



N.T. 3286A

CB0M

Basic manual: M.R. 337

**Special features of vehicles
fitted with the F4R 730 engine**

For parts not dealt with in this technical note, refer to Workshop Repair Manual

M.R. 337

Cancels and replaces Technical Note 3243A

77 11 206 241

JULY 1999

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 by the manufacturer in the production of the various component units and accessories from which his vehicles are constructed".

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VALUES AND SETTINGS

Capacities - Grades

07

Units	Capacity in litres (approx.) *	Grade
Petrol engine (oil)	When draining	<p>European Union countries and Turkey</p> <p>PETROL</p> <p style="text-align: center;">- 15 °C</p> <p style="text-align: center;">- 30 °C - 20 °C - 10 °C 0 °C + 10 °C + 20 °C + 30 °C</p> <p style="text-align: center;">ACEA A2/A3 15W40-15W50</p> <p style="text-align: center;">ACEA A1*/A2/A3 10W30-10W40-10W50</p> <p style="text-align: center;">ACEA A1*/A2/A3 0W30-5W30</p> <p style="text-align: center;">ACEA A1*/A2/A3 0W40-5W40-5W50</p> <p style="text-align: center;">ACEA A1-98 standard * Oil for fuel economy</p>
		<p>Other countries</p> <p>If the lubricants specified for European Union countries are not available, the following specifications must be taken into account:</p> <p>PETROL</p> <p style="text-align: center;">- 15 °C</p> <p style="text-align: center;">- 30 °C - 20 °C - 10 °C 0 °C + 10 °C + 20 °C + 30 °C</p> <p style="text-align: center;">API SH/SJ 15W40-15W50</p> <p style="text-align: center;">API SH/SJ 10W40-10W50</p> <p style="text-align: center;">API SH/SJ 10W30</p> <p style="text-align: center;">API SH/SJ 5W30</p> <p style="text-align: center;">API SH/SJ 5W40-5W50</p> <p style="text-align: center;">Oil for fuel economy: API SJ-IL SAC GF2 standard</p>
F4R	4.75 5.1 (1)	

* Adjust using a dipstick
(1) Following replacement of the oil filter

VALUES AND SETTINGS

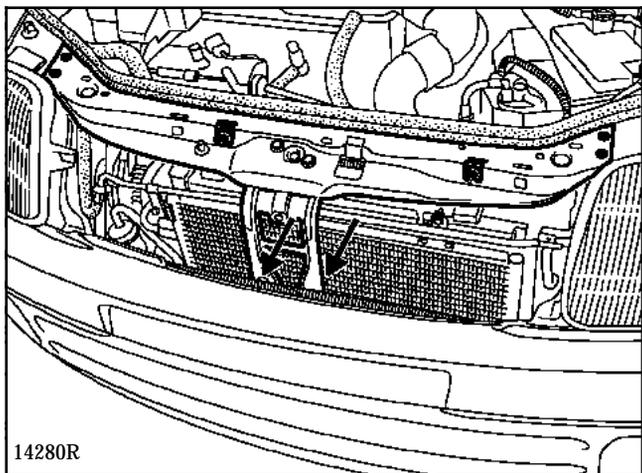
Capacities - Grades

07

Units	Capacity in litres	Grade	Special features
JC5 gearbox	3,1	All countries: TRANSELF TRX 75 W 80 W (API GL5 or MIL-L 2105 G or D standards)	
F4R cooling circuit	7	Glacéol RX (type D)	Protection to $-20\text{ °C} \pm 2\text{ °C}$ for hot, temperate and cold climates. Protection to $-37\text{ °C} \pm 2\text{ °C}$ for very cold climates.

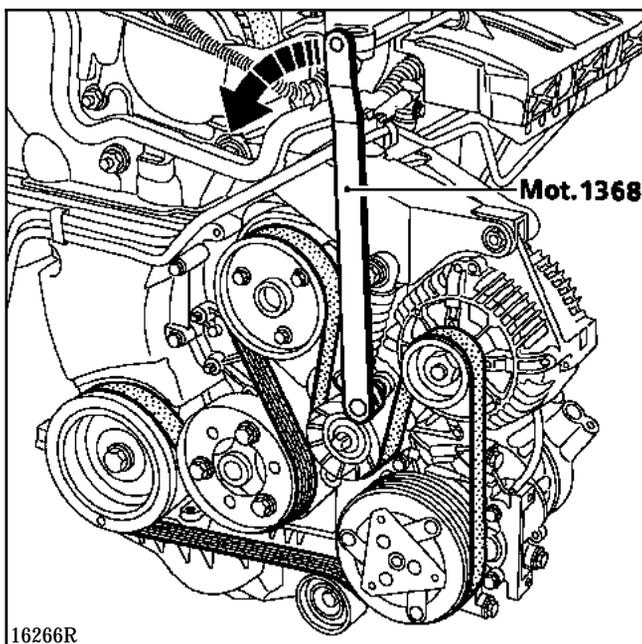
Removal of the accessories belt requires removal of:

- the front bumper,
- the radiator grille,
- the upper crossmember,
- the suspended engine mounting.



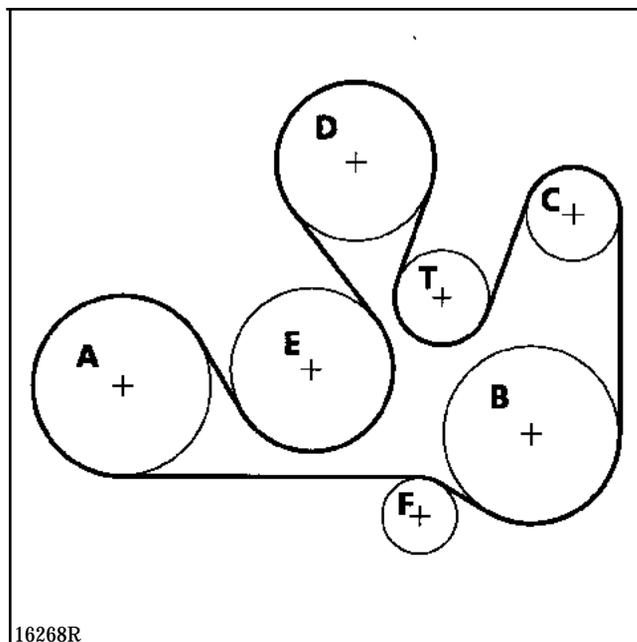
To remove the belt, tilt the accessories belt tensioner using tool **Mot. 1368** and a ratchet attachment, in the direction indicated below.

NOTE: beware of the movement of the tool caused by the rotation of the tensioner.



ALTERNATOR, POWER STEERING AND AIR CONDITIONING

- A Crankshaft
- B Air conditioning compressor
- C Alternator
- D Power steering pump
- E Coolant pump
- F Pulley
- T Automatic tensioner



ESSENTIAL SPECIAL TOOLS	
Mot. 799-01	Tool for immobilising pinions for toothed timing belt
Mot. 1054	Top Dead Centre pin
Mot. 1496	Tool for setting the camshafts
Mot. 1509	Tool for immobilising the camshaft pulleys
Mot. 1509-01	Accessory for tool Mot. 1509
Mot. 1512	Tool for fitting the exhaust camshaft seal
Mot. 1517	Tool for fitting the inlet camshaft seal
ESSENTIAL EQUIPMENT	
Angular tightening wrench	

There are two very distinct procedures for setting the timing.

WARNING: it is essential to refit the lower timing cover before the crankshaft accessories pulley.

1st PROCEDURE

The first procedure is applied in the event of replacement of any components which require slackening of the exhaust camshaft pulley and the inlet camshaft phase shifter.

When this operation is carried out, it is essential to change:

- the exhaust camshaft pulley nut,
- the inlet camshaft phase shifter bolt,
- the camshaft seals,
- the phase shifter blanking piece seal.

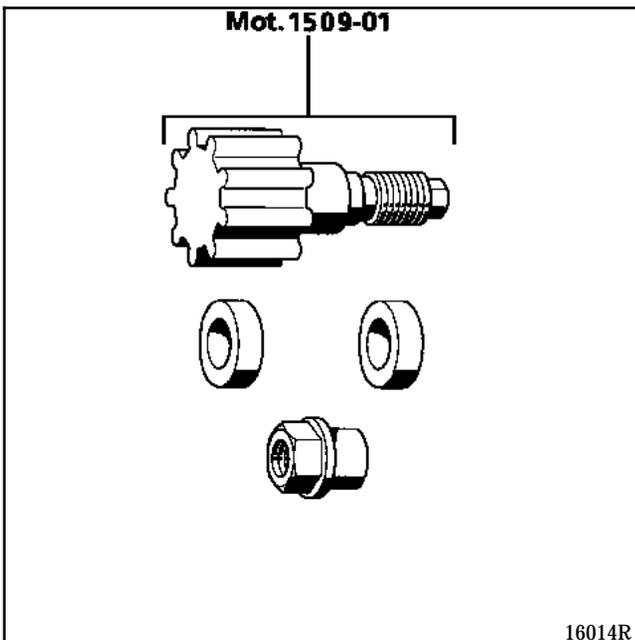
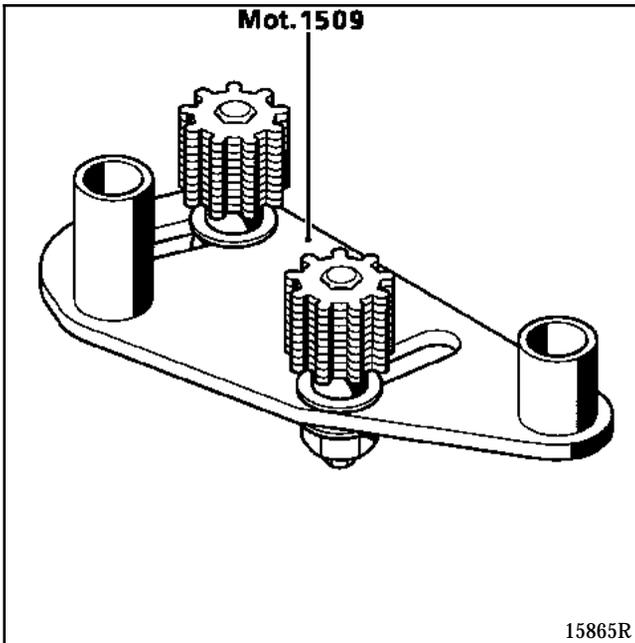
VALUES AND SETTINGS

Timing belt tensioning procedure

07

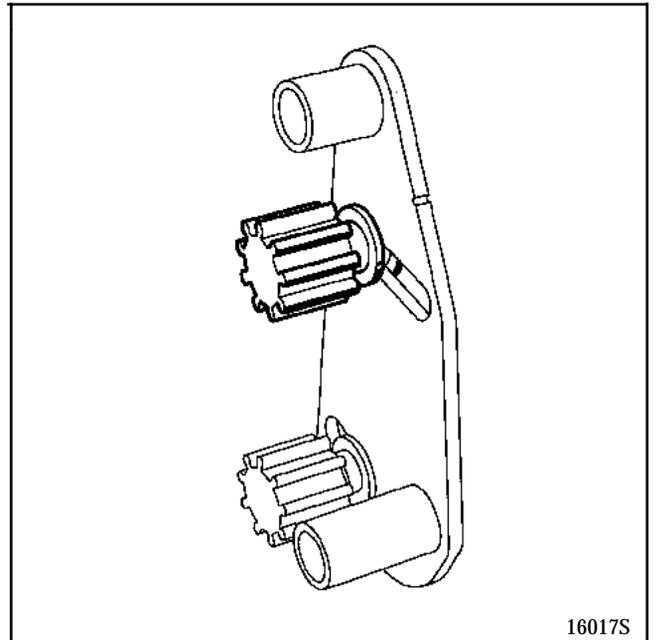
Procedure for slackening the exhaust camshaft pulley and the inlet camshaft phase shifter.

The operation is carried out using tools Mot. 1509 and Mot. 1509-01.

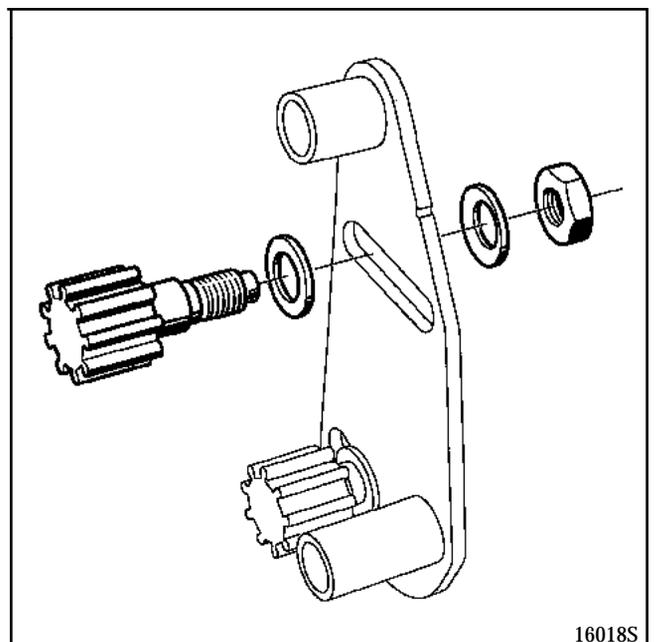


Preparation of tool Mot. 1509

Remove the upper toothed pinion from the support.



Fit in its place the toothed pinion of tool Mot. 1509-01 (reusing the two washers and the nut of tool Mot. 1509).

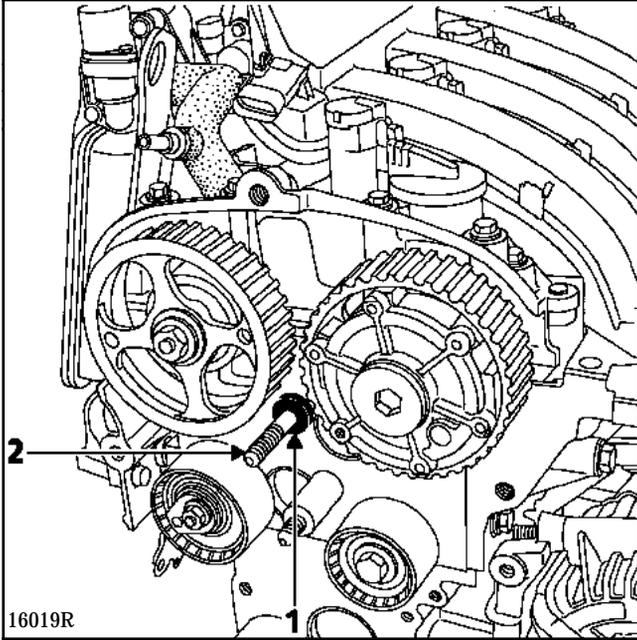


VALUES AND SETTINGS

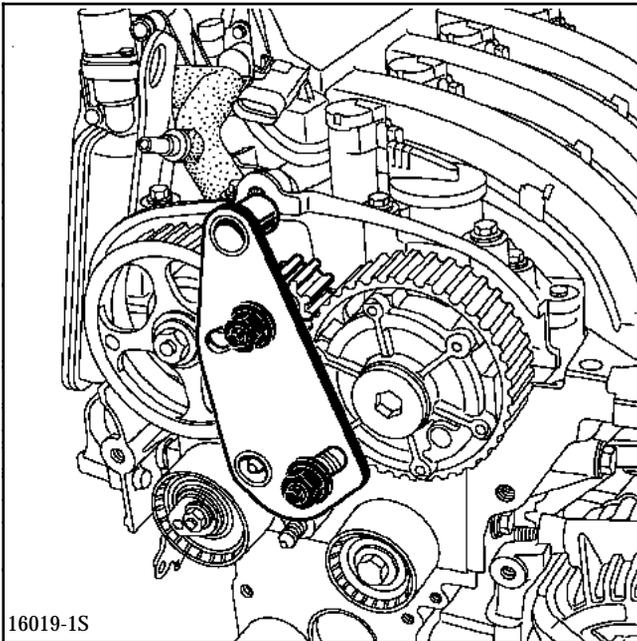
Timing belt tensioning procedure

Fit:

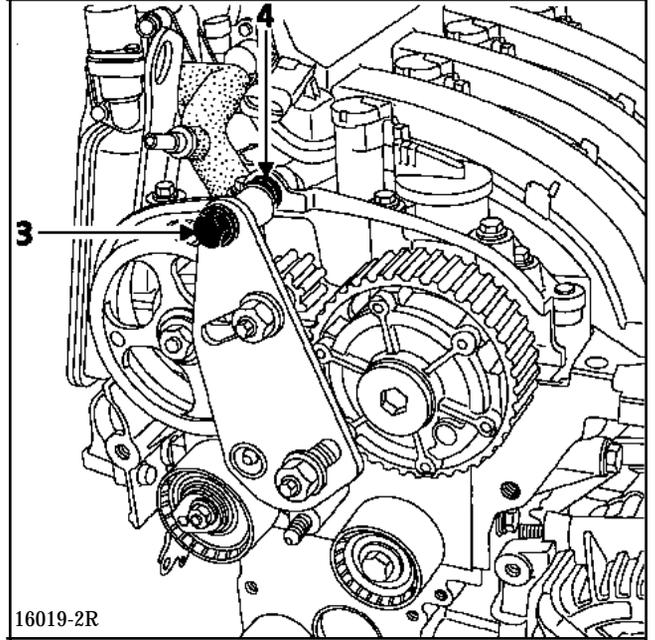
- the spacer (1) of tool Mot. 1509-01 on the stud (2),



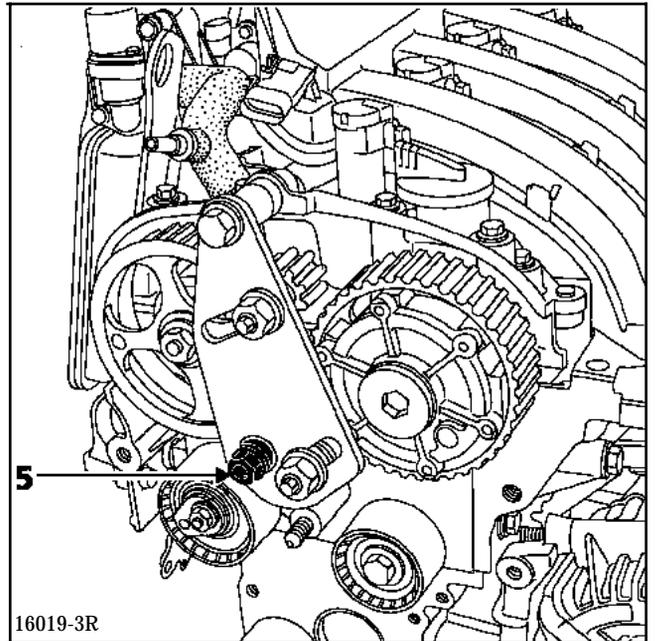
- tool Mot. 1509 as indicated on the diagram below,



- the upper bolt (3) positioning the spacer (4) of tool Mot. 1509-01 between the tool and the camshaft bearing cap casting (do not fully tighten the bolt).



- the shouldered nut (5) of tool Mot. 1509-01.



VALUES AND SETTINGS

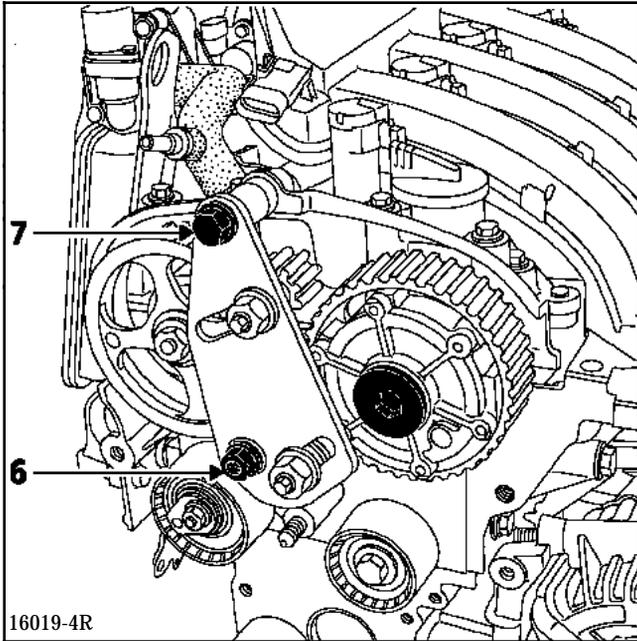
Timing belt tensioning procedure

07

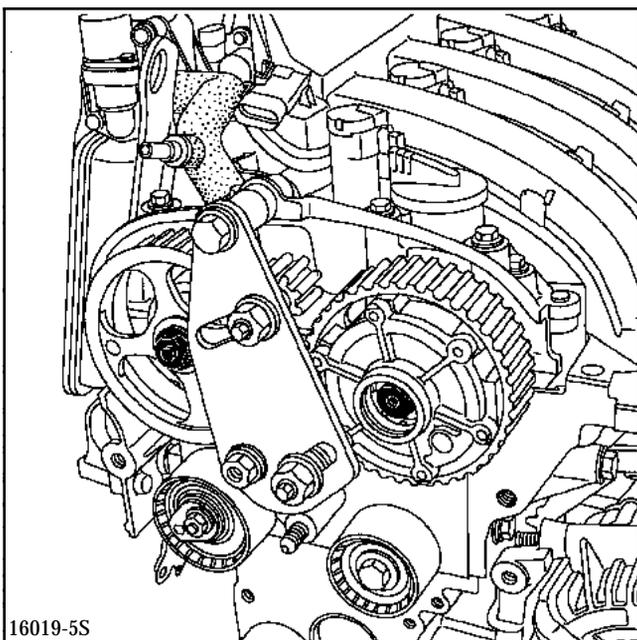
Tighten the shouldered nut (6) and the bolt (7), then immobilise the pulleys using the toothed pinions of tool **Mot. 1509**.

Remove:

- the inlet camshaft phase shifter blanking piece using a **14 mm** hexagonal wrench,

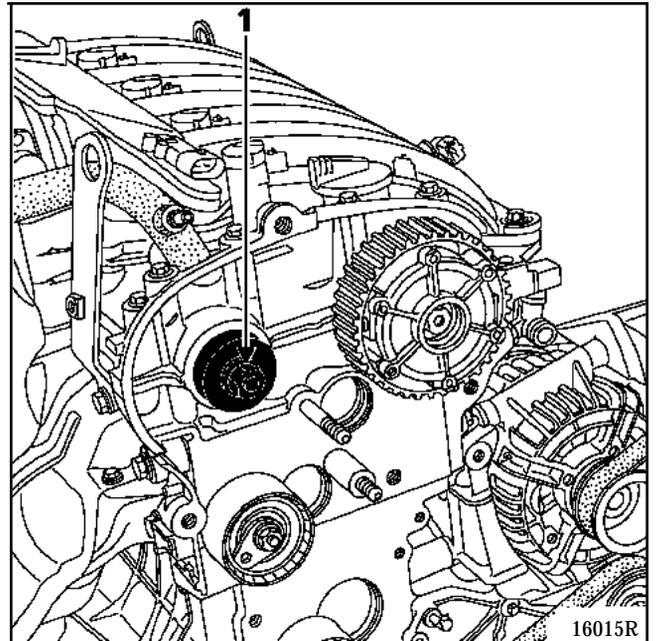


- the exhaust camshaft pulley nut,
- the inlet camshaft phase shifter bolt.

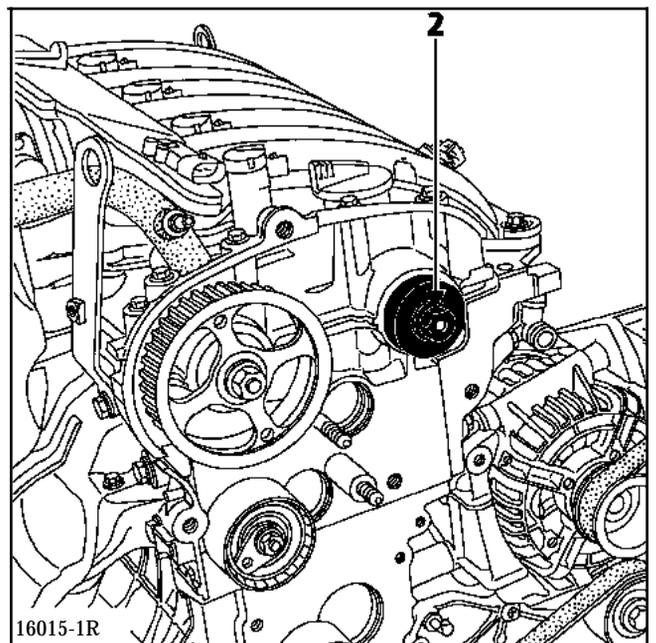


Replacement of the camshaft seals

Fit the **exhaust camshaft seal** using tool **Mot. 1512** and the old nut (1).



Fit the **inlet camshaft phase shifter seal** using tool **Mot. 1517** and the old bolt (2).



NOTE: to use tool **Mot. 1517**, the hole must be altered to a diameter of **13 mm**.

Setting the timing

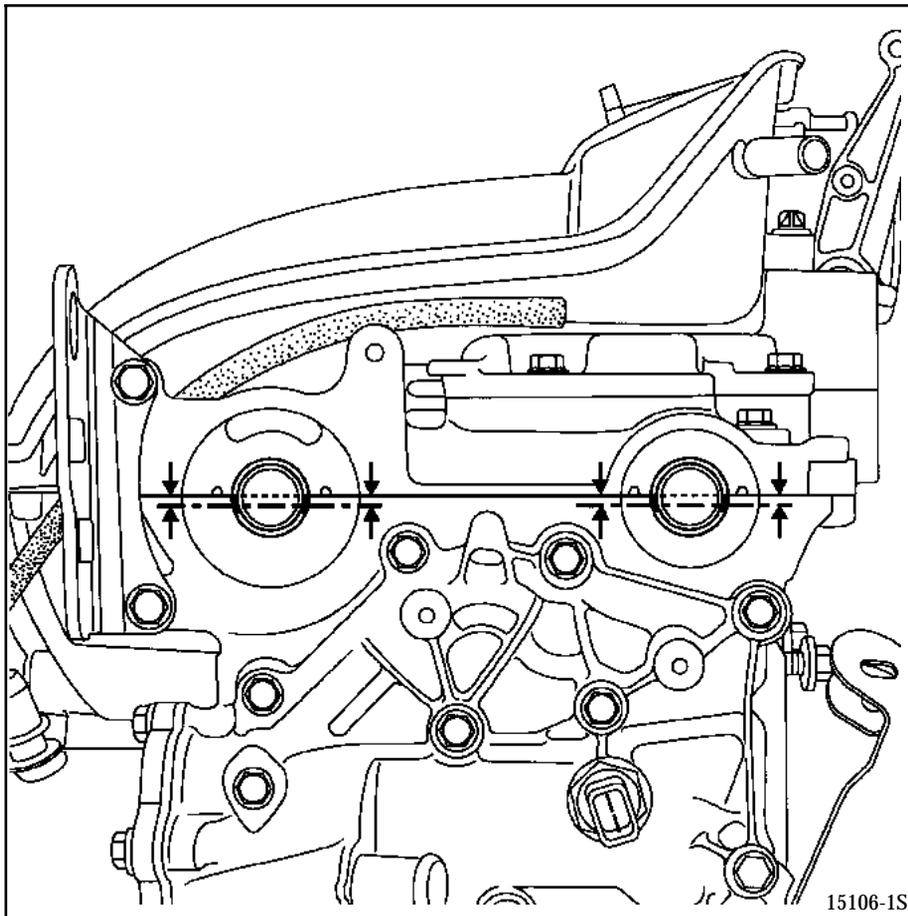
WARNING:

it is essential to degrease the end of the crankshaft (timing end), the bore and the contact surfaces of the timing, the accessories pulley contact surfaces and the ends of the camshafts (timing end), the bores and the contact surfaces of the exhaust camshaft pulley and of the inlet camshaft phase shifter. This is to prevent sliding between the timing, the crankshaft, the exhaust camshaft pulleys and the inlet phase shifter which could destroy the engine.

NOTE:

to make it easier to place the grooves in a horizontal position, fit the camshaft pulley and the phase shifter, then screw in the **old pulley nut** and the **old phase shifter bolt** tightening them to **1.5 daN.m MAXIMUM**. Check that the **pistons are positioned at mid-travel** (to prevent any contact between the valves and the pistons).

Position the camshaft grooves as **indicated on the diagram below** (turning the camshafts using tool Mot. 799-01 if necessary).

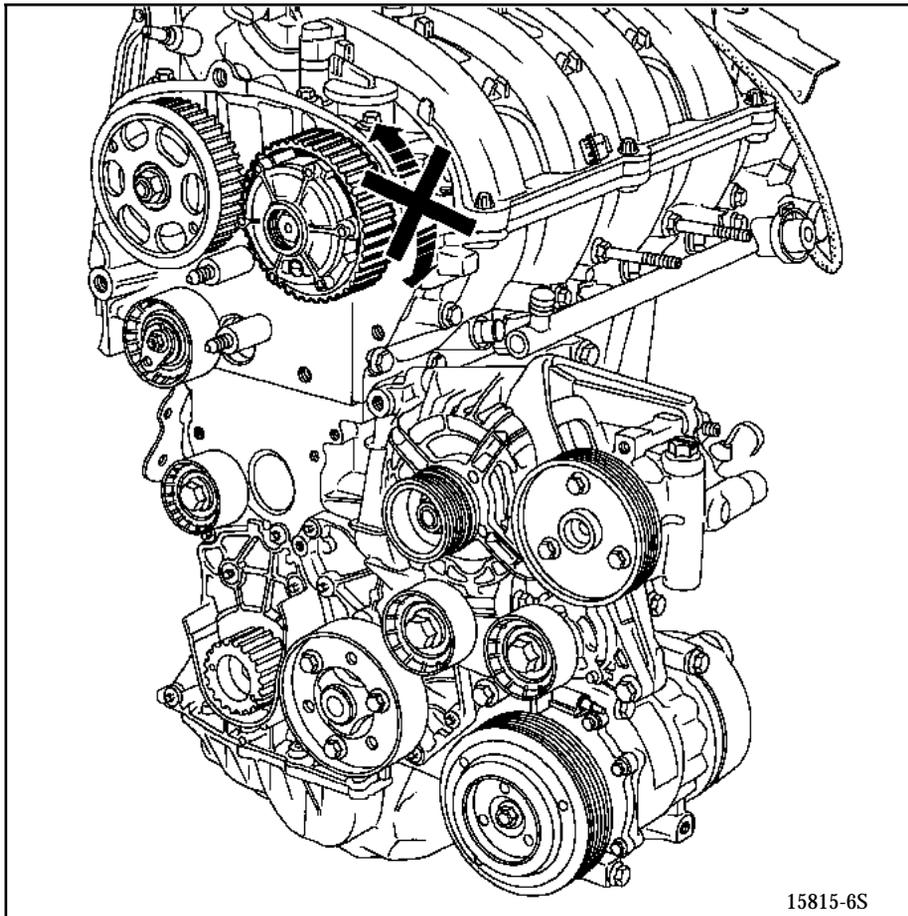


VALUES AND SETTINGS

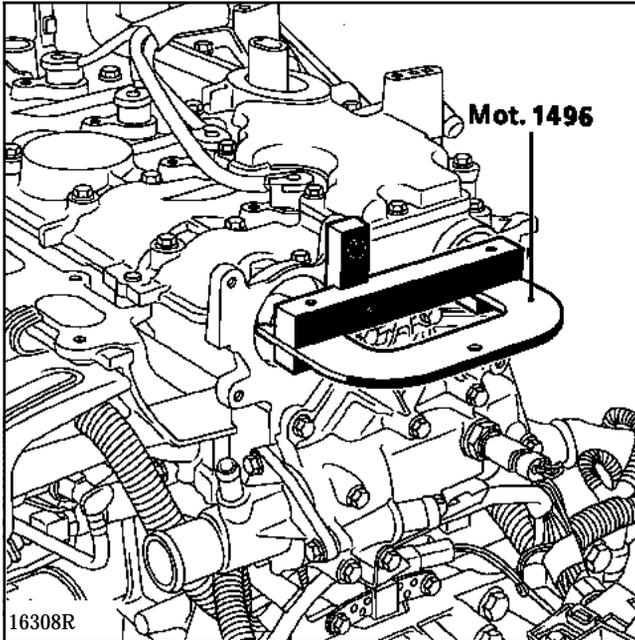
Timing belt tensioning procedure

07

Check that the inlet camshaft phase shifter crown wheel is immobilised correctly (no rotation of the crown wheel to the left or to the right).

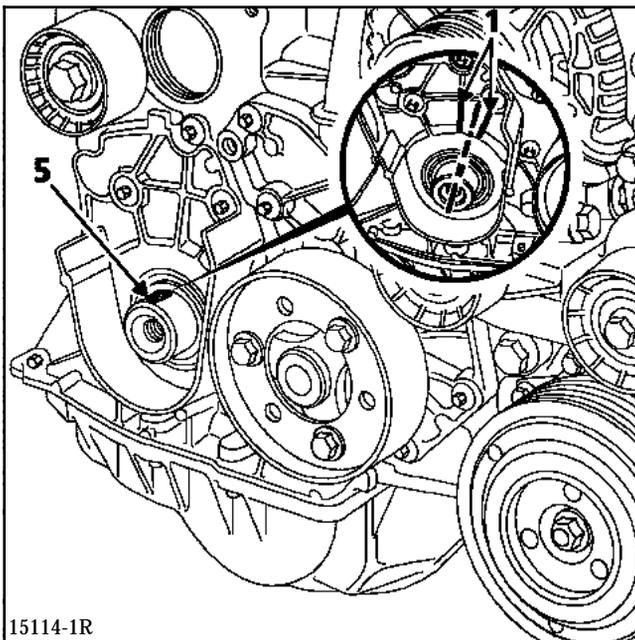


Fit tool **Mot. 1496** which is secured at the end of the camshafts.

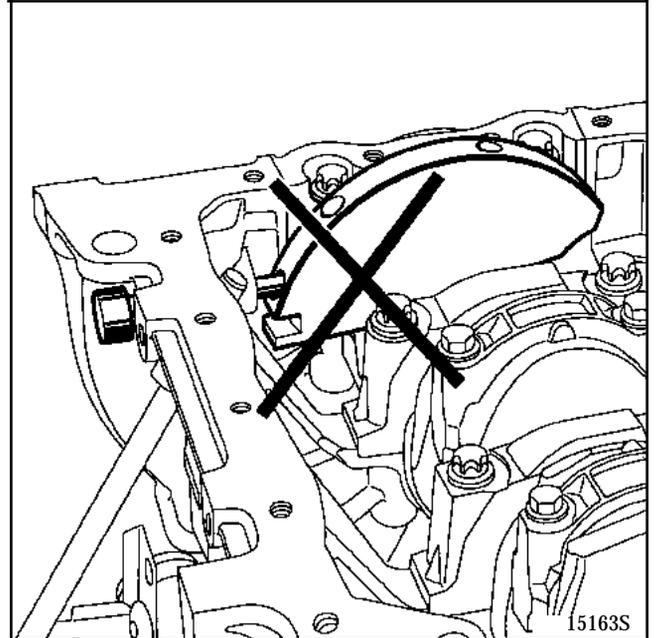


Remove the old pulley nut and the old phase shifter bolt and replace them with a new nut and bolt (without fully tightening the nut and the bolt, clearance of 0.5 to 1 mm between the nut or the bolt and the pulley).

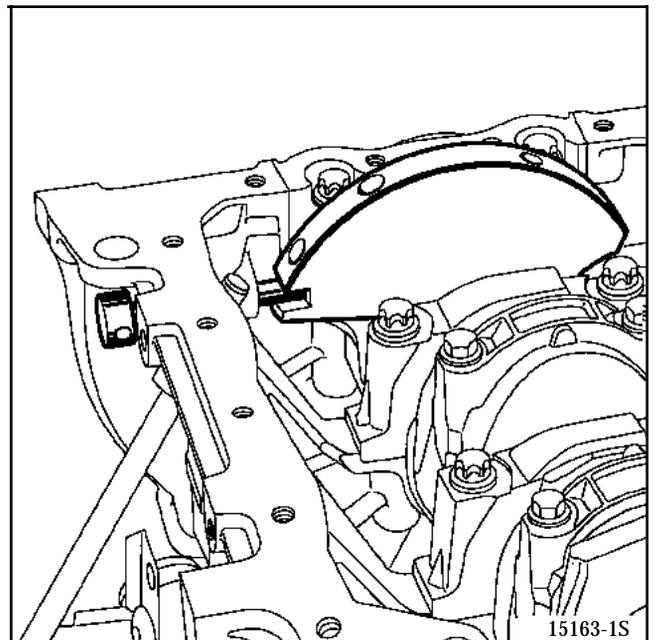
Check that the crankshaft is pinned correctly at Top Dead Centre and not in the balancing hole (the crankshaft groove (5) should be mid-way between the two crankshaft closing cover ribs (1)).



Incorrect position



Crankshaft pinned



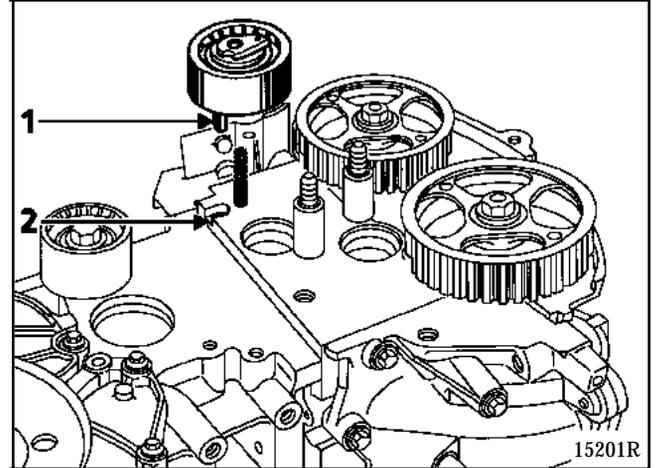
VALUES AND SETTINGS

Timing belt tensioning procedure

07

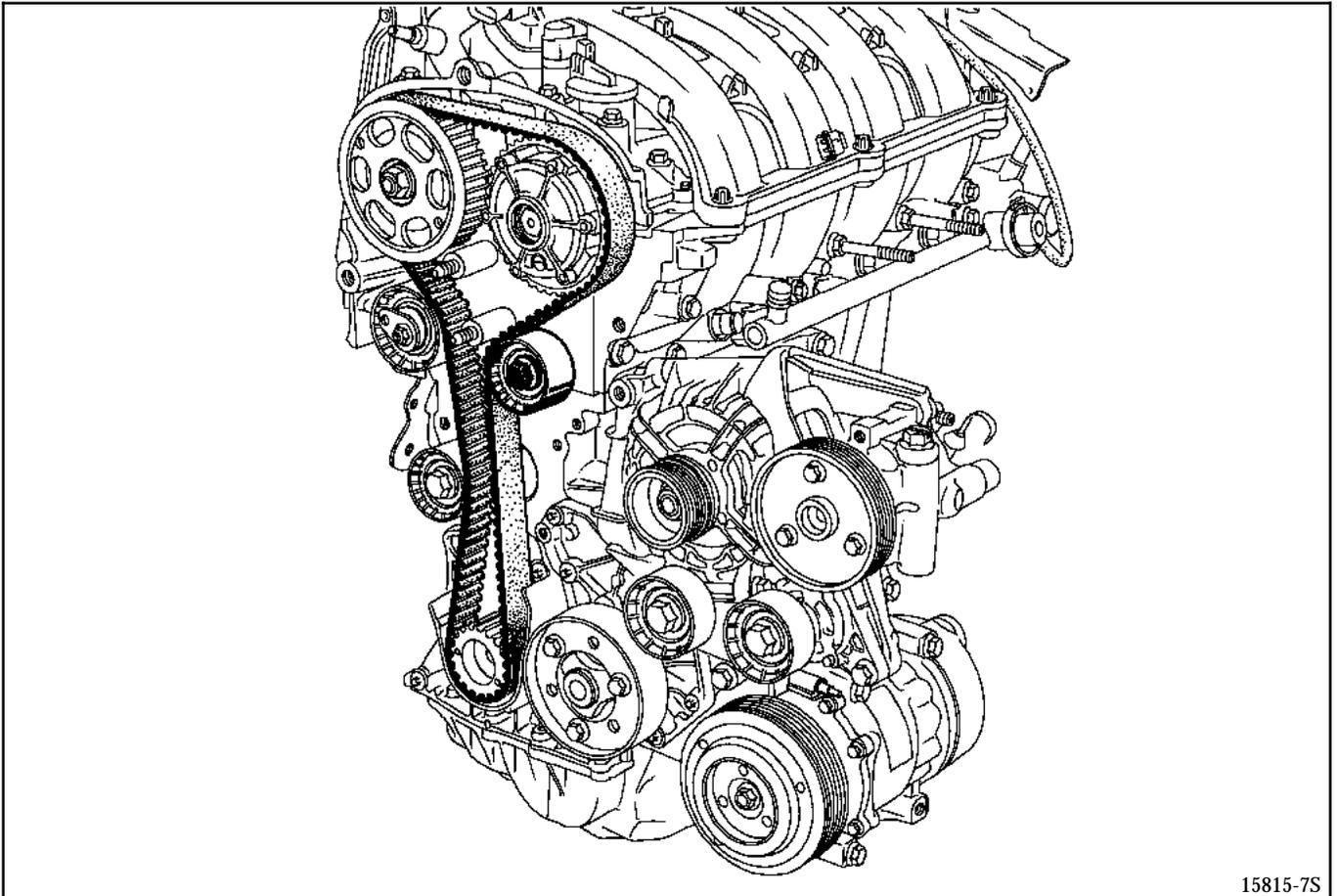
When the timing belt is changed, it is essential to change the tensioners and pulleys.

Check that the tensioner lug (1) is positioned correctly in the groove (2).



Refit:

- the timing belt,



WARNING: it is essential to refit the timing cover before the accessories pulley.

- the crankshaft accessories pulley, pre-tightening the bolt (**without fully tightening the bolt, clearance of 2 to 3 mm between the bolt and the pulley**).

NOTE:

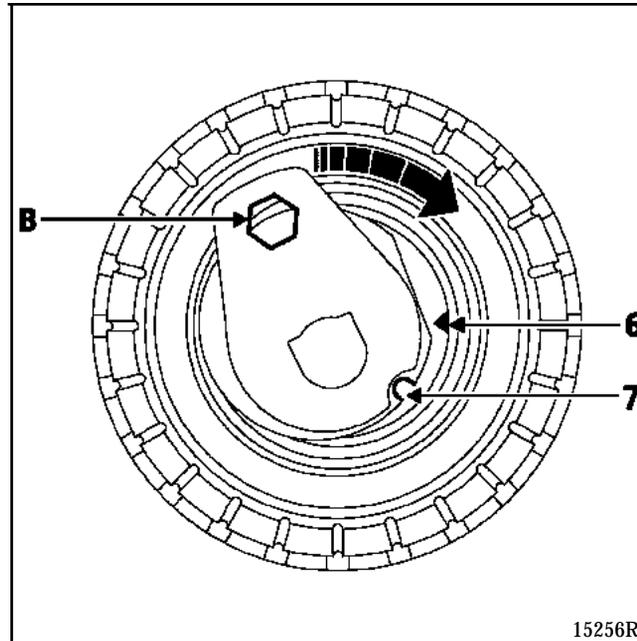
- the crankshaft accessories pulley bolt can be re-used if the length under the head does not exceed **49.1 mm** (otherwise change it),
- do not coat the new bolt with oil. However, if the bolt is re-used, it is essential to coat the treads and under the head with oil.

Tensioning the belt

Check that there is still a clearance of 0.5 to 1 mm between the camshaft pulleys and nuts.

NOTE: do not turn the tensioner anti-clockwise.

Align tensioner marks (6) and (7) using a 6 mm hexagonal wrench at (B).



Pre-tighten the tensioner nut to a torque of **0.7 daN.m**.

NOTE: check that the camshaft pulley nut and bolt do not come into contact with their respective pulleys. Also, place the camshaft pulleys flush against the camshafts from time to time.

Rotate the timing clockwise through **six revolutions** (timing end) via the **exhaust pulley** using tool **Mot. 799-01**.

Align marks (6) and (7) if necessary, slackening the tensioner nut by one revolution maximum while supporting it using a **6 mm** hexagonal wrench. Then tighten the nut to a final torque of **2.8 daN.m**.

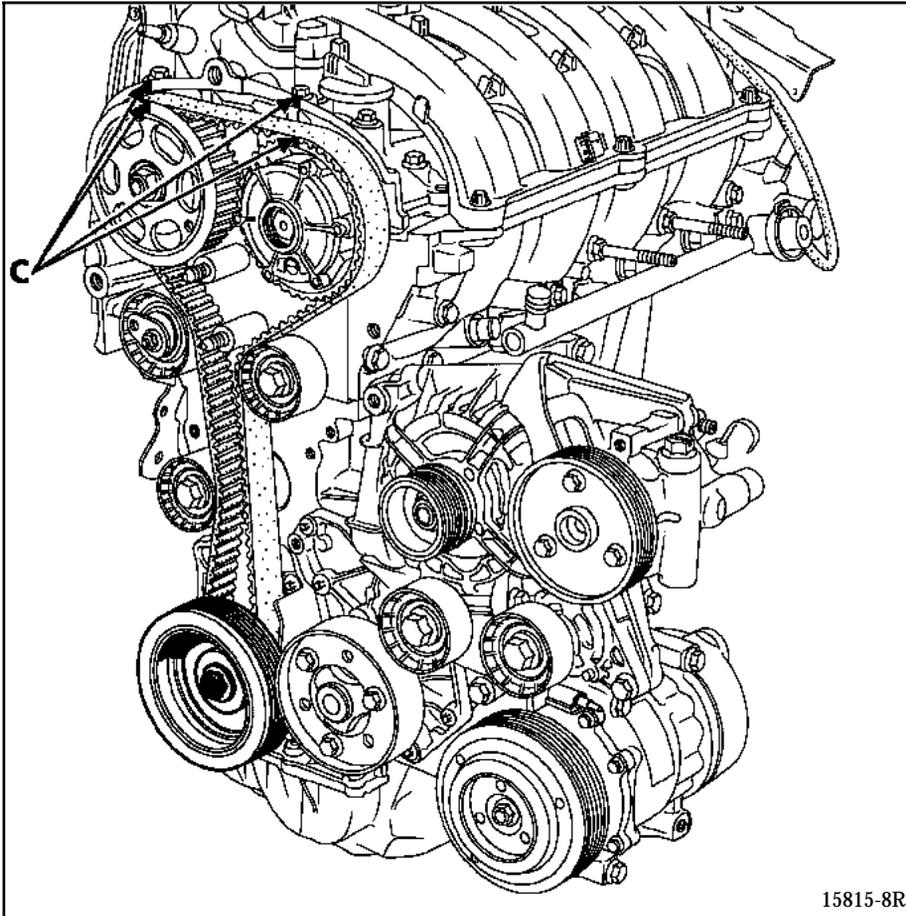
Tighten the crankshaft accessories pulley bolt to a torque of **2 daN.m** (**Top Dead Centre pin still in place in the crankshaft**).

VALUES AND SETTINGS

Timing belt tensioning procedure

07

Make a mark (C) using a pencil between the camshaft pulleys and the camshaft bearing cap casting.



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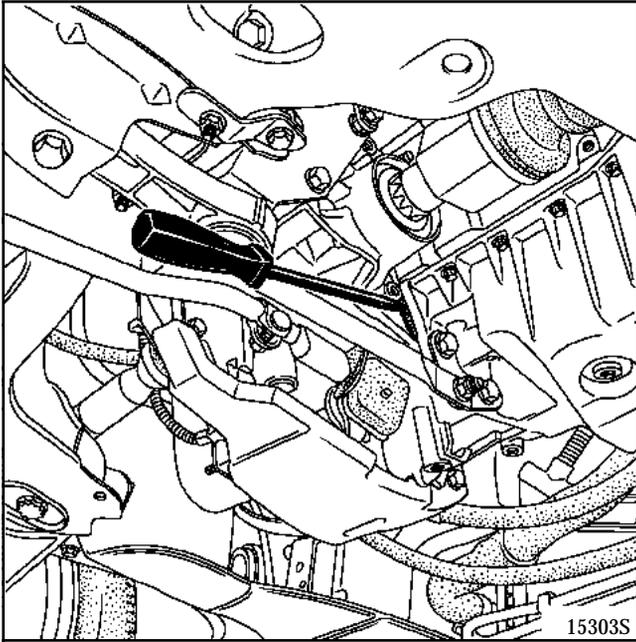
REMOVE THE TOP DEAD CENTRE PIN

VALUES AND SETTINGS

Timing belt tensioning procedure

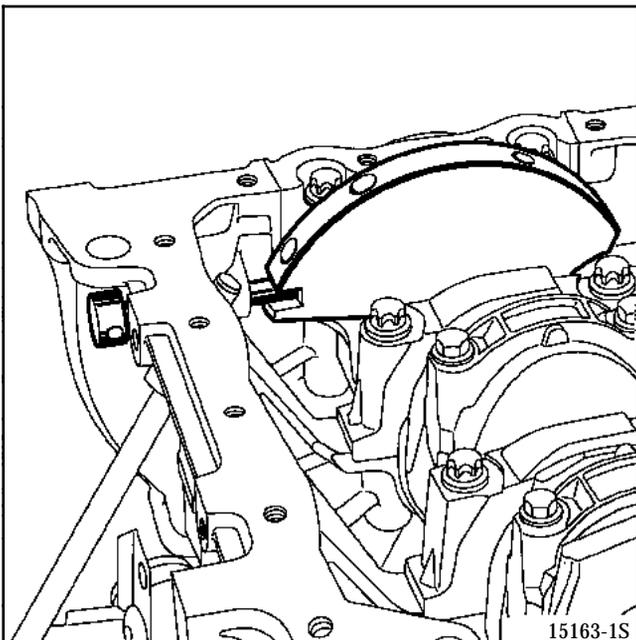
07

Immobilise the engine flywheel using tool **Mot. 582-01** or a **large screwdriver**, then turn the crankshaft accessories pulley bolt through an angle of $115^{\circ} \pm 15^{\circ}$.

