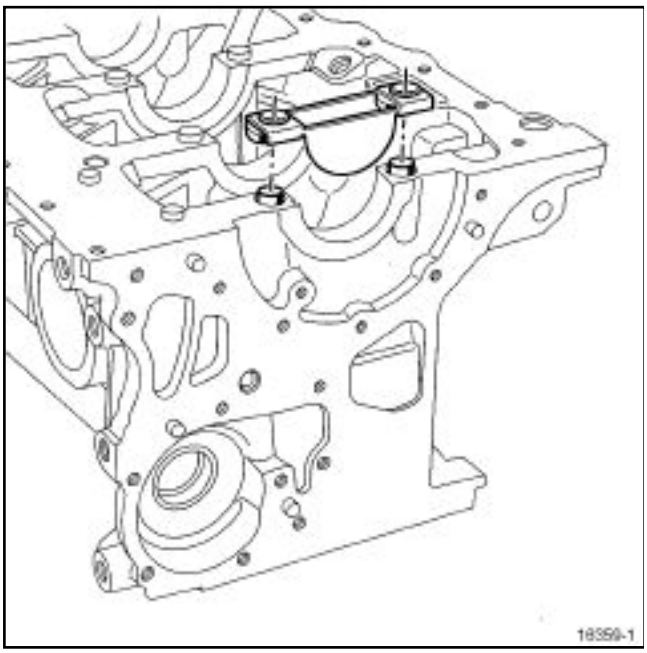
5 - Check for deformation of the contact surface of the crankshaft flywheel

Position the crankshaft on the v-blocks

Place the dial gauge at the base of the crankshaft.

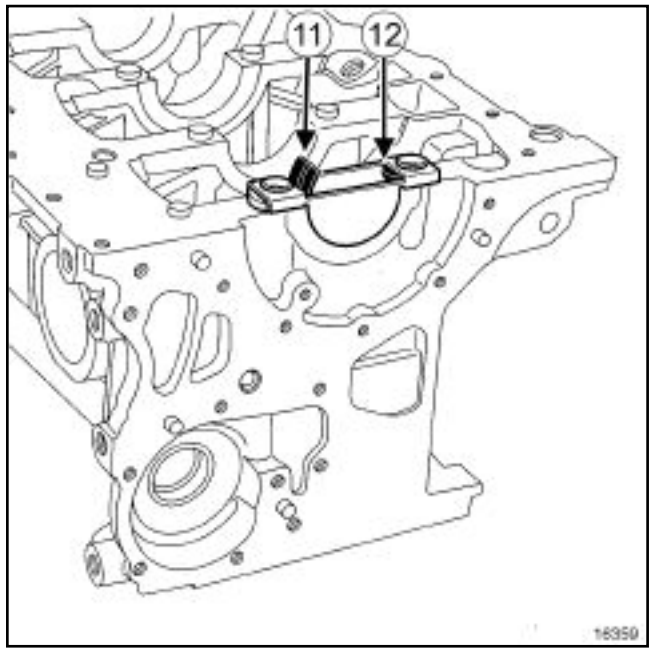
Measure the deformation of the contact surface of the flywheel which should not be greater than **0.6 mm** .

6 - Checking the crankshaft lateral clearance



16359-1

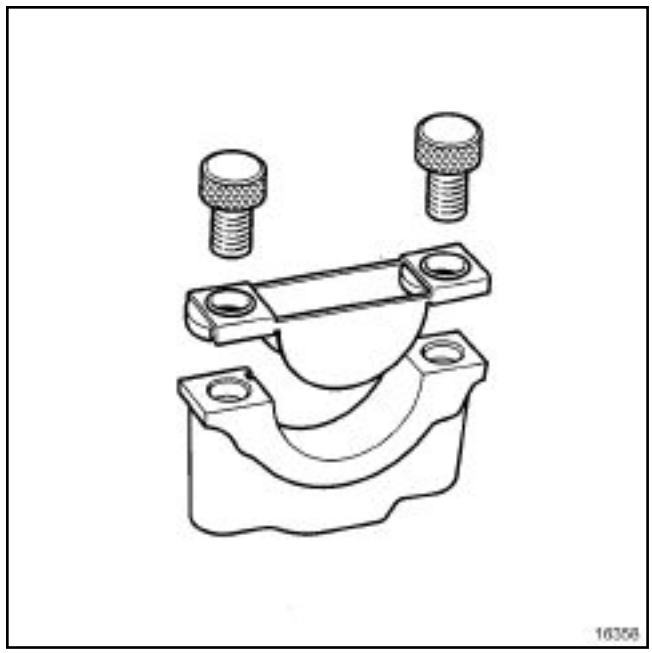
Position the **(Mot. 1493-01)** on the cylinder block.



16359

Mount the grooved bearing shell on the **(Mot. 1493-01)** .

Press at (**11**) on the bearing until it is in contact with the tool at (**12**) .



16358

Position the **(Mot. 1493-01)** on the crankshaft bearing cap.

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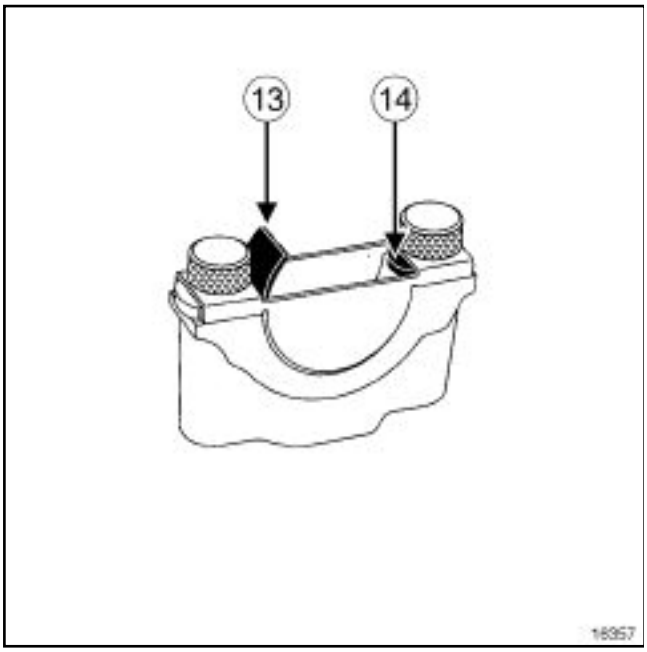


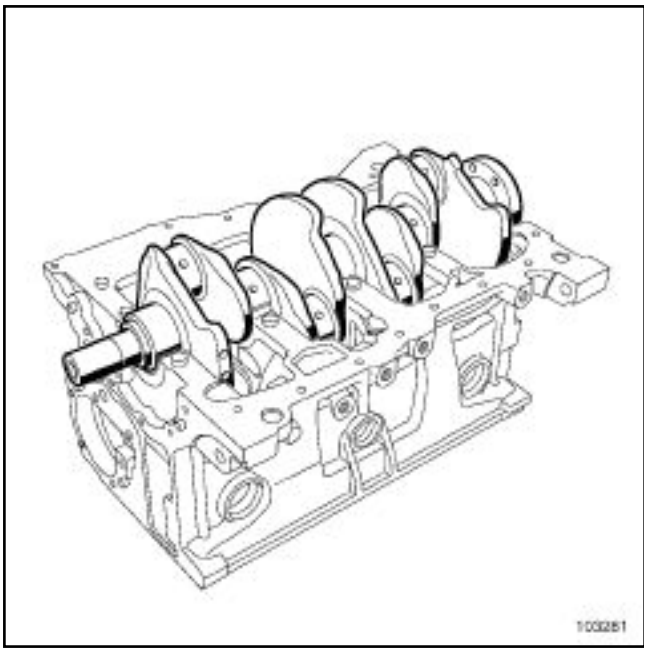
16357

Fit the non grooved bearing shell into the **(Mot. 1493-01)** .

Press at (**13**) on the bearing until it is in contact with the tool at (**14**) .

Lubricate:

- the crankshaft bearing shells (only the surface in contact with the crankshaft).
- the crankshaft journals.

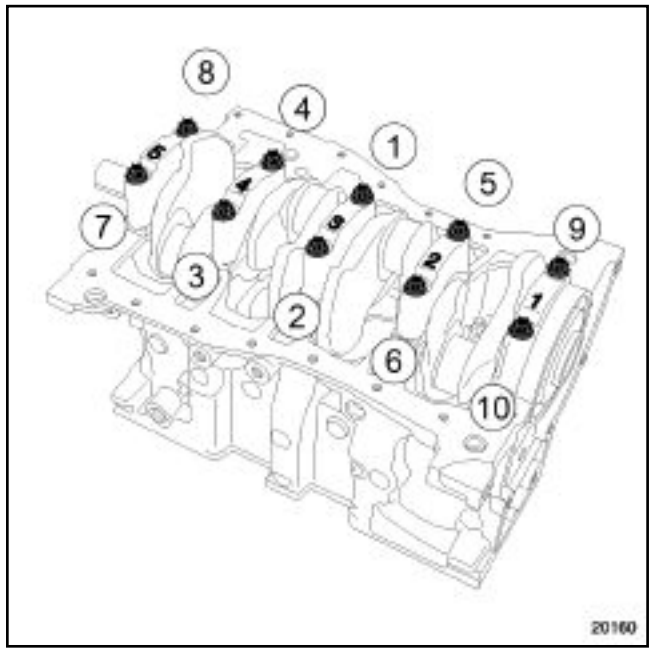


103281

Refit:

- the crankshaft,
- the crankshaft thrust washer on bearing **No.3** , positioning the grooves of the thrust washers at the crankshaft end.

Refit the crankshaft bearing caps (positioning bearing cap No. 1 at the flywheel end).



20160

Torque and angle tighten in order **the crankshaft bearing cap mounting bolts (25 ± 2.5 Nm + 47° ± 6°)** .

Check that the crankshaft turns freely, with no resistance.

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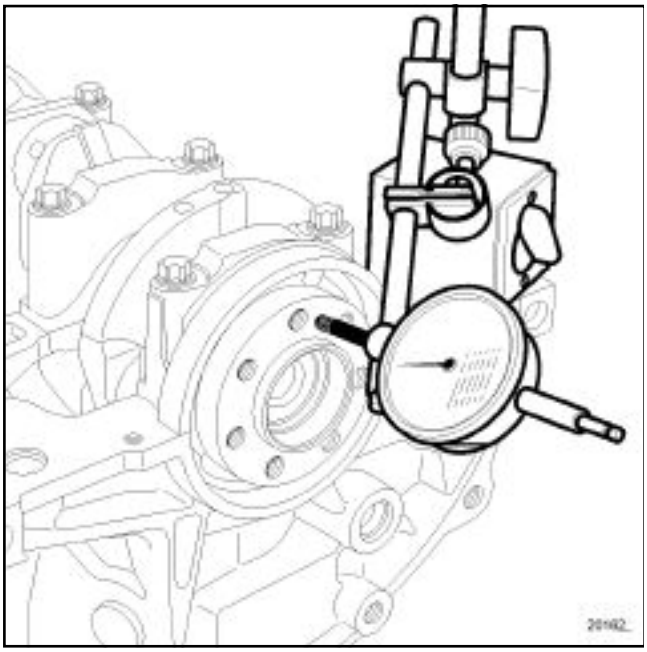


20162

Check the lateral clearance of the crankshaft, which must be:

- without thrust washer wear: **0.045 to 0.252 mm** ,
- with thrust washer wear: **0.045 to 0.852 mm** .

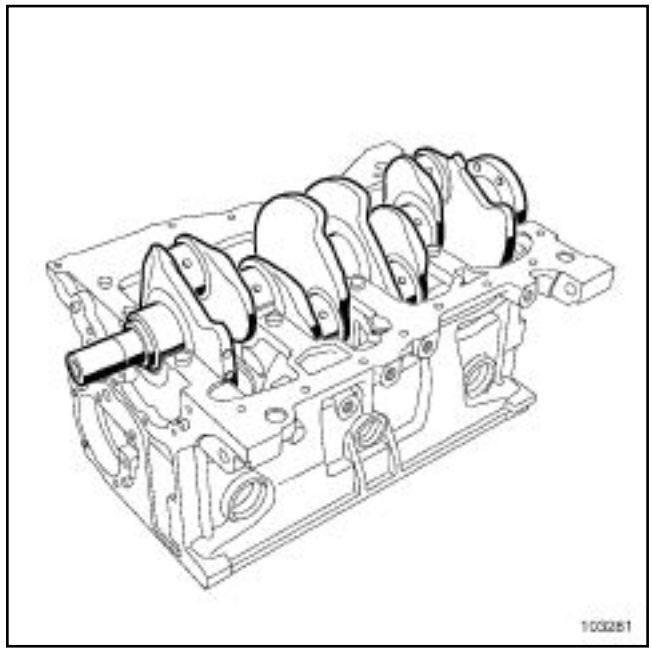
Remove:

- the crankshaft bearing caps,
- the crankshaft.

7 - Checking the crankshaft diametric clearance

> Note:
> Never turn the crankshaft during the operation.

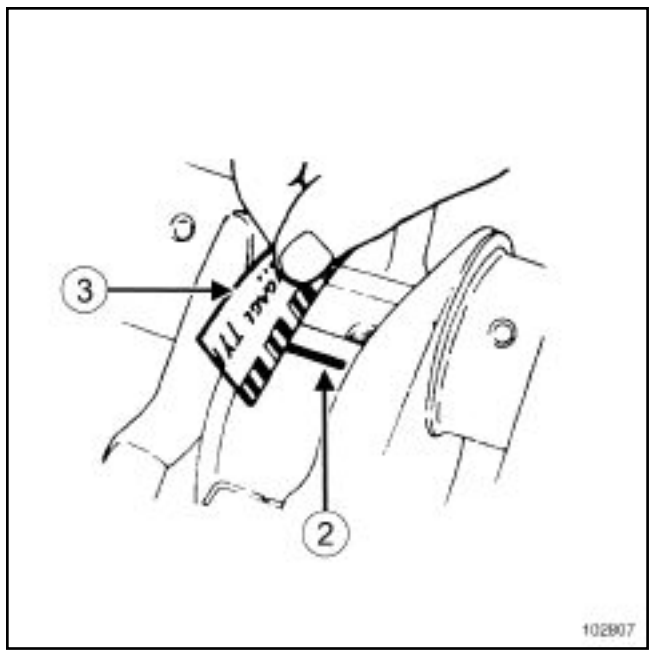
Remove any oil that may be on the crankshaft journals and cylinder block bearings.



103281

Refit:

- the crankshaft,
- the crankshaft thrust washer on bearing **No.3** (grooves at crankshaft end).



102807

Cut bits of wire (**2**) to measure the clearance.

Insert the wire into the axis of the crankshaft journals (avoiding the bearing lubrication holes).

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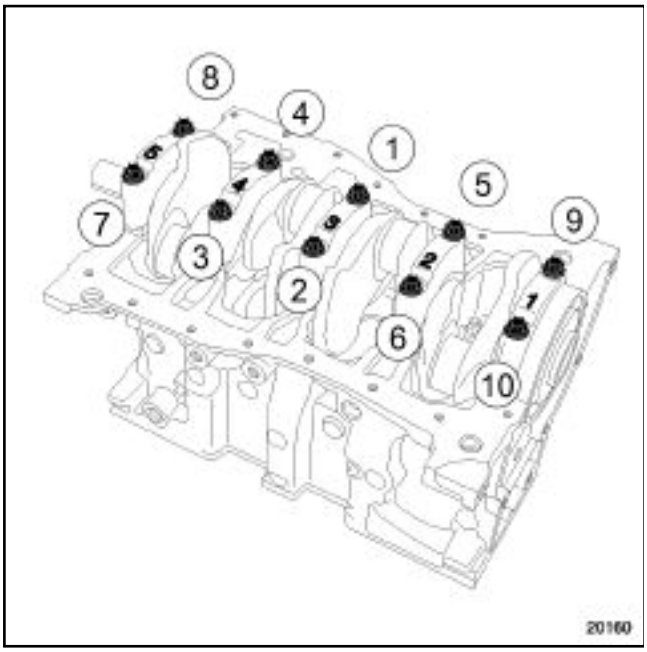


20160

Refit the crankshaft bearing caps, fitting **No.1** at the flywheel end.

Torque and angle tighten in order **the crankshaft bearing cap mounting bolts (25 ± 2.5 Nm + 47° ± 6°)** .

Remove:

- the crankshaft bearing caps,
- the crankshaft.

Measure the flattening of the clearance measuring wire using packaging paper **(3)** .

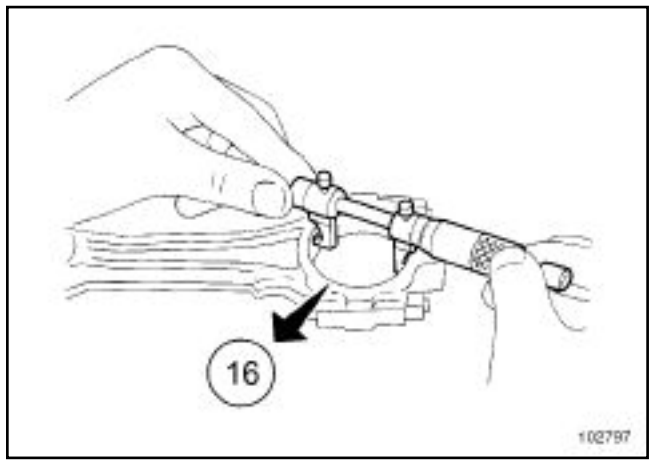
Check the clearance value, which must be between **0.010 and 0.054 mm** .

Clean any traces of measuring wire off the crankshaft and the bearing shells using degreasing agent.

8 - Checking the centre distance of the con rod

The distance between the small end and big end of the con rod should be **133.75 mm** .

9 - Checking the centre distance of the con rod



102797

Using a micrometer, measure the diameter of the big end, which should be **47.619 ± 0.009 mm** .

10 - Checking the diameter of the con rod small end

Using a micrometer, measure the diameter of the con rod small end (with ring):

- For engines K9K 260-700-702-704-710-722 manufactured up to 25/11/2002 the diameter should be **25.019 ± 0.006 mm** ,
- For engines K9K 260-700-702-704-710-722 from 25/11/2002 and engines K9K 270-272-274-276-706-712-714-716-718-724-728-729-732-750-752-760-762-764-766-768-790-792, the diameter should be between **26.019 ± 0.006 mm** .

11 - Checking the diametric clearance of the big ends

Note:

Never turn the crankshaft during the operation.

Remove any oil that may be on the crankshaft journals and cylinder block bearings.

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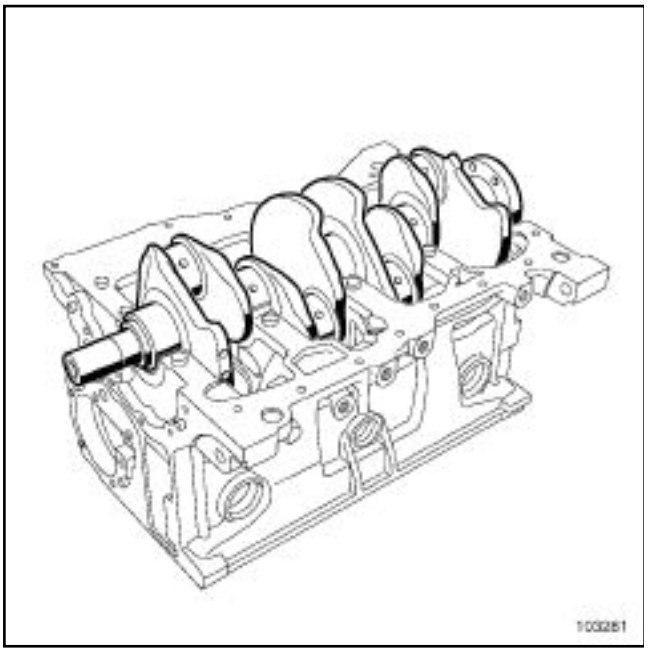
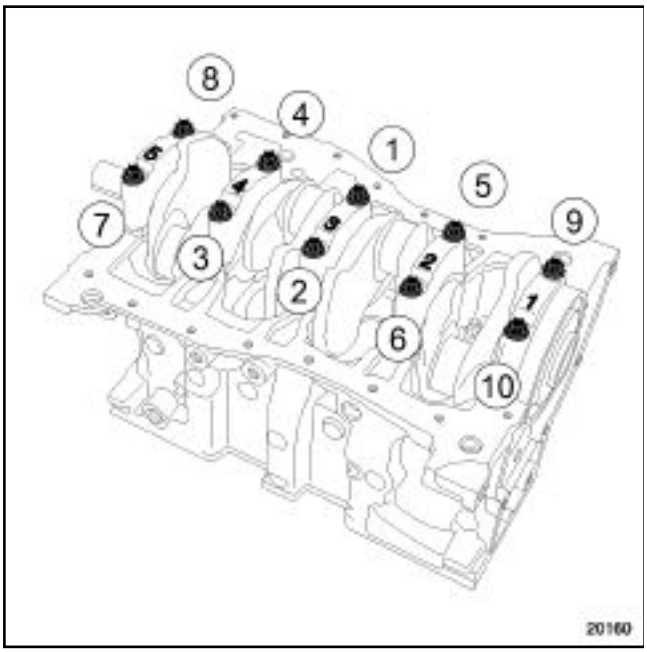


103281

Refit:

- the crankshaft,
- the crankshaft thrust washers on bearing **No.3** (grooves at crankshaft end).

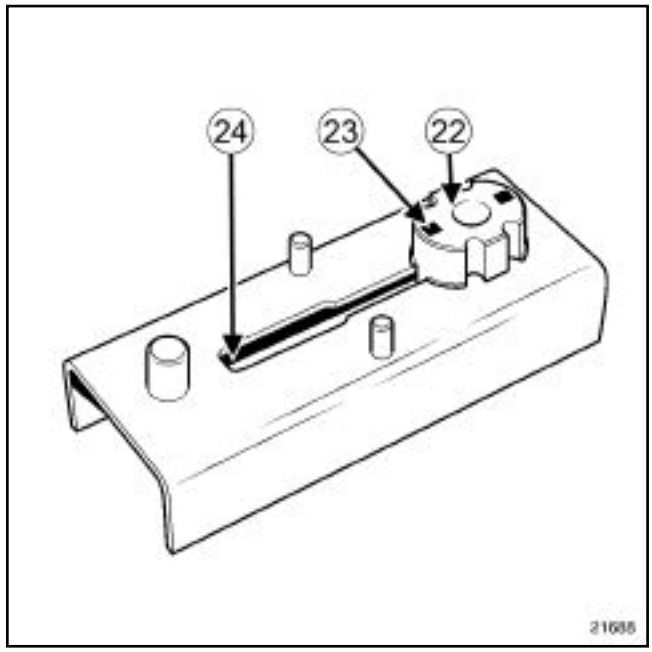


20160

Refit the crankshaft bearing caps, fitting **No.1** at the flywheel end.

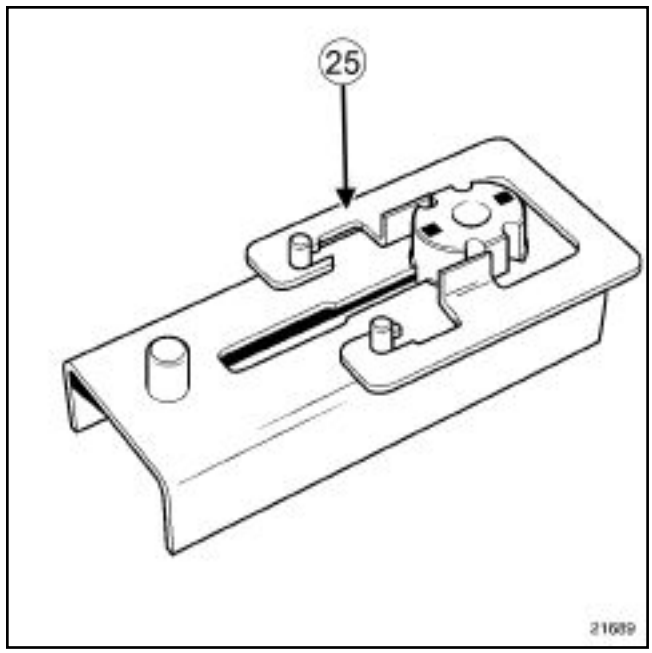
Torque and angle tighten in order **the crankshaft bearing cap mounting bolts (25 ± 2.5 Nm + 47° ± 6°)** .

Refitting the con rod bearings on the con rod body.



21688

Slide the bearing support (**22**) (positioning the marking "A" (**23**) as indicated in the diagram) of the **(Mot. 1492-03)** in the groove (**24**) of the tool block **(Mot. 1492)** .



21689

Place the rail (**25**) of the **(Mot. 1492-03)** on the base.

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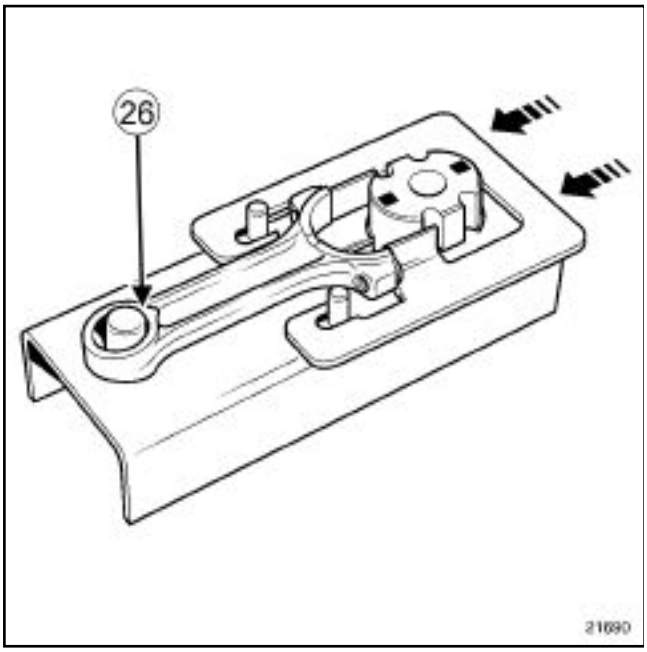
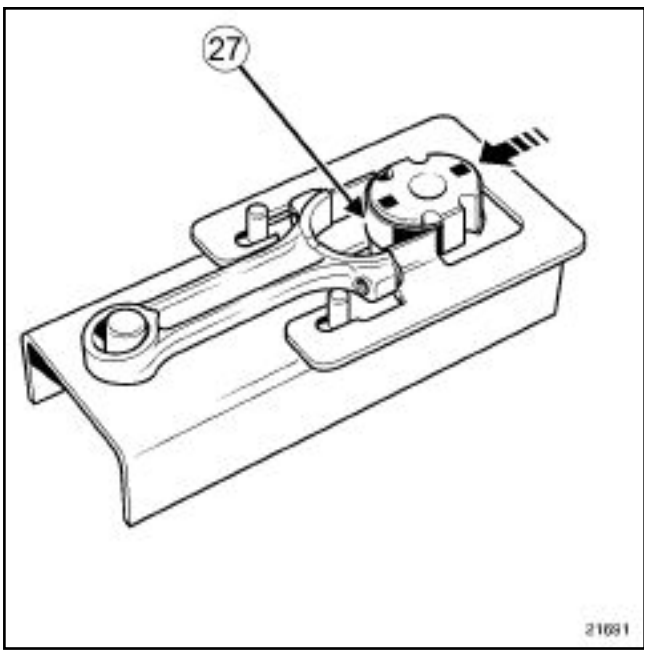


21690

Mount the con rod body on the base.

Check that the lower part (**26**) of the small end is in contact with the centring pin.

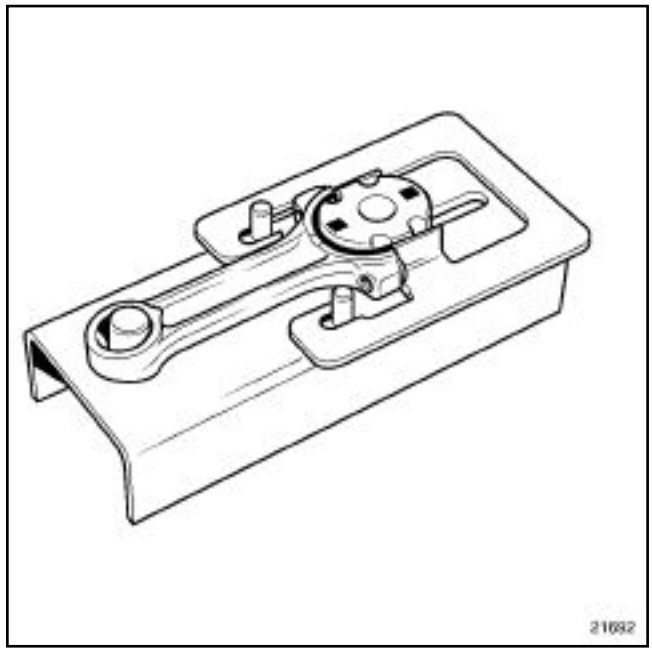
Push the rail (in the direction shown by the arrow) until the rail presses against the con rod end.



21691

Mount the bearing shell (**27**) (with a width of **20.625 mm** on the bearing shell support.

Push the bearing shell support in the direction shown by the arrow.



21692

Bring the bearing shell support to the end of the con rod body base.

Remove the support shell from the con rod body.

Repeat the operation for the other con rod bodies.

Refitting the con rod bearings on the con rod cap.

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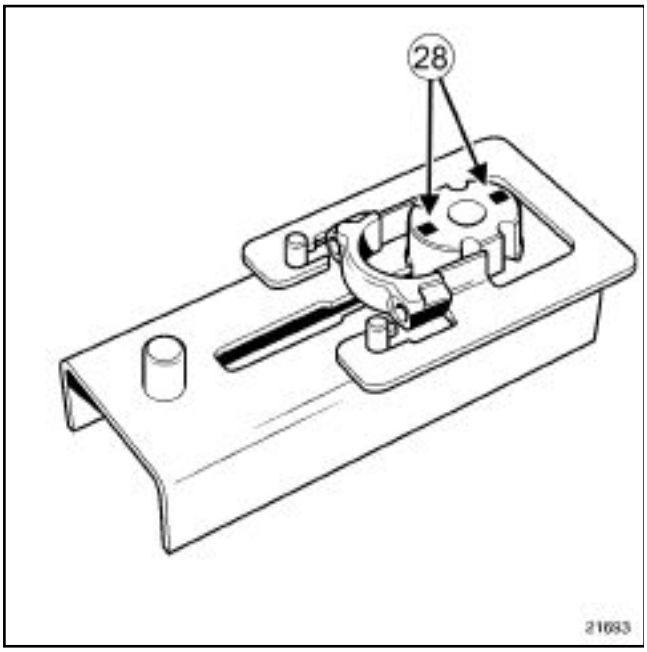
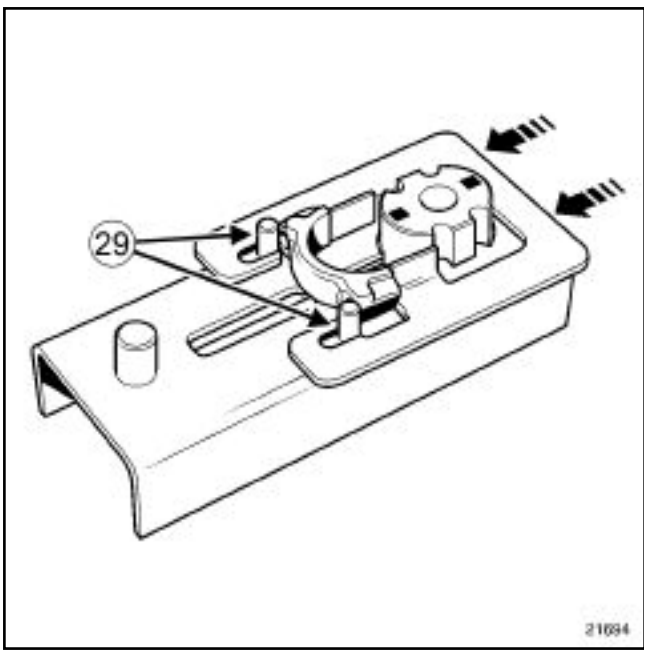


21693

Position the bearing shell support, aligning the marking "A" or "B" (**28**) on the side of the cap as follows:

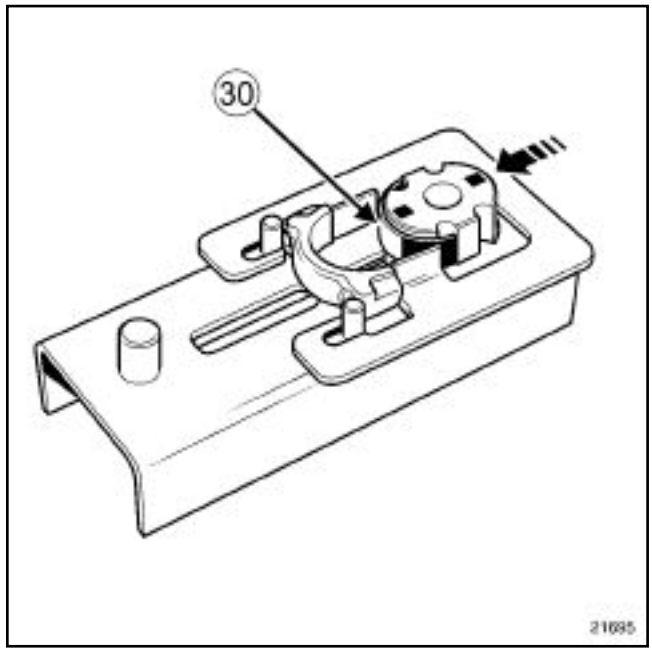
- a bearing shell width of **20.625 mm** corresponds to "A",
- a bearing shell width of **17.625 mm** corresponds to "B",

Mount the con rod cap on the base.



21694

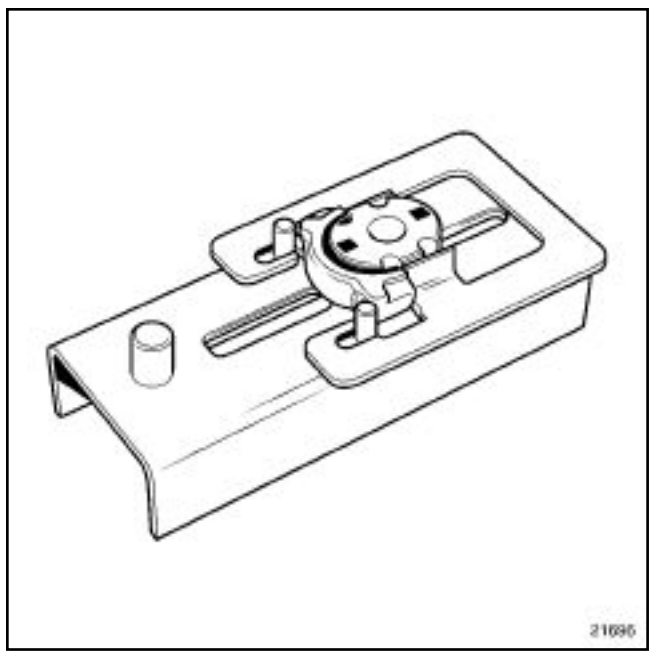
Push the rail in the direction shown by the arrow until the con rod cap presses against the pins (**29**) on the base.



21695

Mount the bearing shell (**30**) on the bearing shell support.

Push the bearing shell support in the direction shown by the arrow.



21696

Bring the bearing shell support to the end of the con rod cap base.

Remove the bearing shell from the con rod cap.

Repeat the operation for the other con rod caps.

Using an indelible pencil, mark the gudgeon pin position in relation to the piston.

Lubricate gudgeon pin with engine oil.

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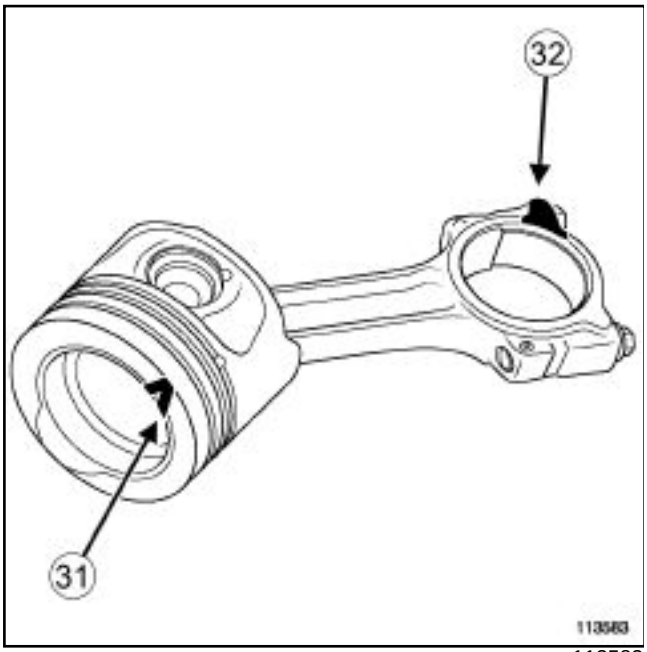
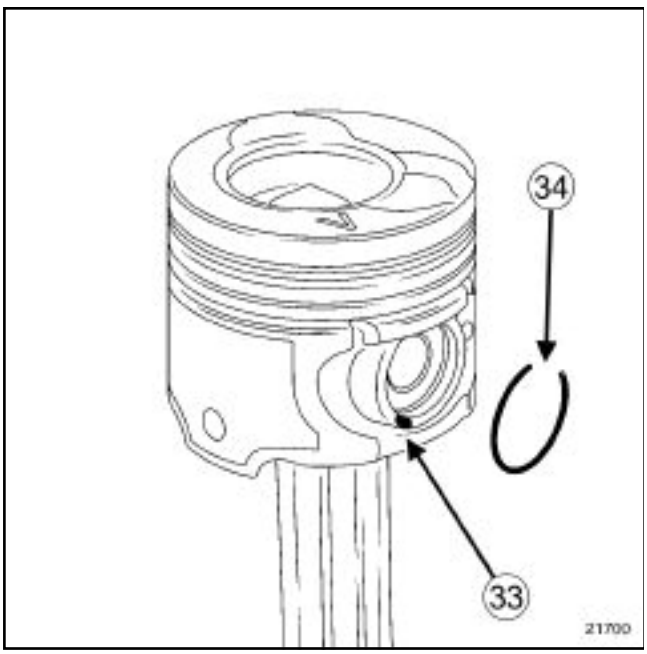
Check that the gudgeon pin slides and turns freely in the piston.



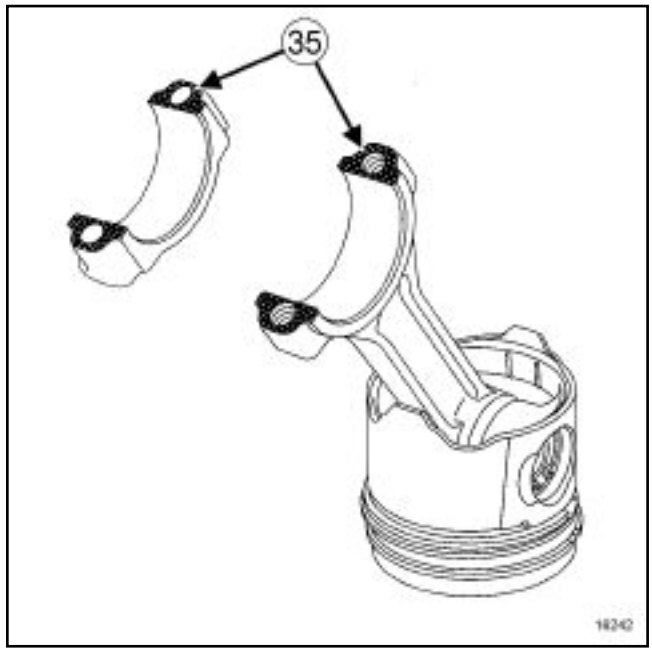
113583

Position the mark **"V"** (**31**) of the piston and the flat surface (**32**) of the con rod cap as indicated in the illustration.



21700

Refit the circlip of the gudgeon pin, positioning the opening (**34**) of the circlip opposite the notch (**33**) .



16242

Using degreasing agent, degrease the contact surfaces (**35**) between the cap and body of the con rod.

Note:

Ensure that the piston matches the cylinder block barrel (No.1 at flywheel end) .

Ensure the correct con rod-piston orientation, positioning the "V" engraved on the piston crown towards the flywheel .

Refit the con rod-piston assembly (without piston rings) onto the cylinder block.

Mount the con rod heads on the crankshaft crankpins.

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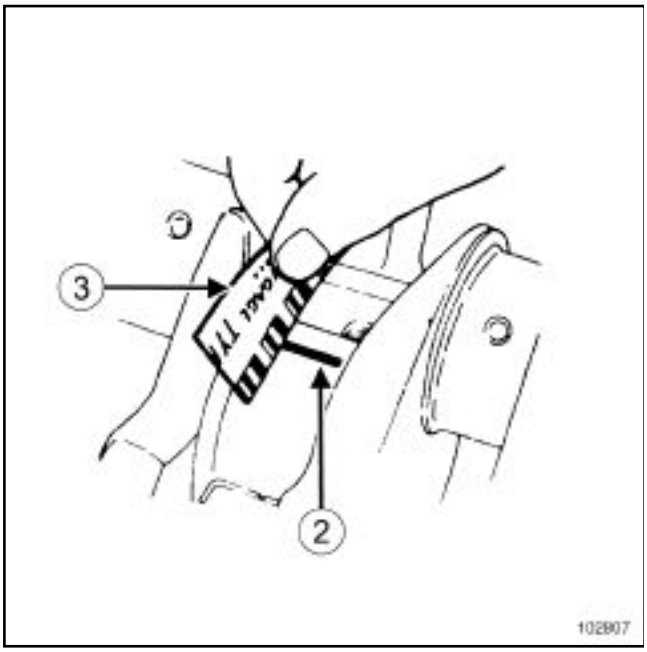
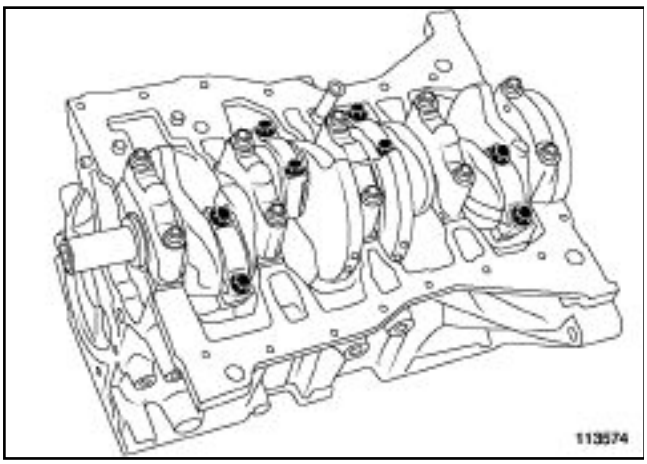


102807

Cut bits of wire (**2**) used to measure the clearance.

Insert the wire into the axis of the crankshaft crankpins (avoiding the bearing lubrication holes).



113574

Refit:

- the con rod caps, ensuring correct matching,
- the con rod cap mounting bolts.

Torque and angle tighten **the con rod cap mounting bolts (20 ± 2 Nm + 45° ± 6)** .

Remove:

- the con rod caps,
- the con rod-piston assembly.

Measure the flattening of the clearance measuring wire using packaging paper **(3)** .

Check the clearance value, which must be between **0.010 and 0.064 mm** .

Clean any traces of measuring wire off the crankshaft and the bearing shells using degreasing agent.

Remove:

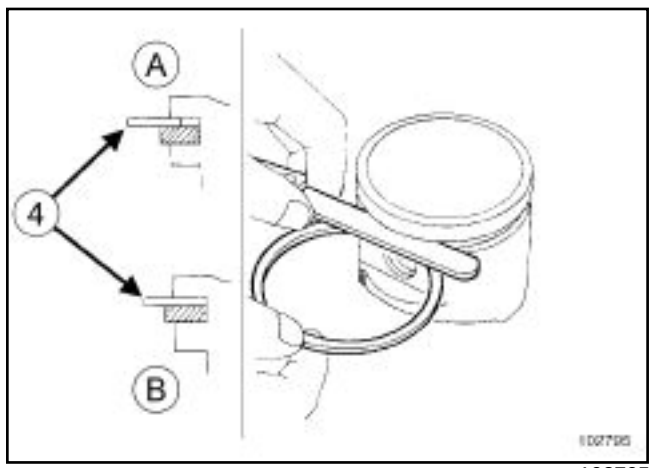
- the crankshaft bearing caps,
- the con rod pistons,
- the crankshaft.

12 - Checking the thickness of the piston rings

Measure the thickness of the piston rings using a micrometer.

- the compression ring must be **2 mm -0.01 / -0.03** .
- the sealing ring must be **2 mm -0.01 / -0.03** .
- the scraper ring must be **2.5 mm -0.01 / -0.03** .

13 - Checking the clearance between the piston grooves and the piston rings



102795

Measure the clearance between the piston grooves and piston rings using a set of shims (**4**) .

- (**A**) : Set of shims incorrectly positioned,
- (**B**) : Set of shims correctly positioned.

The compression ring clearance must be **0.10 to 0.12 mm** .

The clearance for the sealing ring must be **0.08 to 0.10 mm** .

the scraper ring clearance must be **0.03 to 0.05 mm** .

If the clearance is not within tolerance, replace the piston-gudgeon pin assembly, or the piston rings.

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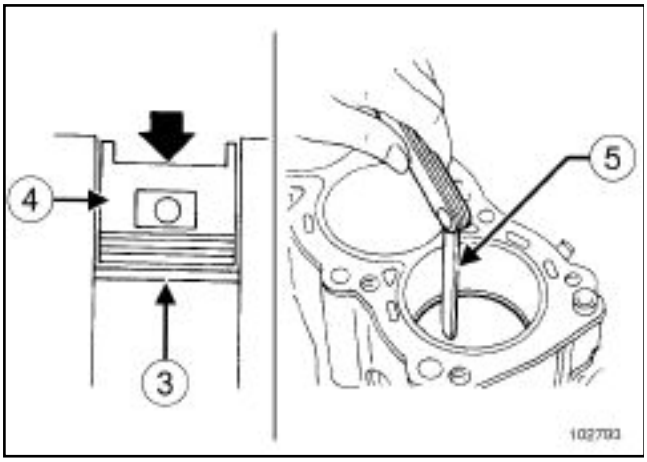
14 - Checking clearance at the ring section



102793

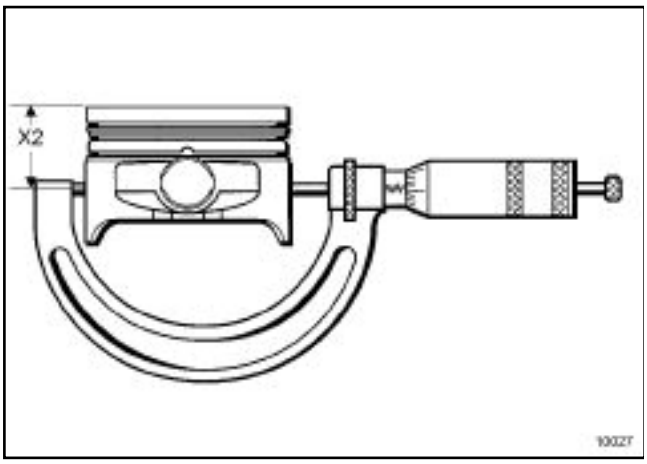
Position the ring (**3**) in the cylinder

Push the piston ring (**3**) to the centre of the cylinder using the piston (**4**) .

Measure the piston ring end clearance using a set of shims (**5**) .

- Compression ring end clearance must be **0.20 to 0.35 mm** ,
- Sealing ring end clearance must be **0.70 to 0.90 mm** .
- Oil control ring end clearance should be **0.25 to 0.50 mm** .

15 - Checking the piston diameter



10027

The piston diameter should be measured at height (**X2**) = **56 mm** .

The diameter of the piston must be:

- **75.949 ± 0.007 mm** for engines K9K 260-270-272-274-700-702-704-706-710-714-716-722-750-752-762-768-790-792,
- **75.945 ± 0.007 mm** for engines K9K 276-712-718-724-728-729-732-760-764-766.

16 - Checking the coolant pump

Check that there is no play nor resistance at the coolant pump.

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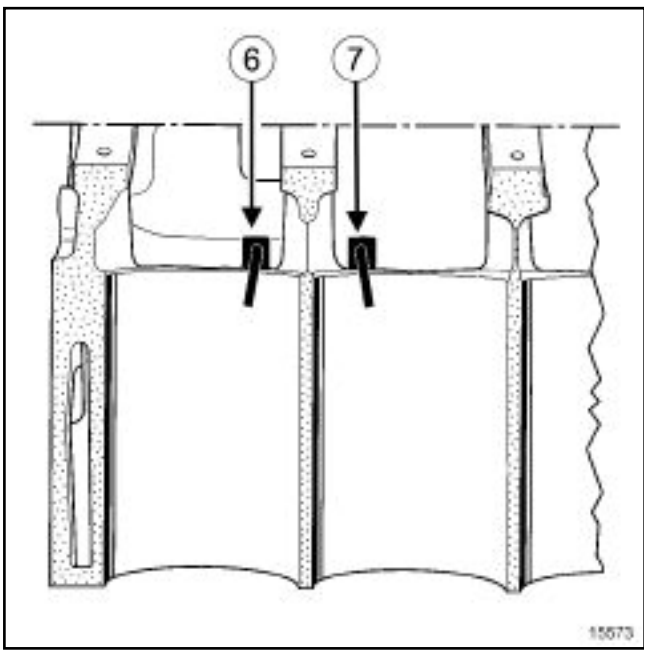
Piston base cooling jet: Refitting

Special tooling required	
Mot. 1494	Tool for refitting piston coolers.

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.



15573

(**6**) orientation of the piston base cooling jets for cylinders 2 and 4,

(**7**) orientation of the piston base cooling jets for cylinders 1 and 3,

WARNING
Check the orientation of the base of the piston base cooling jet which should be aimed towards the centre of the cylinder.

II - PARTS AND CONSUMABLES FOR THE REPAIR

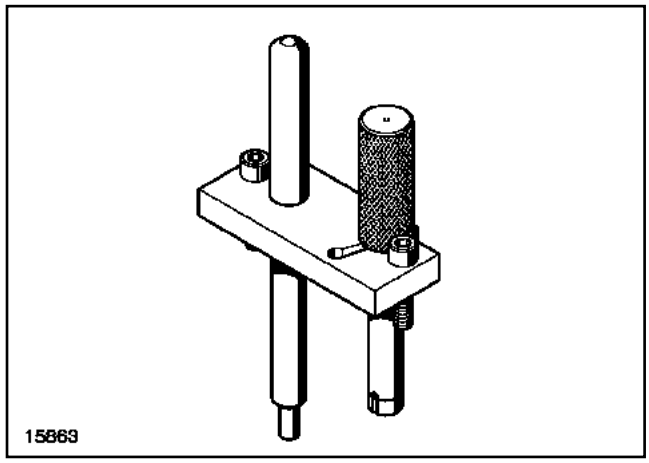
Parts always to be replaced

- the piston base cooling jets,

III - EQUIPMENT REQUIRED

- A hammer.

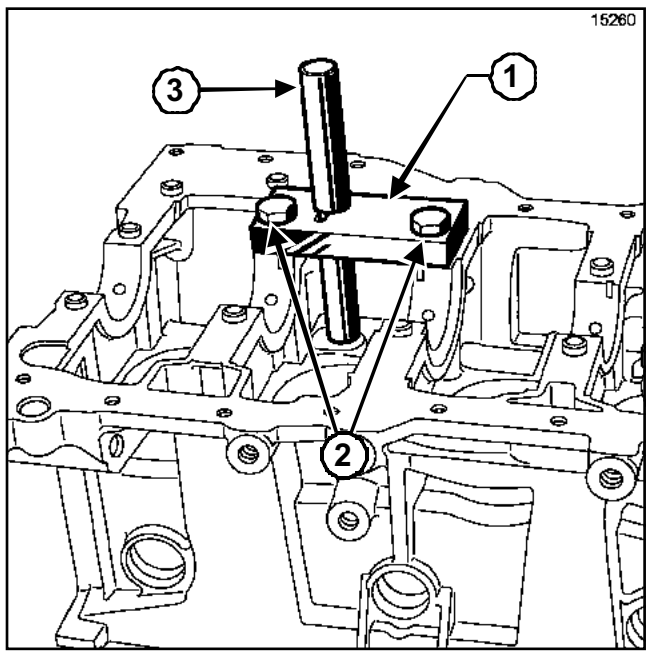
IV - REFITTING THE PISTON BASE COOLING JETS



15863

The piston base cooling jets must be replaced using the **(Mot. 1494)** .

1 - Fitting the jets for cylinders 1 and 3



15260

Position plate (**1**) of tool **(Mot. 1494)** on the cylinder block without tightening the two bolts (**2**) .

Place the guide rod (**3**) in the plate (**1**) .

Position the end of the guide rod in the hole of the piston base cooling jet to centre the plate (**1**) .

Lock the two bolts (**2**) .

Remove the guide rod.

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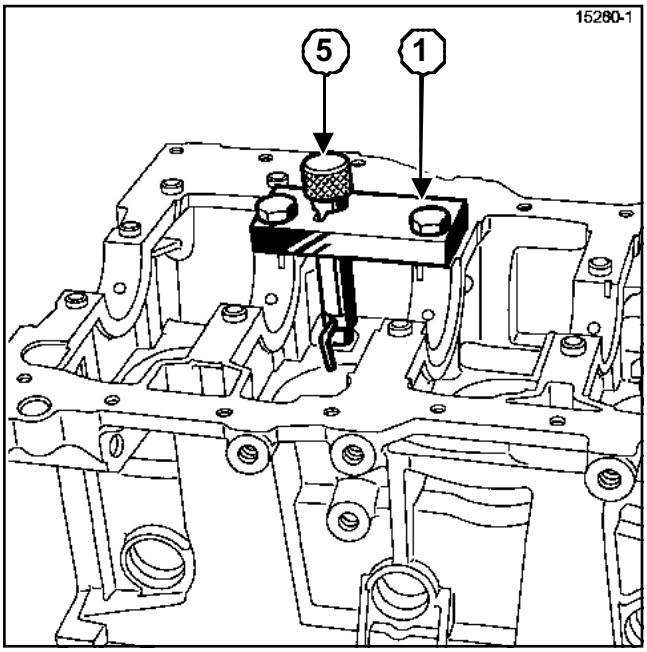
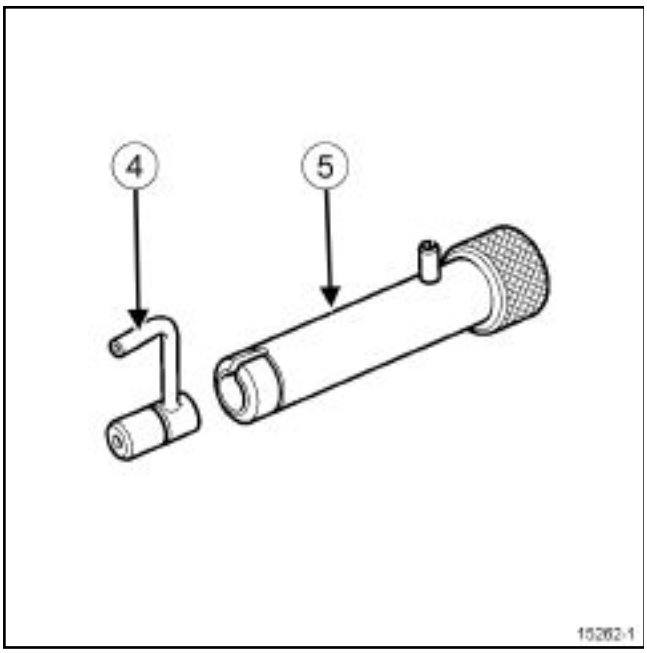


15260-1

Insert the pushrod in place of the guide rod.

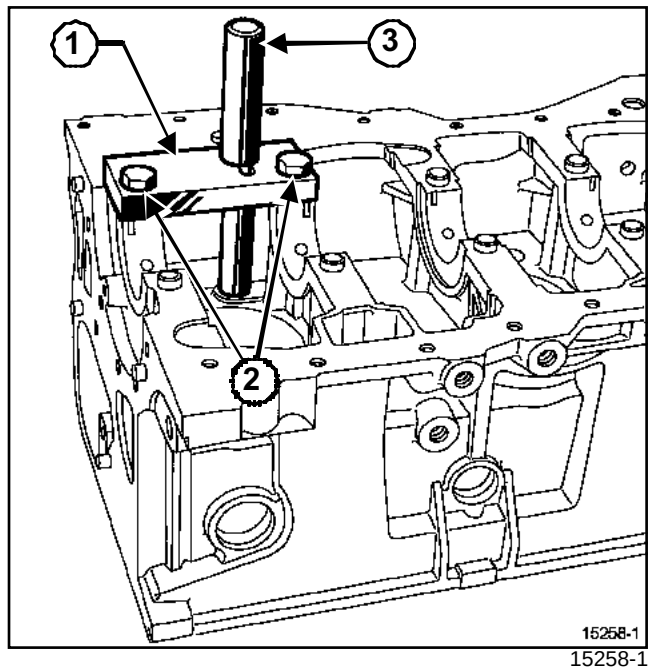


15262-1

Insert the jet (**4**) into the pushrod (**5**) .

Using a hammer, tap the pushrod down until the pushrod collar ***(5)*** is touching the plate ***(1)*** .

2 - Fitting the jets for cylinders 2 and 4



15258-1

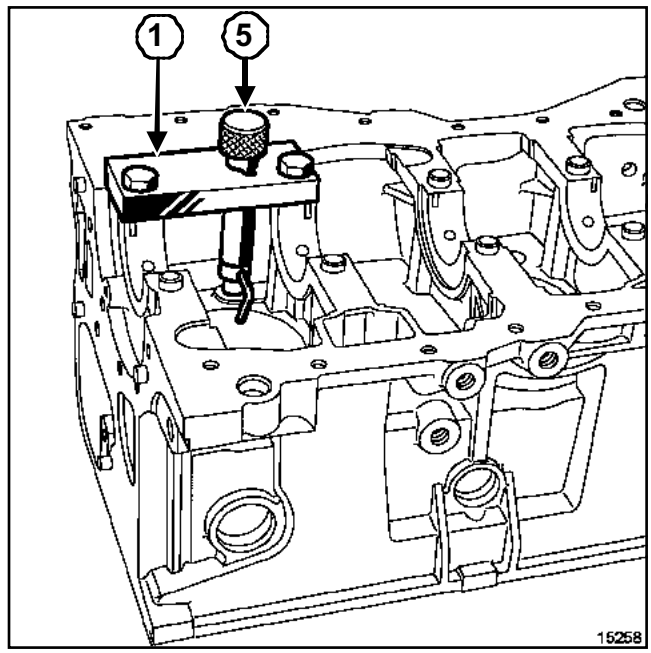
Position plate (**1**) of the **(Mot. 1494)** on the cylinder block without tightening the two bolts (**2**) .

Place the guide rod (**3**) in the plate (**1**) .

Position the end of the guide rod in the hole of the piston base cooling jet to centre the plate (**1**) .

Tighten the two bolts (**2**) .

Remove the guide rod.



15258

Insert the pushrod in place of the guide rod.

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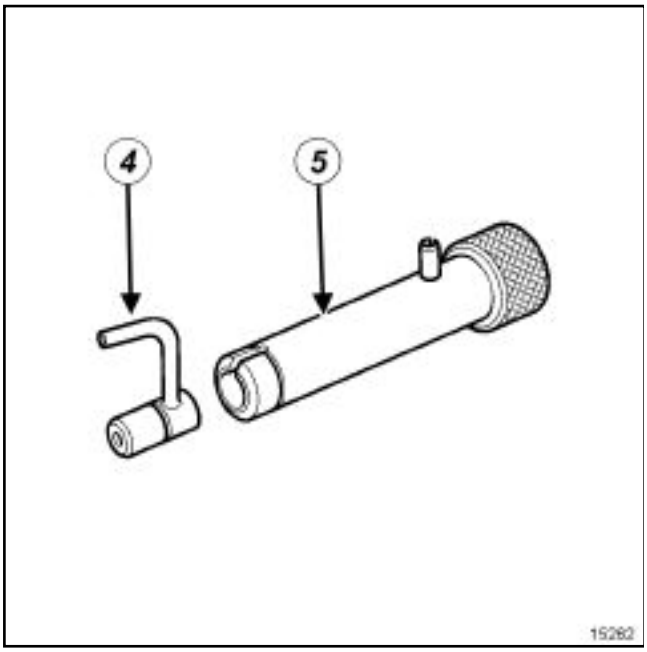

15262

Insert the jet (**4**) into the pushrod (**5**) .

Using a hammer, tap the pushrod down until the pushrod collar ***(5)*** is touching the plate ***(1)*** .

Remove the **(Mot. 1494)** from the cylinder block.

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Special tooling required	
Mot. 1493-01	Crankshaft bearing centring tool.
Mot. 1319-01	Gauge for measuring height of crankpins.
Mot. 1489	TDC locating pin.
Mot. 1319	Gauge for measuring height of crankpins.
Mot. 1492	Tool for fitting main bearing shells.
Mot. 1492-03	Tool for fitting main bearing shells.
Mot. 252-01	Dial gauge support thrust plate.
Mot. 251-01	Dial gauge support.

Tightening torques ▽	
the crankshaft bearing cap mounting bolts	**25 ± 2.5 Nm + 47° ± 6°**
the con rod cap mounting bolts	**20 ± 2 Nm + 45° ± 6°**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

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

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 con rod caps are positioned on the con rod body using the irregularities on the parting line.

Impacts or foreign bodies between the contact surfaces between the caps - con rod body could lead to a breakage of the con rod in the short term.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced

- Con rod cap bolts,
- Crankshaft bearing cap bolts.

Consumables

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

III - EQUIPMENT REQUIRED

- Female torx socket.
- Allen key (**8 mm**),
- Oil can,
- Dial gauge,
- Flat-blade screwdriver,
- Indelible pencil,
- Piston ring compressor,
- Piston mounting ring,
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type),
- Mallet,

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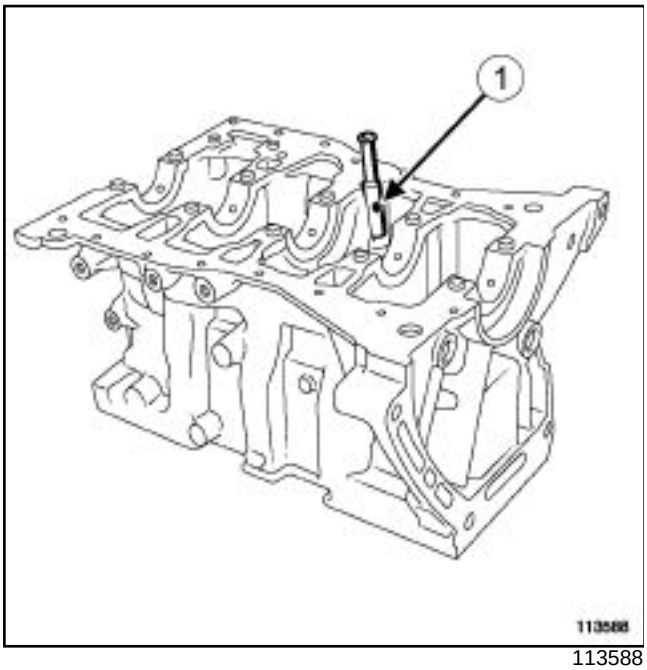
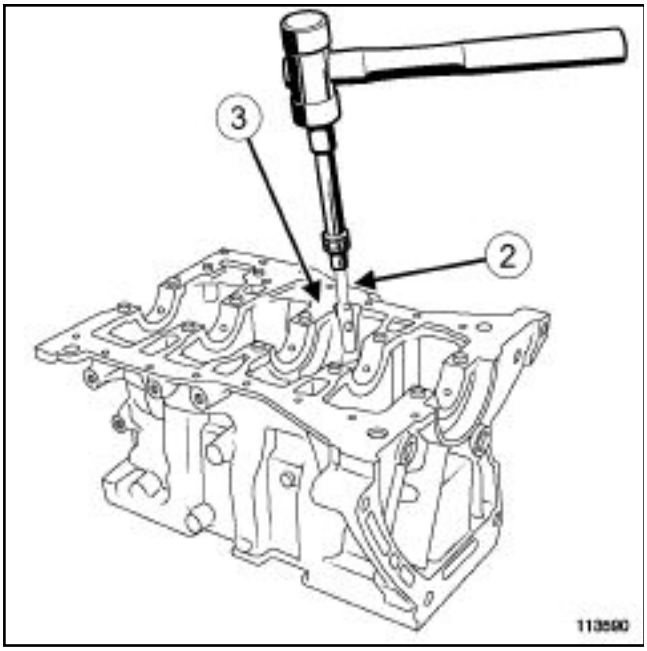
IV - REFITTING THE ROTATING PARTS



113588

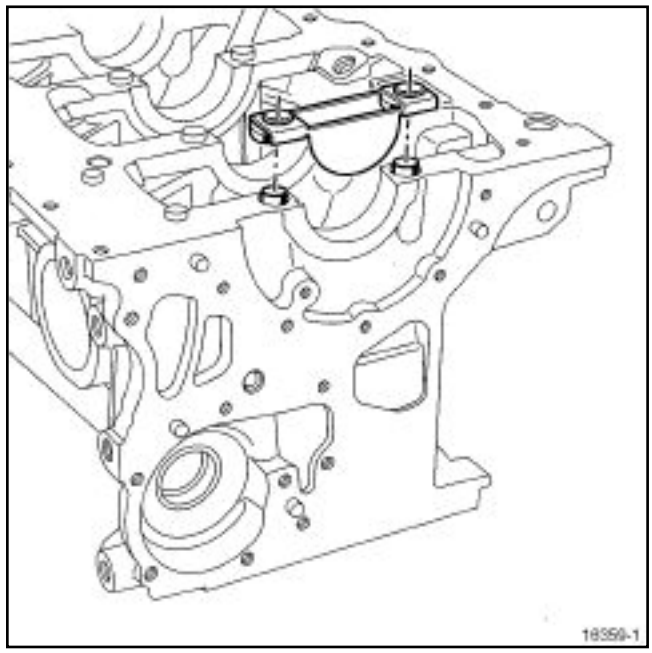
Replace the dipstick guide tube in the cylinder block (if the cylinder block is fitted with one), aligning the orifice (**1**) of the dipstick guide tube as indicated in the diagram.



113590

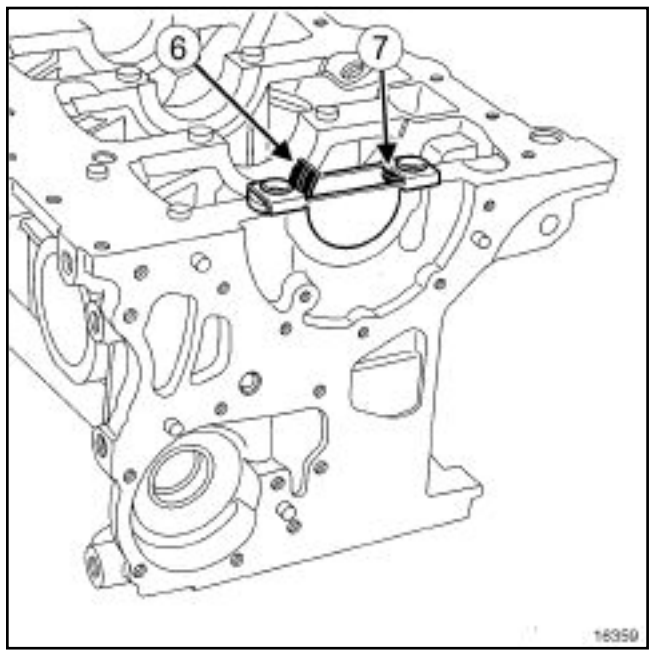
Insert the dipstick guide tube using an **8 mm** male Allen key, until the dipstick guide tube extends by **43 mm** (the end) (**2**) over the sealing surface (**3**) of the cylinder block.

Ensure that the crankshaft bearing journals are matched up with the crankshaft bearings on the cylinder block (see **10A**, **Engine and lower engine assembly**, **Engine peripherals: Specifications**, page **10A-36**) .



16359-1

Position the **(Mot. 1493-01)** on the cylinder block.



16359

Mount the bearing shell **(grooved)** (**6**) in the **(Mot. 1493-01)** .

Push on the bearing until it is pressed against the stop (**7**) .

Repeat this process for other bearings.

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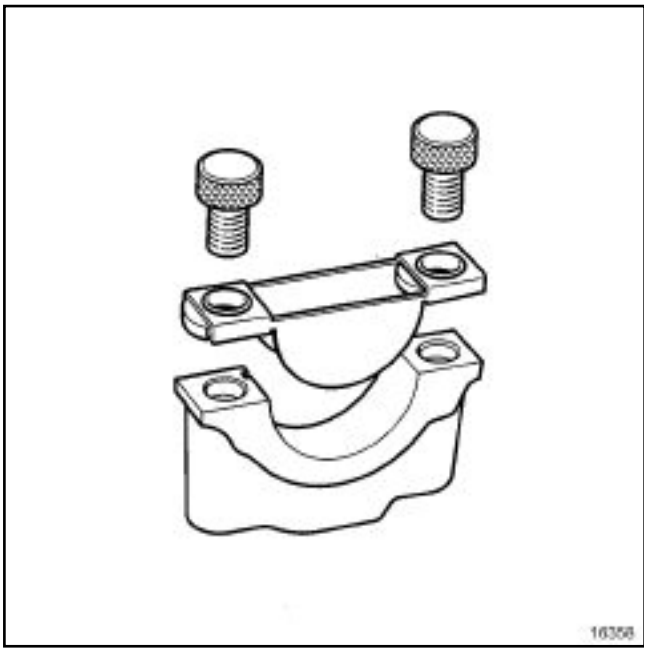
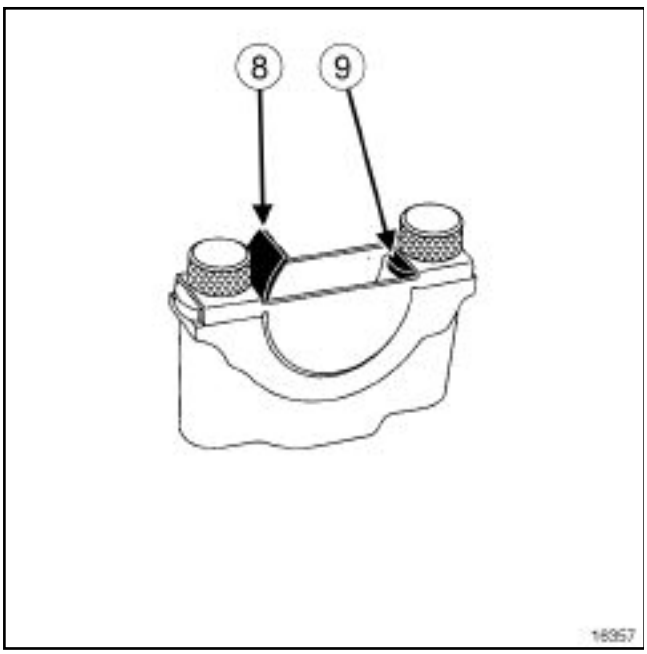


16358

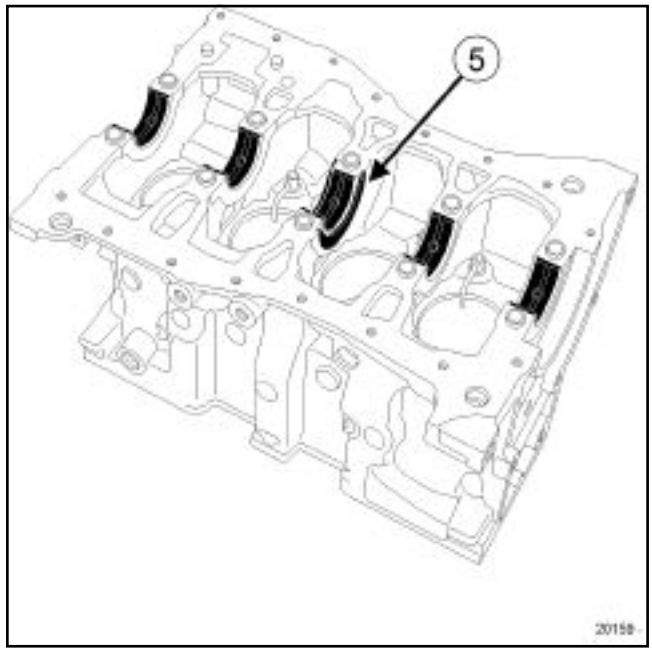
Position the **(Mot. 1493-01)** on the crankshaft bearing cap.



16357

Place the bearing shell **(non-grooved)** (**8**) in the **(Mot. 1493-01)** .

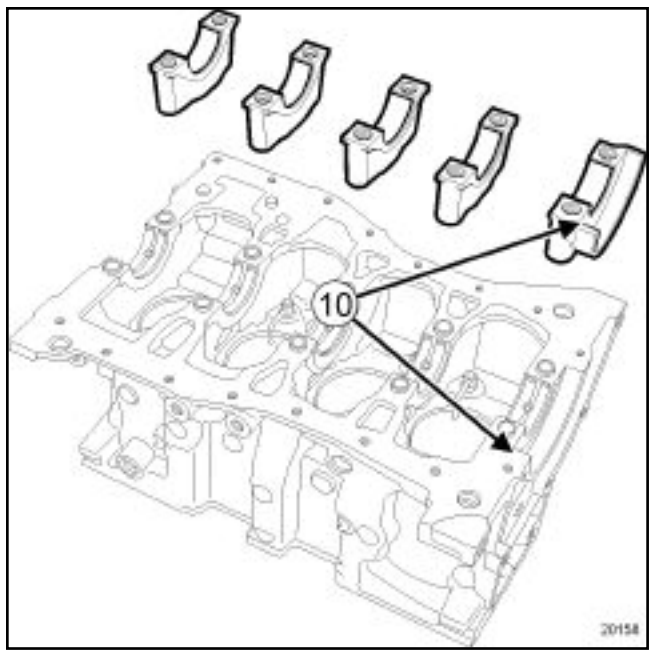
Push on the bearing until it is pressed against the stop (**9**) .



20159

Refit the crankshaft thrust washers **positioning the grooves of the shims at crankshaft end** .

Oil the crankshaft bearing shells with engine oil (only the side of the bearing shell that comes in contact with the crankshaft).



20158

Degrease the surfaces of the seals (**10**) of the cylinder block and the crankshaft bearing cap No. 1 using degreaser.

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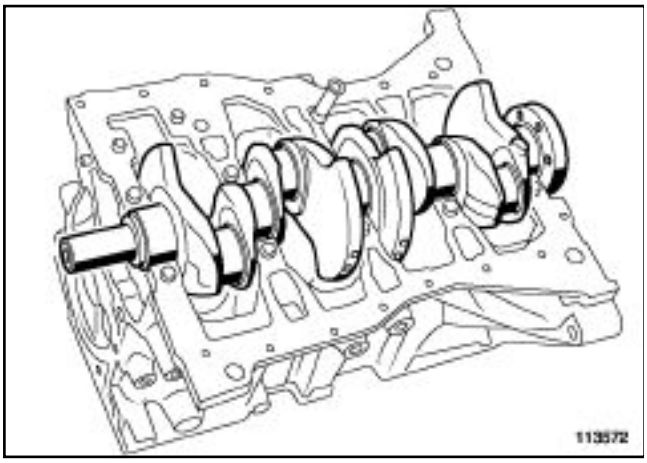
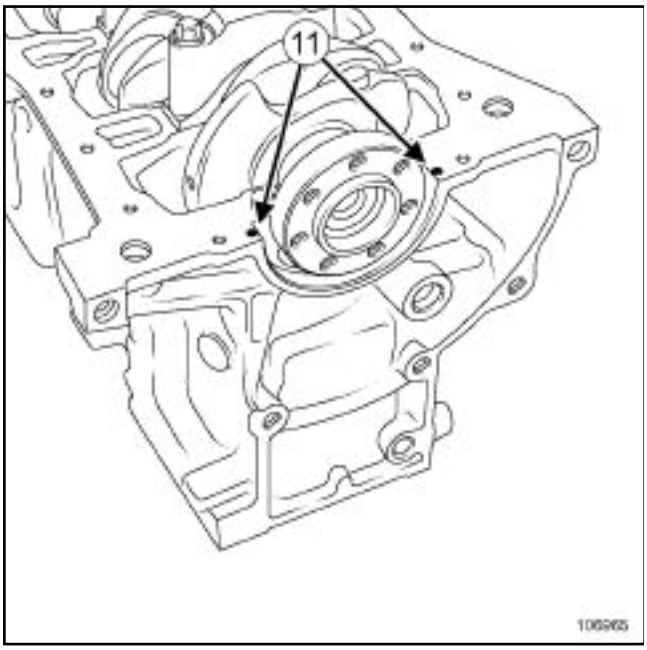


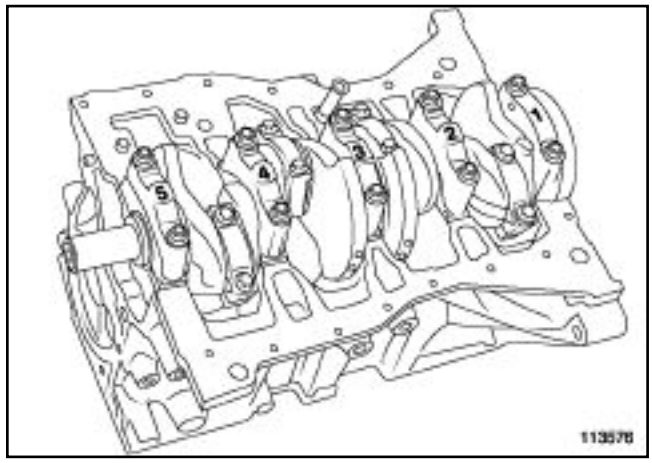
113572

Refit the crankshaft.



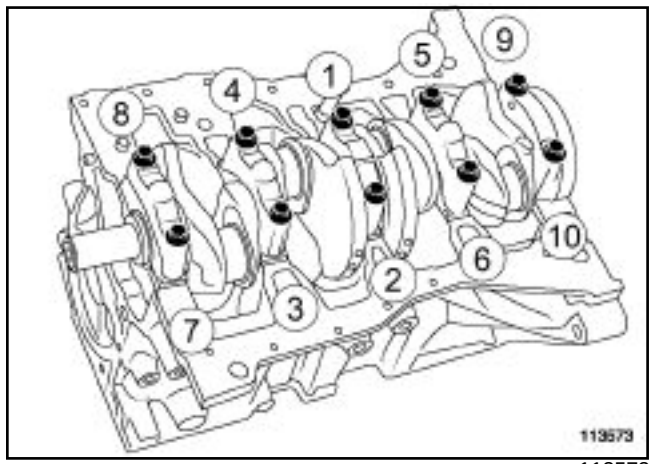
106965

Apply two drops (**11**) of **LOCTITE 518** of a diameter of **4 mm** to camshaft bearing no. 1.



113576

Refit the crankshaft bearing caps, ensuring that they are correctly positioned.



113573

Refit the new crankshaft bearing cap mounting bolts.

Tighten to torque in order and to angle **the crankshaft bearing cap mounting bolts (25 ± 2.5 Nm + 47° ± 6°)** .

Check that the crankshaft turns freely, with no resistance.

Note:

If replacing the con rods, the Parts Department will only supply con rods with a small end diameter of **26 mm** .

It is therefore essential to check that the gudgeon pin is **26 mm** in diameter.

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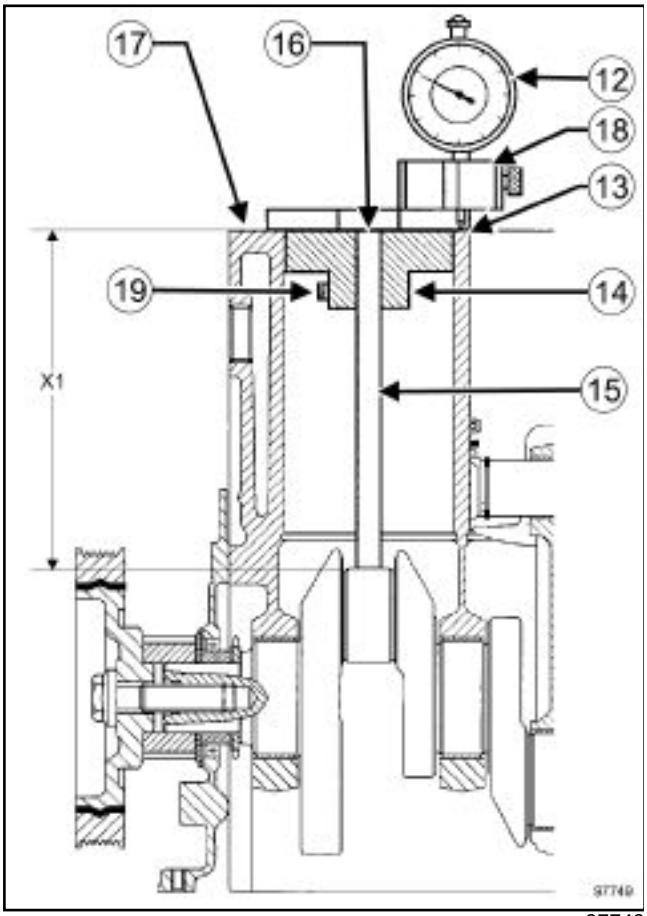
It is essential to determine the height of the crankpin ***(X1)*** in the event of having to replace the con rods, crankshaft, cylinder block.

The height ***(X1)*** represents the distance between the crankpin at TDC and the surface of the seal on the combustion face of the cylinder block.

This measurement enables the piston class to be determined.



97749

Measuring the crankpin height for cylinders 1 and 4:

Insert the appropriate depth gauge of tool **(Mot. 1319-01)** (**15**) in the dummy piston (**14**) of the tool, **(Mot. 1319-01)** lining up the light of the depth gauge opposite the locking bolt (**19**) .

Tighten the locking bolt (**19**) .

Check that the depth gauge slides freely in the dummy piston.

Set the crankshaft at Top Dead Centre using the **(Mot. 1489)** .

Position the dummy piston ***(14)*** of the the **(Mot. 1319-01)** fitted with the depth gauge in cylinder No. 1.

Position the depth gauge ***(15)*** of the tool, **(Mot. 1319-01)** pressing on the crankshaft crankpin.

Place the dial gauge holder ***(18)*** of the **(Mot. 1319)** with dial gauge in place on the dummy piston ***(14)*** .

Calibrate the dial gauge ***(12)*** on the cylinder block, setting the mid-point between points ***(13)*** and ***(17)*** .

Slide the dial gauge holder to the centre ***(16)*** of the depth gauge ***(15)*** .

Measure the protrusion or recess of the depth gauge.

Note the value.

Carry out the same procedure for cylinder No. 4.

Measuring the crankpin height for cylinders 2 and 3:

Position approximately the crankpin for crankshaft No. 2 at Top Dead Centre.

Place the dummy piston-depth gauge assembly into cylinder No. 2.

Place the dial gauge holder, with dial gauge in place, in the centre of the depth gauge.

Gently turn the crankshaft to determine the crankpin top dead centre.

Calibrate the dial gauge ***(12)*** on the cylinder block, setting the mid-point between points ***(13)*** and ***(17)*** .

Slide the dial gauge holder to the centre ***(16)*** of the depth gauge ***(15)*** .

Measure the protrusion or recess of the depth gauge.

Note the value.

Carry out the same procedure for cylinder No. 3.

Determine the class of piston

Add or subtract the values obtained of the length of the depth gauge in order to determine the dimension ***(X1)*** .

For example:

- length of depth gauge = **153.989 mm** ,
- measured protrusion (of the length of the depth gauge beyond the cylinder block) = **0.65 mm** ,
- the dimension ***(X1)*** = **153.989** - **0.65** = **153.339 mm** (in the event of a recess, the figures must be added).

Determine **the height of the gudgeon pin** using the following formulae:

- For engines fitted with a gudgeon pin of diameter **25 mm** use formula (***(X1)*** - **111.535** = the height of the gudgeon pin),

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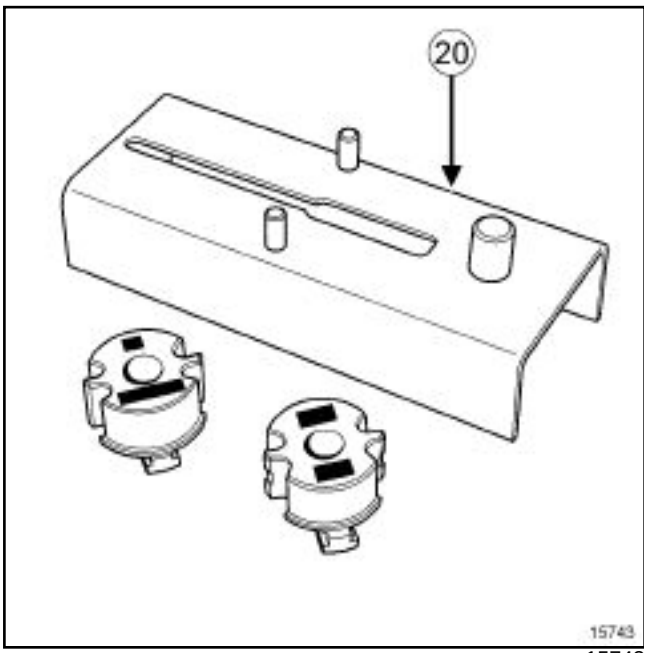
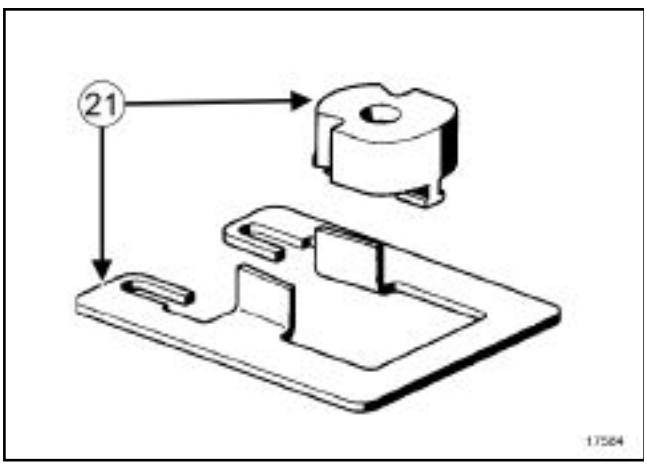
- For engines fitted with a gudgeon pin of diameter **26 mm** use formula (***(X1)*** - **111.576** = the height of the gudgeon pin),

Refer to the height classes table for the gudgeon pins in order to choose the correct piston class (see **10A**, **Engine and lower engine assembly**, **Engine peripherals: Specifications**, page **10A-36**) .



