Espace

N.T. 3007A

JE0M

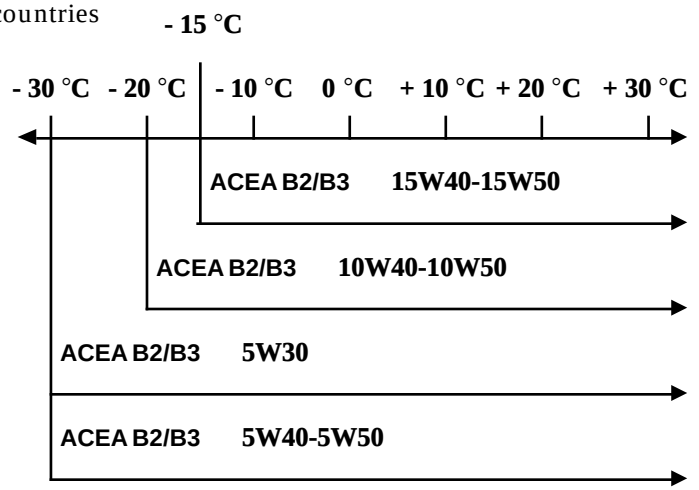
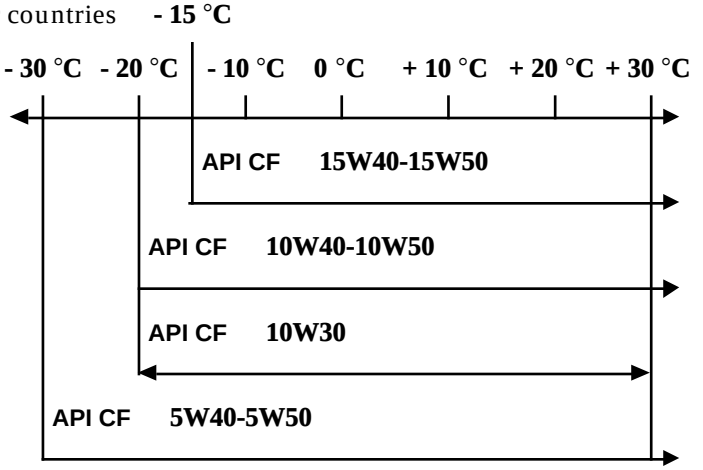
Basic manual : **M.R. 315**

SPECIAL FEATURES OF ESPACE VEHICLES FITTED WITH F9Q ENGINE

77 11 205 694 **JULY 1999** **Edition Anglaise**

Contents

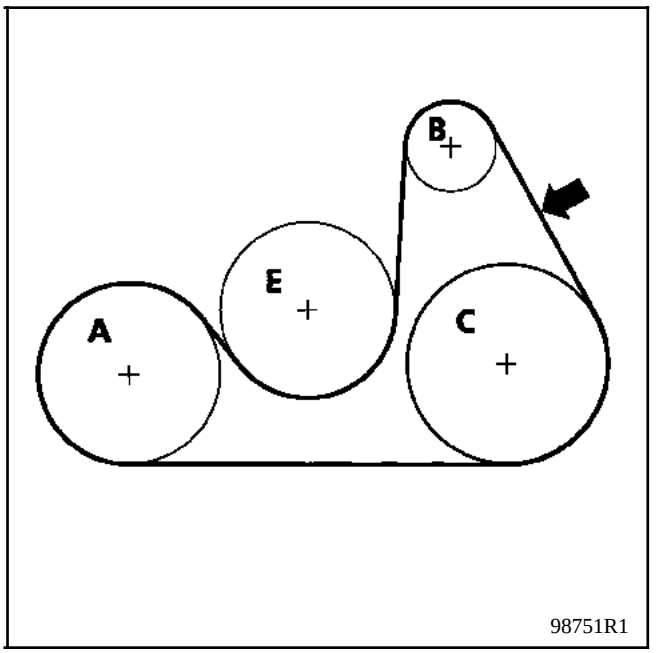
Contents (cont)

Component	Capacity in litres (approx.) *	Grade
Diesel engine (oil) F9Q	For oil change 5 5.5 (1)	EEC countries  ACEA B1 oils must never be used for diesel engines.
		Other countries 

* Adjust using the dipstick
(1) After replacing the oil filter

Component	Capacity in litres	Grade	Notes
Gearbox JC5 077	3.1	All countries : TRANSELF TRX 75 W 80 W (API GL5 or MIL-L 2105 G or D standards)	
Cooling circuit F9Q	7.5	Glacéol RX (type D)	Protection down to - 35 °C ± 2 °C for all countries

ALTERNATOR AND POWER ASSISTED STEERING



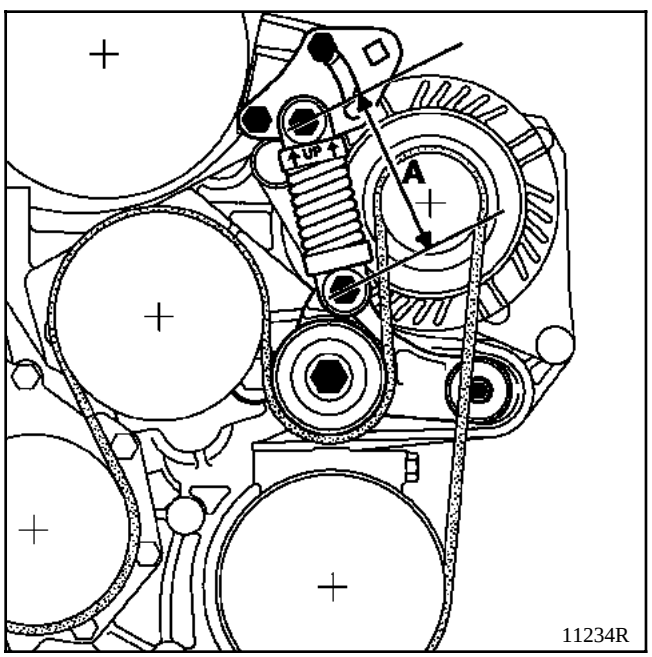
Tension (US = SEEM units)	Multi-tooth power assisted steering belt
Fitting	**97 ± 3**
Minimum for operation	**67**

A Crankshaft
B Alternator
C Power assisted steering pump
E Water pump
T Tension wheel

→ Point for checking tension

SPECIAL TOOLING REQUIRED	
Mot. 1387-01	**Tool for checking the gap between the centres of the bolts on the automatic tensioner**

Checking the gap between the centres of the bolts on the automatic tensioner
Before removing the accessories belt, check the gap between the centres of the bolts (A) on the automatic tensioner using **Mot. 1387-01**.

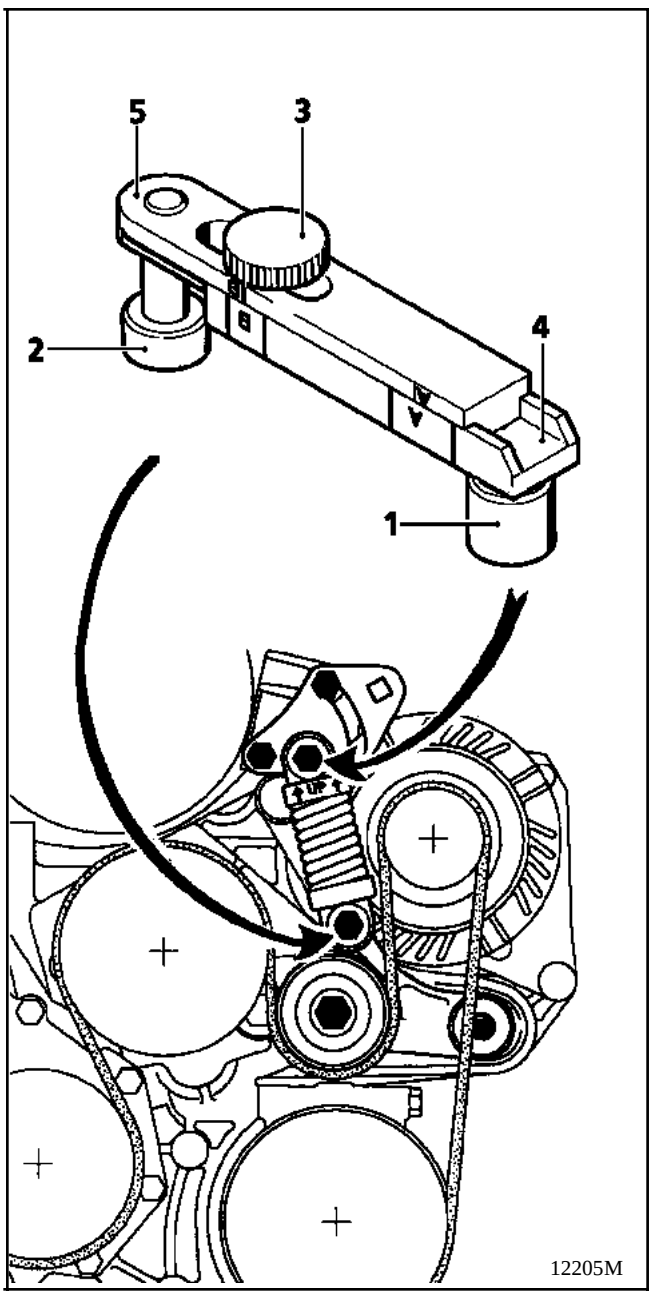


Methods for using Mot. 1387-01

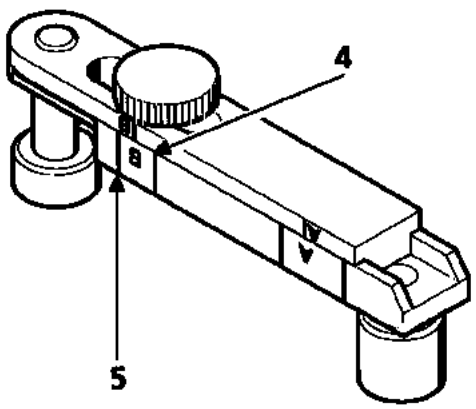
Fit the small sensors (1) and (2) to the tool.

Slacken the knob (3) so that the arms (4) and (5) can slide against one another.

Fit the modified **Mot. 1387** on the two mountings of the tensioner device, then lock the arms (4)and (5) by turning the knob (3).



Check on **Mot. 1387-01** that you are well within the tolerance range **(zone B)**.



12205M2

NOTE :

Minimum tolerance = mark (4)

Maximum tolerance= mark (5)

Checking the gap between the centre of the bolts allows the correct operation of the automatic tensioning system to be checked.

In the case of a gap being outside the tolerance range, check the following points :

ENGINE / GAP	F9Q
Gap less than the minimum	- Check that the eccentric plate is correctly positioned (bottom of slot). - Incorrect belt (too short). - Incorrect belt routing.
Gap greater than the maximum	- Check that the eccentric plate is correctly positioned (bottom of slot). - Incorrect belt (too long). - Incorrect belt routing.

SPECIAL TOOLING REQUIRED	
Mot. 1273	**Tool for checking belt tension**

Procedure for tensioning

Engine cold (ambient temperature).

Check that pin **Mot. 1054** is in place.

Fit the new belt.

Fit the tension wheel so that it rests on the belt by tightening the bolt (A) on the inner timing cover.

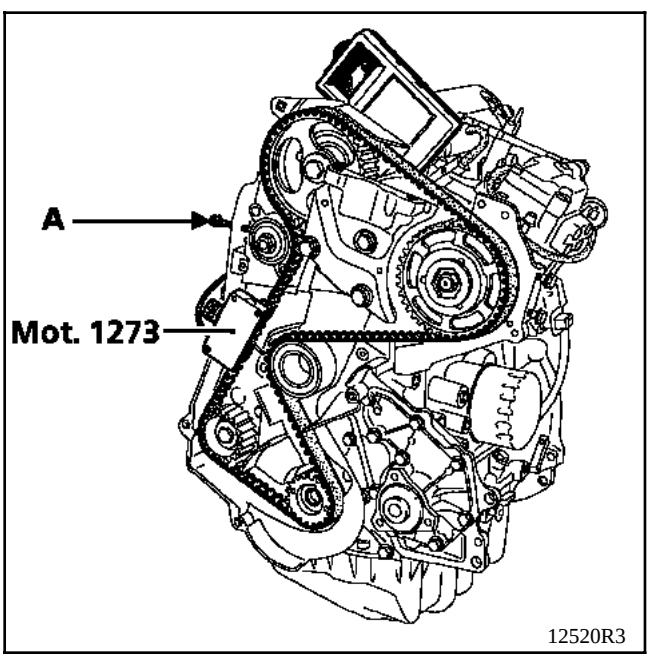
Remove pin **Mot. 1054**.

Press firmly on the section of belt between the idle roller and the tension wheel.

Fit the sensor of tool **Mot. 1273**.

Turn the knob of the sensor until it releases (three "**clicks**").

Tension the belt until it reaches the recommended setting, **42 SEEM units**, by moving bolt (A).



Lock the tensioner, check, adjust the value.

Rotate the crankshaft a minimum of three times.

CHECKING

Refit pin **Mot. 1054** and adjust the timing to its setting point, **(press on the TDC pin one half-tooth before the camshaft markings line up, to avoid falling into a crankshaft balancing hole)**.

Remove pin **Mot. 1054**.

Press firmly on the section of belt between the idle roller and the tension wheel.

Fit the sensor of tool **Mot. 1273**.

Turn the knob of the sensor until it releases (three "**clicks**").

Check that the tension value is 37 SEEM units, if not, readjust it.

Tighten the tension wheel nut to a torque of **5 daN.m**.

NOTE : The tension wheel nut must be tightened to the correct torque to avoid slackening which could lead to engine damage.

Check the injection pump timing (see section **13** "**Pump -Timing**").

Do not refit a belt once it has been removed. Replace it.

METHOD FOR TIGHTENING THE CYLINDER HEAD

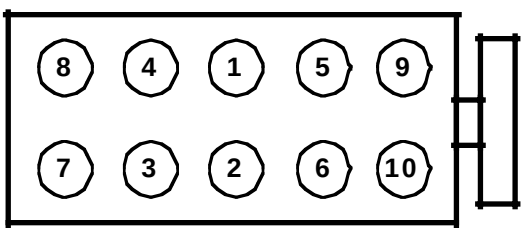
It is necessary to remove the engine and transmission assembly to remove the cylinder head.

REMINDER: To obtain the correct tightening of the bolts, use a syringe to remove any oil which may have entered the cylinder head mounting holes.

All the cylinder head bolts must be systematically replaced after removal. There is no procedure for retightening the cylinder head.

Preseating of the gasket

Tighten all the bolts to **3 daN.m**, then to an angle of **50° ± 4°** in the order specified below.



90775S

Wait three minutes, settling time.

Tightening the cylinder head :

- Tightening of the cylinder head is carried out in stages, the procedure below applies successively to bolts **1-2 then 3-4, 5-6, 7-8 and 9-10**,
- Slacken bolts **1-2 until they are totally free**.
- Tighten bolts **1-2 to 2.5 daN.m**, then to an angle of **213° ± 7°**.
- Repeat the slackening - retightening operation for bolts **3-4, 5-6, 7-8 and 9-10**.

There is no procedure for retightening the cylinder head.

Vehicle type	Engine	Gearbox	Capacity (cm^3)	Bore (mm)	Stroke (mm)	Ratio
JE0M	F9Q 720	JC5	1870	80	93	18.3 / 1

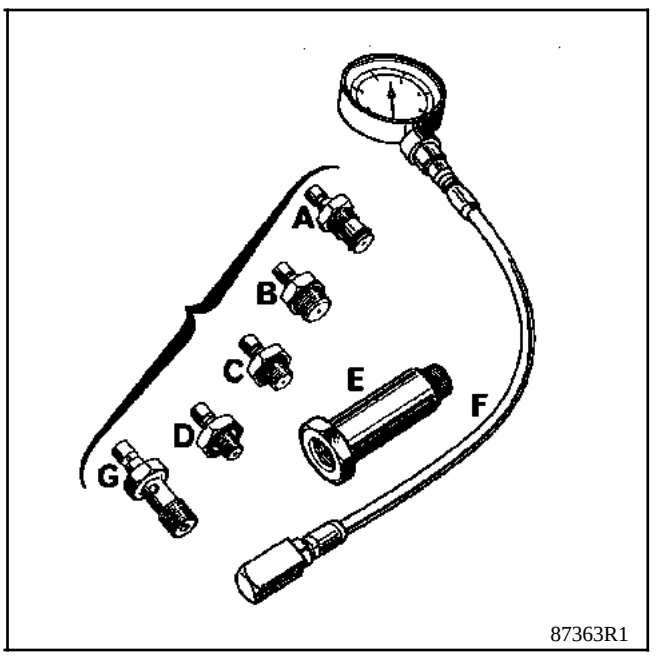
Refer to Workshop Repair Manual : **Mot. F9Q**

SPECIAL TOOLING REQUIRED
Mot. 836 -05 Kit for measuring oil pressure
EQUIPMENT REQUIRED
22 mm long socket

CHECKING

The oil pressure must be checked when the engine is warm (about **80 °C**).

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



USE

B + F

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

Oil pressure

1 000 rpm	**1.2 bar**
3 000 rpm	**3.5 bars**

SPECIAL TOOLING REQUIRED	
Mot. 1390	Universal mounting
Mot. 1410	Tool for releasing quick release unions on the refrigerant circuit
Dir. 1282-01	Wrench for slackening steering box unions.
Dir. 1282-02	Wrench for slackening steering box unions.
BVi. 31 -01	Roll pin punches
Tav. 476	Ball joint extractor

EQUIPMENT REQUIRED
Impact ball joint extractor Safety pads or straps

TIGHTENING TORQUES (in daN.m)	
Shock absorber base mounting bolt Ø M16×200	20
Driveshaft gaiter mounting bolt	2.5
Wheel bolts	10
Engine tie bar bolts	4.5 to 6.5
Suspended engine mounting bolt on gearbox	5.5 to 6.5
Mounting nut for suspended engine mounting pad on front left side member	5.5 to 8
Mounting bolt on engine for front right suspended engine mounting cover	5 to 6.5
Front right suspended engine mounting movement limiter mounting bolt	5 to 6.5
Mounting nut for mounting pad on front right suspended engine mounting cover	3 to 4.5

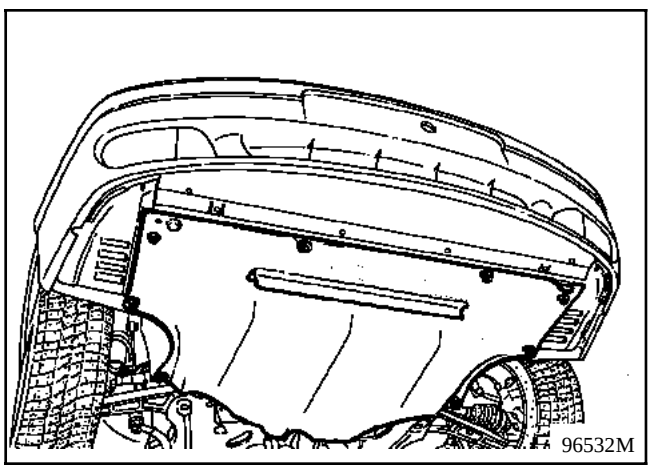
Put the vehicle on a two post lift (use the safety straps).

Remove the engine soundproofing.

Disconnect and remove the battery.

Drain the refrigerant circuit (if fitted) using the filling station.

Remove:
- the engine undertray,
- the front wheels,
- the front right and left hand protectors at the ends of the wheel arches,
- the wheel arch protectors,
- the front bumper.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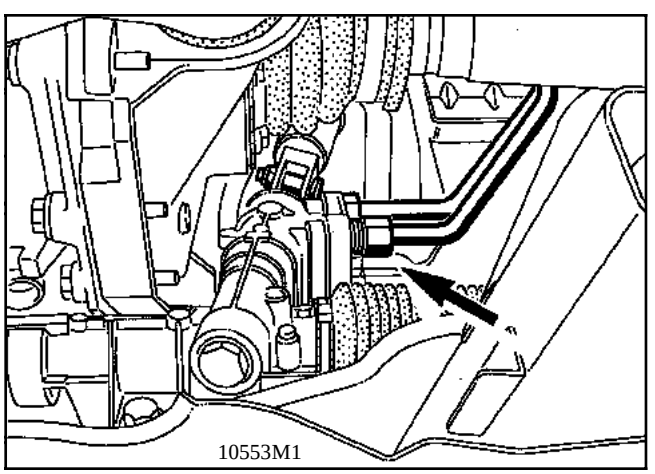
Open the degassing bottle.

Drain the power assisted steering circuit:
- from the low pressure hose on the cooler,
- by disconnecting the high pressure pipe (lower pipe) for the power assisted steering on the steering box (Tool **Dir. 1282-01**). Take care to collect the fluid which will run out.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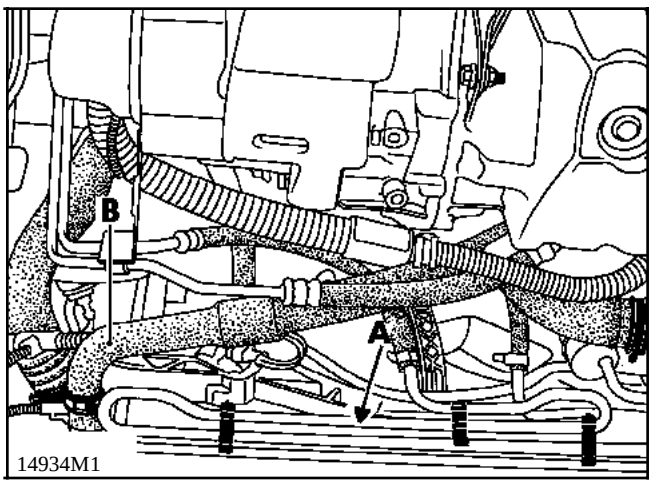
Remove the power assisted steering oil cooler (A).

Drain the cooling circuit from the lower radiator hose (B).



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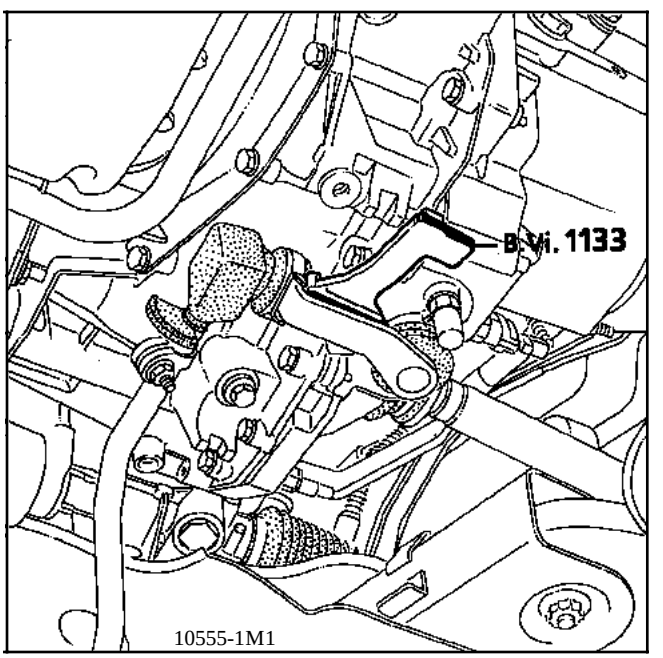
Drain the gearbox.



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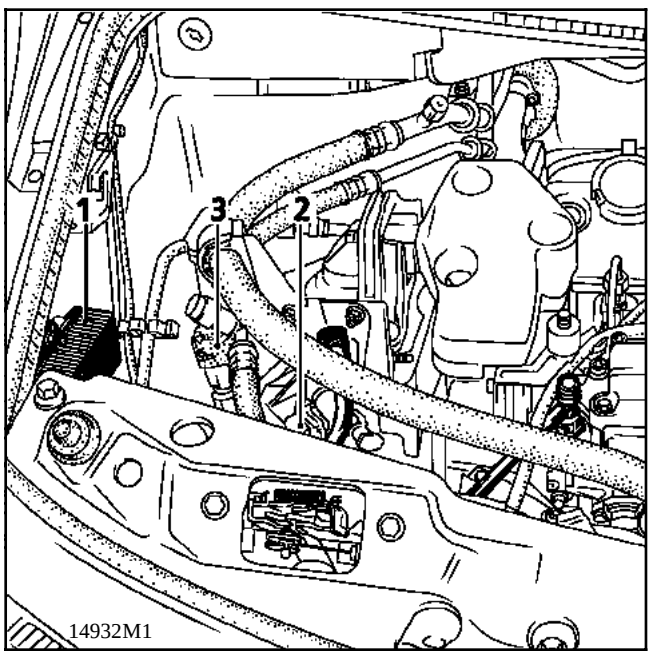
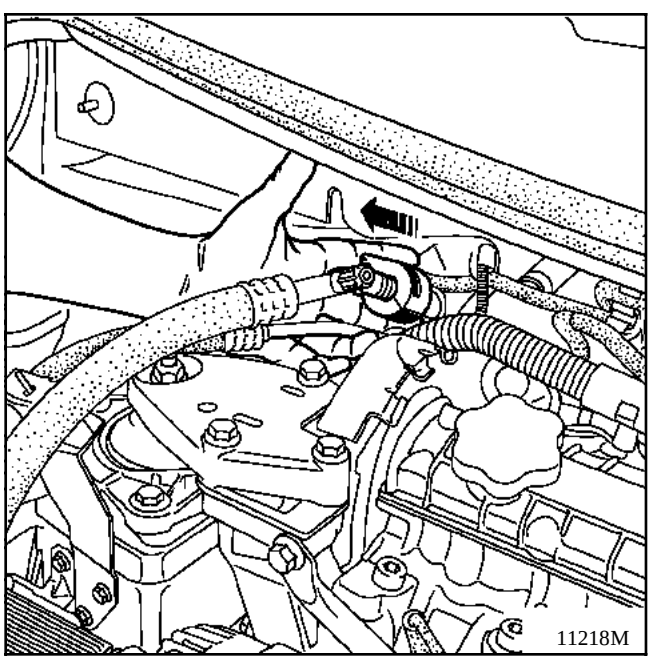
On the left : disconnect the injection computer (against the battery screen).

On the right: disconnect the pre-postheating unit (1), the diesel fuel heater (2), the injection pump connecter and the inertia switch (3).

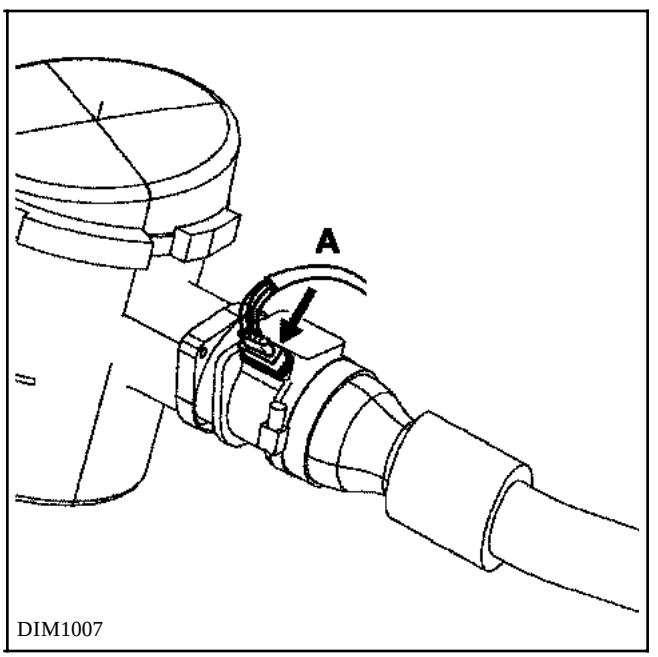


Release the air conditioning unions from the bulkhead.
(use tool **Mot. 1410**. See **MR 315 Section 62**.)