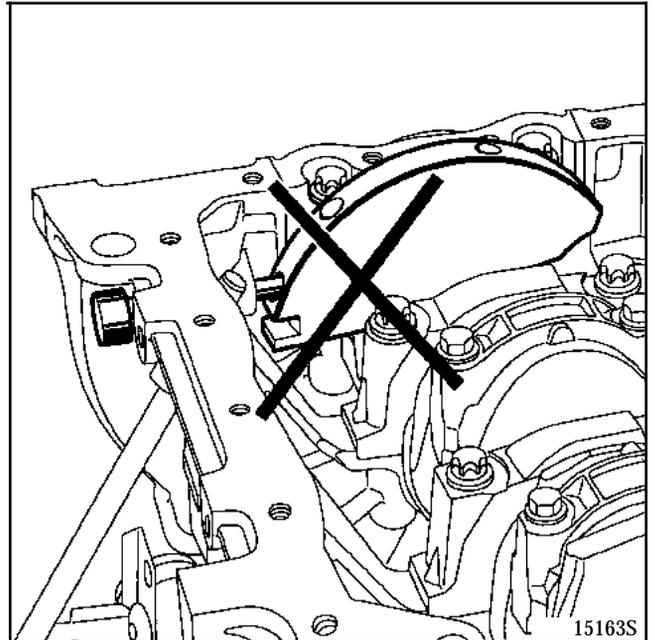


Pin the crankshaft using the marks made by the operator between the camshaft pulleys and the camshaft bearing cap casting. These marks must be aligned to ensure that the pin is in the pin hole and not in a crankshaft balancing hole.

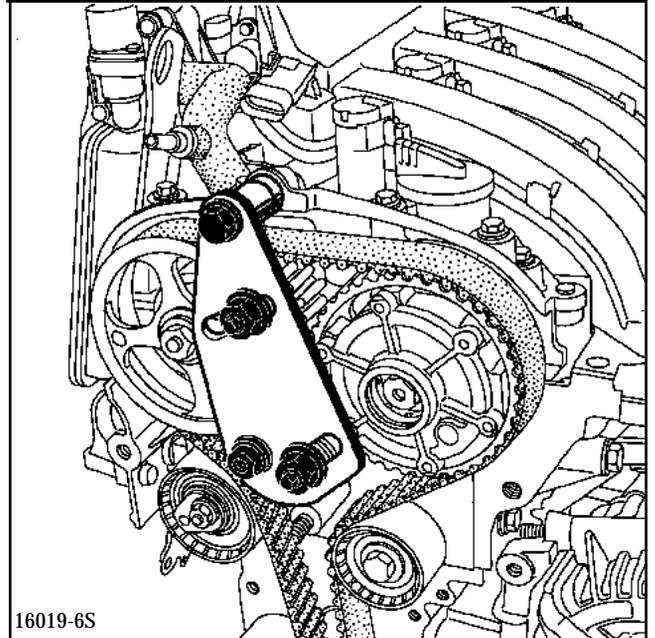
Correct position



Incorrect position



Fit camshaft pulley immobilising tool **Mot. 1509** fitted with the accessory **Mot. 1509-01**.



VALUES AND SETTINGS

Timing belt tensioning procedure

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Tighten the new **inlet** camshaft phase shifter bolt to a torque of **10 daN.m**.

Tighten the **exhaust** camshaft pulley nut to a torque of **3 daN.m**, then turn it through an angle of **$86^\circ \pm 6^\circ$** .

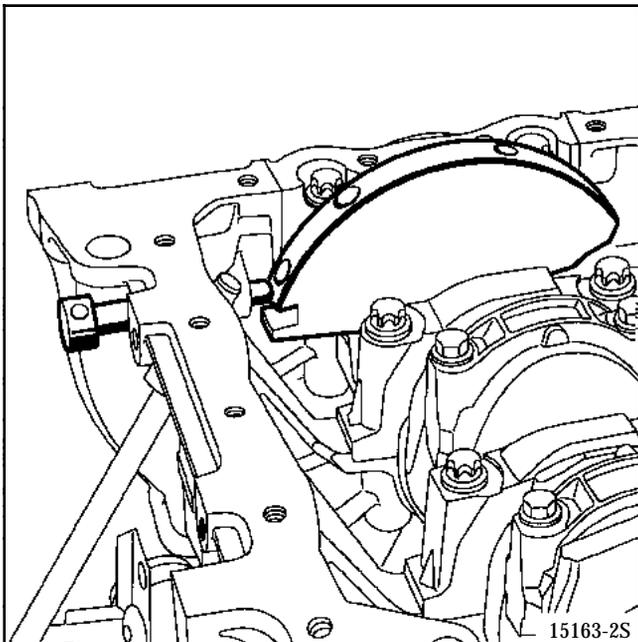
Remove camshaft setting tool **Mot. 1496**, camshaft pulley immobilising tool **Mot. 1509** and Top Dead Centre pin **Mot. 1054**.

Checking the setting and the tension

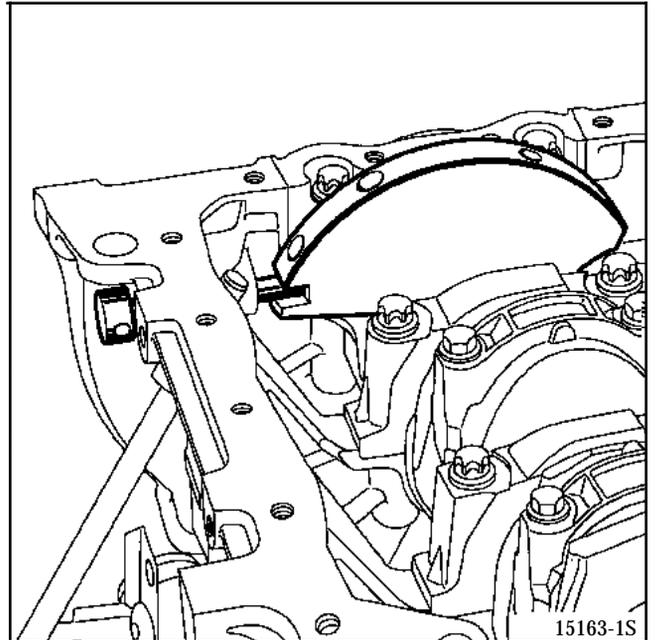
Checking the tension:

Turn the crankshaft two revolutions clockwise (timing end), and before the end of these two revolutions (**that is a half-tooth before alignment of the marks made previously by the operator**), insert the crankshaft Top Dead Centre pin (to be between the balancing hole and the pinning hole) then move the timing to its setting point.

Before pinning



Crankshaft pinned



Remove the Top Dead Centre pin.

Check that the tensioner marks are aligned correctly and repeat the tensioning procedure if they are not. Slacken the tensioner nut by one revolution maximum while supporting it using a **6 mm** hexagonal wrench.

Align the tensioner marks, and tighten the nut to a final torque of **2.8 daN.m**.

VALUES AND SETTINGS

Timing belt tensioning procedure

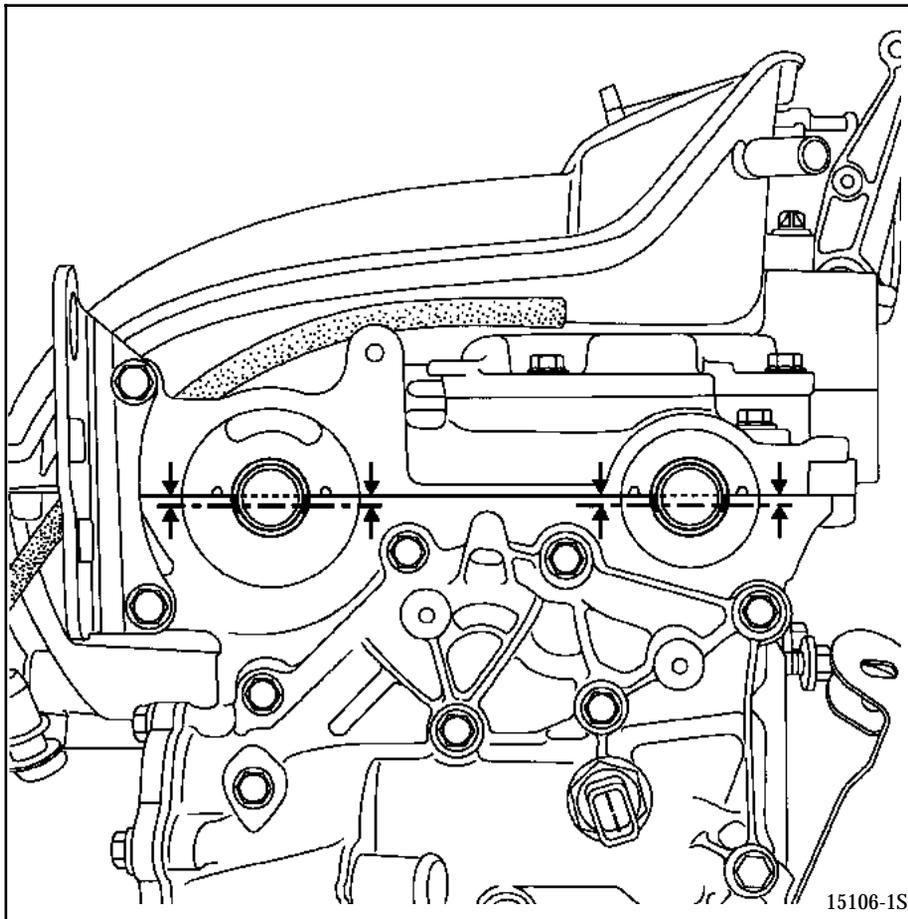
07

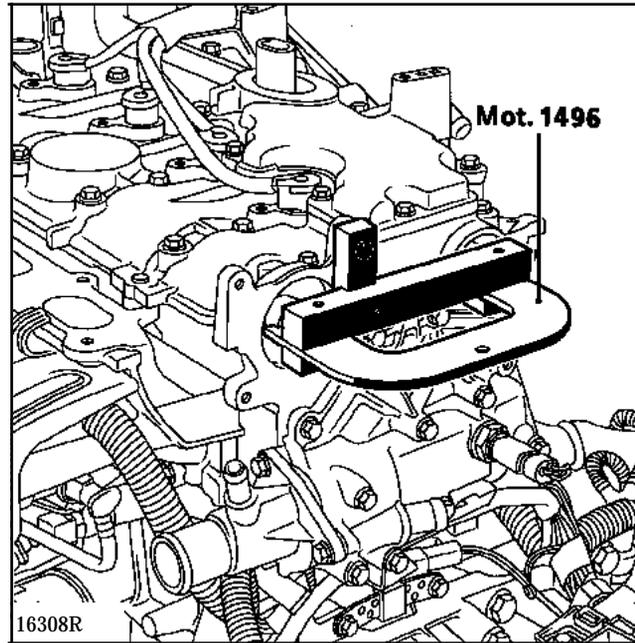
Checking the setting

Ensure that the tensioner marks are positioned correctly before checking the timing setting.

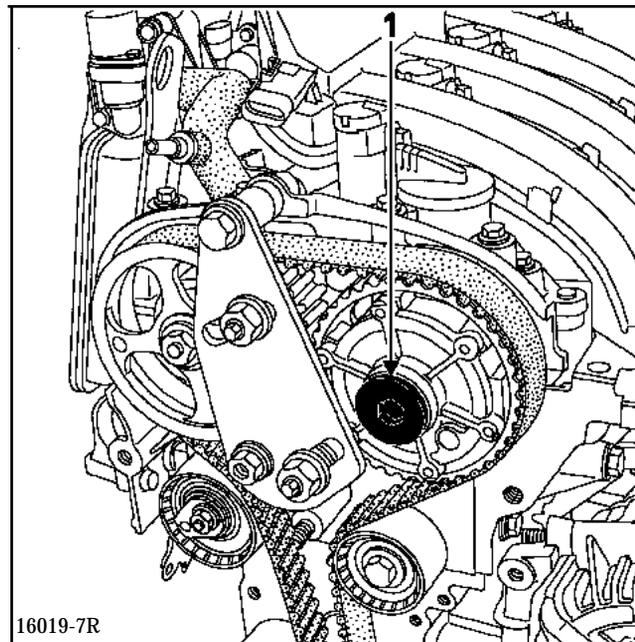
Fit the Top Dead Centre pin (check that the marks made by the operator on the camshaft pulleys are aligned).

Fit (without using force) camshaft setting tool **Mot. 1496** (the camshaft grooves must be horizontal and offset downwards). If the tool does not engage, the timing setting and tensioning procedure must be repeated.





Refit the phase shifter blanking piece (1) (fitted with its new seal) tightening it to a torque of 2.5 daN.m.



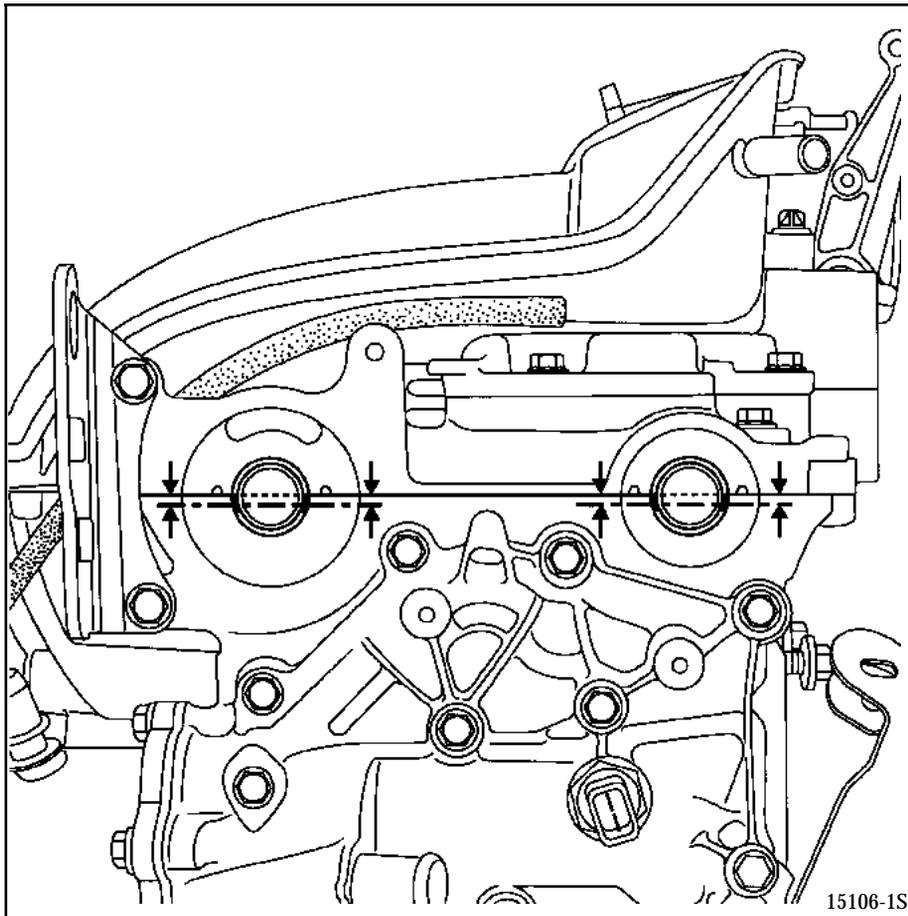
2nd PROCEDURE

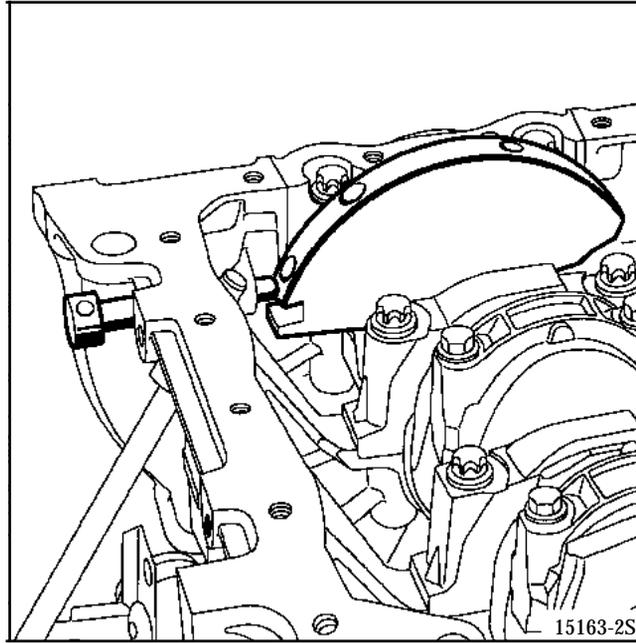
The second procedure is applied in the event of replacement of any components of the timing face which do not require slackening of the exhaust camshaft pulley and the inlet camshaft phase shifter.

Setting the timing

WARNING: it is essential to degrease the end of the crankshaft, the bore and the contact surfaces of the crankshaft pinion and the crankshaft pulley contact surfaces to prevent sliding between the timing and the crankshaft which could destroy the engine.

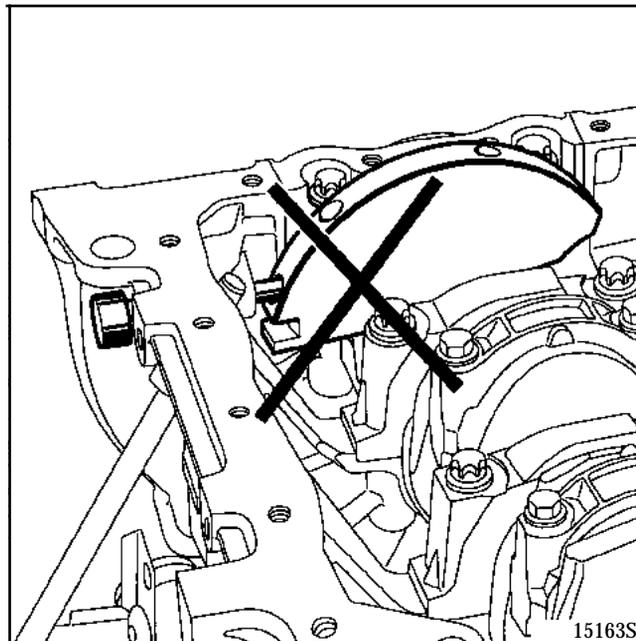
Position the camshaft grooves downwards and almost horizontal as indicated on the diagram below, then insert the Top Dead Centre pin Mot. 1054 to be between the balancing hole and the crankshaft setting groove.





NOTE: this is to avoid pinning the crankshaft in a balancing hole.

Incorrect position



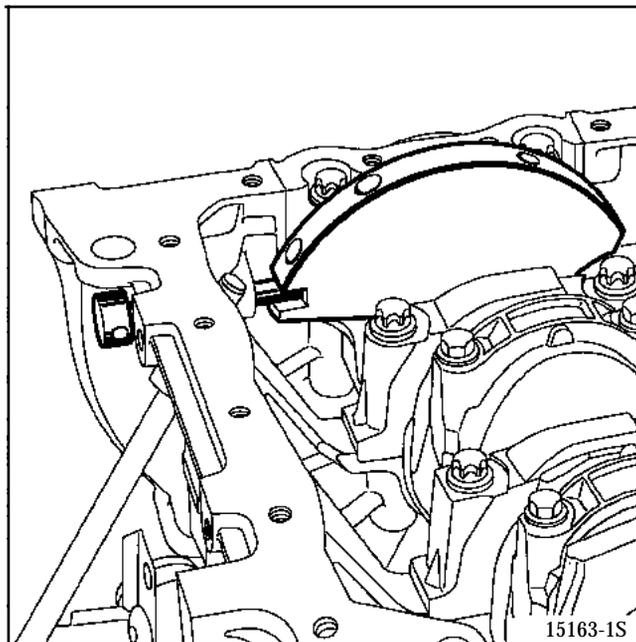
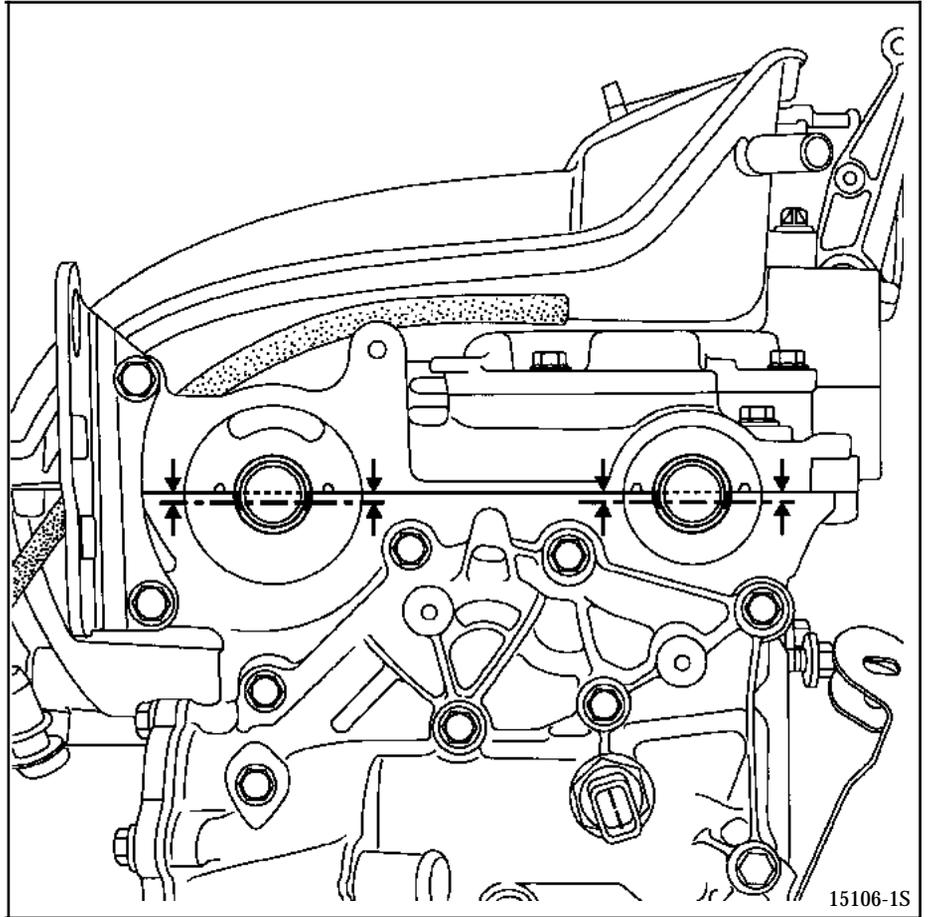
VALUES AND SETTINGS

Timing belt tensioning procedure

07

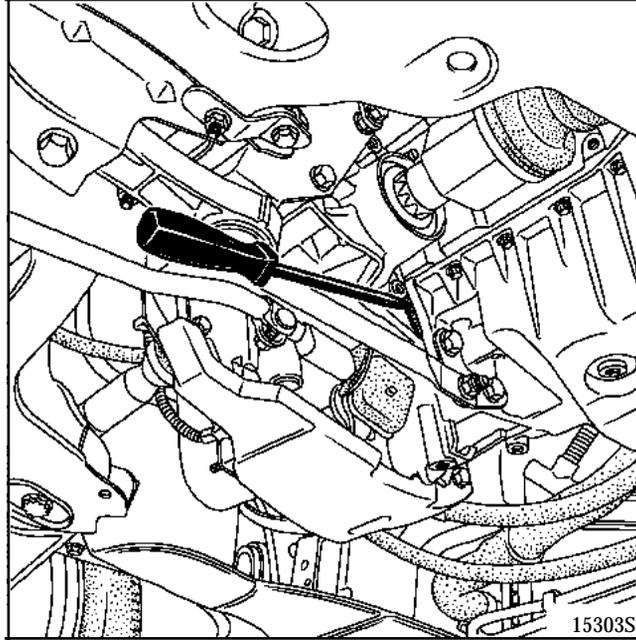
Turn the engine clockwise (timing end), to the timing setting point.

The camshaft grooves must be horizontal and offset downwards as indicated on the diagram opposite.



Remove the Top Dead Centre pin

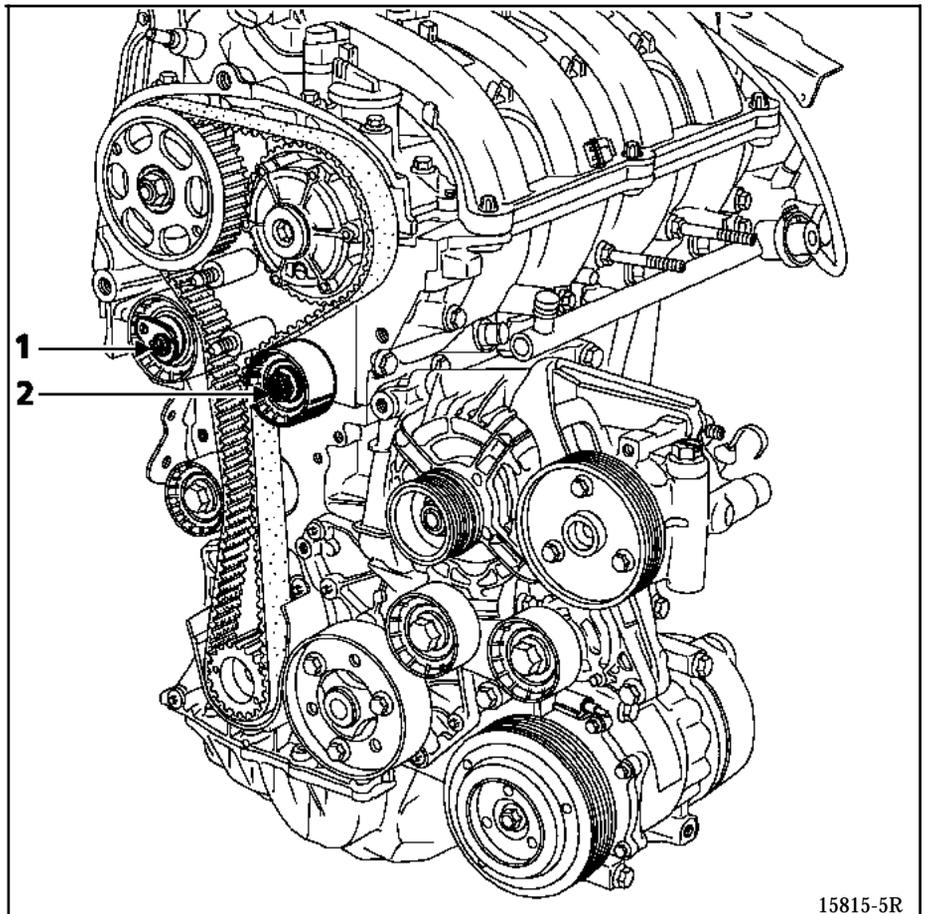
Immobilise the engine flywheel using tool Mot. 582-01 or a large screwdriver.



Remove the crankshaft accessories pulley.

Slacken the timing tensioner by unscrewing nut (1).

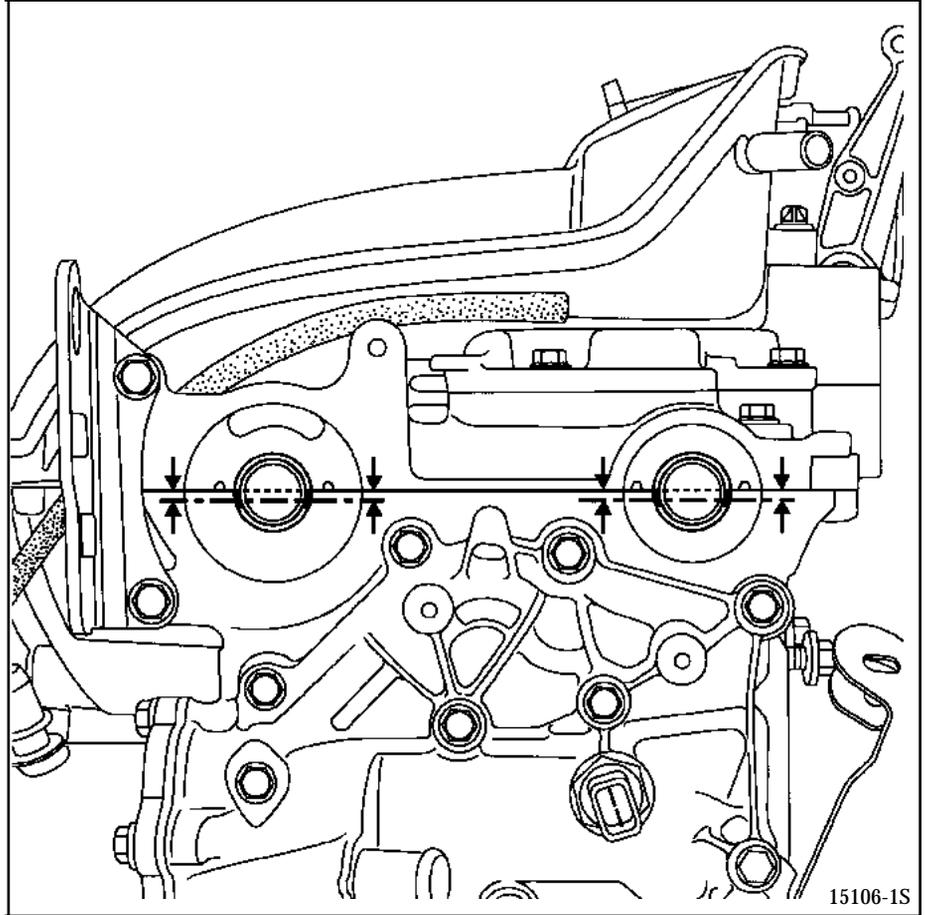
Remove the pulley (2).



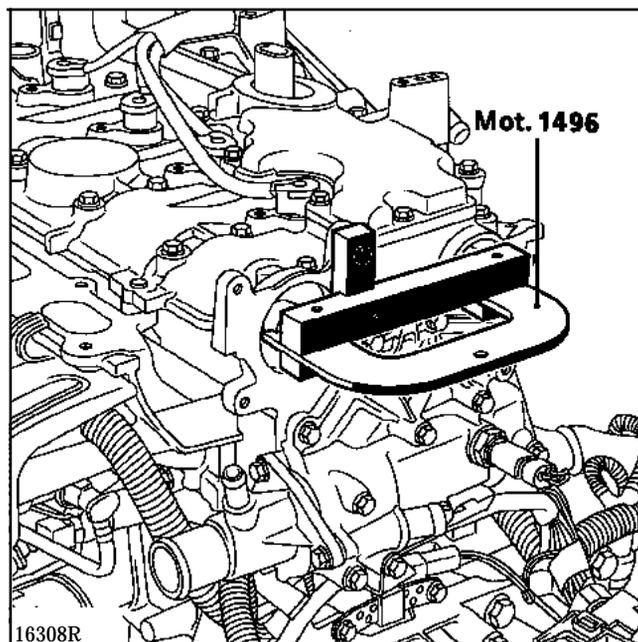
Setting the timing

WARNING: it is essential to degrease the end of the crankshaft, the crankshaft pinion bore and the crankshaft pulley contact surfaces to prevent sliding between the timing and crankshaft which could destroy the engine.

Position the camshaft grooves using tool **Mot. 799-01** as indicated on the diagram opposite.



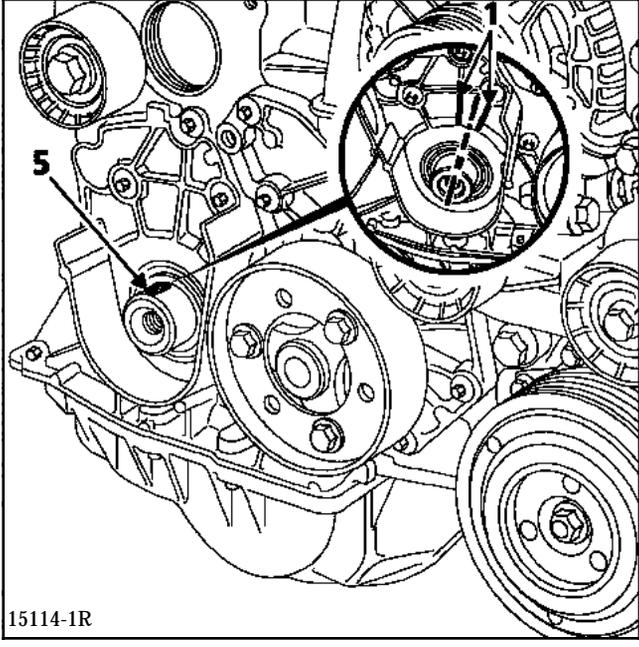
Fit tool **Mot. 1496** which is secured at the end of the camshafts.



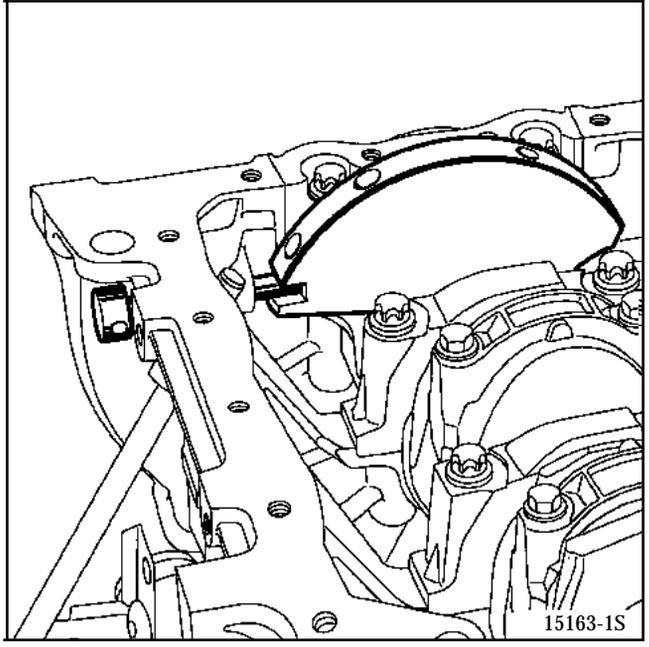
VALUES AND SETTINGS

Timing belt tensioning procedure

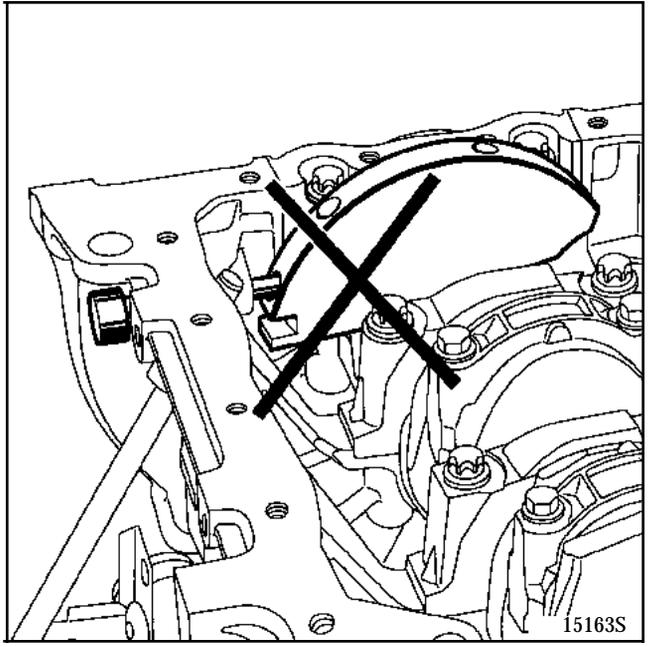
Check that the crankshaft is pinned correctly at Top Dead Centre and not in the balancing hole (the crankshaft groove (5) should be mid-way between the two ribs (1) of the crankshaft closing cover).



Crankshaft pinned



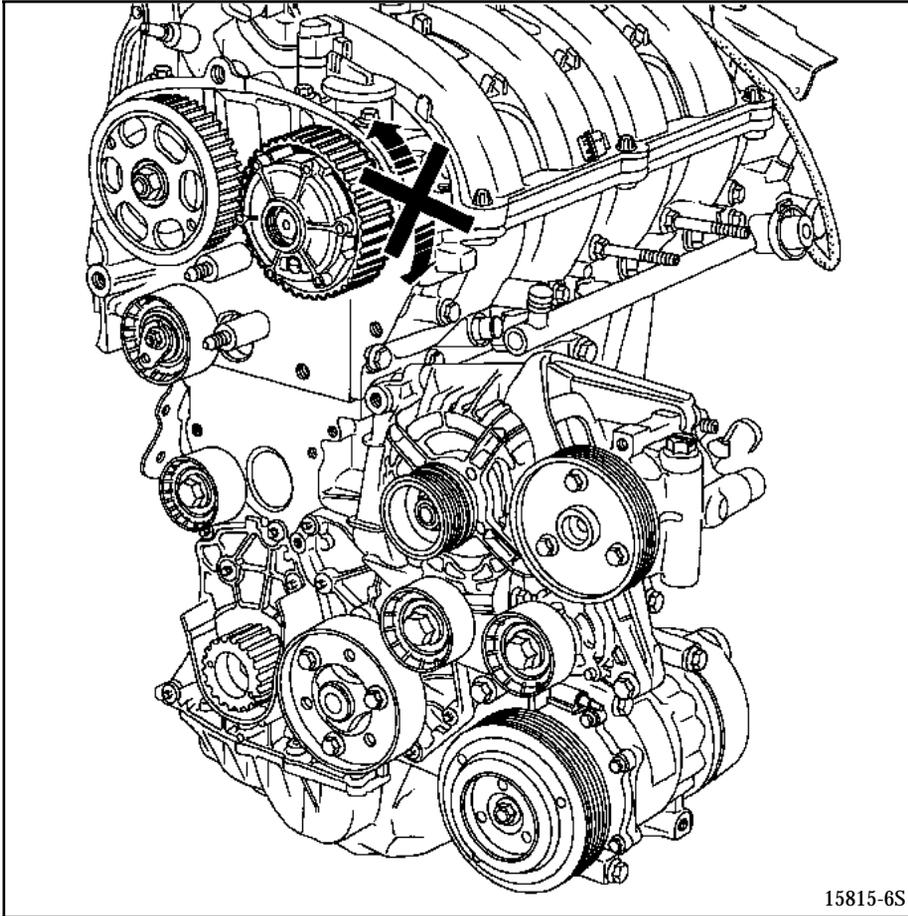
Incorrect position



VALUES AND SETTINGS

Timing belt tensioning procedure

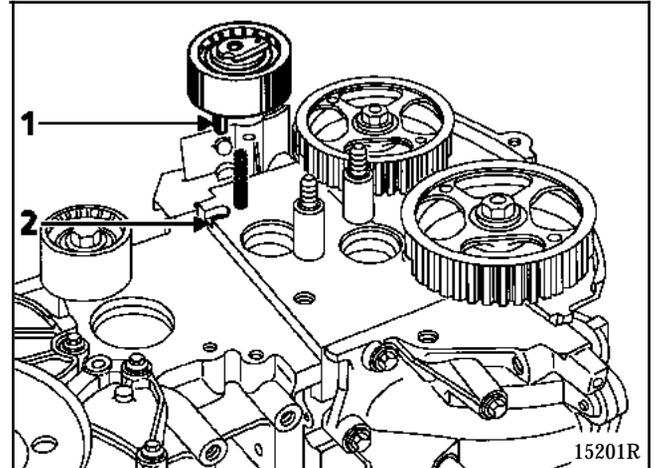
Check that the inlet camshaft phase shifter crown wheel is immobilised correctly (no rotation of the crown wheel to the left or to the right).



15815-6S

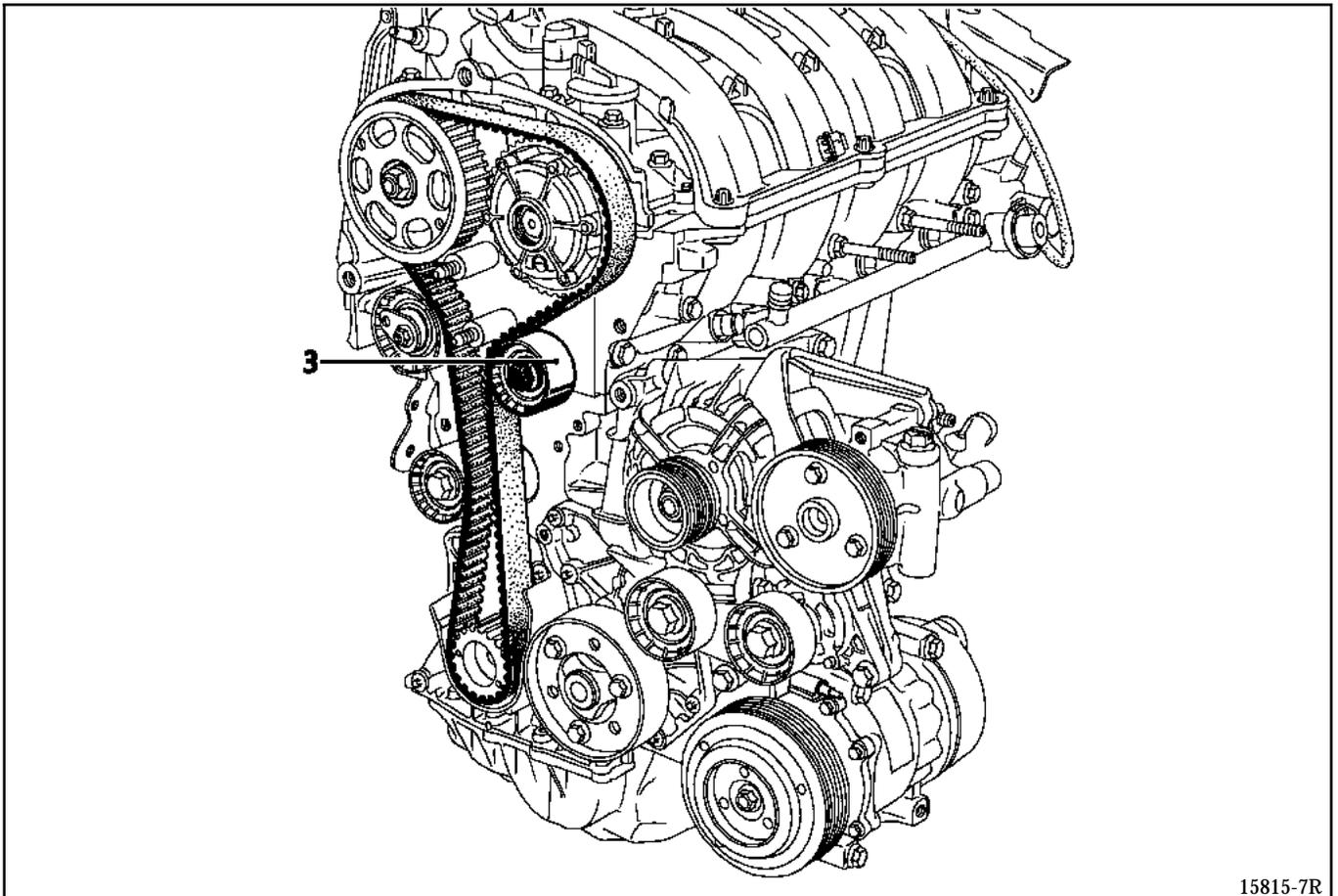
When a timing belt is changed, it is essential to change the tensioners and pulleys.

Ensure that the tensioner lug (1) is positioned correctly in the groove (2).



Refit:

- the timing belt,
- the pulley (3) tightening the mounting bolt to a torque of 4.5 daN.m



WARNING: it is essential to refit the timing cover before the accessories pulley.

- the crankshaft accessories pulley, pre-tightening the bolt (**without fully tightening the bolt, clearance of 2 to 3 mm between the bolt and the pulley**).

NOTE:

- the crankshaft accessories pulley bolt can be re-used if the length under the head does not exceed **49.1 mm** (otherwise change it),
- do not coat the new bolt with oil. However, if the bolt is re-used, it is essential to coat the threads and under the head with oil.

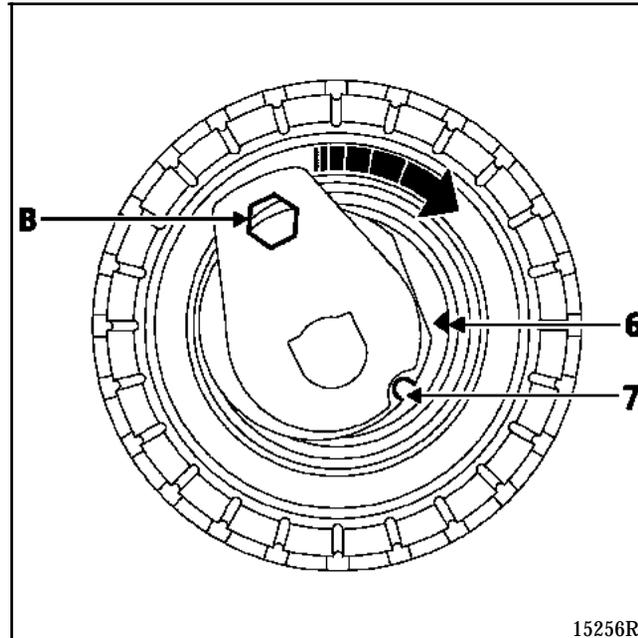
VALUES AND SETTINGS

Timing belt tensioning procedure

07

NOTE: do not turn the tensioner anti-clockwise.

Align tensioner marks (6) and (7) using a **6 mm** hexagonal wrench at (B).



Pre-tighten the tensioner nut to a torque of **0.7 daN.m**.

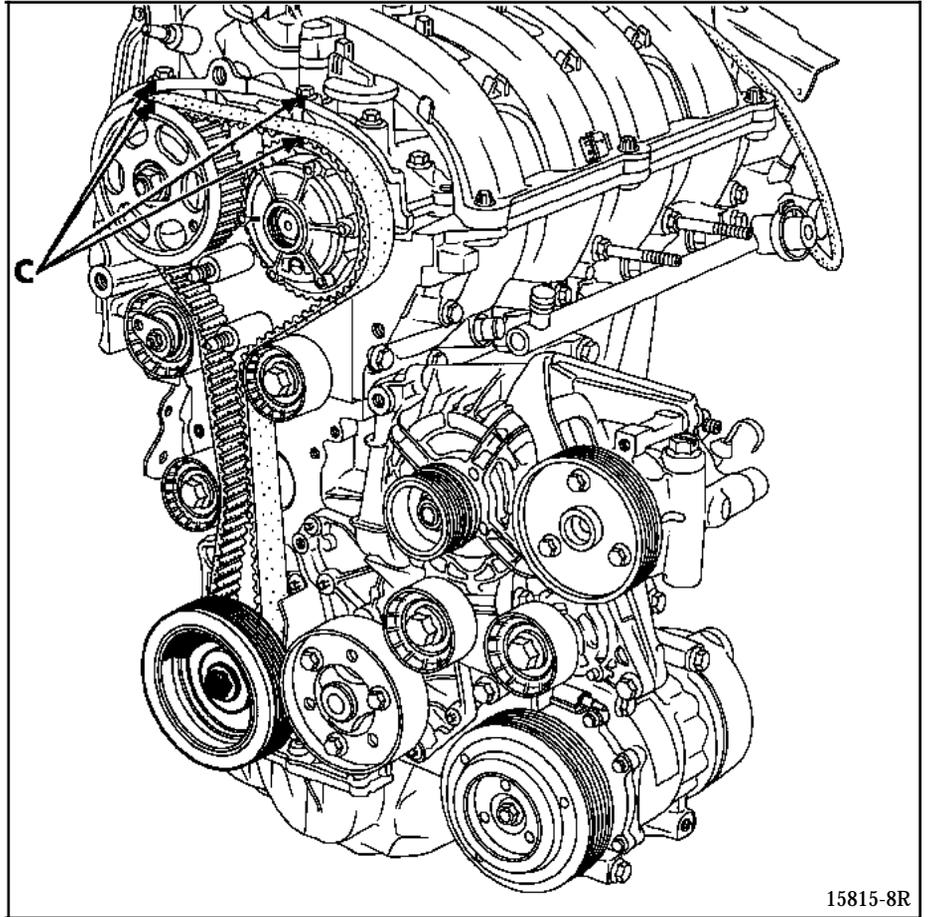
Tighten the crankshaft accessories pulley bolt to a torque of **2 daN.m (Top Dead Centre pin Mot. 1054 still in place in the crankshaft)**.

VALUES AND SETTINGS

Timing belt tensioning procedure

07

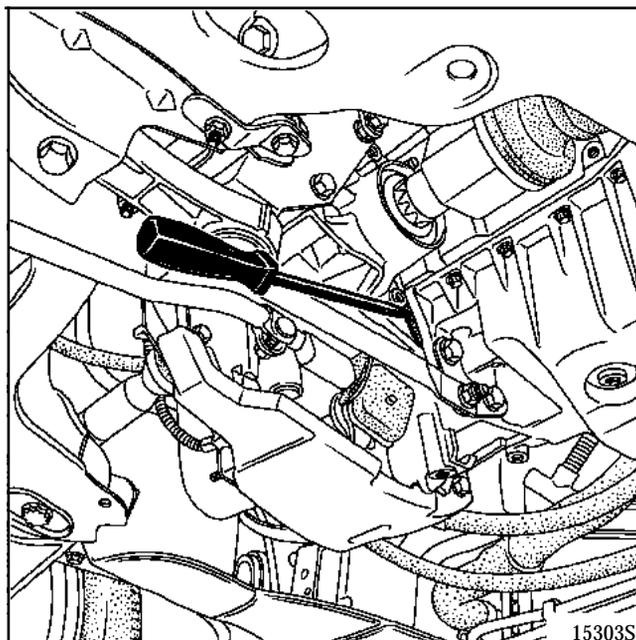
Make a mark (C) on the crown wheel of the inlet camshaft phase shifter and on the exhaust pulley in relation to the camshaft bearing cap casting.