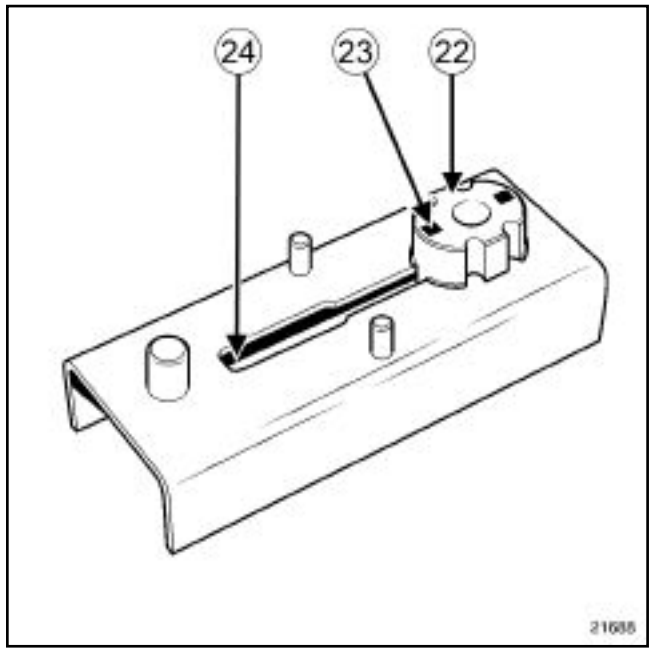
15743



17584

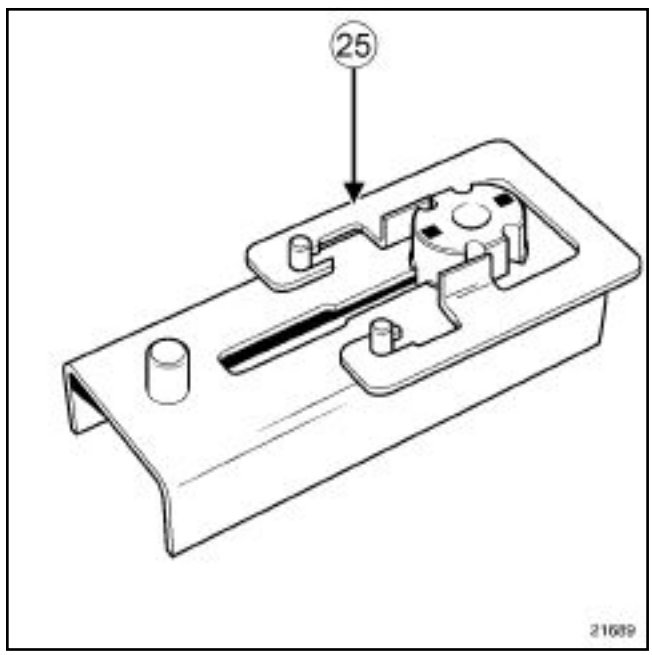
Fit the con rod bearings using the **(Mot. 1492)** (**20**) and **(Mot. 1492-03)** (**21**) .

Refitting the con rod bearings on the con rod body.



21688

Slide the bearing support (**22**) (positioning the marking "A" (**23**) as indicated in the diagram) of the tool **(Mot. 1492-03)** in the groove (**24**) of the tool base **(Mot. 1492)** .



21689

Place the rail (**25**) of the tool **(Mot. 1492-03)** on the base.

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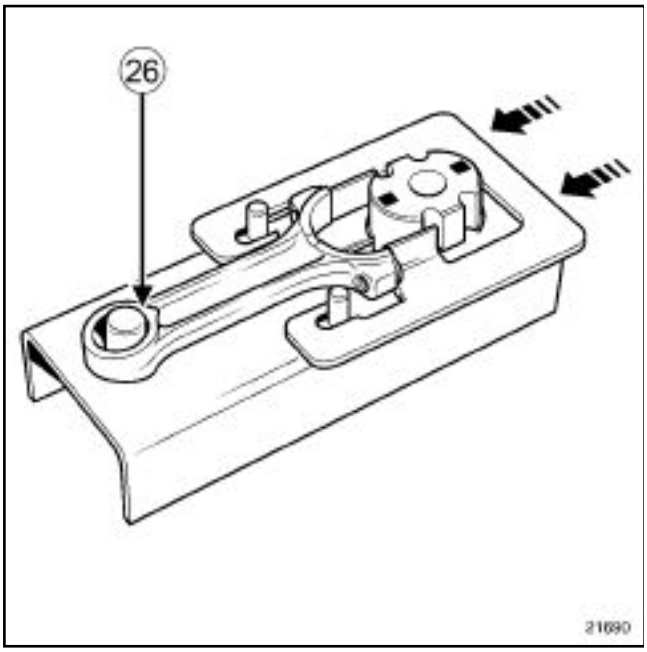
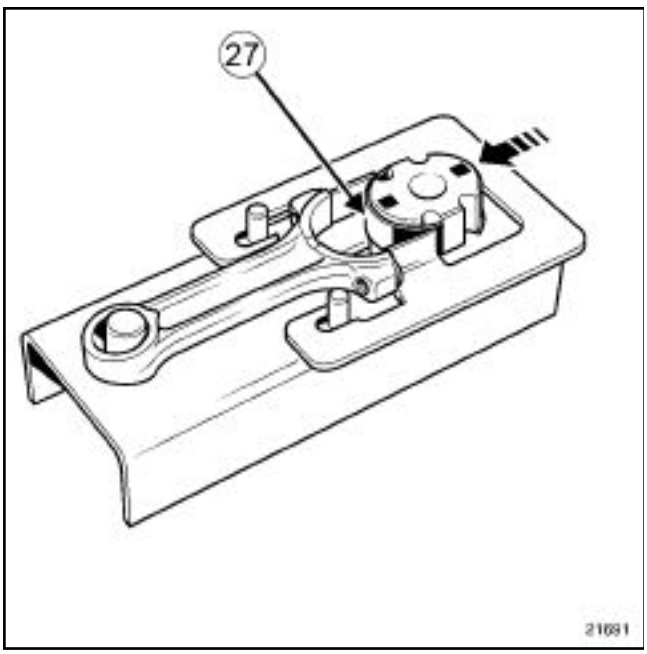


21690

Mount the con rod body on the base.

Check that the lower part (**26**) of the small end is in contact with the centring pin.

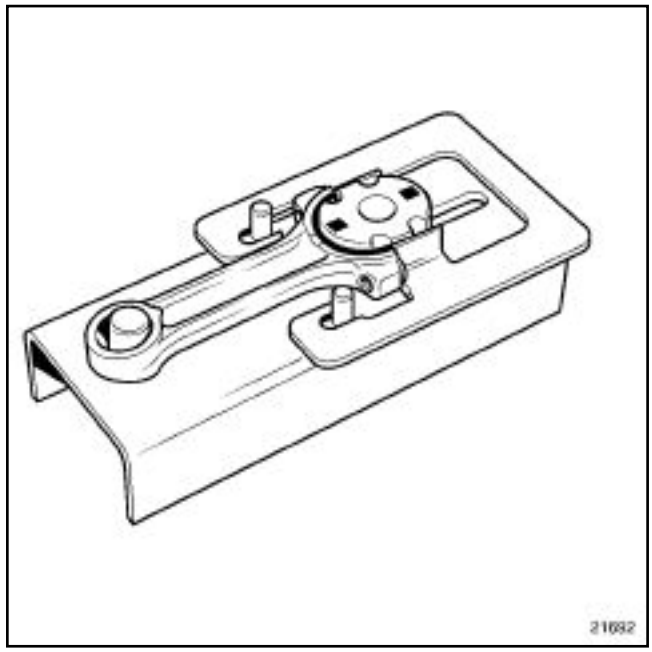
Push the rail (in the direction shown by the arrow) until the rail presses against the con rod end.



21691

Mount the bearing shell (**27**) (with a width of **20.625 mm** on the bearing shell support.

Push the bearing shell support in the direction shown by the arrow.



21692

Bring the bearing shell support to the end of the con rod body base.

Remove the support shell from the con rod body.

Repeat the operation for the other con rod bodies.

Refitting the con rod bearings on the con rod cap.

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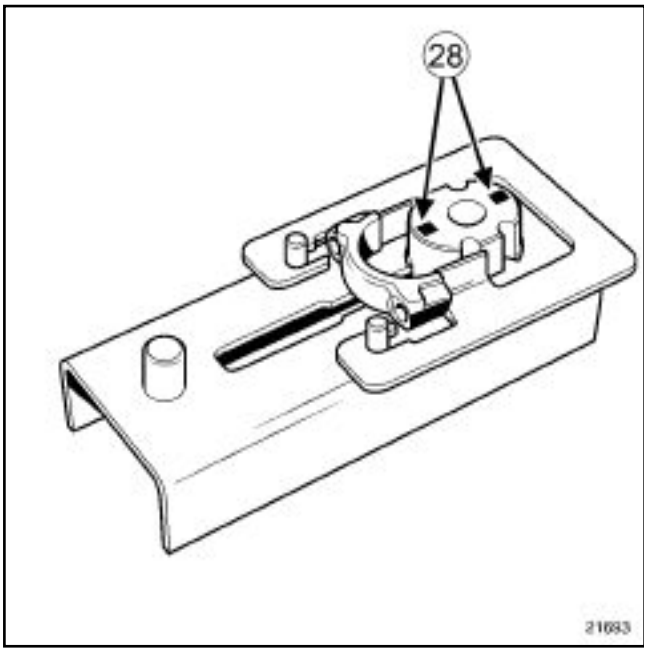
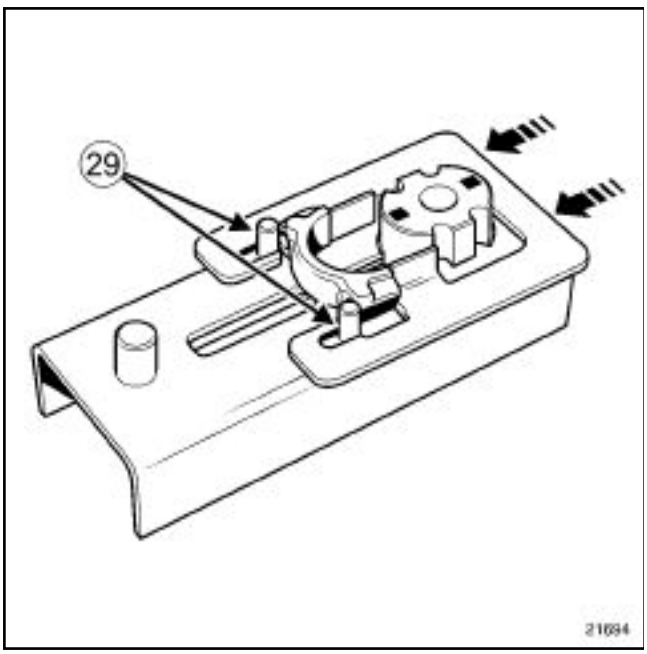


21693

Position the bearing shell support, aligning the marking "A" or "B" (**28**) on the side of the cap as follows:

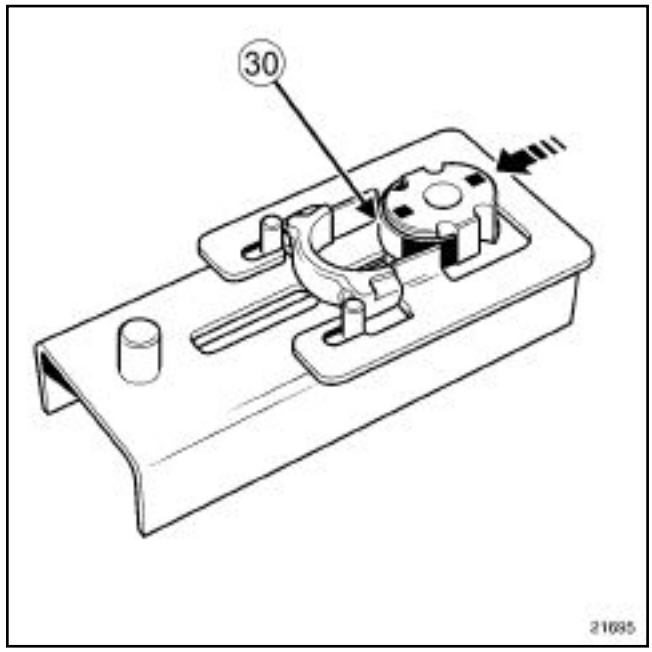
- a bearing shell width of **20.625 mm** corresponds to "A",
- a bearing shell width of **17.625 mm** corresponds to "B",

Mount the con rod cap on the base.



21694

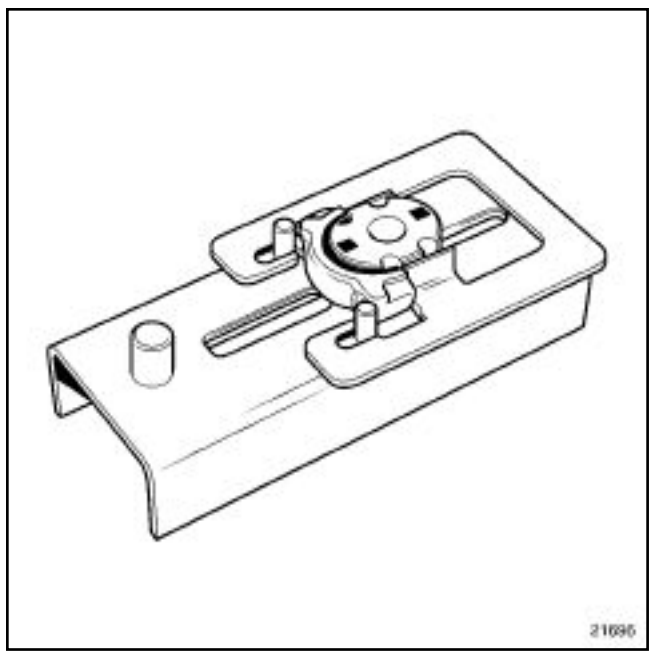
Push the rail in the direction shown by the arrow until the con rod cap presses against the pins (**29**) on the base.



21695

Mount the bearing shell (**30**) on the bearing shell support.

Push the bearing shell support in the direction shown by the arrow.



21696

Bring the bearing shell support to the end of the con rod cap base.

Remove the bearing shell from the con rod cap.

Repeat the operation for the other con rod caps.

Using an indelible pencil, mark the gudgeon pin position in relation to the piston.

Lubricate gudgeon pin with engine oil.

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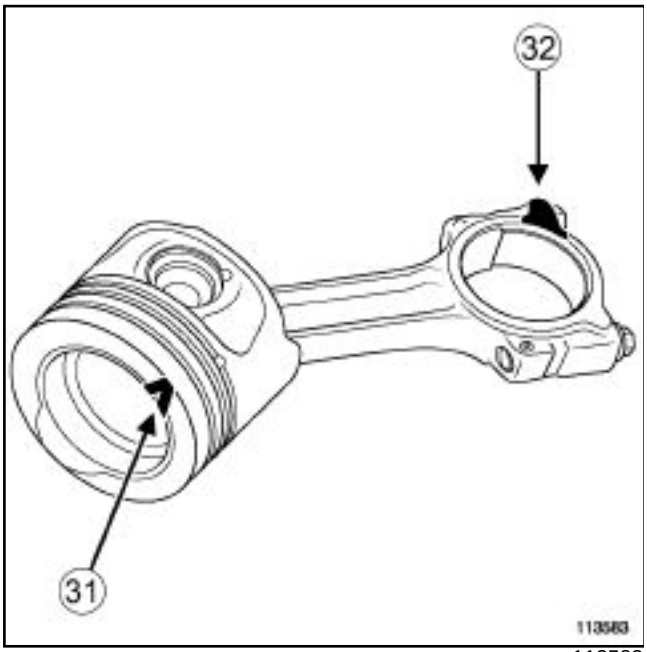
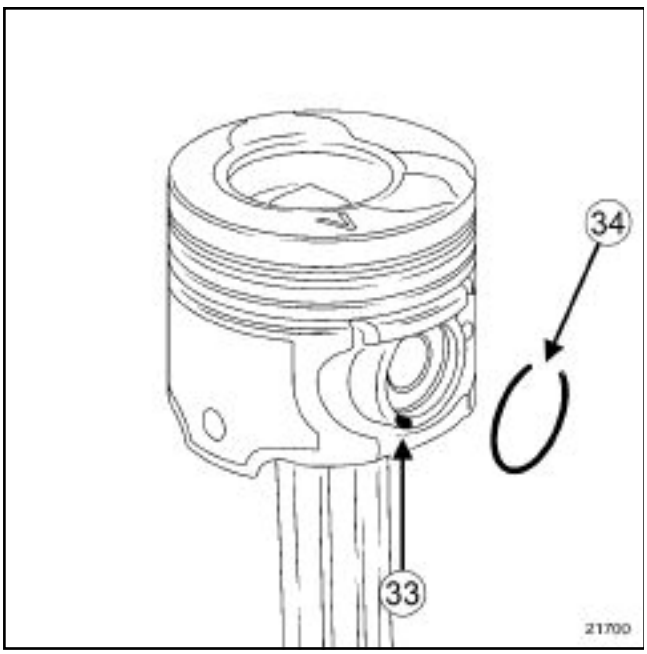
Check that the gudgeon pin slides and turns freely in the piston.



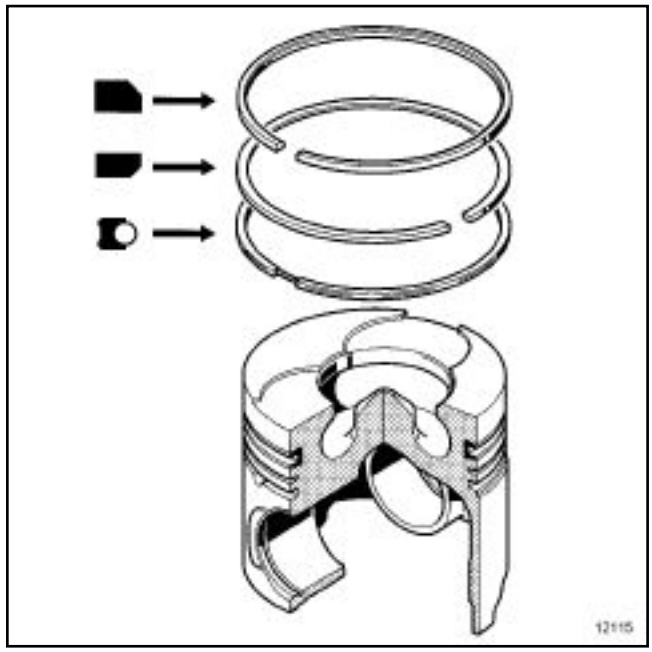
113583

Position the mark **"V"** (**31**) of the piston and the flat surface (**32**) of the con rod cap as indicated in the illustration.



21700

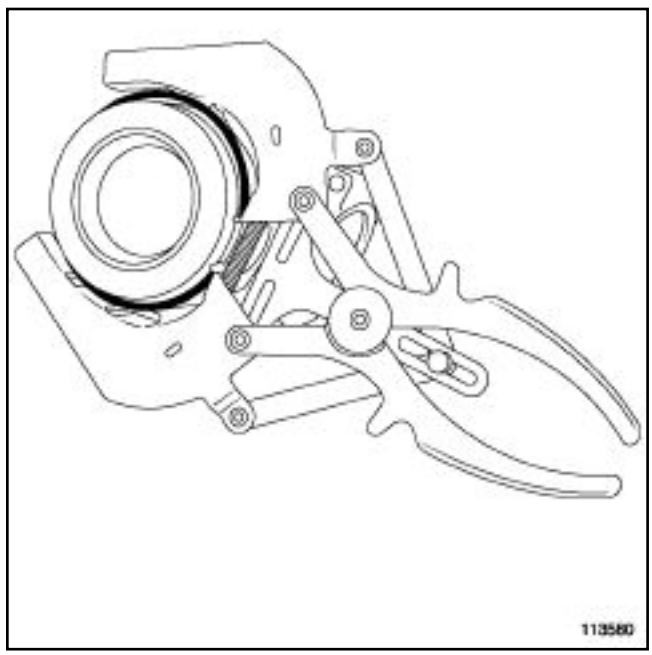
Refit the circlip of the gudgeon pin, positioning the opening (**34**) of the circlip opposite the notch (**33**) .



12115

Note:

Ensure the rings are fitted the right way round, with the word **TOP** pointing upwards.



113580

Refit the piston rings using a piston ring compressor.

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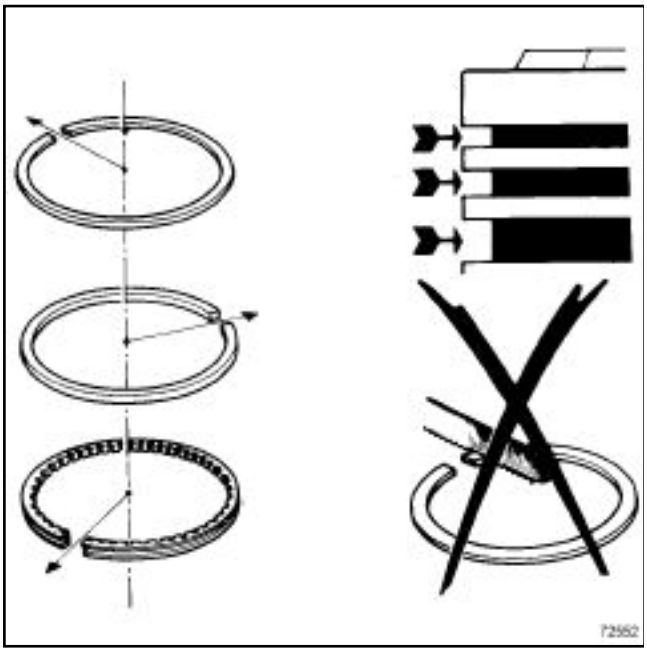
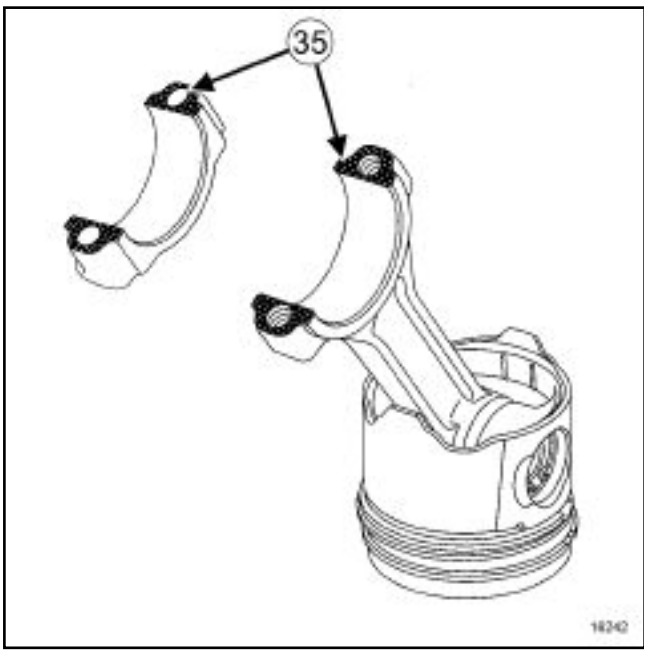


72552

Fit the shoes such that the gaps are equally spaced around the piston.



16242

Using degreasing agent, degrease the contact surfaces (**35**) between the cap and body of the con rod.

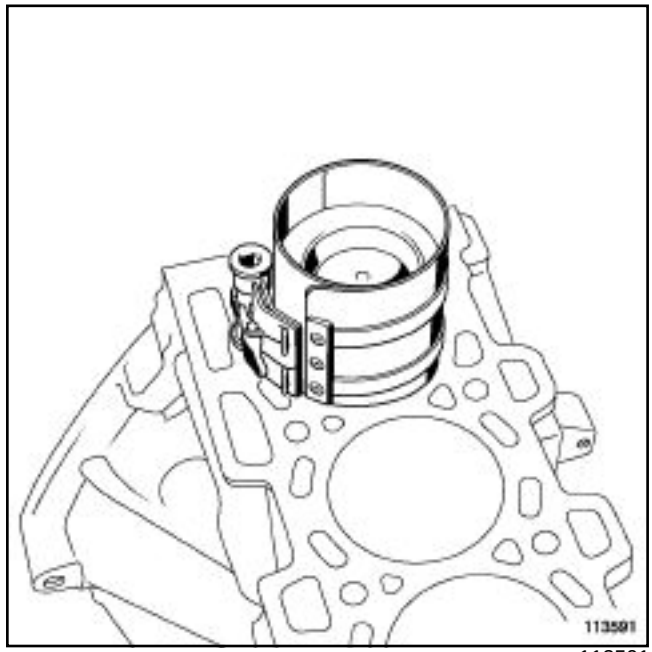
Lubricate with engine oil:

- the cylinder block barrels,
- the piston rings,
- the piston skirts,
- the crankshaft crankpins.

Note:

Ensure that the piston matches the cylinder block barrel (No.1 at flywheel end) .

Ensure the correct con rod-piston orientation, positioning the "V" engraved on the piston crown towards the flywheel .



113591

Refit the con rod-piston assembly using a piston assembly ring.

Mount the con rod heads on the crankshaft crankpins.

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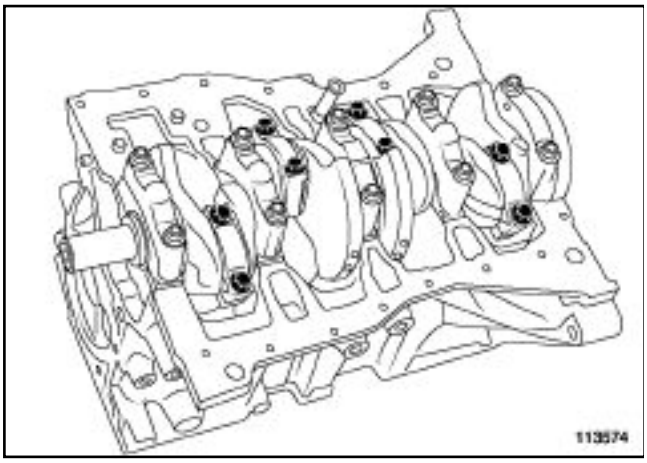


113574

Refit:

- the con rod caps, ensuring correct matching,

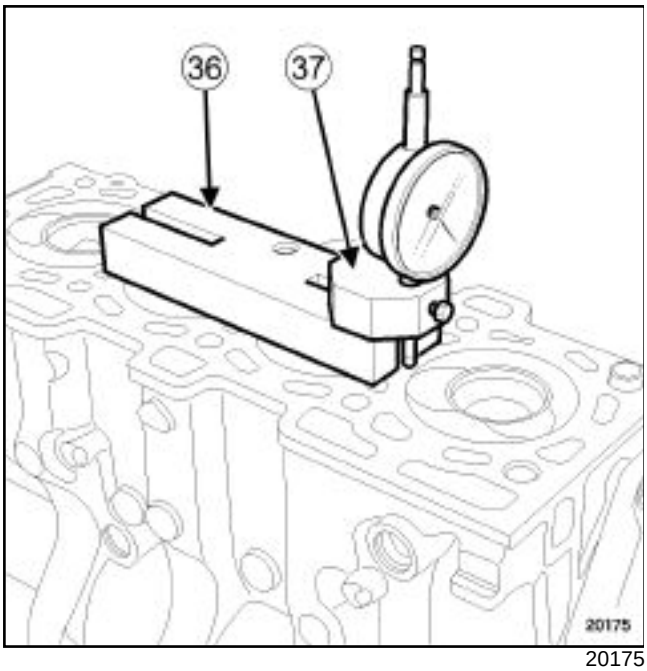
- the new con rod cap mounting bolts.

Torque and angle tighten **the con rod cap mounting bolts (20 ± 2 Nm + 45° ± 6°)** .

Check that the running gear turns freely, with no resistance.

Clean the piston crowns.

Set the crankshaft at Top Dead Centre.



20175

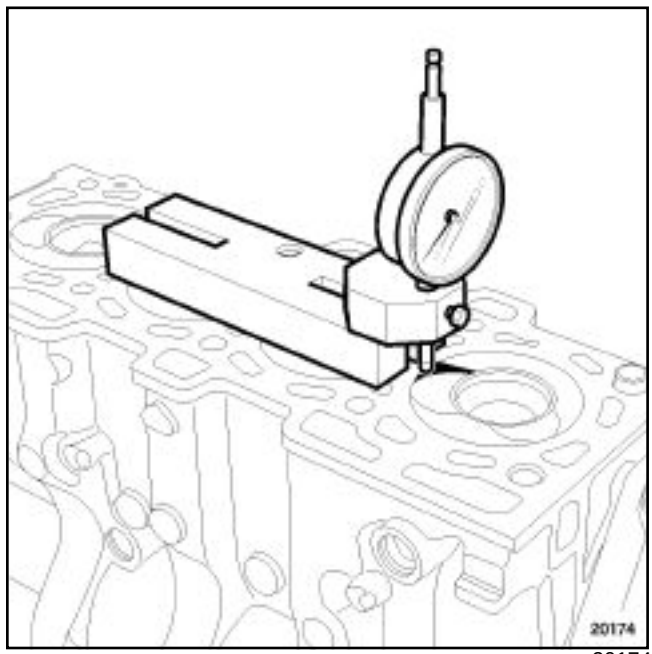
Mount the contact plate of the **(Mot. 252-01)** (**36**) on the cylinder block.

Mount the dial gauge support **(Mot. 251-01)** (**37**) , with a dial gauge, on the pressure plate.

Note:

The measurement is taken along the longitudinal axis of the crankshaft to eliminate play due to the movement of the piston .

Calibrate the dial gauge on the cylinder block.



20174

Measure the recess **(the sensor of the dial gauge should not be in a valve gap)** of the piston which should be:

- For engines **K9K 260-700-702-704-710-722 fitted with a gudgeon pin 25 mm in diameter** the recess is **0.192 ± 0.093 mm** ,

- For engines **K9K 260-270-272-700-702-704-706-710-722-750-752-790 fitted with a gudgeon pin 26 mm in diameter** the recess is **0.154 ± 0.130 mm** ,

- For engines **K9K 274-276-712-714-716-718-724-728-729-732-760-766-768-792-762-764 fitted with a gudgeon pin 26 mm in diameter** the recess is **0.159 ± 0.129 mm** ,

For cylinders No. 2 and No. 3, it is essential to find the Top Dead Centre of the piston before taking the recess measurement.

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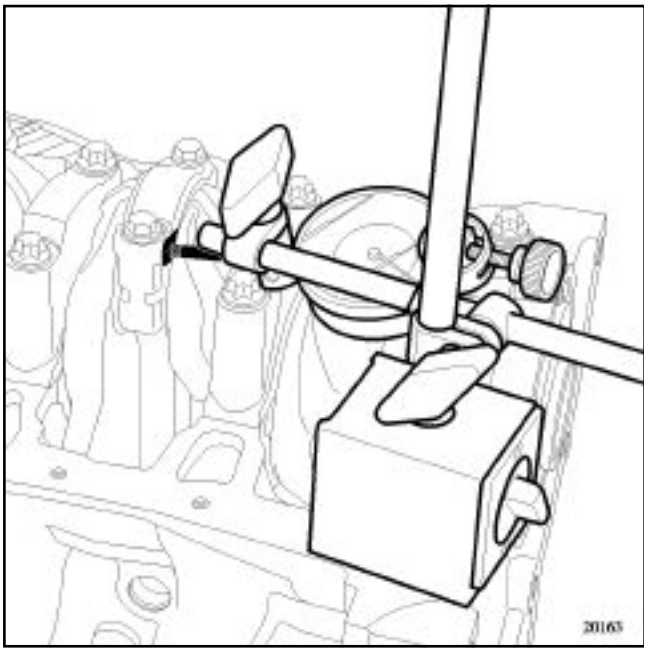

20163

Check the longitudinal clearance of the big ends, which must be between **0.205 and 0.467 mm** .

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K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790

Special tooling required	
Mot. 1018	Sump plug tool.
Mot. 1586	Tool for fitting PTFE crankshaft seal, timing end.
Mot. 1714	Adapter for fitting PTFE crankshaft seal, timing end.
Mot. 1585	Tool for fitting PTFE crankshaft seal, flywheel end.
Emb. 1596	24 mm socket for removing/refitting clutch master cylinder.
Mot. 1329	Oil filter removing tool (76 mm diameter).
Mot. 923	Engine lifting ring.
Mot. 582-01	Flywheel locking tool.
Mot. 1677	Flywheel locking tool.
Emb. 1780	Set of clutch disc centring mandrels.

Tightening torques ▽	
the oil pump mounting bolts	**25 ± 2.5 Nm**
the oil level sensor	**25 ± 2.5 Nm**
the crankshaft nose closure unit mounting bolts	**11 ± 1.1 Nm**
the coolant pump mounting bolts	**11 ± 1.1 Nm**
the engine oil sump mounting bolts	**14 ± 1.4 Nm**
the drain plug of the engine oil sump	**20 ± 2 Nm**
the coolant pump pipe mounting bolt	**22 ± 2.2 Nm**
the coolant / oil heat exchanger mounting bolt	**45 ± 4.5 Nm**

Tightening torques ▽	
the oil filter holder mounting bolt	**45 ± 4.5 Nm**
the acceleration meter	**20 ± 2 Nm**
the oil pressure switch	**30 ± 3 to 35 ± 3.5 Nm**
the oil filter	**14 ± 2 Nm**
the multifunction support mounting bolts (from 1 to 6 or from 1 to 5)	**44 ± 4.4 Nm**
multifunction support mounting bolt (7)	**21 ± 2.1 Nm**
the mounting bolts of the power assisted steering pump or the dummy pulley	**21 ± 2.1 Nm**
the air conditioning compressor mounting bolts	**21 ± 2.1 Nm**
the alternator mounting bolts	**21 ± 2.1 Nm**
the coolant / oil heat exchanger mounting bolt	**45 ± 4.5 Nm**
the oil filter holder mounting bolt	**45 ± 4.5 Nm**
the acceleration meter	**20 ± 2 Nm**
the oil pressure switch	**30 ± 3 to 35 ± 3.5 Nm**
oil filter	**14 ± 2 Nm**
flywheel mounting bolts	**55 ± 5.5 Nm**
the clutch mechanism mounting bolts	**M6 to 14 ± 1.4 Nm and bolts M7 to 20 ± 2 Nm**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

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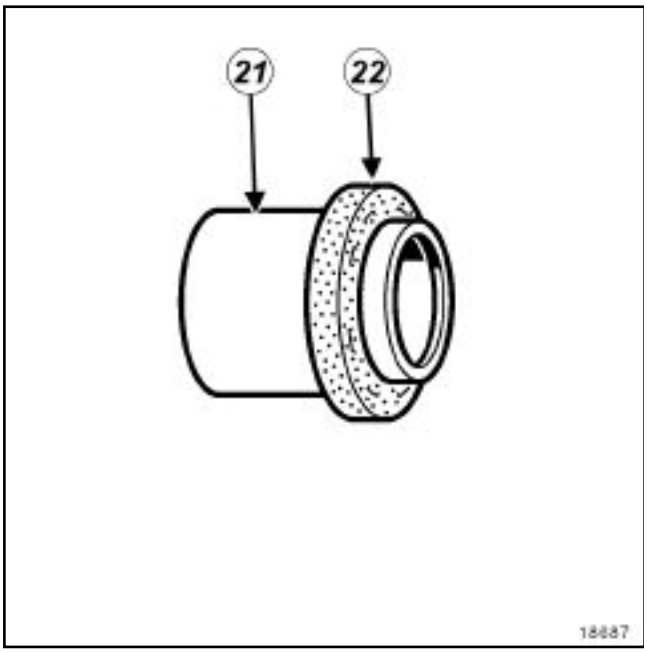
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



18687

WARNING

This type of seal is very delicate. When handling, it is essential to hold the protective piece (**21**) . It is strictly forbidden to touch seal (**22**) ; this is to prevent any oil leaks once the oil seal is fitted to the engine.

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

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.)

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced

- The crankshaft nose closure unit seal,
- The coolant pump seal,
- The oil sump mounting seal,
- The clutch mechanism (if necessary),
- The friction disc (if necessary),
- Flywheel mounting bolt
- The coolant pump inlet pipe seal,
- The oil/coolant heat exchanger seals,
- The crankshaft seal, timing end,
- The crankshaft seal, flywheel end,
- Oil filter,
- The seal of the drain plug of the engine oil sump.

Consumables

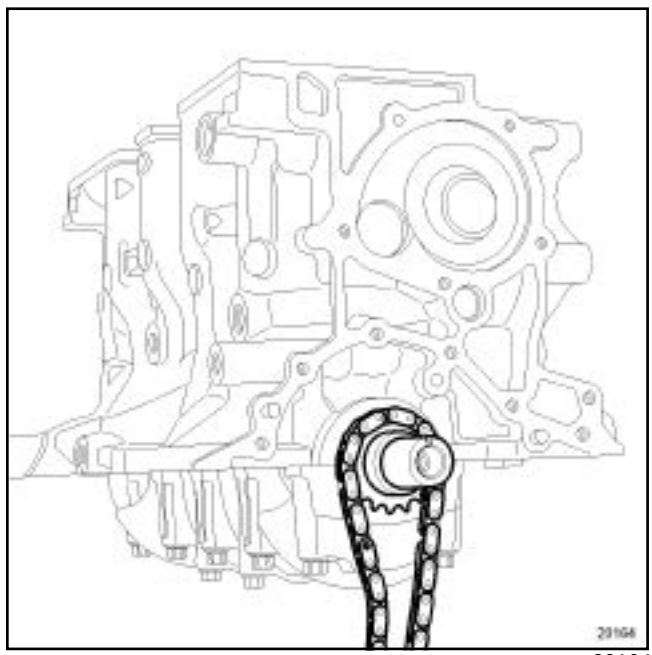
- Degreasing agent, part no. **77 11 224 559** .
- Silicone adhesive sealant, part no. **77 11 227 484** ,
- High-resistance bolt locking product, part no. **77 11 230 112** ,

III - EQUIPMENT REQUIRED

- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type),
- Rule,
- Male triangular drive drain plug spanner **8 mm** ,
- Male torx socket.
- Oil can,
- Workshop hoist.

IV - REASSEMBLING THE CYLINDER BLOCK

Put a little engine oil from an oil can in the oil pump via the oil sump filter.



20164

Refit:

- the oil pump drive sprocket,
- the oil pump chain.

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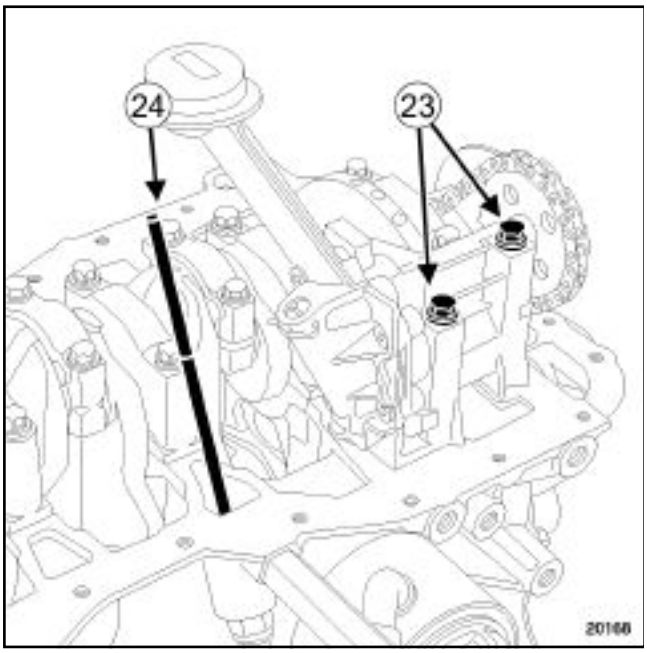
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



20168

Refit:

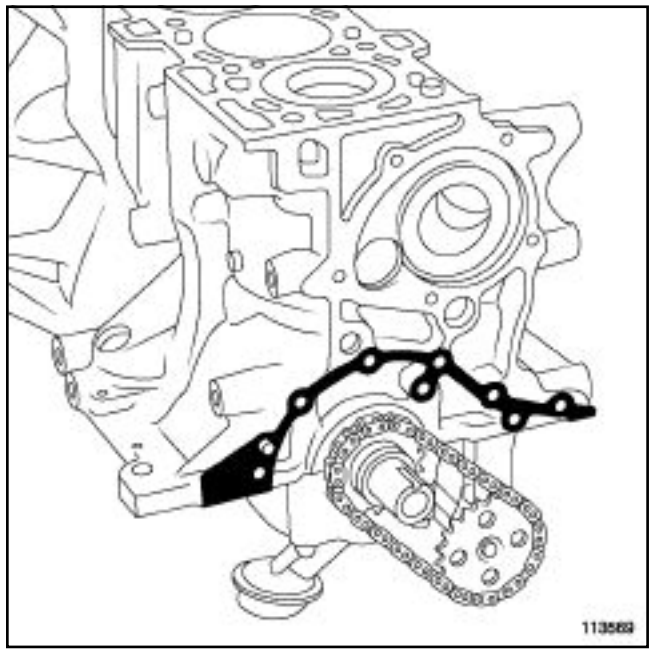
- the oil pump,
- the oil pump mounting bolts (**23**) ,
- the oil level sensor (**24**) .

Tighten to torque:

- **the oil pump mounting bolts (25 ± 2.5 Nm)** ,
- **the oil level sensor (25 ± 2.5 Nm)** .

Apply degreaser to:

- the crankshaft nose closure panel,
- the coolant pump,
- the surface of the seal of the crankshaft nose closure unit on the cylinder block,
- the surface of the coolant pump seal on the cylinder block.



113569

Fit a new seal to the crankshaft nose closure unit.

Check for the centring dowels on the crankshaft nose closure unit.

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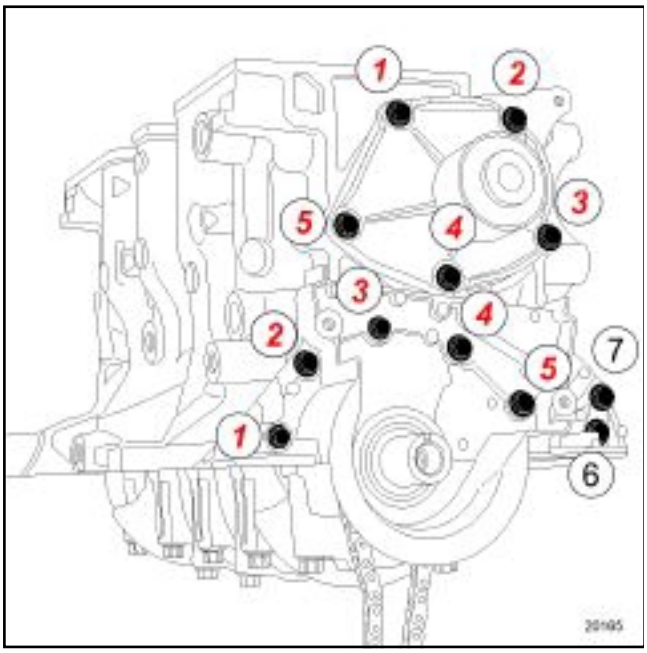
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



20165

Refit:

- the crankshaft nose closure unit,
- the crankshaft nose closure unit mounting bolt,

Tighten to torque and in order **the crankshaft nose closure unit mounting bolts (11 ± 1.1 Nm)** .

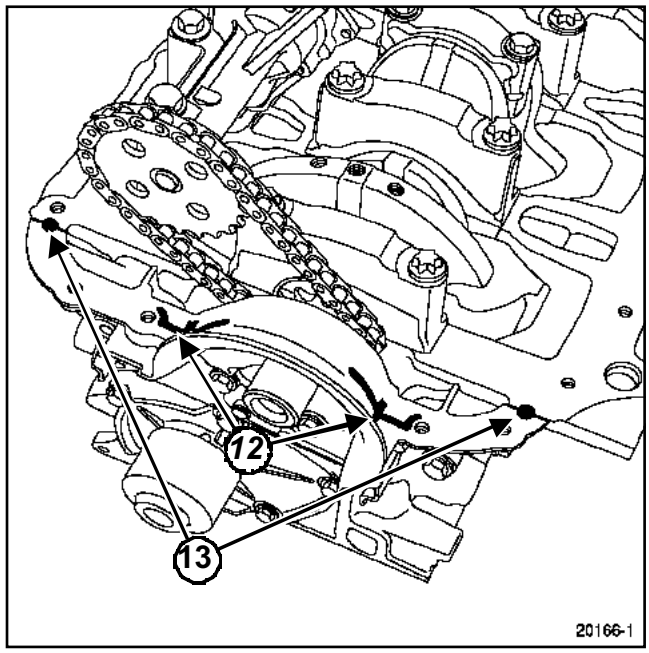
Apply a drop of **HIGH-RESISTANCE BOLT LOCKING PRODUCT** to the coolant pump mounting bolts.

Refit:

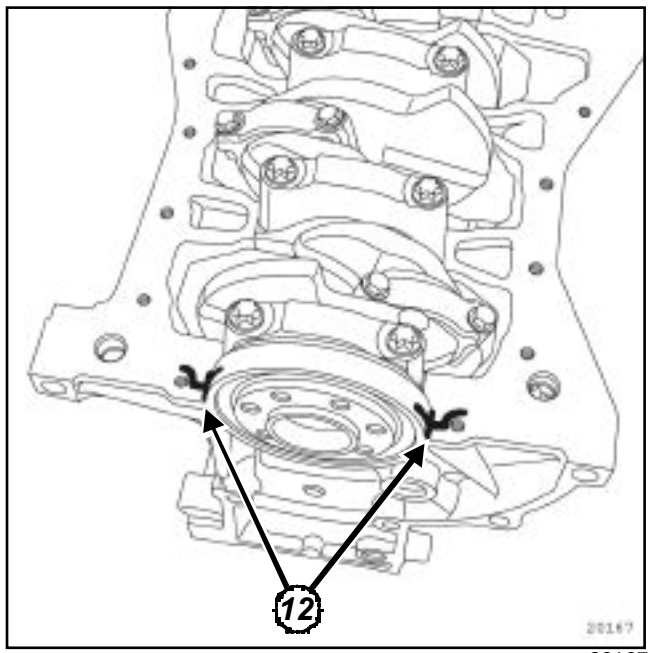
- the coolant pump fitted with a new seal,
- the coolant pump mounting bolts.

Tighten to torque and in order **the coolant pump mounting bolts (11 ± 1.1 Nm)** .

Using degreaser, degrease the seal surfaces of the lower part of the cylinder block and the oil sump.



20166



20167

Apply:

- four beads (**12**) of **SILICONE ADHESIVE SEALANT** with a diameter of **5 mm** ,
- two points (**13**) of **SILICONE ADHESIVE SEALANT 5 mm** in diameter, at the connection between the crankshaft nose closure panel and the cylinder block.

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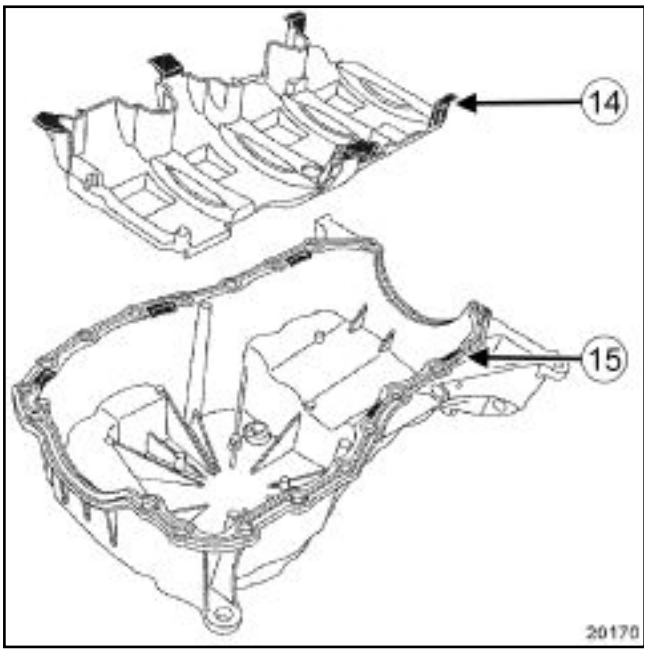
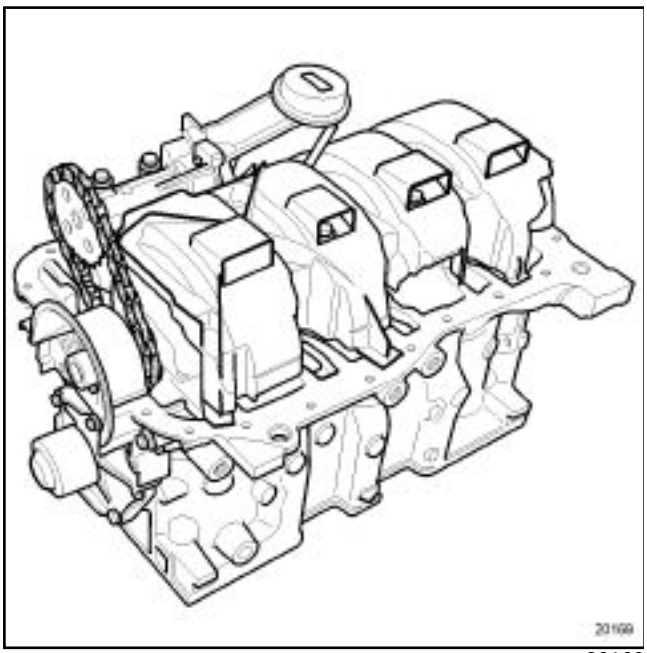
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



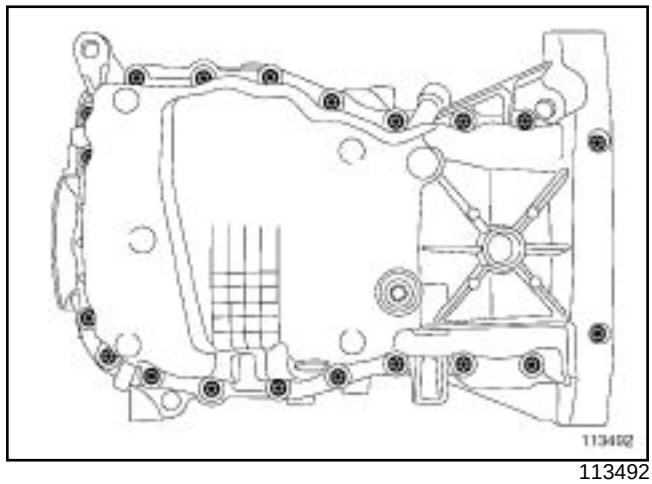
20170



20169

When refitting the engine oil sump check that the lugs (**14**) of the oil splash plate are correctly positioned facing the grooves (**15**) .

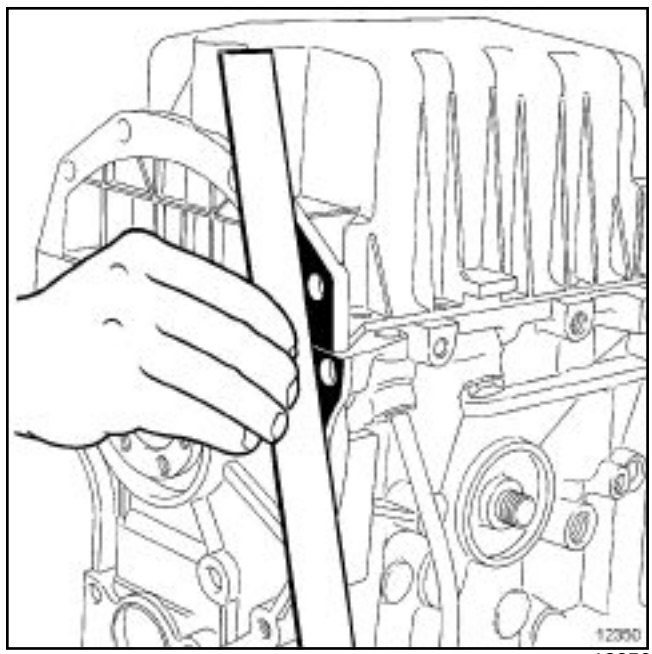
Refit the oil splash plate.



113492

Refit:

- the oil sump mounting seal,
- the engine oil sump,
- the oil sump mounting bolts,



12350

Using a ruler, align the engine oil sump with the cylinder block.

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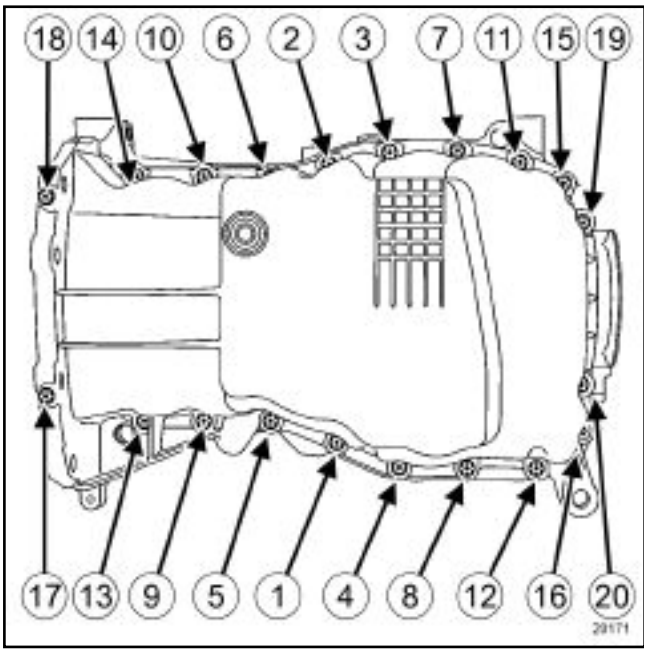
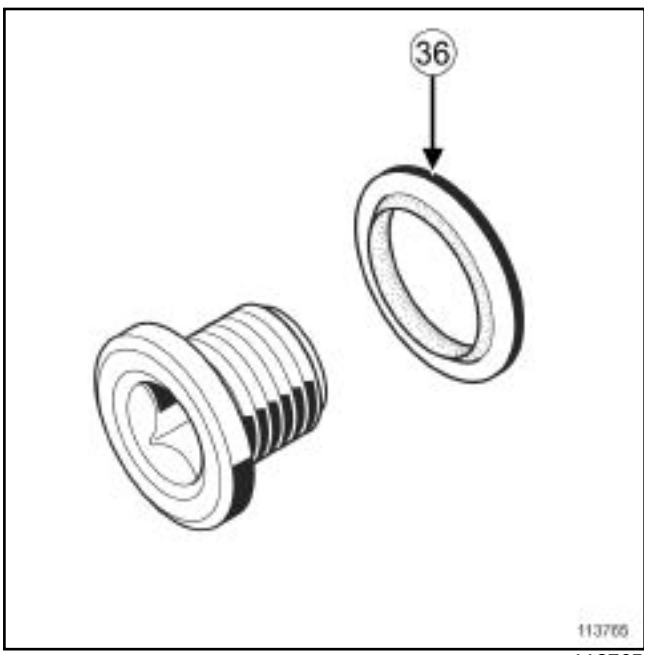
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



20171

Tighten to torque and in order **the engine oil sump mounting bolts (14 ± 1.4 Nm)** .



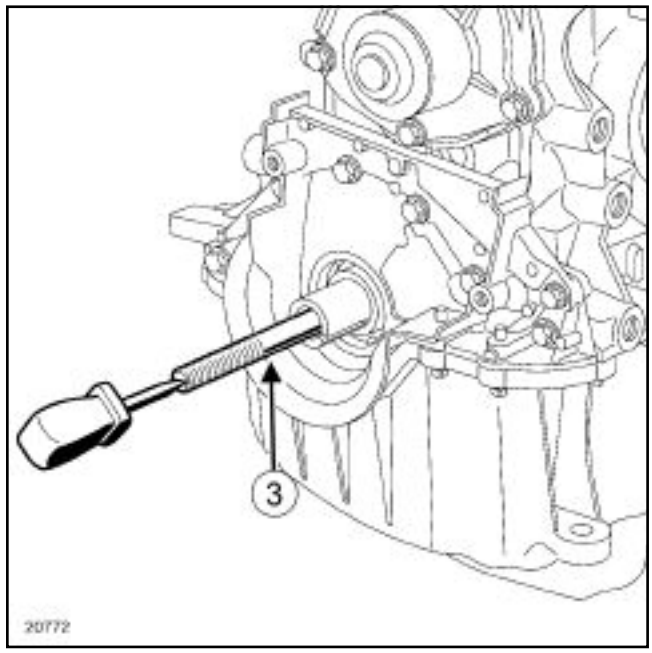
113765

Refit:

- a seal (**36**) on the drain plug of the engine oil sump,
- the drain plug of the engine oil sump, using the **(Mot. 1018)** .

Tighten to torque **the drain plug of the engine oil sump (20 ± 2 Nm)** .

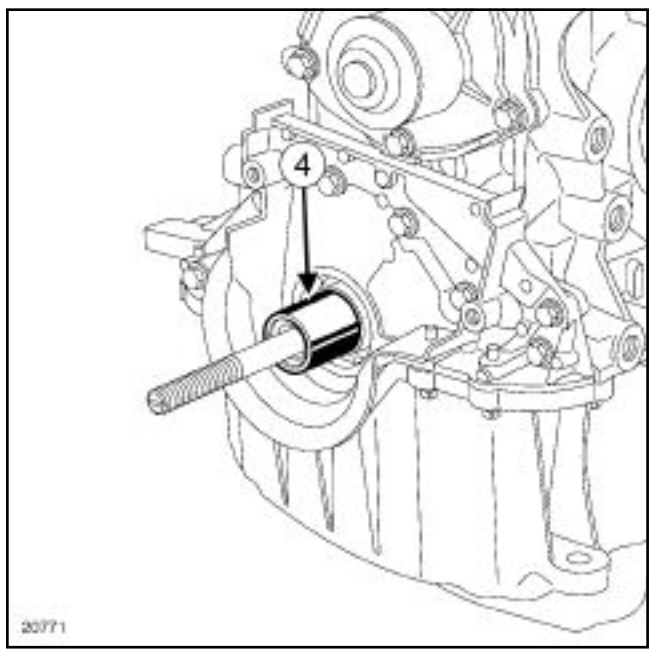
Using degreaser, degrease the seal mating face on the crankshaft and the crankshaft nose closure unit.



20772

Tighten the threaded rod (**3**) :

- of tool **(Mot. 1586)** in the crankshaft with an internal thread of **M12** ,
- of tool **(Mot. 1714)** in the crankshaft with an internal thread of **M14** ,



20771

Insert the spacer (**4**) of tool **(Mot. 1586)** in the crankshaft.

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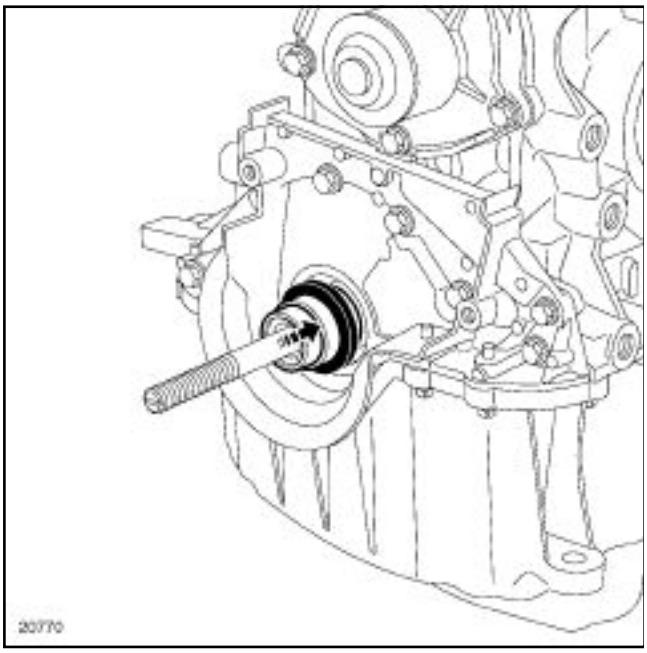
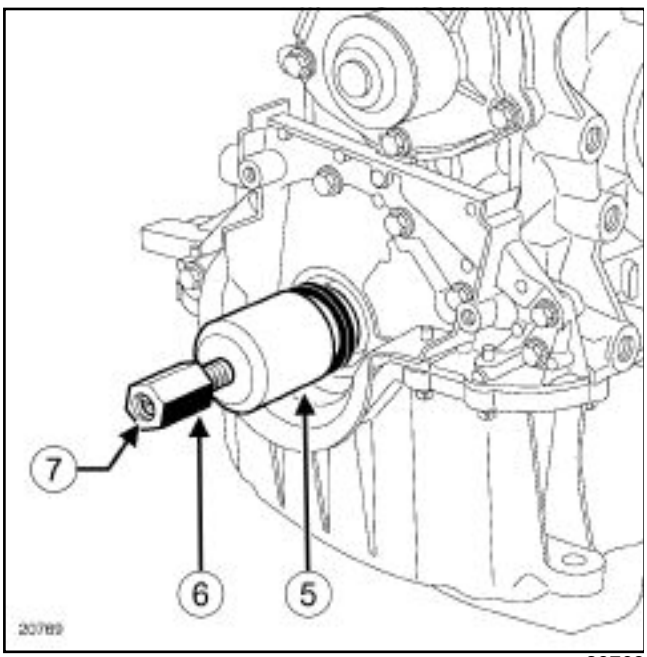
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



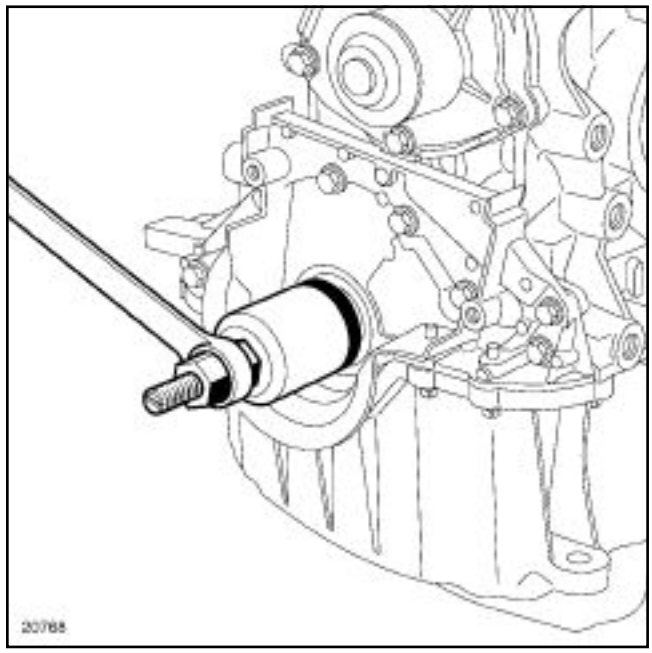
20770

Fit the protector with the new seal in place on the spacer, taking care not to touch the seal.

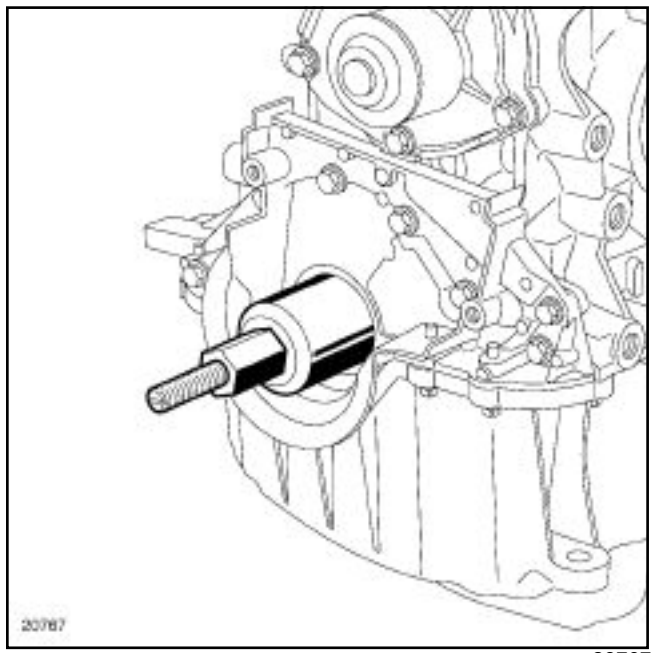


20769

Fit cover (**5**) and nut (**6**) (with the thread (**7**) of the nut towards the outside of the engine).



20768



20767

Screw on the nut until the cover touches the spacer.

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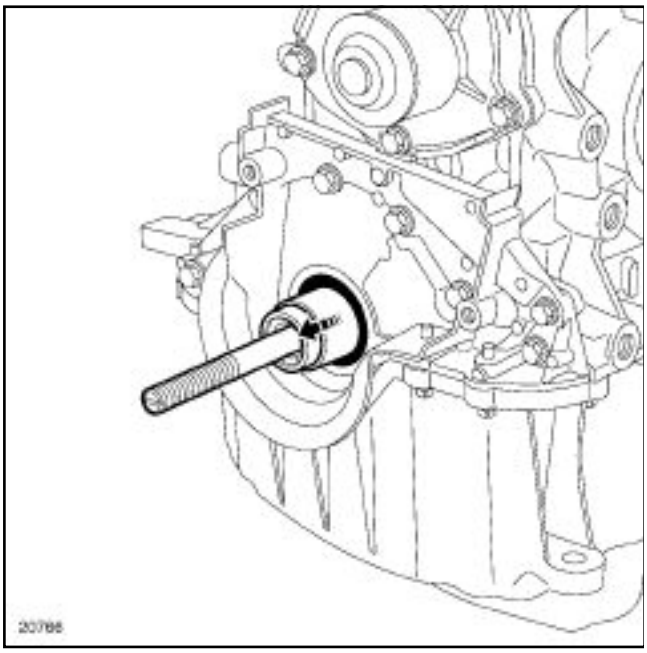
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790

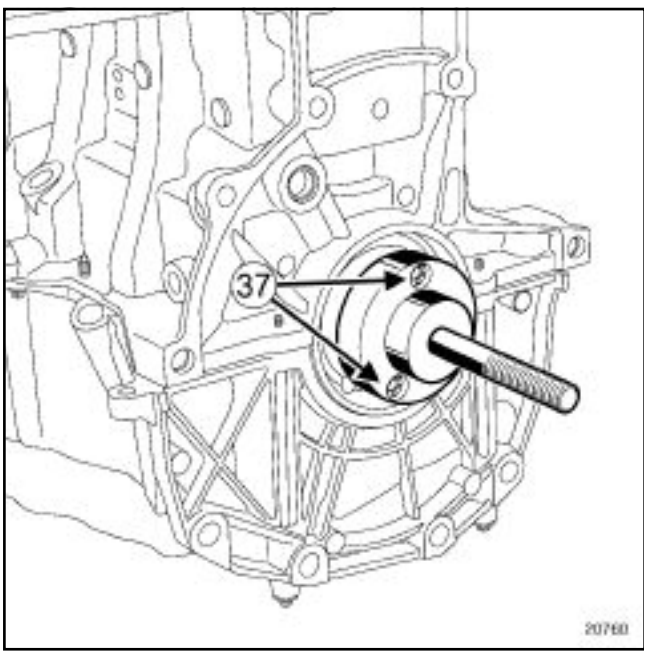


20766

Remove:

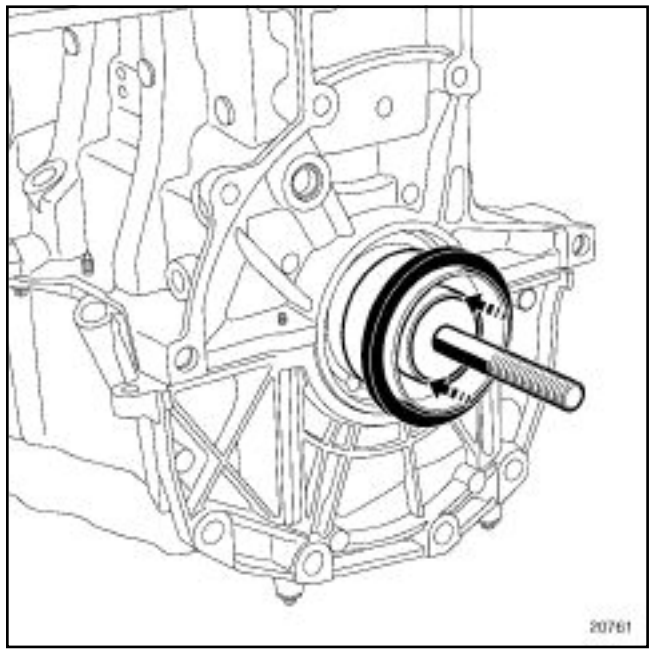
- the nut,
- the cap,
- the protector,
- the spacer,
- the threaded rod.

Using degreaser, degrease the seal mating face on the crankshaft and the cylinder block (flywheel end).



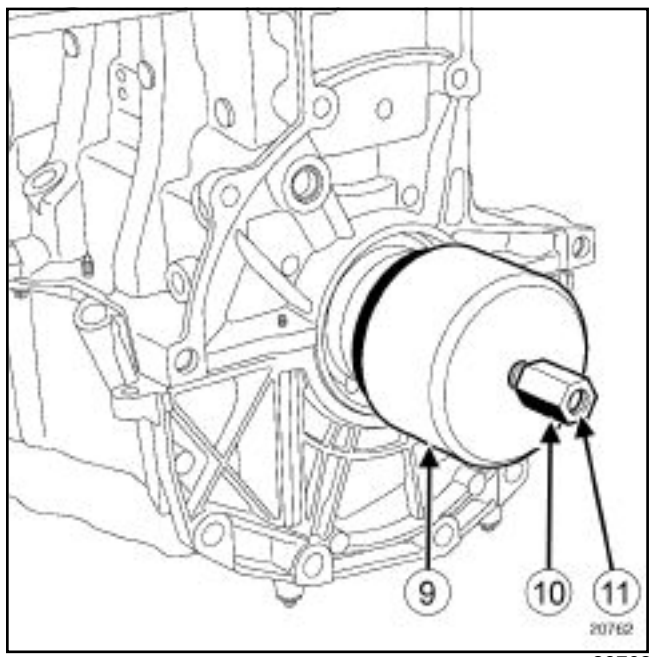
20760

Mount tool **(Mot. 1585)** on the crankshaft, securing it using bolts (**37**) .



20761

Fit the protector with its seal in place on tool, **(Mot. 1585)** taking care not to touch the seal.



20762

Fit cover (**9**) and nut (**10**) (with the thread (**11**) of the nut towards the outside of the engine).

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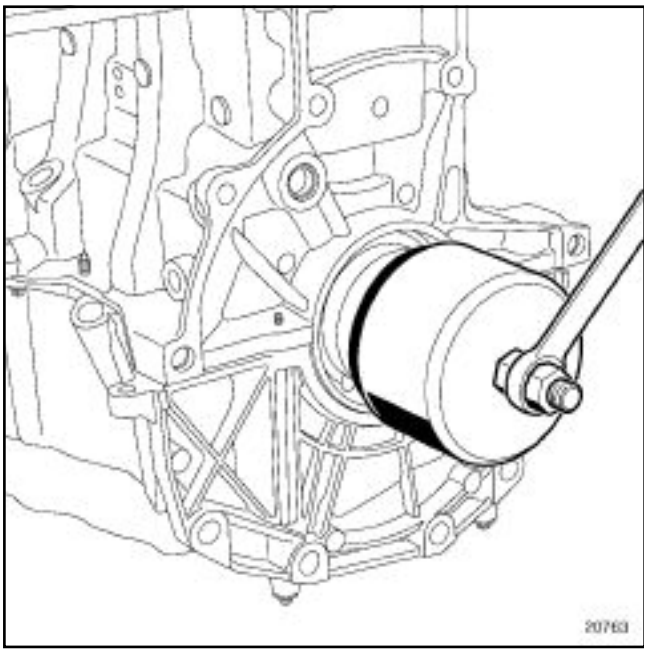
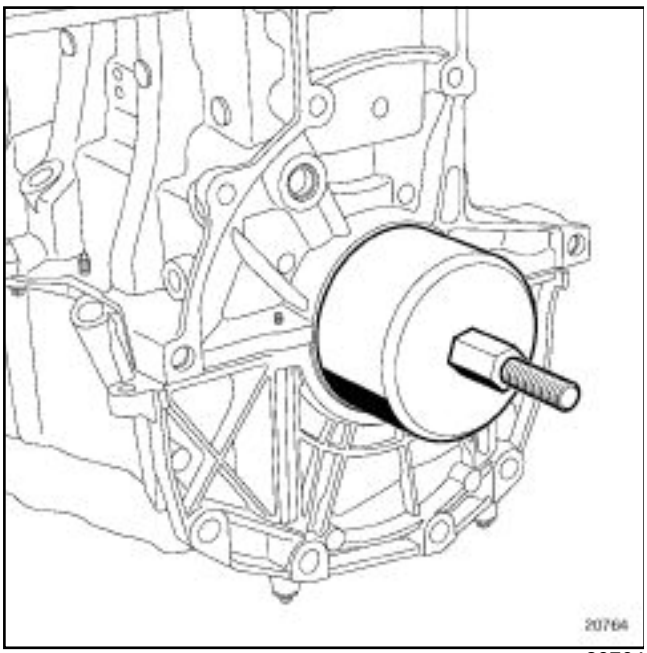
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790

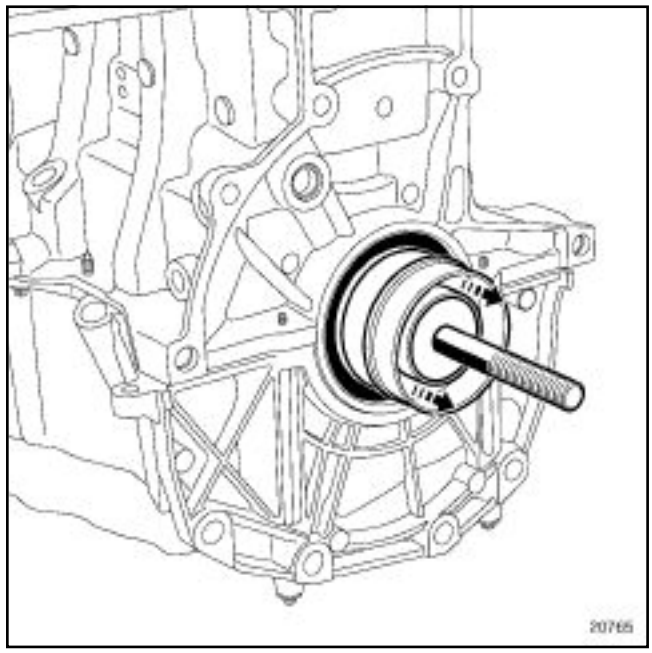


20763



20764

Screw on the nut until the cover touches the cylinder block.

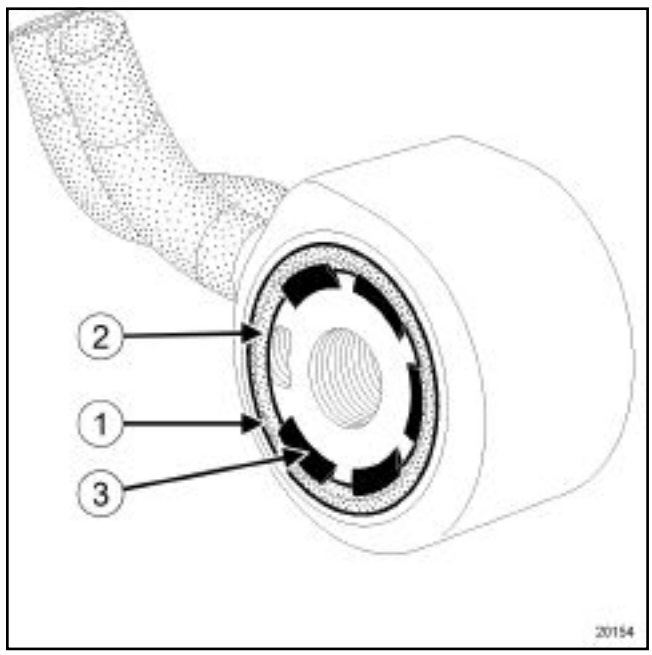


20765

Remove:

- the nut,
- the cap,
- the protector,
- the base.

Using degreaser, degrease the seal mating face of the cylinder block where it receives the coolant / oil heat exchanger.



20154

Replace the seal (**1**) of the coolant / oil heat exchanger, positioning the lip (**2**) of the joint behind the tabs (**3**) of the coolant / oil heat exchanger.

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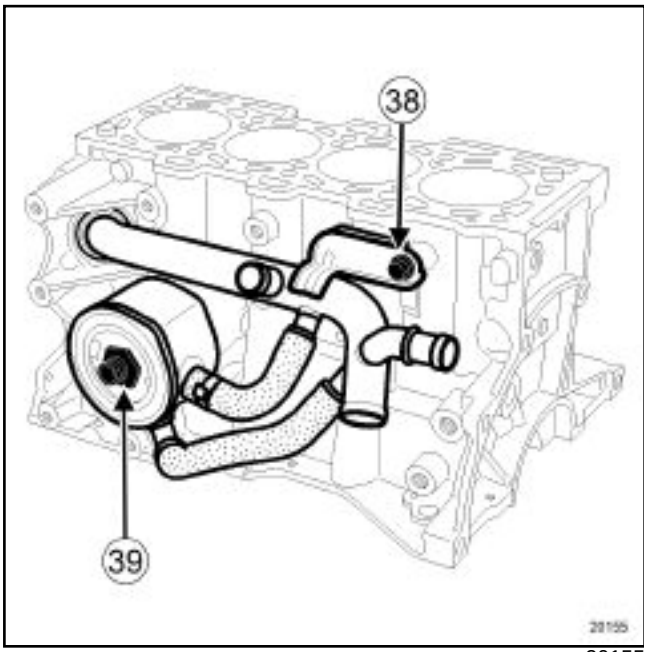
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790

1 - For engines fixed to the flywheel side

Refit a new o-ring seal to the coolant pump inlet pipe.

Put a little soapy water on the o-ring seal of the coolant pump inlet pipe.



20155

Refit:

- the coolant pump inlet pipe,
- the mounting bolt (**38**) of the coolant pump inlet pipe,

Tighten to torque **the coolant pump pipe mounting bolt (22 ± 2.2 Nm)** .

Position the coolant / oil heat exchanger (fitted with its coolant hoses), enclosing the coolant hoses in the inlet pipe of the coolant pump, in order to position correctly the coolant / oil heat exchanger.

Apply two drops of **HIGH-RESISTANCE BOLT LOCKING PRODUCT** to the coolant / oil heat exchanger mounting bolt.

Refit:

- the coolant / oil heat exchanger,
- the mounting bolt (**39**) of the oil / coolant heat exchanger,

Tighten to torque **the coolant / oil heat exchanger mounting bolt (45 ± 4.5 Nm)** .

Using degreaser, degrease the seal mating face of the coolant / oil heat exchanger where it receives the oil filter holder.

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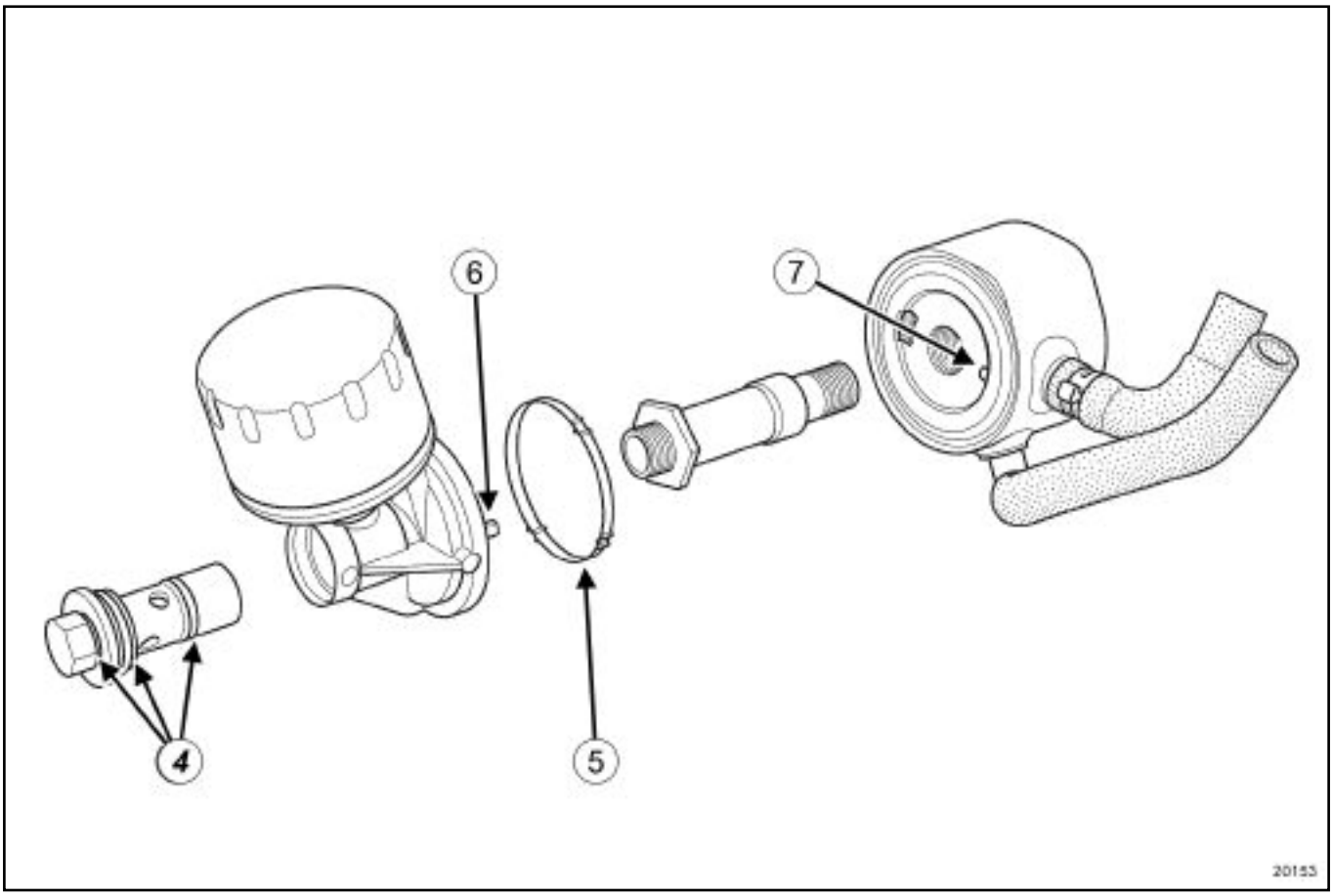
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



20153

Replace the seals (**4**) and (**5**) .

Refit the oil filter holder, positioning the lug (**6**) in the hole (**7**) on the coolant / oil heat exchanger.

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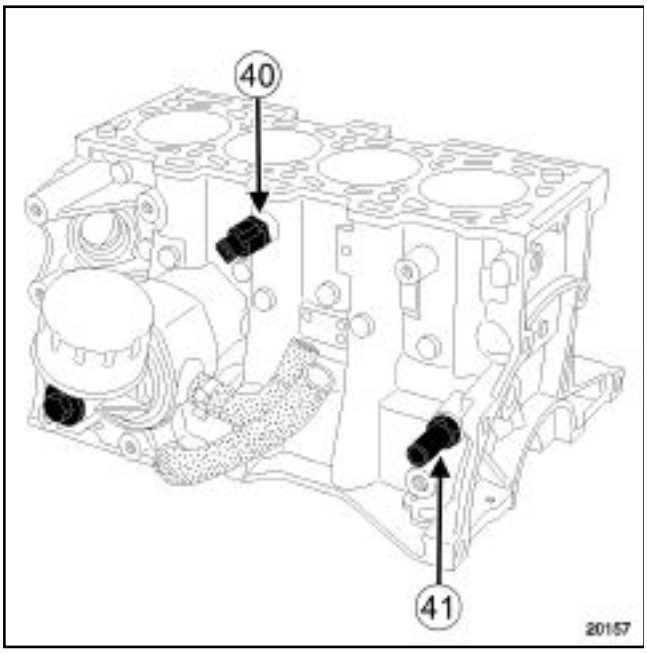
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



20157

Refit:

- the acceleration meter (**40**) ,
- the oil pressure switch (**41**) .

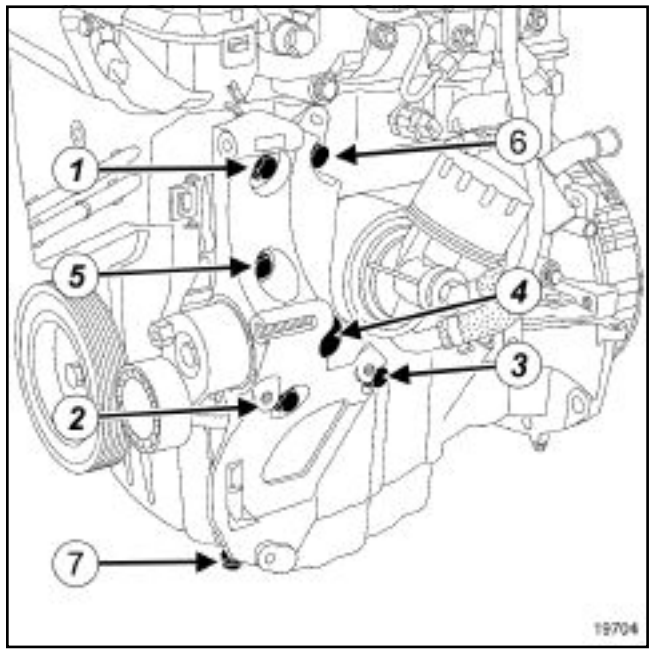
Tighten to torque:

- **the oil filter holder mounting bolt (45 ± 4.5 Nm)** ,
- **the acceleration meter (20 ± 2 Nm)** using the tool **(Emb. 1596)** ,
- **the oil pressure switch (30 ± 3 to 35 ± 3.5 Nm)** .

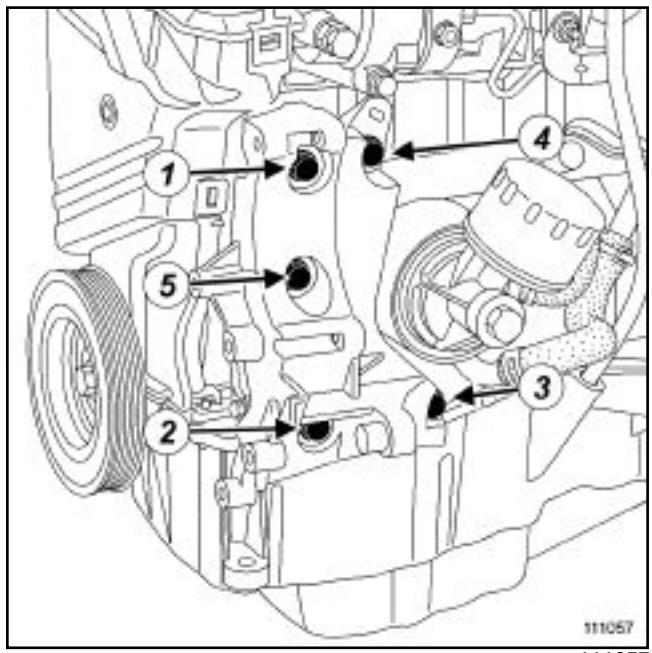
Lubricate the oil filter seal with new engine oil.

