



Technical Note 3286A

CB0M

Basic document: MR 337

Special features of vehicles fitted with F4R 730 engines

For parts that are not dealt with in this Technical Note, refer to MR 337

Cancels and replaces Technical Note 3243A

77 11 198 436

Edition 2 - NOVEMBER 2005

EDITION ANGLAISE

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

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

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Contents

	Page		Page
07	VALUES AND SETTINGS	13	FUEL SUPPLY
	Capacities - Grades		Antipercolation device
	Accessories belt tension		
	Procedure for tensioning the timing belt		
	Tightening the cylinder head		
	Underbody height		
	Tyres and wheels		
	Brakes		
	Brake limiter		
	Underbody height		
	Front axle geometry checking values		
	Rear axle geometry checking values		
10	ENGINE AND PERIPHERALS	14	ANTIPOLLUTION
	Identification		Petrol vapour rebreathing
	Oil pressure		
	Engine and transmission assembly		
	Sump		
	Accessories mounting		
11	TOP AND FRONT OF ENGINE	16	STARTING-CHARGING
	Timing belt		Alternator
	Cylinder head gasket		Starter
12	FUEL MIXTURE	17	IGNITION - INJECTION
	Technical specifications		Specifications
	Inlet manifold		Immobiliser function
	Injector holder shim		AC/injection programming
	Exhaust manifold		Idle speed correction
			Adaptive idle speed correction
			Richness regulation
			Adaptive richness correction
			Centralised coolant temperature management
			Camshaft dephaser
			Computer
			Wiring diagram
			Fault finding - Conformity check

Contents

	Page		Page
19 COOLING SYSTEM		36 STEERING ASSEMBLY	
Diagram	19-1	Power assisted steering rack	36-1
Filling - bleeding	19-2	Hydraulic power-assisted steering pump	36-5
Radiator	19-3		
Coolant pump	19-4		
 ENGINE MOUNTING		38 STEERING ASSEMBLY	
Suspended engine mounting	19-6	BOSCH anti-lock braking system	38-1
 20 CLUTCH		62 AIR CONDITIONING	
Mechanism - Plate	20-1	General information	62-1
Flywheel	20-4	Compressor	62-2
		Condenser	62-3
		Expansion valve	62-4
		Dehydrator reservoir	62-5
 21 MANUAL GEARBOX			
Identification	21-1		
Ratios	21-2		
Capacity - Lubricants	21-3		
Consumables	21-4		
Parts to be systematically replaced	21-4		
Special notes	21-5		
 33 REAR AXLE COMPONENTS			
Brake pads (disc)	33-1		
Brake calliper	33-3		
Brake disc - Hub	33-6		
Disc - hub bearing	33-7		
Brake calliper mounting stub-axle	33-8		

VALUES AND SETTINGS

Capacities - Grades

07

Components	Capacity in litres	Grade	Special notes
JC5 gearbox	3.1	All countries: TRANSELF TRX 75 W 80 W (API GL5 or MIL-L 2105 G or D standard)	
Cooling circuit F4R	7	Glacool RX (type D)	Protection to - 20 °C ± 2 °C for hot, temperate and cold climates. Protection to - 37 °C ± 2 °C for very cold climates.

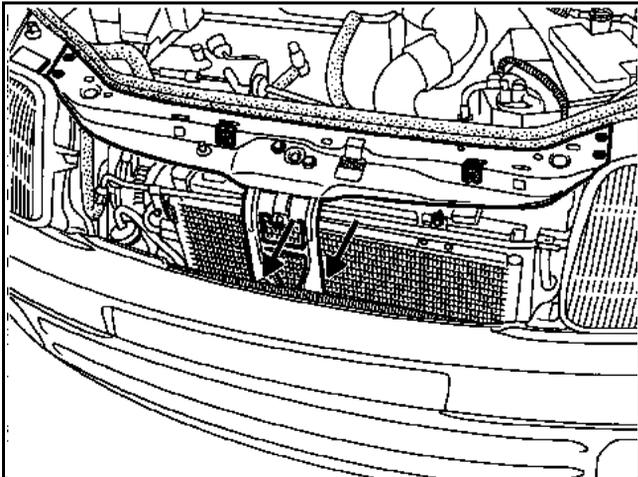
VALUES AND SETTINGS

Accessories belt tensioning

07

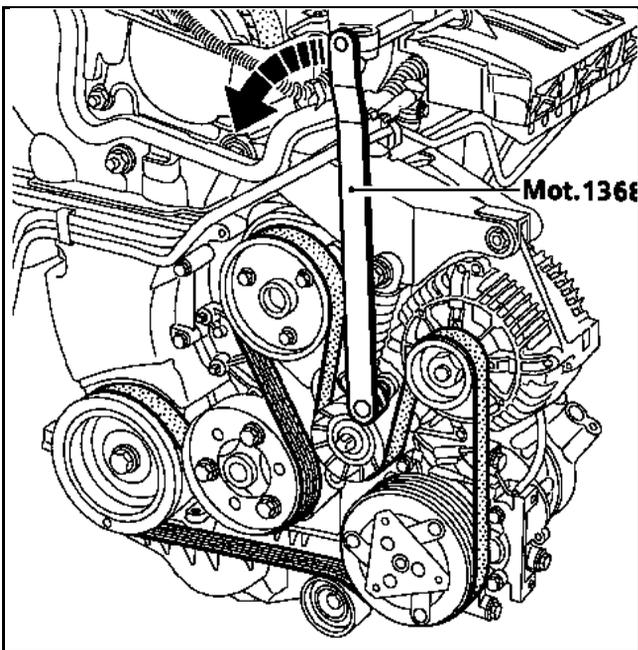
Removing the accessories belt requires the removal of:

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



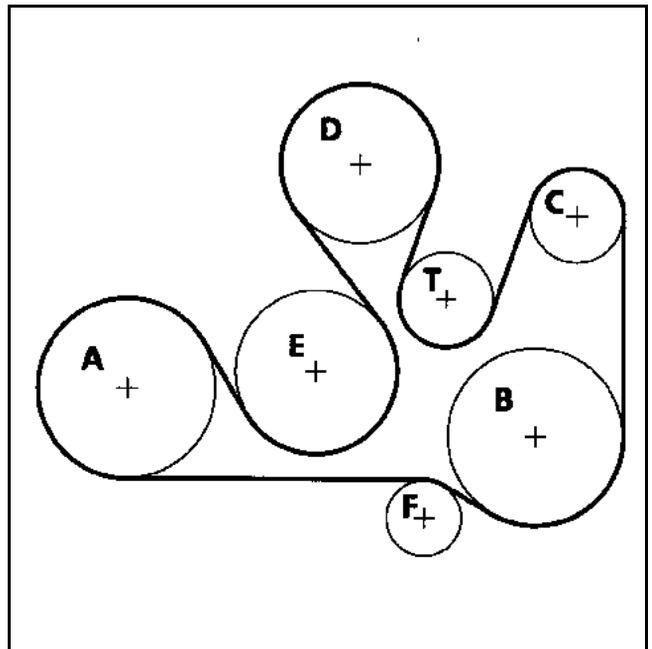
To remove the belt, pivot the accessories belt tensioner using **Mot. 1368** and a ratchet adapter, in the direction indicated below.

NOTE: Be careful of tool movement caused by the tensioning roller rotation.



ALTERNATOR, POWER ASSISTED STEERING AND AIR CONDITIONING

- A Crankshaft
- B Air conditioning compressor
- C Alternator
- D Power-assisted steering pump
- E Coolant pump
- F Fixed roller
- T Automatic tensioning roller



VALUES AND SETTINGS

Procedure for tensioning the timing belt

07

SPECIAL TOOLING REQUIRED	
Mot. 799-01	Timing gear wheel immobiliser
Mot. 1054	TDC setting pin
Mot. 1496	Tool for setting camshaft
Mot. 1509	Tool for locking the camshaft pulleys
Mot. 1509-01	Addition to Mot. 1509
Mot. 1512	Tool for fitting exhaust camshaft seal
Mot. 1517	Tool for fitting inlet camshaft seals
EQUIPMENT REQUIRED	
Angular torque wrench	

There are two distinct procedures for adjusting the timing.

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

1st PROCEDURE

The first procedure is used for replacing all components which require the exhaust camshaft pulley and the inlet camshaft dephaser to be loosened.

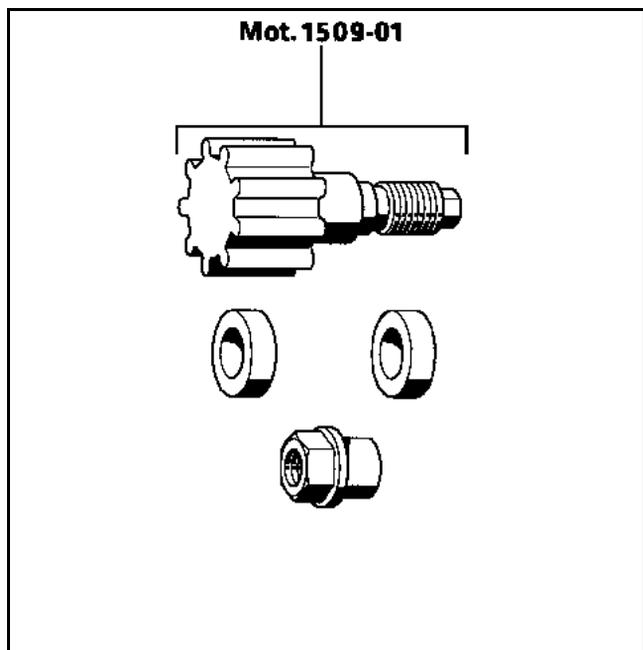
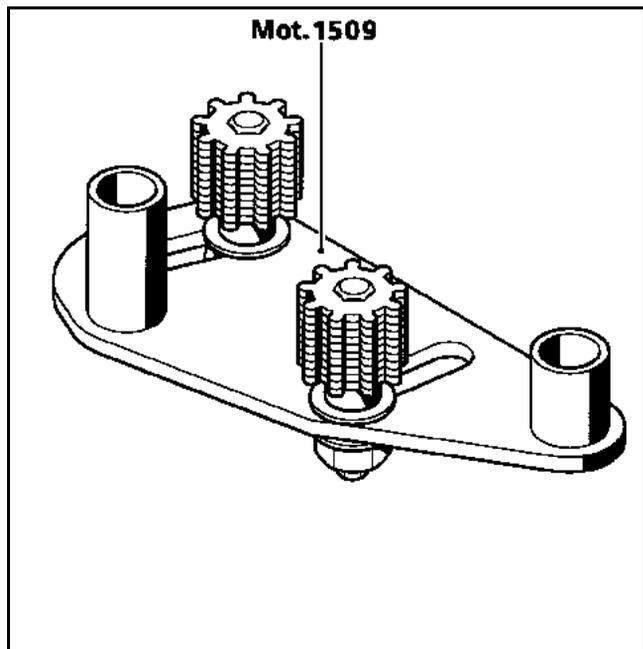
The following components must be replaced in this operation:

- the nut of the exhaust camshaft pulley,
- the bolt of the inlet camshaft dephaser,
- the camshaft seals,
- the seal of the dephaser blanking plate.

Procedure for tensioning the timing belt

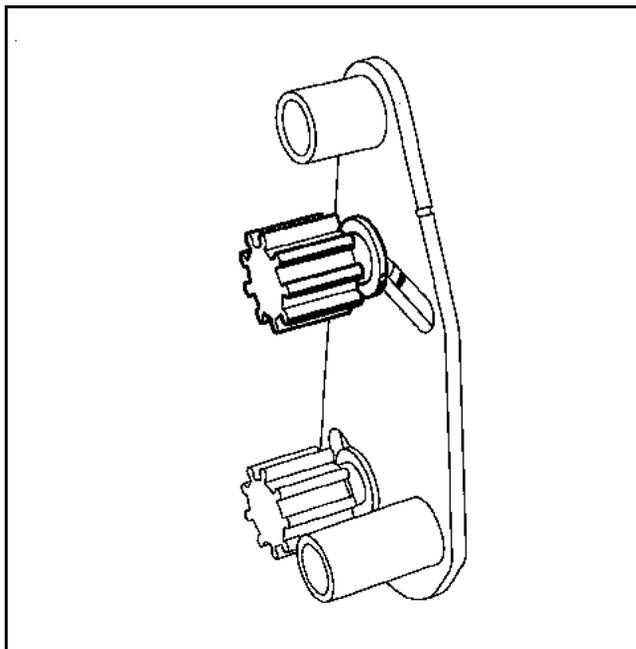
Method for undoing the exhaust camshaft pulley and the inlet camshaft dephaser.

The operation is performed using tools Mot. 1509 and Mot. 1509-01.

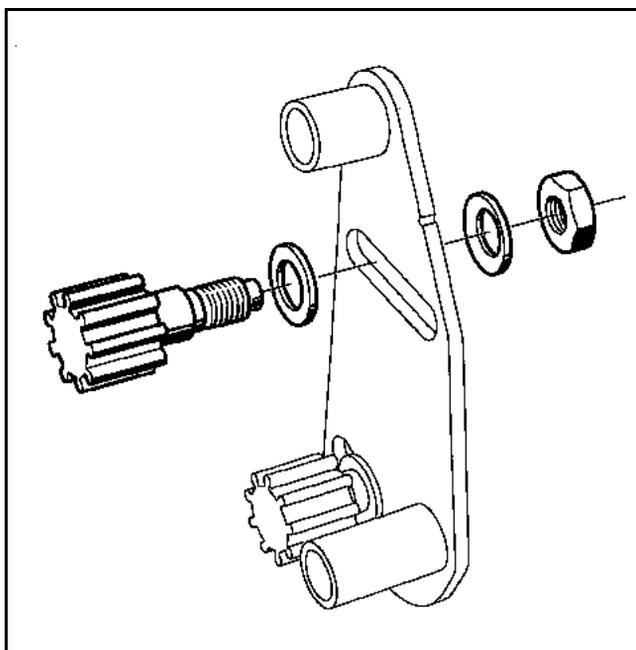


Preparation of tool Mot. 1509

Remove the upper toothed pinion from the bracket.



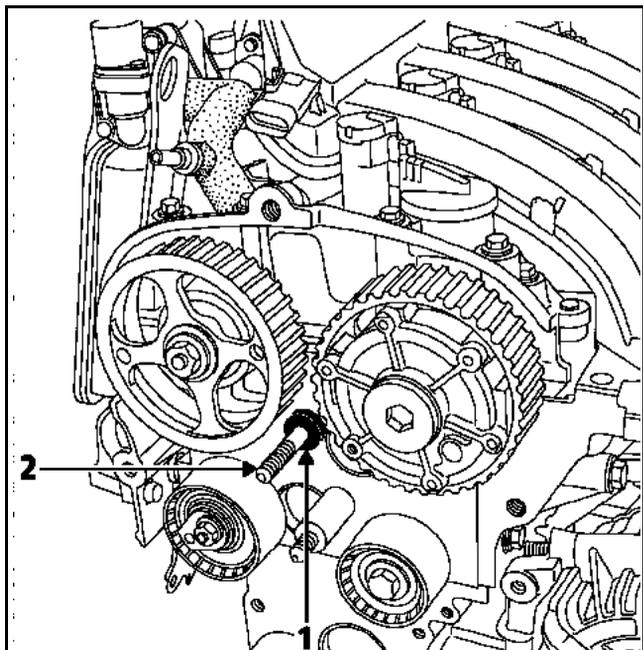
Replace it with the toothed pinion of Mot. 1509-01 (reusing the two washers and the nut from Mot. 1509).



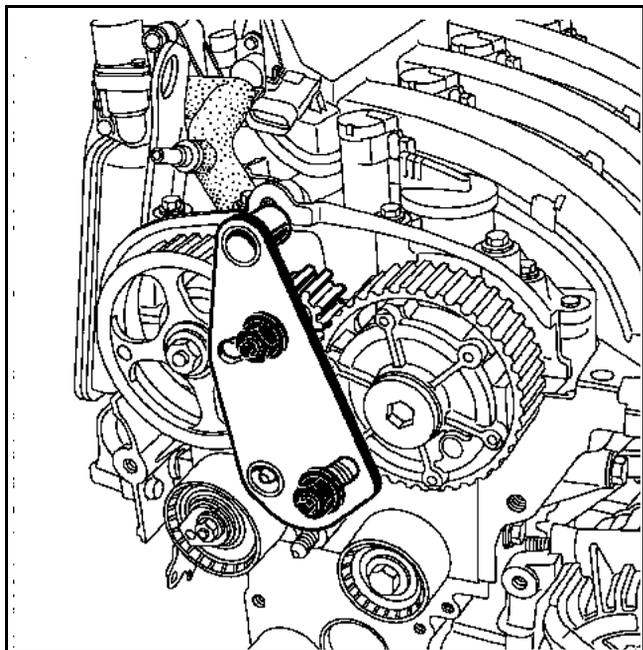
Procedure for tensioning the timing belt

Fit:

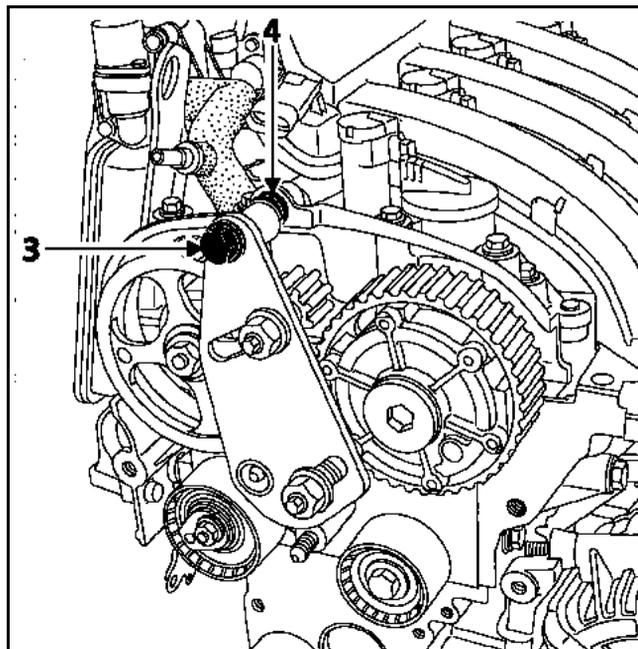
- the spacer (1) of **Mot. 1509-01** on the stud (2),



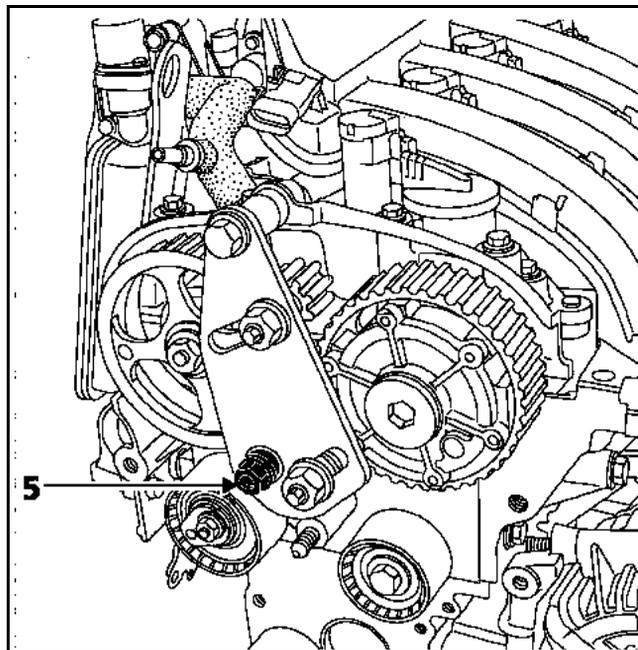
- the **Mot. 1509** as shown in the diagram below,



- the upper bolt (3) whilst positioning the spacer (4) of **Mot. 1509-01** between the tool and the camshaft bearing cap housing (**do not lock the bolt**).



- the collar nut (5) of **Mot. 1509-01**.

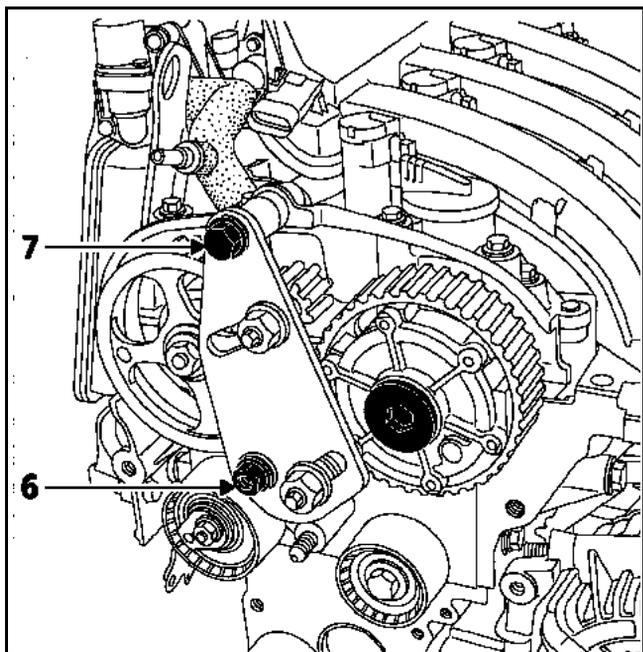


Procedure for tensioning the timing belt

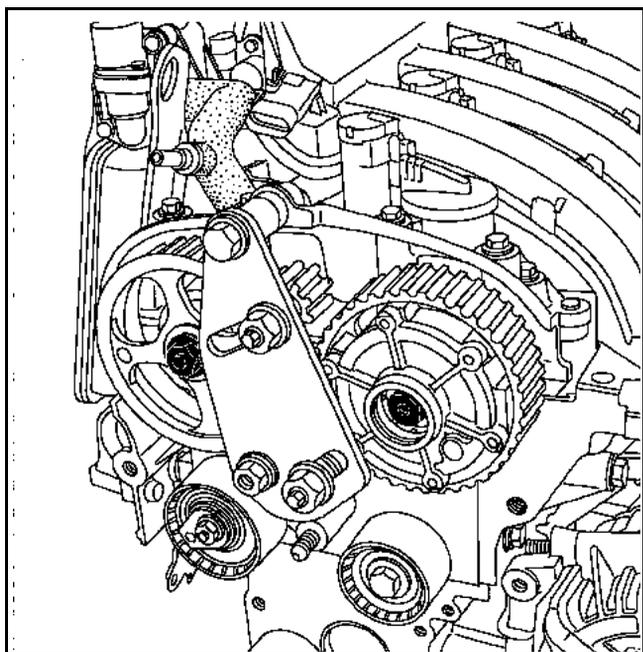
Tighten the collar nut (6) and the bolt (7), then immobilise the pulleys with the toothed pinions of **Mot. 1509**.

Remove

- the blanking cover of the inlet camshaft dephaser using a **14 mm** Allen key,

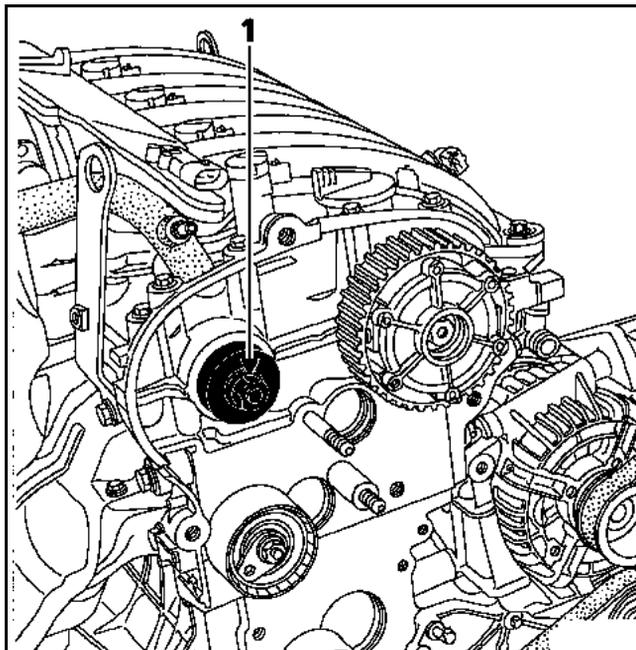


- the nut of the exhaust camshaft pulley,
- the bolt of the inlet camshaft offset timer.

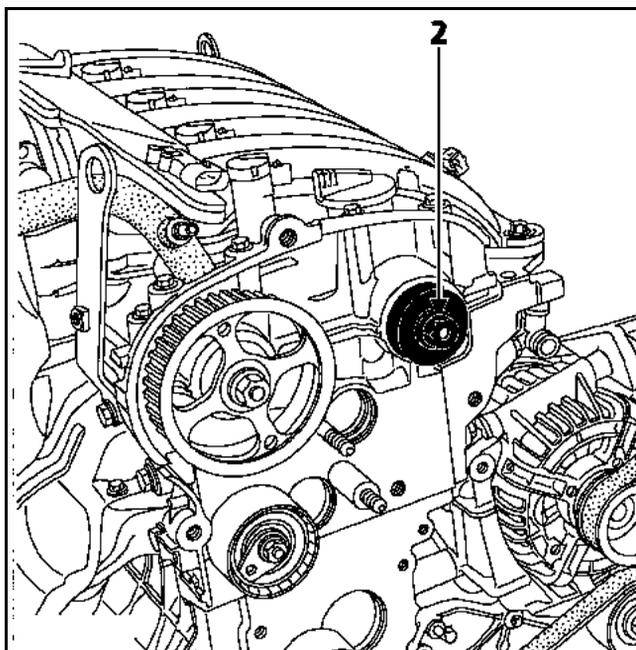


Replacing the camshaft seals

Fit the **exhaust camshaft seal** with **Mot. 1512**, using the old nut (1).



Fit the seal of the **inlet camshaft dephaser** with **Mot. 1517**, using the old bolt (2).



NOTE: to use **Mot. 1517**, it is necessary to modify the hole to a diameter of **13 mm**.

VALUES AND SETTINGS

Procedure for tensioning the timing belt

07

Adjusting the timing

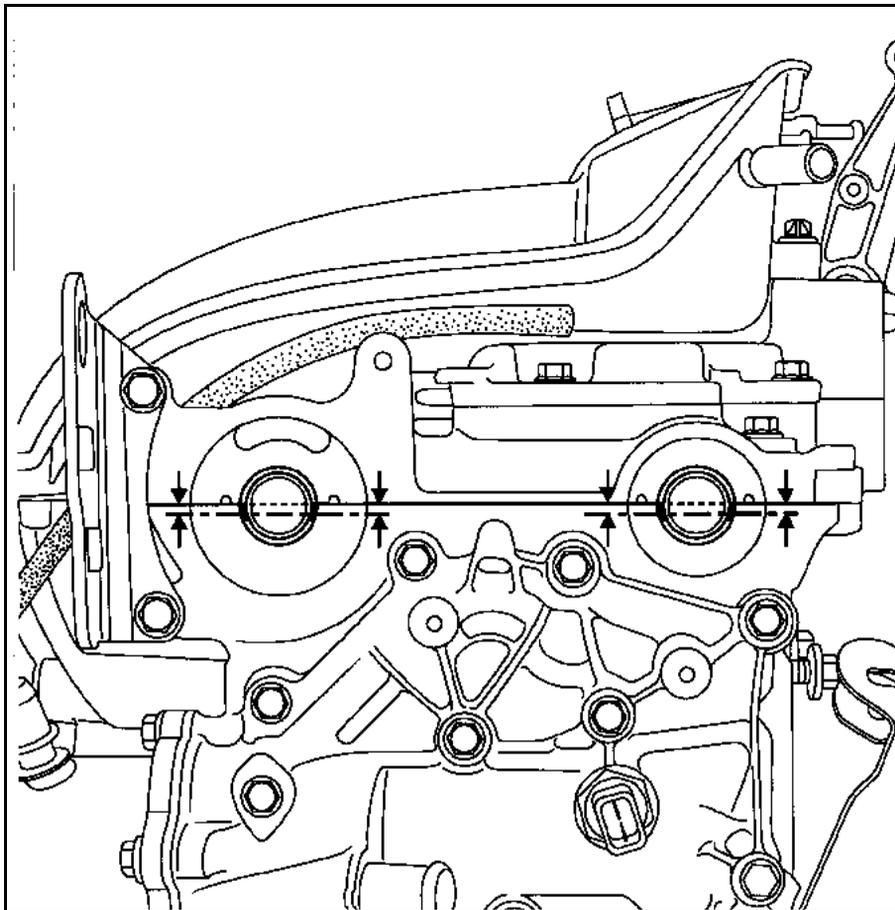
IMPORTANT:

It is essential to degrease the end of the crankshaft (timing end), the bore and the bearing faces of the timing sprocket, the bearing faces of the accessories pulley and the ends of the camshafts (timing side), the bores and the bearing faces of the exhaust camshaft pulleys and inlet camshaft dephaser, to prevent any slip between the timing system, the crankshaft, the exhaust camshaft pulleys and the inlet dephaser, which may damage the engine.

NOTE:

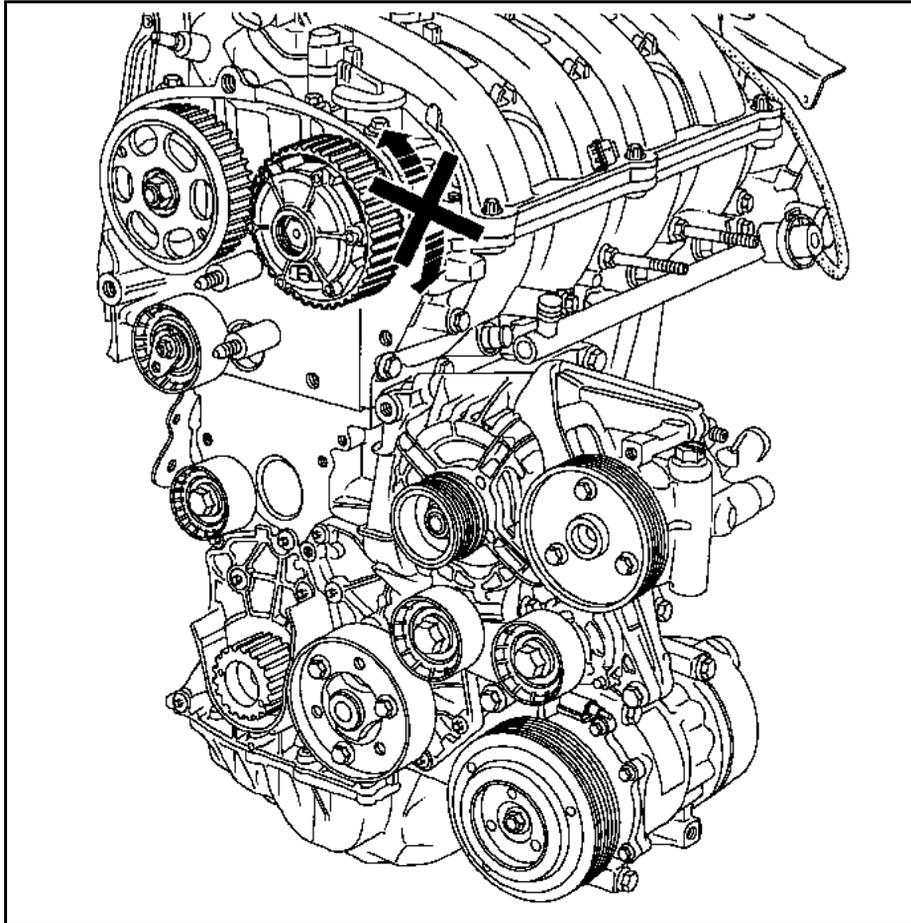
to make it easier to position the grooves horizontally, position the camshaft pulley and dephaser, then tighten the **old nut of the pulley and the old bolt of the dephaser to a torque of 1.5 daNm MAXIMUM**. Check that the **pistons are positioned at mid-stroke (to prevent any contact between the valves and the pistons)**.

Position the grooves of the camshafts as **shown in the diagram below (rotating the camshafts using Mot. 799-01 if necessary)**.



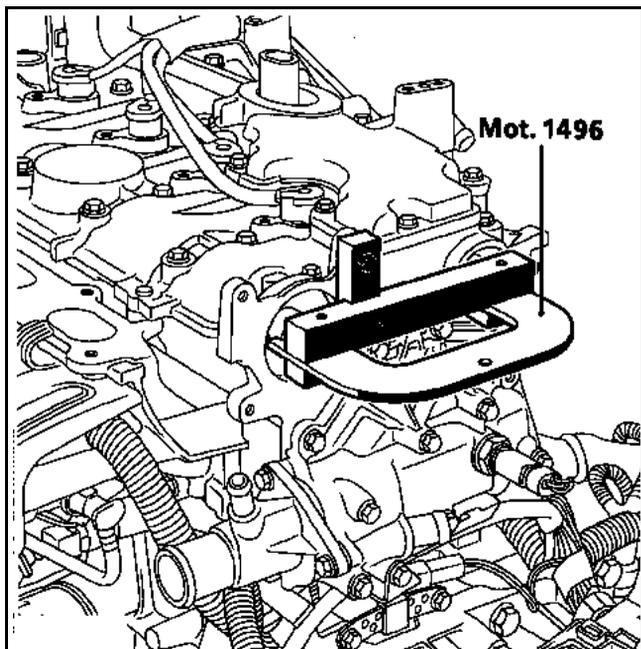
Procedure for tensioning the timing belt

Check that the ring of the camshaft dephaser is correctly locked (no rotation of the ring to the left or to the right).

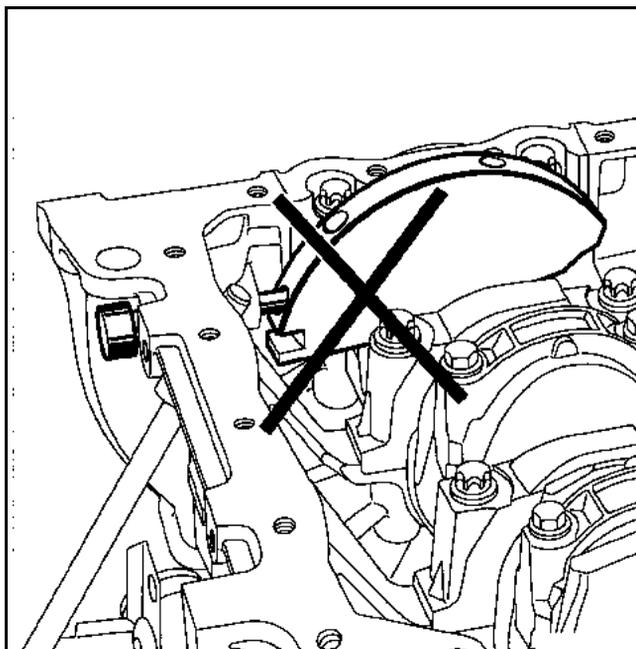


Procedure for tensioning the timing belt

Fit tool **Mot. 1496** onto the end of the camshafts.

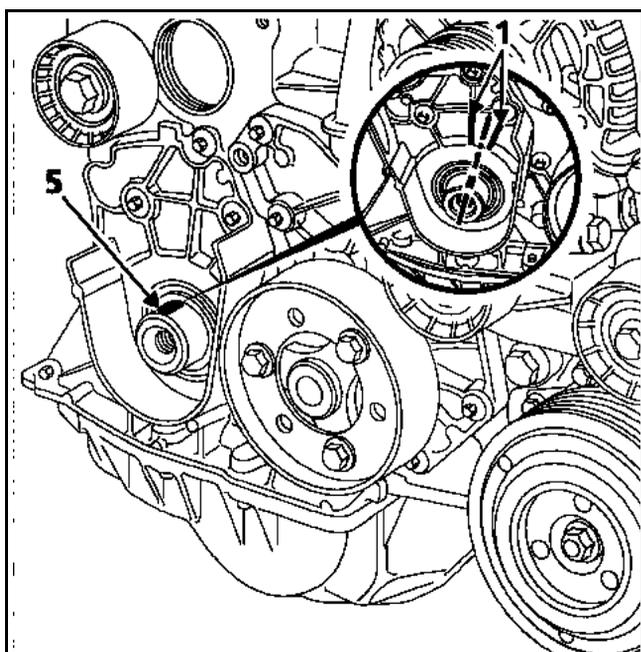


Incorrect position

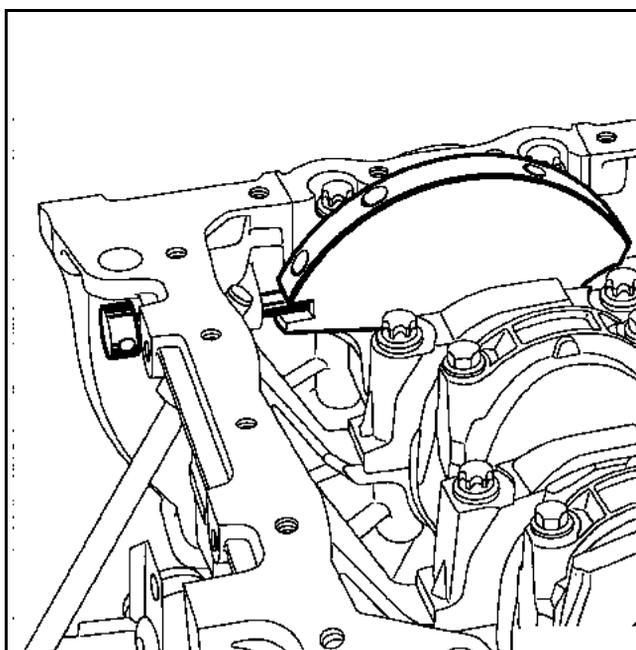


Remove the old nut from the pulley, the old bolt from the dephaser and replace them with a new nut and bolt (without locking the nut and bolt, leaving a clearance of 0.5 - 1 mm between the nut or the pulley bolt).

Ensure that the crankshaft is correctly pinned at Top Dead Centre and not in the balancing hole groove (5) of the crankshaft must be positioned in the middle of the two ribs (1) of the crankshaft closure panel).



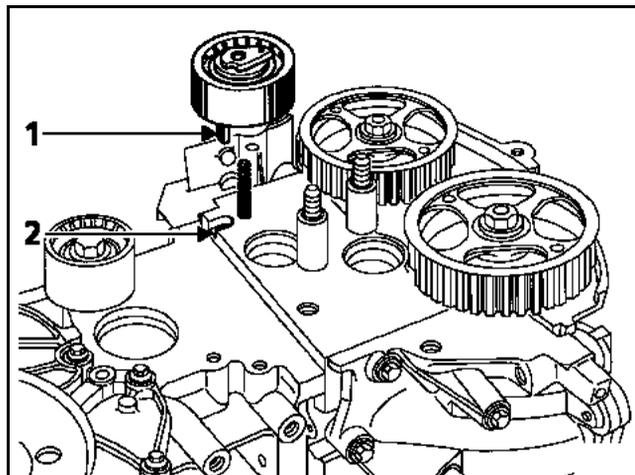
Pinned crankshaft



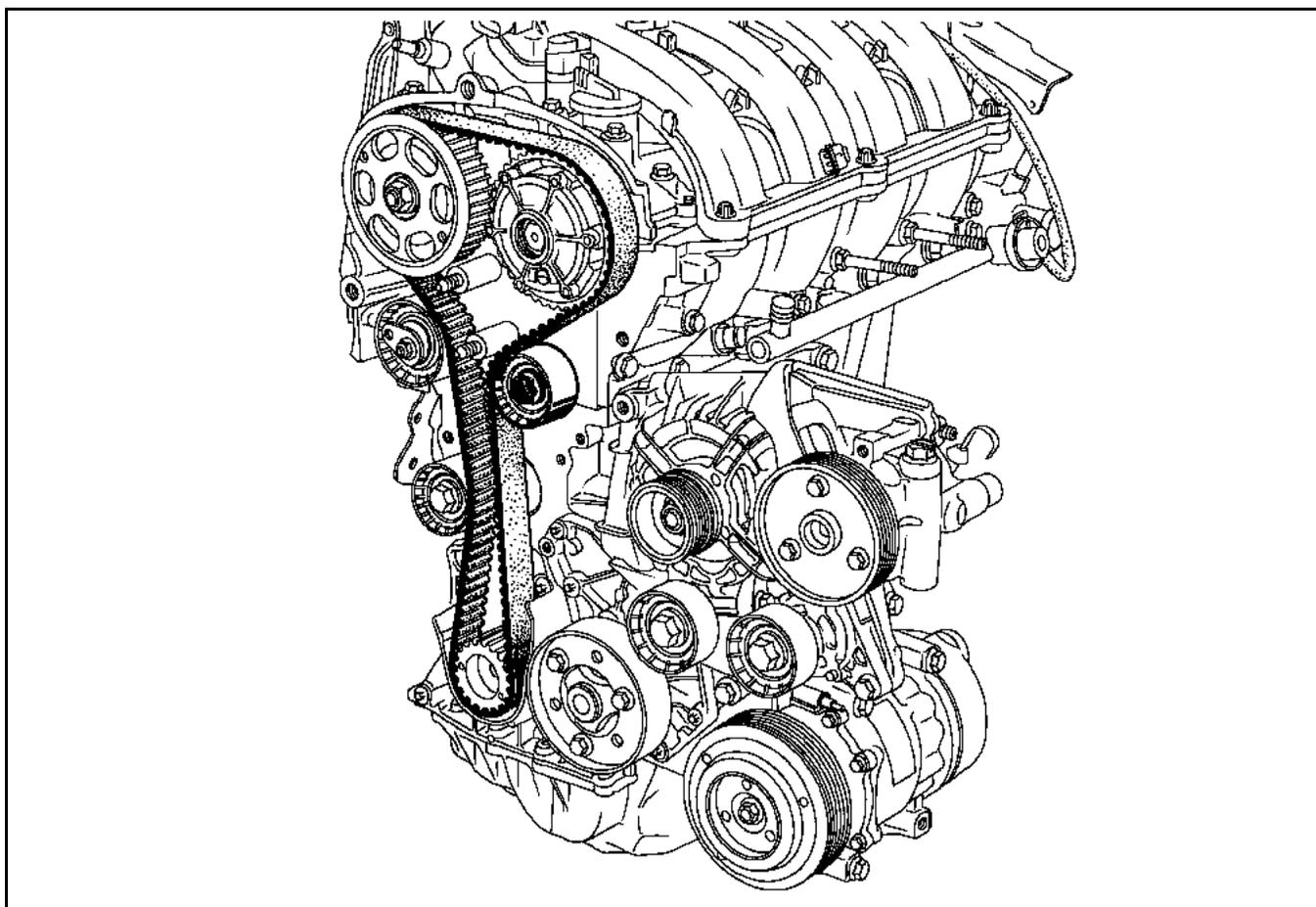
Procedure for tensioning the timing belt

The tensioning roller and fixed roller must be replaced when the timing belt is replaced.

Ensure that lug (1) of the tension wheel is correctly positioned in the groove (2).



Refit:
– the timing belt,



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

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

NOTE:

– the crankshaft accessories pulley bolt can be reused if the length under the head does not exceed **49.1 mm**; otherwise, replace it,
– do not oil the new bolt. However, the bolt must be oiled on the threads and under the head if it is being reused.

VALUES AND SETTINGS

Procedure for tensioning the timing belt

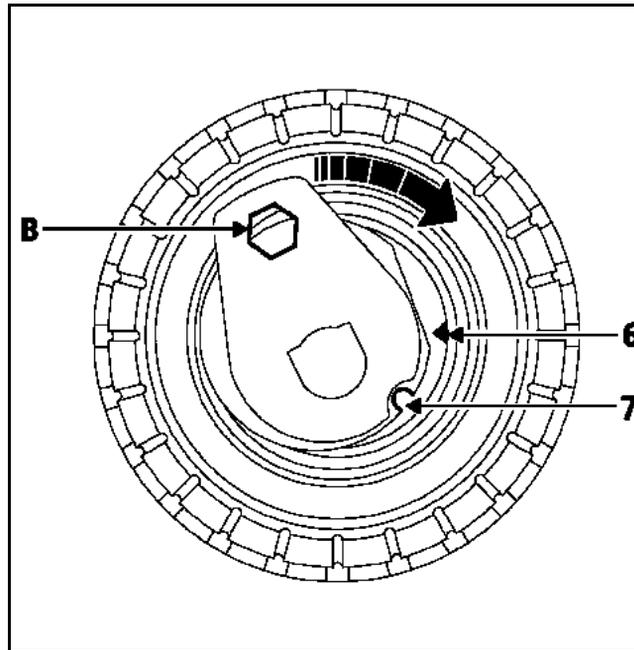
07

Belt tension

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

NOTE: do not rotate the tensioning roller in an anti-clockwise direction.

Align the marks (6) and (7) of the tensioning roller using a 6 mm Allen key at (B).



Pre-tighten the tension wheel nut to a torque of **0.7 daNm**.

NOTE: check that the nut and the bolt of the camshaft pulleys are not touching their respective pulleys. In addition, from time to time, push the camshaft pulleys against the camshafts.

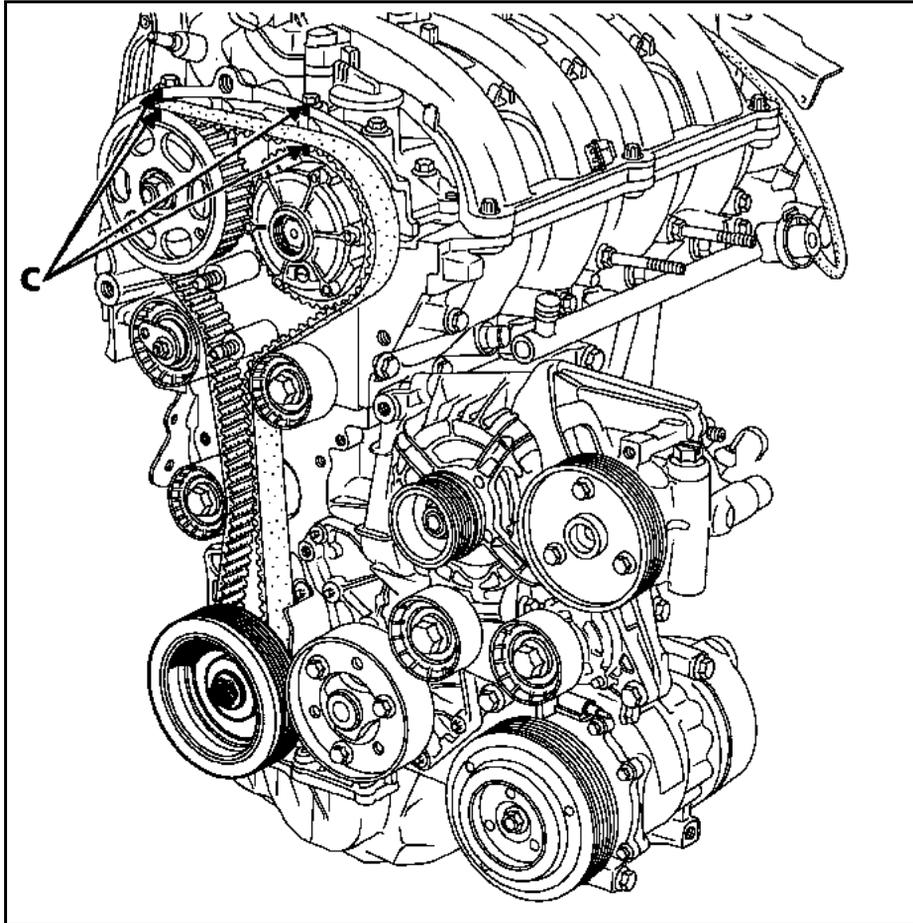
Rotate the timing system through **six revolutions** clockwise (timing end) with the **exhaust camshaft pulley** using **Mot. 799-01**.

Align the references (6) and (7) if necessary, slackening the nut of the tensioning roller by a maximum of one turn whilst holding it with a **6 mm** Allen key. Then tighten the nut finally to a torque of **2.8 daNm**.

Tighten the bolt of the accessories crankshaft pulley to a torque of **2 daNm (TDC setting pin still positioned in the crankshaft)**.

Procedure for tensioning the timing belt

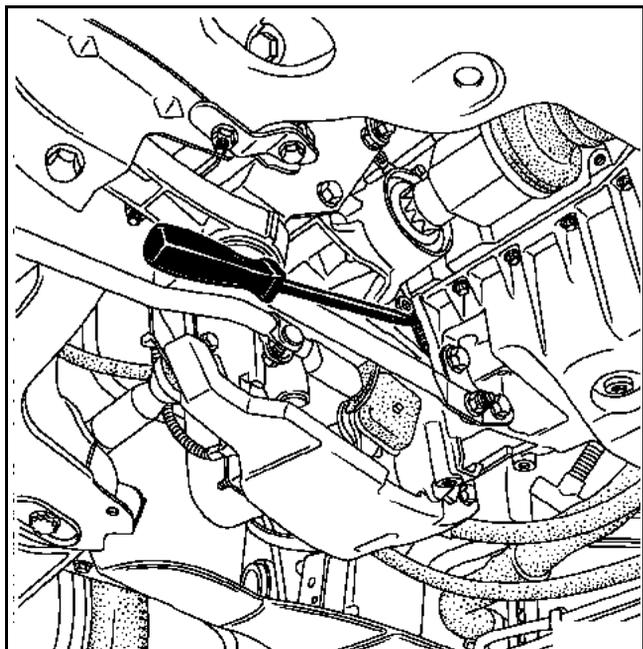
Use a pencil to mark a reference (C) between the camshaft pulleys and the camshaft bearing cap housing.