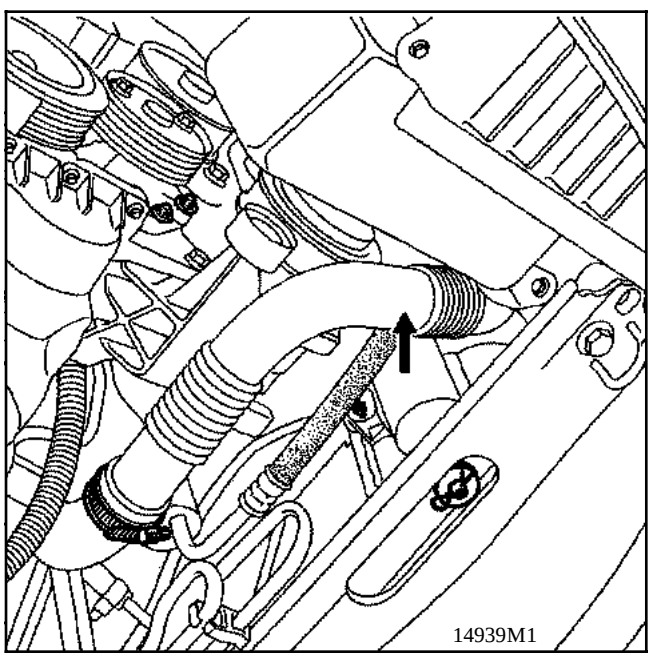
Disconnect:
- the EGR valve capsule,
- the mounting for the air conditioning pipes on the right hand suspended engine mounting.
- the accelerator cable from the potentiometer and remove the potentiometer with its mounting,
- the flowmeter connector (A) on the air filter duct,
- the vacuum hose on the brake servo.

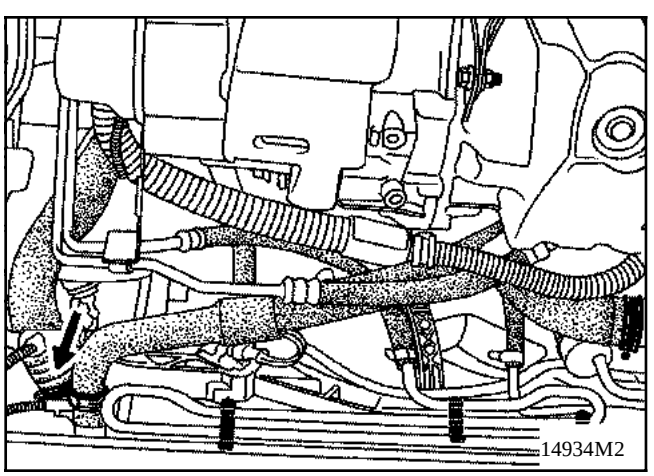
Remove the air filter and its pipes.



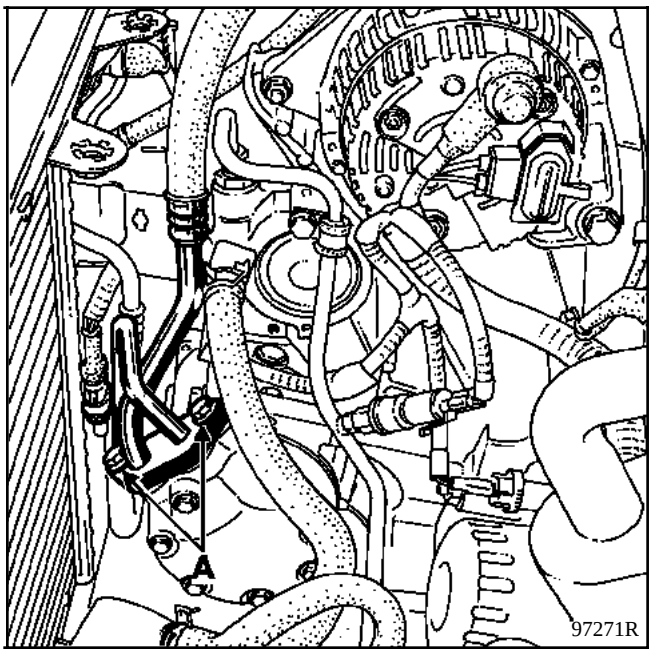
Under the headlight carrier panel, remove the sealing cross member from the cooling panel with the air scoop (four bolts).

Disconnect the air inlet pipes from the air / air exchanger and remove the pipe on the right hand side.



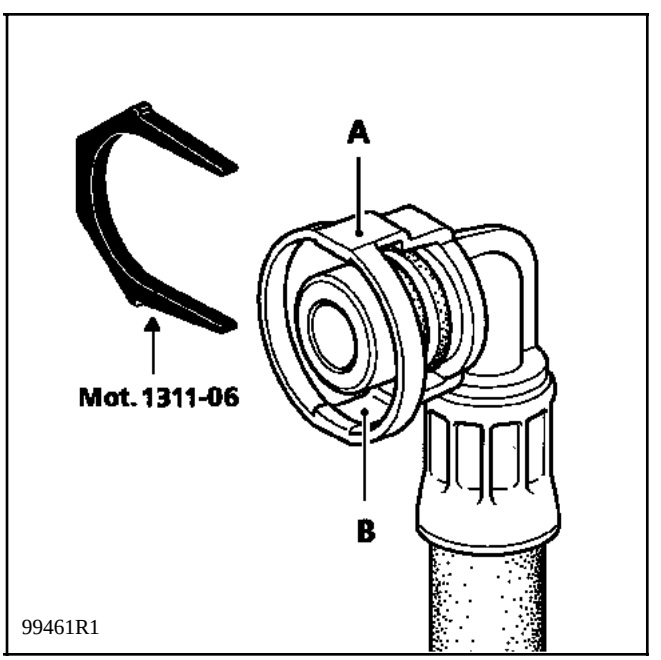


Disconnect the air conditioning pipes from the compressor (two bolts (A) on the flange). Hermetically seal the openings.



Remove the mounting bolt for the earth strap on the gearbox.

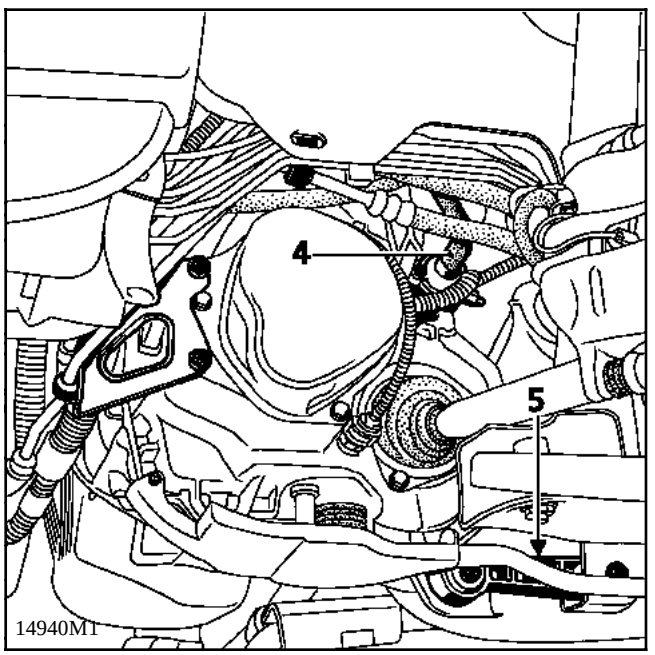
Disconnect the diesel supply union at the filter outlet (use tool **Mot. 1311-06**).

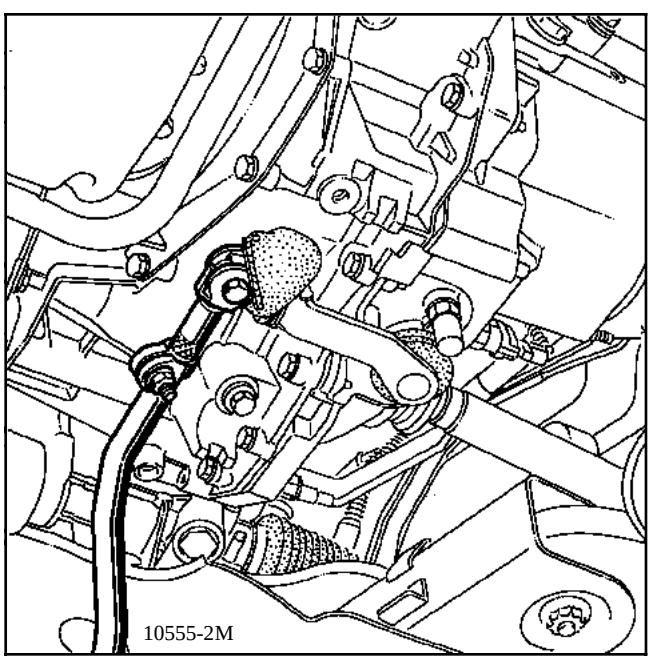


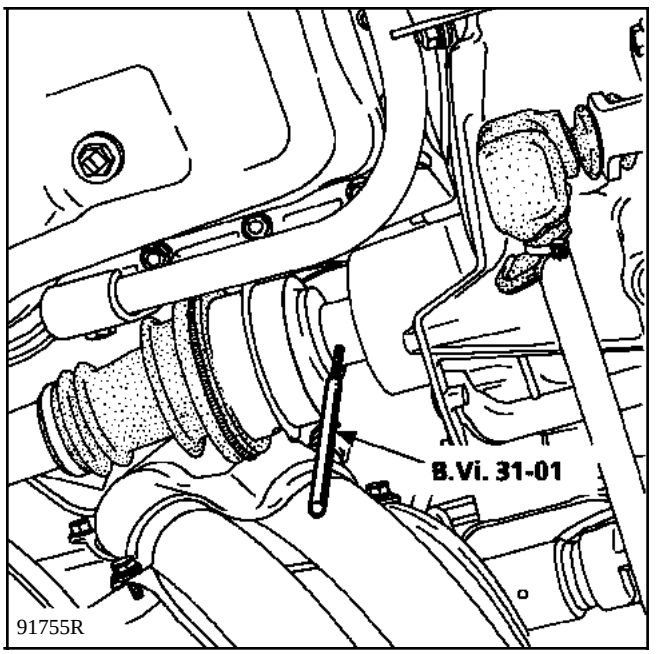
Disconnect the clutch cable at the fork.

Disconnect the coolant outlet on the thermoplunger unit(4).

Remove:
- the engine tie bar (5),
- the exhaust pipe between the turbo and the catalytic converter,
- the gear command (move the gaiter to one side),
- the right hand driveshaft roll pin.





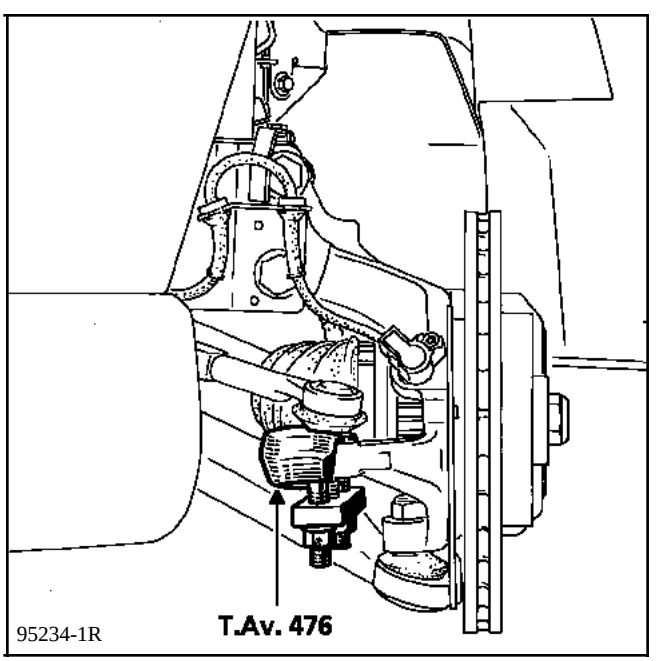


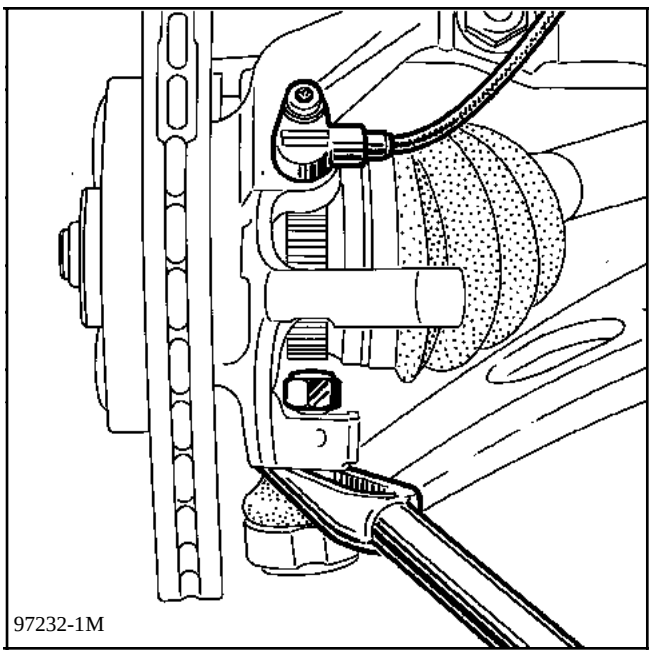
Removing the driveshafts

On the right hand side, remove:
- the brake caliper and secure it to the shock absorber spring, (if necessary, release the brake pipe from the shock absorber strut),
- the shock absorber base bolts (**note their fitting direction**).

Release the lower ball joints (using an impact extractor) and the track rod ends (tool **T. Av.476**).

Tilt the stub axle carrier, release the right hand driveshaft after removing the driveshaft roll pin on the gearbox output shaft.

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On the left hand side, remove:
- the brake caliper and secure it to the shock absorber spring,
- the shock absorber base bolts (**note their fitting direction**).

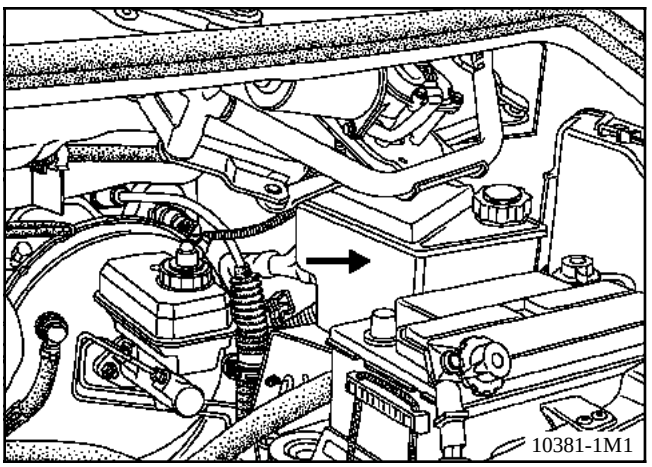
Release the lower ball joints (using an impact extractor) and the track rod ends (tool **T. Av.476**).

Tilt the stub axle carrier, release the left hand driveshaft after removing the three gaiter mounting bolts on the gearbox.

TAKE CARE NOT TO DAMAGE THE GAITERS

Lower the vehicle

Disconnect:
- the upper engine / radiator hose on the radiator; rest it on top of the engine,
- the heater matrix coolant pipes on the engine,
- the coolant expansion bottle (two hoses).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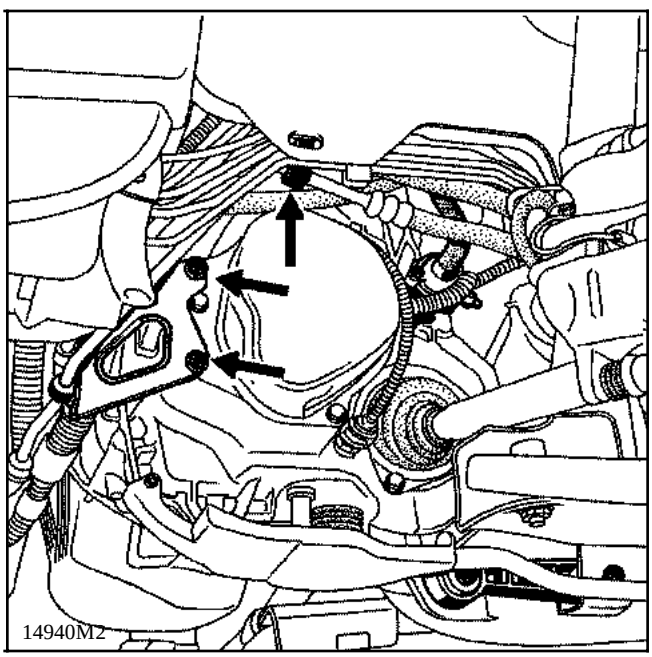
To make it easier to remove the engine and transmission assembly, release the two mounting brackets for the power assisted steering pipes on the gearbox and the front of the engine then put them on top of the engine.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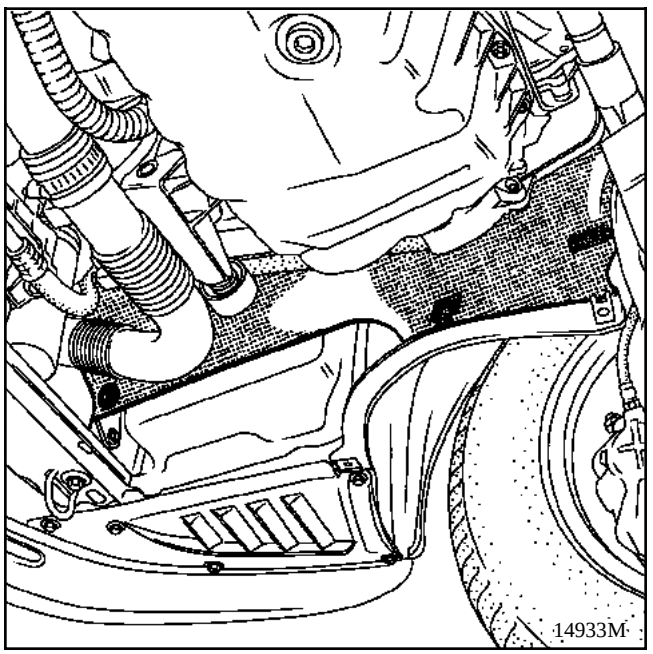
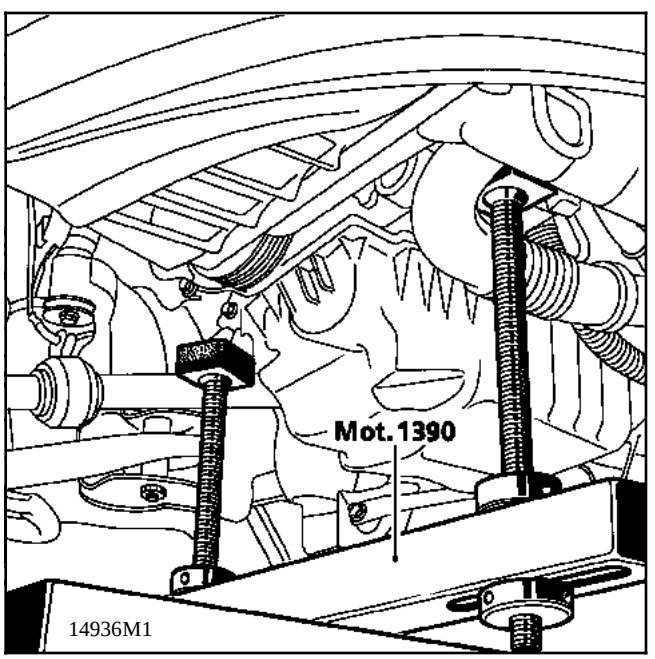
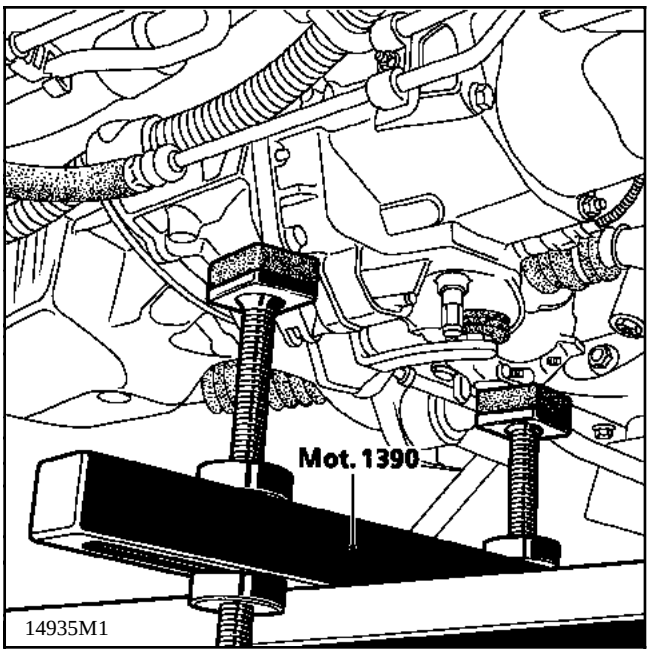
Remove the soundproofing for the right hand side member. This slides between the engine and the side member. Take care not to tear it on removal.

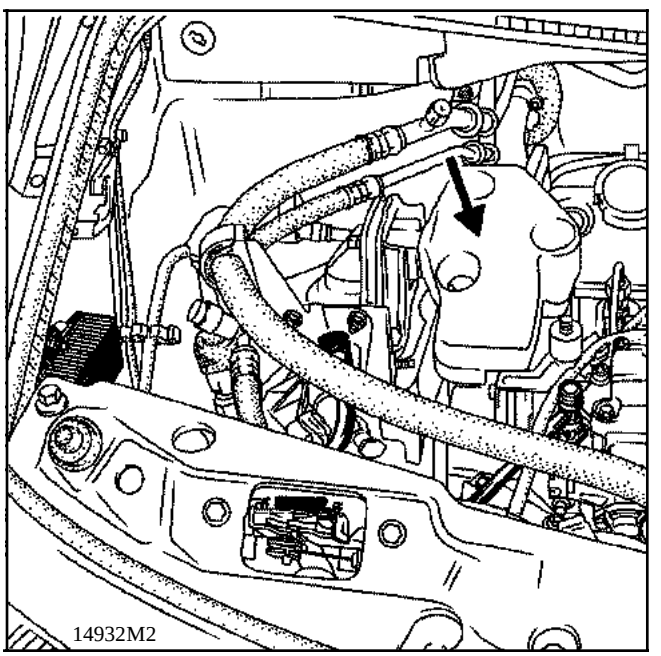


Fit the adjustable support **Mot. 1390** under the engine; lower the vehicle carefully onto it (two persons required).



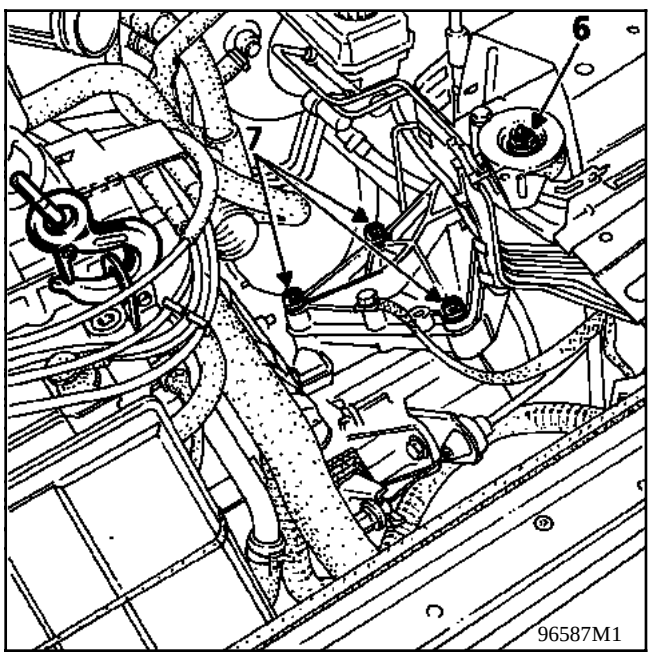


Slacken the right hand suspended engine mounting cover.

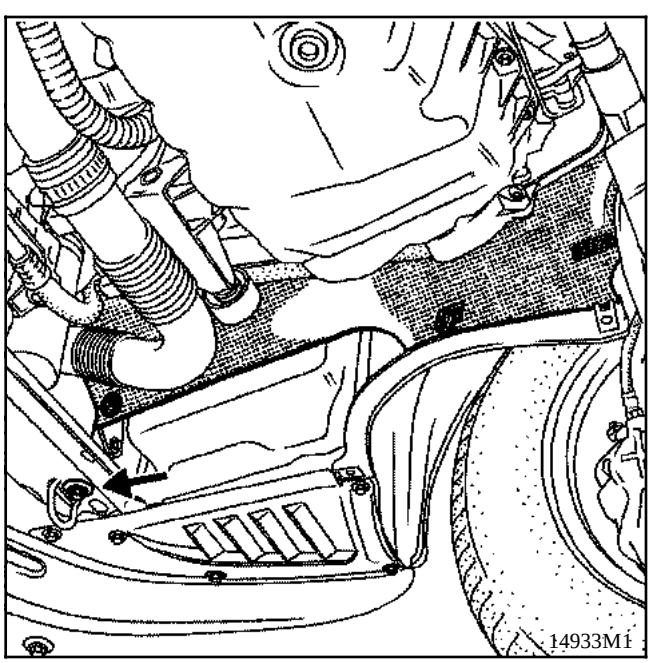


Slacken the aluminium support for the left hand suspended engine mounting on the gearbox (7) .

To make this operation easier, slacken the nut (6) and remove the shaft from underneath.



Remove the right hand mounting bolt for the upper radiator cross member and gently push the cooling assembly forwards to make it easier to lower the engine and transmission assembly.



Gently lower the engine in relation to the vehicle (two persons required).

REFITTING - Special notes

Position the engine and gearbox assembly in the compartment.

Fit the gearbox suspended mounting, secure it to the gearbox and to the mounting pad.

Tighten all nuts and bolts to the recommended torque.

Refitting is the reverse of removal.

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

Apply **Rhodorseal 5661** to the driveshaft roll pin holes.

Carry out the following operations:
- fill the gearbox with oil,
- fill and bleed the cooling circuit (see **section 19**),
- fill and bleed the power assisted steering circuit.

Reset all components affected by the disconnection of the battery.

If fitted:

Fill the refrigerant circuit using the filling station (see **section 62** "**Air conditioning**").

Quantity of refrigerant fluid **R 134 a :**
720 grammes ±20.