Refit the oil filter using the **(Mot. 1329)** .

Tighten to torque **the oil filter (14 ± 2 Nm)** .



19704



111057

Refit:

- the multifunction support,
- the multifunction support mounting bolts.

Tighten to torque and in order **the multifunction support mounting bolts (from 1 to 6 or from 1 to 5) (44 ± 4.4 Nm)** .

Torque tighten the **multifunction support mounting bolt (7) (21 ± 2.1 Nm)** .

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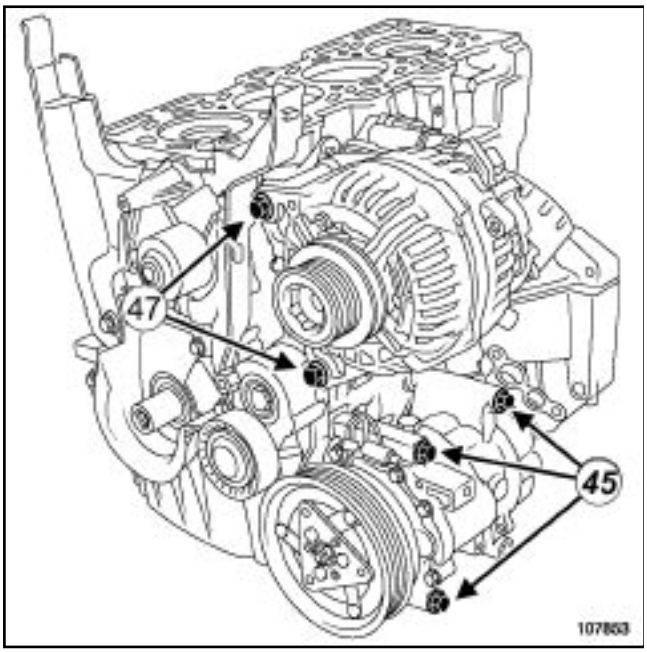
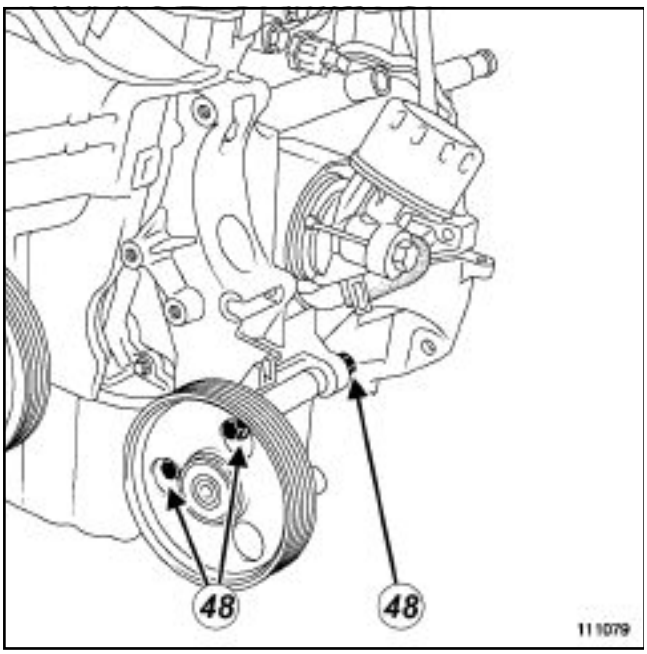
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



107853



111079

Refit:

- the power assisted steering pump or the dummy pulley,
- the mounting bolts (**48**) of the power assisted steering pump or the dummy pulley,
- the air conditioning compressor (if fitted),
- the air conditioning compressor mounting bolts (**45**) ,
- the alternator,
- the alternator mounting bolts (**47**) .

Tighten to torque:

- **the mounting bolts of the power assisted steering pump or the dummy pulley (21 ± 2.1 Nm)** ,
- **the air conditioning compressor mounting bolts (21 ± 2.1 Nm)** ,
- **the alternator mounting bolts (21 ± 2.1 Nm)** .

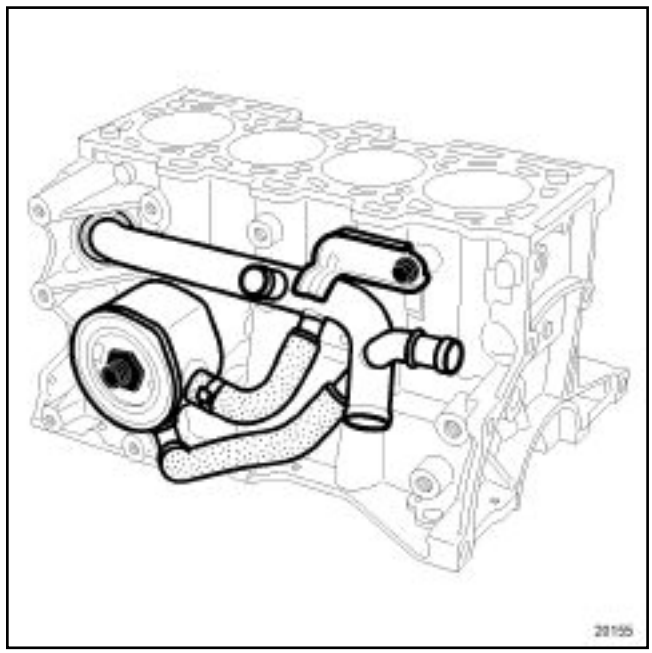
2 - For engines fixed to the oil filter side

In order to position correctly the coolant / oil heat exchanger on the cylinder block it is essential to remove the cylinder block from the engine support using tool **(Mot. 923)** and a workshop hoist.

Remove the engine spindle from the cylinder block.

Refit:

- the coolant pump inlet pipe,
- the mounting bolt of the coolant pump inlet pipe.



20155

Position the coolant / oil heat exchanger (fitted with its coolant hoses), enclosing the coolant hoses in the inlet pipe of the coolant pump, in order to position correctly the coolant / oil heat exchanger.

Apply two drops of **HIGH-RESISTANCE BOLT LOCKING PRODUCT** to the coolant / oil heat exchanger mounting bolt.

Tighten to torque **the coolant / oil heat exchanger mounting bolt (45 ± 4.5 Nm)** .

Using degreaser, degrease the seal mating face of the coolant / oil heat exchanger where it receives the oil filter holder.

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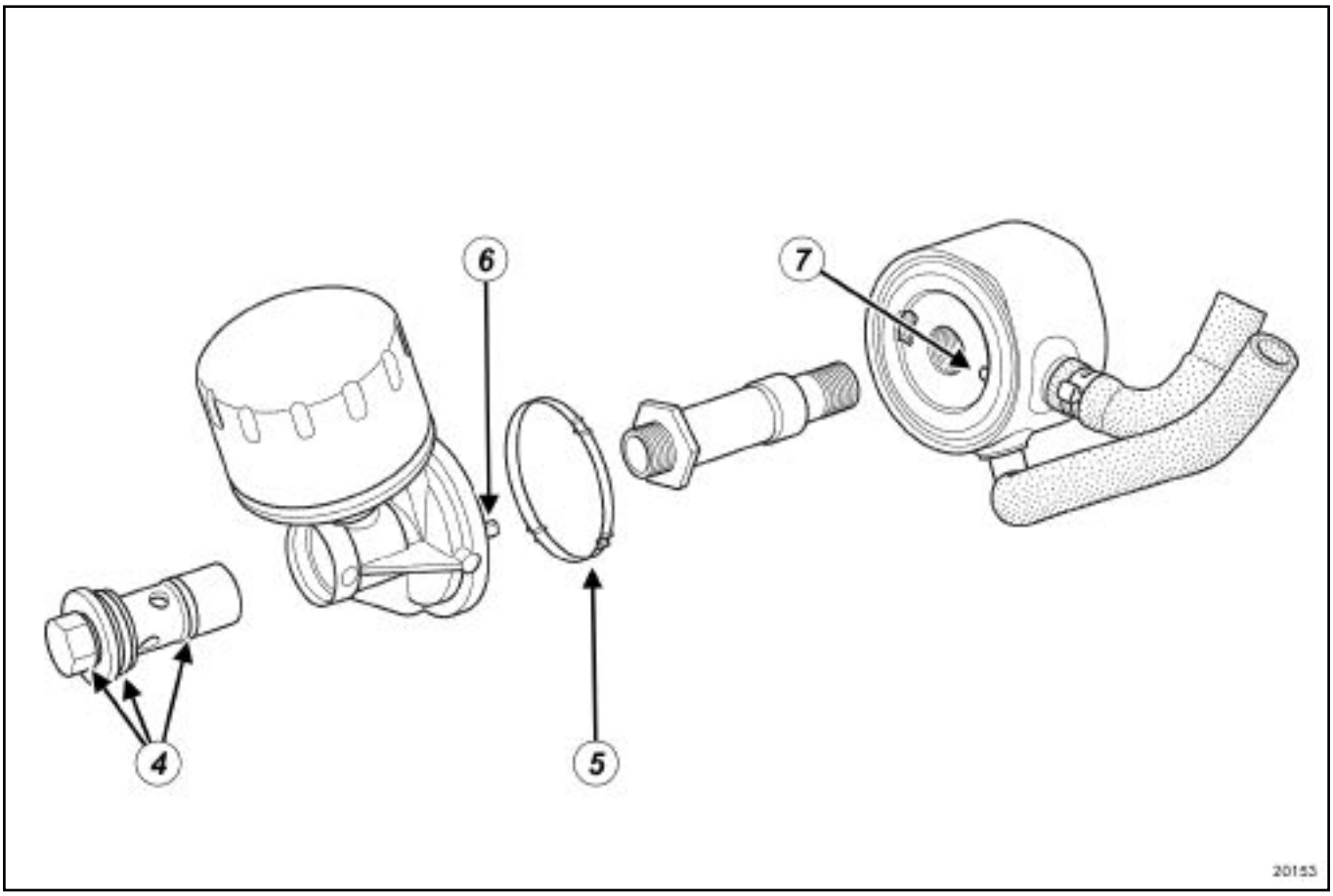
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



20153

Replace the seals (**4**) and (**5**) .

Refit the oil filter holder, positioning the lug (**6**) in the hole (**7**) on the coolant / oil heat exchanger.

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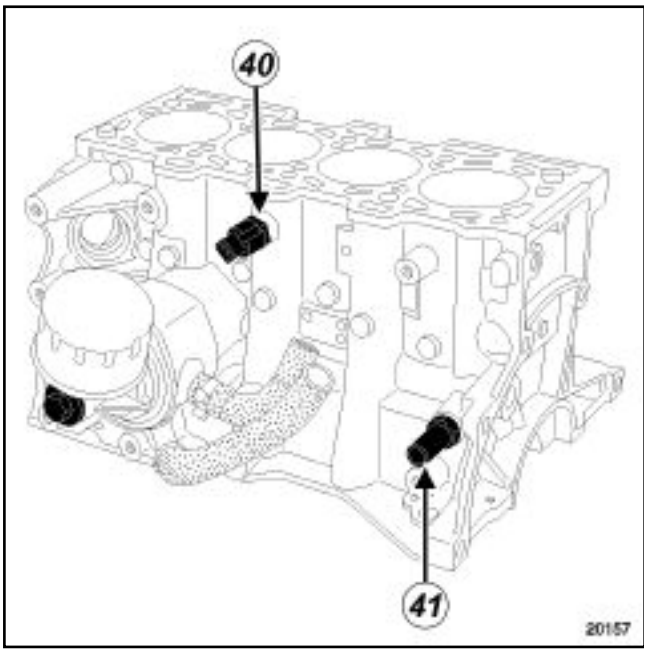
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



20157

Refit:

- the acceleration meter (**40**) ,
- the oil pressure switch (**41**) .

Tighten to torque:

- **the oil filter holder mounting bolt (45 ± 4.5 Nm)** ,
- **the acceleration meter (20 ± 2 Nm)** using the tool **(Emb. 1596)** ,
- **the oil pressure switch (30 ± 3 to 35 ± 3.5 Nm)** .

Remove the coolant pump inlet pipe.

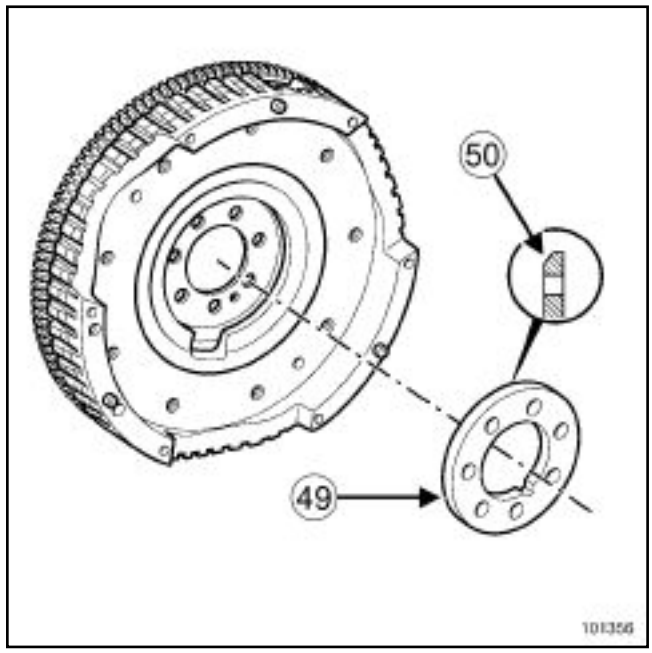
Refit:

- the engine spindle onto the cylinder block.
- the cylinder block onto the engine support.

Lubricate the oil filter seal with new engine oil.

Refit the oil filter using the tool **(Mot. 1329)** .

Tighten to torque the **oil filter (14 ± 2 Nm)** .



101356

Note:

Certain flywheels have a shim (**49**) . **It is essential to position the chamfer** (**50**) **of the shim on the flywheel side** .

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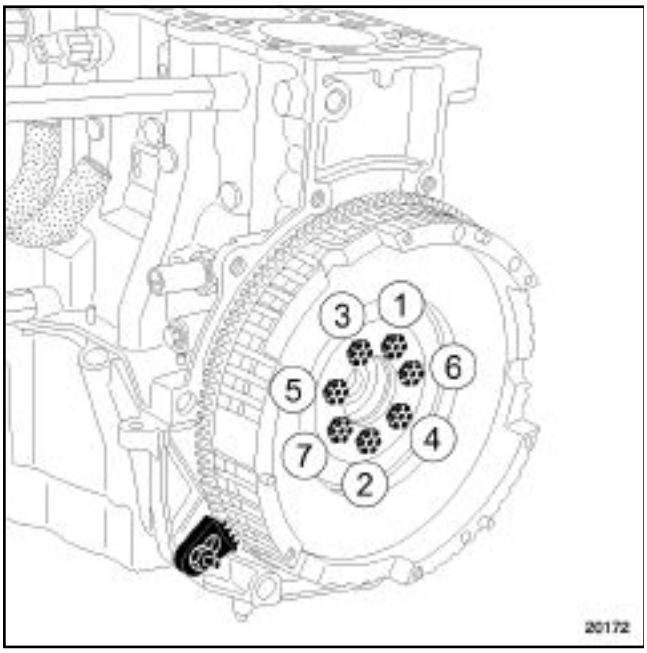
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 722 or 750 or 752 or 790



20172

Refit:

- the flywheel,
- the new flywheel mounting bolts,
- engine flywheel locking tool **(Mot. 582-01)** or **(Mot. 1677)** .

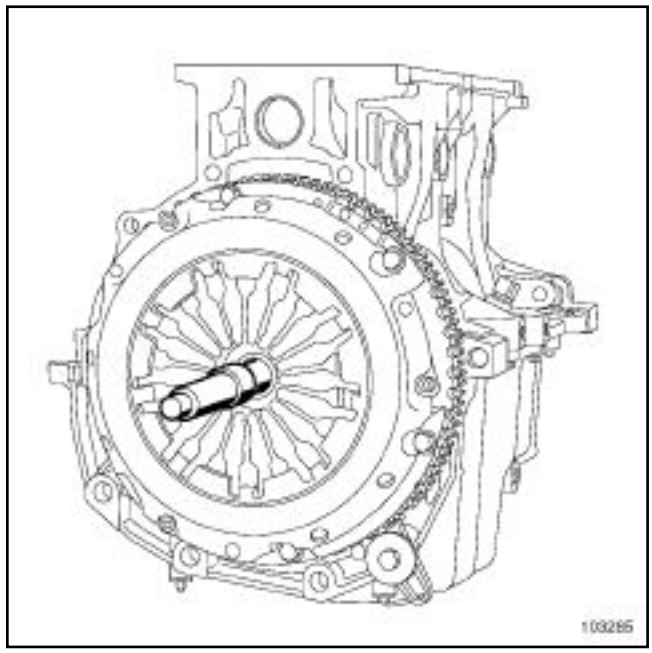
Tighten to torque and in order the **flywheel mounting bolts (55 ± 5.5 Nm)** .

Using degreasing agent, degrease the friction face on the flywheel.

Refit the friction disc (aligning it correctly).

Centre the friction disc using tool **(Emb. 1780)** .

Using degreasing agent, degrease the friction face on the clutch mechanism.



103285

Refit:

- the clutch pressure plate,
- the clutch mechanism mounting bolts.

Gradually tighten the mounting bolts of the clutch pressure plate.

Tighten to torque **the clutch mechanism mounting bolts (M6 to 14 ± 1.4 Nm and bolts M7 to 20 ± 2 Nm)** .

Remove engine flywheel locking tool **(Mot. 582-01)** or. **(Mot. 1677)** .

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K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768

Special tooling required	
Mot. 1018	Sump plug tool.
Mot. 1586	Tool for fitting PTFE crankshaft seal, timing end.
Mot. 1714	Adapter for fitting PTFE crankshaft seal, timing end.
Mot. 1585	Tool for fitting PTFE crankshaft seal, flywheel end.
Emb. 1596	24 mm socket for removing/refitting clutch master cylinder.
Mot. 1329	Oil filter removing tool (76 mm diameter).
Mot. 1677	Flywheel locking tool.
Emb. 1780	Set of clutch disc centring mandrels.

Tightening torques ▽	
oil pump mounting bolts	**25 ± 2.5 Nm**
the crankshaft nose closure unit mounting bolts	**11 ± 1.1 Nm**
the coolant pump mounting bolts	**11 ± 1.1 Nm**
the engine oil sump mounting bolts	**14 ± 1.4 Nm**
the drain plug of the engine oil sump	**20 ± 2 Nm**
the coolant pump inlet pipe mounting bolt	**22 ± 2.2 Nm**
the oil level sensor	**25 ± 2.5 Nm**
the acceleration meter	**20 ± 2 Nm**
the coolant/oil heat exchanger mounting bolt	**45 ± 4.5 Nm**
oil filter holder mounting bolt	**45 ± 4.5 Nm**

Tightening torques ▽	
oil filter	**14 ± 2 Nm**
the multifunction support mounting bolts (1 to 6)	**44 ± 4.4 Nm**
multifunction support mounting bolt (7)	**21 ± 2.1 Nm**
the mounting bolts of the power assisted steering pump or the dummy pulley	**21 ± 2.1 Nm**
the air conditioning compressor mounting bolts	**21 ± 2.1 Nm**
the alternator mounting bolts	**21 ± 2.1 Nm**
flywheel mounting bolts	**55 ± 5.5 Nm**
the clutch mechanism mounting bolts	**M6 to 14 ± 1.4 Nm and bolts M7 to 20 ± 2 Nm**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

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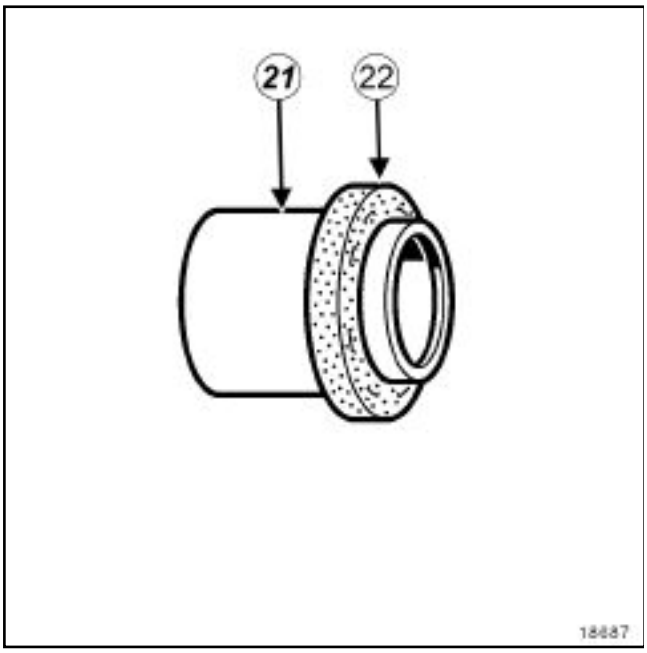
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



18687

WARNING

This type of seal is very delicate. When handling, it is essential to grip protective piece (**21**) . It is strictly forbidden to touch seal; (**22**) this is to prevent any oil leaks once the oil seal is fitted to the engine.

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

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.)

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced

- The crankshaft nose closure unit seal,
- The coolant pump seal,
- The oil sump mounting seal,
- The clutch mechanism (if necessary),
- The friction disc (if necessary),
- Flywheel mounting bolt
- The coolant pump inlet pipe seal,
- The oil/coolant heat exchanger seals,
- The crankshaft seal, timing end,
- The crankshaft seal, flywheel end,
- Oil filter,
- The seal of the drain plug of the engine oil sump.

Consumables

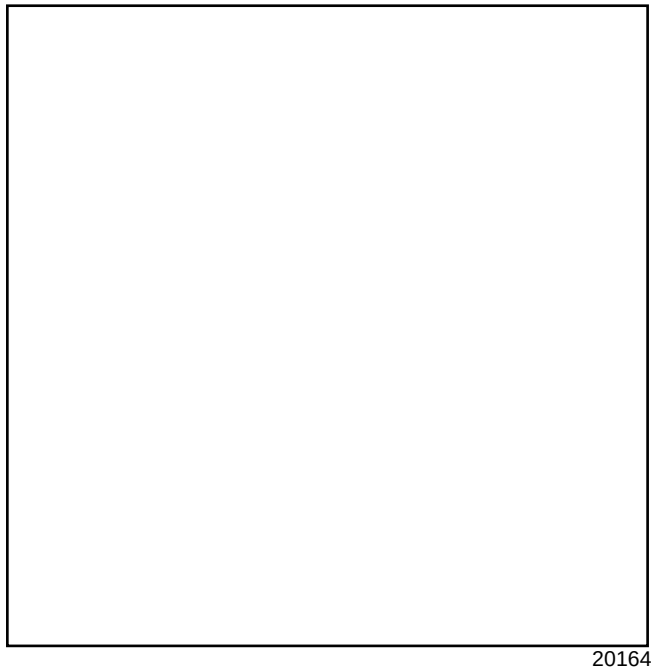
- Degreasing agent, part no. **77 11 224 559** .
- Silicone adhesive sealant, part no. **77 11 227 484** ,
- High-resistance bolt locking product, part no. **77 11 230 112** ,

III - EQUIPMENT REQUIRED

- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type),
- Rule,
- Male triangular drive drain plug spanner **8 mm** ,
- Male torx socket.
- Oil can,

IV - REASSEMBLING THE CYLINDER BLOCK

Put a little engine oil from an oil can in the oil pump via the oil sump filter.


20164

Refit:

- the oil pump drive sprocket,
- the oil pump chain.

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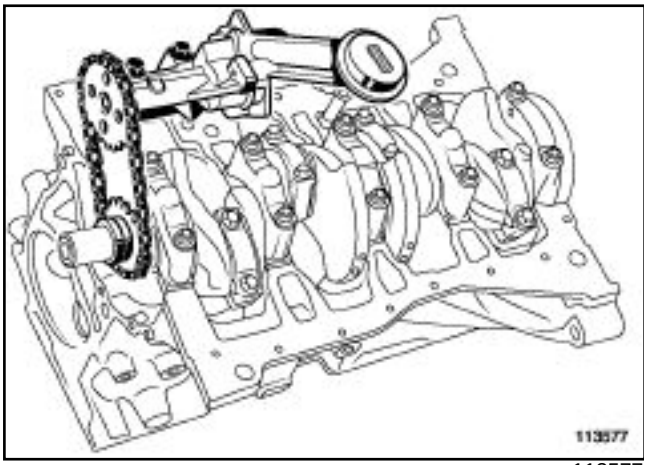
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



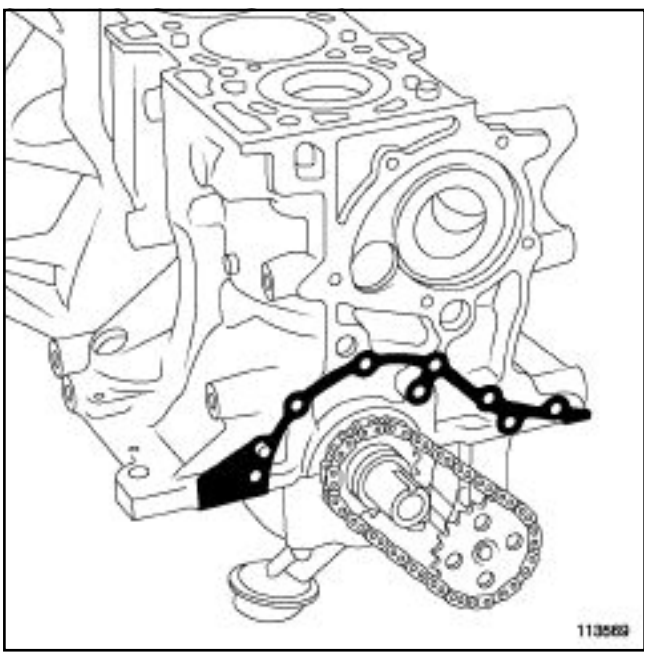
113577

Refit the oil pump.

Tighten to torque the **oil pump mounting bolts (25 ± 2.5 Nm)** .

Apply degreaser to:

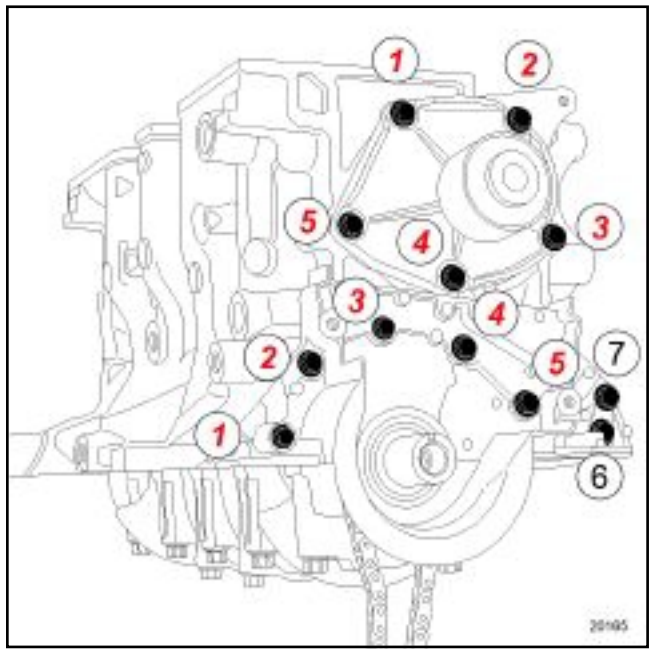
- the crankshaft nose closure panel,
- the coolant pump,
- the surface of the seal of the crankshaft nose closure unit on the cylinder block,
- the surface of the coolant pump seal on the cylinder block.



113569

Fit a new seal to the crankshaft nose closure unit.

Check for the centring dowels on the crankshaft nose closure unit.



20165

Refit:

- the crankshaft nose closure panel,
- the crankshaft nose closure unit mounting bolt,

Tighten to torque and in order **the crankshaft nose closure unit mounting bolts (11 ± 1.1 Nm)** .

Apply a drop of **HIGH-RESISTANCE BOLT LOCKING PRODUCT** to the coolant pump mounting bolts.

Refit:

- the coolant pump fitted with a new seal,
- the coolant pump mounting bolts.

Tighten to torque and in order **the coolant pump mounting bolts (11 ± 1.1 Nm)** .

Using degreaser, degrease the seal surfaces of the lower part of the cylinder block and the oil sump.

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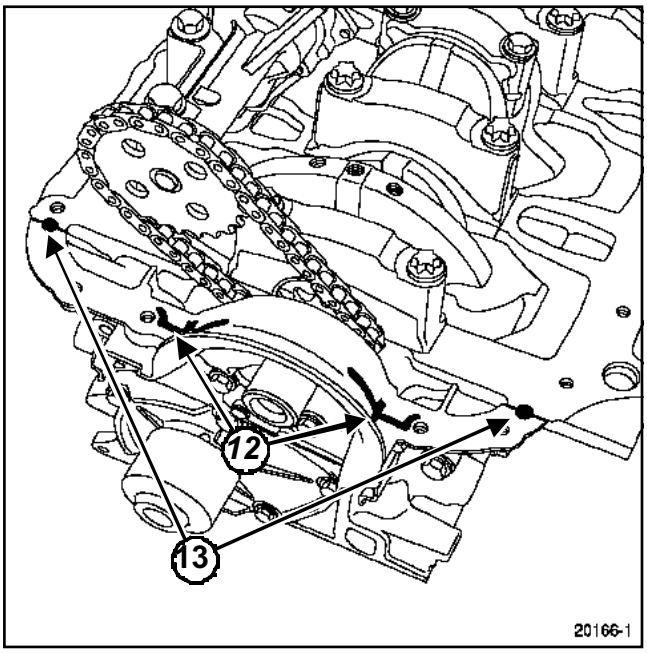
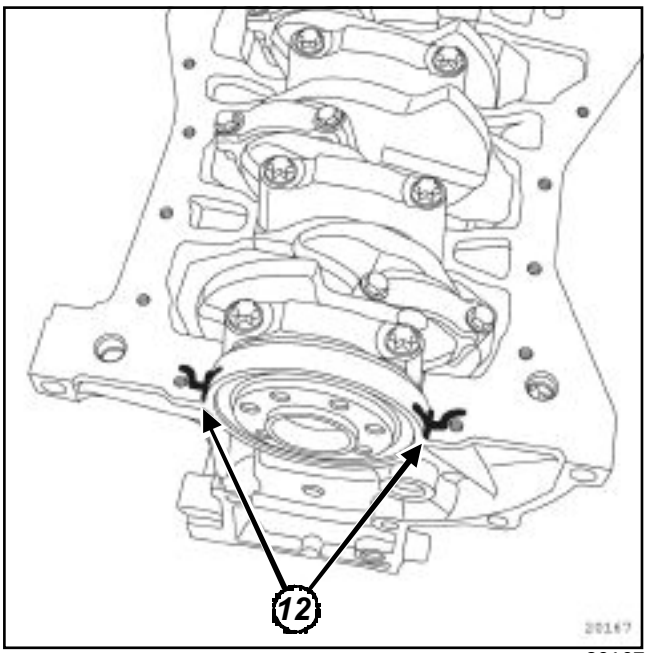
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



20166

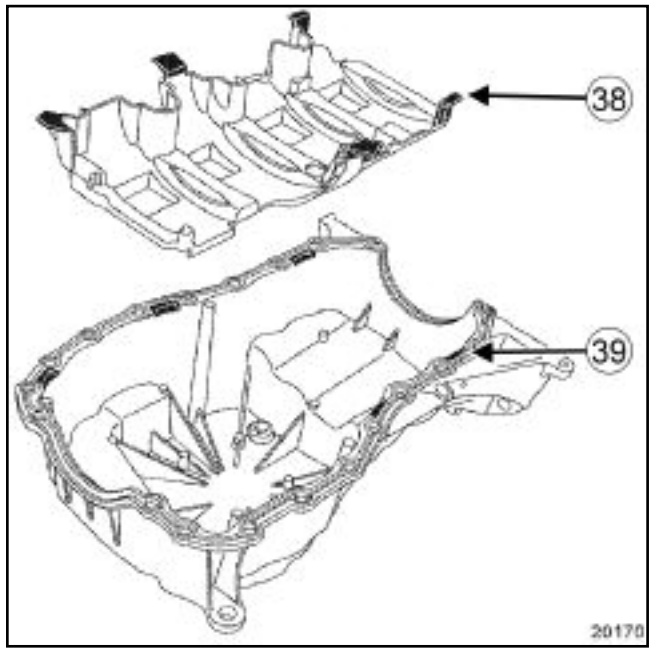


20167

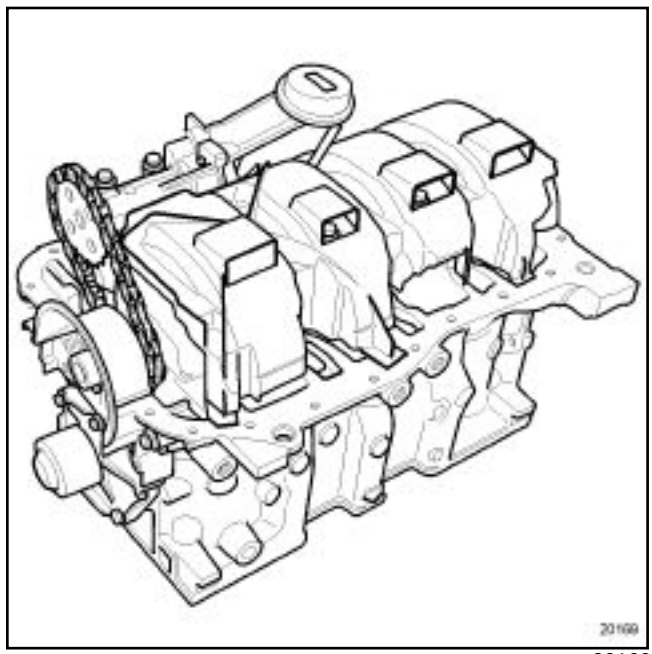
Apply:

- four beads (**12**) of **SILICONE ADHESIVE SEALANT** with a diameter of **5 mm** ,
- two points (**13**) of **SILICONE ADHESIVE SEALANT 5 mm** in diameter, at the connection between the crankshaft nose closure panel and the cylinder block.

K9K, and 712 or 728



20170



20169

When refitting the engine oil sump check that the tabs (**38**) of the oil splash plate are correctly positioned facing the grooves (**39**) .

Refit the oil splash plate.

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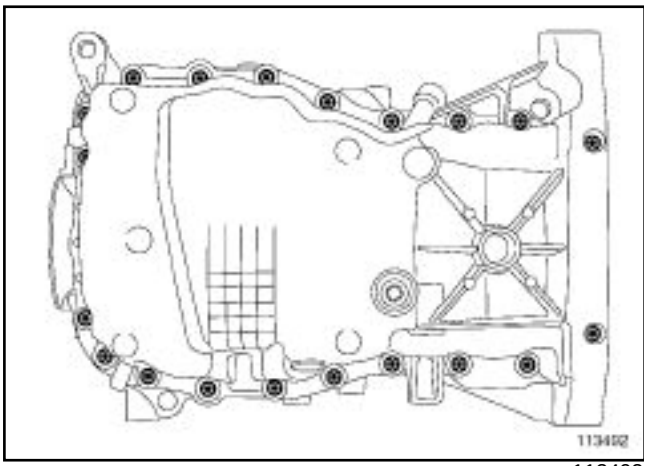
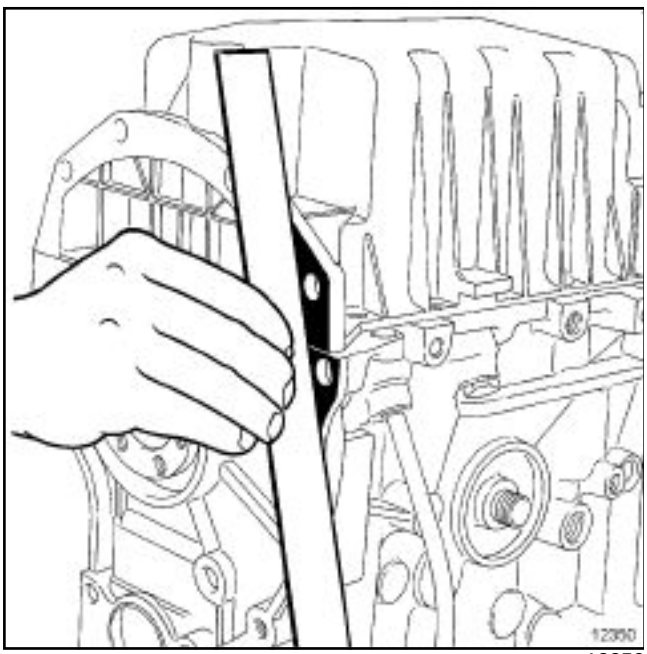
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



113492

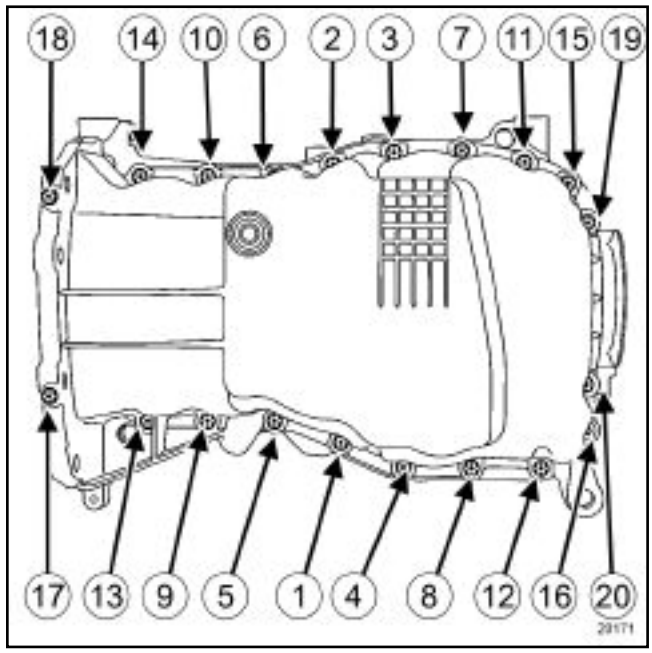
Refit:

- the oil sump mounting seal,
- the engine oil sump,
- the oil sump mounting bolts,



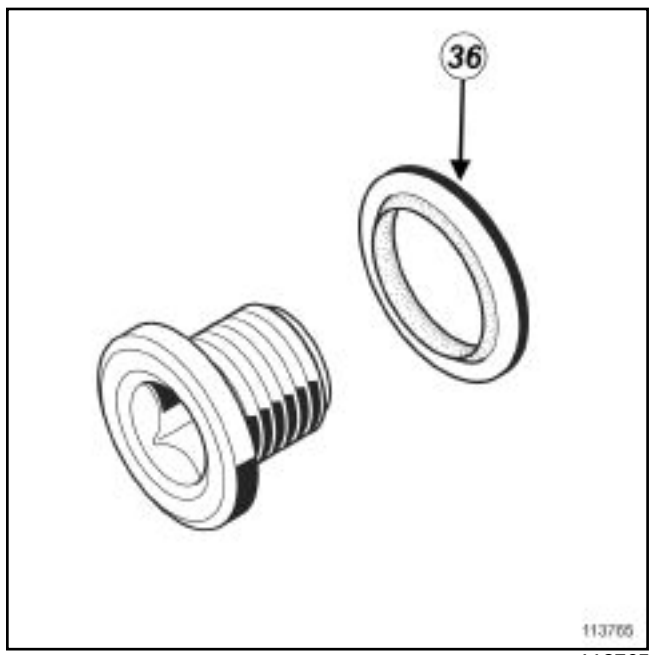
12350

Using a ruler, align the engine oil sump with the cylinder block.



20171

Tighten to torque and in order **the engine oil sump mounting bolts (14 ± 1.4 Nm)** .



113765

Refit:

- a seal (**36**) on the drain plug of the engine oil sump,
- the drain plug of the engine oil sump, using the **(Mot. 1018)** .

Tighten to torque **the drain plug of the engine oil sump (20 ± 2 Nm)** .

Using degreaser, degrease the seal mating face on the crankshaft and the crankshaft nose closure unit.

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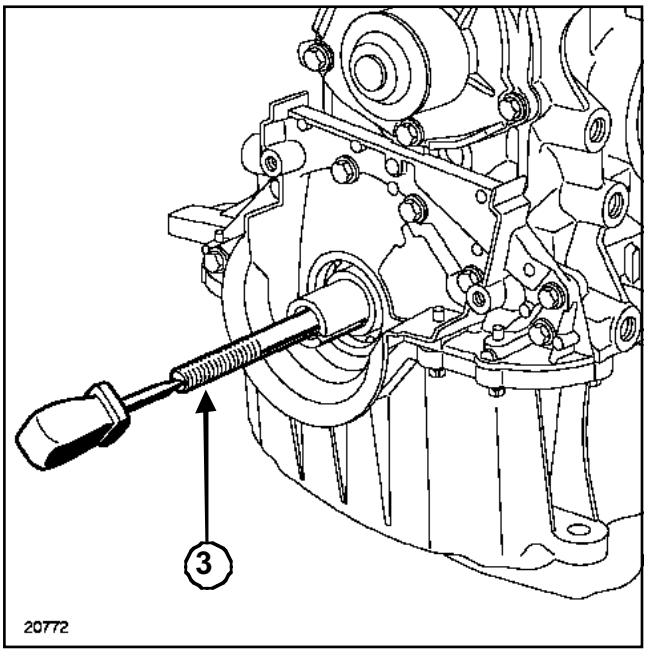
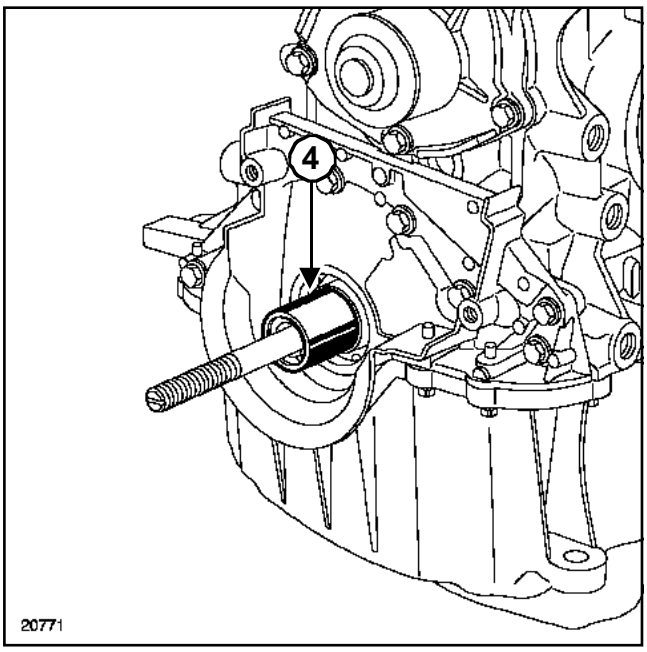
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



20772

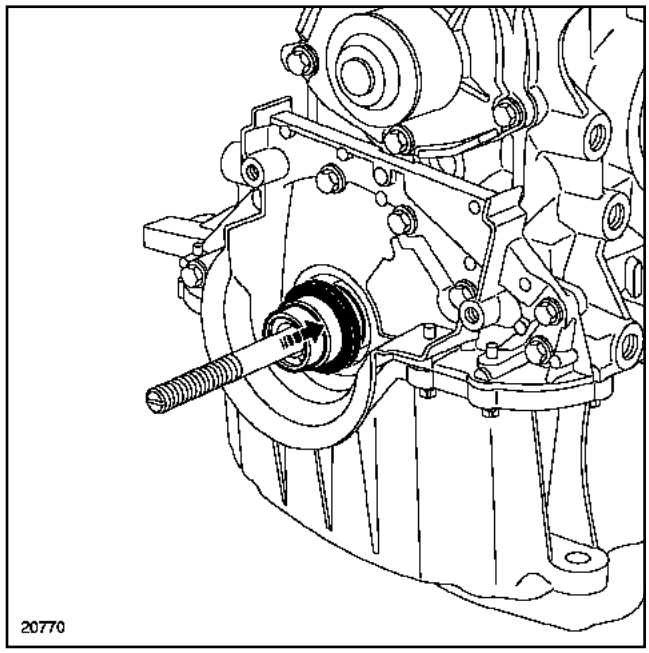
Tighten the threaded rod (**3**) :

- of the **(Mot. 1586)** in the crankshaft with a **M12** thread hole,
- of the **(Mot. 1714)** in the crankshaft with a **M14** thread hole,



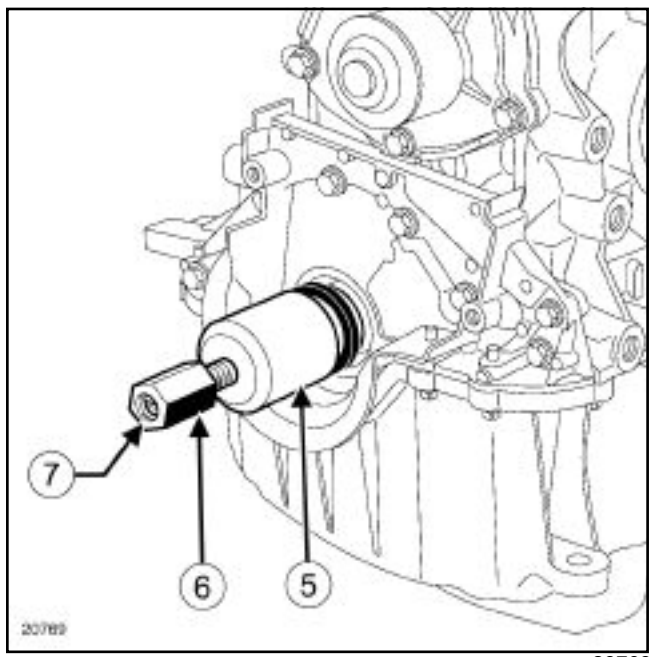
20771

Insert the spacer (**4**) of the **(Mot. 1586)** in the crankshaft.



20770

Fit the protector with the new seal in place on the spacer, taking care not to touch the seal.



20769

Fit cover (**5**) and nut (**6**) (with the thread (**7**) of the nut towards the outside of the engine).

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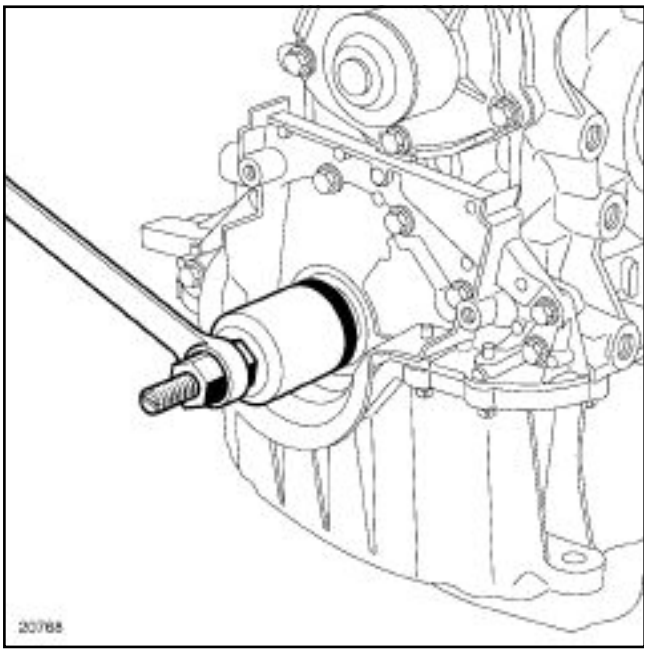
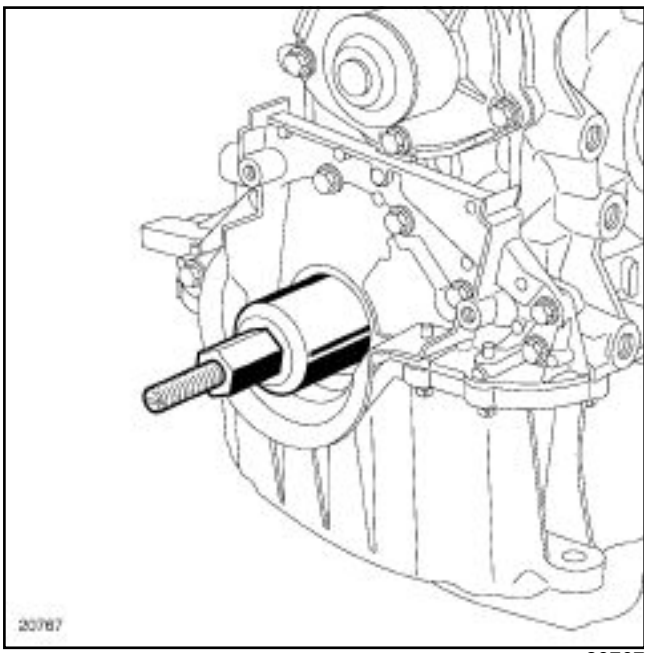
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768

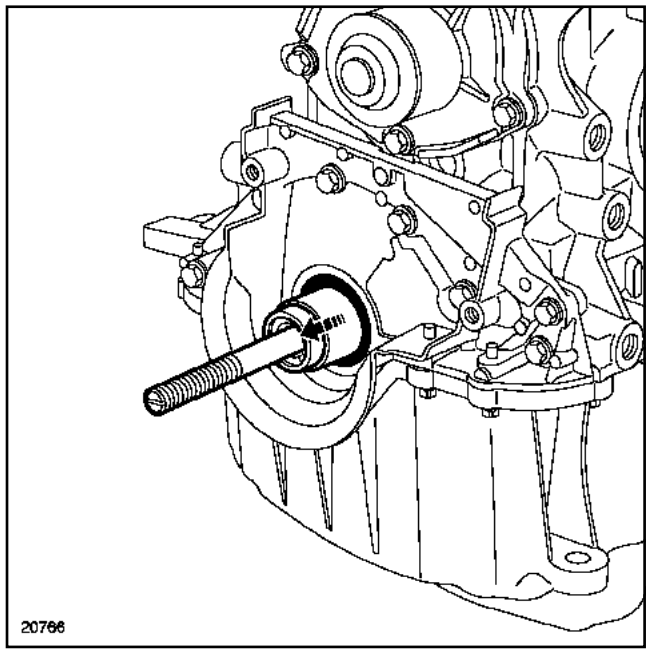


20768



20767

Screw on the nut until the cover touches the spacer.

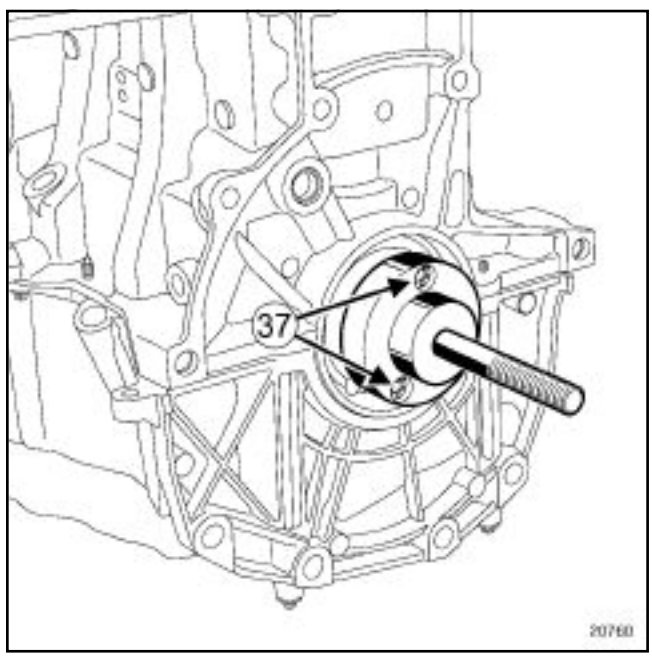


20766

Remove

- the nut,
- the cap,
- the protector,
- the spacer,
- the threaded rod.

Using degreaser, degrease the seal mating face on the crankshaft and the cylinder block (flywheel end).



20760

Mount the **(Mot. 1585)** on the crankshaft, securing it using bolts (**37**) .

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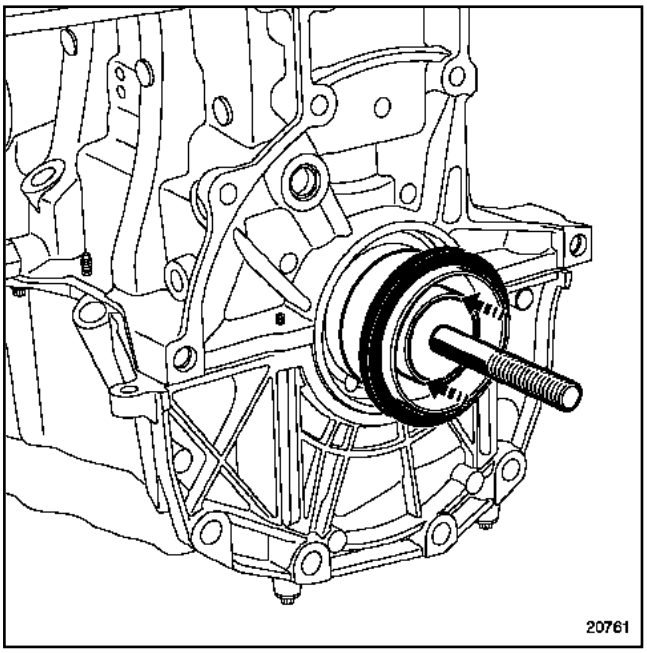
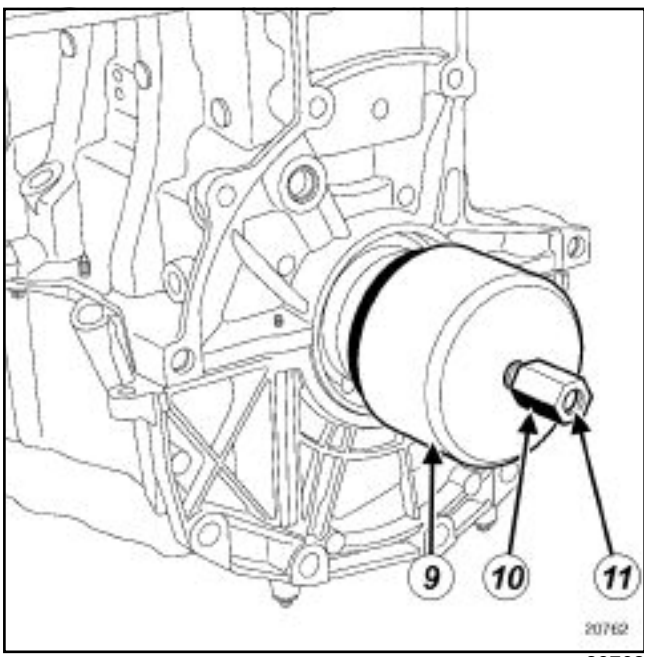
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



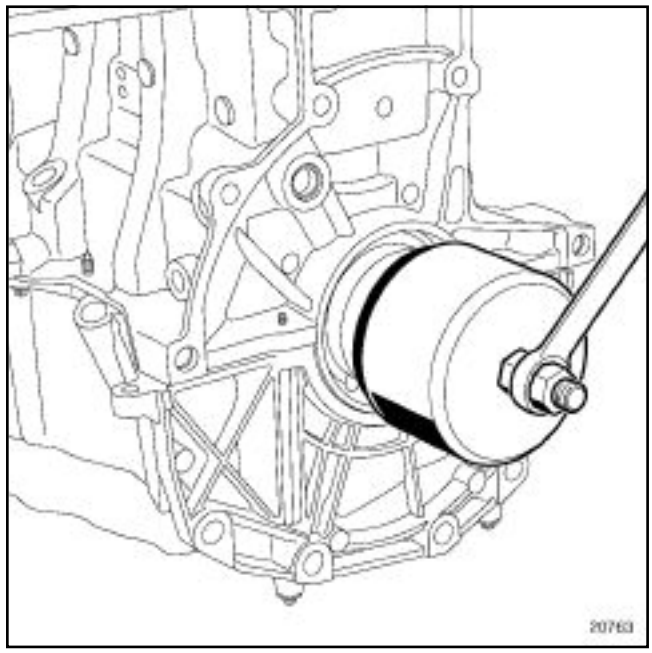
20761

Fit the protector with its seal in place on the **(Mot. 1585)** , taking care not to touch the seal.

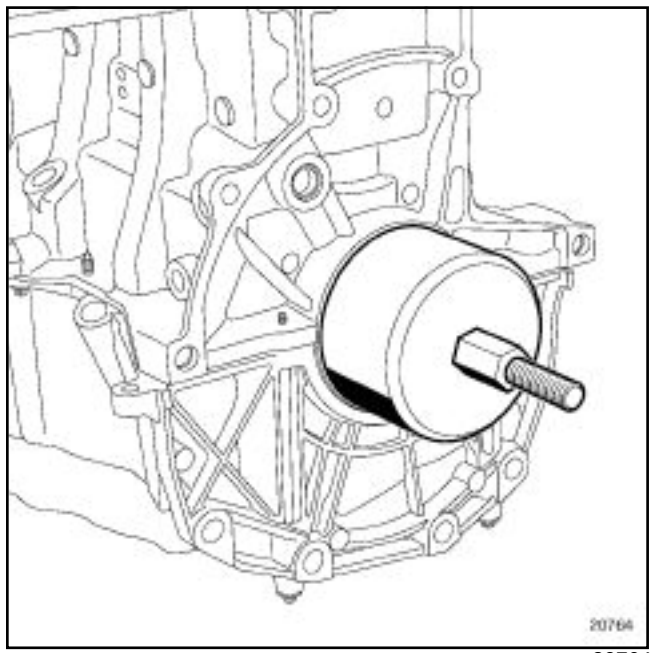


20762

Fit cover (**9**) and nut (**10**) (with the thread (**11**) of the nut towards the outside of the engine).



20763



20764

Screw on the nut until the cover touches the cylinder block.

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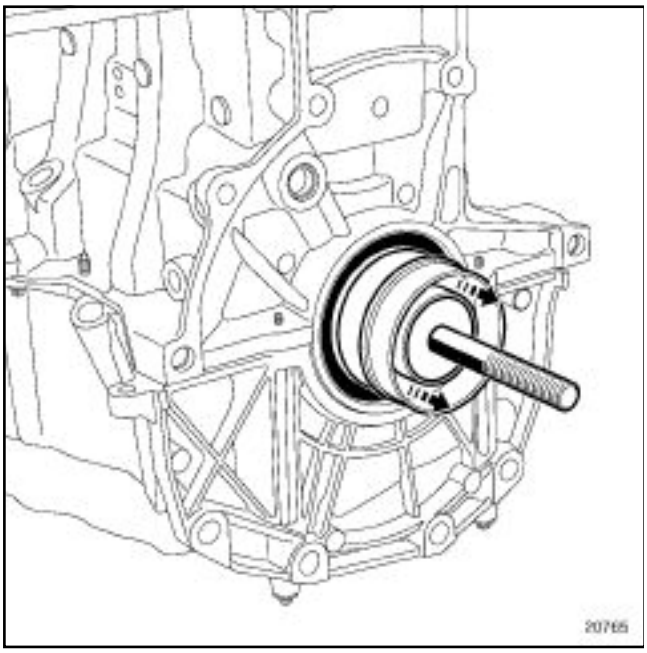
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



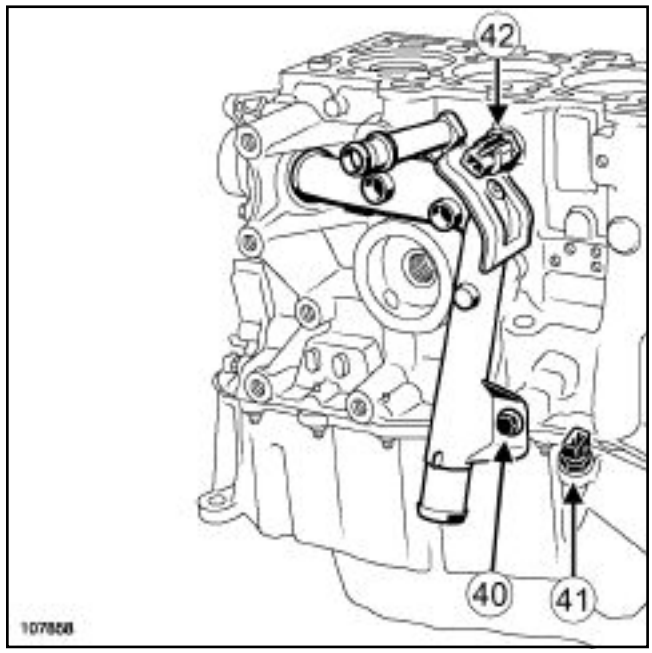
20765

Remove:

- the nut,
- the cap,
- the protector,
- the base.

Refit a new O-ring seal to the coolant pump inlet pipe.

Put a little soapy water on the O-ring seal of the coolant pump inlet pipe.



107858

Refit:

- the coolant pump inlet pipe,
- the mounting bolt (**40**) of the coolant pump inlet pipe,
- the oil level sensor (**41**) ,
- the acceleration meter (**42**) .

Tighten to torque:

- **the coolant pump inlet pipe mounting bolt (22 ± 2.2 Nm)** .
- **the oil level sensor (25 ± 2.5 Nm)** .
- **the acceleration meter (20 ± 2 Nm)** using the **(Emb. 1596)** .

Using degreaser, degrease the seal mating face of the cylinder block where it receives the coolant / oil heat exchanger.

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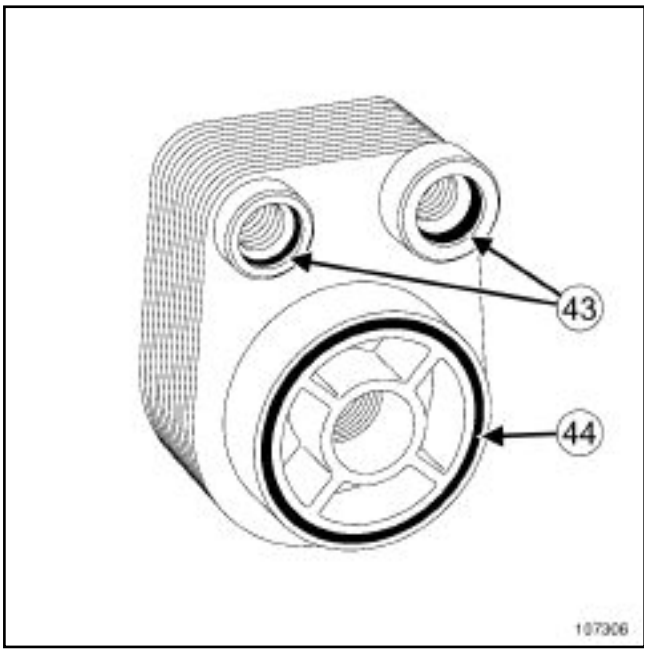
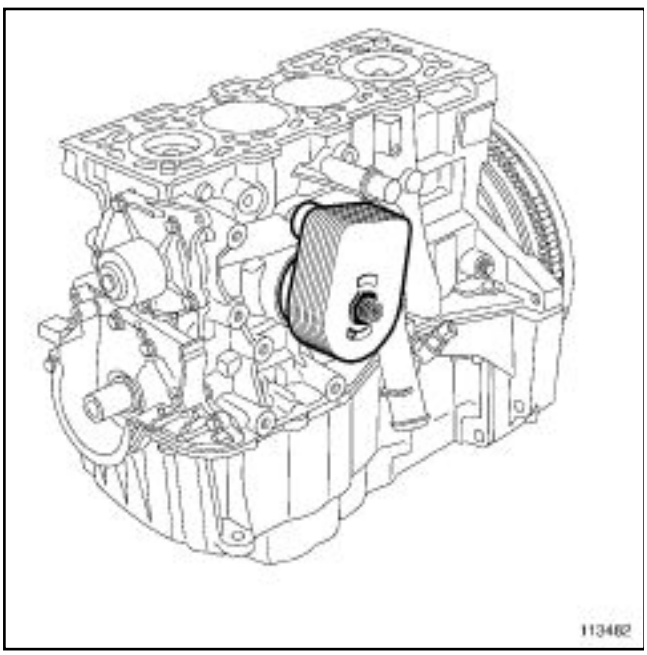
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



107306



113482

Fit the new seals (**43**) and (**44**) on the coolant/oil heat exchanger.

Apply soapy water to the two seals (**43**) in contact with the inlet pipe of the coolant pump.

Apply two drops of **HIGH-RESISTANCE BOLT LOCKING PRODUCT** to the coolant/oil heat exchanger mounting bolt.

Refit:

- the coolant/oil heat exchanger,

- the mounting bolt of the oil/coolant heat exchanger,

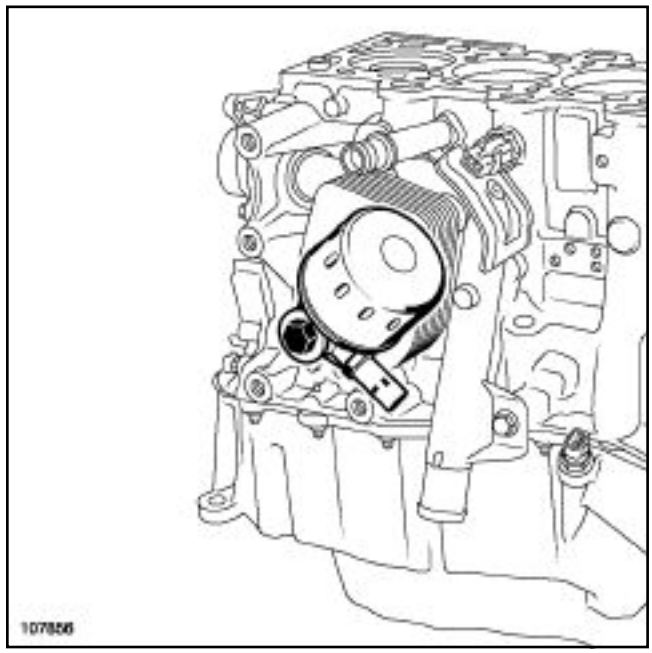
Tighten to torque **the coolant/oil heat exchanger mounting bolt (45 ± 4.5 Nm)** .

Using degreaser, degrease the seal mating face of the coolant / oil heat exchanger where it receives the oil filter holder.

Refit:

- a new seal on the oil filter holder,

- a new seal on the oil filter holder mounting bolt.



107856

Refit:

- the oil filter holder,

- the oil filter holder mounting bolt

Tighten to torque the **oil filter holder mounting bolt (45 ± 4.5 Nm)** .

Lubricate the oil filter seal with new engine oil.

Refit the oil filter using the **(Mot. 1329)** .

Tighten to torque the **oil filter (14 ± 2 Nm)** .

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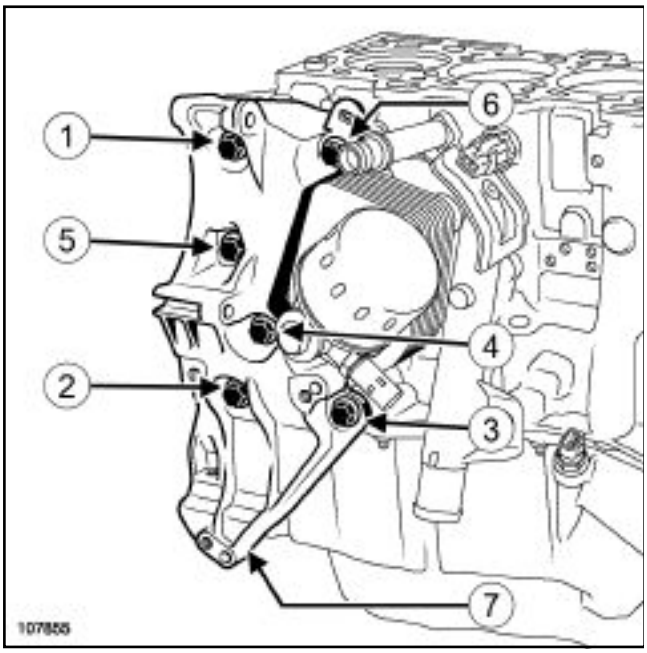
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



107855

Refit:

- the multifunction support,
- the multifunction support mounting bolts.

Tighten to torque and in order **the multifunction support mounting bolts (1 to 6) (44 ± 4.4 Nm)** .

Torque tighten the **multifunction support mounting bolt (7) (21 ± 2.1 Nm)** .

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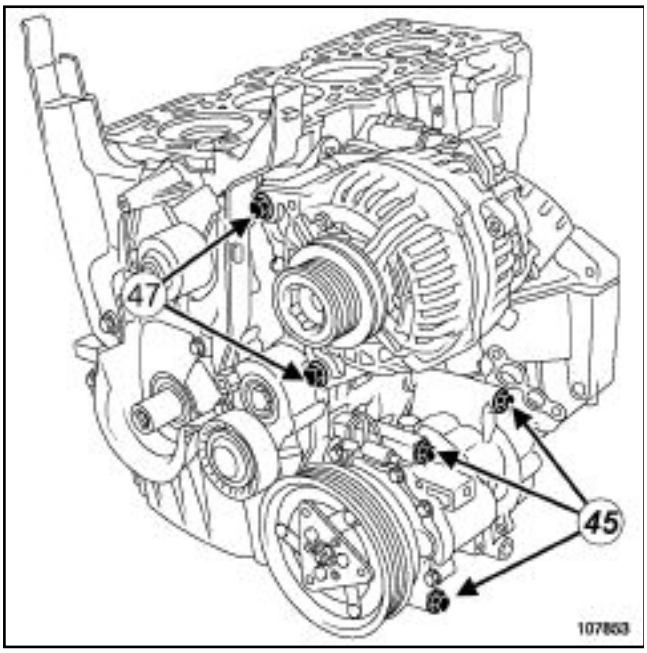
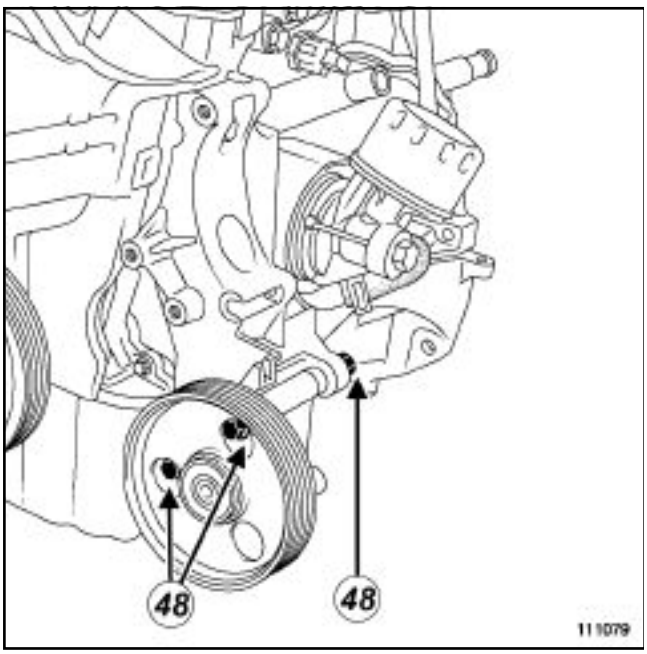
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



107853



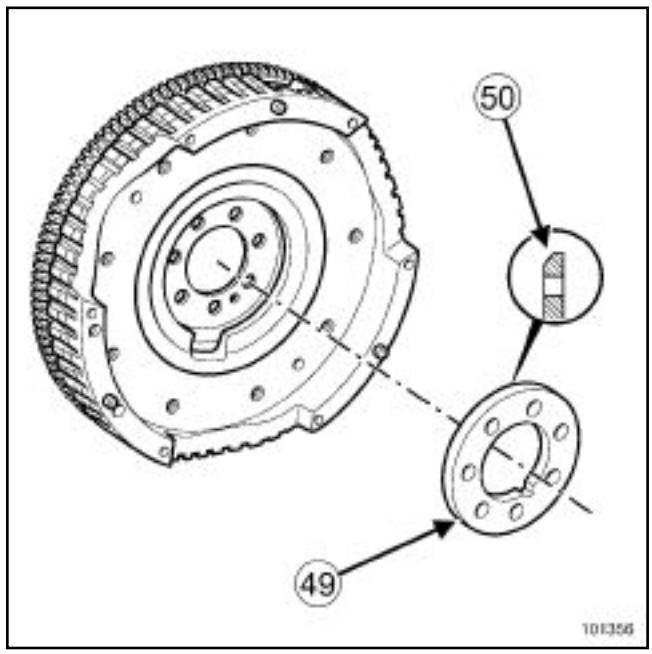
111079

Refit:

- the power assisted steering pump or the dummy pulley,
- the mounting bolts (**48**) of the power assisted steering pump or the dummy pulley,
- the air conditioning compressor (if fitted),
- the air conditioning compressor mounting bolts (**45**) ,
- the alternator,
- the alternator mounting bolts (**47**) .

Tighten to torque:

- **the mounting bolts of the power assisted steering pump or the dummy pulley (21 ± 2.1 Nm)** ,
- **the air conditioning compressor mounting bolts (21 ± 2.1 Nm)** ,
- **the alternator mounting bolts (21 ± 2.1 Nm)** .



101356

Note:

Certain flywheels have a shim (**49**) . **It is essential to position the chamfer** (**50**) **of the shim on the flywheel side** .

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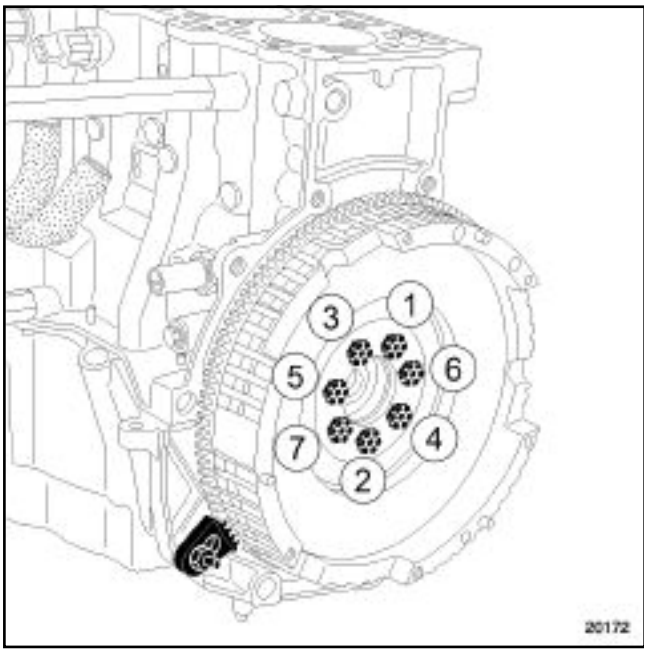
K9K, and 274 or 276 or 712 or 714 or 716 or 718 or 724 or 728 or 729 or 760 or 762 or 766 or 768



20172

Refit:

- the flywheel,
- the new flywheel mounting bolts,
- the engine flywheel locking tool **(Mot. 1677)** .

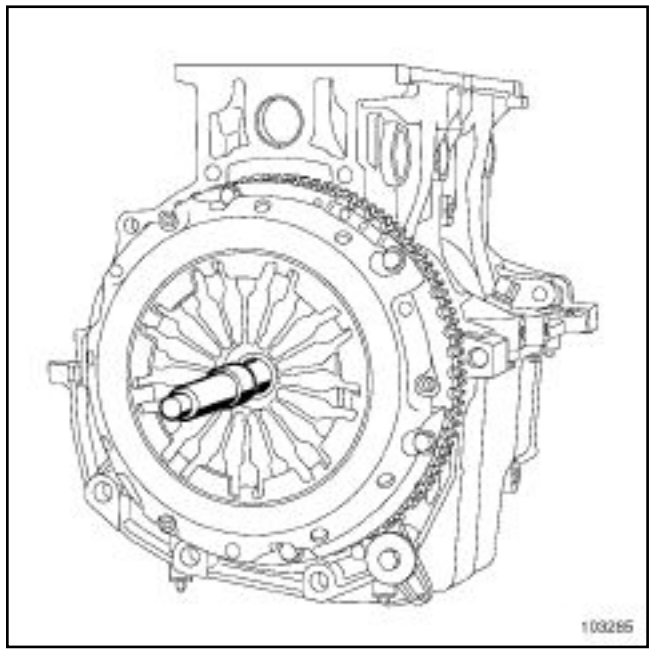
Tighten to torque and in order the **flywheel mounting bolts (55 ± 5.5 Nm)** .

Using degreasing agent, degrease the friction face on the flywheel.

Refit the friction plate (aligning it correctly).

Centre the friction plate using the **(Emb. 1780)** .

Using degreasing agent, degrease the friction face on the clutch mechanism.



103285

Refit:

- the clutch pressure plate,
- the clutch mechanism mounting bolts.

Gradually tighten the mounting bolts of the clutch pressure plate.

Tighten to torque **the clutch mechanism mounting bolts (M6 to 14 ± 1.4 Nm and bolts M7 to 20 ± 2 Nm)** .

Remove flywheel immobiliser tool **(Mot. 1677)** .

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K9K, and 732 or 764

Special tooling required	
Mot. 1018	Sump plug tool.
Mot. 1586	Tool for fitting PTFE crankshaft seal, timing end.
Mot. 1714	Adapter for fitting PTFE crankshaft seal, timing end.
Mot. 1585	Tool for fitting PTFE crankshaft seal, flywheel end.
Mot. 1677	Flywheel locking tool.
Emb. 1780	Set of clutch disc centring mandrels.
Emb. 1761	Clutch pressure plate removal/refitting kit
Mot. 1329	Oil filter removing tool (76 mm diameter).

Tightening torques ▽	
oil pump mounting bolts	**25 ± 2.5 Nm**
the crankshaft nose closure unit mounting bolts	**11 ± 1.1 Nm**
the coolant pump mounting bolts	**11 ± 1.1 Nm**
the engine oil sump mounting bolts	**14 ± 1.4 Nm**
the drain plug of the engine oil sump	**20 ± 2 Nm**
the flywheel mounting bolts	**2 ± 20 Nm + 36° ± 6°**
clutch mechanism bolt	**14 ± 1.4 Nm**
the clutch mechanism bolt	**14 ± 1.4 Nm**
the coolant pump inlet pipe mounting bolt	**22 ± 2.2 Nm**
the oil level sensor	**25 ± 2.5 Nm**

Tightening torques ▽	
the coolant/oil heat exchanger mounting bolt	**45 ± 4.5 Nm**
oil filter holder mounting bolt	**45 ± 4.5 Nm**
oil filter	**14 ± 2 Nm**
the multifunction support mounting bolts (1 to 6)	**44 ± 4.4 Nm**
multifunction support mounting bolt (7)	**21 ± 2.1 Nm**
air conditioning compressor mounting bolts	**21 ± 2.1 Nm**
the alternator mounting bolts	**21 ± 2.1 Nm**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

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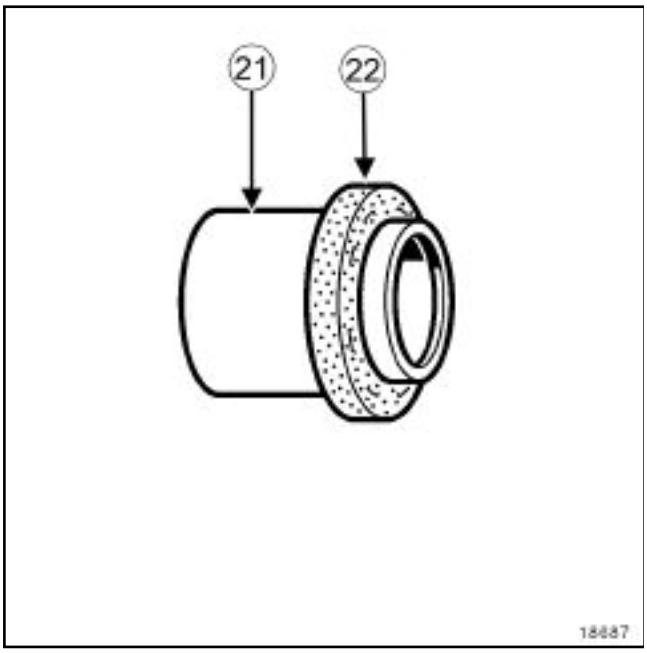
K9K, and 732 or 764



18687

WARNING

This type of seal is very delicate. When handling, it is essential to grip protective piece. (**21**) It is strictly forbidden to touch seal, (**22**) this is to prevent any oil leaks once the oil seal is fitted to the engine.

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

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.)

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced

- The crankshaft nose closure unit seal,
- The coolant pump seal,
- The oil sump mounting seal,
- The clutch mechanism (if necessary),
- The friction disc (if necessary),
- Flywheel mounting bolt
- The coolant pump inlet pipe seal,
- The oil / coolant heat exchanger seals,
- The crankshaft, timing end, mounting seal,
- The crankshaft, flywheel end, mounting seal,
- Oil filter,
- The seal of the drain plug of the engine oil sump.

Consumables

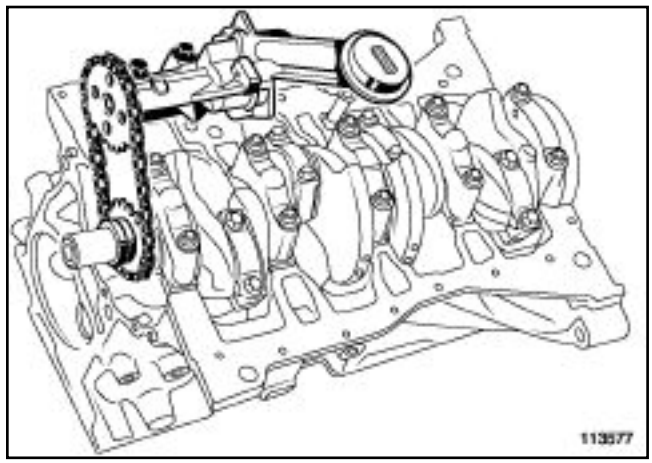
- Degreasing agent, part no. **77 11 224 559** .
- Silicone adhesive sealant, part no. **77 11 227 484** ,
- High-resistance bolt locking product, part no. **77 11 230 112** ,

III - EQUIPMENT REQUIRED

- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type),
- Ruler,
- Square section drain wrench, male **8 mm** ,
- Male torx socket.
- Oil can,

IV - REASSEMBLING THE CYLINDER BLOCK

Put a little engine oil from an oil can in the oil pump via the oil sump filter.



113577

Refit:

- the oil pump drive sprocket,
- the oil pump complete with its chain,
- the oil pump mounting bolts.

Tighten to torque the **oil pump mounting bolts (25 ± 2.5 Nm)** .

Apply degreaser to:

- the crankshaft nose closure panel,
- the coolant pump,

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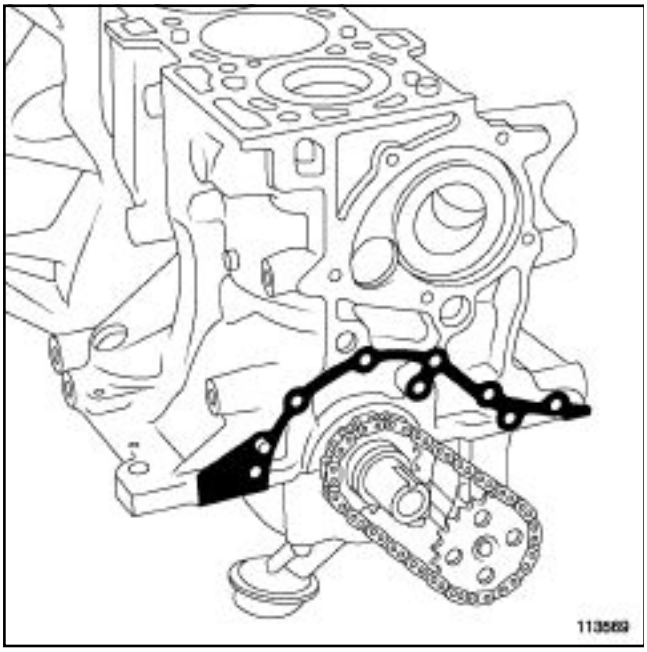
K9K, and 732 or 764

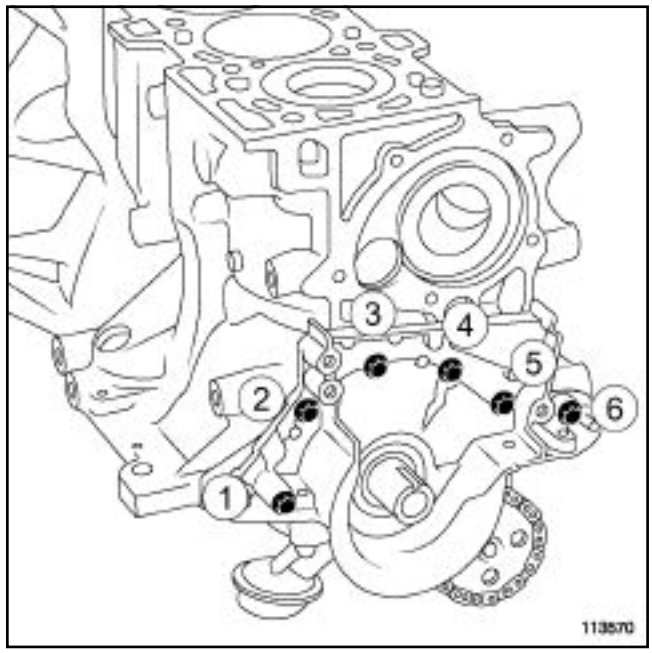
- the surface of the seal of the crankshaft nose closure unit on the cylinder block,
- the surface of the coolant pump seal on the cylinder block.



113569

Fit a new seal to the crankshaft nose closure unit.

Check for the centring dowels on the crankshaft nose closure unit.



113570

Refit:

- the crankshaft nose closure panel,
- the crankshaft nose closure unit mounting bolt,

Tighten to torque and in order **the crankshaft nose closure unit mounting bolts (11 ± 1.1 Nm)** .

Apply a drop of **HIGH-RESISTANCE BOLT LOCKING PRODUCT** to the coolant pump mounting bolts.