REMOVE THE TOP DEAD CENTRE PIN.

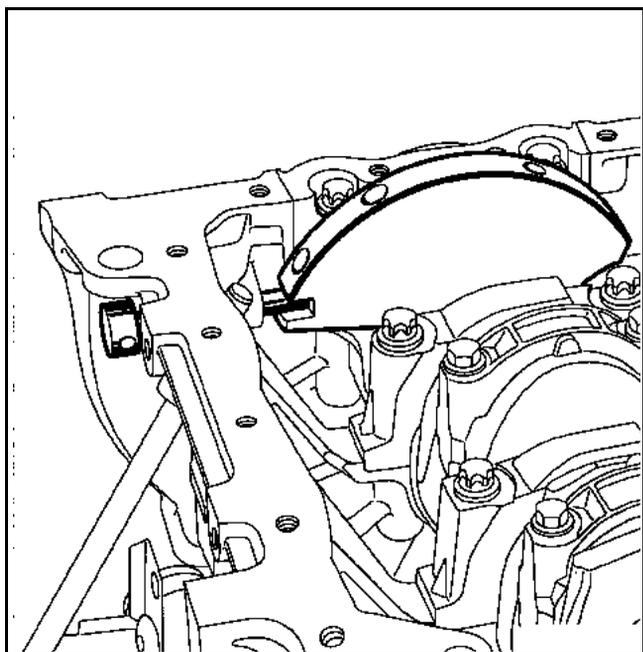
Procedure for tensioning the timing belt

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

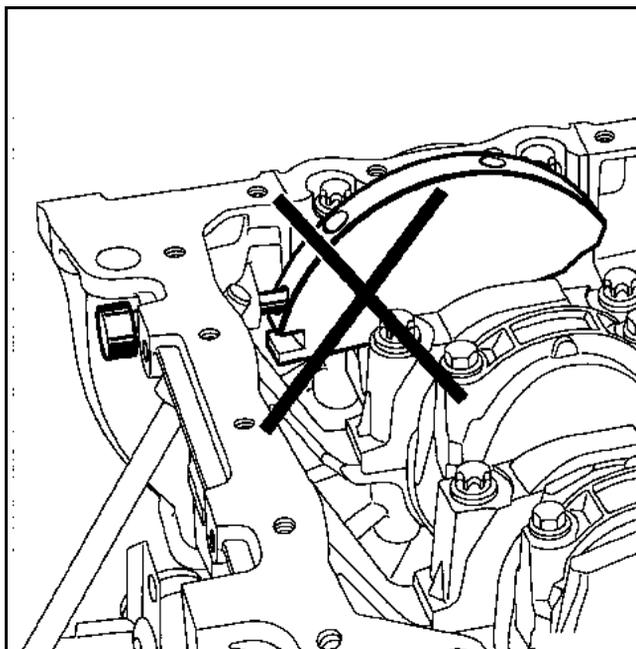


Pin the crankshaft using the marks made by the operator between the camshaft pulleys and the camshaft bearing cap housing. These references must be aligned, which will ensure that the pin is in the pinning hole and not in the crankshaft balancing hole.

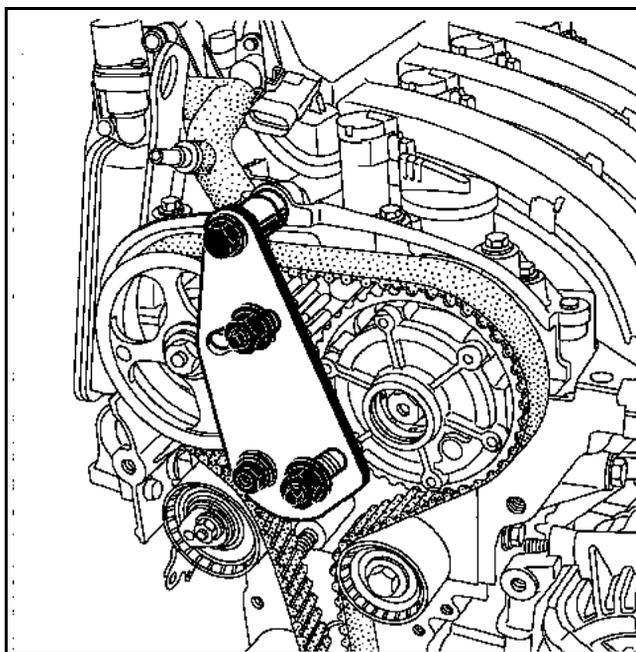
Correct position



Incorrect position



Fit the camshaft pulley locking tool **Mot. 1509** fitted with the additional tool **Mot. 1509-01**.



Procedure for tensioning the timing belt

Tighten the new bolt of the **inlet** camshaft dephaser to a torque of **10 daNm**.

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

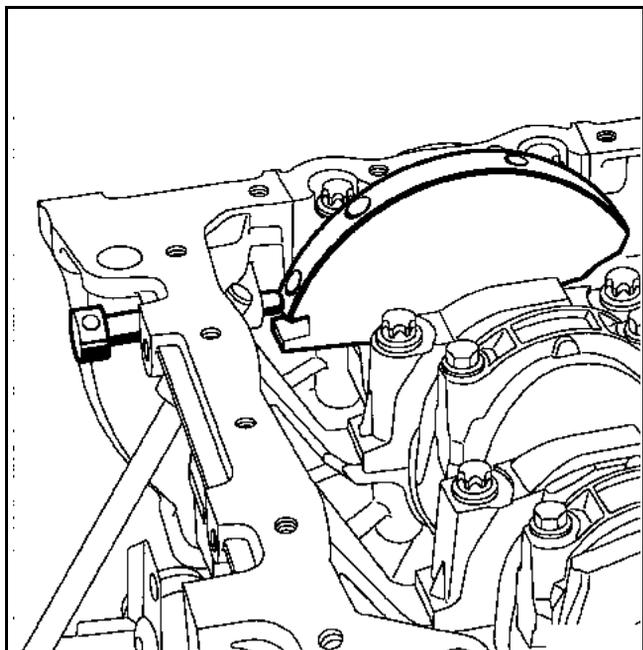
Remove **Mot. 1496** for setting the camshafts, **Mot. 1509** for locking the camshaft pulleys and **Mot. 1054**, the TDC setting pin.

Checking the timing and the tension

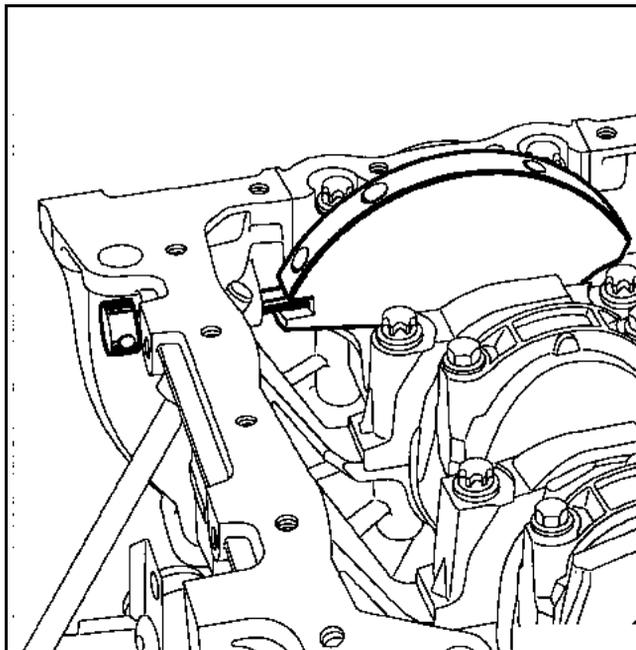
Checking the tension:

Rotate the crankshaft twice in a clockwise direction (timing end) and before the end of the second turn (**in other words, before the marks made previously are aligned**), insert the crankshaft TDC setting pin (so as to be between the balancing hole and the gauging hole) then move the timing to its setting point.

Before pinning



Pinned crankshaft



Remove the TDC setting rod.

Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure. Slacken the tension wheel nut by a maximum of one turn, holding it with a **6 mm** Allen key.

Align the tensioning roller marks and tighten the nut finally to a torque of **2.8 daNm**.

VALUES AND SETTINGS

Procedure for tensioning the timing belt

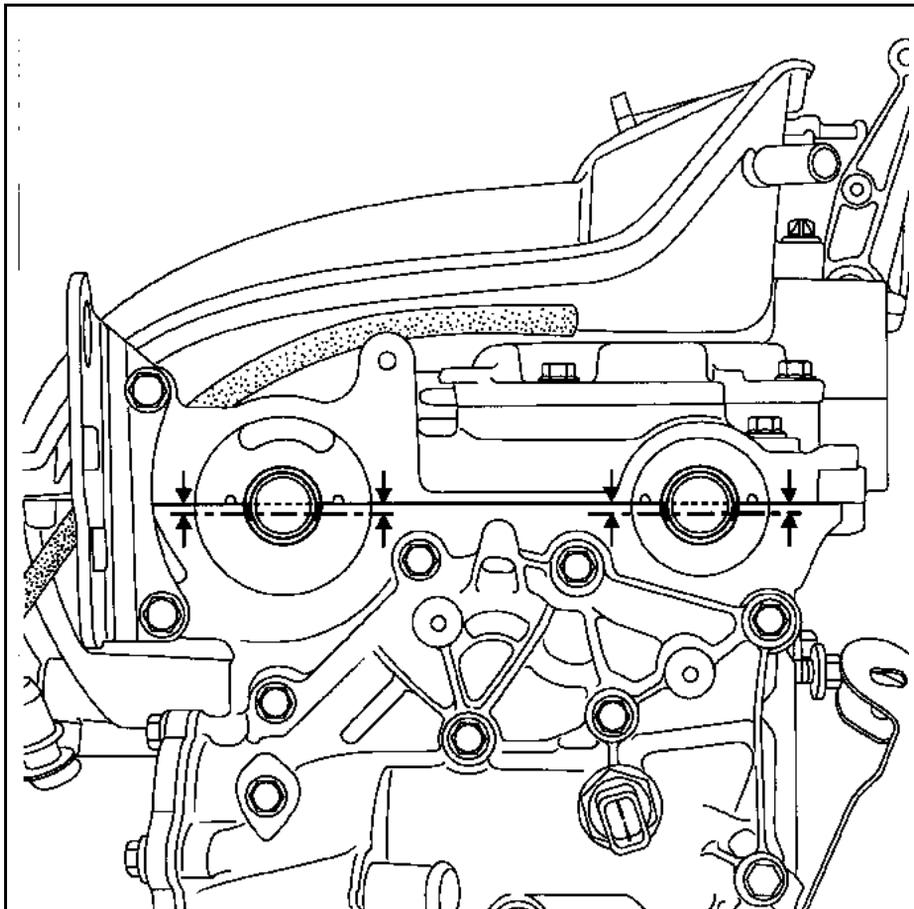
07

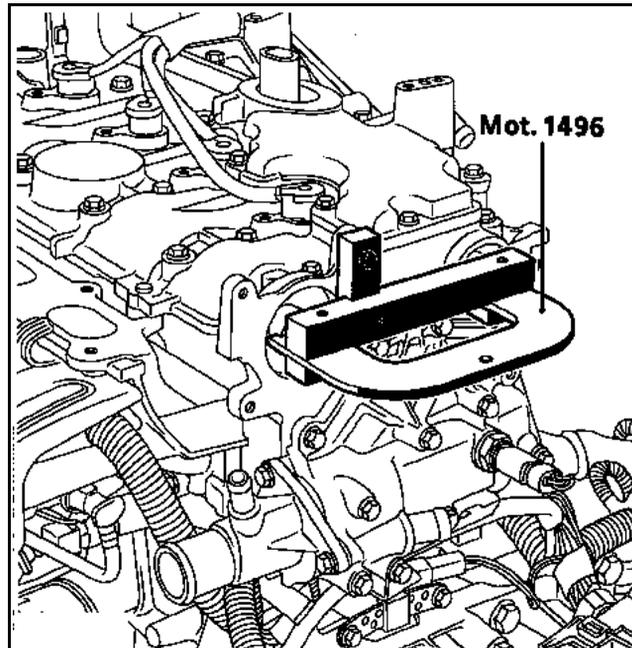
Checking the timing

Ensure that the tension wheel marks are in the correct position before checking the timing.

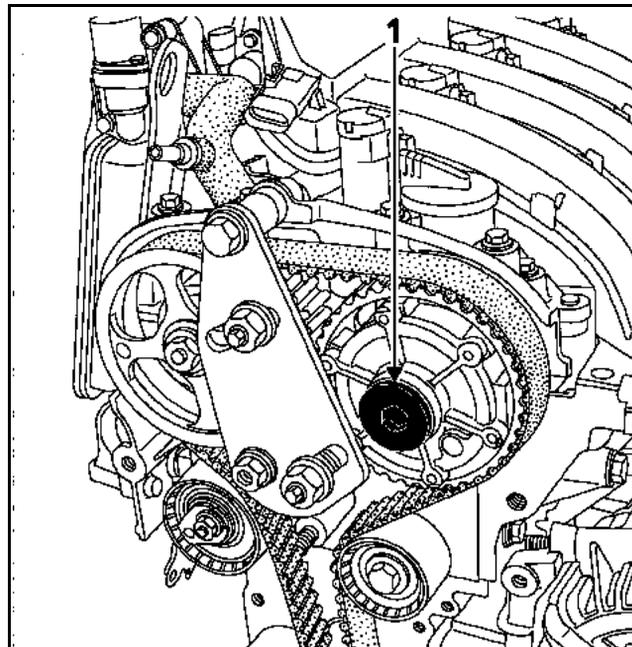
Fit the TDC setting pin (check that the marks made by the operator on the camshaft pulleys are aligned).

Fit (without forcing) tool **Mot. 1496** for setting the camshafts (the camshaft grooves must be horizontal and offset towards the bottom). The timing setting and tensioning procedure must be repeated if the tool does not engage.





Refit the blanking cover (1) (fitted with a new seal) of the dephaser, tightening it to a torque of **2.5 daNm**.



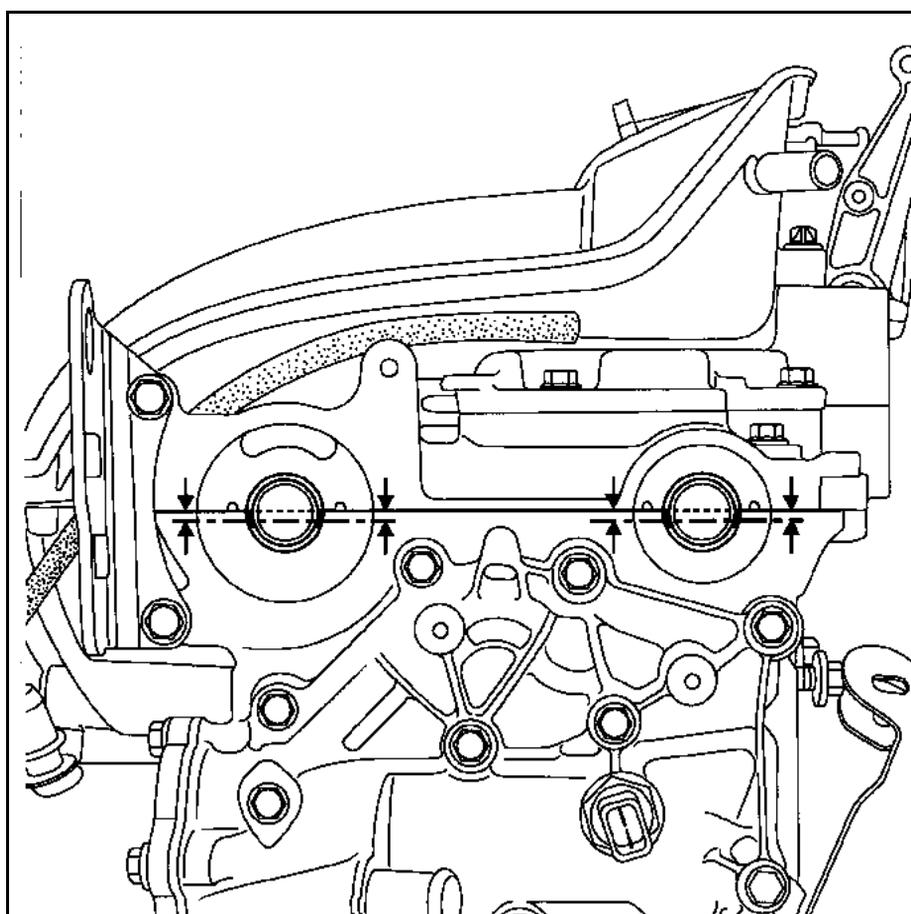
Procedure for tensioning the timing belt

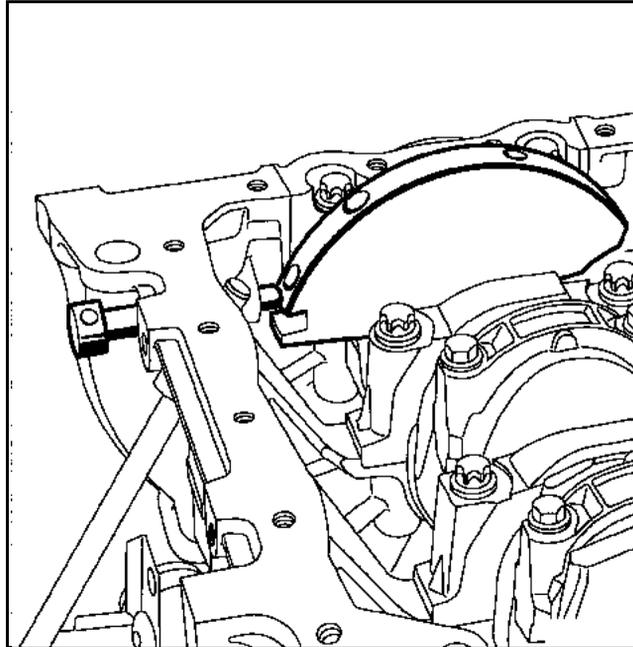
2nd PROCEDURE

The second procedure is used for replacing all components located on the front of the timing system which do not require the exhaust camshaft pulley and the inlet camshaft dephaser to be loosened.

Timing adjustment

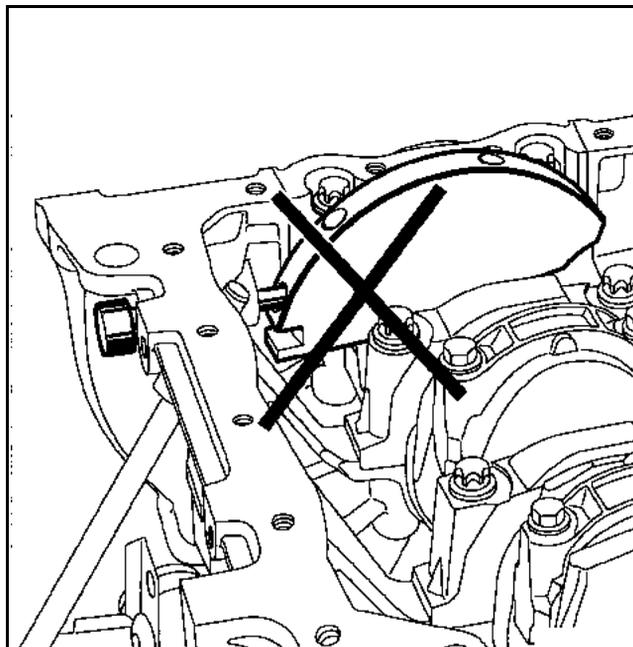
IMPORTANT: it is essential to degrease the end of the crankshaft, the bore of the crankshaft sprocket and the bearing faces of the crankshaft pulley to prevent any slip between the timing system and the crankshaft which would risk destroying the engine. Position the camshaft grooves towards the bottom and almost horizontally as shown in the drawing below, then insert TDC setting pin Mot. 1054, so that it is between the balancing hole and the crankshaft timing groove.





NOTE: this prevents the crankshaft from being pinned in a balancing hole.

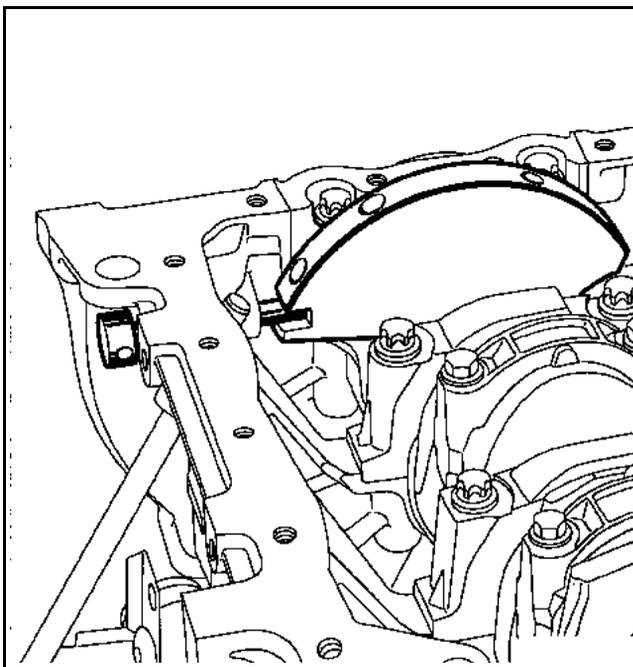
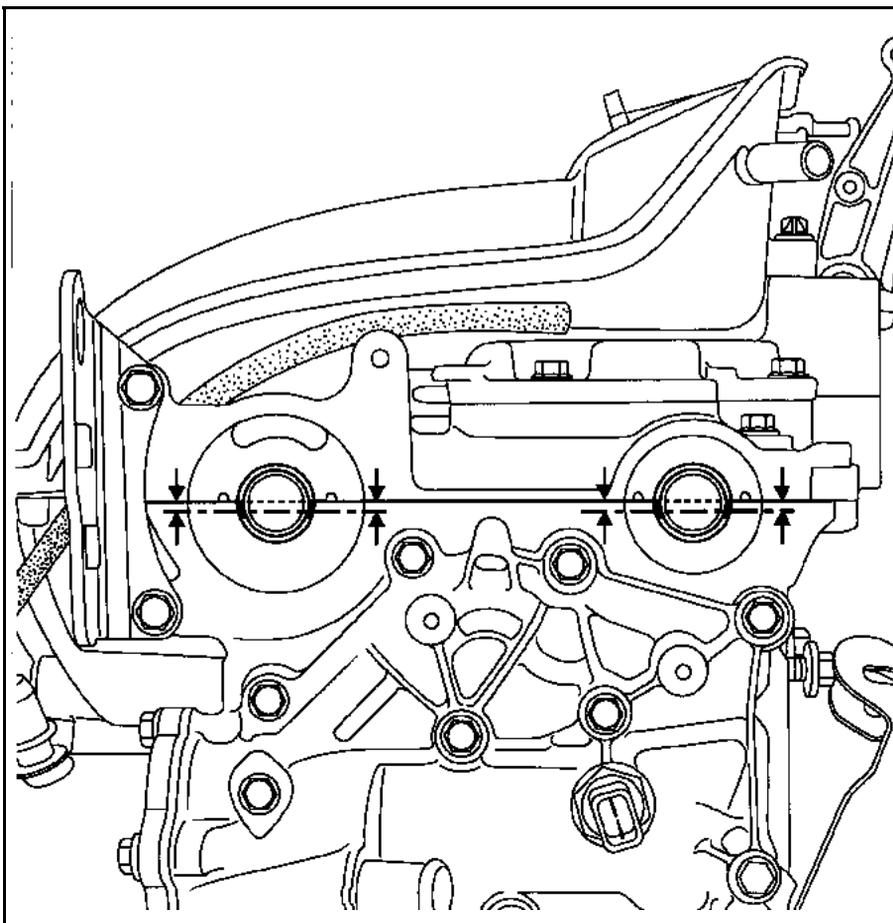
Incorrect position



Procedure for tensioning the timing belt

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

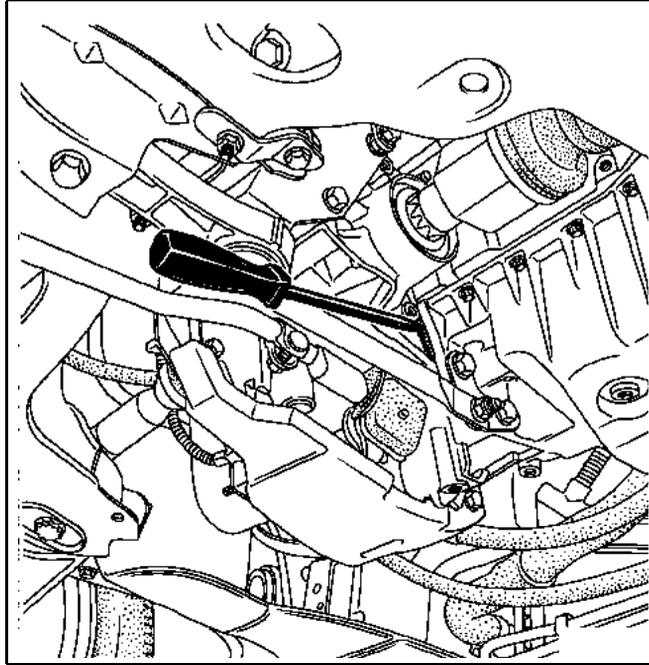
The camshaft grooves must be horizontal and offset towards the bottom as shown in the following illustration.



Procedure for tensioning the timing belt

Remove the TDC setting pin

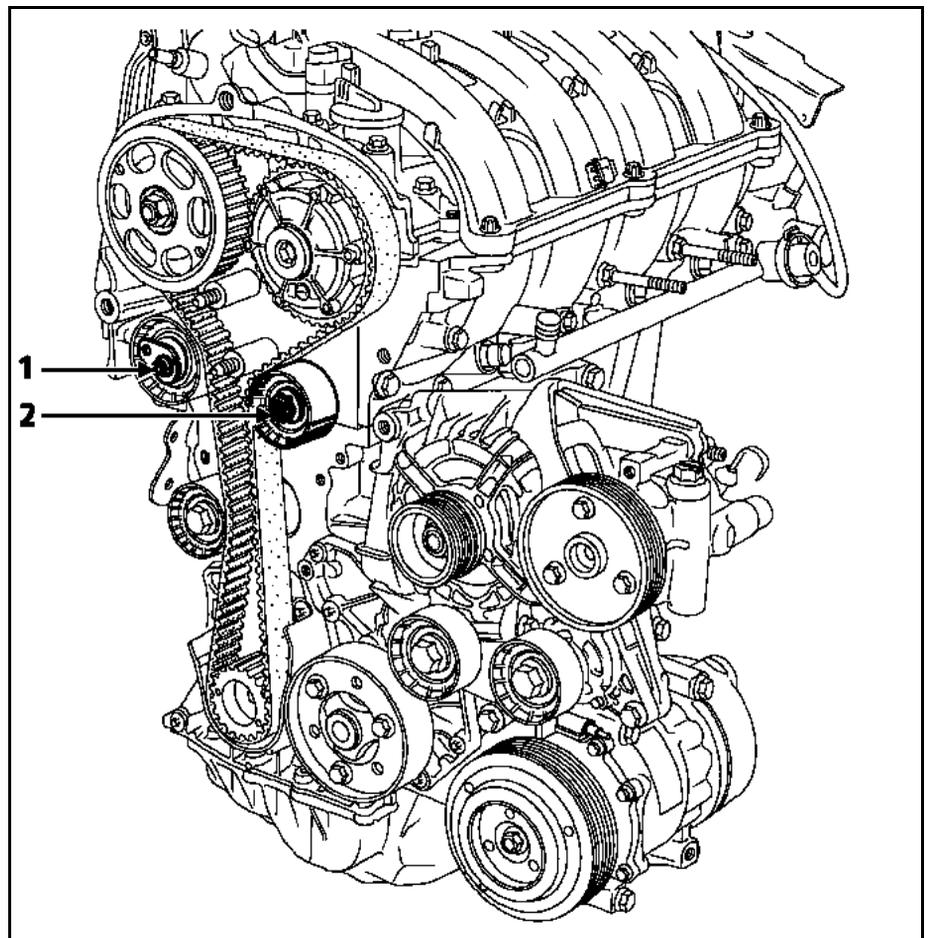
Lock the flywheel using **Mot. 582-01** or a large screwdriver.



Remove the crankshaft accessories pulley.

Slacken the timing tensioning roller by undoing the nut (1).

Remove the fixed roller (2).

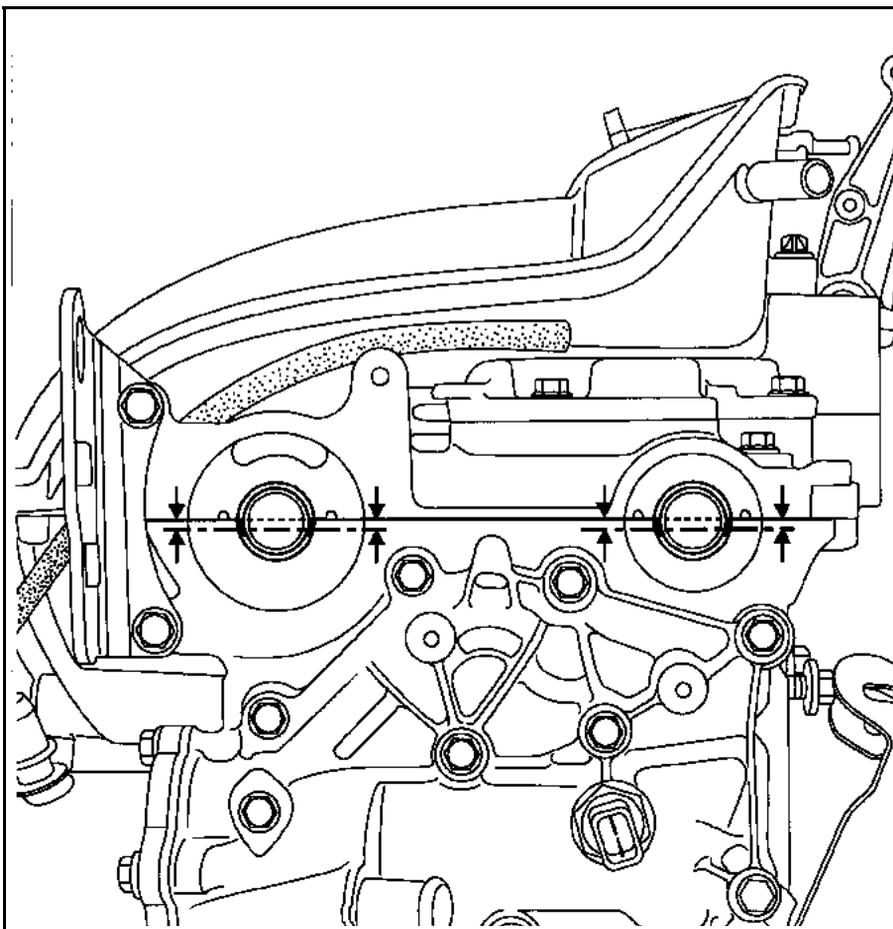


Procedure for tensioning the timing belt

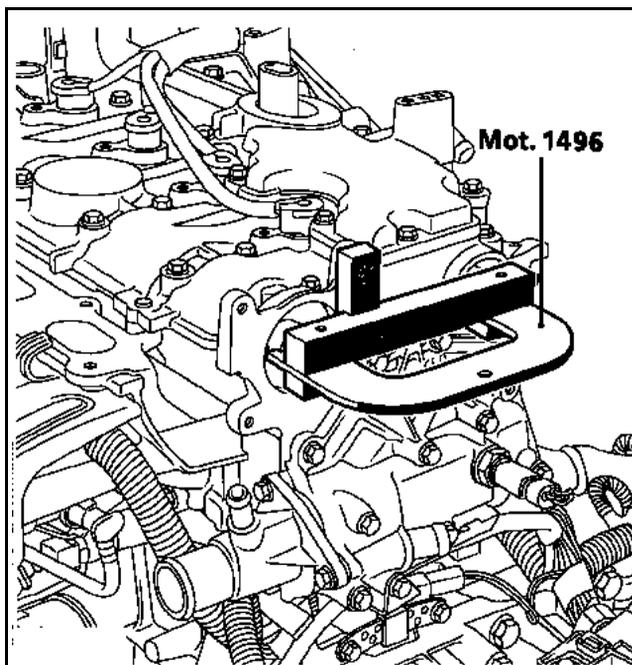
Timing adjustment

IMPORTANT: it is essential to decrease the end of the crankshaft, the bore of the crankshaft pinion and the bearing faces of the crankshaft pulley to prevent any slip between the timing and the crankshaft which would risk destroying the engine.

Position the grooves of the camshafts using tool **Mot. 799-01** as shown in the diagram opposite.

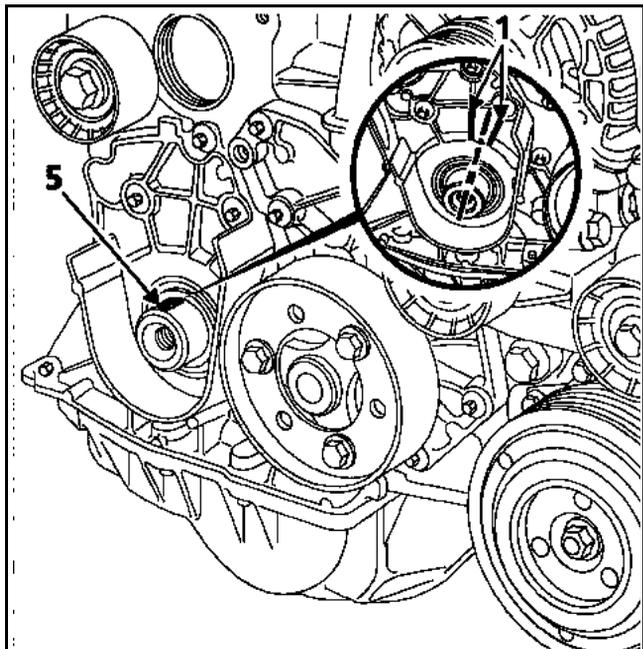


Fit tool **Mot. 1496**, on the end of the camshafts.

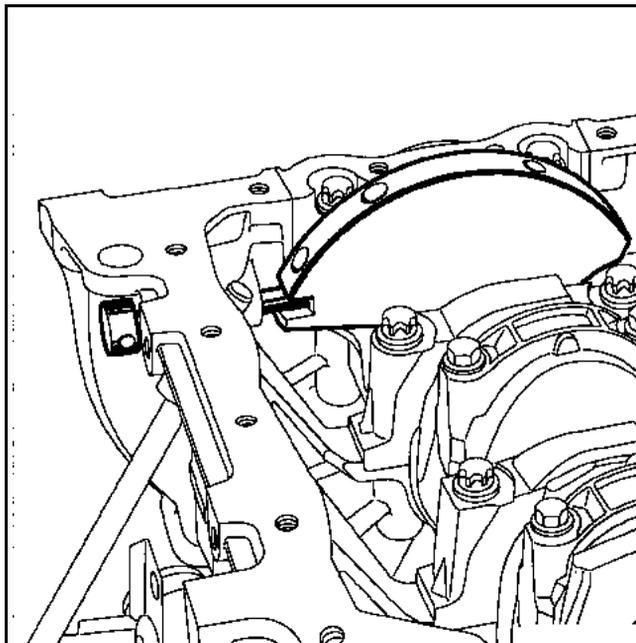


Procedure for tensioning the timing belt

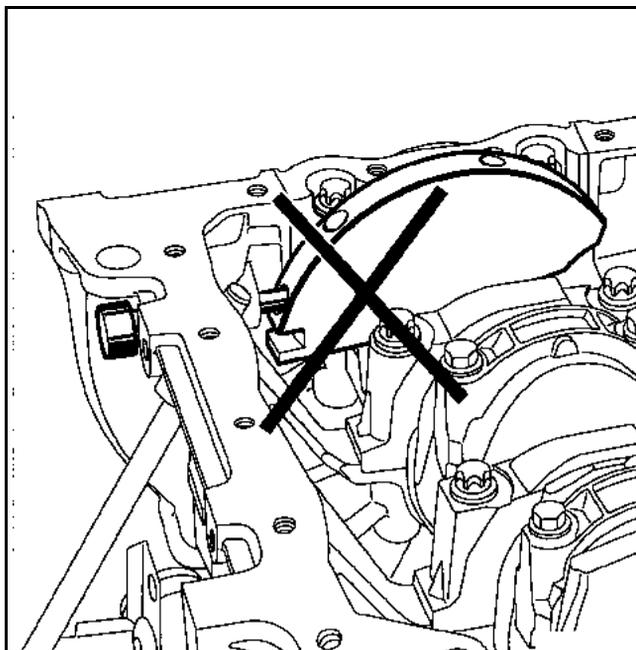
Check that the crankshaft is correctly pinned at Top Dead Centre and not in the balancing hole (groove (5) of the crankshaft must be positioned in the middle of the two ribs (1) of the crankshaft closure panel).



Pinned crankshaft

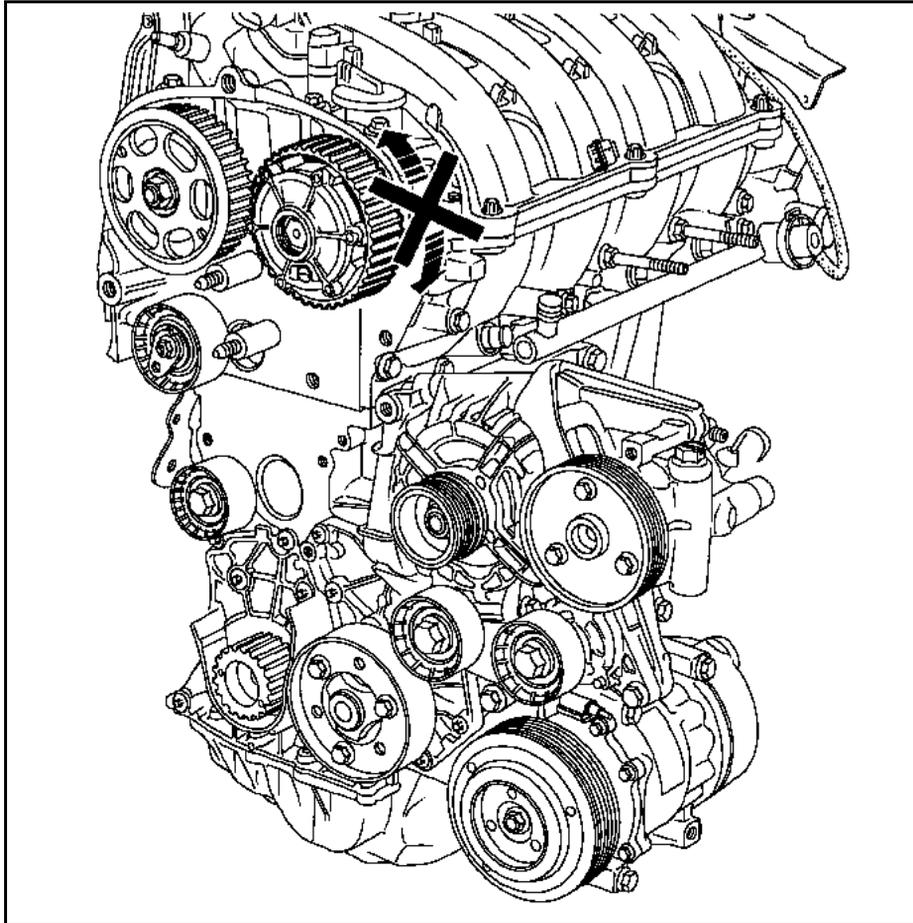


Incorrect position



Procedure for tensioning the timing belt

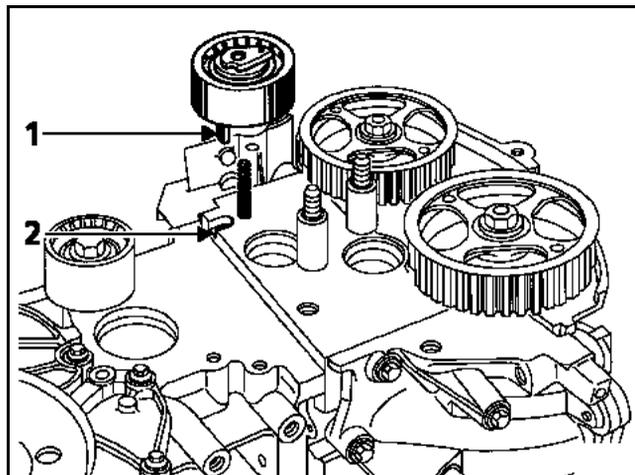
Check that the ring of the camshaft dephaser is correctly locked (no rotation of the ring to the left or to the right).



Procedure for tensioning the timing belt

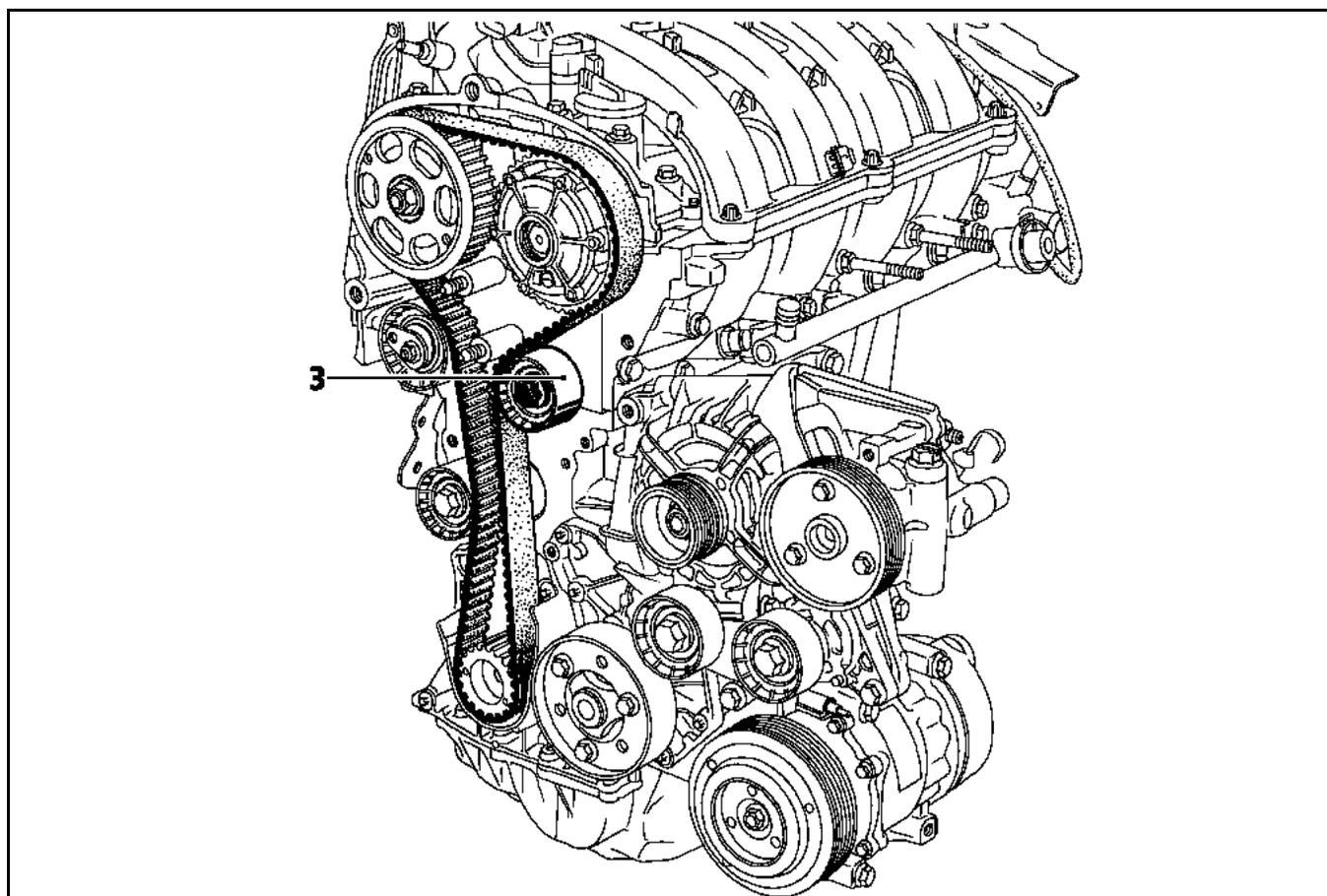
The tensioning roller and fixed roller must be replaced when the timing belt is replaced.

Ensure that lug (1) of the tension wheel is correctly positioned in the groove (2).



Refit:

- the timing belt,
- the fixed roller (3) tightening the bolt to a torque of **4.5 daNm**,



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

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

NOTE:

- the crankshaft accessories pulley bolt can be reused if the length under the head does not exceed **49.1 mm**; otherwise, replace it,
- do not oil the new bolt. However, the bolt must be oiled on the threads and under the head if it is being reused.

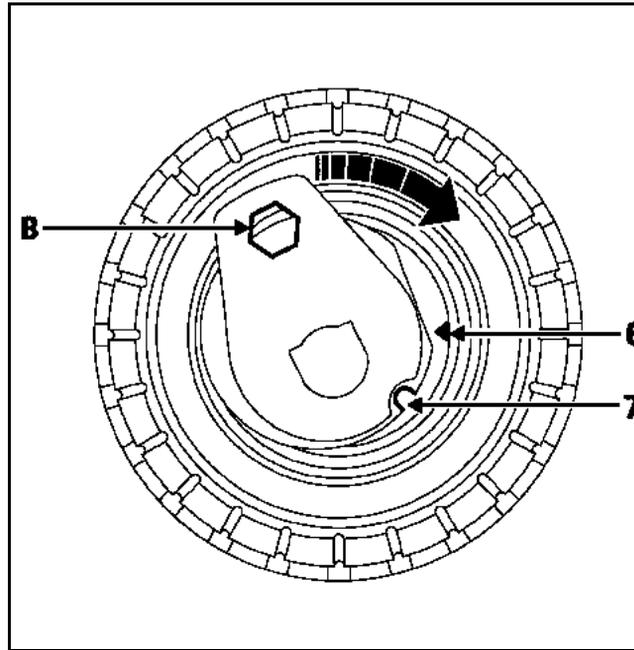
VALUES AND SETTINGS

Procedure for tensioning the timing belt

07

NOTE: do not rotate the tensioning roller in an anti-clockwise direction.

Align the marks (6) and (7) of the tensioning roller using a 6 mm Allen key at (B).

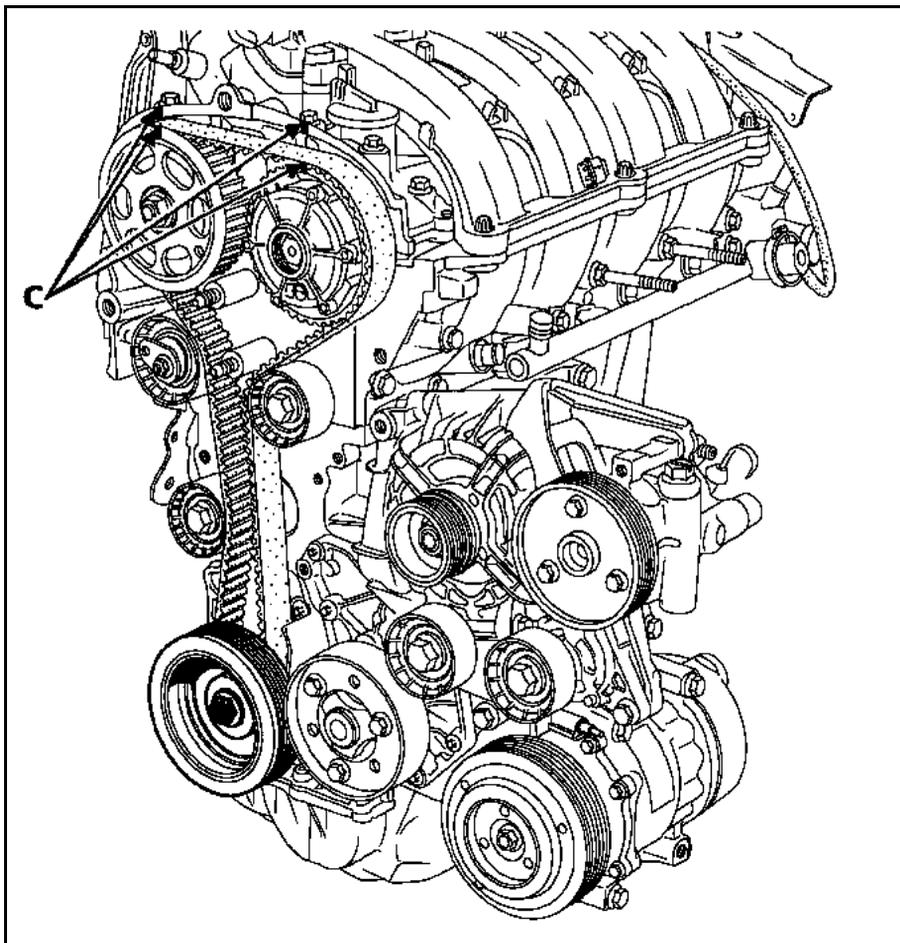


Pre-tighten the tension wheel nut to a torque of **0.7 daNm**.