SPECIAL TOOLING REQUIRED	
Mot. 1273	**Tool for checking belt tension**
Mot. 1387	**Tool for checking the gap between the centre of the bolts on the automatic tensioner**

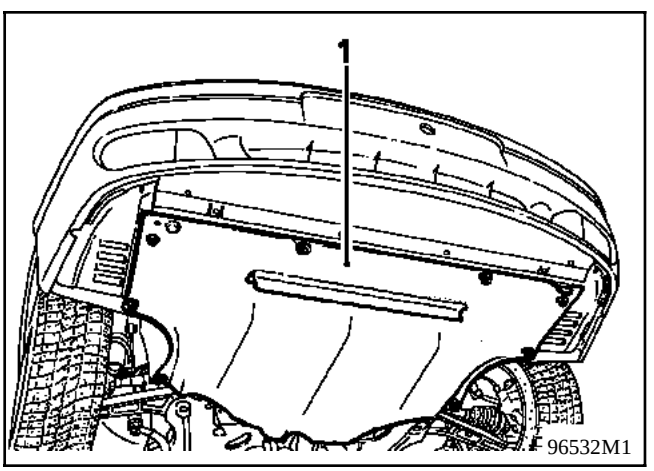
TIGHTENING TORQUES (in daN.m)	
Wheel bolts	**10**

REMOVAL

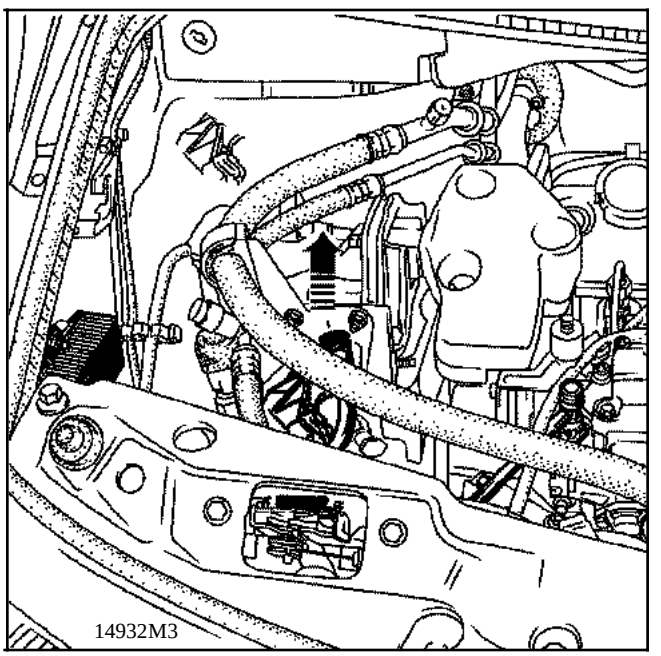
Place the vehicle on a two post lift.

Disconnect the battery.

Remove:
- the front right hand wheel,
- the front right hand wheel arch,
- the engine undertray (1),
- the engine soundproofing (three nuts).



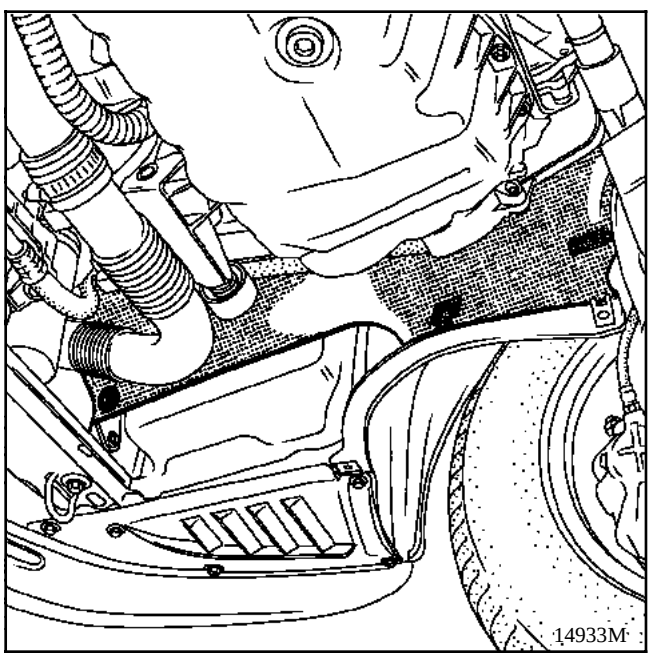
Separate the diesel filter from its mounting and push it towards the right.



Before removing the accessories belt, check the gap between the centres of the bolts on the automatic tensioner (see section 07 "Checking the tension of the accessories belt").

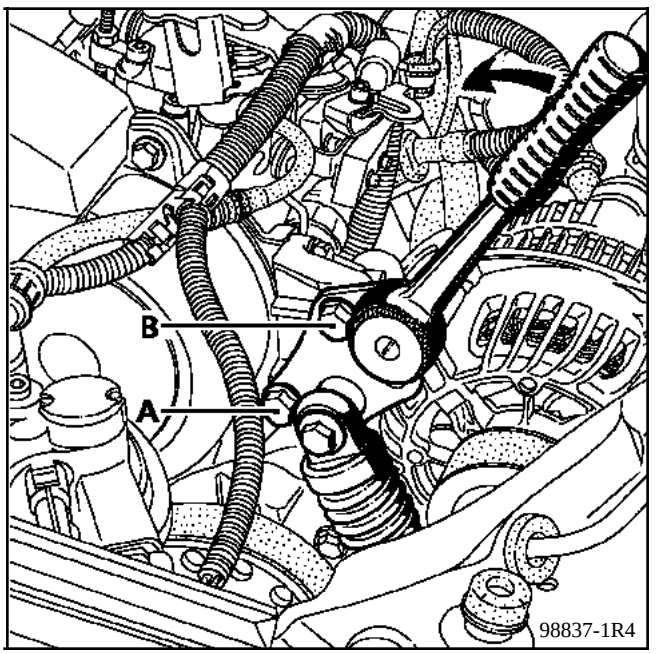
If the gap between the centres of the bolts exceeds the range indicated on tool **Mot. 1387** (modified), the belt will have to be renewed.

Remove the side member soundproofing (four clips and clips on the wheel arch protector) .



Slacken the bolt at (A), then the bolt at (B)until the shoulders are exceeded, whilst holding the automatic tensioner plate using a square drive (example: **FACOM J151** ratchet), then slacken the belt by moving the wrench in the direction of the arrow.

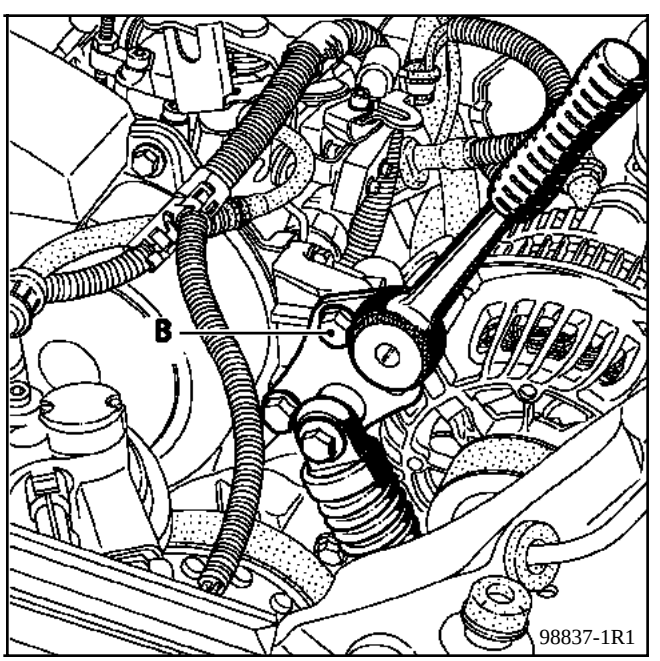
Remove the accessories belt.



REFITTING

Refitting is the reverse of removal.

Tensioning of the belt for vehicles fitted with air conditioning is carried out by bringing the automatic tensioner plate against the bolt (B), without forcing it, using a **9mm** square drive.



Ensure all the mounting clips for the side member soundproofing are correctly refitted.

SPECIAL TOOLING REQUIRED	
Mot. 1054	TDC pin
Mot. 1273	Tool for checking belt tension
Mot. 1387	Tool for checking the gap between the centre of the bolts on the automatic tensioner
Mot. 1390	Engine support tool

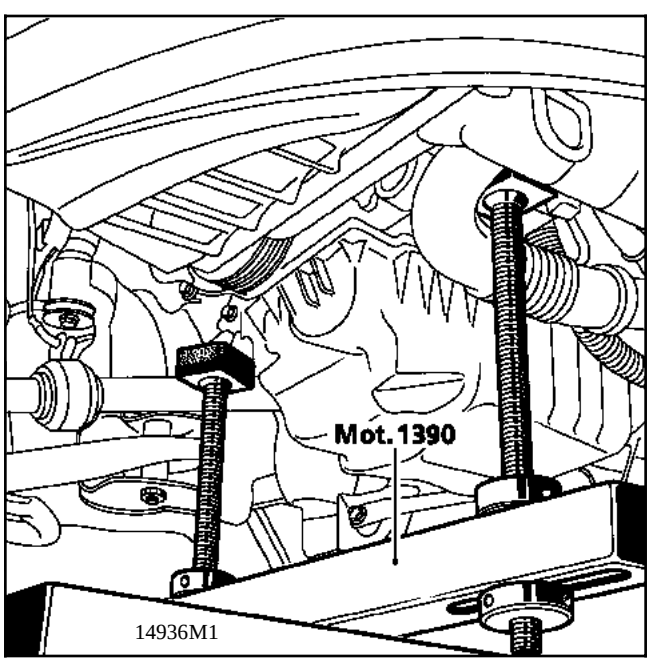
EQUIPMENT REQUIRED
14 mm torx socket

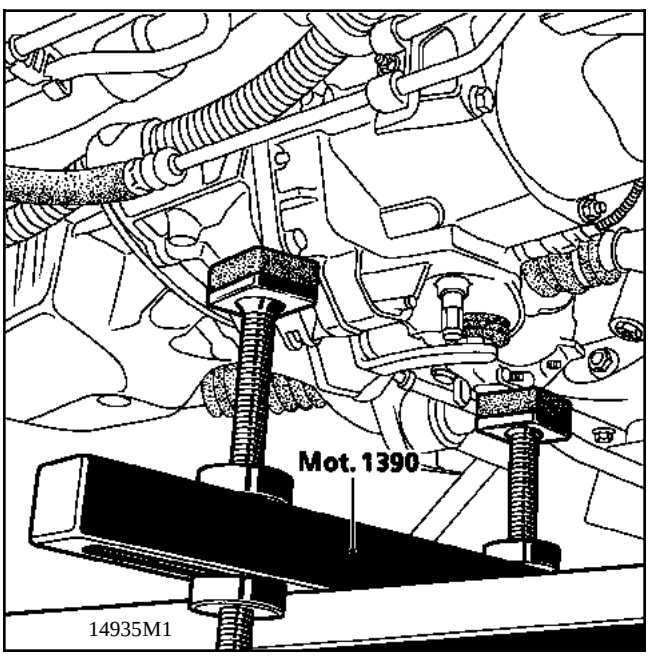
TIGHTENING TORQUES (in daN.m and/or °)	
Tensioner nut	5
Crankshaft pulley bolt	2 + 115° ± 15°
Suspended engine mounting limiter bolt	6
Suspended engine mounting cover bolt	4
Wheel bolts	10

REMOVAL

Remove the accessories belt (see previous section).

Fit the engine support tool.

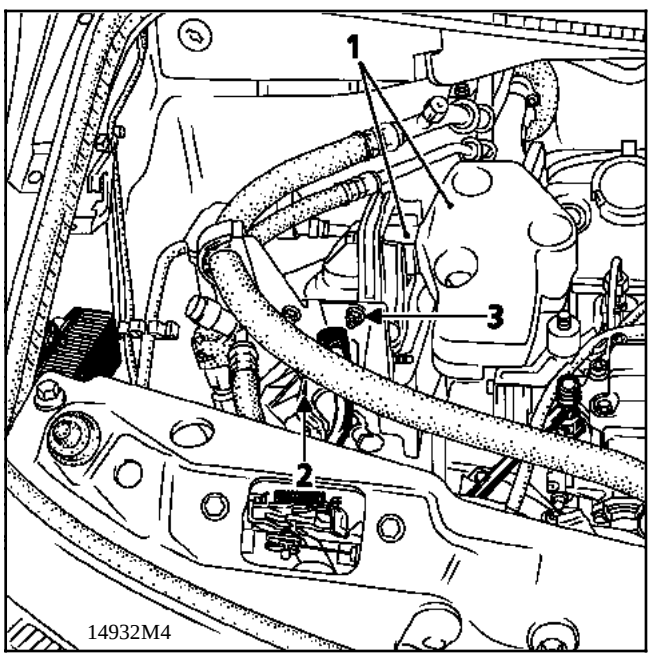




Remove the suspended engine mounting cover - movement limiter (1).

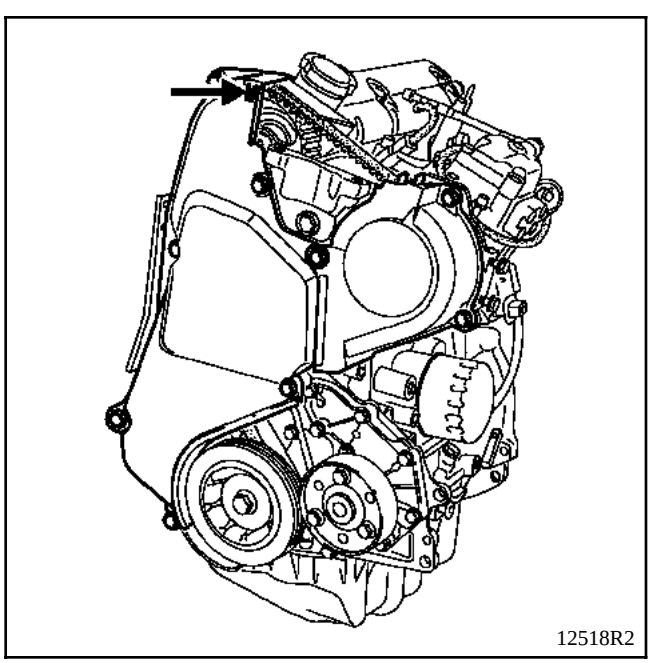
Separate the diesel filter from its plastic mounting (2).

Remove:
- the diesel filter metal mounting (3).
- the mounting for the suspended mounting cover on the shock absorber turret.



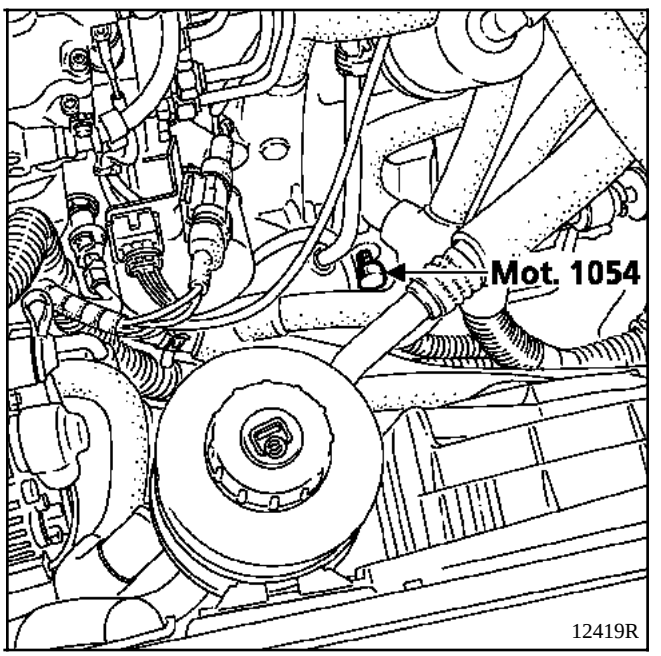
Setting the timing

Turn the crankshaft to align the camshaft timing reference mark in the timing window.

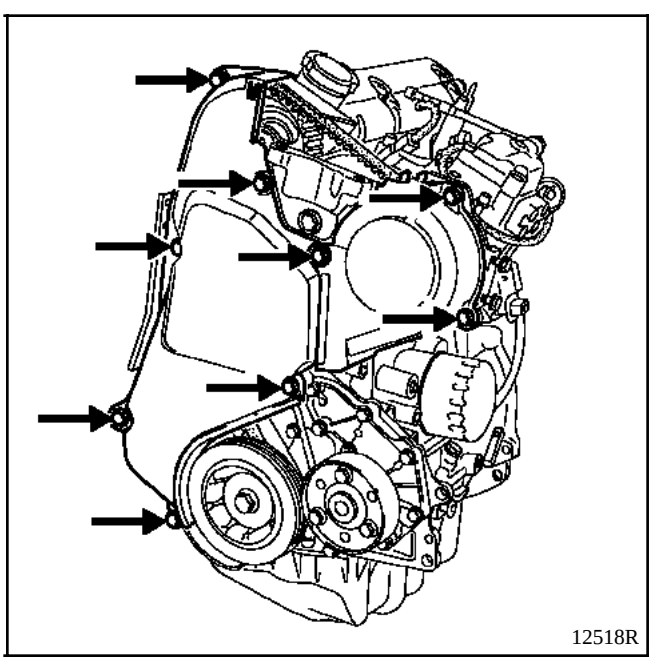


Remove:
- the crankshaft pulley,
- the TDC pin plug.

Fit the TDC pin **Mot. 1054**.



Remove the timing covers.



Slacken the tension wheel, then remove the belt .

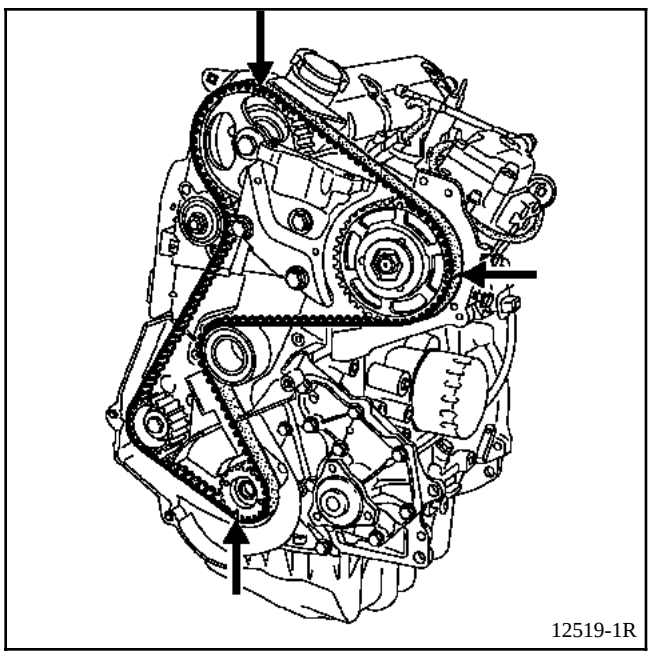
NOTE : slackening the tension wheel nut more than one revolution may cause the tension wheel to disengage.

REFITTING

Engine cold (ambient temperature).

Check that pin **Mot. 1054** is in place.

Fit the timing belt by lining up the markings on the belt with those on the camshaft, injection pump and crankshaft sprockets.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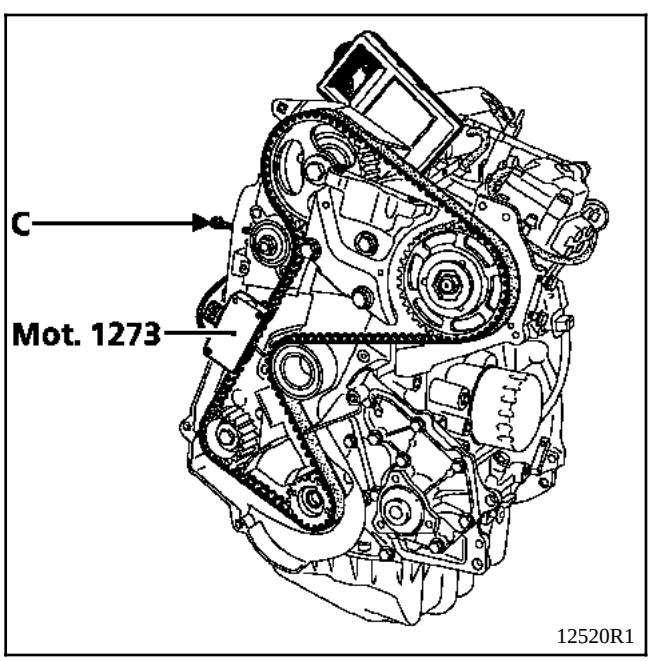
Tension the timing belt by tightening one bolt (C) on the inner timing cover.



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Remove pin **Mot. 1054**.

Press firmly on the section of belt between the idle roller and the tension wheel.

Place the sensor of tool **Mot. 1273**.

Turn the sensor knob until it releases (three"**clicks**").

Tension the belt until the recommended setting value of **42 SEEM units** is reached, by moving the bolt at (C).

Lock the tensioner, check, adjust the value.
Remove the sensor of tool **Mot. 1273**.
Turn the crankshaft four times.

CHECKING

Refit the pin **Mot. 1054** and adjust the timing to its setting point, **(start to press on the pin one half tooth before the camshaft markings line up, to avoid falling into a crankshaft balancing recess)**.

Remove pin **Mot. 1054**.

Press firmly on the section of belt between the idle roller and the tension wheel.

Place the sensor of tool **Mot. 1273** and turn the sensor knob until it releases (three "**clicks**").

Check that the tension value is 37 SEEM units. If it is not, readjust it.

Tighten the tension wheel nut to a torque of **5 daN.m**.

NOTE: the tension wheel nut MUST be tightened to the recommended torque to avoid slackening which could cause engine damage.

Check the injection pump timing (see section **13** "**Pump -Timing**").

Do not refit a belt once it has been removed. Replace it.

Replace the crankshaft pulley bolt.

Refit the crankshaft pulley and tighten the bolt to a torque of **2 daN.m** and then to an angle of **115°** ± **15°**.

Refitting is the reverse of removal.

Refer to the previous section "**Removing - refitting the accessories belt**"

SPECIAL TOOLING REQUIRED	
Mot. 251-01	Dial gauge mounting
Mot. 252-01	Pressure plate for measuring cylinder liner protrusion
Mot. 591-02	Index
Mot. 591-04	Angular wrench for tightening the cylinder head
Mot. 1054	TDC pin
Mot. 1159	Tool for retaining the engine on the sub-frame
Mot. 1202	Hose clip pliers
Mot. 1273	Tool for checking belt tension
Mot. 1311-06	Tool for removing fuel pipe
Mot. 1387	Tool for checking the gap between the centres of the bolts on the automatic tensioner
Mot. 1390	Engine - gearbox support tool
Mot. 1410	Tool for releasing refrigerant circuit unions

EQUIPMENT REQUIRED
14 mm torx socket
55 mm torx socket
Impact ball joint extractor
Safety pads or straps

TIGHTENING TORQUES (in daN.m and/or °)	
Tension wheel nut	5
Crankshaft pulley bolt	2 + 115° ± 15°
Shock absorber base bolt Ø M16×200	20
Driveshaft gaiter mounting bolt	2.5
Wheel bolts	10
Engine tie bar bolt	4.5 to 6.5
Suspended mounting bolt on gearbox	5.5 to 6.5
Suspended mounting rubber pad mounting nut on front left side member	5.5 to 8

TIGHTENING TORQUES (in daN.m and/or °)	
Mounting bolt on engine for front right suspended mounting cover	5 to 6.5
Front right suspended mounting movement limiter mounting bolt	5 to 6.5
Mounting nut for rubber pad on front right suspended mounting cover	3 to 4.5

REMOVAL

Removal of the cylinder head requires the engine and transmission assembly to be removed. (See section **10** "**Removing / refitting the engine and transmission assembly**")

Remove:
- the turbo charger,
- the inlet and exhaust manifolds,
- the accessories and timing belts,
- the injector harnesses.

Disconnect the injector with sensor.
Remove the cylinder head

CLEANING

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

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

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

Gloves should be worn during the operation.

Do not allow the product to touch any paintwork.

We draw your attention to the care that is necessary when carrying out this operation, to avoid foreign bodies being introduced into the pipes taking oil under pressure to the camshafts (pipes located in the cylinder block and in the cylinder head) and into the oil return pipe.

CHECKING THE GASKET FACE

Check for gasket face bow using a straight edge and a set of shims.

Maximum deformation **0.05 mm.**

Regrinding of the cylinder head is not permitted.

Check the cylinder head for any possible cracks.

CHECKING THE THICKNESS OF THE CYLINDER HEAD GASKET

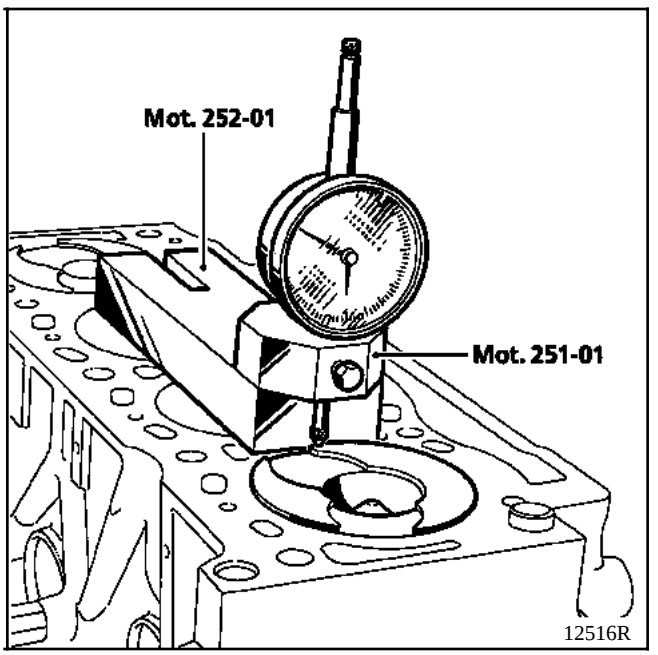
Checking piston protrusion

Clean the heads of the pistons to eliminate sooty carbon deposits.

Turn the crankshaft one revolution, in its operating direction, to bring piston **n° 1** close to Top Dead Centre.

Place tool **Mot. 252-01** on the cylinder block.

Fit tool **Mot. 251-01** equipped with a dial gauge onto pressure plate **Mot. 252-01**. With the dial gauge pin in contact with the piston, check the TDC of the piston.



NOTE: all measurements should be made along the longitudinal axis of the engine, to eliminate errors due to the tilting of the piston.

Measure the piston protrusion.

ONLY TAKE INTO CONSIDERATION THE DIMENSIONS OF THE PISTON WITH THE MAXIMUM PROTRUSION.

For maximum protrusion of the piston:
- lower than **0.653** (excluded), use a gasket marked by a tab with **two holes (1.35 mm thick)**,
- included between **0.653** (included) and **0.786** (included), use a gasket marked by a tab with **one hole (1.45 mm thick)**,
- greater than **0.786** (excluded), use a gasket marked by a tab with **three holes (1.55 mm thick)**.

REFITTING

Refit the cylinder head gasket selected previously. This is centred by two dowels.

Bring the pistons into the mid-stroke position to prevent them from coming into contact with the valves during the tightening of the cylinder head.