15815-8R

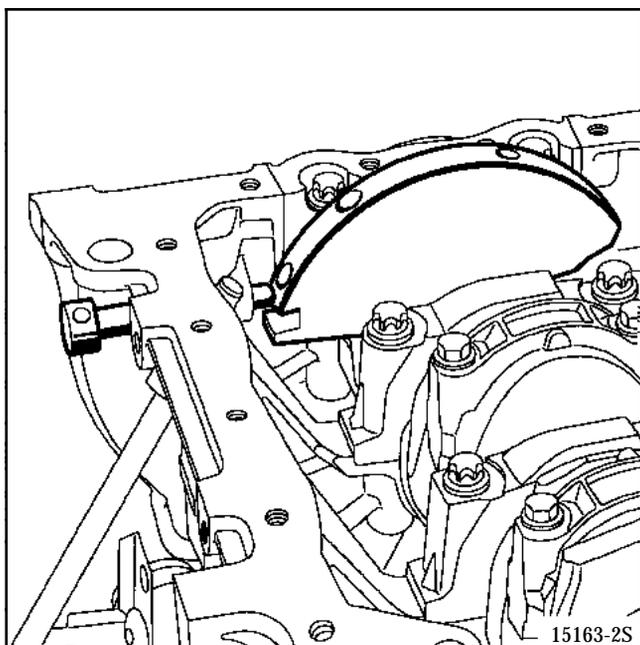
Remove camshaft setting tool **Mot. 1496** and Top Dead Centre pin **Mot. 1054**.

Carry out angular tightening of the crankshaft pulley bolt to $115^{\circ} \pm 15^{\circ}$, immobilising the engine flywheel using a large screwdriver or tool **Mot. 582-01**.

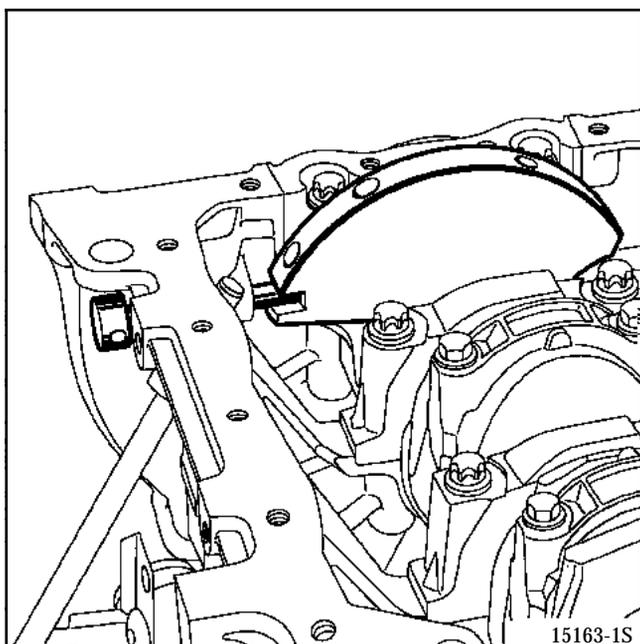


15303S

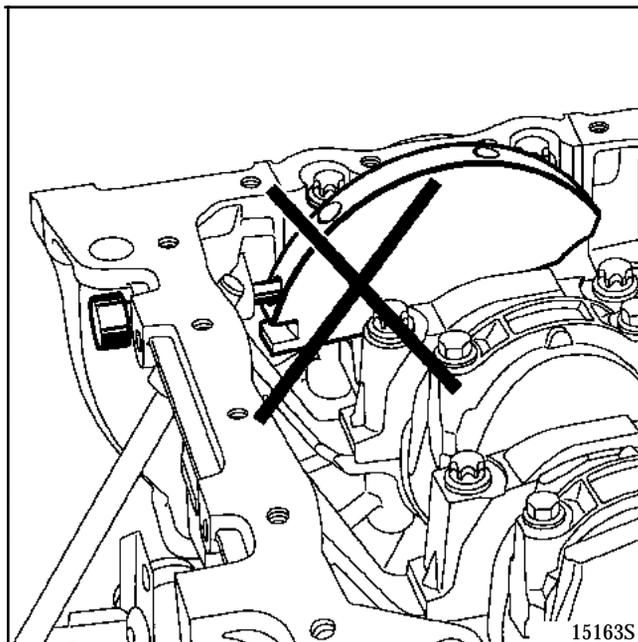
Turn the crankshaft two revolutions clockwise (timing end). Before the end of these two revolutions (**that is a half-tooth before alignment of the marks made previously by operator**), insert the crankshaft Top Dead Centre pin (to be between the balancing hole and the pinning hole), then move the timing to its setting point.



Correct position



Incorrect position



Remove Top Dead Centre pin **Mot. 1054**.

Check that the marks on the tensioner are aligned correctly and repeat the tensioning procedure if they are not. Slacken the tensioner nut by one revolution maximum while supporting it using a **6 mm** hexagonal wrench.

Align the tensioner marks and tighten the nut to a final torque of **2.8 daN.m**.

Checking the setting and tension

Checking the tension:

Turn the crankshaft two revolutions clockwise (timing end). Before the end of these two revolutions (**that is a half-tooth before alignment of the marks made previously by operator**), insert the crankshaft Top Dead Centre pin.

Remove Top Dead Centre pin **Mot. 1054**.

Check that the marks on the tensioner are aligned correctly and repeat the tensioning procedure if they are not. Slacken the tensioner nut by one revolution maximum while supporting it using a **6 mm** hexagonal wrench.

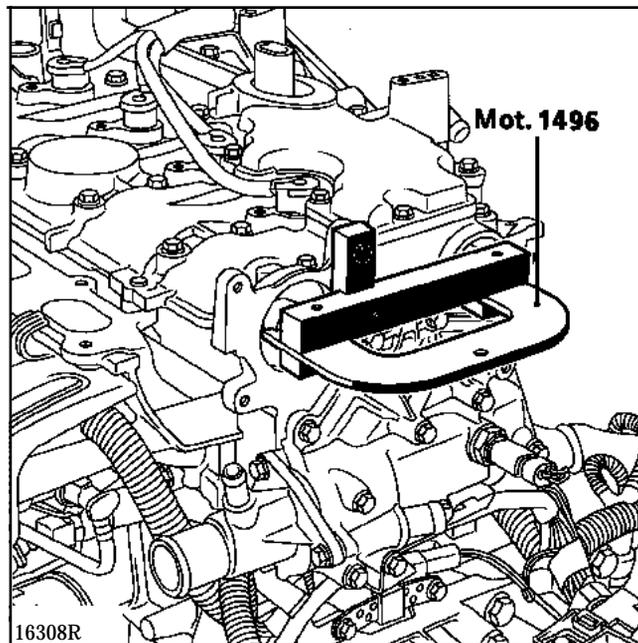
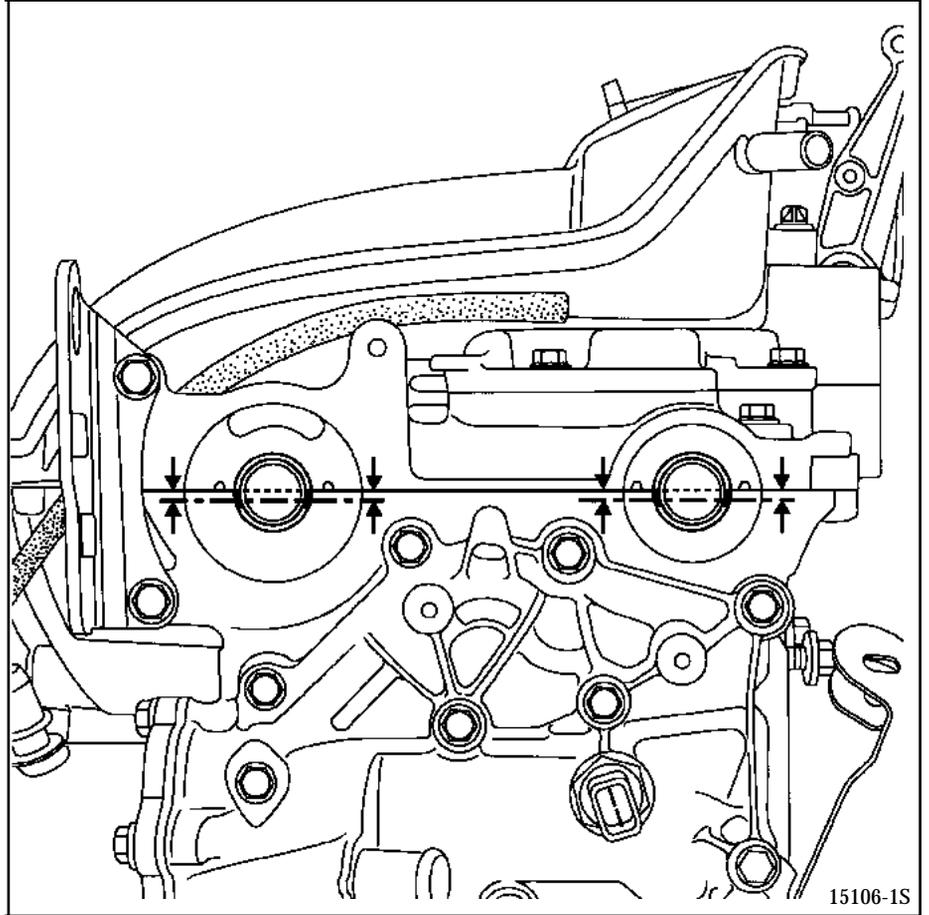
Align the tensioner marks and tighten the nut to a final torque of **2.8 daN.m**.

Checking the setting

Ensure that the tensioner marks are positioned correctly before checking the timing setting.

Fit the Top Dead Centre pin (check that the marks made by the operator on the camshaft pulleys are aligned).

Fit (without using force) camshaft setting tool **Mot. 1496** (the camshaft grooves must be horizontal and offset downwards). If the tool does not engage, the timing setting and tensioning procedure must be repeated.



CYLINDER HEAD TIGHTENING PROCEDURE

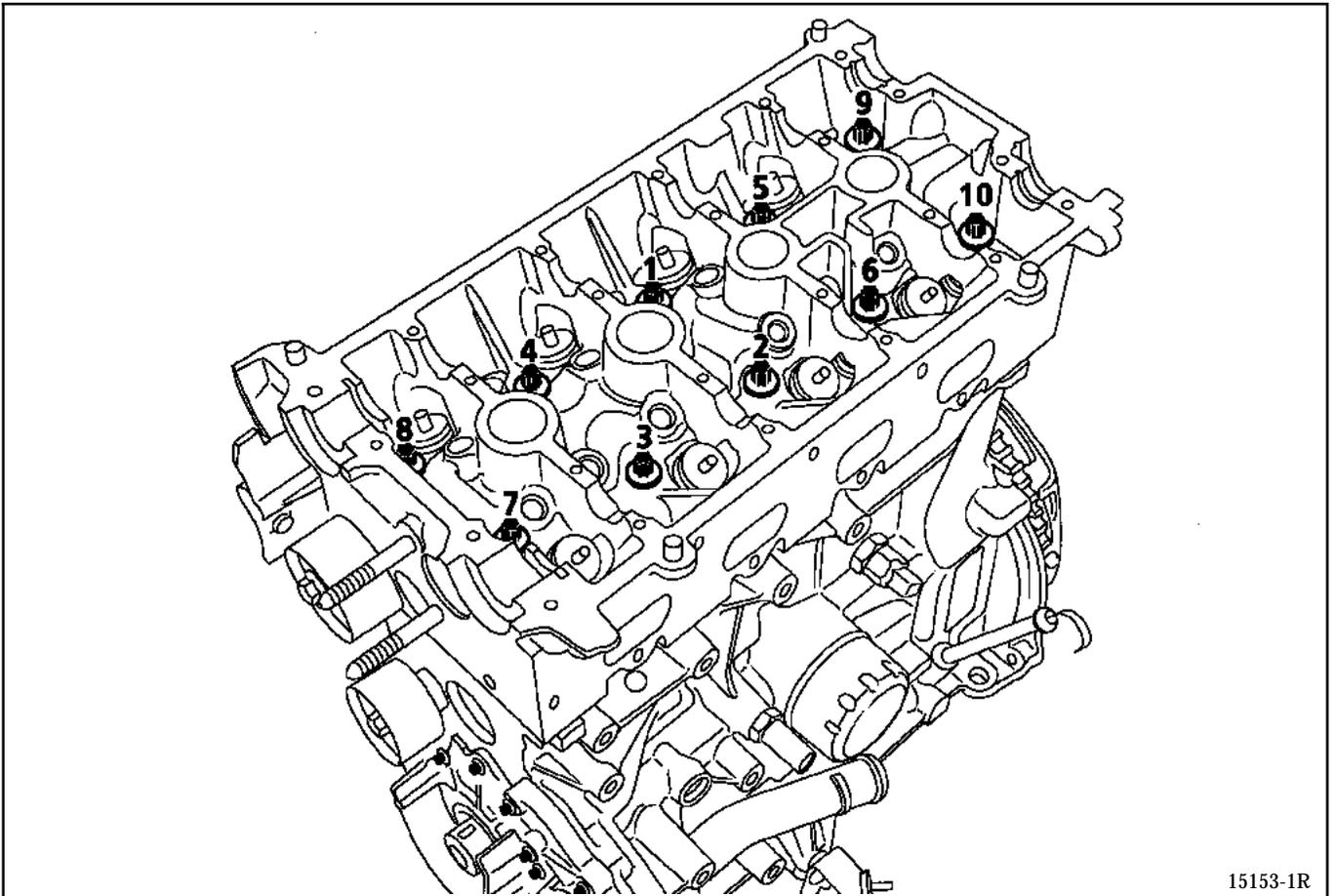
The bolts can be re-used if the length under the head does not exceed 117.7 mm (otherwise change all the bolts).

Cylinder head tightening procedure

REMINDER: to obtain correct tightening of the bolts, remove any oil from the cylinder head securing holes using a syringe.

Do not coat new bolts with oil. However, if the bolts are re-used, it is essential to coat them with oil.

Tighten all the bolts to **2 daN.m** in the order indicated below.



15153-1R

Check that all the bolts are correctly tightened to **2 daN.m** then carry out angular tightening (bolt by bolt) of $165^\circ \pm 6^\circ$.

The cylinder head bolts are not re-tightened following application of this procedure.

VALUES AND SETTINGS

Underbody height

07

Vehicle	At the front H1 - H2 = ... mm	At the rear H4 - H5 = ... mm	Dimension X (in mm) RH and LH
CB0M	118	0	-

Tolerance: ± 10.5 mm

The difference between the right-hand side and the left-hand side on the same axle of a vehicle must not exceed **5 mm**, with the driver's side always being the higher.

Any work carried out on the underbody height requires adjustment of the brake limiter and of the headlights.

VALUES AND SETTINGS

Tyres - Wheels

07

Vehicle	Wheel rim	Tyres	Tyre inflation pressure when cold (in bars) (1)	
			Front	Rear
CB0M	7 J 15	195/50R15	2.2	1.9

(1) Fully laden and motorway use.

Wheel nuts tightening torque: **10.5 daN.m**

Rim run-out: **1.2 mm**

VALUES AND SETTINGS

Brakes

07

Vehicle	Disk thicknesses (in mm)				Drum diameter (in mm)	
	Front		Rear		Rear	
	Max.	Min.	Max.	Min.	Max. (1)	Min.
CB0M	24	21.8	8	7	-	-

(1) Drum: maximum wear diameter.

The disc run-out is 0.07 maximum.

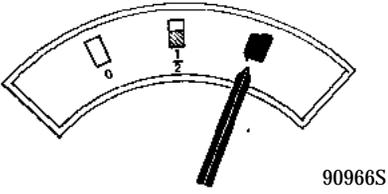
Vehicle	Disc thicknesses (in mm)				Brake fluid
	Front (including support)		Rear		
	New	Min.	New	Min.	
CB0M	18	6	11	4.6	SAE J1703 DOT 4

VALUES AND SETTINGS

Brake compensator

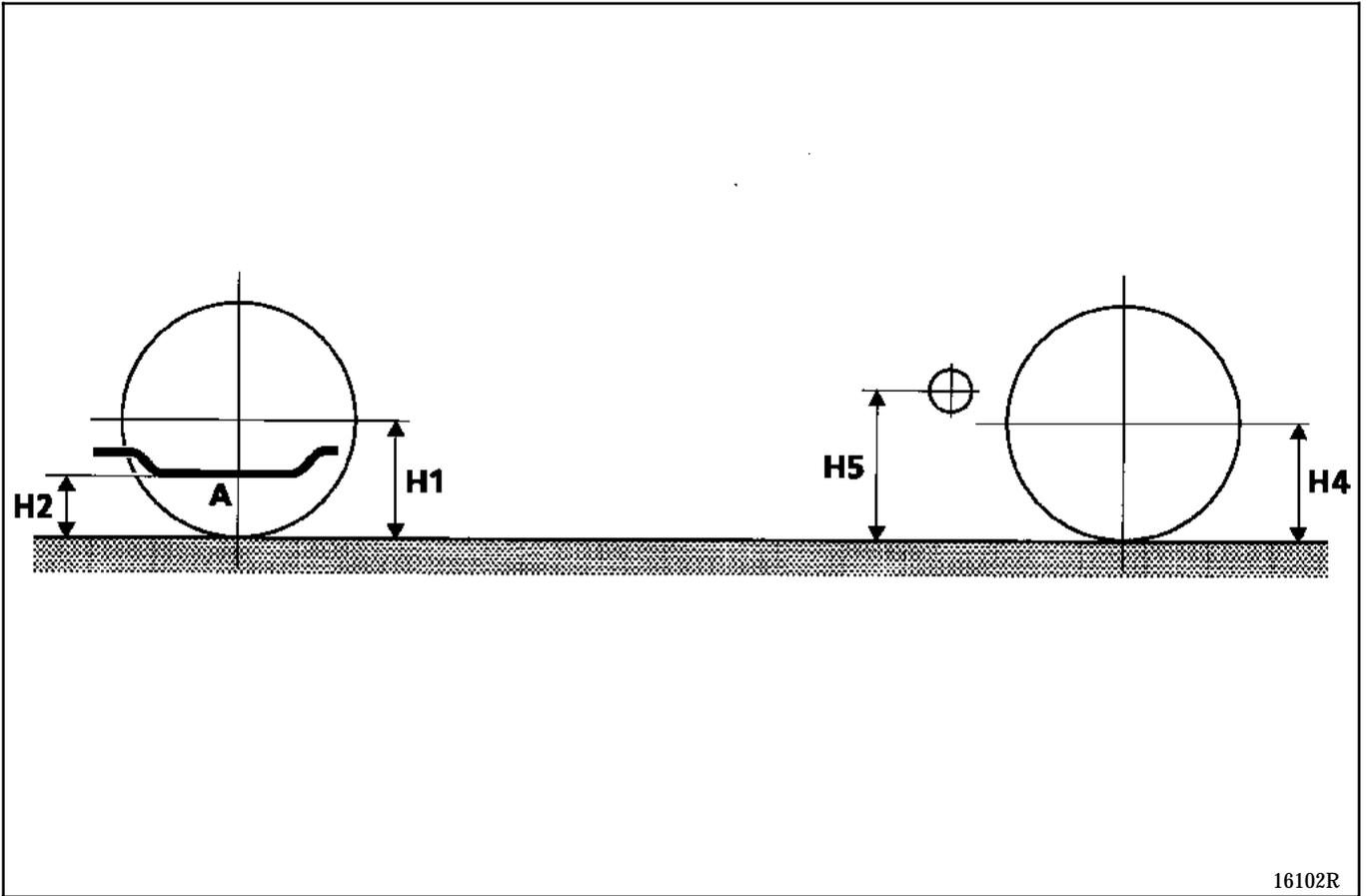
07

BRAKING PRESSURE

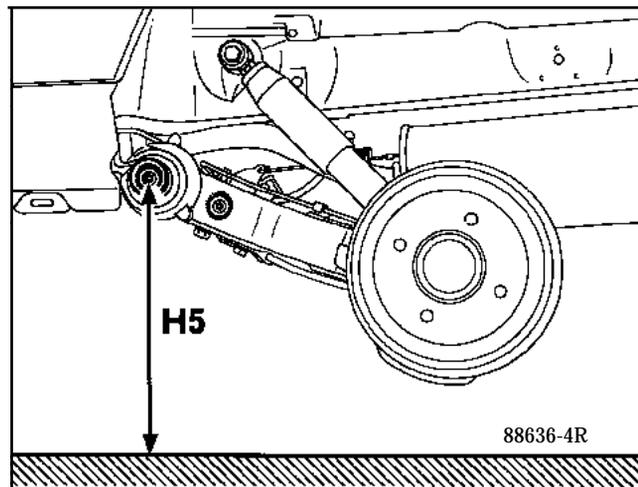
Vehicle	Fuel level status (driver in vehicle)	Check pressure (1) (in bar)	
		Front	Rear
CB0M		100	$38 \begin{matrix} + 18 \\ 0 \end{matrix}$

(1) The check is carried out using two pressure gauges arranged in an X formation.

MEASURING POINTS



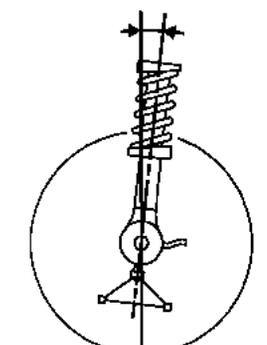
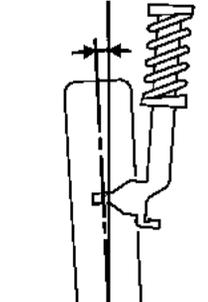
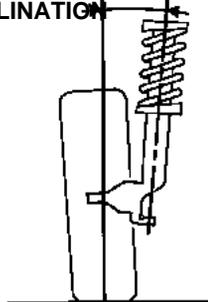
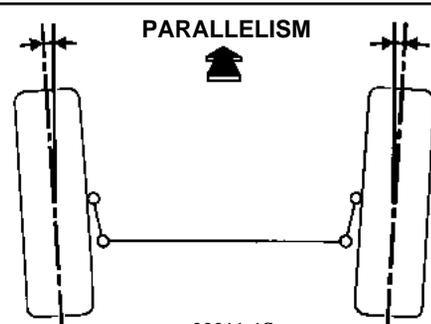
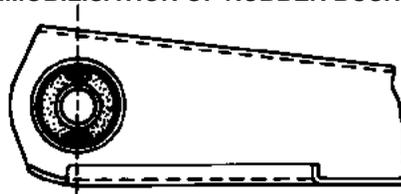
- H1** : radius of tyre under load.
- H2** : height measured between lower surface of cradle (A) and ground following wheel centre line.
- H4** : radius of rear tyre under load.
- H5** : height measured between rear axle hinge pin and ground.



VALUES AND SETTINGS

Values for checking front axle geometry

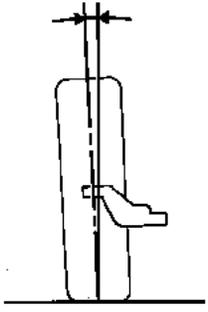
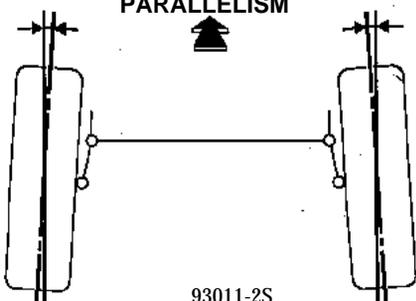
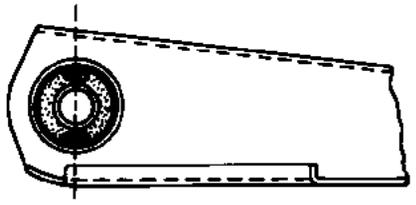
07

ANGLES	VALUES	POSITION OF FRONT AXLE	ADJUSTMENT
<p>CASTOR</p>  <p style="text-align: right;">93012-1S</p>	$\left. \begin{array}{l} 1^{\circ}44' \\ 2^{\circ}31' \\ 3^{\circ}18' \end{array} \right\} \pm 30'$ <p>Maximum right/ left difference= 1°</p>	<p>H5 - H2 = 134 H5 - H2 = 104 H5 - H2 = 74</p>	<p>NOT ADJUSTABLE</p>
<p>CAMBER</p>  <p style="text-align: right;">93013-1S</p>	$\left. \begin{array}{l} - 1^{\circ}02' \\ - 1^{\circ}01' \\ - 0^{\circ}59' \end{array} \right\} \pm 30'$ <p>Maximum right/ left difference= 1°</p>	<p>H1 - H2 = 118 H1 - H2 = 126 H1 - H2 = 134</p>	<p>NOT ADJUSTABLE</p>
<p>KING PIN INCLINATION</p>  <p style="text-align: right;">93014-1S</p>	$\left. \begin{array}{l} 11^{\circ}48' \\ 11^{\circ}59' \\ 12^{\circ}04' \end{array} \right\} \pm 30'$ <p>Maximum right/ left difference= 1°</p>	<p>H1 - H2 = 118 H1 - H2 = 126 H1 - H2 = 134</p>	<p>NOT ADJUSTABLE</p>
<p style="text-align: center;">PARALLELISM</p>  <p style="text-align: center;">93011-1S</p>	<p>(For 2 wheels)</p> <p>10'±5' toe-out 1 mm±0,5 mm</p>	<p>UNLADEN</p>	<p>Adjustable by rotating track rod sleeves 1 tour = 30' (3 mm)</p>
<p>IMMOBILISATION OF RUBBER BUSHES</p>  <p style="text-align: right;">81603S1</p>	<p>-</p>	<p>UNLADEN</p>	<p>-</p>

VALUES AND SETTINGS

Values for checking rear axle geometry

07

ANGLES	VALUES	POSITION OF REAR AXLE	ADJUSTMENT
<p>CAMBER</p>  <p style="text-align: right; margin-right: 50px;">93013-2S</p>	<p>- 1°31' ± 20'</p>	<p>UNLADEN</p>	<p>NOT ADJUSTABLE</p>
<p style="text-align: center;">PARALLELISM</p>  <p style="text-align: center; margin-top: 10px;">93011-2S</p>	<p>(for 2 wheels) Toe-in - 0°20' ± 30' - 3 mm ± 3 mm</p>	<p>UNLADEN</p>	<p>NOT ADJUSTABLE</p>
<p>IMMOBILISATION OF RUBBER BUSHES</p>  <p style="text-align: right; margin-right: 50px;">81603S1</p>	<p>-</p>	<p>UNLADEN</p>	<p>-</p>

ENGINE AND PERIPHERALS ASSEMBLY

Identification

10

Type of vehicle	Engine	Gearbox	Cubic capacity (cm ³)	Bore (mm)	Stroke (mm)	Compression ratio
CB0M	F4R 730	JC5	1998	82.7	93	11.2/1

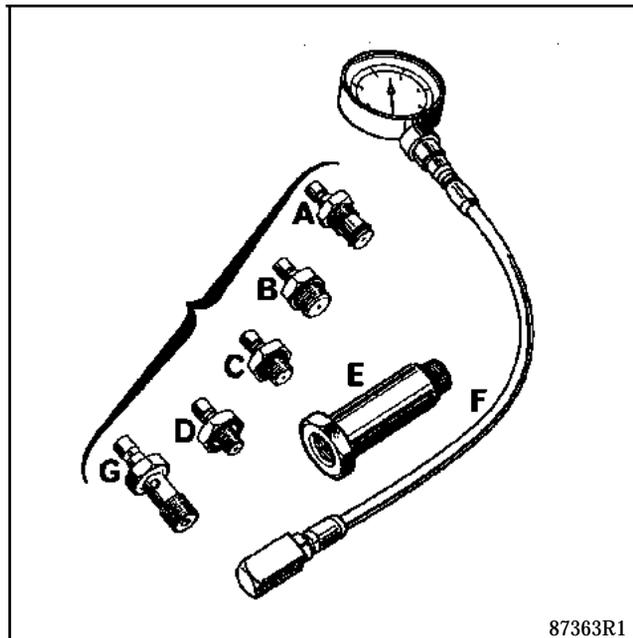
Manual to be consulted: **Mot. F4R.**

ESSENTIAL SPECIAL TOOLS
Mot. 836 -05 Boxed kit for measuring oil pressure
ESSENTIAL EQUIPMENT
22 mm long socket or tube wrench

CHECK

The oil pressure check must be carried out while the engine is warm (approximately **80 °C**).

Contents of boxed kit **Mot. 836-05**.



USE

B + F

Connect the pressure gauge in place of the oil pressure switch.

Oil pressure

Idle	1 bar
3,000 rpm	3 bars

ESSENTIAL SPECIAL TOOLS	
Mot. 1040-01	Dummy mounting for removing/refitting engine and transmission assembly
Mot. 1159	Tool for retaining engine on sub-frame
Mot. 1202	Clip pliers for spring clips
Mot. 1453	Engine support tool

TIGHTENING TORQUES (in daN.m)	
Sub-frame front mounting bolt	6.2
Sub-frame rear mounting bolt	10.5
Front right suspended engine mounting cover to engine mounting bolt	6.2
Front right suspended engine mounting cover mounting nut	4.4
Rubber engine mounting to front left side member support mounting nut	6.2
Gearbox lower rubber mounting mounting nut	4.4
Shock absorber base mounting bolts	18
Brake caliper mounting bolt	4
Steering shaft yoke mounting bolt	3
Wheel bolt	9

REMOVAL

Place the vehicle on a two post lift.

Remove the battery and the engine undertray.

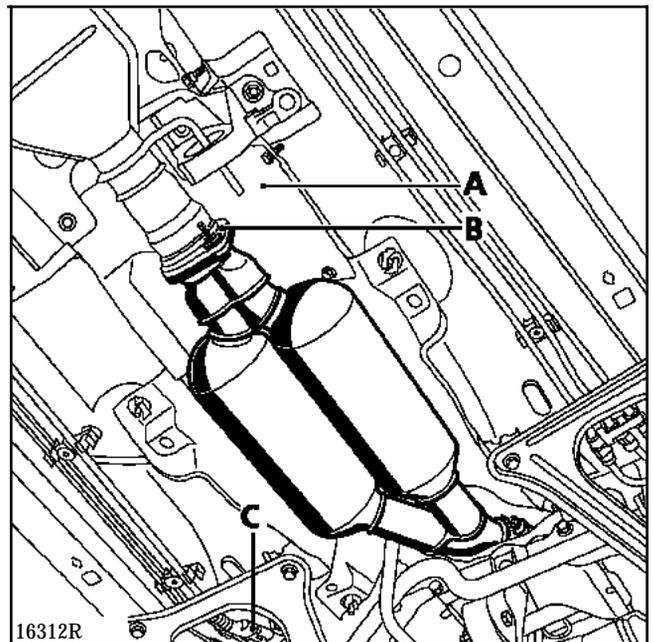
Drain:

- the cooling circuit via the lower radiator hose,
- the gearbox and the engine (if necessary),
- the refrigerant circuit using filling equipment.

Remove:

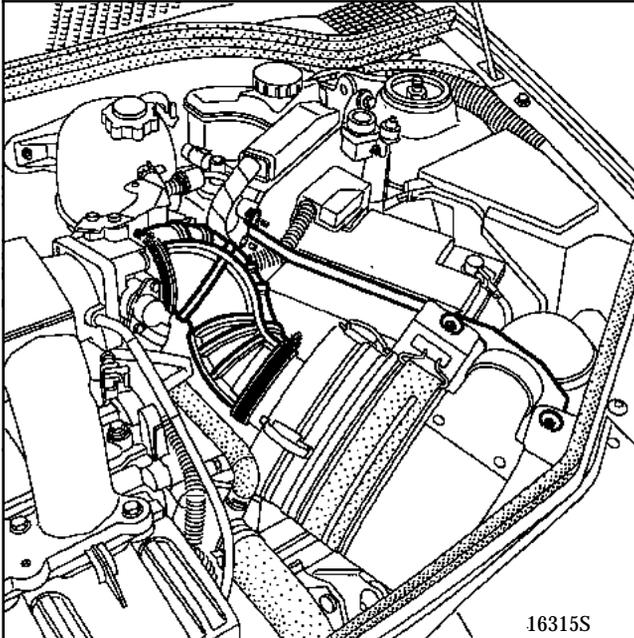
- the front wheels and the mud shields,
- the front bumper,
- the radiator grille,
- the upper crossmember,
- the sub-frame - body tie-rods,
- the brake calipers and the ABS sensors and attach them to the suspension springs,
- the shock absorber base bolts,

- the heat shield (A) and the gearbox control cable,

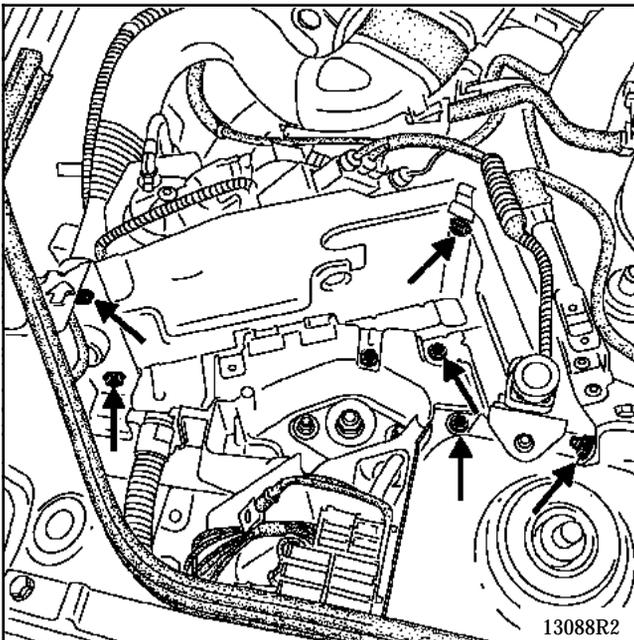


- the exhaust clip (B) between the catalytic converter and the expansion box and disconnect the oxygen sensor connector (C).
- the earth strap on the gearbox,

- the expansion bottle fasteners and move it aside,
- the fasteners securing the catalytic converter to the manifold, and remove it,
- the vacuum pipe on the manifold,
- the air intake pipe and the air unit.

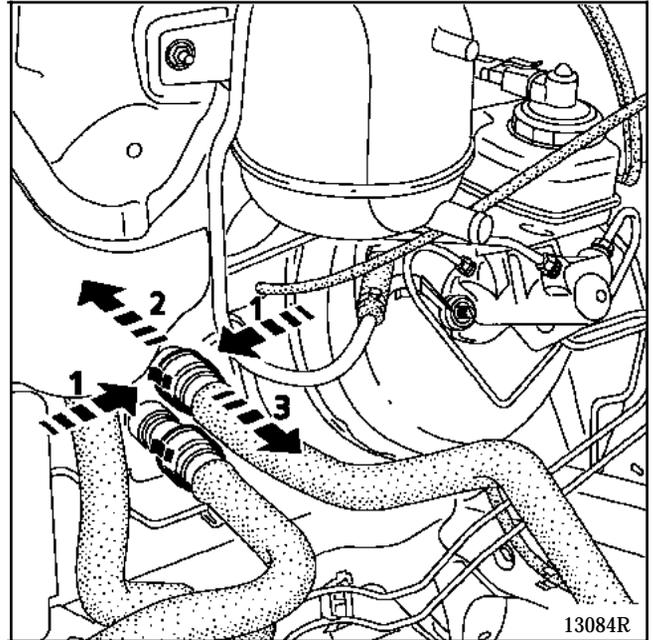


- the injection computer support after first disconnecting the **90-way** connector and the impact switch connector,
- the battery tray.

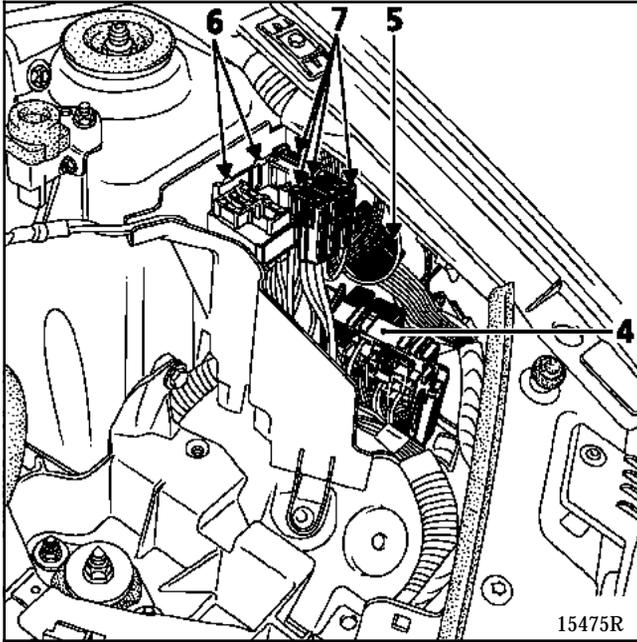


Disconnect:

- the brake booster pipe,
- the heater pipes,



- the relay board (4), the connector (5), the fuse support (6) and remove the fuse holders (7) on it,



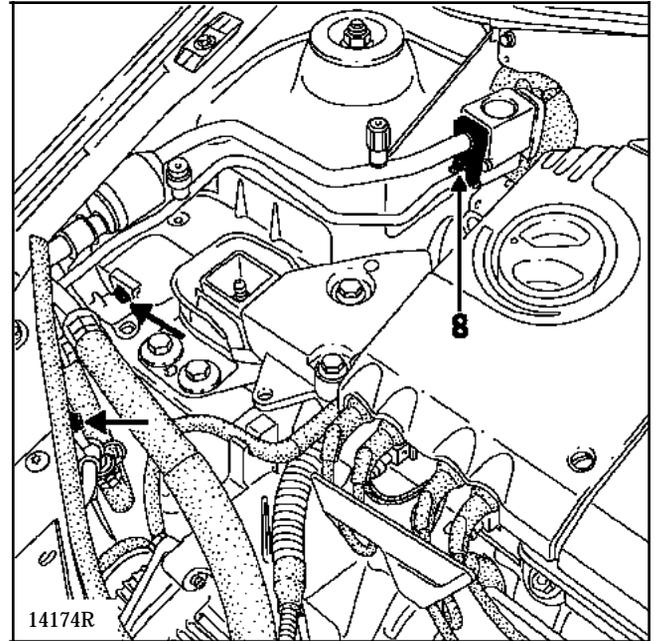
- the connector on the canister,
- the canister pipe on the inlet manifold,
- the accelerator and clutch cables.

Unclip the power steering reservoir and place it on the engine.

Remove:

- the upper radiator fasteners,
- the AC pipe fasteners and the clamp (8) and place the assembly on the engine,

NOTE: it is essential to fit plugs on the pipes and the pressure relief valve to prevent the introduction of humidity into the circuit.



- the steering shaft yoke nut and the eccentric bolt after first pushing back the protector.

SPECIAL FEATURES OF VEHICLES FITTED WITH A DRIVER'S AIR BAG

WARNING

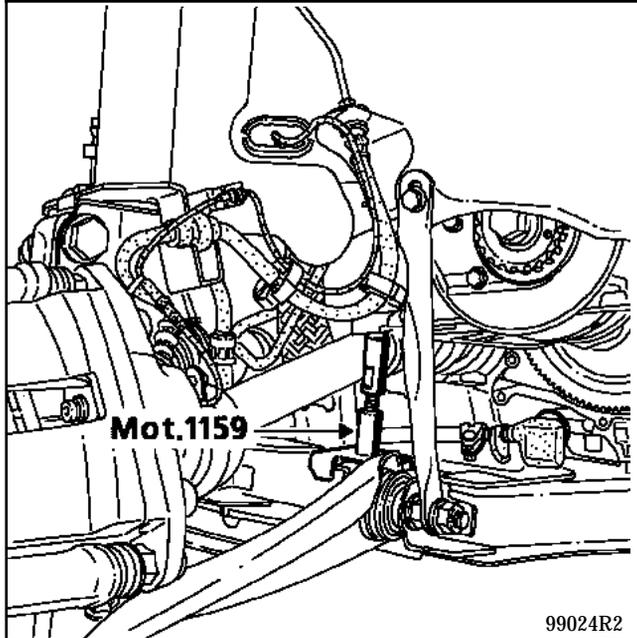
To prevent any risk of destruction of the rotary switch under the steering wheel, follow the instructions below:

- Before the steering column and the rack are uncoupled, it is **ESSENTIAL** that the steering wheel is immobilised with the wheels straight using a "steering wheel immobiliser" tool for the entire duration of the operation.
- If there is any doubt about the correct centring of the rotary switch, the steering wheel must be removed and the centring procedure described in section 88 "Air bag" must be applied.

REMINDER: in this case, only qualified, trained personnel must carry out the procedure.

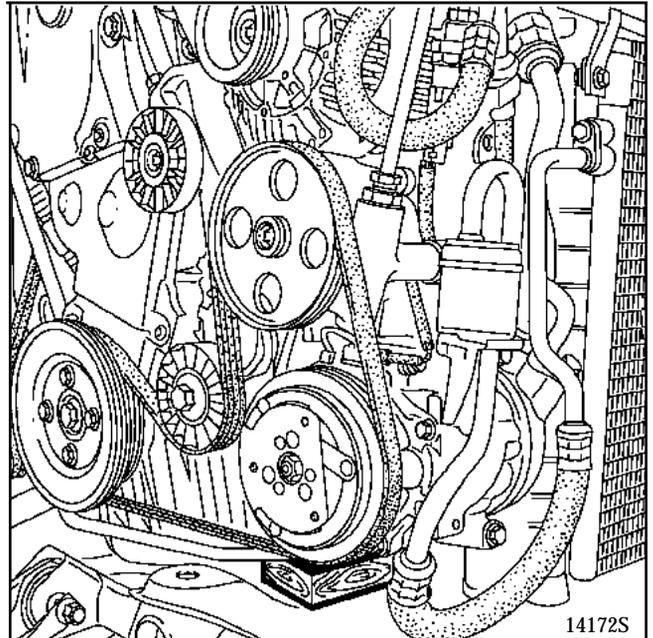
Fit:

- tool **Mot. 1159** between the sub-frame and the cylinder block,

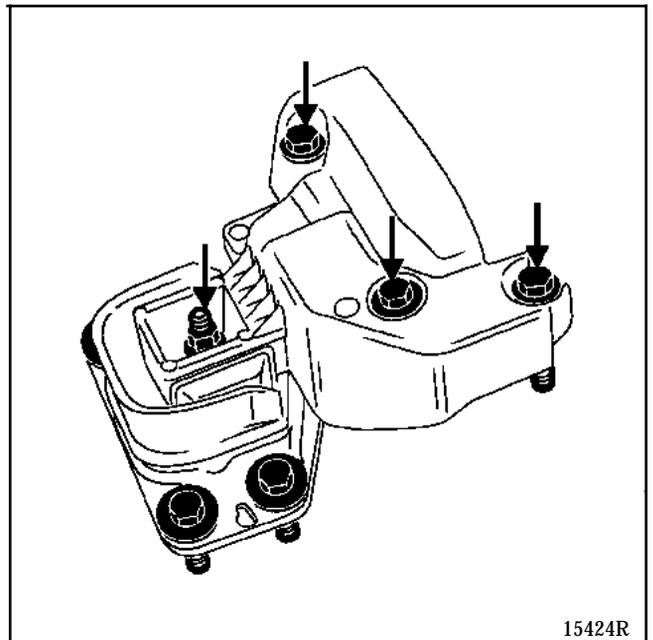


- the lifting ring **77 00 108 302** with two bolts part number **77 03 002 039** (gearbox end),
- the engine support tool **Mot. 1453**.

Fit a shim between the multi-function support and the sub-frame.



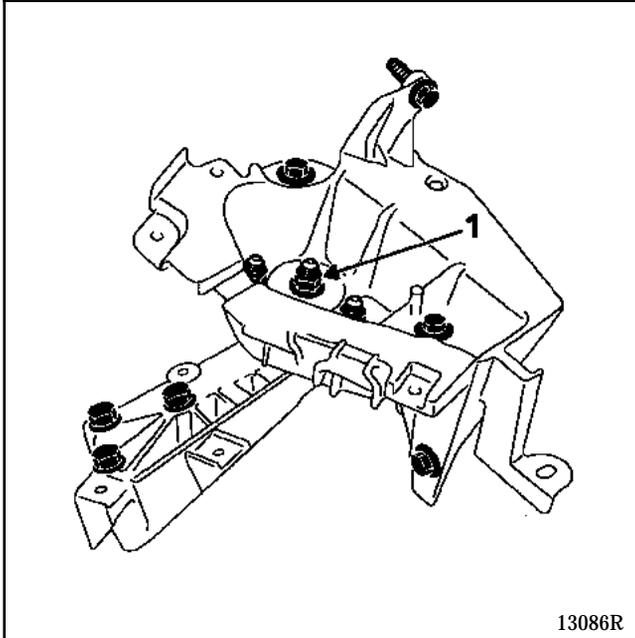
Remove the suspended engine mounting cover.



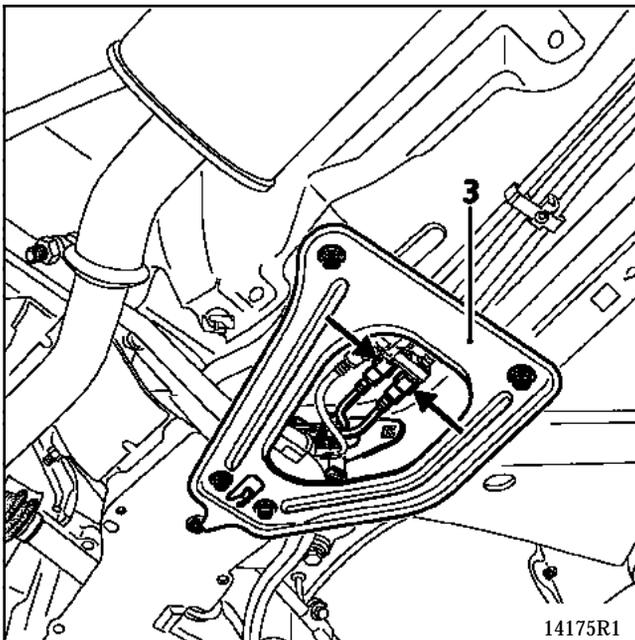
Fit a shim between the gearbox and the sub-frame.

Remove:

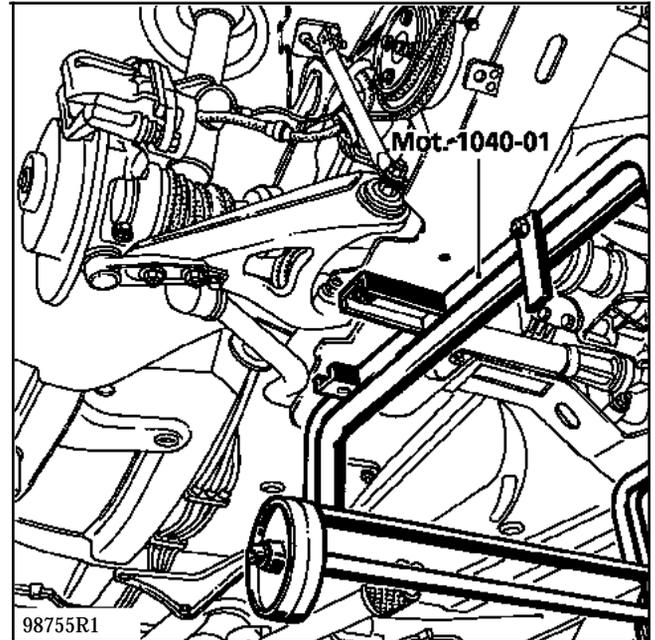
- the nut (1), then, using a copper hammer, tap to release the suspended engine mounting securing stud.



- the tie-rods (3),
- the fuel supply and return pipes.



Secure tool Mot. 1040-01 under the sub-frame.



Lower the lift until the tool comes into contact with the ground.

Remove the sub-frame mounting bolts and extract the engine and transmission assembly, lifting the body.

NOTE: for an operation requiring separation of the engine - gearbox - sub-frame assembly, take care to mark the position of Mot. 1159 on the sub-frame.

REFITTING

The alignment of the sub-frame with the body will be made easier by positioning two threaded rods **Mot. 1233-01** in the two front fasteners of the body sub-frame.

Tighten the sub-frame mounting bolts to a torque of:

- **6.2 daN.m** at the front,
- **10.5 daN.m** at the rear.

Refit in the reverse order to removal.

Fit the heat shields correctly.

Fit the caliper mounting bolts with **Loctite FRENBLOC** and tighten them to the specified torque.

Press the brake pedal several times to bring the pistons into contact with the pads.

Carry out the following operations:

- fill the engine and gearbox with oil (if necessary),
- fill and bleed the cooling circuit (see section **19 "Filling - Bleeding"**).
- fill the refrigerant circuit (refer to section **62**).

When refitting the suspended engine mounting and the gearbox mountings, take care to position them correctly (refer to the procedure in section **19 "Suspended engine mounting"**).

ESSENTIAL SPECIAL TOOLS

T.Av. 1233-01	Threaded rods for lowering the sub-frame
---------------	--

TIGHTENING TORQUES (in daN.m)



Sub-frame front mounting bolt	6.2
Sub-frame rear mounting bolt	10.5
Sump bolt	1.4
Steering shaft yoke mounting bolt	3
Engine tie-bar bolt	6.2
Wheel bolt	9
Gearbox lower rubber mounting nut	4.4

REMOVAL

Place the vehicle on a two post lift.

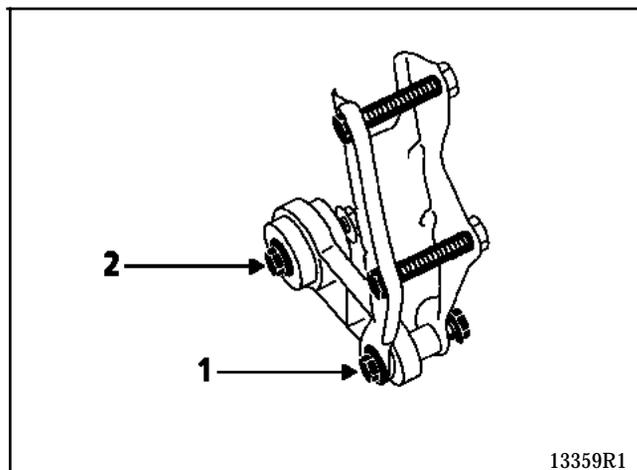
Disconnect the battery.