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

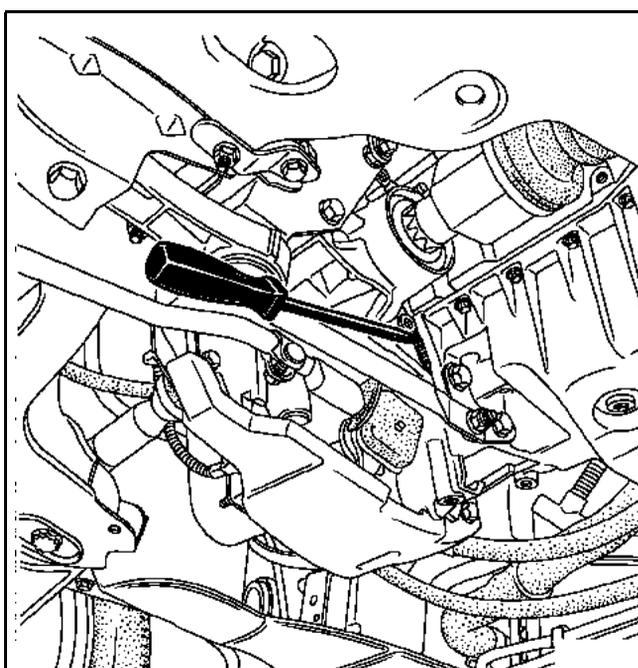
Procedure for tensioning the timing belt

Mark a reference (C) on the ring of the inlet camshaft dephaser and on the exhaust pulley in relation to the camshaft bearing cap housing.



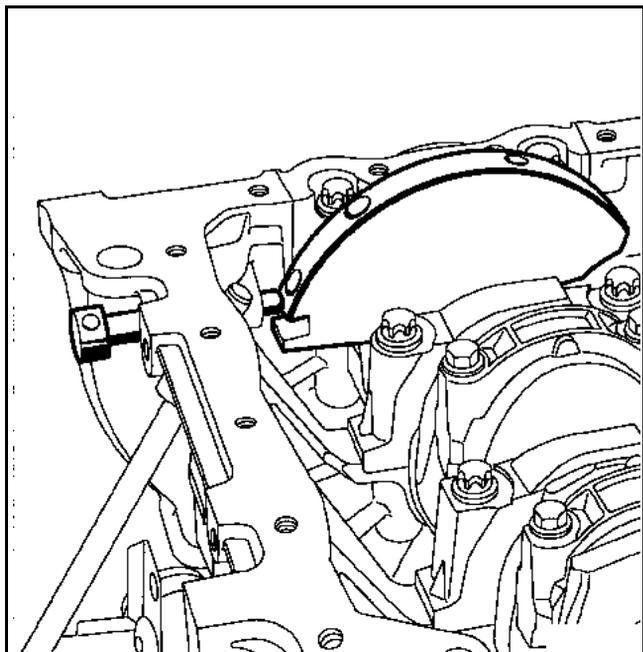
Remove the camshaft setting tool **Mot. 1496** as well as the TDC setting pin **Mot. 1054**.

Start angle tightening the crankshaft pulley bolt $115^\circ \pm 15^\circ$, locking the flywheel using a large screwdriver or **Mot. 582-01**.

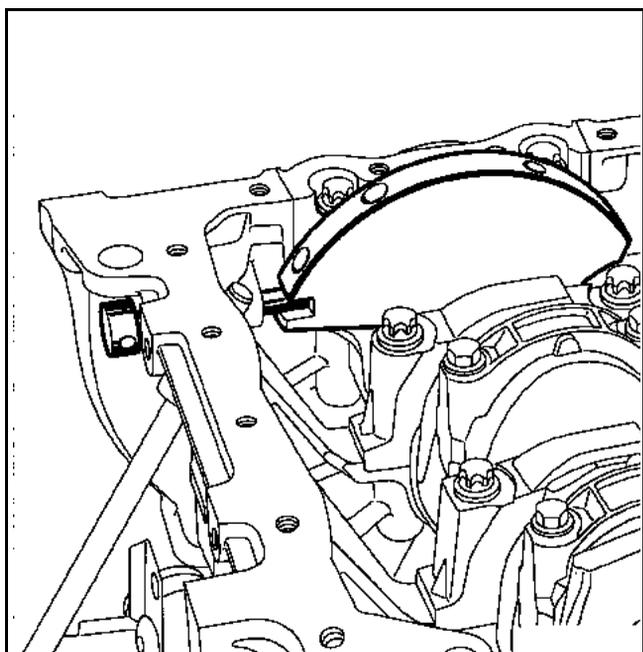


Procedure for tensioning the timing belt

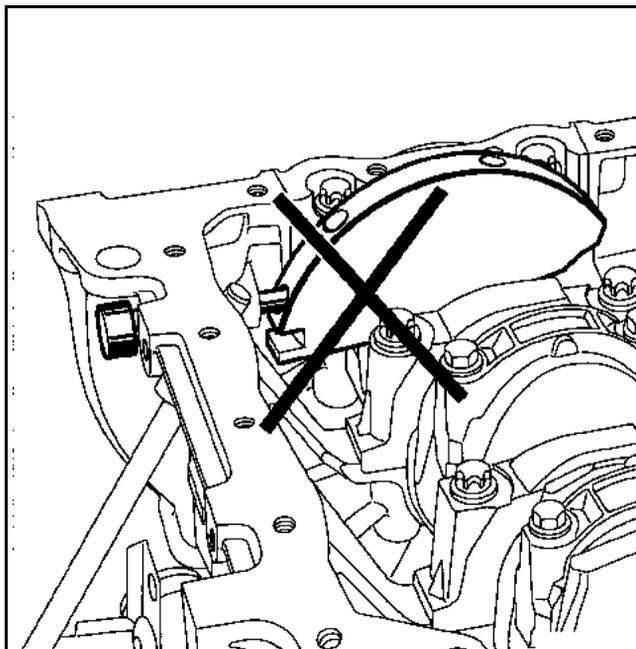
Rotate the crankshaft through two revolutions in a clockwise direction (timing end). Before the end of the two revolutions (**in other words, half a tooth before the marks previously made are aligned**), insert the crankshaft TDC setting pin (so as to be between the balancing hole and the gauging hole), then move the timing system to its setting point.



Correct position



Incorrect position



Remove the TDC setting rod **Mot. 1054**.

Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure. Slacken the tension wheel nut by a maximum of one turn, holding it with a **6 mm** Allen key.

Align the tensioning roller marks and tighten the nut finally to a torque of **2.8 daNm**.

Checking the timing and the tension

Checking the tension:

Rotate the crankshaft through two revolutions in a clockwise direction (timing end). Before the two revolutions are completed (**i.e. half a tooth before the alignment of the two marks made by the operator**), insert the crankshaft TDC setting pin.

Remove the TDC setting rod **Mot. 1054**.

Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure. Slacken the tension wheel nut by a maximum of one turn, holding it with a **6 mm** Allen key.

Align the tensioning roller marks and tighten the nut finally to a torque of **2.8 daNm**.

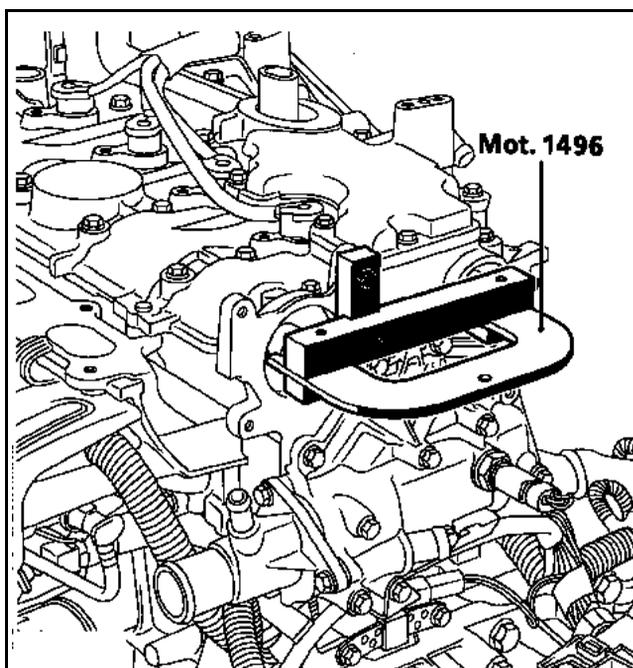
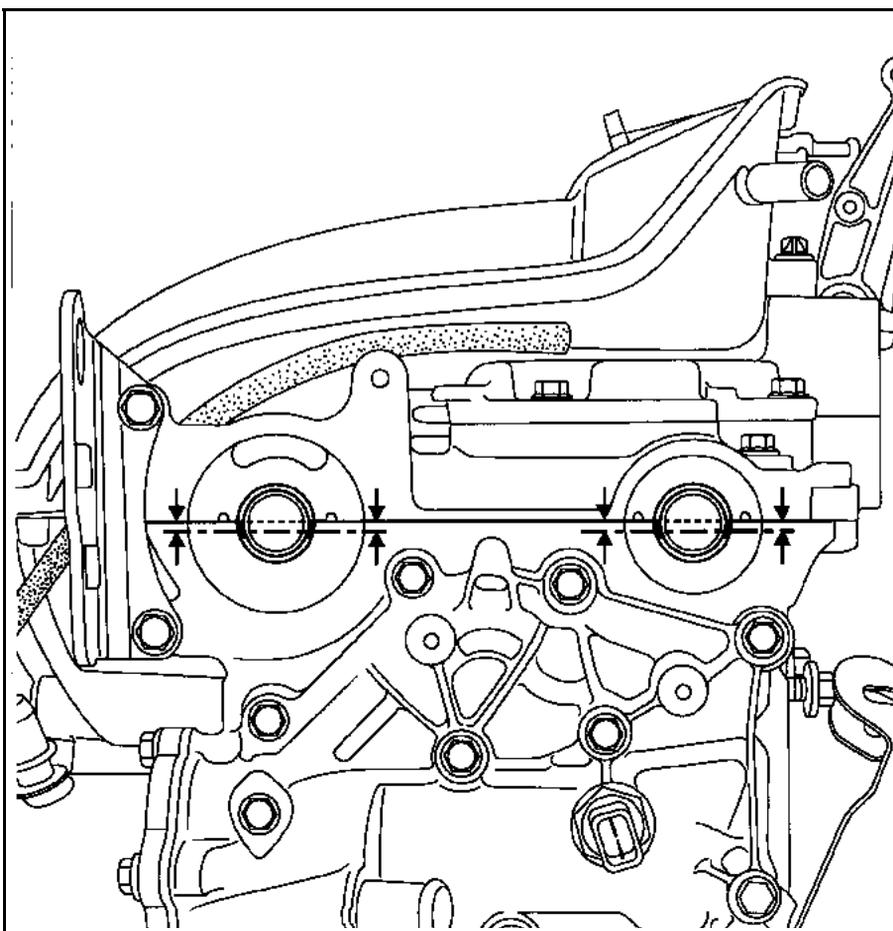
Procedure for tensioning the timing belt

Checking the timing

Ensure that the tension wheel marks are in the correct position before checking the timing.

Fit the TDC setting pin (check that the marks made by the operator on the camshaft pulleys are aligned).

Fit (without forcing) tool **Mot. 1496** for setting the camshafts (the camshaft grooves must be horizontal and offset towards the bottom). If the tool cannot be inserted, the timing setting and tensioning procedure must be repeated.



VALUES AND SETTINGS

Tightening the cylinder head

07

CYLINDER HEAD TIGHTENING PROCEDURE

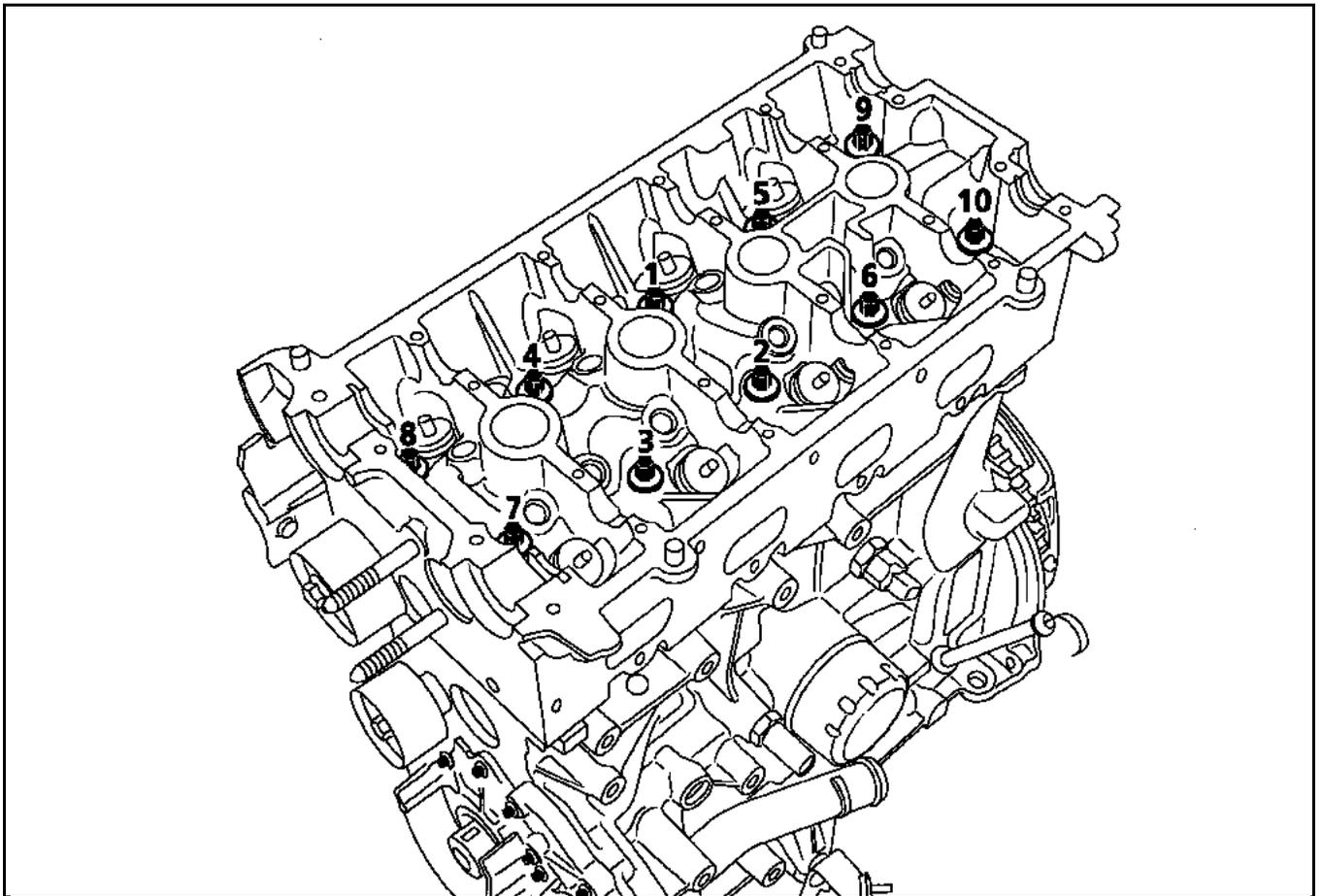
The bolts can be reused if the length under the head does not exceed 117.7 mm (otherwise replace all the bolts).

Cylinder head tightening procedure

REMINDER: Use a syringe to remove any oil which may have entered the cylinder head mounting bolt holes to achieve correct tightening of the bolts.

Do not oil the new bolts. However, the bolts must be oiled if they are being reused.

Tighten all the bolts to **2 daNm** in the order recommended below.



Check that all the bolts are correctly tightened to **2 daNm** then perform an angular tightening (bolt by bolt) of $165^\circ \pm 6^\circ$.

Do not retighten the cylinder head bolts after performing this procedure.

VALUES AND SETTINGS

Underbody height

07

Vehicle	At the front H1 - H2 = ... mm	At the rear H4 - H5 = ... mm	Dimensions X (in mm) Left and right
CB0M	118	0	-

Tolerance: + 10.5 mm

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

Any work on the underbody height involves adjusting the brake limiter and the headlights.

VALUES AND SETTINGS

Tyres and wheels

07

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

(1) With full load and on motorways.

Tightening torque for the wheel nuts: **10.5 daNm**

Rim run-out: **1.2 mm**

VALUES AND SETTINGS

Brakes

07

Vehicle	Disc thickness (in mm)				Diameter of drums (in mm)	
	Front		Rear		Rear	
	Max.	Minimum	Max.	Minimum	Max. (1)	Minimum
CB0M	24	21.8	8	7	-	-

(1) Drum: maximum wear diameter

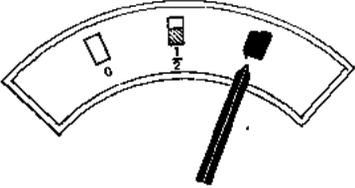
The disc run-out is 0.07 maximum.

Vehicle	Disc thickness (in mm)				Brake fluid
	Front (including mounting)		Rear		
	New	Minimum	New	Minimum	
CB0M	18	6	11	4.6	SAE J 1703 DOT 4

VALUES AND SETTINGS

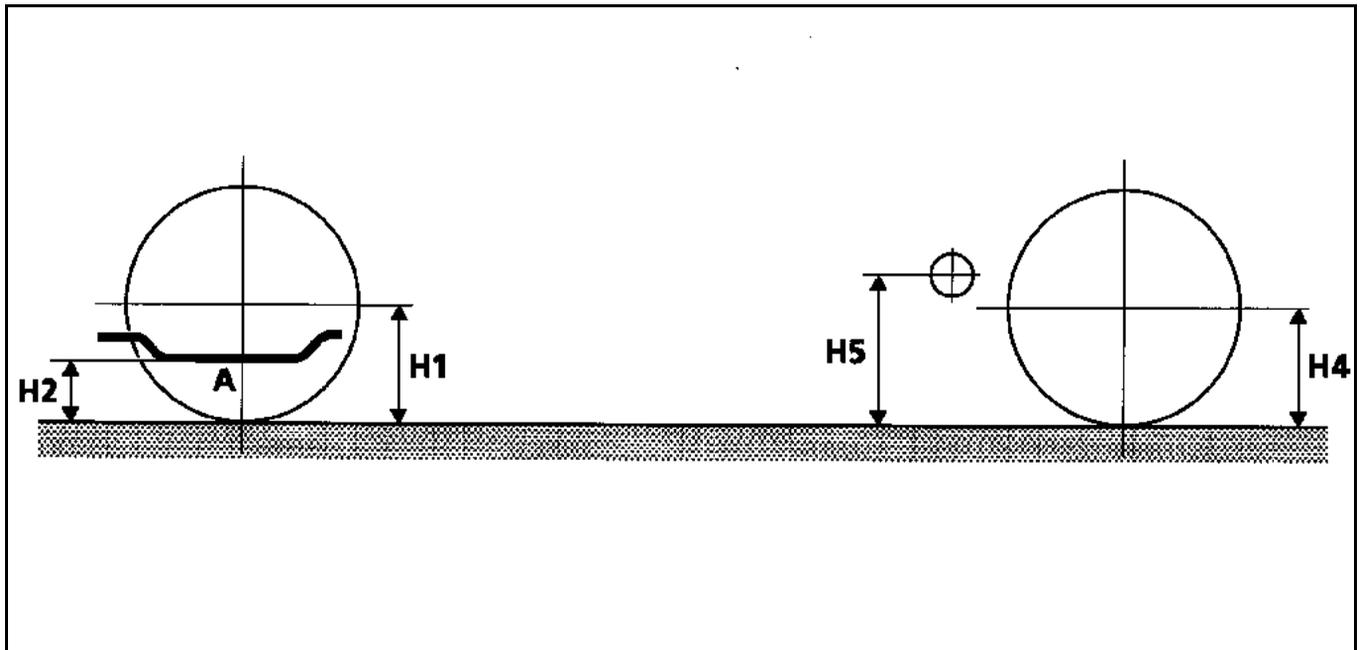
Brake limiter

BRAKING PRESSURE

Vehicle	Amount of fuel in tank (driver aboard)	Check pressure (1) (in bars)	
		Front	Rear
CB0M		100	<div style="display: flex; align-items: center; justify-content: center;"> → <div style="text-align: left;"> 38 ⁺¹⁸ 0 </div> </div>

(1) The test is performed using two pressure gauges in an X arrangement

MEASURING POINTS

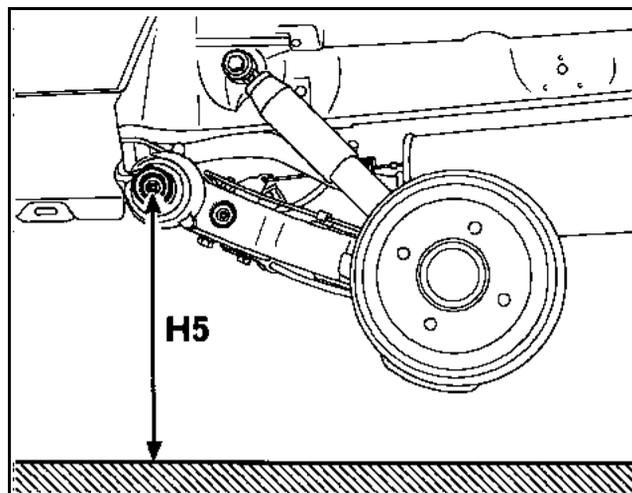


H1: tyre radius under load.

H2: height measured between the lower side of the sub-frame (A) and the ground along the wheel shaft.

H4: radius of rear tyre under load.

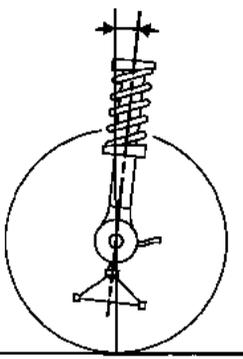
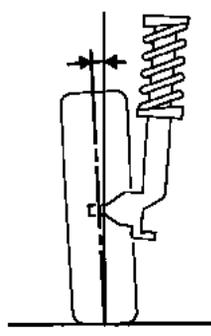
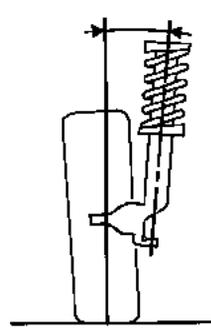
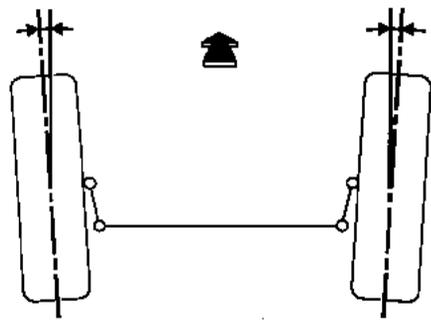
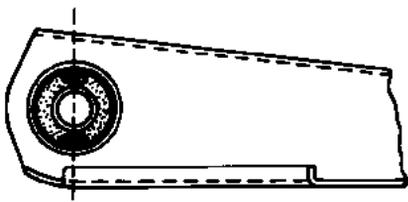
H5: height measured between the rear axle hinge pin axis and the ground.



VALUES AND SETTINGS

Front axle geometry checking values

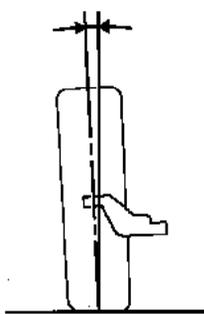
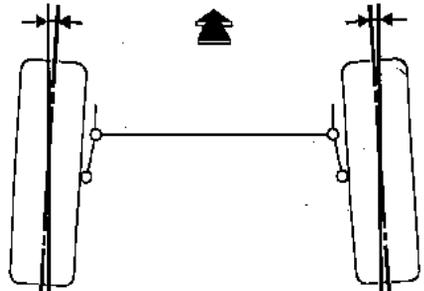
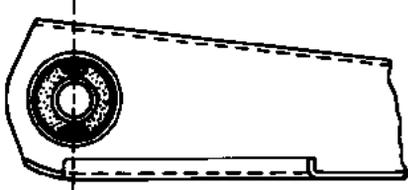
07

ANGLES	VALUES	POSITION OF FRONT AXLE	ADJUSTMENT
<p>CASTOR</p> 	$\left. \begin{array}{l} 1^{\circ}44' \\ 2^{\circ}31' \\ 3^{\circ}18' \end{array} \right\} \pm 30'$ <p>Max. right/left difference = 1°</p>	<p>H5 - H2 = 134 H5 - H2 = 104 H5 - H2 = 74</p>	<p>NOT ADJUSTABLE</p>
<p>CAMBER</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>PIVOT</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>WHEEL ALIGNMENT</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 turn = 30' (3 mm)</p>
<p>POSITION FOR TIGHTENING RUBBER BUSHES</p> 	<p>-</p>	<p>UNLADEN</p>	<p>-</p>

VALUES AND SETTINGS

Rear axle geometry checking values

07

ANGLES	VALUES	POSITION OF REAR AXLE	ADJUSTMENT
<p>CAMBER</p> 	$- 1^{\circ}31' \pm 20'$	UNLADEN	NOT ADJUSTABLE
<p>WHEEL ALIGNMENT</p> 	<p>(for 2 wheels) Toe-in $- 0^{\circ}20' \pm 30'$ $- 3 \text{ mm} \pm 3 \text{ mm}$</p>	UNLADEN	NOT ADJUSTABLE
<p>POSITION FOR TIGHTENING RUBBER BUSHES</p> 	-	UNLADEN	-

ENGINE AND PERIPHERALS

Identification

10

Vehicle type	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 consult: **Mot. F4R.**

ENGINE AND PERIPHERALS

Oil pressure

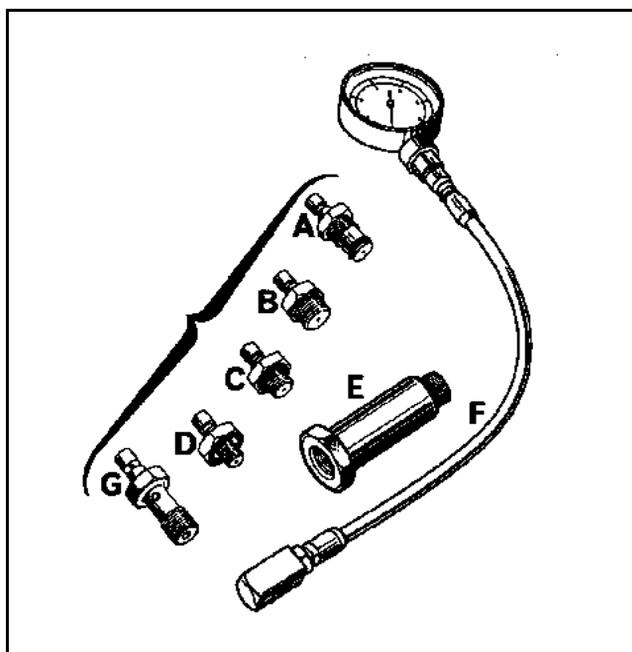
10

SPECIAL TOOLING REQUIRED
Mot. 836 -05 Oil pressure measuring kit
EQUIPMENT REQUIRED
22 mm long socket or pipe spanner

CHECKING

The oil pressure should be checked when the engine is warm (approximately 80 °C).

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



USE

B + F

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

Oil pressure

Idling speed	1 bar
3,000 rpm	3 bar

ENGINE AND PERIPHERALS

Engine and transmission assembly

10

SPECIAL TOOLING REQUIRED		
Mot.	1040-01	Support cradle for removal/refitting engine and gearbox unit
Mot.	1159	Tool for retaining engine on subframe
Mot.	1202	Hose clip pliers
Mot.	1453	Engine support tool

TIGHTENING TORQUES (in daNm)	
Sub-frame front mounting bolt	6.2
Sub-frame rear mounting bolt	10.5
Engine mounting bolt for front right suspended mounting cover	6.2
Front right suspended engine cover mounting nut	4.4
Mounting nut for engine rubber mounting pad on front left-hand side member support	6.2
Gearbox lower rubber pad mounting nut	4.4
Shock absorber base bolts	18
Brake calliper mounting bolt	4
Steering shaft yoke mounting bolt	3
Wheel bolts	9

REMOVAL

Position the vehicle on a two-post lift.

Remove the battery and the engine undertray.

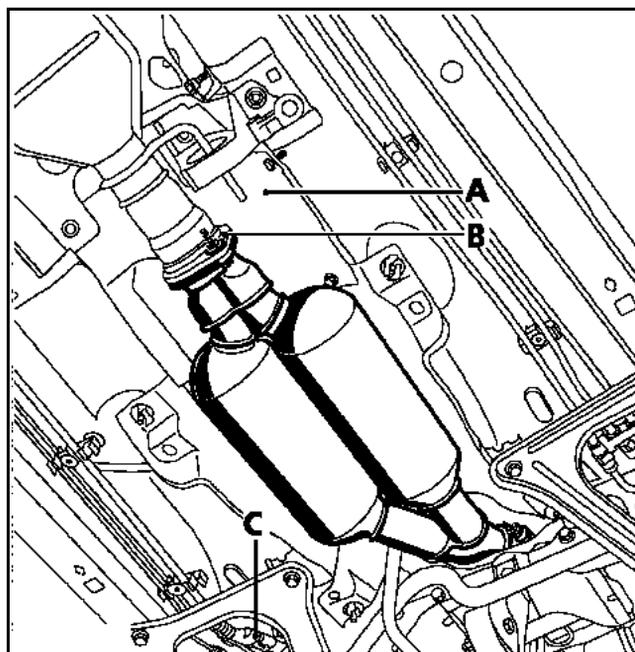
Drain:

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

Remove

- the front wheels along with the mudguard,
- the front bumper,
- the radiator grille,
- the upper cross member,
- the sub-frame and body tie-rods,
- the brake callipers as well as the **ABS** sensors and secure them to the suspension springs,
- the shock absorber base bolts,

– heat shield (A) as well as the gearbox control,



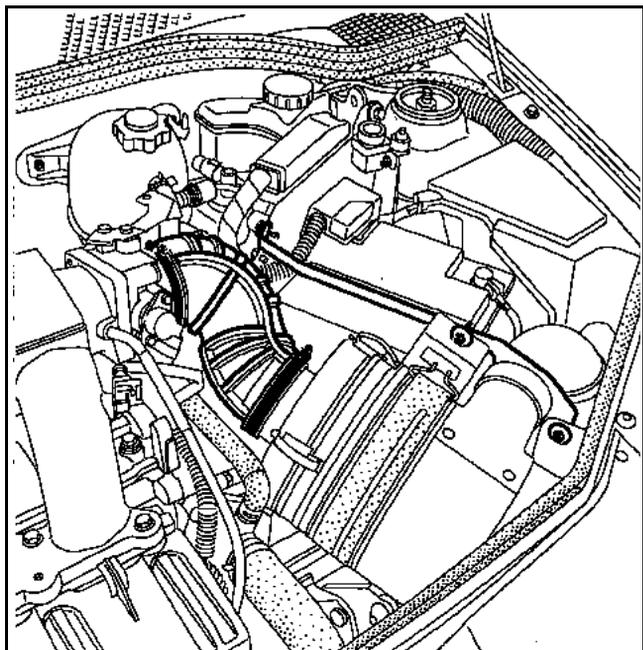
- Exhaust pipe clip (B) between the catalytic converter and the expansion chamber and disconnect the oxygen sensor connector (C),
- the earth strap from the gearbox,

ENGINE AND PERIPHERALS

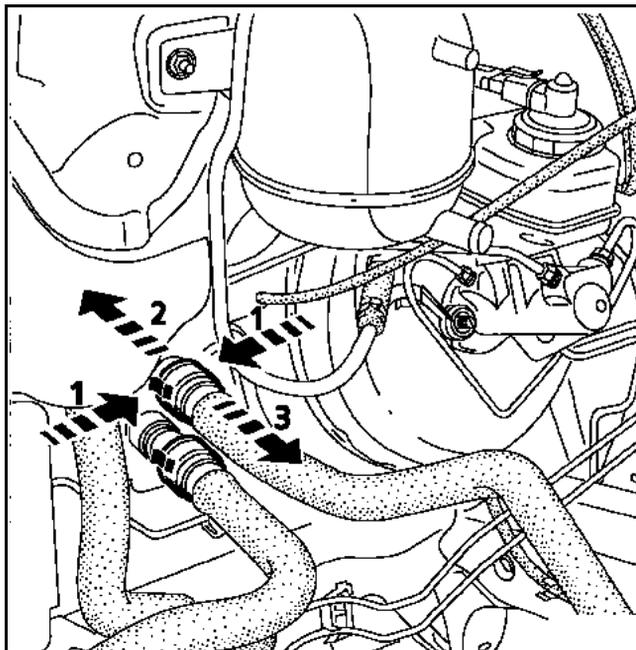
Engine and transmission assembly

10

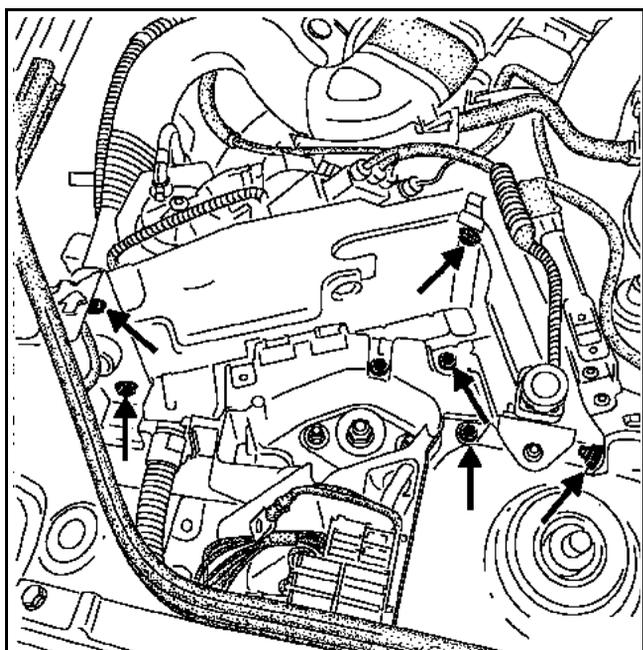
- the expansion bottle mountings and move expansion bottle aside,
- the catalytic converter mountings on the manifold and remove it,
- the vacuum pipe on the plenum chamber,
- the air duct and the air unit.



- Disconnect:
- the brake servo pipe,
 - the heater hoses,



- the injection computer mounting, after having disconnected the **90-track** connector as well as the impact switch connector,
- the battery tray.

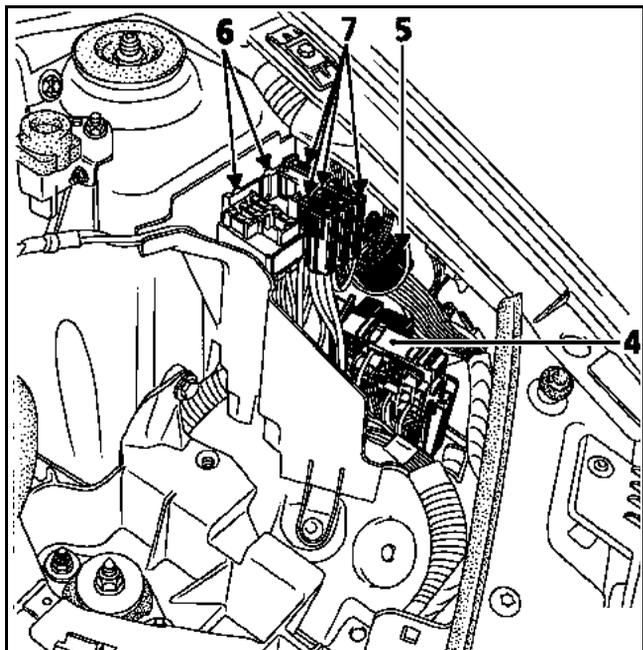


ENGINE AND PERIPHERALS

Engine and transmission assembly

10

- the relay plate (4), connector (5), fuse mounting (6) and remove fuse holders (7) on the above,



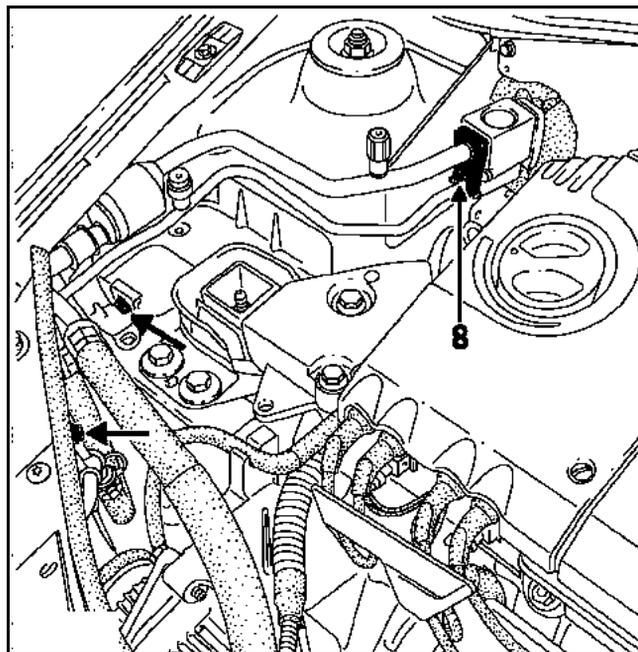
- the connector on the canister,
- the canister pipe on the plenum chamber,
- the accelerator and clutch cables.

Unclip the power-assisted steering fluid reservoir and place it on the engine.

Remove:

- the upper radiator mountings,
- the **air conditioning** pipe mountings and clamp (8) and place the assembly on the engine,

NOTE: plugs must be fitted onto the hoses and pressure relief valve to prevent moisture from entering the circuit.



- the nut and the eccentric bolt from the steering shaft yoke, after pushing back the guard.

SPECIAL NOTES FOR VEHICLES FITTED WITH A DRIVER'S AIRBAG

IMPORTANT

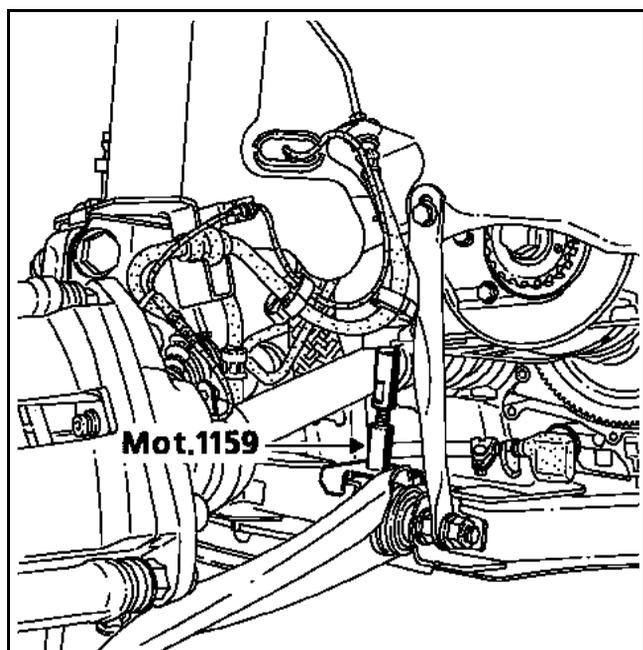
In order to eliminate any risk of damaging the rotary switch under the steering wheel, observe the recommendations below:

- Before the steering column and the steering rack are uncoupled, the steering wheel **MUST** be immobilised with the wheels straight for the duration of the operation using a steering wheel locking tool.
- If there is any doubt regarding the correct centring of the rotary switch, the steering wheel must be removed so that the centring procedure described in Section 88 Airbag can be applied.

REMINDER: in this case, only qualified personnel who have received training may carry out the operation.

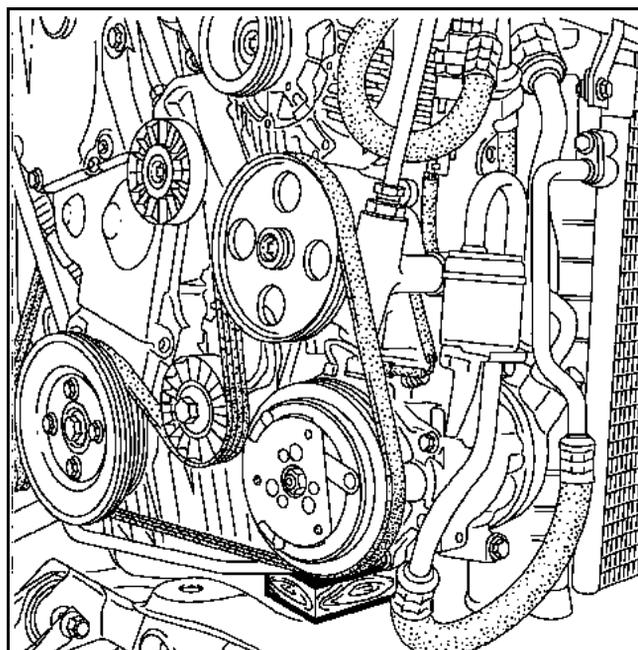
Fit:

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

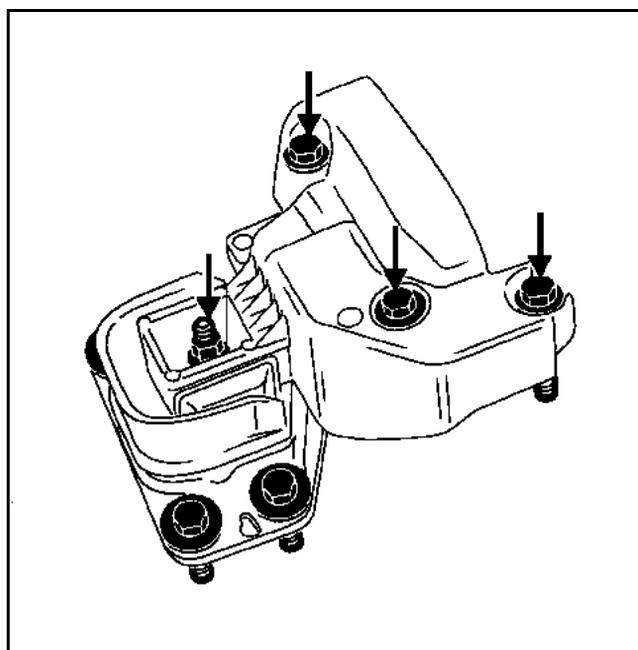


- the lifting eye **77 00 108 302** with two bolts, part no. **77 03 002 039** (gearbox side),
- the engine support tool **Mot. 1453**.

Fit a shim between the multifunction support and the sub-frame.



Remove the suspended engine mounting cover.



ENGINE AND PERIPHERALS

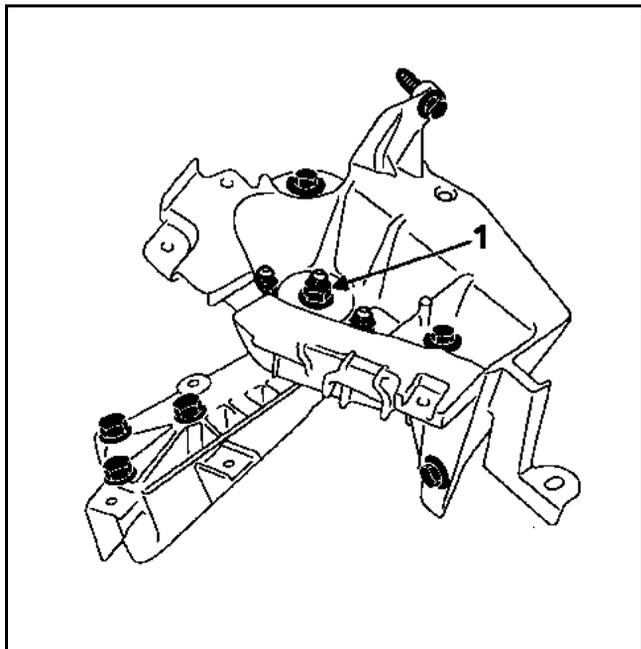
Engine and transmission assembly

10

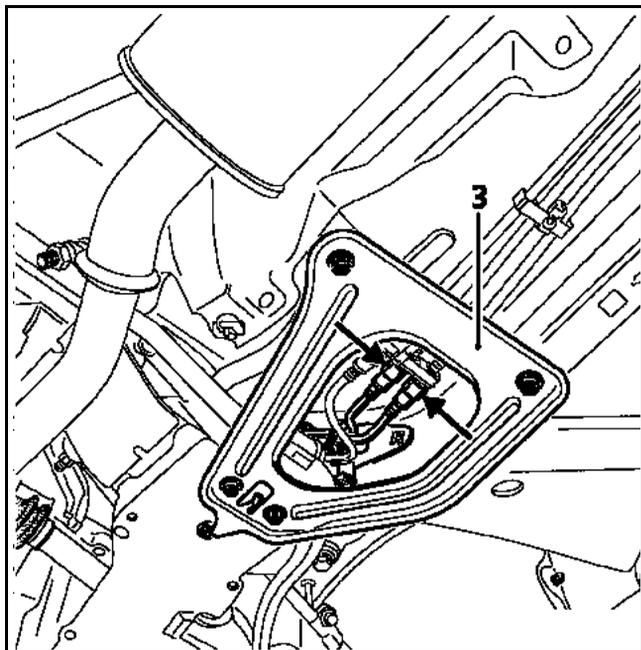
Insert a shim between the gearbox and the sub-frame.

Remove:

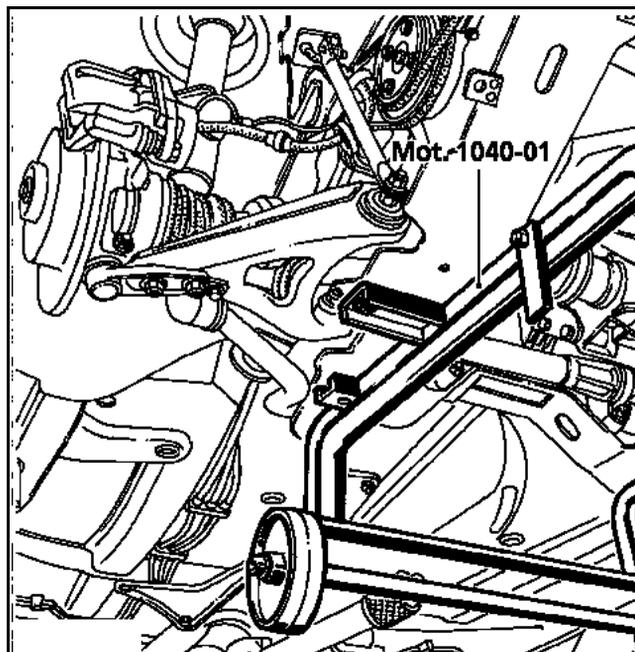
- nut (1), then using a copper hammer, tap to release the suspended engine mounting stud,



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



Fit the **Mot. 1040-01** under the sub-frame.



Lower the lift until the tool touches the ground.

Remove the sub-frame mounting bolts and take out the engine and transmission assembly by lifting the body.

NOTE: for any operation requiring the engine, gearbox and sub-frame assembly to be separated, 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 mountings of the sub-frame on the body.

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

- **6.2 daNm** at the front,
- **10.5 daNm** at the rear.

Refitting is in the reverse order to removal.

Fit the heat shields correctly.

Apply **FRENBLOC loctite** to the brake calliper mounting bolts before fitting and tighten them to torque.

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

Carry out the following:

- fill the engine and gearbox with oil (if necessary),
- Fill and bleed the cooling circuit (see Section **19 Filling - bleeding**),
- Fill the refrigerant (consult Section **62**).

When refitting the suspended engine mounting and gearbox mountings, take care when positioning them (see the procedure in Section **19 Suspended engine mounting**).

ENGINE AND PERIPHERALS

Sump

10

SPECIAL TOOLING REQUIRED

Mot.	1233-01	Threaded rods for lowering the sub-frame
------	---------	--

TIGHTENING TORQUES (in daNm)



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

REMOVAL

Position the vehicle on a two-post lift.

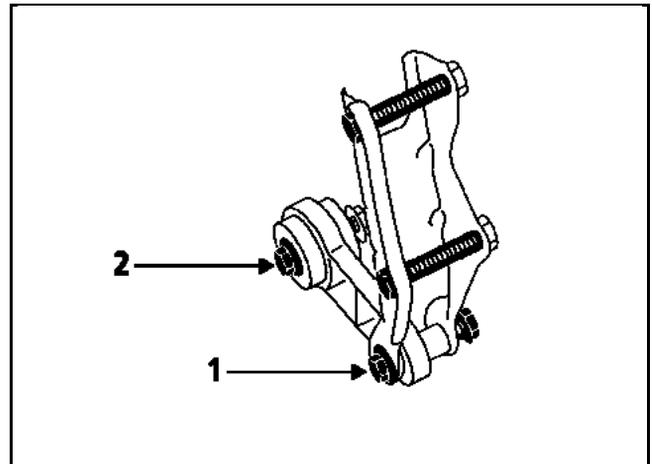
Disconnect the battery.