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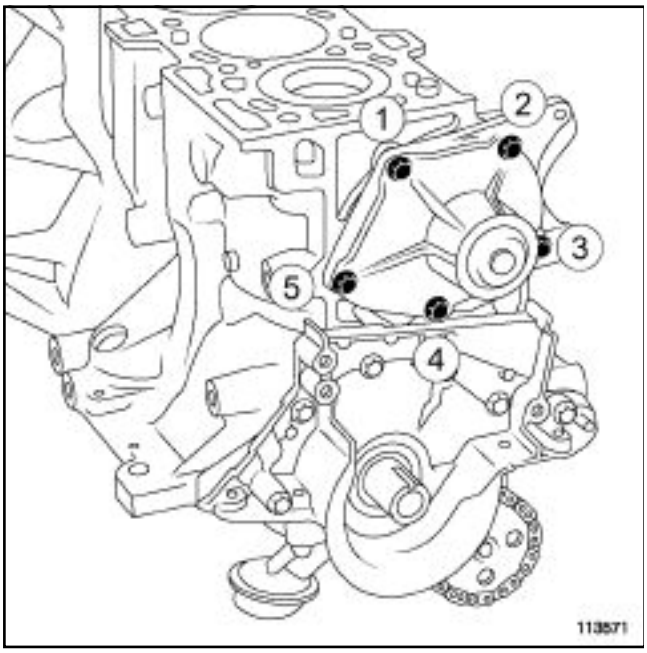


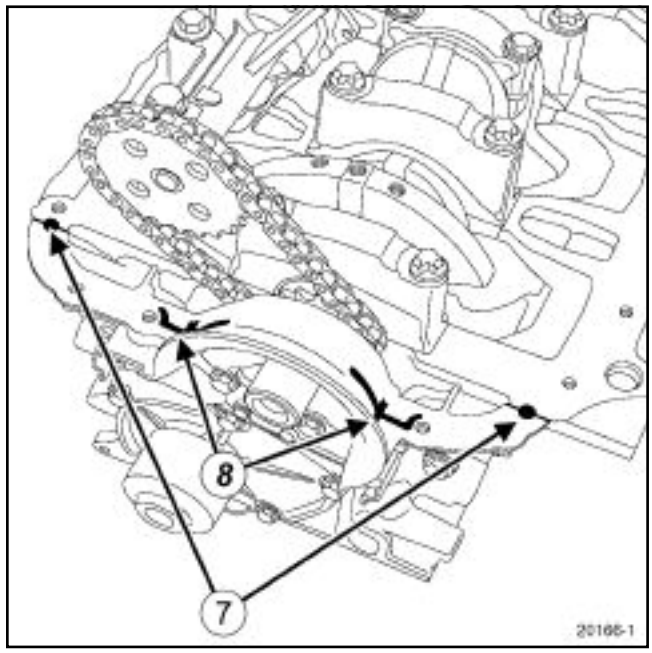
113571

Refit:

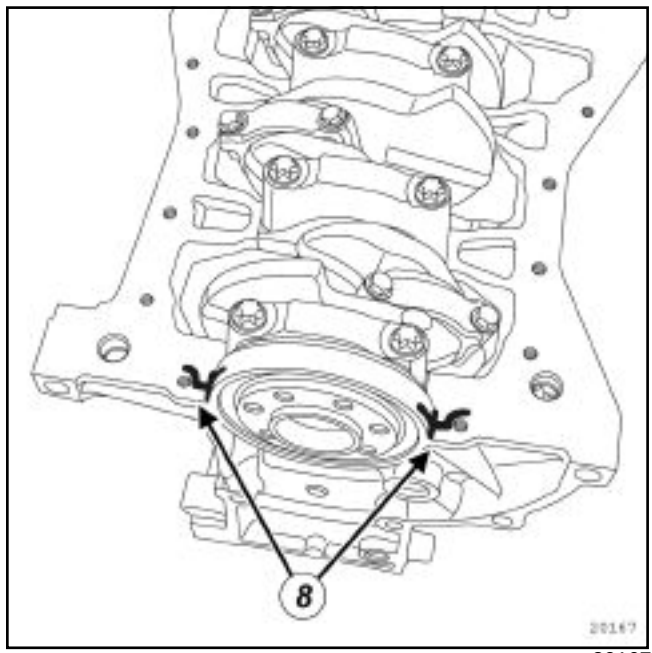
- the coolant pump fitted with a new seal,
- the coolant pump mounting bolts.

Tighten to torque and in order **the coolant pump mounting bolts (11 ± 1.1 Nm)** .

Using degreaser, degrease the seal surfaces of the lower part of the cylinder block and the oil sump.



20166



20167

Apply:

- four beads (**8**) of **SILICONE ADHESIVE SEALANT** with a diameter of **5 mm** ,
- two points (**7**) of **SILICONE ADHESIVE SEALANT 5 mm** in diameter, at the connection between the crankshaft nose closure panel and the cylinder block.

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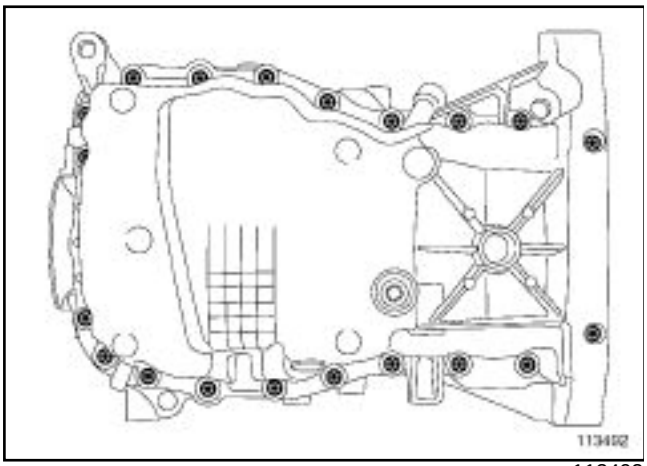
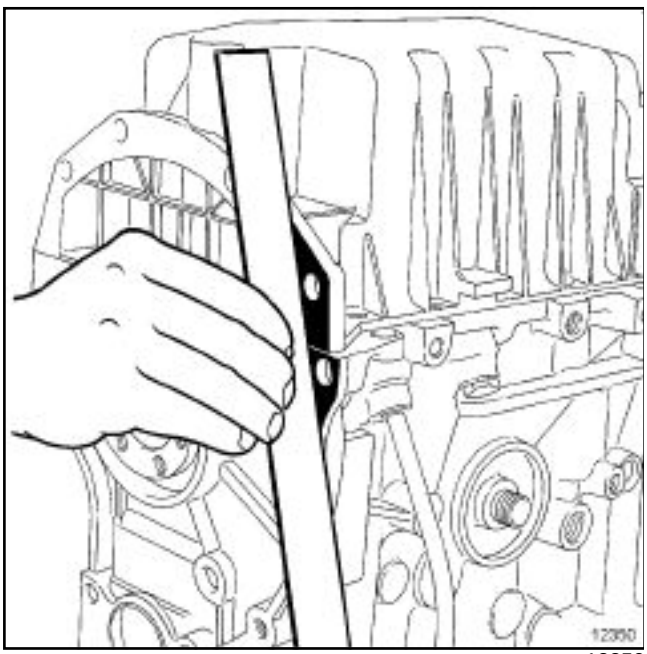


113492

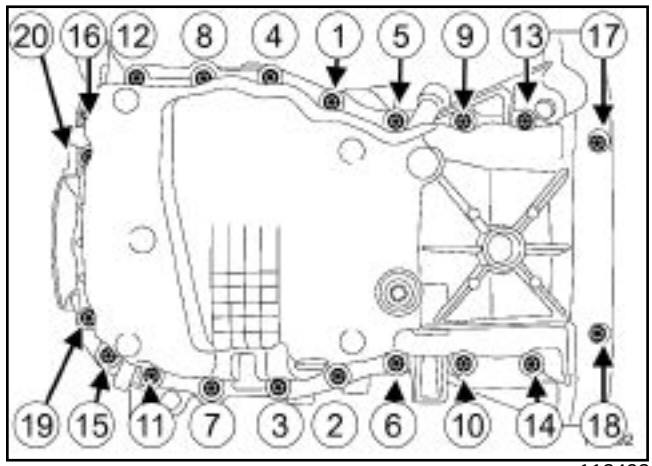
Refit:

- the oil sump mounting seal,
- the engine oil sump,
- the oil sump mounting bolts,



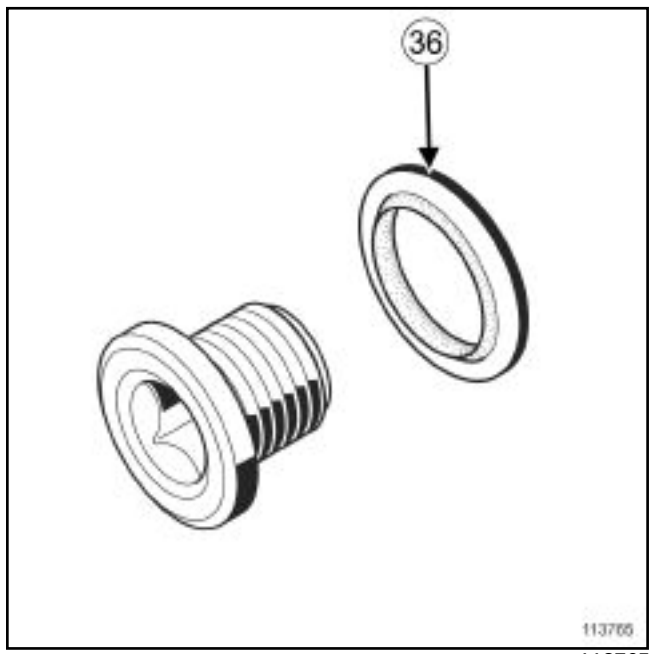
12350

Using a ruler, align the engine oil sump with the cylinder block.



113492

Tighten to torque and in order **the engine oil sump mounting bolts (14 ± 1.4 Nm)** .



113765

Refit:

- a seal (**36**) on the drain plug of the engine oil sump,
- the drain plug of the engine oil sump, using the **(Mot. 1018)** .

Tighten to torque **the drain plug of the engine oil sump (20 ± 2 Nm)** .

Using degreaser, degrease the seal mating face on the crankshaft and the crankshaft nose closure unit.

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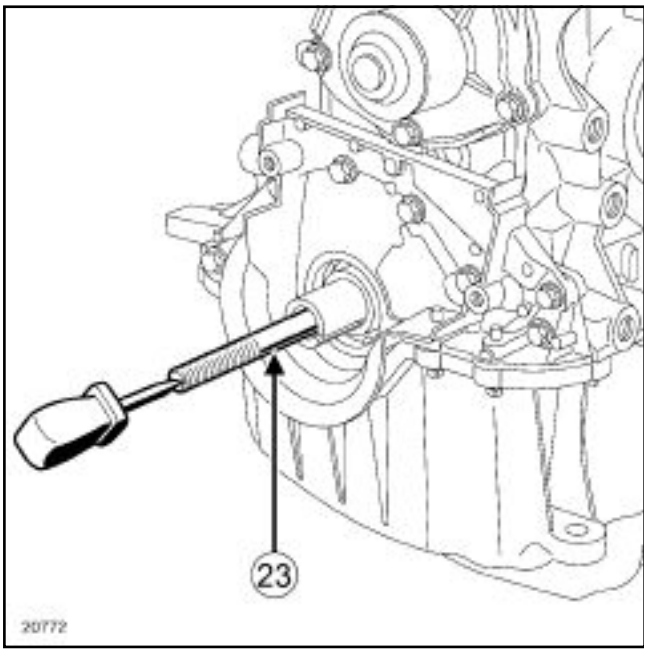
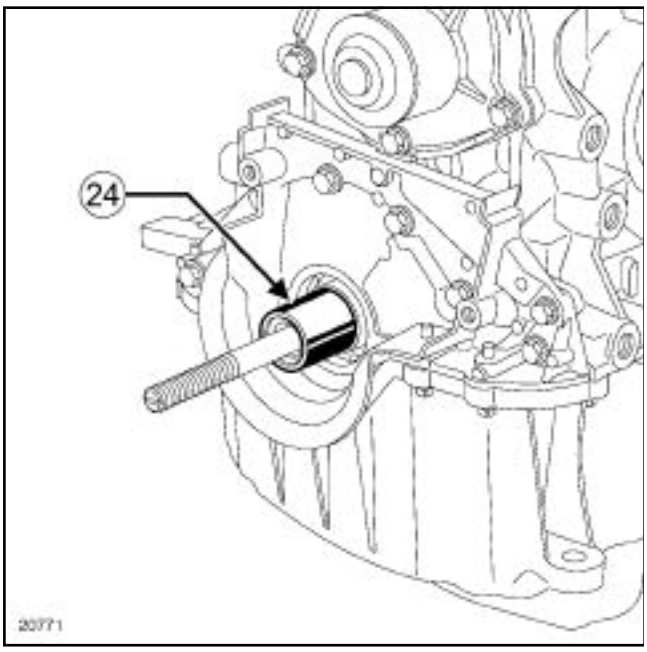


20772

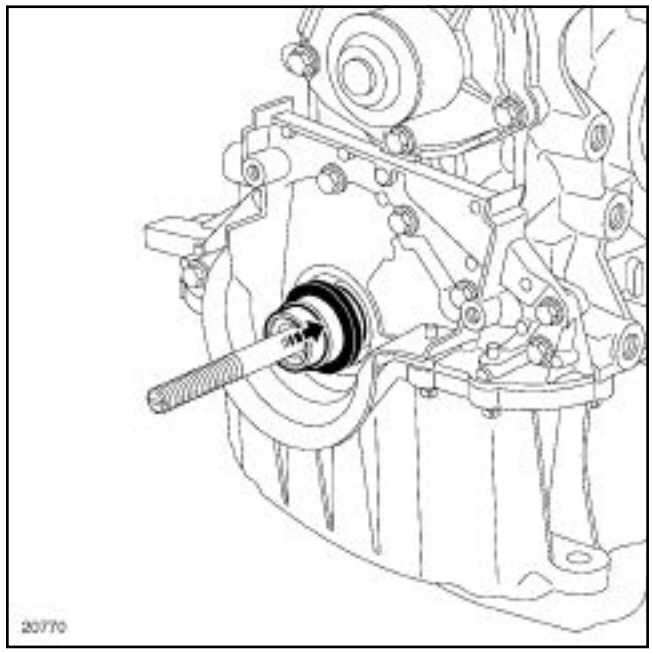
Tighten the threaded rod (**23**) :

- of tool **(Mot. 1586)** in the crankshaft with an internal thread of **M12** ,
- of tool **(Mot. 1714)** in the crankshaft with an internal thread of **M14** ,



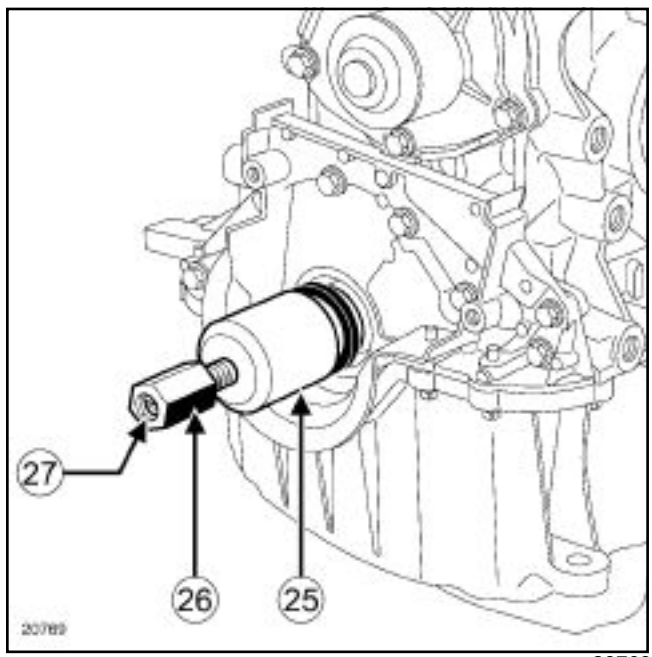
20771

Insert the spacer (**24**) of tool **(Mot. 1586)** in the crankshaft.



20770

Fit the protector with the new seal in place on the spacer, taking care not to touch the seal.



20769

Fit cover (**25**) and nut (**26**) (with the thread (**27**) of the nut towards the outside of the engine).

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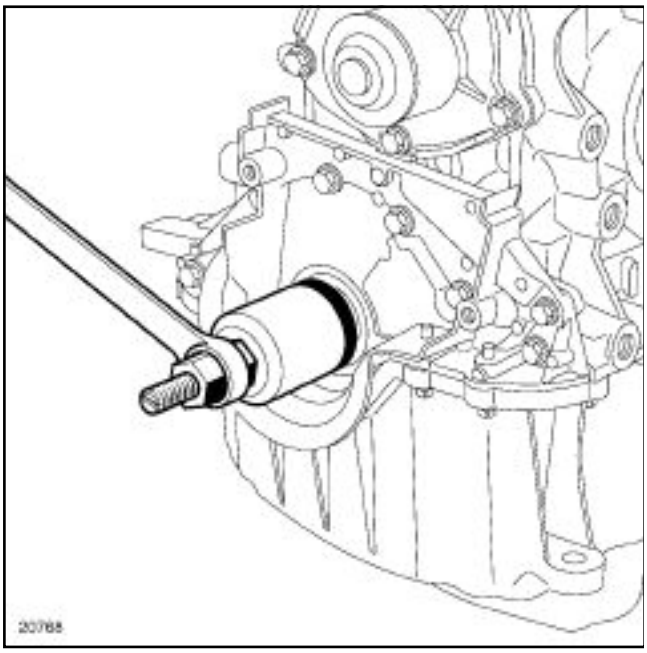
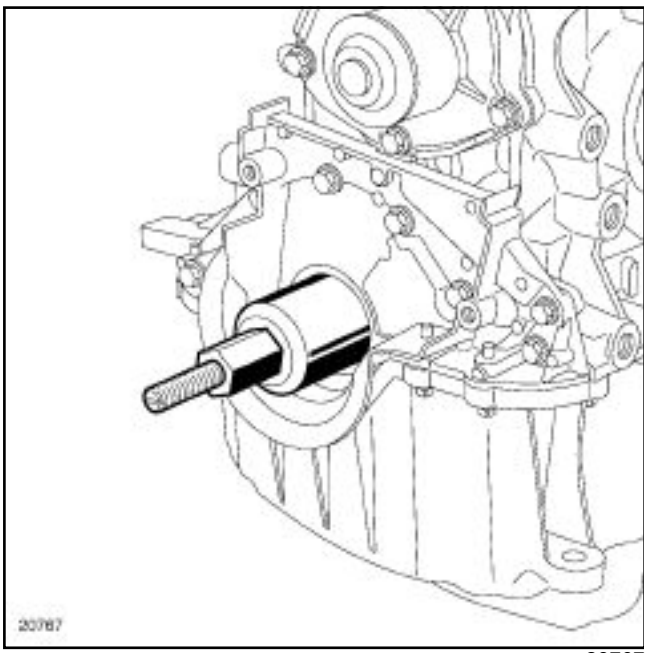
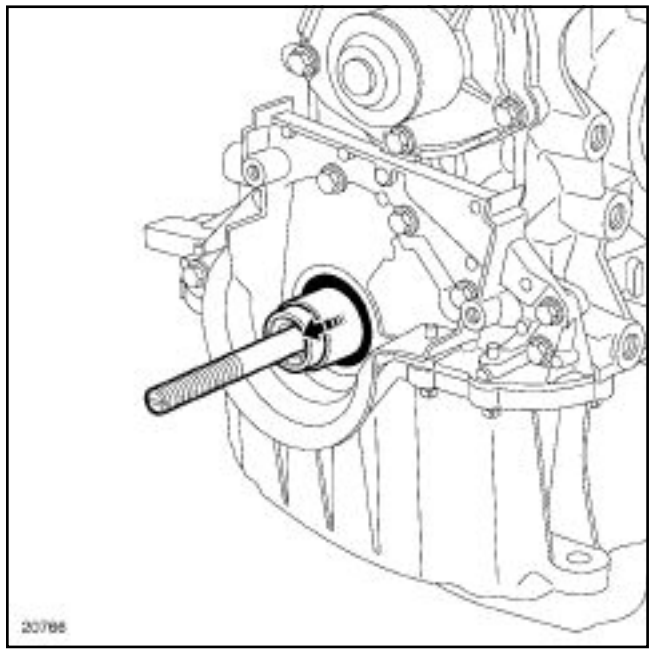


20768



20767

Screw on the nut until the cover touches the spacer.

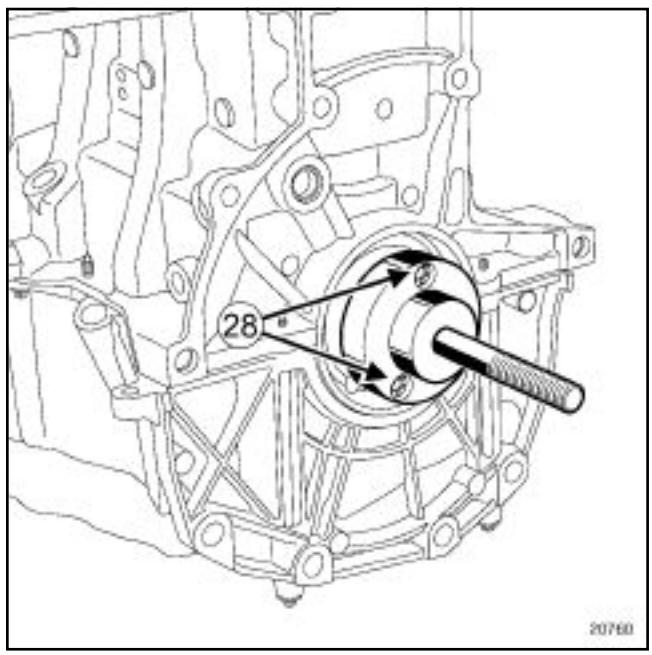


20766

Remove:

- the nut,
- the cap,
- the protector,
- the spacer,
- the threaded rod.

Using degreaser, degrease the seal mating face on the crankshaft and the cylinder block (flywheel end).



20760

Mount the **(Mot. 1585)** on the crankshaft, securing it using bolts (**28**) .

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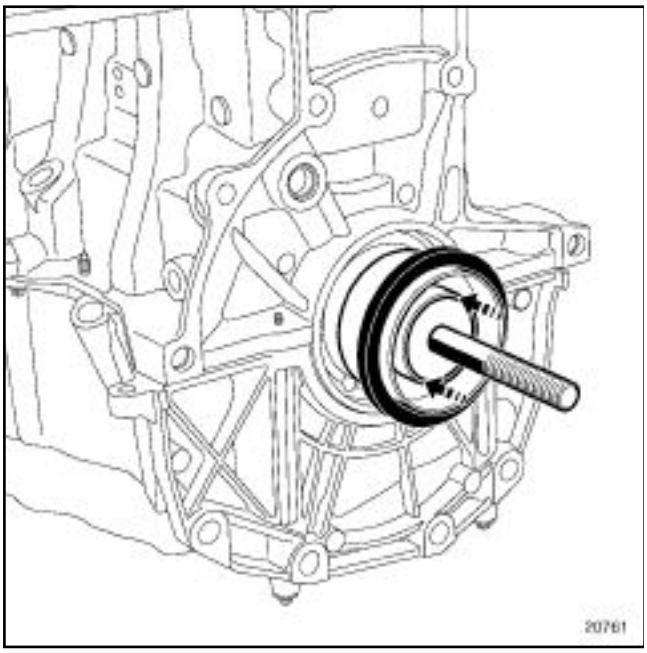
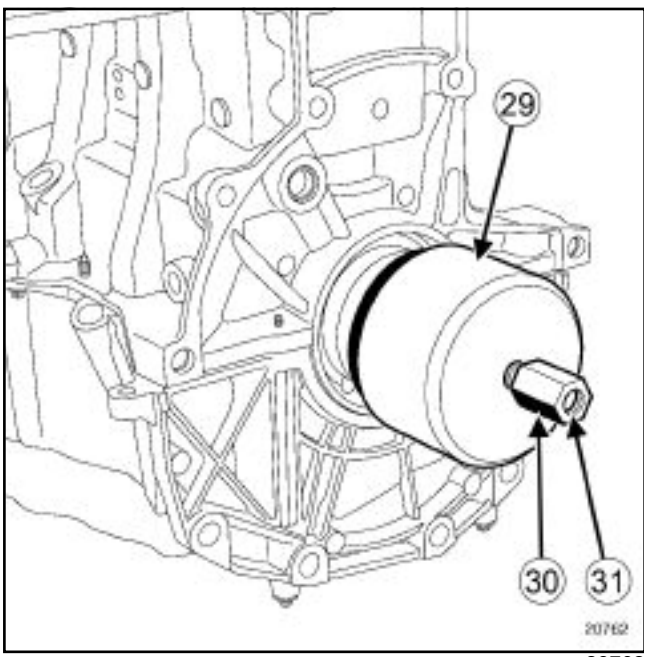
K9K, and 732 or 764



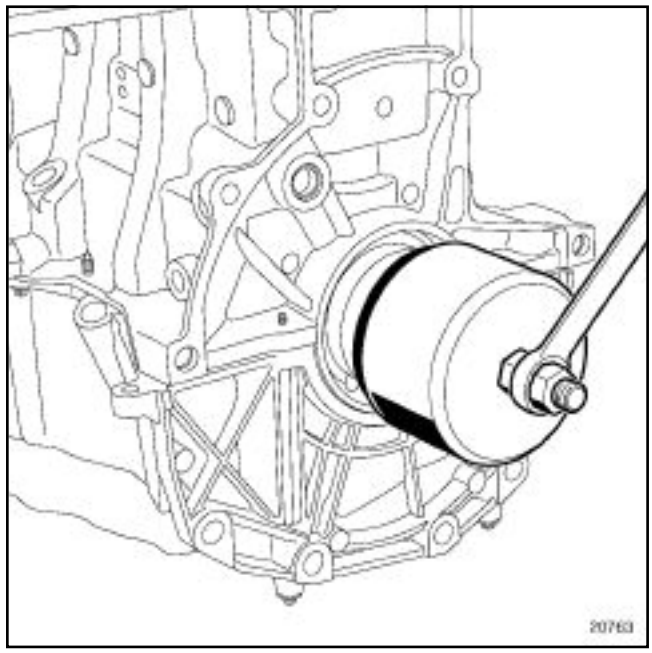
20761

Fit the protector with its seal in place on tool, **(Mot. 1585)** taking care not to touch the seal.

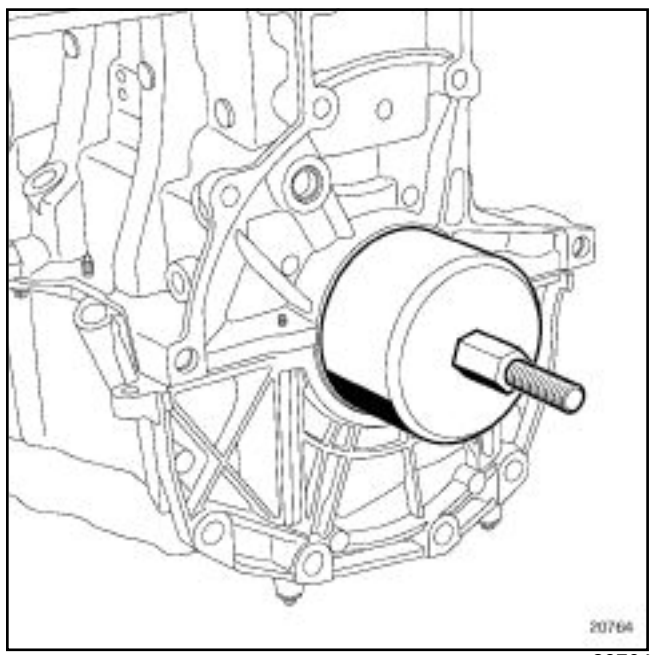


20762

Fit cover (**29**) and nut (**30**) (with the thread (**31**) of the nut towards the outside of the engine).



20763



20764

Tighten the nut until the cover touches the cylinder block.

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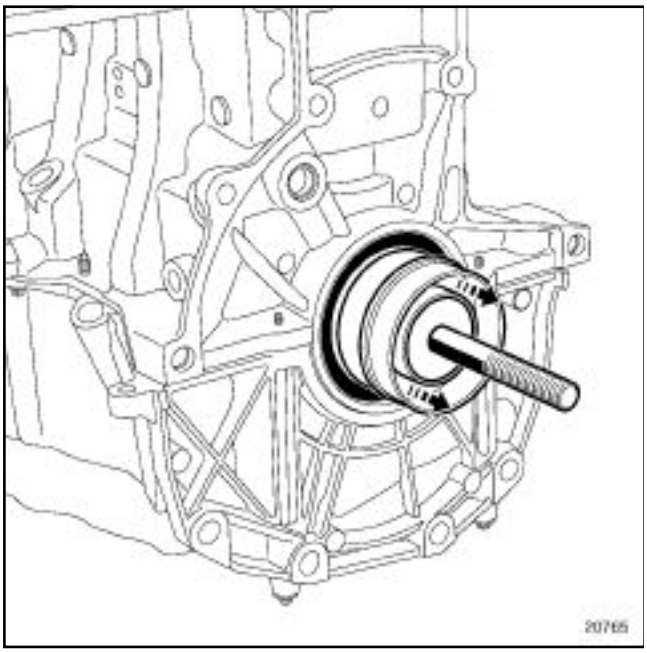
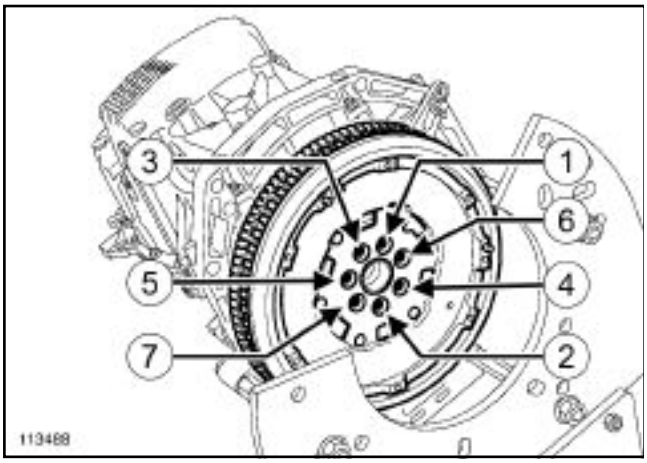


20765

Remove:

- the nut,
- the cap,
- the protector,
- the base.



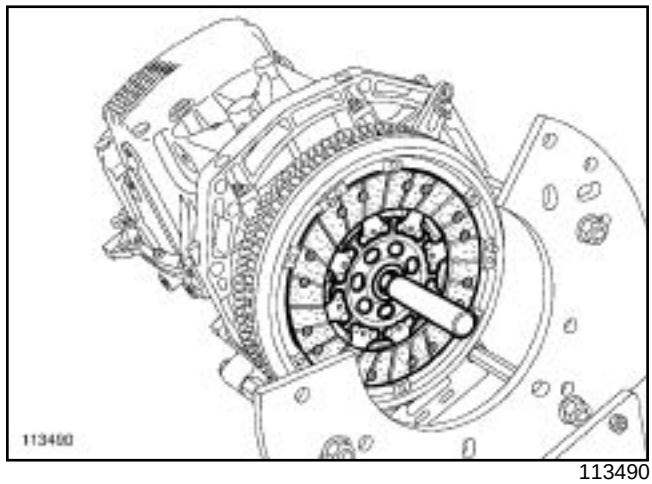
113488

Refit:

- the flywheel,
- the new flywheel mounting bolts,
- engine flywheel locking tool **(Mot. 1677)** .

Tighten to torque and in order **the flywheel mounting bolts (2 ± 20 Nm + 36° ± 6°)** .

Using degreasing agent, degrease the friction face on the flywheel.

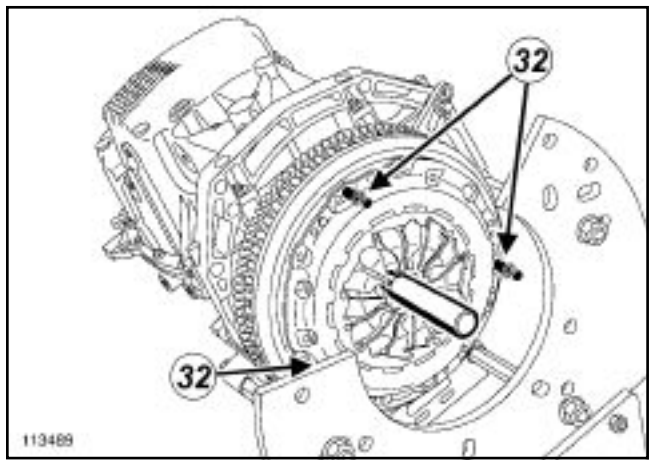


113490

Refit the friction disc (aligning it correctly).

Centre the friction disc using the **(Emb. 1780)** .

Using degreasing agent, degrease the friction face on the clutch mechanism.



113489

Refit the clutch mechanism.

Position the mounting bolts of the clutch mechanism using tool **(Emb. 1761)** (**32**) .

Position the clutch mechanism flat against the flywheel, tightening the nuts of tool **(Emb. 1761)** .

Refit the clutch mechanism mounting bolts.

Tighten to torque the **clutch mechanism bolt (14 ± 1.4 Nm)** .

Remove the **(Emb. 1761)** .

Refit the three clutch mechanism mounting bolts.

Tighten to torque **the clutch mechanism bolt (14 ± 1.4 Nm)** .

Remove flywheel immobiliser tool **(Mot. 1677)** .

Refit a new o-ring seal to the coolant pump inlet pipe.

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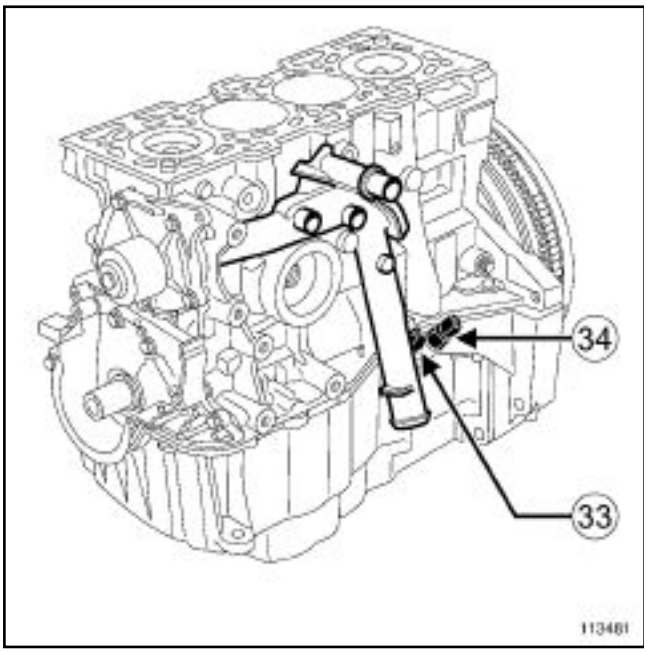
Put a little soapy water on the o-ring seal of the coolant pump inlet pipe.



113481

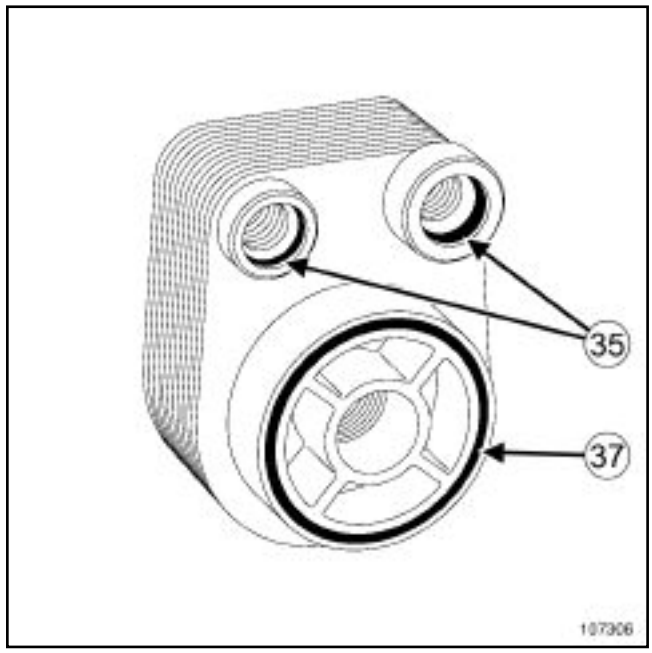
Refit:

- the coolant pump inlet pipe,
- the mounting bolt (**33**) of the coolant pump inlet pipe,
- the oil level sensor (**34**) .

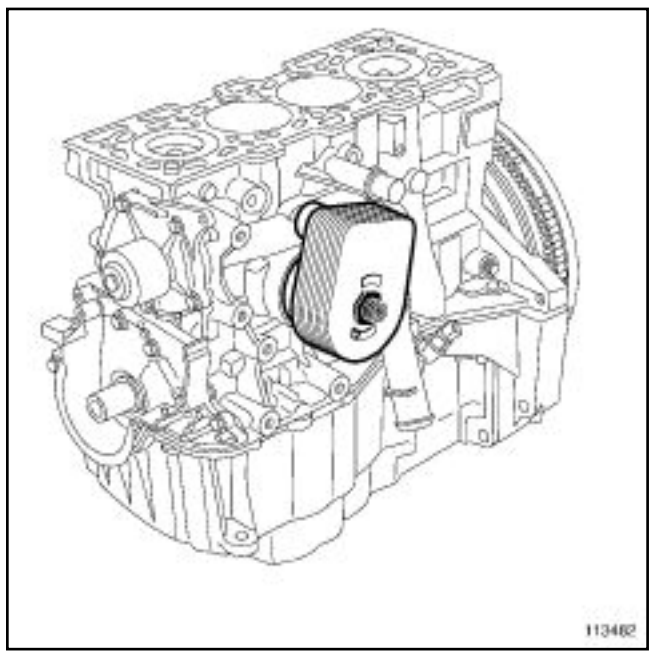
Tighten to torque:

- **the coolant pump inlet pipe mounting bolt (22 ± 2.2 Nm)** ,
- **the oil level sensor (25 ± 2.5 Nm)** .

Using degreaser, degrease the seal mating face of the cylinder block where it receives the coolant / oil heat exchanger.



107306



113482

Fit the new seals (**35**) and (**37**) on the coolant / oil heat exchanger.

Apply soapy water to the two seals (**35**) in contact with the inlet pipe of the coolant pump.

Apply two drops of **HIGH-RESISTANCE BOLT LOCKING PRODUCT** to the coolant / oil heat exchanger mounting bolt.

Refit:

- the coolant/oil heat exchanger,
- the mounting bolt of the oil/coolant heat exchanger,

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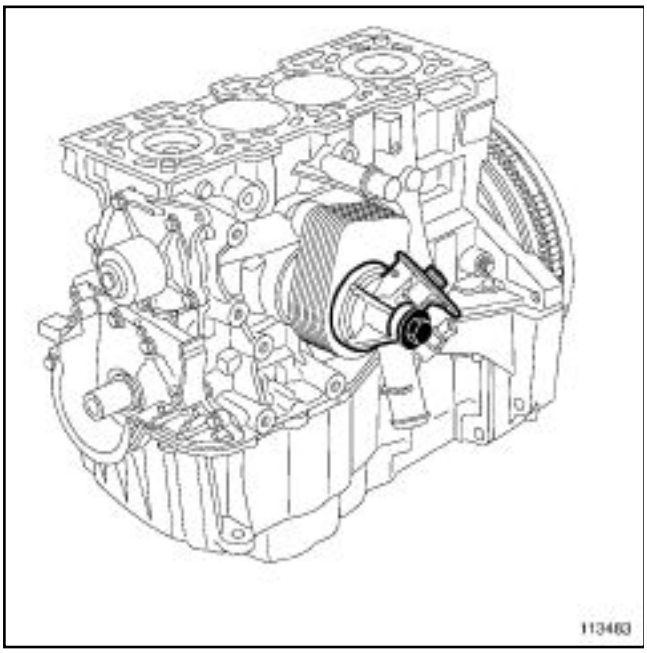
Tighten to torque **the coolant/oil heat exchanger mounting bolt (45 ± 4.5 Nm)** .

Using degreaser, degrease the seal mating face of the coolant/oil heat exchanger where it receives the oil filter holder.

Refit:

- a new seal on the oil filter holder,

- a new seal on the oil filter holder mounting bolt.



113483

Refit:

- the oil filter holder,

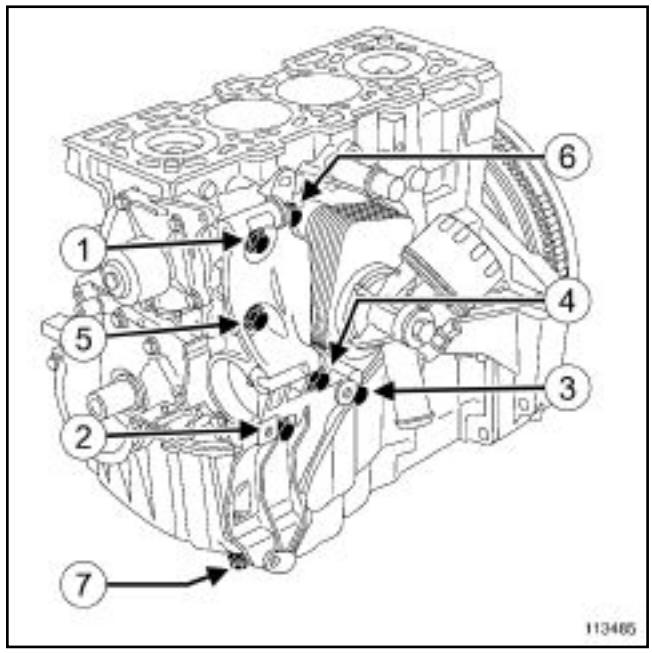
- the oil filter holder mounting bolt

Tighten to torque the **oil filter holder mounting bolt (45 ± 4.5 Nm)** .

Lubricate the oil filter seal with new engine oil.

Refit the oil filter using the **(Mot. 1329)** .

Tighten to torque the **oil filter (14 ± 2 Nm)** .



113485

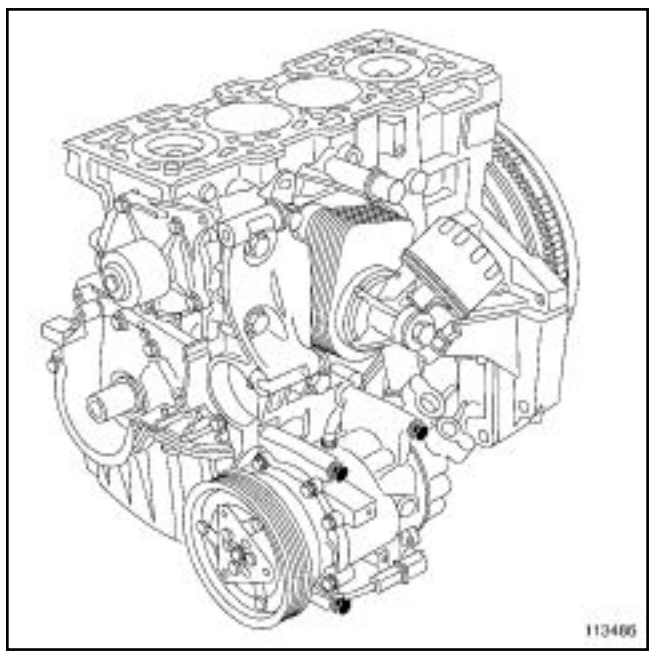
Refit:

- the multifunction support,

- the multifunction support mounting bolts.

Tighten to torque and in order **the multifunction support mounting bolts (1 to 6) (44 ± 4.4 Nm)** .

Torque tighten the **multifunction support mounting bolt (7) (21 ± 2.1 Nm)** .



113486

Refit:

- the air conditioning compressor,

- the air conditioning compressor mounting bolts.

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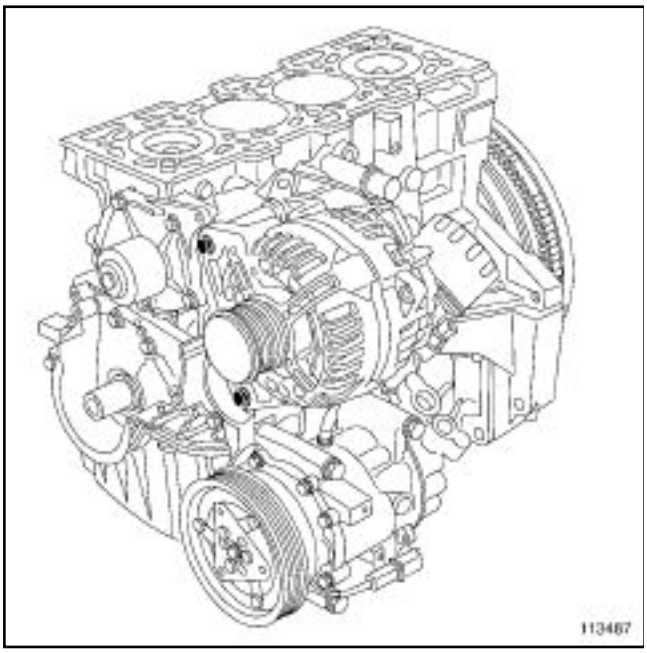
K9K, and 732 or 764

Tighten to torque the **air conditioning compressor mounting bolts (21 ± 2.1 Nm)** .



113487

Refit:

- the alternator,
- the alternator mounting bolts.

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

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Timing - 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. 1430	Set of 5 crankshaft and camshaft pulley timing pins.
Mot. 1489	TDC locating pin.

Tightening torques ▽	
the cylinder head mounting bolts	**25 ± 2.5 Nm**
the cylinder head mounting bolts	**255° ± 10°**
the rocker cover bolts	**12 ± 1.2 Nm**
the turbocharger oil return pipe mounting bolts	**12 ± 1.2 Nm**
the turbocharger mounting nuts	**26 ± 2.6 Nm**
the catalytic converter stay mounting bolts on the engine	**44 ± 4.4 Nm**
the catalytic converter stay mounting bolts on the catalytic converter	**26 ± 2.6 Nm**
the mounting bolt of the turbocharger oil supply pipe (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**
the inner timing cover mounting bolts	**9 ± 0.9 Nm**
the tensioning roller bolt	**27 ± 2.7 Nm**
the crankshaft accessories pulley M12 mounting bolt	**60 ± 6 Nm + 100° ± 10°**
the crankshaft accessories pulley M14 mounting bolt	**120 ± 12 Nm + 95° ± 15°**

Tightening torques ▽	
the tensioning roller bolt	**27 ± 2.7 Nm**
the TDC pin plug cap	**20 ± 2 Nm**
the cylinder head suspended mounting bolts	**21 ± 2.1 Nm**
the high-pressure pump position sensor bolt	**8 ± 0.8 Nm**

I - RECOMMENDATIONS FOR THE REPAIR OF THE CYLINDER HEAD

IMPORTANT
Wear protective gloves during every operation.

WARNING
When handling the cylinder head gasket, it is essential to hold the cylinder head gasket by the part between barrels.

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

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.)

To obtain correct tightening of the cylinder head bolts, remove any oil from the cylinder head mounting holes using a syringe.

Do not retighten the cylinder head bolts after applying this procedure.

Do not grease the new cylinder head mounting bolts.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced for the cylinder head

- The cylinder head gasket,
- The cylinder head bolts,
- The rocker cover gasket,
- The gasket between the exhaust manifold and the turbocharger,
- The seals on the turbocharger oil return pipe,

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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 catalytic converter seal,

Consumables

- Degreasing agent, part no. **77 11 224 559** .
- High-resistance bolt locking product, part no. **77 11 230 112** ,
- Silicone adhesive sealant, part no. **77 11 227 484** .

III - EQUIPMENT REQUIRED FOR THE CYLINDER HEAD

- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type),
- Oil can,
- Female torx socket (**14**),
- Protective gloves.

IV - REFITTING THE CYLINDER HEAD

Position the pistons at mid-stroke.

Apply degreaser to:

- the combustion side of the cylinder head,
- the combustion face of the cylinder block.

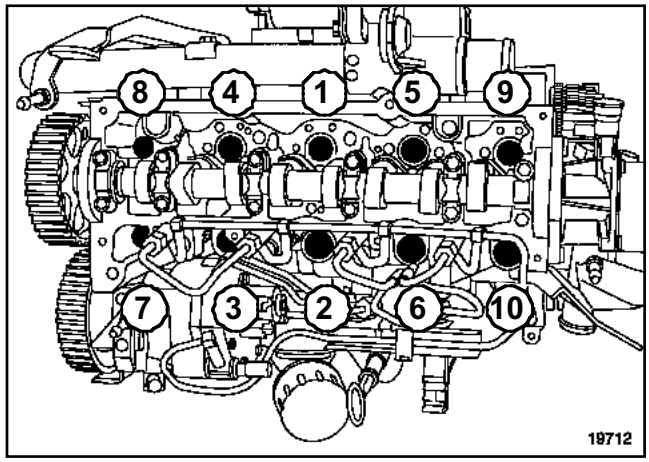
Check for the cylinder head centring dowels on the cylinder block.

Refit the cylinder head gasket (positioning the TOP at the top) on the cylinder block.

Remove the cylinder head from the cylinder head support.

Refit:

- the cylinder head,
- the new cylinder head mounting bolts.



19712

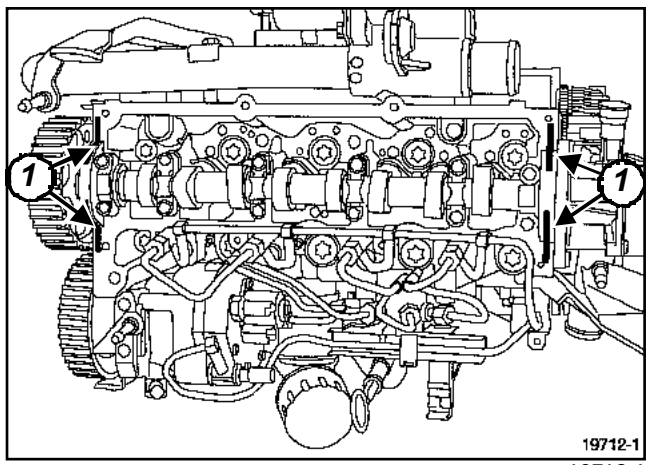
Torque tighten in order **the cylinder head mounting bolts (25 ± 2.5 Nm)** .

Check that all the **cylinder head mounting bolts** are correctly tightened to **(25 ± 2.5 Nm)** .

Tighten in order and to torque **the cylinder head mounting bolts (255° ± 10°)** .

Using degreasing agent, degrease the surface of the rocker cover bearing on the cylinder head.

Fit a new seal on the rocker cover.



19712-1

Apply four beads (**1**) of **SILICONE SEALANT** with a diameter of **2 mm** .

Refit:

- the rocker cover,
- the rocker cover mounting bolts.

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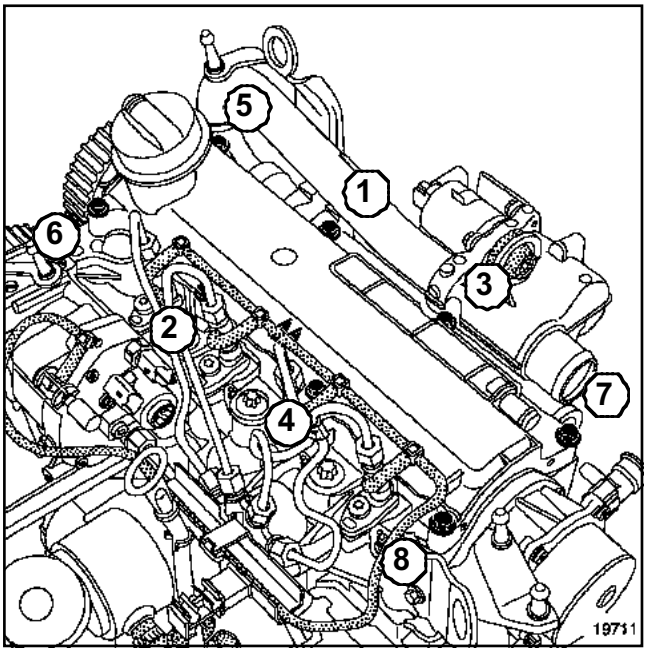
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

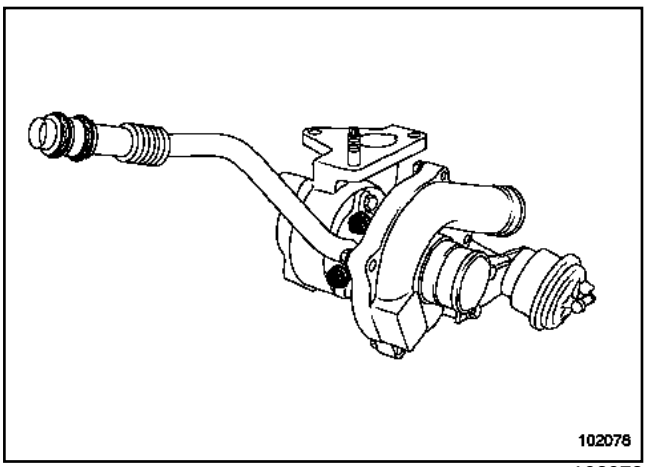


19711

Tighten to torque and in order **the rocker cover bolts (12 ± 1.2 Nm)** .

Fit the new seals on the turbocharger oil return pipe.

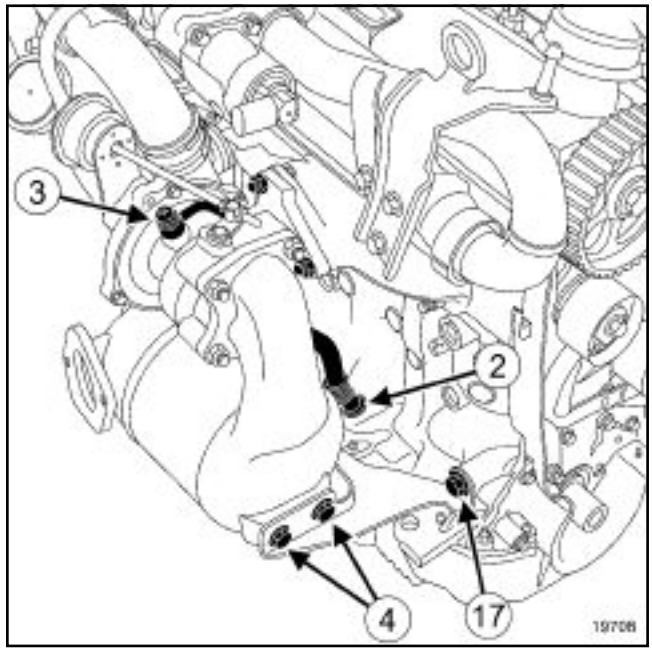
Lubricate the O-ring seals of the turbocharger oil return pipe with engine oil.



102078

Tighten to torque **the turbocharger oil return pipe mounting bolts (12 ± 1.2 Nm)** .

Fit a new seal between the exhaust manifold and the turbocharger.



19708

Refit the turbocharger-catalytic converter assembly.

Fully insert the turbocharger oil return pipes on to the cylinder block at (**2**) .

Refit:

- the catalytic converter mounting stay,

- the catalytic converter stay mounting bolts.

Tighten to torque:

- **the turbocharger mounting nuts (26 ± 2.6 Nm)** ,

- **the catalytic converter stay mounting bolts on the engine (44 ± 4.4 Nm)** (**17**) ,

- **the catalytic converter stay mounting bolts on the catalytic converter (26 ± 2.6 Nm)** (**4**) ,

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

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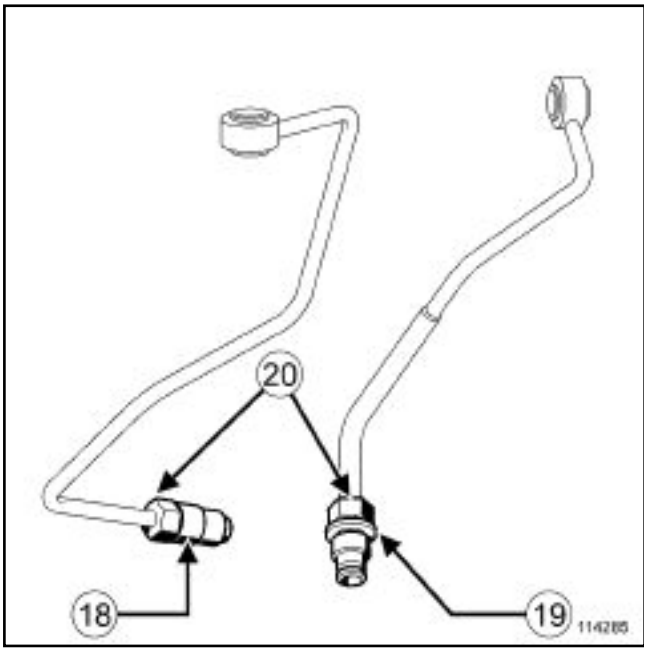
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

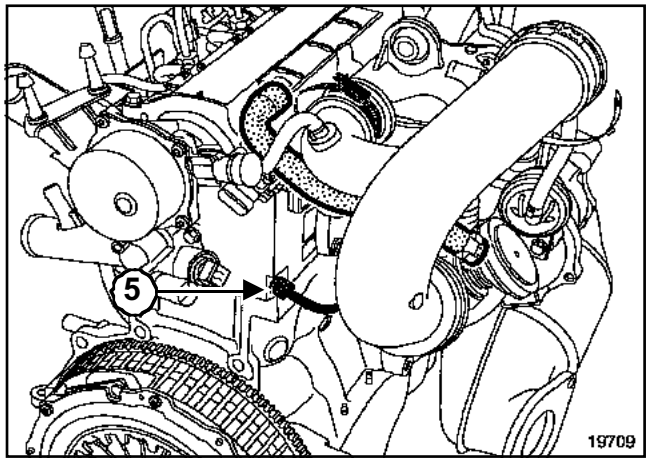


114285

Note:

These two turbocharger oil supply pipes may be used on the same engine. The tightening torque of the end pieces (**20**) on the cylinder head is different, depending on the following:

- if the end piece is **shouldered** (**19**) , 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** (**18**) , in this case it is essential to place the high-resistance bolt locking product on the end piece thread,



19709

Refit the turbocharger oil supply pipe.

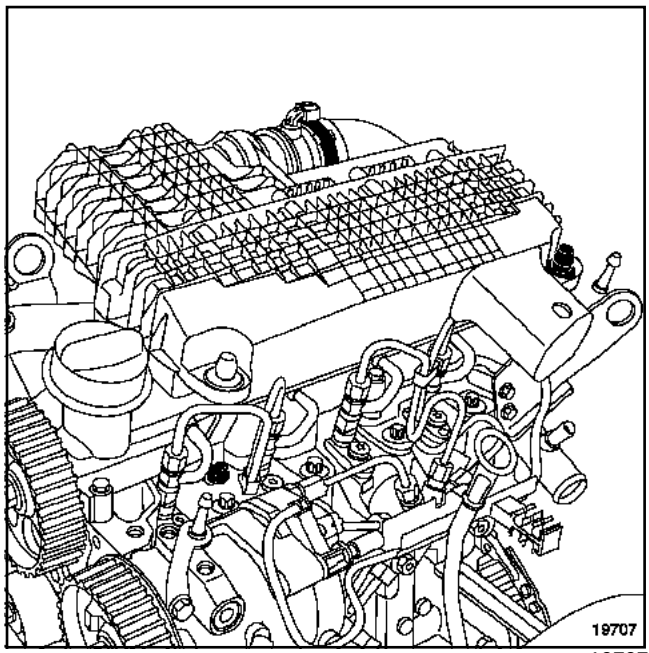
Screw in place each mounting of the turbocharger oil supply pipe.

Tighten to torque:

- **the mounting bolt of the turbocharger oil supply pipe (turbocharger end) (23 ± 2.3 Nm)** at **(3)** ,
- **the turbocharger oil supply pipe mounting nut (cylinder head end) (collar nut 35 ± 3.5 Nm or no collar nut 23 ± 2.3 Nm)** at (**5**) .

Refit:

- the oil vapour rebreather pipe,
- the new turbocharger air ducts.



19707

Refit the air filter unit.

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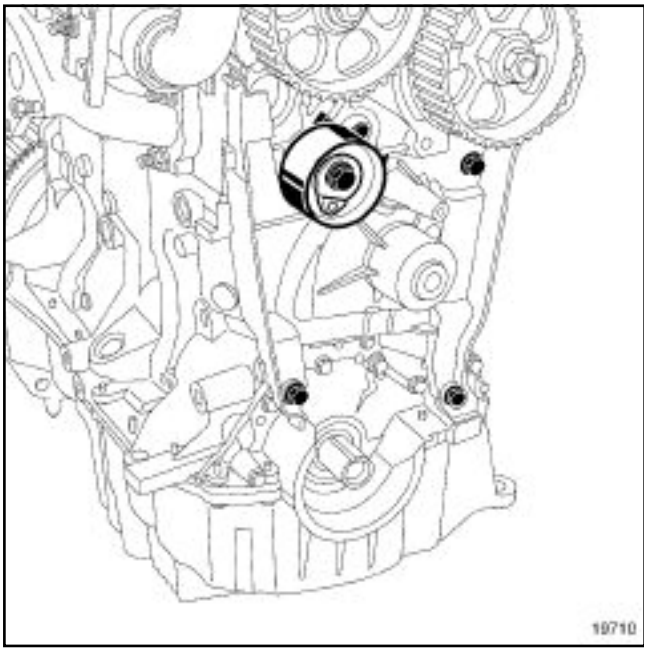
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19710

Refit:

- the inner timing cover (moving the alternator if necessary),
- the inner timing cover mounting bolts.

Tighten to torque **the inner timing cover mounting bolts (9 ± 0.9 Nm)** .

V - RECOMMENDATIONS FOR THE REPAIR OF THE TIMING GEAR

IMPORTANT
Wear protective gloves during every operation.

WARNING
The belt must be replaced with a new one if it has been removed.

Never turn the engine in the opposite direction to its normal operating direction.

Do not run the engine without the accessories belt so as not to damage the crankshaft accessories pulley.

When replacing the belt, always replace the tensioning rollers and fixed rollers.

It is essential to remove the grease from the end of the crankshaft, the camshaft timing sprocket and the bearing face of the crankshaft accessories pulley. This is to avoid timing slippage.

VI - PARTS AND CONSUMABLES FOR THE REPAIR

Pièces à remplacer systématiquement pour la distribution

- Timing belt,
- Timing belt tensioning roller,
- Crankshaft accessories pulley bolt.

Ingrédients

- Silicone adhesive sealant, part no. **77 11 227 484**
- Degreasing agent, part no. **77 11 224 559** .

VII - EQUIPMENT REQUIRED FOR THE TIMING GEAR

- Protective gloves,
- Allen key (**6 mm**),
- Female torx socket (**14**),
- Offset spanner (**18 mm**),
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

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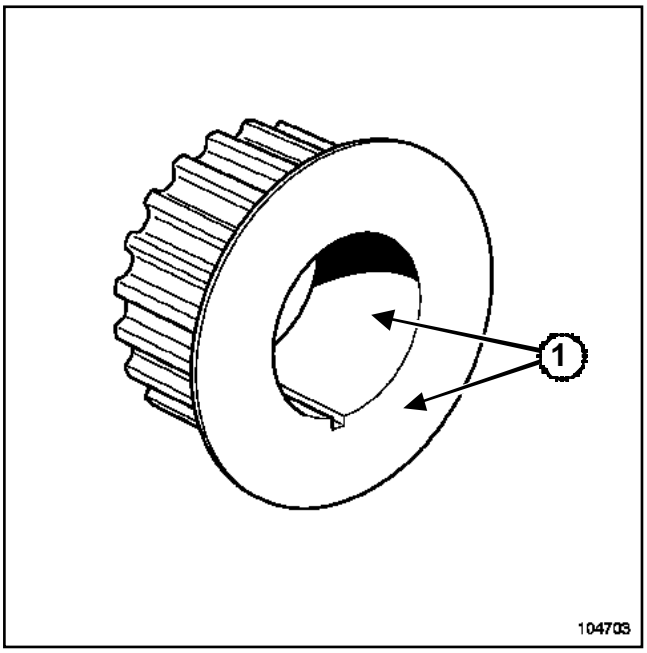
VIII - REFITTING THE TIMING BELT



104703

Apply degreaser to:

- the end of the crankshaft (timing end),
- the timing sprocket bearing faces and bore at (**1**) ,
- the contact surfaces of the crankshaft accessories pulley.

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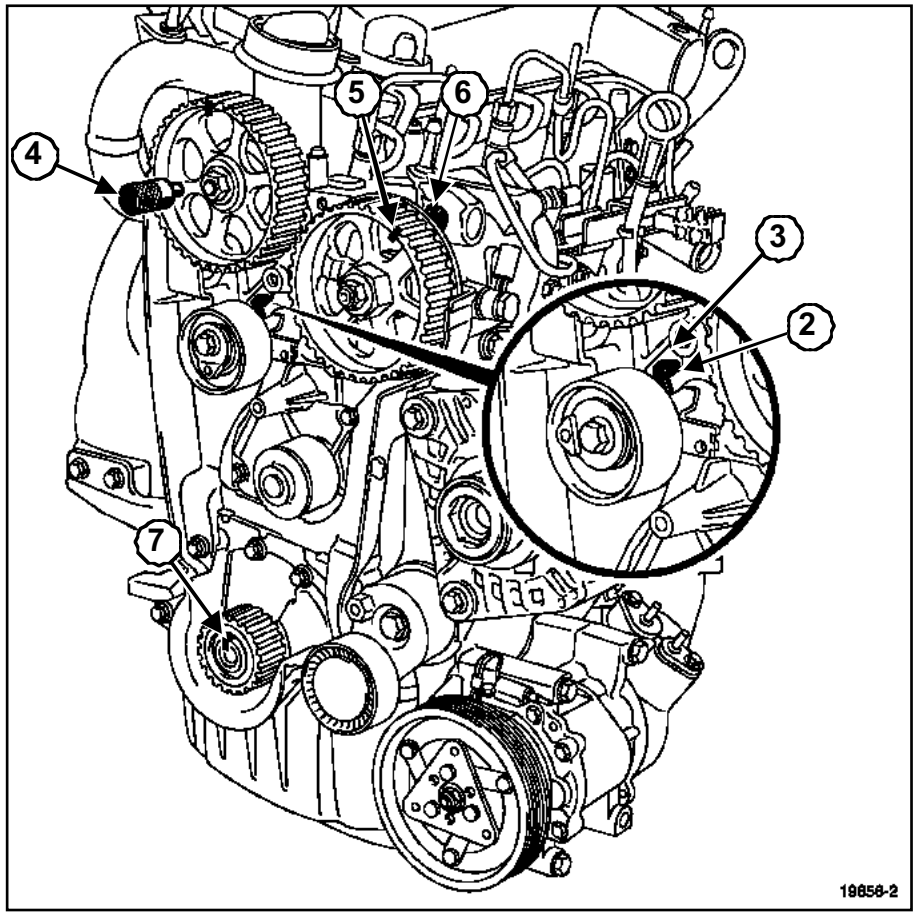
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19656-2

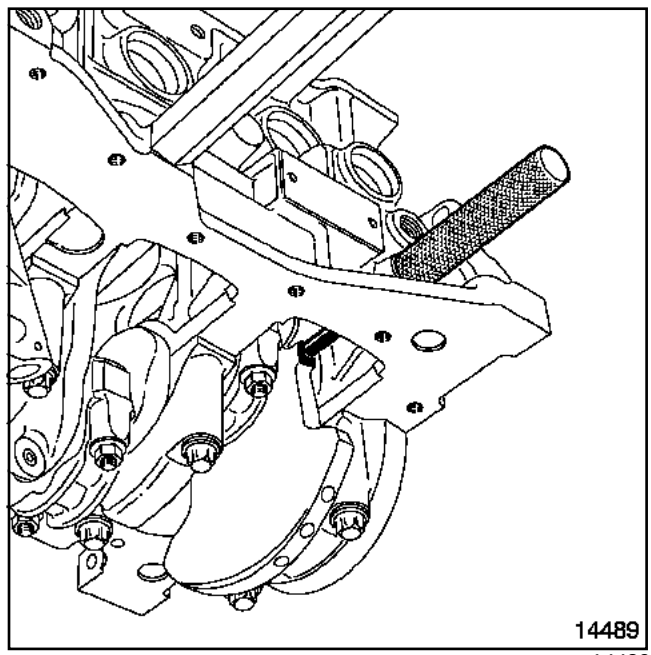
Refit:

- the crankshaft timing sprocket,
- the timing tensioning roller.

Position the spigot (**2**) of the tensioning roller in the groove (**3**) of the cylinder head.

Insert pin **(Mot. 1430)** in the cylinder head and camshaft pulley holes at (**4**) . Turning the camshaft using an **18 mm** offset spanner, if necessary.

Check that high-pressure pump pulley marking (**5**) is opposite the bolt head (**6**) .



14489

Position the crankshaft so that is presses against the TDC setting pin **(Mot. 1489)** (crankshaft groove **(7)** must be at the top).

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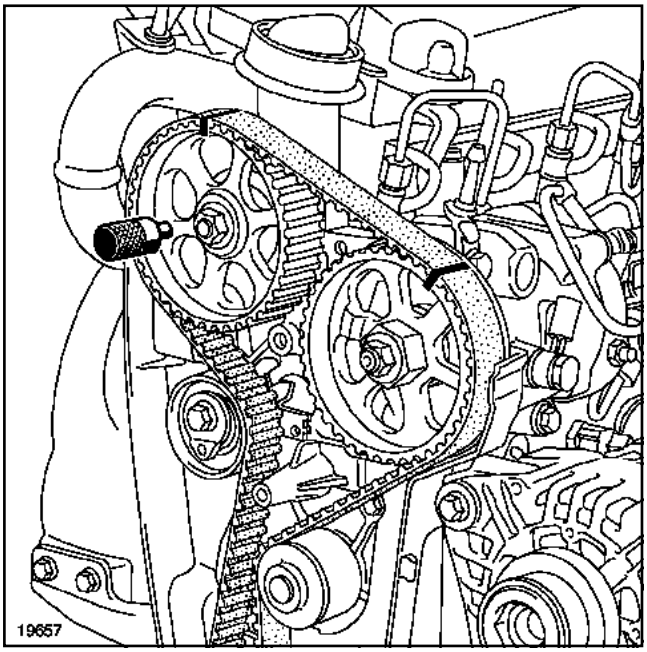
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

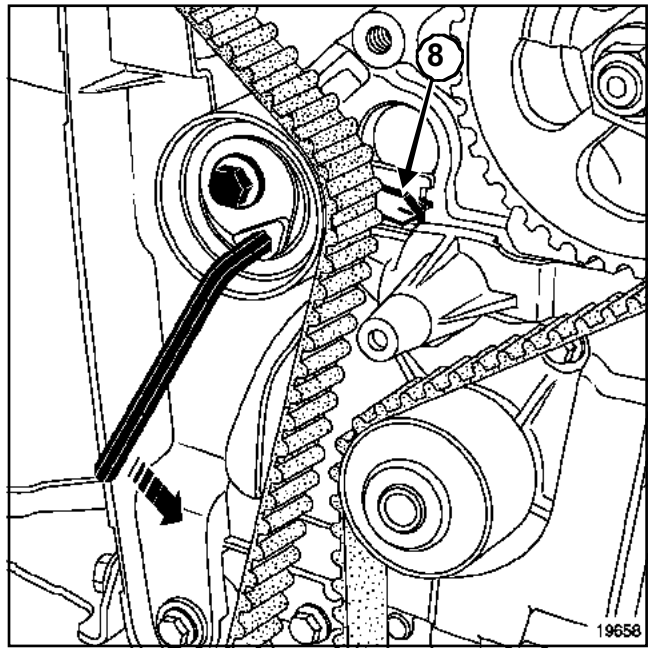


19657

Fit the timing belt, starting with the crankshaft sprocket, aligning the marks on the belt with those on the camshaft and high-pressure pump pulleys.

Note:

There must be 19 belt grooves between the marks of the high-pressure pump and camshaft pulleys.



19658

Position the tensioning roller adjustable index marker (**8**) opposite the spigot, turning the eccentric cam anti-clockwise using a **6 mm** Allen key.

Torque tighten **the tensioning roller bolt (27 ± 2.7 Nm)** .

Refit the accessories crankshaft pulley with a new bolt.

Torque and angle tighten (crankshaft pressed against the TDC setting pin):

- **the crankshaft accessories pulley M12 mounting bolt (60 ± 6 Nm + 100° ± 10°)** ,
- **the crankshaft accessories pulley M14 mounting bolt (120 ± 12 Nm + 95° ± 15°)** ,

Remove the following tools:

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

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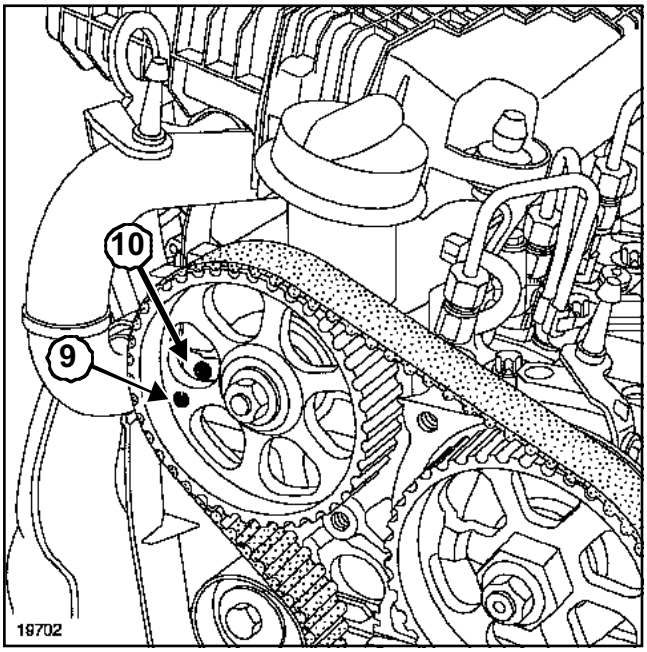
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

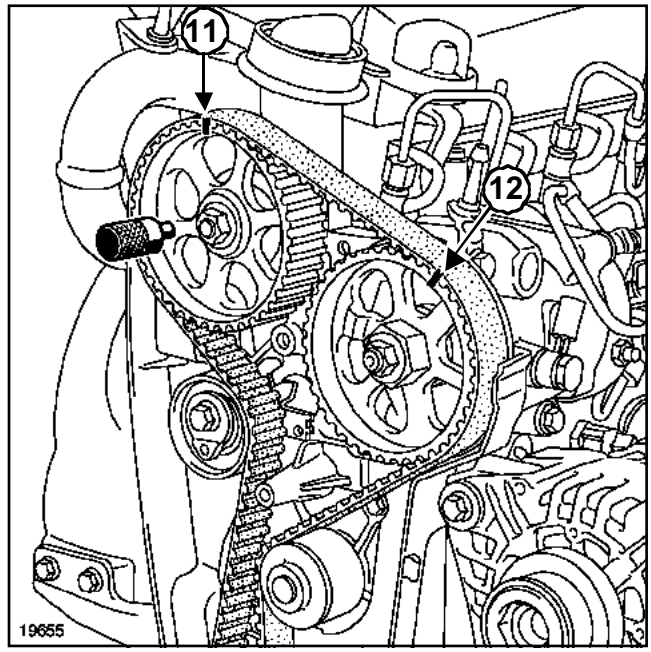


19702

Rotate the crankshaft twice in a clockwise direction (timing end) before the camshaft pulley hole (**9**) is opposite the cylinder head hole (**10**) .

Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

Bring the crankshaft slowly and smoothly against the TDC setting pin.



19655

Set the camshaft pulley using the **(Mot. 1430)** .

Note:

There must be **19 belt grooves** between the marks of the camshaft pulley (**11**) and the high-pressure pump pulley (**12**) .

Remove:

- the TDC setting pin **(Mot. 1489)** ,
- the Set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Note:

After two turns, the tensioning roller index markers may be in two different positions.

The rotation of the tensioning roller eccentric depends on the position.

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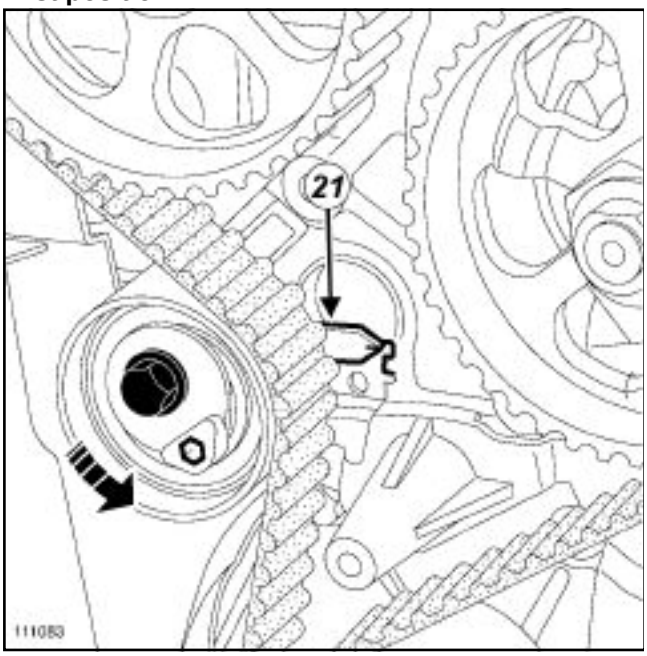
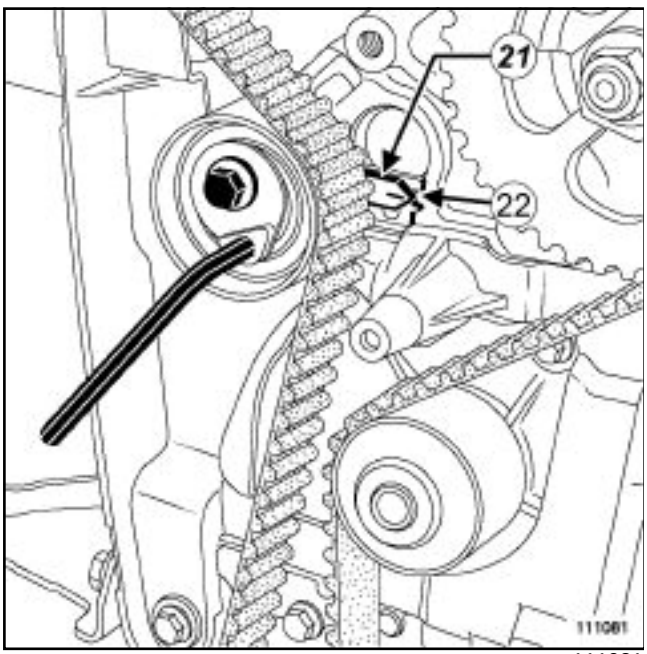
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

First position



111083

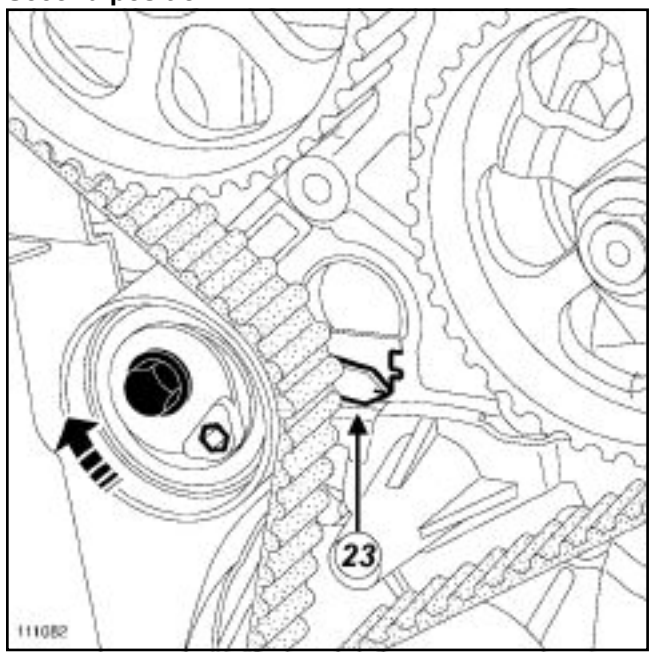


111081

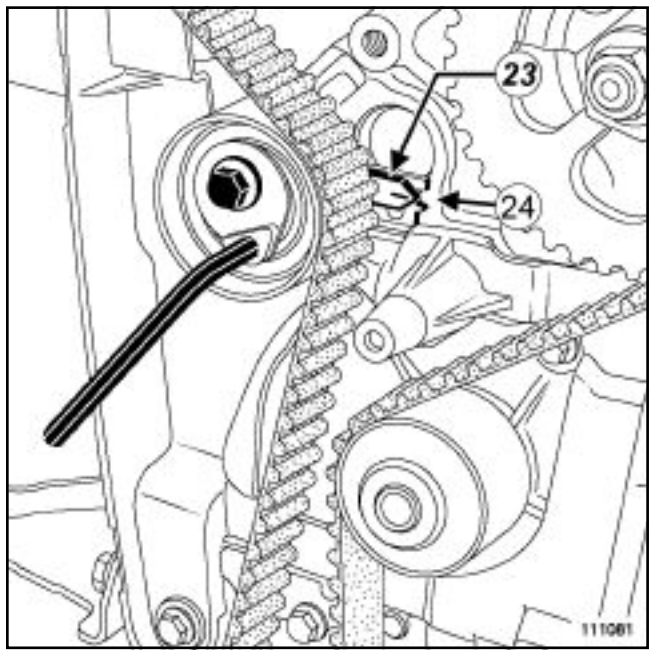
Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index marker (**21**) to the middle of the timing window, (**22**) turning the key anti-clockwise.

Second position



111082



111081

Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index marker (**23**) to the middle of the timing window, (**24**) turning the key clockwise.

Torque tighten **the tensioning roller bolt (27 ± 2.7 Nm)** .

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole is opposite the cylinder head hole.

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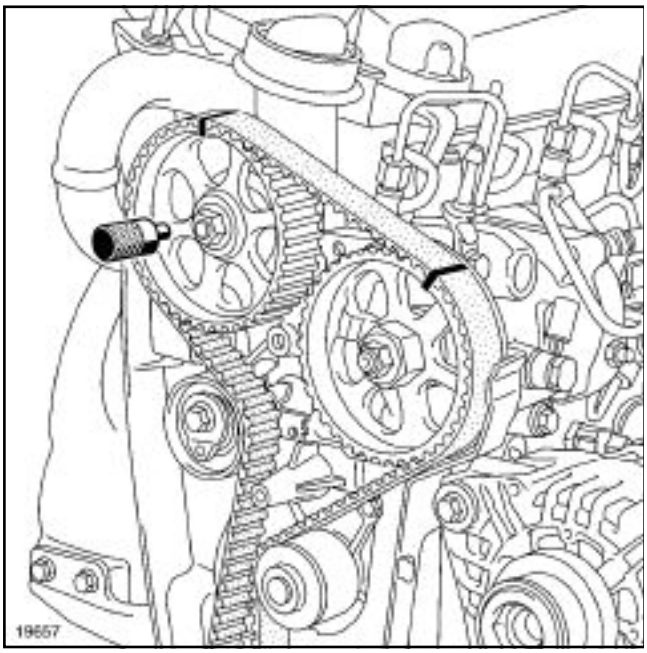
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

Bring the crankshaft slowly and smoothly against the TDC setting pin.



19657

Set the camshaft pulley using the **(Mot. 1430)** .

If this is not possible, repeat the timing belt refitting operation.

Remove the following tools:

- TDC setting pin **(Mot. 1489)** ,
- set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Place a drop of **ADHESIVE SILICONE SEALANT** on the threading of the TDC pin plug.

Tighten to torque **the TDC pin plug cap (20 ± 2 Nm)** .

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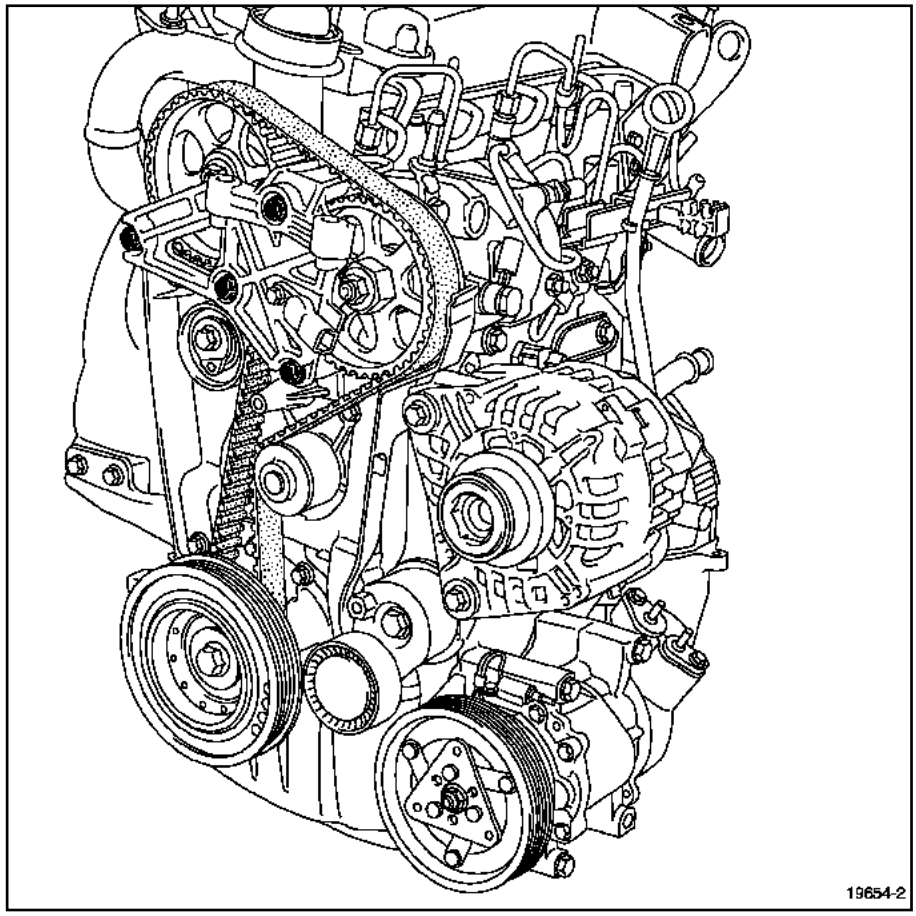
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19654-2

Refit the cylinder head suspended mounting.

Tighten to torque **the cylinder head suspended mounting bolts (21 ± 2.1 Nm)** .