Drain the engine.

Remove:

- the front wheels and the right-hand mud shield,
- the steering shaft yoke nut and eccentric bolt after first pushing back the protector,

- the lower ball joint fasteners and the steering fasteners,
- the sub-frame - body tie-rods,
- the gear control cable, gearbox end,
- the bolt (1) and unscrew the engine tie-bar bolt (2) without removing it,



13359R1

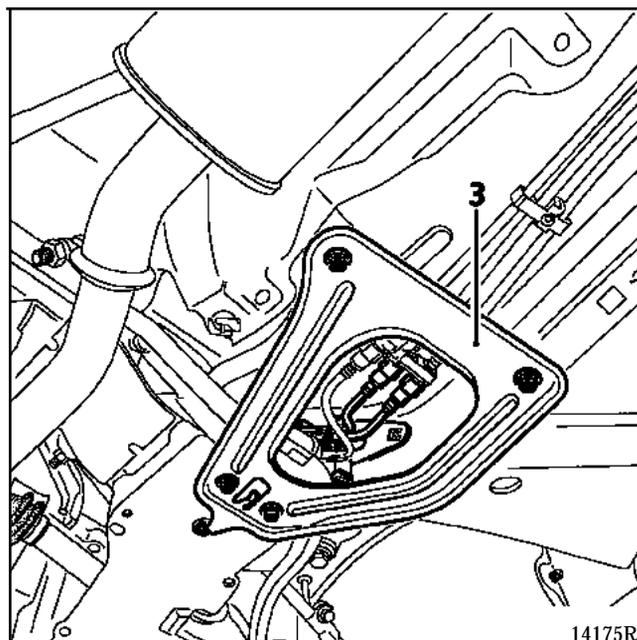
- the bumper lower fastenings,
- the tie-rod fasteners (3),
- the sub-frame mounting bolts and gradually fit the threaded rods **Mot. 1233-01**.

WARNING

To prevent any risk of destruction of the rotary switch under the steering wheel, follow the instructions below:

- Before the steering column and the rack are uncoupled, it is **ESSENTIAL** that the steering wheel is immobilised with the wheels straight using a "steering wheel immobiliser" tool for the entire duration of the operation.
- If there is any doubt about the correct centring of the rotary switch, the steering wheel must be removed and the centring procedure described in section 88 "Air bag" must be applied.

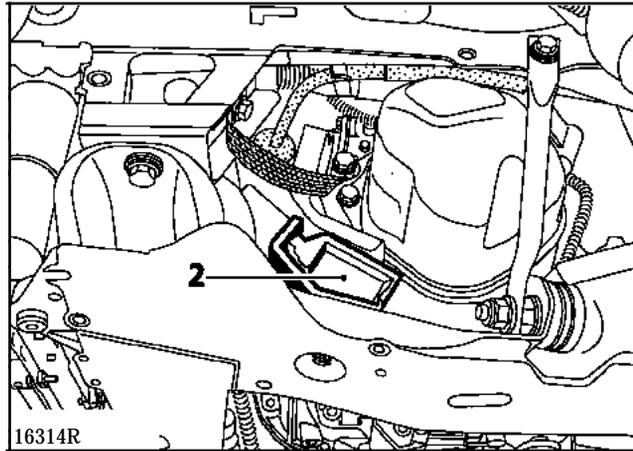
REMINDER: in this case, only qualified, trained personnel must carry out the procedure.



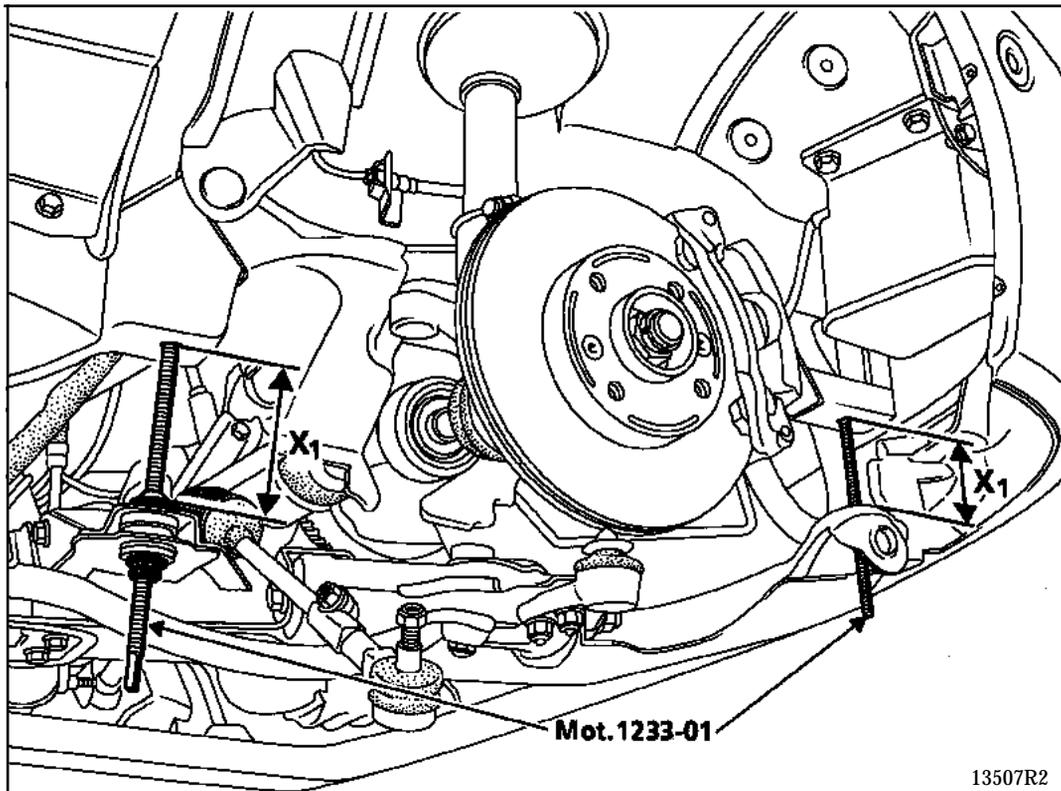
14175R

Sump

Remove the gearbox lower mounting fastener (2).



Gradually lower the sub-frame using the threaded rods **Mot. 1233-01** until the approximate dimensions $X_1 = 8 \text{ cm}$ are reached.

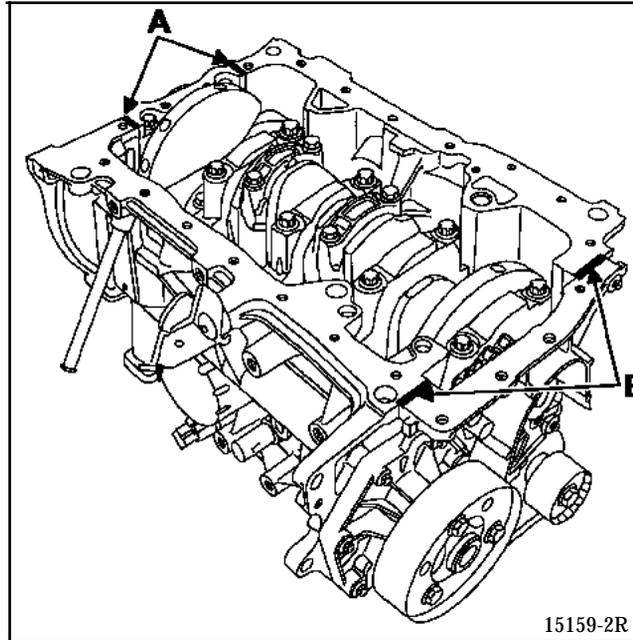


Remove the sump.

Sump

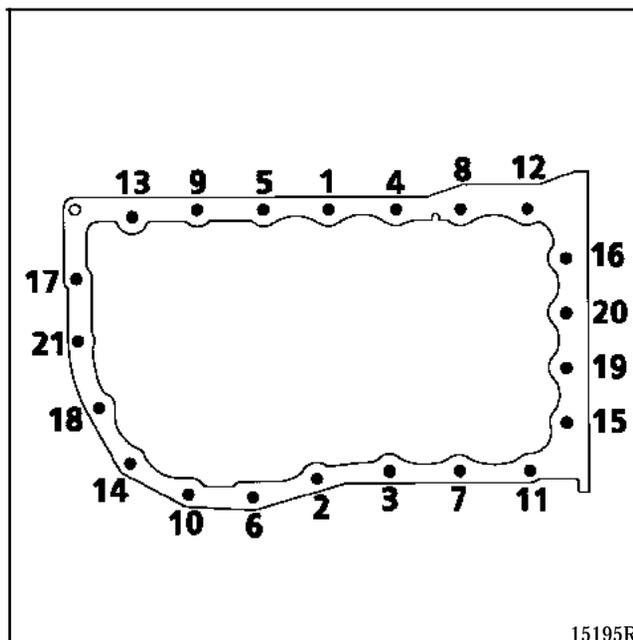
REFITTING

Apply a spot of **RHODORSEAL 5661** at (A) on either side of bearing n° 1, and at (B) (at the intersection of the crankshaft closing plate and the cylinder block).



15159-2R

Refit the sump with a new seal pre-tightening it to a torque of **0.8 daN.m**, then carry out a final tightening of **1.2 to 1.5 daN.m** in the order shown below.



15195R

TIGHTENING TORQUES (in daN.m)



Alternator upper support mounting bolt (1)	3.8±0.4
Alternator upper support mounting bolt (2)	3.2±0.3
Alternator/block tie-rod mounting bolt (3)	6.2±0.6
Alternator upper mounting bolt (4)	3.2±0.3
Alternator lower mounting bolt (5)	3.8±0.4
Compressor support mounting bolt	6.2±0.6
Compressor mounting bolt	3.2±0.3
Coolant pump support mounting bolt (6)	6.2±0.6
Coolant pump mounting bolt	3.1±0.3
Belt tensioner mounting bolt (7)	6.2±0.6
Belt tensioner spring mounting bolt (8)	2.1±0.2
Pulley bolt (9)	3.2±0.3

REMOVAL

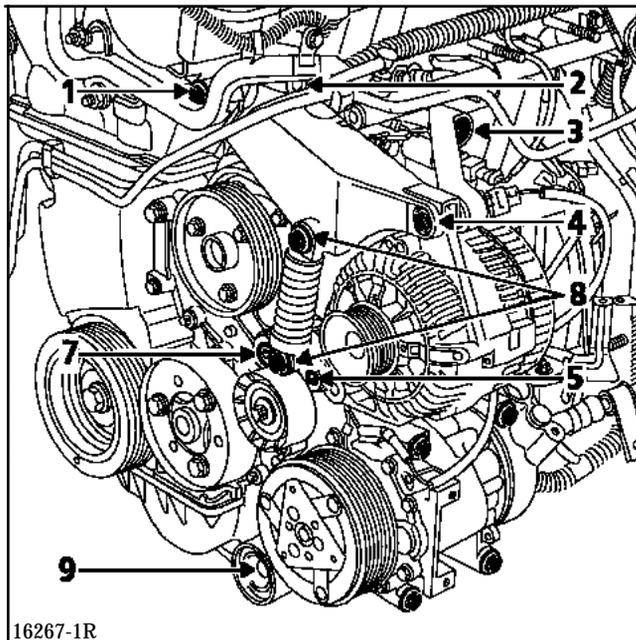
Place the vehicle on a two post lift.

Disconnect the battery.

Remove the accessories belt (see section 07 "Accessories belt tensioning").

Remove:

- the alternator (see section 16 "Alternator"),
- the compressor (see section 62 "Compressor"),
- the coolant pump (see section 19 "Coolant pump"),



16267-1R

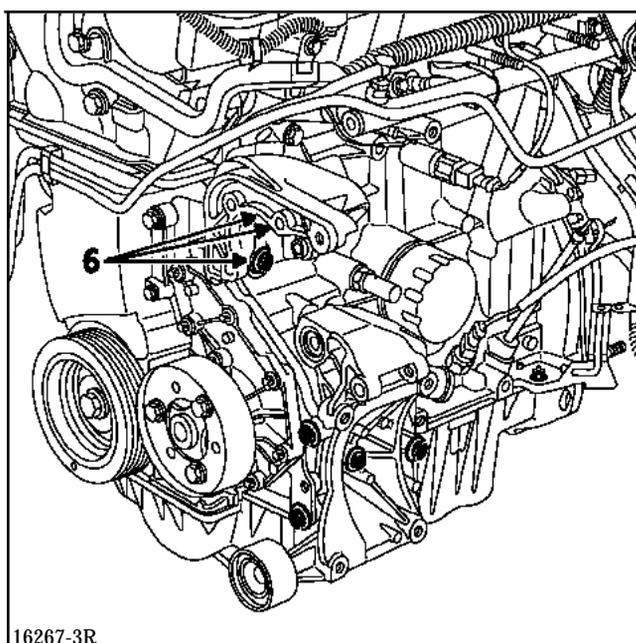
- the alternator support,
- the compressor support,
- the coolant pump support.

REFITTING

Refit in the reverse order to removal.

Fit all the bolts of each support and tighten them gradually.

Observe the tightening torques.



16267-3R

TOP AND FRONT OF ENGINE

Timing belt

11

ESSENTIAL SPECIAL TOOLS	
Mot. 799-01	Tool for immobilising pinions for toothed timing belt
Mot. 1054	Top dead centre pin
Mot. 1368	Tool for tightening the timing pulley
Mot. 1453	Engine support tool
Mot. 1487	Tool for fitting the inlet camshaft sealing plug
Mot. 1488	Tool for fitting the exhaust camshaft sealing plug
Mot. 1496	Tool for setting the camshafts
Mot. 1509 and 1509 -01	Tool for immobilising the camshaft pulleys
Mot. 1512	Tool for fitting the exhaust shafts seal
Mot. 1517	Tool for fitting the inlet camshaft seal
ESSENTIAL EQUIPMENT	
Angular tightening wrench	

TIGHTENING TORQUES (in daN.m or/and °)	
Wheel bolt	9
Pulley bolt	4.5
Crankshaft pulley bolt	$2 + 135^\circ \pm 15^\circ$
Tensioner nut	2.8
Front right suspended engine mounting cover to engine mounting bolt	6.2
Front right suspended engine mounting movement limiter mounting bolt	6.2

TOP AND FRONT OF ENGINE

Timing belt

11

REMOVAL

Place the vehicle on a two post lift.

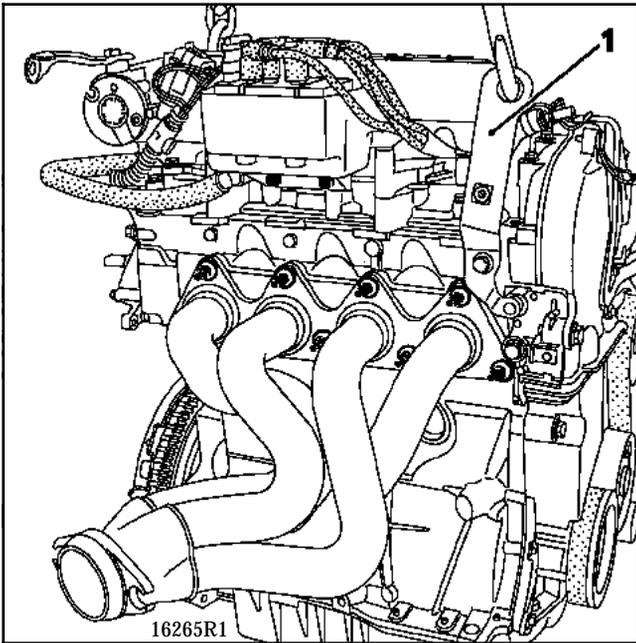
Disconnect the battery.

Remove:

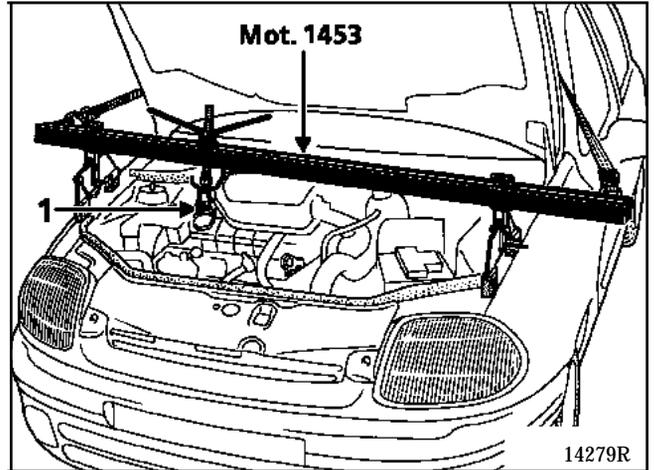
- the front right wheel,
- the front right wheel arch and the engine undertray.

Fit:

- the engine support (1) ,



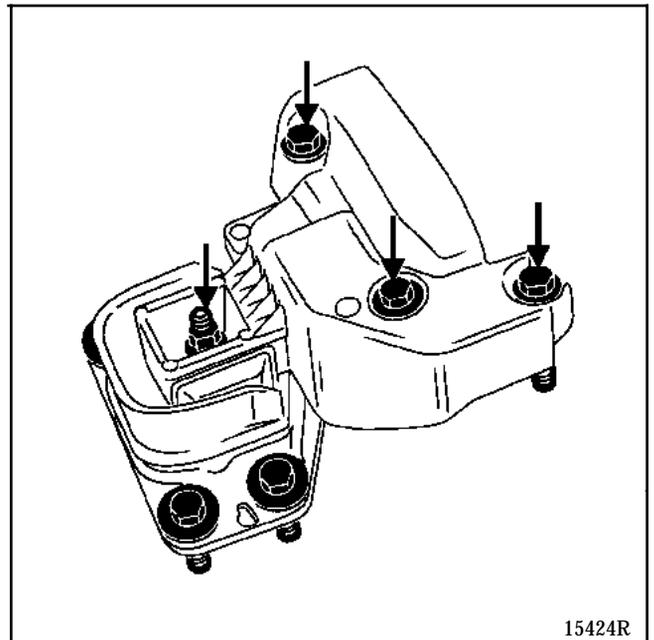
- the support Mot. 1453.



NOTE: when carrying out this operation, be sure to fit the engine support pads on the rigid sections of the wings.

Remove:

- the front bumper,
- the radiator grille,
- the upper crossmember,
- the suspended engine mounting cover and the movement limiter,



TOP AND FRONT OF ENGINE

Timing belt

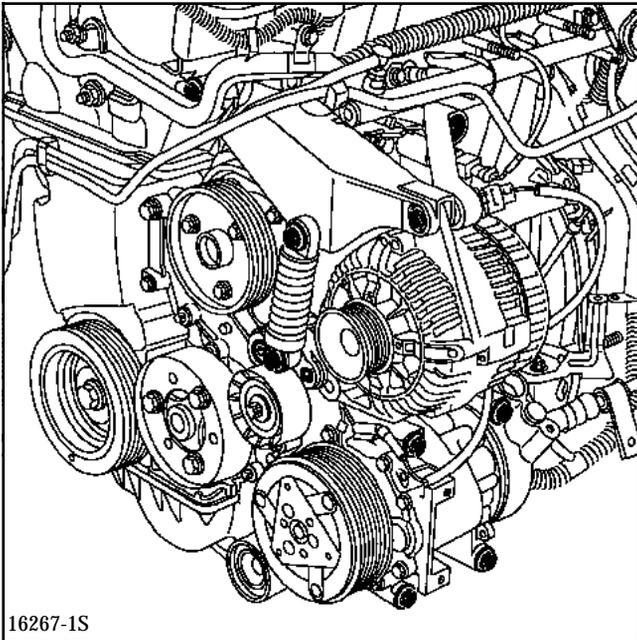
11

- the accessories belt (see section 07 "Accessories belt tensioning procedure").

Disconnect the connectors.

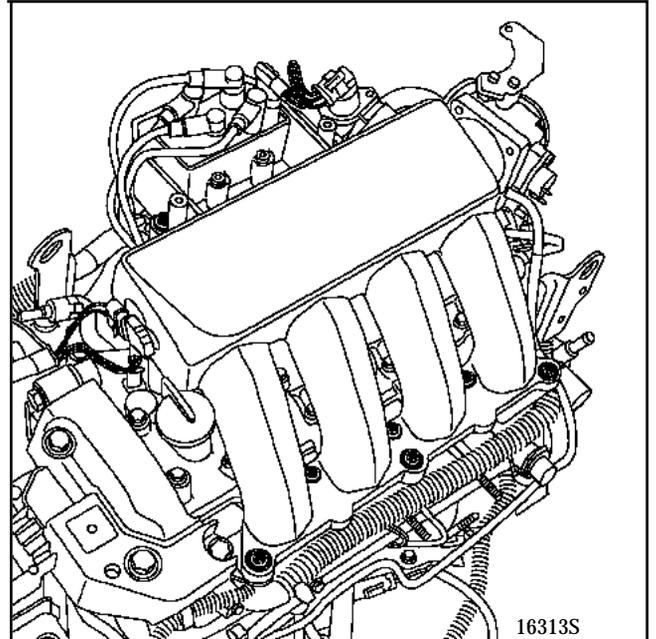
Unclip:

- the electrical harness on the upper timing cover and move aside the assembly,
- the fuel pipes on the intermediate timing cover.

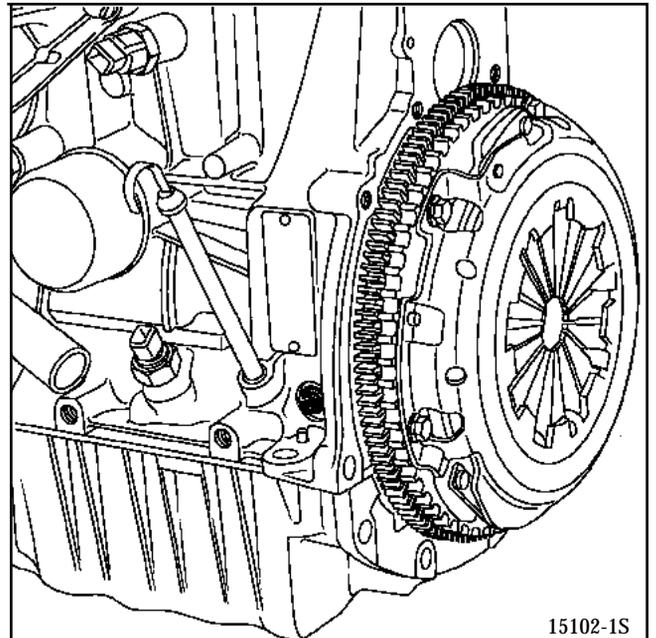


Remove:

- the air intake pipe,
- the inlet manifold (see section 12 "Inlet manifold"),
- the camshaft sealing plugs,



- the Top Dead Centre pin plug.



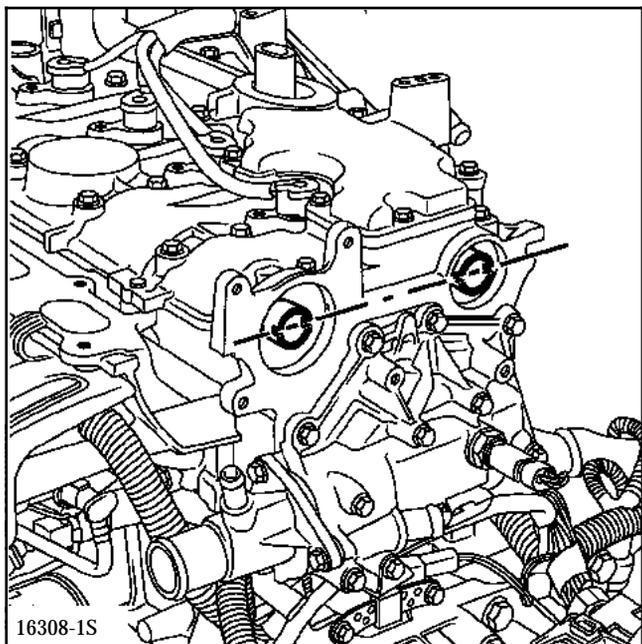
TOP AND FRONT OF ENGINE

Timing belt

11

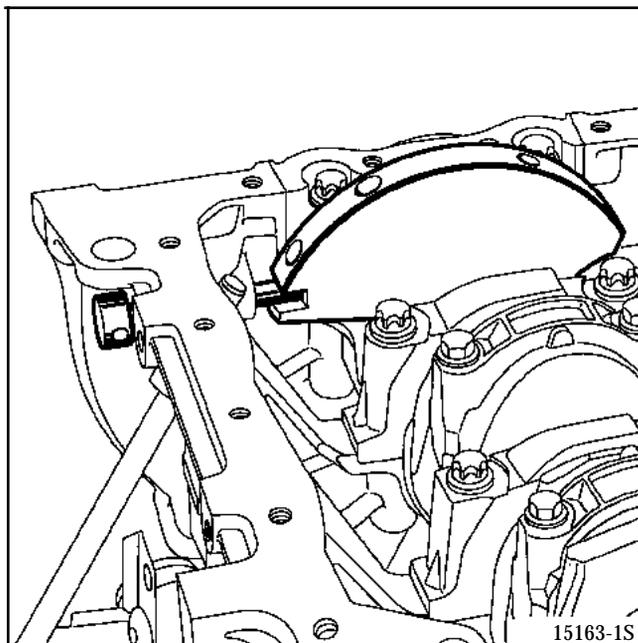
Setting the timing

Turn the engine clockwise (timing end) to place the camshaft grooves downwards in an almost horizontal position as indicated on the diagram below. Then insert the Top Dead Centre pin **Mot. 1054** to be between the balancing hole and the crankshaft setting groove.

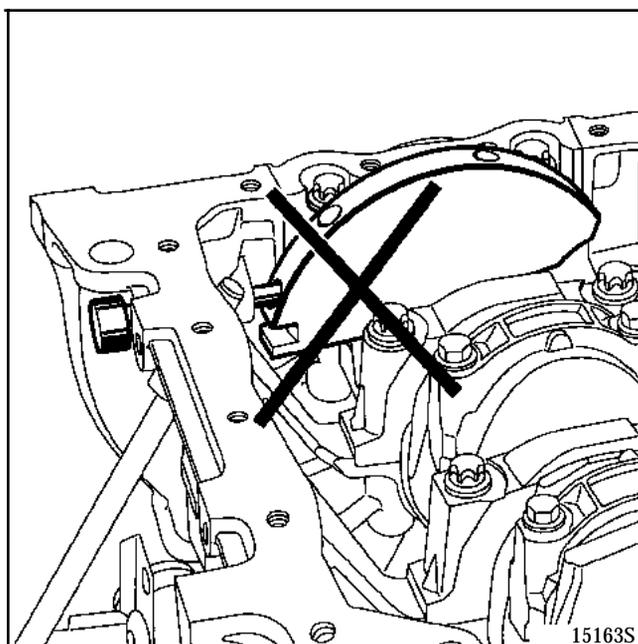
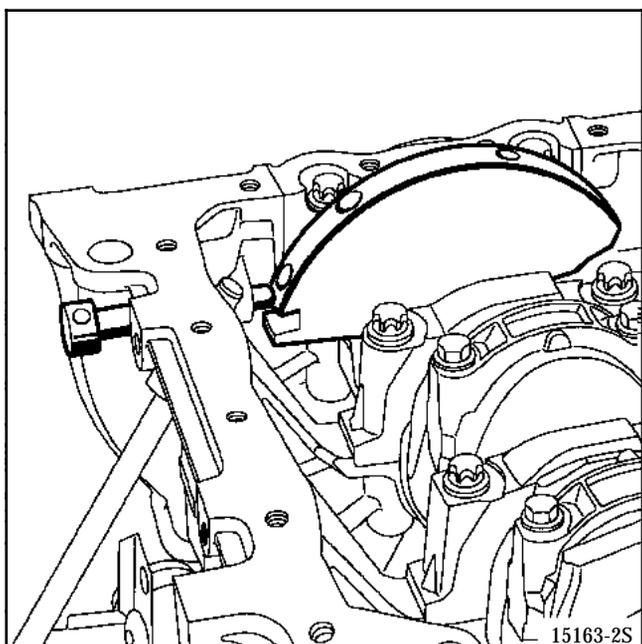


Turn the engine slightly, in the same direction, engaging pin **Mot. 1054** at the setting point.

Correct position



Incorrect position (the pin is in the balancing hole).



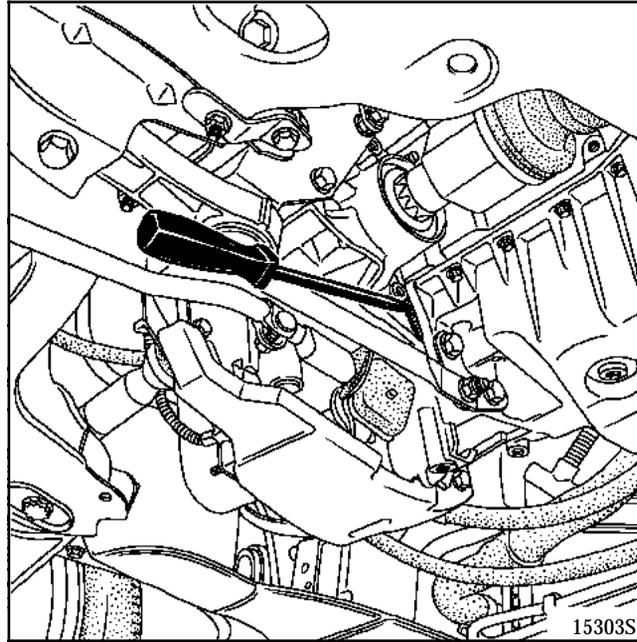
TOP AND FRONT OF ENGINE

Timing belt

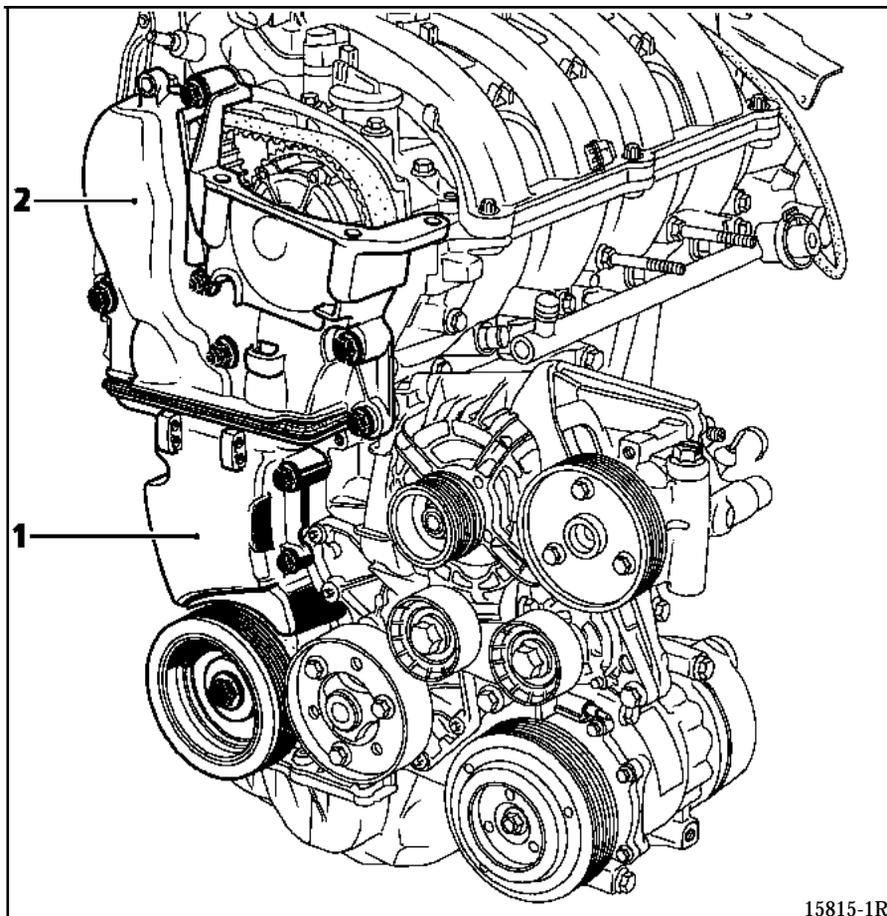
11

Remove:

- the crankshaft pulley immobilising the engine flywheel using a screwdriver,



- the alternator upper support,
- the upper timing cover (2)
- the intermediate timing cover (1).



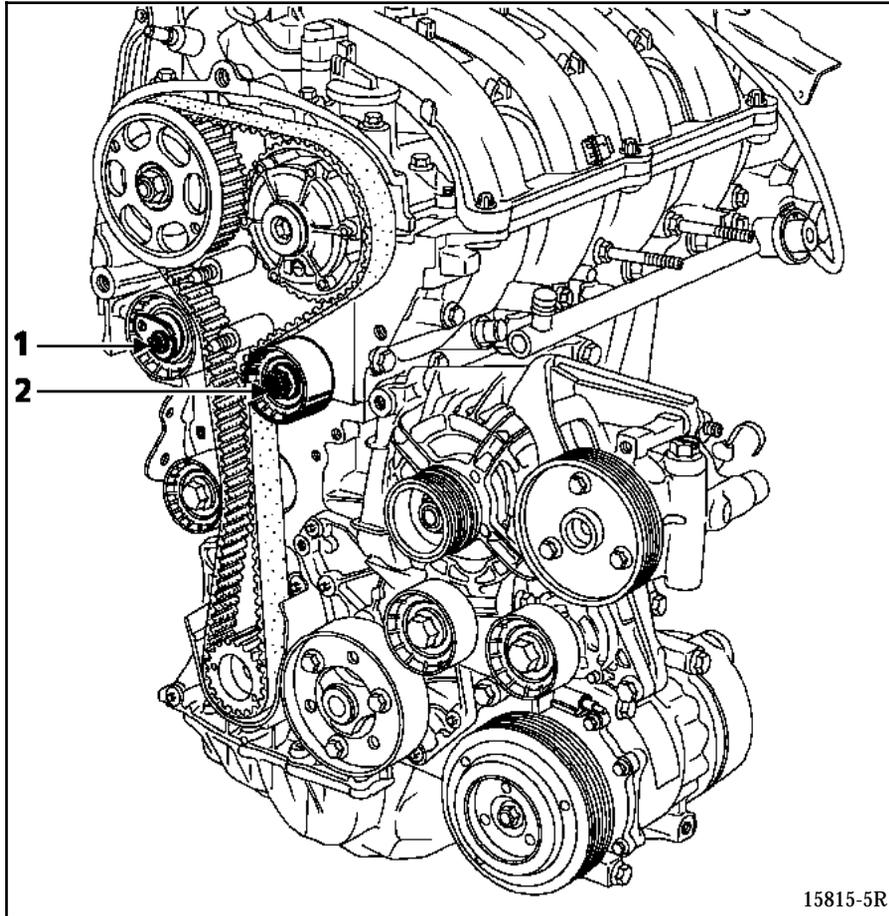
TOP AND FRONT OF ENGINE

Timing belt

11

Slacken the timing belt by unscrewing the tensioner nut (1).

To remove the timing belt, remove the pulley (2) and **take care not to drop the crankshaft pinion (as this does not have a cotter pin).**



15815-5R

WARNING: it is essential to degrease the end of the crankshaft, the crankshaft pinion bore and the contact surfaces of the pulley to prevent sliding of the timing which could destroy the engine.

REFITTING

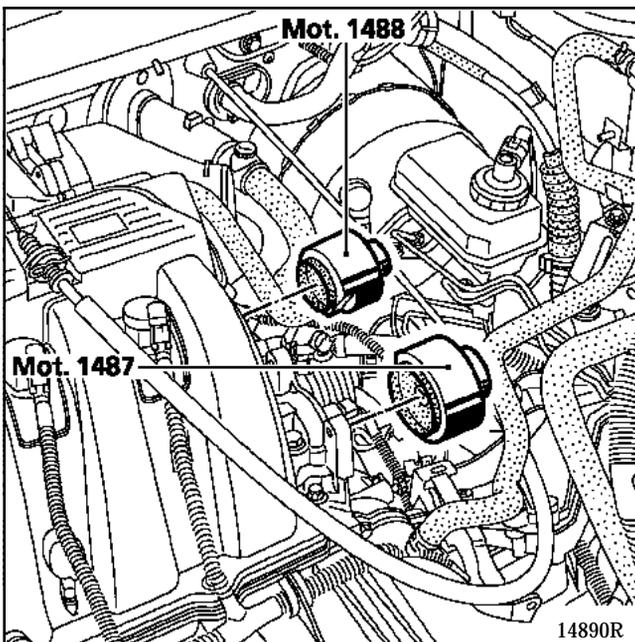
When the timing belt is changed, it is essential to change the timing tensioners and pulleys.

WARNING: it is essential to refit the intermediate timing cover before the accessories pulley.

Refit:

- the timing belt (it is essential to follow the procedure described in section 07 "Timing belt tensioning procedure"),
- the accessories belt (see section 07 "Accessories belt tensioning procedure"),
- the Top Dead Centre pin plug applying a spot of RHODORSEAL 5661 to the thread,
- the new sealing plugs:
 - on the inlet camshaft (Mot. 1487),
 - on the exhaust camshaft (Mot. 1488),

- the right-hand suspended engine mounting tightening the bolts to the specified torque, adjust in line with the procedure described in section 19 "Suspended engine mounting",
- the inlet manifold (see section 12 "Inlet manifold").



TOP AND FRONT OF ENGINE

Cylinder head gasket

11

ESSENTIAL SPECIAL EQUIPMENT	
Mot. 799-01	Tool for immobilising pinions for toothed timing belt
Mot. 1159 and Mot. 1159 -02	Tool for supporting the engine on the sub-frame
Mot. 1368	Tool for tightening the timing pulley
Mot. 1453	Engine support tool
Mot. 1487	Tool for fitting the inlet camshaft sealing plug
Mot. 1488	Tool for fitting the exhaust camshaft sealing plug
Mot. 1489	Top Dead Centre pin
Mot. 1496	Tool for setting the camshafts
Mot. 1509 and Mot. 1509-01	Tool for immobilising the camshaft pulleys
Mot. 1512	Tool for fitting the exhaust shafts seal
Mot. 1513	Tool for refitting the camshaft phase shifter solenoid valve seal
Mot. 1517	Tool for fitting the inlet camshaft seal
ESSENTIAL EQUIPMENT	
Cylinder head testing equipment	
Angular tightening wrench	

TIGHTENING TORQUES (in daN.m or/and °)	
Wheel bolt	9
Pulley bolt	4.5
Accessories pulley bolt	2 + 135° ± 15°
Tensioner nut	2.8
Exhaust camshaft pulley nuts	3 + 86°
Cylinder head cover bolt	1.2
Oil separator bolt	1.3
Suspended engine mounting bolt	6.2
Engine tie-bar bolt	6.2
Camshaft phase shifter bolt	10

REMOVAL

Place the vehicle on a two post lift.

Disconnect the battery.

Remove the engine undertray and the front right mud shield.

Drain the cooling circuit (via the lower radiator hose).

Fit:

- the engine lifting ring,
- the engine support tool Mot. 1453.

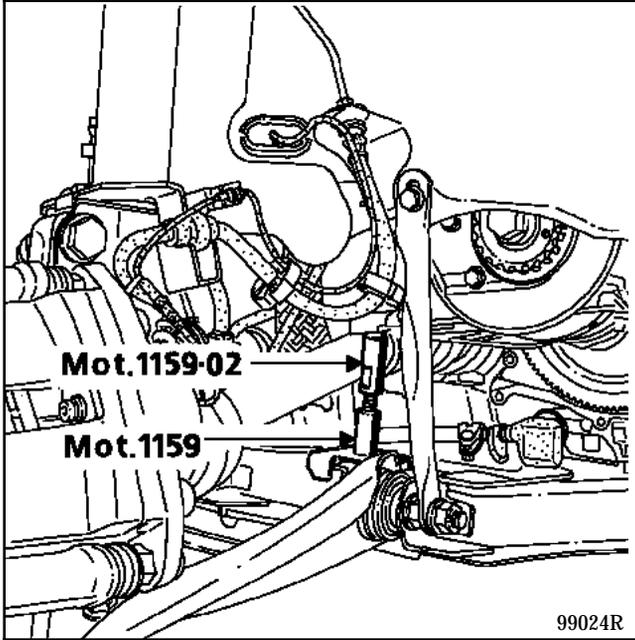
TOP AND FRONT OF ENGINE

Cylinder head gasket

11

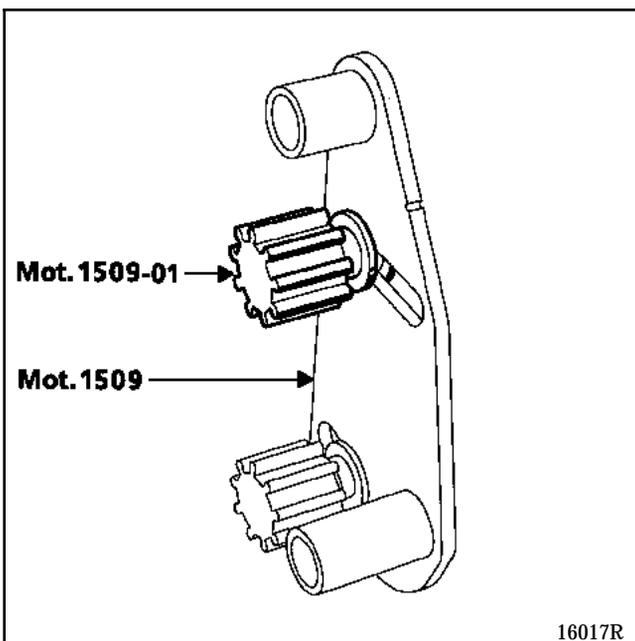
Remove the timing belt (refer to the procedure described in section 11 "Timing belt").

Fit the engine support tool **Mot. 1159** between the sub-frame and the cylinder block.



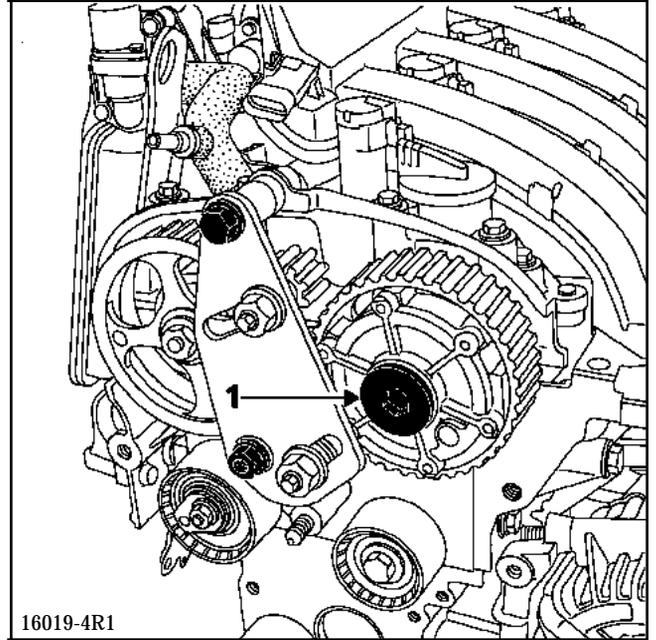
Remove the engine support.

Fit tool **Mot. 1509-01** on tool **Mot. 1509** in place of the upper pinion.

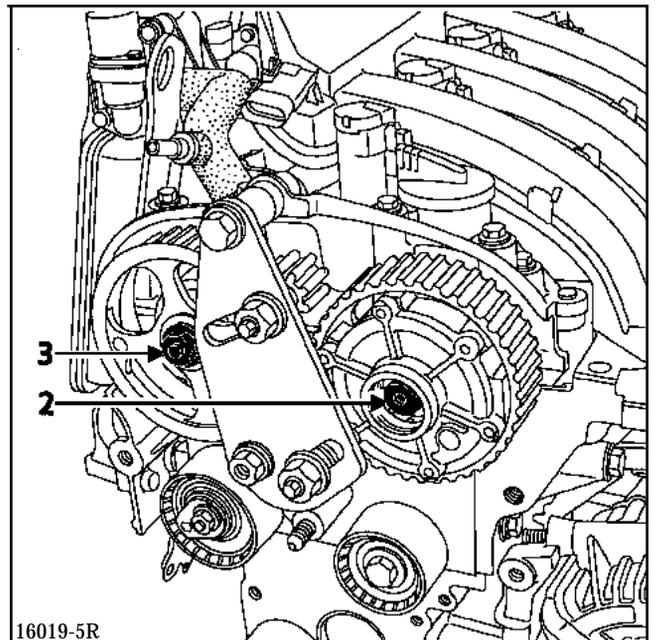


Fit tool **Mot. 1509** on the engine to immobilise the camshaft pulleys.

NOTE: fit the spacers supplied in kit **Mot. 1509-01** and use the timing cover fasteners (see section 07).



Remove the inlet camshaft phase shifter plug (1).



Remove the inlet camshaft phase shifter bolt (2) and the exhaust camshaft pulley nut (3).

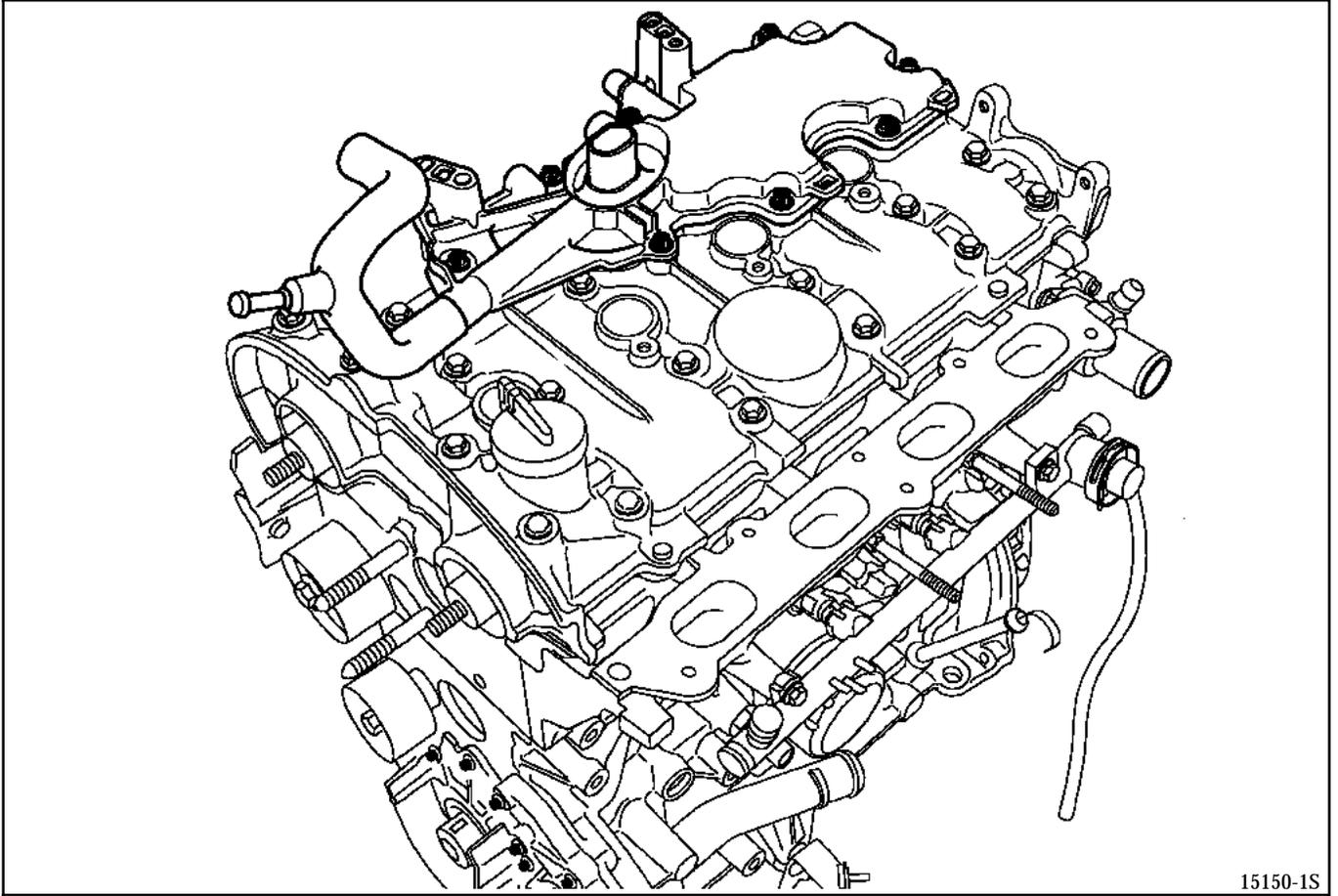
TOP AND FRONT OF ENGINE

Cylinder head gasket

11

Remove:

- the lifting eye,
- the oil separator,



15150-1S

- the injection rail protector,
- the injection rail.