Centre the cylinder head on the dowels.

Tighten the cylinder head using an angular wrench designed for tightening the cylinder head (see section **07** "**Tightening the cylinder head**").

Refitting is the reverse of removal.

Refit the timing belt (see method described in section **11** "**Timing belt** ").

Refit the engine and transmission assembly into the vehicle (see section 1 "**Removing / refitting the engine and transmission assembly**").

SPECIAL TOOLING REQUIRED	
Mot. 799-01	**Camshaft sprocket immobiliser**
Mot. 988-02	**Tool for fitting the camshaft seal, timing side**
Mot. 1054	TDC pin
Mot. 1273	**Tool for checking belt tension**
Mot. 1387	**Tool for checking the gap between the centres of the bolts on the automatic tensioner**
Mot. 1390	**Engine support tool**

EQUIPMENT REQUIRED
14 mm torx socket

TIGHTENING TORQUES (in daN.m and / or °)	
Tension wheel nut	**5**
Camshaft sprocket bolt	**6**
Crankshaft pulley bolt	**2 + 115° ± 15°**
Suspended engine mounting limiter bolt	**6**
Suspended engine mounting cover bolt	**4**
Wheel bolt	**10**

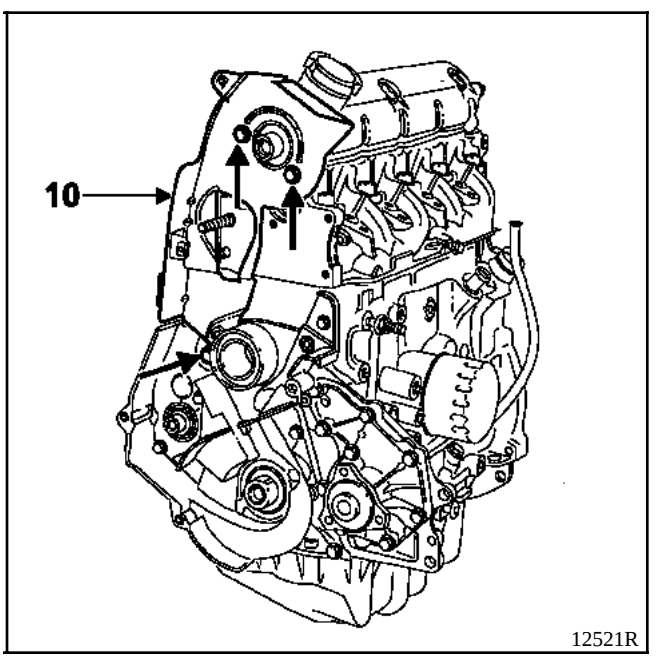
Removal:

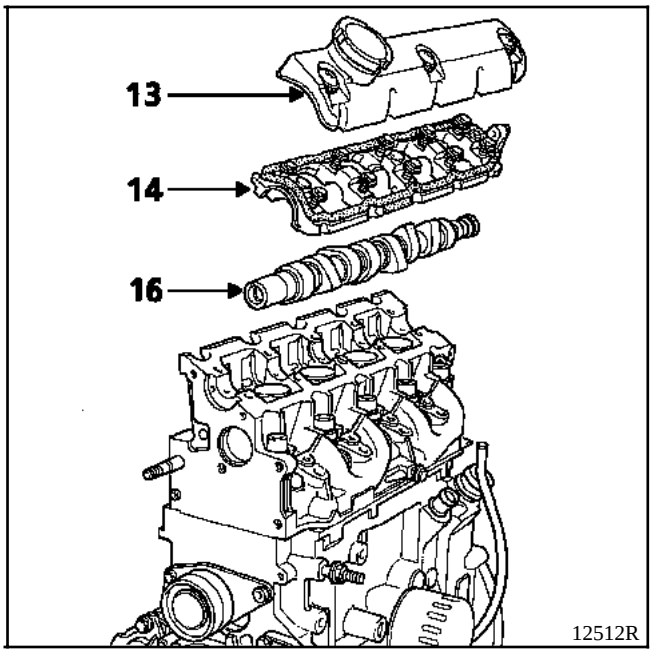
Remove the timing belt
(see section **11** "**Removing - refitting the timing belt**") .

Remove the camshaft sprocket using tool **Mot. 799-01**.

Remove the timing cover (10).

Remove:
- the vacuum pump,
- the cylinder head cover (13),
- the camshaft beam,
- the camshaft (16).





REFITTING

Refitting is the reverse of removal.

Replace the camshaft seal.

SPECIAL TOOLING REQUIRED	
Mot. 799-01	**Camshaft sprocket immobiliser**
Mot. 988-02	**Tool for fitting the camshaft seal, timing side**
Mot. 1054	**TDC pin**
Mot. 1273	**Tool for checking belt tension**
Mot. 1387	**Tool for checking the gap between the centres of the bolts on the automatic tensioner**
Mot. 1390	**Engine support tool**

EQUIPMENT REQUIRED
14 mm torx socket

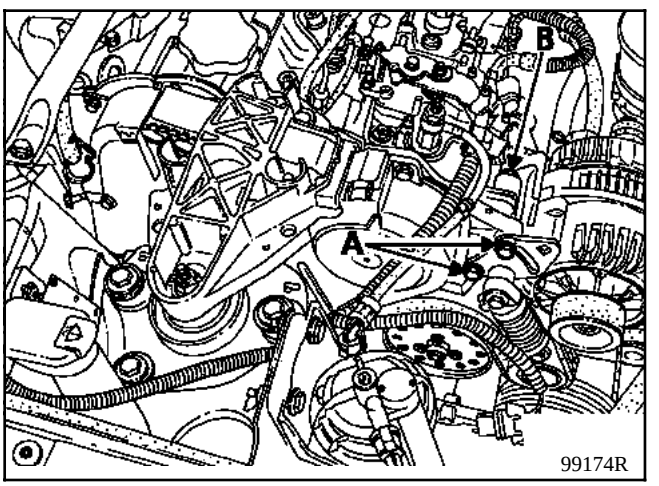
TIGHTENING TORQUES (in daN.m and / or °)	
Tension wheel nut	**5**
Camshaft sprocket bolt	**6**
Crankshaft pulley bolt	**2 + 115° ± 15°**
Suspended engine mounting limiter bolt	**6**
Suspended engine mounting cover bolt	**4**
Wheel bolt	**10**

REMOVAL

Place the vehicle on a two post lift.

Disconnect the battery .

Remove:
- the timing belt (see section **11** "**Timing belt** "),
- the automatic tensioner mounting bolt (A) and bolt (B),



- the high pressure injection pipes.

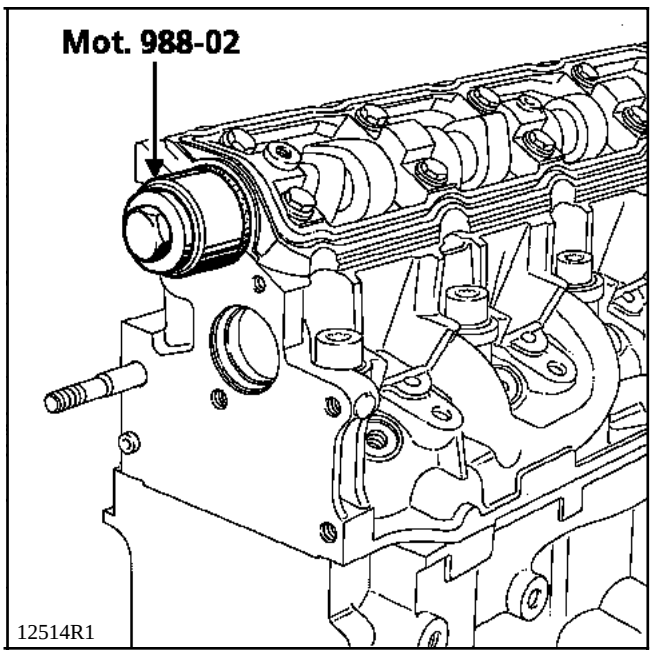
Slacken the mounting bolts of the suspended engine mounting on the cylinder head.

Remove:
- the injection pump rear mounting bolt,
- the camshaft sprocket by locking it using **Mot. 799-01**.

Remove the seal using a sharp tool, taking care not to scratch the sealing face on the bearing cap.

REFITTING

Use **Mot. 988-02** to fit the new camshaft seal.

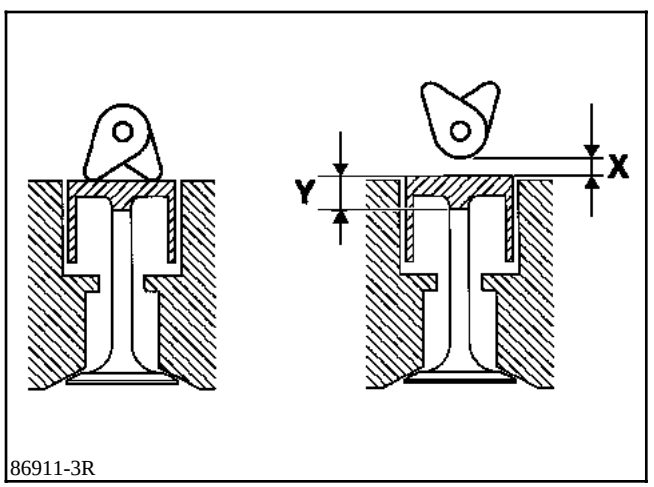


Refit :
- the camshaft sprocket by tightening the bolt to **6 daN.m**,
- the timing belt (see method described in section **11** "**Timing belt**").

SPECIAL TOOLING REQUIRED		
Mot.	**252-01**	**Pressure plate for measuring liner protrusion**
Mot.	**856-02**	**Dial gauge extension**
Mot.	**1079**	**Dial gauge from injection pump timing kit**
EQUIPMENT REQUIRED		
Dial gauge mounting		

Checking the valve clearance

Place the valves of the cylinder concerned at the "end of exhaust - beginning of inlet" position and check the clearance (X).



1	**4**
3	**2**
4	**1**
2	**3**

Compare the two values noted with the recommended values and replace the adjusters concerned.

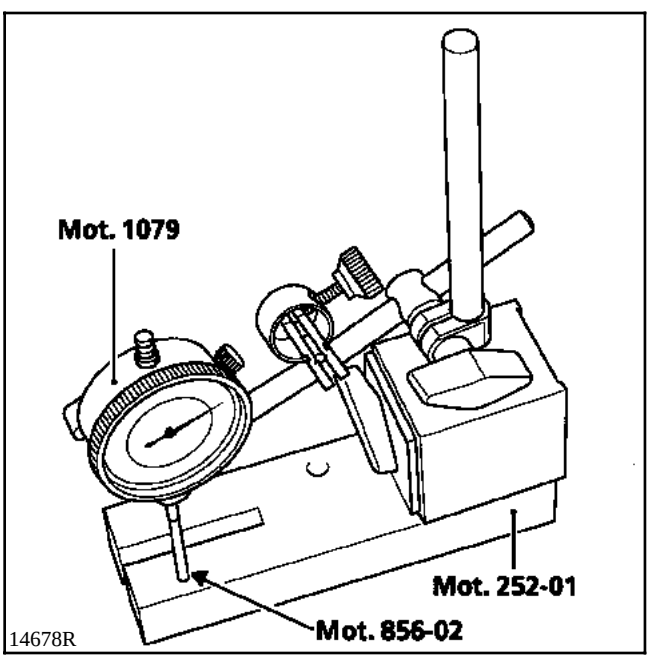
Replacing monobloc adjusters

The camshaft must be removed to replace monobloc adjusters.

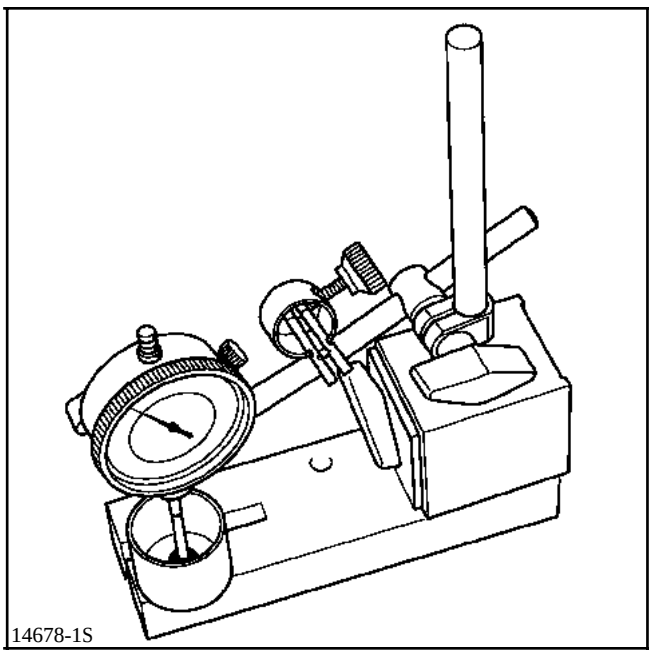
Dimension (Y) corresponds to the adjuster class, of which there are 25.

Measuring dimension (Y)

Make up the following assembly using tool **Mot. 252-01** and tool **Mot. 856-02** and zero the dial gauge.



Lift the dial gauge extension and slide in (without altering the position of the assembly) the adjuster to be measured.



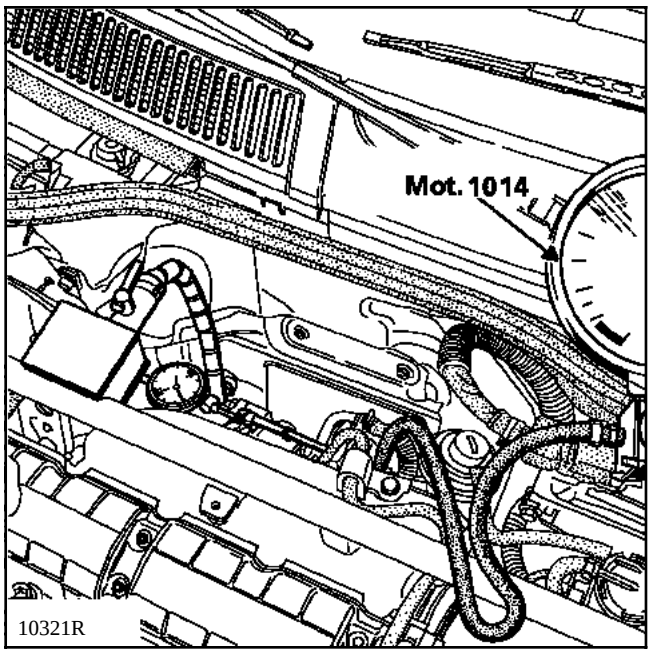
Note dimension (Y) and repeat the operation for the adjusters where the valve clearance is outside the tolerance range.

Refer to the PR catalogue for the vehicle concerned to select the replacement adjusters. The Parts Department supplies 25 classes of monobloc adjusters.

BOOST PRESSURE LIMITING VALVE(WASTEGATE)

Checking the calibration pressure

Carried out on the vehicle.



Remove the engine soundproofing. The wastegate rod is visible above the right hand suspended engine mounting pad.

Use a magnetic base with a dial gauge positioned at the end of the **wastegate** rod (as far as possible in line with the **wastegate** shaft).

Increasing pressure is applied to the wastegate using pressure gauge Mot**. 1014.**

Calibration pressure values

Pressure values	Rod movement (mm)
1050 to 1110	1
1240 to 1350	4

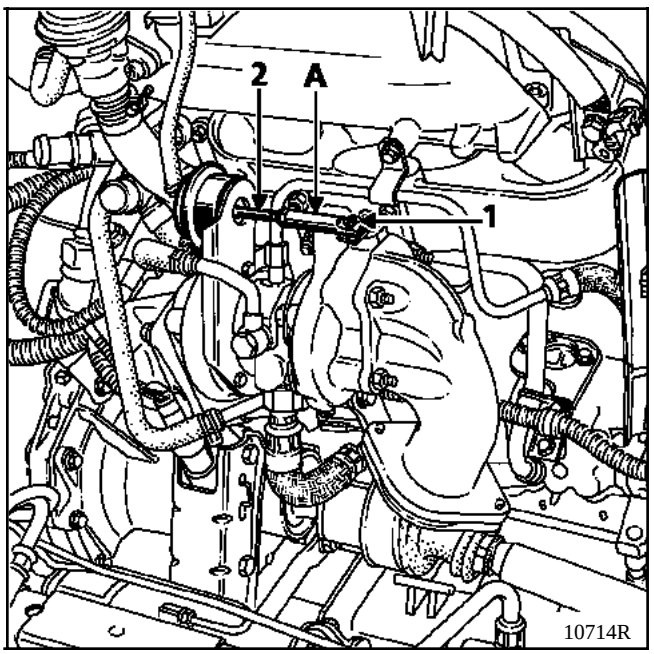
On the vehicle

When checking the calibration pressure value, it may be necessary to adjust the length of the wastegate rod (A) (pressure outside the tolerance range).

This adjustment is carried out with the turbocharger in place.

To do this, unclip the clip (1) and the rod from the regulator arm (A).

The rod on the wastegate side (2) must be held using vice grips.

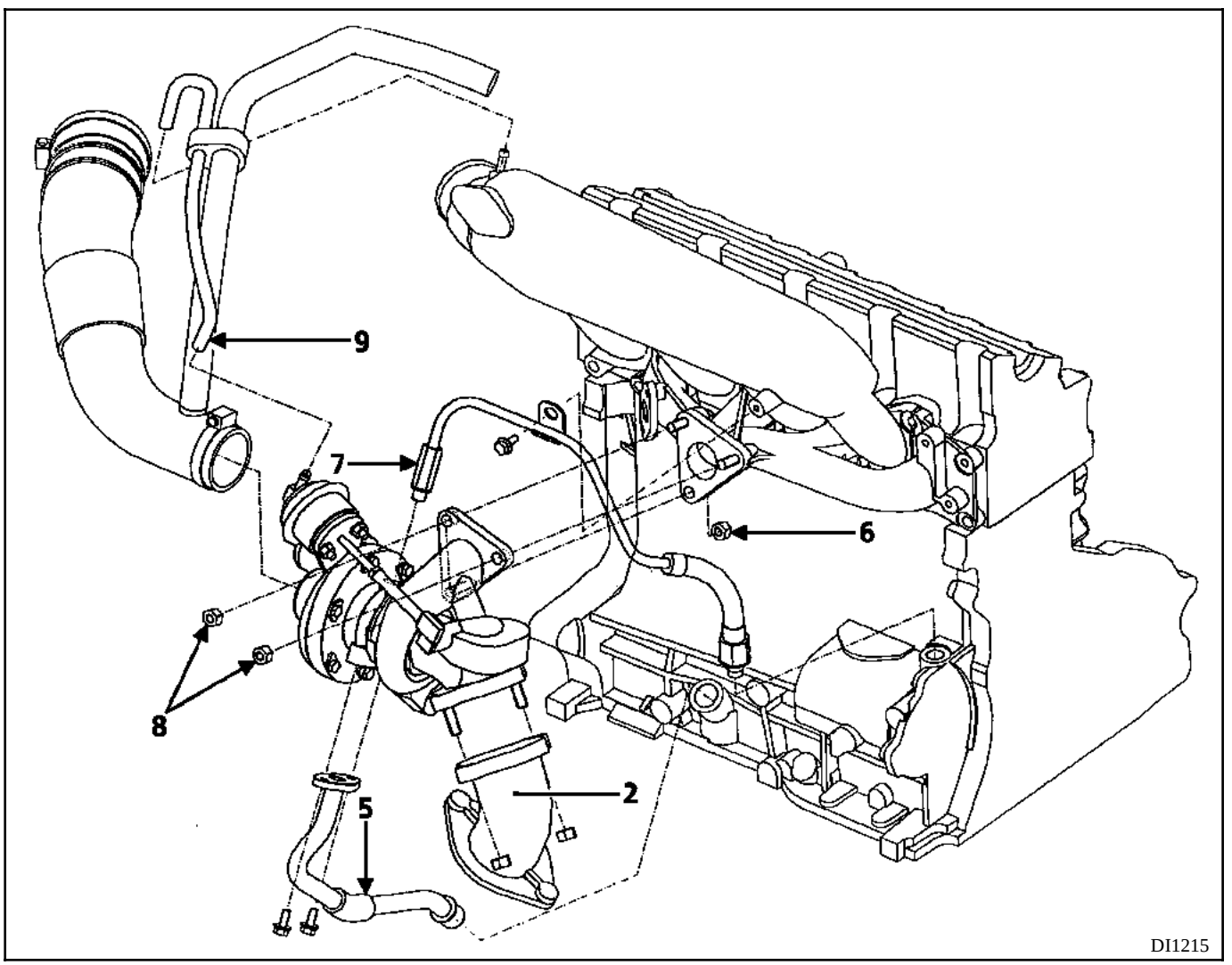


Slacken the lock nut, then slacken or tighten the threaded end section.

Turn by half-turns (tighten to increase the calibration pressure).

NOTE : the refitting of the threaded end section on the regulator arm (A) is made easier by using tool **Mot. 1014** and by applying increasing pressure.

TIGHTENING TORQUES (in daN.m)	
Turbo mounting nuts	2.6
Bolt for the oil inlet union	2
Bolt for the oil return union	0.9
Mounting nut for the intermediate exhaust downpipe on the turbo	2.6



REMOVAL

NOTE: to slacken the turbocharger mounting nuts on the exhaust manifold more easily, spray releasing agent onto the nuts while they are still warm, then once again just before removing.

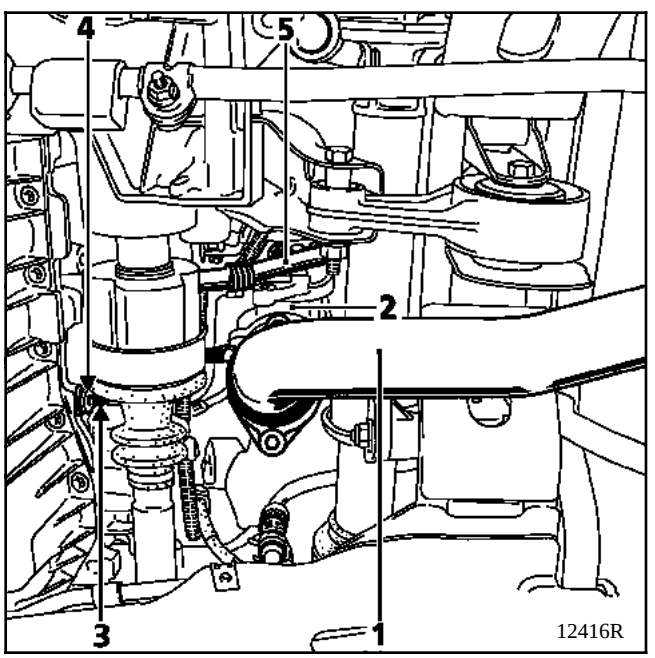
Disconnect the battery.

Remove the engine cover.

Refer to the diagram on the previous page.

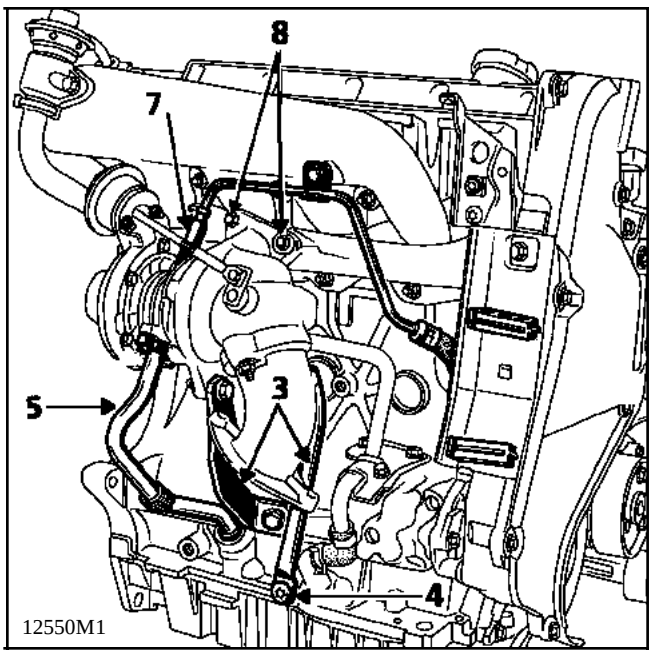
From below

Remove:
- the engine undertray,
- the exhaust downpipe (1),
- the starter motor (see starter motor section),
- the mounting brackets (3) and (5). To remove bolt (4), use a locally made tool, a shortened torx 50 socket to fit between the driveshaft and the engine,
- the intermediate exhaust downpipe (2),
- the two bolts mounting the oil return pipe (5) from the turbo to the engine,
- the turbo mounting nut (6) on the exhaust manifold.



- the bolt (7) from the oil inlet union to the turbo,
- the two air inlet and outlet pipes connected to the turbo,
- the two upper turbo mounting nuts (8) on the manifold.

Disconnect the rubber pipe (9) (connected to the wastegate).



REFITTING

Refitting is the reverse of removal.

IMPORTANT: the copper seal at the turbo oil inlet union MUST be replaced.

IMPORTANT :

Before starting the engine, leave the electrical solenoid connector on the injection pump disconnected.

Activate the starter motor until the oil pressure warning light extinguishes (this may take a few seconds).

Reconnect the electrical solenoid, preheat and then start the engine.

Let the engine run at idle speed and check that there are no leaks from the oil unions.

Special precautions

- Before refitting, check the turbo bearing lubrication is correct. To do this, activate the starter motor having previously disconnected the electrical solenoid valve connector (prevents engine operation) (erase the computer memory).

  Plenty of oil should arrive at the pipes bringing oil up (place a container below). If this is not the case, replace the lubrication pipe.

- Check that no foreign bodies have entered the turbine or compressor whilst refitting.

- If a turbo has failed, check the air - air exchanger is not full of oil.

  If it is, remove it and rinse with a cleaning agent then leave to drain thoroughly.

- Check that the oil return pipe from the turbo is not partially or completely blocked by deposits. Check its seal is good. If it is not, replace it.

REMOVAL

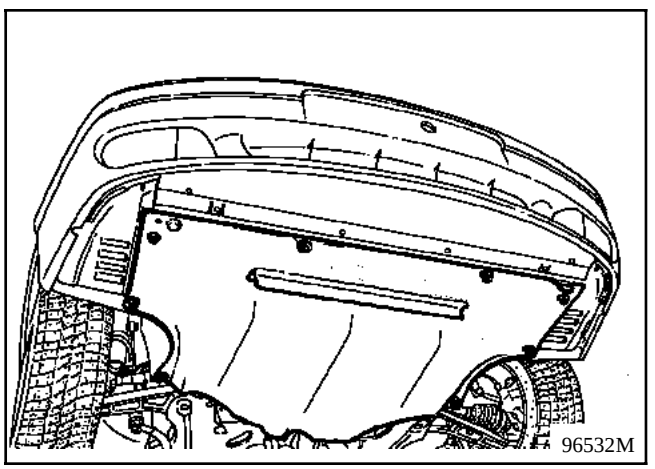
Put the vehicle on a two post lift.

Disconnect the battery.

Open the degassing bottle.

Drain the air conditioning circuit, if fitted (see air conditioning section).