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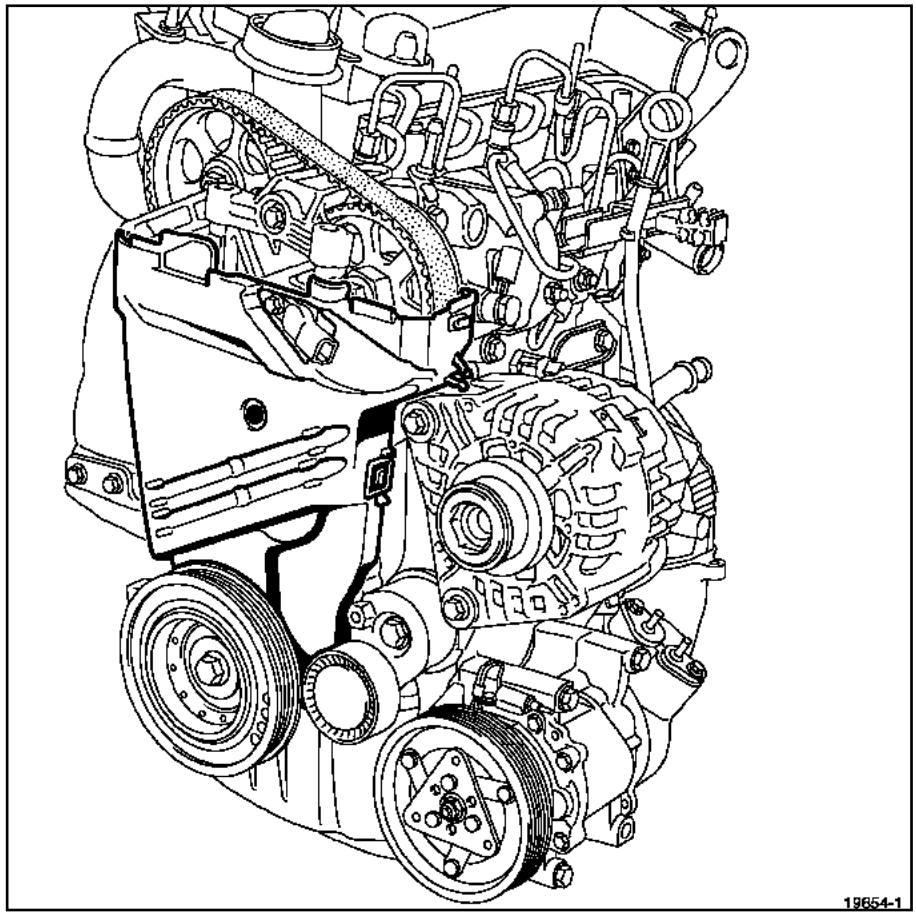
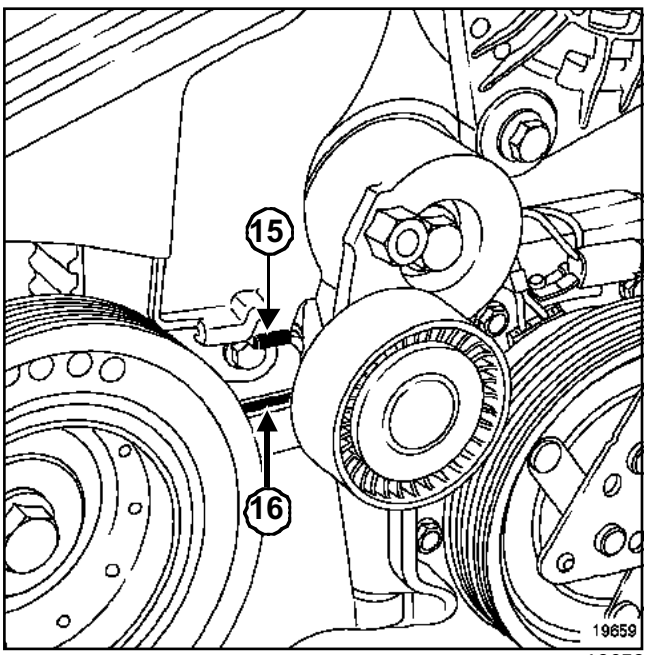
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19654-1



19659

Refit the timing cover, positioning tab (**15**) in lower timing cover opening. (**16**) .

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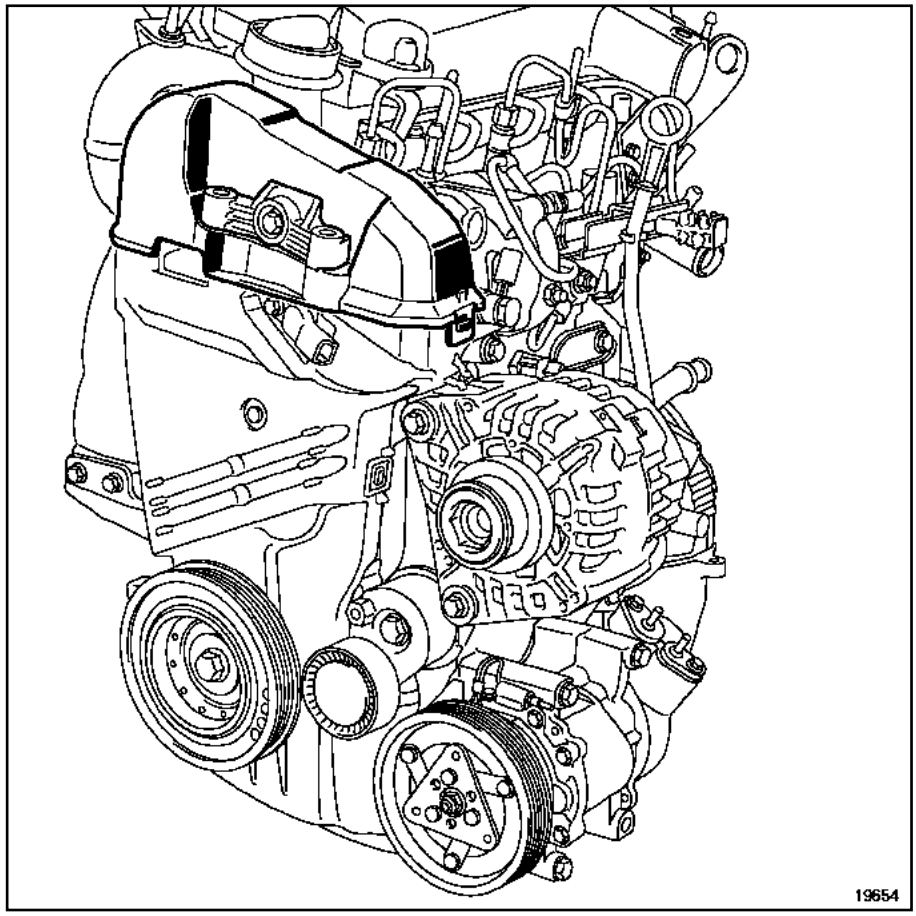
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19654

Refit the high-pressure pump position sensor.

Tighten to torque **the high-pressure pump position sensor bolt (8 ± 0.8 Nm)** .

Refit the upper timing cover.

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Timing - cylinder head: Refitting

K9K, and 732 or 764

Special tooling required	
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.
Mot. 1489	TDC locating pin.

Tightening torques ▽	
cylinder head mounting bolts	**25 ± 2.5 Nm**
cylinder head mounting bolts	**255° ± 10°**
rocker cover mounting bolts	**12 ± 1.2 Nm**
dipstick guide mounting nuts	**10 ± 1 Nm**
damper valve mounting nuts	**12 ± 1.2 Nm**
turbocharger oil return pipe mounting bolts	**12 ± 1.2 Nm**
the nuts mounting the catalytic converter on the turbocharger	**26 ± 2.6 Nm**
the bolts mounting the catalytic converter stay on the engine	**44 ± 4.4 Nm**
the bolts mounting the catalytic converter stay on the catalytic converter	**26 ± 2.6 Nm**
inner timing cover mounting bolts	**9 ± 0.9 Nm**
tensioning roller bolt	**27 ± 2.7 Nm**
the camshaft pulley wheel bolts	**14 ± 1.4 Nm**
the tensioning roller bolt	**27 ± 2.7 Nm**
the camshaft pulley wheel bolts	**14± 1.4 Nm**
the crankshaft accessories pulley M14 bolt	**120 ± 12 Nm + 95° ± 15°**

Tightening torques ▽	
TDC pin plug	**20 ± 2 Nm**
cylinder head suspended mounting bolts	**21 ± 2.1 Nm**
cylinder head suspended mounting bolts	**21 ± 2.1 Nm**

I - RECOMMENDATIONS FOR REPAIRING THE CYLINDER HEAD

IMPORTANT
Wear protective gloves during every operation.

WARNING
When handling the cylinder head gasket, use the cylinder barrel to hold it.

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

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.)

To obtain correct tightening of the cylinder head bolts, remove any oil from the cylinder head mounting holes using a syringe.

Do not retighten the cylinder head bolts after applying this procedure.

Do not lubricate the new cylinder head bolts.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced for the cylinder head

- The cylinder head gasket,
- The cylinder head bolts,
- The rocker cover gasket,
- The damper valve seal,
- The seals on the turbocharger oil return pipe,
- The catalytic converter seal.

Consumables

- Degreaser, part no. **77 11 224 559** ,
- Silicone adhesive sealant, part no. **77 11 227 484** .

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K9K, and 732 or 764

III - EQUIPMENT REQUIRED FOR THE CYLINDER HEAD

- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type),
- Female torx socket (**14**),
- Protective gloves.

IV - REFITTING OF THE CYLINDER HEAD

Position the pistons at mid-stroke.

Apply degreaser to the:

- the combustion side of the cylinder head,
- the combustion face of the cylinder block.

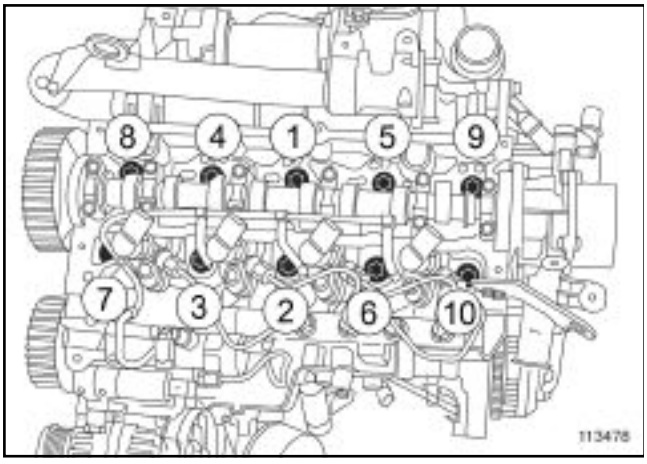
Check for the cylinder head centring dowels on the cylinder block.

Refit the cylinder head gasket (positioning the TOP facing upwards) onto the cylinder block.

Remove the cylinder head from the cylinder head support.

Refit:

- the cylinder head,
- the new cylinder head mounting bolts.



113478

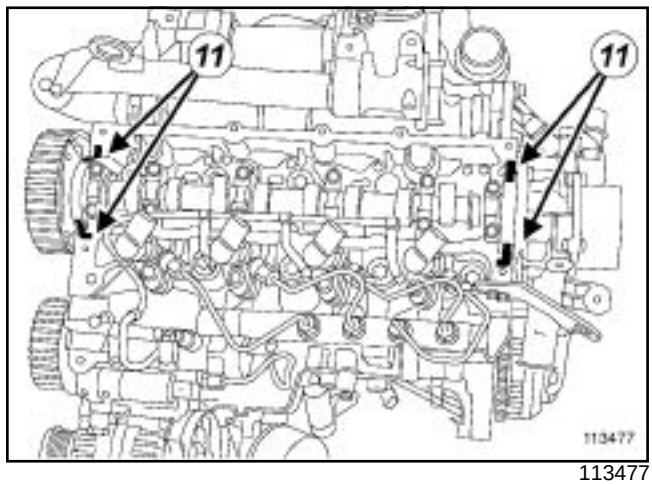
Tighten to torque and in order the **cylinder head mounting bolts (25 ± 2.5 Nm)** .

Check that all the **cylinder head mounting bolts** are tightened to **(25 ± 2.5 Nm)** .

Angle tighten in order the **cylinder head mounting bolts (255° ± 10°)** .

Degrease the rocker cover sealing surface on the cylinder head.

Fit a new seal onto the rocker cover.

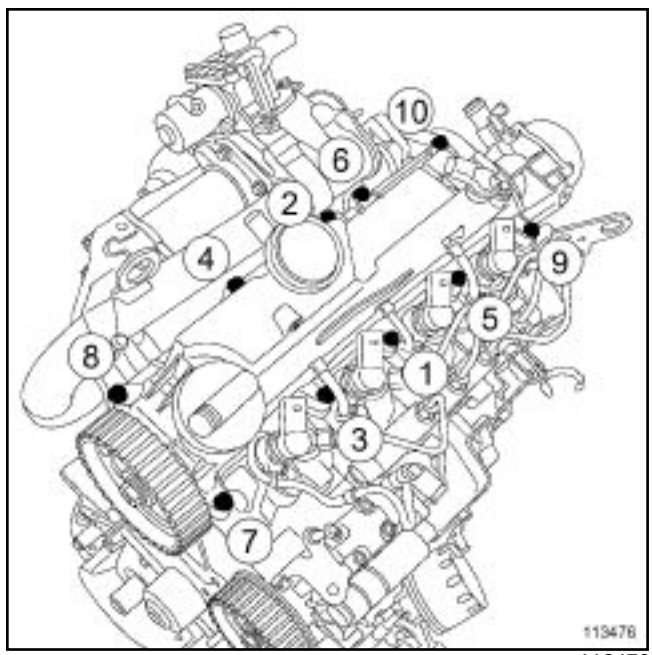


113477

Apply four beads (**11**) of **SILICONE ADHESIVE SEALANT** (**2 mm** in diameter).

Refit:

- the rocker cover,
- the rocker cover mounting bolts.



113476

Tighten to torque and in order the **rocker cover mounting bolts (12 ± 1.2 Nm)** .

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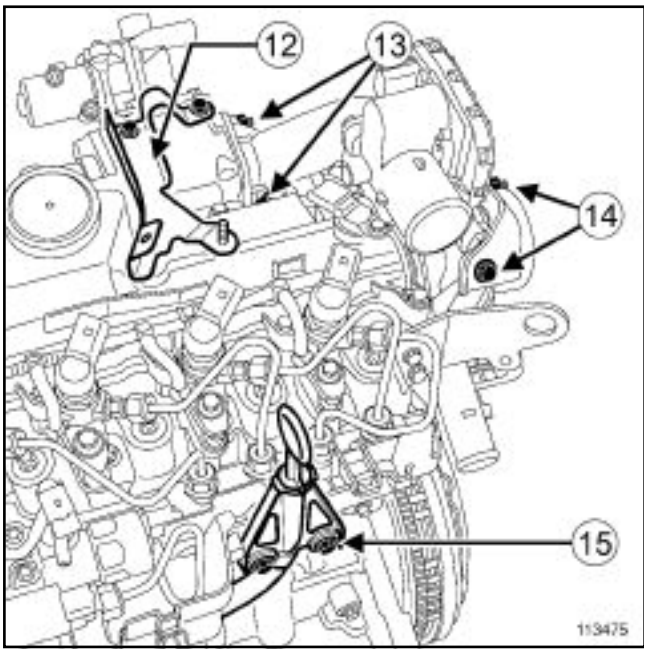
K9K, and 732 or 764



113475

Refit:

- the dipstick guide,
- the dipstick guide mounting nuts (**15**) .

Tighten to torque the **dipstick guide mounting nuts (10 ± 1 Nm)** .

Refit a new seal to the damper valve.

Refit:

- the damper valve,
- the damper valve mounting nuts (**13**) .

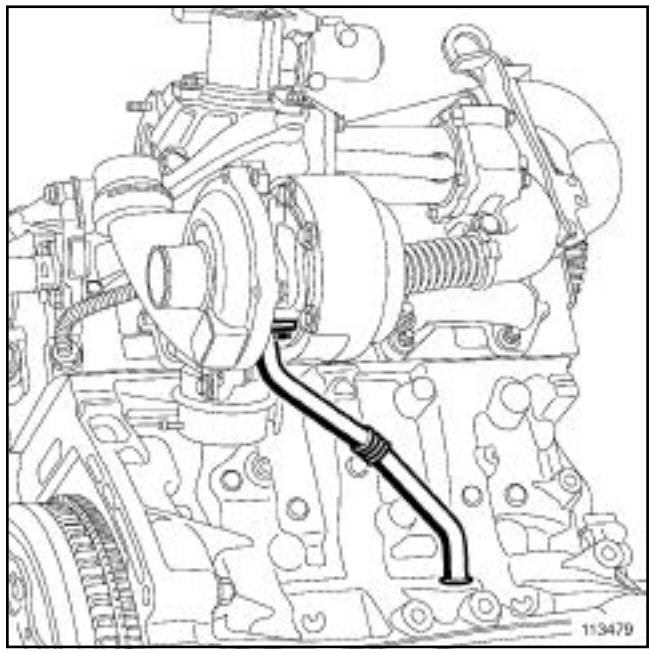
Tighten to torque the **damper valve mounting nuts (12 ± 1.2 Nm)** .

Refit:

- the damper valve mounting bracket,
- the mounting bolts securing the damper valve mounting bracket,
- the exhaust gas recirculation valve retaining bracket,
- the exhaust gas recirculation valve retaining bracket mounting bolts.

Fit the new seals onto the turbocharger oil return pipe.

Use engine oil to lubricate the turbocharger oil return pipe O-ring seals.



113479

Refit:

- the turbocharger oil return pipe,
- the turbocharger oil return pipe mounting bolts.

Tighten to torque the **turbocharger oil return pipe mounting bolts (12 ± 1.2 Nm)** .

Fit a new seal between the turbocharger and the catalytic converter.

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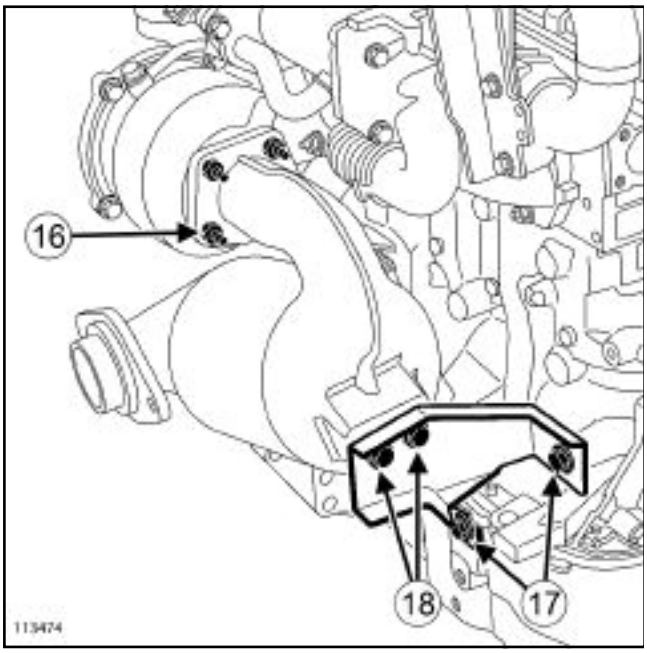


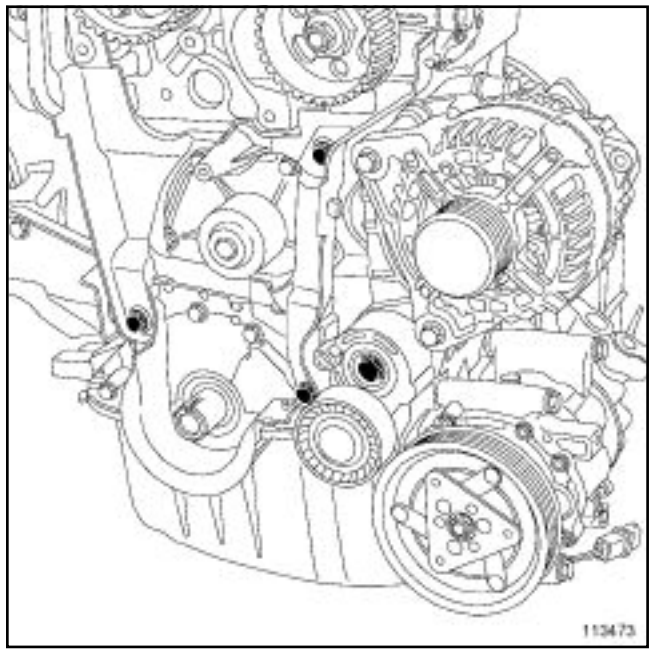
113474

Refit:

- the catalytic converter,
- the nuts mounting the catalytic converter on the turbocharger,
- the catalytic converter mounting stay,
- the catalytic converter stay mounting bolts.

Tighten to torque:

- **the nuts mounting the catalytic converter on the turbocharger (26 ± 2.6 Nm)** (**16**) ,
- **the bolts mounting the catalytic converter stay on the engine (44 ± 4.4 Nm)** (**17**) ,
- **the bolts mounting the catalytic converter stay on the catalytic converter (26 ± 2.6 Nm)** (**18**) .



113473

Refit:

- the inner timing cover (tilting the alternator if necessary),
- the inner timing cover mounting bolts.

Tighten to torque the **inner timing cover mounting bolts (9 ± 0.9 Nm)** .

V - RECOMMENDATIONS FOR REPAIRING THE TIMING

IMPORTANT

Wear protective gloves during every operation.

WARNING

The belt must be replaced with a new one if it has been removed.

Never turn the engine in the opposite direction to its normal operating direction.

Do not run the engine without the accessories belt so as not to damage the crankshaft accessories pulley.

When replacing the belt, always replace the tensioning rollers and fixed rollers.

VI - PARTS AND CONSUMABLES

Parts always to be replaced for the timing

- Timing belt,

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- Timing belt tensioning roller,
- Crankshaft accessories pulley bolt.

Consumables

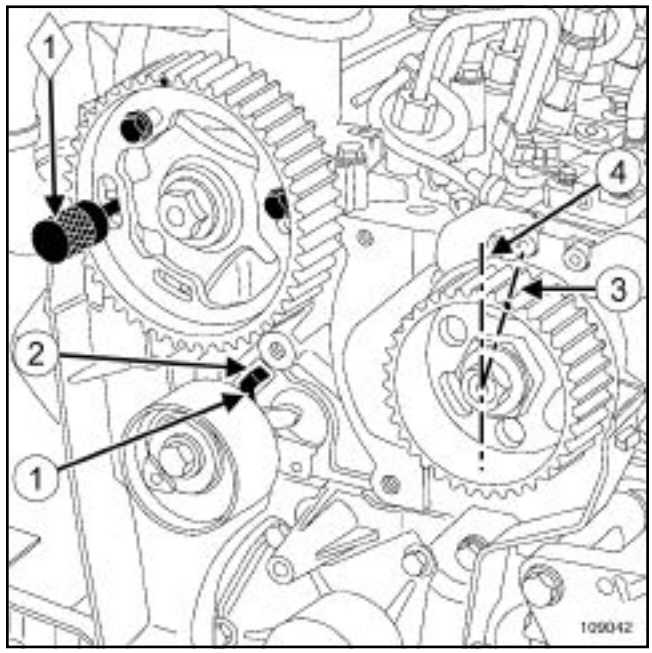
- Silicone adhesive sealant, part no. **77 11 227 484**

VII - EQUIPMENT REQUIRED FOR THE TIMING BELT

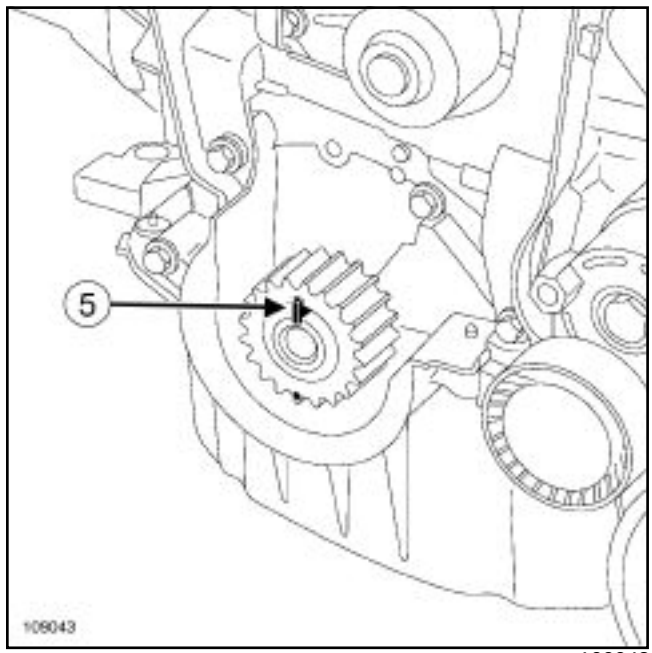
- Protective gloves,
- Allen key (**6 mm**),
- Female torx socket (**14**),
- Offset wrench (**18 mm**),
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

VIII - REFITTING THE TIMING BELT

Refit the crankshaft timing sprocket.



109042



109043

Refit the timing tensioning roller.

Put the tensioning roller spigot (**1**) in the cylinder head groove (**2**) .

Engage the pin (**1**) **(Mot. 1430)** in the holes of the camshaft pulley and cylinder head, turning the camshaft using an **18 mm** offset wrench if necessary.

Check that the high-pressure pump mark (**3**) has shifted one tooth to the right of the vertical axle (**4**) .

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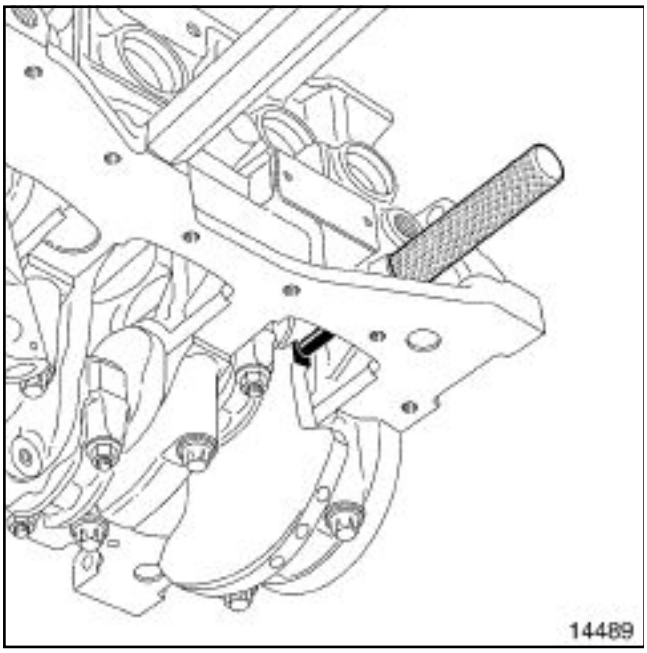
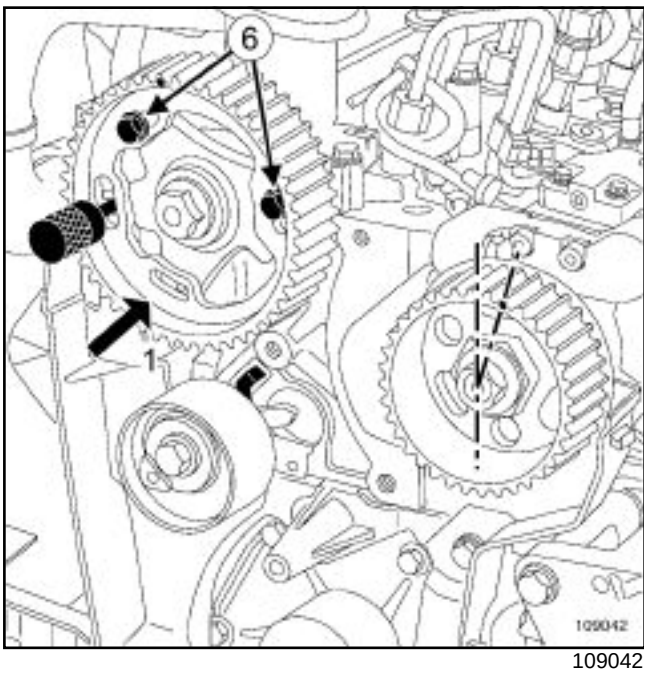


14489

Position the crankshaft so that it presses on the TDC setting pin **(Mot. 1489)** (the crankshaft timing sprocket cotter ***(5)*** must face upwards)



109042

Remove one bolt from the camshaft pulley wheel.

Loosen the two other camshaft pulley wheel bolts (**6**) by one turn.

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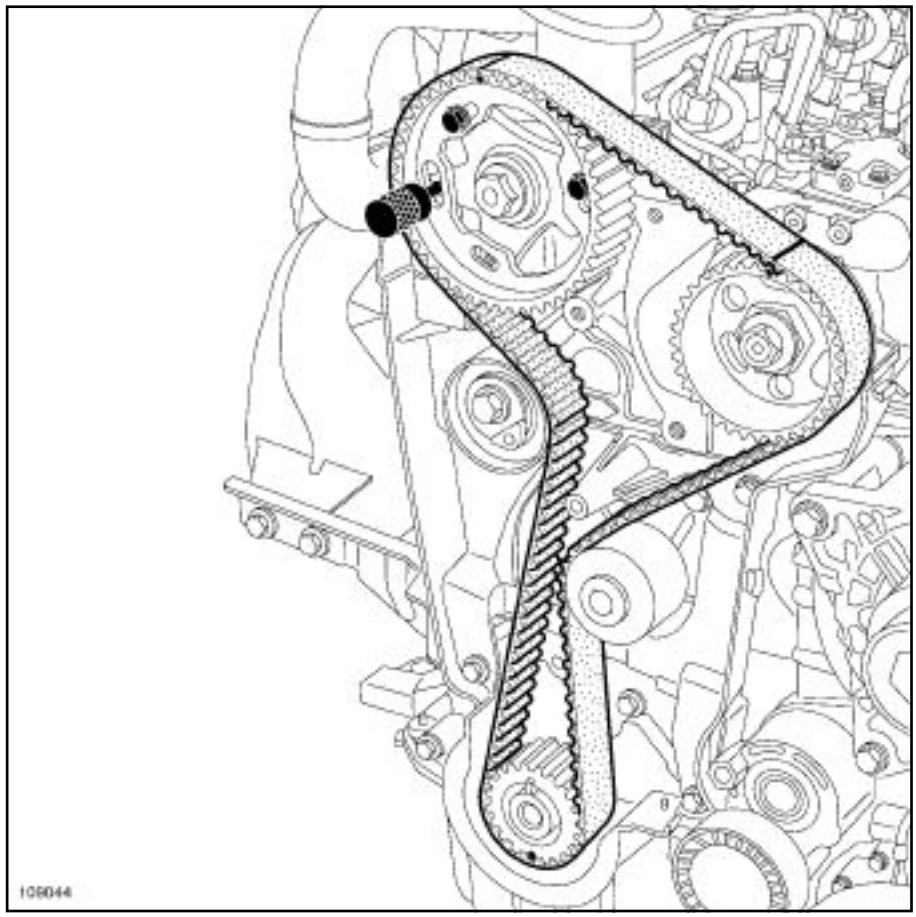

109044

Fit the timing belt, starting with the crankshaft sprocket, by aligning the marks on the belt with those on the crankshaft sprockets, the camshaft and the high-pressure pump.

note:

There should be 19 tooth belt grooves on the belt between the camshaft sprocket marks and the high-pressure pump, and 51 tooth belt grooves between the crankshaft sprockets and the high-pressure pump.

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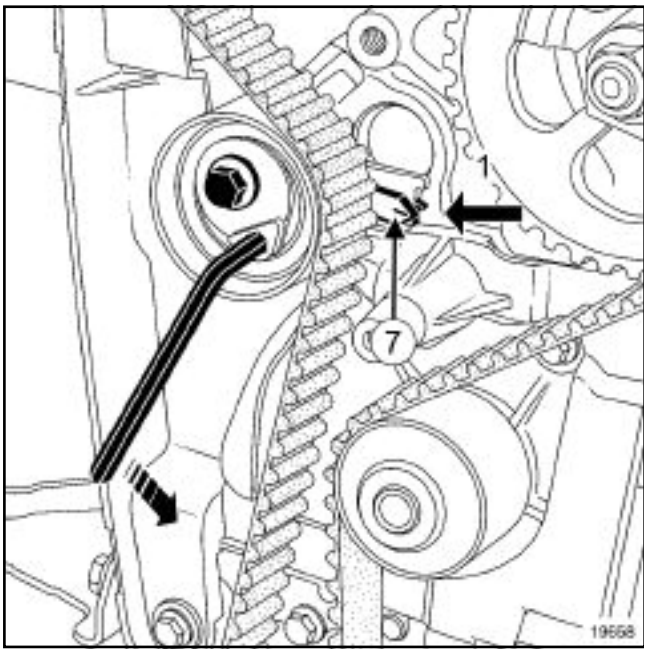
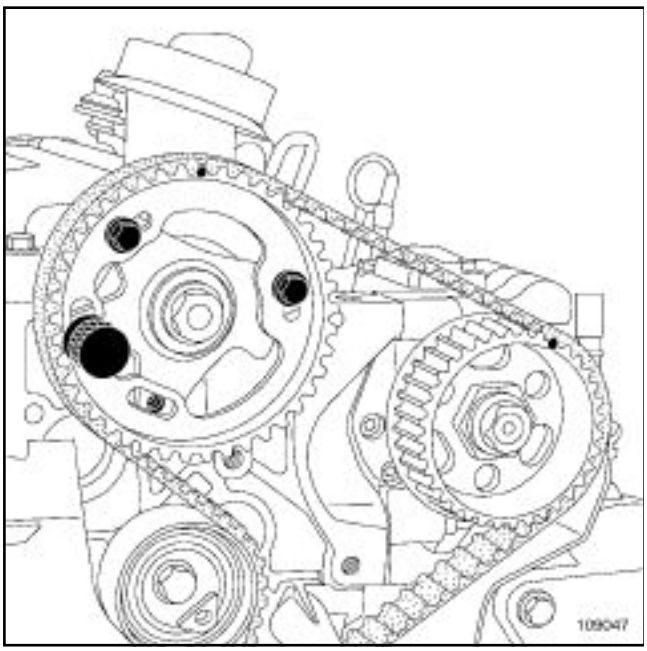


19658

Position the tensioning roller adjustable index (**7**) opposite the spigot, turning the eccentric cam anticlockwise using a **6 mm** Allen key.

Tighten to torque the **tensioning roller bolt (27 ± 2.7 Nm)** .



109047

Check that the camshaft pulley hub bolts are not fully up against the camshaft pulley wheel.

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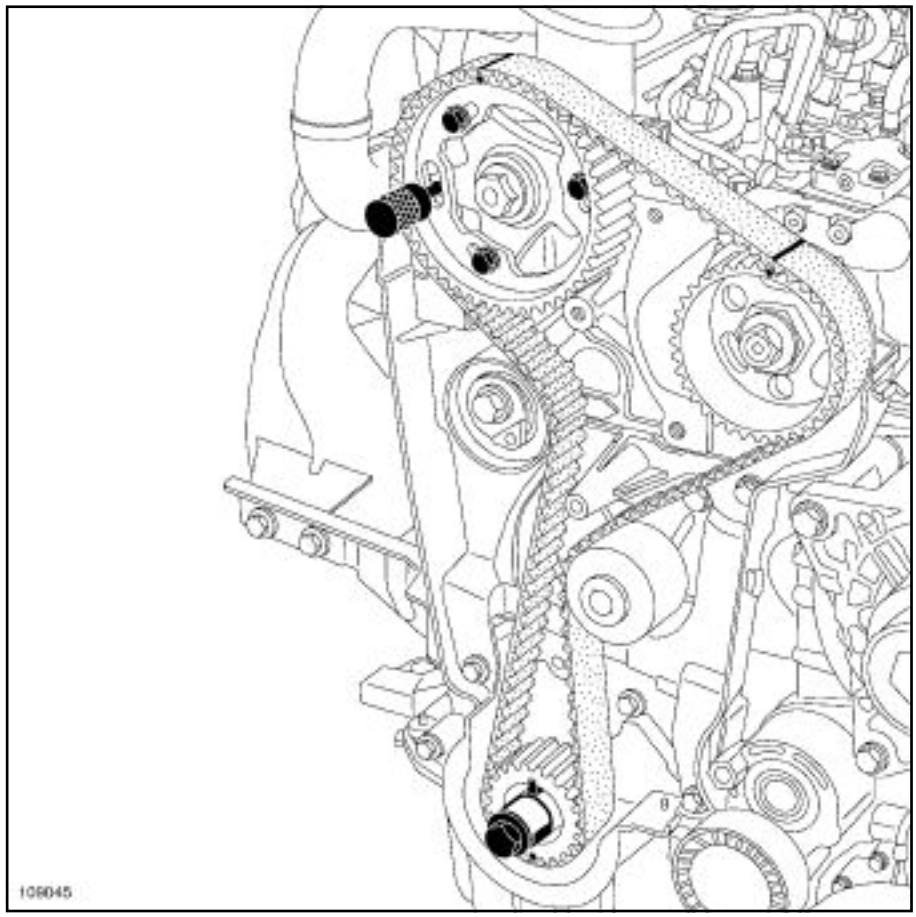


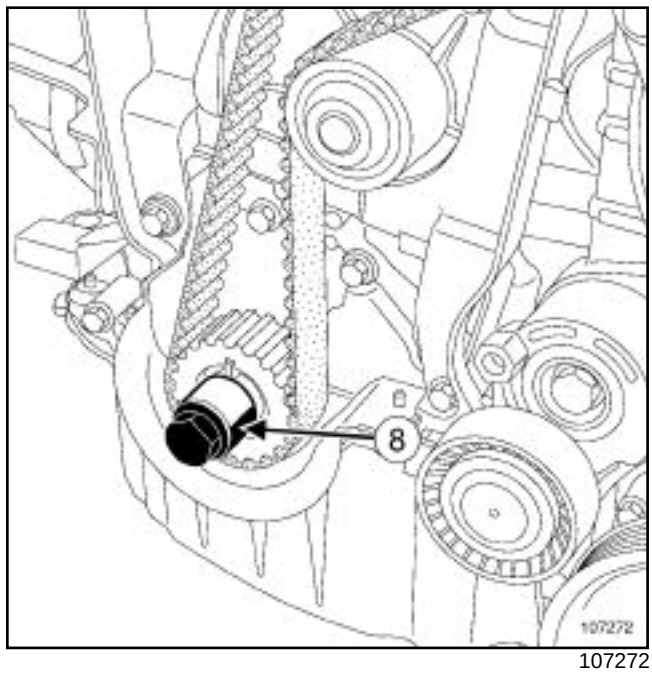
109045

Refit the bolt to the camshaft pulley wheel.

Tighten to torque **the camshaft pulley wheel bolts (14 ± 1.4 Nm)** .

Remove:

- the TDC setting pin **(Mot. 1489)** ,
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .



107272

Tighten the old crankshaft accessories pulley bolt fitted with a spacer (which does not cover the timing sprocket mark) (**8**) onto the crankshaft.

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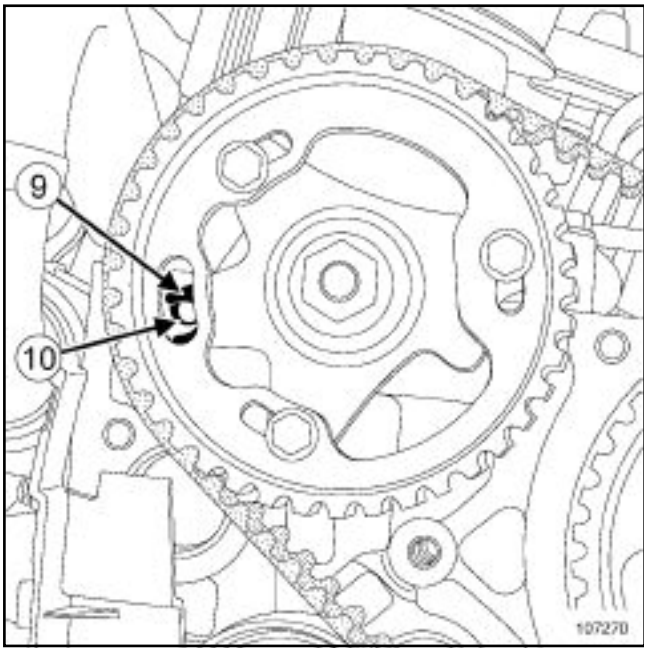
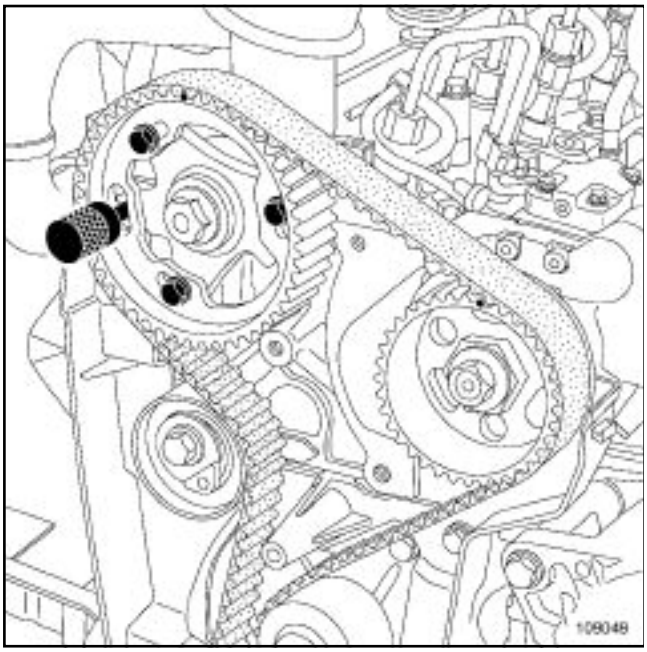


107270

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole (**9**) is opposite the cylinder head hole (**10**) .

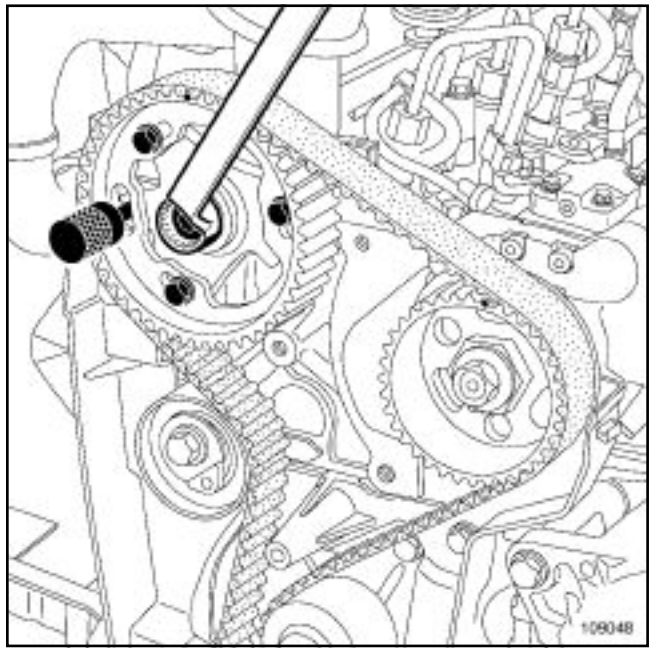
Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

Bring the crankshaft slowly and smoothly against the TDC setting pin.



109049

Set the camshaft pulley using the **(Mot. 1430)** .



109048

If the pin **(Mot. 1430)** does not engage:

loosen the camshaft pulley wheel bolts by one turn,

Turn the camshaft pulley hub using an **18 mm** offset wrench to set the camshaft pulley hub timing.

Do not retighten the camshaft pulley wheel bolts.

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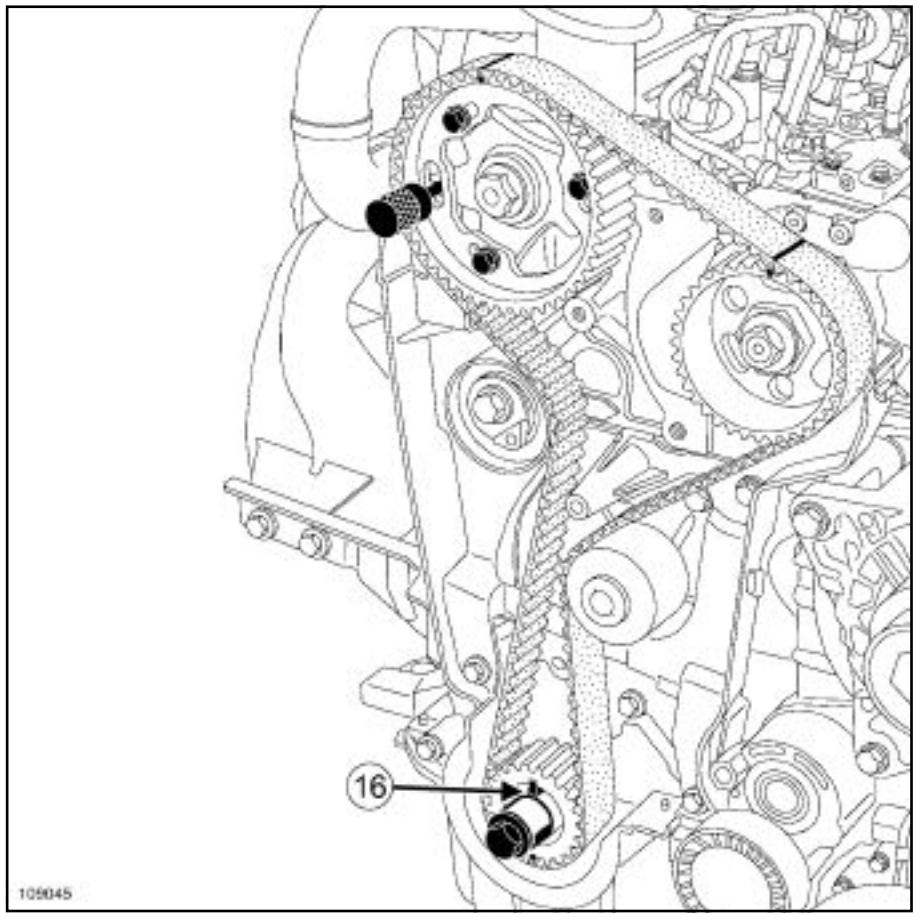

109045

Check that the crankshaft timing sprocket cotter (**16**) is positioned vertically at the top.

note:

After two turns, the tensioning roller index markers may be in two different positions.

The rotation of the tensioning roller eccentric depends on the position.

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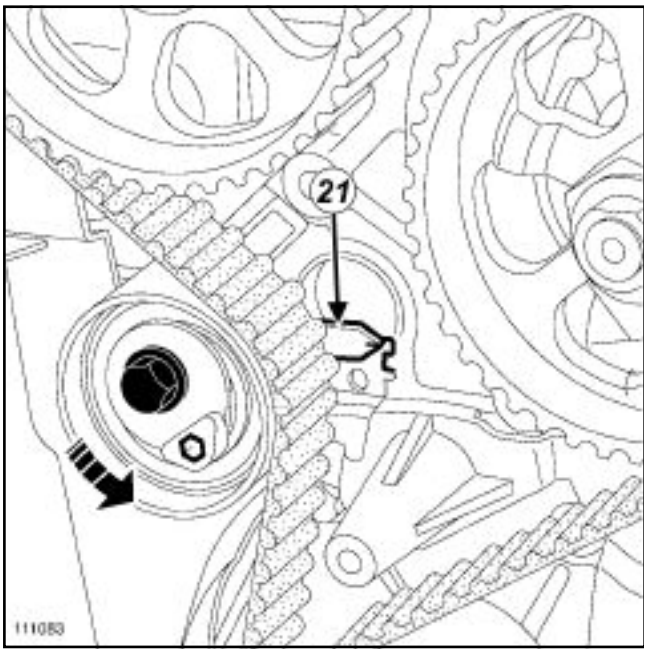
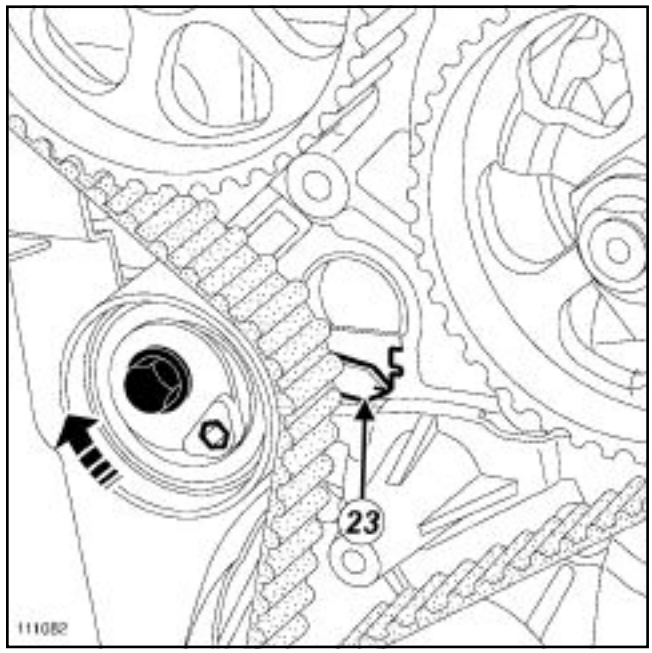
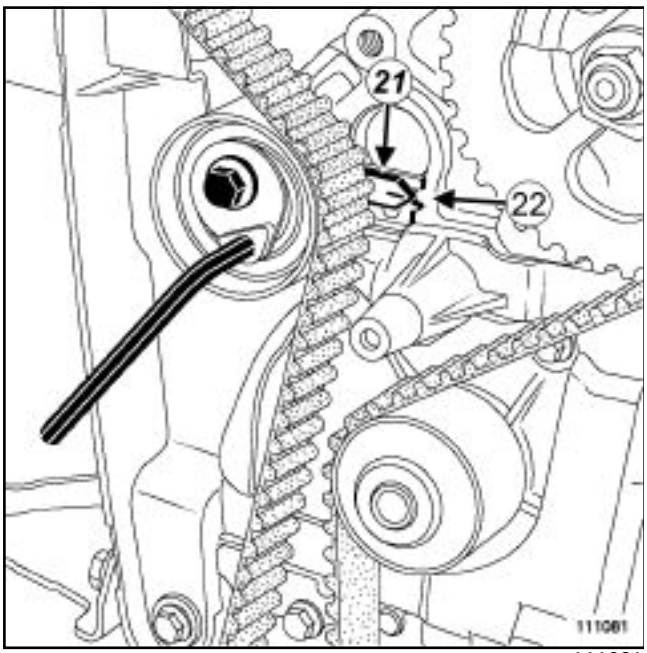


111083



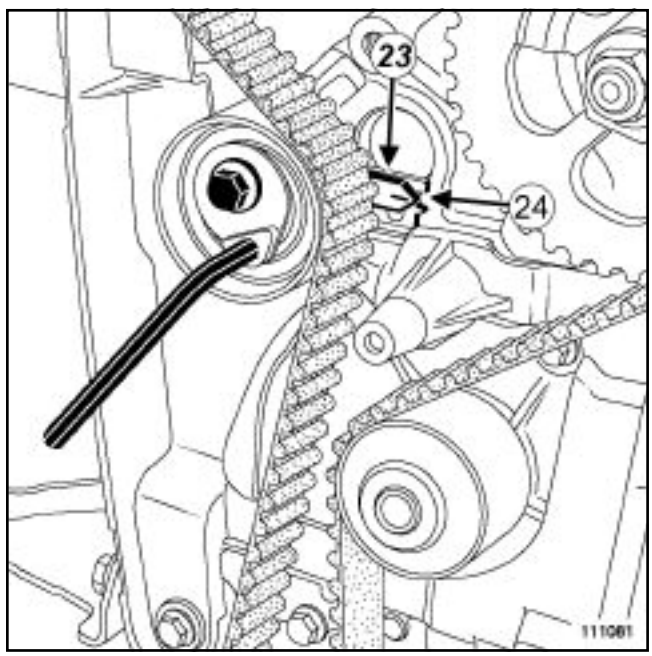
111082



111081

Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index (**21**) in the middle of the timing window (**22**) , turning the key anticlockwise.



111081

Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index (**23**) in the middle of the timing window (**24**) , turning the key clockwise.

Tighten to torque:

- **the tensioning roller bolt (27 ± 2.7 Nm)** ,
- **the camshaft pulley wheel bolts (14± 1.4 Nm)** .

Remove the following tools:

- TDC setting pin **(Mot. 1489)** ,

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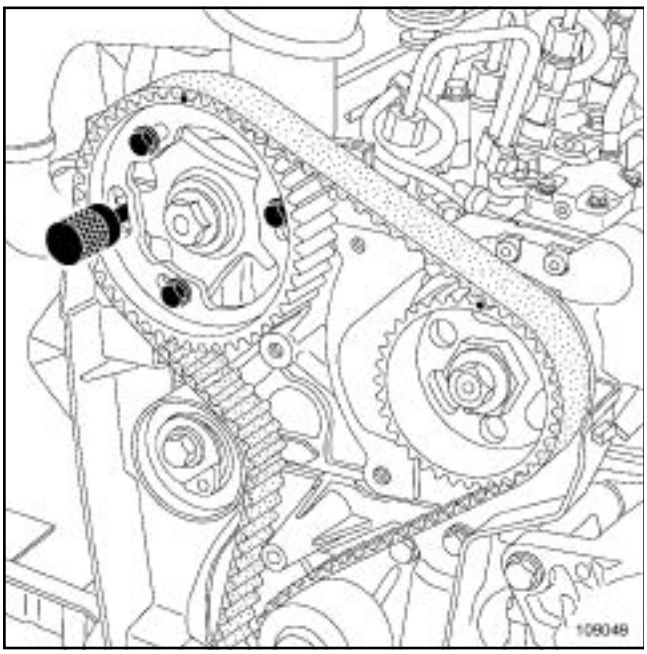
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole is opposite the cylinder head hole.

Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

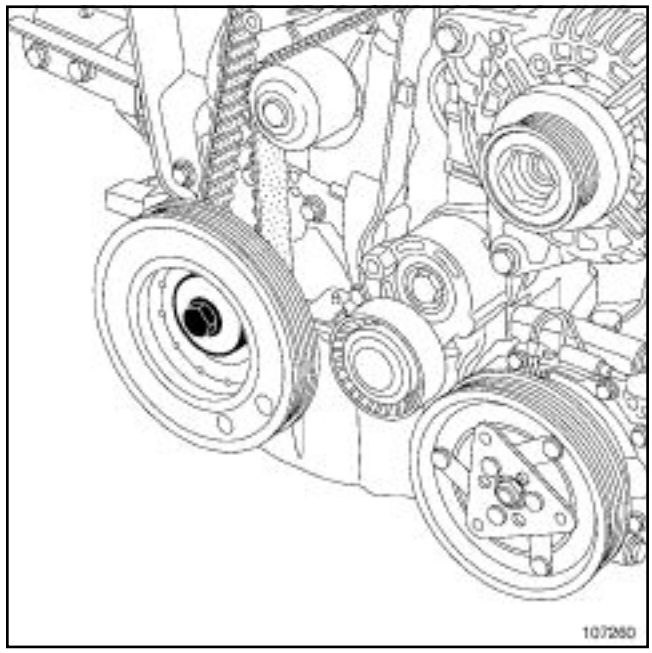
Bring the crankshaft slowly and smoothly against the TDC setting pin.



109049

Set the camshaft pulley using the **(Mot. 1430)** .

If this is not possible, repeat the timing belt refitting operation.



107260

Refit the accessories crankshaft pulley with a new bolt.

Tighten to torque and angle (crankshaft in contact with the TDC setting pin) **the crankshaft accessories pulley M14 bolt (120 ± 12 Nm + 95° ± 15°)** .

Remove the following tools:

- TDC setting pin **(Mot. 1489)** ,
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Refit the TDC pin plug, coating the thread with **SILICONE ADHESIVE SEALANT** .

Tighten to torque the **TDC pin plug (20 ± 2 Nm)** .

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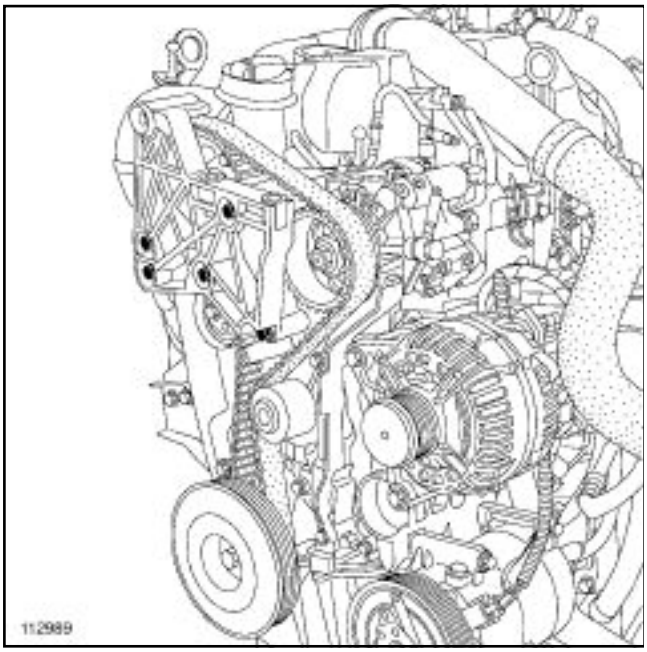
Timing - cylinder head: Refitting

K9K, and 732 or 764

K9K, and 732



112989

Refit the cylinder head suspended mounting.

Tighten to torque the **cylinder head suspended mounting bolts (21 ± 2.1 Nm)** .

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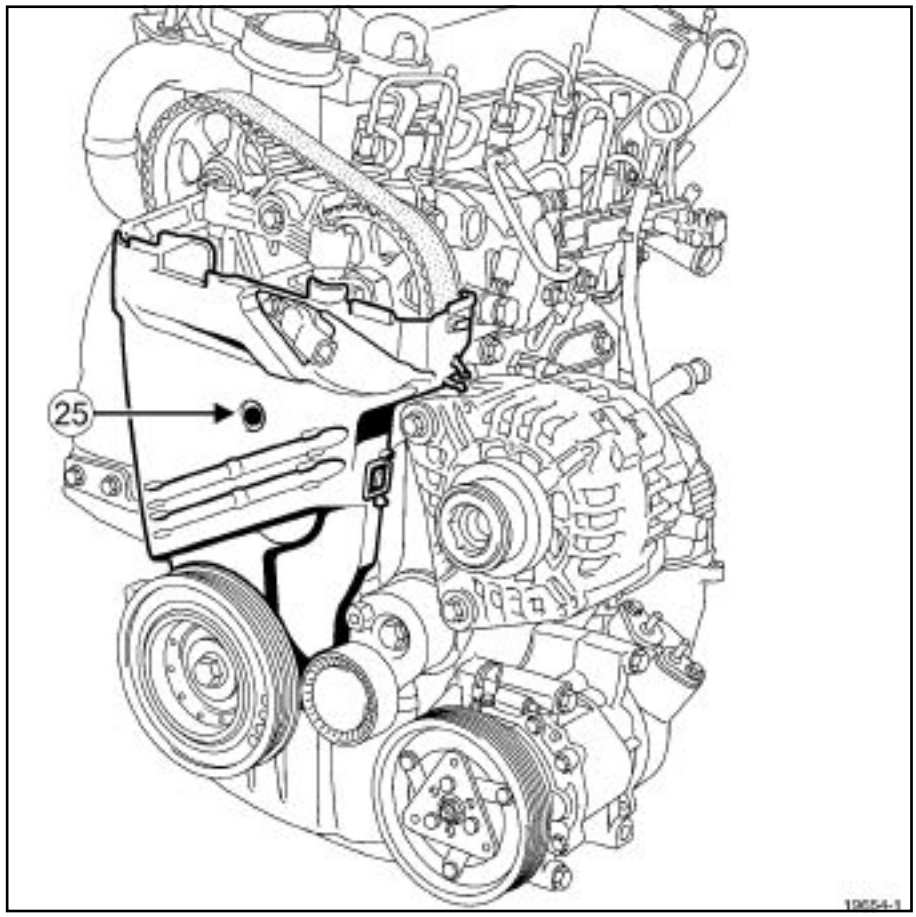
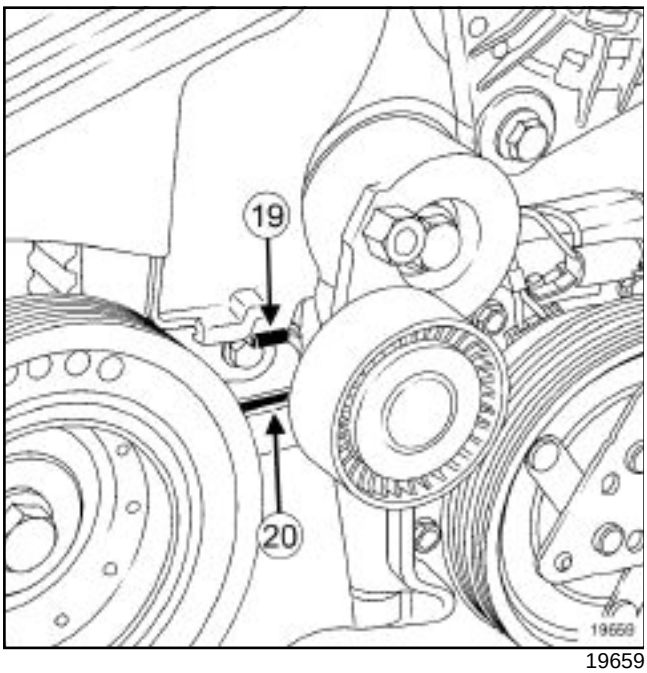
K9K, and 732 or 764



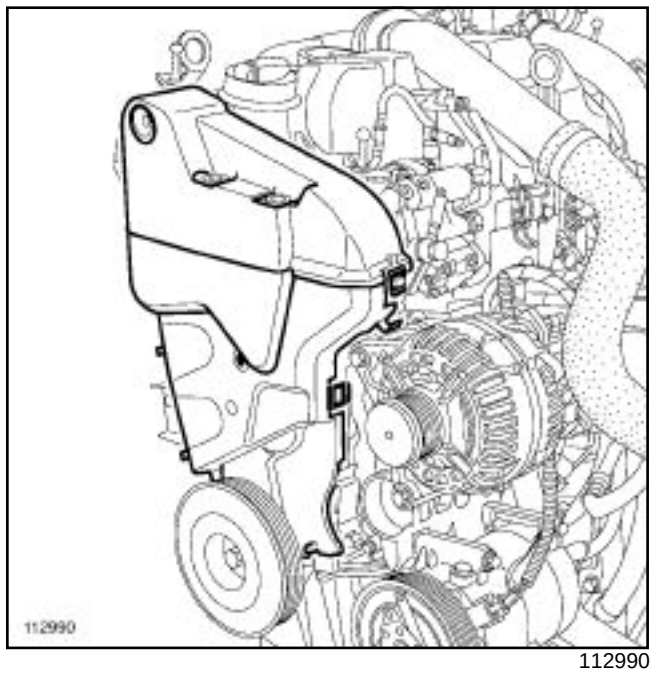
19654-1



19659

Refit:

- the lower timing cover, positioning the tab (**19**) in the inner timing cover hole (**20**) ,
- the timing cover plastic bolt (**25**) .



112990

Refit the upper timing cover.

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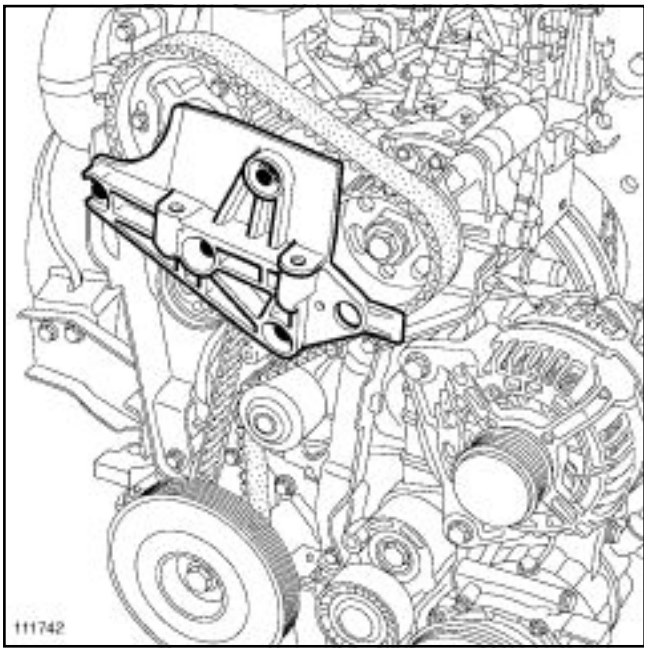
K9K, and 732 or 764

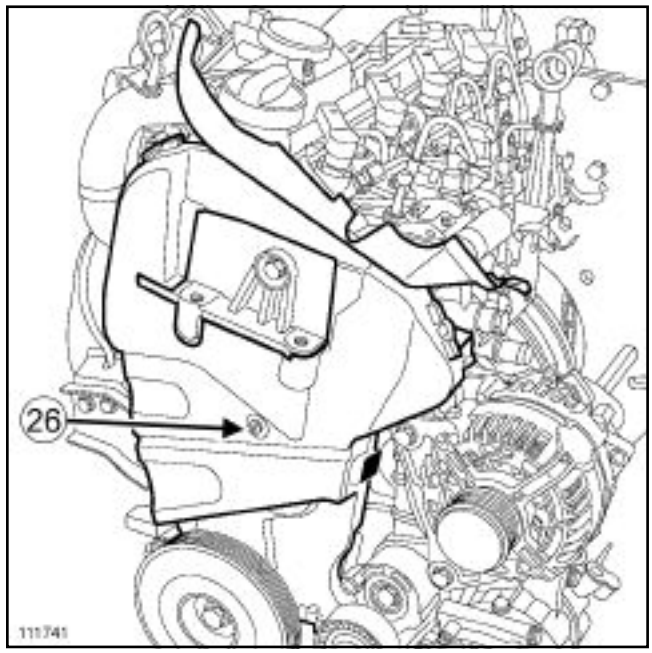
K9K, and 764



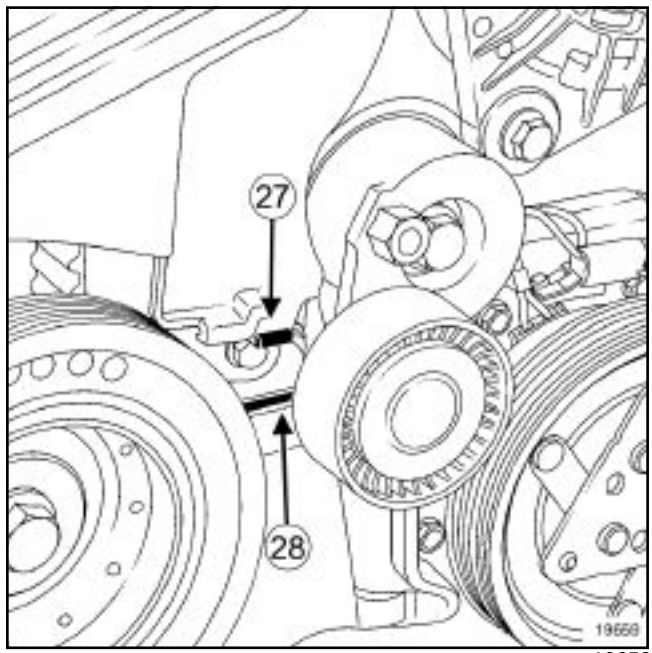
111742

Refit the cylinder head suspended mounting.

Tighten to torque the **cylinder head suspended mounting bolts (21 ± 2.1 Nm)** .



111741



19659

Refit:

- the timing cover, positioning the tab (**27**) in the inner timing cover hole (**28**) ,
- the timing cover plastic bolt (**26**) .

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Timing - cylinder head: Refitting

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

Special tooling required	
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.
Mot. 1489	TDC locating pin.

Tightening torques ▽	
cylinder head mounting bolts	**25 ± 2.5 Nm**
cylinder head mounting bolts	**255° ± 10°**
rocker cover mounting bolts	**12 ± 1.2 Nm**
turbocharger oil return pipe mounting bolts	**12 ± 1.2 Nm**
the nuts mounting the catalytic converter on the turbocharger	**26 ± 2.6 Nm**
the bolts mounting the catalytic converter stay on the engine	**44 ± 4.4 Nm**
the bolts mounting the catalytic converter stay on the catalytic converter	**26 ± 2.6 Nm**
oil vapour recirculation valve mounting nuts	**12 ± 1.2 Nm**
inner timing cover mounting bolts	**9 ± 0.9 Nm**
tensioning roller bolt	**27 ± 2.7 N.m**
the camshaft pulley wheel bolts	**14 ± 1.4 Nm**
the tensioning roller bolt	**27 ± 2.7 Nm**
the camshaft pulley wheel bolts	**14± 1.4 Nm**
the crankshaft accessories pulley M14 bolt	**120 ± 12 Nm + 95° ± 15°**
TDC pin plug	**20 ± 2 Nm**

Tightening torques ▽	
cylinder head suspended mounting bolts	**21 ± 2.1 Nm**
high-pressure pump position sensor bolt	**8 Nm**

I - RECOMMENDATIONS FOR REPAIRING THE CYLINDER HEAD

IMPORTANT
Wear protective gloves during every operation.

WARNING
When handling the cylinder head gasket, use the cylinder barrel to hold it.

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

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.)

To obtain correct tightening of the cylinder head bolts, remove any oil from the cylinder head mounting holes using a syringe.

Do not retighten the cylinder head bolts after applying this procedure.

Do not lubricate the new cylinder head bolts.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced for the cylinder head

- The cylinder head gasket,
- The cylinder head bolts,
- The rocker cover gasket,
- The oil vapour recirculation valve seal,
- The seals on the turbocharger oil return pipe,
- The catalytic converter seal.

Consumables

- Degreaser, part no. **77 11 224 559** ,
- Silicone adhesive sealant, part no. **77 11 227 484** .

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

III - EQUIPMENT REQUIRED FOR THE CYLINDER HEAD

- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type),
- Female torx socket (**14**),
- Protective gloves.

IV - REFITTING OF THE CYLINDER HEAD

Position the pistons at mid-stroke.

Apply degreaser to:

- the combustion side of the cylinder head,
- the combustion face of the cylinder block.

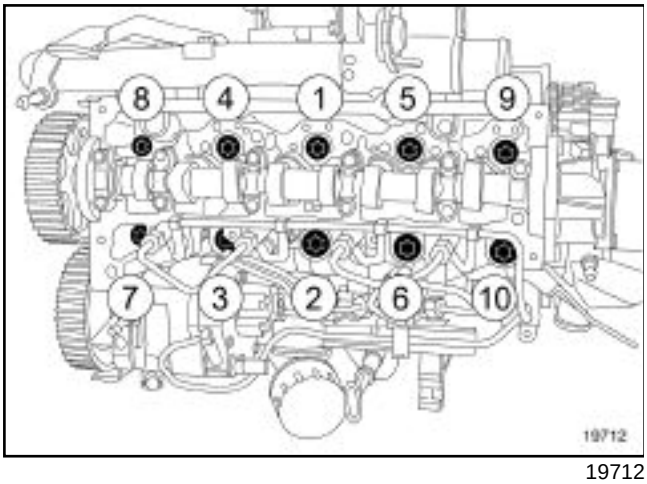
Check for the cylinder head centring dowels on the cylinder block.

Refit the cylinder head gasket (positioning the TOP facing upwards) onto the cylinder block.

Remove the cylinder head from the cylinder head support.

Refit:

- the cylinder head,
- the new cylinder head mounting bolts.



19712

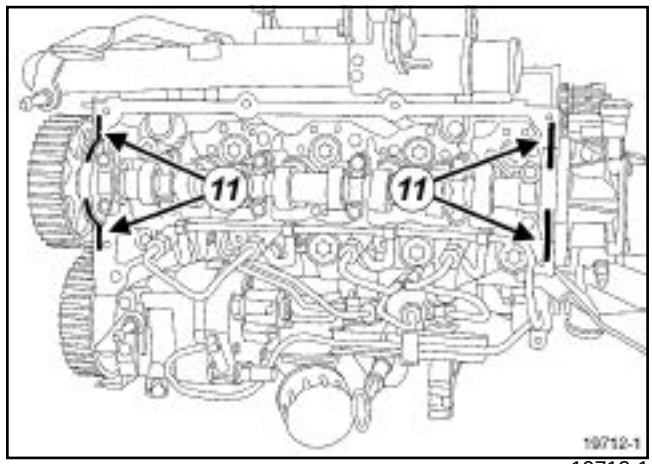
Tighten to torque and in order the **cylinder head mounting bolts (25 ± 2.5 Nm)** .

Check that all the **cylinder head mounting bolts** are tightened to **(25 ± 2.5 Nm)** .

Angle tighten in order the **cylinder head mounting bolts (255° ± 10°)** .

Degrease the rocker cover sealing surface on the cylinder head.

Refit a new seal onto the rocker cover.

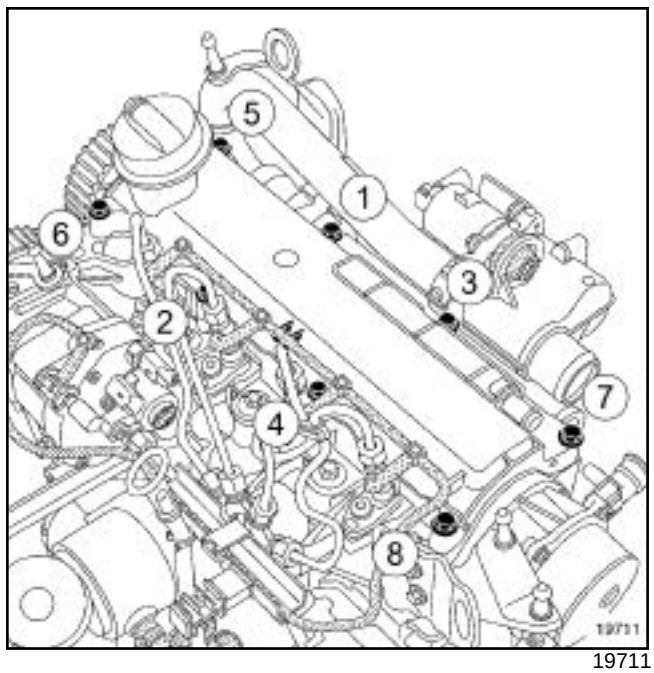


19712-1

Apply four beads (**11**) of **SILICONE ADHESIVE SEALANT** (**2 mms** in diameter).

Refit:

- the rocker cover,
- the rocker cover mounting bolts.



19711

Tighten to torque and in order the **rocker cover mounting bolts (12 ± 1.2 Nm)** .

Refit the dipstick guide tube.

Clip the fuel return pipe onto the rocker cover.

Fit the new seals onto the turbocharger oil return pipe.

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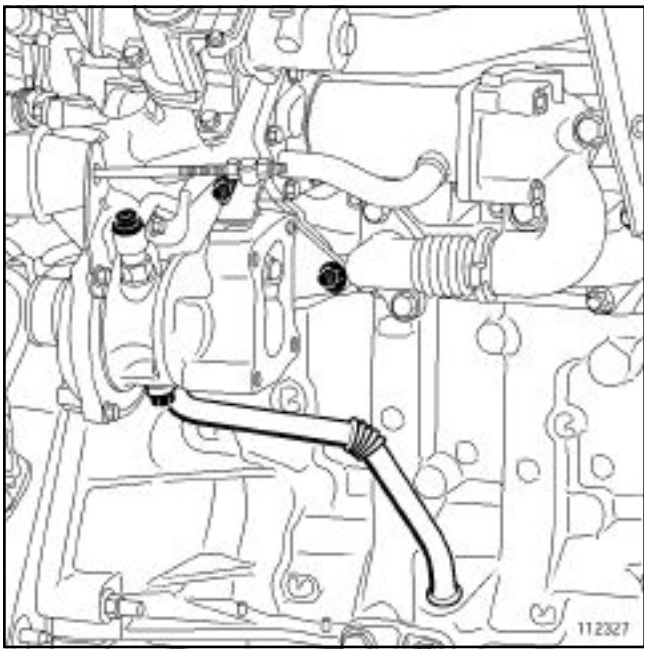
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

Use engine oil to lubricate the turbocharger oil return pipe O-ring seals.



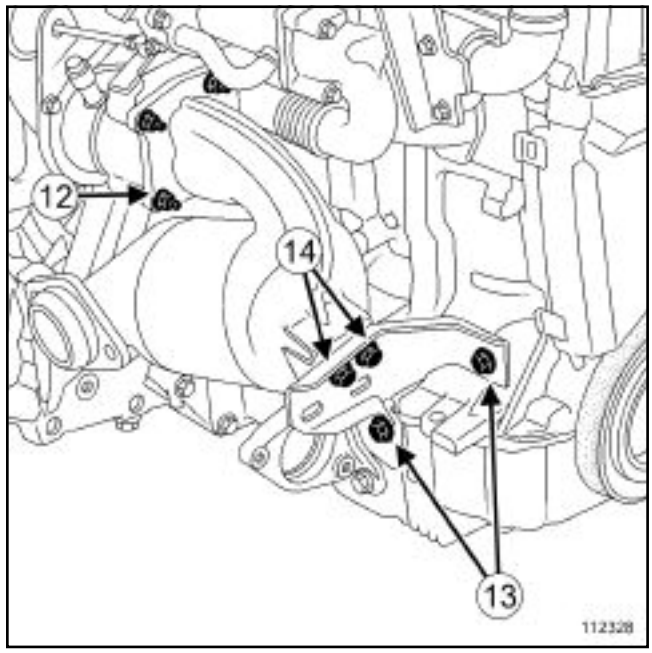
112327

Refit:

- the turbocharger oil return pipe,
- the turbocharger oil return pipe mounting bolts.

Tighten to torque the **turbocharger oil return pipe mounting bolts (12 ± 1.2 Nm)** .

Fit a new seal between the turbocharger and the catalytic converter.



112328

Refit:

- the catalytic converter,
- the nuts mounting the catalytic converter on the turbocharger,
- the catalytic converter mounting stay,
- the catalytic converter stay mounting bolts.

Tighten to torque:

- **the nuts mounting the catalytic converter on the turbocharger (26 ± 2.6 Nm)** (**12**) ,
- **the bolts mounting the catalytic converter stay on the engine (44 ± 4.4 Nm)** (**13**) ,
- **the bolts mounting the catalytic converter stay on the catalytic converter (26 ± 2.6 Nm)** (**14**) .

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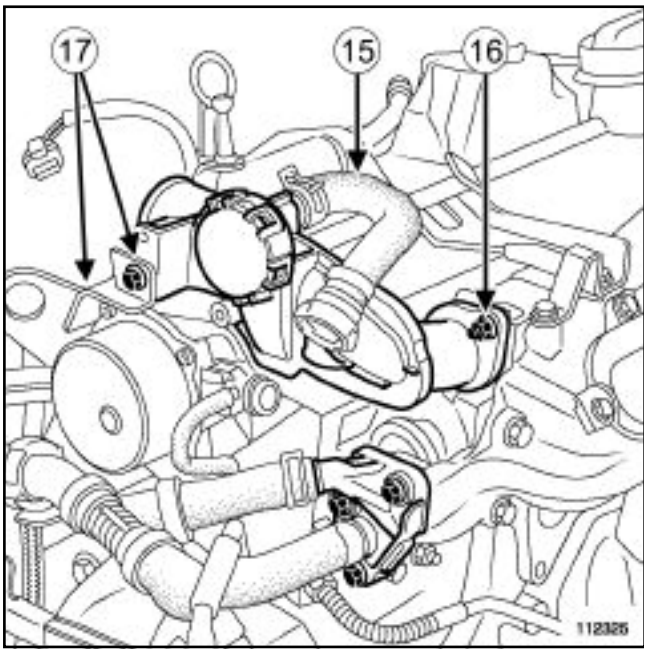


112325

Fit a new seal onto the oil vapour recirculation valve.

Refit:

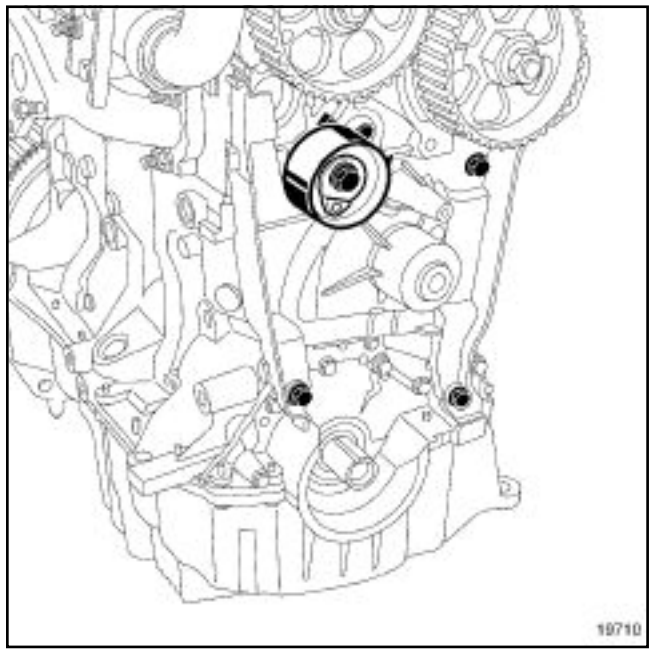
- the oil vapour recirculation valve,
- the oil vapour recirculation valve mounting nuts (**16**) .

Tighten to torque the **oil vapour recirculation valve mounting nuts (12 ± 1.2 Nm)** .

Connect the oil vapour recirculation pipe (**15**) .

Refit:

- the oil vapour recirculation valve retaining bracket,
- the mounting bolts of the oil vapour recirculation valve retaining bracket.



19710

Refit:

- the inner timing cover (tilting the alternator if necessary),
- the inner timing cover mounting bolts.

Tighten to torque the **inner timing cover mounting bolts (9 ± 0.9 Nm)** .

V - RECOMMENDATIONS FOR REPAIRING THE TIMING BELT

IMPORTANT

Wear protective gloves during every operation.

WARNING

The belt must be replaced with a new one if it has been removed.

Never turn the engine in the opposite direction to its normal operating direction.

Do not run the engine without the accessories belt so as not to damage the crankshaft accessories pulley.

When replacing the belt, always replace the tensioning rollers and fixed rollers.

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VI - PARTS AND CONSUMABLES FOR THE REPAIR

Pièces à remplacer systématiquement pour la distribution

- Timing belt,
- Timing belt tensioning roller,
- Crankshaft accessories pulley bolt.

Ingrédients

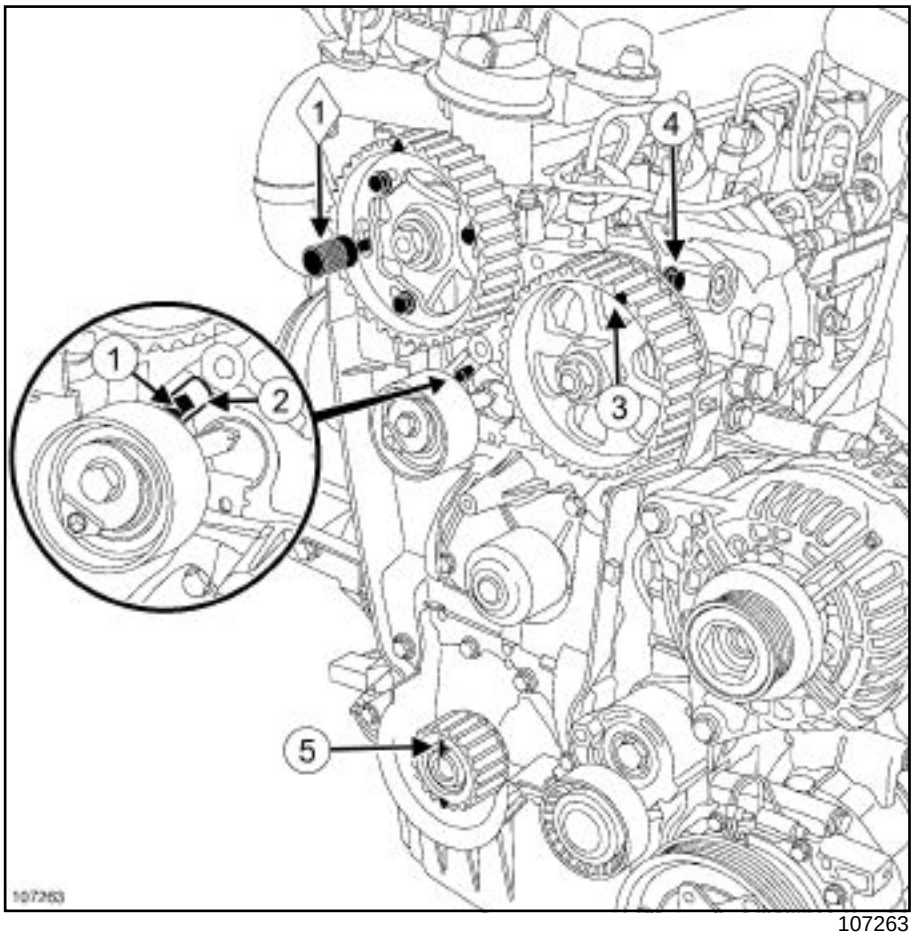
- Silicone adhesive sealant, part no. **77 11 227 484**

VII - EQUIPMENT REQUIRED FOR THE TIMING BELT

- Protective gloves,
- Allen key (**6 mm**),
- Female torx socket (**14**),
- Offset wrench (**18 mm**),
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

VIII - REFITTING THE TIMING

Refit the crankshaft timing sprocket.



107263

Refit the timing tensioning roller.

Put the tensioning roller spigot (**1**) in the cylinder head groove (**2**) .

Engage the pin (**1**) **(Mot. 1430)** in the holes of the camshaft pulley and cylinder head, turning the camshaft using an **18 mm** offset wrench if necessary.

Check that the mark on the high-pressure pump (**3**) is opposite the bolt head (**4**) .

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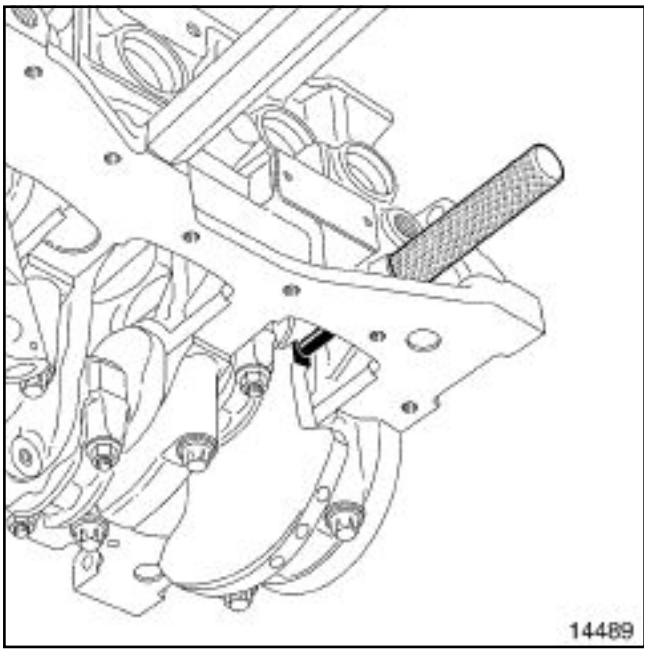

14489

Position the crankshaft so that it presses against the TDC setting pin **(Mot. 1489)** (the crankshaft sprocket cotter ***(5)*** must face upwards).