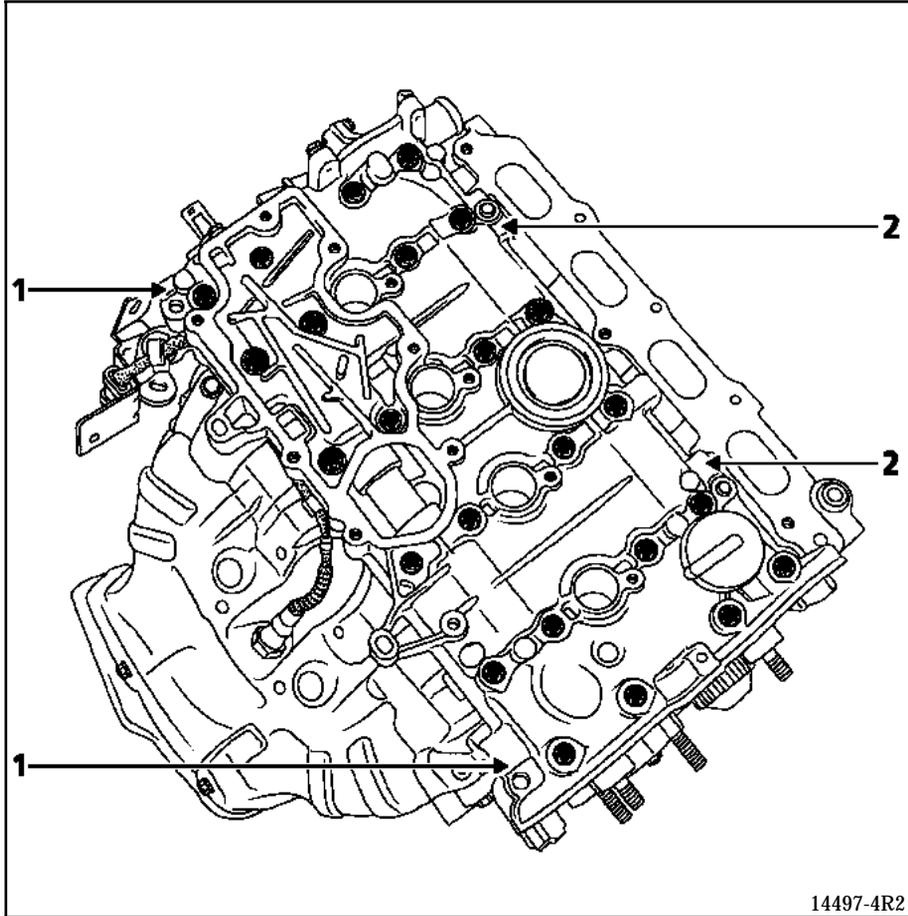
NOTE: when carrying out work on the fuel circuit, be aware of the quantity of fuel in the injection rail.
Protect vulnerable areas.

TOP AND FRONT OF ENGINE

Cylinder head gasket

11

Remove the cylinder head cover bolts then release it vertically tapping the "lugs" at (1) using a copper hammer and using a screwdriver as a lever at (2) (protect the screwdriver to prevent damage to the aluminium surfaces).



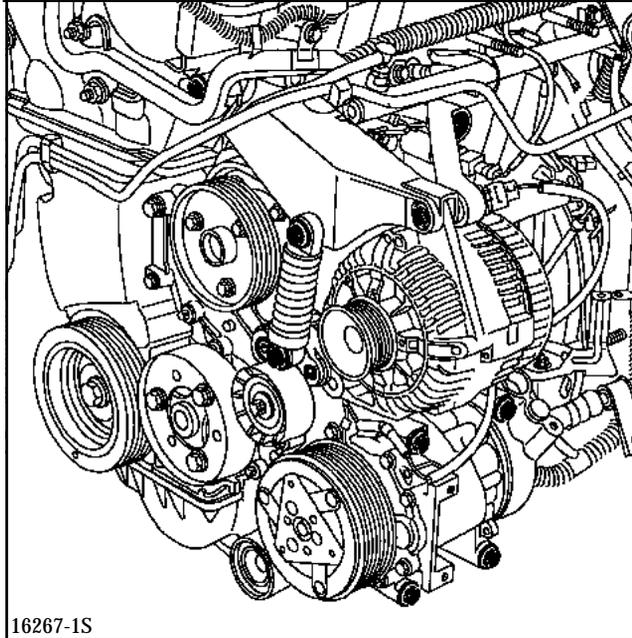
TOP AND FRONT OF ENGINE

Cylinder head gasket

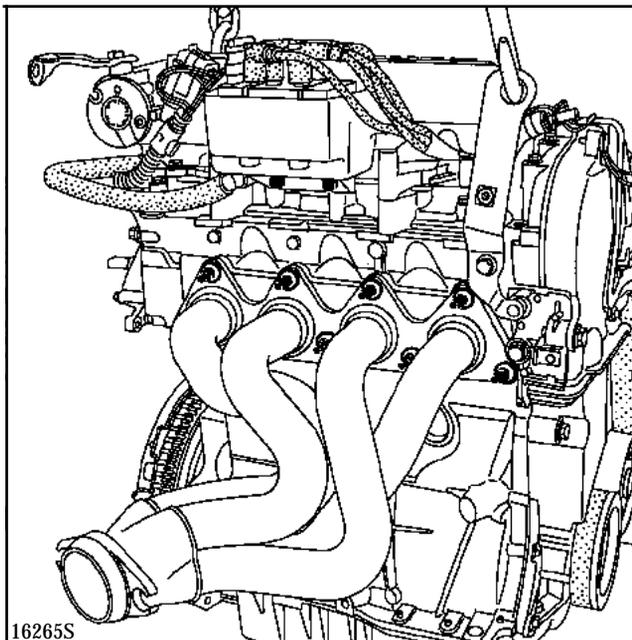
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Remove:

- the camshafts and the valve rockers,
- the hoses on the cylinder head outlet water housing and the coolant temperature sensor connector,
- the electrical harness support fasteners,



- the exhaust manifold,

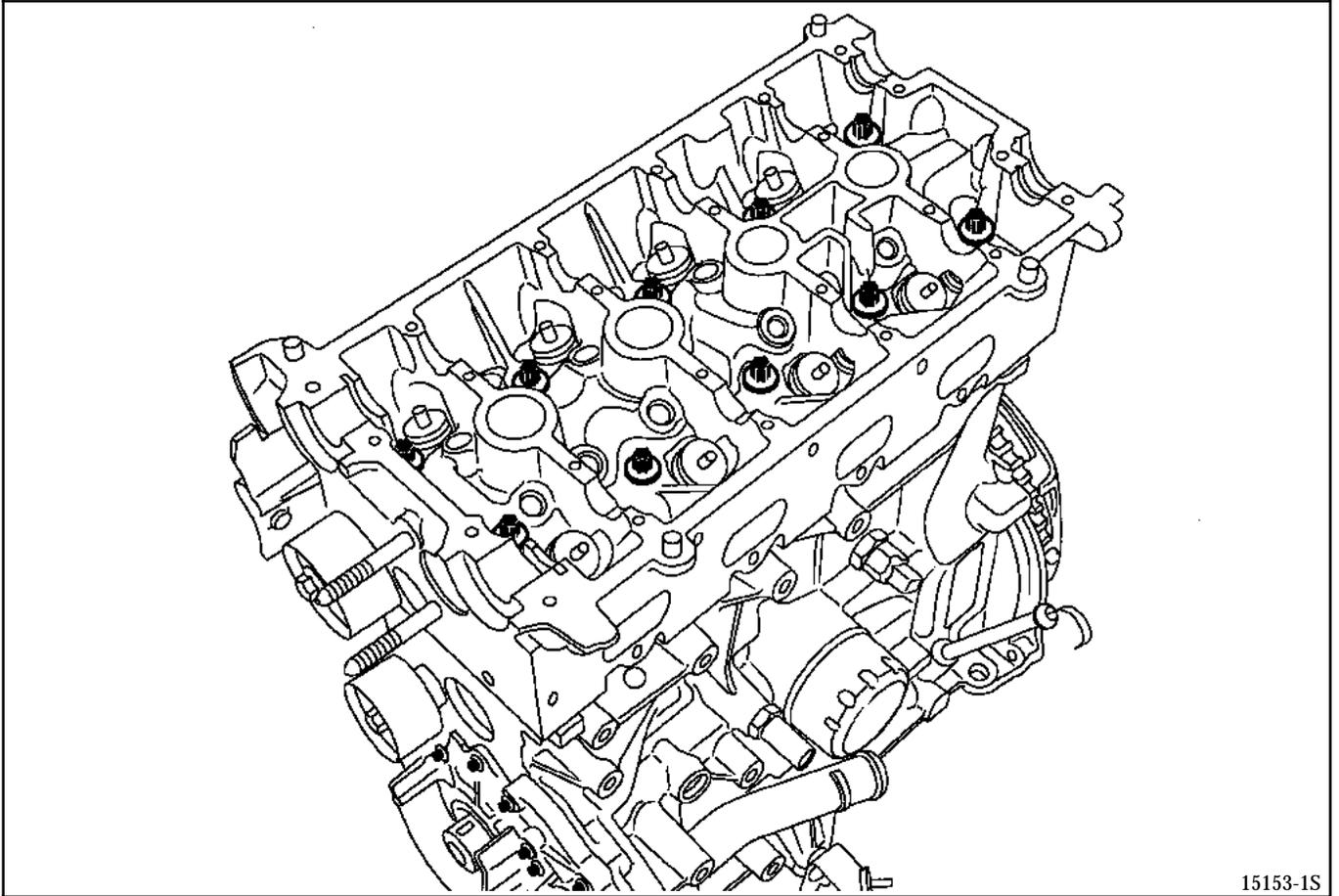


TOP AND FRONT OF ENGINE

Cylinder head gasket

11

- the cylinder head.



15153-IS

CLEANING

It is very important that the mating surfaces of the aluminium parts are not scratched.

Use the product **Décapjoint** to dissolve the part of the gasket which remains attached.

Apply the product to the section to be cleaned; wait approximately ten minutes, then remove it using a wooden spatula.

It is advisable to wear gloves during this operation.

Your attention is drawn to the care which must be taken when carrying out this operation to prevent the introduction of foreign bodies into the oil feed pipes (pipes located in the cylinder block and in the cylinder head).

CHECKING THE MATING SURFACE

Check whether the mating surface is deformed.

Maximum deformation: **0.05 mm.**

Grinding of the cylinder head is prohibited.

Test the cylinder head to detect any cracks.

TOP AND FRONT OF ENGINE

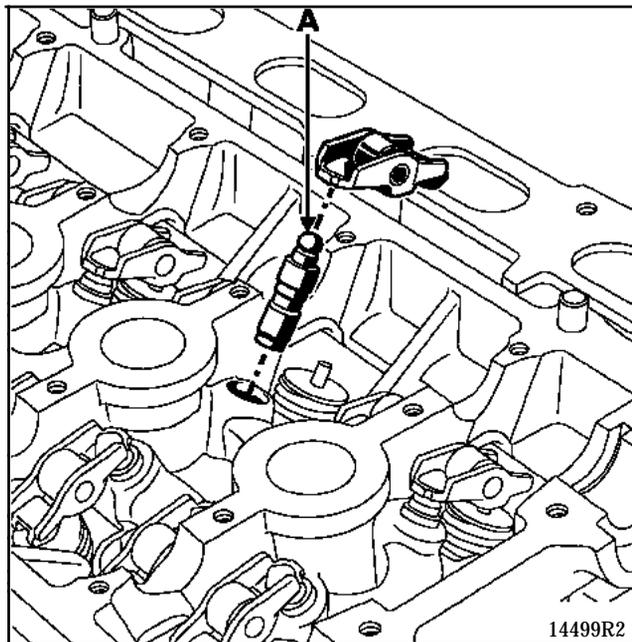
Cylinder head gasket

11

REFITTING

When removing-refitting the cylinder head, observe the following points:

- It is essential to reprime the hydraulic stops as they risk becoming empty after too prolonged a time.
To check whether it is necessary to reprime them, press the top of the stop at (A) with the thumb. If the stop piston lowers, immerse it in a container full of diesel then refit them.

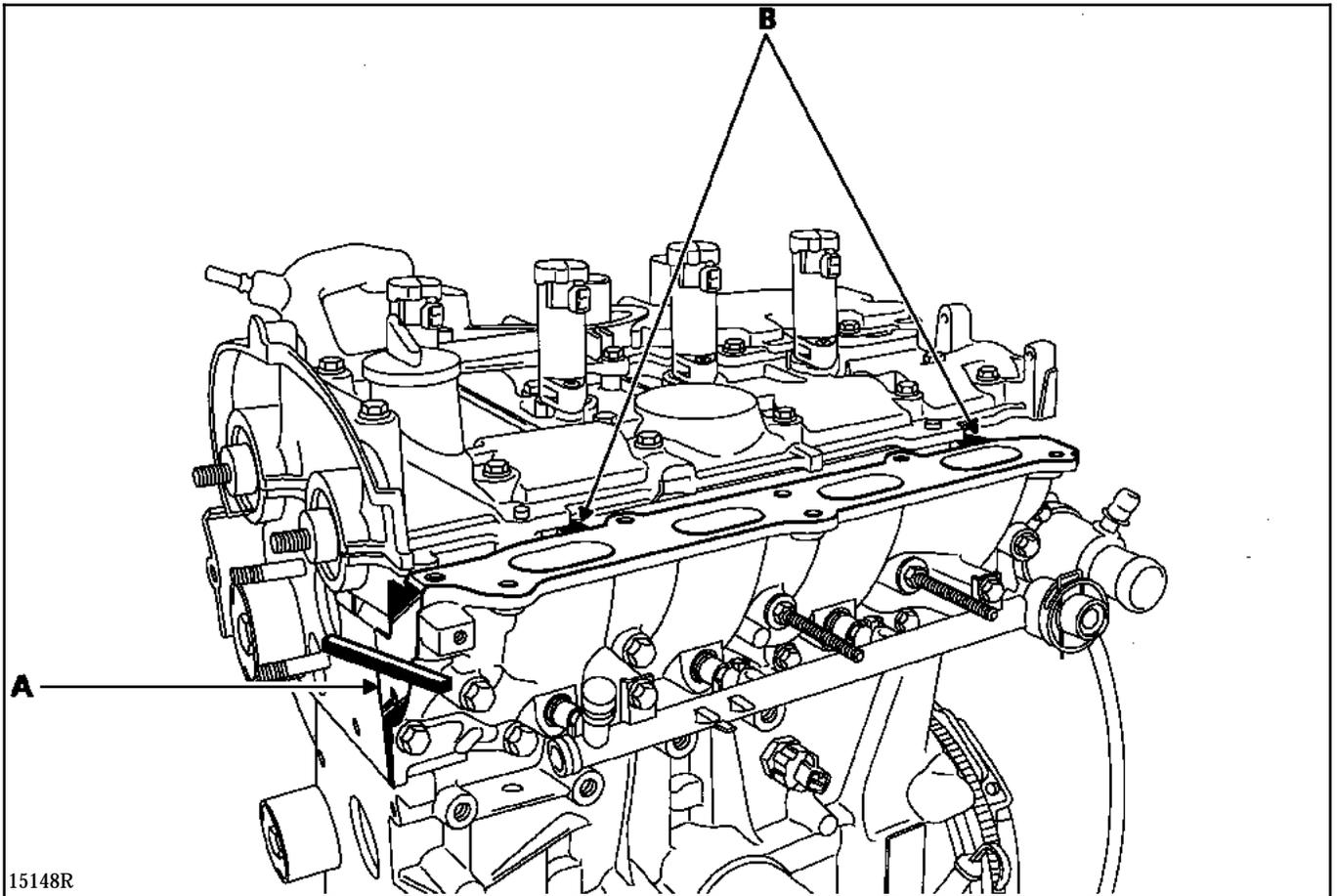


TOP AND FRONT OF ENGINE

Cylinder head gasket

11

Check the alignment (A) between the lower inlet manifold and the cylinder head (timing end) ensuring that the tabs (B) are in contact with those of the cylinder head cover.

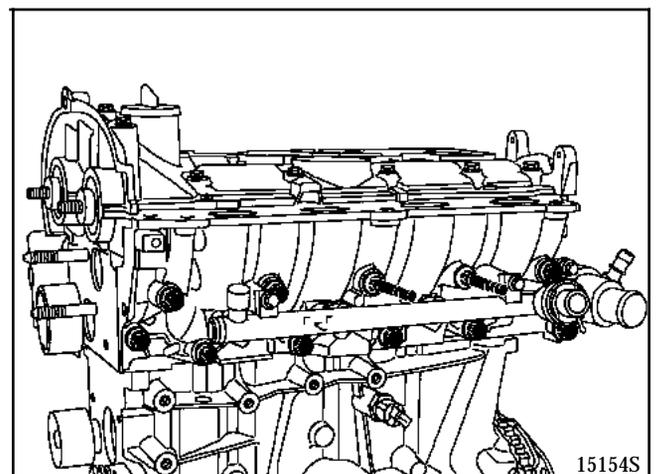


The lower inlet manifold is tightened to a torque of **2.1 daN.m**.

Place the pistons at mid-travel to prevent any contact with the valves when the camshafts are refitted.

Fit the cylinder head gasket then the cylinder head.

Check the bolts then tighten the cylinder head (see section 07 "Cylinder head tightening").



TOP AND FRONT OF ENGINE

Cylinder head gasket

11

Refit:

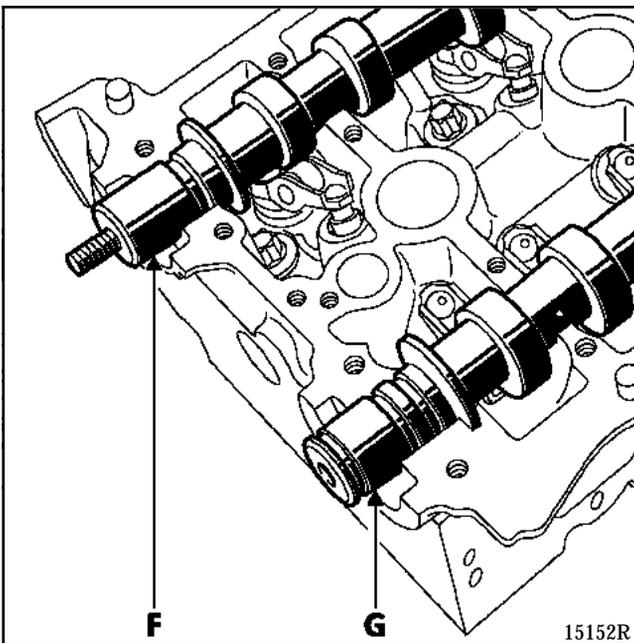
- the valve rockers,
- the camshafts lubricating the bearings.

WARNING: do not apply oil to the cylinder head cover mating surface.

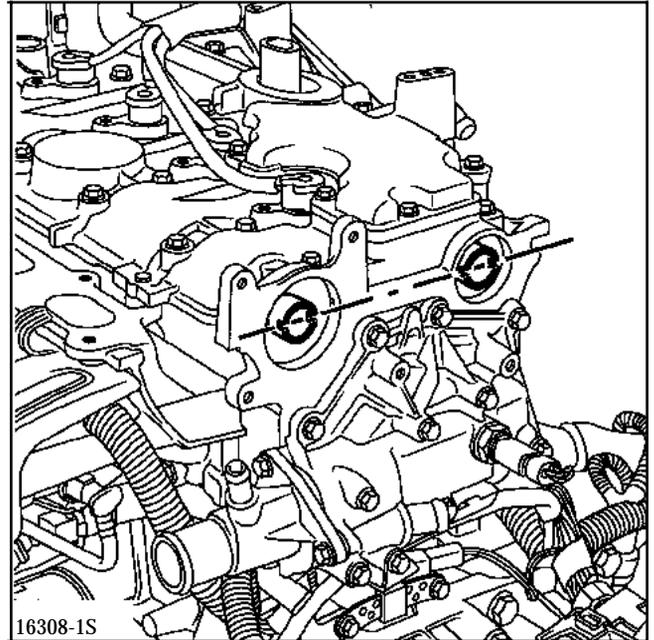
The camshafts are identified by the pulley fasteners.

Details of pulley fasteners:

- F** exhaust camshaft,
- G** inlet camshaft.

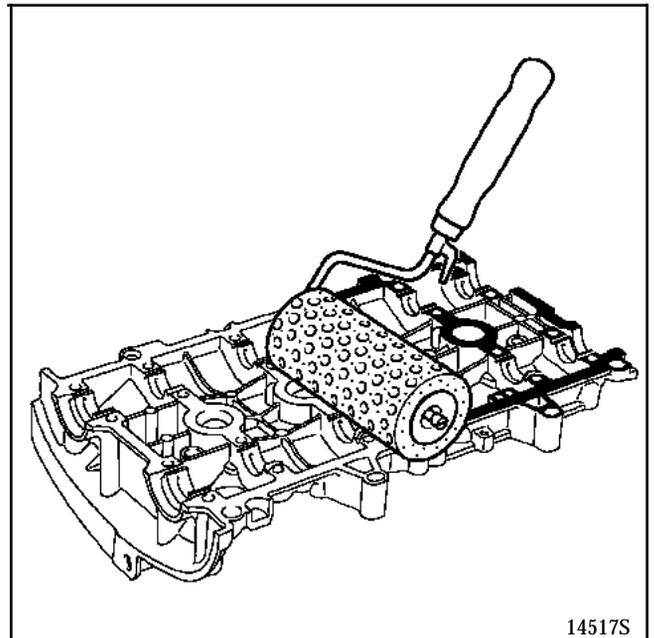


Place the camshaft grooves in a horizontal position and offset downwards as indicated on the diagram below.



NOTE: the mating surfaces must be clean, dry and not greasy (avoid finger prints).

Using a roller (uneven) apply **Loctite 518** to the cylinder head cover mating surface until it is **red-dish**.



TOP AND FRONT OF ENGINE

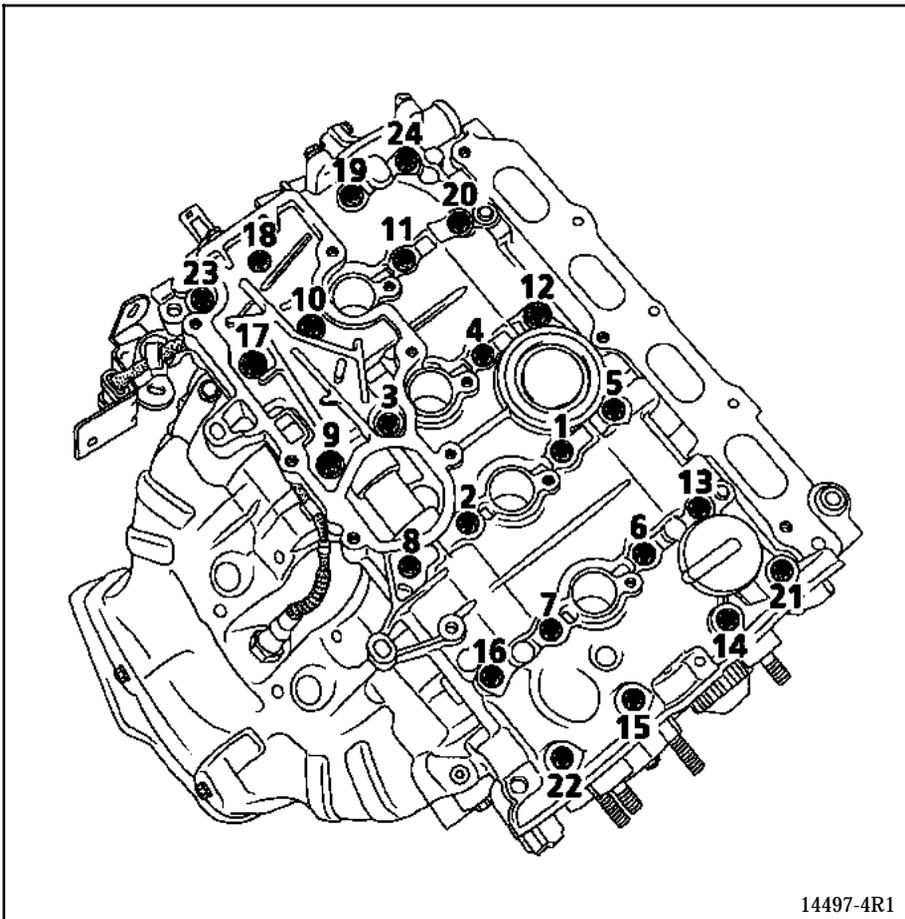
Cylinder head gasket

11

Refit the cylinder head cover tightening it to the specified torque.

Tightening procedure

Fitting	Order of tightening of bolts	Order of slackening of bolts	Tightening torque (in daN.m)
Operation n° 1	22-23-20-13	-	0.8
Operation n° 2	1 to 12 14 to 19 21 and 24	-	1.2
Operation n° 3	-	22-23-20-13	-
Operation n° 4	22-23-20-13	-	1.2



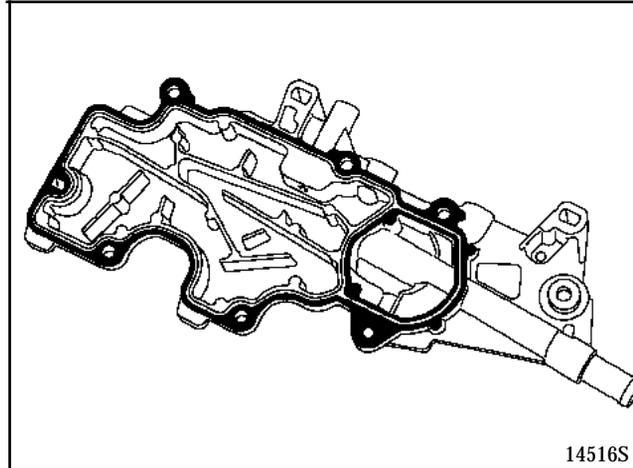
TOP AND FRONT OF ENGINE

Cylinder head gasket

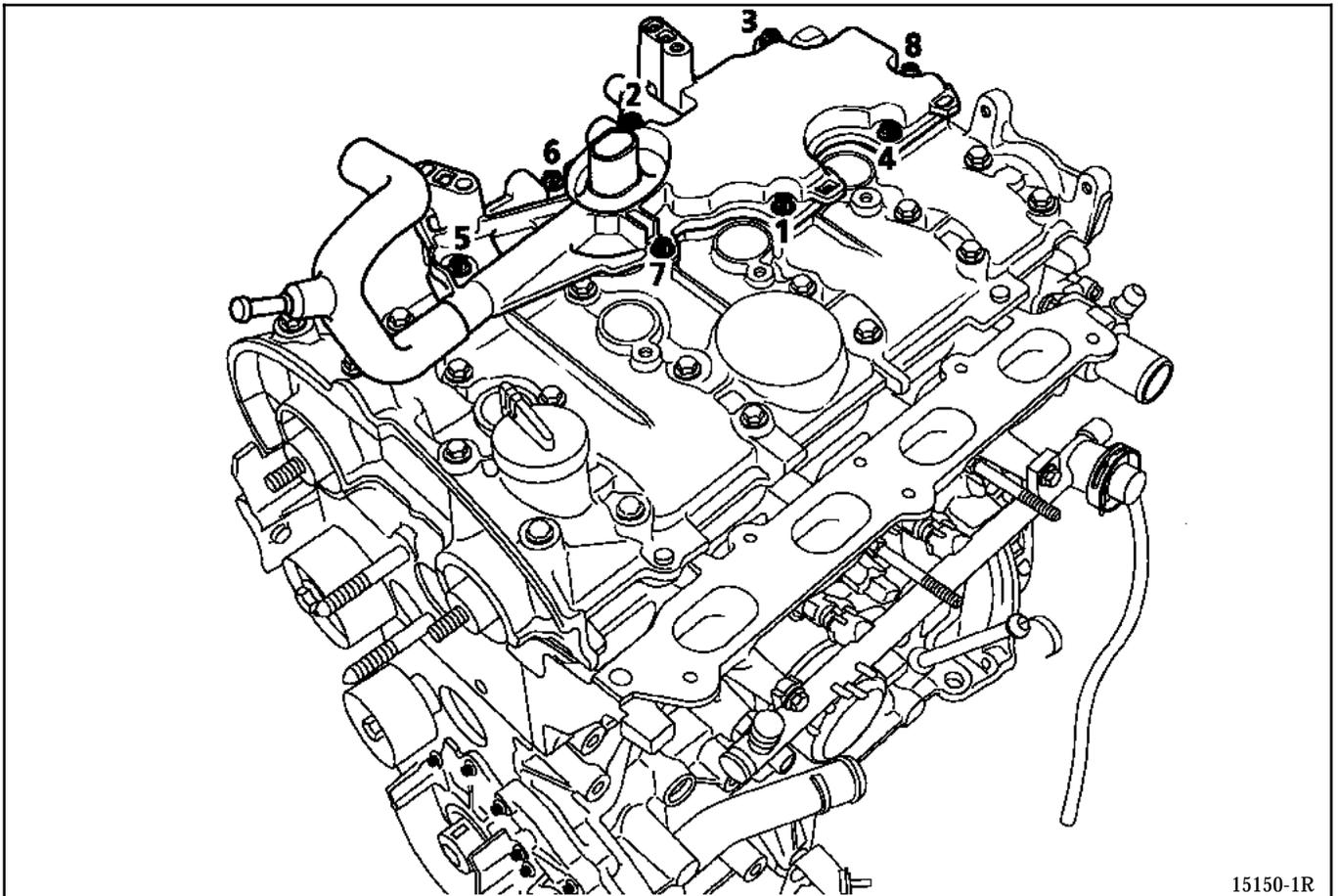
11

NOTE: the mating surfaces must be clean, dry and not greasy (avoid finger prints).

Using a roller (uneven) apply **Loctite 518** to the oil separator mating surface until it is **reddish**.



Refit the oil separator and tighten it to a torque of **1.3 daN.m** in the order indicated.



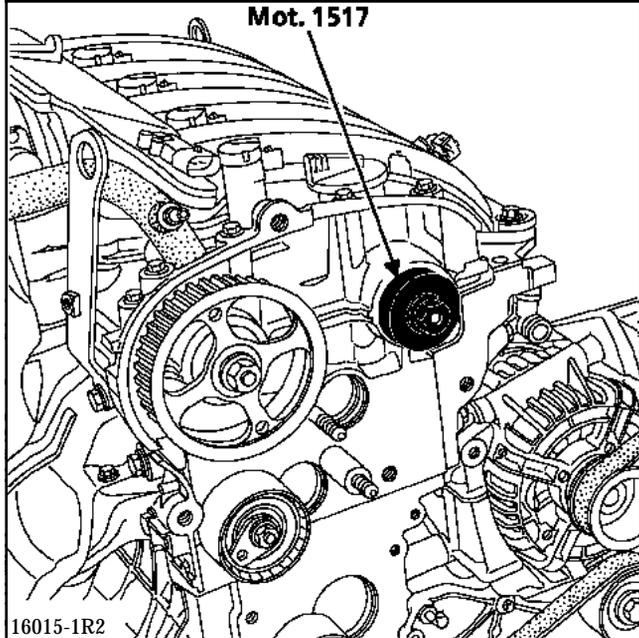
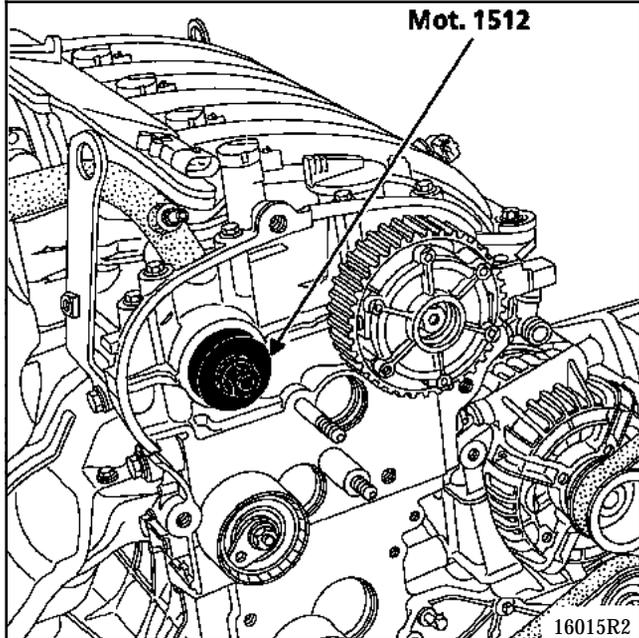
Refit the exhaust manifold (refer to the procedure described in section 12 "Exhaust manifold").

TOP AND FRONT OF ENGINE

Cylinder head gasket

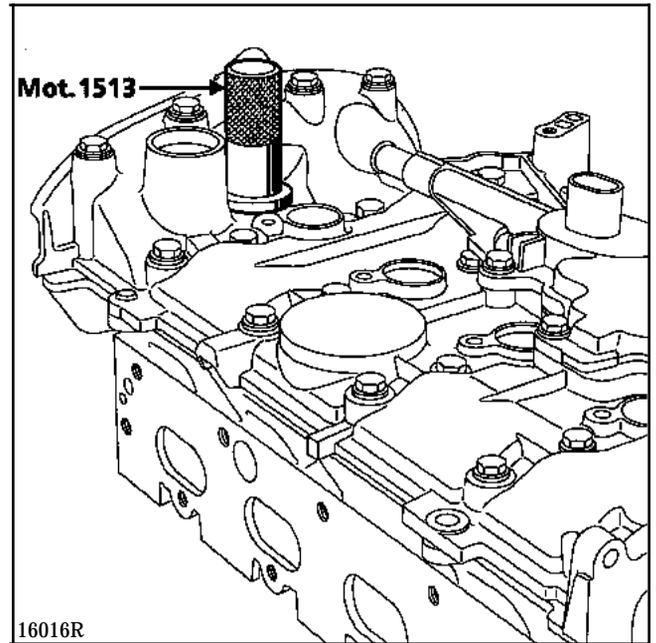
11

Refit the camshaft seals using tool **Mot. 1512** and the old nut for the exhaust camshaft, tool **Mot. 1517** and the old bolt of the inlet camshaft.



To use tool **Mot. 1517** it is necessary to drill to a diameter of **13 mm**.

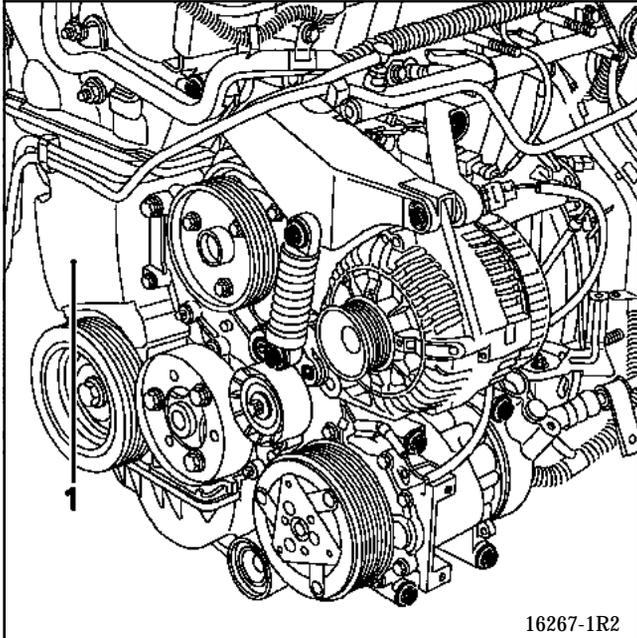
Refit the camshaft phase shifter solenoid valve seal using tool **Mot. 1513**.



Refit the solenoid valve.

Setting the timing

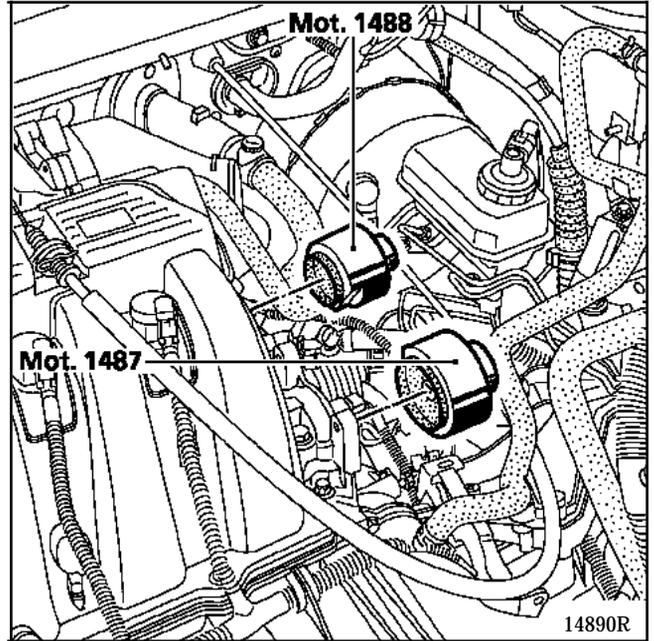
WARNING: it is essential to refit the intermediate timing cover (1) before the accessories pulley.



WARNING: it is essential to degrease the end of the crankshaft, the timing pinion bore, the contact surfaces of the pulley and the ends of the camshafts (timing end) to prevent sliding of the timing which could destroy the engine.

Refit:

- the timing belt (it is essential to follow the procedure described in section 07 "Timing belt tensioning procedure", do not forget the camshaft phase shifter plug,
- the accessories belt (refer to the procedure described in section 07 "Accessories belt"),
- the new sealing plugs:
 - on the inlet camshaft (Mot. 1487),
 - on the exhaust camshaft (Mot. 1488),



- the right-hand suspended engine mounting and the engine tie-bar tightening them to the specified torque (see section 19 "Suspended engine mounting"),
- the inlet manifold (refer to the procedure described in section 12 "Inlet manifold").

Refit in the reverse order to removal.

Fill and bleed the cooling circuit (see section 19 "Filling - Bleeding").

FUEL MIXTURE Specifications

12

Vehicle	Gearbox	Engine							Emission control standard
		Type	Index	Bore (mm)	Stroke (mm)	Cubic capacity (cm ³)	Compression ratio	Catalytic converter	
CB0M	JC5	F4R	730	82.7	93	1998	11.2/1	◇ C124 ◇ C125	EU 96

Engine		Checks carried out at idle*					Fuel*** (minimum octane rating)
Type	Index	Engine speed (rpm)	Emission of pollutants **				
			CO (%) (1)	CO ₂ (%)	HC (ppm)	Lambda (λ)	
F4R	730	800±50	0.5 max.	14.5 min.	100 max.	0.97<λ<1.03	Unleaded (IO 95)

(1) at 2,500 rpm, the CO should be 0.3 maximum.

* At a coolant temperature greater than 80 °C and after a constant engine speed of 2,500 rpm for approximately 30 seconds. Check to be carried out after return to idle.

** For the legislative values, refer to the specifications for the country concerned.

*** Compatible IO 91 unleaded.

Temperature in °C (± 1°)	- 10	25	50	80	110
Air temperature sensor NTC type Resistance in Ohms	10,450 to 8,525	2,120 to 1,180	860 to 760	-	-
Coolant temperature sensor NTC type Resistance in Ohms	-	2,360 to 2,140	770 to 850	275 to 290	112 to 117

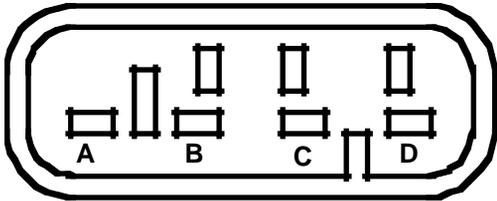
FUEL MIXTURE Specifications

12

DESCRIPTION	BRAND/TYPE	SPECIAL NOTES
Computer	SIEMENS "SIRIUS"	9-way
Injection	-	Multipoint sequential Inlet camshaft phase shifter
Stepper motor	STEEP PLASTIC	Resistance \approx 50 Ω at 25 °C
Throttle potentiometer	MAGNETI MARELLI	Incorporated in the throttle housing Resistance of track (tracks B - C): 1,200 \pm 400 Ω Resistance of cursor at no-load (tracks A - C): 1,000 \pm 200 Ω
Magnetic sensor (TDC and engine speed)	SIEMENS	Resistance = 200 to 270 Ω
Canister solenoid valve	SAGEM	Incorporated in the Canister Resistance: 26 \pm 4 Ω at 23 °C
Injector	MAGNETI PICO	Resistance: 14.5 Ω at 20 °C Leak flow: 0.7 cm³/min. maximum
Pressure sensor	DELCO ELECTRONICS	Resistance \approx 50 KΩ
Knock sensor	SAGEM	Piezo-electric type - Tightening to 2 daN.m
Oxygen sensor	BOSCH	Track 80 (earth) and 45 (signal) Resistance of heater: 6 \pm 1 Ω at 23 °C Rich mixture > 750 \pm 70 mvolts Lean mixture < 150 \pm 50 mvolts

FUEL MIXTURE Specifications

12

DESCRIPTION	BRAND/TYPE	SPECIAL NOTES
Ignition coil	SAGEM	<p>Monobloc coil with four outputs Primary resistance≈ 0.5 Ω Secondary resistance: 11 ± 1 KΩ Tightening to 0.9 ± 0.1 daN.m A : supply (internal connection) B : supply C : cylinders 2 and 3 control D : cylinders 1 and 4 control</p> 
Spark plugs	NGK - PFR 6 E	Tightening to 2.5 to 3 daN.m
Idle manifold pressure	-	320 to 500 mbars
Immersed supply pump	WALBRO	Pressure: 3 bars ± 0.06 at 80 litres/hr
Camshaft phase shifter solenoid valve	AISIN	Resistance: 7.1±0.5Ω

TIGHTENING TORQUES (in daN.m)



Inlet manifold mounting

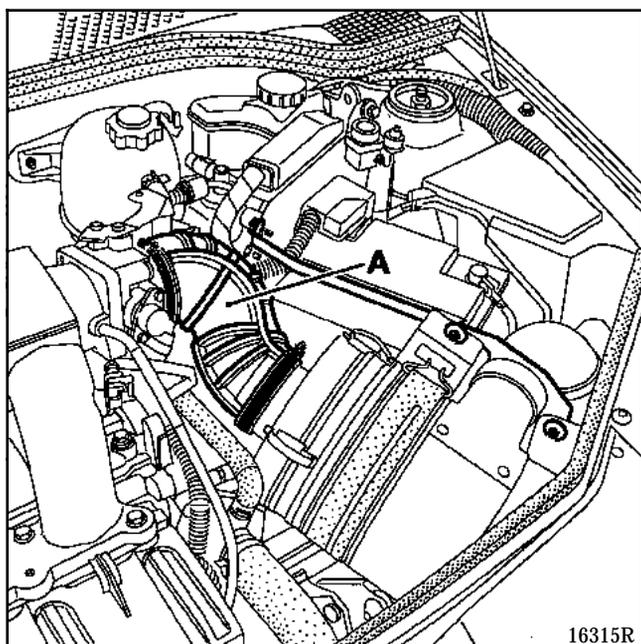
bolt	1.1 ± 0.2
Throttle housing	1.3

REMOVAL

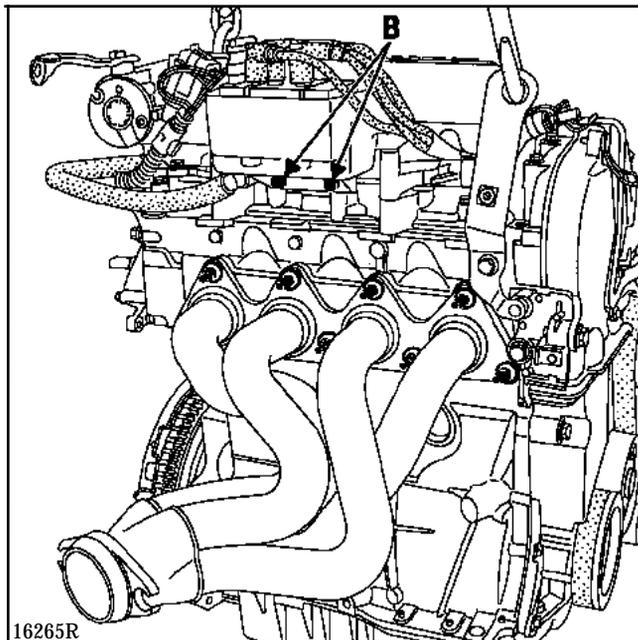
Disconnect the battery.

Remove:

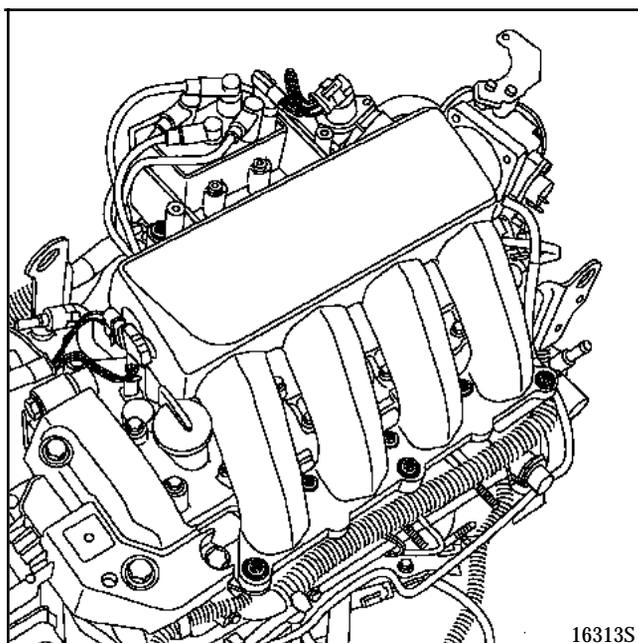
- the air intake pipe (A),



- the pressure sensor and air temperature sensor connectors,
- the ignition coil,
- the ignition harness,
- the accelerator cable,
- the throttle potentiometer,
- the idle and fuel vapours pipes,
- the bolts (B) securing the inlet manifold located above the exhaust manifold,



- the inlet manifold mounting bolts.



REFITTING

Refit:

- the inlet manifold replacing the seals and observing the tightening torque and order of tightening of the bolts,
- the connectors of the coil, throttle housing and the ignition harness,
- the air intake pipe.

WARNING: take care to avoid friction between the clip or the air intake pipe and the injection computer harness.

It is essential to replace the oil separator seal and to position the oil separator correctly.

ESSENTIAL SPECIAL EQUIPMENT

Mot. 1453 Engine support tool

TIGHTENING TORQUES (in daN.m)



Inlet manifold mounting

bolt	1.1 ± 0.2
Injectors support bolt	2.1 ± 0.2

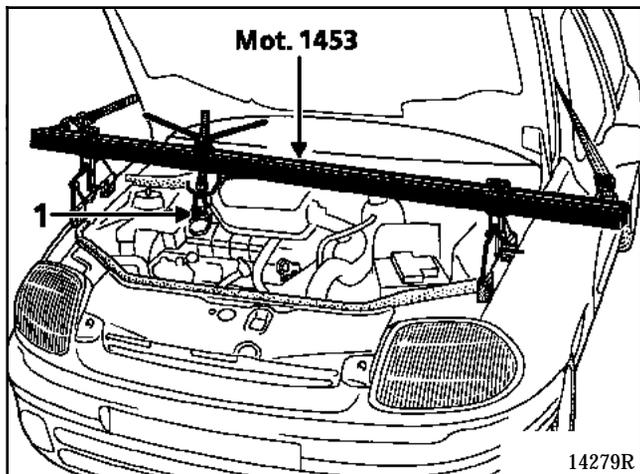
REMOVAL

Disconnect the battery.

Remove:

- the air intake pipe,
- the inlet manifold (refer to the procedure on the previous page).

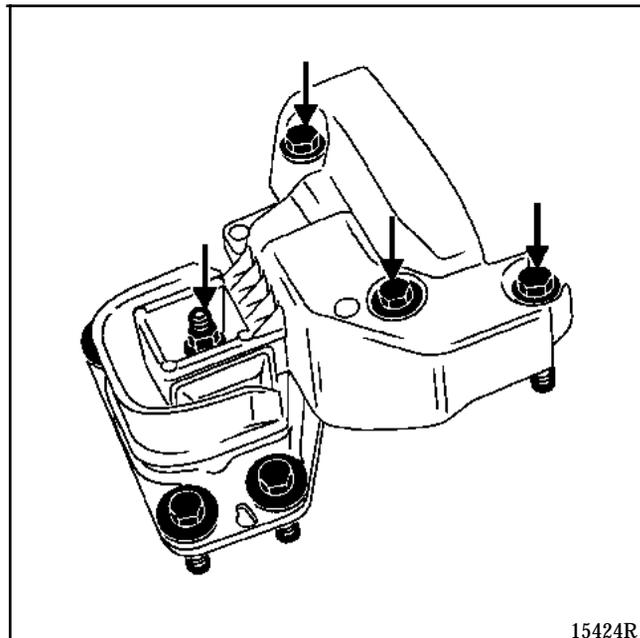
Fit the engine support. To do this, position the lifting hook (1).



NOTE: during this operation, be sure to place the pads of the engine support on the rigid parts of the wings.

Remove:

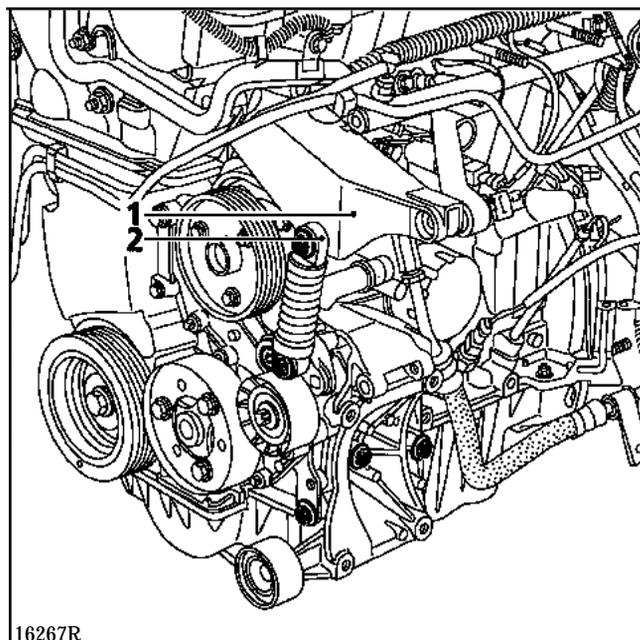
- the suspended engine mounting cover, the movement limiter and the engine tie-bar.