Remove:
- the front bumper,
- the radiator grille,
- the engine undertray.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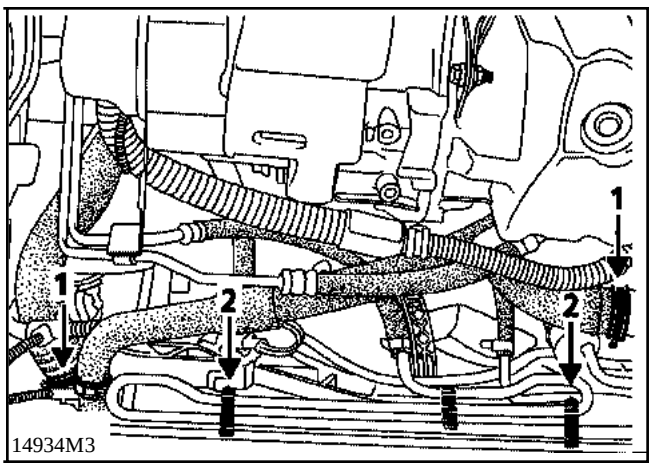
Drain the cooling circuit from the lower radiator hose.

Disconnect the air pipes on the air / air exchanger (1).

Separate the power assisted steering oil exchanger from the lower clips (2) .



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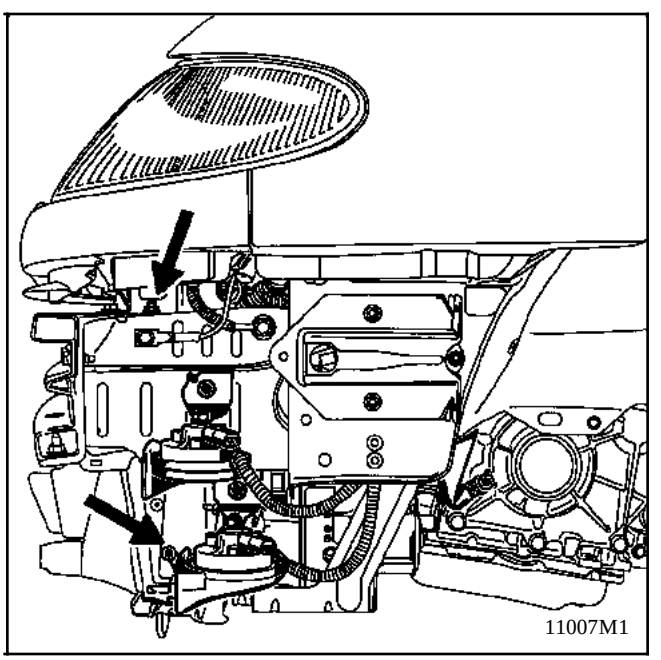
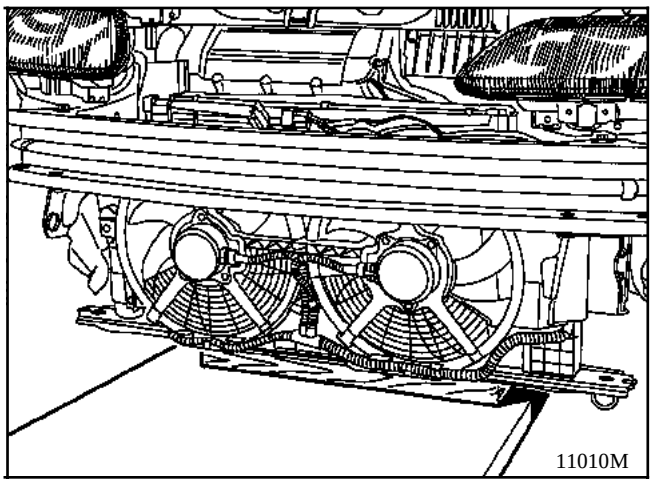
Disconnect the wiring for the cooling unit at the engine connection unit. IMPORTANT : this operation is delicate.

Remove the mounting bolts on the side members as shown in the diagram.


11007M1

Position a support under the radiator cross member, of sufficient width to allow access to the mountings.

Remove the two cross member bolts and carefully lower the cooling assembly by lifting the vehicle (two persons required).



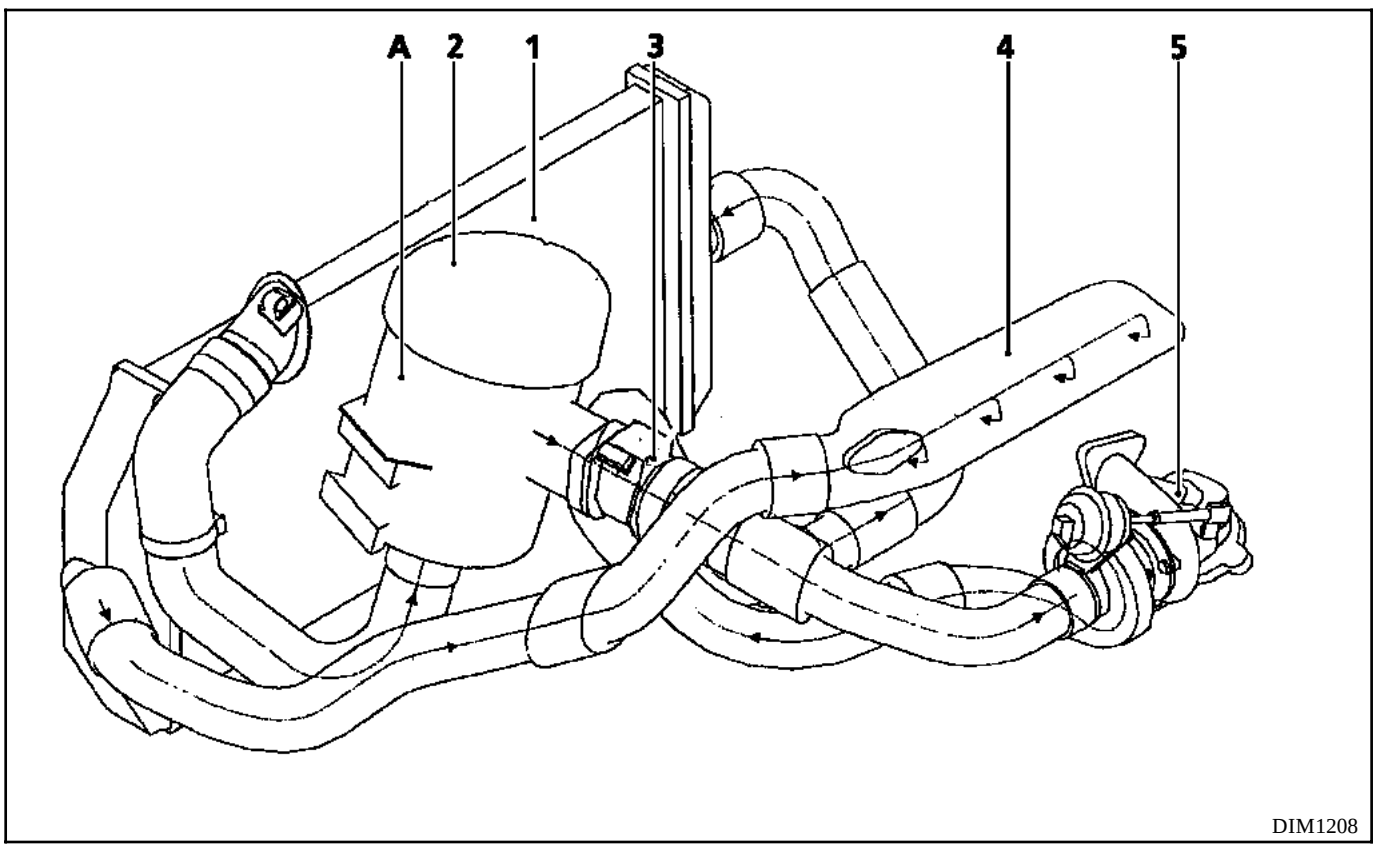
Release the air / air exchanger from the radiator (two clips).

REFITTING

Refitting is the reverse of removal.

Ensure all fluid unions are clean on refitting.

AIR INLET CIRCUIT DIAGRAM



1 Air - air exchanger
2 Air filter
3 Flow meter
4 Inlet manifold
5 Turbocharger
A Air inlet

TIGHTENING TORQUES (in daN.m)	
Manifold mounting stud	**0.8**
Manifold mounting nut	**2.8**
EGR valve mounting bolt	**2.1**
EGR circuit pipe nut	**2.1**

REMOVAL

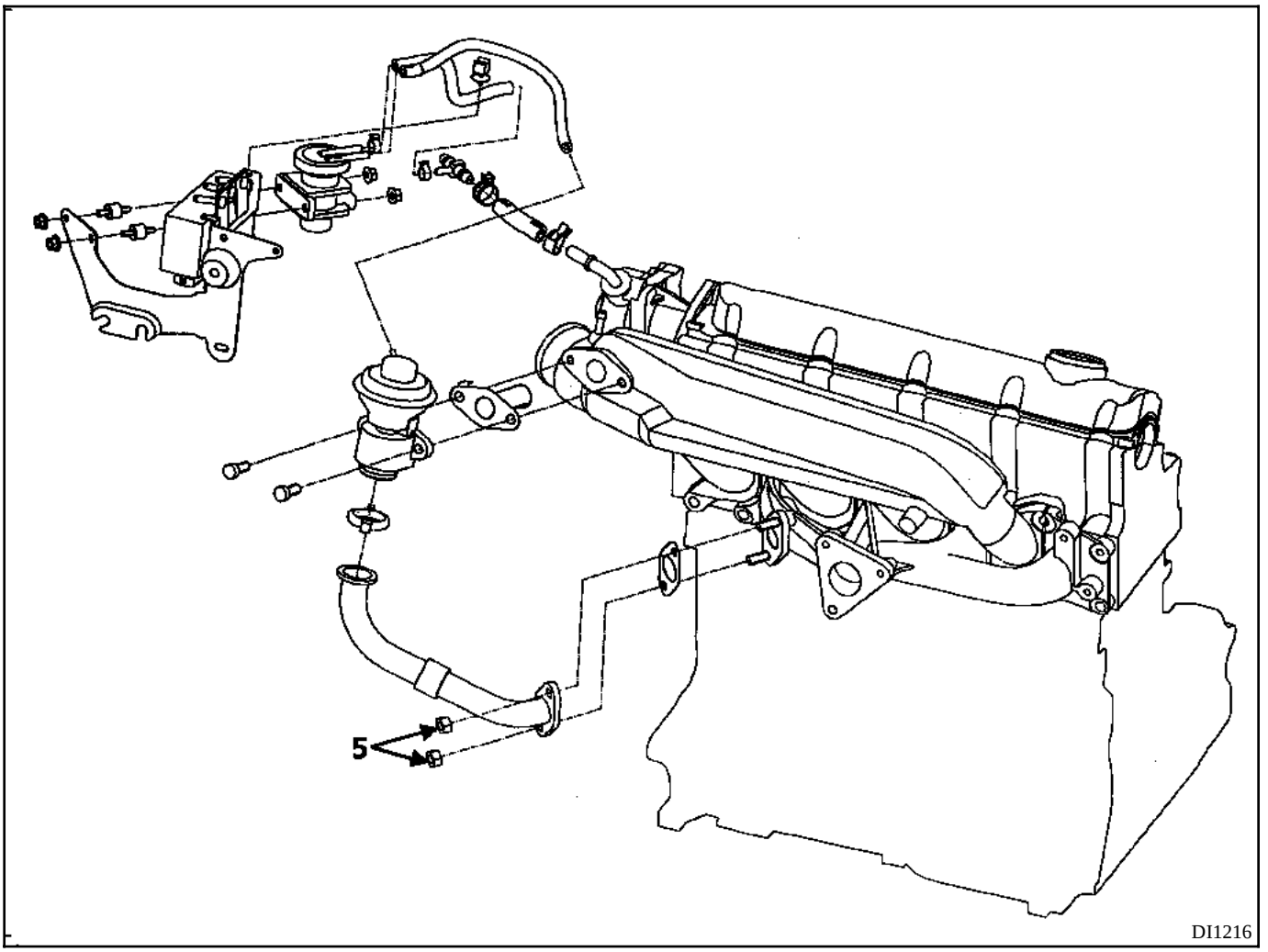
NOTE: Removal of the manifolds involves the removal of the turbocharger (see section "**turbocharging**"). The two manifolds cannot be removed separately.

The compressor mounting nuts are removed from above and from below the vehicle.

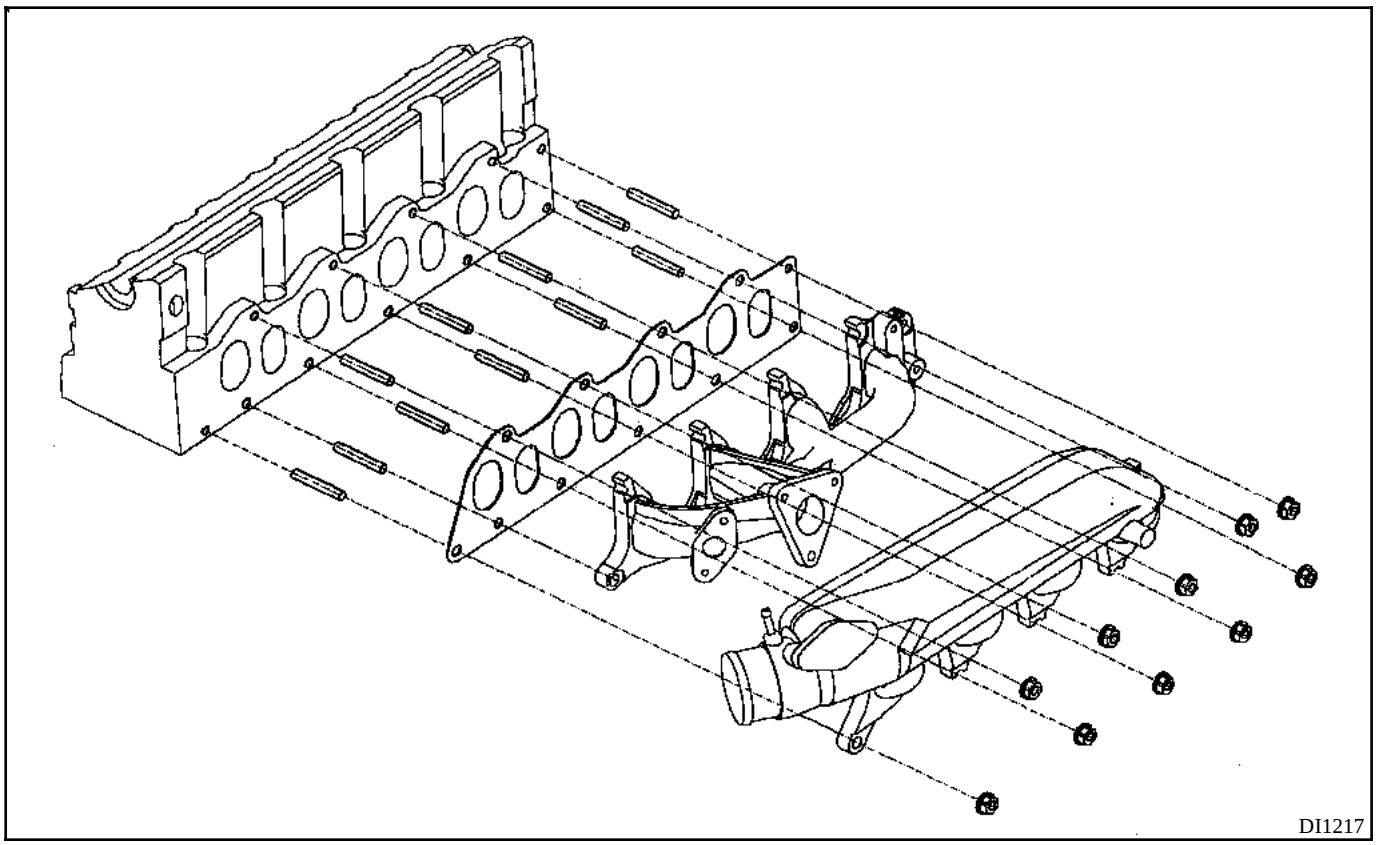
To make the operation easier, use a mirror above the cylinder head.

Refer to the diagrams on the following pages.

From the exhaust manifold, remove the two nuts (5) mounting the EGR pipe.



Remove the nuts holding the manifolds.



If a replacement of the inlet manifold is expected, remove the **EGR** valve.

REFITTING

Refitting is the reverse of removal.

Replace the manifold gasket and ensure that it is correctly in place.

Vehicle	Gearbox	Engine							Depollution standard
		Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Ratio	Catalytic converter	
JE0 M	JC5	F9Q	722	80	93	1870	18.3 / 1	◊ C160	Eu 96

ENGINE SPEED (rpm)			SMOKE OPACITY	
Idle	Maximum no load	Maximum with load	Homologation value	Legal maximum
850 ± 25	4700 ± 75	4250 ± 50	0.44 m^{-1}	2.5 m^{-1}

DESCRIPTION	MAKE/TYPE	SPECIAL NOTES
Injection pump	BOSCH VE 4 / 11 E2125R803	Rotary pump associated with a computer controlling : - the pump (advance and flow), - the cold start system, - the EGR system.
Pump timing, obtaining TDC using the 8 mm pin (**Mot. 1054**)		Pump piston lift: **0.25 to 0.40 mm**
Injector holders	BOSCH 0432193611 (cylinders 1-2-3) 0432193610 (cylinder 4)	Resistance of injector with sensor: **100 ± 10 Ω at 20 °C**
Injectors	DSLA 145 P619	-
Fuel filter	BOSCH	The filter is fitted with an electrical diesel fuel heater.
EGR solenoid valve	BORG WARNER	Voltage: **12 Volts** Resistance : **5.5 ± 0.5 Ω**
Return pipes	-	Interior diameter: **1.8 mm** Length: **360 mm**
Preheating unit	NAGARES	With pre-postheating function controlled by injection computer.
Plugs	BOSCH CHAMPION BERU	Tightening torque: **1.5 daN.m** Voltage: **12 Volts** Resistance : **1.1 ± 0.1 Ω**

DESCRIPTION	MAKE/TYPE	SPECIAL NOTES
Turbocharger	GARRETT	**Setting:** **1080 ± 10 mbar** for a rod travel of **1 ± 0.02 mm** **1300 ± 10 mbar** for a rod travel of **4 ± 0.02 mm**
Computer	BOSCH	68 tracks, Part Number: **77 00 108959**
Injection	-	Direct
Flowmeter	BOSCH SIEMENS	Hot film flowmeter
Flow slide valve	BOSCH (integral in pump)	Resistance between tracks 4 and 7 of the pump connector of **0.4 to 1 Ω at 20 °C**
Flow slide valve position sensor	BOSCH (integral in pump)	Resistance between tracks: - 1 and 3 of the pump connector of **4.9 to 6.5 Ω at 20 °C**, - 3 and 2 of the pump connector of **4.9 to 6.5 Ω at 20 °C**.
Advance solenoid valve	BOSCH (integral in pump)	Resistance between tracks 1 and 2 of the solenoid valve connector of **14.3 to 17.3 Ω at 20 °C**.
Accelerator cable potentiometer	BOSCH	The potentiometer has an integrated switch. The switch is closed in the no load position.
Thermoplunger	-	Resistance : **0.45 ± 0.05 Ω at 20 °C**

Temperature in °C (± 1°)	**-10**	**25**	**50**	**80**
Air temperature sensor (Resistance in Ohms)	15000 to 17000	2750 to 2850	950 to 1050	-
Coolant temperature sensor (Resistance in Ohms)	15000 to 17000	2750 to 2850	950 to 1050	300 to 450
Diesel fuel temperature sensor (Resistance in Ohms)	15000 to 17000	2750 to 2850	950 to 1050	300 to 450

The adoption of electronic injection on our diesel engines has allowed us to optimise their operation and thereby to reduce the rate of emission of pollutants.

The system consists of a computer which receives information from the:
- coolant temperature sensor,
- air temperature sensor,
- flow meter,
- engine speed sensor,
- vehicle speed sensor,
- accelerator pedal position sensor,
- brake switch,
- clutch switch,
- start of injection sensor (the sensor is part of the injector for cylinder **n° 1**),
- diesel fuel temperature sensor,
- fuel flow valve position sensor,
- atmospheric pressure sensor (located in the computer).

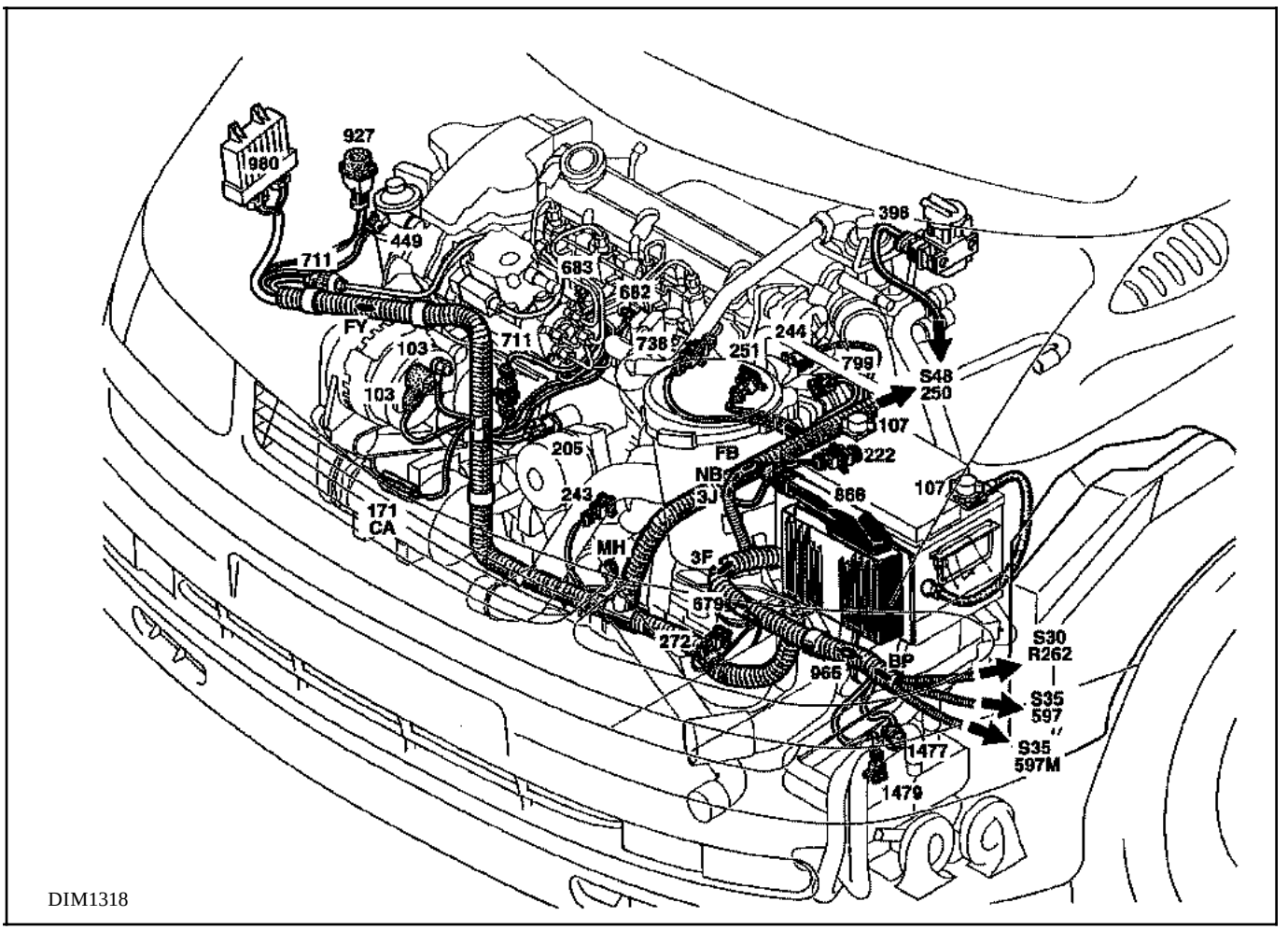
} sensors located in the pump

It controls :
- the injection pump :
  - the fuel flow valve,
  - the advance solenoid valve,
- the cold start system (plugs and pre-postheating unit),
- the immobiliser system,
- the exhaust gas recycling system (**EGR**),
- the injection fault warning light,
- the preheating warning light,
- the electrical solenoid,
- the thermoplungers which heat the coolant in the cooling circuit (depending on the vehicle).

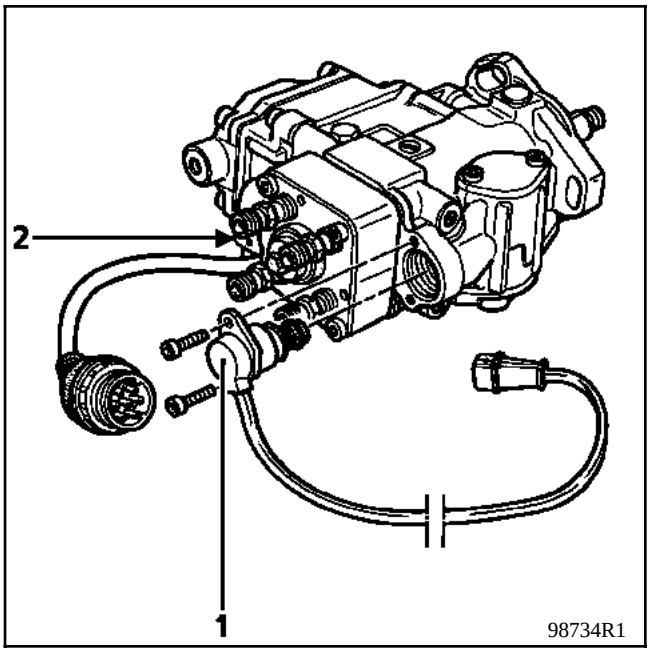
It also carries out a self-diagnostic procedure which can be seen on the **XR25**.

SPECIAL NOTES

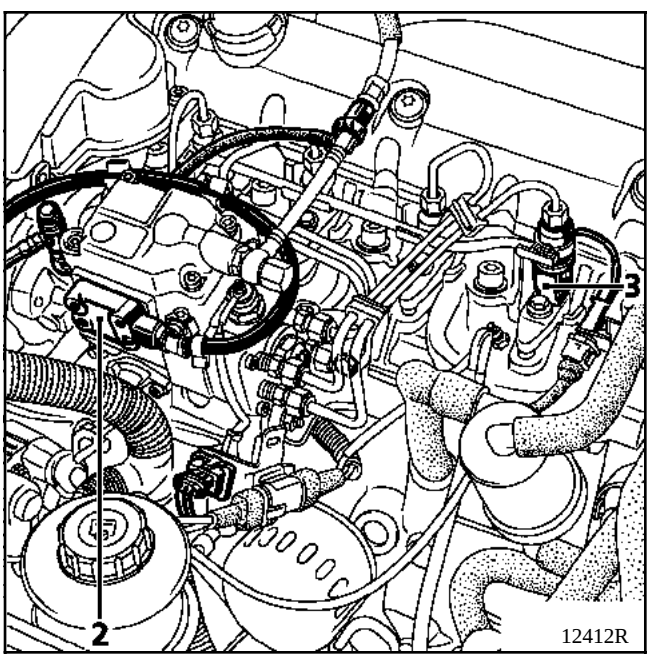
The accelerator cable controls a potentiometer on the air filter side. The computer, principally as a function of this information, operates the injection pump flow control.