107264

Remove one bolt from the camshaft pulley wheel.

Loosen the two other camshaft pulley wheel bolts (**6**) by one turn.

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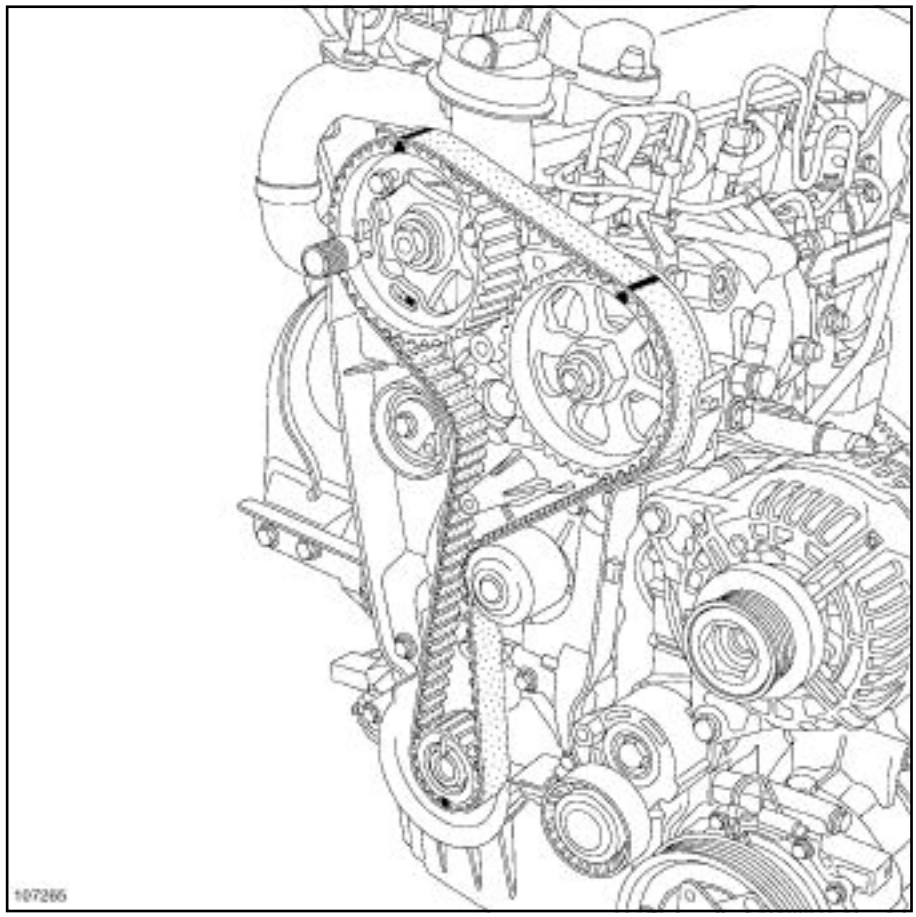

107265

Fit the timing belt, starting with the crankshaft sprocket, by aligning the marks on the belt with those on the crankshaft sprockets, the camshaft and the high-pressure pump.

note:

There should be 19 tooth belt grooves between the camshaft sprocket marks and the high-pressure pump, and 51 tooth valleys between the crankshaft sprockets and the high-pressure pump.

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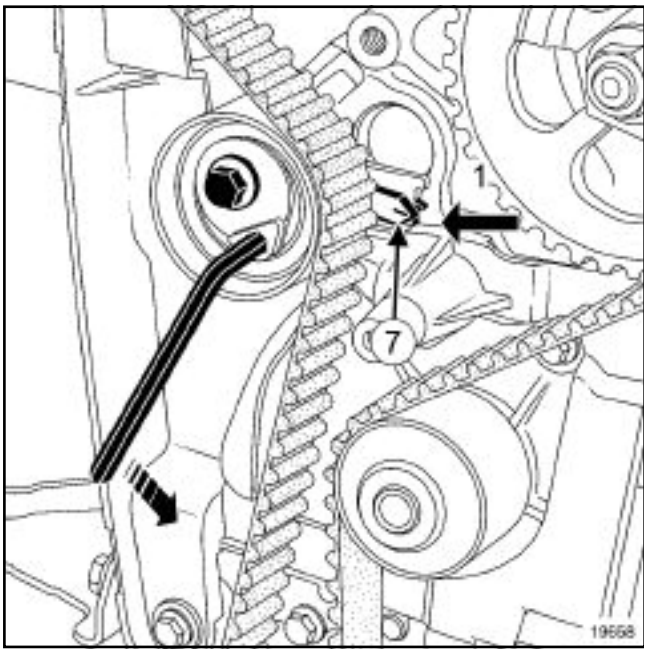
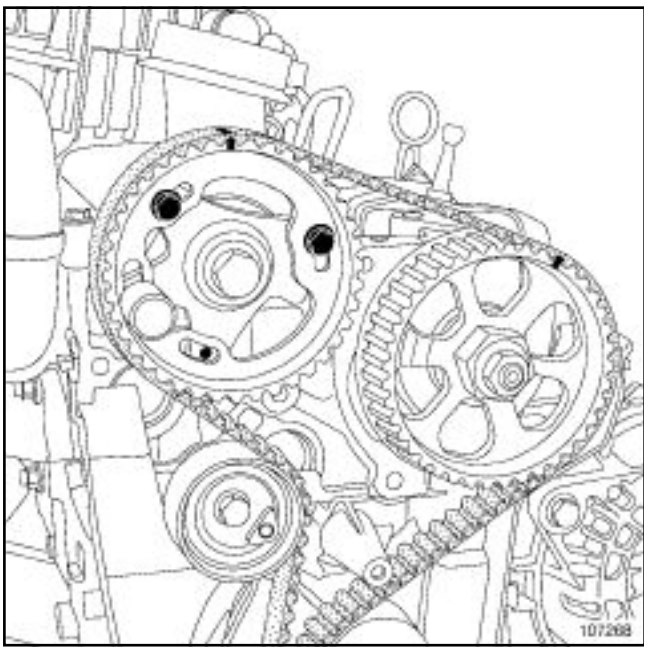


19658

Position the tensioning roller adjustable index (**7**) opposite the spigot, turning the eccentric cam anticlockwise using a **6 mm** Allen key.

Tighten to torque the **tensioning roller bolt (27 ± 2.7 N.m)** .



107268

Check that the camshaft pulley hub bolts are not fully up against the camshaft pulley wheel.

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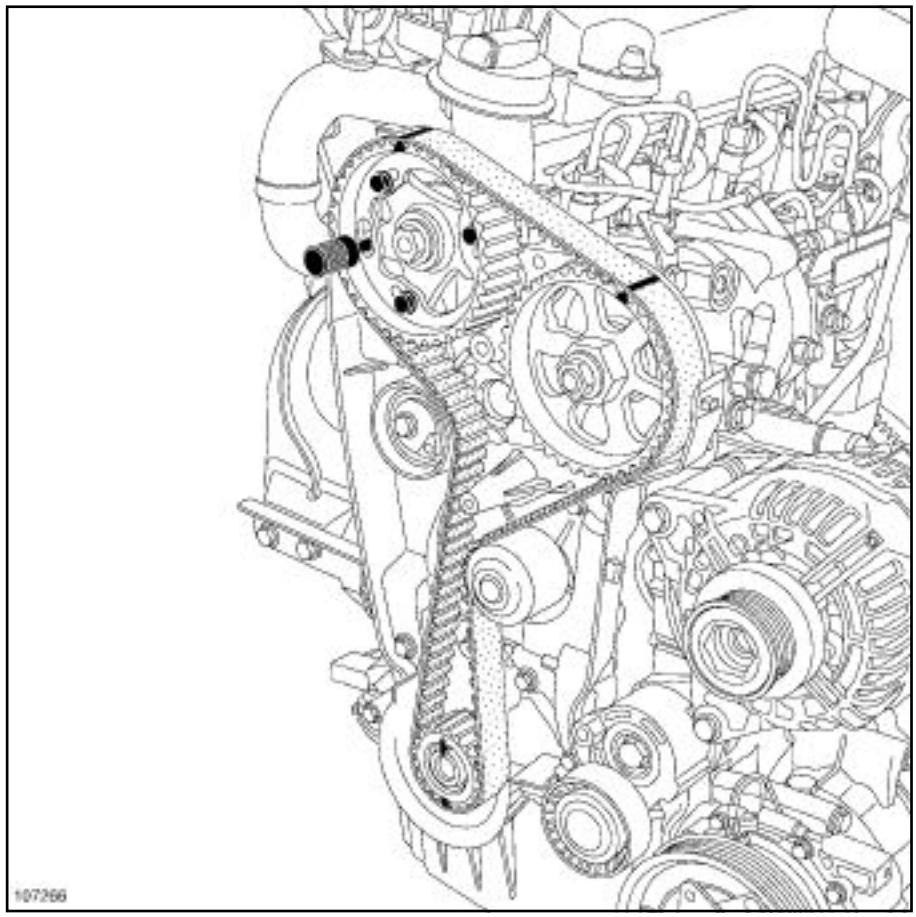


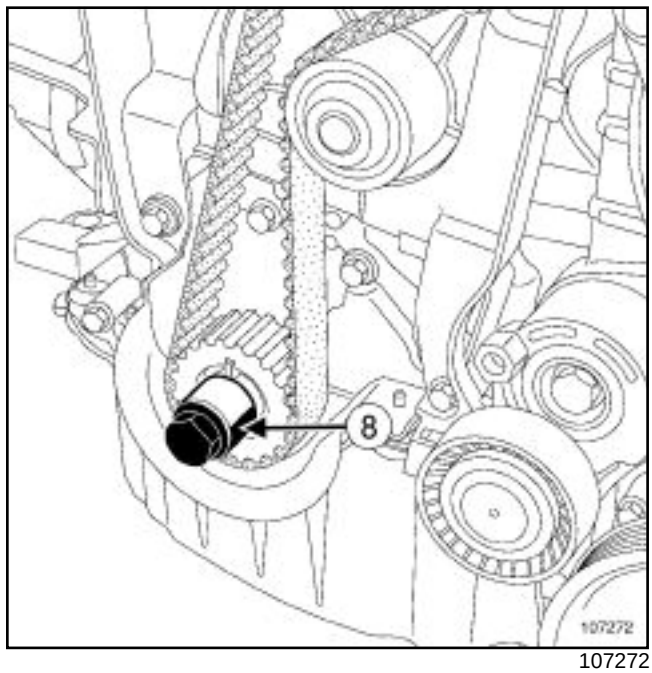
107266

Refit the bolt to the camshaft pulley wheel.

Tighten to torque **the camshaft pulley wheel bolts (14 ± 1.4 Nm)** .

Remove:

- the TDC setting pin **(Mot. 1489)** ,
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .



107272

Tighten the old crankshaft accessories pulley bolt fitted with a spacer (which does not cover the timing sprocket mark) (**8**) onto the crankshaft.

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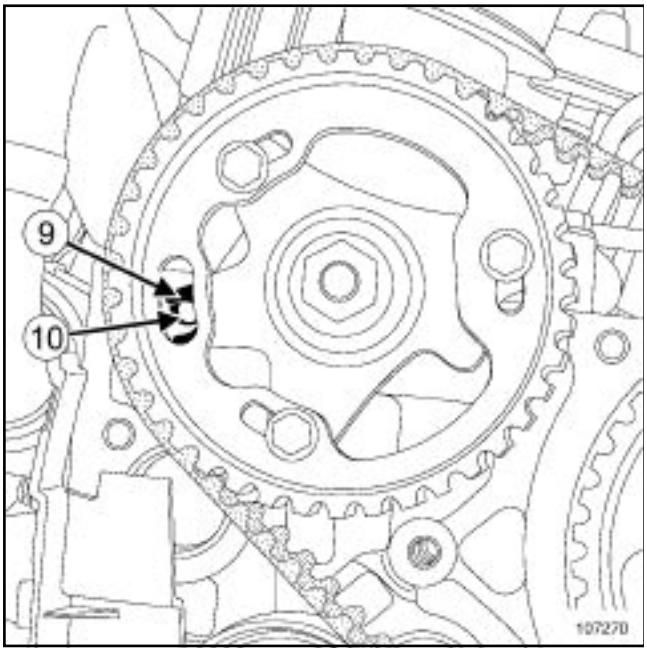
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

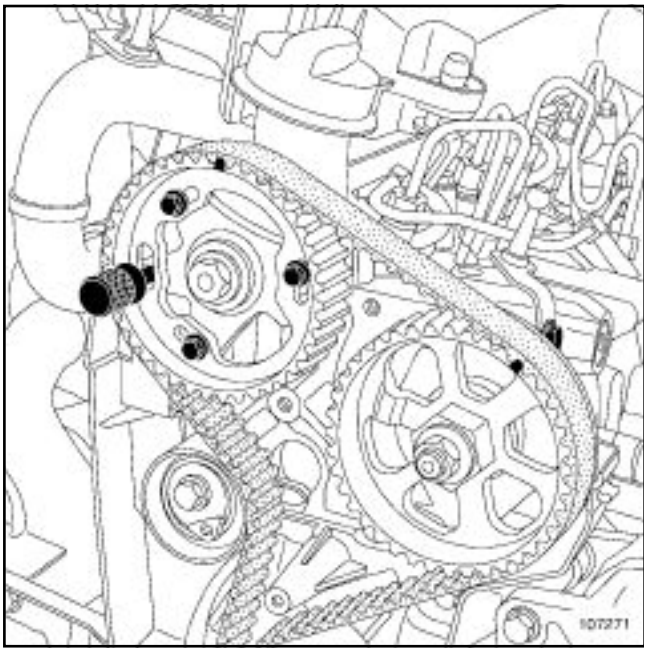


107270

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole (**9**) is opposite the cylinder head hole (**10**) .

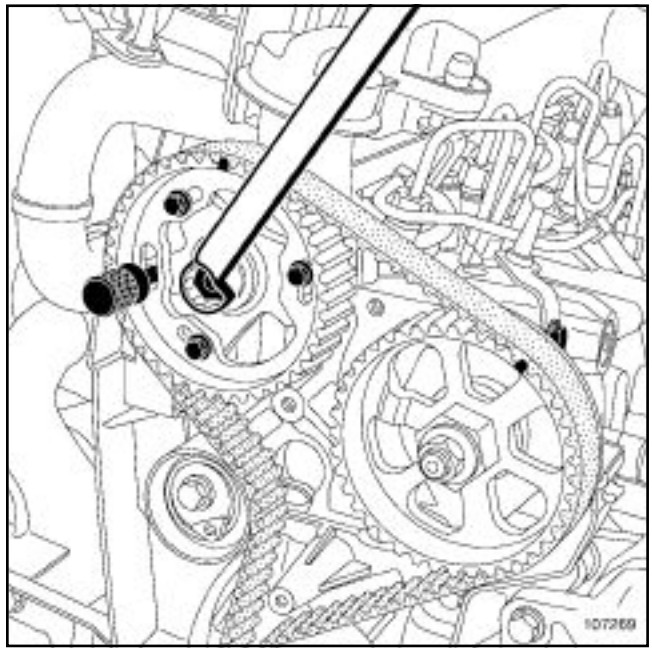
Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

Bring the crankshaft slowly and smoothly against the TDC setting pin.



107271

Set the camshaft pulley using the **(Mot. 1430)** .



107269

If the pin **(Mot. 1430)** does not engage:

loosen the camshaft pulley wheel bolts by one turn at most,

Turn the camshaft pulley hub using an **18 mm** offset wrench to set the camshaft pulley hub timing.

Do not retighten the camshaft pulley wheel bolts.

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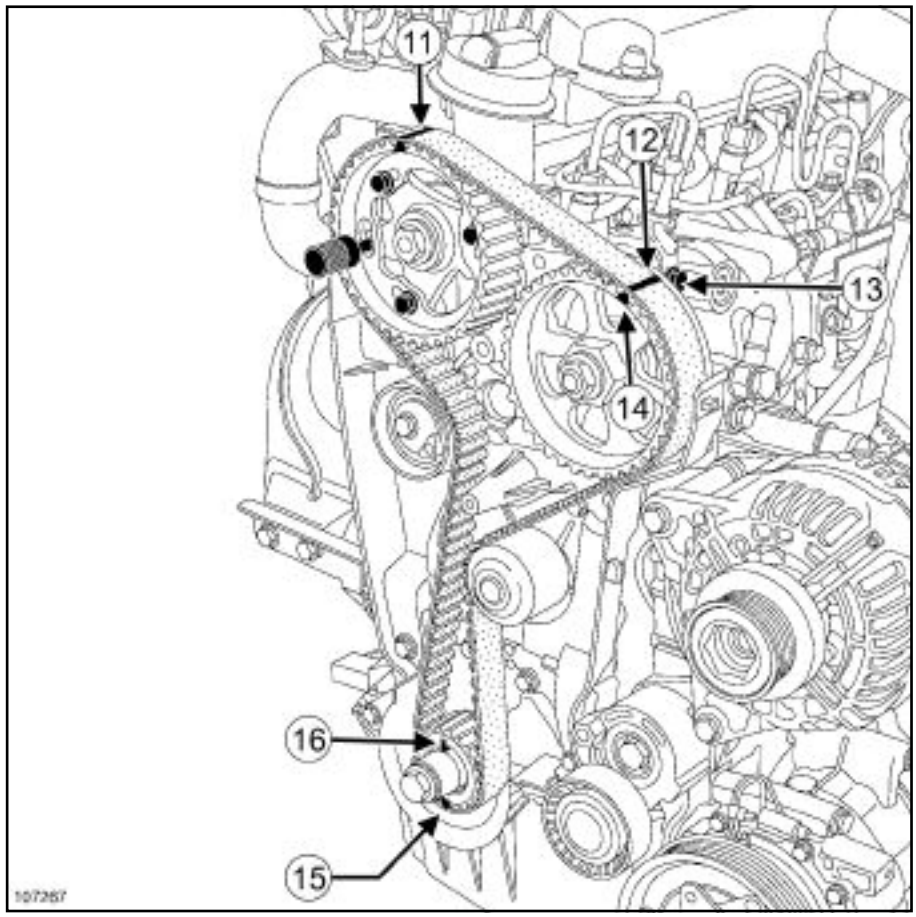

107267

Check:

- that the high-pressure pump sprocket mark (**14**) is opposite the bolt head (**13**) ,
- that the crankshaft timing sprocket cotter (**16**) is positioned vertically at the top,
- that there are 19 tooth belt grooves between the camshaft sprocket marks (**11**) and the high-pressure pump sprocket (**12**) ,
- that there are 51 tooth belt grooves between the crankshaft sprocket marks (**15**) and the high-pressure pump sprocket (**12**) .

note:

After two turns, the tensioning roller index markers may be in two different positions.

The rotation of the tensioning roller eccentric cam depends on the position.

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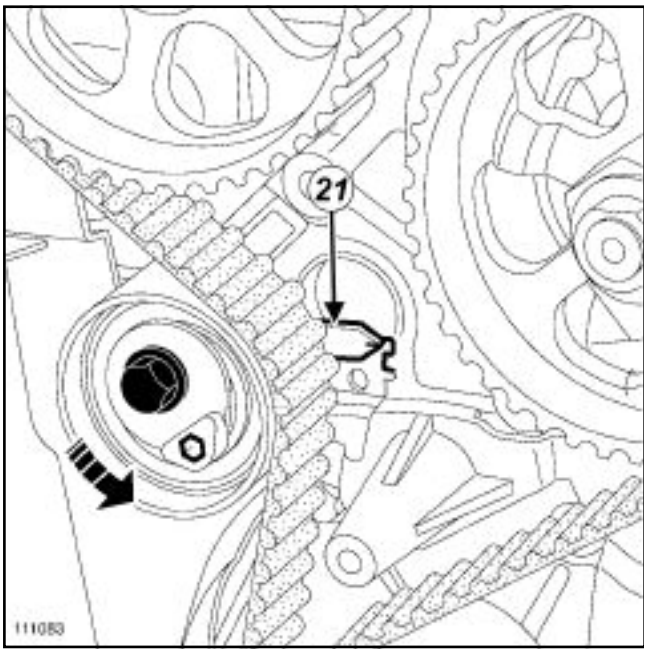
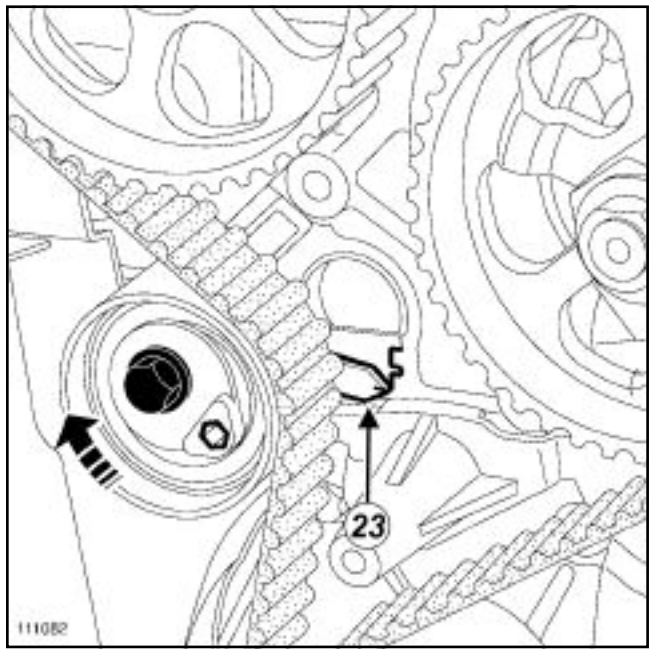
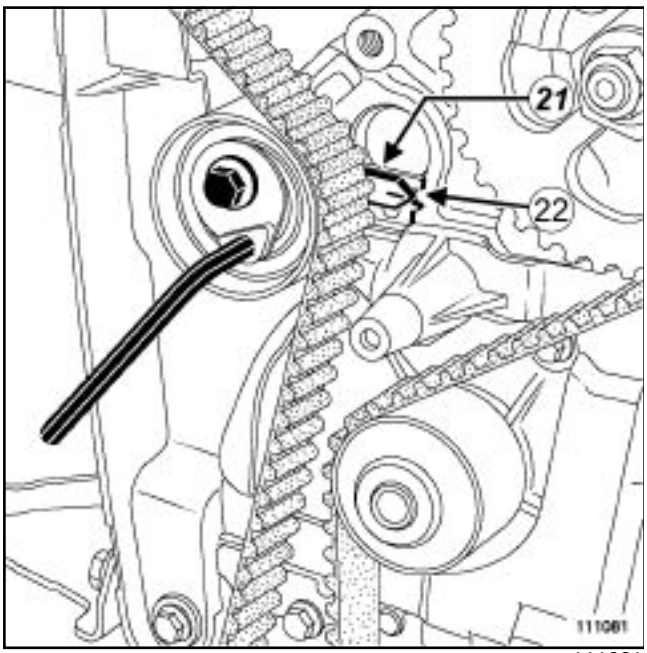


111083



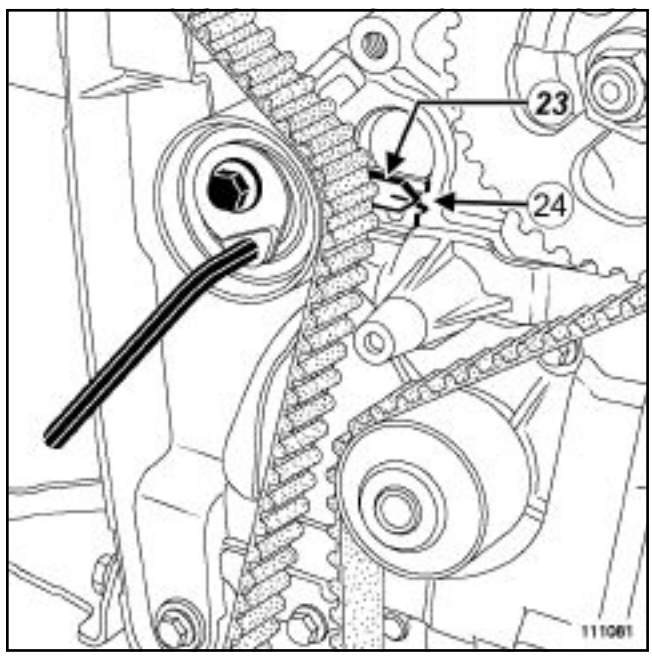
111082



111081

Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index (**21**) in the middle of the timing window (**22**) , turning the key anticlockwise.



111081

Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index (**23**) in the middle of the timing window (**24**) , turning the key clockwise.

Tighten to torque:

- **the tensioning roller bolt (27 ± 2.7 Nm)** ,
- **the camshaft pulley wheel bolts (14± 1.4 Nm)** .

Remove the following tools:

- TDC setting pin, **(Mot. 1489)**

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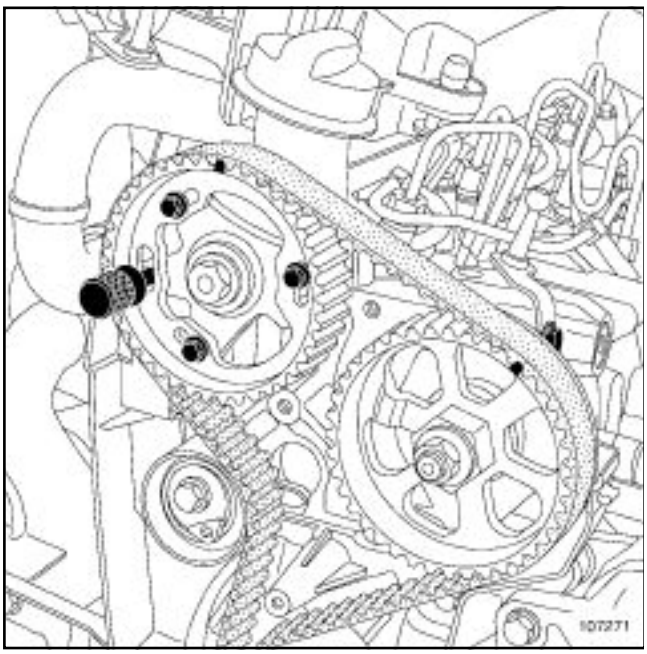
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole is opposite the cylinder head hole.

Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

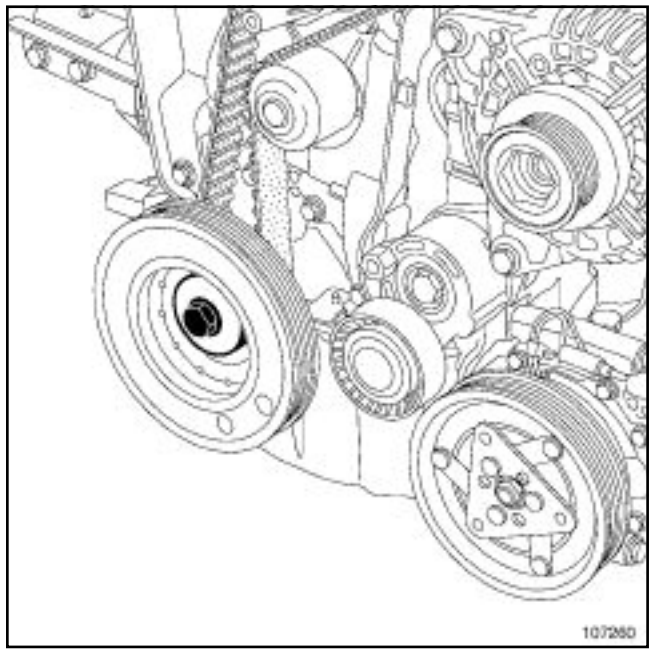
Bring the crankshaft slowly and smoothly into contact with the TDC setting pin.



107271

Set the camshaft pulley using the **(Mot. 1430)** .

If this is not possible, repeat the timing belt refitting operation.



107260

Refit the accessories crankshaft pulley with a new bolt.

Tighten to torque and angle (crankshaft in contact with the TDC setting pin) **the crankshaft accessories pulley M14 bolt (120 ± 12 Nm + 95° ± 15°)** .

Remove the following tools:

- TDC setting pin, **(Mot. 1489)**
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Refit the TDC pin plug, coating the thread with **SILICONE ADHESIVE SEALANT** .

Tighten to torque the **TDC pin plug (20 ± 2 Nm)** .

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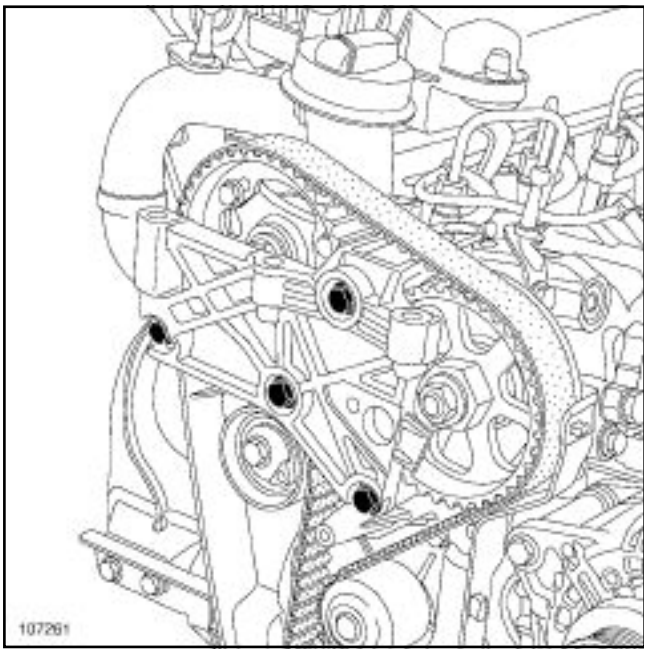

107261

Refit the cylinder head suspended mounting.

Tighten to torque the **cylinder head suspended mounting bolts (21 ± 2.1 Nm)** .

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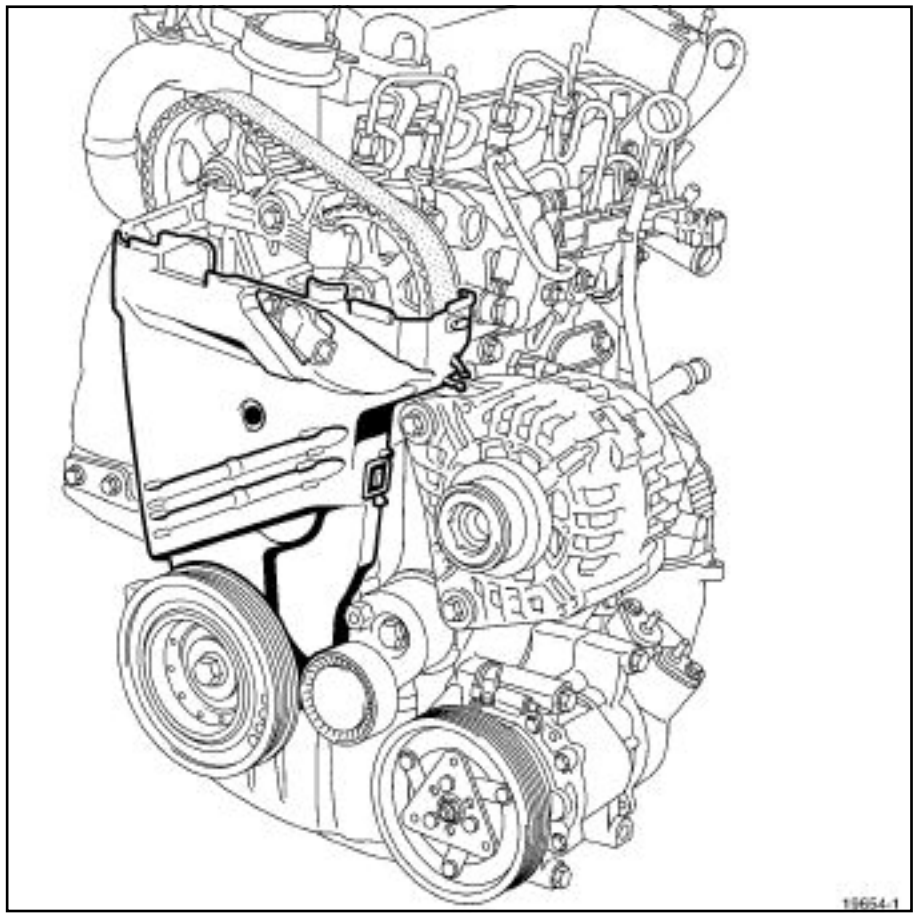
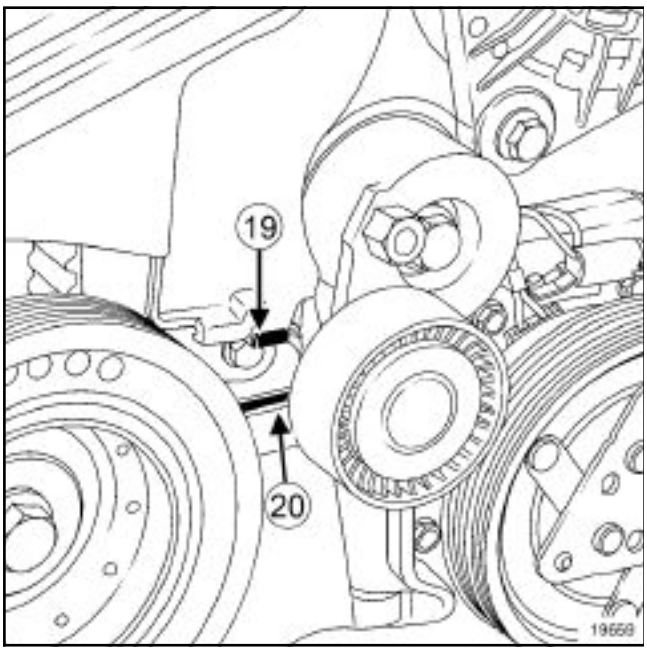


19654-1



19659

Refit:

- the lower timing cover, positioning the tab (**19**) in the inner timing cover hole (**20**) ,
- the timing cover plastic mounting bolt.

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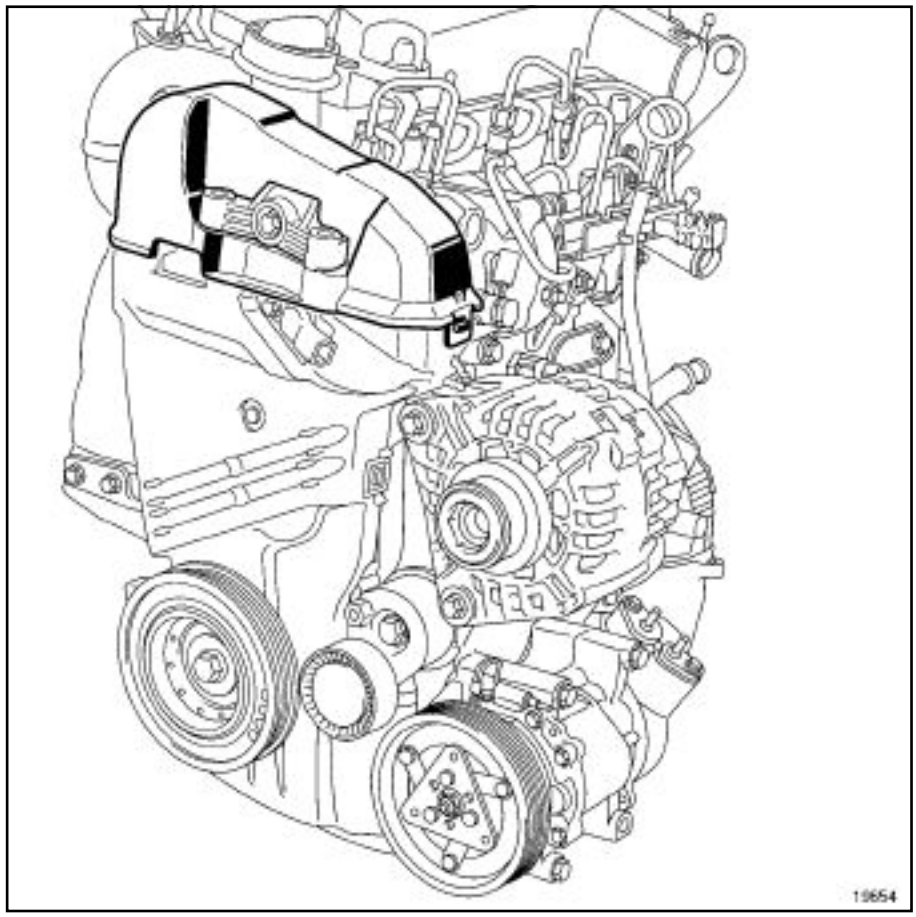
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



19654

Refit the high-pressure pump position sensor.

Tighten to torque the **high-pressure pump position sensor bolt (8 Nm)** .

Refit the upper timing cover.

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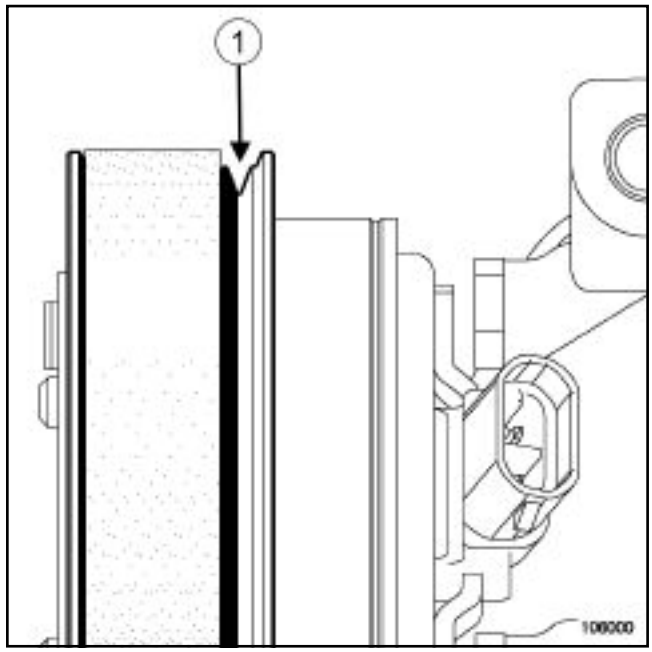
Special tooling required	
Mot. 1638	Accessories belt tension tool. For engines fitted with a mechanical tensioning roller.
Mot. 1505	Belt tension setting tool (frequency meter)
Mot. 1715	Belt tension checking tool (frequency indicator).

Tightening torques ▽	
mechanical tensioning roller mounting bolts	**35 ± 3.5 Nm**
auto tensioner mounting bolt	**40 ± 4 Nm**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.



106000

WARNING
Certain accessories belts have five teeth whereas the air conditioning compressor pulley, power-assisted steering pump pulley, and alternator pulley all have six teeth. In this case, it is essential to check that the inner tooth (**1**) of the pulleys remains free when fitting the accessories belt.

Never turn the engine in the opposite direction to its normal operating direction.

Use a brush to remove any deposits from the crankshaft accessories pulley V grooves.

For engines fitted with a mechanical tensioning roller, it is essential to replace the tensioning roller mounting bolts.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced

- The mechanical or automatic tensioning roller,
- The mechanical tensioning roller mounting bolts with **M8 bolts - 125 X 20** , part no. **77 03 002 059** ,
- The accessories belt.

III - EQUIPMENT REQUIRED

- Brush,
- Torque wrench

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- Protective gloves,
- Tubular hexagon box spanner (**16 mm**),
- Offset wrench (**16 mm**).

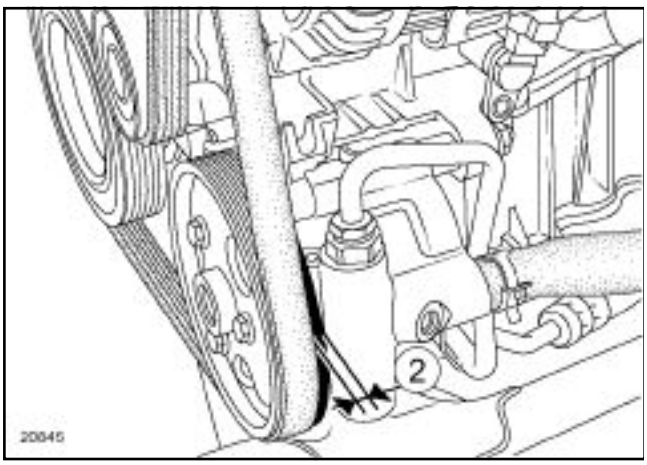
IV - REFITTING

1 - Engine without air conditioning

Use a brush to remove any deposits from the crankshaft accessories pulley V grooves.

Refit:

- the tensioning roller,
- the new tensioning roller mounting bolts.

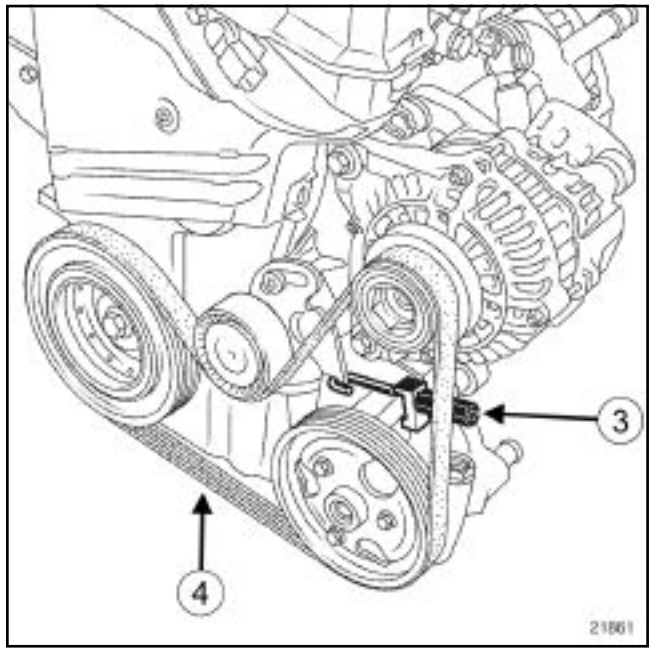


20845

It is essential to leave one inner tooth (**2**) of the pulleys free for engines fitted with a belt with five teeth for pulleys with six teeth.

Refit the accessories belt.

Check that the two mechanical tensioning roller bolts are not overtightened.



21861

Fit the **(Mot. 1638)** into the tensioning roller notch (as indicated in the diagram).

Tension the accessories belt using the **(Mot. 1638)** by tightening nut (**3**) .

Check the accessories belt tension at (**4**) using the **(Mot. 1505)** or **(Mot. 1715)** .

The accessories belt tension must be between **223 and 245 Hz** .

It is essential to turn the engine through two revolutions to position the accessories belt correctly.

Check that the accessories belt tension is between **223 and 245 Hz** at measuring point ***(4)*** .

Adjust the accessories belt tension if necessary.

Tighten to torque the **mechanical tensioning roller mounting bolts (35 ± 3.5 Nm)** .

2 - Engine with air conditioning

Use a brush to remove any deposits from the crankshaft accessories pulley V grooves.

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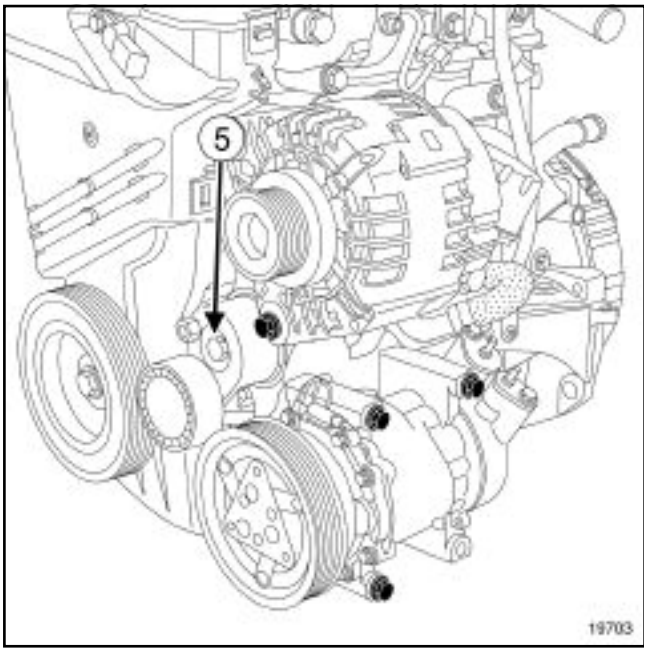
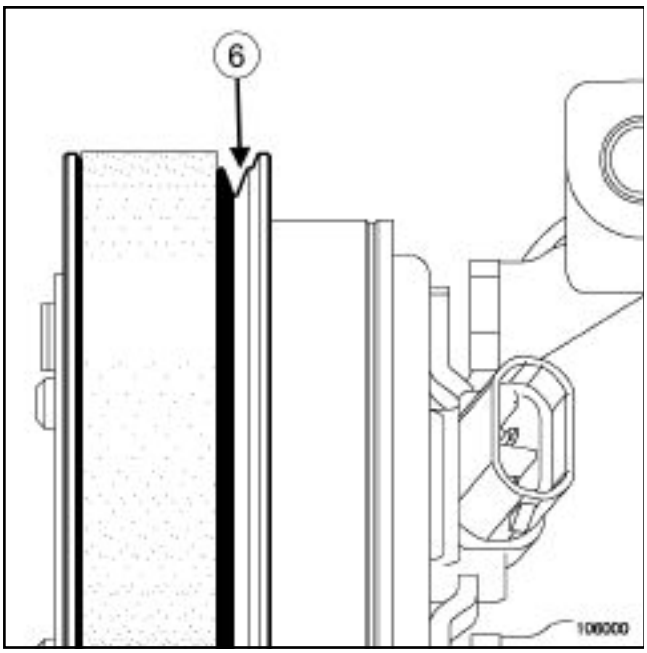


19703

Refit:

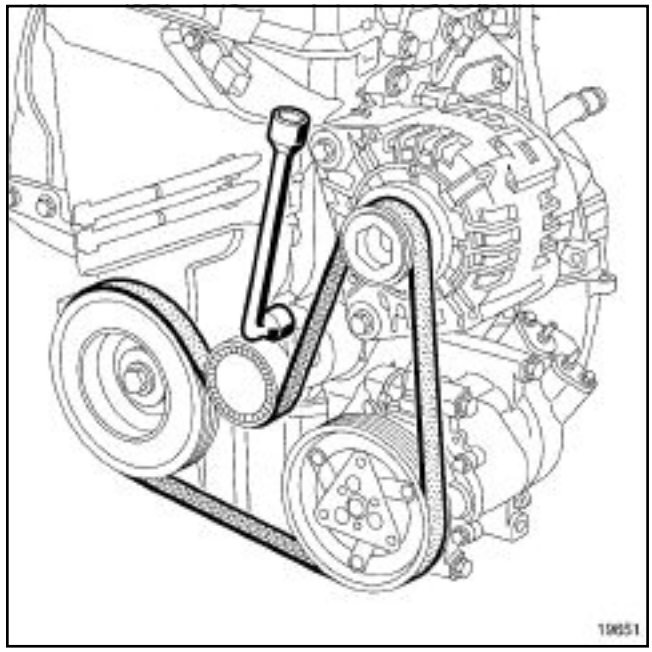
- the auto tensioner,
- the auto tensioner mounting bolt (**5**) .

Tighten to torque the **auto tensioner mounting bolt (40 ± 4 Nm)** .



106000

It is essential to leave one inner tooth (**6**) of the pulleys free for engines fitted with a belt with five teeth for pulleys with six teeth.



19651

Turn the accessories belt auto tensioner clockwise using a **16 mm** spanner.

Refit the crankshaft accessories belt.

Rotate the crankshaft twice to position the accessories belt correctly.

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Special tooling required	
Mot. 792-03	Engine support plate for Desvil engine stand
Mot. 1638	Accessories belt tension tool. For engines fitted with a mechanical tensioning roller.
Mot. 1505	Belt tension setting tool (frequency meter)
Mot. 1715	Belt tension checking tool (frequency indicator).
Mot. 1723	Engine support for DESVIL engine support stand.
Mot. 582-01	Flywheel locking tool.
Mot. 1677	Flywheel locking tool.
Emb. 1780	Set of clutch disc centring mandrels.

Tightening torques ▽	
coolant pump inlet pipe mounting bolt	**22 ± 2.2 Nm**
multifunction support mounting bolts (1 to 6 or 1 to 5)	**44 ± 4.4 Nm**
multifunction support mounting bolt (7)	**21 ± 2.1 Nm**
the power-assisted steering pump or dummy pulley mounting bolts	**21 ± 2.1 Nm**
the air conditioning compressor mounting bolts	**21 ± 2.1 Nm**
the alternator mounting bolts	**21 ± 2.1 Nm**
mechanical tensioning roller mounting bolts	**35 ± 3.5 Nm**
auto tensioner mounting bolt	**40 ± 4 Nm**

Tightening torques ▽	
the flywheel mounting bolts	**55 ± 5.5 Nm**
the dual-mass flywheel mounting bolts	**20 ± 2 Nm + 36° ± 6°**
clutch pressure plate mounting bolts	**M6 bolts to 14 ± 1.4 Nm and M7 bolt to 20 ± 2 Nm**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves throughout the operation.

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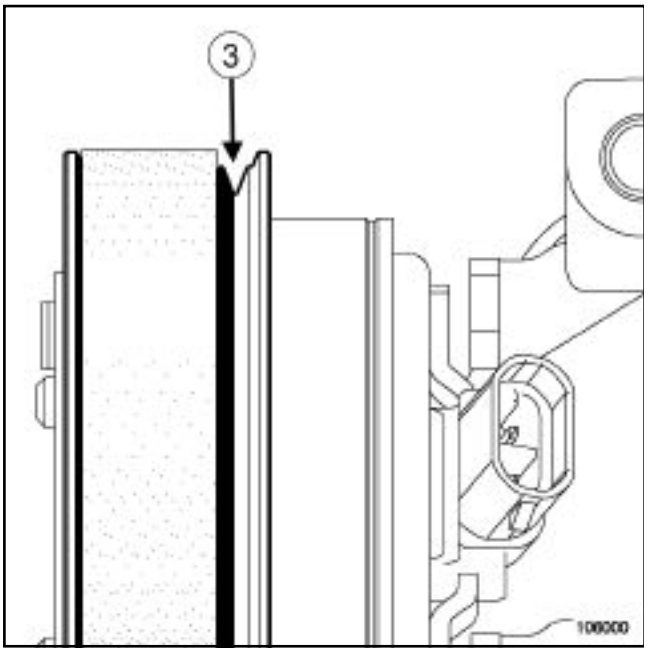


106000

WARNING

Certain accessories belts have five teeth whereas the air conditioning compressor pulley, power-assisted steering pump pulley, and alternator pulley all have six teeth. In this case, it is essential to check that the inner tooth (**3**) of the pulleys remains free when fitting the accessories belt.

Never turn the engine in the opposite direction to its normal operating direction.

Use a brush to remove any deposits from the crankshaft accessories pulley V grooves.

For engines fitted with a mechanical tensioning roller, it is essential to replace the tensioning roller mounting bolts.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced

- Coolant pump inlet pipe seal,
- Flywheel mounting bolt,
- Accessories belt mechanical or auto tensioner,
- Mechanical tensioning roller mounting bolts with **M8 - 125 X20** bolts, part no. **77 03 002 059**
- Accessories belt.

Consumables

- Degreaser, part no. **77 11 224 559** .

III - ESSENTIAL EQUIPMENT

- Workshop crane,
- Load positioner,
- Brush,
- Offset wrench or tubular hexagon box spanner **16 mm** ,
- Protective gloves,
- Male torx socket,
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

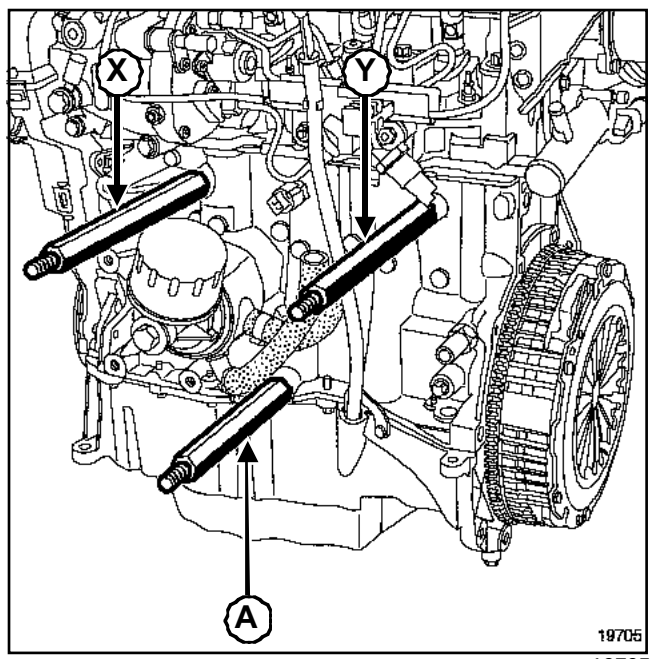
IV - REBUILDING THE ENGINE FOR ENGINES ATTACHED ON SIDE OF OIL FILTER

1 - This fitting operation only concerns K9K 260-270-272-700-702-704-706-710-722-750-752-790 engines.

Fit a load positioner onto the engine lifting eyes.

Remove the engine from the engine stand using a workshop hoist.

Remove the support plate **(Mot. 792-03)** from the engine.



19705

Remove support studs (**A**) , (**X**) and (**Y**) from the cylinder block.

Refit a new O-ring onto the coolant pump inlet pipe.

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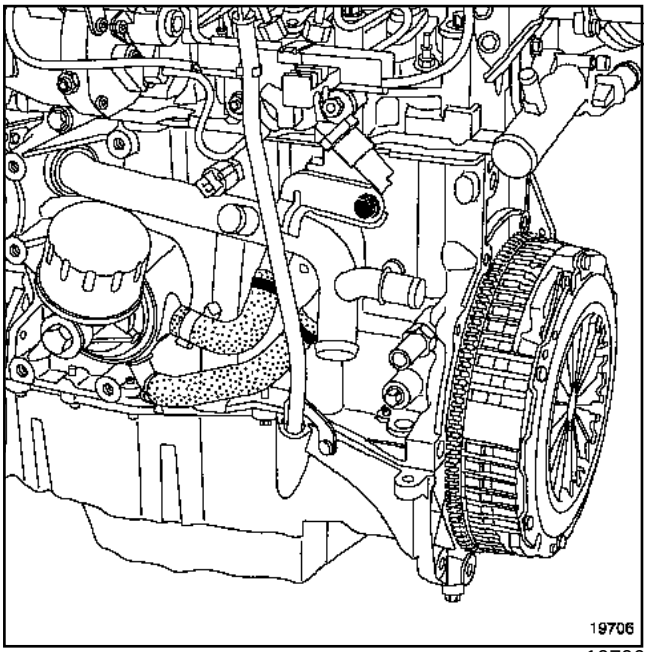
Apply a small amount of soapy water to the coolant pump inlet pipe O-ring.



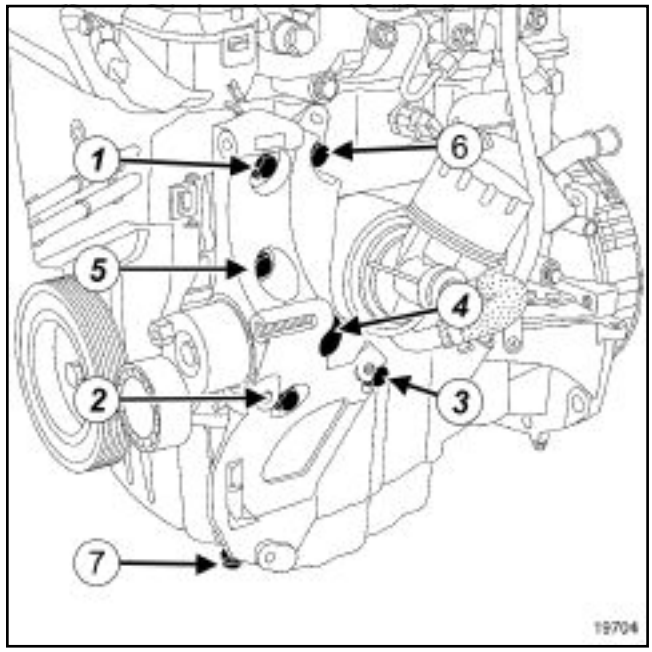
19706

Refit:

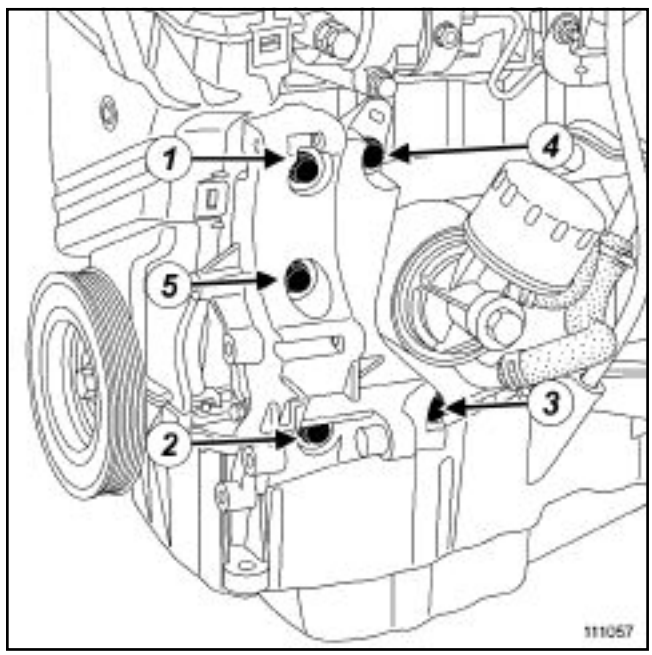
- the coolant pump inlet pipe,
- the coolant pump inlet pipe mounting bolt.

Tighten to torque the **coolant pump inlet pipe mounting bolt (22 ± 2.2 Nm)** .

Connect the hoses to the coolant pump inlet pipe.



19704



111057

Refit:

- the multifunction support,
- the multifunction support mounting bolts.

Tighten to torque and in order the **multifunction support mounting bolts (1 to 6 or 1 to 5) (44 ± 4.4 Nm)**

Tighten to torque the **multifunction support mounting bolt (7) (21 ± 2.1 Nm)** .

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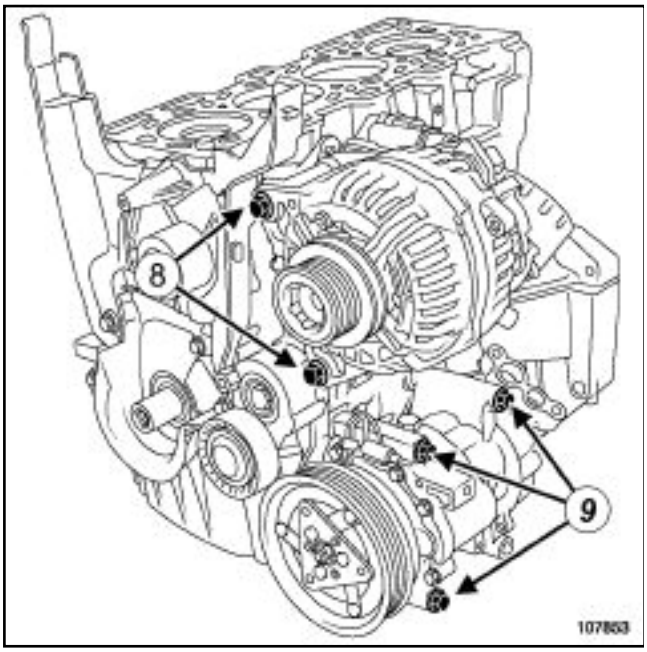
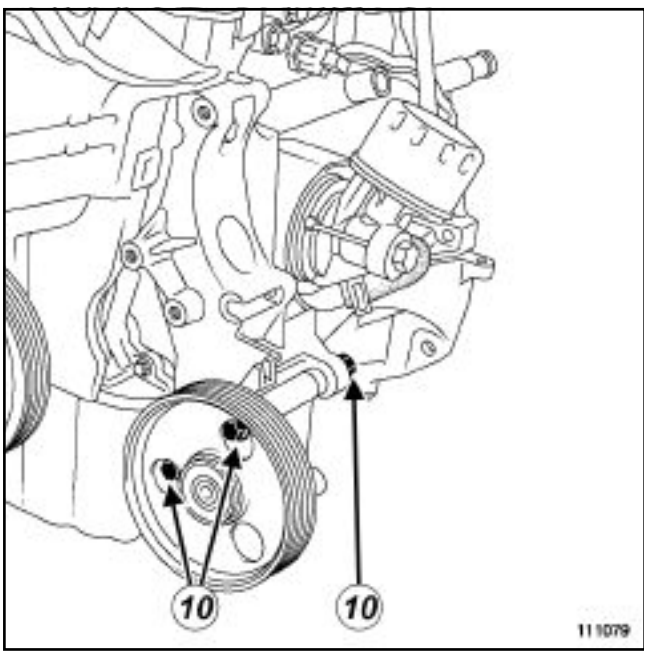


107853



111079

Refit:

- the power-assisted steering pump or dummy pulley,
- the power-assisted steering pump or dummy pulley mounting bolts (**10**) ,
- the air conditioning compressor (if fitted to the vehicle),
- the air conditioning compressor mounting bolts (**9**) ,
- the alternator,
- the alternator mounting bolts (**8**) .

Tighten to torque:

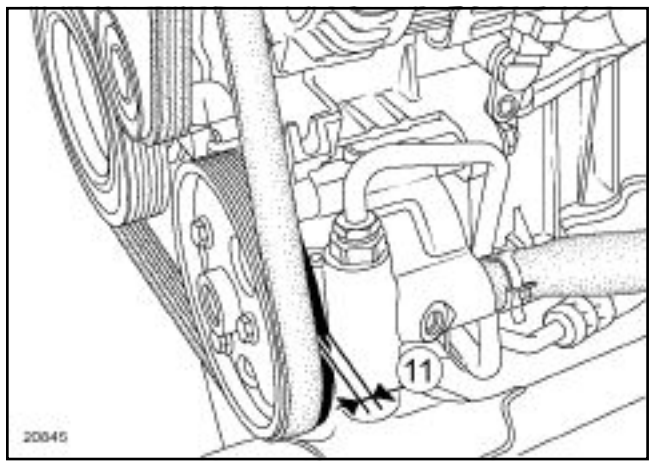
- **the power-assisted steering pump or dummy pulley mounting bolts (21 ± 2.1 Nm)** ,
- **the air conditioning compressor mounting bolts (21 ± 2.1 Nm)** ,
- **the alternator mounting bolts (21 ± 2.1 Nm)** .

2 - Refitting the accessories belt for engines without air conditioning

Use a brush to remove any deposits from the crankshaft accessories pulley V grooves.

Refit:

- the tensioning roller,
- the new tensioning roller mounting bolts.



20845

It is essential to leave one inner tooth (**11**) of the pulleys free for engines fitted with a belt with five teeth for pulleys with six teeth.

Refit the accessories belt.

Check that the two mechanical tensioning roller bolts are not overtightened.

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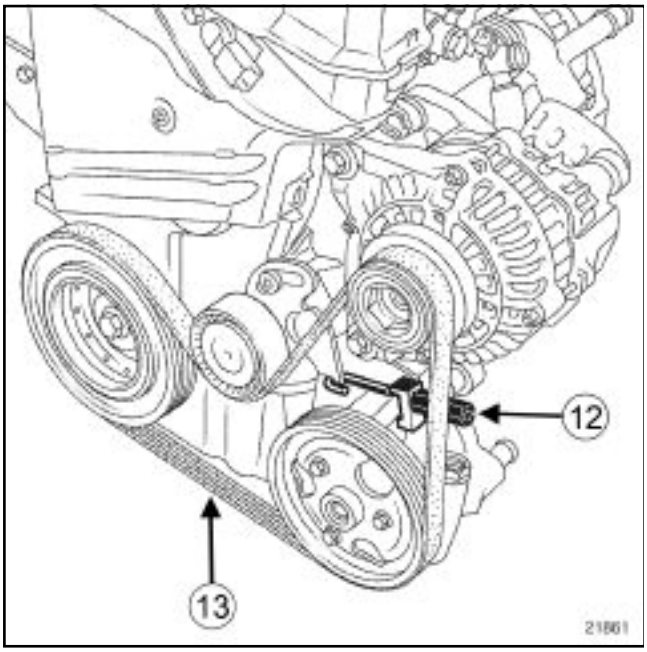


21861

Fit the **(Mot. 1638)** into the tensioning roller notch (as indicated in the diagram).

Put the accessories belt under tension using the **(Mot. 1638)** by tightening nut (**12**) .

Check the accessories belt tension at (**13**) using the **(Mot. 1505)** or **(Mot. 1715)** .

The accessories belt tension must be between **223 to 245 Hz** .

It is essential to turn the engine through two revolutions to position the accessories belt correctly.

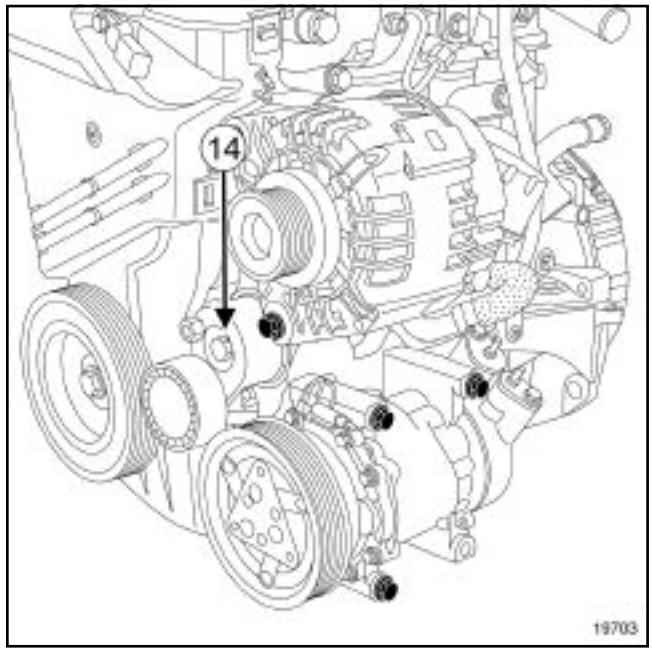
Check that the accessories belt tension is between **223 and 245 Hz** at measuring point ***(13)*** .

Adjust the accessories belt tension if necessary.

Tighten to torque the **mechanical tensioning roller mounting bolts (35 ± 3.5 Nm)** .

3 - Refitting the accessories belt for engines with air conditioning

Use a brush to remove any deposits from the crankshaft accessories pulley V grooves.



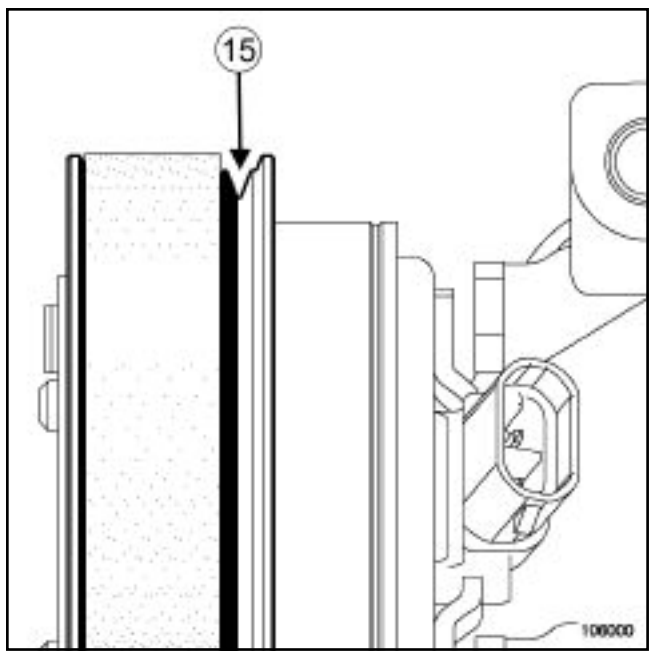
19703

Refit:

- the auto tensioner,

- the auto tensioner mounting bolt (**14**) .

Tighten to torque the **auto tensioner mounting bolt (40 ± 4 Nm)** .



106000

It is essential to leave one inner tooth (**15**) of the pulleys free for engines fitted with a belt with five teeth for pulleys with six teeth.

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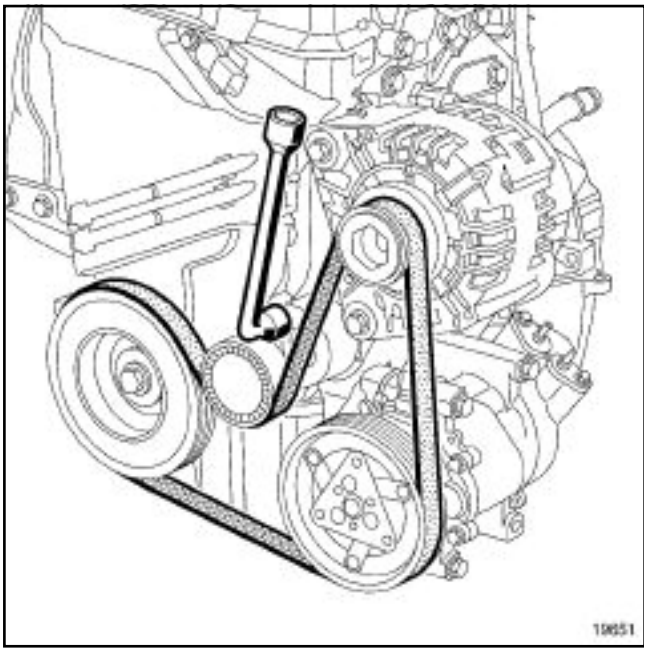


19651

Turn the accessories belt auto tensioner clockwise using a **16 mm** spanner.

Refit the crankshaft accessories belt.

Rotate the crankshaft twice to position the accessories belt correctly.

V - REBUILDING THE ENGINE ATTACHED TO THE FLYWHEEL END

This fitting operation concerns all K9K engines

Fit a load positioner onto the engine lifting eyes.

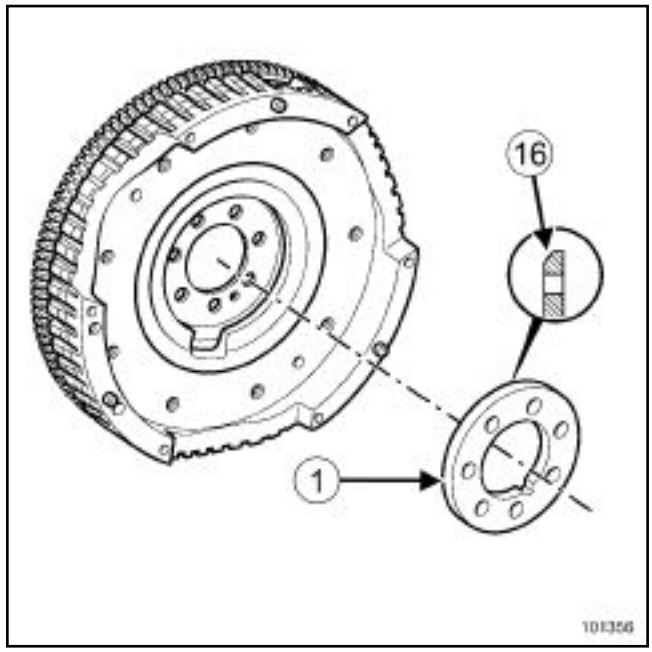
Remove the engine from the engine stand using a workshop hoist.

Remove:

- the engine from the support plate **(Mot. 1723)** ,
- the studs from the cylinder block.

Note:

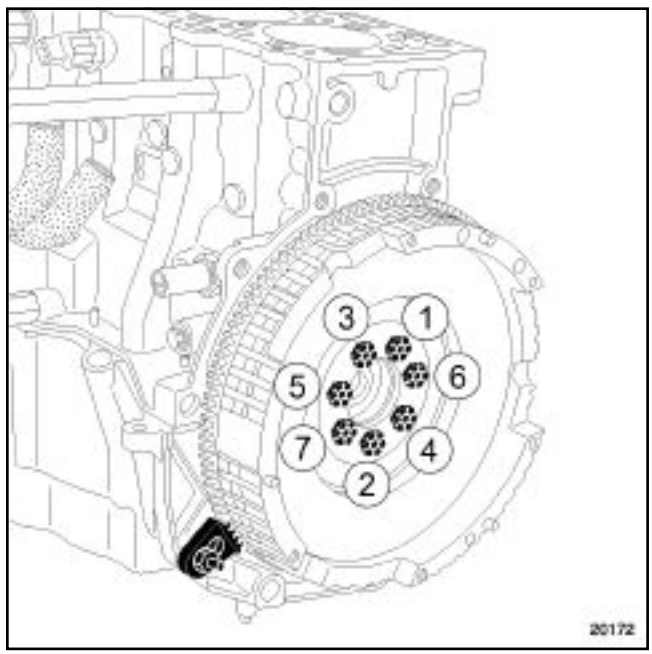
For engines which have a starter located on the exhaust side, the flywheel must only be refitted after the engine has been removed from the engine stand.



101356

Note:

Certain flywheels have a shim (**1**) . **It is essential to position the shim chamfer** (**16**) **on the flywheel end** .



20172

Refit:

- the flywheel,
- the new flywheel mounting bolts,
- the engine flywheel locking tool **(Mot. 582-01)** or **(Mot. 1677)** .

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Tighten to torque and in order:

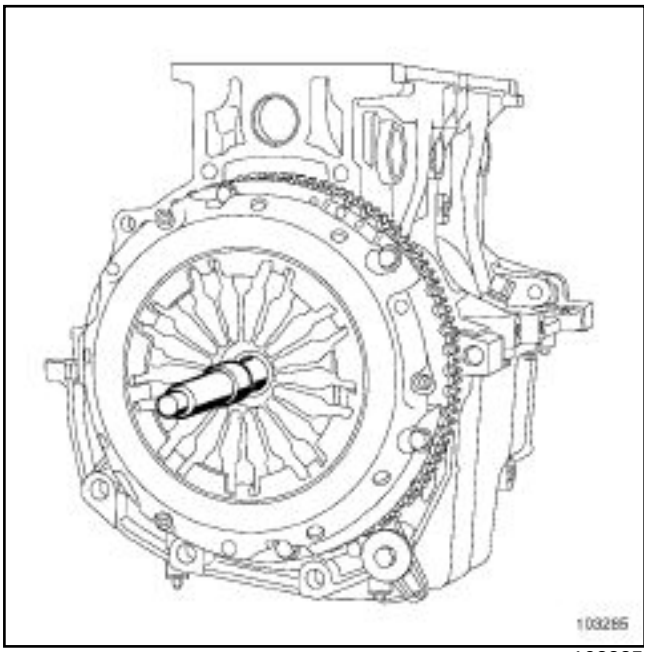
- **the flywheel mounting bolts (55 ± 5.5 Nm)** ,
- **the dual-mass flywheel mounting bolts (20 ± 2 Nm + 36° ± 6°)** .

Degrease the flywheel friction surface using degreaser.

Refit the friction plate (orientating it correctly).

Centre the friction plate using the **(Emb. 1780)** .

Degrease the clutch pressure plate friction surface using degreaser.



103285

Refit:

- the clutch pressure plate,
- the clutch pressure plate mounting bolts.

Gradually tighten the clutch pressure plate mounting bolts.

Tighten to torque the **clutch pressure plate mounting bolts (M6 bolts to 14 ± 1.4 Nm and M7 bolt to 20 ± 2 Nm)** .

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

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Timing belt: Removal

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

Special tooling required	
Mot. 1489	TDC locating pin.
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

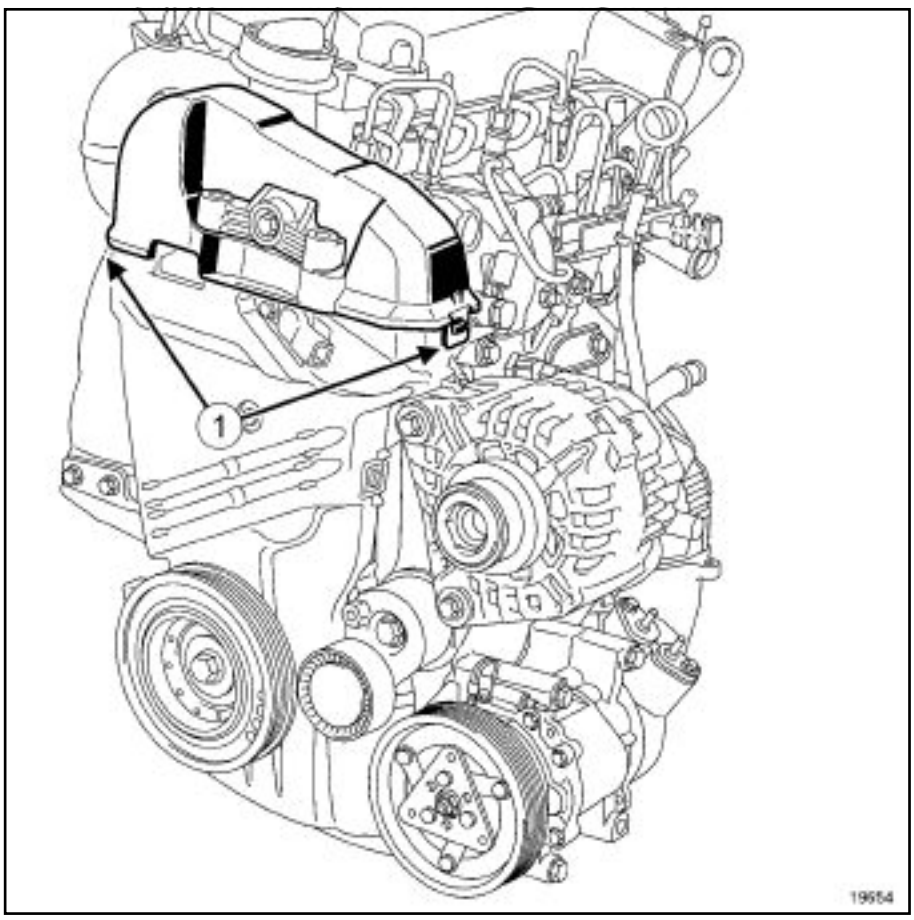
WARNING
Never turn the engine in the opposite direction to its normal operating direction.

Do not run the engine without the accessories belt so as not to damage the crankshaft accessories pulley.

II - ESSENTIAL EQUIPMENT

- Protective gloves,
- Large screwdriver,
- Allen key (**6 mm**),
- Torx socket (**14**).

III - REMOVAL



19654

Remove the upper timing cover by unclipping both tabs (**1**) .

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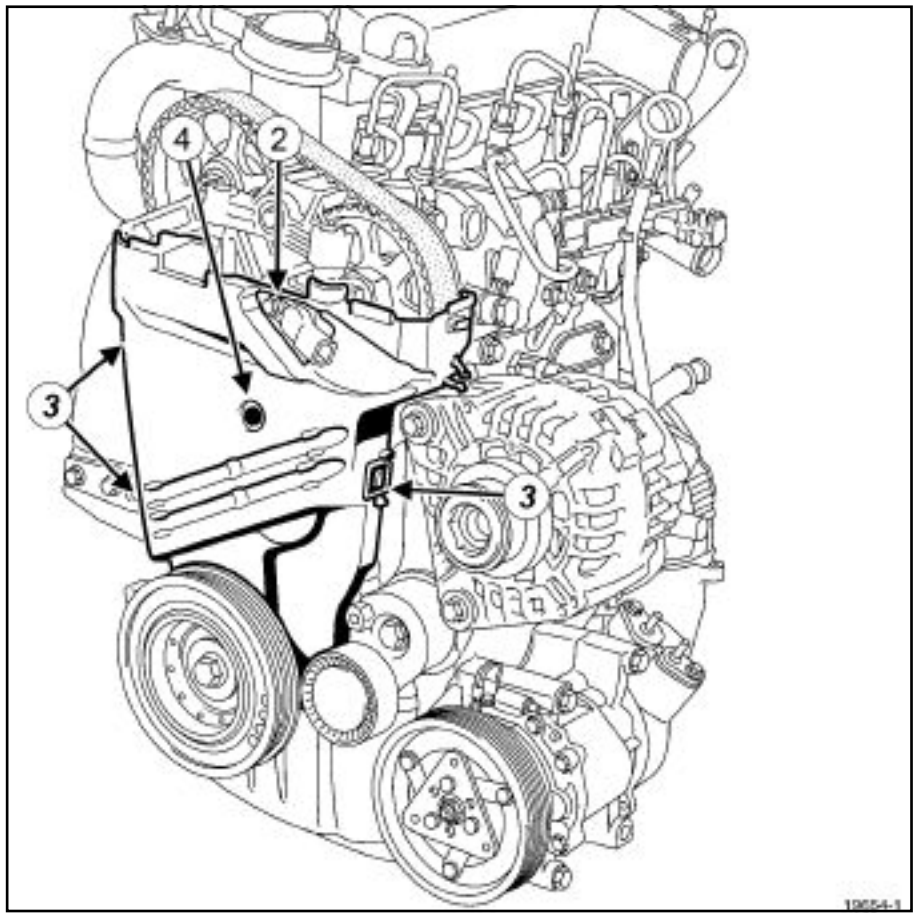
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



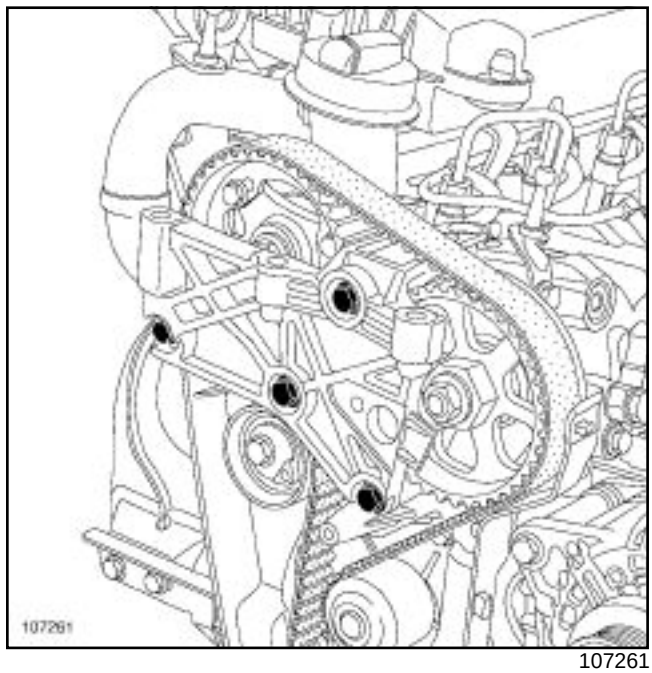
19654-1

Remove:

- the high-pressure pump position sensor (**2**) ,
- the plastic bolt (**4**) .

Unclip the three tabs (**3**) .

Remove the lower timing cover.

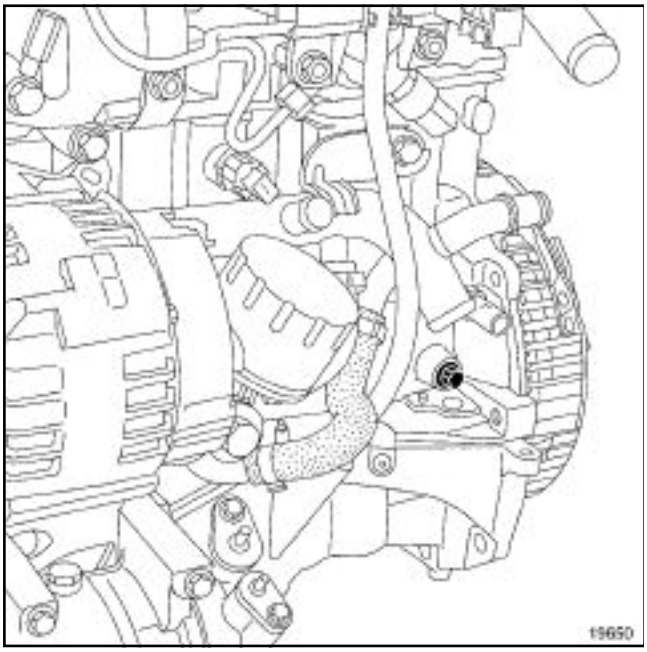


107261

Remove the cylinder head suspended mounting.

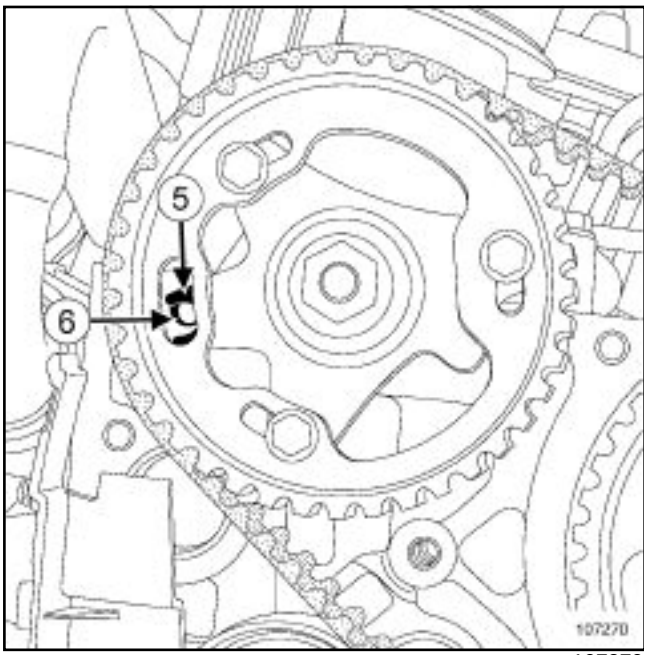
GETtheMANUALS.org

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



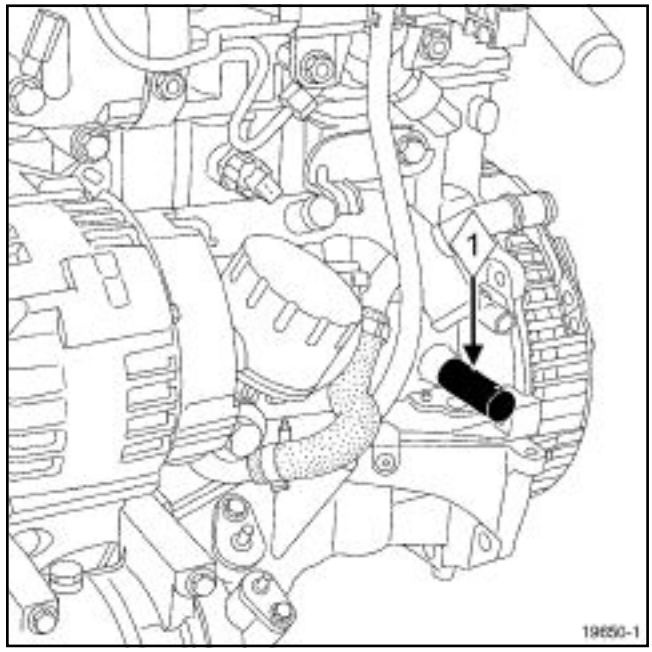
19650

Remove the TDC setting pin plug using a female torx socket (**14**).