Drain the engine.

Remove:

- the front wheels along with the right-hand mudguard,
- the steering shaft yoke nut and eccentric bolt after pushing back the protector,

- the mountings for the lower ball joints as well as the steering ball joints,
- the sub-frame and body tie-rods,
- the gear control on the gearbox side,
- bolt (1), and slacken engine tie-bar bolt (2), without removing it,



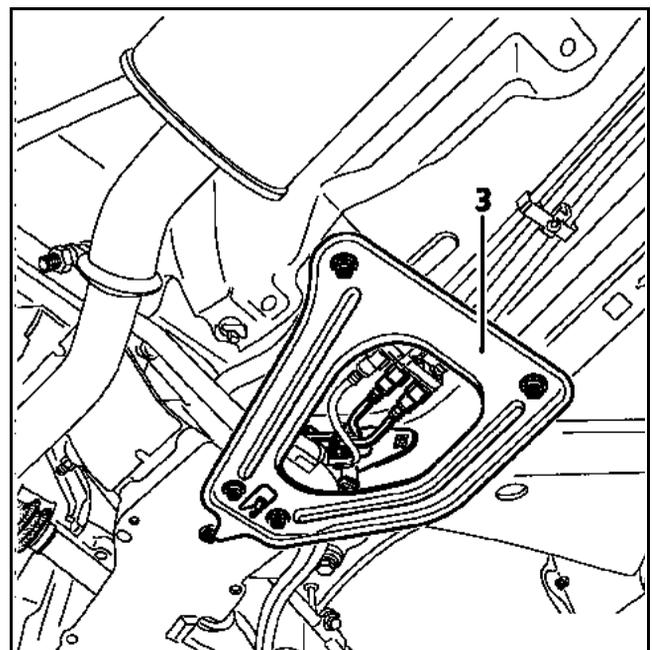
- the bottom mountings of the bumper,
- tie-rod mountings (3),
- the sub-frame mounting bolts, inserting the threaded rods **Mot. 1233-01** as you go.

IMPORTANT

In order to eliminate any risk of damaging the rotary switch under the steering wheel, observe the recommendations below:

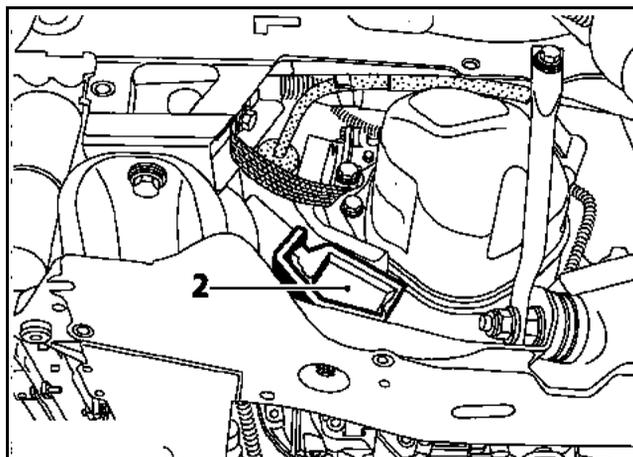
- Before the steering column and the steering rack are uncoupled, the steering wheel **MUST** be immobilised with the wheels straight for the duration of the operation using a steering wheel locking tool.
- If there is any doubt regarding the correct centring of the rotary switch, the steering wheel must be removed so that the centring procedure described in Section 88 Airbag can be applied.

REMINDER: in this case, only qualified personnel who have received training may carry out the operation.

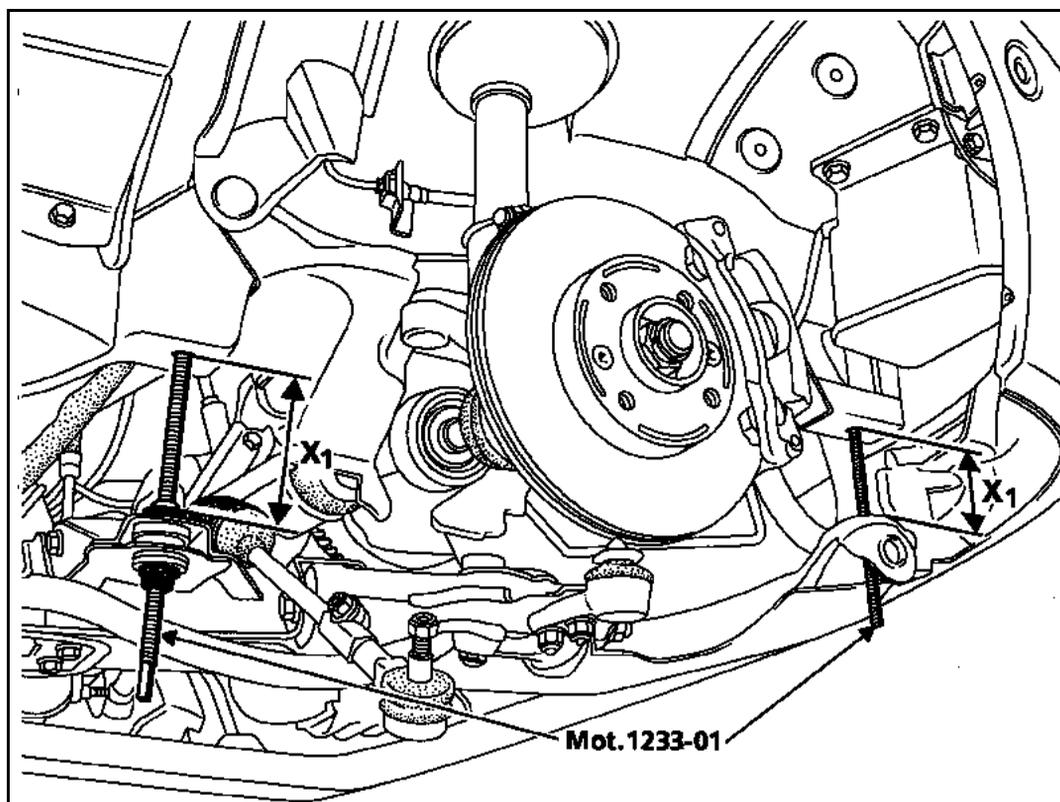


Sump

Remove the gearbox lower support mounting (2).



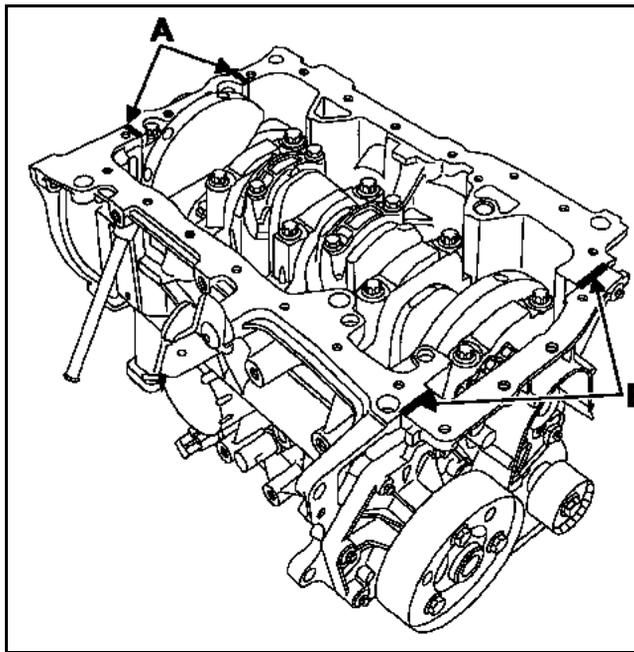
Lower the sub-frame gradually using threaded rods **Mot. 1233-01** until it approximately reaches the $X_1 = 8$ cm.



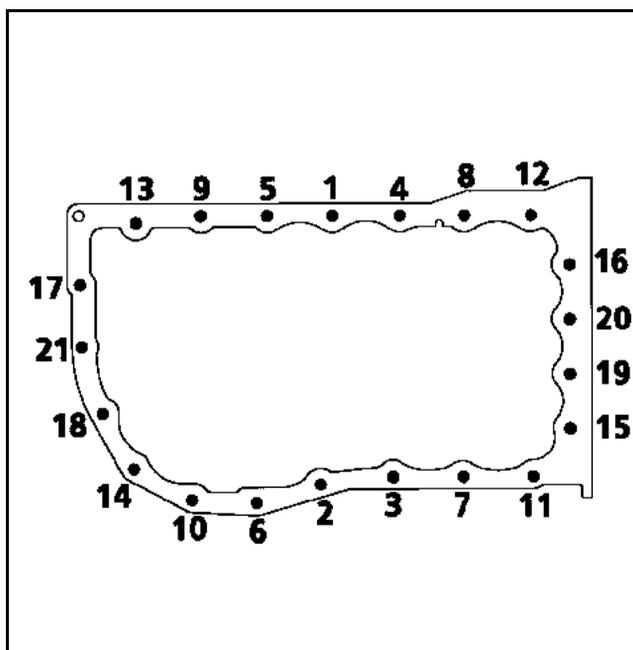
Remove the sump.

REFITTING

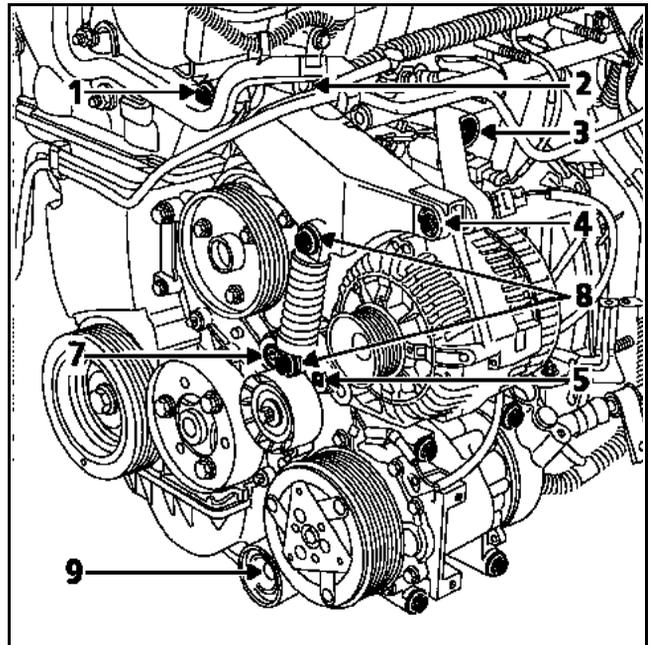
Apply a drop of **RHODORSEAL 5661** to (A) (on either side of bearing No. 1), and to (B) (where the crankshaft closure panel and the cylinder block meet).



Refit the lower cover with a new seal, pretightening it to a torque of **0.8 daNm**, then tighten it finally to between **1.2 and 1.5 daNm** in the order specified below.



TIGHTENING TORQUES (in daNm)	
Alternator upper mounting bolt (1)	3.8 ± 0.4
Alternator upper mounting bolt (2)	3.2 ± 0.3
Alternator tie-rod/unit 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
Fixed roller bolt (9)	3.2 ± 0.3



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

REMOVAL

Position the vehicle on a two-post lift.

Disconnect the battery.

Remove the accessories belt (see Section **07 Accessories belt tension**).

Remove:

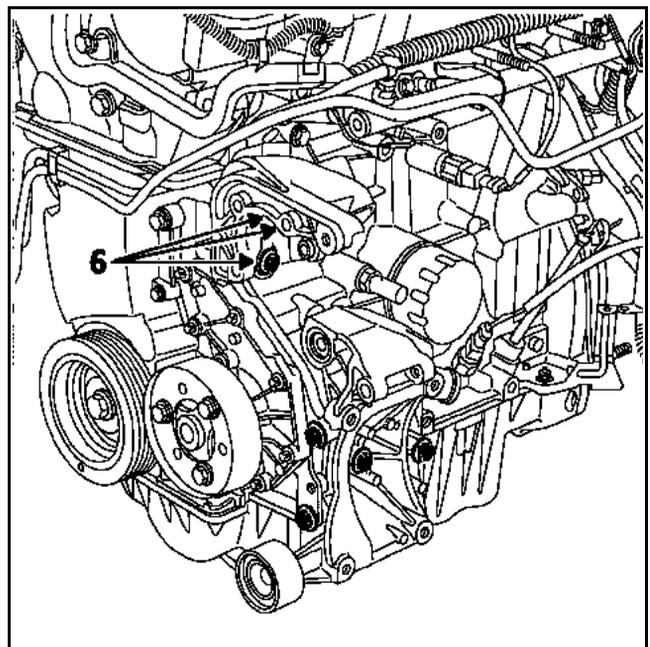
- the alternator (see Section **16 Alternator**),
- the compressor (see Section **62 Compressor**),
- the coolant pump (see Section **19 Coolant pump**),

REFITTING

Proceed in the reverse order to removal.

Fit all the bolts into each mounting and gradually tighten them.

Observe the tightening torques.



TOP AND FRONT OF ENGINE

Timing belt

11

SPECIAL TOOLING REQUIRED		
Mot.	799 -01	Timing gear wheel immobiliser
Mot.	1054	TDC setting pin
Mot.	1368	Timing pulley tightening tool
Mot.	1453	Engine support tool
Mot.	1487	Tool for fitting inlet camshaft sealing plug
Mot.	1488	Tool for fitting exhaust camshaft sealing plug
Mot.	1496	Tool for setting camshaft
Mot.	1509 and 1509-01	Tool for locking the camshaft pulleys
Mot.	1512	Tool for fitting exhaust camshaft seals
Mot.	1517	Tool for fitting inlet camshaft seals

EQUIPMENT REQUIRED
Angular torque wrench

TIGHTENING TORQUES (in daNm and/or °)	
Wheel bolts	9
Tensioner wheel bolt	4.5
Crankshaft pulley bolt	2 + 135° ± 15°
Tension wheel nut	2.8
Engine mounting bolt for front right suspended mounting cover	6.2
Mounting bolt for the movement limiter of the front right hand suspended engine mounting	6.2

TOP AND FRONT OF ENGINE

Timing belt

11

REMOVAL

Position the vehicle on a two-post lift.

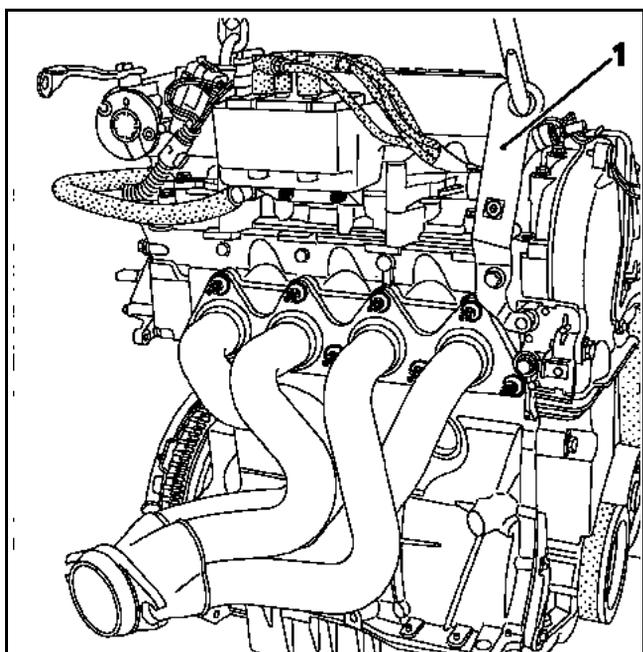
Disconnect the battery.

Remove:

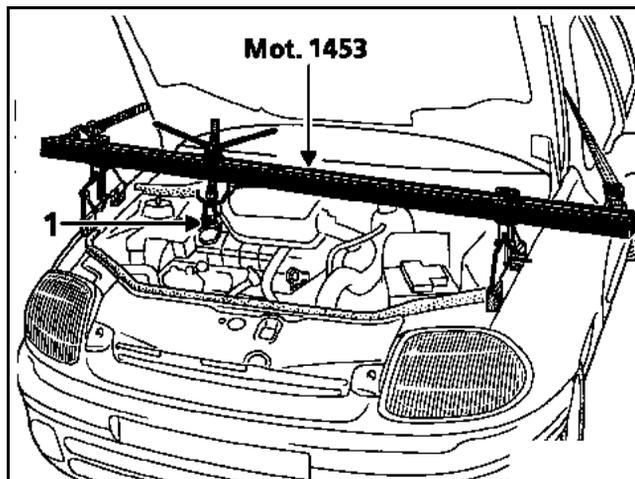
- the front right-hand wheel,
- the front right wheel arch as well as the engine undertray.

Fit:

- the engine stand (1),



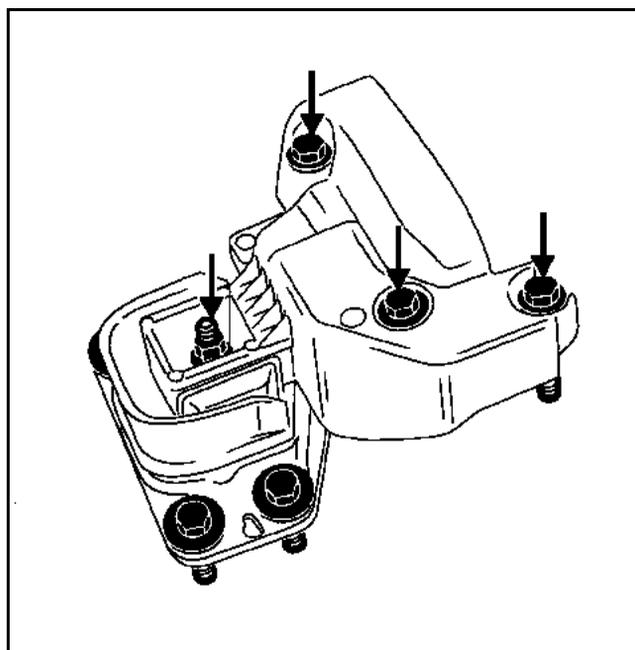
- the stand Mot. 1453.



NOTE: when doing this make sure that the feet of the engine stand are positioned on the rigid sections of the wings.

Remove:

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



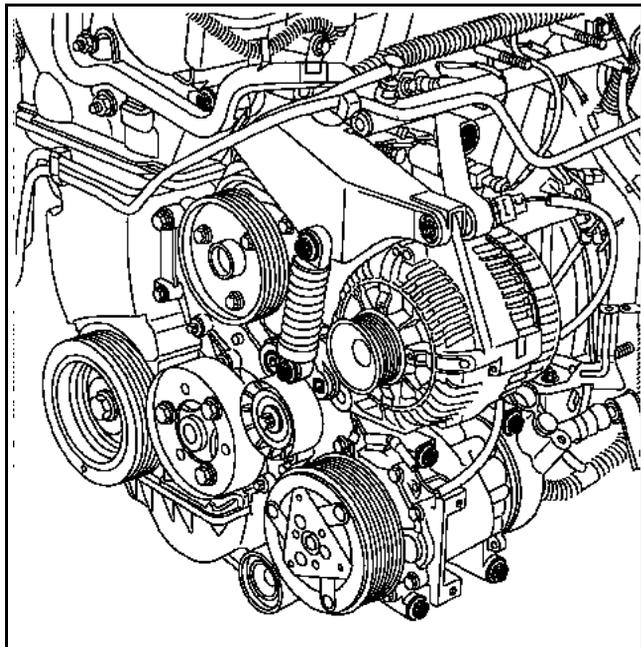
Timing belt

- the accessories belt (see Section 07 Procedure for tensioning the accessories belt).

Disconnect the connectors.

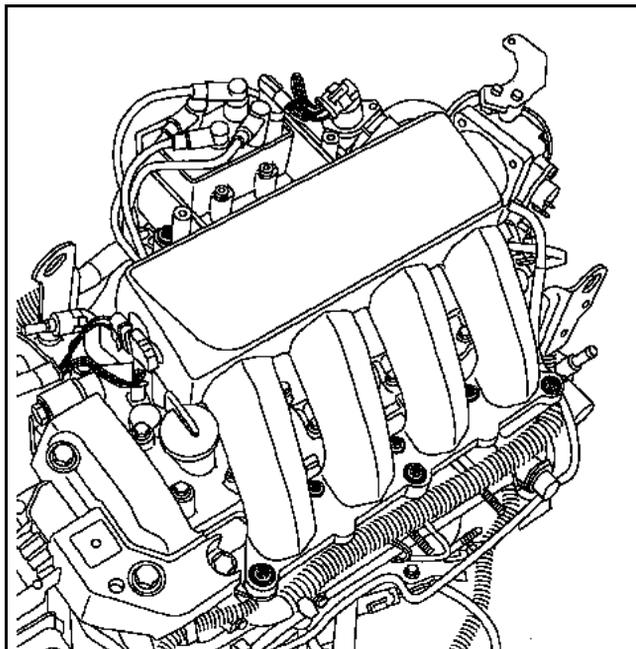
Unclip:

- the wiring harness on the upper timing cover and separate the assembly,
- the petrol pipes on the intermediate timing cover.

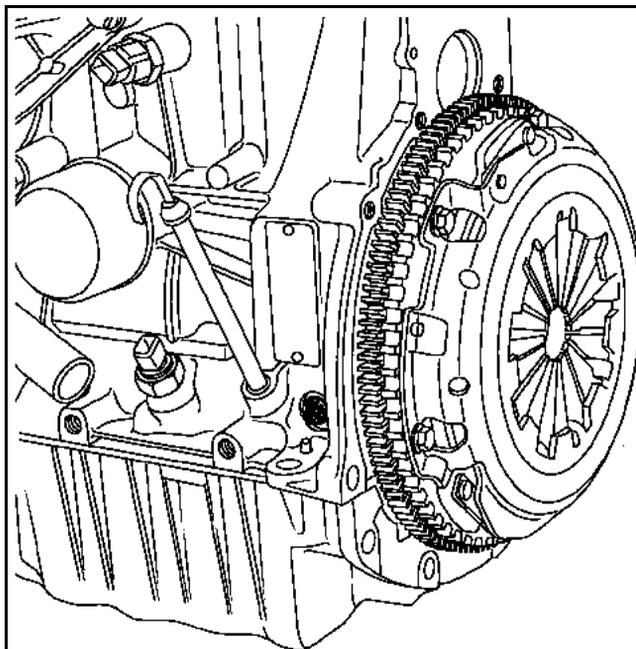


Remove:

- the air duct,
- the inlet manifold (see Section 12 Inlet manifold),
- the camshaft sealing plugs,

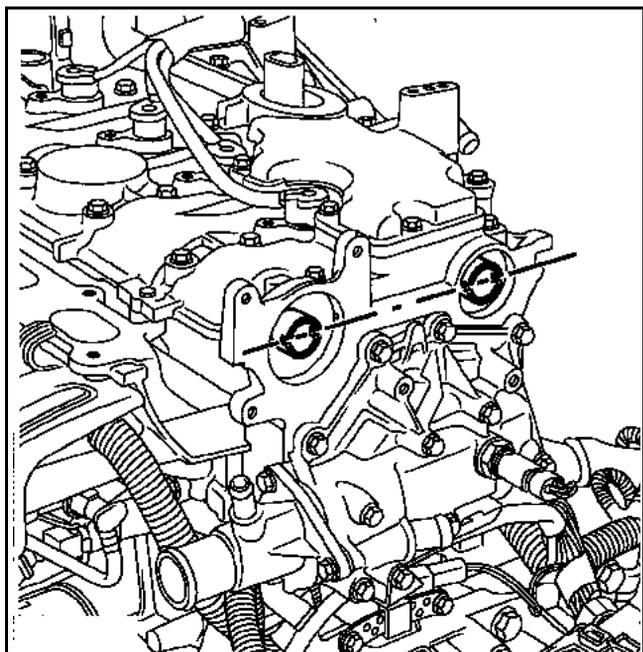


- the TDC pin plug.

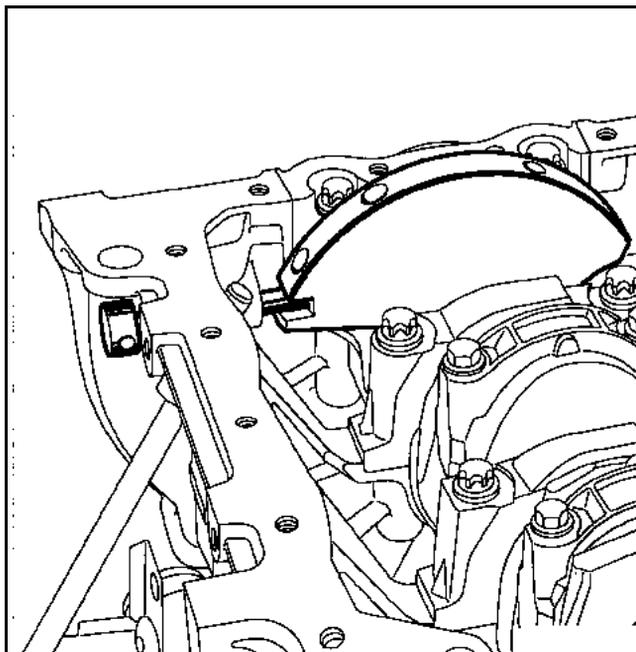


Timing adjustment

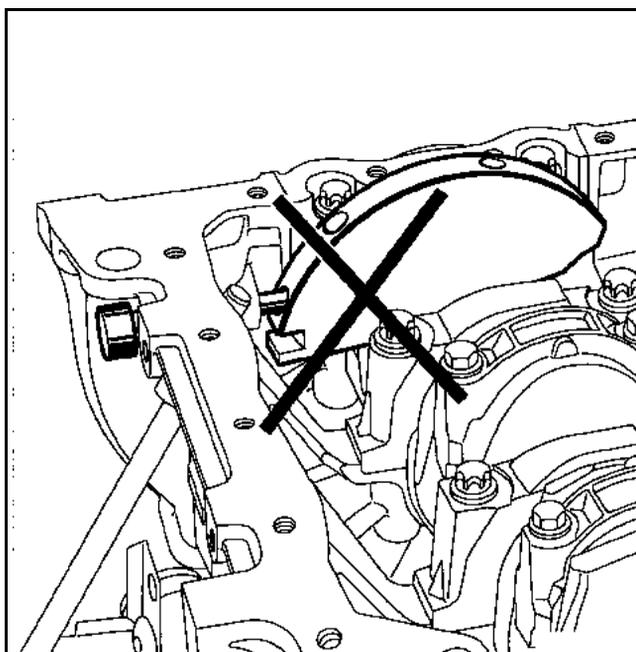
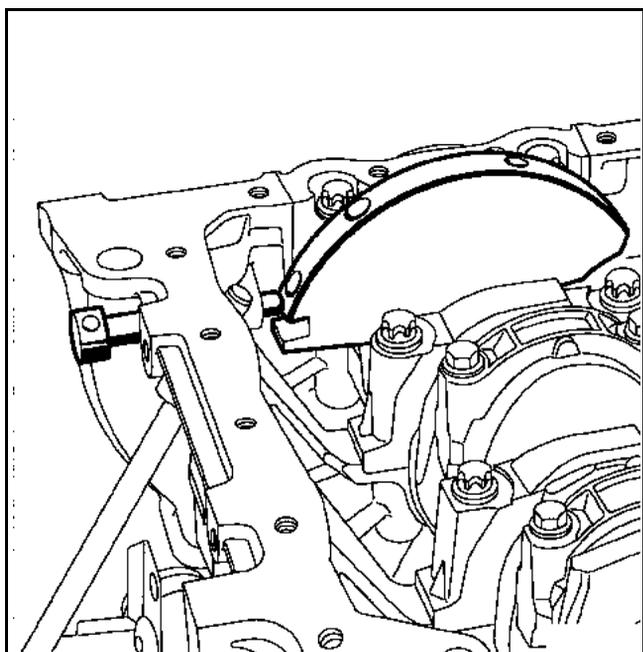
Turn the engine over clockwise (timing side) so as to position the camshaft grooves towards the bottom in an almost horizontal position as shown on the diagram below. Then insert the Top Dead Centre pin **Mot. 1054** so that it is between the balancing hole and the crankshaft setting groove.



Rotate the engine slightly in the same direction, inserting the pin **Mot. 1054** to the setting point.

Correct position

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



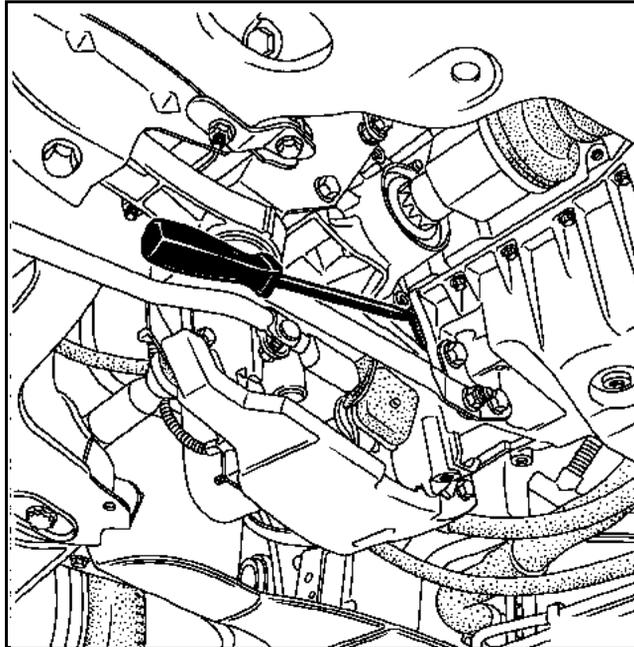
TOP AND FRONT OF ENGINE

Timing belt

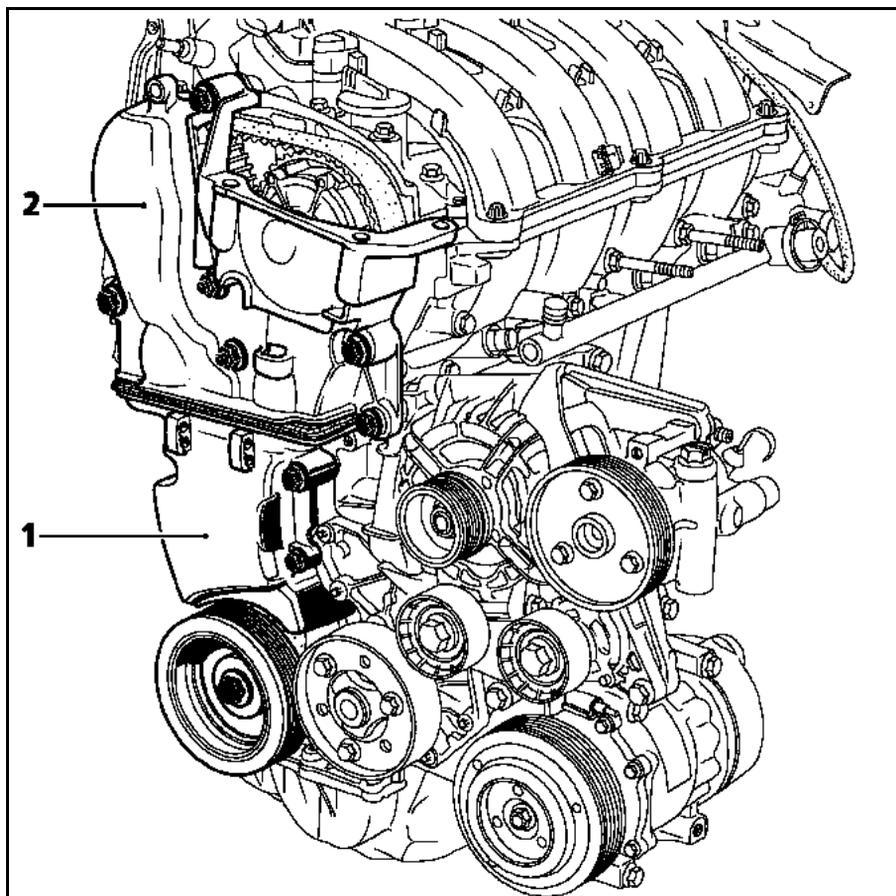
11

Remove:

- the crankshaft pulley, locking the flywheel using a screwdriver,



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



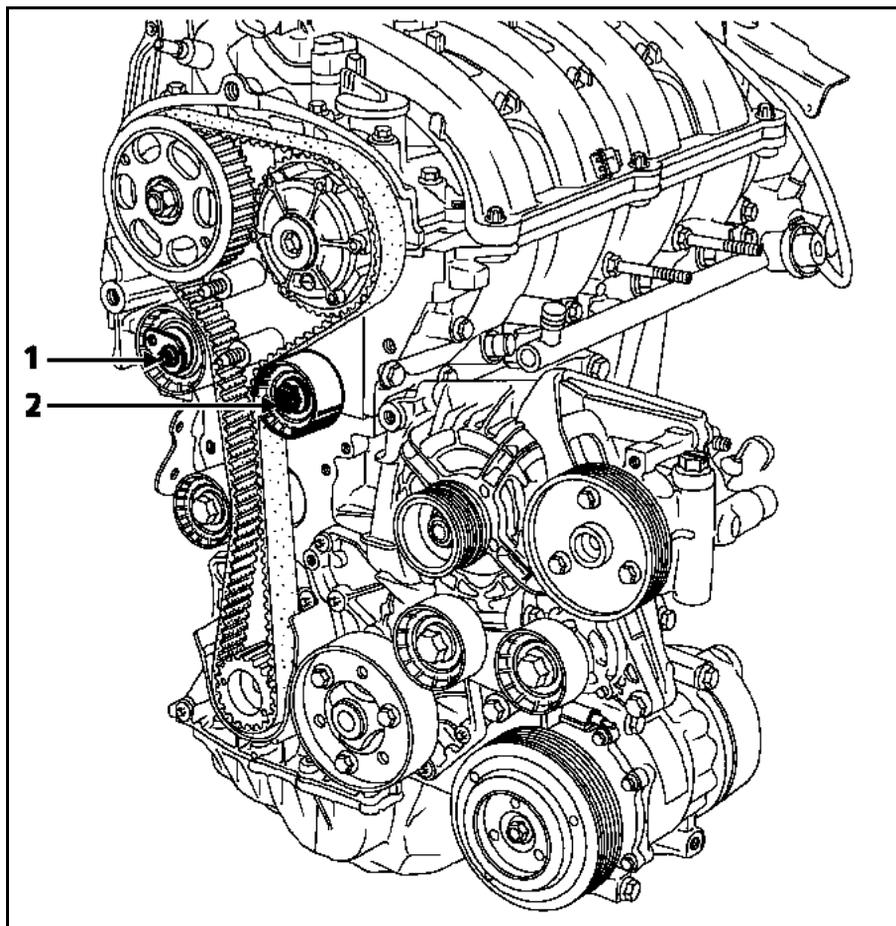
TOP AND FRONT OF ENGINE

Timing belt

11

Slacken the timing belt by undoing the nut (1) of the tensioning roller.

To remove the timing belt, remove the fixed roller (2), **taking care not to drop the crankshaft sprocket (as it does not have a collet).**



TOP AND FRONT OF ENGINE

Timing belt

11

IMPORTANT: it is essential to degrease the end of the crankshaft, the bore of the crankshaft sprocket and the bearing faces of the sprocket in order to prevent any slip between the timing which may destroy the engine.

REFITTING

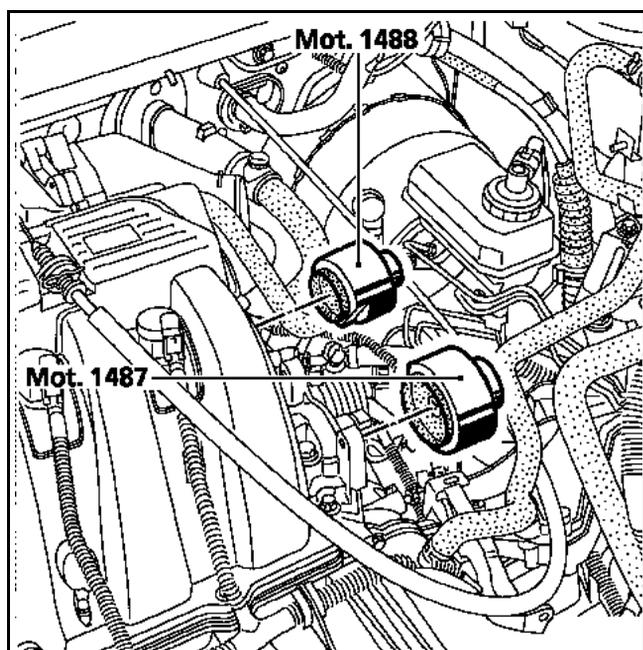
The tensioner and pulley must be replaced when the timing belt is replaced.

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

Refit:

- the timing belt (following exactly the procedure described in Section 07 Procedure for tensioning the timing belt),
- the accessories belt (see Section 07 Procedure for tensioning the accessories belt section),
- the plug of the Top Dead Centre pin, applying a drop of **RHODORSEAL 5661** to the thread,
- the new sealing plugs:
 - to the inlet camshaft (**Mot. 1487**),
 - of the outlet camshaft (**Mot. 1488**).

- the right-hand suspended engine mounting by tightening the bolts to torque. Adjust according to the procedure in Section 19 Suspended engine mounting,
- the inlet manifold (see Section 12 Inlet manifold).



TOP AND FRONT OF ENGINE

Cylinder head gasket

11

SPECIAL TOOLING REQUIRED	
Mot. 799-01	Timing gear wheel immobiliser
Mot. 1159 and Mot. 1159-02	Engine support tool on the sub-frame
Mot. 1368	Timing pulley tightening tool
Mot. 1453	Engine support
Mot. 1487	Tool for fitting inlet camshaft sealing plug
Mot. 1488	Tool for fitting exhaust camshaft sealing plug
Mot. 1054	TDC setting pin
Mot. 1496	Camshaft setting tool
Mot. 1509 and Mot. 1509-01	Tool for locking the camshaft pulleys
Mot. 1512	Tool for fitting exhaust camshaft seals
Mot. 1513	Tool for fitting camshaft dephaser solenoid valve seals
Mot. 1517	Tool for fitting inlet camshaft seals
EQUIPMENT REQUIRED	
Tool for testing cylinder head	
Angular torque wrench	

TIGHTENING TORQUES (in daNm and/or °)	
Wheel bolts	9
Tensioner wheel bolt	4.5
Accessories pulley bolt	2 + 135° ± 15°
Tension wheel nut	2.8
Exhaust camshaft pulley nuts	3 + 86°
Cylinder head bolts	1.2
Oil decanter bolts	1.3
Suspended engine mounting bolt	6.2
Engine tie-bar bolt	6.2
Camshaft dephaser bolt	10

REMOVAL

Position the vehicle on a two-post lift.

Disconnect the battery.

Remove the engine undertray and the front right-hand wheel arch liner.

Drain the cooling circuit (through the radiator bottom hose).

Fit:

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

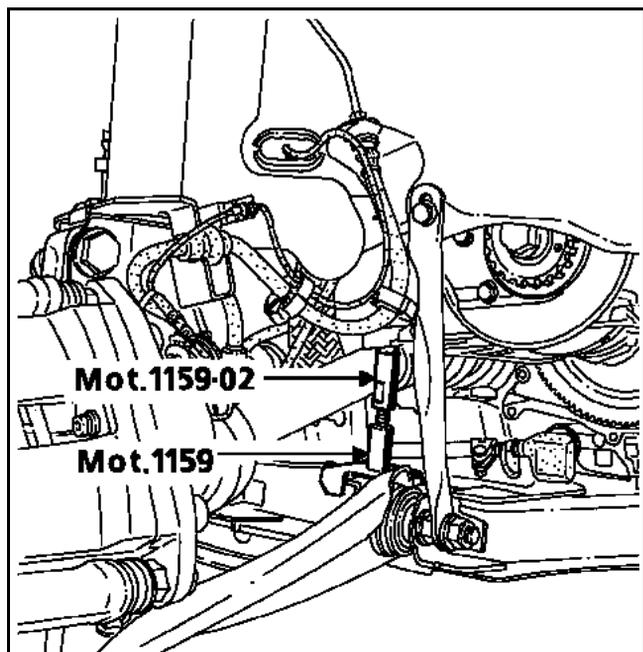
TOP AND FRONT OF ENGINE

Cylinder head gasket

11

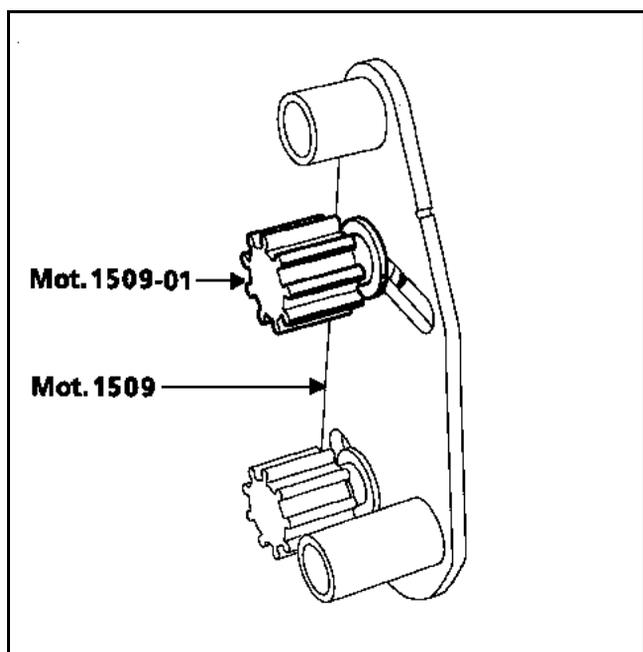
Remove the timing belt (see the procedure described in section 11 **Timing belt**).

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



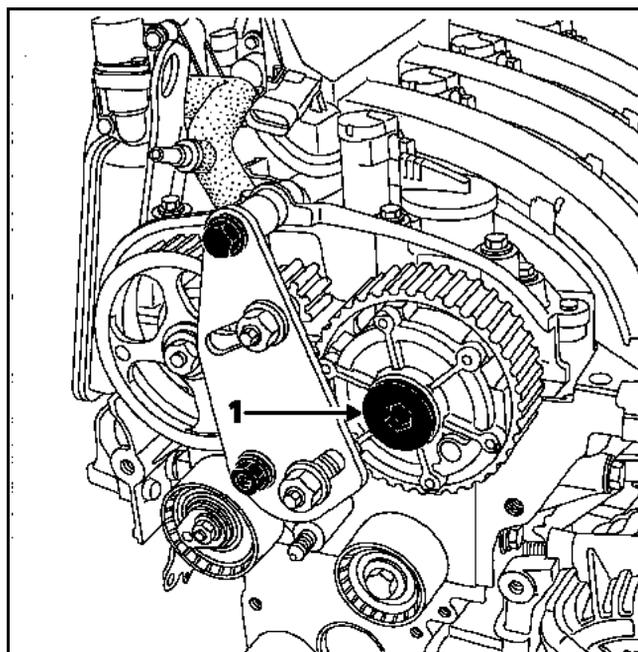
Remove the engine support.

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

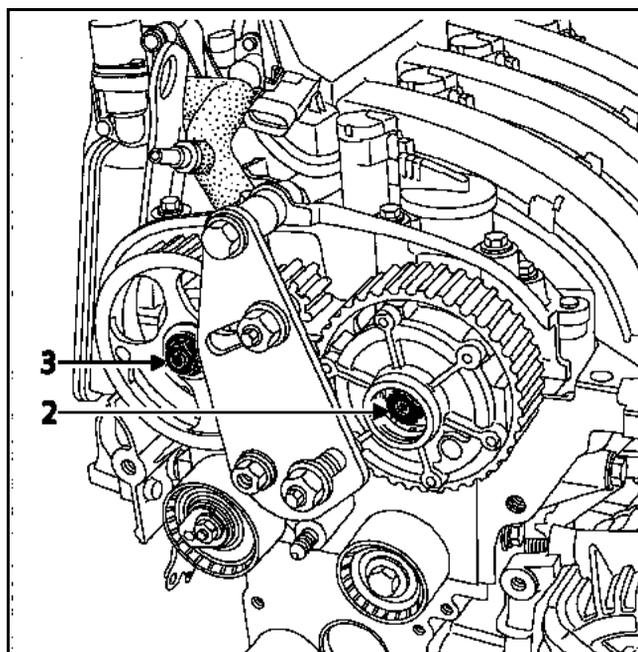


Fit **Mot. 1509** on the engine, in order to lock the camshaft pulleys.

NOTE: fit the spacers from the kit **Mot. 1509-01** and use the timing cover mountings (see Section 07).



Remove the inlet camshaft dephaser plug (1).



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

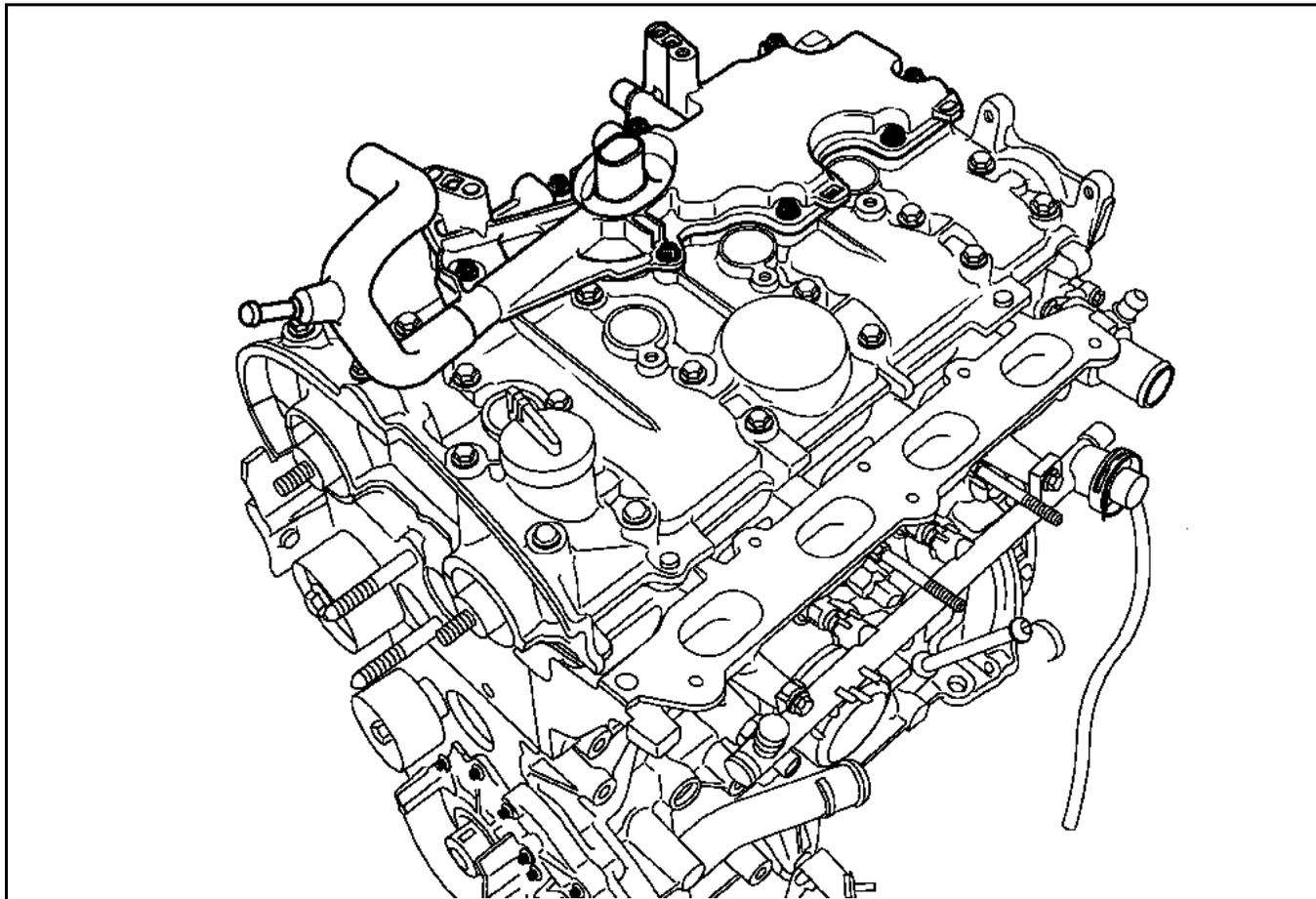
TOP AND FRONT OF ENGINE

Cylinder head gasket

11

Remove:

- the lifting bracket,
- the oil decanter,



- the injector rail protection,
- the injector rail.