103	Alternator
171	Air conditioning compressor clutch
205	Oil pressure switch
244	Coolant temperature sensor
251	Coolant bi-function temperature switch
272	Air temperature sensor
398	Exhaust gas recirculation solenoid valve (EGR)
449	Diesel fuel heater
679	Anti-interference condenser
682/3	Heater plugs n° 3 and 4
711	Injection pump
738	Injection needle lift sensor
799	Hot wire air flow sensor
866	Diesel injection computer
927	Inertia switch
980	Pre-postheating unit



1 Advance solenoid valve
2 Flow control valve, information on position of the flow valve, diesel fuel temperature information.
3 Injector with sensor



The injection pump sends information to the computer.

It has two sensors to do this:
- one diesel fuel temperature sensor,
- one sensor giving the fuel flow valve position.

The pump, as a result of the commands received from the computer, sends a specific amount of diesel fuel to each cylinder, at a given point in time.

There are two actuators to do this:
- one advance solenoid valve; this solenoid valve, which is controlled by the computer, allows the advance point to be modified constantly (**2 track** connector on the pump),
- one electromagnet allows the position of the fuel flow valve to be modified.

Only the advance solenoid valve and the diesel fuel temperature sensor are removable. If there is a fault in one of the other components, take the pump to an Injection Centre.

The computer controls the electrical solenoid located on the pump, as well as the immobiliser.

ILLUMINATION OF INJECTION WARNING LIGHT ON THE INSTRUMENT PANEL (depending on version)

- **Vehicle with immobiliser system deactivated**

  When the ignition is switched on, the injection warning light illuminates for 3 seconds then extinguishes, and the red immobiliser warning light, which was previously flashing, illuminates for 3 seconds before extinguishing.

- **Vehicle with immobiliser system active**

  When the ignition is switched on, if the computer does not recognise the code, starting will be prevented. The injection warning light illuminates for 3 seconds, then extinguishes.

  Before switching the ignition on, the red immobiliser warning light flashes. When the ignition is switched on, this same warning light flashes twice as quickly.

  If an immobiliser system fault is detected when the engine is running, then the injection warning light will flash over the engine operating range between idle speed and 1 500 rpm approximately.

- **Fault in a part of the injection system**

  Faults causing the warning light to illuminate:
  - accelerator pedal position potentiometer,
  - injector with sensor,
  - advance solenoid valve,
  - engine speed sensor,
  - electrical solenoid,
  - computer fault,
  - flow valve (actuator and potentiometer).

This vehicle is equipped with a 2nd generation immobiliser system. The immobiliser code MUST be programmed into the injection computer in order for the system to operate.

REPLACING THE INJECTION COMPUTER

The computer is delivered uncoded. After replacing the computer, the new one must be programmed with the vehicle code, then the operation of the immobiliser function must be checked.

To do this, switch on the ignition for several seconds, then remove the key.

CHECKING THE IMMOBILISER OPERATION

Remove the key from the ignition, after about **10 seconds** the red immobiliser warning light should flash (to check that the engine cannot be started, refer to section **82**).

IMPORTANT: It is now impossible to borrow an uncoded injection computer from stores (or a coded one from another vehicle) to test a function. They cannot be decoded.

AIR CONDITIONING COMPRESSOR OPERATION PROGRAMMING

During certain operating phases, the injection computer blocks compressor operation.

Engine starting programming
Compressor operation is blocked for 5 seconds after the engine starts.

Thermal protection programming
The compressor is not engaged when the coolant temperature is greater than or equal to : + 117 °C.

Programming for restoring power under high acceleration
The compressor is cut under high acceleration if the vehicle speed is lower than 68 mph (110 km / h) and if the engine speed is lower than 3 000 rpm.

Programming for restoring power when the vehicle begins to move
The compressor is cut when the vehicle begins to move and is under very high acceleration.

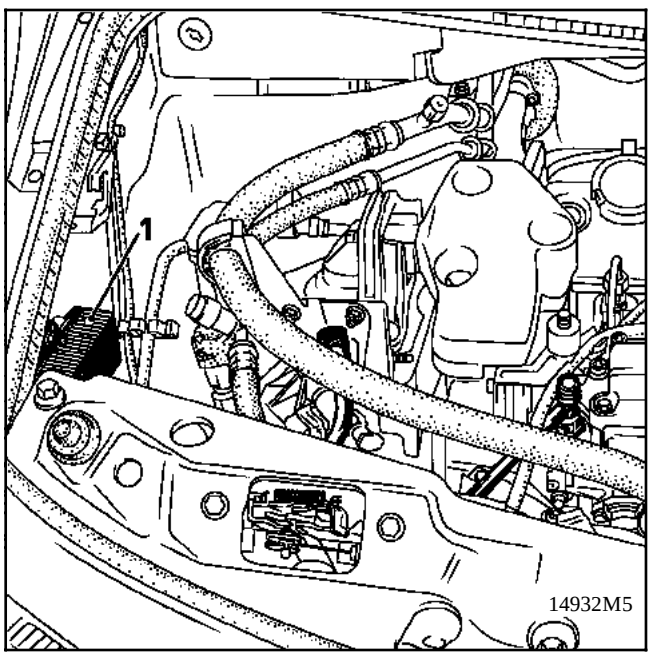
Engine anti-stalling programming
The compressor is cut if the engine speed is lower than 625 rpm.

Special notes
Compressor starting is completely blocked if a fault is detected on:
- the engine speed sensor,
- the injector with sensor (needle lift).

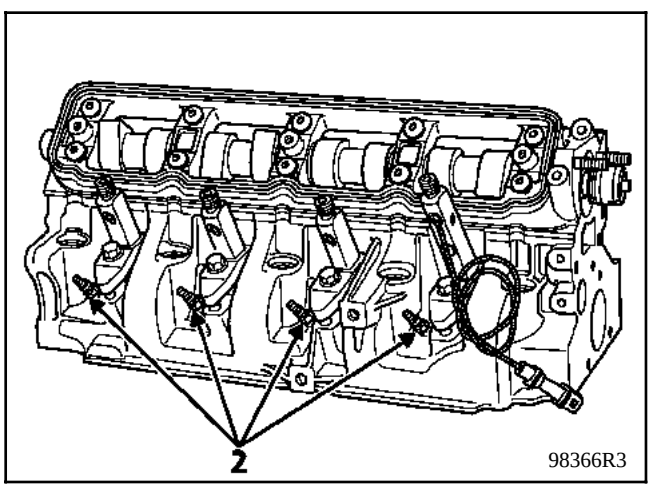
IDLE SPEED CORRECTION AS A FUNCTION OF AIR CONDITIONING SELECTION

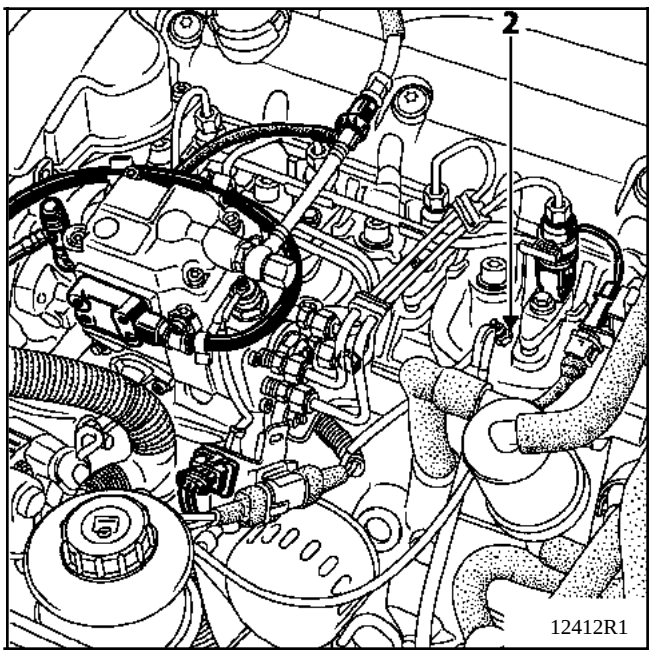
If air conditioning is selected by the driver, then the idle speed is increased to 875 rpm.

LOCATION



1 Pre-postheating unit





2 Heater plug (tightening torque **1.5 daN.m**).

To remove the heater plugs, the following must be removed :
- the plastic cover on the engine,
- the high pressure diesel fuel pipes,
- the plastic cover protecting the engine mounting.

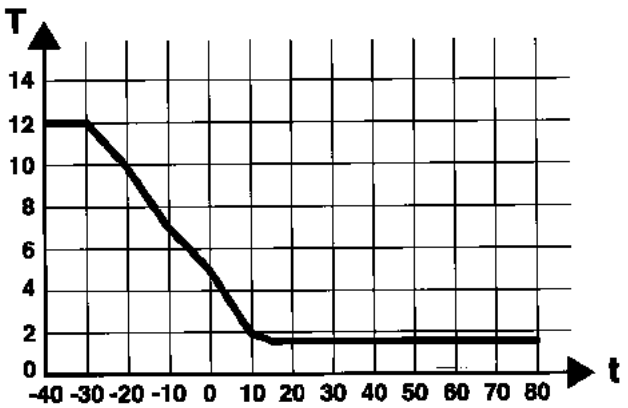
IMPORTANT: the tightening torque for the nut holding the electrical wire on the plug is 0.2 daN.m.

PRE-POSTHEATING OPERATING PRINCIPLE

1. Ignition on - "preheating"

a) Variable preheating

The illumination time of the warning light and the supply time of the plugs is a function of coolant temperature.



12527M

If the coolant temperature sensor is faulty, the plugs are systematically supplied for **14 seconds**.

b) Fixed preheating

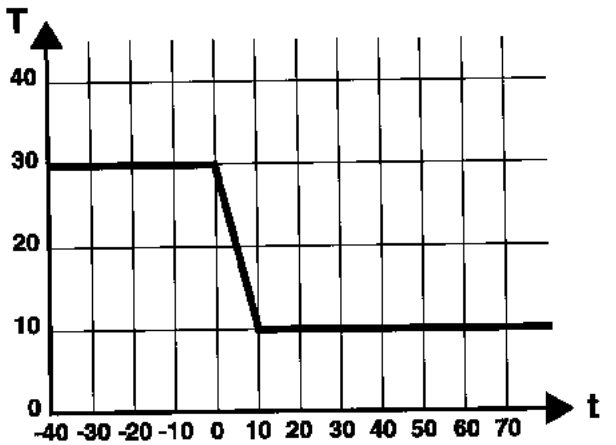
After the preheating warning light extinguishes (variable preheating), the plugs will remain supplied for **8 seconds**, or after an engine speed **> 2500 rpm**, for more than **2 seconds**.

2. Starting

Under the action of the starter motor, the plugs will remain supplied for a maximum of **20 seconds**, if the coolant temperature is lower than **60 °C** and if the engine speed is less than 2500 rpm.

3. Engine running - "postheating"

In this phase, the plugs are continuously supplied as a function of the coolant temperature.



12526S

The postheating is interrupted if the engine speed is **greater than 2 500 rpm**.

If the coolant temperature sensor is faulty, the plugs are systematically supplied for **30 seconds**.

The three thermoplungers (plugs) are located on a coolant unit mounted under the manifold at the engine - gearbox connection.

The aim of the system is to heat the coolant.

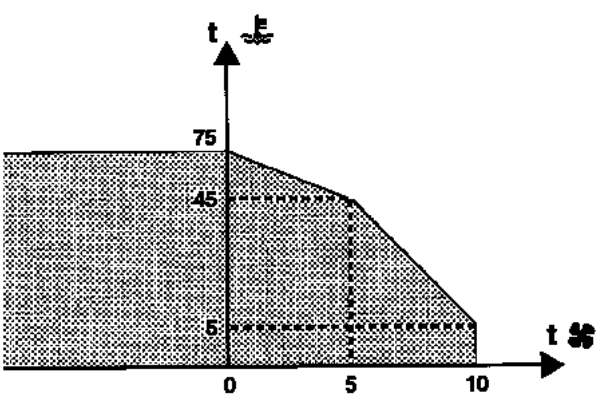
The thermoplungers are supplied with **12 volts** by two relays. One relay controls two thermoplungers, the other relay controls one thermoplunger. This allows a choice of controlling one, two or three thermoplungers.

The resistance of the thermoplungers is :
0.45 ± 0.05 Ω at 20 °C.

Control programming

The thermoplungers are supplied:
- if the engine speed is greater than **650 rpm**,
- if postheating is complete.

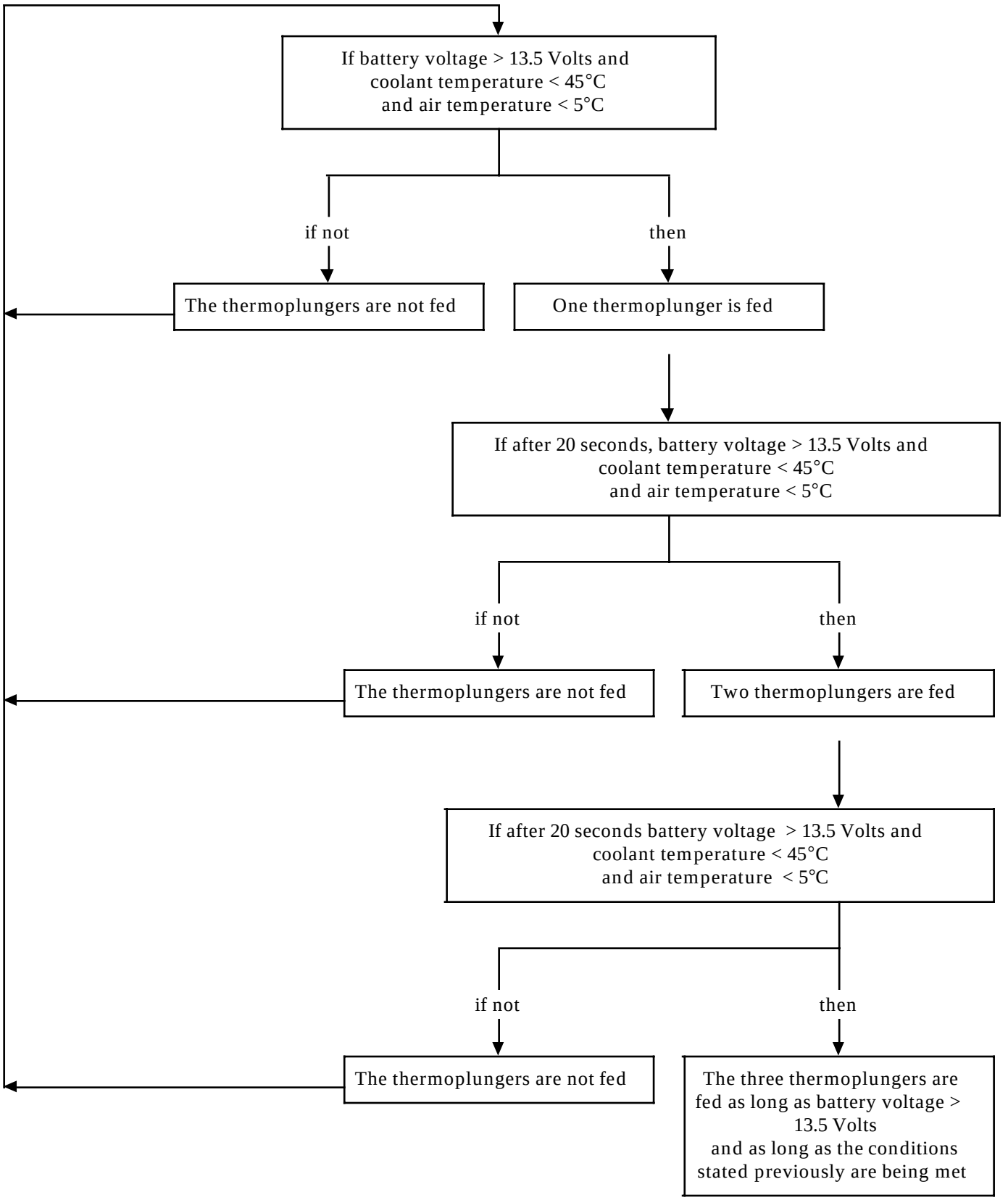
If the above conditions are met, the thermoplungers are controlled as a function of mapping relating to the air and coolant temperature.



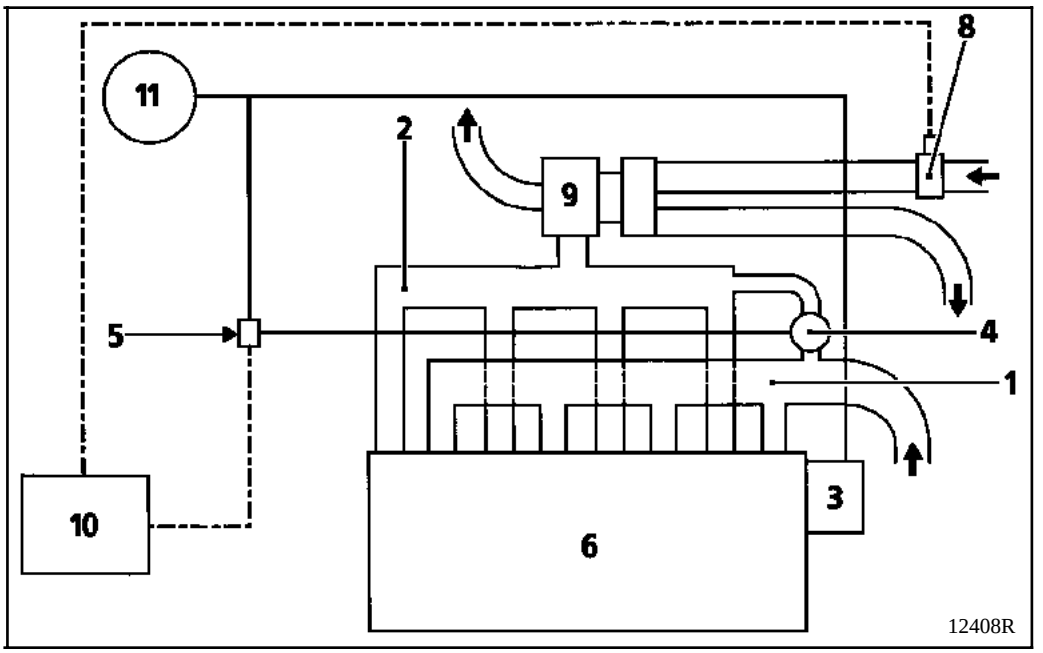
12528S

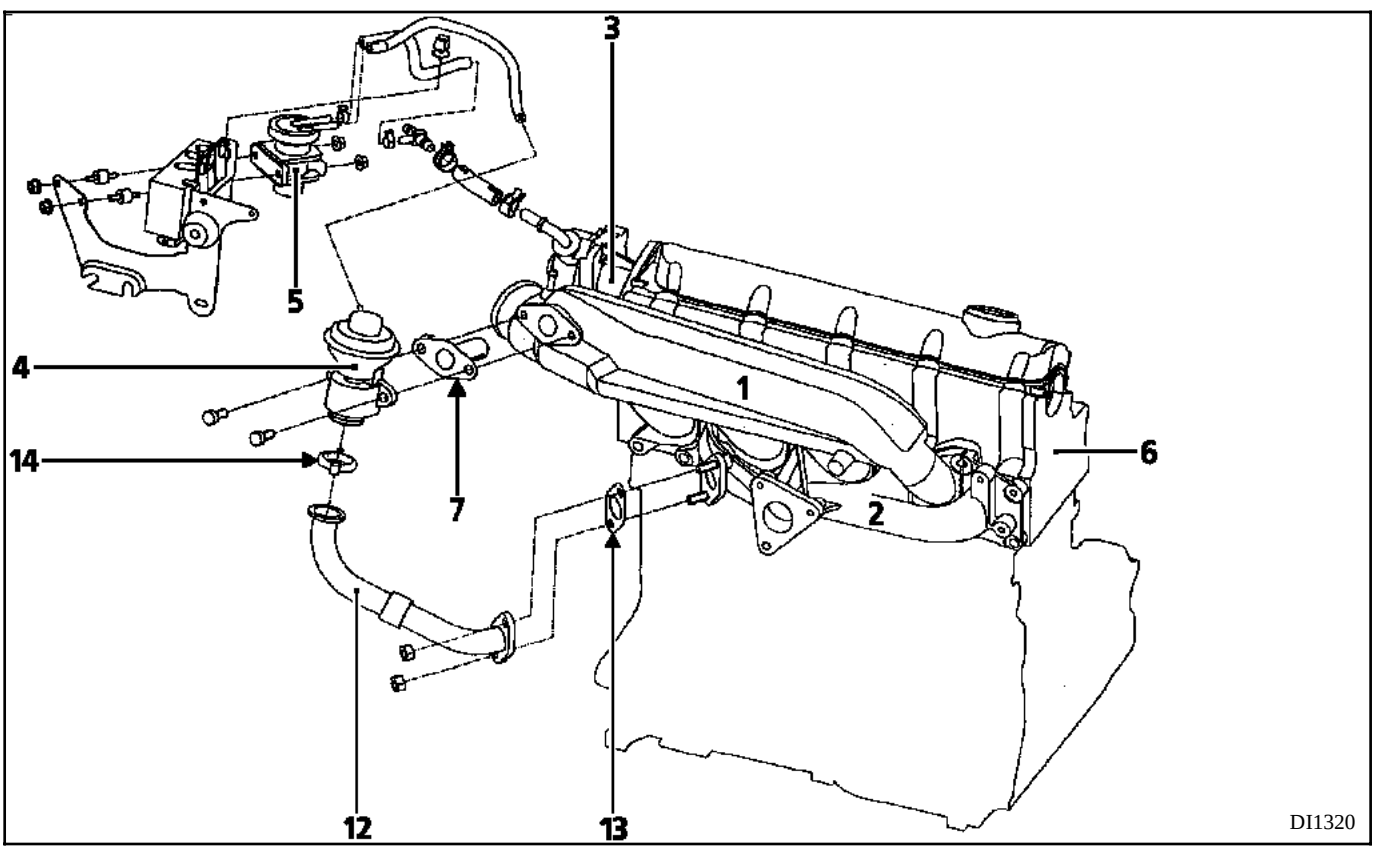
Area without grey tint : thermoplungers not supplied
Area with grey tint : thermoplungers supplied

If the conditions stated previously are observed, then the thermoplungers are fed one by one as a function of battery voltage.



PRESENTATION





1 Inlet manifold
2 Exhaust manifold
3 Vacuum pump
4 EGR valve (bolt tightening torque : **2 daN.m**)
5 EGR solenoid valve
6 Cylinder head
7 Venturi
8 Flow meter
9 Turbo
10 Computer
11 Brake servo
12 Steel EGR pipe
13 Seal
14 Clip

TIGHTENING TORQUES (in daN.m)	
EGR valve bolts	**2.1**
Exhaust manifold steel pipe nut	**2.1**

REMOVING THE EGR VALVE (see diagram on previous page)

On the valve, disconnect the vacuum connection pipe between the capsule (5) and the vacuum pump.

Under the solenoid valve, unclip and remove the clip (14) connecting the steel pipe to the EGR solenoid valve .

Remove the two bolts holding the **EGR** solenoid valve (5), then remove it.

AIM OF THE EGR SYSTEM

Exhaust gas recirculation **EGR** is used to reduce the nitrogen oxide (**NOx**) content of the exhaust gases.

SOLENOID VALVE OPERATING PRINCIPLE

The **EGR** solenoid valve is controlled by an **RCO** signal emitted by the injection computer.The **RCO** signal allows modification of the opening of the solenoid valve and, as a result, the quantity of exhaust gases directed towards the inlet manifold .

As a function of this signal, the solenoid valve applies a certain amount of the vacuum pump pressure onto a diaphragm (C). The diaphragm (C) moves and pulls the rod (B) which authorises the passage of exhaust gases (by vacuum) towards the inlet manifold .

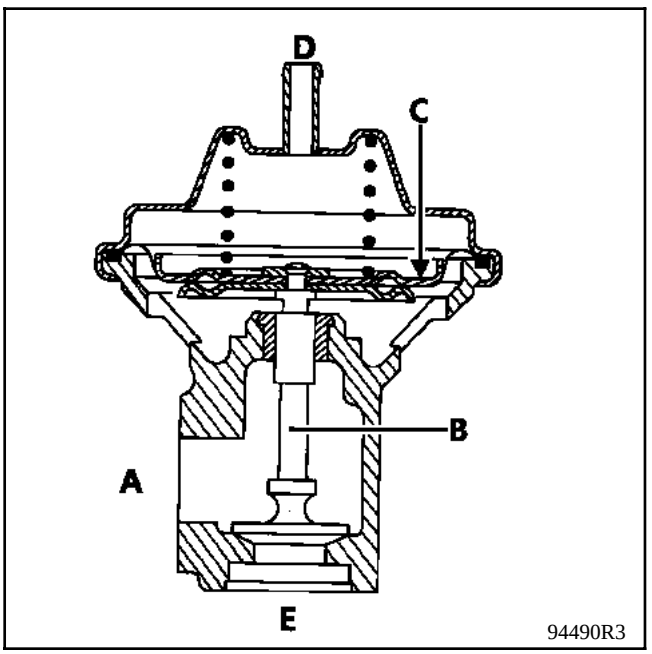
CONFIRMATION OF THE OPERATION OF THE DEVICE THROUGH ROAD TESTING

To ensure correct operation of the **EGR** control device, one could, by fitting a pressure gauge, check the arrival of information and of pressure, to control the **EGR** valve. In addition, the **RCO** value applied to the **EGR** solenoid valve can be read using **# 24** on the **XR25** .

Procedure

Disconnect the pneumatic pipe coming to the **EGR** valve at (D) and fit a T-union in its place. On the free pipe, connect a pressure gauge **(0 ; - 1 000 mbar)**.

On a road test, a variable vacuum can then be noted.



A Towards the inlet manifold
B Rod
C Diaphragm
D Control vacuum for opening the **EGR** valve
E Towards the exhaust manifold

CHECKING THE SEAL AND OPERATION OF THE EGR SOLENOID VALVE (VEHICLE STATIONARY)

After the engine cooling fan has operated at least once, stop the engine and switch off the ignition.

Disconnect the electrical connector.

Directly supply the solenoid valve with **12 Volts**.

Disconnect the **EGR** valve, the pipe (D) connected to the **EGR** solenoid valve. Connect a vacuum pump in its place.

Create a vacuum of **300 mbars**. The pressure should not fall more than **2 mbars** per second (**120 mbars** per minute).

Eliminate the vacuum to return the solenoid valve to atmospheric pressure.

After this operation, erase the computer memory.