15424R

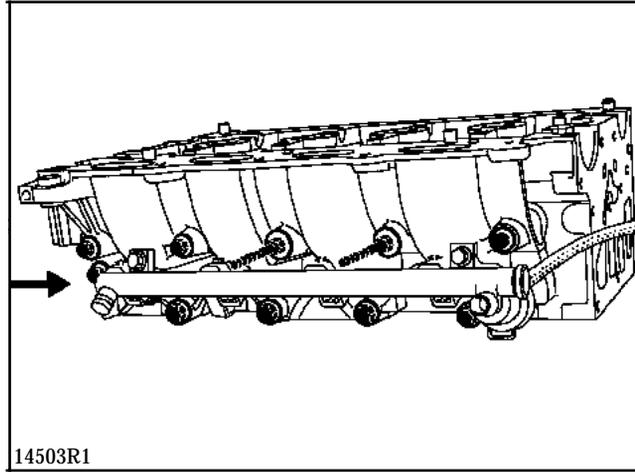
- the accessories belt,
- the injection rail protector,
- the injection rail,
- the alternator upper support (1),
- the tensioner spring (2).

WARNING: when removing fuel pipes, protect vulnerable areas.



16267R

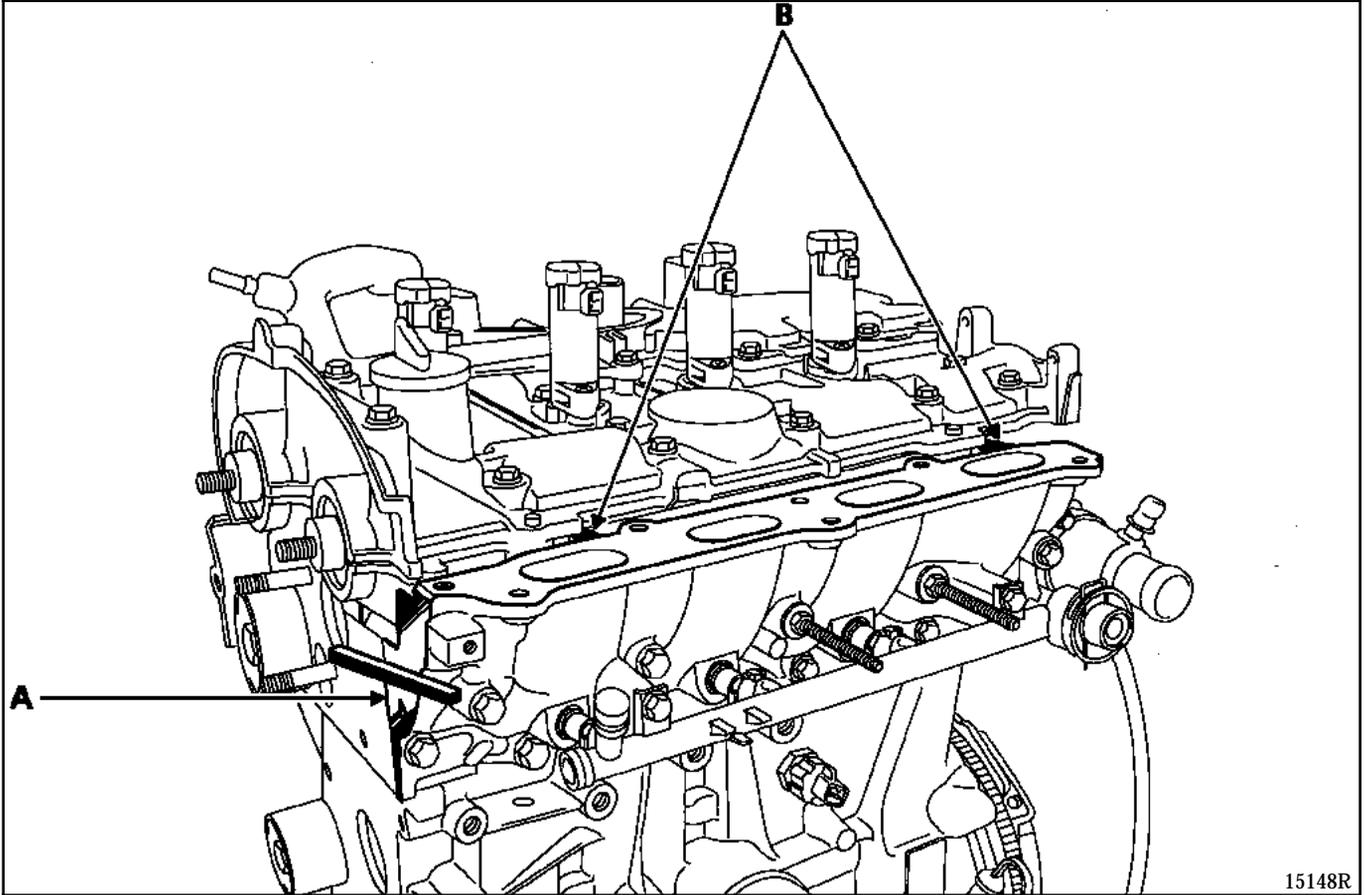
Remove the injectors support mounting bolts.



REFITTING

Change the seal.

Check the alignment (at A) between the inlet support and the cylinder head ensuring that the support is in contact (at B) with the cylinder head cover.



For refitting, position the bolts of the injectors support (inlet support), the alternator upper support and the tensioner spring then tighten them.

Observe the tightening torques of the injectors support mounting bolts.

For refitting of the inlet manifold, refer to the procedure described in section 12 "Inlet manifold")

TIGHTENING TORQUES (in daN.m)



Exhaust manifold mounting nuts	1.8 ± 0.2
Inlet manifold mounting nuts	1.1 ± 0.2
Engine tie-bar	6.2 ± 0.6

REMOVAL

Place the vehicle on a two post lift.

Disconnect the battery.

From underneath:

Remove:

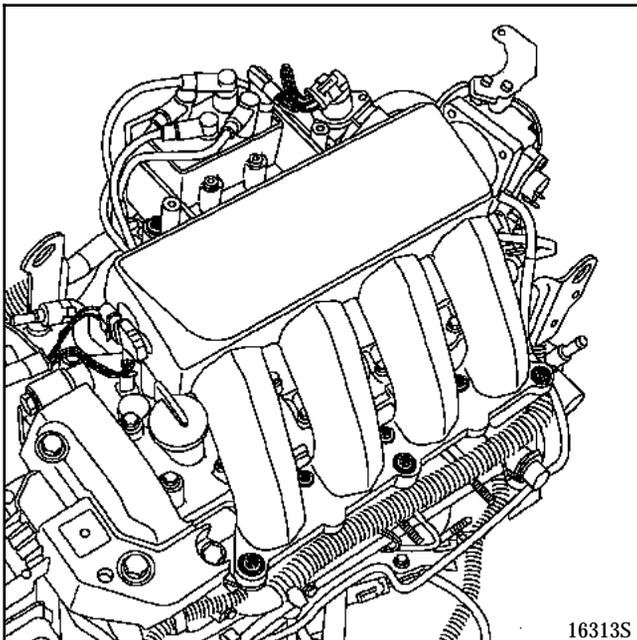
- the engine tie-bar,
- the fastener connecting the manifold and the catalytic converter.

Disconnect the oxygen sensor connector.

Remove the fastener connecting the catalytic converter and the exhaust line, then remove the catalytic converter.

From above:

Remove the inlet manifold (refer to the procedure described in section 12 "Inlet manifold").

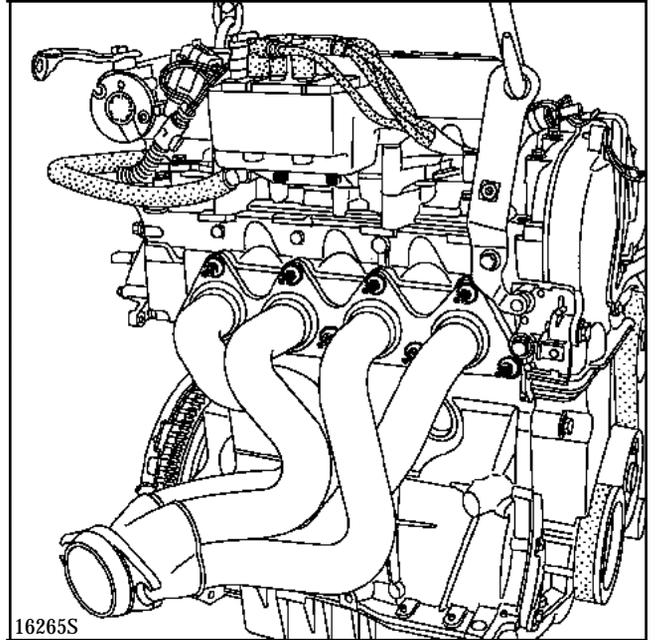


16313S

Move aside the coolant reservoir without removing it.

Remove the exhaust manifold mounting nuts.

Remove the exhaust manifold carefully taking care not to damage the bulkhead heat shield.



16265S

REFITTING

Change all seals which were removed (inlet manifold seal, exhaust manifold seal, exhaust manifold/pressure relief valve connection seal and oil separator seal).

It is essential to tighten all the bolts and nuts to the specified torque and in the order indicated.

Ensure that the starter and bulkhead heat shields are positioned correctly and that they are in good condition.

For refitting of the inlet manifold, refer to the procedure described in section 12 "Inlet manifold".

PRINCIPLE OF OPERATION

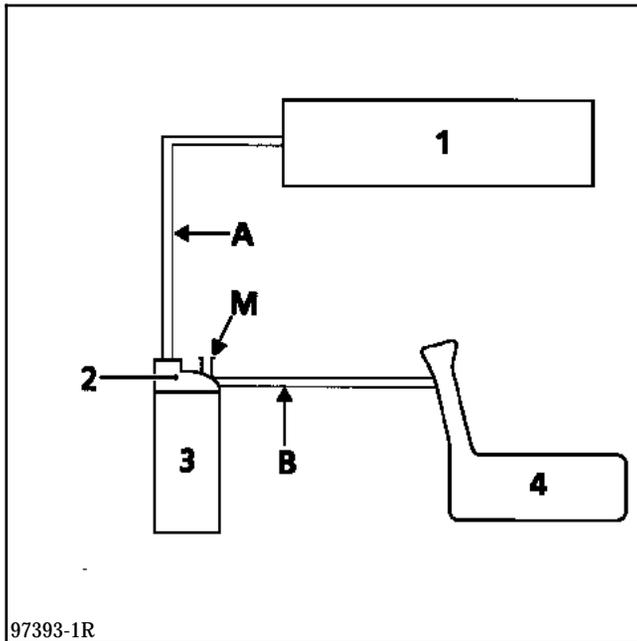
The anti-percolation system is controlled directly by the injection computer.

The coolant temperature information is taken from the injection coolant temperature sensor (see section 17 "CCTM").

When the ignition is switched off, the injection computer changes to monitoring mode. If the engine coolant temperature exceeds the threshold of **108 °C** during the two minutes which follow switching off of the engine, the fan low speed relay is supplied.

If the temperature again falls below **100 °C**, the fan assembly relay is cut off (operation of the fan assembly cannot exceed a duration of **12 minutes**).

BASIC DIAGRAM OF THE CIRCUIT



- 1 Inlet manifold
- 2 Incorporated canister purge solenoid valve
- 3 Fuel vapours absorber (canister) with solenoid valve
- 4 Tank
- M Breather
- A Canister pipe (inlet manifold)
- B Tank/Canister pipe

CANISTER PURGE CONDITION

The canister purge solenoid valve is controlled by track 4 of the computer when:

- the coolant temperature is greater than 55 °C,
- the air temperature is greater than 10 °C,
- a load threshold is reached,
- the throttle potentiometer position is not **no-load**.

It is possible to display the canister purge solenoid valve opening cyclic ratio using the diagnostic equipment by consulting the parameter "Canister purge solenoid valve RCO".

The solenoid valve is closed if the value is below 1.5 % (minimum value).

CANISTER PURGE OPERATION CHECK

A system malfunction may result in an unstable idle or stalling of the engine.

Check the conformity of the circuit (refer to the basic diagram) and the condition of the pipes to the tank (refer to Workshop Repair Manual MR 337)

STARTING - CHARGING Alternator

16

IDENTIFICATION

Vehicle	Engine	Alternator	Intensity
CB0M	F4R 730	VALEO A13 VI 259	110 A

CHECK

After **15 minutes** of warming up under a voltage of **13.5 volts**.

RPM	110 Amps
1,500	26 A
2 000	57 A
4,000	95 A

STARTING - CHARGING

Alternator

16

ESSENTIAL SPECIAL TOOLS

Mot. 1368	Tool for tightening the tensioner bolt
Mot. 1453	Engine support tool

TIGHTENING TORQUES (in daN.m)



Alternator upper mounting bolt	3.2 ± 0.3
Alternator lower mounting bolt	3.8 ± 0.4

REMOVAL

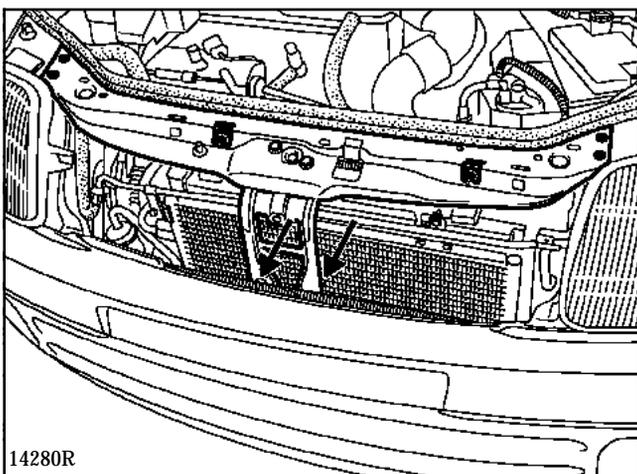
Place the vehicle on a two post lift.

Disconnect the battery.

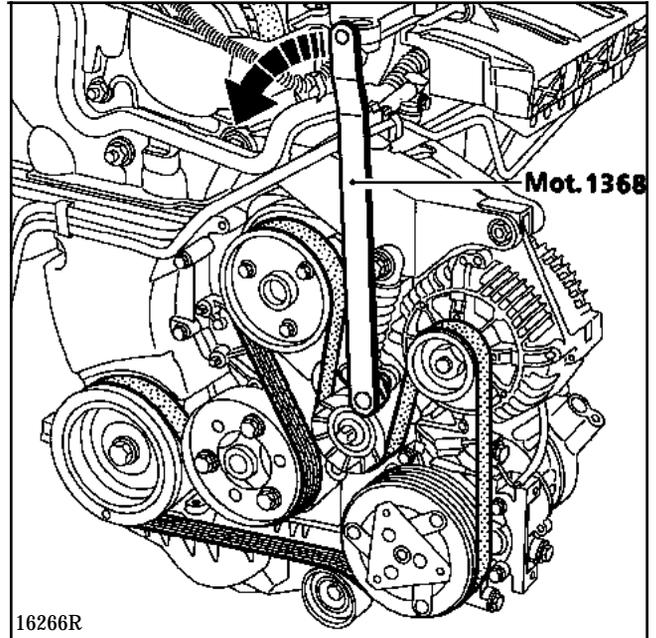
Fit the lifting hook and position the engine support tool **Mot. 1453**.

Remove:

- the front right wheel and the mud shield,
- the bumper and the radiator grille,
- the upper crossmember (by slackening the two lower mounting bolts) and place it on the engine,



- the accessories belt (see section 07 "Accessories belt tensioning") using tool **Mot. 1368**,
- the supply pipe on the injection rail.



- the fastener securing the power steering pipe to the alternator support,
- the alternator upper support,
- the alternator.

REFITTING

Refit in the reverse order to removal.

Refer to section 07 "Accessories belt tensioning" for the tensioning procedure.

STARTING - CHARGING

Starter

16

IDENTIFICATION

Vehicle	Engine	Starter
CB0M	F4R 730	BOSCH 0001 1091

SPECIAL FEATURES OF THE MULTIPOINT INJECTION FITTED TO THE F4R 730 ENGINE

- SIEMENS "SIRIUS 32" 90-way computer controlling the injection and the ignition.
- Use of diagnostic equipment (except XR25).
- Multipoint injection operating in sequential mode without cylinder position sensor and camshaft position sensor. Consequently, phasing is controlled by software from the top dead centre sensor. To phase, drive at half-load in 2nd gear for approximately 1 minute.
- Injection warning light on the instrument panel not operational
- Special precautions relating to the engine immobiliser:
Installation of a 2nd generation type engine immobiliser making a special computer replacement procedure necessary.
- Idle speed:
 - nominal idle speed (coolant temperature > 80°C) **800±50 rpm**
- Idle speed corrected in line with the air conditioning.
- Canister purge solenoid valve controlled by opening cyclic ratio (RCO) in line with the operation of the engine.
- Control of the fan assembly and the coolant temperature warning light on the instrument panel by the injection computer.
- Control of an inlet camshaft phase shifter (hydraulic) solenoid valve.
- Max. engine speeds

for a coolant temperature < 75°C	6,700 rpm
for a coolant temperature > 75°C in 1 st or 2 nd gear	7,200 rpm
for a coolant temperature > 75°C in 3 rd , 4 th or 5 th speed	7,000 rpm
- Gear change indicator light illuminating approximately **300 rpm** before the maximum engine speed.

This vehicle is fitted with a 2nd generation engine immobiliser system. For the injection computer to operate, it is **ESSENTIAL** to programme it with the engine immobiliser code.

REPLACEMENT OF AN INJECTION COMPUTER

The computers are supplied without a code. Following replacement of a computer, the new computer must be programmed with the vehicle code, and the correct operation of the engine immobiliser function must be checked.

To do this, simply switch on the ignition for a few seconds then switch it off.

CHECKING THE ENGINE IMMOBILISER FUNCTION

Remove the key from the ignition switch, after 10 seconds the red engine immobiliser warning light should flash (to check that it is impossible to start the engine, refer to section **82** of Workshop Repair Manual **M.R. 337**).

TESTING AN INJECTION COMPUTER WITHOUT A CODE BORROWED FROM THE WAREHOUSE (this operation is extremely inadvisable)

WARNING: before testing an injection computer, it is essential to programme it with the vehicle's engine immobiliser code for it to be able to operate. Following the test, it is **essential to erase the code** from the computer before returning it to the warehouse. If the code is not erased, the computer will be **unusable**. This operation must be carried out by suitably trained personnel. To erase the code from the computer, refer to section **82** of Workshop Repair Manual **M.R. 337**.

IT IS NOT POSSIBLE TO BORROW A CODED COMPUTER FROM ANOTHER VEHICLE TO CARRY OUT A TEST.

THE COMPRESSOR IS OF THE VARIABLE CUBIC CAPACITY TYPE

INJECTION COMPUTER/AC COMPUTER CONNECTION

The injection computer is connected to the AC computer by two wires:

- one wire from the injection computer to track **10** of the AC computer. The compressor operation authorisation or prohibition information is sent along this wire.
- one wire from the AC computer to track **23** of the injection computer. This is for a power absorbed information signal.

When the AC switch is pressed, the AC computer requests operation of the compressor.

The injection computer authorises or prohibits engagement of the compressor and imposes an idle speed of **900 rpm** (a few seconds may pass before the idle speed stabilises).

COMPRESSOR OPERATION STRATEGY

During certain phases of operation, the injection computer prohibits operation of the compressor.

Engine starting strategy

Compressor operation is prohibited for **10 seconds** after the engine is started.

Overheating protection strategy

The compressor is not engaged if the coolant temperature is above **115 °C**.

Over-revving protection strategy

Compressor operation is prohibited if the engine speed is greater than **6,000 rpm**.

POWER STEERING PRESSURE SWITCH - INJECTION COMPUTER CONNECTION

The injection computer receives information from the power steering pressure switch (which can be displayed on the diagnostic equipment).

The injection computer does not alter the engine idle speed.

ELECTRICAL CORRECTION IN LINE WITH THE BATTERY VOLTAGE AND THE ELECTRICAL BALANCE

The purpose of this correction is to compensate for the drop in voltage due to operation of a power consuming component while the battery is at low charge. To do this, the idle speed is increased, thus permitting the rotation of the alternator to be increased resulting in an increase in the battery voltage.

The lower the voltage, the more significant the correction. Therefore the engine speed correction is variable. It begins when the voltage falls below **12.8 Volts**. The idle speed may reach a maximum **900 rpm**.

NOTE: following a cold start and prolonged operation at idle speed, a sudden drop in the engine speed of approximately **150 rpm** may be noticed. This drop in engine speed is due to the presence of a starting controller.

INJECTION

Adaptive idle speed correction

17

PRINCIPLE

Under normal operating conditions when warm, the idle speed **RCO** varies between an upper value and a lower value to obtain the nominal idle speed.

It is possible, following a variation in operation (running in, fouling up of the engine...), for the idle speed **RCO** value to be close to the upper or lower value.

The adaptive correction of the idle speed **RCO** makes it possible to compensate for slow variations in the engine's air requirements.

This correction is only effective if the coolant temperature is greater than 75 °C, **20 seconds** after the engine is started and if the nominal idle speed regulation phase is active.

VALUES OF THE IDLE SPEED RCO AND ITS ADAPTIVE CORRECTION

PARAMETER	F4R 730 engine
Nominal idle speed	$X = 800 \pm 50$ rpm
Idle speed RCO	$2 \% \leq X \leq 25 \%$
Idle speed RCO adaptation value	Limit: - minimum : - 7 % - maximum : + 7 %

Every time the engine is switched off, the computer resets the stepper motor to its lower limit.

INTERPRETATION OF THESE PARAMETERS

In the presence of excess air (air leak, throttle limit misadjusted...), the idle speed increases and the idle speed **RCO** value decreases to return to the nominal idle speed. The idle speed **RCO** adaptive correction value decreases to realign the idle speed regulation operation.

If there is a lack of air (fouling up, etc.), the reasoning is reversed, the idle speed **RCO** increases and the adaptive correction also increases to realign the idle speed regulation operation.

IMPORTANT: it is essential, after erasing the computer memory, to start the engine and then switch it off to permit resetting of the potentiometer. Start the engine again and let it run at idle so that the adaptive correction can take place.

NOTE: if the idle speed is not constant, check whether the engine phasing is correct. To do this, drive in 2nd gear, at half-load, for approximately **one minute**. Then, using the after sales service diagnostic equipment, check the status "**ET 018 Recognition of cylinder 1**".

SENSOR HEATING

The oxygen sensor is heated by the injection computer from the time the engine is switched on.

Heating of the oxygen sensor is stopped:

- if the vehicle speed is greater than **112 mph (180 km/h)**, (value given for information),
- in line with the load and the engine speed.

UPSTREAM SENSOR VOLTAGE

The value read on the diagnostic equipment (except XR25) under the parameter: "upstream sensor voltage" represents the voltage supplied to the computer by the oxygen sensor placed upstream of the catalytic converter. It is expressed in millivolts.

During mixture regulation, the voltage should fluctuate rapidly between two values:

- **150 ± 100 mV** for a lean mixture,
- **750 ± 100 mV** for a rich mixture.

The smaller the gap between the maximum and minimum values, the less reliable is the information from the sensor (this gap is usually at least **500 mV**).

NOTE: in the case of a small gap, check the heating of the sensor. The value read under the parameter "**downstream sensor voltage**" should not be taken into account as this vehicle is not fitted with a downstream sensor.

MIXTURE CORRECTION

The value read on the diagnostic equipment under the parameter: "mixture correction" represents the average of the mixture corrections made by the computer in line with the richness of the carbonised mixture seen by the oxygen sensor placed upstream of the catalytic converter.

The correction value has a mid-point of **128** and limits of **0** and **255** :

- value below **128**: leaner mixture required,
- value above **128**: richer mixture required.

ENTRY INTO THE MIXTURE REGULATION PHASE

Entry into the mixture regulation phase takes effect after a given starting delay which depends on the coolant temperature and whether the upstream sensor is ready (sufficiently warm).

In all cases, the mixture regulation should be active after **2 minutes** if the coolant temperature is greater than **70°C**.

Before entry into the mixture regulation phase, the value of the parameter is **128**. Consult the "**mixture regulation**" status on the diagnostic equipment.

Unlooping phase

In the mixture regulation phase, the phases of operation during which the computer does not take into account the value of the voltage supplied by the sensor are:

- at full-load,
- during heavy acceleration,
- during deceleration with no-load information,
- in the event of failure of the oxygen sensor.

In this case **128** is displayed.

DOWNGRADED MODE IN THE EVENT OF FAILURE OF THE OXYGEN SENSOR

If the voltage supplied by the oxygen sensor is incorrect (varying very little or not at all) during mixture regulation, the computer will only change to downgraded mode if the failure has been recognised as being present for **10 seconds**. In this case only, the failure will be stored, the parameter: "mixture correction" is **128**.

If a failure present on the oxygen sensor is detected and if the failure has already been stored, the system goes straight into an open loop.

PRINCIPLE

In the looping phase the mixture regulation corrects the injection time to obtain a dosage as close as possible to mixture **1**. The correction value is close to **128**, with limits of **0** and **255**.

The adaptive correction makes it possible to offset the injection pattern to realign the mixture regulation around **128**.

Therefore, it is necessary, following reinitialisation of the computer (return to **128** of the adaptive corrections), to carry out a special road test.

PARAMETER	F4R 730 engines
Operating mixture adaptation value	$64 \leq X \leq 160$
Idle mixture adaptation value	$64 \leq X \leq 160$
Mixture correction	$60 \leq X \leq 200$

ROAD TEST

Conditions:

- engine warm (coolant temperature > 75 °C),
- do not exceed an engine speed of **4,800 rpm**.

Pressure zones which must be passed through during the test

	Range n° 1 (mbars)	Range n° 2 (mbars)	Range n° 3 (mbars)	Range n° 4 (mbars)	Range n° 5 (mbars)
F4R 730	251 ----- 399 ----- 517 ----- 635 ----- 753 ----- 873				
	Average 325	Average 458	Average 576	Average 694	Average 813

Following this test, the corrections are operational.

The test must be followed by normal, smooth and varied driving for a distance of **3 to 6 miles (5 to 10 kilometres)**.

After the test, read the mixture adaptation values. Initially **128**, they should have changed. If they have not, repeat the test taking care to observe the conditions strictly.

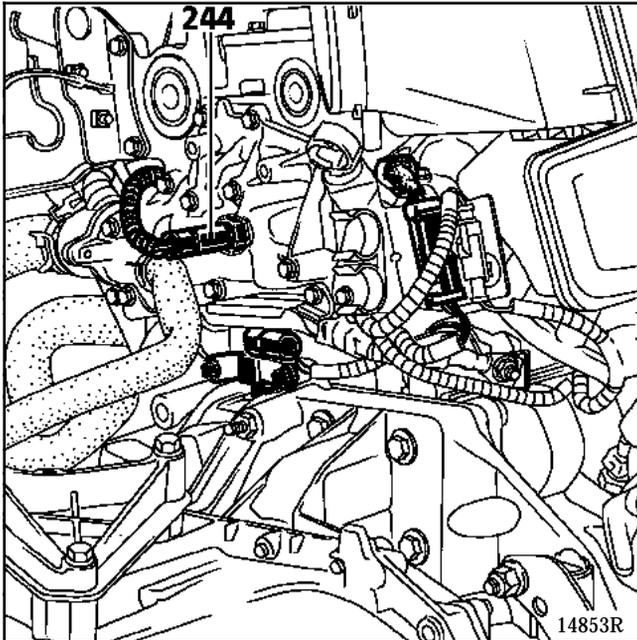
INTERPRETATION OF THE VALUES GATHERED FOLLOWING A ROAD TEST

In the case of a lack of fuel (injectors clogged, pressure and flow of fuel too low, ...), the mixture regulation increases to obtain a mixture as close as possible to **1**. The adaptive mixture correction increases until the mixture correction again fluctuates around **128**.

In the event of an excessive amount of fuel the reasoning is reversed: the mixture regulation decreases and the adaptive correction decreases as well to realign the mixture correction around **128**.

Centralised coolant temperature management

CCTM



- 244 Coolant temperature sensor (injection and coolant temperature indication on the instrument panel).
Three-way sensor, two tracks for the coolant temperature information and 1 track for the indication on the instrument panel.

This system is fitted with a single coolant temperature sensor which is used by the injection, the fan assembly and the temperature warning light on the instrument panel.

Operation

Sensor 244 enables:

- the coolant temperature to be indicated on the instrument panel,
- the injection computer to be informed of the engine coolant temperature.

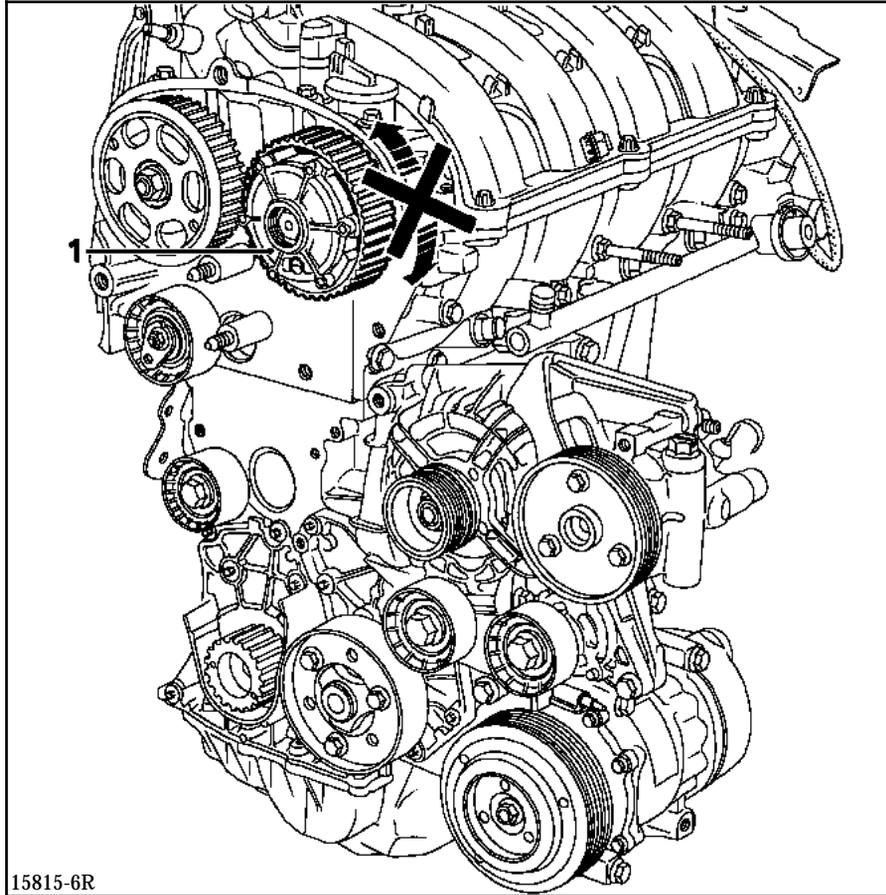
Depending on the coolant temperature, the injection computer controls:

- the injection system,
- the fan assembly relays:
 - the fan assembly is controlled at low speed if the coolant temperature exceeds **100 °C** and stops when the temperature falls below **96 °C**,
 - the fan assembly is controlled at high speed if the coolant temperature exceeds **102 °C** and stops when the temperature falls below **100 °C**,
 - the fan assembly may be controlled at low speed for the anti-percolation system and at high or low speed for the AC.
- the coolant temperature warning light.

COOLANT TEMPERATURE WARNING LIGHT

The warning light is controlled by the injection computer if the coolant temperature exceeds **118 °C** and is switched off if the temperature falls below **115 °C**.

The camshaft phase shifter (1) is located on the inlet camshaft. Its role is to alter the timing pattern. It is controlled (to operate or not) by the injection computer via a solenoid valve (2) on the cylinder head cover.

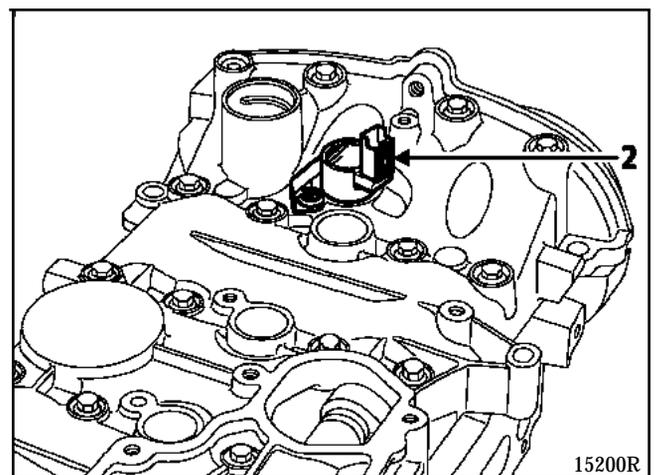


The solenoid valve is closed at rest. It authorises the passage of oil to control the phase shifter in line with the operation of the engine:

- if the engine speed is between **1,800** and **6,500 rpm**,
- if the throttle potentiometer is not at no-load.

WARNING: if the solenoid valve is jammed in the open position this will result in an unstable idle and the pressure in the manifold at idle will be too high.

NOTE: to replace the solenoid valve seal, refer to the procedure described in section 11 "Top and front of engine".



ALLOCATION OF INJECTION COMPUTER INPUTS AND OUTPUTS

61	31	1
62	32	2
63	33	3
64	34	4
65	35	5
66	36	6
67	37	7
68	38	8
69	39	9
70	40	10
71	41	11
72	42	12
73	43	13
74	44	14
75	45	15

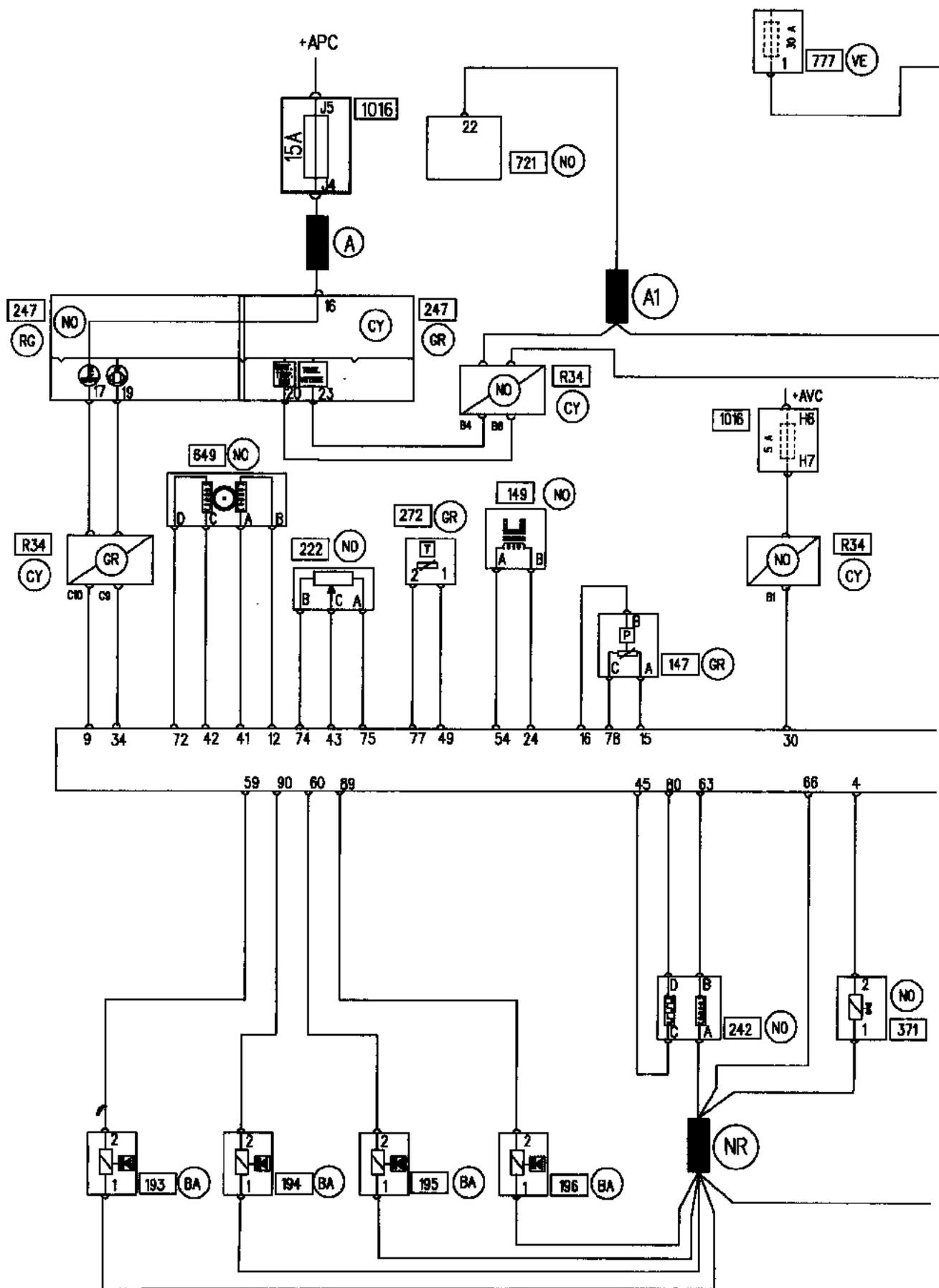
76	46	16
77	47	17
78	48	18
79	49	19
80	50	20
81	51	21
82	52	22
83	53	23
84	54	24
85	55	25
86	56	26
87	57	27
88	58	28
89	59	29
90	60	30

1	→	IGNITION COIL 2-3 CONTROL
32	→	IGNITION COIL 1-4 CONTROL
3	---	POWER EARTH
33	---	POWER EARTH
4	→	CANISTER PURGE CONTROL
8	→	FAN ASSEMBLY RELAY 1 CONTROL BY CCTM
38	→	FAN ASSEMBLY RELAY 2 CONTROL BY CCTM
9	→	COOLANT TEMPERATURE WARNING LIGHT
39	→	ACTUATOR RELAY CONTROL
10	→	AC COMPRESSOR CONTROL
41	→	IDLE SPEED REGULATOR CONTROL (TRACK A)
12	→	IDLE SPEED REGULATOR CONTROL (TRACK B)
42	→	IDLE SPEED REGULATOR CONTROL (TRACK C)
13	←	COOLANT TEMPERATURE SENSOR INPUT
43	←	THROTTLE POTENTIOMETER SIGNAL
15	---	PRESSURE SENSOR EARTH
45	←	OXYGEN SENSOR SIGNAL INPUT
63	→	OXYGEN SENSOR HEATER CONTROL
64	→	CAMSHAFT OFFSETTING DEVICE CONTROL
65	→	GEAR CHANGE INDICATOR LIGHT CONTROL
66	---	+AFTER IGNITION
68	→	FUEL PUMP RELAY CONTROL
70	→	TDC ENGINE SPEED INFORMATION
72	→	IDLE SPEED REGULATOR CONTROL (TRACK D)
73	---	COOLANT TEMPERATURE SENSOR EARTH
74	---	THROTTLE POTENTIOMETER SUPPLY
75	---	THROTTLE POTENTIOMETER EARTH
16	←	MANIFOLD PRESSURE SENSOR SIGNAL INPUT
19	---	KNOCK SENSOR SHIELDING
49	←	AIR TEMPERATURE SENSOR INPUT
20	←	KNOCK SENSOR SIGNAL INPUT
23	←	AC COMPRESSOR POWER ABSORBED INFORMATION
53	←	VEHICLE SPEED INPUT
24	←	ENGINE SPEED SENSOR SIGNAL INPUT
54	←	ENGINE SPEED SENSOR SIGNAL INPUT
26	---	DIAGNOSTIC
56	---	DIAGNOSTIC
28	---	POWER EARTH
58	←	ENGINE IMMOBILISER SYSTEM
29	---	+AFTER IGNITION
59	→	INJECTOR 1 CONTROL
30	---	+BEFORE IGNITION
60	→	INJECTOR 3 CONTROL
77	---	AIR TEMPERATURE SENSOR EARTH
78	---	PRESSURE SENSOR SUPPLY
79	---	KNOCK SENSOR EARTH
80	---	OXYGEN SENSOR EARTH
85	→	POWER STEERING PRESSURE SWITCH INFORMATION
89	→	INJECTOR 4 CONTROL
90	→	INJECTOR 2 CONTROL

PRO15097

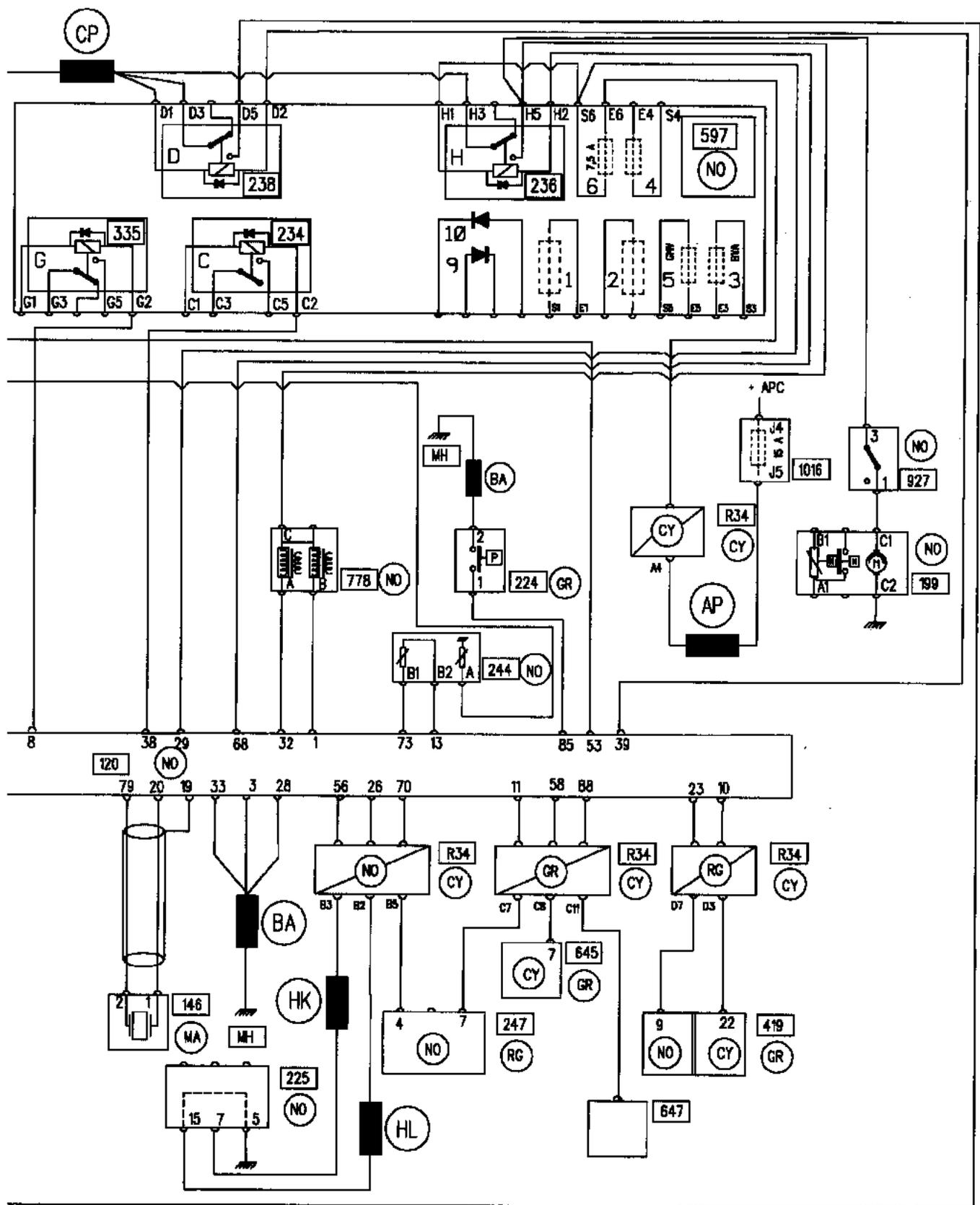
INJECTION Wiring diagram

17



PRO16055G

INJECTION Wiring diagram



PARTS LIST

120	Injection computer
146	Knock sensor
147	Air temperature sensor
149	Top Dead Centre sensor
193, 194, 195, 196	Injectors
199	Fuel gauge
222	Throttle potentiometer
224	Power steering pressure switch
225	Diagnostic socket
234	High speed fan assembly relay
236	Fuel pump relay
238	Engine immobiliser relay
242	Oxygen sensor
244	Coolant temperature sensor
247	Instrument panel
272	Air temperature sensor
335	Fan assembly low speed relay
371	Canister solenoid valve
419	AC management unit
597	Engine fuse and relay box
645	Passenger compartment ECU transponder
647	Electric windscreen
649	Stepper motor
721	ABS ECU transponder block
777	Power fuse board
778	Ignition coil
927	Impact switch
1016	Passenger compartment fuse box

INJECTION

Fault finding - Conformity check

17

NOTES	Engine stopped, ignition on
--------------	-----------------------------

Order	Function	Descriptions	Display and Notes
Status window			
1	Battery voltage	ER 001 : + after ignition computer PR 001 : Computer supply voltage	ACTIVE 11.8 < X < 13.2 V
2	Computer configuration	ET 002 : Air conditioning connection ET 003 : Computer configuration with automatic transmission ET 004 : Power steering pressure switch connection ET 005 : Electric windscreen connection ET 006 : Computer configuration without wheel speed ET 007 : Wheel speed sensor from the ABS ET 008 : Reluctant type wheel speed sensor ET 009 : Magnetoresistant type wheel speed sensor ET 011 : Configuration with engine immobiliser	ACTIVE (if option) INACTIVE ACTIVE (if option) ACTIVE (if option) ACTIVE INACTIVE INACTIVE INACTIVE ACTIVE
		ET 010 : Speed sensor connection	ACTIVE
		ET 016 : Actuator relay control	ACTIVE
3	Engine immobiliser	ET 012 : Engine immobiliser	INACTIVE

INJECTION

Fault finding - Conformity check

17

NOTES	Engine stopped, ignition on
--------------	-----------------------------

Order	Function	Descriptions	Display and Notes
4	Throttle position potentiometer	Accelerator pedal released ET 013 : Throttle position: no-load PR 030 : Throttle position Accelerator pedal pressed lightly ET 013 : Throttle position: no-load ET 014 : Throttle position: full-load Accelerator pedal pressed ET 014 : Throttle position: full-load PR 030 : Throttle position	<p style="text-align: center;">ACTIVE</p> <p style="text-align: center;">$0 < X < 43$</p> <p style="text-align: center;">INACTIVE</p> <p style="text-align: center;">INACTIVE</p> <p style="text-align: center;">ACTIVE</p> <p style="text-align: center;">$180 < X < 240$</p>
Parameters window			
5	Coolant temperature sensor	PR 010 : Coolant temperature	X = Engine temperature ± 5 °C
6	Air temperature sensor	PR 011 : Air temperature	X = Temperature under bonnet ± 5 °C
7	Pressure sensor	PR 020 : Manifold pressure PR 021 : Atmospheric pressure	X = Atmospheric pressure X = Atmospheric pressure

INJECTION

Fault finding - Conformity check

17

NOTES	Engine stopped, ignition on.
--------------	------------------------------

Order	Function	Descriptions	Display and Notes
Commands window			
8	Fuel pump	Relay command: Fuel pump	The fuel pump should be heard operating
9	Fan assembly	Command : Fan assembly low speed Command: Fan assembly high speed	The fan assembly should be heard operating at low speed The fan assembly should be heard operating at high speed
10	Idle speed regulation valve	Command : Idle speed regulation valve	Place your hand on it to feel it operating
11	Canister purge solenoid valve	Command : Canister purge	The canister purge solenoid valve should operate
12	Air conditioning	AC selected on the instrument panel. Command : AC compressor	The compressor should engage if it is selected on the instrument panel
13	Camshaft phase shifter	Command : Camshaft offsetting device	The control solenoid valve should operate
14	Instrument panel warning lights	Command : MIL warning light Command : Overheating warning light	The warning light should be illuminated (depending on vehicle) The warning light should flash

INJECTION

Fault finding - Conformity check

17

NOTES	Carry out the actions below with the engine warm at idle, no power consuming equipment operating.
--------------	---

Order	Function	Descriptions	Display and Notes
Status window			
1	Battery voltage	ET 001 : + After Ignition computer PR 001 : Computer supply voltage If PR 001 : Computer supply voltage Then PR 070 : Engine speed	ACTIVE 13 < X < 15 V X < 12.7 V 800 < X < 900 rpm
2	Fuel pump command	ET 015 : Fuel pump relay command	ACTIVE
3	Flywheel signal	ET 017 : Flywheel signal	ACTIVE
4	Cylinder n° 1 recognition	ET 018 : Cylinder 1 recognition	ACTIVE
5	Oxygen sensor heater	ET 019 : Upstream oxygen sensor heater ET 020 : Downstream oxygen sensor heater	ACTIVE INACTIVE (not fitted on vehicle)

INJECTION

Fault finding - Conformity check

17

NOTES	Carry out the actions below with the engine warm at idle, no power consuming equipment operating.
--------------	---

Order	Function	Descriptions	Display and Notes
8	Idle speed regulation	ET 021 : Idle speed regulation PR 070 : Engine speed (engine warm) PR 073 : Idle speed difference PR 071 : Idle speed RCO PR 080 : Idle speed RCO adaptation value	ACTIVE 750 < X < 850 rpm - 50 < X < +50 rpm 2 % < X < 25 % - 7 % < X < 7 %
Parameters window			
9	Pressure circuit	PR 020 : Manifold pressure PR 021 : Atmospheric pressure	320 < X < 500 mb X = Atmospheric pressure
10	Anti-knock circuit	PR 060 : Knock signal	30 < X < 70
Status window			
11	Mixture regulation	ET 022 : Mixture regulation ET 110 : Upstream oxygen sensor voltage ET 112 : Mixture correction	ACTIVE 20 < X < 840 mV 60 < X < 200 Average value 128
12	Camshaft phase shifter	ET 035 : Camshaft offsetting device	ACTIVE (depending on operation)

INJECTION

Fault finding - Conformity check

17

NOTES	Carry out the actions below with the engine warm at idle, no power consuming equipment operating.
--------------	---

Order	Function	Descriptions	Display and Notes
13	Air conditioning (AC selected)	ET 023 : Air conditioning request ET 024 : Fast idle ET 025 : Air conditioning compressor PR 070 : Engine speed PR 044 : Power absorbed by the compressor	<p style="text-align: center;">ACTIVE</p> Illuminated if the AC requests compressor operation <p style="text-align: center;">ACTIVE</p> Illuminated if the fast idle is active <p style="text-align: center;">ACTIVE</p> Illuminated if the injection authorises compressor operation 800 < X < 900 rpm 250 < X < 5000 W
		ET 023 : Air conditioning request ET 024 : Fast idle ET 025 : Air conditioning compressor PR 070 : Engine speed PR 044 : Power absorbed by the AC compressor	<p style="text-align: center;">INACTIVE</p> <p style="text-align: center;">ACTIVE</p> <p style="text-align: center;">INACTIVE</p> if the injection does not authorise compressor operation 800 < X < 900 rpm X ≤ 300 W
		ET 027 : Fan assembly low speed	The fan assembly should operate at low speed

INJECTION

Fault finding - Conformity check

17

NOTES	Carry out the actions below with the engine warm at idle, no power consuming equipment operating.
--------------	---

Order	Function	Descriptions	Display and Notes
14	Power steering pressure switch	Turn the wheels to full lock ET 029 : Power steering pressure switch	ACTIVE
15	Canister purge	ET 030 : Canister purge PR 040 : Canister purge RCO	INACTIVE X < 1.5 % Purging of the canister is prohibited. The solenoid valve remains closed
16	Fan assembly	ET 027 : Fan assembly low speed PR 010 : Coolant temperature ET 028 : Fan assembly high speed (only if fitted with AC) PR 010 : Coolant temperature	INACTIVE The fan assembly should operate when the engine coolant temperature exceeds 100 °C ACTIVE The fan assembly should operate when the engine coolant temperature exceeds 102 °C
17	EGR	PR 050 : EGR valve opening reference value	0 Vehicle not fitted with an EGR device

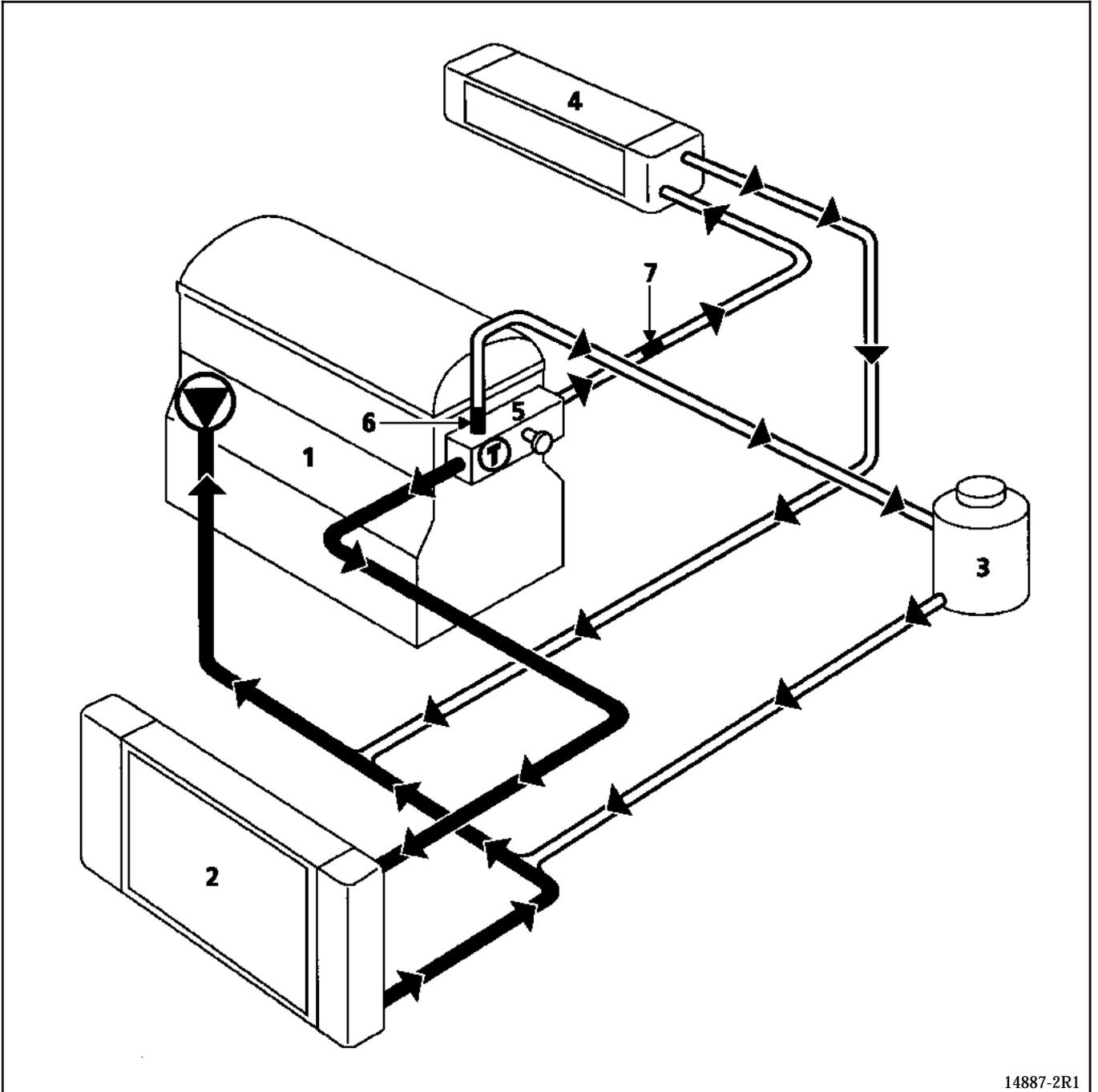
INJECTION

Fault finding - Conformity check

17

NOTES	Carry out the actions below during a road test
--------------	--

Order	Function	Descriptions	Display and Notes
Status window			
1	Canister purge	ET 030 : Canister purge PR 040 : Canister purge RCO	ACTIVE Purging of the canister is authorised $X > 1.5\%$ and variable
Parameters window			
2	Vehicle speed	PR 090 : Vehicle speed	X = speed read on the speedometer in km/h
3	Knock sensor	Vehicle with load PR 060 : Knock signal PR 061 : Anti-knock correction	X is variable and not zero $0 < X < 7^\circ$ Crankshaft
4	Mixture correction and adaptation values	ET 112 : Mixture correction After programming PR 110 : Idle speed mixture adaptation value PR 111 : Operating mixture adaptation value	$60 < X < 200$ $64 < X < 160$ $64 < X < 160$
5	Emission of pollutants	2,500 rpm after driving At idle, wait for stabilisation	$CO < 0.3\%$ $CO_2 > 13.5\%$ $O_2 < 0.8\%$ $HC < 100$ ppm $0.97 < \lambda < 1.03$ $CO < 0.5\%$ $HC < 100$ ppm $0.97 < \lambda < 1.03$



14887-2R1

- 1 Engine
- 2 Radiator
- 3 "Warm" reservoir with degassing following thermostat
- 4 Heater matrix
- 5 Thermostat support
- 6 \varnothing 3 mm nozzle
- 7 \varnothing 8 mm nozzle

-  Coolant pump
-  Thermostat
-  Bleed screw

The expansion bottle valve calibration value is **1.2 bar** (brown).