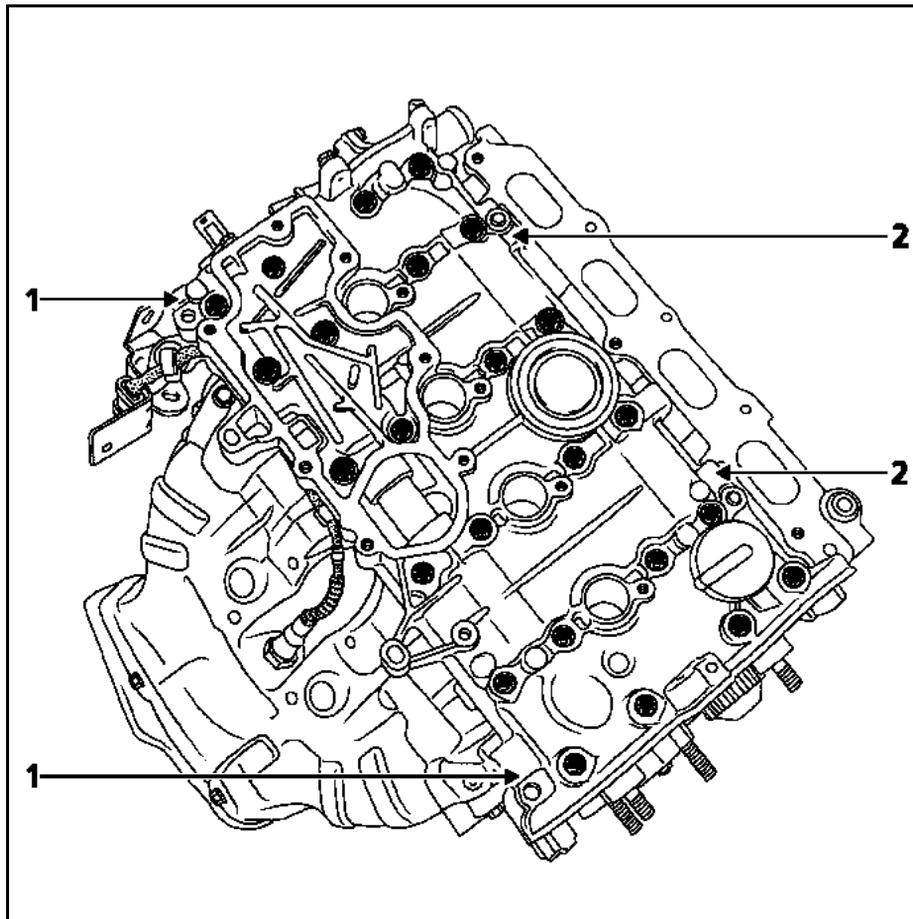
NOTE: be careful when operating on the fuel circuit as there will be fuel in the injector rail. Protect sensitive components.

TOP AND FRONT OF ENGINE

Cylinder head gasket

11

Remove the bolts of the cylinder head cover, then release it vertically by tapping on the **lugs** at (1) using a copper hammer and lever it using a screwdriver at (2) (protect the screwdriver to avoid damaging the aluminium surfaces).

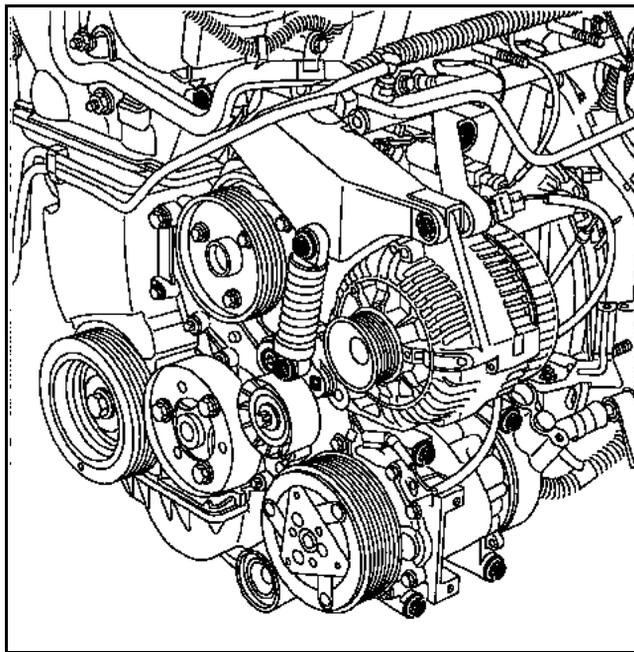


TOP AND FRONT OF ENGINE

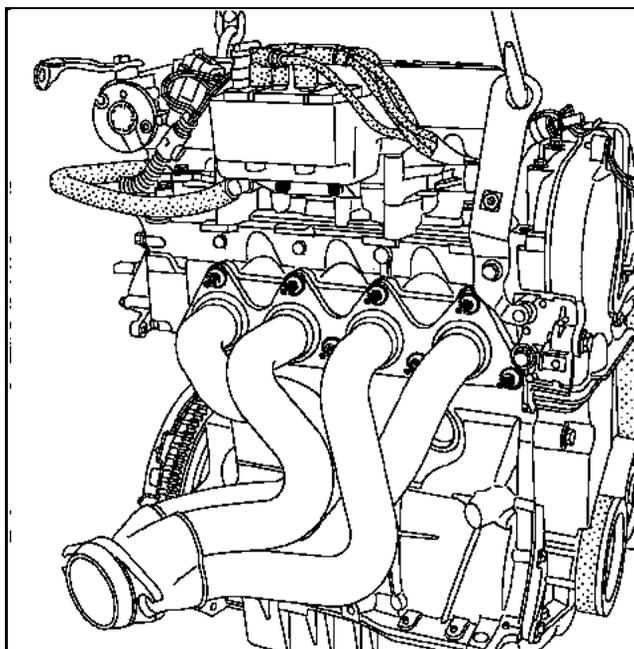
Cylinder head gasket

Remove:

- the camshafts and the valve rockers,
- the hoses on the cylinder head water outlet housing as well as the coolant temperature sensor connector,
- the electrical harness bracket mountings,



- the exhaust manifold,

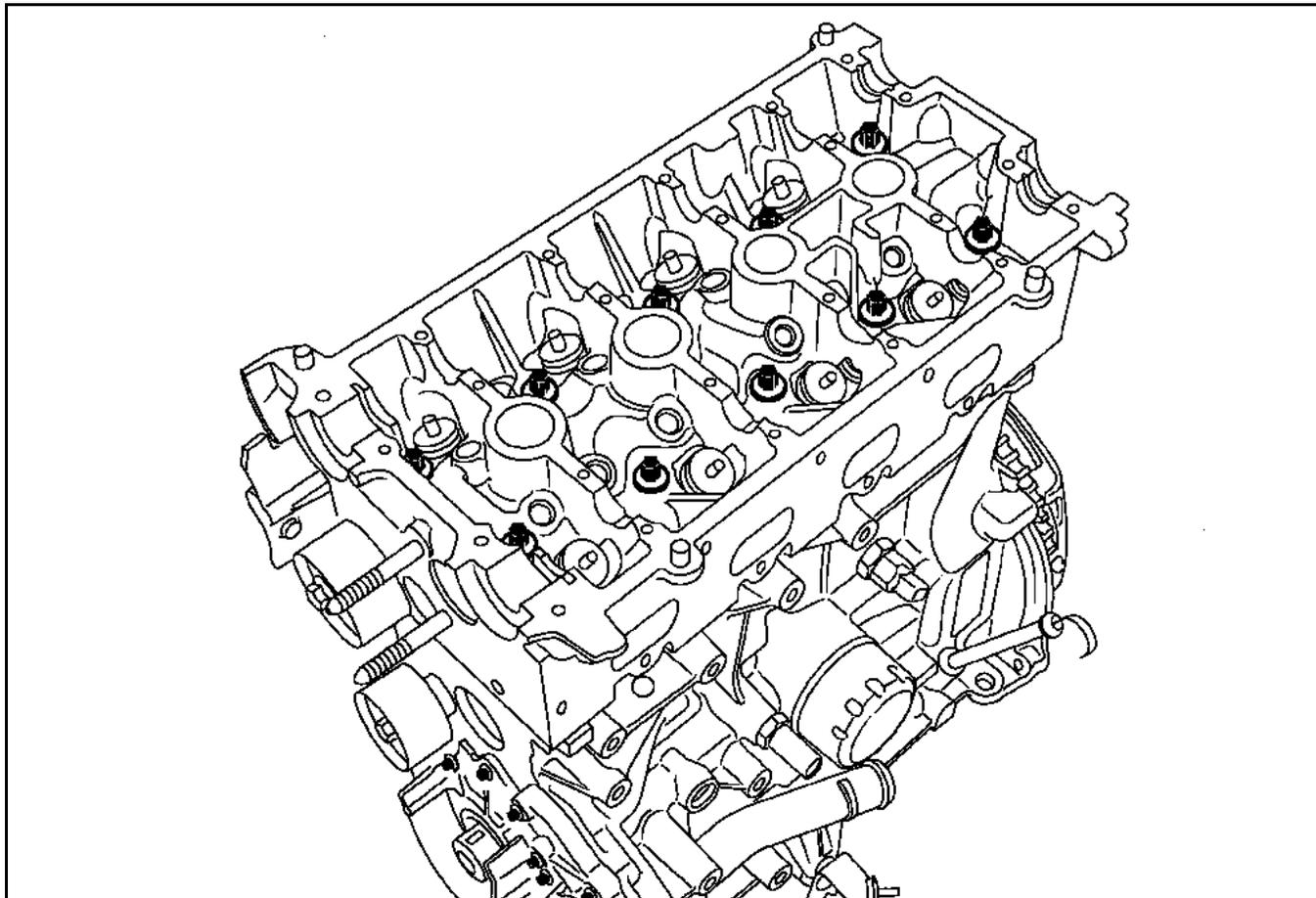


TOP AND FRONT OF ENGINE

Cylinder head gasket

11

– the cylinder head.



CLEANING

It is very important not to scratch the gasket faces of any aluminium component.

Use the **Décapjoint** product to dissolve any remains of the gasket still adhering.

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

Wear gloves whilst carrying out this operation.

Please take the greatest care during this operation to prevent the entry of foreign bodies into the oil galleries (channels located in the cylinder block and in the cylinder head).

CHECKING THE GASKET FACE

Check for gasket face bow.

Maximum bow: **0.05 mm**.

No regrinding of the cylinder head is permitted.

Check the cylinder head for cracks.

TOP AND FRONT OF ENGINE

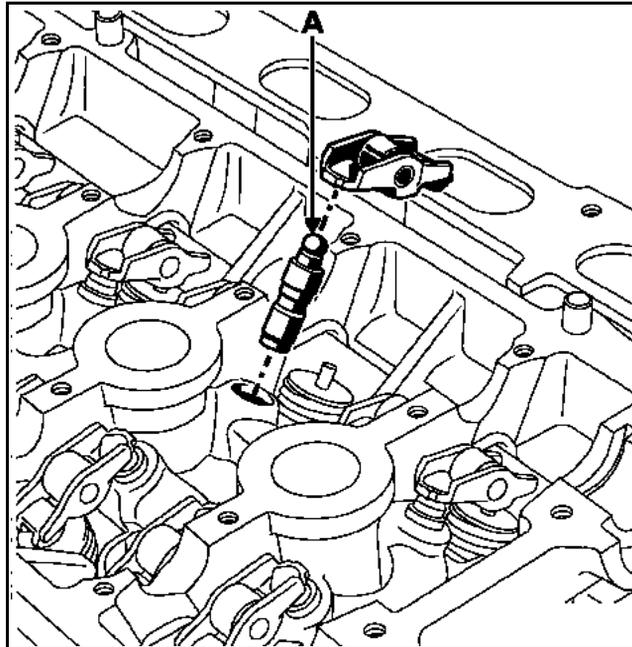
Cylinder head gasket

11

REFITTING

Observe the following points when dismantling and refitting the cylinder head:

- It is important to re-prime the hydraulic tappets as these may become drained after a long time. To check whether they need repriming, press the top of the tappet at (A) with your thumb and if the tappet piston can be pressed down, immerse the tappet in a container filled with diesel then refit.

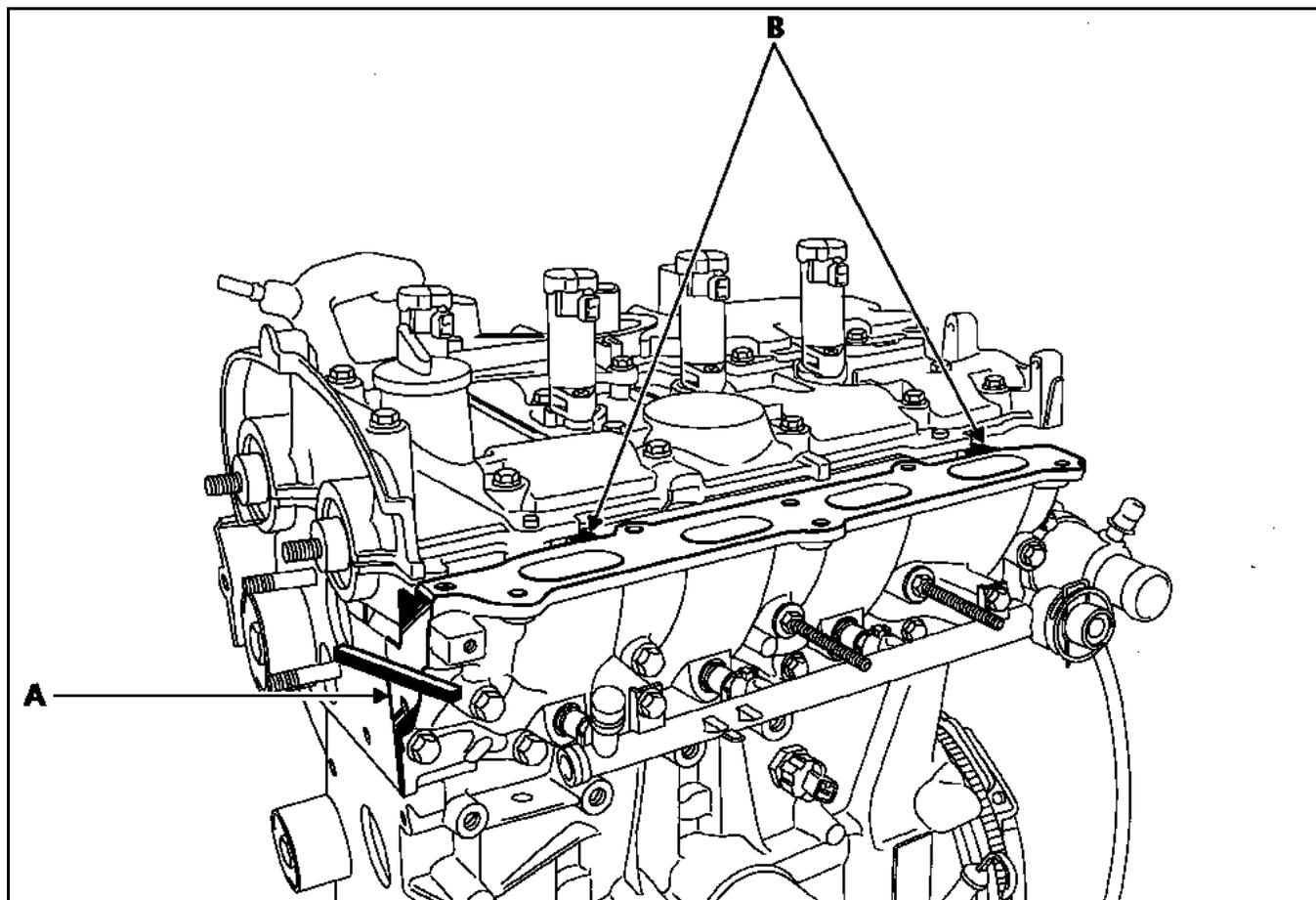


TOP AND FRONT OF ENGINE

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 making proper contact with those of the rocker cover.

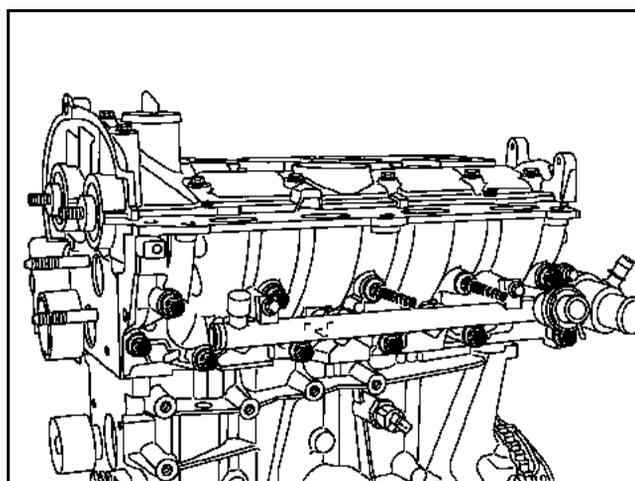


The lower inlet manifold must be tightened to a torque of **2.1 daNm**.

Position the pistons at mid-stroke to prevent any contact with the valves when the camshafts are being refitted.

Position the cylinder head gasket and then the cylinder head.

Check the bolts then tighten the cylinder head (see Section 07 Tightening the cylinder head).



TOP AND FRONT OF ENGINE

Cylinder head gasket

11

Refit:

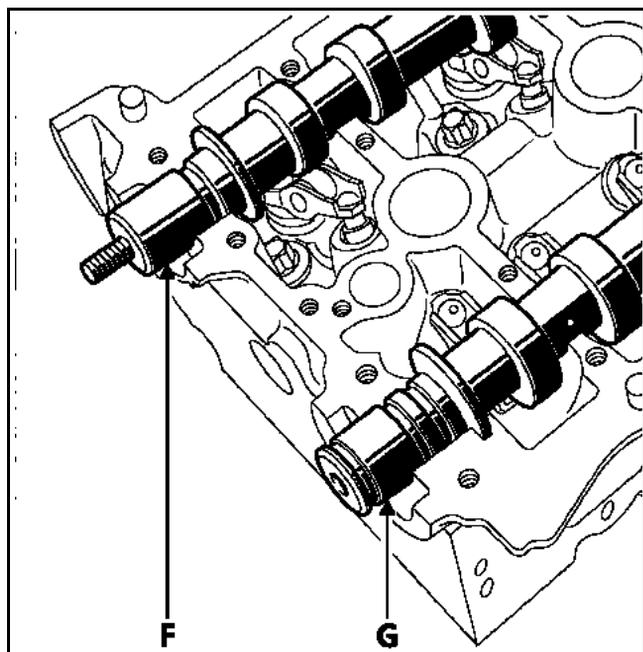
- the valve rockers,
- the camshafts, oiling the bearings.

IMPORTANT: do not put oil on the gasket face of the cylinder head cover.

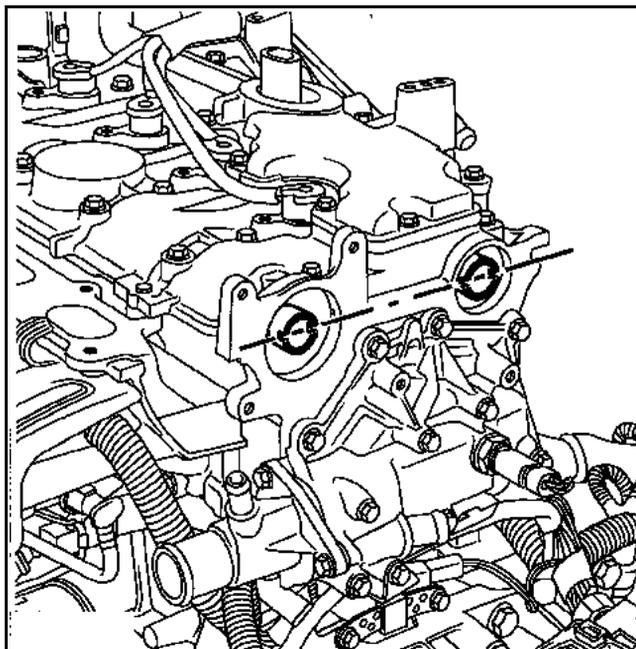
The camshafts are identified by the pulley mountings.

Details of the pulley mountings:

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

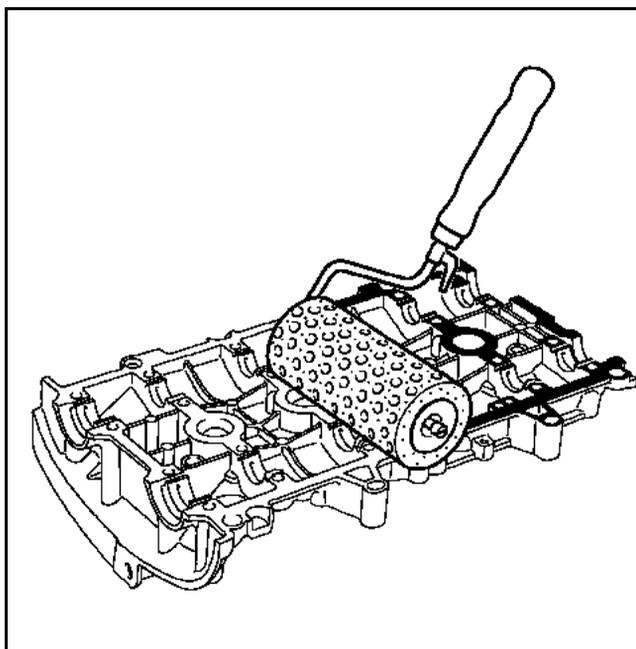


Position the camshaft grooves horizontal and off-centred downward as shown in the following illustration.



NOTE: the gasket faces must be clean, dry and free from grease (avoid finger marks).

Apply **Loctite 518** using a stipple roller to the gasket face of the cylinder head cover until it turns **reddish in colour**.



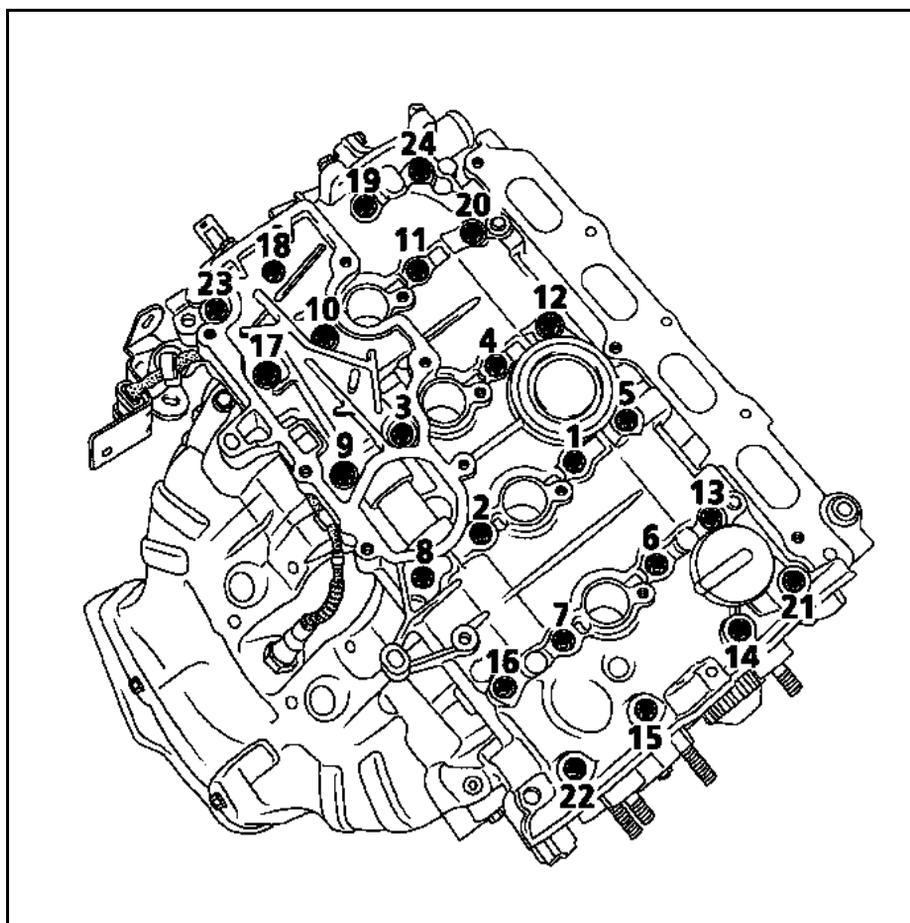
TOP AND FRONT OF ENGINE

Cylinder head gasket

Refit the cylinder head cover, tightening it to the correct torque.

Tightening procedure

Assembly	Bolt tightening order	Bolt slackening order	Tightening torque (in daNm)
Operation no. 1	22-23-20-13	-	0.8
Operation no. 2	1 to 12 14 to 19 21 and 24	-	1.2
Operation no. 3	-	22-23-20-13	-
Operation no. 4	22-23-20-13	-	1.2



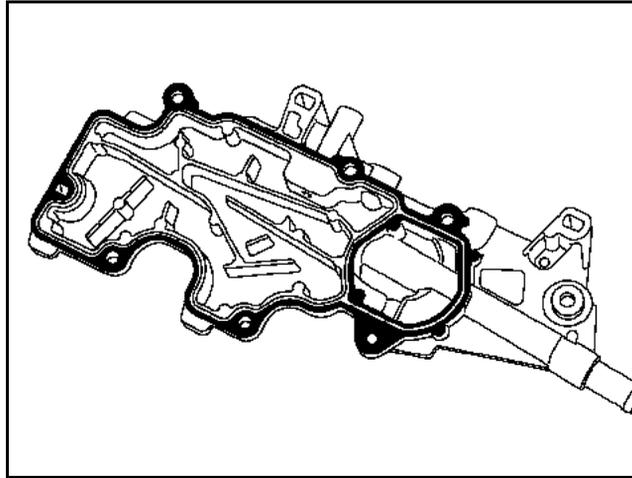
TOP AND FRONT OF ENGINE

Cylinder head gasket

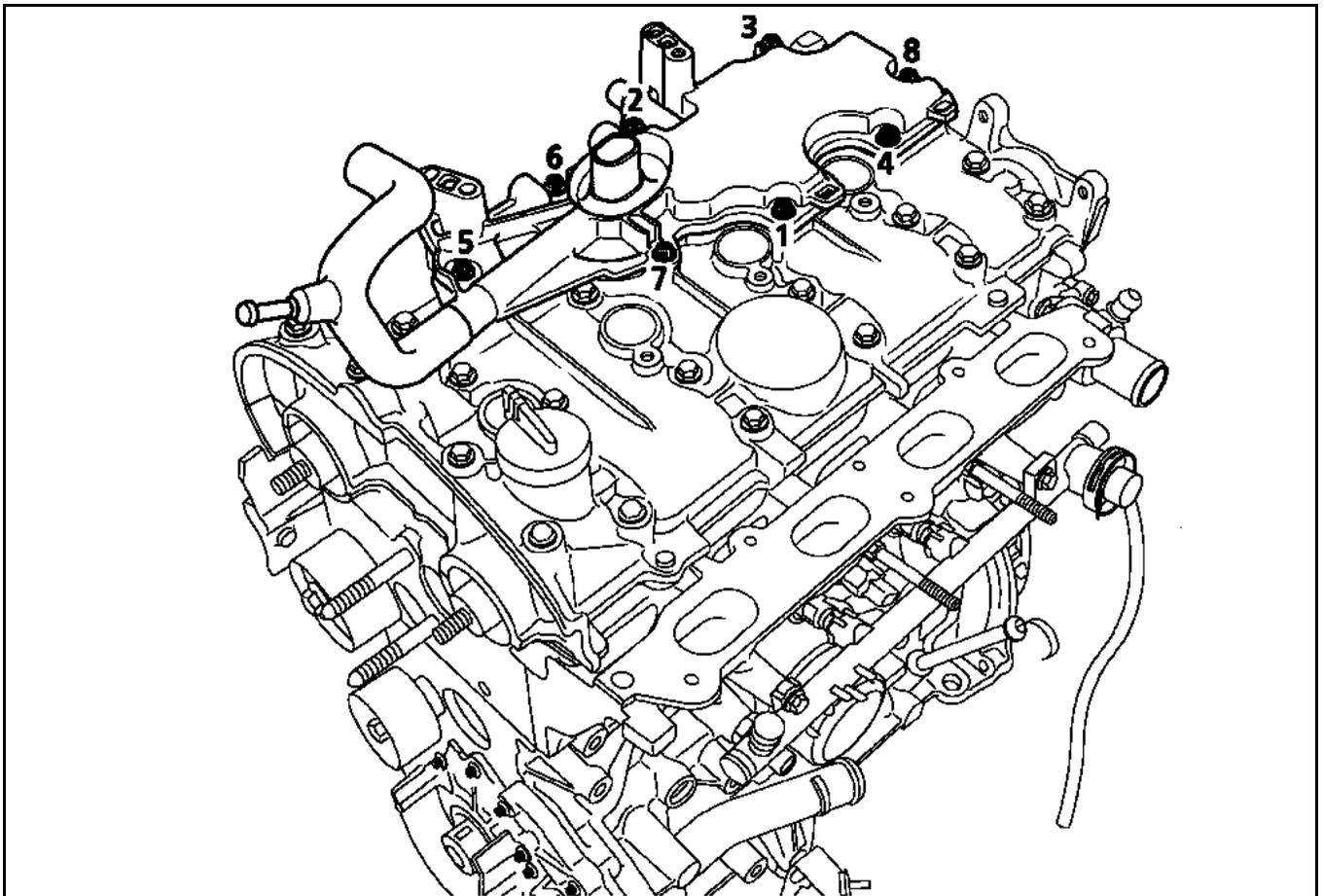
11

NOTE: the gasket faces must be clean, dry and free from grease (avoid finger marks).

Apply **Loctite 518** using a stipple roller to the gasket face of the oil decanter until it turns **reddish in colour**.



Fit the oil decanter and tighten it to a torque of **1.3 daNm** in the recommended order.



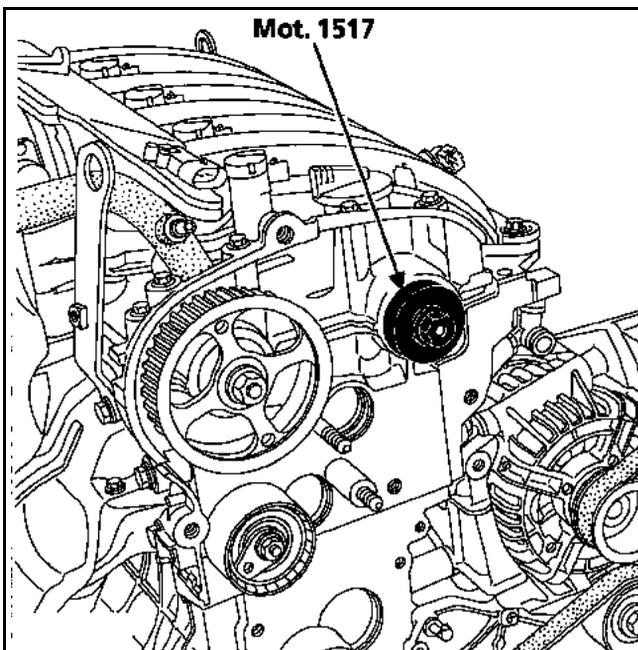
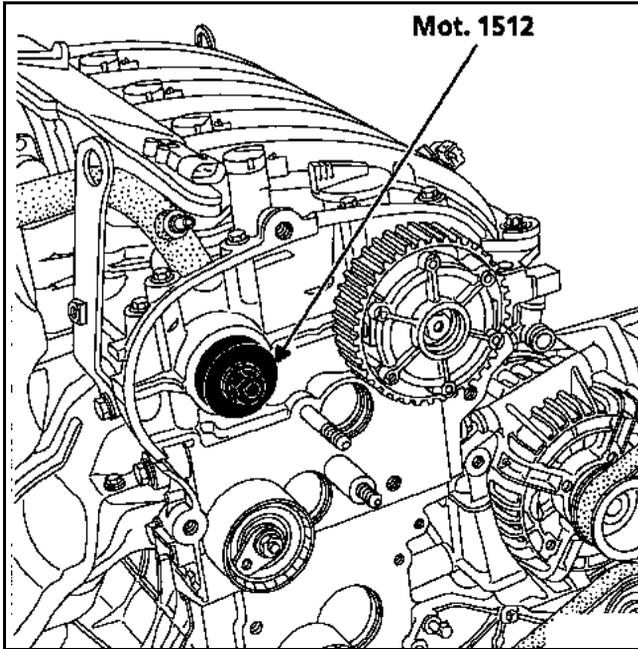
Refit the exhaust manifold (refer to the procedure in Section **12 Exhaust manifold**).

TOP AND FRONT OF ENGINE

Cylinder head gasket

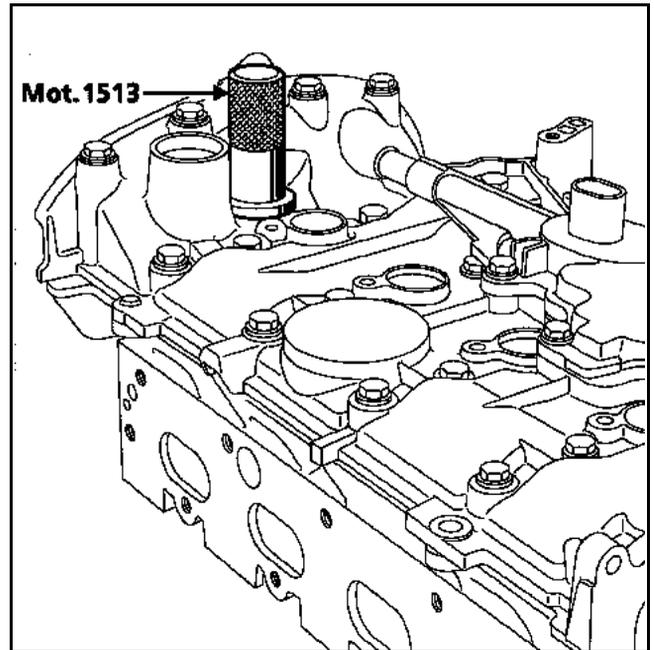
11

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



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

Replace the camshaft dephaser solenoid valve seal using **Mot. 1513**.



Refit the solenoid valve.

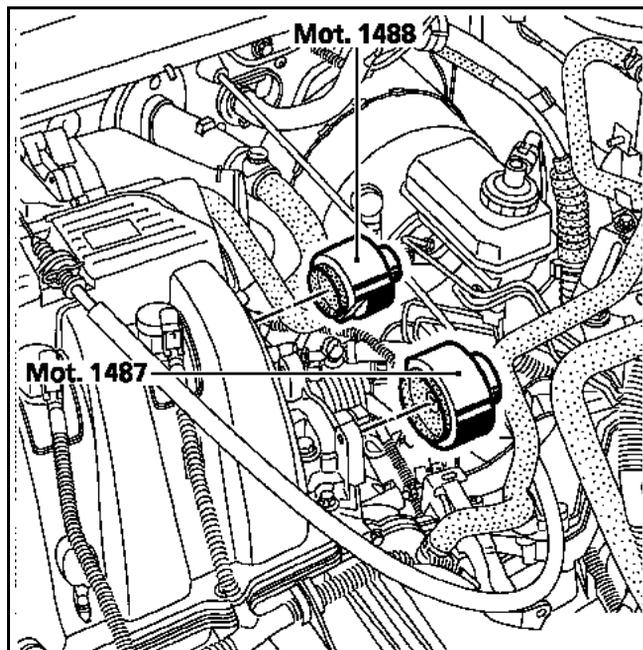
TOP AND FRONT OF ENGINE

Cylinder head gasket

11

Timing adjustment

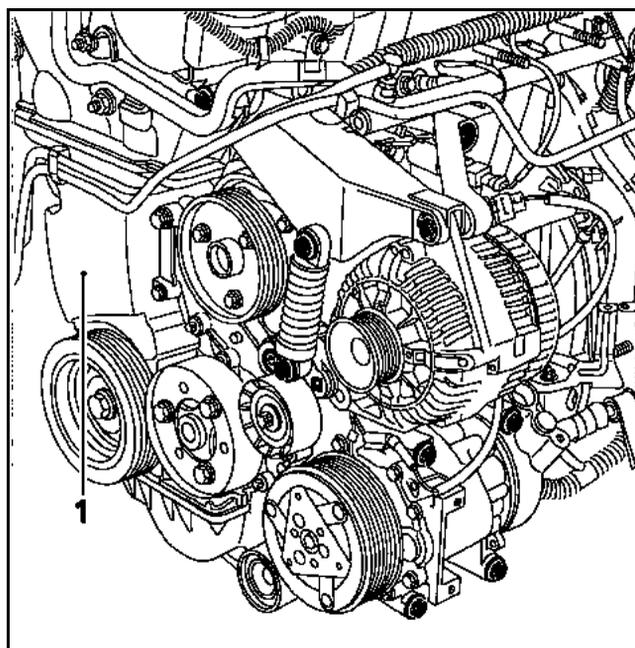
IMPORTANT: it is essential to refit the intermediate timing cover (1) before the accessories pulley.



IMPORTANT: it is essential to degrease the end of the crankshaft, the bore of the timing sprocket, the bearing faces of the pulley, the ends of the camshafts (timing side) and the bores of the camshaft sprockets to prevent the timing from slipping, which could damage the engine.

Refit:

- the timing belt (it is essential to observe the procedure described in Section **07 Procedure for tensioning the timing belt**), do not forget the camshaft dephaser plug,
- the accessories belt (see Section **07A Accessories belt**),
- the new sealing plugs:
 - to the inlet camshaft (**Mot. 1487**),
 - to the exhaust camshaft (**Mot. 1488**),



- the suspended engine mounting and the engine tie-bar by tightening them to torque (see Section **19D Suspended engine mounting**),
- the inlet manifold (see the procedure in Section **12 Inlet manifold**).

Refitting is in the reverse order to removal.

Fill and bleed the cooling circuit (see Section **19 Filling-bleeding**).

FUEL MIXTURE Specifications

12

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

Engine		Tests at idle speed*					Fuel *** (minimum octane rating)
		Engine speed (rpm)	Emission of pollutants **				
Type	Suffix		CO (%) (1)	CO ₂ (%)	HC (ppm)	Oxygen (λ)	
F4R	730	800 ±50	0.5 max	14.5 min	100 max	0.97 < λ < 1.03	Unleaded (OR 95)

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

* For a coolant temperature above 80 °C and after engine speed has settled at 2500 rpm for approximately 30 seconds. Test to be carried out after return to idle speed.

** For legal values refer to your country specification.

*** 91 RON unleaded compatible.

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 1,880	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

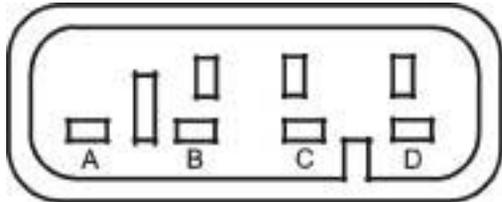
FUEL MIXTURE Specifications

12

DESCRIPTION	MANUFACTURER/ TYPE	SPECIAL NOTES
Computer	SIEMENS "SIRIUS"	90 tracks
Injection	-	Sequential multipoint Inlet camshaft dephaser
Stepper-motor	STEEP PLASTIC	Resistance \approx 50 Ω to 25 °C
Throttle position potentiometer	MAGNETI MARELLI	Integrated in the throttle valve Track resistance (tracks B - C): 1200 \pm 400 Ω Sliding contact resistance at no load (tracks A - C): 1000 \pm 200 Ω
Magnetic sensor (TDC and engine speed)	SIEMENS	Resistance = 200 to 270 Ω
Canister solenoid valve	SAGEM	Integrated in the canister Resistance: 26 \pm 4 Ω at 23 °C
Injector	MAGNETI PICO	Resistance: 14.5 Ω at 20 °C Fuel flow: 0.7 cm³/min. max
Pressure sensor	DELCO ELECTRONICS	Resistance \approx 50 KΩ
Pinking sensor	SAGEM	Piezo-electric type - Tightening to 2 daNm
Oxygen sensor	BOSCH	80 tracks (earth) and 45 (signal) Heating resistance: 6 \pm 1 Ω at 23 °C Rich mixture > 750 \pm 70 mvolts Lean mixture < 150 \pm 50 mvolts

FUEL MIXTURE Specifications

12

DESCRIPTION	MANUFACTURER/ TYPE	SPECIAL NOTES
Ignition coil	SAGEM	<p>Monobloc coil with four outputs Primary resistance $\approx 0.5 \Omega$ Secondary resistance: $11 \pm 1 \text{ K}\Omega$ Tightening to $0.9 \pm 0.1 \text{ daNm}$ 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 from 2.5 to 3 daNm
Idle speed manifold pressure	-	320 to 500 mbars
Submerged fuel pump	WALBRO	Pressure: 3 bar \pm 0.06 to 80 l/h
Camshaft dephaser solenoid valve	AISIN	Resistance: 7.1 \pm 0.5 Ω

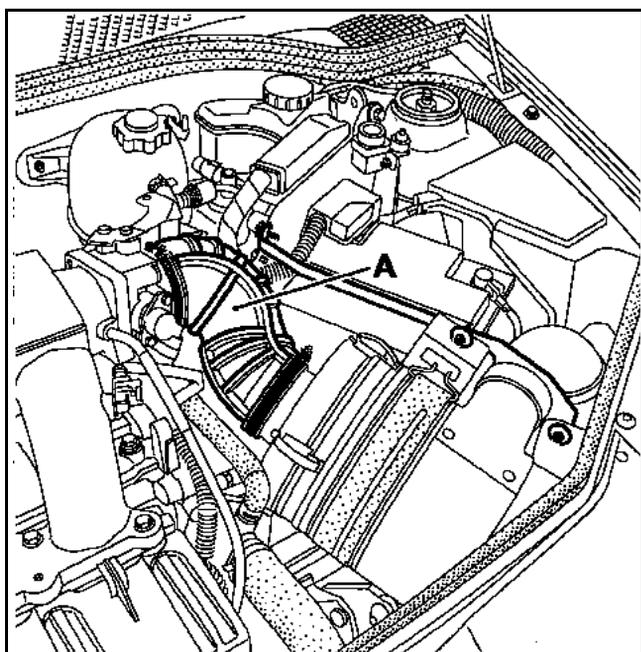
TIGHTENING TORQUES (in daNm) 	
Inlet manifold mounting bolts	1.1 ± 0.2
Throttle valve bolt	1.3

REMOVAL

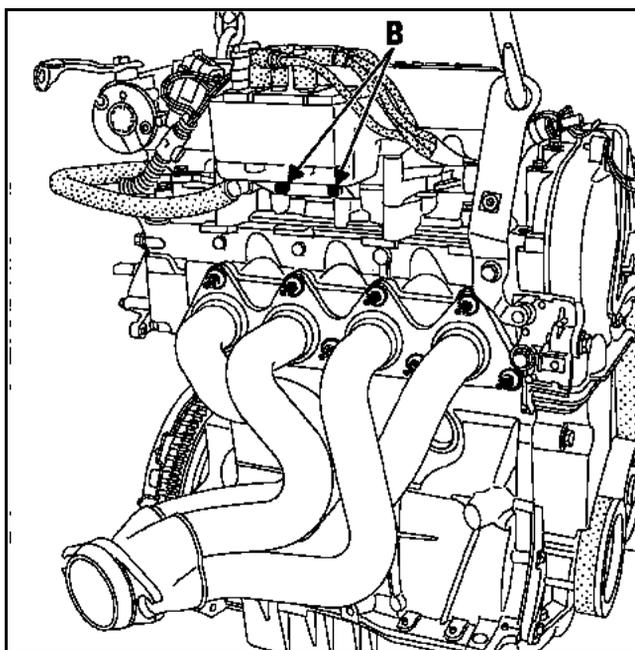
Disconnect the battery.

Remove:

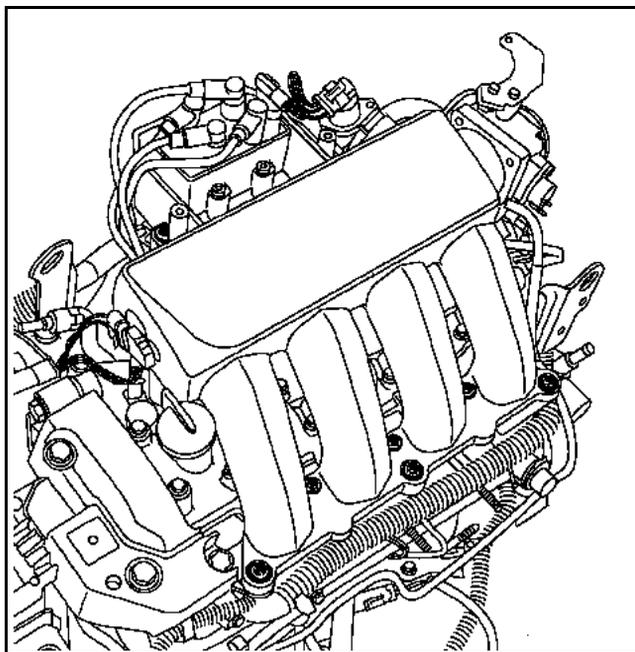
- the air duct (A),



- the air temperature pressure sensor connectors,
- the ignition coil,
- the ignition wiring harness,
- the accelerator cable,
- the throttle potentiometer,
- the oil vapour and idle pipes,
- the inlet manifold mounting bolts (B) above the exhaust manifold,



- the inlet manifold mounting bolts.



REFITTING

Refit:

- the inlet manifold by replacing the seals and respecting the tightening torque and tightening order,
- the coil, throttle valve and ignition wiring harness connectors,
- the air duct.

IMPORTANT: take care not to rub the clip or air duct against the injection computer wiring harness.

It is essential to replace the oil decanter seal and ensure it is correctly positioned.

FUEL MIXTURE

Injector holder shim

12

SPECIAL TOOLING REQUIRED

Mot. 1453 Engine support tool

TIGHTENING TORQUES (in daNm)



Inlet manifold mounting bolts	1.1 ± 0.2
Injector holder shim bolt	2.1 ± 0.2

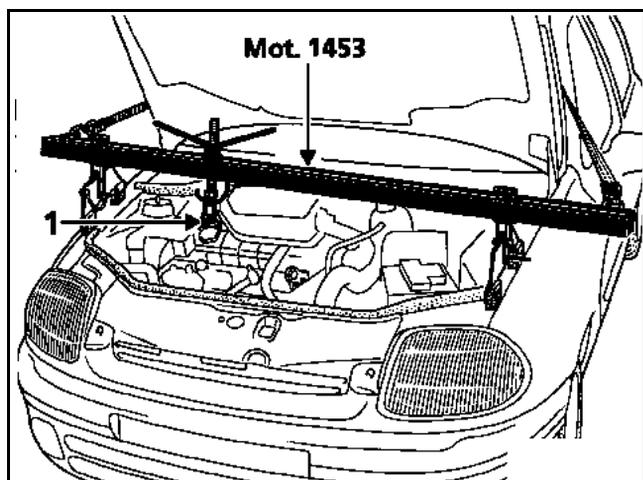
REMOVAL

Disconnect the battery.

Remove:

- the air duct,
- the inlet manifold (see procedure on the previous page).

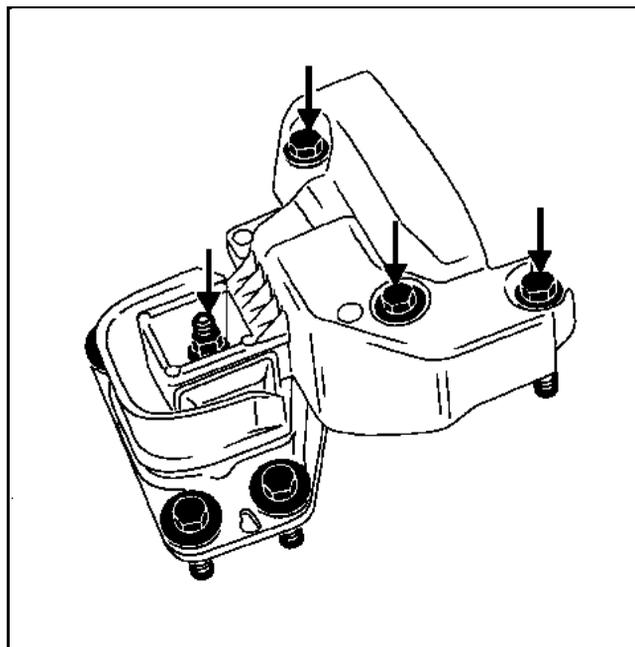
Position the engine mounting. To do this, position the lifting hook (1).



NOTE: when doing this make sure that the feet of the engine support tool are positioned on the rigid sections of the wings.

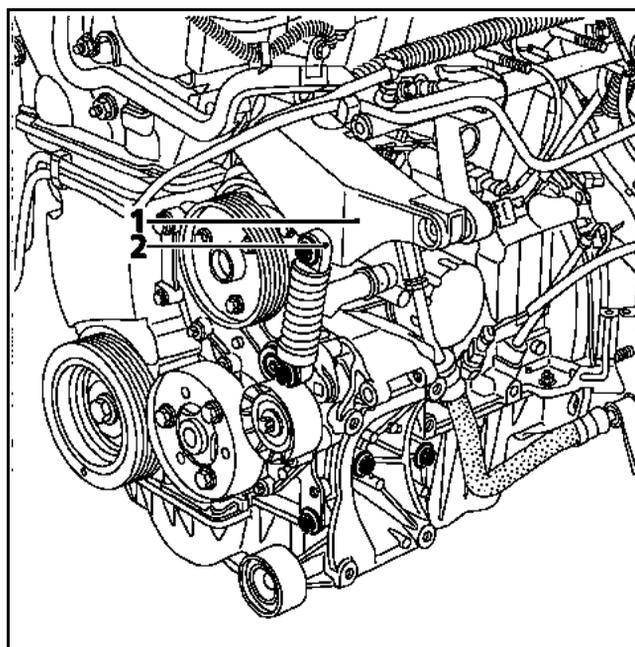
Remove:

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



- the accessories belt,
- the injector rail protection,
- the injector rail,
- the upper alternator mounting (1),
- the tensioning roller spring (2).