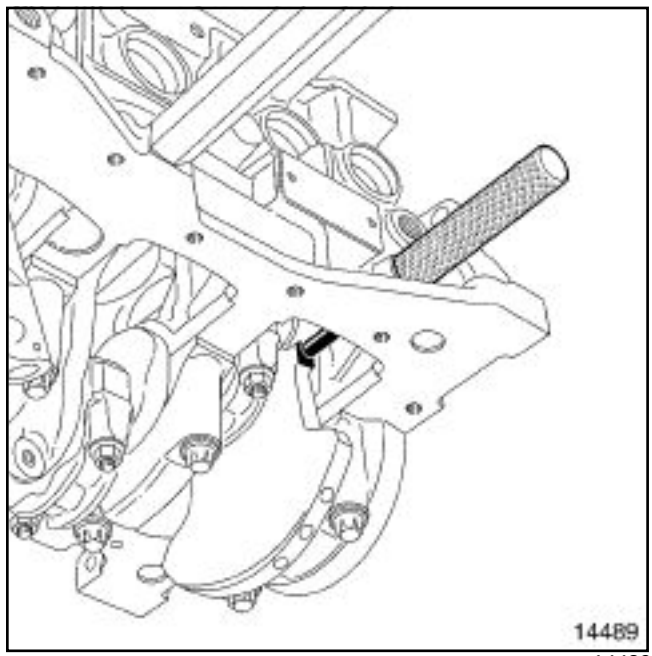
107270

Turn the crankshaft to position the camshaft pulley hole (**5**) almost opposite the cylinder head hole (**6**) .



19650-1

Screw in the TDC setting pin (**1**) **(Mot. 1489)** .



14489

Turn the crankshaft clockwise (timing end) smoothly until the crankshaft comes into contact with the TDC setting pin.

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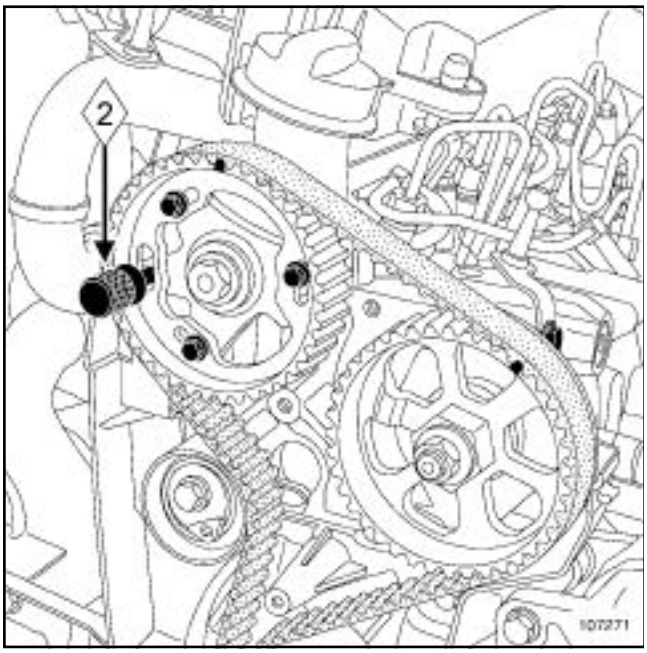
Timing belt: Removal

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

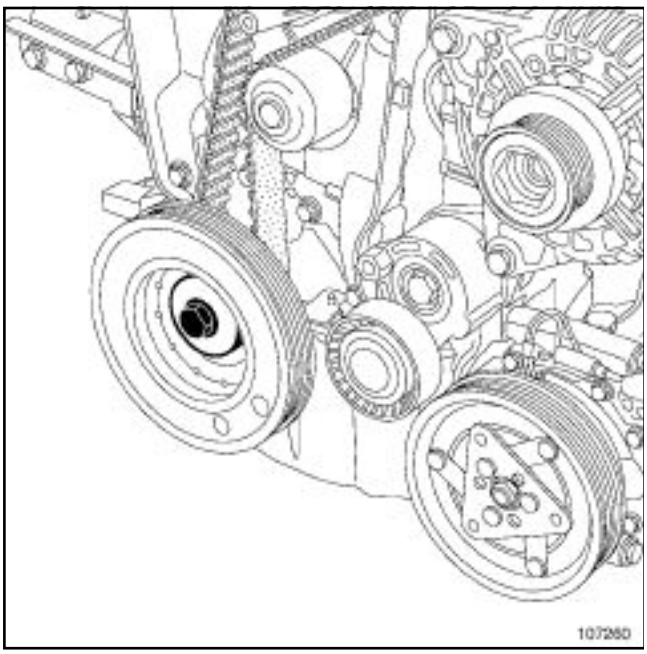


107271

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

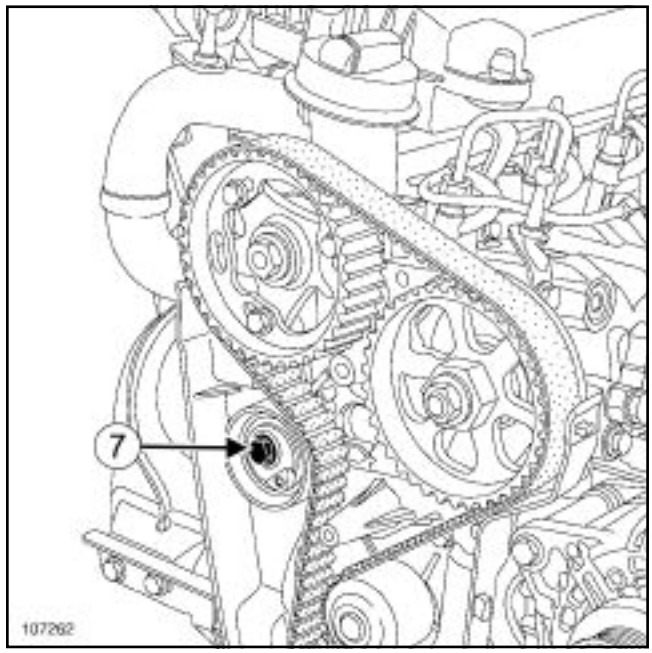
Remove:

- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** ,
- the TDC setting pin **(Mot. 1489)** .



107260

Remove the crankshaft accessories pulley, locking the flywheel with a screwdriver.



107262

Undo the tensioning roller bolt (**7**) .

Loosen the timing tensioning roller by turning the eccentric cam using a **6 mm** Allen key.

Remove:

- the timing belt,
- the timing tensioning roller.

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Timing belt: Removal

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. 1489	TDC locating pin.
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT

Wear protective gloves during every operation.

WARNING

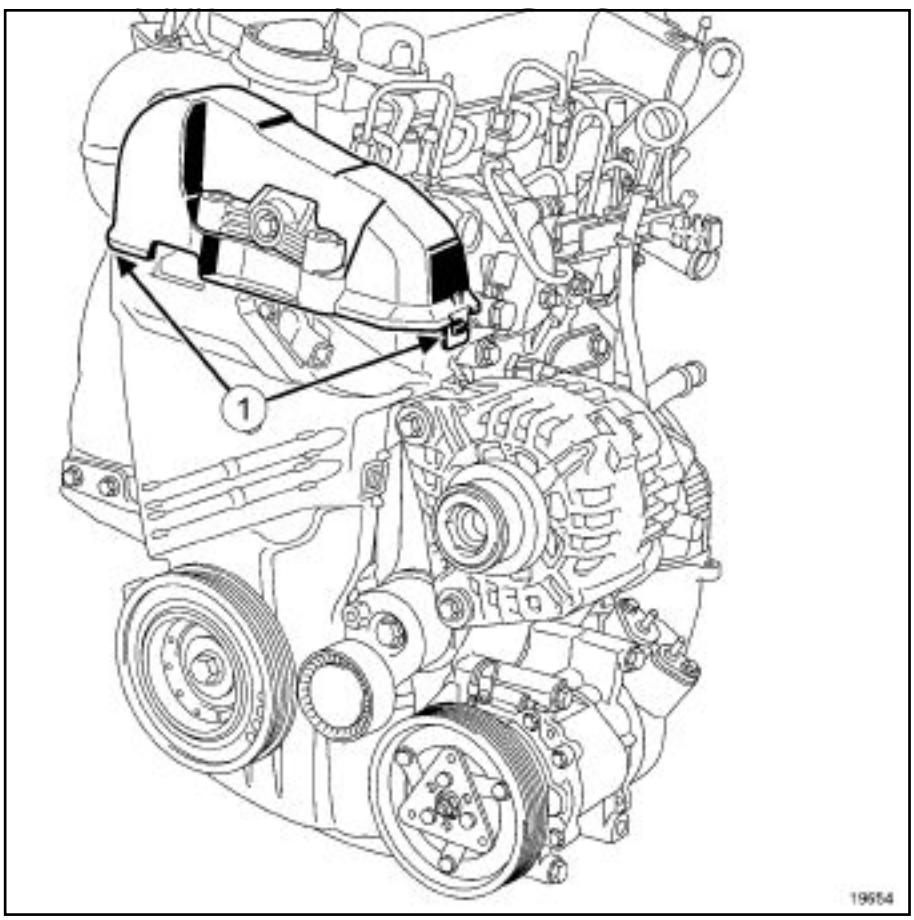
Never turn the engine in the opposite direction to its normal operating direction.

Do not run the engine without the accessories belt so as not to damage the crankshaft accessories pulley.

II - ESSENTIAL EQUIPMENT

- Protective gloves,
- Large screwdriver,
- Allen key (**6 mm**),
- Torx socket (**14**).

III - REMOVAL



19654

Remove the upper timing cover by unclipping both tabs (**1**) .

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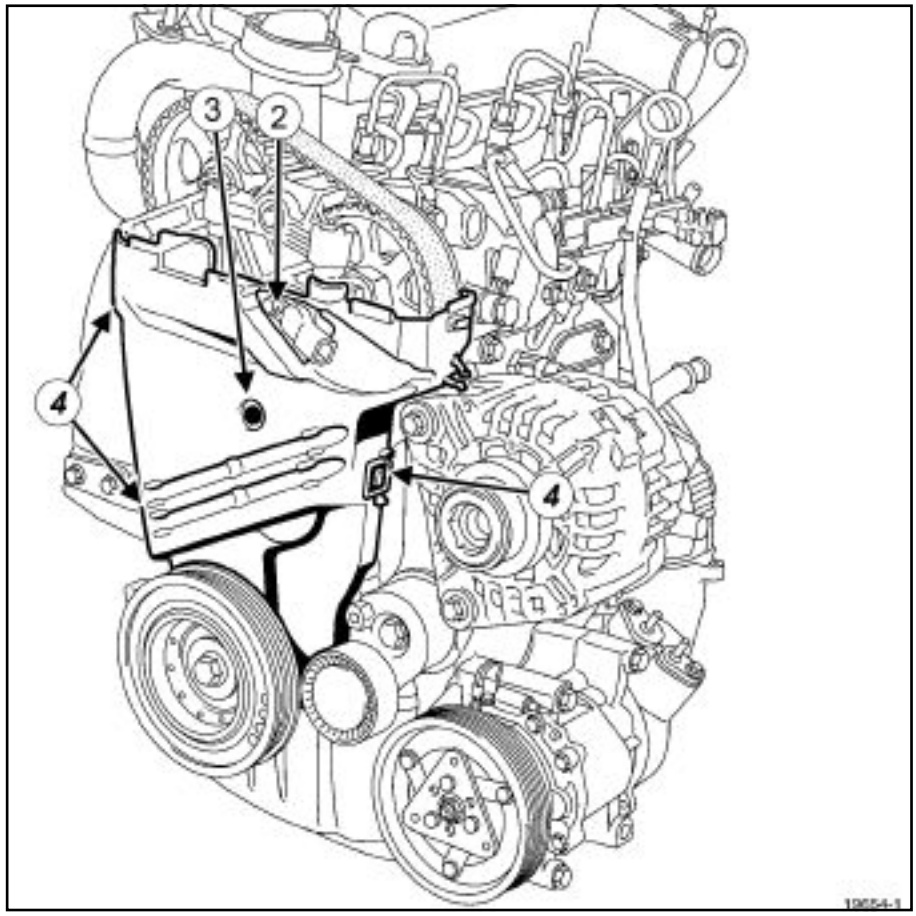
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19654-1

Remove:

- the high-pressure pump position sensor (**2**) ,
- the plastic bolt (**3**) .

Unclip the three tabs (**4**) .

Remove the lower timing cover.

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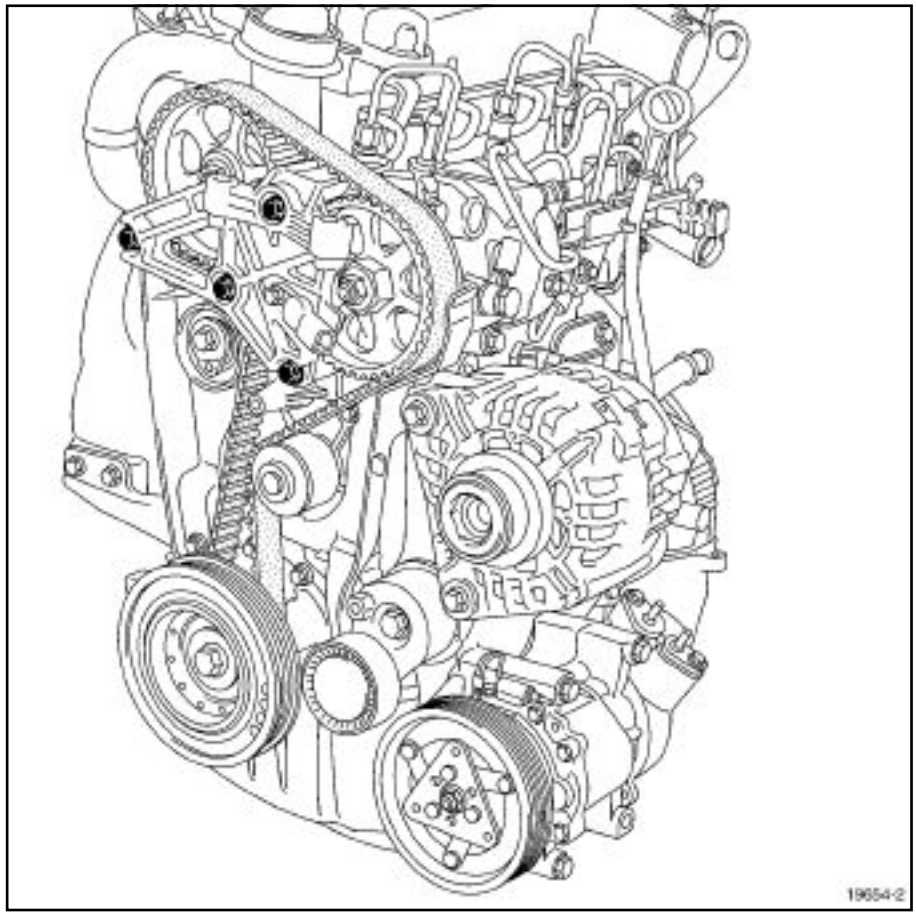
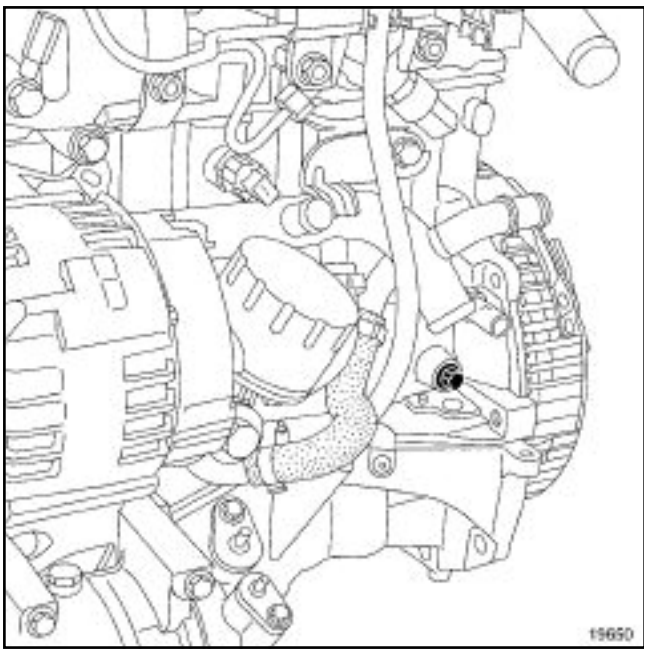
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



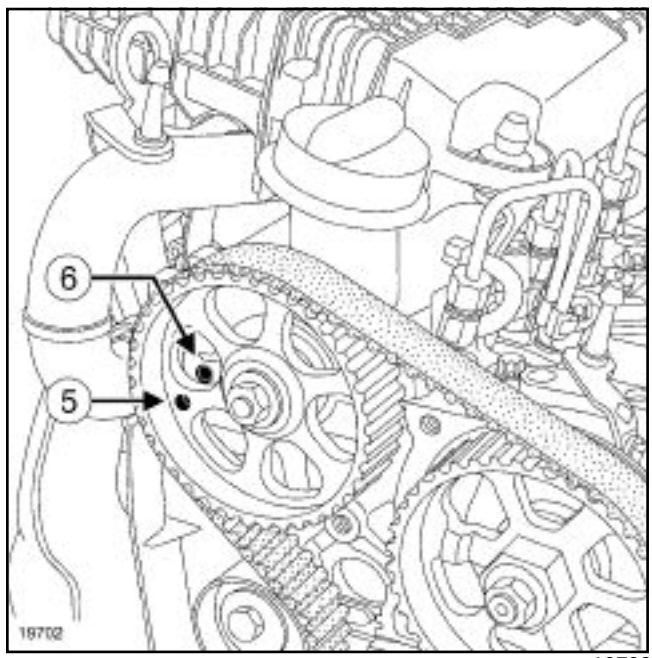
19654-2

Remove the cylinder head suspended mounting.



19650

Remove the TDC pin plug using a female torx socket (**14**).



19702

Turn the crankshaft to position the camshaft pulley hole (**5**) almost opposite the cylinder head hole (**6**) .

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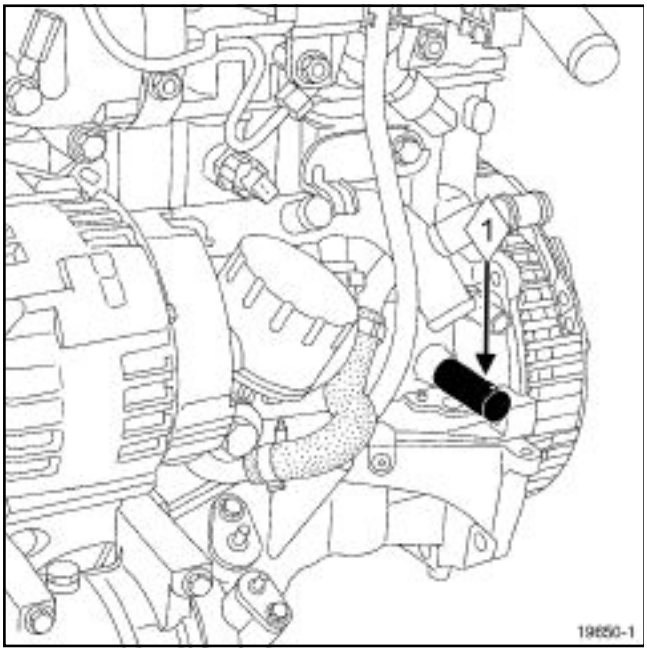
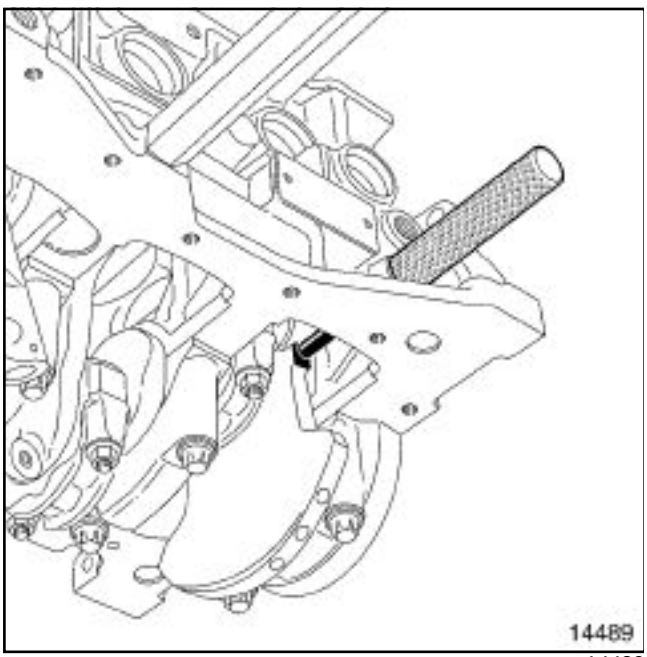
Timing belt: Removal

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



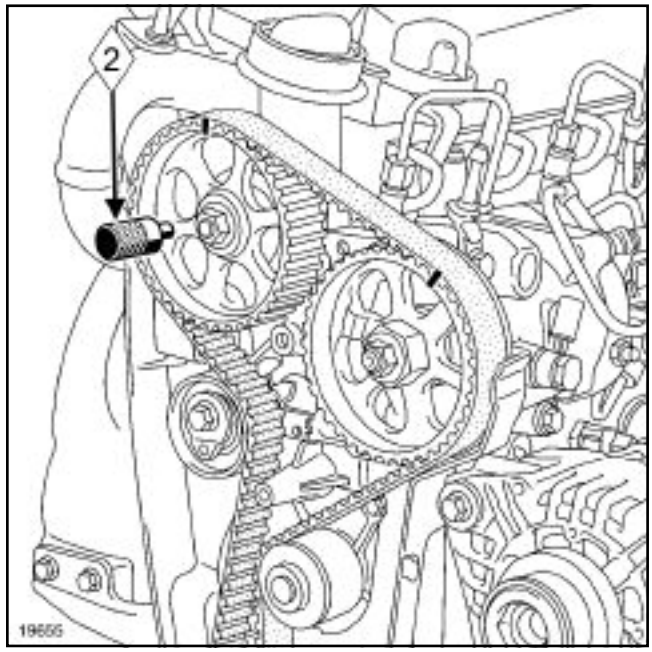
19650-1

Screw in the TDC setting pin **(Mot. 1489)** (**1**) .



14489

Turn the crankshaft clockwise (timing end) smoothly until the crankshaft comes into contact with the TDC setting pin.



19655

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

Remove:

- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** ,
- the TDC setting pin **(Mot. 1489)**

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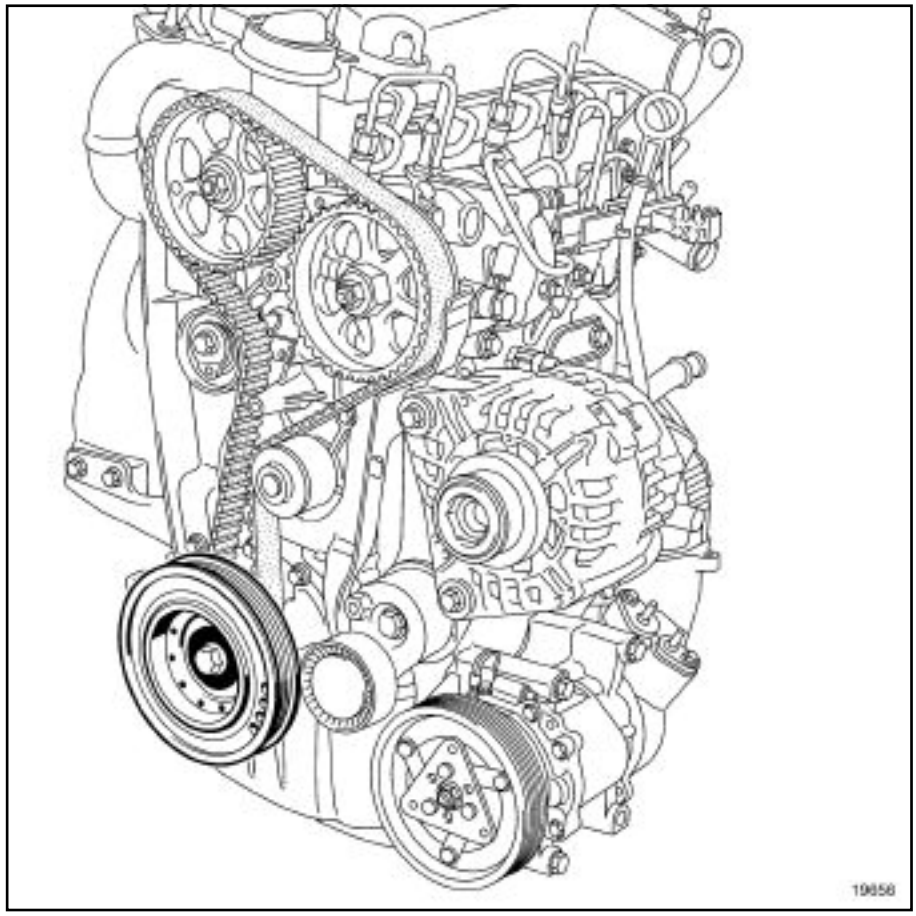
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19656

Remove the crankshaft accessories pulley by locking the flywheel with a large screwdriver.

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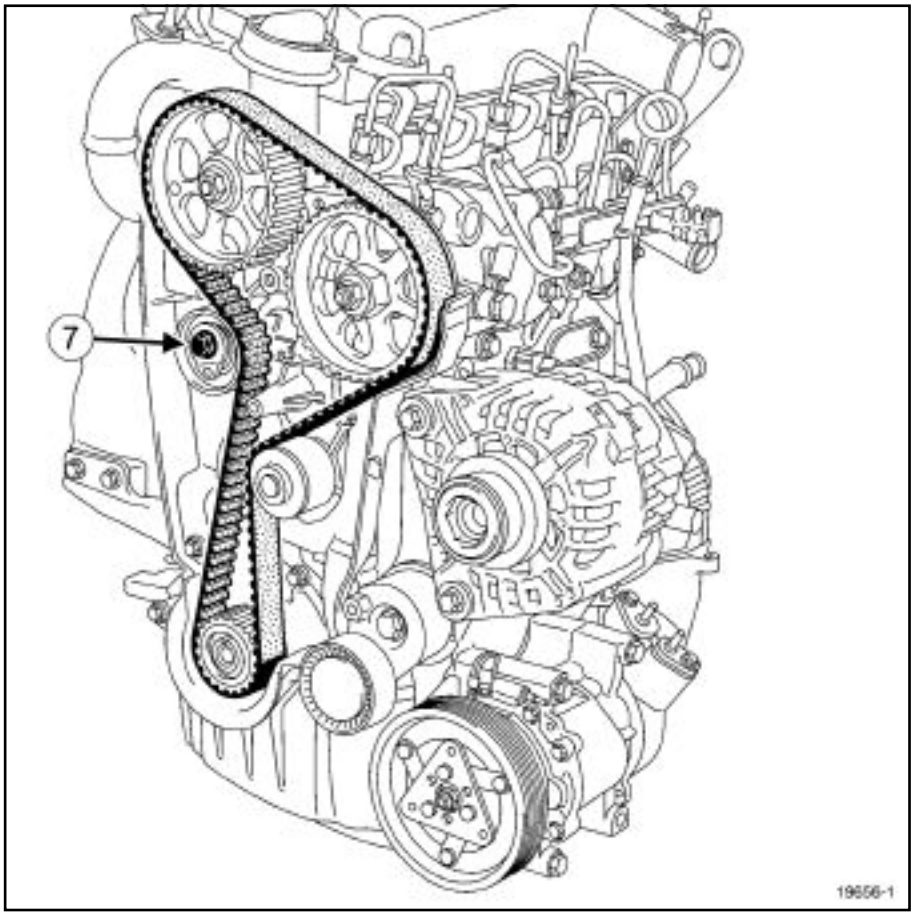
Timing belt: Removal

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



19656-1

Undo the tensioning roller bolt (**7**) .

Loosen the timing tensioning roller by turning the eccentric cam using a **6 mm** Allen key.

Remove:

- the timing belt taking care not to let the crankshaft timing sprocket fall out,
- the timing tensioning roller.

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Timing belt: Removal

K9K, and 732 or 764

Special tooling required	
Mot. 1489	TDC locating pin.
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

WARNING
Never turn the engine in the opposite direction to its normal operating direction.

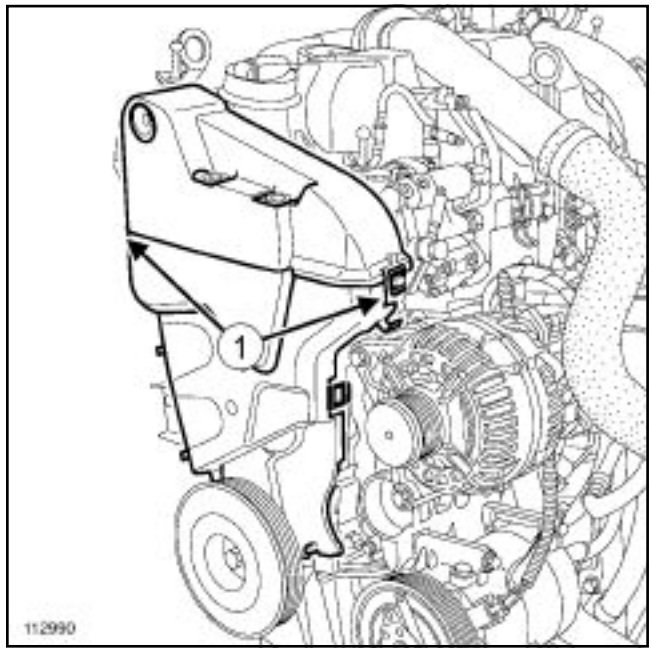
Do not run the engine without the accessories belt so as not to damage the crankshaft accessories pulley.

II - EQUIPMENT REQUIRED

- Protective gloves,
- Large screwdriver,
- Allen key (**6 mm**),
- Torx socket (**14**).

III - REMOVAL

K9K, and 732



112990

Remove the upper timing cover by unclipping both tabs (**1**) .

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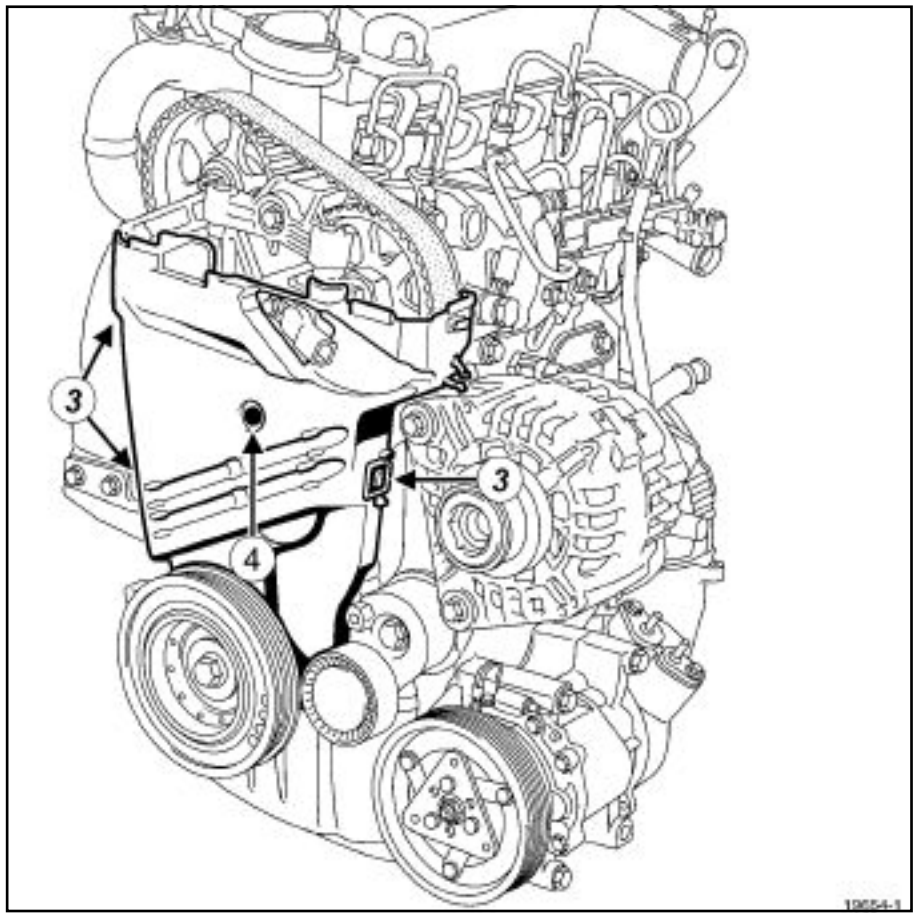
K9K, and 732 or 764

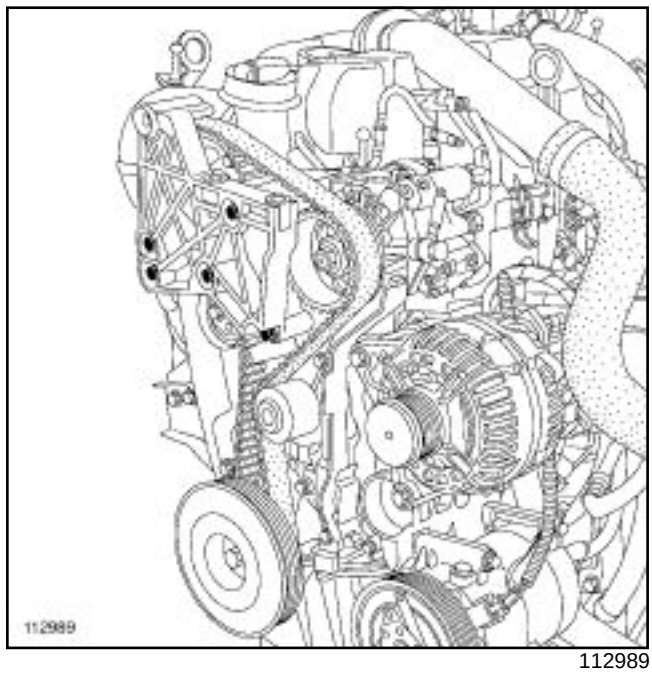


19654-1

Remove the plastic bolt (**4**) .

Unclip the three tabs (**3**) .

Remove the lower timing cover.



112989

Remove the cylinder head suspended mounting.

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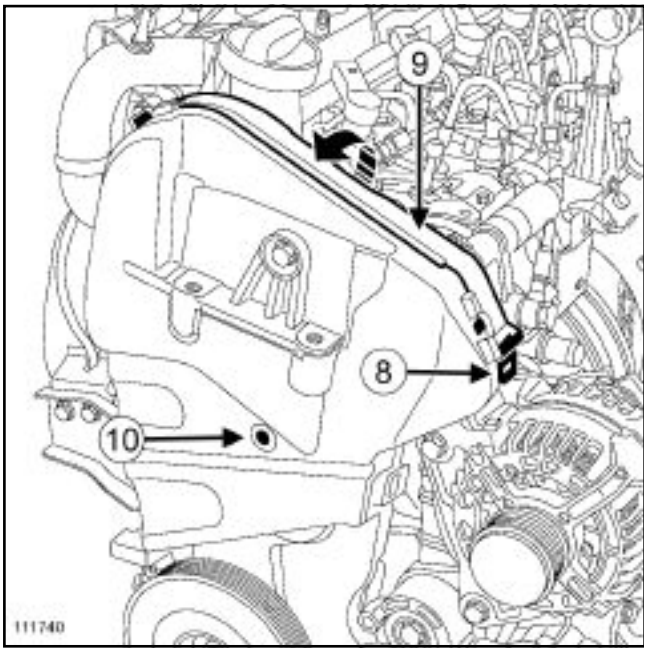
K9K, and 732 or 764

K9K, and 764

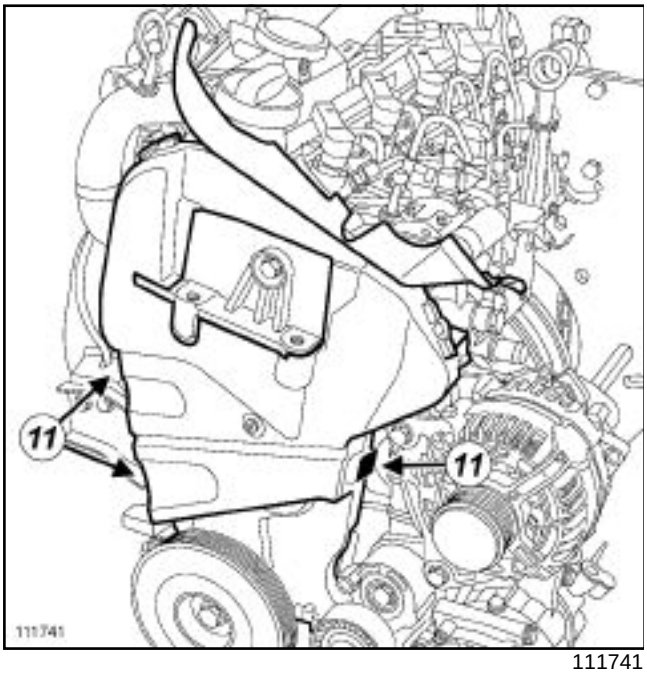


111740

Unclip the tab (**8**) .

Turn the timing cover (**9**) in the direction of the arrow.

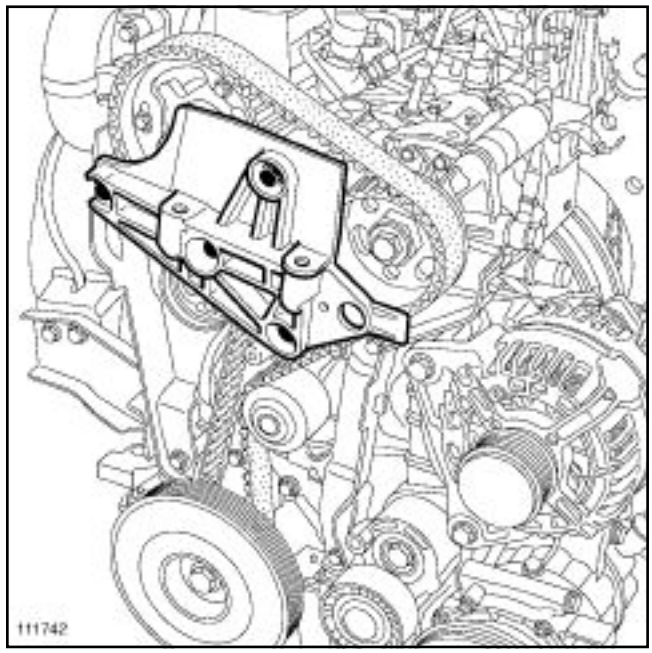
Remove the plastic bolt (**10**) .



111741

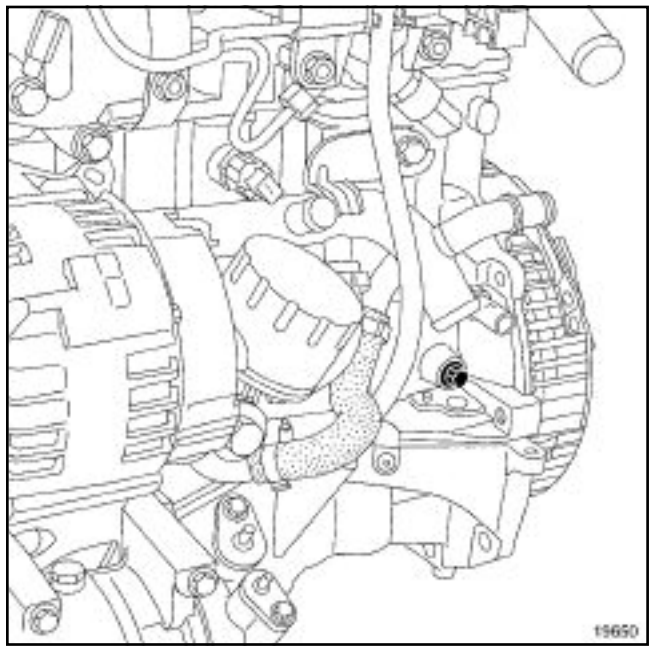
Unclip the three tabs (**11**) .

Remove the timing cover.



111742

Remove the cylinder head suspended mounting.



19650

Remove the TDC setting pin plug using a female torx socket (**14**).

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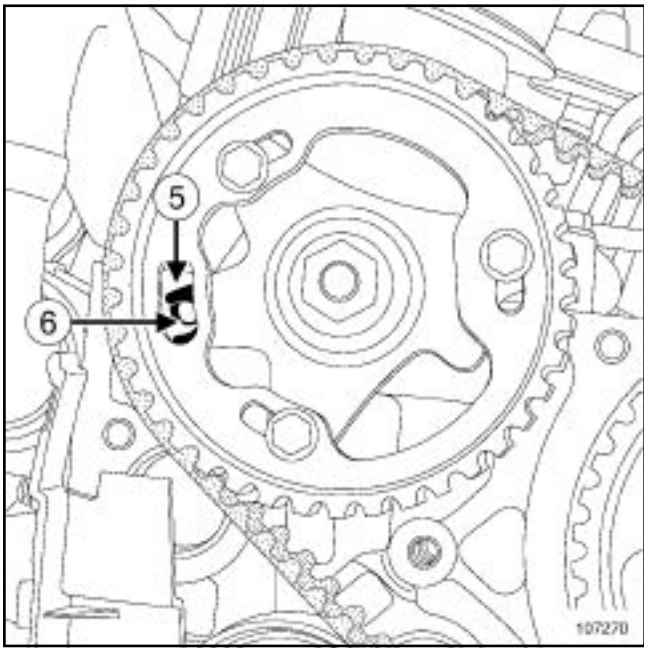
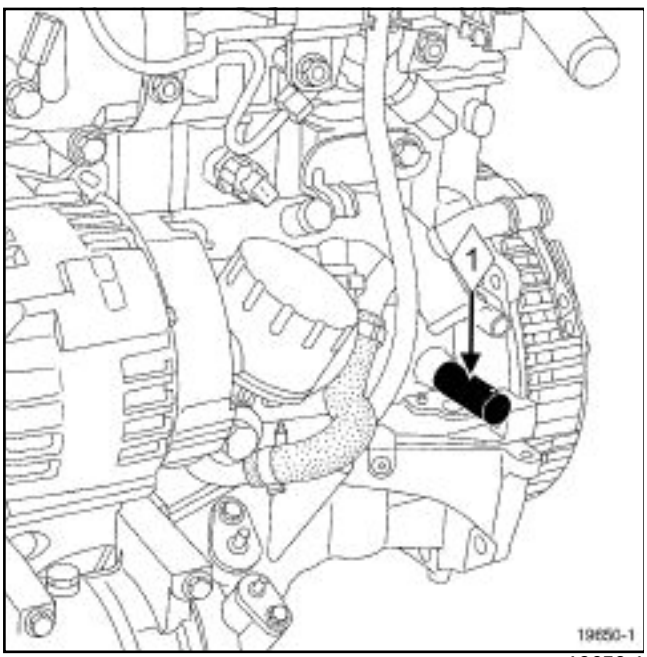
K9K, and 732 or 764



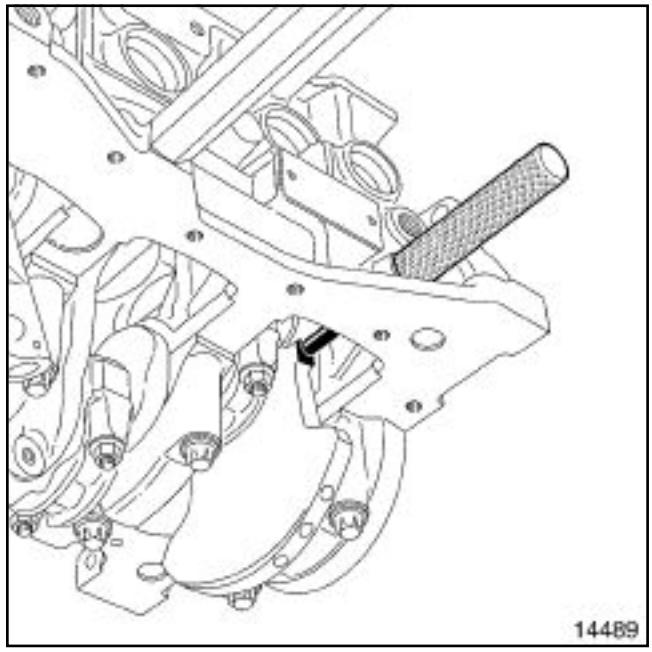
107270

Turn the crankshaft to position the camshaft pulley hole (**5**) almost opposite the cylinder head hole (**6**) .



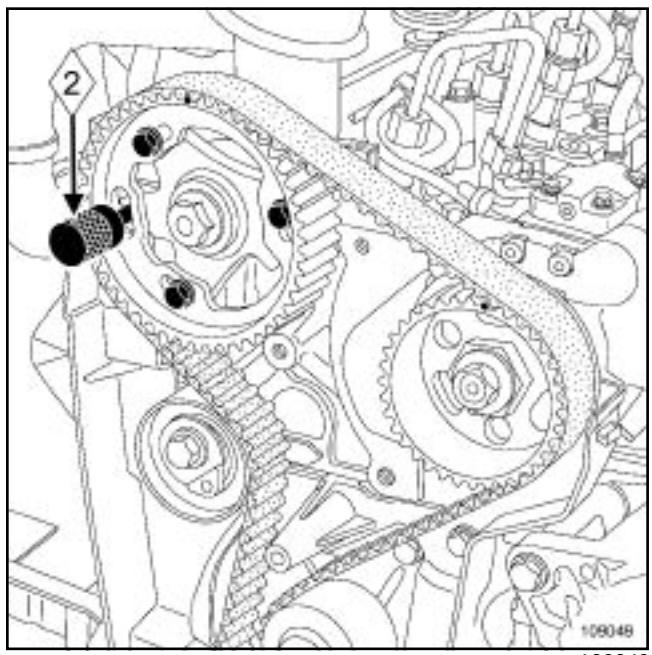
19650-1

Screw in the TDC setting pin (**1**) **(Mot. 1489)** .



14489

Turn the crankshaft clockwise (timing end) smoothly until the crankshaft comes into contact with the TDC setting pin.



109049

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

Remove:

- the set of 5 pins for the camshaft and craknshaft pulleys **(Mot. 1430)** ,

- the TDC setting pin **(Mot. 1489)** .

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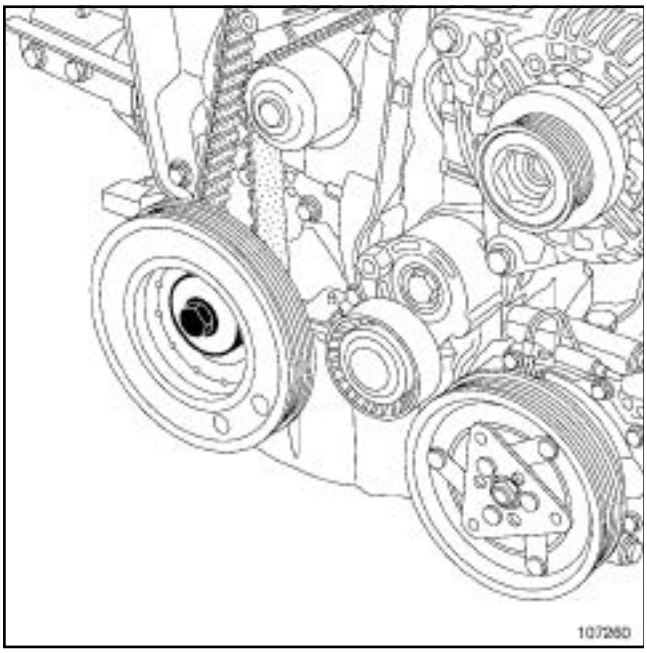
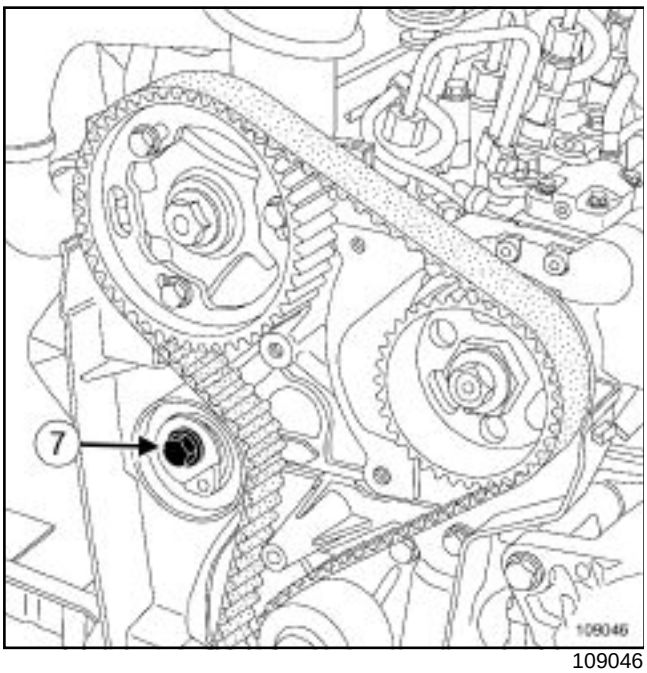
Timing belt: Removal

K9K, and 732 or 764



107260

Remove the crankshaft accessories pulley, locking the flywheel with a screwdriver.



109046

Undo the tensioning roller bolt (**7**) .

Loosen the timing tensioning roller by turning the eccentric cam using a **6 mm** Allen key

Remove:

- the timing belt,

- the timing tensioning roller.

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There are three distinct tension procedures that must be observed, according to the engine family.

Some engines require:

- a pretensioning torque to be applied (using the special tooling for the engine type) to the belt section to be measured to compensate for all the belt play.
- a **pre-stress T1** slightly greater than the **final fitting tension T2** to be applied.

The purpose of these two operations is to stabilise the belt's internal voltage, to make a reliable tension measurement.

WARNING
Replace any removed belt.

WARNING
When replacing the timing belt specified by the manufacturer, the belt, tension wheel and pulley(s) must be replaced.

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Timing belts: Refitting

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

Special tooling required	
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.
Mot. 1489	TDC locating pin.

Tightening torques ▽	
tensioning roller bolt	**27 ± 2.7 Nm**
the camshaft pulley wheel bolts	**14 ± 1.4 Nm**
the tensioning roller bolt	**27 ± 2.7 Nm**
the camshaft pulley wheel bolts	**14± 1.4 Nm**
the crankshaft accessories pulley M14 bolt	**120 ± 12 Nm + 95° ± 15°**
TDC pin plug	**20 ± 2 Nm**
cylinder head suspended mounting bolts	**21 ± 2.1 Nm**
high-pressure pump position sensor bolt	**8 Nm**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

WARNING
The belt must be replaced with a new one if it has been removed.

Never turn the engine in the opposite direction to its normal operating direction.

Do not run the engine without the accessories belt so as not to damage the crankshaft accessories pulley.

When replacing the belt, always replace the tensioning rollers and fixed rollers.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Pièces à remplacer systématiquement

- Timing belt,
- Timing belt tensioning roller,
- Crankshaft accessories pulley bolt.

Ingrédients

- Silicone adhesive sealant, part no. **77 11 227 484**

III - ESSENTIAL EQUIPMENT

- Protective gloves,
- Allen key (**6 mm**),
- Female torx socket (**14**),
- Offset wrench (**18 mm**),
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

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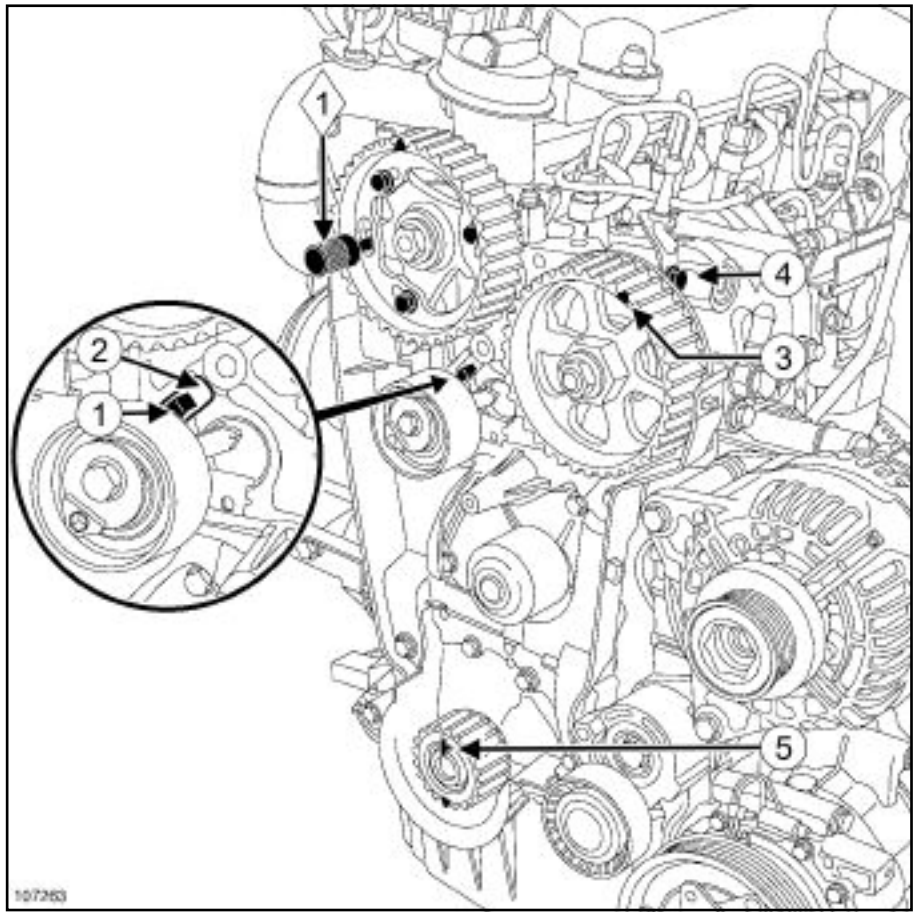
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

IV - REFITTING



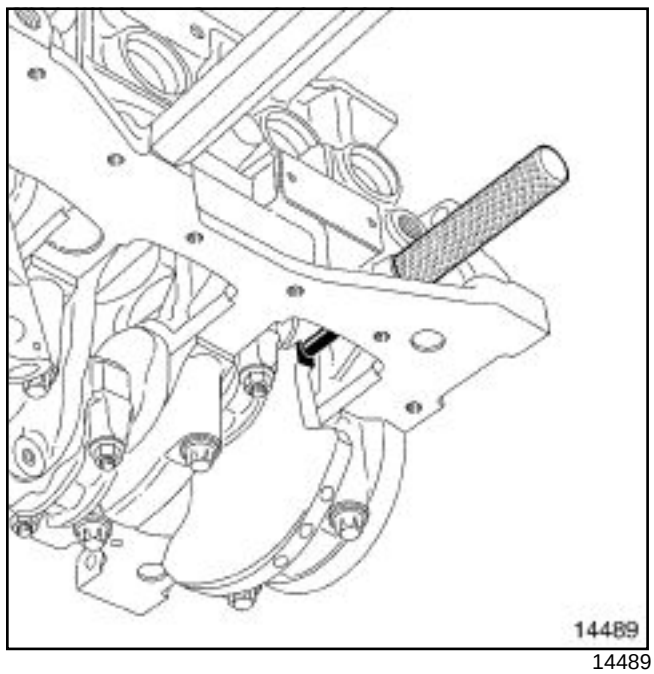
107263

Refit the timing tensioning roller.

Place the tensioning roller spigot (**1**) in the cylinder head groove (**2**) .

Engage the pin (**1**) **(Mot. 1430)** in the holes of the camshaft pulley and cylinder head, turning the camshaft using an **18 mm** offset wrench if necessary.

Check that the mark on the high-pressure pump (**3**) is opposite the bolt head (**4**) .



14489

Position the crankshaft so that it presses against the TDC setting pin **(Mot. 1489)** (the crankshaft sprocket cotter ***(5)*** must face upwards).

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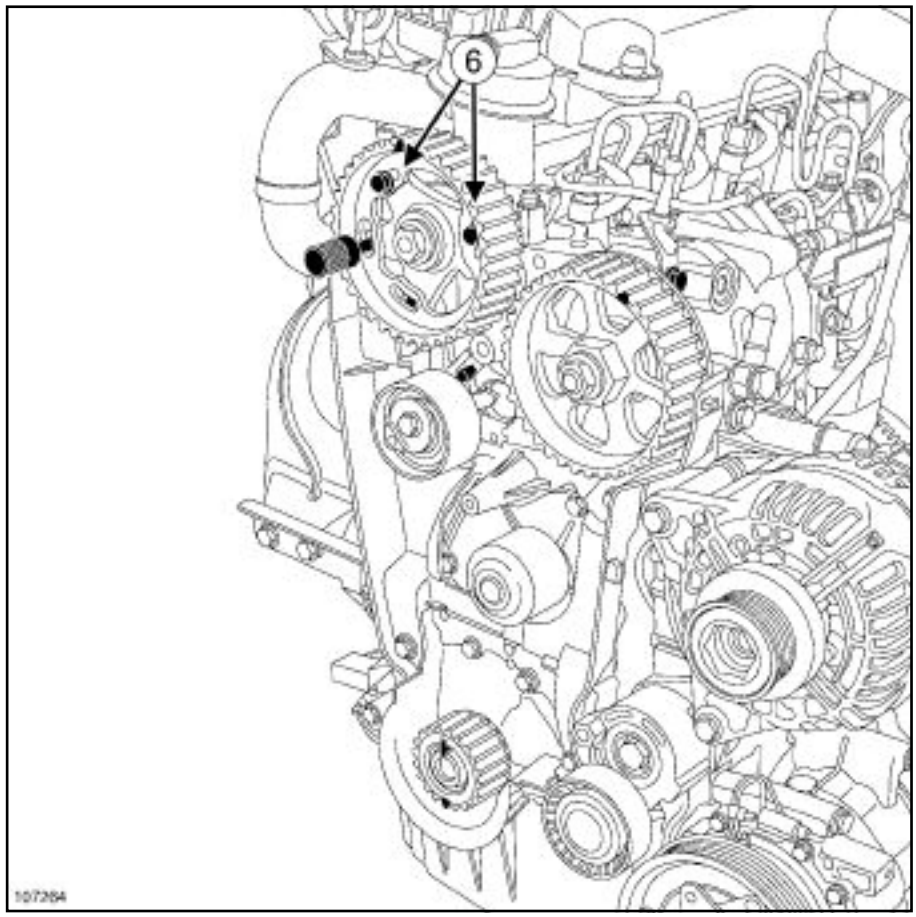
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



107264

Remove one bolt from the camshaft pulley wheel.

Loosen the two other camshaft pulley wheel bolts (**6**) by one turn.

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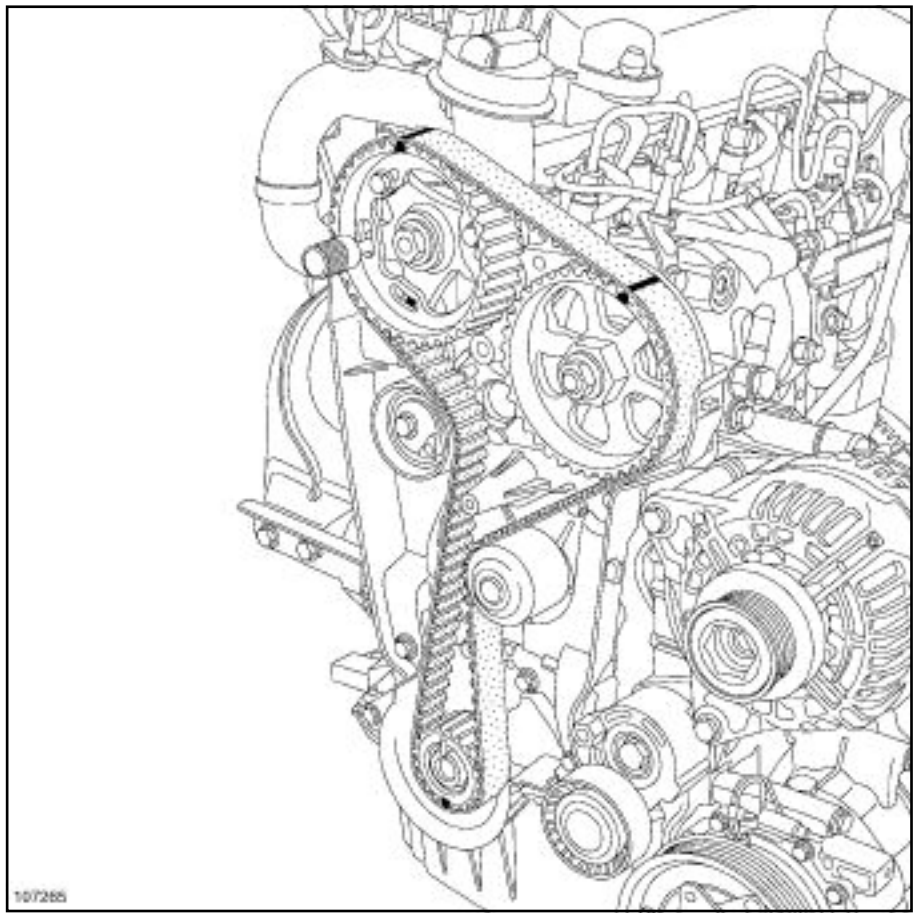
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



107265

Fit the timing belt, starting with the crankshaft sprocket, by aligning the marks on the belt with those on the crankshaft sprockets, the camshaft and the high-pressure pump.

Note:

There should be 19 tooth belt grooves between the camshaft sprocket marks and the high-pressure pump, and 51 tooth belt grooves between the crankshaft sprockets and the high-pressure pump.

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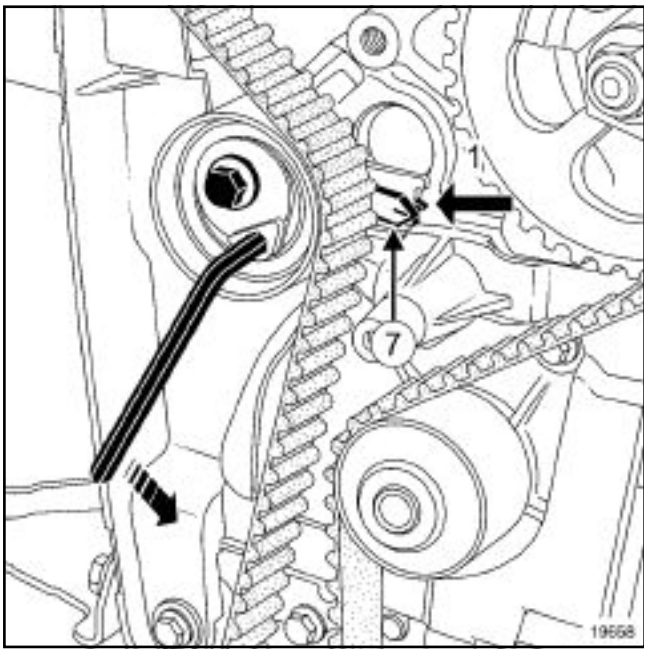
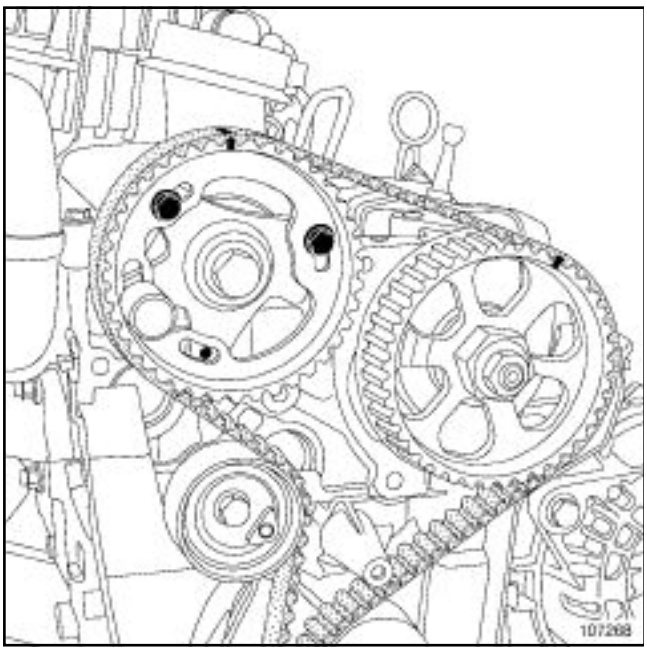
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



19658

Position the tensioning roller adjustable index (**7**) opposite the spigot, turning the eccentric cam anticlockwise using a **6 mm** Allen key.

Tighten to torque the **tensioning roller bolt (27 ± 2.7 Nm)** .



107268

Check that the camshaft pulley hub bolts are not fully up against the camshaft pulley wheel.

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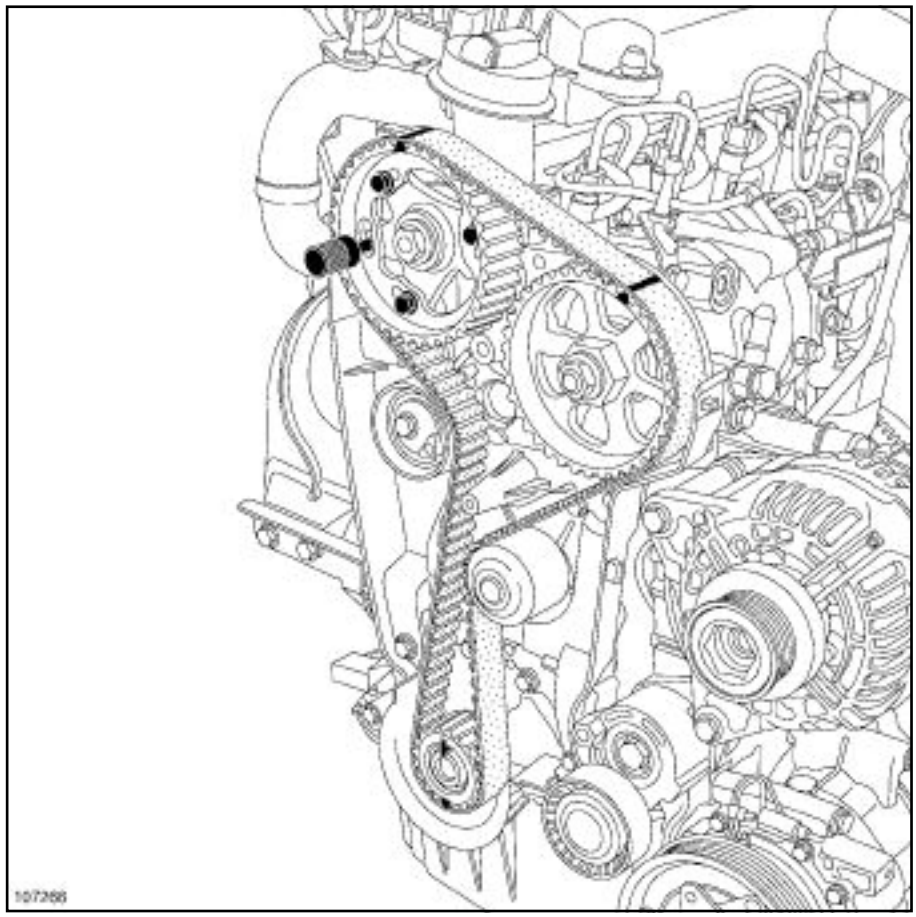
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



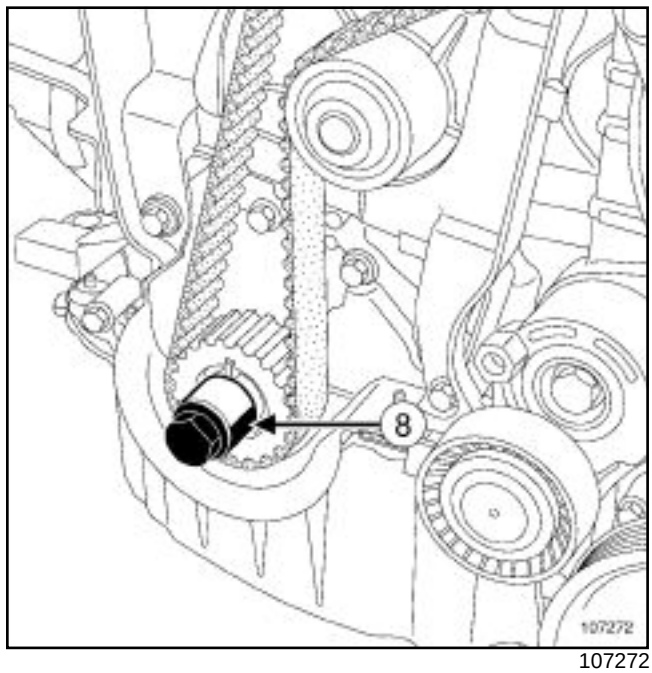
107266

Refit the bolt to the camshaft pulley wheel.

Tighten to torque **the camshaft pulley wheel bolts (14 ± 1.4 Nm)** .

Remove:

- the TDC setting pin **(Mot. 1489)** ,
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .



107272

Tighten the old crankshaft accessories pulley bolt fitted with a spacer (which does not cover the timing sprocket mark) (**8**) onto the crankshaft.

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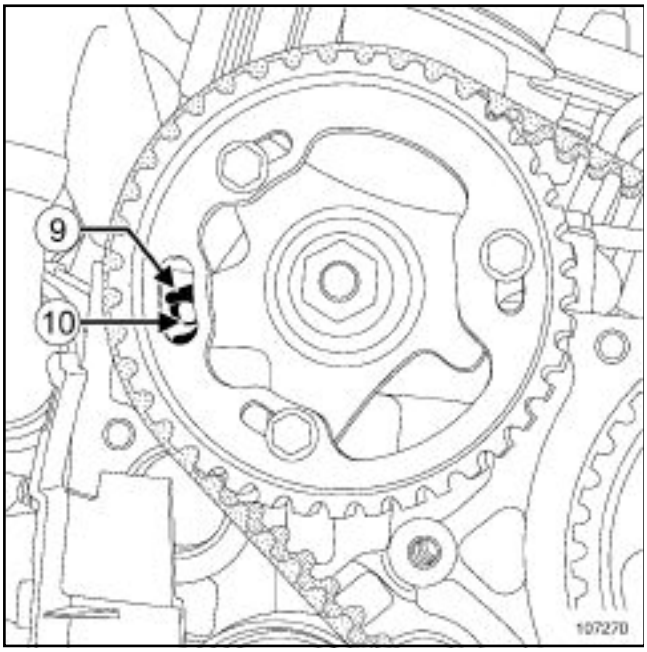
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

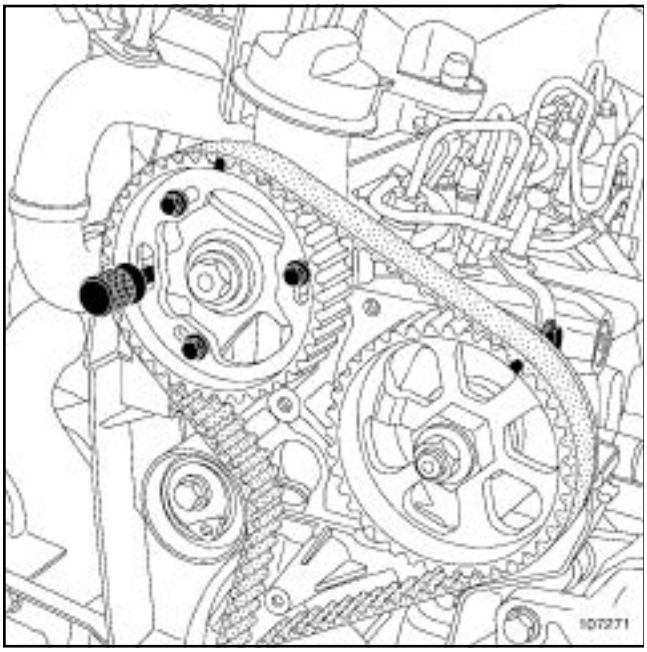


107270

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole (**9**) is opposite the cylinder head hole (**10**) .

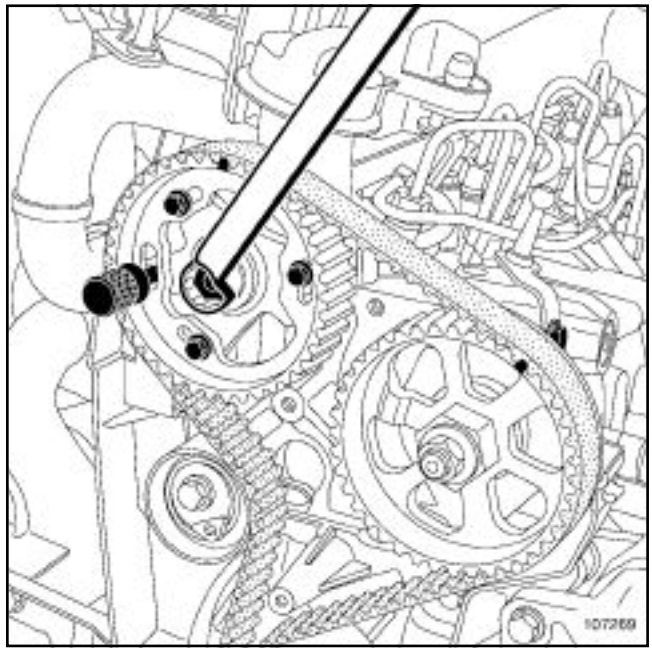
Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

Bring the crankshaft slowly and smoothly against the TDC setting pin.



107271

Set the camshaft pulley using the **(Mot. 1430)** .



107269

If the pin **(Mot. 1430)** does not engage:

loosen the camshaft pulley wheel bolts by one turn at most,

Turn the camshaft pulley hub using an **18 mm** offset wrench to set the camshaft pulley hub timing.

Do not retighten the camshaft pulley wheel bolts.

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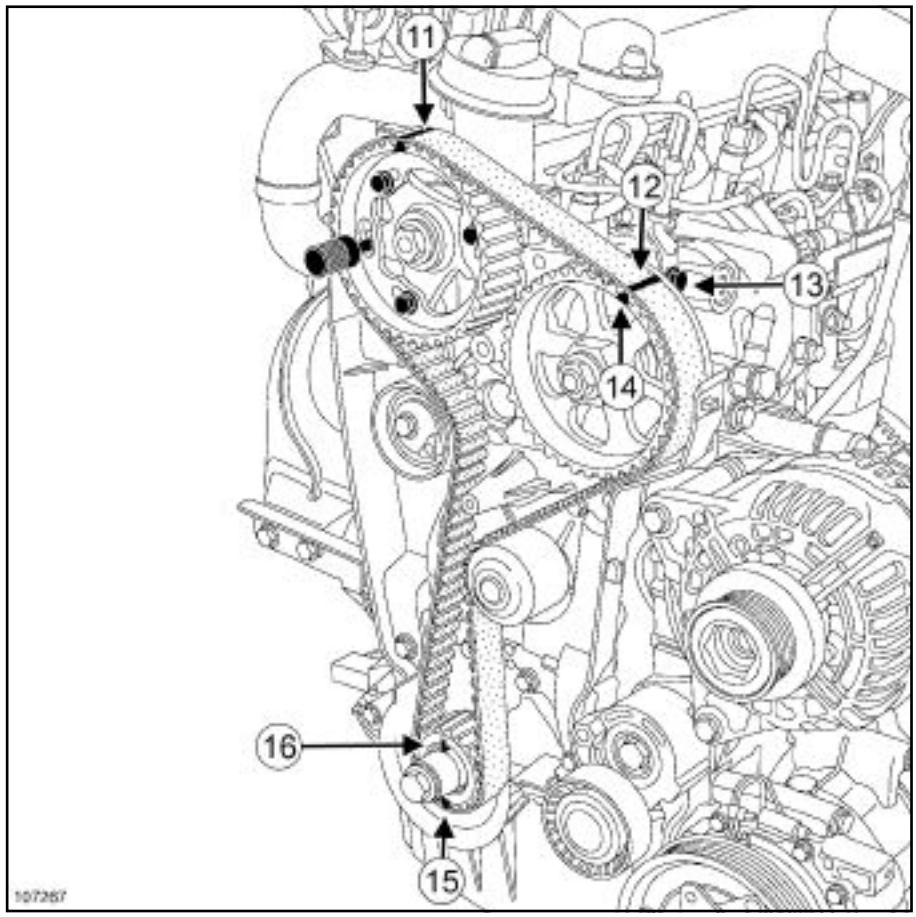
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



107267

Check:

- that the high-pressure pump sprocket mark (**14**) is opposite the bolt head (**13**) ,
- that the crankshaft timing sprocket cotter (**16**) is positioned vertically at the top,
- that there are 19 tooth belt grooves between the camshaft sprocket marks (**11**) and the high-pressure pump sprocket (**12**) ,
- that there are 51 tooth belt grooves between the crankshaft sprocket marks (**15**) and the high-pressure pump sprocket (**12**) .

Note:

After two turns, the tensioning roller index markers may be in two different positions.

The rotation of the tensioning roller eccentric depends on the position.

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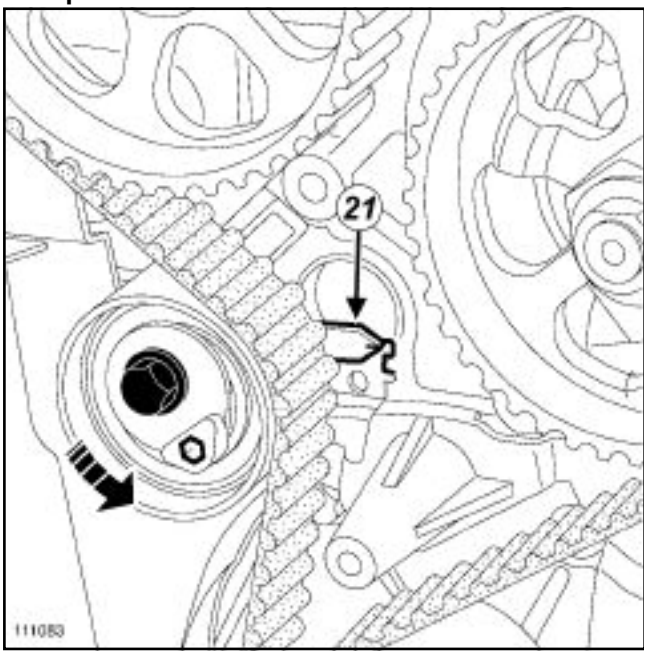
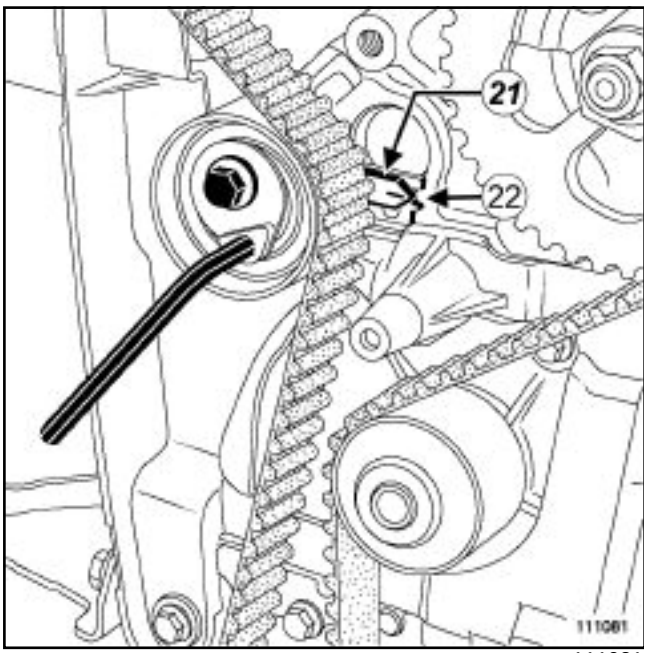
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

First position



111083

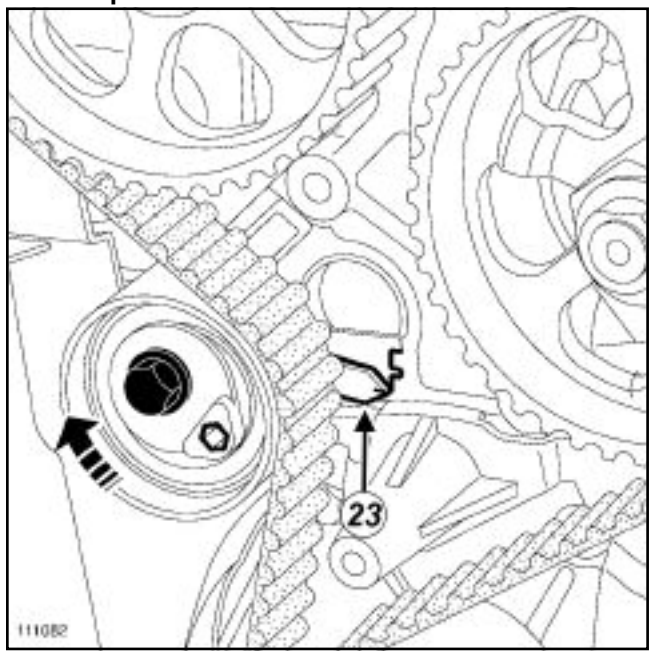


111081

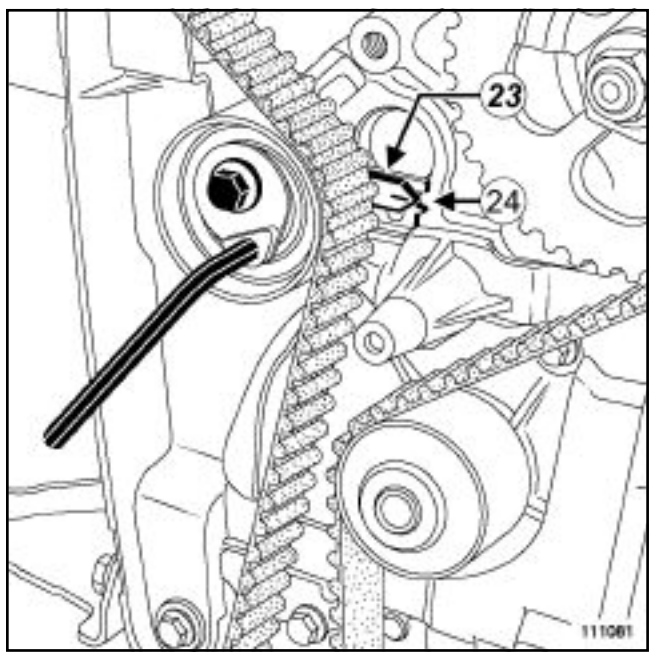
Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index (**21**) in the middle of the timing window (**22**) , turning the key anticlockwise.

Second position



111082



111081

Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index (**23**) in the middle of the timing window (**24**) , turning the key clockwise.

Tighten to torque:

- **the tensioning roller bolt (27 ± 2.7 Nm)** ,
- **the camshaft pulley wheel bolts (14± 1.4 Nm)** .

Remove the following tools:

- TDC setting pin **(Mot. 1489)** ,

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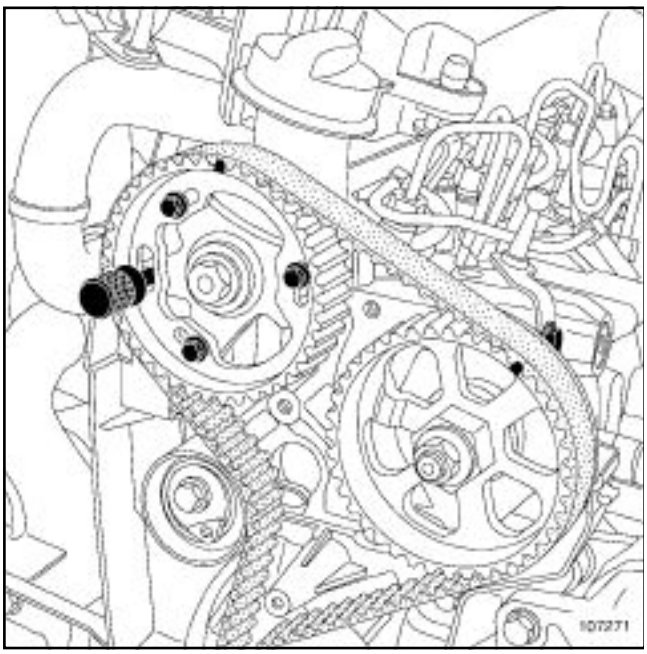
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768

- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole is opposite the cylinder head hole.

Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

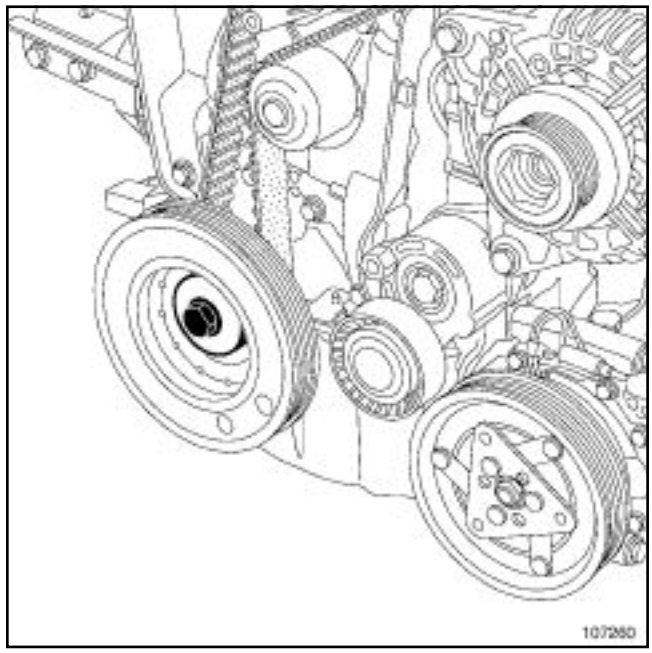
Bring the crankshaft slowly and smoothly against the TDC setting pin.



107271

Set the camshaft pulley using the **(Mot. 1430)** .

If this is not possible, repeat the timing belt refitting operation.



107260

Refit the accessories crankshaft pulley with a new bolt.

Tighten to torque and angle (crankshaft in contact with the TDC setting pin) **the crankshaft accessories pulley M14 bolt (120 ± 12 Nm + 95° ± 15°)** .

Remove the following tools:

- TDC setting pin **(Mot. 1489)** ,
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Refit the TDC pin plug, coating the thread with **SILICONE ADHESIVE SEALANT** .