The circulation in the heater matrix is continuous, thus contributing to the cooling of the engine.

FILLING

Open the only bleed screw on the circuit.

Fill the circuit via the expansion bottle opening.

Close the bleed screw when the liquid starts to flow in a continuous stream.

Start the engine (**2,500 rpm**).

Adjust the level by overflow for approximately **4 minutes**.

Close the reservoir.

BLEEDING

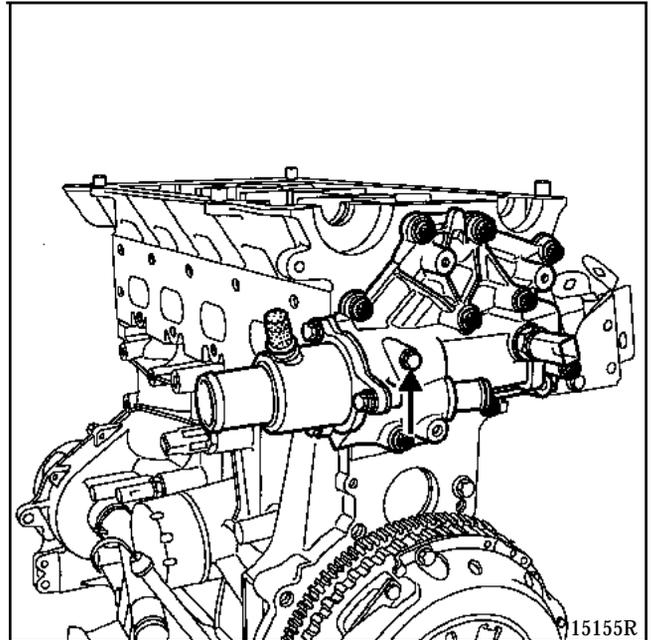
Run the engine for **20 minutes at 2,500 rpm**, until the fan cuts in (time required for automatic degassing).

Check that the fluid level is close to the "**Maximum**" mark.

DO NOT OPEN THE BLEED SCREW WHILE THE ENGINE IS RUNNING.

RETIGHTEN THE EXPANSION BOTTLE PLUG WHILE THE ENGINE IS WARM.

Location of the bleed screw on the plenum chamber



ESSENTIAL SPECIAL TOOLS

Mot. 1448 Clip pliers for spring clips

REMOVAL

Place the vehicle on a two post lift.

Disconnect the battery.

Remove the engine undertray.

Drain the cooling circuit via the lower engine radiator hose.

NOTE: it is not necessary to drain the refrigerant circuit.

Disconnect the fan assembly connectors.

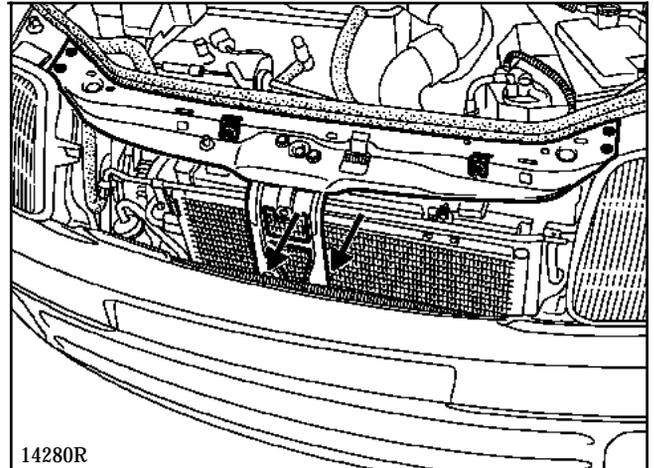
Remove the dehydration canister fasteners on the fan assembly.

Unclip:

- the AC pipes on the fan assembly. Move them towards the engine and attach them,
- the power steering reservoir on the fan assembly and move it aside.

Remove:

- the fasteners securing the fan assembly to the radiator and remove it,
- the fasteners securing the radiator to the condenser and remove it,
- the front bumper,
- the radiator grille,
- the upper crossmember,
- the air intake pipe.



14280R

REFITTING

Refit in the reverse order to removal.

Fill and bleed the cooling circuit (see section 19 "Filling - Bleeding").

NOTE: take care not to damage the radiator or condenser fins during removal-refitting, protect them if necessary.

ESSENTIAL SPECIAL TOOLS

Mot. 1202	Circlip pliers
Mot. 1453	Engine support tool

TIGHTENING TORQUE (in daN.m)



Coolant pump mounting bolt	1.7
----------------------------	-----

REMOVAL

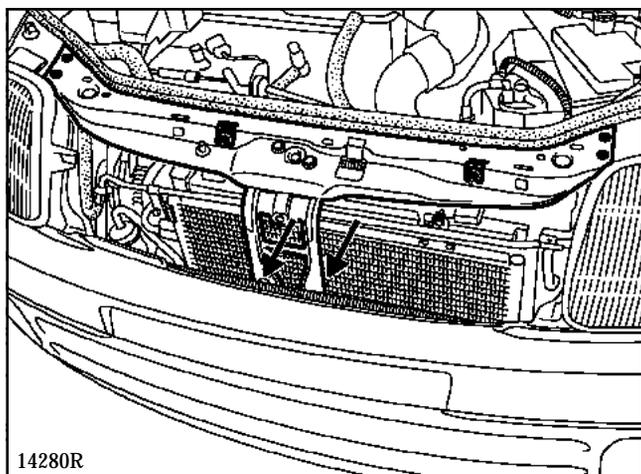
Place the vehicle on a two post lift.

Disconnect the battery.

Drain the cooling circuit via the lower radiator hose.

Remove:

- the front right mud shield,
- the front bumper,
- the upper crossmember,

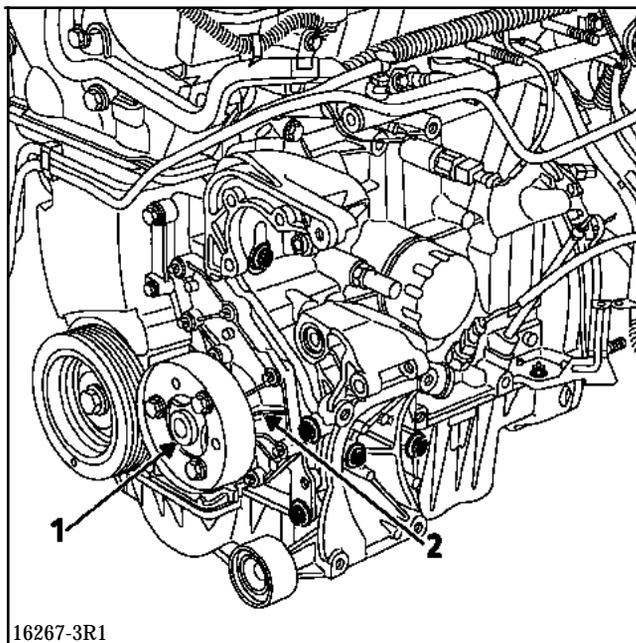


- the accessories belt (see section 07 "Accessories belt tensioning"),

Fit engine support tool Mot. 1453.

Remove:

- the suspended engine mounting and lower the engine as much as possible,
- the coolant pump pulley (1),
- the coolant pump mounting bolt (2).



Cleaning

It is very important that the mating surfaces are not scratched.

Use the **Décapjoint** product to dissolve the part of the seal which remains attached.

Apply the product to the section to be cleaned, wait approximately ten minutes, then remove it using a wooden spatula.

It is advisable to wear gloves during the operation.

Do not allow any of the product to fall onto the paintwork.

REFITTING

Refit:

- the coolant pump (fitted with a new seal) tightening the bolts to a torque of **1.7 daN.m**,
- the accessories belt and tension it (see section **07 "Accessories belt tensioning"**).

Fill and bleed the cooling circuit (see section **19 "Filling - Bleeding"**).

For refitting of the suspended engine mounting, refer to the procedure described in section **19 "Suspended engine mounting"**.

ENGINE MOUNTING SYSTEM

Suspended engine mounting

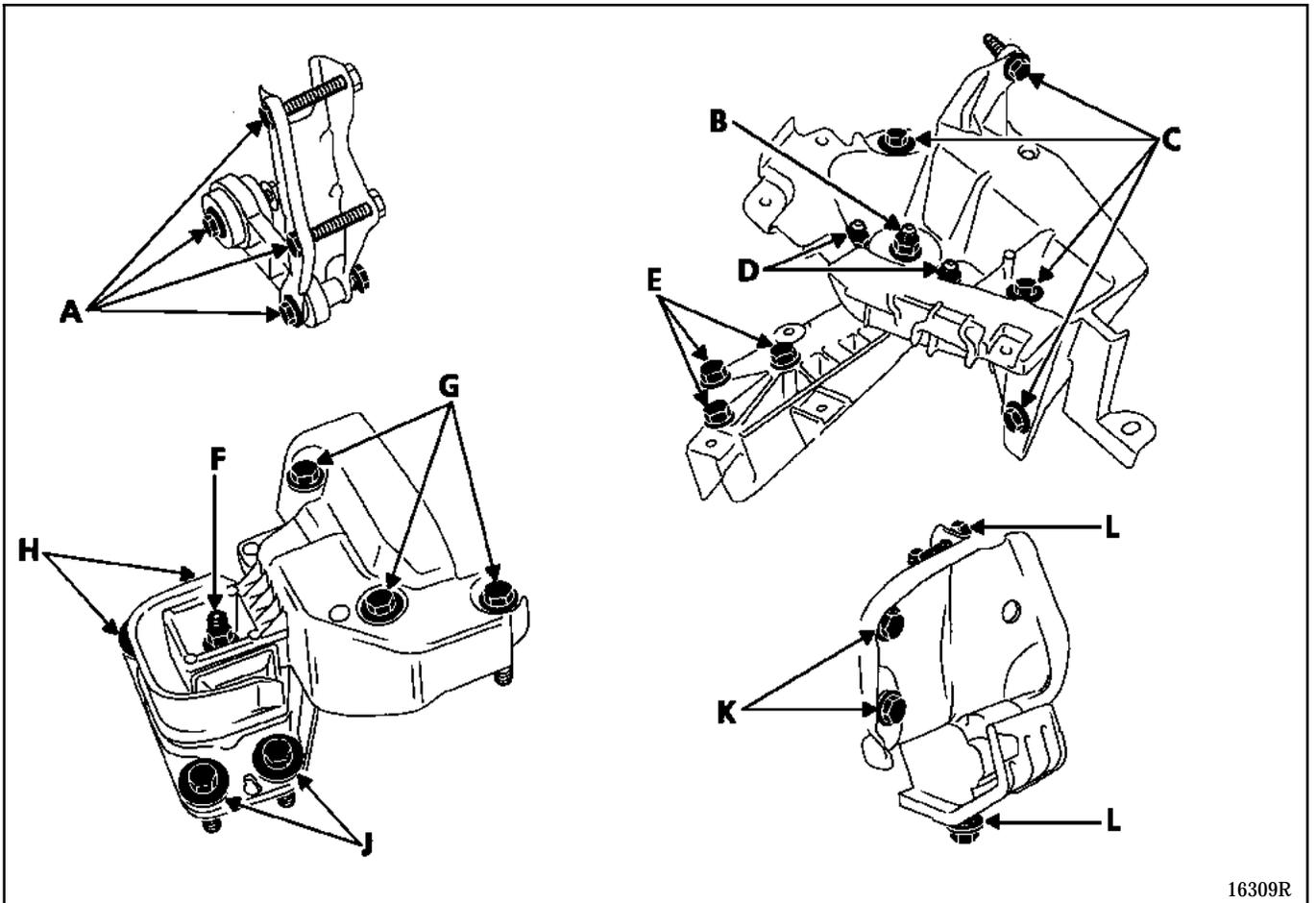
19

TIGHTENING TORQUE (daN.m)



A	6.2
B	6.2
C	2.1
D	2.1
E	6.2
F	4.4

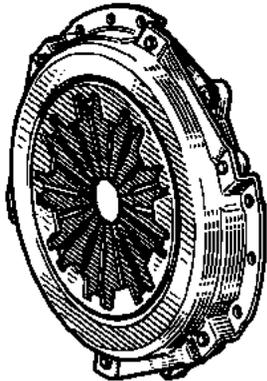
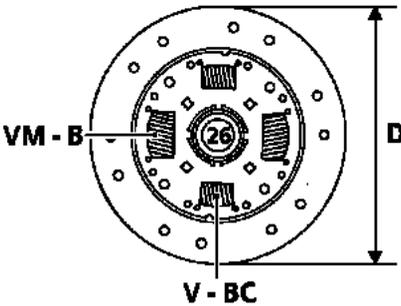
G	6.2
H	6.2
J	6.2
K	6.2
L	4.4



16309R

CLUTCH Cover - Disc

20

VEHICLE TYPE	ENGINE TYPE	COVER	DISC
CB0M	F4R	 <p style="text-align: right; margin-top: 10px;">85873S</p> <p style="text-align: center; margin-top: 20px;">215 CP ON 4600</p>	<p>26 splines D = 215 mm E = 6.8 mm</p> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 60%;"> <p>VM : Moss Green V : Green BC : Capri Blue B : Light Blue</p>  <p style="text-align: center; margin-top: 10px;">90693-2R17</p> </div> <div style="width: 35%; text-align: center;"> <p>E</p>  <p style="margin-top: 10px;">94990R1</p> </div> </div>

Monodisc clutch operating dry, cable controlled.

Clutch stop in constant contact.

CLUTCH Cover - Disc

20

REPLACEMENT (following removal of the gearbox)

ESSENTIAL SPECIAL TOOLS	
Mot. 582	Immobilising tool
or	
Mot. 582-01	

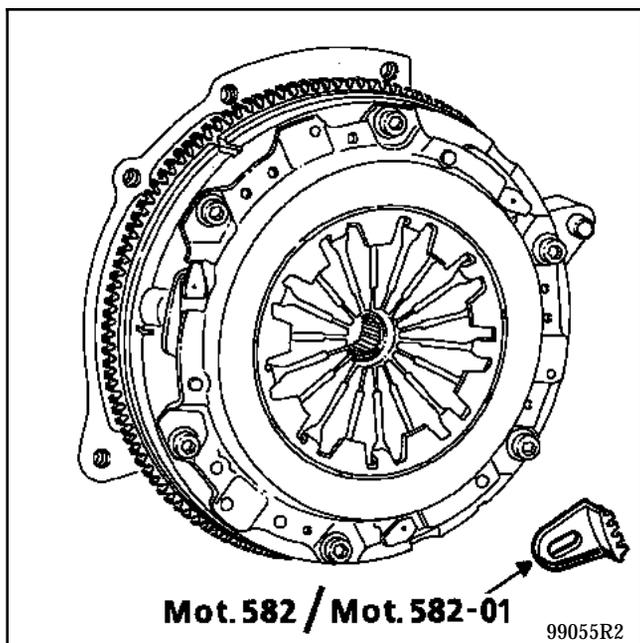
TIGHTENING TORQUE (en daN.m)	
Cover mounting bolt	2

REMOVAL

Fit immobilising tool **Mot. 582** or **Mot. 582-01**.

Remove the cover mounting bolts and remove the clutch disc.

Check and change any faulty parts.

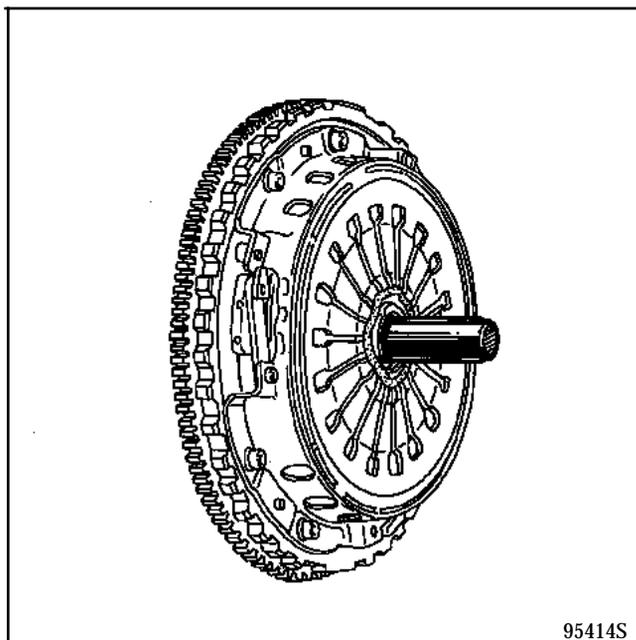


REFITTING

Clean the clutch shaft splines and refit the assembly **without any lubricant**.

Fit the disc (hub offset gearbox side).

Align using the tool supplied in the part replacement kit.



Gradually screw in the bolts in a star formation, then tighten the cover mounting bolts to the specified torque.

Remove immobilising tool **Mot. 582** or **Mot. 582-01**.

Coat with **MOLYKOTE BR2** grease:

- the tube guide,
- the fork pads.

CLUTCH Cover - Disc

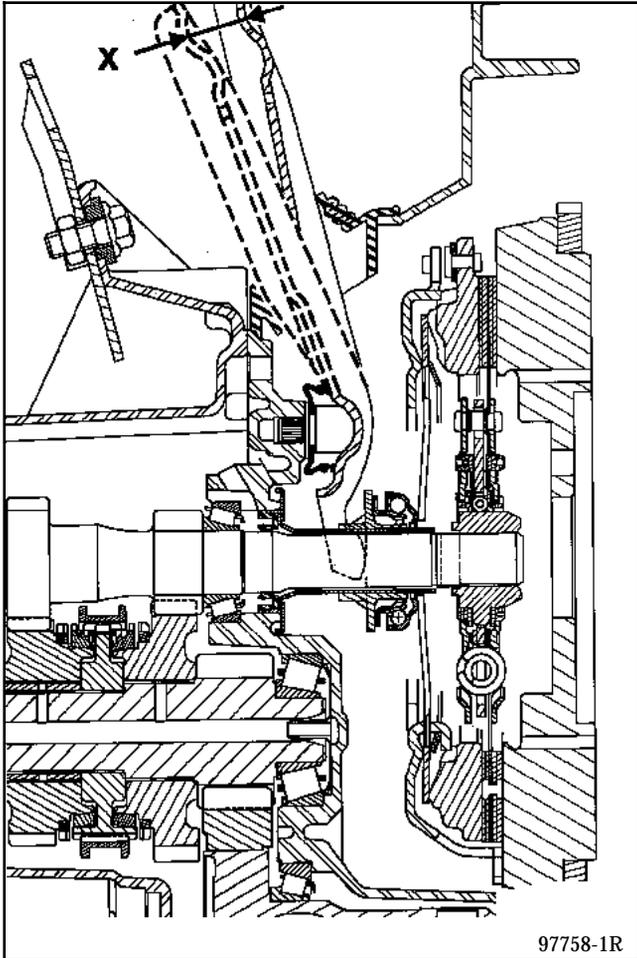
20

After refitting the gearbox, place the cable on the clutch fork and check the operation of the play compensation system.

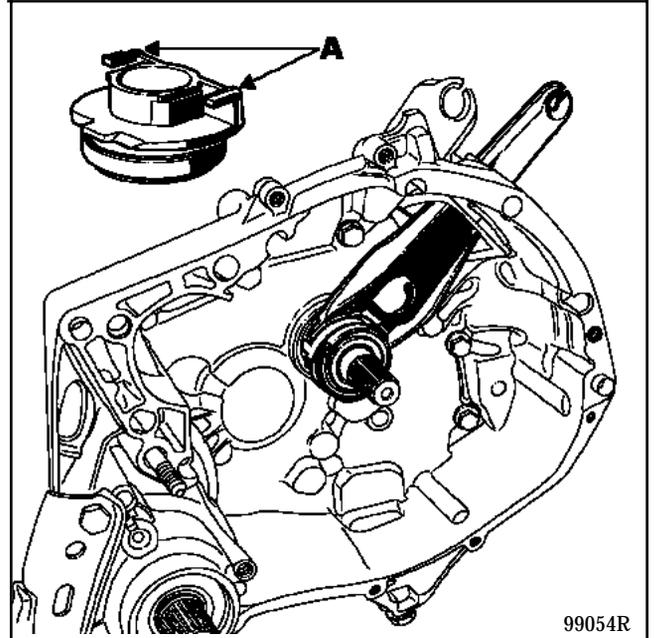
Check the clutch release travel.

The fork travel should be:

$X = 25.4 \text{ to } 25.9 \text{ mm}$



NOTE: in the event of an operation which does not require removal of the gearbox, or after fitting the gearbox, **DO NOT LIFT** the fork as it may come free of the notch (A) of the stop.



REPLACEMENT OF THE FLYWHEEL

ESSENTIAL SPECIAL TOOLS	
Mot. 582 -01	Immobilising tool

TIGHTENING TORQUE (in daN.m)	
Flywheel bolt	5.5

REMOVAL

After removing the clutch disc, remove the engine flywheel mounting bolts (the bolts cannot be reused).

Reworking of the clutch face is prohibited.

REFITTING

Clean the flywheel mounting bolt threads on the crankshaft.

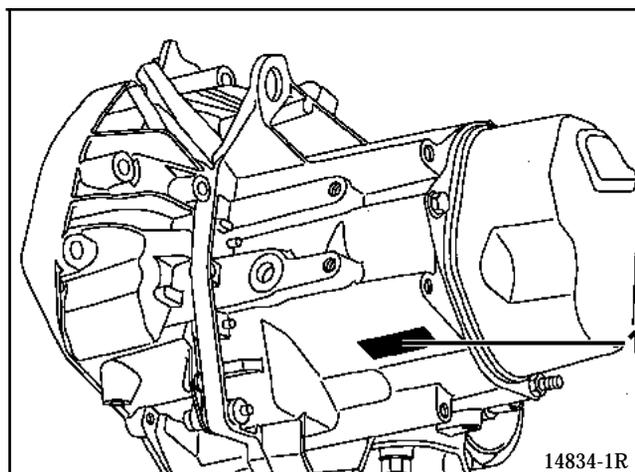
Degrease the contact surface of the flywheel with the crankshaft.

Refit the flywheel immobilising it using tool **Mot. 582-01**.

COMMENT: the flywheel mounting bolts must always be changed.

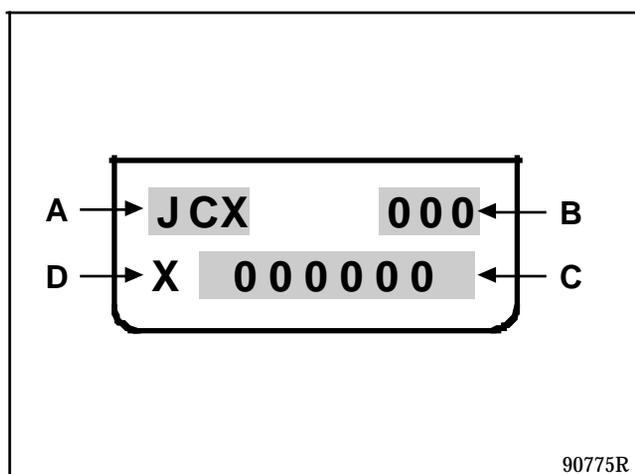
"CLIO" vehicles fitted with **F4R** engines are fitted with a **JC5** type manual gearbox.

Workshop Repair Manual "**B.V. JC**" deals with the complete repair of this unit.



A mark (1), located on the gearbox casing, indicates:

- A Type of gearbox
- B Gearbox index
- C Manufacturing number
- D Factory of manufacture



MANUAL GEARBOX Gears

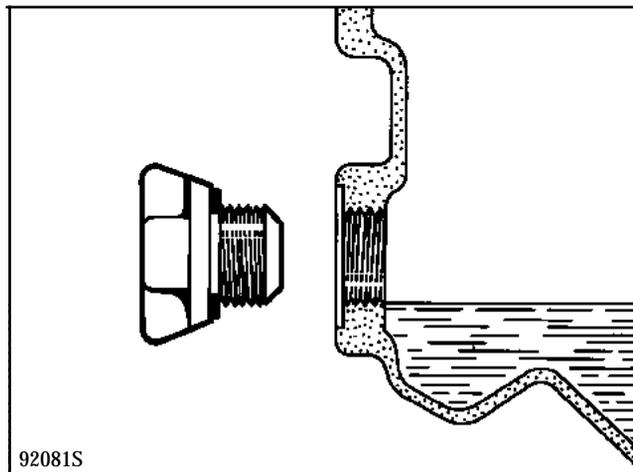
JC5									
Index	Vehicle	Step down ratio	Speedometer drive gear	1st	2nd	3rd	4th	5th	Reverse gear
089	CB0M	15 -- 58	21 -- 19	11 -- 34	22 -- 41	28 -- 37	34 -- 35	39 -- 31	11 -- 26 39

CAPACITY (in litres)

5-speed gearbox	
JC5	3.1

Grade - Viscosity
TRX 75W 80W

LEVEL CHECK



Fill to the level of the opening.

TYPE	PACKAGING	PART NUMBER	UNIT
MOLYKOTE BR2	1 kg box	77 01 421 145	Right-hand sun wheel splines Fork pivot Stop guide Fork pads } Clutch
LOCTITE 518	24 ml syringe	77 01 421 162	Casing assembly surfaces
RHODORSEAL 5661 E.g.: CAF 4/60 THIXO	100 g tube	77 01 404 452	Threaded plugs and switches Bearing plugs Ends of the roll pins on the driveshafts
LOCTITE FRENBLOC (locking and sealing resin)	24 cc vial	77 01 394 071	Input and output shaft nuts Fixed gear and hub of 5 th Differential lock drive stud

Parts which must always be changed

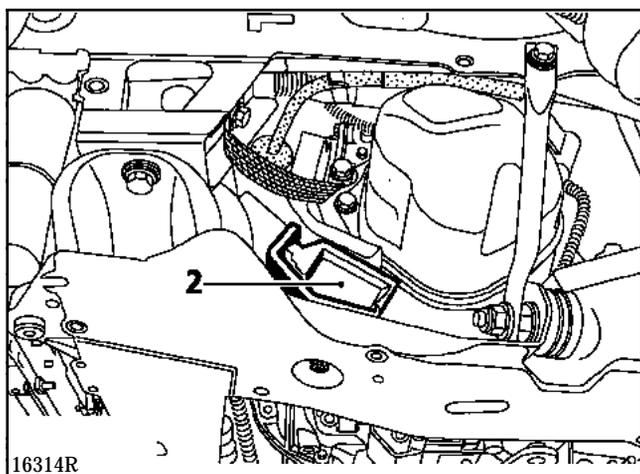
When they have been removed:

- lip seals,
- O-rings,
- stop guide tubes,
- output shaft and differential nuts,
- speedometer pinion and its shaft,
- speedometer crown wheel,
- roll pins,
- bushes under the gears.

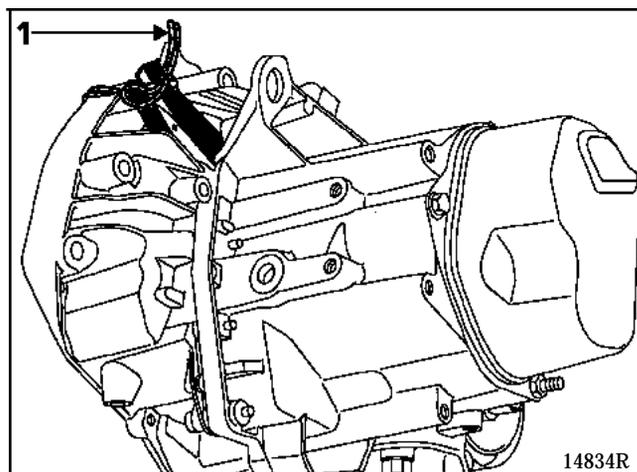
TIGHTENING TORQUES (in daN.m)	
Drain plug	2.2
Brake caliper bolt	4
Driveshaft gaiter bolt	2.5
Shock absorber base bolt	18
Gearbox surround and starter bolt	3
Suspended engine mounting to gearbox bolt	6.2
Gearbox lower mounting bolt	6.2
Gearbox lower flexible mounting bolt	4.4
Wheel bolt	9
Steering shaft yoke mounting bolt	3
Sub-frame rear mounting bolt	10.5
Sub-frame front mounting bolt	6.2
Lower ball joint nut	4.2
Steering ball joint nut	3.7
Engine tie-bar bolt	6.2

The removal and refitting of the gearbox remains identical and does not present any difficulties in relation to **CLIO** vehicles.

The only difference is the presence of a gearbox - sub-frame mounting (2).



NOTE: when refitting the gearbox, it is preferable to support the clutch control fork using string (1) to prevent it from coming free from its ball joint (located on the clutch housing).



REAR BEARING ELEMENTS

Brake linings (Disc)

33

TIGHTENING TORQUES (in daN.m)



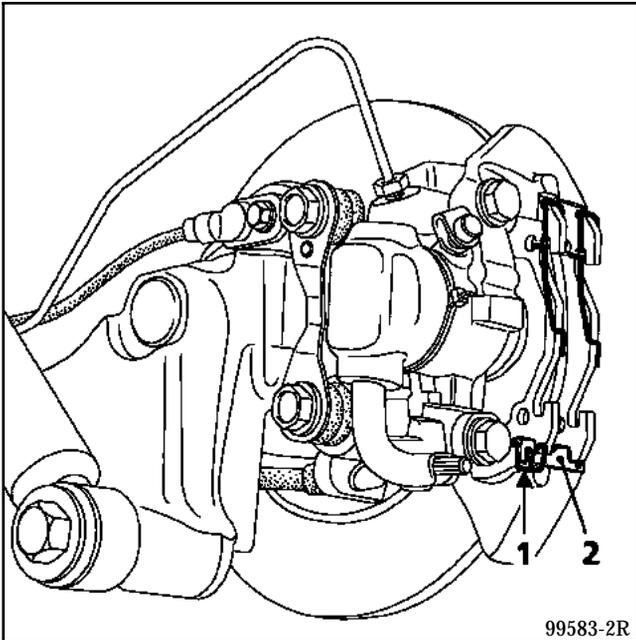
Wheel bolts

9

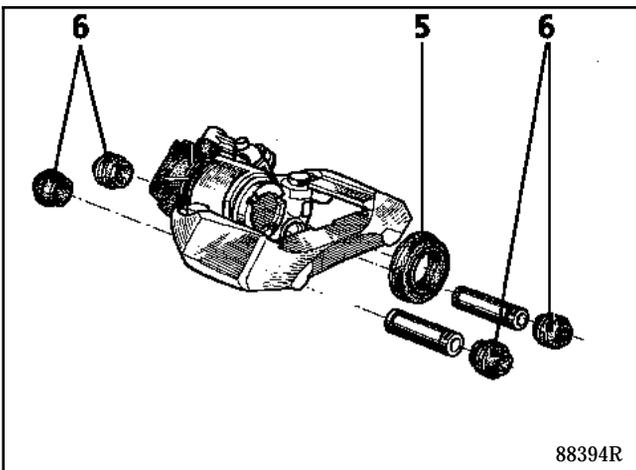
REMOVAL

Remove

- the clip (1),
- the cotter pin (2),
- the linings.

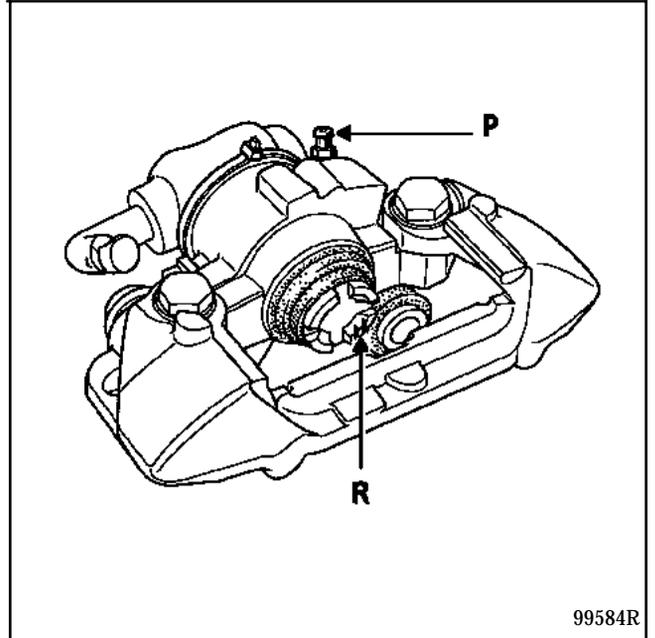


Check the condition of the dust seal (5) and the gaiters (6) protecting the caliper slides and change them if necessary. In this case, lubricate the end of the piston and the two slides after cleaning them with methylated spirit.



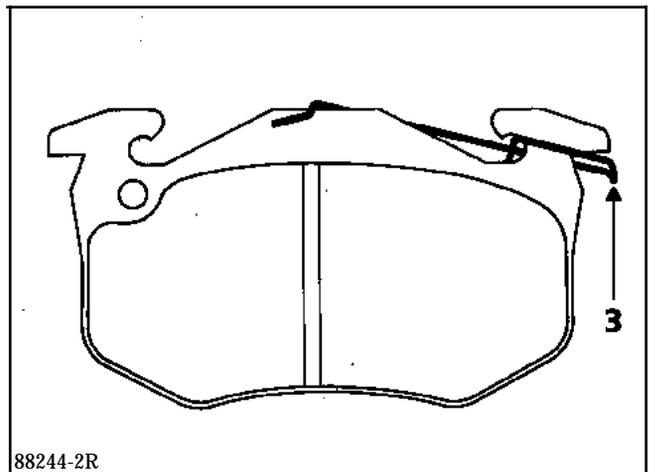
REFITTING

Push back the piston turning it using a square cross-section screwdriver until it rotates but no longer lowers.



Position the piston so that the mark (R) on its contact surface is directed towards the bleed screw (P).

Fit the two sound deadening clips (3) on the new linings.



REAR BEARING ELEMENTS

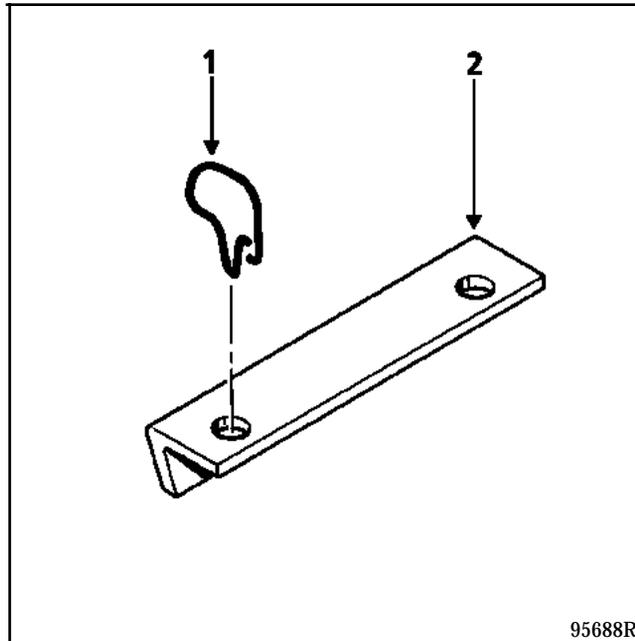
Brake linings (Disc)

33

Position the linings in the caliper observing their direction of fitting.

Engage the cotter pin (2) and refit the clip (1) (a single clip per caliper).

NOTE: the clip (1) is positioned on the interior side of the caliper.



Press the brake pedal several times to bring the piston into contact with the linings.

REAR BEARING ELEMENTS

Brake caliper

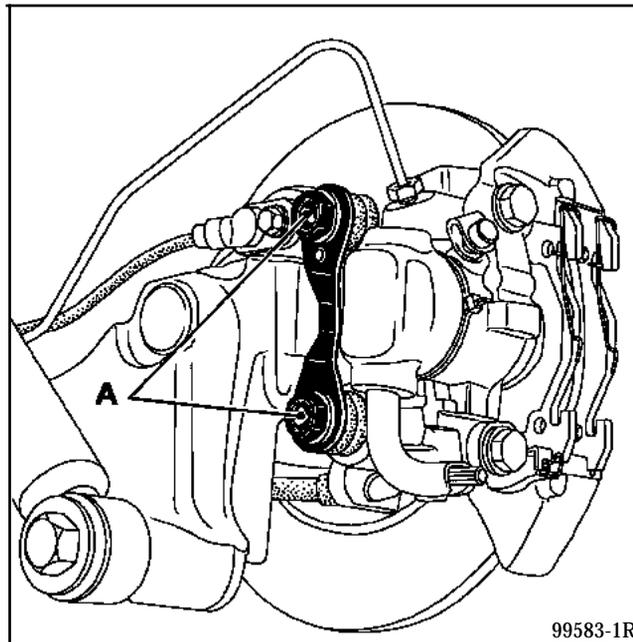
33

Tightening torques (in daN.m)	
Wheel bolts	9
Brake caliper mounting bolt	10
Rigid pipe union	2
Bleed screw	0.6

REMOVAL

Remove the brake linings (refer to the relevant paragraph).

Disconnect the handbrake cable.

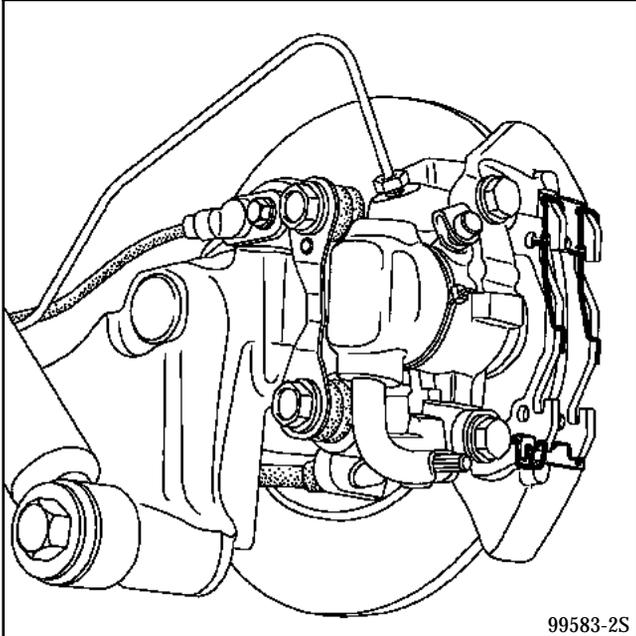


Remove the two mounting bolts (A) on the stub axle carrier.

Unscrew the pipe union (be prepared for the flow of brake fluid).

REFITTING

Coat the bolt with Loctite FRENBLOC.
Fit the brake caliper.



Refit the rigid pipe union.

Tighten the bolts and the union to the specified torque.

Slacken the slave cylinder bleed screw and wait for the fluid to flow out (check that the compensation reservoir level is sufficient).

Retighten the bleed screw.

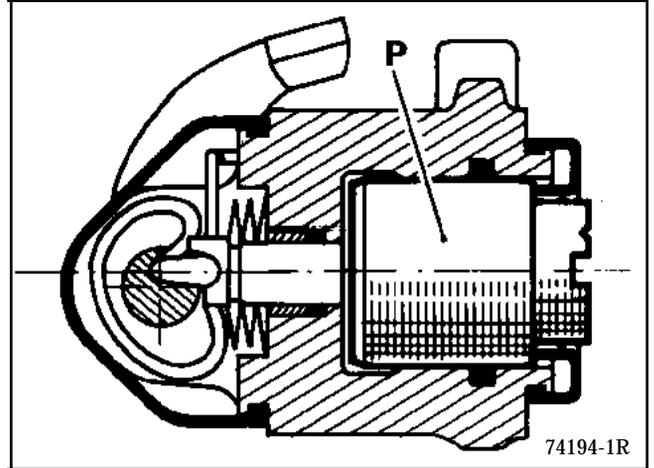
Check the condition of the linings and refit them.

Partially bleed the circuit if the compensation reservoir has not been completely emptied during the operation, otherwise bleed the circuit completely. It is essential to observe the order of bleed operations.

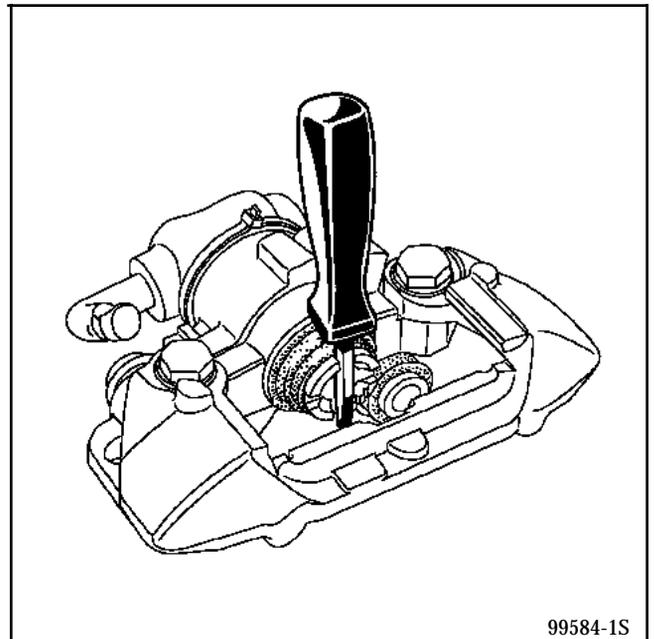
Press the brake pedal several times to bring the piston into contact with the linings.

REPAIR

Remove the brake caliper.
The complete caliper must be changed if there are scratches in the bore.
Removal of the interior of the piston (P) is prohibited.

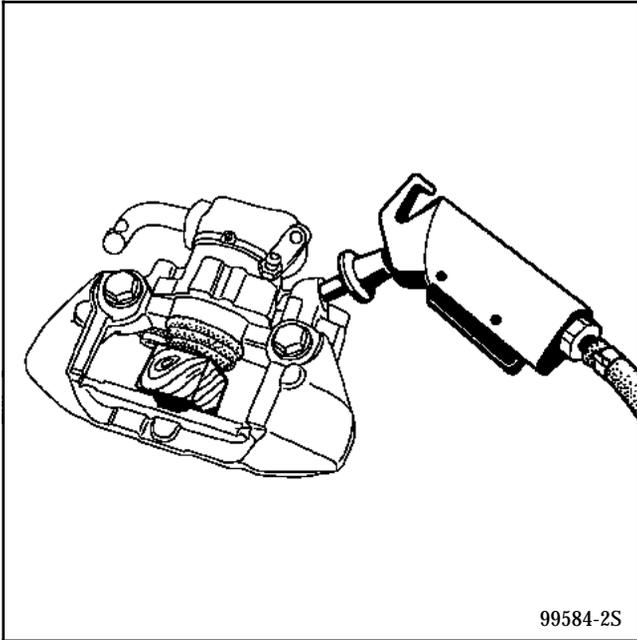


Place the caliper in a vice fitted with soft jaws.
Remove the rubber dust seal.
Remove the piston unscrewing it using a square cross-section screwdriver.