IMPORTANT: when removing the fuel pipes, protect sensitive components.

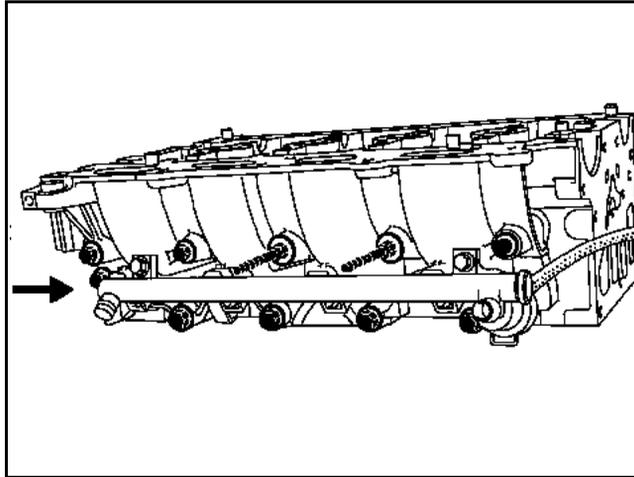


FUEL MIXTURE

Injector holder shim

12

Remove the mounting bolts from the injector holder shims.



FUEL MIXTURE

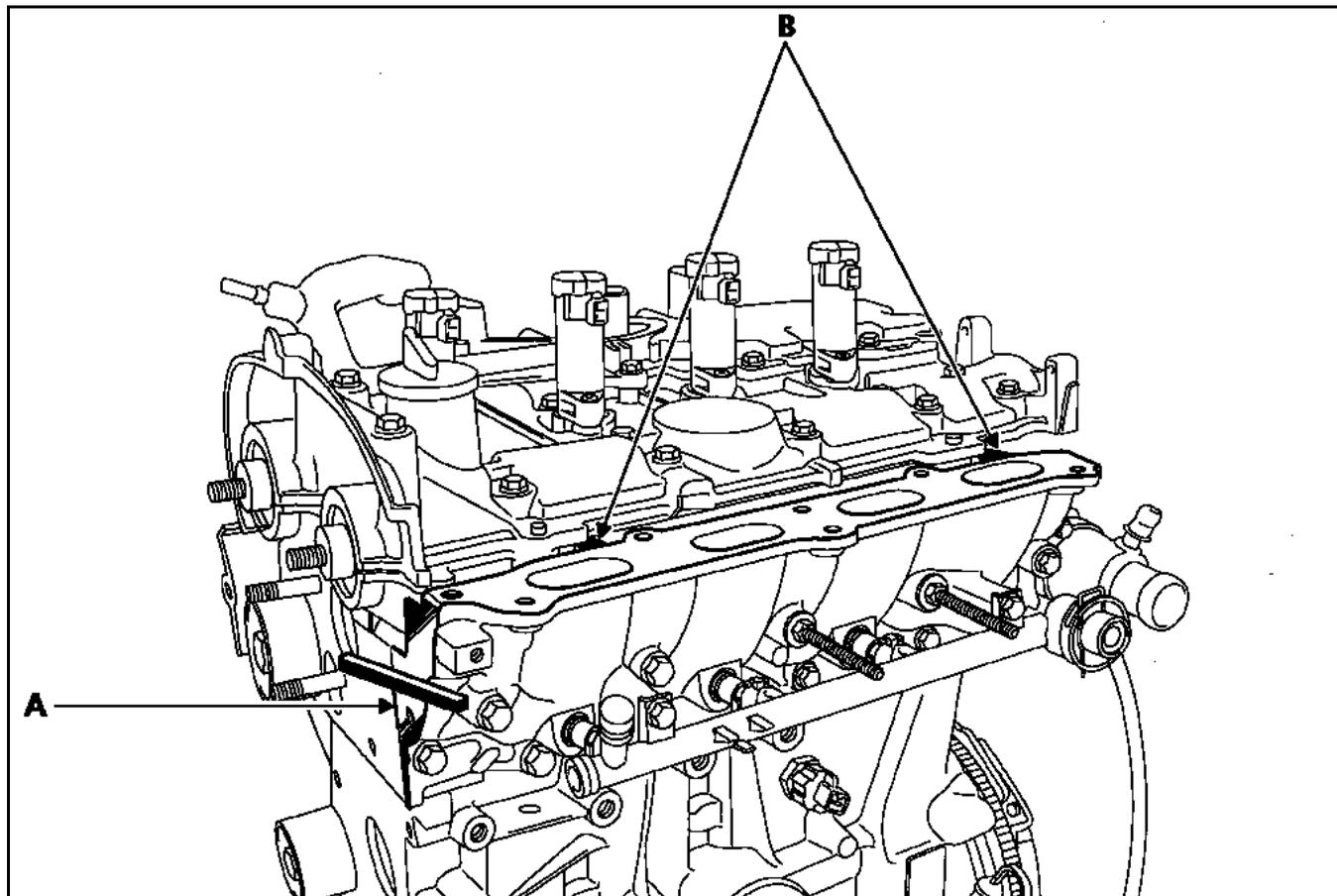
Injector holder shim

12

REFITTING

Replace the seal.

Check the alignment (at A) between the inlet shim and the cylinder head, ensuring that the shim is touching (at B) the rocker cover.



To refit, fit the bolts for the injector holder shim (inlet), alternator upper mounting, and tensioning roller spring and finger tighten them.

Respect the tightening torques for the injector holder shim mounting bolts.

To refit the inlet manifold, consult the procedure in Section **12 Inlet manifold**

TIGHTENING TORQUES (in daNm) 	
Exhaust manifold mounting nuts	1.8 ± 0.2
Inlet manifold mounting nuts	1.1 ± 0.2
Engine tie-bar	6.2 ± 0.6

REMOVAL

Position the vehicle on a two-post lift.

Disconnect the battery.

From below:

Remove:

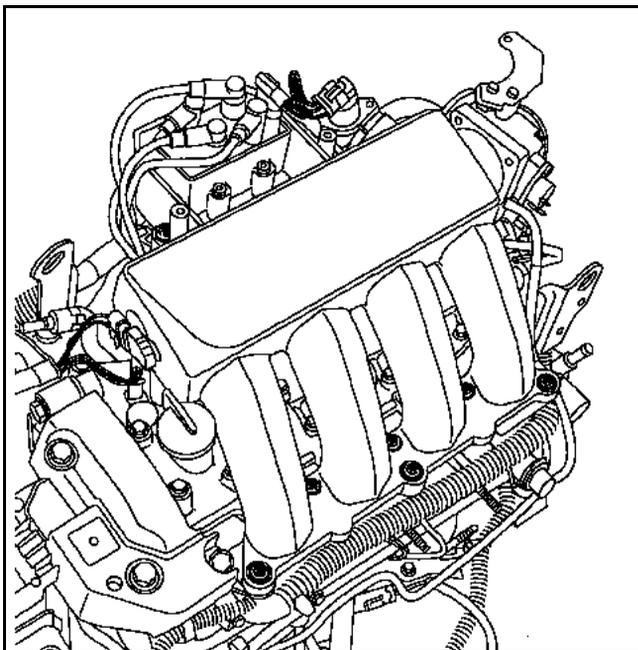
- the engine tie-bar,
- the manifold and catalytic converter connection mounting.

Disconnect the oxygen sensor connector.

Remove the exhaust system and catalytic converter connection mounting, then remove it.

From above:

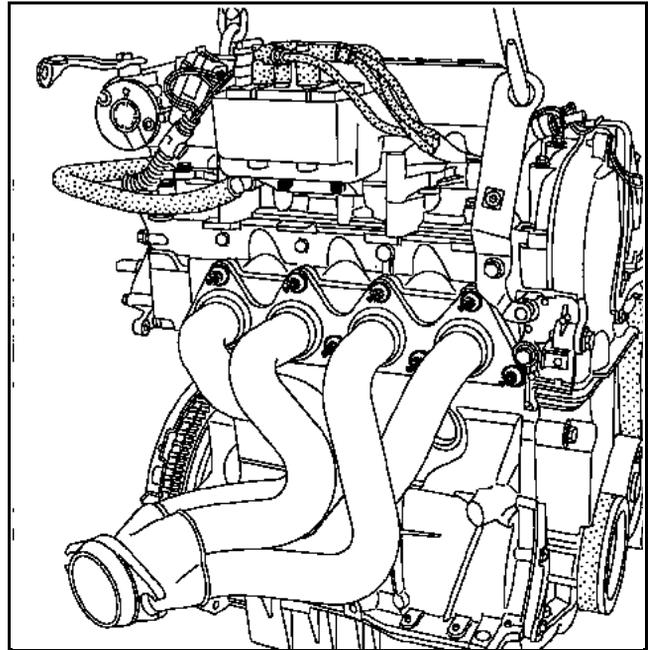
Remove the inlet manifold (see procedure in Section 12 Inlet manifold).



Move aside the coolant reservoir without removing it.

Remove the mounting nuts for the exhaust manifold.

Gently remove the exhaust manifold, taking care not to damage the bulkhead heat shield.



REFITTING

Replace all the seals that have been removed (inlet manifold gasket, exhaust manifold gasket, manifold connection/exhaust expansion valve and oil decanter seals).

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

Make sure that the bulkhead and starter heat shields are correctly positioned and in good condition.

To refit the inlet manifold, consult the procedure in Section 12 Inlet manifold.

OPERATING PRINCIPLE

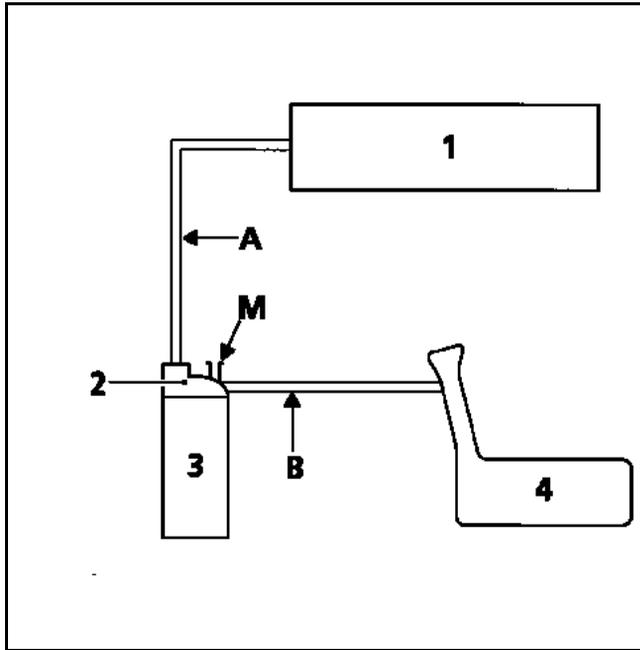
The anti-percolation system is controlled directly by the injection computer.

The coolant temperature signal is taken from the injection coolant temperature sensor (see Section 17 **Centralised coolant temperature management**).

The injection computer enters monitoring mode after the ignition is switched off. If the engine coolant temperature exceeds the threshold of **108°C** during the two minutes after the engine is switched off, the fan low speed relay is supplied.

If the temperature falls below **100 °C**, the fan assembly relay is cut off (the fan assembly cannot operate for longer than **12 minutes**).

OPERATING DIAGRAM OF THE CIRCUIT



- 1 Inlet manifold
- 2 Integrated canister bleed solenoid valve
- 3 Fuel vapour absorber (canister) with solenoid valve
- 4 Fuel tank
- M Breather
- A Canister pipe (inlet manifold)
- B Canister/tank pipe

CANISTER BLEED CONDITIONS

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

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

The opening cyclic ratio of the canister bleed solenoid valve can be viewed using the diagnostic tool, by using the Canister bleed solenoid valve OCR parameter.

The solenoid valve is closed for 1.5 % or less (minimum value).

CHECKING CANISTER BLEED OPERATION

Incorrect operation of the system may result in rough idle or engine stalling.

Check the conformity of the circuit (see operating diagram) and the condition of the pipes to the tank (refer to MR 337).

STARTING/CHARGING

Alternator

16

IDENTIFICATION

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

CHECKING

After **15 minutes** warming up at 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

SPECIAL TOOLING REQUIRED		
Mot.	1368	Tensioning roller bolt tightening tool
Mot.	1453	Engine support tool

TIGHTENING TORQUES (in daNm)	
Alternator upper mounting bolt	3.2 ± 0.3
Alternator lower mounting bolt	3.8 ± 0.4

REMOVAL

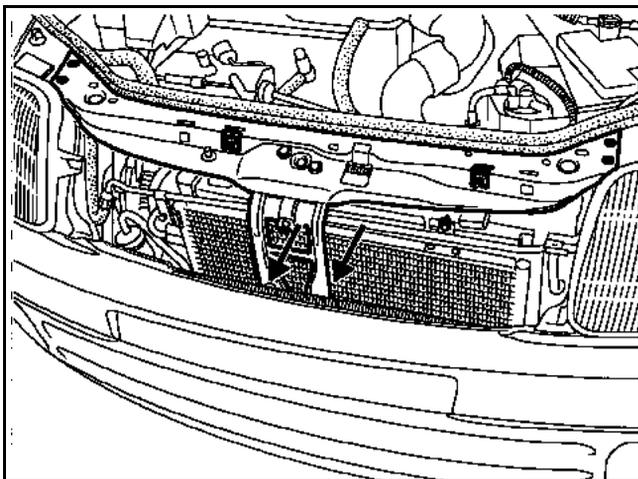
Position the vehicle on a two-post lift.

Disconnect the battery.

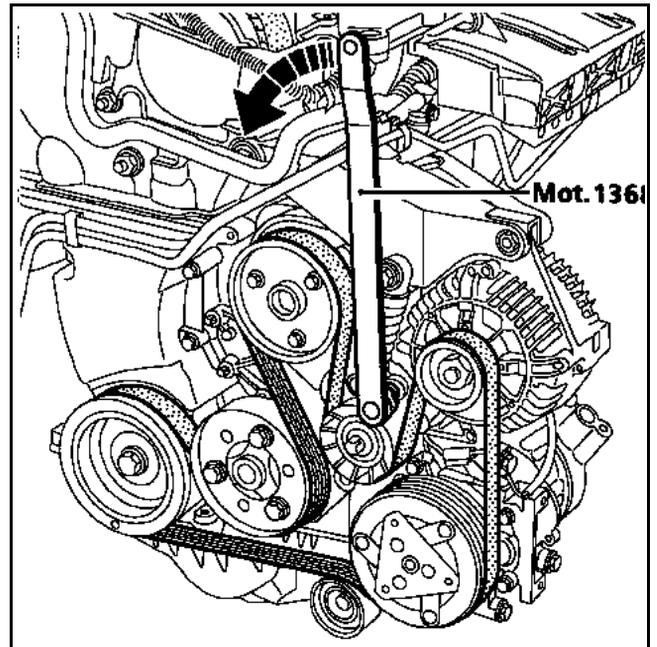
Fit the lifting hook and engine support tool **Mot. 1453**.

Remove:

- the front right-hand wheel and the wheel liner,
- the bumper and radiator grille,
- the upper cross member (by loosening the two lower mounting bolts) and fit it to the engine,



- the accessories belt (see Section **07 Accessories belt tension**) using **Mot. 1368**,
- the fuel supply pipe on the injector rail.



- the power-assisted steering pipe mounting on the alternator mounting,
- the upper alternator mounting,
- the alternator.

REFITTING

Refit in reverse order to removal.

Refer to Section **07 Accessories belt tension** for the tensioning procedure.

STARTING/CHARGING

Starter motor

IDENTIFICATION

Vehicle	Engine	Starter motor
CB0M	F4R 730	BOSCH 0001 1091

STARTING/CHARGING

Starter motor

16

TIGHTENING TORQUES (in daNm)	
Starter mounting bolts	3

REMOVAL

Position the vehicle on a two-post lift.

Disconnect the battery.

From below:

Disconnect:

- the starter excitation connector,
- the engine tie-bar.

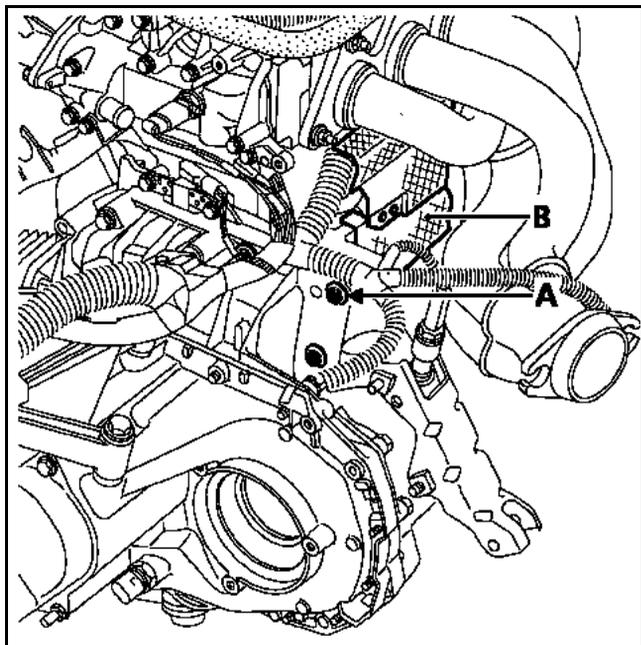
From above:

Remove:

- the air duct,
- the starter motor mounting bolts.

From below:

Remove the starter heat shield and remove the starter through the wheel arch.



REFITTING

Refitting is in the reverse order to removal.

Check for the centring dowel which should be located at (A).

It is essential to refit the starter heat shield (B).

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

- **SIEMENS SIRIUS 32 90-track** computer controlling injection and ignition.
- Use of diagnostic tools (except XR25).

Multipoint injection operating in sequential mode without a cylinder marking sensor or camshaft position sensor. This means that phasing is implemented in software using the TDC sensor. To implement phasing, drive at half-load in 2nd gear for approximately **1 minute**.

- Injection warning light on instrument panel not operational.

Special precautions relating to the engine immobiliser:

Installation of a 2nd generation engine immobiliser that requires a special procedure for replacing the computer.

- Idle speed
– nominal idle speed (coolant temperature > 80 °C) **800 ± 50 rpm.**
- Idling speed corrected depending on air conditioning status.
- Canister bleed solenoid valve controlled by opening cyclic ratio (OCR) depending on engine operation.
- Control of the fan assembly and of the coolant temperature warning light on the instrument panel by the injection computer.
- Control of a hydraulic inlet camshaft dephaser solenoid valve.
- Maximum engine speeds:
 - for coolant temperature < 75 °C **6700 rpm.**
 - for coolant temperature > 75 °C in 1st or 2nd gear **7200 rpm.**
 - for coolant temperature > 75 °C in 3rd, 4th or 5th gear **7000 rpm.**
- Gear change indicator light comes on approximately **300 rpm** before the maximum engine speed.

INJECTION

Immobiliser function

17

This vehicle is fitted with a 2nd generation engine immobiliser. The injection computer **MUST** have been programmed with the immobiliser code to operate.

REPLACING THE INJECTION COMPUTER

The computers are supplied uncoded. When a computer is replaced it must be programmed with the vehicle code, then checked to ensure that the immobiliser function is working properly.

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

CHECKING THE IMMOBILISER FUNCTION

Remove the key from the ignition switch, after 10 seconds the red engine immobiliser indicator light should flash (to check that it is impossible to start the engine, refer to Section 82 of **MR 337**).

TESTING AN UNCODED INJECTION COMPUTER FROM THE DEPARTMENT (this operation is not advised)

IMPORTANT: before testing an injection computer, it is essential that it has been programmed with a vehicle immobiliser code in order for it to function. After the test, it is **essential to decode** the computer before returning it to the department. If this is not done, the computer would be **unusable**. This operation must be carried out by appropriately trained personnel. To decode the computer, consult Section 82 of **MR 337**.

IT IS NOT POSSIBLE TO USE A CODED COMPUTER FITTED TO ONE VEHICLE TO PERFORM A TEST ON ANOTHER VEHICLE.

THE COMPRESSOR IS OF VARIABLE DISPLACEMENT 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 the **AC** computer on track **10**. The compressor operation authorisation or prohibition information is sent along this wire.
- one wire from the **AC** computer to the injection computer on track **23**. This is for a power absorbed information signal.

When the **AC** button is pressed, the **AC** computer requests that the compressor is switched on. The injection computer either authorises or inhibits compressor disengaging and imposes an idling speed of **900 rpm** (a few seconds may pass before the idling speed is stabilised).

COMPRESSOR OPERATION PROGRAMMING

During certain operating phases, the injection computer inhibits operation of the compressor.

Engine starting programming

The compressor is prevented from functioning for **10 seconds** after the engine is started.

Thermal protection strategy

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

Overspeed protection programming

The compressor is prevented from operating if the engine speed is greater than **6000 rpm**.

INJECTION

Idle speed correction

17

POWER ASSISTED STEERING PRESSURE SWITCH / INJECTION COMPUTER LINK

The injection computer receives a signal from the power-assisted steering pressure switch (which can be displayed on the diagnostic tools).

The injection computer does not adjust the engine idle speed.

ELECTRICAL CORRECTION ACCORDING TO BATTERY VOLTAGE AND ELECTRICAL POWER BALANCE

The purpose of this adjustment is to compensate for the drop in voltage due to a power consumer being switched on when the battery is not charged sufficiently. To achieve this, the idle speed is increased, which increases the rotation speed of the alternator, and this increases the battery voltage.

The lower the voltage, the more significant the correction. Correction of the engine speed is therefore variable. It begins when the voltage drops below **12.8 volts**. The idling speed may reach **900 rpm maximum**.

NOTE: after starting at cold and long operation at idle speed it is possible to notice a sharp drop in the engine speed of approximately **150 rpm**. This fall in engine speed is due to the presence of an automatic starting device.

Adaptive idle speed correction

PRINCIPLE

Under normal warm engine operating conditions, the idle speed **OCR signal** varies between a high value and a low value, so that the nominal idle speed is obtained.

In the case of variations in the operation of the vehicle (such as running in, engine wear, etc.) the idle speed **OCR** value may be close to the high or low values.

Adaptive correction of the idle speed **OCR** allows the slow variations in the engine's air requirements to be counteracted.

This correction only takes effect 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.

IDLE SPEED OCR VALUES AND ADAPTIVE CORRECTION

PARAMETER	F4R 730 engine
Nominal idle speed	$X = 800 \pm 50$ rpm.
Idle OCR	$2 \% \leq X \leq 25 \%$
Idling RCO signal adaptive	Thrust bearing: – min: - 7 % – max: + 7 %

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

INTERPRETATION OF THESE PARAMETERS

In the event of excess air (air leak, incorrectly adjusted throttle stop, etc.) the idle speed increases, the idle speed **OCR** value decreases to the nominal idle speed; the adaptive correction value of the idle speed **OCR** decreases in order to realign idle speed regulation operation.

If there is insufficient air (clogging, etc.), the logic is reversed, the idle speed **OCR** increases and the adaptive correction also increases, in order to reset the idle speed regulation operation.

WARNING: it is essential after clearing the computer memory that you start the engine and then switch it off to allow the stepper motor to be retimed. Start it again and let it run at idle speed so that the adaptive correction can take place.

NOTE: in the event of rough idle, check whether the engine phasing is correct. To implement phasing, drive at half-load in 2nd gear for approximately **one minute**. Then check status **ET018 Cylinder 1 recognition** using the After-Sales diagnostic tool.

SENSOR HEATING

The oxygen sensor is heated by the injection computer when the engine is started.

Oxygen sensor heating is stopped:

- when the vehicle speed is greater than **108 mph (180 km/h)** (value given for information purposes),
- according to the load and engine speed.

UPSTREAM SENSOR VOLTAGE

The value read on the diagnostic tools (except XR25) under the Upstream sensor voltage parameter indicates the voltage supplied to the computer by the oxygen sensor located upstream of the catalytic converter.

It is expressed in millivolts. The voltage should fluctuate rapidly between two values during richness regulation:

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

The smaller the variance between the upper and lower values, the poorer the information from the sensor (the variance is usually at least **500 mV**).

NOTE: if the difference is small, check the sensor heater. It is not necessary to take into account the value in the **Downstream sensor voltage** parameter because the vehicle is not fitted with one.

MIXTURE CORRECTION

The value read on the diagnostic tools under the Richness correction parameter represents the average of the richness corrections made by the computer in line with the richness of the fuel mixture registered by the oxygen sensor located upstream of the catalytic converter.

The correction value has a midpoint of **128** and limits of **0** and **255**:

- value less than **128**: leaner mixture required,
- value greater than **128**: richer mixture required.

ENTRY INTO RICHNESS REGULATION MODE

Richness regulation will start after a timed starting period according to the coolant temperature if the oxygen sensor is ready (sufficiently warm).

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

When the mixture regulation is complete the parameter value is **128**. Refer to the **richness regulation** status on the diagnostic tools.

Unlooping phase

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

- under full load,
- under heavy acceleration,
- under deceleration with a no load signal,
- when the oxygen sensor is faulty.

In this case the value **128** is displayed.

DEFECT MODE IN THE EVENT OF AN OXYGEN SENSOR FAULT

When the voltage from the oxygen sensor is incorrect (varying only slightly or not at all) during mixture regulation, the computer will only enter defect mode if the fault has been recognised as present for **10 seconds**. In this case only the fault will be stored, the Mixture correction parameter is **128**.

If an oxygen sensor fault is present and recognised and if the fault has already been stored, the system enters the open loop mode directly.

INJECTION

Adaptive richness adjustment

PRINCIPLE

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

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

After reinitialising the computer (return to **128** of the adaptive corrections) a special road test must therefore be carried out.

PARAMETER	F4R 730 engines
Operating richness adaptive	$64 \leq X \leq 160$
Idle speed richness adaptive	$64 \leq X \leq 160$
Richness correction	$60 \leq X \leq 200$

ROAD TEST

Conditions:

- engine warm (coolant temperature > 75 °C),
- do not exceed an engine speed of **4800 rpm**.

Pressure zones which must be passed through during the test

	Range No. 1 (mbar)	Range No. 2 (mbar)	Range No. 3 (mbar)	Range No. 4 (mbar)	Range No. 5 (mbar)
F4R 730	251 - - - - - 339	- - - - - 517	- - - - - 635	- - - - - 753	- - - - - 873
	Average 325	Average 458	Average 576	Average 694	Average 813

Following this test the adjustments will be operational.

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

After the test, read the adaptive richness values. Initially **128**, should be changed.
If not, repeat the test ensuring that the test conditions are observed.

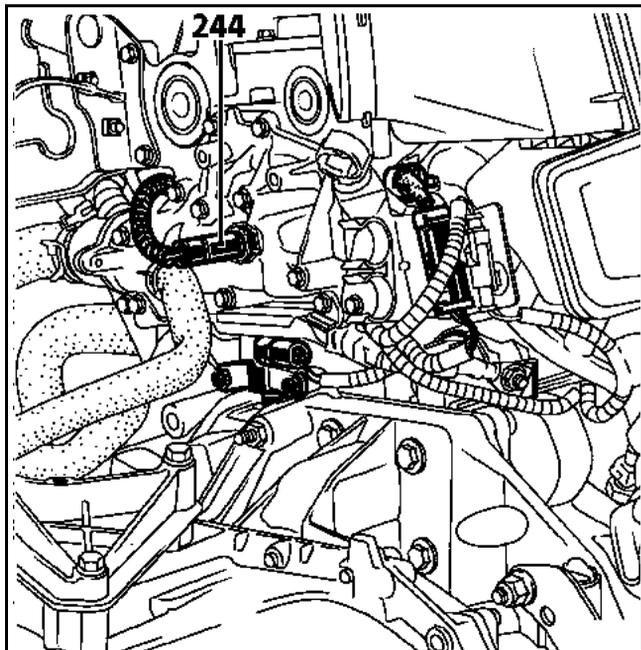
INTERPRETATION OF DATA GATHERED DURING A ROAD TEST

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

In the event of an excessive amount of fuel, the logic is reversed: the richness regulation decreases and the adaptive richness correction also decreases to realign the richness correction at around **128**.

Centralised coolant temperature management

Centralised Coolant Temperature Management



244 Coolant temperature sensor (injection and coolant temperature indication on the instrument panel).

Three track sensor: two for coolant temperature signal and one for the indication on the instrument panel.

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

Operation

Sensor **244** enables:

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

The injection computer controls the following according to the coolant temperature:

- the injection system,
- the motor-driven fan assembly relays,
 - the **motor-driven fan assembly** is controlled at low speed if the coolant temperature exceeds **100 °C** and is switched off when the temperature falls below **96 °C**,
 - the **motor-driven fan assembly** is controlled at low speed if the coolant temperature exceeds **102 °C** and is switched off when the temperature falls below **100 °C**,
 - the **motor-driven fan assembly** can be controlled at low speed for the anti-percolation device and at high or low speed for the air conditioning.
- temperature warning light.

COOLANT TEMPERATURE WARNING LIGHT

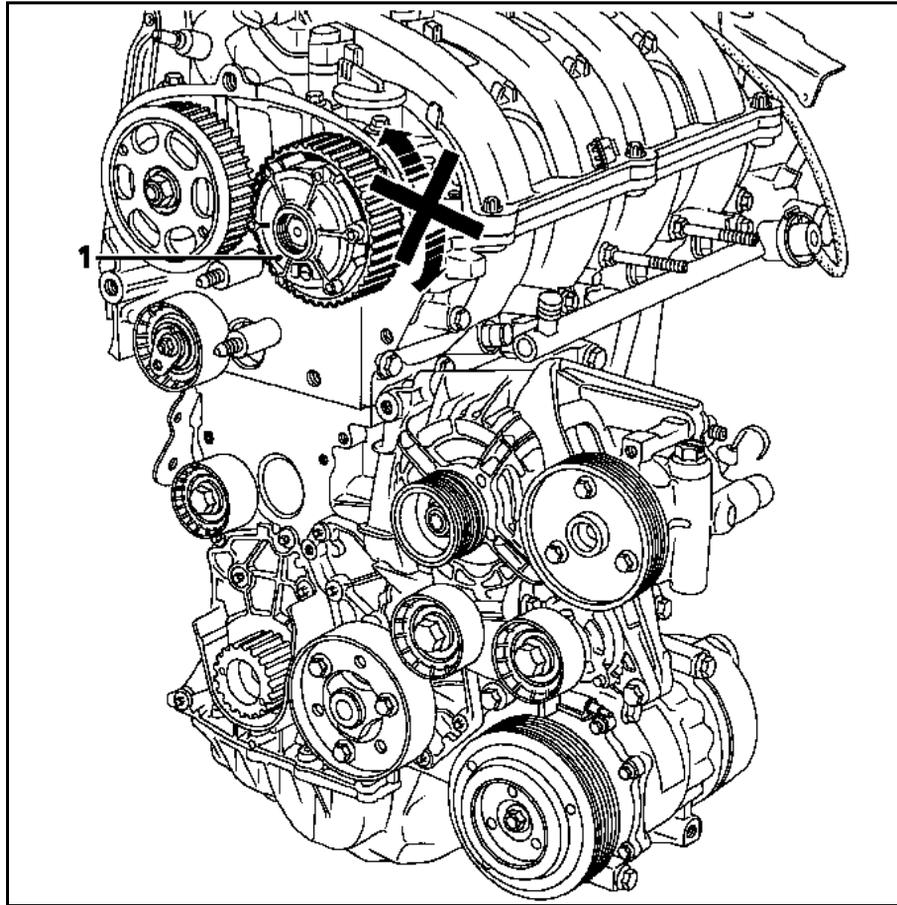
The warning light is controlled by the injection computer if the coolant temperature exceeds **118 °C** and goes out if the temperature falls below **115 °C**.

INJECTION

Camshaft dephaser

17

The camshaft dephaser (1) is located on the inlet camshaft. Its role is to modify the valve timing. It is controlled (in all or nothing mode) by the injection computer via a solenoid valve (2) located on the rocker cover.

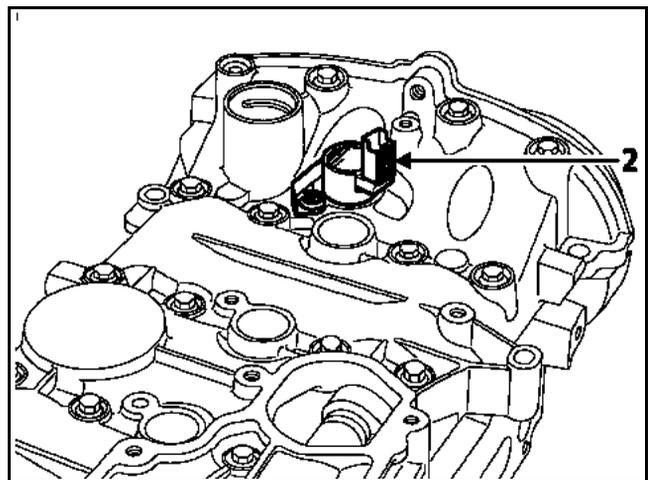


At rest, the solenoid valve is in the closed position. It allows oil to flow through to control the dephaser depending on engine operation:

- if the engine speed is between **1800** and **6500 rpm**,
- if the throttle potentiometer is outside no load conditions.

IMPORTANT: a solenoid valve that is locked open leads to rough idle and too high a pressure in the manifold at idle speed.

NOTE: to replace the solenoid valve seal, consult the procedure described in Section **11 Top and front of engine**.



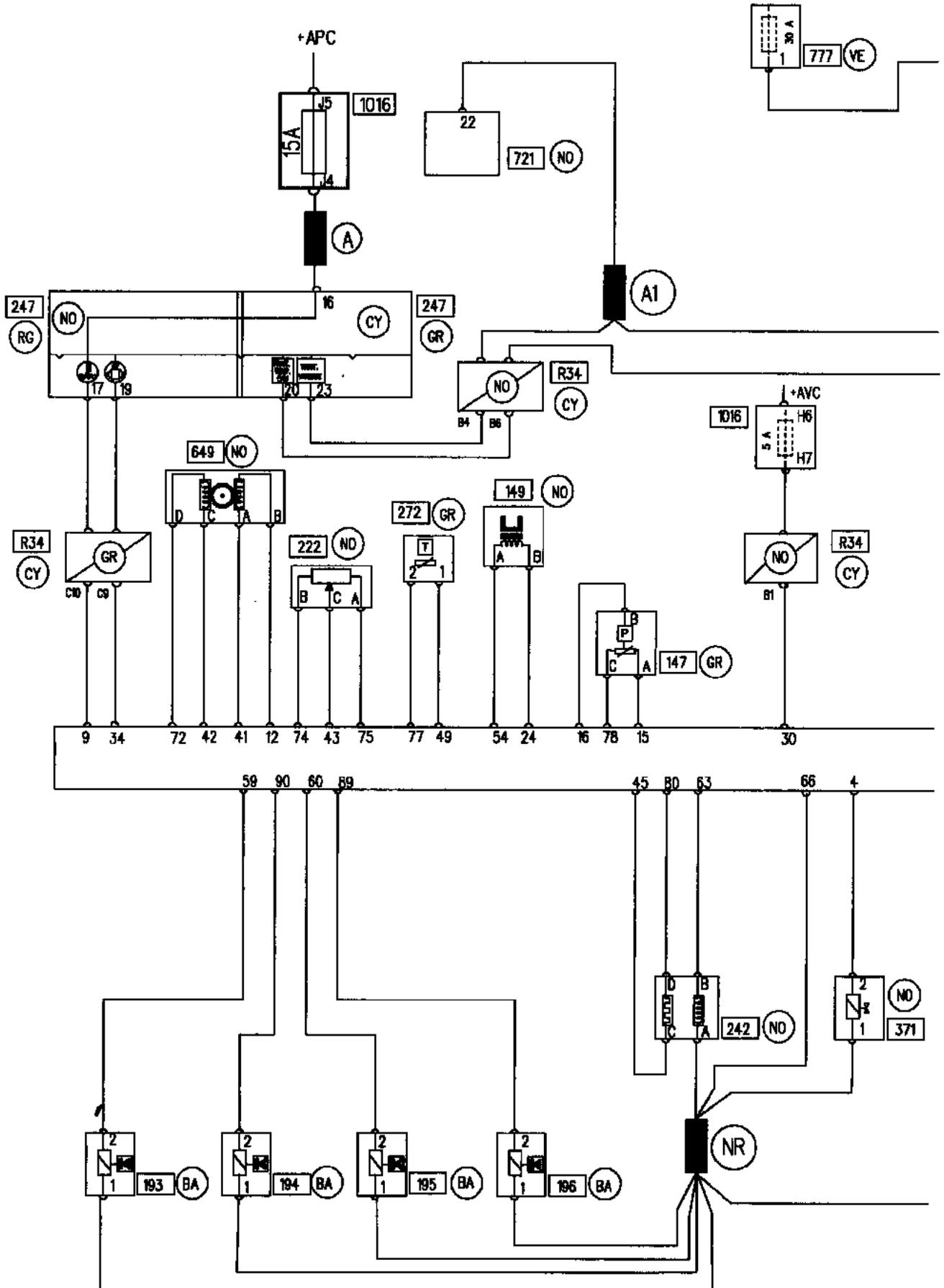
ALLOCATION OF INJECTION COMPUTER INPUTS AND OUTPUTS

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

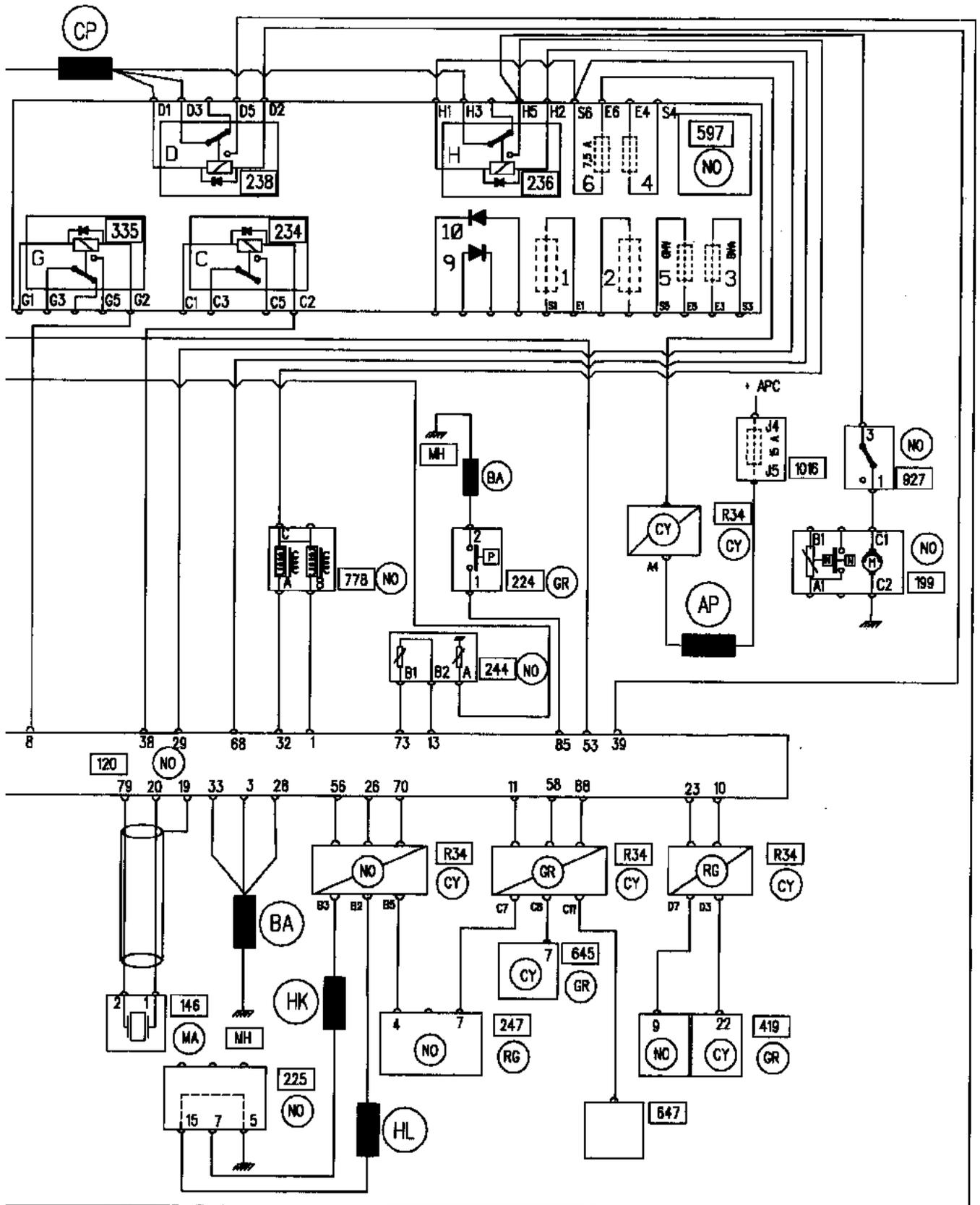
76	46	16
77	47	17
78	48	18
79	49	19
80	50	20
81	51	21
82	52	22
83	53	23
84	54	24
85	55	25
86	56	26
87	57	27
88	58	28
89	59	29
90	60	30

- 1 → IGNITION COIL CONTROL 2-3
- 32 → IGNITION COIL CONTROL 1-4
- 3 --- POWER EARTH
- 33 --- POWER EARTH
- 4 → CANISTER BLEED CONTROL
- 8 → MOTOR-DRIVEN FAN ASSEMBLY 1 RELAY CONTROL BY CCTM
- 38 → MOTOR-DRIVEN FAN ASSEMBLY 2 RELAY CONTROL BY CCTM
- 9 → COOLANT TEMPERATURE WARNING LIGHT
- 39 → ACTUATOR RELAY CONTROL
- 10 → AC COMPRESSOR CONTROL
- 41 → IDLE REGULATOR CONTROL (TRACK A)
- 12 → IDLE REGULATOR CONTROL (TRACK B)
- 42 → IDLE 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 DEPHASER CONTROL
- 65 → GEAR SELECTION WARNING LIGHT CONTROL
- 66 --- + AFTER IGNITION FEED
- 68 → FUEL PUMP RELAY CONTROL
- 70 → TDC ENGINE SPEED SIGNAL
- 72 → IDLE REGULATOR CONTROL (TRACK D)
- 73 --- COOLANT TEMPERATURE SENSOR EARTH
- 74 --- THROTTLE POTENTIOMETER SUPPLY
- 75 --- THROTTLE POTENTIOMETER EARTH
- 16 ← MANIFOLD PRESSURE SENSOR SIGNAL INPUT
- 19 --- PINKING SENSOR SCREENING
- 49 ← AIR TEMPERATURE SENSOR INPUT
- 20 ← PINKING SENSOR SIGNAL INPUT
- 23 ← POWER ABSORBED BY THE AIR CONDITIONING COMPRESSOR SIGNAL
- 53 ← VEHICLE SPEED INPUT
- 24 ← ENGINE SPEED SENSOR INPUT SIGNAL
- 54 ← ENGINE SPEED SENSOR INPUT SIGNAL
- 26 --- FAULT FINDING
- 56 --- FAULT FINDING
- 28 --- POWER EARTH
- 58 ← ENGINE IMMOBILISER SYSTEM
- 29 --- + After ignition feed
- 59 → INJECTOR 1 CONTROL
- 30 --- + before ignition feed
- 60 → INJECTOR 3 CONTROL
- 77 --- AIR TEMPERATURE SENSOR EARTH
- 78 --- PRESSURE SENSOR SUPPLY
- 79 --- PINKING SENSOR EARTH
- 80 --- OXYGEN SENSOR EARTH
- 85 → POWER-ASSISTED STEERING PRESSURE SWITCH SIGNAL
- 89 → INJECTOR 4 CONTROL
- 90 → INJECTOR 2 CONTROL

INJECTION Wiring diagram



INJECTION Wiring diagram



PARTS LIST

120	Injection computer
146	Pinking sensor
147	Air temperature sensor
149	TDC sensor
193, 194, 195, 196	Injectors
199	Fuel sender
222	Throttle position potentiometer
224	Power assisted steering pressure switch
225	Diagnostic socket
234	High-speed GMV relay
236	Fuel pump relay
238	Engine immobiliser relay
242	Oxygen sensor
244	Coolant temperature sensor
247	Instrument panel
272	Air temperature sensor
335	Low-speed GMV relay
371	Canister solenoid valve
419	Air conditioning control unit
597	Engine fuse and relay box
645	Passenger compartment computer
647	Heated windscreen
649	Stepper-motor
721	ABS computer unit
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	Titles	Display and notes
Statuses Window			
1	Battery voltage	ER 001: Computer + after ignition feed PR 001: Computer feed voltage	ACTIVE 11.8 < X < 13.2 V
2	Computer configuration	ET 002: Air conditioning connection ET 003: Computer configuration with ATX ET 004: Power-assisted steering pressure switch connection ET 005: Heated windscreen connection ET 006: Computer configuration without wheel speed ET 007: Wheel speed sensor from ABS ET 008: Reluctant type wheel speed sensor ET 009: Magneto-resistive type wheel speed sensor ET 011: Configuration with immobiliser	ACTIVE (if option). INACTIVE ACTIVE (if option). ACTIVE (if option). ACTIVE INACTIVE INACTIVE INACTIVE ACTIVE
		ET 010: Vehicle 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	Titles	Display and notes
4	Throttle position potentiometer	Accelerator pedal released	ACTIVE $0 < X < 43$
		ET 013: Throttle position: no load PR 030: Throttle position	
		Accelerator pedal depressed slightly	INACTIVE INACTIVE
		ET 013: Throttle position: no load ET 014: Throttle position: full load	
		Accelerator pedal pressed	ACTIVE $180 < X < 240$
		ET 014: Throttle position: full load PR 030: Throttle position	
Parameter Window			
5	Coolant temperature sensor	PR 010: Coolant temperature	X = Engine temperature $\pm 5\text{ }^{\circ}\text{C}$
6	Air temperature sensor	PR 011: Air temperature	X = Temperature under bonnet $\pm 5\text{ }^{\circ}\text{C}$
7	Pressure sensor	PR 020: Inlet manifold vacuum	X = Atmospheric pressure
		PR 021: Atmospheric pressure	X = Atmospheric pressure

INJECTION

Fault finding - Conformity check

17

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

Order	Function	Titles	Display and notes
Command Window			
8	Fuel pump	Relay control: Fuel pump	The fuel pump should be heard operating
9	Fan unit	Command: Low-speed motor-driven fan assembly Command: High-speed motor-driven fan assembly	The fan should be heard running at low speed The fan should be heard running at high speed
10	Idle speed regulation valve	Command: Idle speed regulation valve	Place your hand on it to ensure that it is operating
11	Canister bleed solenoid valve	Command: Canister bleed	The canister bleed solenoid valve should operate
12	Air conditioning	Air conditioning selected on the instrument panel. Command: Air conditioning compressor	The compressor must be engaged if it is selected on the instrument panel
13	Camshaft dephaser	Command: Camshaft dephaser	The control solenoid valve should operate
14	Instrument panel warning lights	Command: MIL warning light Command: Overheating warning light	The indicator light should be lit (depending on the vehicle) The warning light should flash

INJECTION

Fault finding - Conformity check

17

NOTES	Carry out the following operations with a warm engine at idle speed, without electrical consumers
--------------	---

Order	Function	Titles	Display and notes
Statuses Window			
1	Battery voltage	ET 001: Computer + after ignition feed PR 001: Computer feed voltage, If PR 001: Computer feed voltage, When PR 070: Engine speed	ACTIVE $13 < X < 15 \text{ V}$ $X < 12.7 \text{ V}$ $800 < X < 900 \text{ rpm.}$
2	Petrol pump control	ET 015: Petrol pump relay control	ACTIVE
3	Flywheel signal	ET 017: Flywheel signal	ACTIVE
4	Cylinder no. 1 recognition	ET 018: Cylinder 1 detection	ACTIVE
5	Oxygen sensor heater	ET 019: Upstream oxygen sensor heating ET 020: Downstream oxygen sensor heater	ACTIVE INACTIVE (vehicle does not have this option)

INJECTION

Fault finding - Conformity check

17

NOTES	Carry out the following operations with a warm engine at idle speed, without electrical consumers
--------------	---

Order	Function	Titles	Display and notes
8	Idle speed regulation	ET 021: Idle speed regulation PR 070: Engine speed (warm engine) PR 073: Idle speed divergence PR 071: Idle OCR PR 080: Idling RCO signal adaptive	ACTIVE 750 < X < 850 rpm. - 50 < X < + 50 rpm. 2 % < X < 25 % - 7 % < X < 7 %
Parameter Window			
9	Pressure circuit	PR 020: Inlet manifold vacuum PR 021: Atmospheric pressure	320 < X < 500 mb X = Atmospheric pressure
10	Anti-pinking circuit	PR 060: Pinking signal	30 < X < 70
Statuses Window			
11	Richness regulation	ET 022: Richness regulation ET 110: Upstream oxygen sensor voltage ET 112: Richness correction	ACTIVE 20 < X < 840 mV 60 < X < 200 Average value 128
12	Camshaft dephaser	ET 035: Camshaft dephaser	ACTIVE (depending on operation)

INJECTION

Fault finding - Conformity check

17

NOTES	Carry out the following operations with a warm engine at idle speed, without electrical consumers
--------------	---

Order	Function	Titles	Display and notes
13	Air conditioning (AC selected)	ET 023: Air conditioning request	ACTIVE On if the AC requests compressor operation
		ET 024: Fast idle speed	ACTIVE On if the fast idle speed is active
		ET 025: Air conditioning compressor	ACTIVE On if the injection authorises compressor operation
		PR 070: Engine speed	800 < X < 900 rpm.
		PR 044: Power absorbed by the compressor	250 < X < 5000 W
		ET 023: Air conditioning request	INACTIVE
		ET 024: Fast idle speed	ACTIVE
		ET 025: Air conditioning compressor	INACTIVE if the injection does not authorise compressor operation
		PR 070: Engine speed	800 < X < 900 rpm.
		PR 044: Power absorbed by the air conditioning compressor	X ≤ 300 W
		ET027: Low-speed fan unit	The fan should run at low speed

INJECTION

Fault finding - Conformity check

17

NOTES	Carry out the following operations with a warm engine at idle speed, without electrical consumers
--------------	---

Order	Function	Titles	Display and notes
14	Power assisted steering pressure switch	Turn wheels to full lock ET 029: Power assisted steering pressure switch	ACTIVE
15	Canister bleed	ET 030: Canister bleed PR 040: Canister bleed OCR	INACTIVE X < 1.5 % Canister bleed is prohibited. The solenoid valve remains closed.
16	Fan unit	ET027: Low-speed fan unit PR 010: Coolant temperature ET 028: High-speed motor-driven fan assembly (only if equipped with AC) PR 010: Coolant temperature	INACTIVE The motor-driven fan assembly should operate when the coolant temperature exceeds 100 °C ACTIVE The motor-driven fan assembly should operate when the coolant temperature exceeds 102 °C
17	EGR	PR 050: EGR valve opening setpoint	0 Vehicle not fitted with EGR device

INJECTION

Fault finding - Conformity check

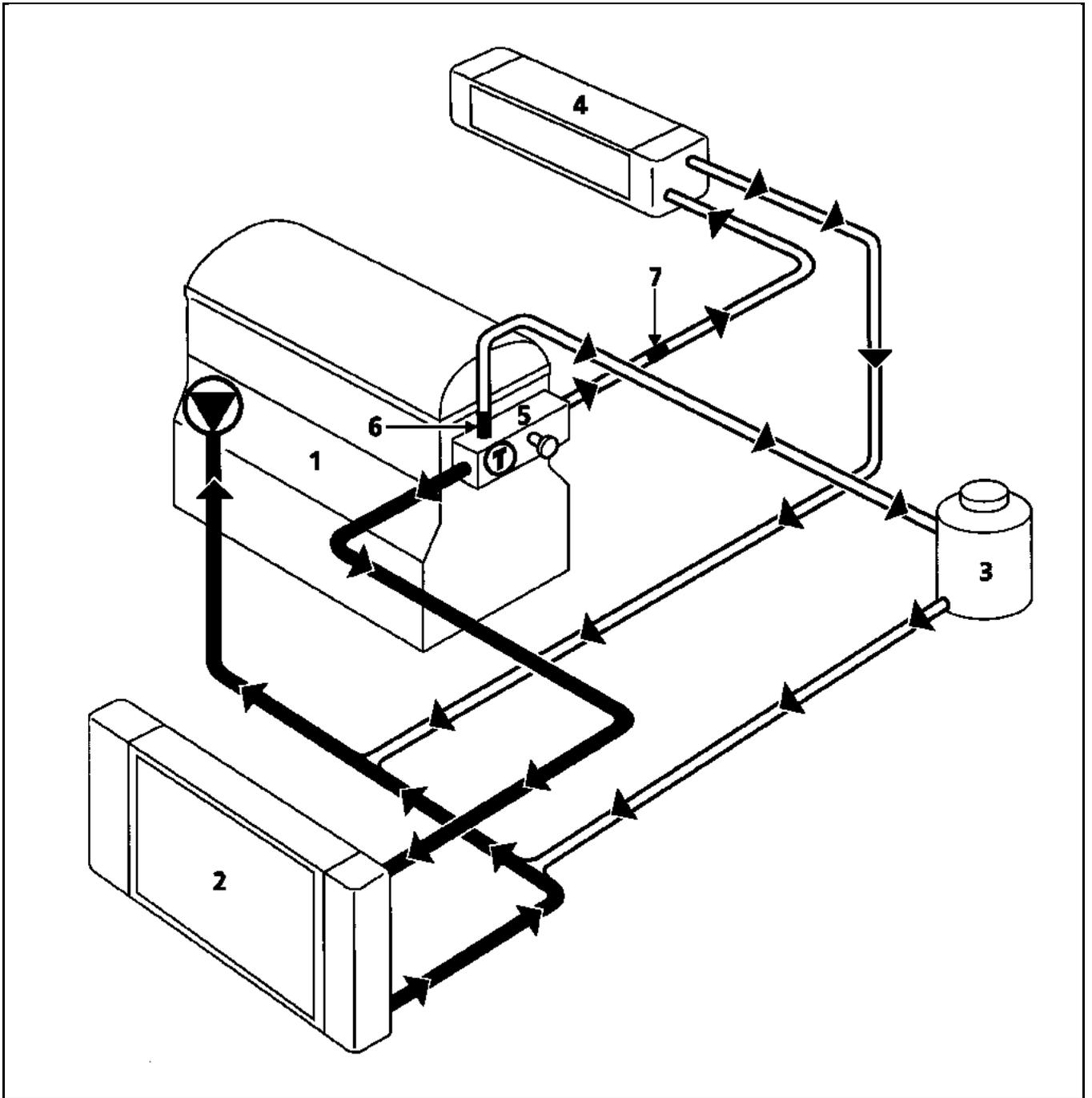
17

NOTES	Carry out the following operations during a road test
--------------	---

Order	Function	Titles	Display and notes
Statuses Window			
1	Canister bleed	ET 030: Canister bleed PR 040: Canister bleed OCR	ACTIVE The canister bleed is authorised $X > 1.5 \%$ and variable
Parameter Window			
2	Vehicle speed	PR 090: Vehicle speed	$X =$ speed read on speedometer in mph (km/h)
3	Pinking sensor	Vehicle under load PR 060: Pinking signal PR 061: Anti-pinking correction	X is variable and not zero $0 < X < 7^\circ$ Crankshaft
4	Richness adaptive and correction	ET 112: Richness correction Programming PR 110: Idle speed richness adaptive PR 111: Operating richness adaptive	$60 < X < 200$ $64 < X < 160$ $64 < X < 160$
5	Emission of pollutants	2500 rpm after driving At idle speed, wait for stabilisation	$CO < 0.3 \%$ $CO_2 > 13.5 \%$ $O_2 < 0.8 \%$ $HC < 100 \text{ pp}$ $0.97 < \lambda < 1.03$ $CO < 0.5 \%$ $HC < 100 \text{ ppm}$ $0.97 < \lambda < 1.03$

COOLING SYSTEM Diagram

19



- 1 Engine
- 2 Radiator
- 3 Hot tank with degassing after thermostat
- 4 Heater matrix
- 5 Thermostat mounting
- 6 \varnothing 3 mm restriction
- 7 \varnothing 8 mm restriction

-  Water pump
-  Thermostat
-  Bleed screw

The rating value of the expansion bottle valve is 1.2 bar (brown).