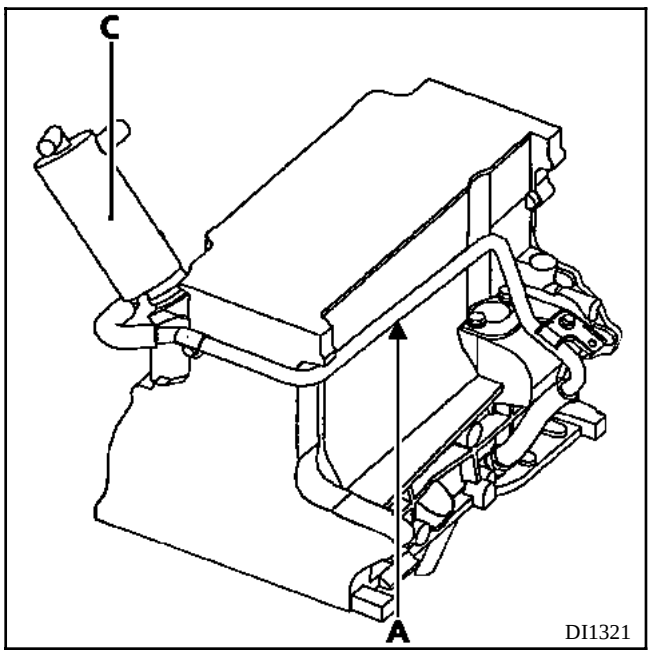
CONDITION OF OPERATION

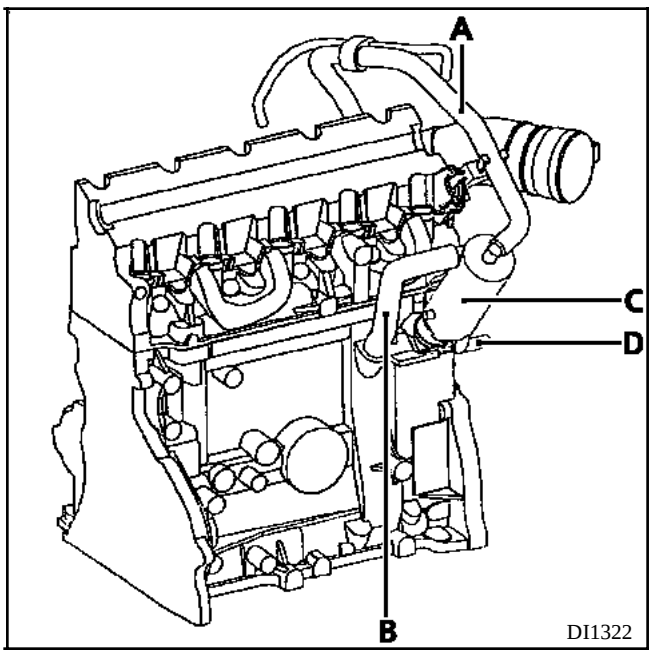
Using an **RCO** type signal, the computer controls the **EGR** solenoid valve, except in the cases described below:

- **40 seconds** after recognising the beginning of an idle speed regulation phase,
- if the engine speed / flow pairing is greater than a threshold (mapping),
- after exiting the starting phase for a period of **10** to **40 seconds** depending on the coolant temperature,
- if the engine speed is slightly greater than **3 000 rpm**,
- if battery voltage is lower than **10 volts**,
- in the engine is in a deceleration phase,
- if engine speed is lower than **650 rpm**,
- in the case of a fault:
  - in the engine speed sensor,
  - in the injector with sensor,
  - in the air flow meter,
  - in the advance solenoid valve,
  - in the **EGR** solenoid valve,
  - in the **EGR** regulation

Special notes

After each entry into the idle speed phase the **EGR** is fed for **40 seconds**, then is interrupted.



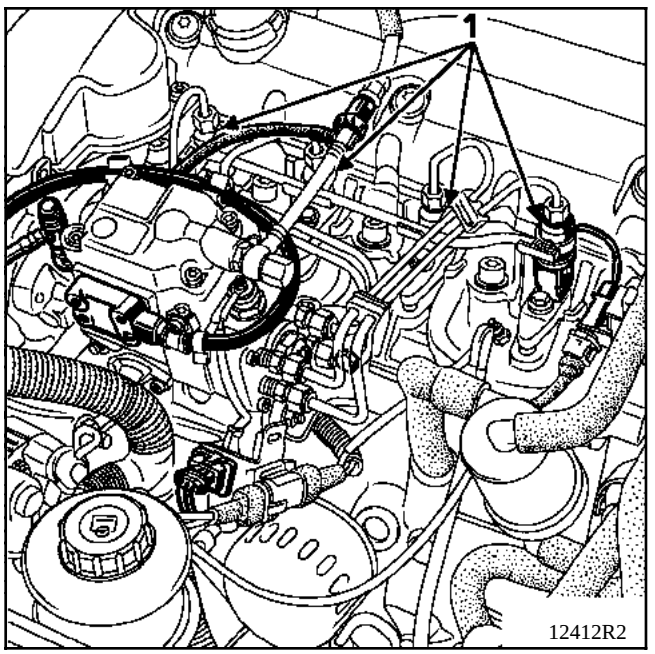


A Oil vapour rebreathing pipe from the bottom of the engine
B Oil vapour rebreathing pipe from the top of the engine
C Oil decanter (connected at its base to the engine)
D Oil vapour rebreathing pipe connected to the inlet pipe

To remove the injectors (1), remove the diesel fuel high pressure pipes, then the injector mounting flange.

Each time an injector is removed, replace the seal between the injector and the cylinder head.

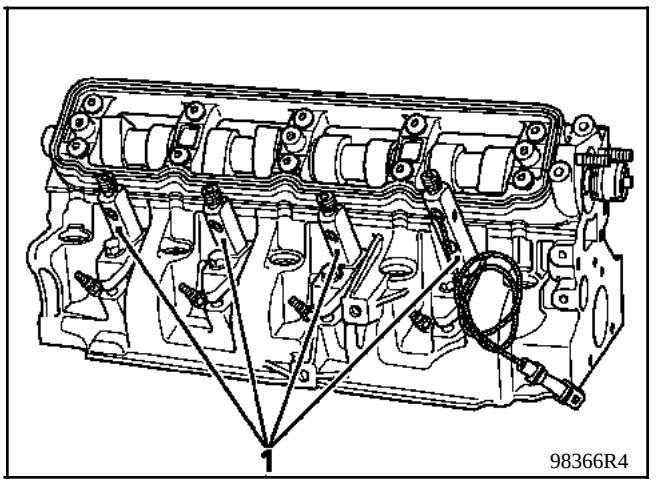
The tightening torque for the bolt holding the flange is **2.7 daN.m.**

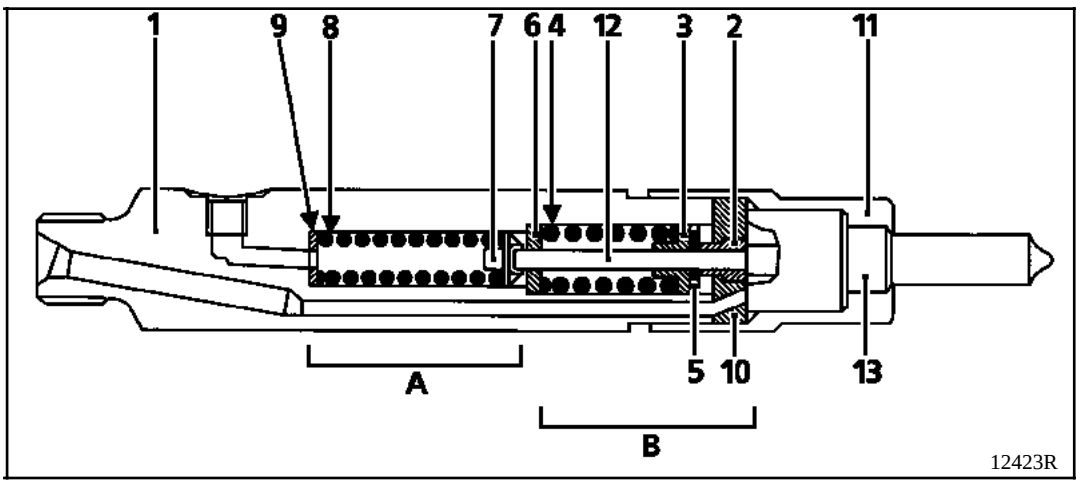


The injector is a double spring type. This means that there are two calibration pressures.

Calibrating the injectors is impossible. Only the 1st stage pressure calibration can be checked. It is 200 $^{+12}_{-0}$ bars.

If this value is not obtained, the injector must be replaced.





1 Injector holder body
2 End socket
3 Spring cup
4 2nd stage spring
5 2nd stage adjusting shim
6 Guide washer
7 Pushrod
8 1st stage spring
9 1st stage adjusting shim
10 Intermediate disc
11 Nut
12 Pushrod
13 Injector

A 1st stage
B 2nd stage

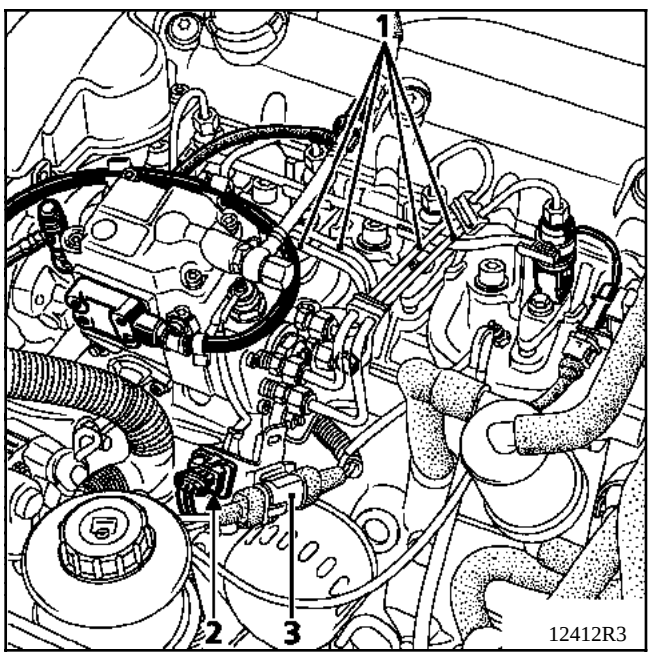
When removing the advance solenoid valve, the operator is asked to carry out this operation under hygienic conditions.

TIGHTENING TORQUES (in daN.m)	
Hydraulic head bolt	**1.2**
Advance solenoid valve bolt	**1**

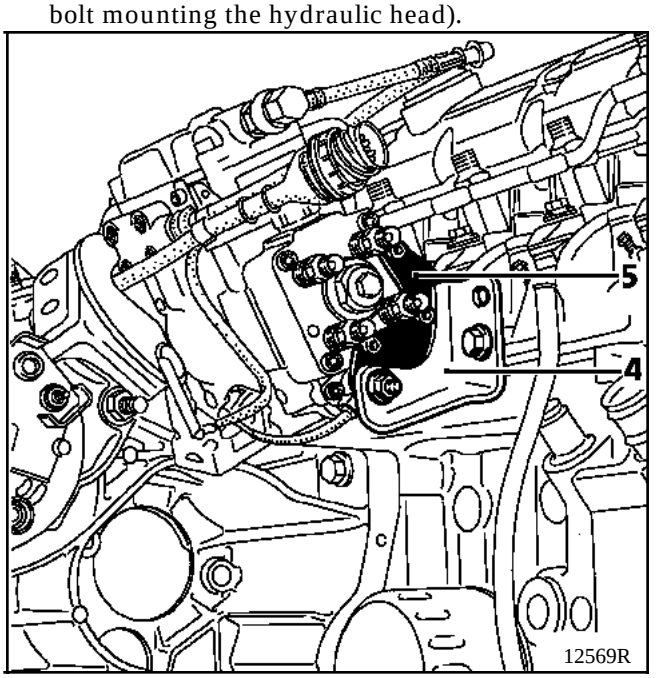
REMOVAL

Remove the high pressure pipes (1).

Disconnect connectors (2) and (3).

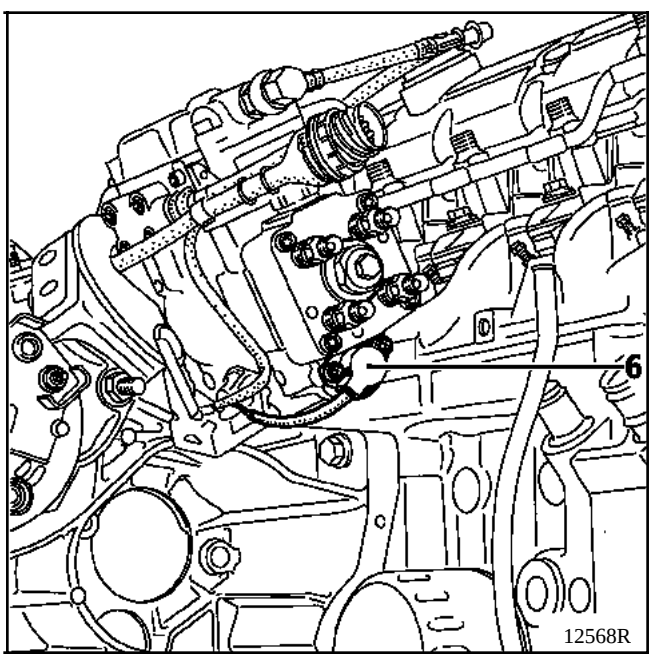


Remove:
- the bracket (4) mounting the pump on the engine,
- the steel bracket (5) (this bracket is held by a bolt mounting the hydraulic head).

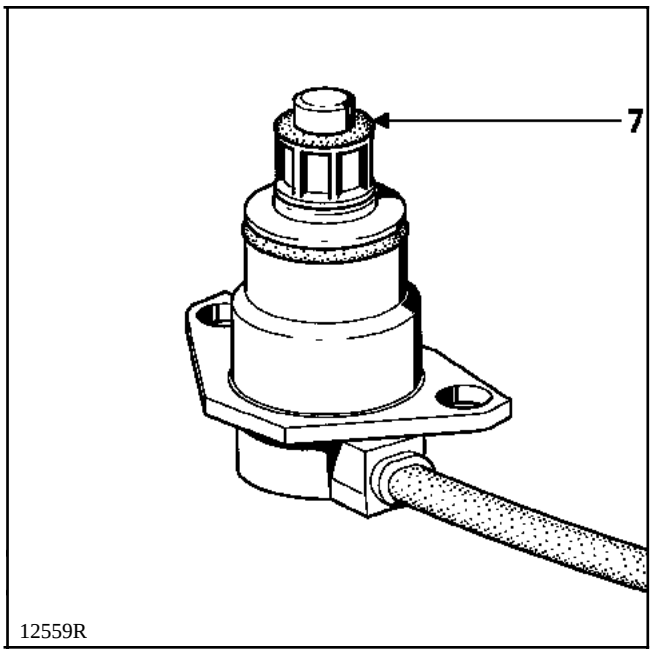


Clean the section where the advance solenoid valve is mounted to the pump.

Remove the advance solenoid valve (6).



IMPORTANT: check that the O ring (7) has not remained bonded to the pump body.



REFITTING

Refitting is the reverse of removal.

Observe the tightening torque for the bolt mounting the hydraulic head and those holding the advance solenoid valve.

SPECIAL EQUIPMENT REQUIRED	
0986 612 605	**Socket for removing BOSCH head bolts**

This tooling can be obtained from the BOSCH network.

When removing the diesel fuel temperature sensor, the operator is asked to carry out this operation under hygienic conditions.

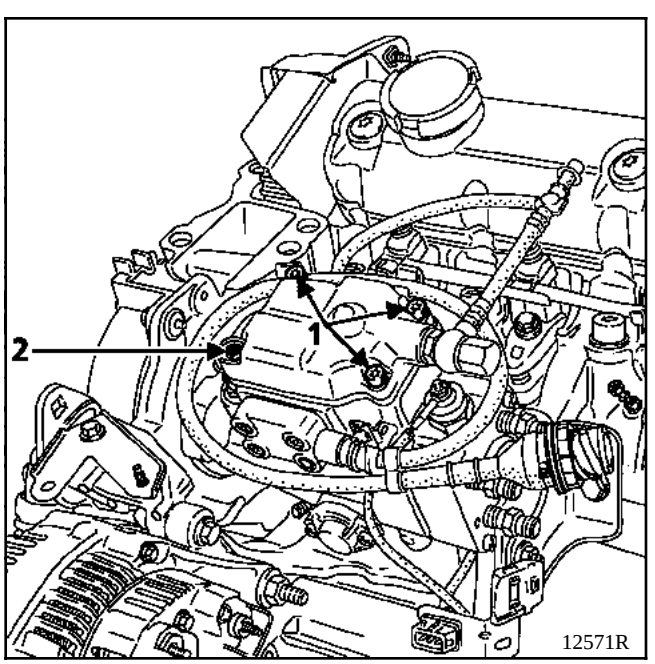
TIGHTENING TORQUE (in daN.m)	
Bolts holding the pump cover	**0.7**

REMOVAL

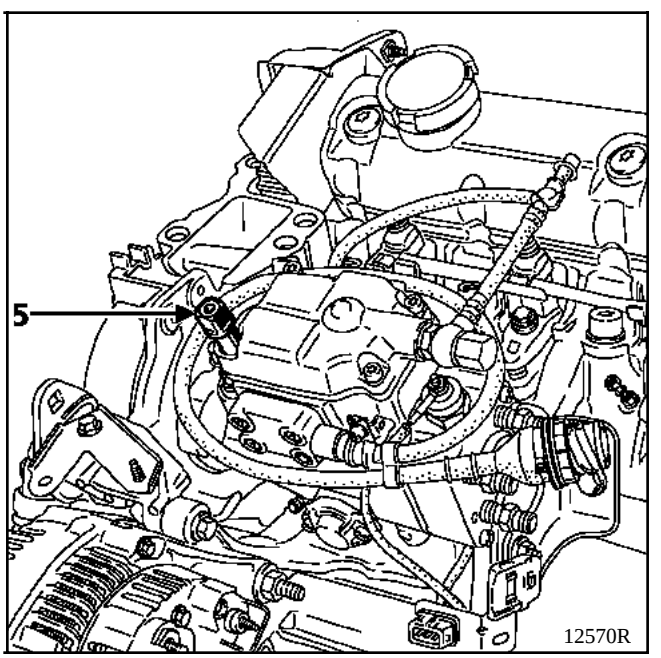
Very carefully clean the upper section of the pump (pump cover).

Place a cloth under the pump and on the alternator to soak up the diesel fuel which will run out of the pump.

Remove the three bolts (1) holding the pump cover.

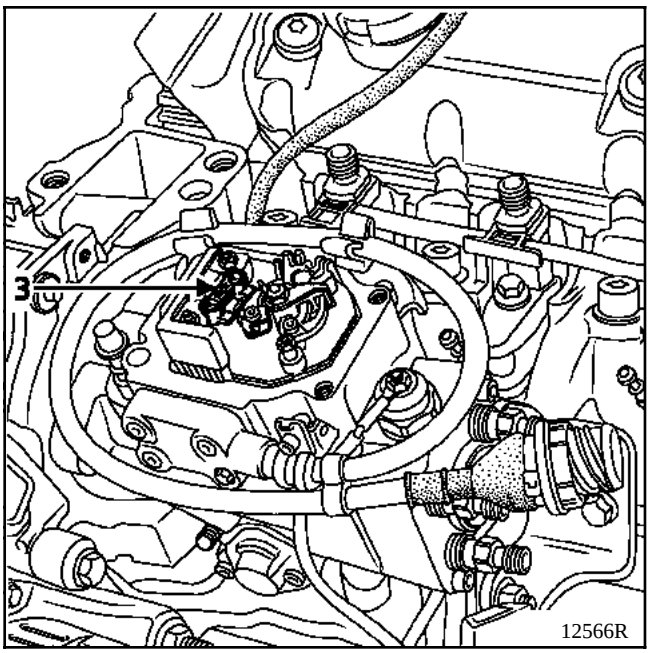


To remove the fourth bolt (2) holding the pump cover, use the **BOSCH** tool (5).

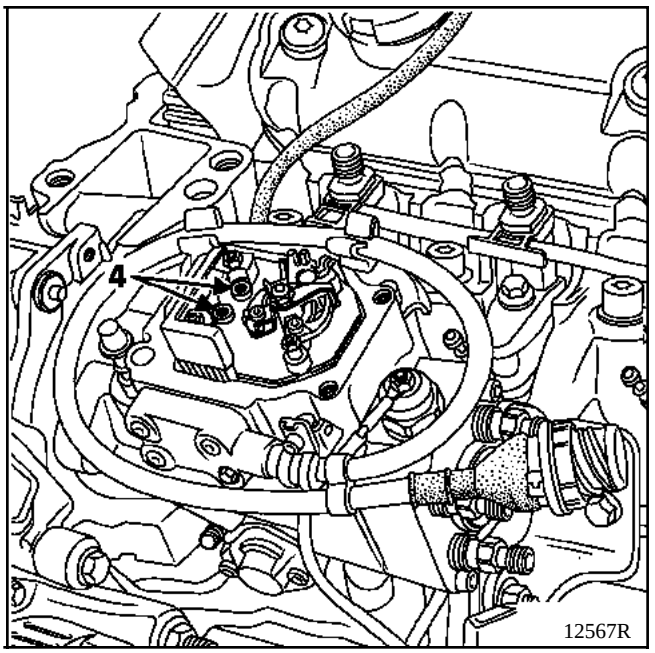


IMPORTANT: ensure that no impurities enter the pump.

Remove the diesel fuel temperature sensor (3). It is held by two torx bolts.



Clean the sealing faces (4) on the diesel fuel temperature sensor wiring connections.



REFITTING

Fit the sensor and tighten it.

Clean the seal surface on the upper section of the pump and the cover.

Fit the cover and the bolts, then tighten them, observing their tightening torques. Tighten crosswise.

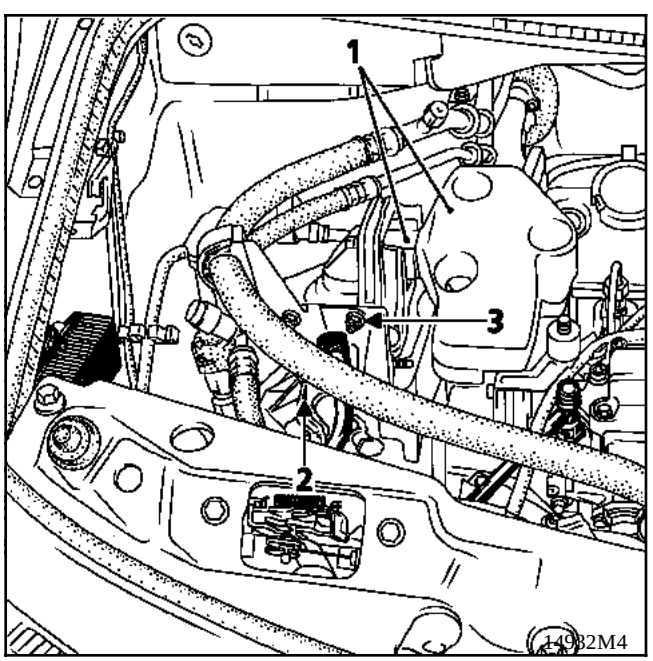
SPECIAL TOOLING REQUIRED	
Mot. 1054	**TDC pin**
Mot. 1200	**Pulley - pump retaining tool**
Mot. 1311-06	**Tool for removing the diesel fuel pipe**

TIGHTENING TORQUES (in daN.m and/or °)	
Nut mounting pump shaft to the RAM pulley	**1.5 + angle of 60° ± 10°**
Pump mounting bolt	**2.2**

REMOVAL

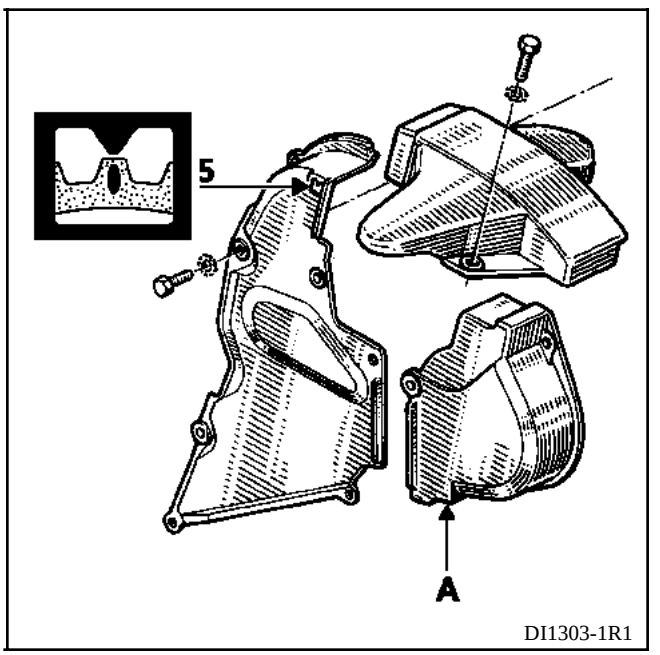
Disconnect:
- the battery,
- on the diesel filter holder (2) the two diesel fuel unions (use tool **Mot. 1311-06**),
- the electrical connection to the pump,
- on the diesel filter holder (2), the diesel fuel heater connector.

Remove:
- the diesel fuel filter holder mounted by bolts (3),

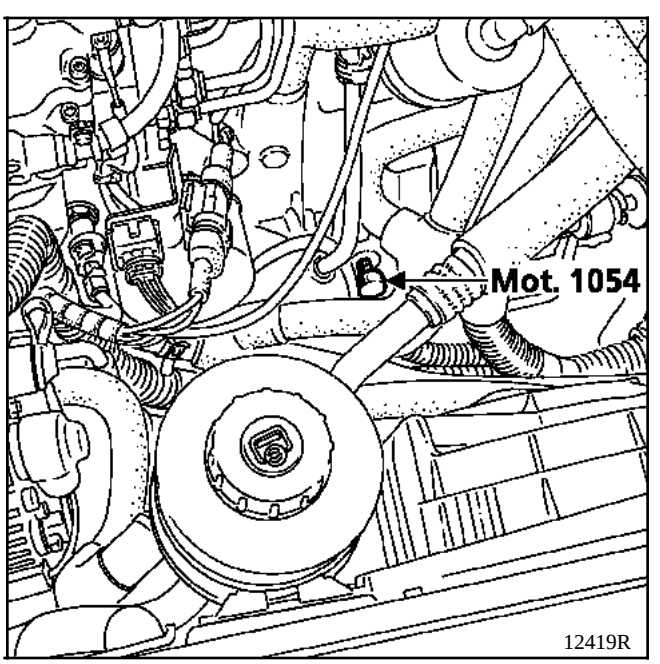


- the cover (A) protecting the RAM pulley.

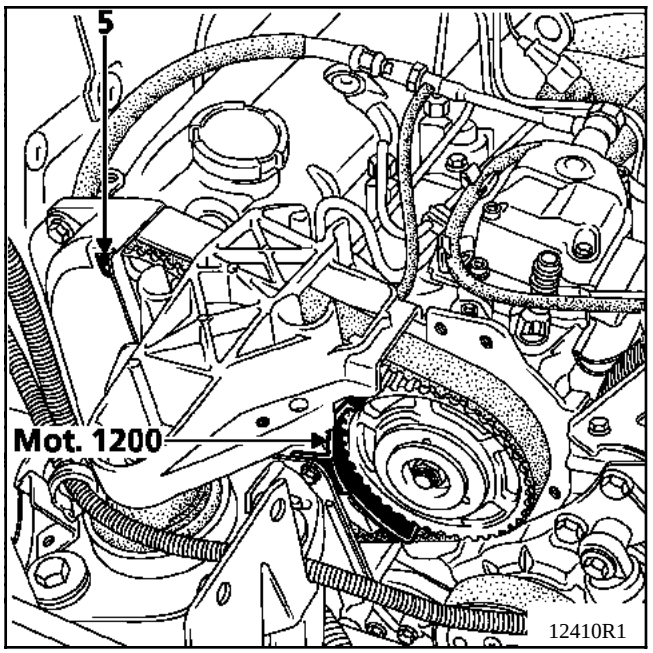
Turn the engine so that the index on the camshaft sprocket aligns with the marking (5) on the timing cover.