When the piston turns freely, gradually apply compressed air to the cylinder taking care not to eject the piston roughly. Insert a wooden shim between the caliper and the piston to prevent any damage to it.

Any trace of impact or scratching will render the piston unusable.

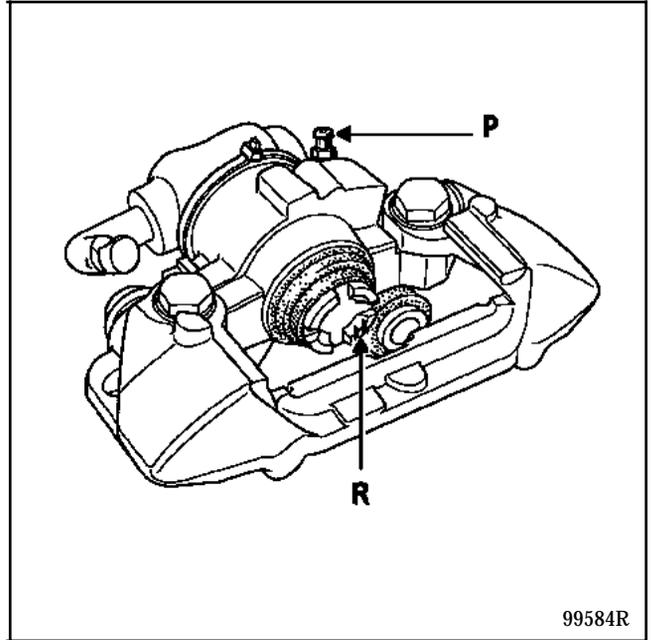


99584-2S

Remove the seal from its groove using a steel blade with rounded edges.
Clean the parts with methylated spirit and refit them.
Lubricate the seal and the piston with brake fluid.
Gradually lower the piston by hand to prevent damage to the seal.

Finish lowering the piston by turning it using a screwdriver until the piston turns but no longer lowers.

Direct the piston so that the mark (R) on its contact surface is on the bleed screw side (P) to permit correct bleeding of the caliper and normal fitting of the lining in the central groove of the piston.



99584R

Coat the piston surface with grease.
Fit the new protective cap.

REAR BEARING ELEMENTS

Brake hub / disc

33

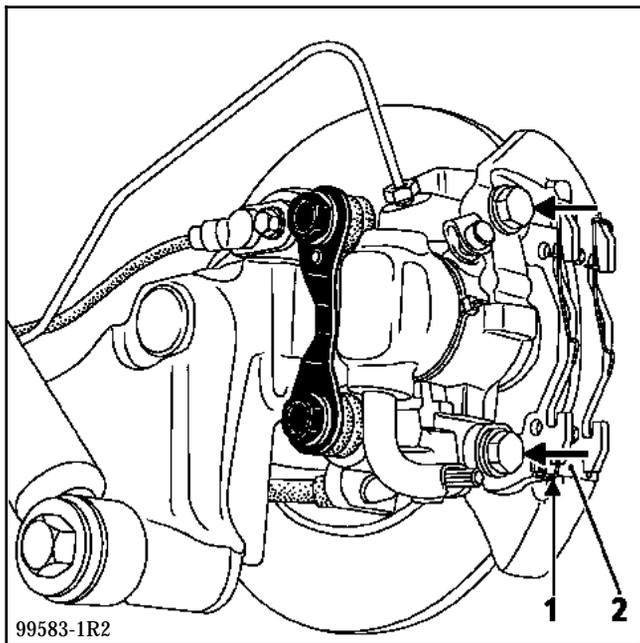
The brake discs cannot be ground. The disc must be changed if it is significantly worn or scratched.

TIGHTENING TORQUE (in daN.m)	
Caliper yoke mounting bolt	6
Wheel bolt	9
Stub axle nut	17.5

REMOVAL

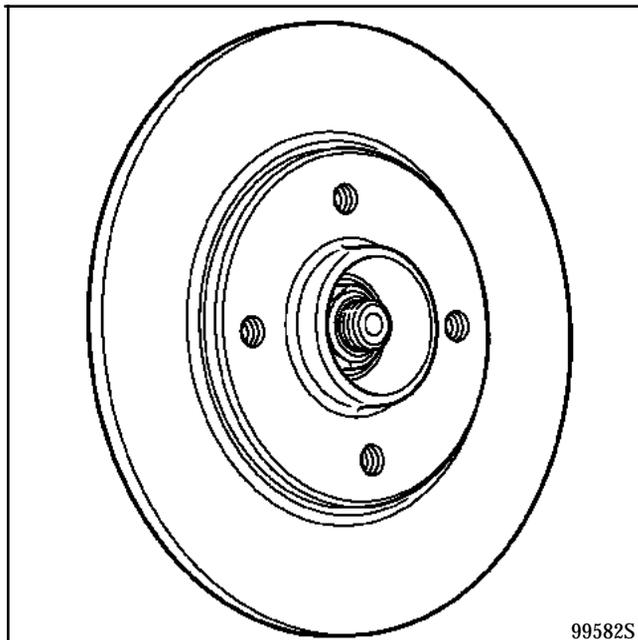
Remove:

- the two caliper yoke mounting bolts,



- the stub axle nut,

NOTE: to remove the lower bolt, it will be necessary to remove the clip (1) and move aside the cotter pin (2).



- the disc.

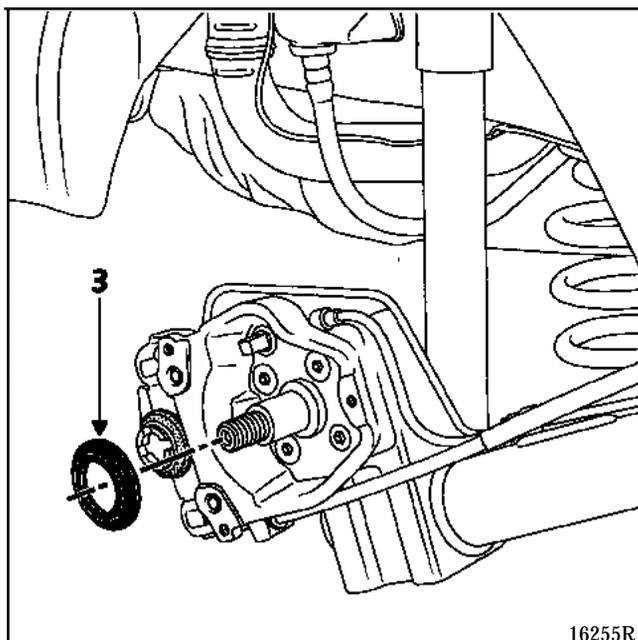
REFITTING

Refit in the reverse order to removal.

Coat the bolts with Loctite FRENBLOC.

Press the brake pedal several times to bring the piston into contact with the linings.

NOTE: ensure that the deflector (3) is refitted the right way round. There is a chamfer on the deflector so that is correctly in contact with the stub axle.



REAR BEARING ELEMENTS

Hub/disc bearing

33

TIGHTENING TORQUES (in daN.m)



Wheel bolts	9
Wheel nuts	17.5
Caliper yoke bolt	6

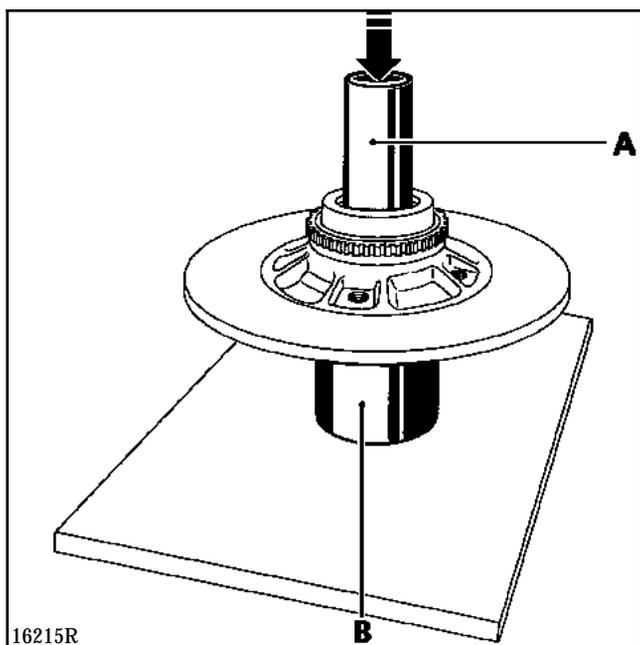
Place the vehicle on a two post lift.

REMOVAL

Remove:

- the brake hub/disc; to do this refer to the procedure described on the previous page,
- the circlips.

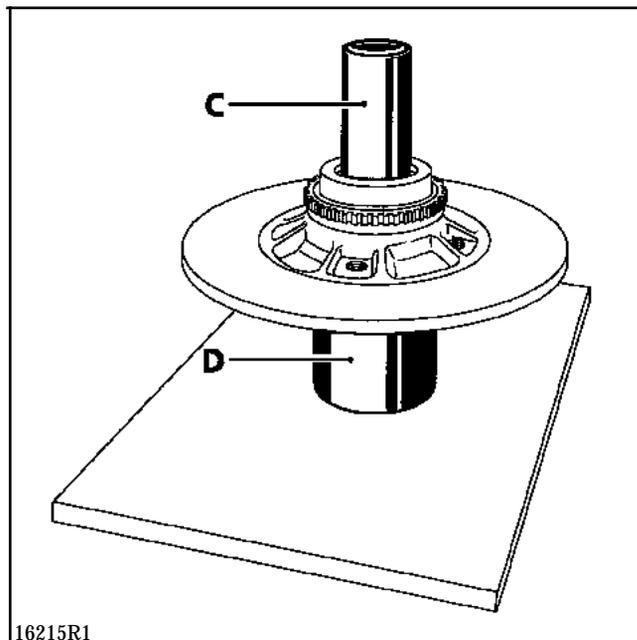
By means of a press, remove the bearing using tubes (A) and (B).



NOTE: ensure that the disc is positioned correctly for the removal of the bearing. The ABS crown wheel should be facing upwards.

REFITTING

By means of a press, refit the bearing using tubes (C) and (D).



IMPORTANT: ensure that the bearing is positioned correctly: the dust cover should be at the rear.

NOTE: the bearing dust cover plastic protector should be removed at the last moment.

Refit:

- the circlips,
- the hub-disc.

REAR BEARING ELEMENTS

Stub axle and brake caliper support

33

TIGHTENING TORQUES (in daN.m)



Wheel bolts	9
Caliper yoke bolt	6
Stub axle mounting bolt M10 x 150	5.7
M8 x 125	2.9
ABS sensor mounting bolt	0.8

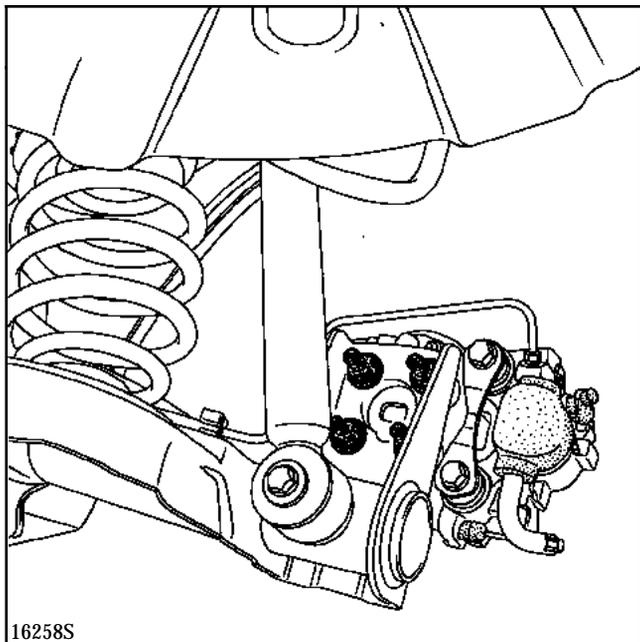
Place the vehicle on a two post lift.

REMOVAL

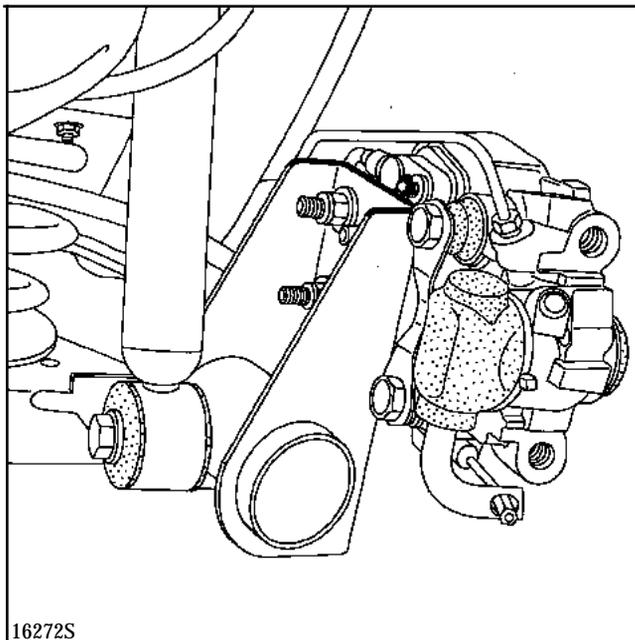
Disconnect the battery.

Remove:

- the wheel on the side concerned,
- the caliper and the hub-disc (refer to the previous pages),
- the stub axle - caliper support assembly (four bolts).



NOTE: the ABS sensor can only be removed when the caliper support is no longer secured to the axle.

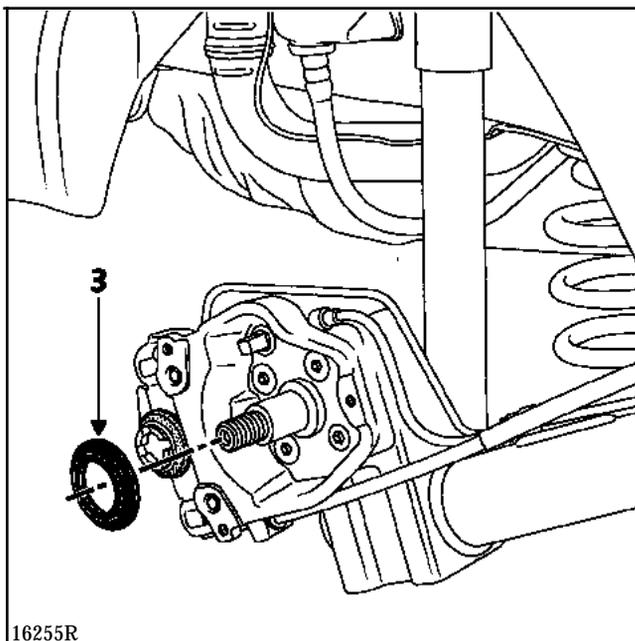


REFITTING

Refit in the reverse order to removal.

NOTE:

- ensure that the deflector (3) is refitted the right way round. There is a chamfer on this deflector so that it is in perfect contact with the stub axle. Lubricate between the bearing seal and the deflector.
- Coat the sensor - hub - disc interfaces with **MOLYKOTE FB 180** grease.



Partially bleed the brake circuit if the reservoir is not empty, otherwise bleed the circuit completely.

STEERING ASSEMBLY

Power steering unit

36

ESSENTIAL SPECIAL TOOLS

Mot. 453 -01	Hose clamps
T.Av. 476	Tool for extracting ball joints
T. Av. 1233 -01	Tools for operating on the sub-frame - axle

TIGHTENING TORQUES (in daN.m)



Wheel bolts	9
Universal joint bolt	2.5
Engine tie-bar nut	6.2
Steering unit to sub-frame mounting nuts	5
Steering ball joint nut	3.7

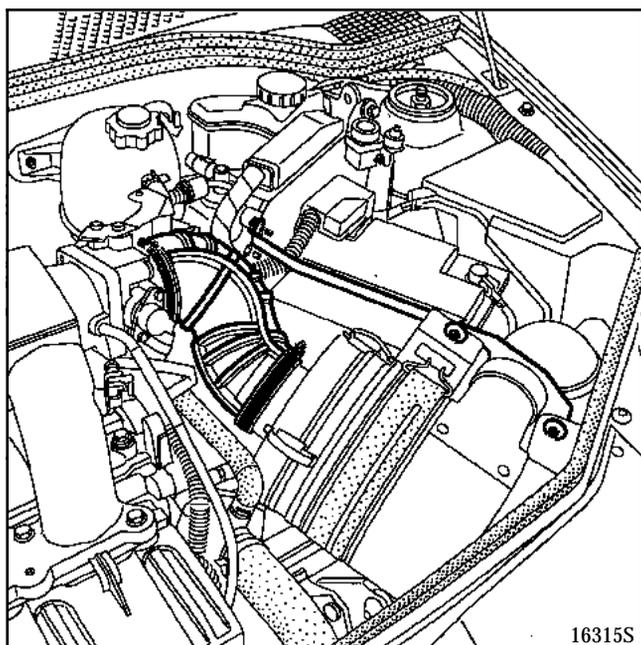
Place the vehicle on a two post lift.

REMOVAL

In the engine compartment

Disconnect the battery.

Remove the air filter unit.



16315S

Disconnect the accelerator cable.

Remove the two expansion bottle nuts and move the expansion bottle forwards.

Fit the hose clamps **Mot. 453-01** on the power steering reservoir hoses.

Disconnect the high and low pressure pipes on the steering unit. Plug the pipes to prevent the entry of impurities.

Underneath the vehicle

Remove:

- the two wheels,
- the front left mud shields,
- the engine undertray.

Disconnect the steering ball joints using tool **T. Av. 476**.

Remove the engine tie-bar front bolt.

Uncouple:

- the exhaust downpipe from the exhaust assembly,
- the gearbox control rod.

Remove the universal joint bolt and fit a steering wheel immobiliser to retain the same position on refitting.

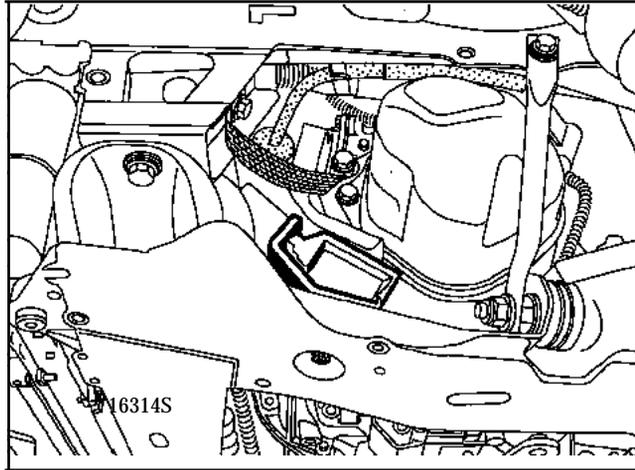
STEERING ASSEMBLY

Power steering unit

36

Remove:

- the tie-bar flexible mounting lower mounting nut,



- the sub-frame stiffeners (four bolts),
- the upper bolts of the sub-frame - body side tie-rods.

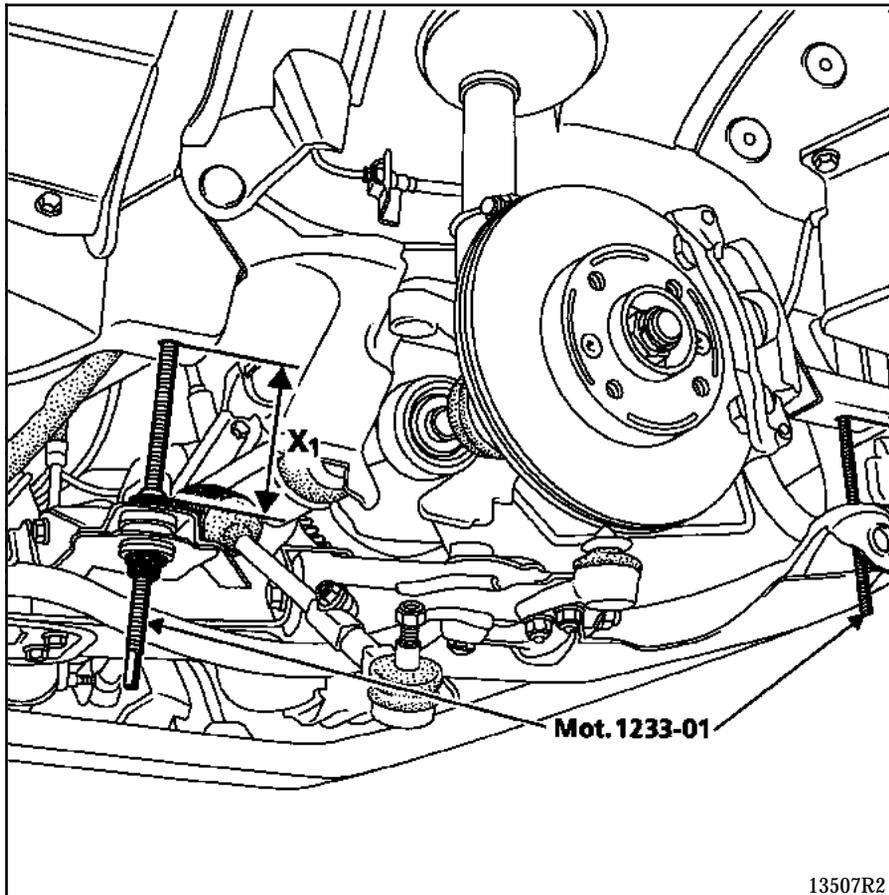
Replace the sub-frame mounting bolts with threaded rods **T. Av. 1233-01** one by one.

STEERING ASSEMBLY

Power steering unit

36

Slacken the nuts of tool T. Av. 1233-01 to lower the sub-frame by X1 = 12 cm minimum.



NOTE: disconnect the oxygen sensor before the sub-frame has been lowered completely.

Remove the steering unit mounting bolts, then remove it from the left-hand side.

REFITTING

In the case of a new steering assembly

Fit the steering ball joints.

Refit in the reverse order to removal observing the tightening torques.

Ensure that the exhaust downpipe is secured correctly to prevent any leaks.

Bleed the power steering circuit, turning from lock to lock with the engine running.

Adjust the parallelism if necessary.

STEERING ASSEMBLY

Mechanical power steering pump

36

ESSENTIAL SPECIAL TOOLS

Mot. 453 -01 Hose clamps

TIGHTENING TORQUES (in daN.m)



Alternator upper mounting bolt(4)	3.2
Alternator lower mounting bolt(5)	3.8
Belt tensioner mounting bolt (7)	6.2
Belt tensioner spring mounting bolt (8)	2.1
Power steering pump pulley bolt	0.8
Power steering pump mounting bolt	3.2

Place the vehicle on a two post lift.

REMOVAL

Disconnect the battery.

Remove:

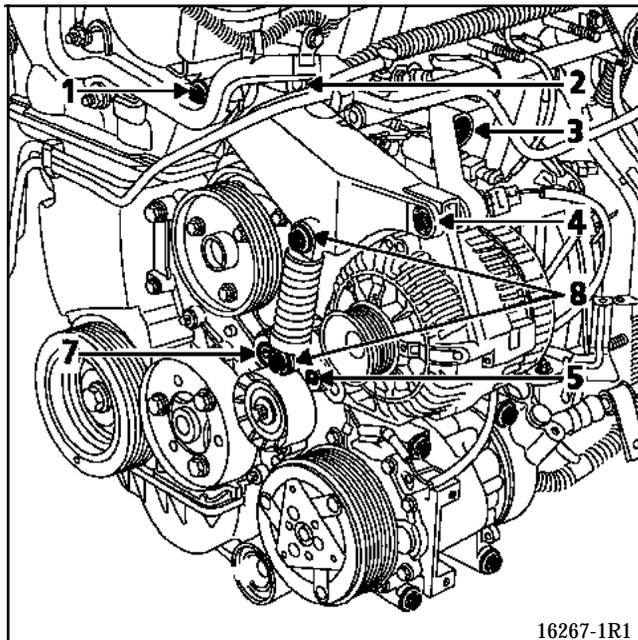
- the accessories belt (refer to section 16),
- the alternator (refer to section 16).

Place a clamp **Mot. 453-01** on the supply pipe.

Disconnect the high and low pressure pipes, be prepared for the flow of power steering fluid.

Remove:

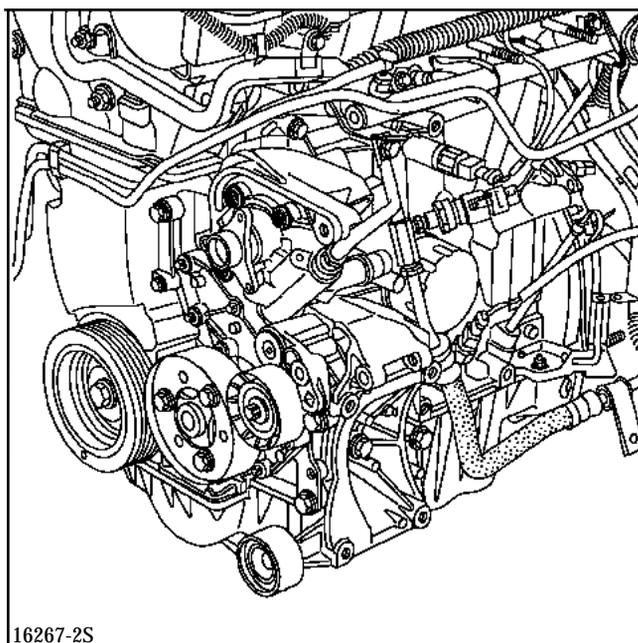
- the upper spring fastener (8) and the tensioner mounting bolt (7),
- the alternator support (bolts 1-2-3-4).



Remove the spring/tensioner assembly completely.

Remove:

- the pulley (three bolts),
- the power steering pump (four bolts).



REFITTING

Refit in the reverse order to removal.

To fit the spring/tensioner and alternator, all the bolts must be engaged and then tightened in this order:

- spring upper mounting bolt,
- alternator upper mounting bolt.

Fill and bleed the circuit turning from lock to lock.

NOTE: the power steering pump cannot be repaired. In the event of a fault, change it.

The power steering pump pressure should be between **86** and **93 bars**.

STEERING ASSEMBLY

Mechanical power steering pump

36

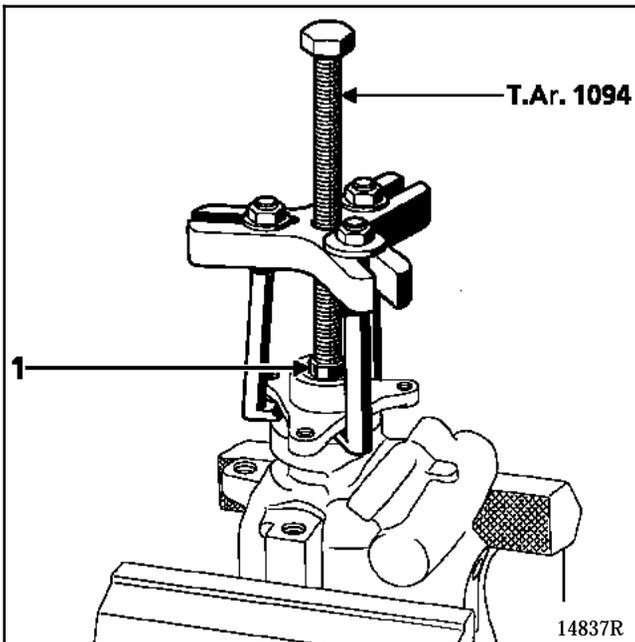
ESSENTIAL SPECIAL TOOLS

Dir.	1083 -01	Tool for refitting the pulley
T.Ar.	1094	Tool for extracting the differential bearing

REPLACEMENT OF THE HUB

Place the pump on the workbench, in a vice.

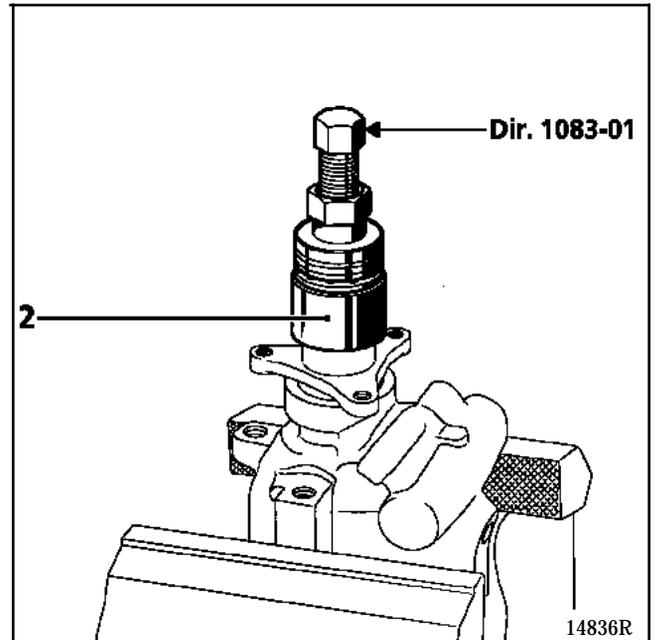
Fit tool T.Ar. 1094 and extract the hub.



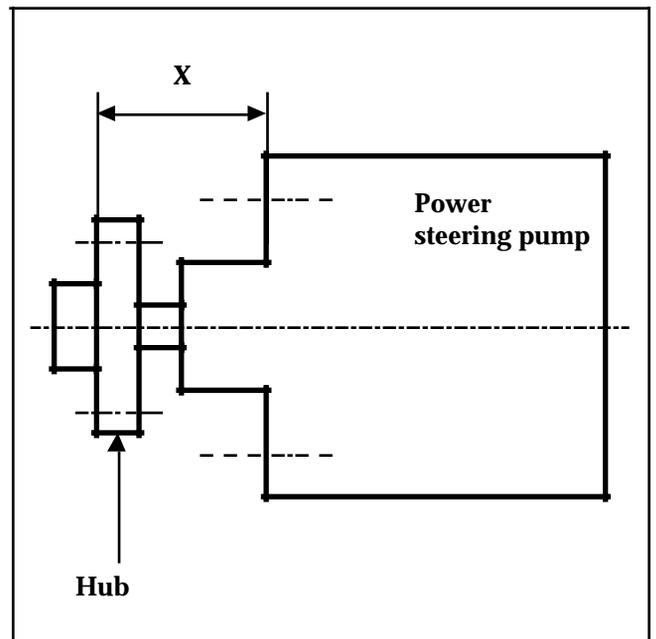
NOTE: insert a bolt (1) between the pump shaft and the push rod of tool T.Ar. 1094.

Position the hub (new) and fit it using tool Dir. 1083-01. Coat it with multipurpose grease first to make refitting easier.

NOTE: insert a shim (2) of approximately 25 mm between tool Dir. 1083-01 and the hub.



Observe the fitting dimension:
 $X = 42.6 \text{ mm}$



ELECTRONICALLY CONTROLLED HYDRAULIC SYSTEM

BOSCH anti-lock brake system

38

This vehicle is fitted with a **BOSCH 5.3 ABS** of the additional four channels type. The conventional braking equipment and the **ABS** equipment are separate.

SPECIAL FEATURES

The system has four speed sensors. Each hydraulic braking track is connected to a sensor installed at each wheel. Thus, the front wheels are controlled separately. Conversely, the rear wheels are controlled simultaneously in the same way in accordance with the principle of low selection called **select low** (the first wheel which starts to lock immediately triggers control of the whole axle).

The brake compensator has not been fitted to this vehicle (in the case of versions fitted with ABS) and its role is carried out by a special programme in the ABS assembly computer and called EBD (Electronic Braking Distributor).

WARNING: if the ABS fuse is removed, take care not to brake sharply in the event of a road test as the **EBD** function is not active (front and rear pressures identical) and therefore there is a risk of "spinning".

TIGHTENING TORQUES (in daN.m)		
Pipe unions	M10 X 100	1.7
	M12 X 100	1.7

Place the vehicle on a two post lift.

REMOVAL

Disconnect the battery.

Fit a pedal press to limit the flow of brake fluid.

Remove:

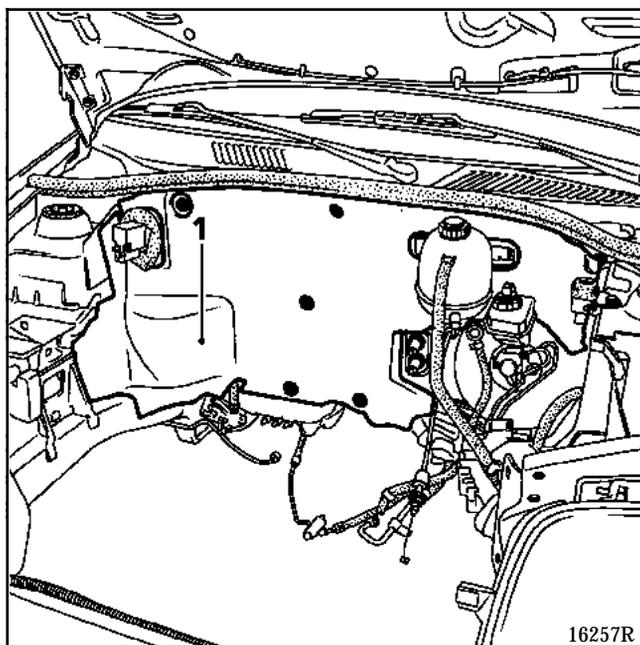
- the engine undertray,
- the front right mud shield.

Disconnect the accelerator cable.

Remove the two expansion bottle mounting nuts and move it forwards.

Move aside the power steering fluid reservoir.

Remove the bulkhead felt sound-proofing.

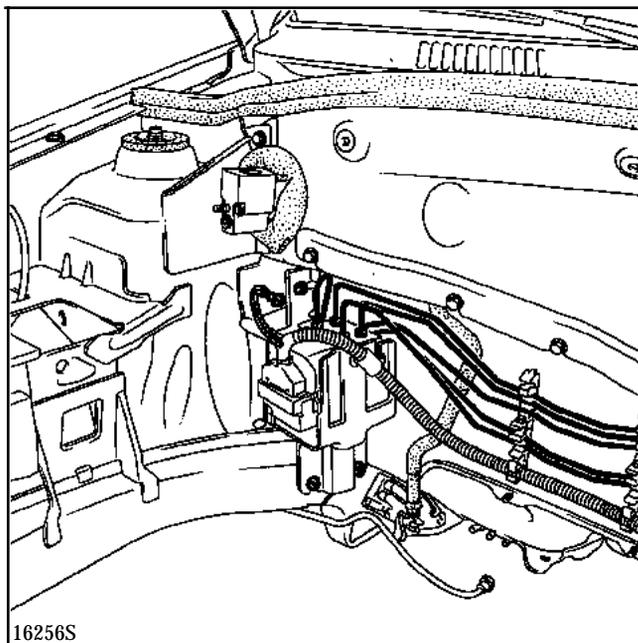


NOTE: cut the felt sound-proofing at (1).

Remove:

- the earth strap bolt,
- the three hydraulic assembly mounting bolts.

Disconnect the six pipes on the hydraulic assembly, mark their position for refitting.



NOTE: two pipes are connected behind the hydraulic assembly. To disconnect them, the three assembly mounting bolts must first be removed. The pipes must also be unclipped from the bulkhead to make it possible to move the assembly forward and thus gain access to the pipe nuts. It is also possible to gain access to these pipes via the front right wheel arch after removing the mud shield.

Remove the hydraulic assembly completely from above moving it towards the master cylinder.

REFITTING

Refit in the reverse order to removal.

Bleed the brake circuit. To do this, refer to the following pages.

NOTE: the computer must not be removed. In the event of a failure, change the complete hydraulic assembly.

HYDRAULIC CONTROL OF BRAKING

This section describes the test carried out using the diagnostic equipment to check the fitting of the **ABS** on the vehicle and, more specifically, the hydraulic circuit.

NOTE: for this test, two operators are required and the vehicle must be placed, preferably, on a two post lift.

Principle of the test

With the vehicle on the lift, the wheel to be tested is lifted. One of the operators must be in the passenger compartment in the driver's seat with the diagnostic equipment. Switch on the ignition, with the vehicle in neutral, in fault finding mode and press the brake pedal. The second operator must apply a torque to the wheel to try to turn it.

The operator generates an appropriate command on the diagnostic equipment which carries out this cycle ten times: alternating fall then increase in pressure on the wheel to be checked. These actions on the **ABS** will appear on the wheel in question as ten alternate release and locking phases. The jerky movements of the wheel, qualitatively recorded by the operator, confirm that the hydraulic circuit of this wheel is connected correctly.

Programme carried out by the diagnostic equipment:

- Cycle on the wheel to be tested:
 - a fall in pressure of **200 ms** with simultaneous starting of the pump,
 - an increase in pressure of **300 ms** with simultaneous starting of the pump (ten cycles are carried out for the wheel in question).
- an increase in the master cylinder pressure on the four wheels.
- stopping of the hydraulic pump motor.
- the operator releases the brake pedal.

The hydraulic test of the wheel in question is completed, repeat the check for the other three wheels.

BLEED PROCEDURE

NOTE: the hydraulic assembly is supplied pre-filled.

This bleed procedure is applied following removal of the following components:

- the hydraulic assembly,
- the master cylinder,
- the pipes (between the assembly and the master cylinder).

1) Carry out conventional bleeding of the brake circuit by foot or using suitable equipment.

NOTE: if, following a road test with **ABS** regulation, the pedal travel is not correct, bleed the hydraulic assembly.

2) Bleeding of the hydraulic assembly.

IMPORTANT: observe the order of bleeding starting with the **right rear**, brake, then **left rear**, **left front** then **right front**.

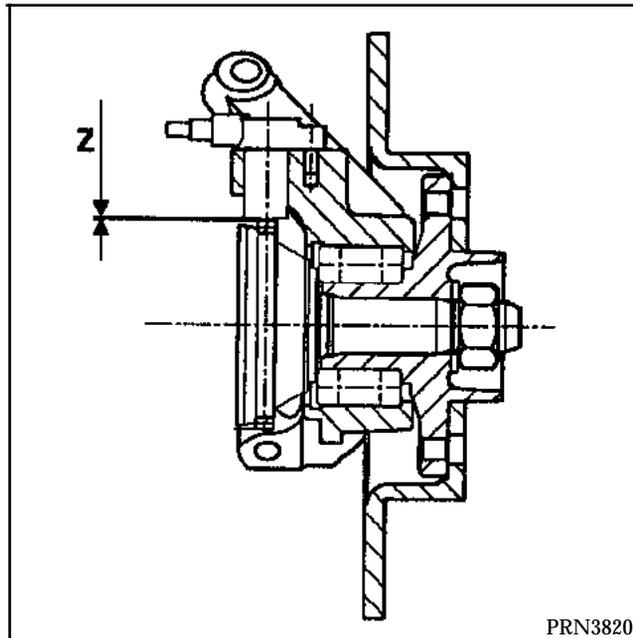
- a) Bleed the **right rear** brake bleeding the secondary circuit of the hydraulic assembly using the diagnostic equipment:
 - position the bleed receptacle and the hose, open the brake bleed screw,
 - pump the brake pedal (approximately ten presses),
 - start the bleed command on the diagnostic equipment,
 - pump the brake pedal during the diagnostic bleed phase,
 - at the end of the bleed cycle on the diagnostic equipment, continue to pump the brake pedal and close the brake bleed screw.
- b) Carry out the procedure described at **a)** for the **left rear**, **left front** and **right front** brakes.
- c) Check the pedal travel. If it is not satisfactory, repeat the bleed procedure.

IMPORTANT: ensure that there is enough brake fluid in the reservoir.

WHEEL SPEED SENSORS CHECK

- a) Carry out a ohmmeter check of the sensor connections (from the computer connector to the two-way wheel sensor connector).
- b) Carry out a visual check of the teeth (26 teeth) on the target wheel: if it is faulty, change it.
- c) Check the air gap using a set of feeler gauges, only the front can be checked.

Front: $0.1 < Z < 1.9 \text{ mm}$



CONSUMABLES

- Compressor oil:
SANDEN SP 10 : 135 cm³

- Refrigerant:
R134a : 710 ± 35 g

- Compressor:
SANDEN SD 6V12

IMPORTANT: when a pipe is changed, add **10 ml** of **SP 10** oil or if a pipe bursts (rapid leak) add **100 ml**.

TIGHTENING TORQUES (In daN.m)	
Pressure relief valve on evaporator bolt	0.6
Connecting pipes on pressure relief valve nut	0.8
Pressure relief valve connecting pipe on dehydration canister retaining bolt	0.8
Condenser connecting pipe on dehydration canister retaining bolt	1.2
Compressor connecting pipe on condenser retaining bolt	0.8
Connecting pipes on compressor retaining bolt	0.8
Compressor retaining bolt	2.1
Circuit pressure sensor	1.1
Compressor mounting bolt	3.2

REMOVAL

Drain the **R134a** refrigerant circuit. Place the vehicle on a lift.

Disconnect:

- the battery,
- the compressor operation command connector.

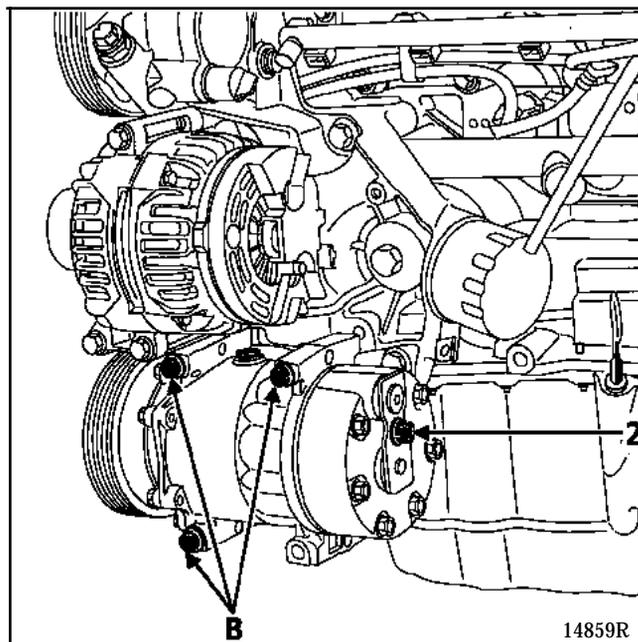
Remove:

- the front bumper,
- the radiator grille,
- the upper crossmember,
- the compressor drive belt
- the two connecting pipes, bolt (2),
- the compressor retaining bolts (B).

Remove the compressor from underneath the vehicle.

NOTE: it is essential to fit plugs on the connecting pipes and on the compressor to prevent the introduction of humidity into the circuit.

IMPORTANT: when changing the compressor, it is essential to top up the oil correctly.



REFITTING

If the compressor is changed, it is supplied filled with oil.

Position the compressor the right way up (filler plug at the top).

Tighten the retaining bolts (B) (tightening torque: **2.1 daN.m**).

Refit the connecting pipes on the compressor.

NOTE: check the condition of the seals and lubricate them with **P.A.G. SP 10** oil.

Fit the accessories drive belt (see section **07** "Accessories belt tensioning").

Reconnect the compressor operation command connector.

Create a vacuum, then fill the **R134a** refrigerant circuit using the filling equipment.

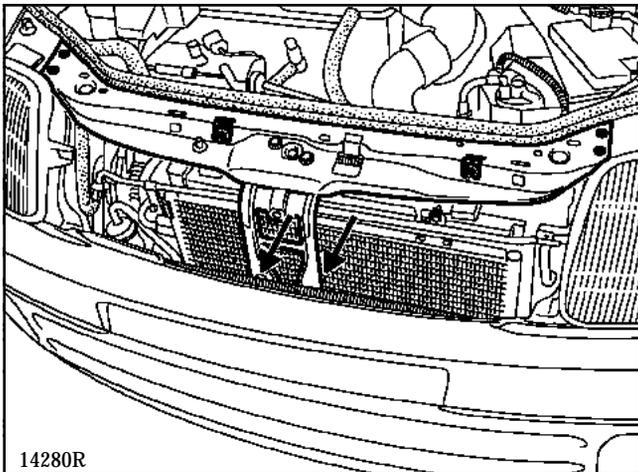
REMOVAL

Drain the **R134a** refrigerant circuit.

Place the vehicle on a two post lift.

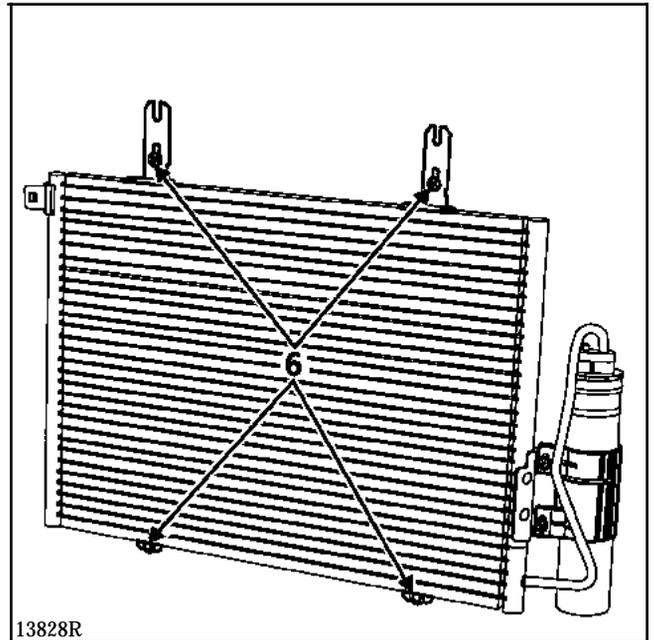
Remove:

- the front bumper,
- the radiator grille,
- the upper crossmember and fold it back on the engine,



- the two **R134a** refrigerant pipes. Fit sealing plugs to prevent the entry of humidity.
- the mounting bolts (6) securing the condenser on the cooling radiator.

Remove the condenser/dehydration canister assembly from underneath.



REFITTING

Refit in the reverse order to removal.

Check the condition of the seals.

Create a vacuum, then fill the **R134a** refrigerant circuit using the filling equipment.

IMPORTANT

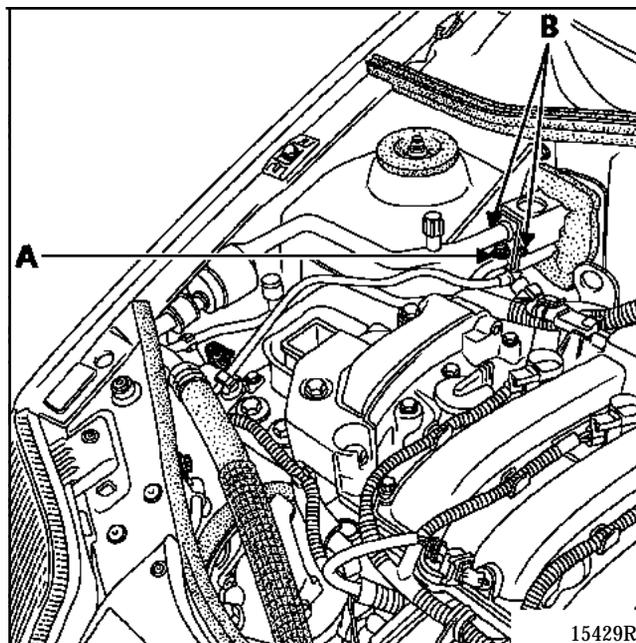
When changing the condenser, add **30 ml** of **P.A.G. SP 10** oil to the circuit.

REPLACEMENT

Drain the R134a refrigerant circuit using the filling equipment.

Remove:

- the connecting pipes retaining nut (A),
- the two retaining bolts (B) securing the pressure relief valve on the evaporator.



On refitting, ensure that the pipe seals are in good condition.

Bolt tightening torques:

- bolt (A) : **0.8 daN.m**,
- bolt (B) : **0.6 daN.m**.

Create a vacuum, then fill the R134a refrigerant circuit using the filling equipment.

REMOVAL

Place the vehicle on a lift.

Drain the R134a refrigerant circuit using the filling equipment.

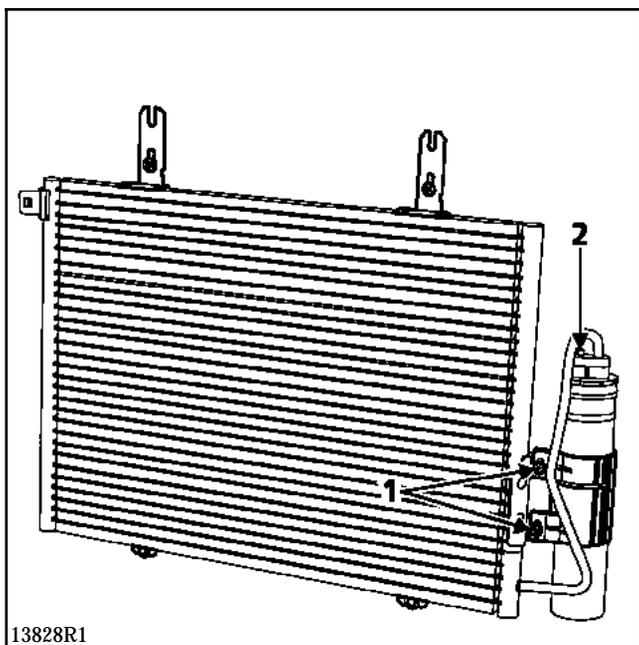
Remove:

- the bumper
- the grille,
- the two radiator upper mounting bolts,
- the R134a union (2),
- the two mounting bolts securing the pipes on the dehydration canister.

Move back the radiator/condenser assembly slightly.

From underneath the vehicle

Remove the two mounting bolts (1) securing the dehydration canister on the condenser.



Remove the dehydration canister.

Fit plugs on each opening to prevent any entry of humidity into the units.

REFITTING

Refit in the reverse order to removal.

Check that the seals are in good condition and lubricate them with **SP 10** oil

Create a vacuum, then fill the R134a refrigerant circuit using the filling equipment.

When changing the dehydration canister, add **15 ml** of **SP 10** oil to the circuit.

NOTE : tightening torque of bolts (2) : **1.2 daN.m**