COOLING SYSTEM

Filling - bleeding

19

Coolant flows continuously through the heater matrix, which contributes to engine cooling.

FILLING

Open the only circuit bleed screw.

Fill the system through the expansion bottle opening.

Close the bleed screw as soon as the fluid runs out in a continuous jet.

Start the engine (2,500 rpm).

Adjust the overflow level for approximately 4 minutes.

Close the tank.

BLEEDING

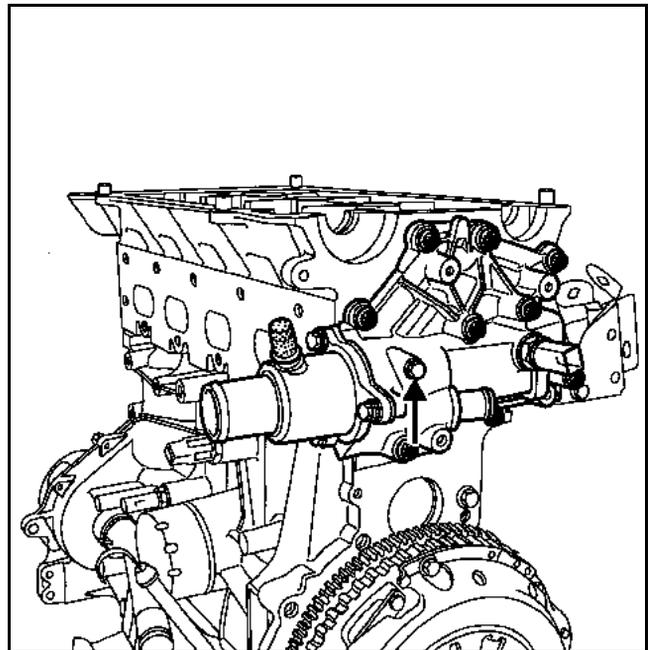
Run the engine for **20 minutes** at **2,500 rpm**, until the engine cooling fan cuts in (time required for automatic degassing).

Check that the fluid level is at the **Maximum** mark.

NEVER OPEN THE BLEED SCREW WHEN THE ENGINE IS RUNNING.

RE-TIGHTEN THE EXPANSION BOTTLE CAP WHILE THE ENGINE IS WARM.

Location of the bleed screw on the plenum chamber



COOLING SYSTEM

Radiator

19

SPECIAL TOOLING REQUIRED

Mot.	1448	Remote operation clip pliers for cooling system hose clips
-------------	-------------	---

REMOVAL

Position the vehicle on a two-post lift.

Disconnect the battery.

Remove the engine undertray.

Drain the cooling circuit through the engine radiator bottom hose.

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

Disconnect the fan assembly wiring.

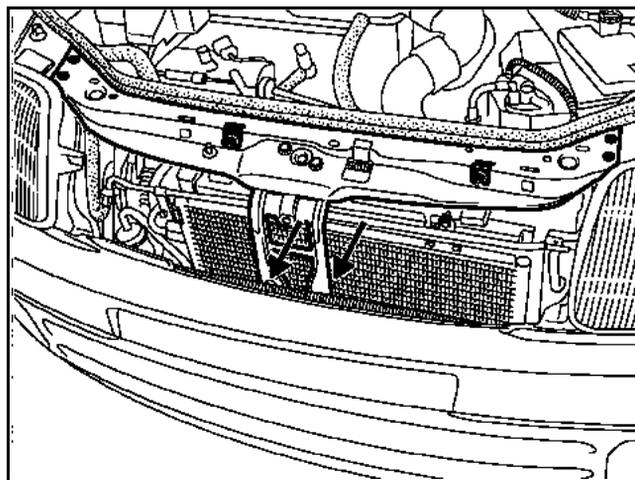
Remove the dehydrator reservoir mountings on the motor-driven fan assembly.

Unclip:

- the AC pipes on the motor-driven fan assembly, move them towards the engine and attach them,
- the PAS reservoir on the motor-driven fan assembly and remove it.

Remove:

- the fan unit mountings on the radiator and remove it,
- the radiator mountings on the condenser and remove it,
- the front bumper,
- the radiator grille,
- the upper cross member,
- the air duct.



REFITTING

Refit in the reverse order to removal.

Fill and bleed the cooling circuit (see Section 19 Filling and bleeding).

NOTE: ensure that the fins of the radiator or of the condenser are not damaged during removal and refitting; protect them if necessary.

COOLING SYSTEM

Water pump

19

SPECIAL TOOLING REQUIRED

Mot.	1202	Hose clip pliers
Mot.	1453	Engine support tool

TIGHTENING TORQUE (in daNm)



Water pump mounting bolts

1.7

REMOVAL

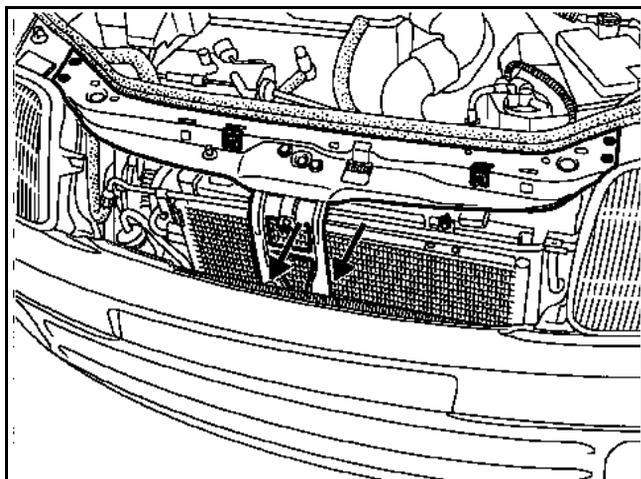
Position the vehicle on a two-post lift.

Disconnect the battery.

Drain the cooling circuit through the radiator bottom hose.

Remove:

- the front right-hand wheel-arch liner,
- the front bumper,
- the upper cross member,

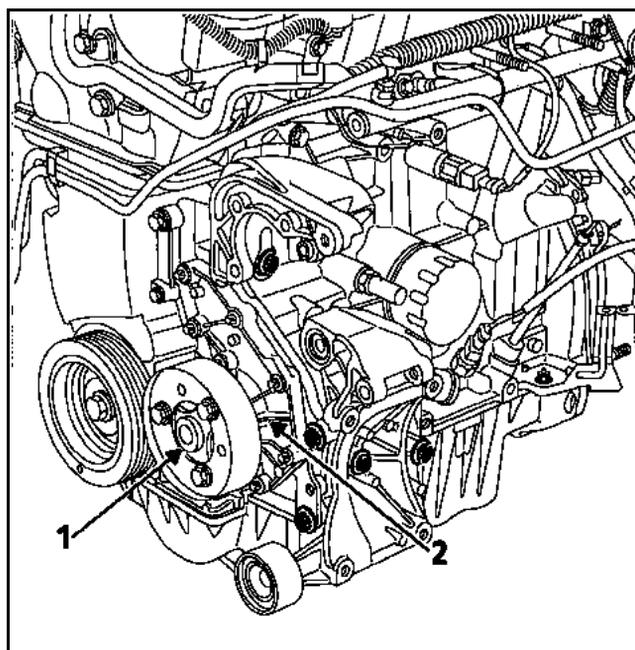


- the accessories belt (see Section **07 Accessories belt tension**).

Fit the engine support tool (**Mot. 1453**).

Remove:

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



Cleaning

It is very important not to scratch the sealing faces.

Use the **Décapjoint** product to dissolve any remains of the gasket still adhering.

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

Wear gloves whilst carrying out this operation.

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

REFITTING

Refit:

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

Fill and bleed the cooling circuit (see Section **19 Filling and bleeding**).

To refit the suspended engine mounting, refer to the procedure in Section **19 Suspended engine mounting**.

ENGINE MOUNTING

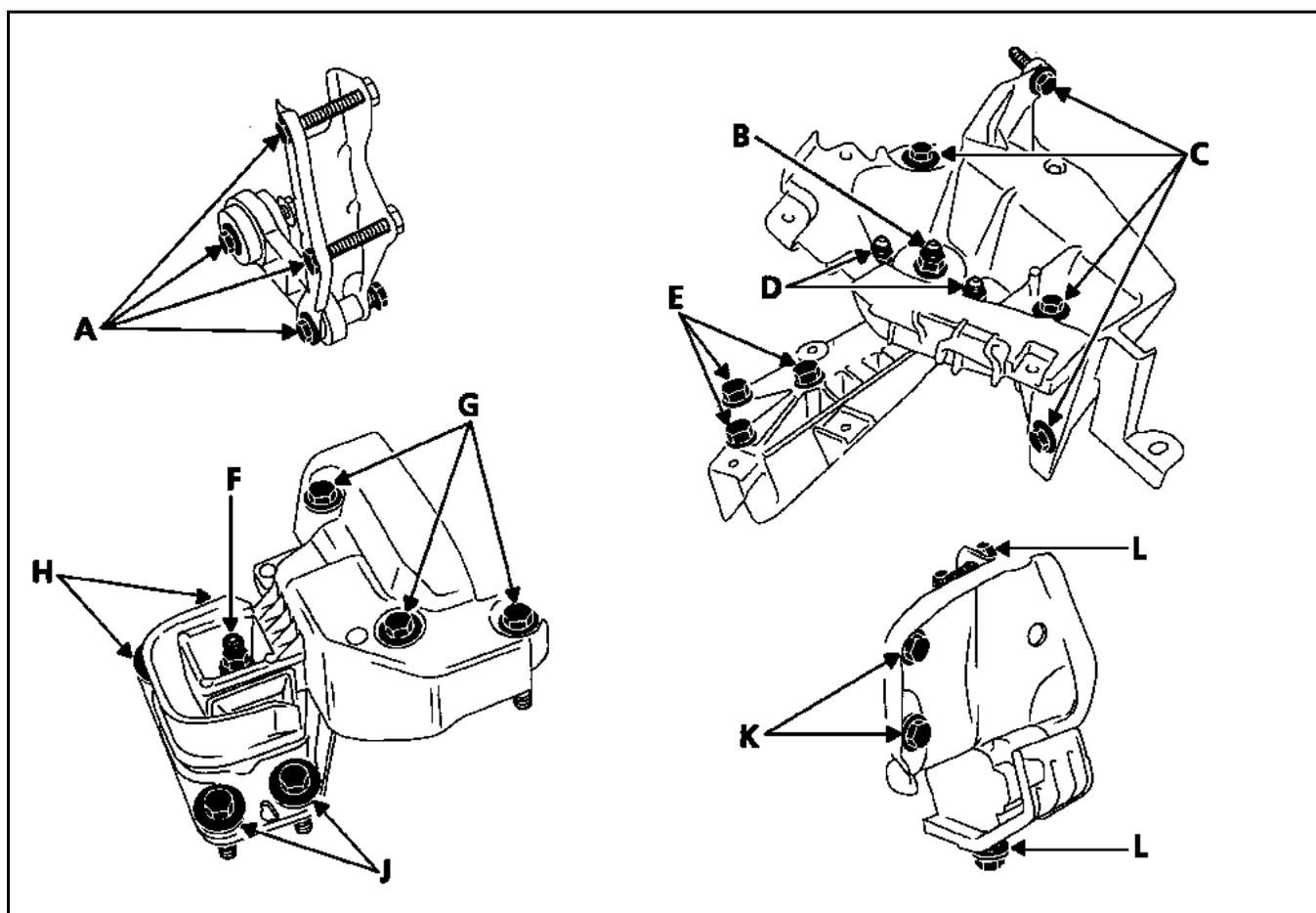
Suspended engine mounting

TIGHTENING TORQUES (daNm)



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

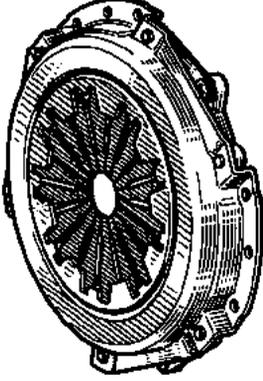
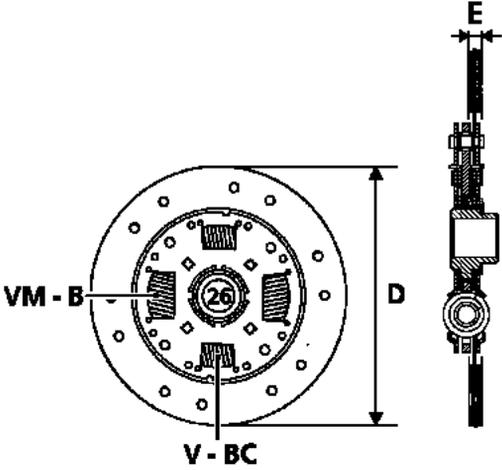
G	6.2
H	6.2
J	6.2
K	6.2
L	4.4



CLUTCH

Pressure plate/driven plate

20

VEHICLE TYPE	ENGINE TYPE	PRESSURE PLATE	DRIVEN PLATE
CB0M	F4R	 <p data-bbox="572 1059 777 1088">215 CP ON 4600</p>	<p data-bbox="917 383 1063 472"> 26 splines D = 215 mm E = 6.8 mm </p> <p data-bbox="1199 383 1397 506"> VM: Moss green V: Green BC: Capri blue B: Light blue </p> 

Cable-controlled dry-operating single disc clutch.

Constant pressure clutch thrust bearing.

CLUTCH

Pressure plate/driven plate

20

REPLACEMENT (after removal of the gearbox)

SPECIAL TOOLING REQUIRED	
Mot. 582 or	Locking tool
Mot. 582-01	

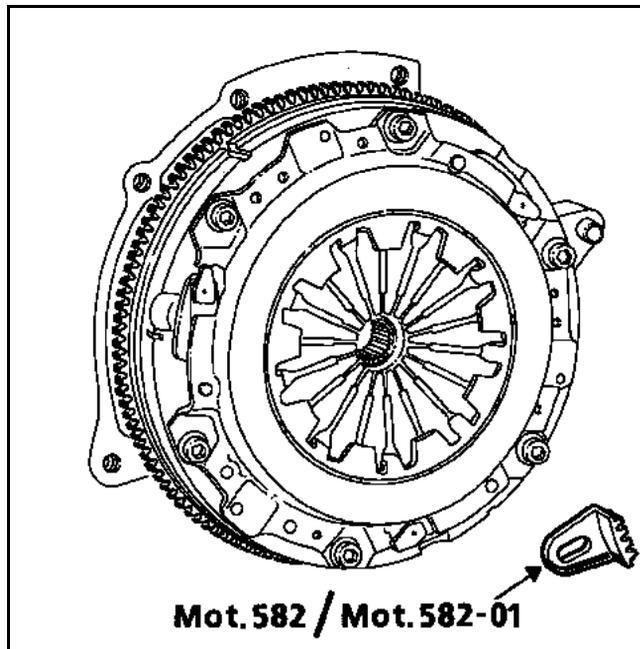
TIGHTENING TORQUE (in daNm)	
Mechanism mounting bolt	2

REMOVAL

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

Remove the mounting bolts from the mechanism and remove the friction plate.

Check and replace any faulty parts.

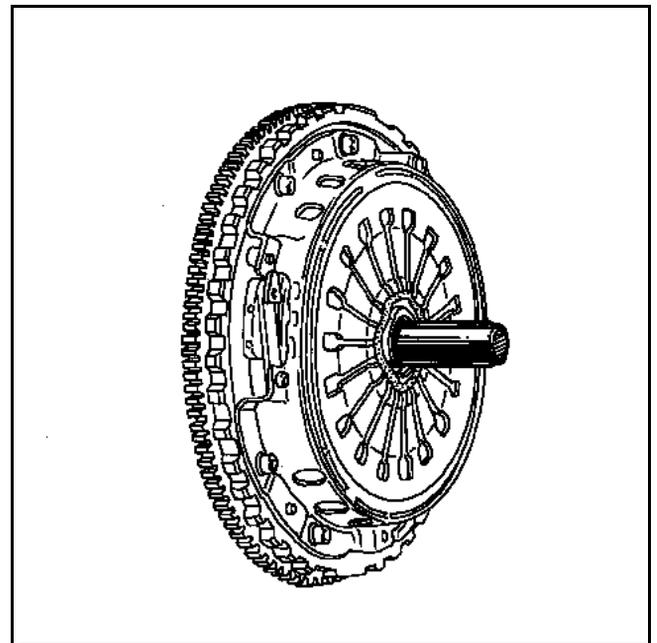


REFITTING

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

Fit the disc (with the offset on the hub on the gearbox side).

Centre using the tool supplied in the kit.



Tighten progressively in a star pattern, then tighten the mounting bolts to the correct torque.

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

Coat with **MOLYKOTE BR2** grease:

- the guide tube,
- the fork pads.

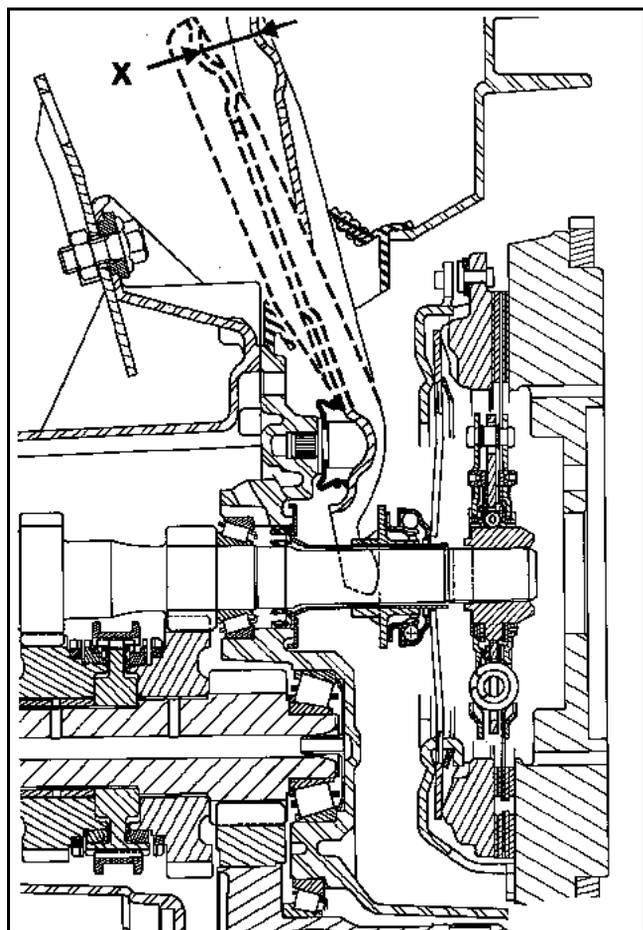
Pressure plate/driven plate

After refitting the gearbox, place the cable onto the clutch fork and check that the play compensation is in working order.

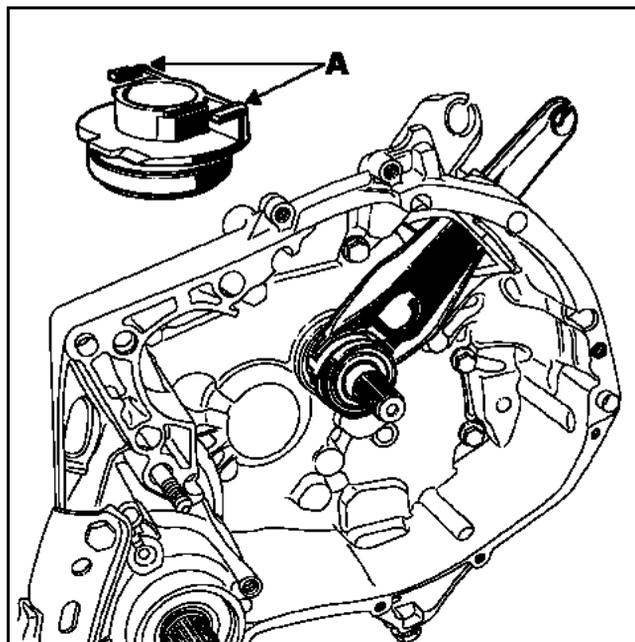
Check clutch travel.

The fork travel should be:

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



NOTE: in the case of any intervention not requiring the gearbox to be removed, or after fitting the gearbox, **DO NOT LIFT** the fork, as it may be released from slot (A) of the clutch thrust bearing.



REPLACING THE FLYWHEEL

SPECIAL TOOLING REQUIRED	
Mot. 582-01	Locking tool

TIGHTENING TORQUE (in daNm)	
Steering wheel bolt	5.5

REMOVAL

After removing the friction plate, remove the mounting bolts of the flywheel (must not be re-used).

Regrinding of the friction face is not permitted.

REFITTING

Clean the flywheel mounting bolt threads on the crankshaft.

Degrease the bearing face of the flywheel on the crankshaft.

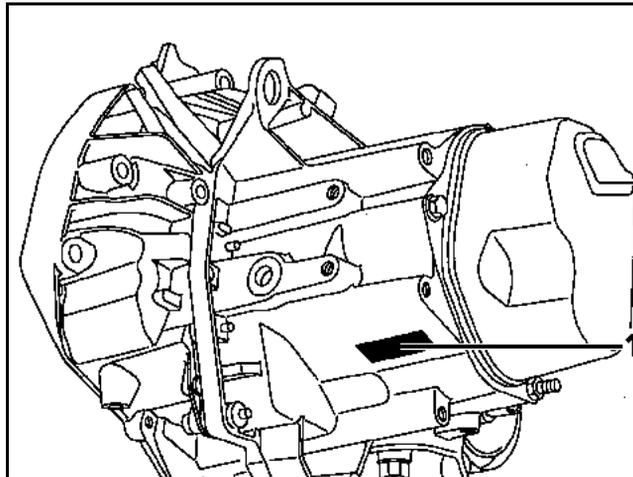
Refit the flywheel by immobilising it with **Mot. 582-01**.

NOTE: the flywheel mounting bolts are to be systematically replaced.

MANUAL GEARBOX Identification

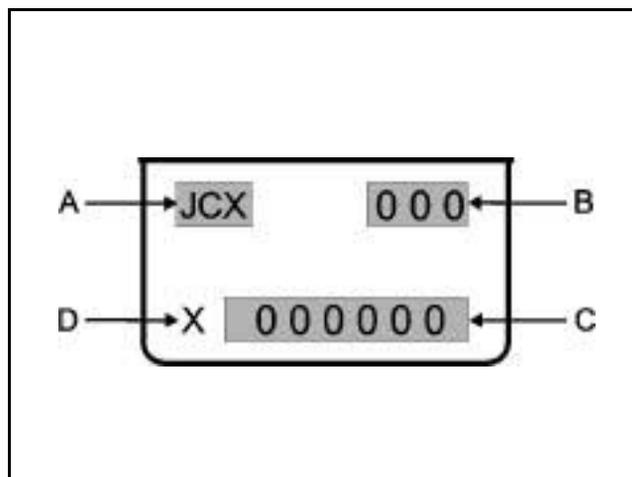
CLIO vehicles with **F4R** engines are fitted with **JC5** manual gearboxes.

The **MR JB gearbox** deals with the complete repair of this component.



Marking (1), on the gearbox casing, indicates:

- A Type of gearbox
- B Gearbox suffix
- C Production number
- D Factory of manufacture



MANUAL GEARBOX

Gears

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

MANUAL GEARBOX Capacities - Lubricants

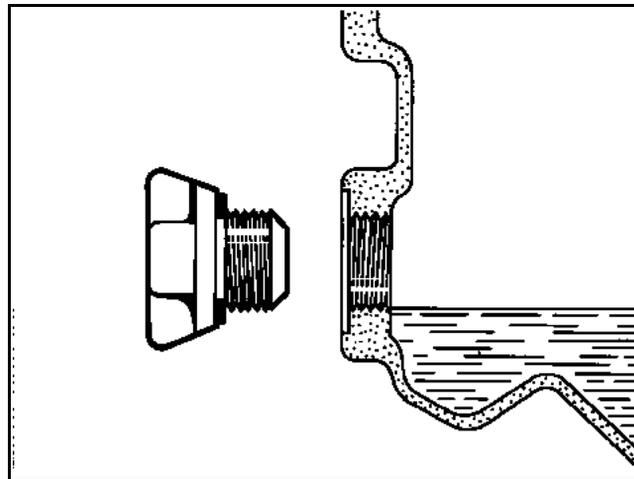
21

CAPACITY (in litres)

5-speed gearbox	
JC5	3.1

Viscosity grade
TRX 75W 80W

CHECKING THE LEVEL



Fill up to the level of the hole.

MANUAL GEARBOX

Consumables

21

TYPE	PACKAGING	PART NUMBER	COMPONENT
MOLYKOTE BR2	1-kg tin	77 01 421 145	Right-hand sunwheel splines Fork pivot Thrust bearing guide Fork pads } Clutch
Loctite 518	24 ml syringe	77 01 421 162	Housing assembly faces
RHODORSEAL 5661 E.g.: CAF 4/60 THIXO	100 g tube	77 01 404 452	Threaded plugs and switches Bearing plugs End of roll pins on driveshafts
LOCTITE FRENBLOC (locking and sealing resin)	24 cc bottle	77 01 394 071	Primary and secondary shaft nuts Fixed pinion and 5 th gear hub Differential lock drive stud

Parts always to be replaced

If they have been removed:

- the lip seals,
- the O-rings,
- the thrust bearing guide tubes,
- the secondary shaft and differential nuts,
- the speedometer drive gear and its shaft,
- the speedometer ring gear,
- roll pins,
- the gear supporting rings.

MANUAL GEARBOX

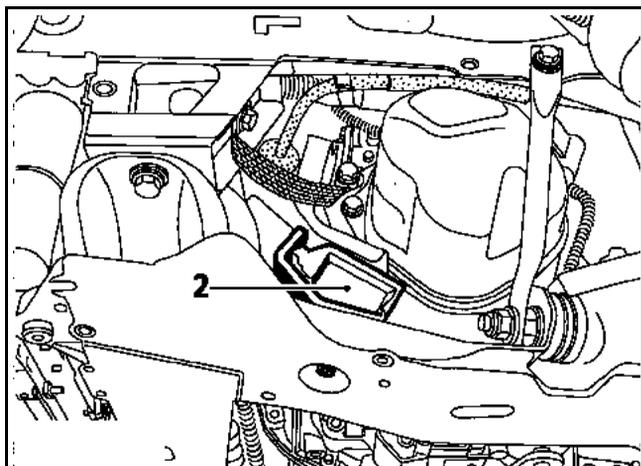
Special notes

21

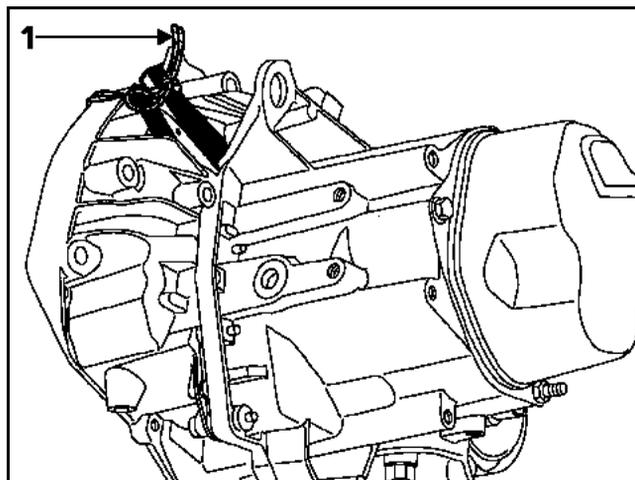
TIGHTENING TORQUES (in daNm)	
Drain plug	2.2
Brake calliper bolts	4
Driveshaft gaiter bolt	2.5
Shock absorber base bolt	18
Bolts around gearbox and starter motor	3
Suspended gearbox mounting bolt	6.2
Gearbox lower bracket bolt	6.2
Gearbox lower bracket rubber pad bolt	4.4
Wheel bolts	9
Steering shaft yoke mounting bolt	3
Sub-frame rear mounting bolt	10.5
Sub-frame front mounting bolt	6.2
Lower ball joint nut	4.2
Track rod end nut	3.7
Engine tie-bar nut	6.2

The procedure for removing and refitting the gearbox remains the same and does not pose any problems for **CLIO** vehicles.

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



NOTE: when refitting the gearbox, use string (1) to hold the clutch control fork to prevent it from coming out of its ball joint (located on the clutch bell).



TIGHTENING TORQUE (in daNm)



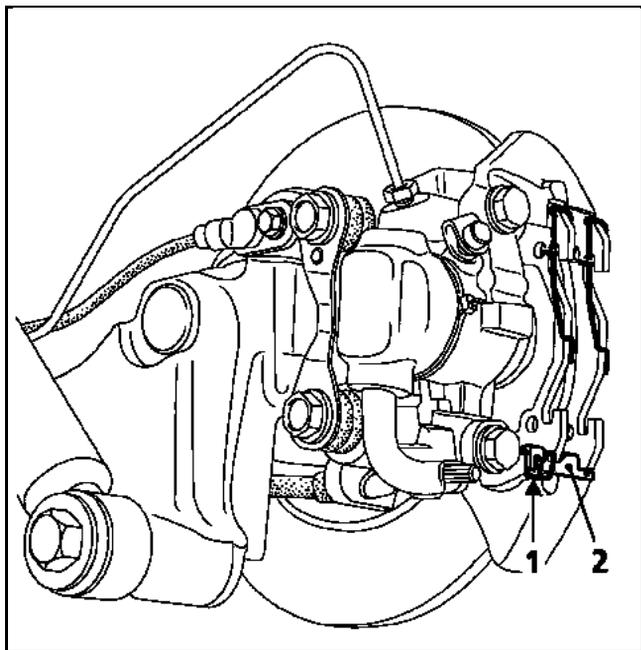
Wheel bolts

9

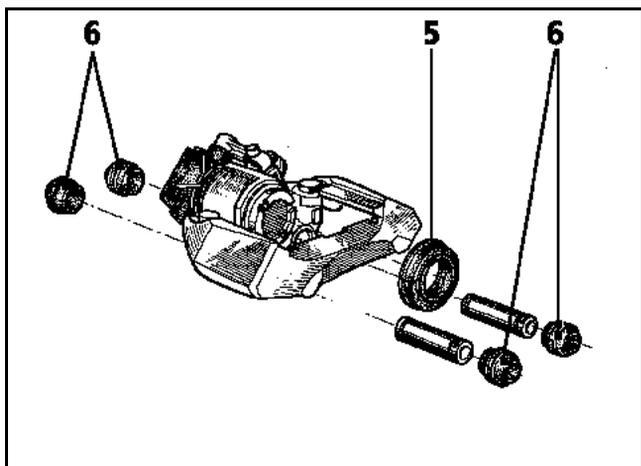
REMOVAL

Remove

- the clip (1),
- the key (2),
- the brake shoes.

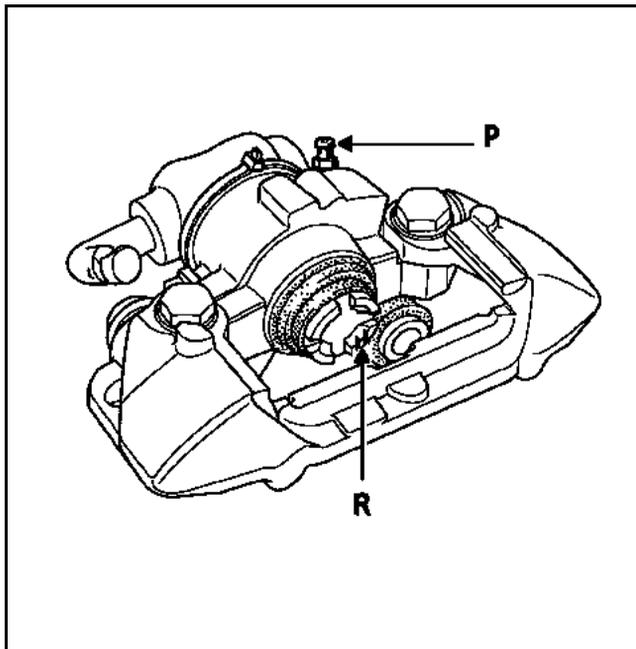


Check the condition of the dust seal (5) and the calliper slide protection gaiters (6), and replace them if necessary. If replacing, grease the end of the piston and the two slides after cleaning them with denatured alcohol.



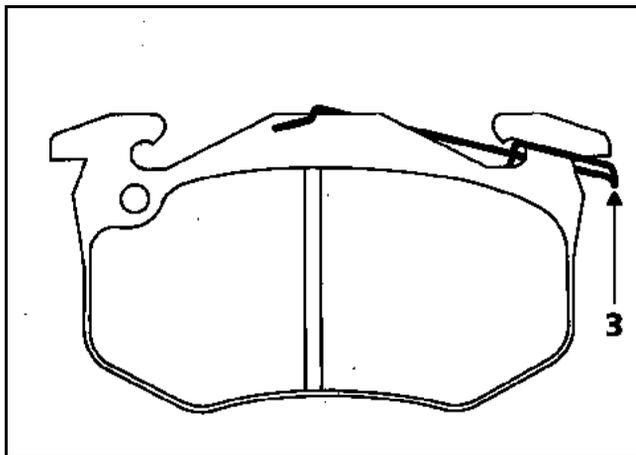
REFITTING

Push the piston back in by screwing it using a square tip screwdriver until it turns but cannot sink in any more.



Position the piston so that the mark (R) on its pressure face is orientated to the bleed screw side (P).

Position the two noise reduction pins (3) on the new linings.



REAR AXLE COMPONENTS

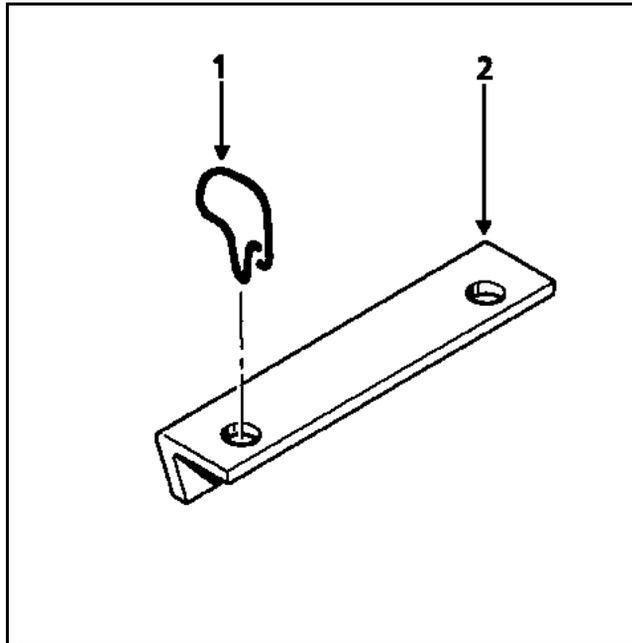
Brake pads (disc)

33

Position the linings in the calliper, making sure to respect the direction of fitting.

Engage the key (2) and refit the clip (1) (only one clip per calliper).

NOTE: the clip (1) is positioned on the inner side of the calliper.



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

REAR AXLE COMPONENTS

Brake calliper

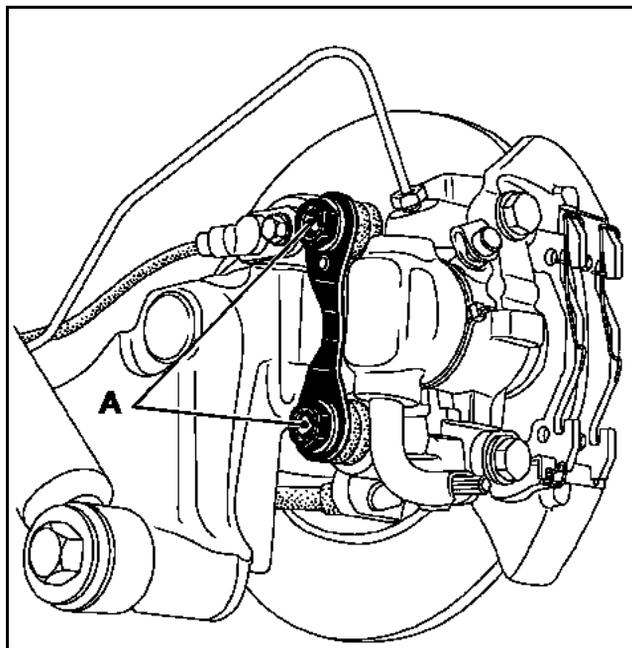
33

TIGHTENING TORQUES (in daNm)	
Wheel bolts	9
Brake calliper mounting bolt	10
Rigid pipe union	2
Bleed screw	0.6

REMOVAL

Remove the brake pads (see the relevant information).

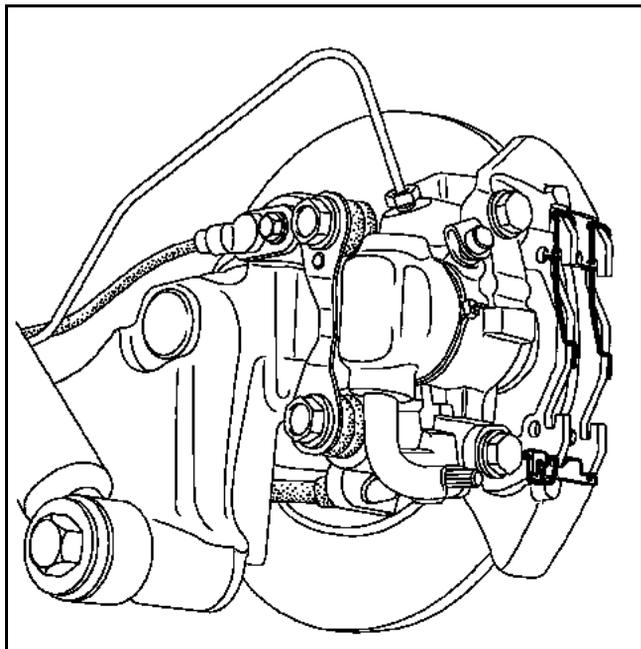
Disconnect the handbrake cable.



Remove the two mounting bolts (A) on the stub axle carrier. Unscrew the pipe union (prepare for brake fluid running out).

REFITTING

Coat the bolts with Loctite FRENBLOC. Fit the brake calliper.



Screw the rigid pipe union back on.

Tighten the bolts and union to torque.

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

Re-tighten the bleed screw.

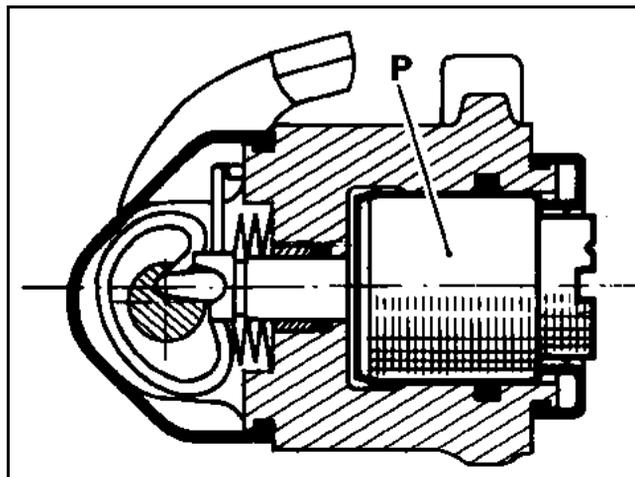
Check the condition of the linings and refit them.

Carry out a partial circuit bleed if the compensation reservoir did not completely empty during the operation, if not carry out a complete circuit bleed, making sure that the order of bleed operations is observed.

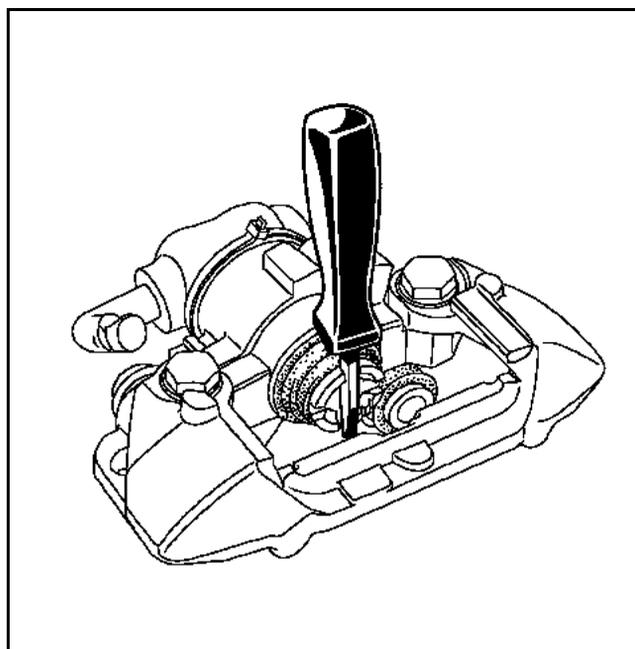
Press the brake pedal several times to bring the piston into contact with the pads.

REPAIR

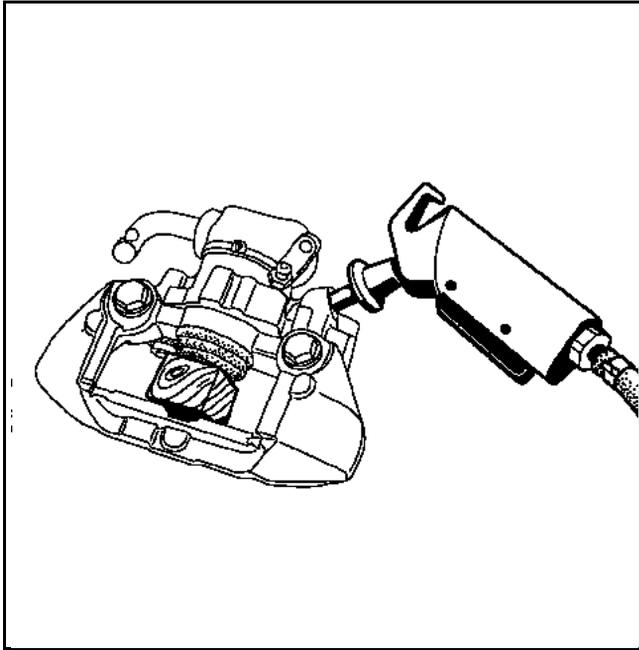
Remove the brake calliper. The complete calliper must be systematically replaced if there is any calliper bore scoring. It is prohibited to remove the inside of the piston (P).