Tighten to torque the **TDC pin plug (20 ± 2 Nm)** .

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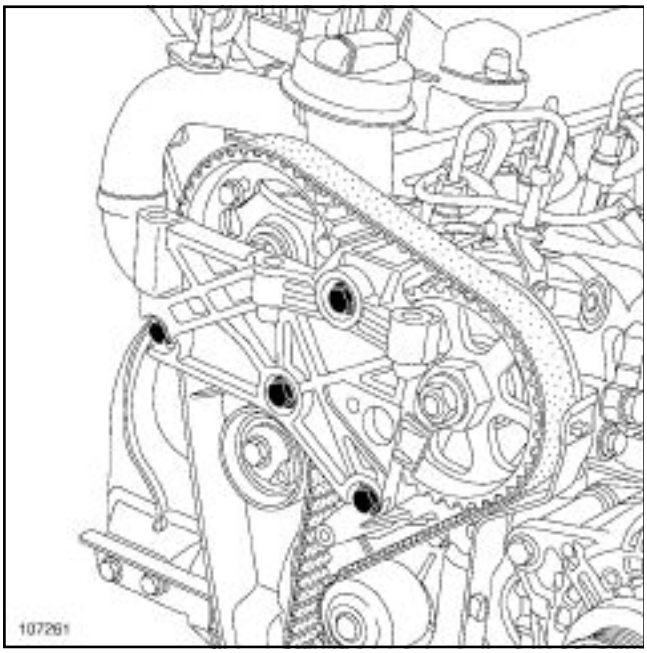
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



107261

Refit the cylinder head suspended mounting.

Tighten to torque the **cylinder head suspended mounting bolts (21 ± 2.1 Nm)** .

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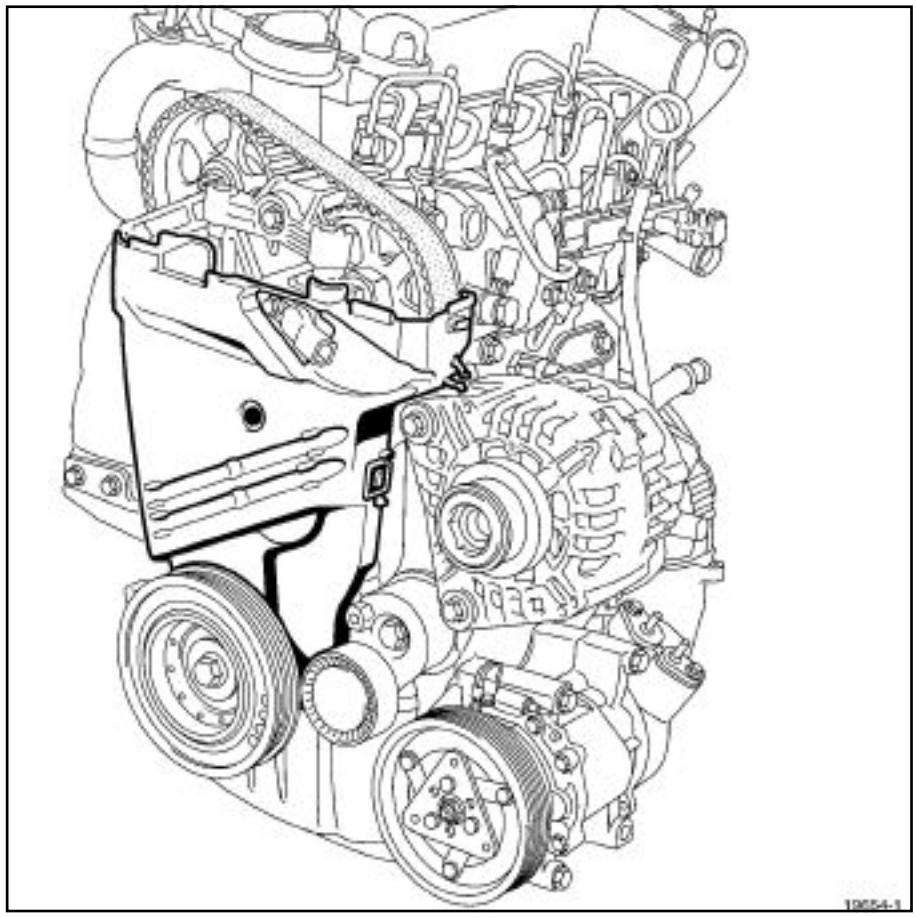
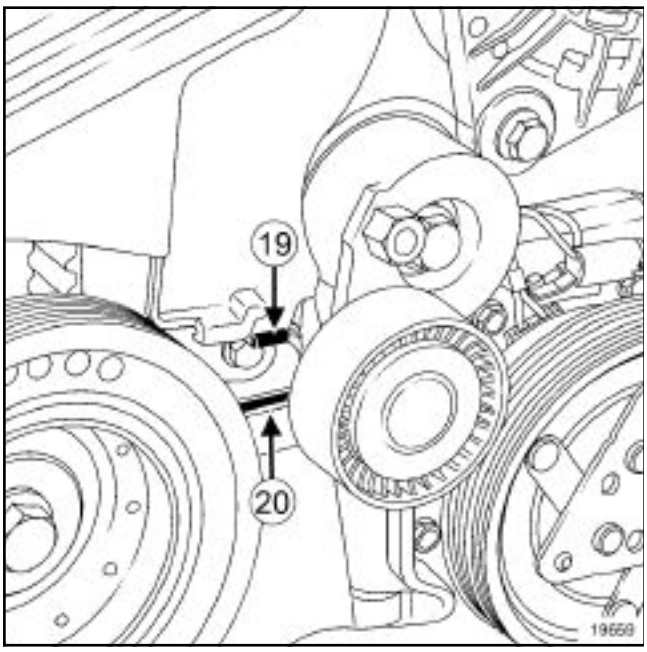
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768


19654-1



19659

Refit:

- the lower timing cover, positioning the tab (**19**) in the inner timing cover hole (**20**) ,
- the timing cover plastic mounting bolt.

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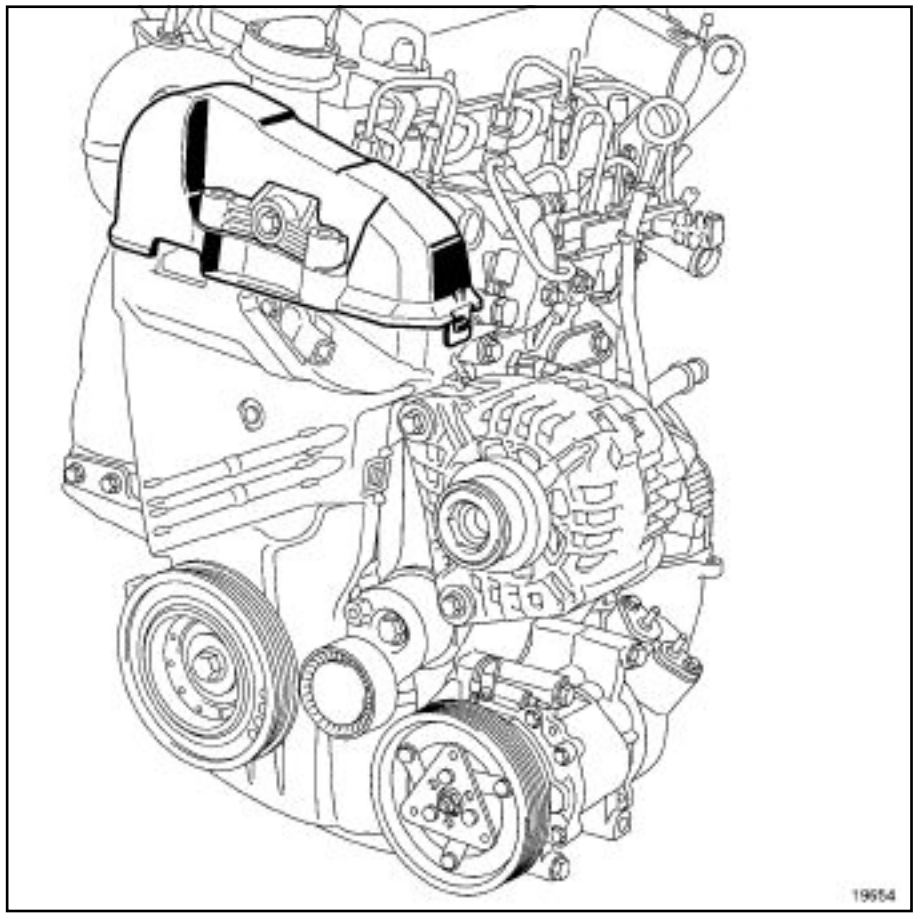
K9K, and 274 or 276 or 714 or 716 or 718 or 766 or 768



19654

Refit the high-pressure pump position sensor.

Tighten to torque the **high-pressure pump position sensor bolt (8 Nm)** .

Refit the upper timing cover.

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Timing belts: 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. 1430	Set of 5 crankshaft and camshaft pulley timing pins.
Mot. 1489	TDC locating pin.

Tightening torques ▽	
timing pulley bolt	**27 Nm**
the crankshaft accessories pulley M12 bolt	**60 Nm + 100° ± 10°**
the crankshaft accessories pulley M14 bolt	**120 Nm + 95° ± 15°**
tensioning roller bolt to	**27 Nm**
TDC cap	**20 Nm**
cylinder head suspended mounting bolt	**21 Nm**
high-pressure pump position sensor bolt	**8 Nm**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

WARNING
The belt must be replaced with a new one if it has been removed.

Never turn the engine in the opposite direction to its normal operating direction.

Do not run the engine without the accessories belt so as not to damage the crankshaft accessories pulley.

When replacing the belt, always replace the tensioning rollers and fixed rollers.

It is essential to remove the grease from the end of the crankshaft, the camshaft timing sprocket and the bearing face of the crankshaft accessories pulley. This is to avoid timing slippage.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Pièces à remplacer systématiquement

- Timing belt,
- Timing belt tensioning roller,
- Crankshaft accessories pulley bolt.

Ingrédients

- Silicone adhesive sealant, part no. **77 11 227 484** ,
- Degreaser, part no. **77 11 224 559** .

III - EQUIPMENT REQUIRED

- Protective gloves,
- Allen key (**6 mm**),
- Female torx socket (**14**),
- Offset wrench (**18 mm**),
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

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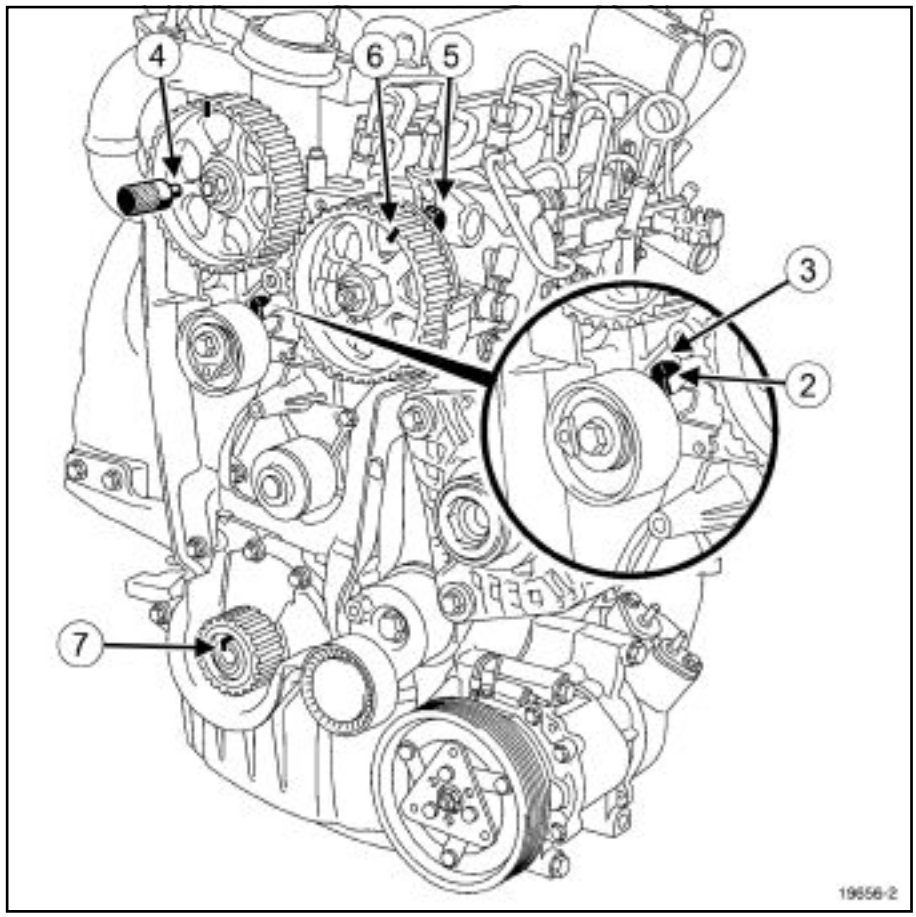
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

IV - REFITTING



19656-2

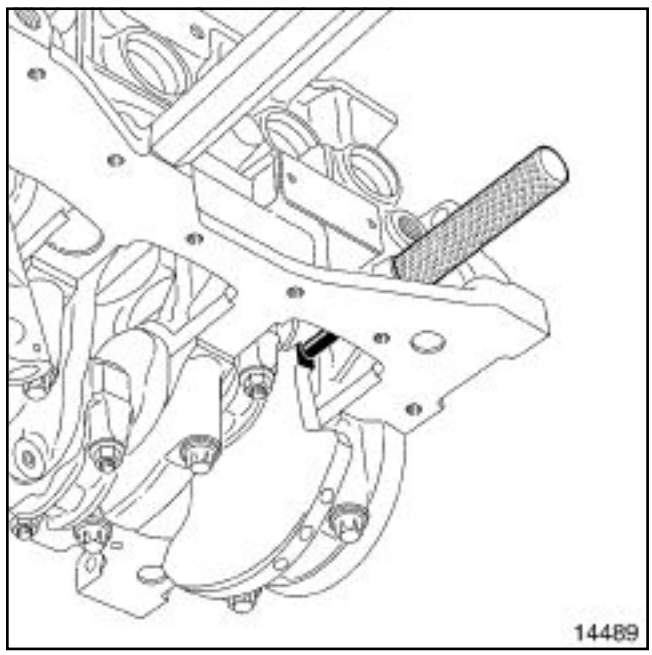
Refit:

- the crankshaft timing sprocket,
- the timing tensioning roller.

Put the tensioning roller spigot (**2**) in the cylinder head groove (**3**) .

Engage the pin **(Mot. 1430)** in the camshaft pulley and cylinder head holes at (**4**) . Turn the camshaft using an **18 mm** offset wrench if necessary.

Check that the mark on the high-pressure pump pulley (**6**) is opposite the bolt head (**5**) .



14489

Position the crankshaft so that it presses against the TDC setting pin **(Mot. 1489)** (the crankshaft groove ***(7)*** must face upwards).

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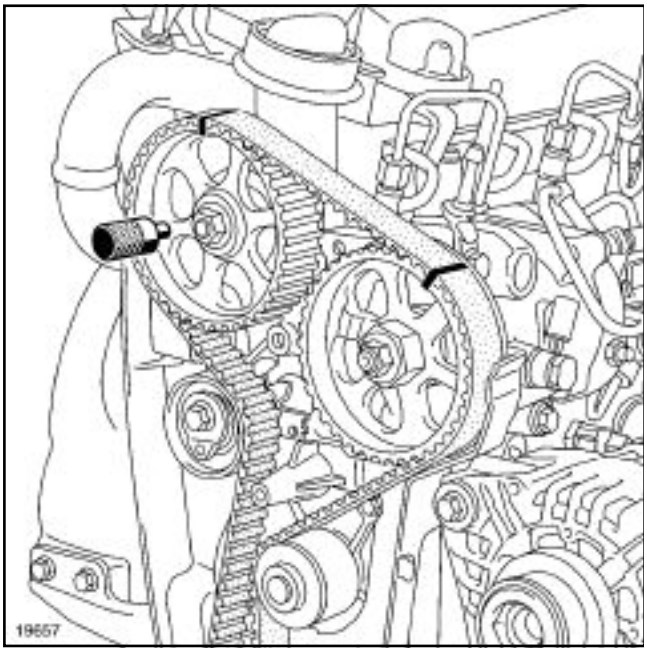
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

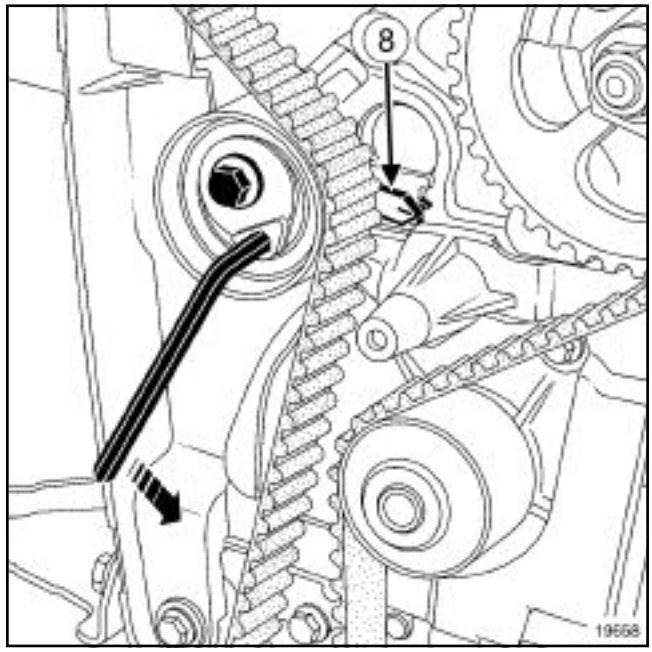


19657

Fit the timing belt, starting with the crankshaft sprocket, aligning the marks on the belt with those on the camshaft and high-pressure pump pulleys.

Note:

There must be 19 tooth belt grooves between the marks of the high-pressure pump and camshaft pulleys.



19658

Position the tensioning roller adjustable index (**8**) opposite the spigot, turning the eccentric cam anticlockwise using a **6 mm** Allen key.

Tighten to torque the **timing pulley bolt (27 Nm)** .

Refit the accessories crankshaft pulley with a new bolt.

Torque and angle-tighten (crankshaft in contact with the TDC setting pin):

- **the crankshaft accessories pulley M12 bolt (60 Nm + 100° ± 10°)** ,
- **the crankshaft accessories pulley M14 bolt (120 Nm + 95° ± 15°)**

Remove the following tools:

- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** ,
- the TDC setting pin **(Mot. 1489)** .

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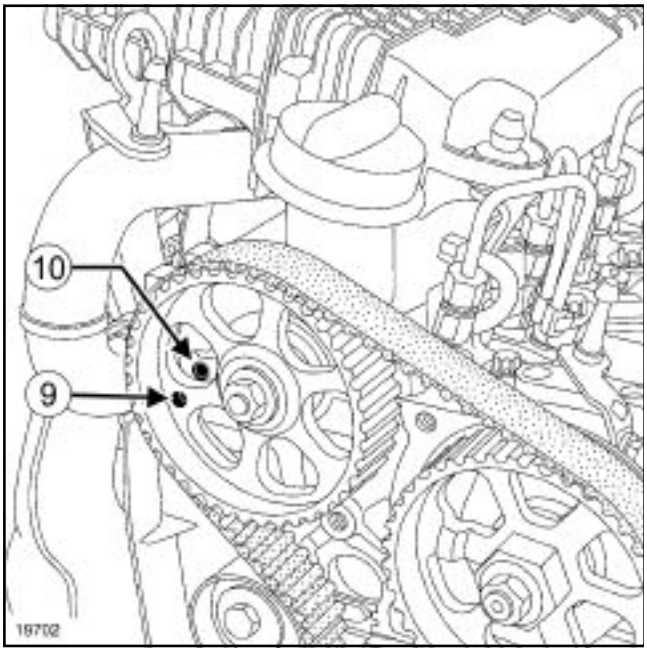
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

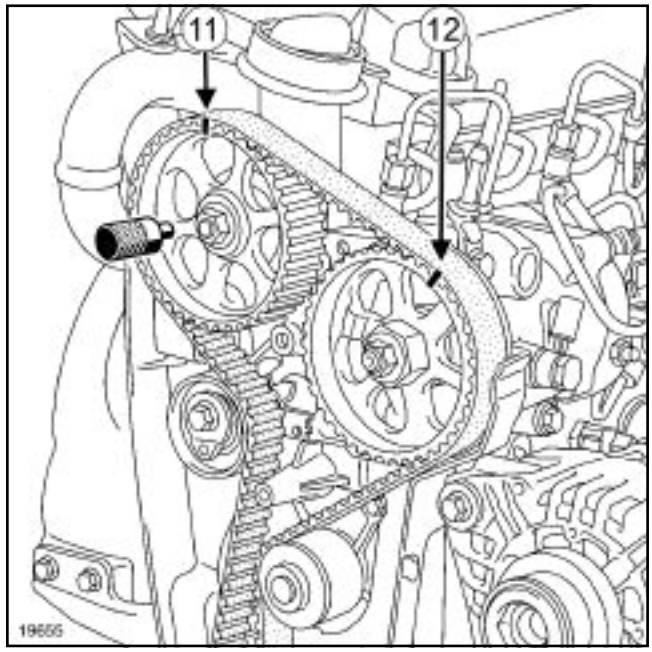


19702

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole (**9**) is opposite the cylinder head hole (**10**) .

Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

Bring the crankshaft slowly and smoothly against the TDC setting pin.



19655

Set the camshaft pulley using the **(Mot. 1430)** .

Note:

There must be **19 tooth belt grooves** between the camshaft pulley marks (**11**) and the high-pressure pump pulley (**12**)

Remove:

- the TDC setting pin **(Mot. 1489)** ,
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Note:

After two turns, the tensioning roller index markers may be in two different positions.

The rotation of the tensioning roller eccentric cam depends on the position.

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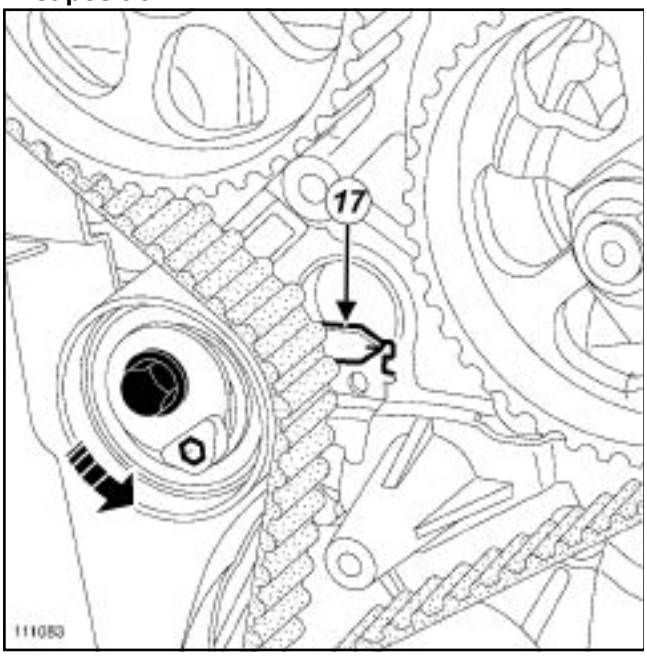
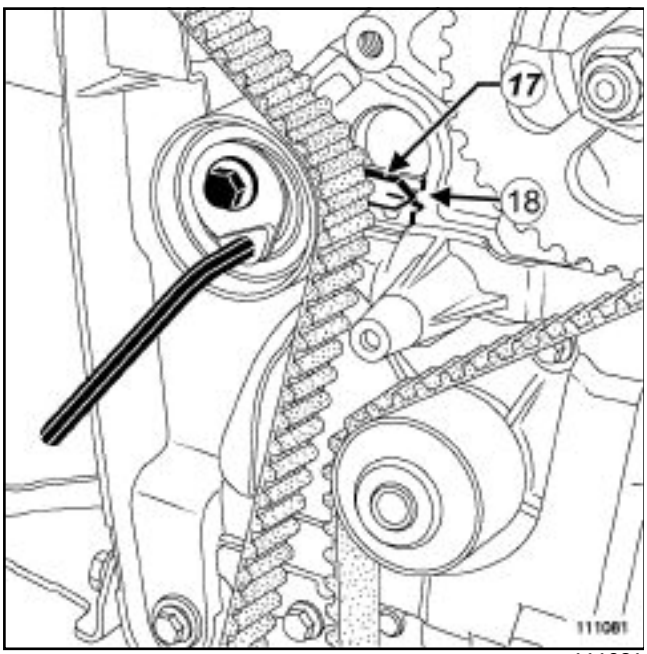
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

First position



111083



111081

Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index (**17**) in the middle of the timing window (**18**) , turning the key anti-clockwise.

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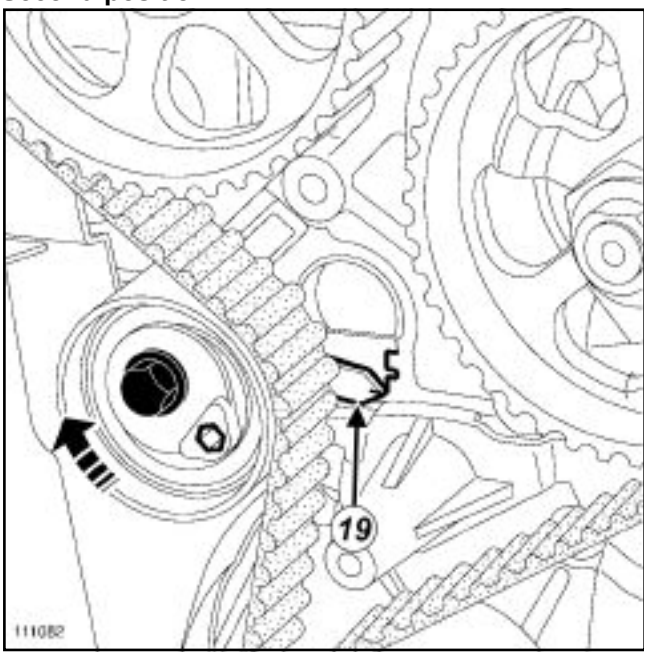
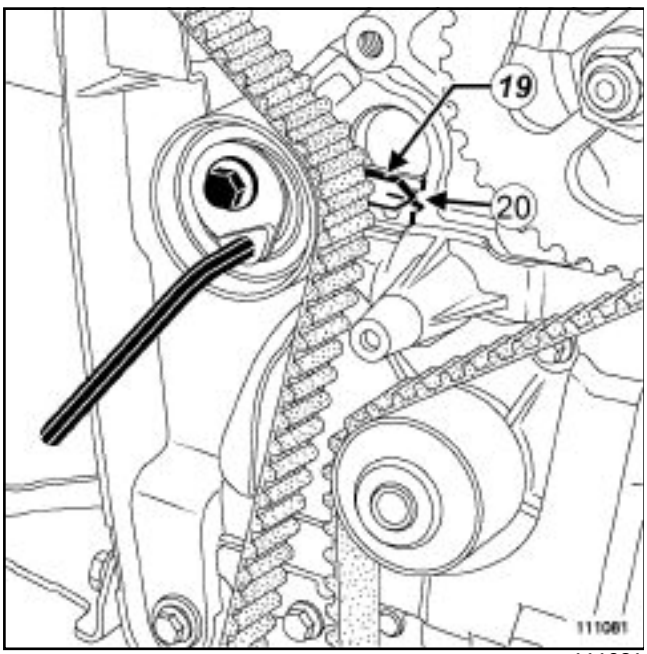
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790

Second position



111082



111081

Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

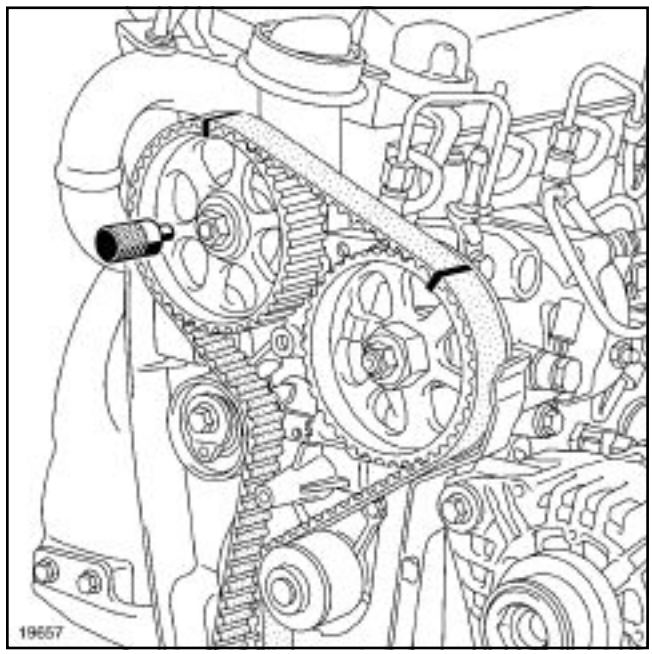
Gradually align the adjustable index (**19**) in the middle of the timing window (**20**) , turning the key clockwise.

Tighten to torque the **tensioning roller bolt to (27 Nm)** .

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole is opposite the cylinder head hole.

Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

Bring the crankshaft slowly and smoothly against the TDC setting pin.



19657

Set the camshaft pulley using the **(Mot. 1430)** .

If this is not possible, repeat the timing belt refitting operation.

Remove the following tools:

- TDC setting pin **(Mot. 1489)** ,
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)**

Place a drop of **SILICONE ADHESIVE SEALANT** on the threading of the TDC pin plug.

Tighten to torque the **TDC cap (20 Nm)** .

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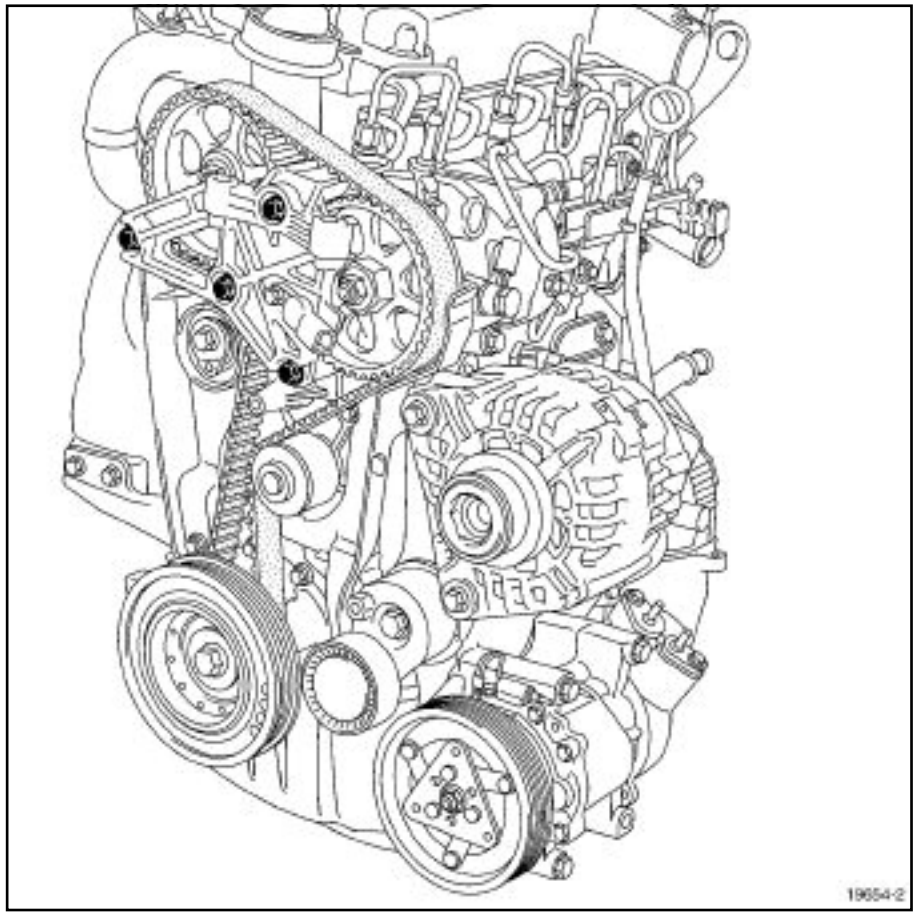
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19654-2

Refit the cylinder head suspended mounting.

Tighten to torque the **cylinder head suspended mounting bolt (21 Nm)** .

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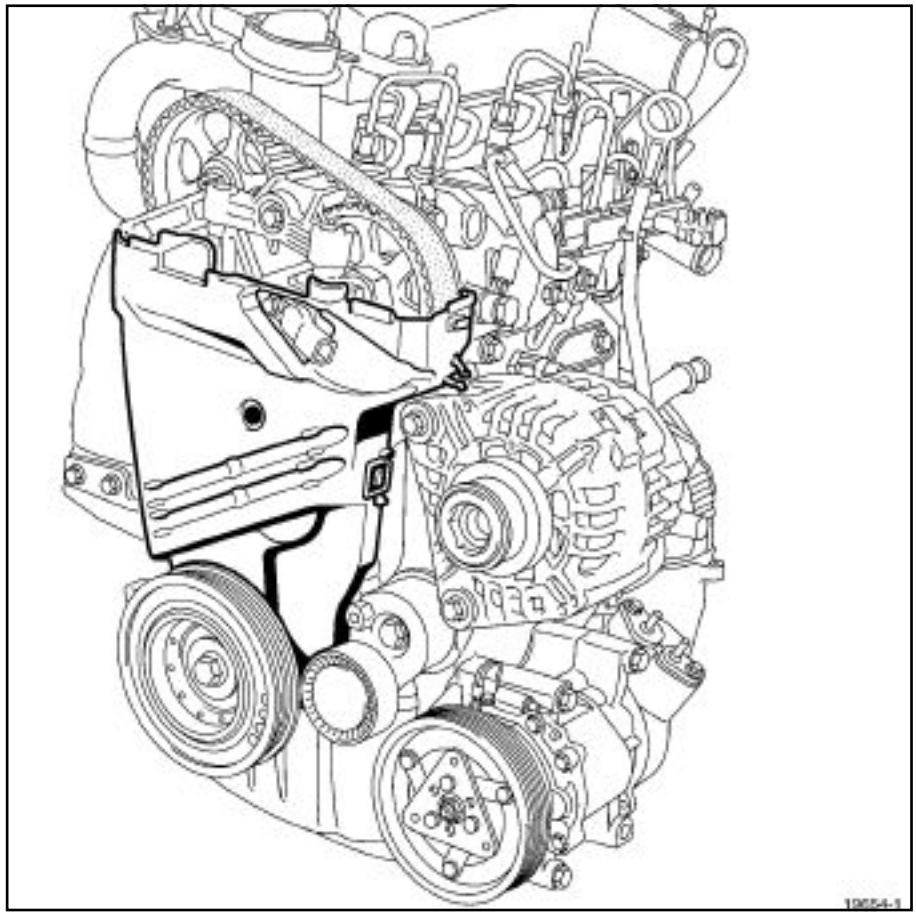
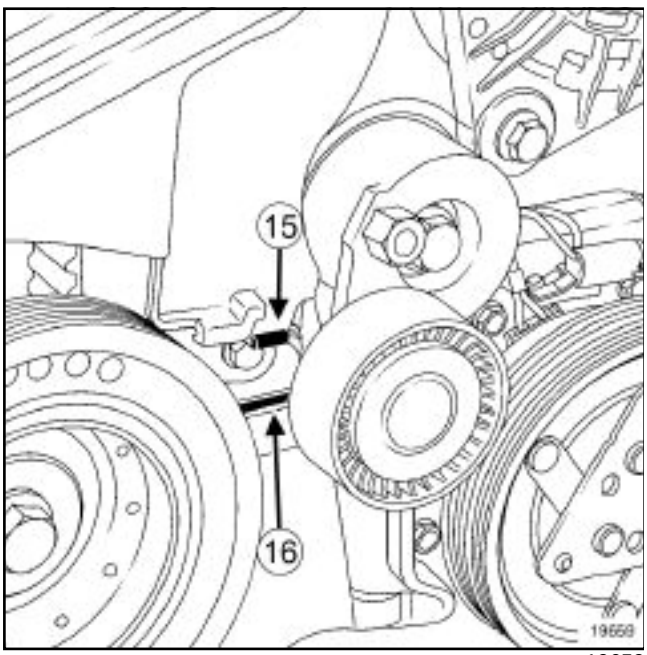
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19654-1



19659

Refit the timing cover, positioning the tab (**15**) in the inner timing cover hole (**16**) .

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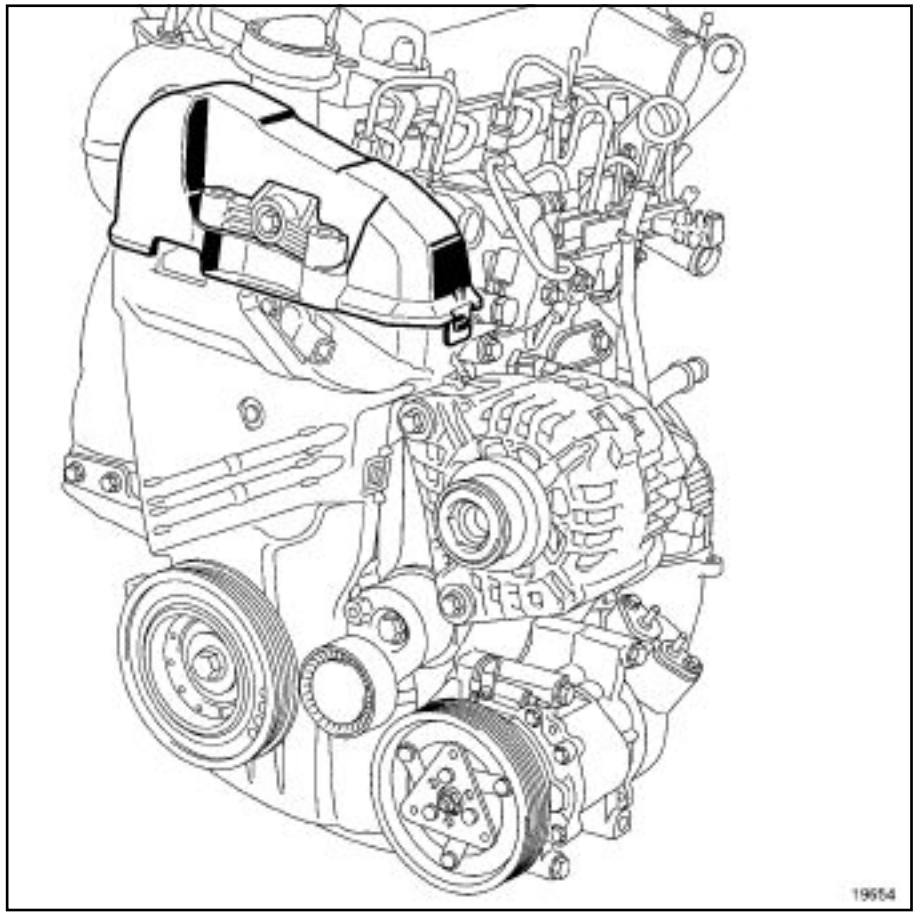
K9K, and 260 or 270 or 272 or 700 or 702 or 704 or 706 or 710 or 712 or 722 or 724 or 728 or 729 or 750 or 752 or 760 or 762 or 790



19654

Refit the high-pressure pump position sensor.

Tighten to torque the **high-pressure pump position sensor bolt (8 Nm)** .

Refit the upper timing cover.

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K9K, and 732 or 764

Special tooling required	
Mot. 1430	Set of 5 crankshaft and camshaft pulley timing pins.
Mot. 1489	TDC locating pin.

Tightening torques ▽	
tensioning roller bolt	**27 ± 2.7 Nm**
the camshaft pulley wheel bolts	**14 ± 1.4 Nm**
the tensioning roller bolt	**27 ± 2.7 Nm**
the camshaft pulley wheel bolts	**14± 1.4 Nm**
the crankshaft accessories pulley M14 bolt	**120 ± 12 Nm + 95° ± 15°**
TDC pin plug	**20 ± 2 Nm**
cylinder head suspended mounting bolts	**21 ± 2.1 Nm**
cylinder head suspended mounting bolts	**21 ± 2.1 Nm**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

WARNING
The belt must be replaced with a new one if it has been removed.

Never turn the engine in the opposite direction to its normal operating direction.

Do not run the engine without the accessories belt so as not to damage the crankshaft accessories pulley.

When replacing the belt, always replace the tensioning rollers and fixed rollers.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced

- Timing belt,
- Timing belt tensioning roller,
- Crankshaft accessories pulley bolt.

Consumables

- Silicone adhesive sealant, part no. **77 11 227 484**

III - ESSENTIAL EQUIPMENT

- Protective gloves,
- Allen key (**6 mm**),
- Female torx socket (**14**),
- Offset wrench (**18 mm**),
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type).

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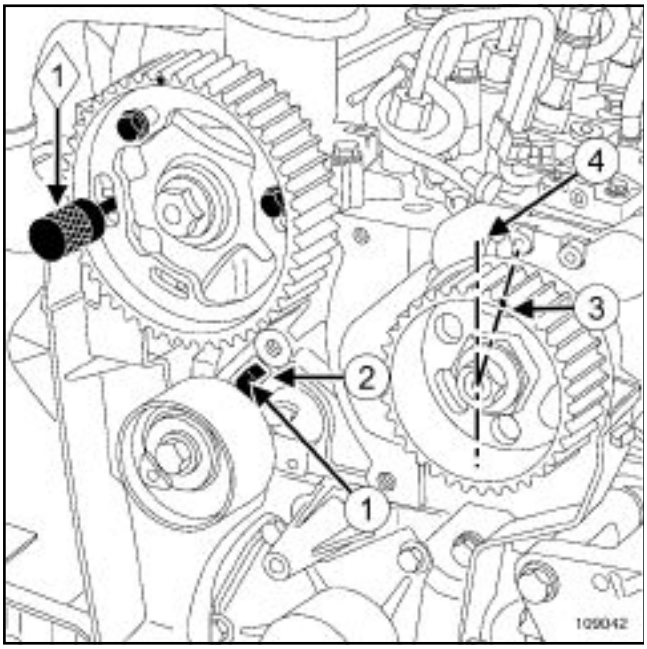
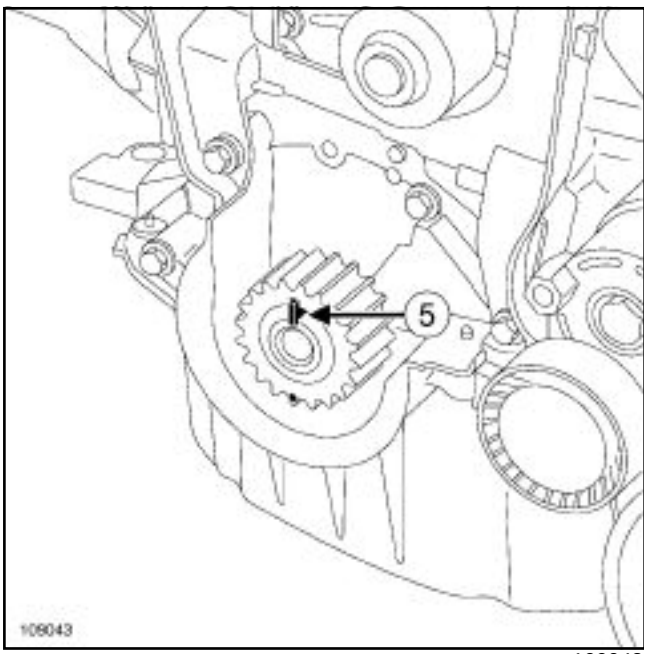
K9K, and 732 or 764

IV - REFITTING



109042



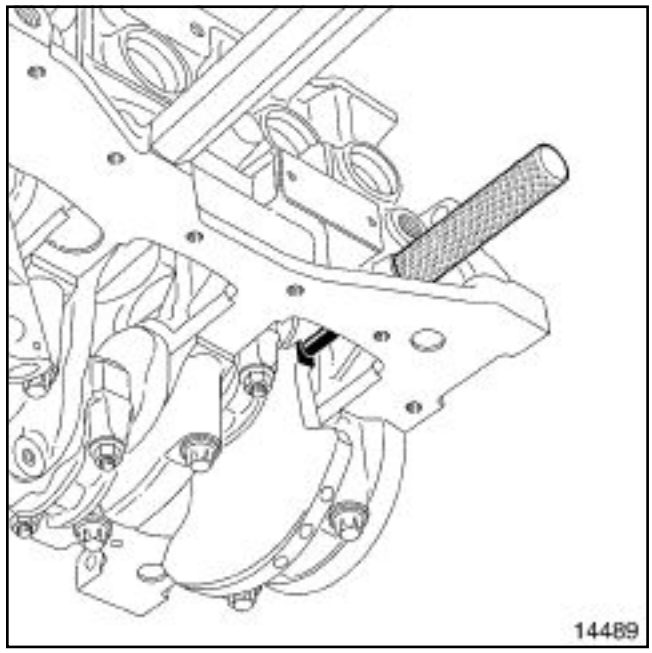
109043

Refit the timing tensioning roller.

Put the tensioning roller spigot (**1**) in the cylinder head groove (**2**) .

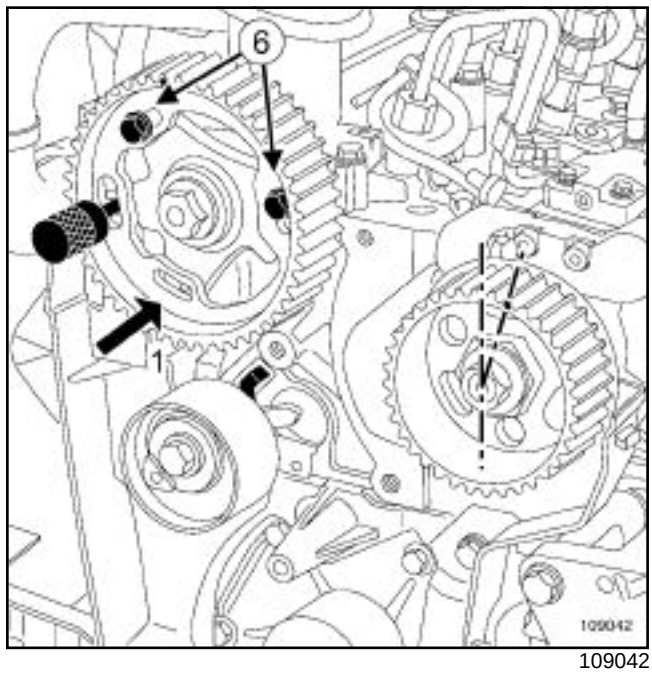
Engage the pin (**1**) **(Mot. 1430)** in the holes of the camshaft pulley and cylinder head, turning the camshaft using an **18 mm** offset wrench if necessary.

Check that the high-pressure pump mark (**3**) has shifted one tooth to the right of the vertical axle (**4**) .



14489

Position the crankshaft so that it presses on the TDC setting pin **(Mot. 1489)** (the crankshaft timing sprocket cotter ***(5)*** must face upwards).



109042

Remove one bolt from the camshaft pulley wheel.

Loosen the two other camshaft pulley wheel bolts (**6**) by one turn.

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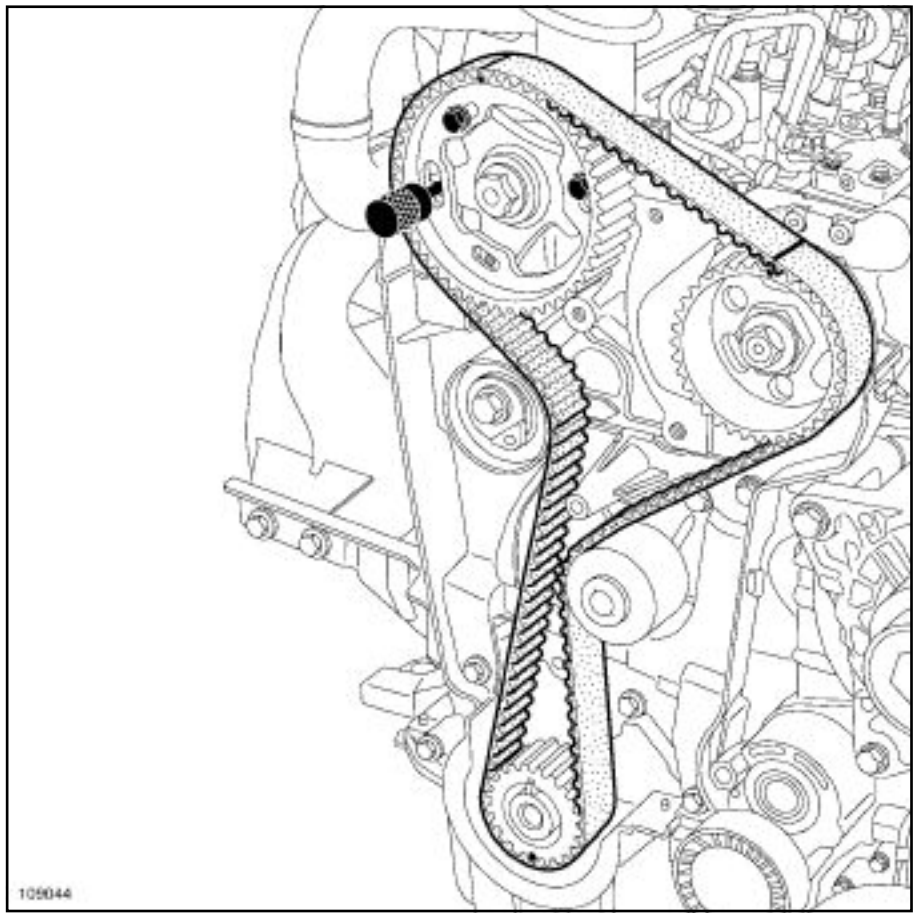
K9K, and 732 or 764



109044

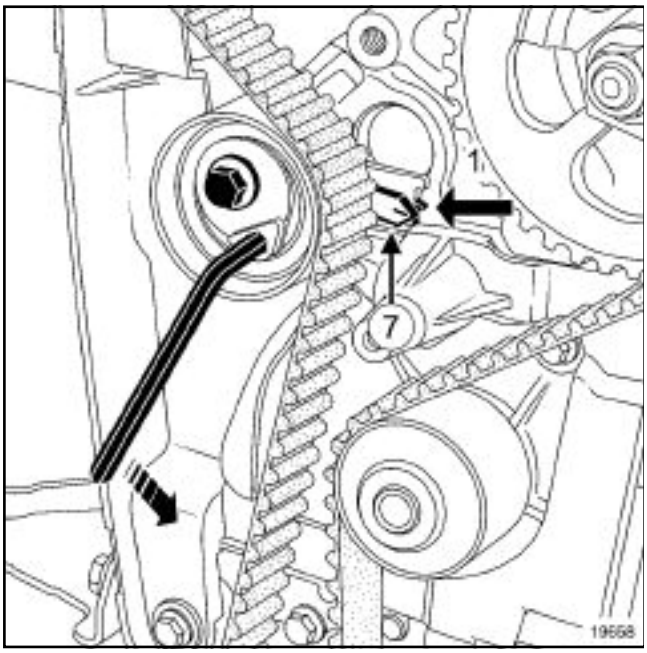
Fit the timing belt, starting with the crankshaft sprocket, by aligning the marks on the belt with those on the crankshaft sprockets, the camshaft and the high-pressure pump.

Note:

There should be 19 tooth belt grooves between the camshaft sprocket marks and the high-pressure pump, and 51 tooth belt grooves between the crankshaft sprockets and the high-pressure pump.

GETtheMANUALS.org

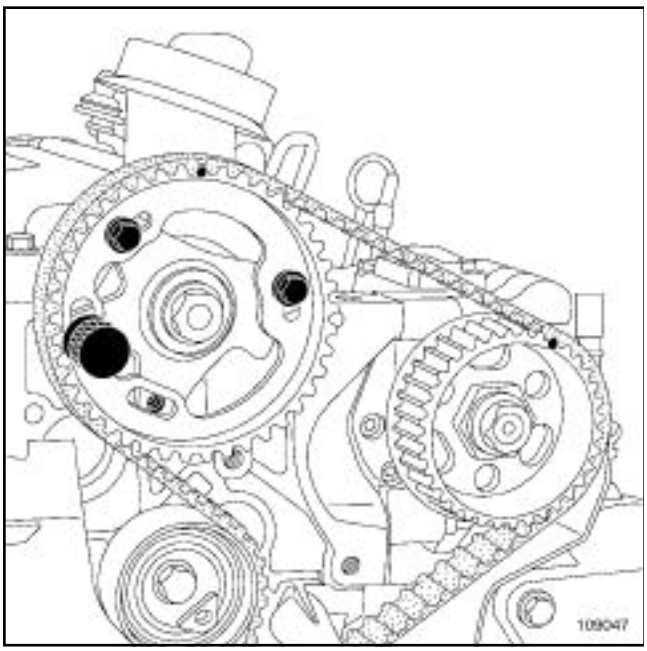
K9K, and 732 or 764



19658

Position the tensioning roller adjustable index (**7**) opposite the spigot, turning the eccentric cam anticlockwise using a **6 mm** Allen key.

Tighten to torque the **tensioning roller bolt (27 ± 2.7 Nm)** .



109047

Check that the camshaft pulley hub bolts are not fully up against the camshaft pulley wheel.

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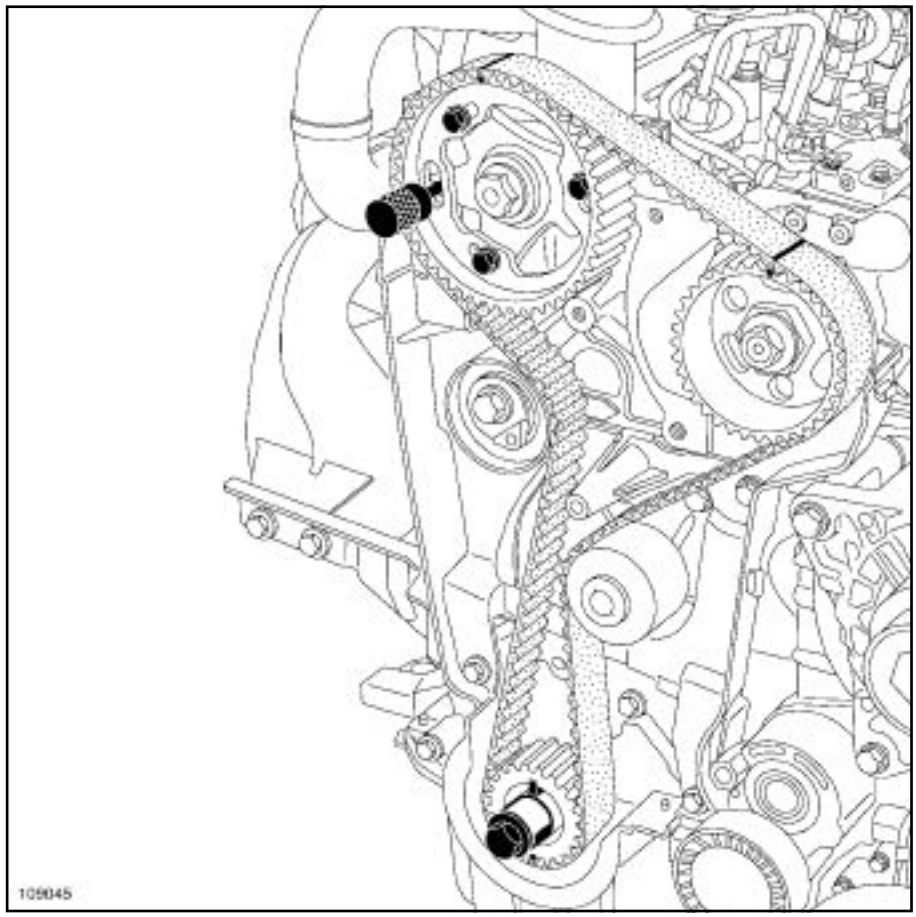
K9K, and 732 or 764



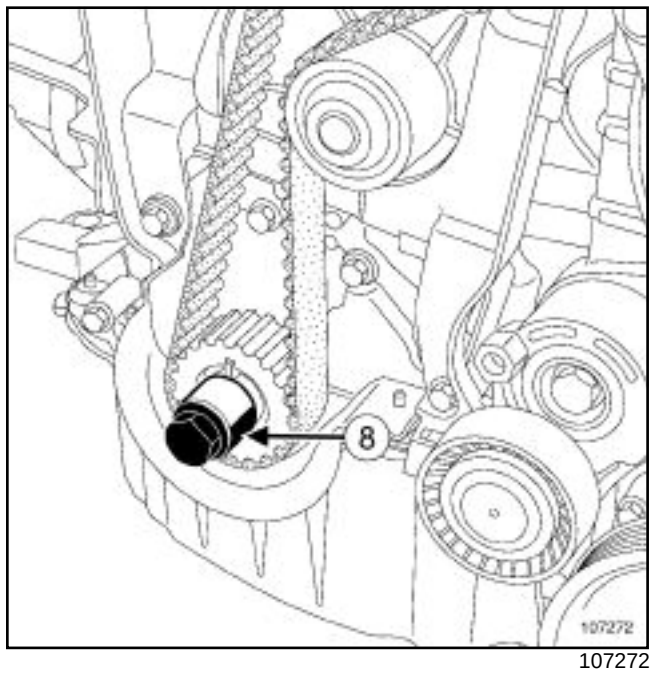
109045

Refit the bolt to the camshaft pulley wheel.

Tighten to torque **the camshaft pulley wheel bolts (14 ± 1.4 Nm)** .

Remove:

- the TDC setting pin **(Mot. 1489)** ,
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .



107272

Tighten the old crankshaft accessories pulley bolt fitted with a spacer (which does not cover the timing sprocket mark) (**8**) onto the crankshaft.

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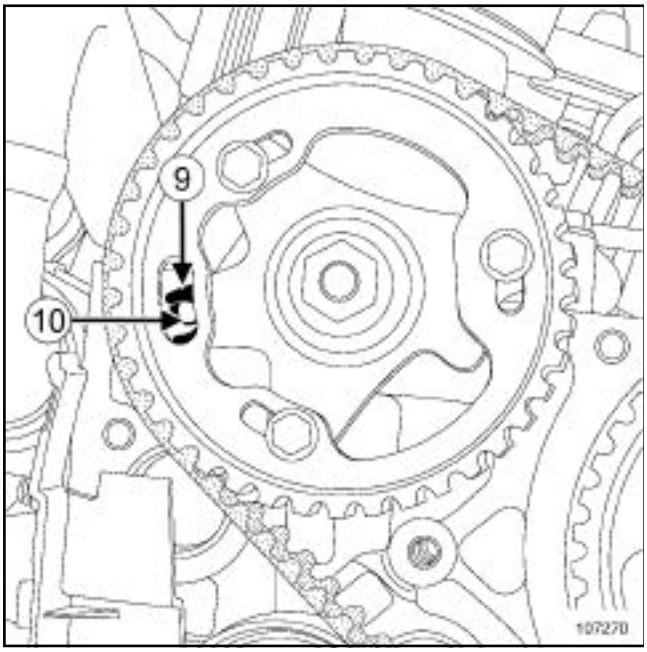
K9K, and 732 or 764

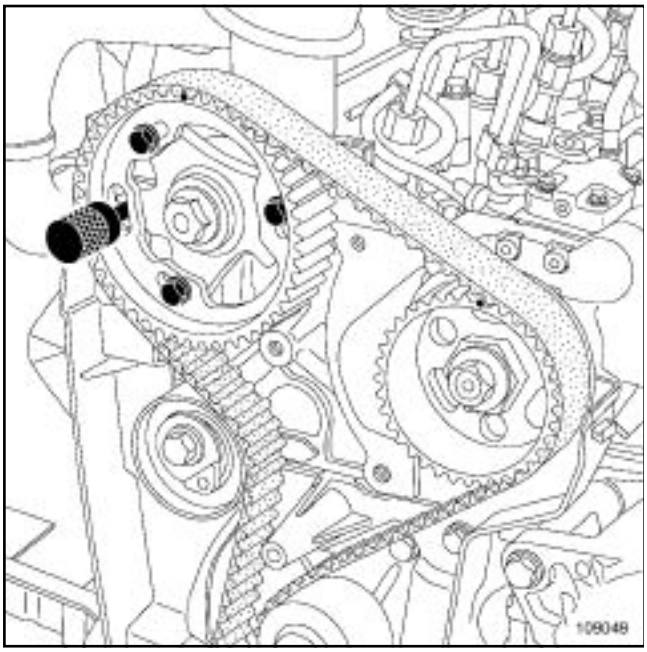


107270

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole (**9**) is opposite the cylinder head hole (**10**) .

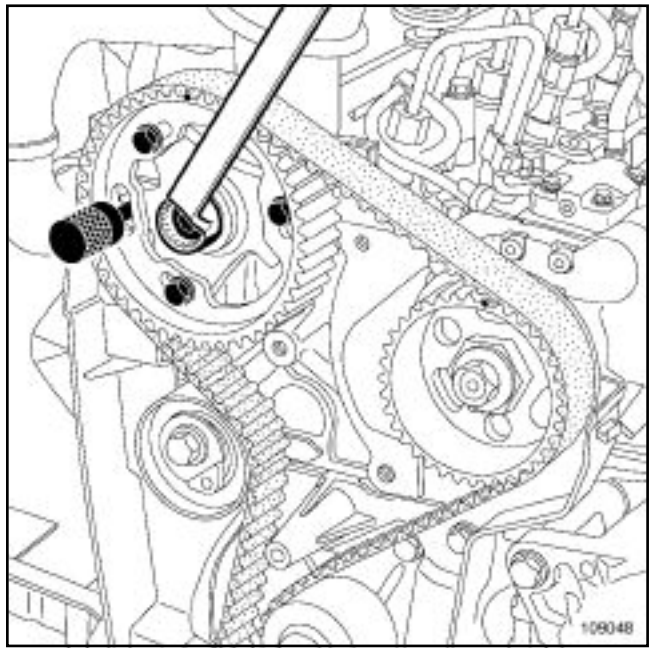
Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

Bring the crankshaft slowly and smoothly against the TDC setting pin.



109049

Set the camshaft pulley using the **(Mot. 1430)** .



109048

If the pin **(Mot. 1430)** does not engage:

loosen the camshaft pulley wheel bolts by one turn at most,

Turn the camshaft pulley hub using an **18 mm** offset wrench to set the camshaft pulley hub timing.

Do not retighten the camshaft pulley wheel bolts.

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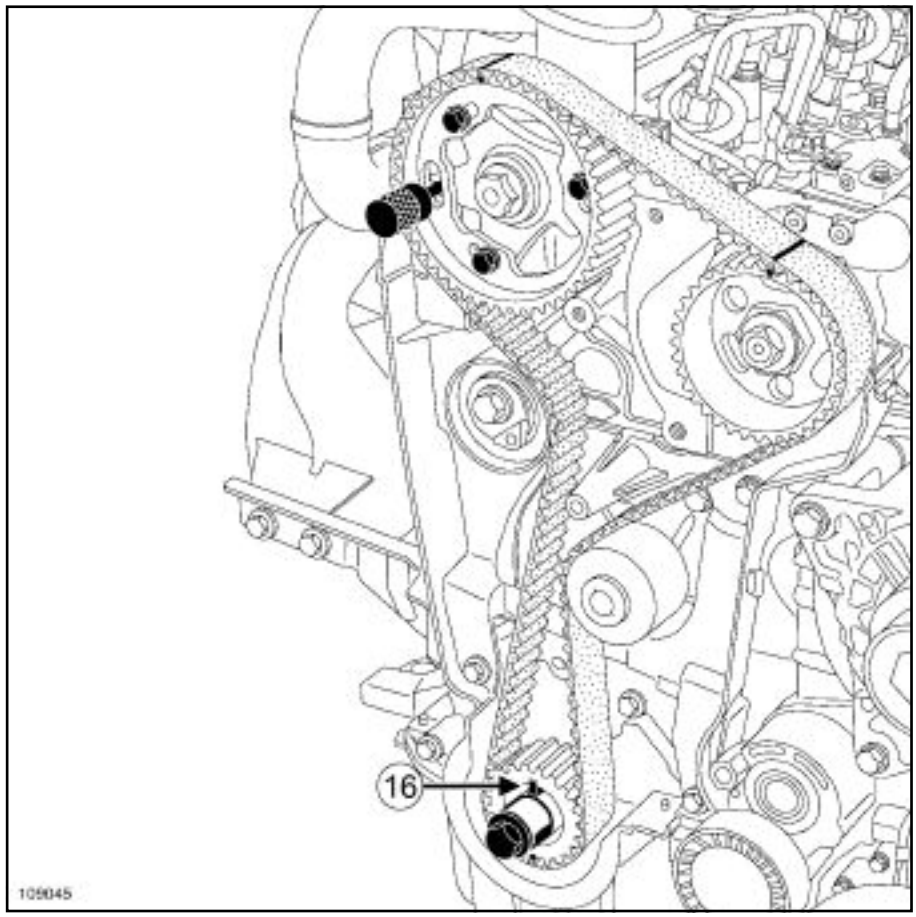
K9K, and 732 or 764



109045

Check that the crankshaft timing sprocket cotter (**16**) is positioned vertically at the top

Note:

After two turns, the tensioning roller index markers may be in two different positions.

The rotation of the tensioning roller eccentric cam depends on the position.

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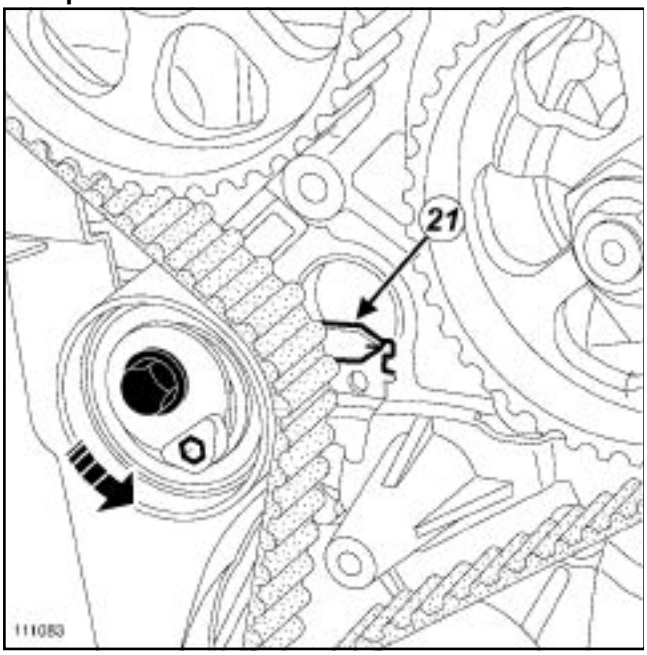
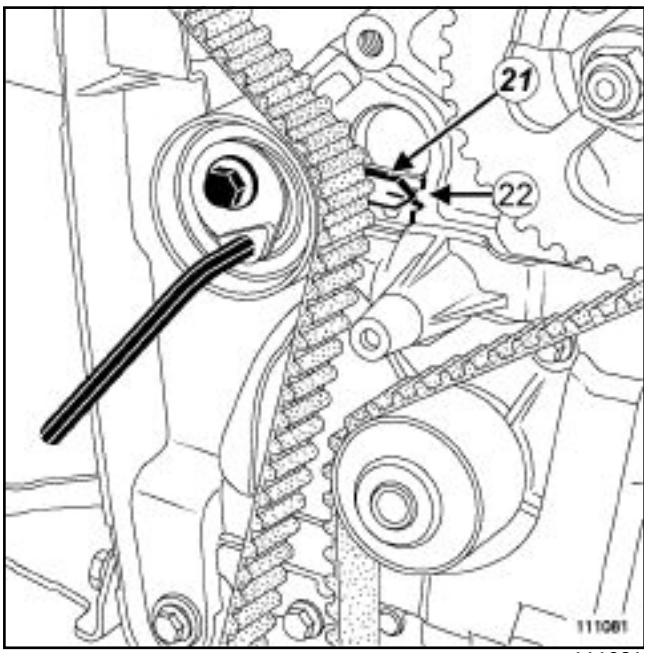
K9K, and 732 or 764

First position



111083

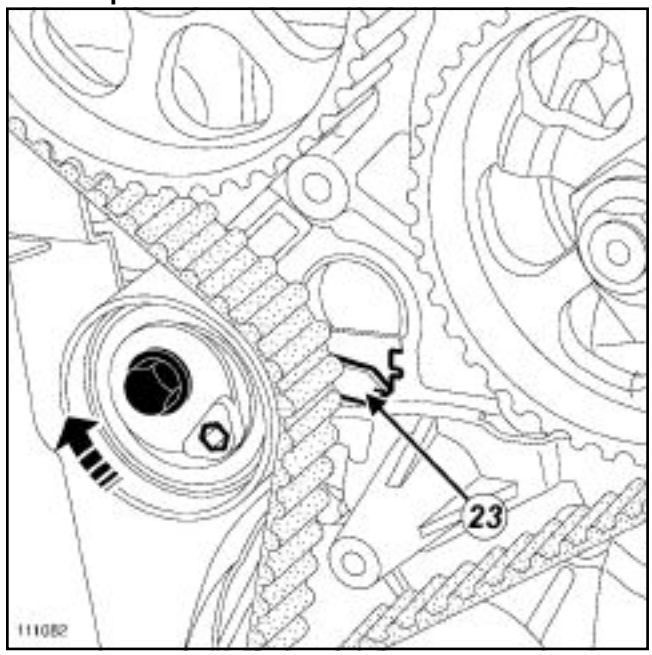


111081

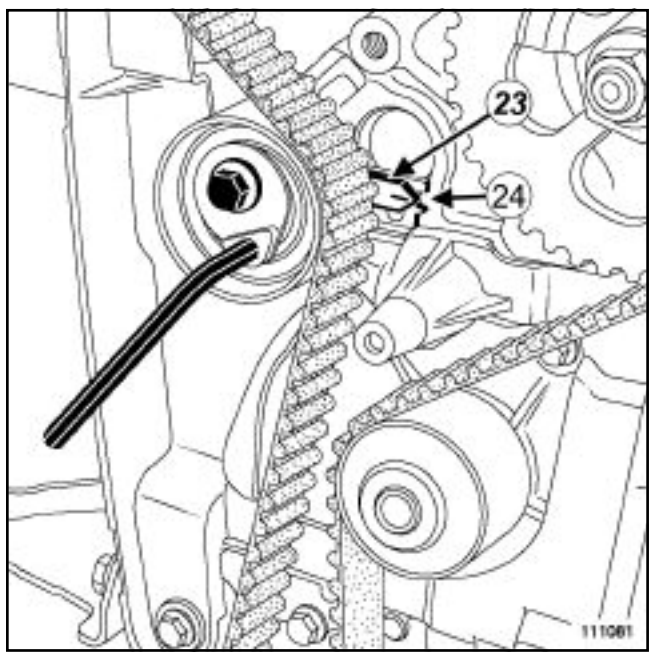
Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index (**21**) in the middle of the timing window (**22**) , turning the key anticlockwise.

Second position



111082



111081

Loosen the tensioning roller bolt by no more than one turn, holding it with a **6 mm** Allen key.

Gradually align the adjustable index (**23**) in the middle of the timing window (**24**) , turning the key clockwise.

Tighten to torque:

- **the tensioning roller bolt (27 ± 2.7 Nm)** ,
- **the camshaft pulley wheel bolts (14± 1.4 Nm)** .

Remove the following tools:

- TDC setting pin **(Mot. 1489)** ,

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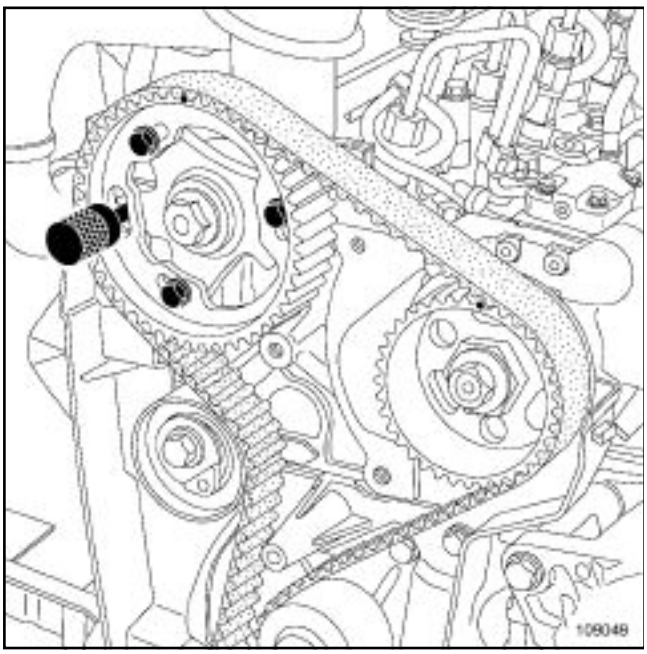
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Rotate the crankshaft clockwise through two revolutions (timing end), before the camshaft pulley hole is opposite the cylinder head hole.

Screw the TDC setting pin **(Mot. 1489)** into the cylinder block.

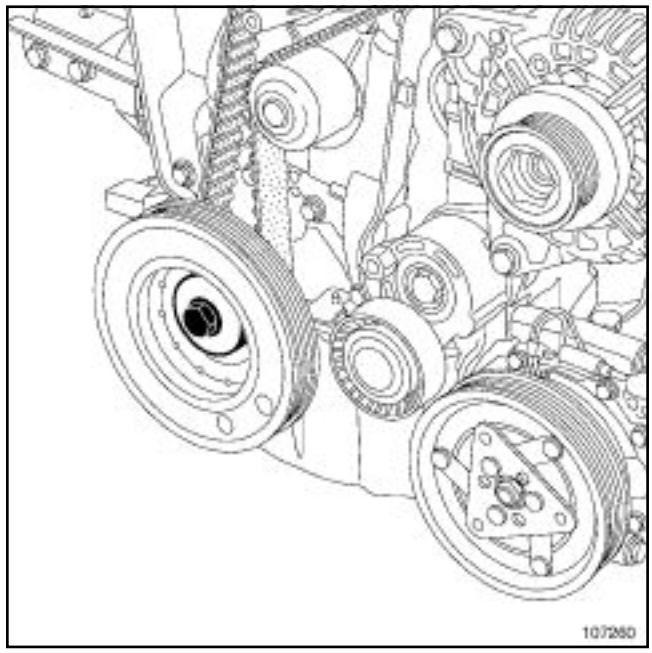
Bring the crankshaft slowly and smoothly against the TDC setting pin.



109049

Set the camshaft pulley using the **(Mot. 1430)** .

If this is not possible, repeat the timing belt refitting operation.



107260

Refit the accessories crankshaft pulley with a new bolt.

Tighten to torque and angle (crankshaft in contact with the TDC setting pin) **the crankshaft accessories pulley M14 bolt (120 ± 12 Nm + 95° ± 15°)** .

Remove the following tools:

- TDC setting pin **(Mot. 1489)** ,
- the set of 5 timing pins for the camshaft and crankshaft pulleys **(Mot. 1430)** .

Refit the TDC pin plug, coating the thread with **SILICONE ADHESIVE SEALANT** .

Tighten to torque the **TDC pin plug (20 ± 2 Nm)** .

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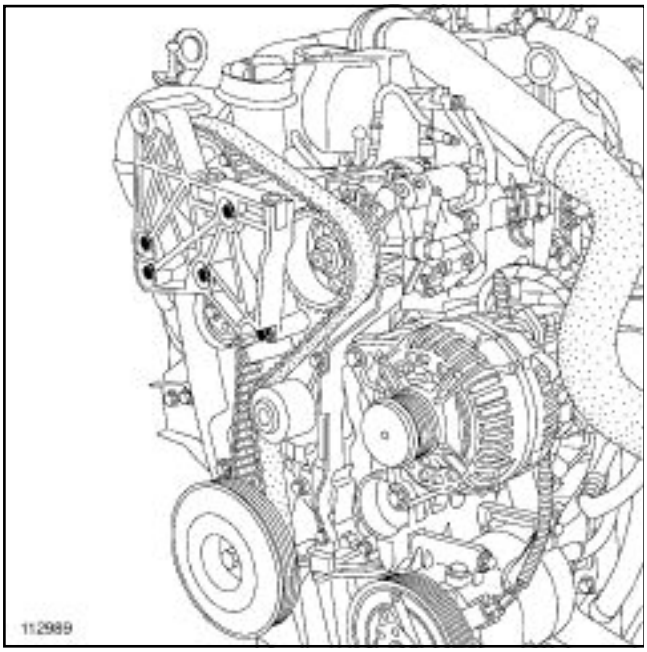
K9K, and 732



112989

Refit the cylinder head suspended mounting.

Tighten to torque the **cylinder head suspended mounting bolts (21 ± 2.1 Nm)** .

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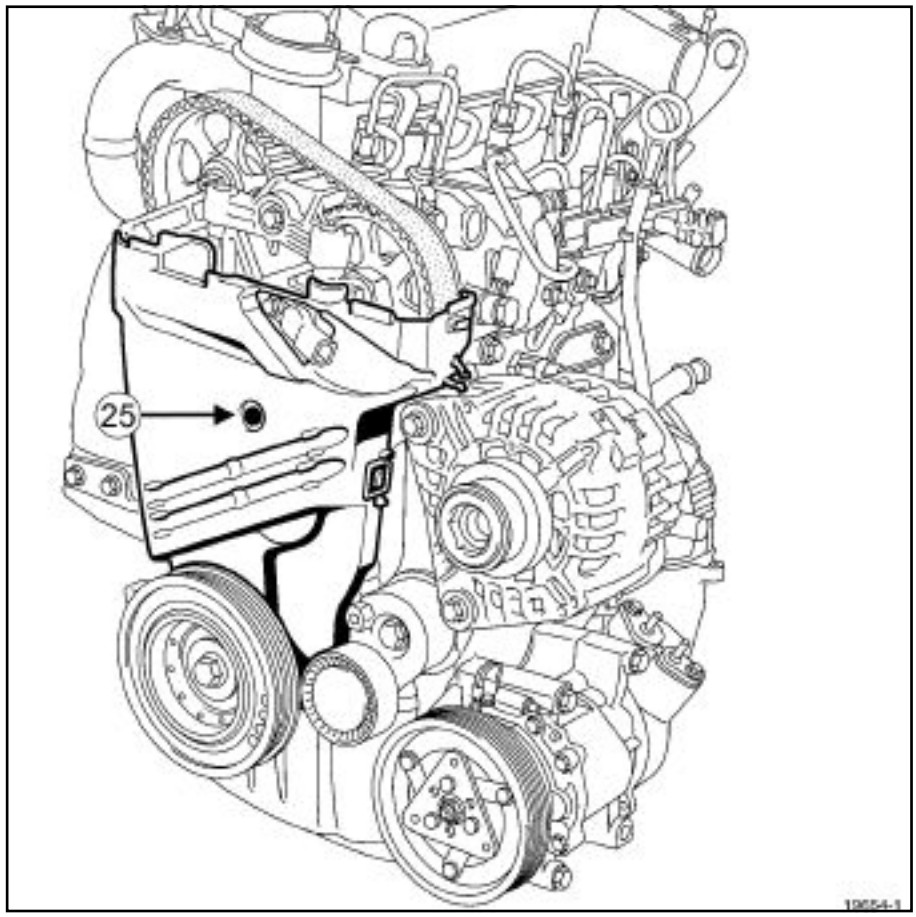
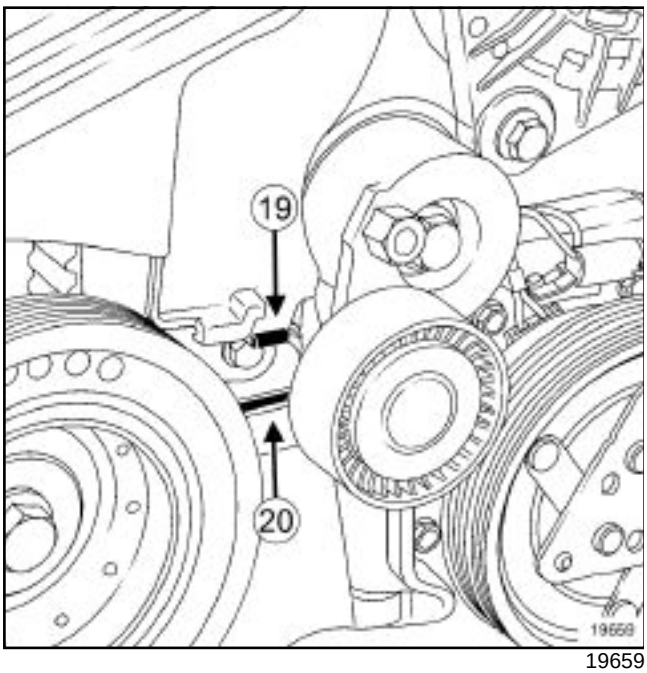


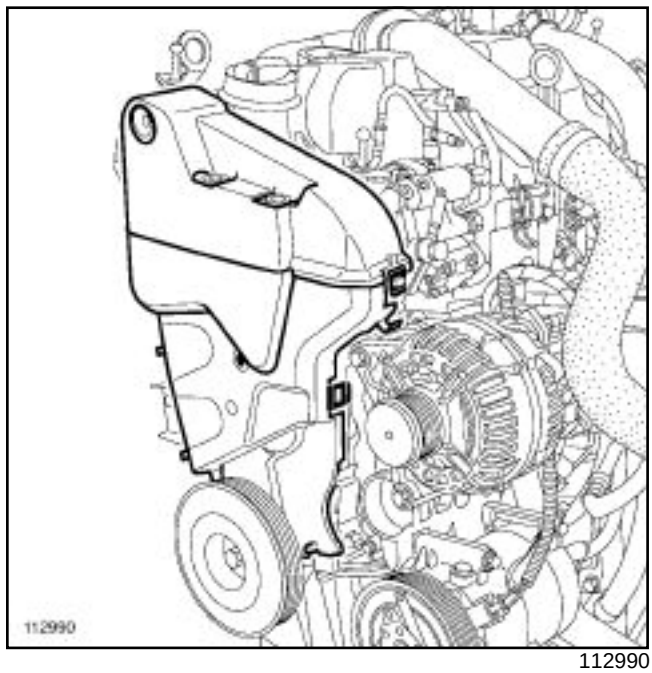
19654-1



19659

Refit:

- the lower timing cover, positioning the tab (**19**) in the inner timing cover hole (**20**) ,
- the timing cover plastic bolt (**25**) .


112990

Refit the upper timing cover.

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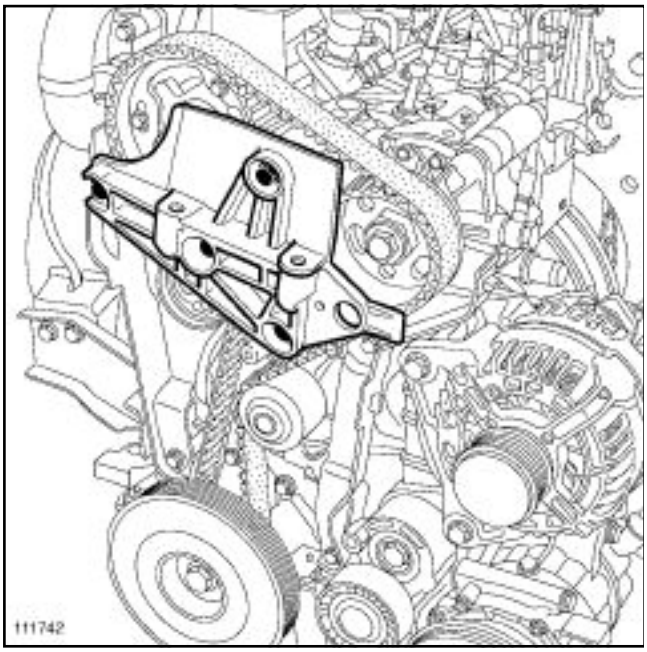
K9K, and 732 or 764

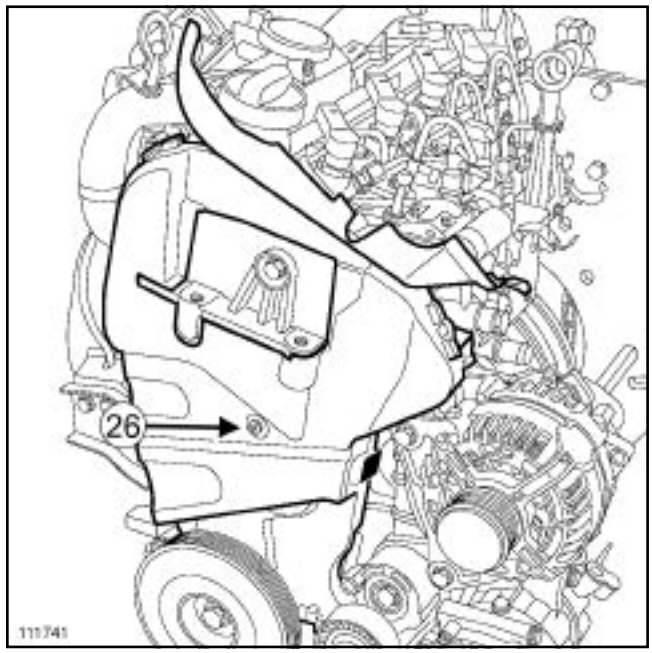
K9K, and 764



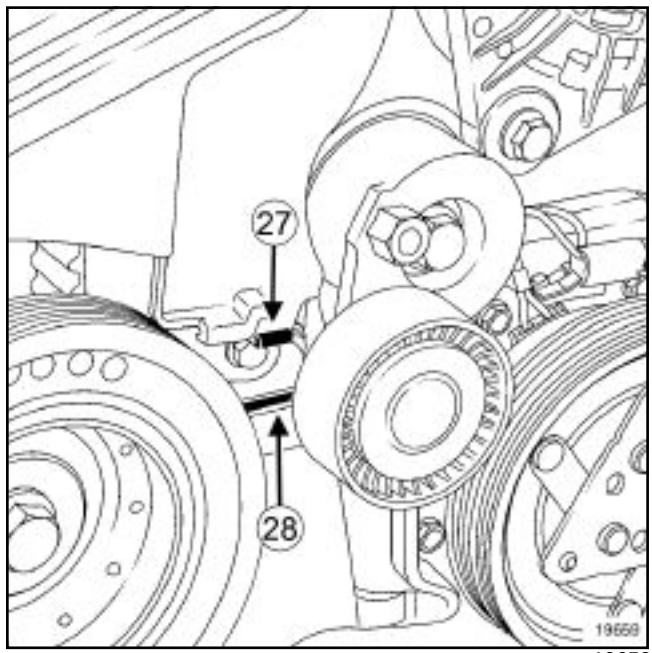
111742

Refit the cylinder head suspended mounting.

Tighten to torque the **cylinder head suspended mounting bolts (21 ± 2.1 Nm)** .



111741



19659

Refit:

- the timing cover, positioning the tab (**27**) in the inner timing cover hole (**28**) ,
- the timing cover plastic bolt (**26**) .

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