Put the calliper in a vice with jaws. Remove the rubber dust seal. Remove the piston by unscrewing it using a square tip screwdriver.



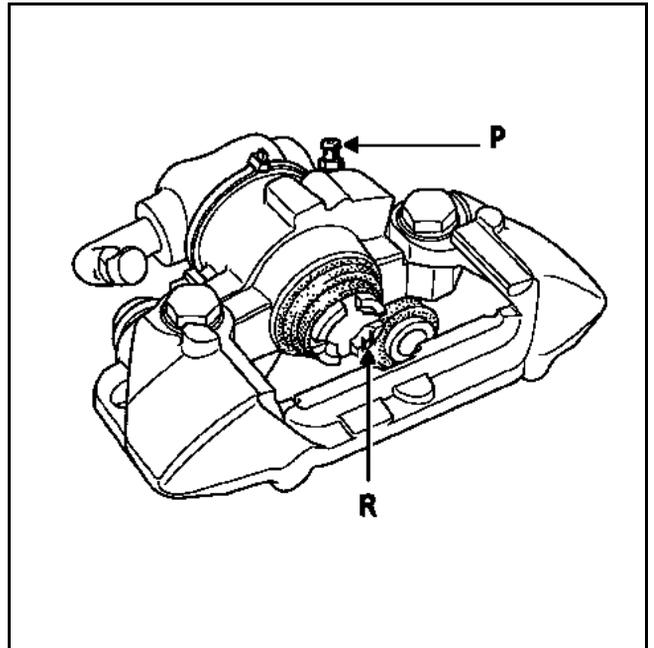
When the piston rotates freely, gradually blow compressed air into the cylinder, taking care not to eject the piston suddenly. Insert a wooden block between the calliper and the piston to prevent the piston from being damaged.
Any trace of impact or scratch will render the piston unfit for use.



Remove the seal from its neck using a round-edged steel blade.
Clean the parts with denatured alcohol and start the refitting operation.
Lubricate the seal and the piston with brake fluid.
Push in the piston gradually by hand in order to prevent damaging the seal.

Finish pushing the piston in by screwing it using a screwdriver until the piston turns but cannot sink in any more.

Orientate the piston so that mark (R) on its pressure face is located on bleed screw side (P) to enable the calliper to be bled correctly and the pad to be fitted in the central groove of the piston.



Coat the perimeter of the piston with grease.
Refit the new protective cover.

REAR AXLE COMPONENTS

Brake disc - Hub

33

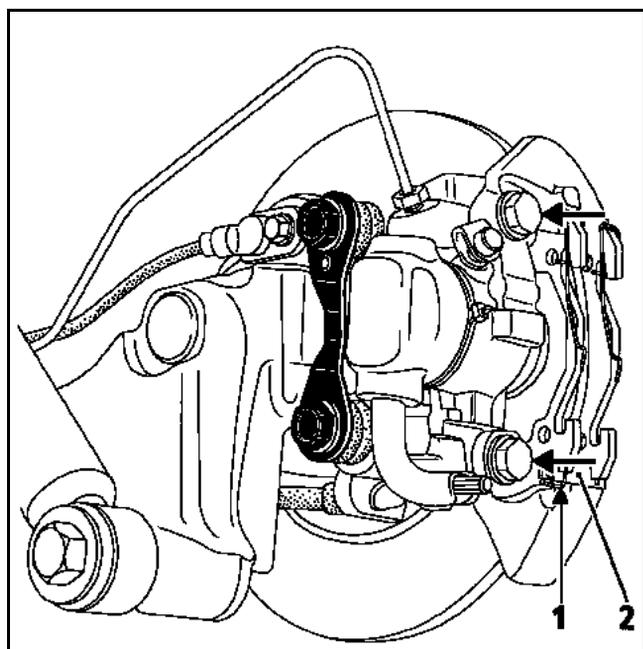
Brake discs are not grindable. If they are too heavily worn or are scratched they must be replaced.

TIGHTENING TORQUES (in daNm)	
Calliper yoke mounting bolt	6
Wheel bolts	9
Stub-axle nut	17.5

REMOVAL

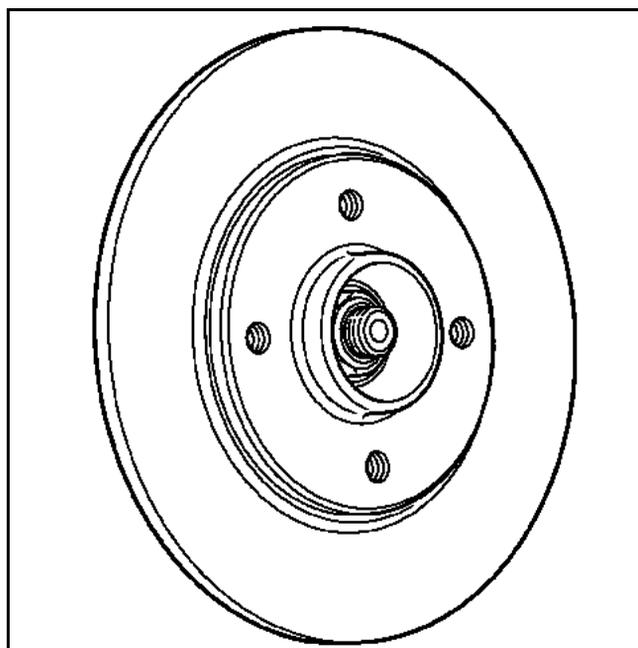
Remove:

- the two calliper yoke mounting bolts,



- the stub-axle nut,

NOTE: to remove the lower bolt, it is necessary to remove the clip (1) and the key (2).



- the disc.

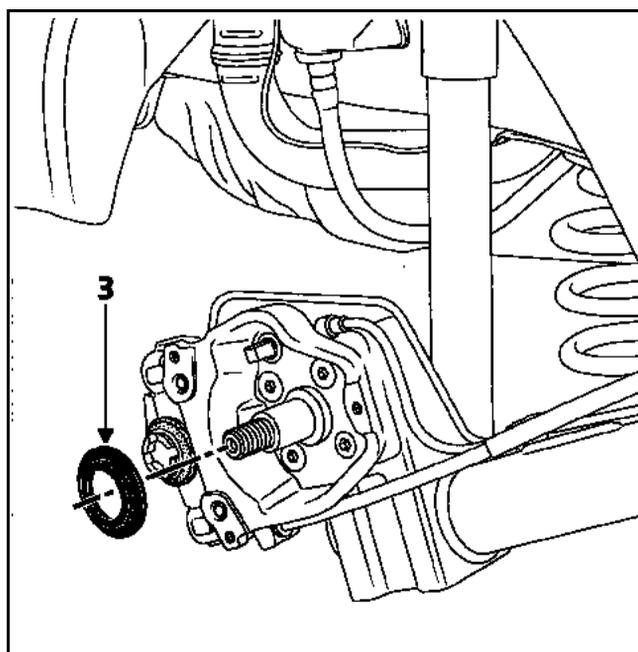
REFITTING

Proceed in the reverse order to removal.

Coat the bolts with Loctite FRENBLOC.

Press the brake pedal several times in order to bring the piston into contact with the pads.

NOTE: ensure that the deflector (3) is refitted the right way round. This deflector has a chamfer so that it touches the stub-axle correctly.



REAR AXLE COMPONENTS

Hub bearing - disc

33

TIGHTENING TORQUES (in daNm)	
Wheel bolts	9
Wheel nuts	17.5
Calliper yoke bolt	6

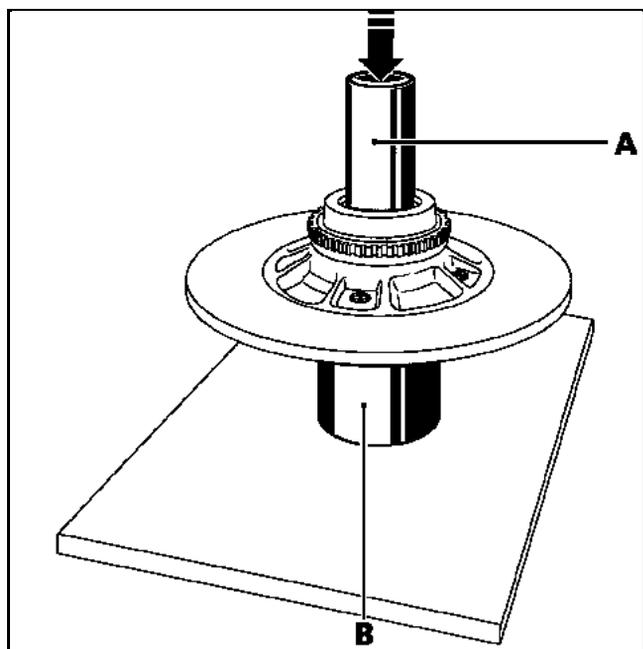
Put the vehicle on a two post lift.

REMOVAL

Remove:

- the brake disc - hub, refer to the procedure described on the previous page,
- the circlips.

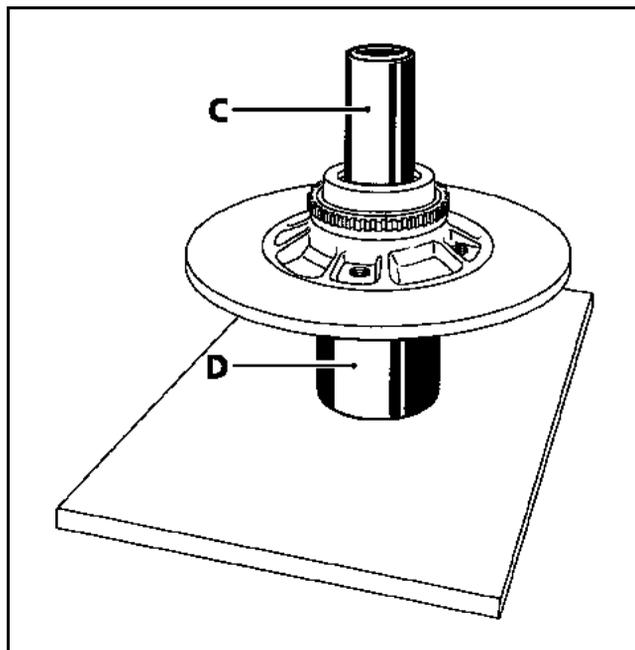
With a press, remove the bearing using tubes (A) and (B).



NOTE: ensure that the disc is correctly orientated in order to remove the bearing. The ABS ring must be facing upwards.

REFITTING

With a press, refit the bearing using tubes (C) and (D).



WARNING: ensure that the bearing is correctly orientated. The dust seal must be facing rearwards.

NOTE: the bearing dust seal plastic protector must be removed at the last minute.

Refit:

- the circlips,
- the disc - hub.

REAR AXLE COMPONENTS

Brake calliper mounting stub-axle

33

TIGHTENING TORQUES (in daNm)		
Wheel bolts		9
Calliper yoke bolt		6
Stub-axle mounting bolt	M10 x 150	5.7
	M8 x 125	2.9
ABS sensor mounting bolt		0.8

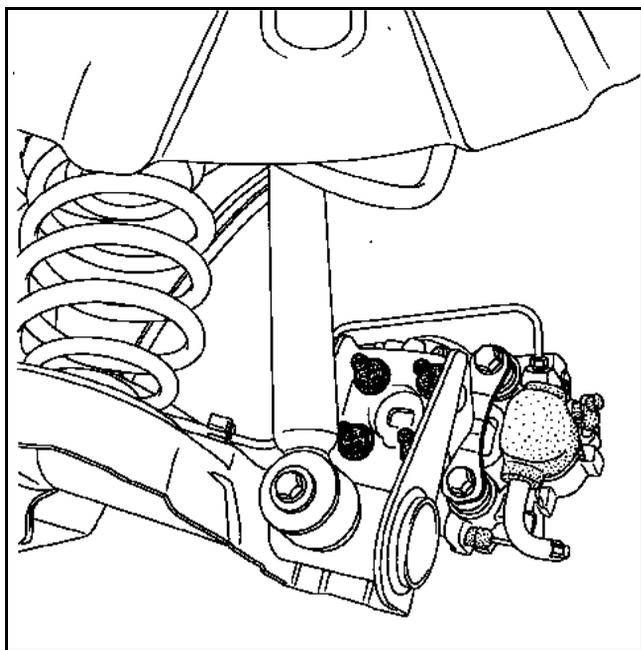
Position the vehicle on a two-post lift.

REMOVAL

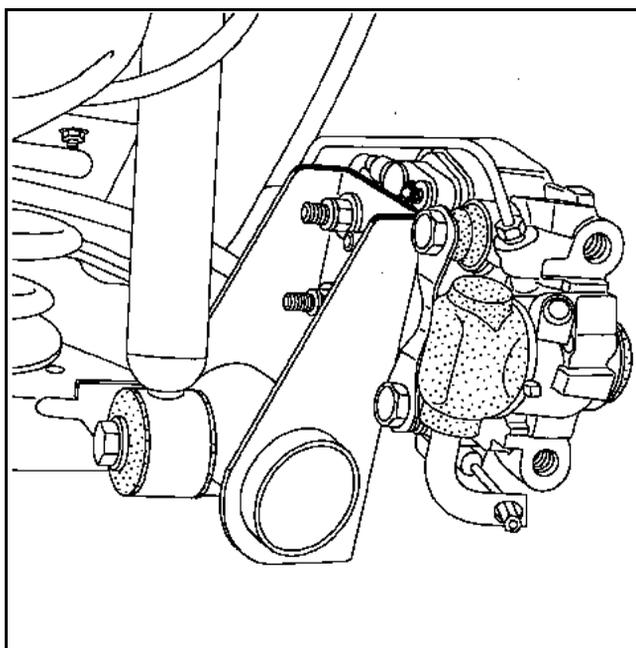
Disconnect the battery.

Remove:

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



NOTE: the ABS sensor can only be removed when the calliper mounting is no longer attached to the axle.

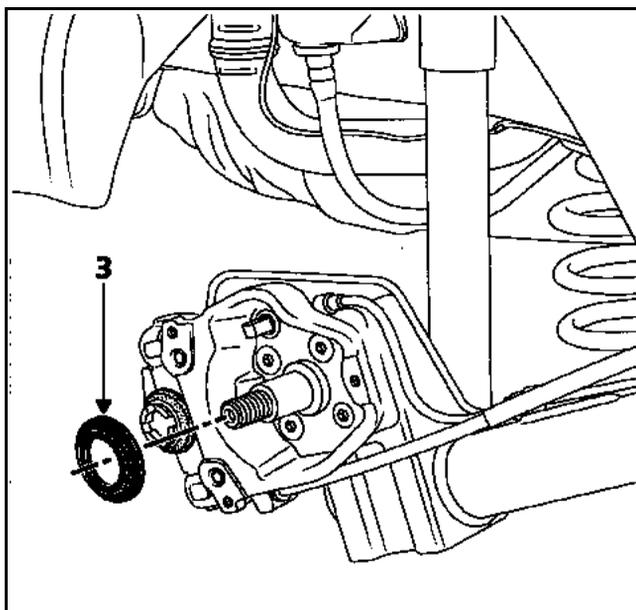


REFITTING

Proceed in the reverse order to removal.

NOTE:

- Ensure that the deflector (3) is refitted the right way round. This deflector has a chamfer so that it touches the stub-axle correctly. Grease between the deflector and the bearing seal.
- Coat the brake disc - hub - sensor interfaces with **MOLYKOTE FB 180** grease.



Perform a partial brake circuit bleed if the reservoir is not empty, if not perform a complete bleed.

STEERING ASSEMBLY

Power assisted steering rack

36

SPECIAL TOOLING REQUIRED	
Mot. 453-01	Set of 2 hose clamps
T. Av. 476	Ball joint extractor
T. Av. 1233-01	Tooling for operating on the sub-frame/axle

TIGHTENING TORQUES (in daNm)	
Wheel bolts	9
Steering column universal joint bolt	2.5
Engine tie-bar nut	6.2
Steering rack mounting nuts on the sub-frame	5
Track rod end nut	3.7

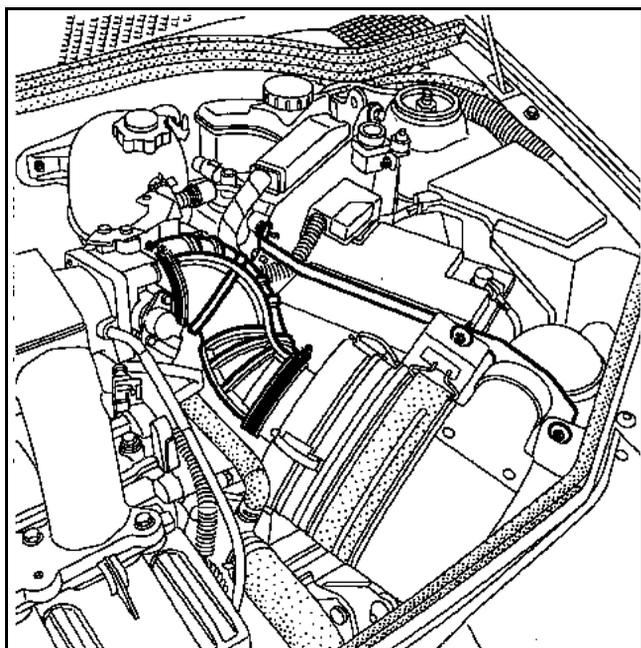
Position the vehicle on a two-post lift.

REMOVAL

In the engine compartment

Disconnect the battery.

Remove the air filter unit.



Disconnect the accelerator cable.

Remove both the expansion bottle nuts and move it to the front.

Fit a set of hose clamps **Mot. 453-01** on the PAS reservoir flexible pipes.

Disconnect the high and low pressure pipes on the steering rack. Ensure that the take-off pipes are plugged to prevent any impurities from entering.

Under the vehicle

Remove:

- the two wheels,
- the front left-hand wheel arch liner,
- the engine undertray.

Disconnect the track rod ends using **T.Av. 476**

Remove the engine tie-bar front bolt.

Disconnect:

- the exhaust downpipe from the exhaust system,
- the gearbox control linkage.

Remove the universal joint bolt, and fit a steering wheel locking tool in order to maintain the same position for the refitting operation.

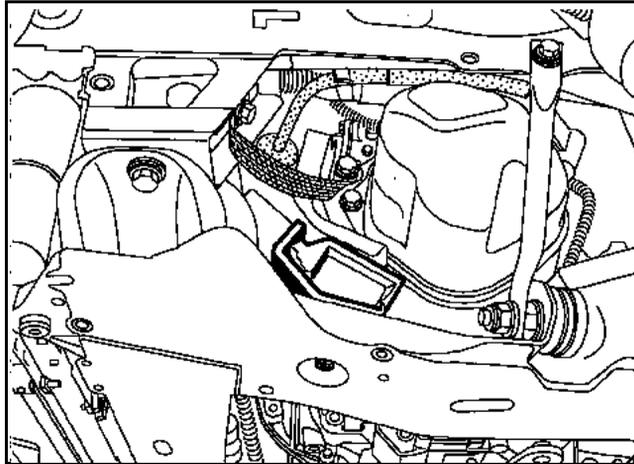
STEERING ASSEMBLY

Power assisted steering rack

36

Remove:

- the engine tie-bar rubber pad lower mounting nut,



- the sub-frame reinforcements (four bolts),
- the body/sub-frame side tie-rod upper bolts.

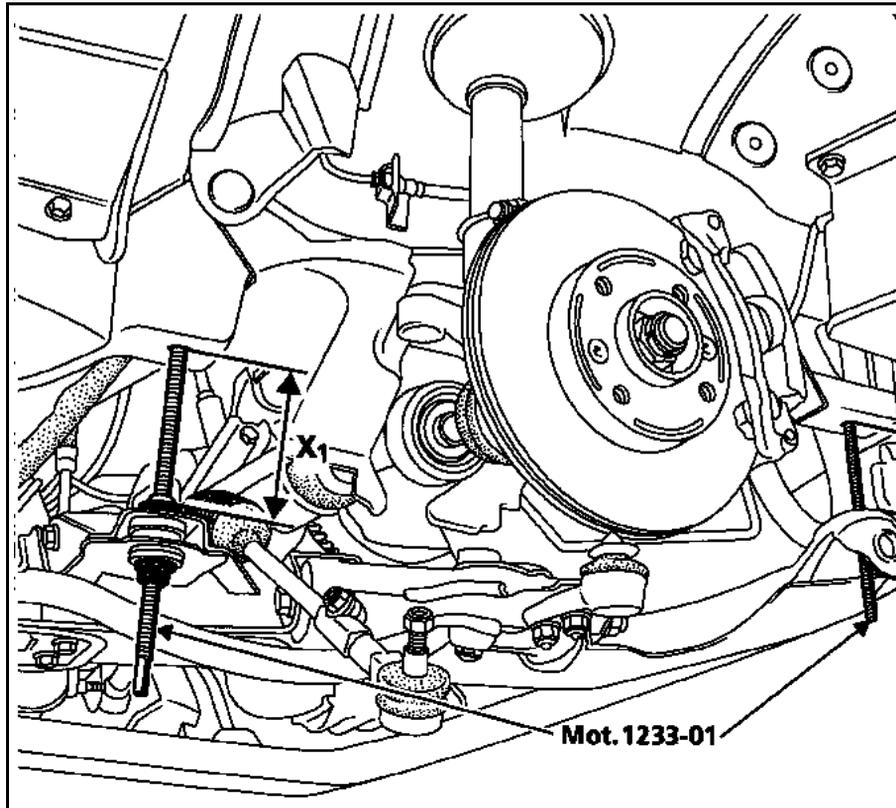
Replace the sub-frame mounting bolts one by one with threaded rods **T. Av. 1233-01**.

STEERING ASSEMBLY

Power assisted steering rack

36

Undo the nuts of T. Av. 1233-01 in order to lower the sub-frame by X1 = 12 cm minimum.



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

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

STEERING ASSEMBLY

Power assisted steering rack

36

REFITTING

In the event of a new steering rack

Fit the track rod ends.

Proceed in the reverse order to removal, respecting the tightening torques.

Ensure that the exhaust downpipe is reattached properly in order to prevent potential leaks.

Bleed the PAS circuit by turning the steering wheel from lock to lock with the engine running.

Carry out wheel alignment adjustment if necessary.

STEERING ASSEMBLY

Hydraulic power-assisted steering pump

36

SPECIAL TOOLING REQUIRED

Mot. 453-01 Hose clamp pliers

TIGHTENING TORQUES (in daNm)



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
PAS pump pulley bolt	0.8
PAS pump mounting bolt	3.2

Position the vehicle on a two-post lift.

REMOVAL

Disconnect the battery.

Remove:

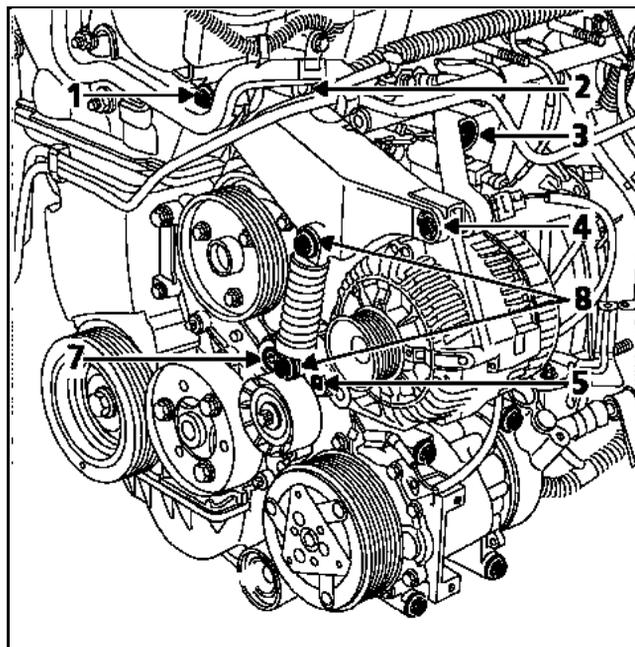
- the accessories belt (refer to Section 16),
- the alternator (refer to Section 16).

Fit a **Mot. 453-01** clamp to the supply pipe.

Disconnect the high and low pressure pipes, prepare for power-assisted steering fluid running out.

Remove:

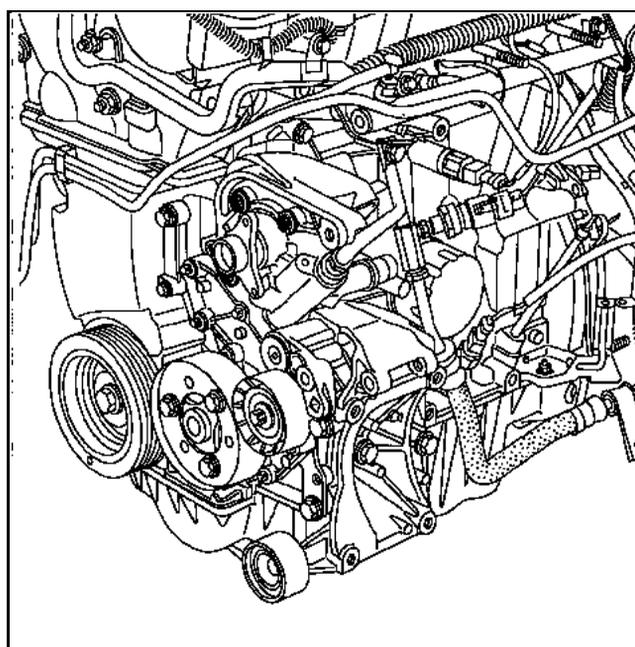
- the spring upper mounting (8) and the tensioning roller mounting bolt (7),
- the alternator mounting (bolt 1-2-3-4).



Remove the tensioning roller/spring assembly completely.

Remove:

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



STEERING ASSEMBLY

Hydraulic power-assisted steering pump

36

REFITTING

Proceed in the reverse order to removal.

To fit the tensioning roller/spring assembly and alternator, fit all bolts and tighten them in the following order:

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

Fill and bleed the circuit, turning the steering from lock to lock.

NOTE: the PAS pump cannot be repaired; replace it if it is faulty.

The PAS pump pressure must be between **86** and **93 bars**.

STEERING ASSEMBLY

Hydraulic power-assisted steering pump

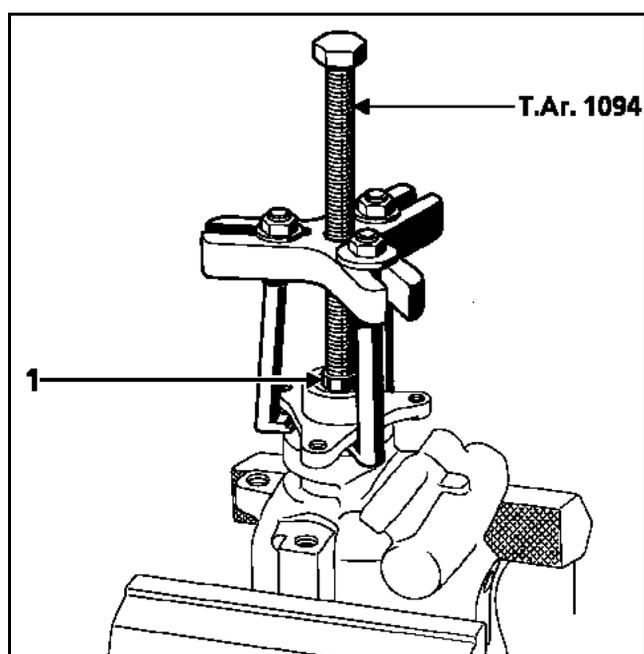
36

SPECIAL TOOLING REQUIRED		
Dir.	1083-01	PAS pump pulley fitting tool.
T.Ar.	1094	Puller with 3 sliding jaws

REPLACING THE HUB

Place the pump in a vice on the bench.

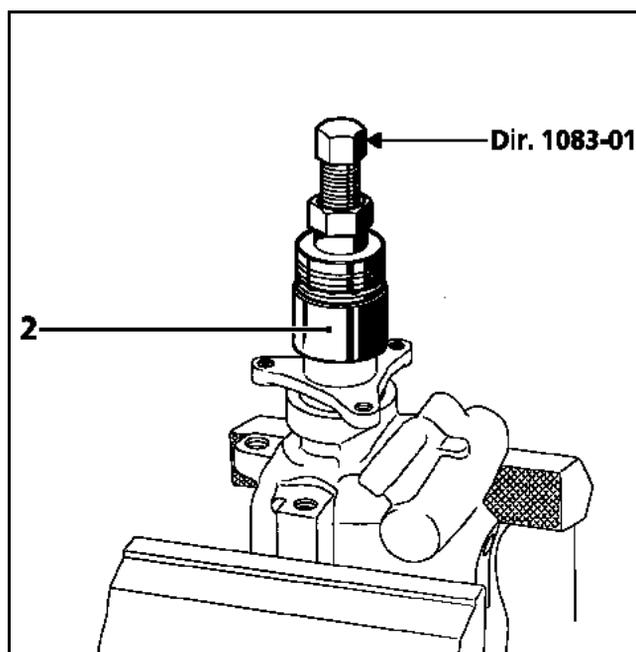
Fit **T. Ar. 1094** and extract the hub.



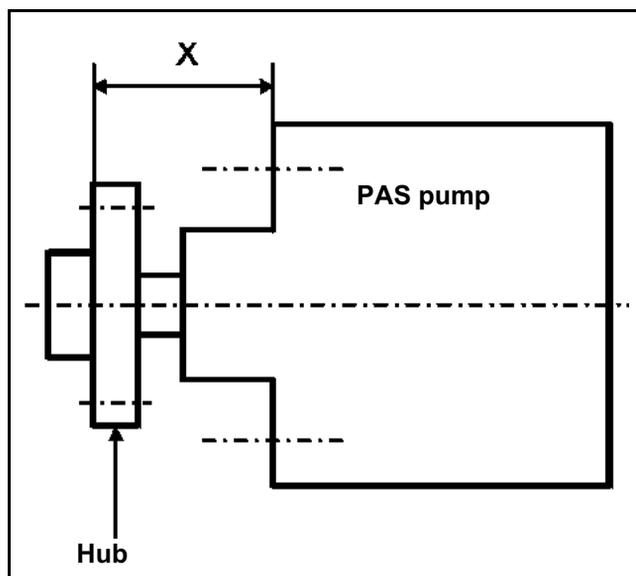
NOTE: insert a bolt (1) between the centre line of the pump and the pushrod of tool **T. Ar. 1094**.

Fit the hub (new) and press it in using tool **Dir. 1083-01**. Coat it beforehand with multipurpose grease to aid refitting.

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



Observe the fitting dimension:
X = 42.6 mm



ELECTRONICALLY CONTROLLED HYDRAULIC SYSTEM

BOSCH anti-lock braking system

38

This vehicle is fitted with **BOSCH 5.3 ABS** of the four channel additional type; the conventional braking system and the **ABS** system are separate.

SPECIAL NOTES

The system includes four speed sensors. Each hydraulic braking channel is associated with a sensor at each wheel. The front wheels are therefore regulated separately. The rear wheels however are regulated at the same time and in the same way according to the **select low** principle (the first wheel tending to lock causes immediate regulation on the complete axle assembly).

On this vehicle, the brake limiter is not fitted (for versions fitted with ABS) and its role is performed by a specific program located in ABS unit computer called EBD (Electronic Braking Distribution).

WARNING: if the ABS fuse is removed, do not brake sharply during road tests as the **EBD** function is no longer active (the pressure is the same in the front and rear) and there is a risk of slewing.

TIGHTENING TORQUES (in daNm)		
Pipe union	M10 x 100	1.7
	M12 x 100	1.7

Position the vehicle on a two-post lift.

REMOVAL

Disconnect the battery.

Fit a pedal press to limit the amount of brake fluid which will run out.

Remove:

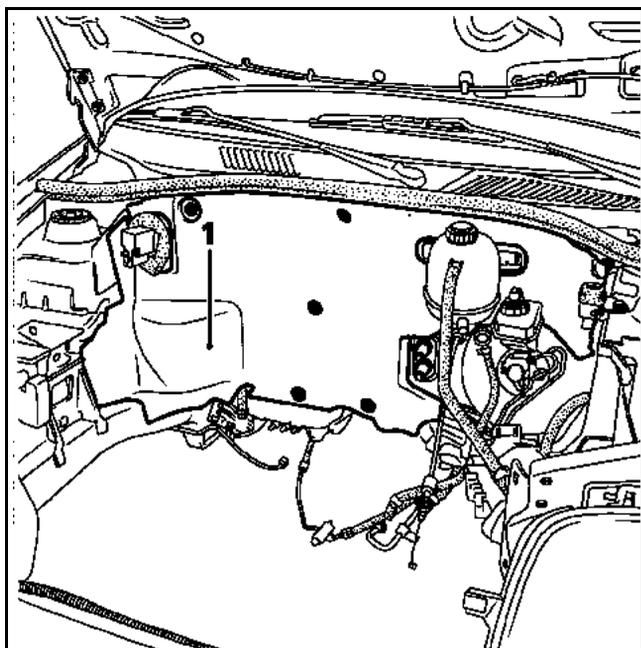
- the engine undertray,
- the front right-hand wheel-arch liner.

Disconnect the accelerator cable.

Remove both the expansion bottle mounting nuts and move them to the front.

Move the PAS reservoir forwards.

Remove the felt soundproofing from the bulkhead.

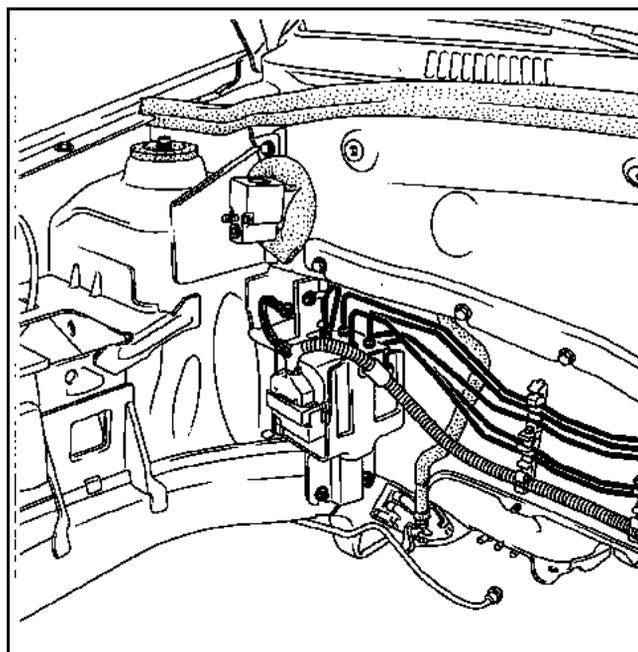


NOTE: cut the felt soundproofing at (1).

Remove:

- the earth wire bolt,
- the three hydraulic unit mounting bolts.

Disconnect the six pipes from the hydraulic assembly, marking their position for refitting.



NOTE: two pipes are connected behind the hydraulic unit. To disconnect them, remove the three hydraulic unit mounting bolts first. Also unclip the bulkhead pipes, to be able to move the unit to the front and have access to the pipe nuts. It is also possible to access these pipes through the front right-hand wheel arch by removing the wheel arch liner first.

Completely remove the hydraulic unit from above, by moving it towards the master cylinder.

REFITTING

Proceed in the reverse order to removal.

Bleed the brake circuit; for this refer to the following pages.

NOTE: the computer must not be removed, if faulty, replace the entire hydraulic unit.

HYDRAULIC BRAKING TEST

This section describes the test carried out with the diagnostic tool, to check the installation of the **ABS** on the vehicle and in particular the hydraulic circuit.

NOTE: this test requires two operators and it is advisable to position the vehicle on a two-post lift.

Test procedure

When the vehicle is on the lift, lift the wheel requiring testing. One of the operators must be in the passenger compartment driver's seat with the diagnostic tool. Switch on the ignition, with the vehicle in neutral, in fault finding mode, depress the brake pedal. The second operator must apply a torque to the wheel to try and rotate it.

The operator generates a command for the diagnostic tool which performs the cycle ten times: the pressure drops and increases alternately on the wheel being checked. These operations on the **ABS** will be displayed on the wheel being tested by ten alternate locking and unlocking cycles. The jerky movements of the wheel, noted qualitatively by the operator, signify that the hydraulic circuit for this wheel is correctly connected.

Program carried out by the diagnostic tool:

- Cycle on the wheel to be tested:
 - a pressure drop of **200 ms** with the pump simultaneously starting,
 - an increase in pressure of **300 ms** with the pump simultaneously starting (ten cycles are carried out on the wheel being tested).
- An increase in pressure to the master cylinder pressure on all four wheels.
- Cutting out of the hydraulic pump motor.
- The operator releases the brake pedal.

The hydraulic test for the wheel being studied has finished, start the test for the other three wheels.

BLEEDING PROCEDURE

NOTE: the hydraulic unit is supplied prefilled.

This bleeding procedure must be used when one of the following components has been removed:

- the hydraulic unit,
- the master cylinder,
- the pipework (between the hydraulic unit and the master cylinder).

1) Bleed the brake circuit in the conventional way using your foot or a bleeding device.

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

2) Bleed the hydraulic unit.

WARNING: observe the bleeding order starting with the **rear right-hand** brake, then the **rear left-hand**, and **front left-hand** brakes then **front right-hand** brake.

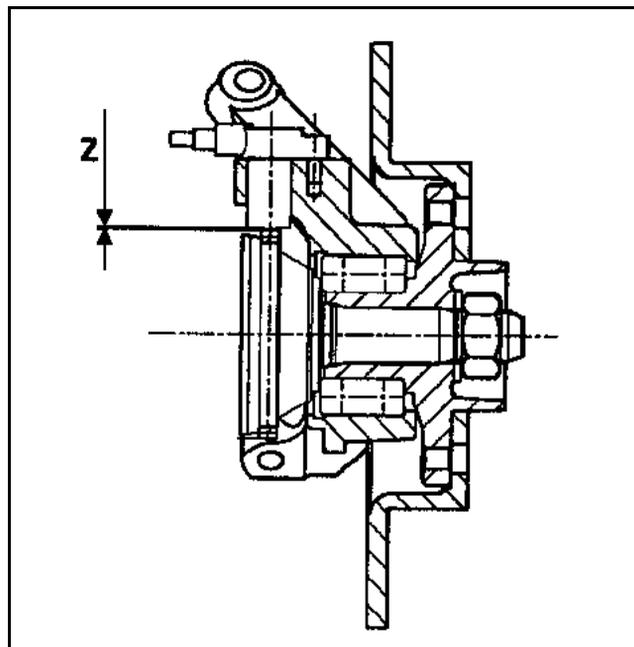
- a) Bleed the **rear right-hand** brake by bleeding the secondary circuit of the hydraulic unit using the diagnostic tool:
 - position the bleed container and the hose and open the brake bleed screw,
 - pump the brake pedal approximately ten times,
 - run the bleed command on the diagnostic tool,
 - pump the brake pedal during the fault finding bleed phase,
 - at the end of the bleed cycle using the diagnostic tool, continue to pump the brake pedal and close the brake bleed screw.
- b) Follow the procedure described in a) for **rear left-hand and front left-hand and front right-hand** brakes.
- c) Check the pedal travel and if it is incorrect, restart the bleeding procedure.

WARNING: check that there is sufficient brake fluid in the reservoir.

CHECKING THE WHEEL SPEED SENSORS

- a) Check the resistance of the sensor connections (from the computer connector to the 2-track speed sensor connector).
- b) Visually inspect the target teeth (26 teeth): if they are faulty, replace them.
- c) Carry out a test on the air gap using a set of shims; only the front can be tested.

Front: $0.1 < Z < 1.9$ mm



CONSUMABLES

Compressor oil:

SANDEN SP 10: 135 cm³

– Refrigerant:

R134a: 710 ± 35 g

– Compressor:

SANDEN SD 6V12

WARNING: when replacing a pipe, add **10 ml** of **SP 10** oil or, when a pipe has burst (rapid leak), add **100 ml**.

TIGHTENING TORQUES (in daNm)	
Pressure relief valve bolt on the evaporator	0.6
Pressure relief valve connecting hose retaining nut	0.8
Expansion valve connecting hose retaining bolt on dehydrator reservoir	0.8
Condenser connecting hose retaining bolt on dehydrator reservoir	1.2
Compressor connecting hose retaining bolt on condenser	0.8
Compressor connecting hose 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 clutch control connector.

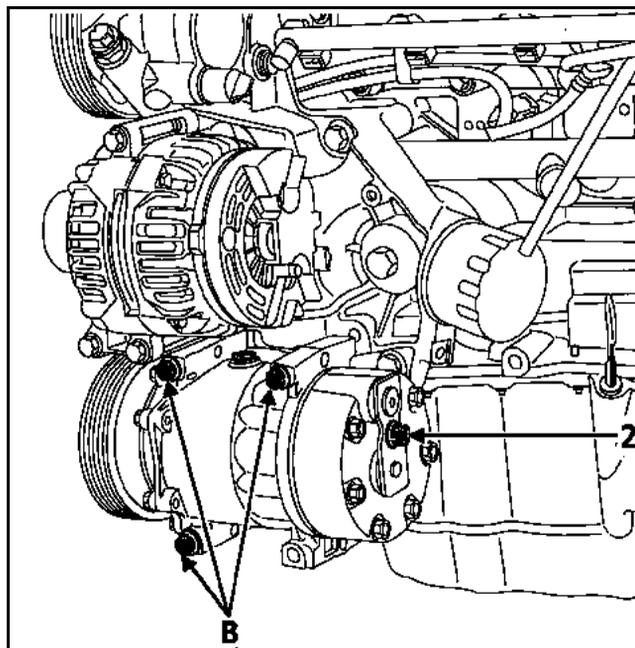
Remove:

- the front bumper,
- the radiator grille,
- the upper cross member,
- the compressor drive belt,
- the two connecting hoses, bolts (2),
- the compressor retaining bolts (B).

Remove the compressor from underneath the vehicle.

NOTE: it is essential to plug the connecting hoses and the compressor to prevent moisture from entering the circuit.

WARNING: When replacing the compressor, it is essential to top up the oil.



REFITTING

If the compressor needs replacing, the new one is supplied filled with oil.

Position the compressor the correct way round (filler plug facing upwards).

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

Refit the connecting hoses onto the compressor.

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

Fit the accessories belt (see Section **07 Accessories belt tension**).

Reconnect the compressor clutch control connector.

Create a vacuum, then fill the **R134 a** refrigerant circuit using the charging station.

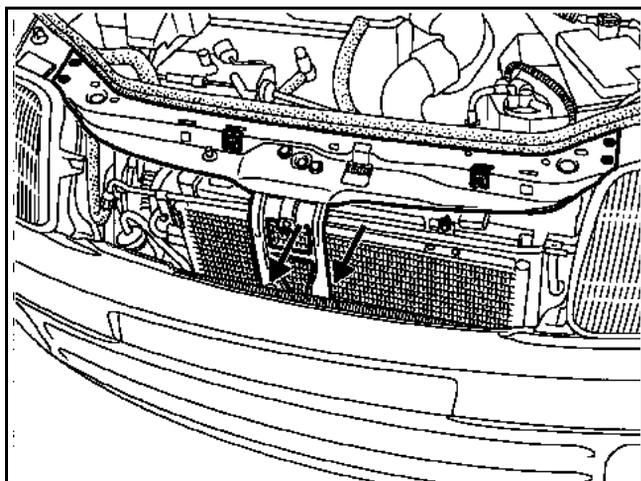
REMOVAL

Drain the **R134a** refrigerant circuit.

Position the vehicle on a two-post lift.

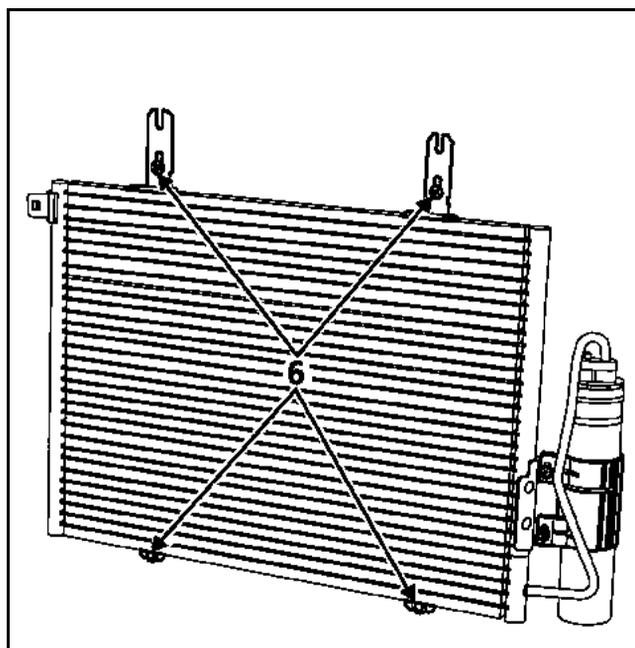
Remove:

- the front bumper,
- the radiator grille,
- the upper cross member and pull it down on the engine,



- the two **R134a** refrigerant pipes. Fit the sealing plugs to prevent moisture from entering.
- the condenser mounting bolts (6) on the cooling radiator.

Remove the dehydrator reservoir/condenser assembly from the bottom.



REFITTING

Proceed in the reverse order to removal.

Check the condition of the seals.

Create a vacuum, then fill the **R134a** circuit using the charging station.

WARNING

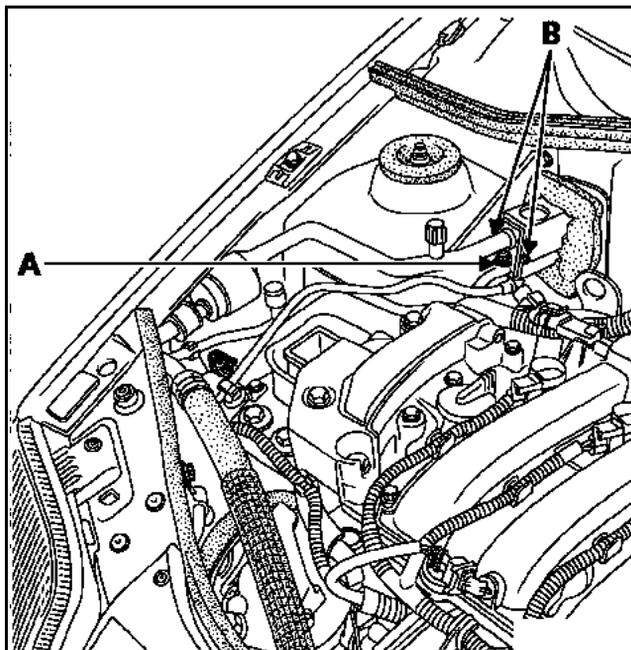
When replacing the condenser, add **30 ml** of **P.A.G. SP 10** oil to the circuit.

REPLACEMENT

Drain the R134a refrigerant circuit using the charging station.

Remove:

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



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

Bolt tightening torques:

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

Create a vacuum, then fill the R134a refrigerant circuit using the charging station.

REMOVAL

Place the vehicle on a lift.

Drain the R134a refrigerant circuit using the charging station.

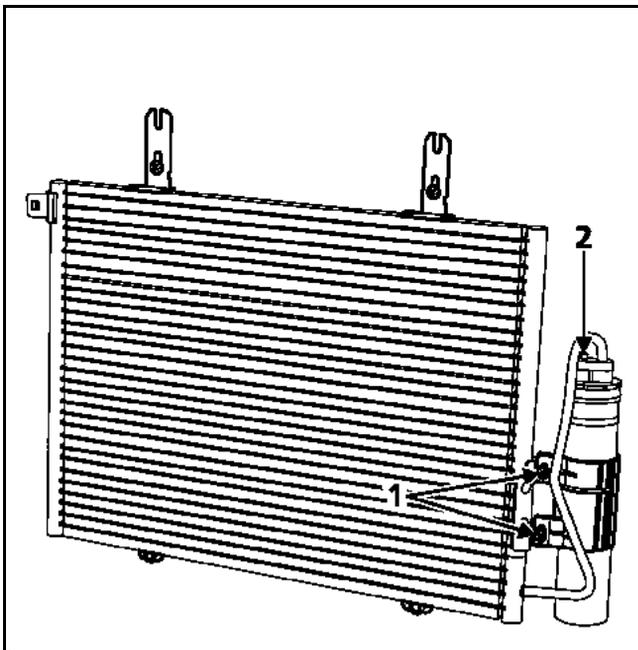
Remove:

- the bumper,
- the radiator grille,
- the two radiator upper mounting bolts,
- the union for R134a (2),
- the two hose mounting bolts on the dehydrator reservoir.

Move the radiator-condenser assembly back slightly.

From underneath the vehicle

Remove the two dehydrator reservoir retaining bolts (1) on the condenser.



Remove the dehydrator reservoir.

Fit plugs to each opening to prevent any moisture entering the components.

REFITTING

Refit in reverse order to removal.

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

Create a vacuum, then fill the R134a refrigerant circuit using the charging station.

When changing the dehydrator reservoir, add **15 ml** of **SP 10** oil to the circuit.

NOTE: tightening torque bolt (2): **1.2 daNm**