Remove the bolt protecting the timing hole and fit tool **Mot. 1054** in its place.

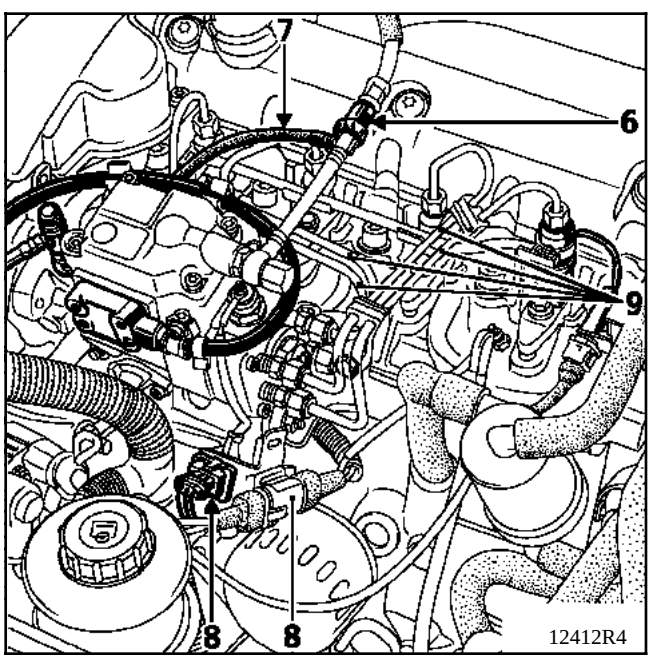


Fit the pulley retaining tool **Mot. 1200** in place.



Disconnect:
- the diesel fuel return quick release union (6),
- the rubber pipe (7) for returning diesel fuel from the injectors,
- the connectors (8).

Remove:
- the four high pressure pipes (9),
- the bolt holding the pump mounting on the cylinder block.



Slacken:
- the three bolts holding the pump by inserting a torx screwdriver into the openings of the **RAM** pulley,
- the central nut mounting the pump shaft to the **RAM** pulley.

Slacken alternately the central nut and all three bolts mounting the pump until they are fully slackened.

Remove the pump.

REFITTING

Refit the pump.

Carry out the timing operations (see sections "**Pump -Timing**").

Refitting is the reverse of removal.

RAM PULLEY OPERATION (micrometrically adjusted pulley)

IMPORTANT : never open a RAM pulley .

List of components

1 Aluminium pulley bolt.
It joins the adaptor hub (8) to the pulley rim (4). Pre-tighten the bolt to **2 daN.m**, then tighten to **9 ± 0.5 daN.m**.

2 Pulley flange.

3 Collar nut.
It secures the pump shaft to the pulley. Its tightening torque is **4.5 ± 0.5 daN.m**.

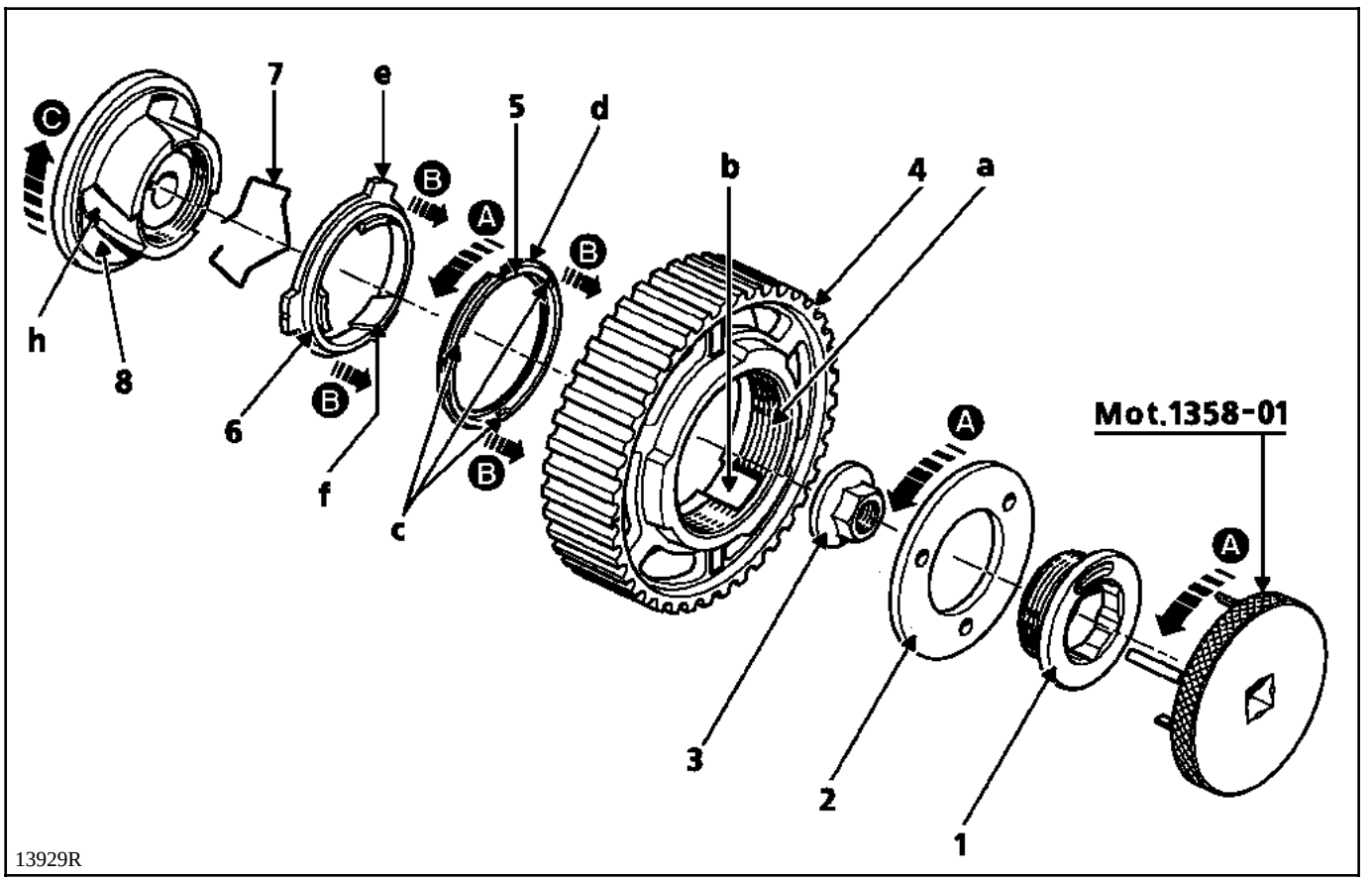
4 Pulley rim.
When making adjustments, this is fixed. Its internal section consists of:
- a thread (a) onto which part (5) is screwed,
- three guide vanes (b) into which part (6) lines up.

5 Micrometric advance ring.
It consists of three grooves (c) into which the three arms of the tool **Mot. 1358-01** fit.
Its external section consists of a thread (d) which screws into the pulley (4). It remains joined to part (6) when part (6) moves sideways. In contrast, part (5) rotates freely in relation to part (6).

6 Angular adjustment ring.
It is locked in rotation. Its external section consists of three lugs (e) which slide onto the pulley rim (4). Its internal section consists of three helical guide vanes (f) which slide onto the adaptor hub (8).

7 Screw locking device.

8 Adaptor hub.
It drives the pump while adjustments are being made. This turns the pump shaft. It consists of three helical vanes (h).



Operating principle

Before adjusting, slacken bolt (1).

Fit tool **Mot. 1358-01** into the three holes on the flange (2). The three rods of the tool fit into the three grooves on the micrometric advance ring (5).

The rotation (A) of tool **Mot. 1358-01** rotates the micrometric advance ring (5).

When this turns, it screws into the pulley rim (4). As it screws in, part (5) has a rotary, but also a lateral movement (B). It moves closer to the nut (1).

Part (6) is connected to part (5) for lateral movements. On the other hand, it is locked for rotary motion. In effect, these three lugs slide into the three straight vanes on the pulley rim (4). As a result, part (6) moves towards bolt (1).

Part (6) has three helical guide vanes. These fit into the helical vanes of part (8). Following the transverse movement of part (6), and as part (8) cannot move transversely, part (6), by moving, turns part (8) via the helical vanes.

A Rotary movement made by the operator acting on the tool.

B Transverse movement of the rings.

C Rotary movement applied to the pump shaft, divided by **180** in relation to movement **A**.

SPECIAL TOOLING REQUIRED	
Mot. 856 -02	**Dial gauge mounting and extension (electronic Bosch pump)**
Mot. 1054	**TDC pin**
Mot. 1311 -06	**Tool for removing diesel fuel pipe**
Mot. 1200 -01	**Pulley - pump retaining tool**
Mot. 1358 -01 **Mot. 1359**	**Set of tools for operations on a RAM pulley**
EQUIPMENT REQUIRED	
Left hand torque wrench	

IMPORTANT:
- tool **Mot. 1358-01** MUST be used (tool **Mot. 1358** does not work on **HTD2** pulleys),
- the engine must only be rotated by turning a wheel, in **5th** gear, (turn gently and without sharp movements to avoid the engine moving back due to compression),
- the engine should only be turned in its operating direction. If it is turned in the opposite direction, repeat the procedure for checking or adjusting the timing to zero.

NOTE : the timing value is **0.25 to 0.40 mm**.

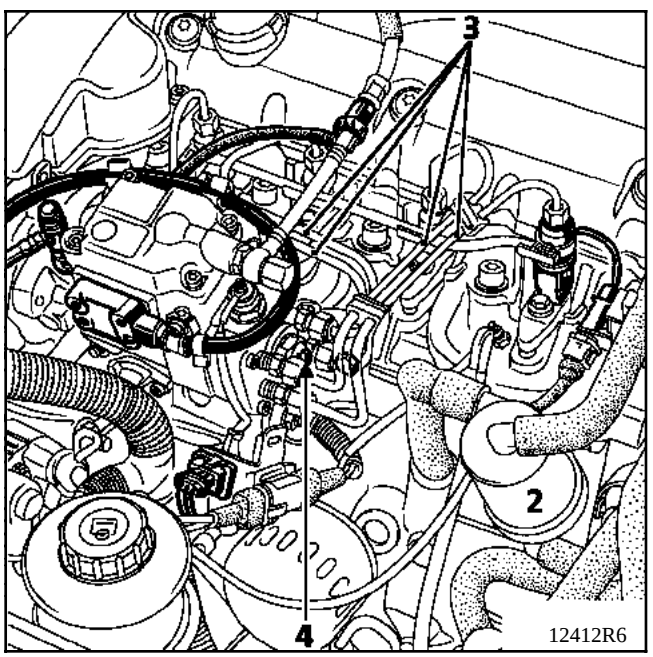
TIGHTENING TORQUE (in daN.m)	
RAM pulley nut (adjustment locking)	**9**

CHECKING THE TIMING OF INJECTION PUMPS FITTED WITH RAM PULLEYS

Remove the oil decanter (2) and the diesel fuel high pressure pipes (3) using tool **Mot. 1311-06**.

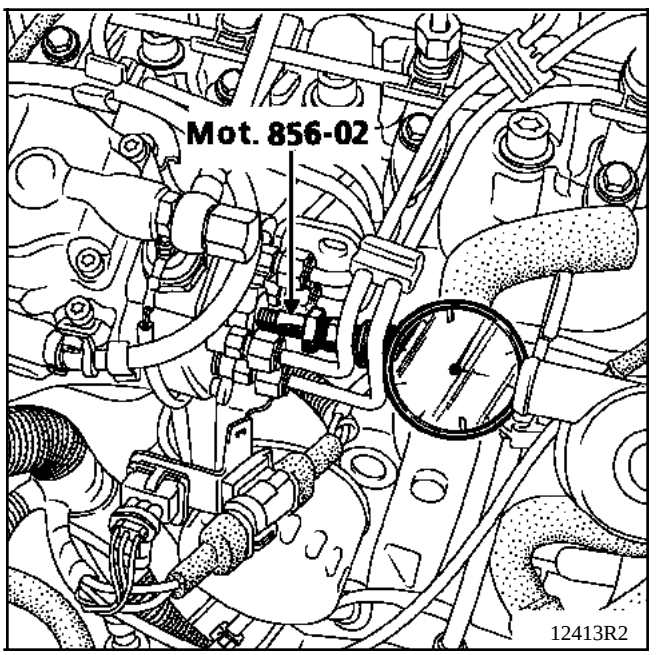
Screw mounting **Mot. 856-02** into the place of the plug (4).

On the dial gauge, screw on the extension delivered with tool **Mot 856-02** then put it in place and secure it to the dial gauge mounting **Mot. 856-02** .



Calibrate the dial gauge on the injection pump piston **BDC**.

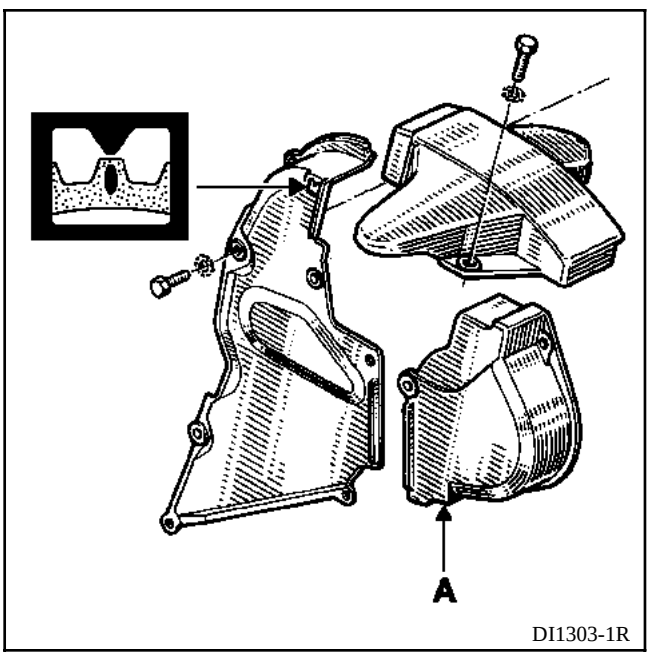
Check that the dial gauge pin slides easily into the pump body, and that it always indicates the same **BDC** value (check to be made each time the engine is turned).



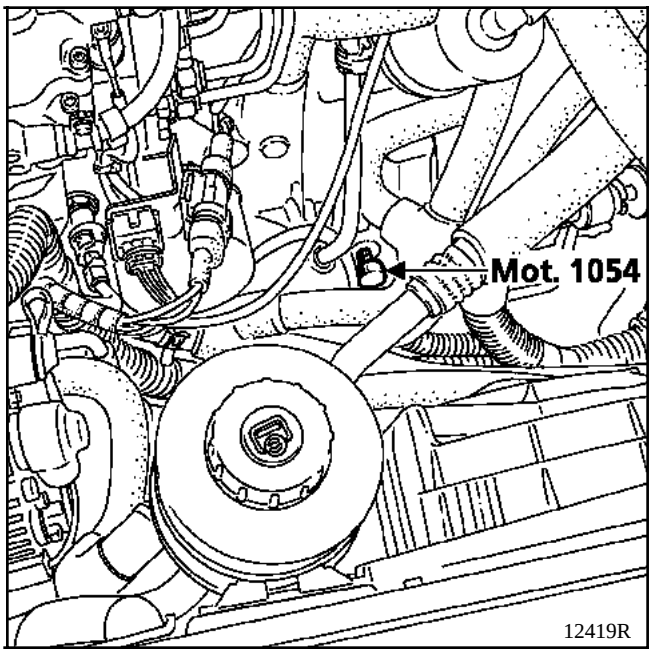
Check that the pump piston stroke is less than the dial gauge stroke.

Turn the engine twice.

Pin the engine using tool **Mot. 1054** (two people), to do this :
- turn the engine in its operating direction (clockwise from timing end),
- locate the spot on the camshaft pulley where the reference mark will appear,
- **stop the engine from turning one half tooth before the two reference marks align.**



Fit pin **Mot. 1054**.



Maintain pressure on the pin.

Turn the engine slowly until the pin penetrates into the slot on the crankshaft.

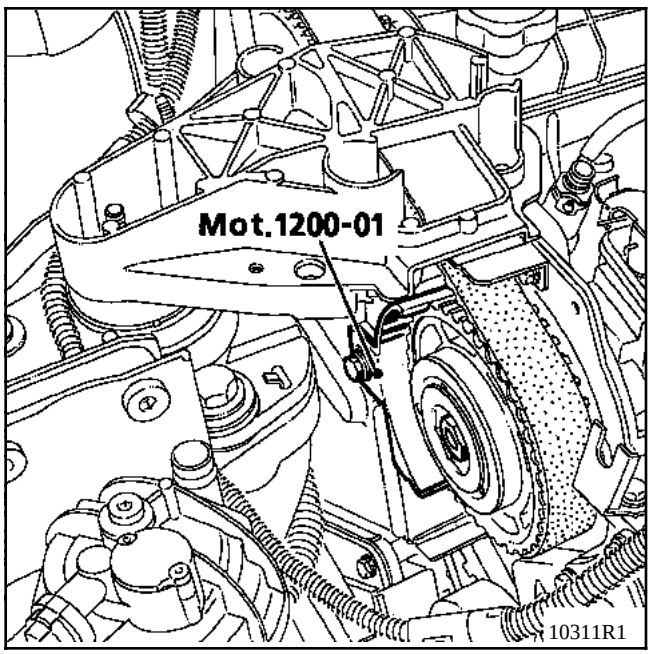
Check the pump piston lift, which may be read on the dial gauge.The timing value is **0.25 to 0.40 mm**.

If the value is not correct, correct the timing (see below).

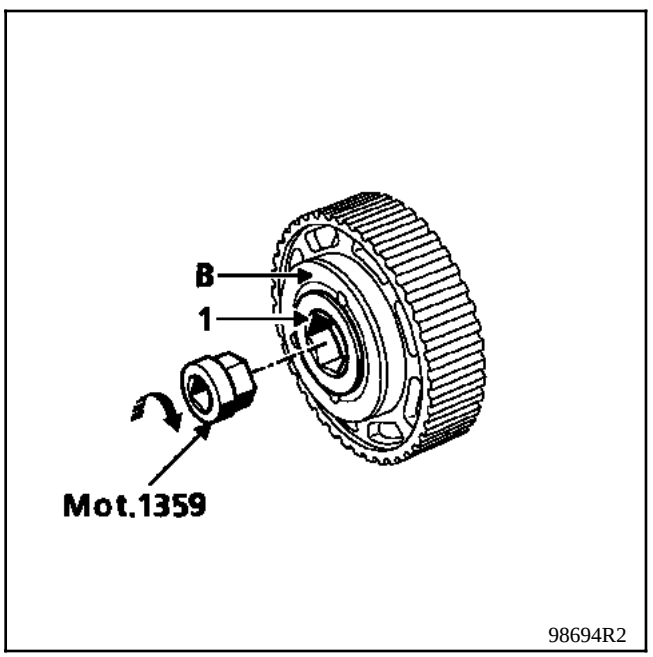
ADJUSTING THE TIMING OF INJECTION PUMPS FITTED WITH RAM PULLEYS (to be carried out after the timing has been checked, see above).

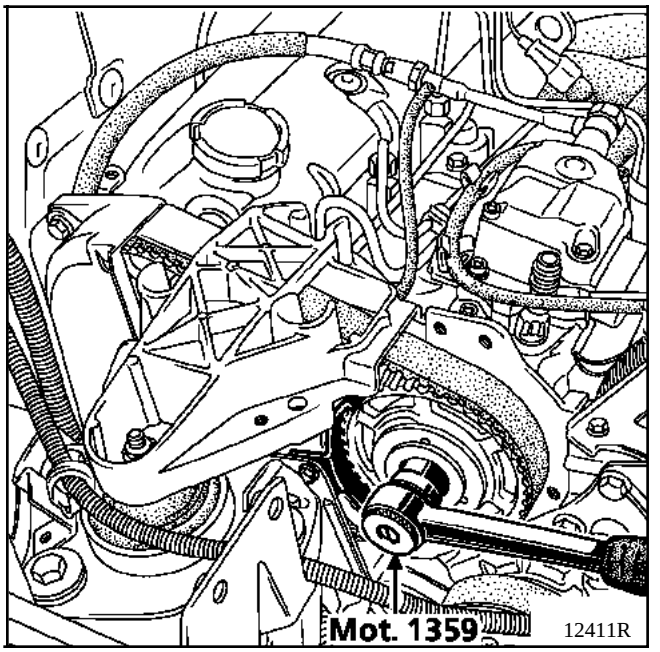
Remove:
- pin **Mot. 1054,**
- the cover protecting the RAM pulley .

Fit tool **Mot. 1200-01** to immobilise the pulley.



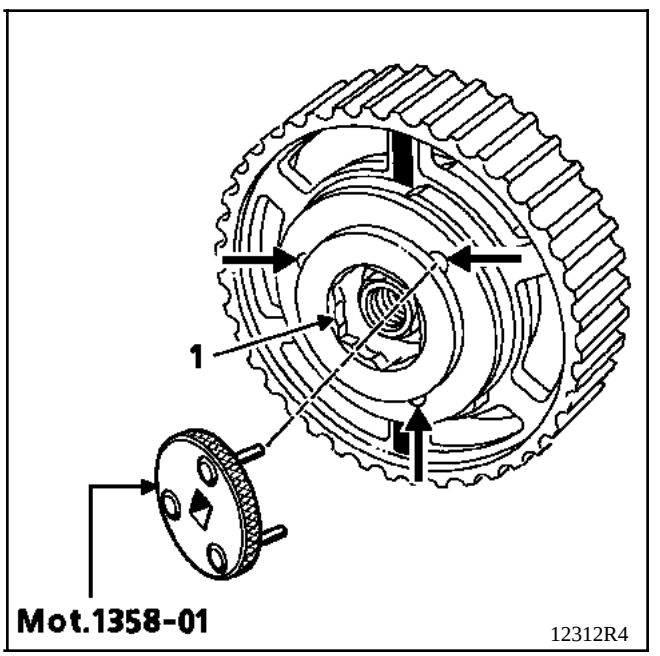
IMPORTANT: slightly loosen the bolt at (1) using tool **Mot. 1359** (**IMPORTANT: left hand thread**) so that the flange (B) can rotate freely.





Fit tool **Mot. 1358-01** into the three openings of the flange (B).

Turn the tool - flange assembly so that the three brackets of the tool fit into the three slots in the adjusting ring bolt.

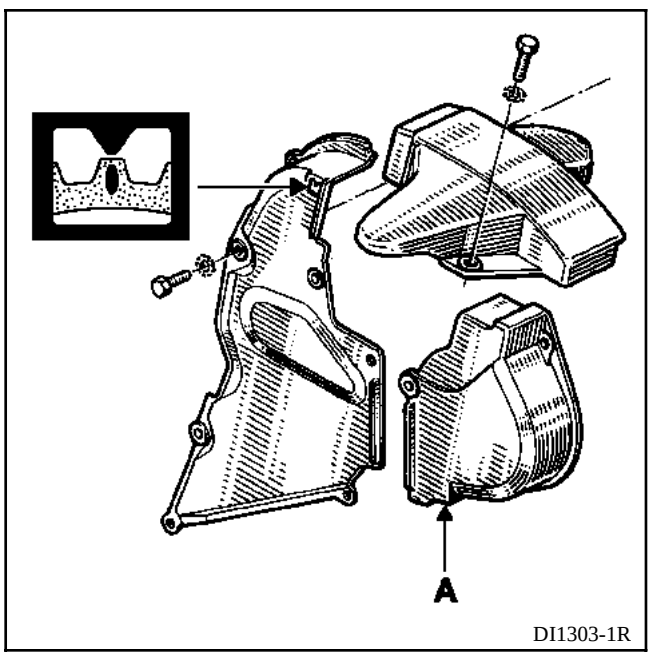


Turn the flange - tool assembly **Mot. 1358-01** clockwise until the pulley stops, which allows the pulley to be put to the start of timing position.

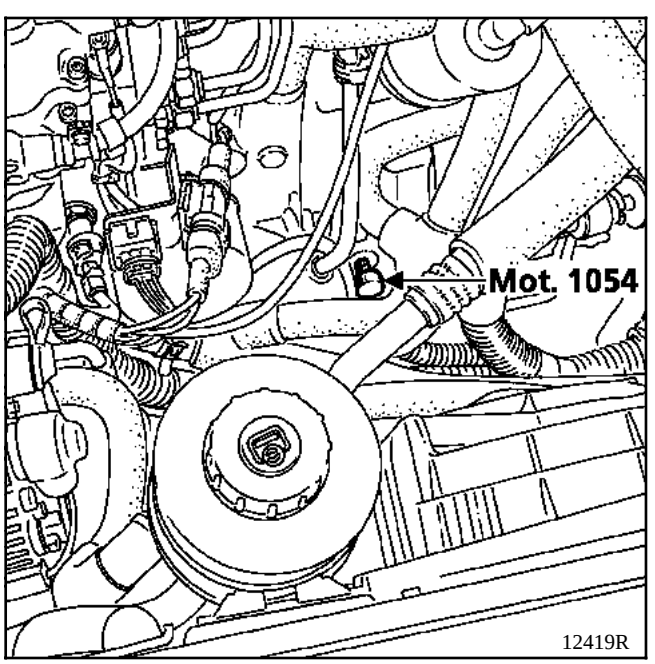
Remove the immobilising tool **Mot. 1200-01.**

Turn the engine twice.

Pin the engine using tool **Mot. 1054** (two people).
To do this:
- turn the engine in its operating direction (clockwise from timing end),
- locate the spot on the camshaft pulley where the reference mark will appear,
- **Stop the engine from turning one half tooth before the two reference marks align.**



Fit pin **Mot. 1054**.



Keep pressure applied to the pin.

Turn the engine slowly until the pin penetrates into the slot on the crankshaft.

Using tool **Mot. 1358-01**, adjust the timing by turning the tool anti-clockwise until the timing value is **0.45 ± 0.02 mm**.

If the value is not correct, adjust the timing (see below).

NOTE : if the timing value is exceeded when adjusting, turn the engine back two revolutions to regain the clearance using tool Mot. 1358-01 then restart the preceding operation.

Leave pin **Mot. 1054** in place.

Slightly pre-tighten bolt (1) using tool **Mot. 1359** to a torque of not more than **2 daN.m** (left hand thread, the dial gauge needle should not move).

IMPORTANT: the torque wrench used must operate to the left.

Remove pin **Mot. 1054**.

Fit tool **Mot. 1200-01** to immobilise the pulley.

Turn the engine by hand anti-clockwise to bring the locking tool into contact with the pulley.

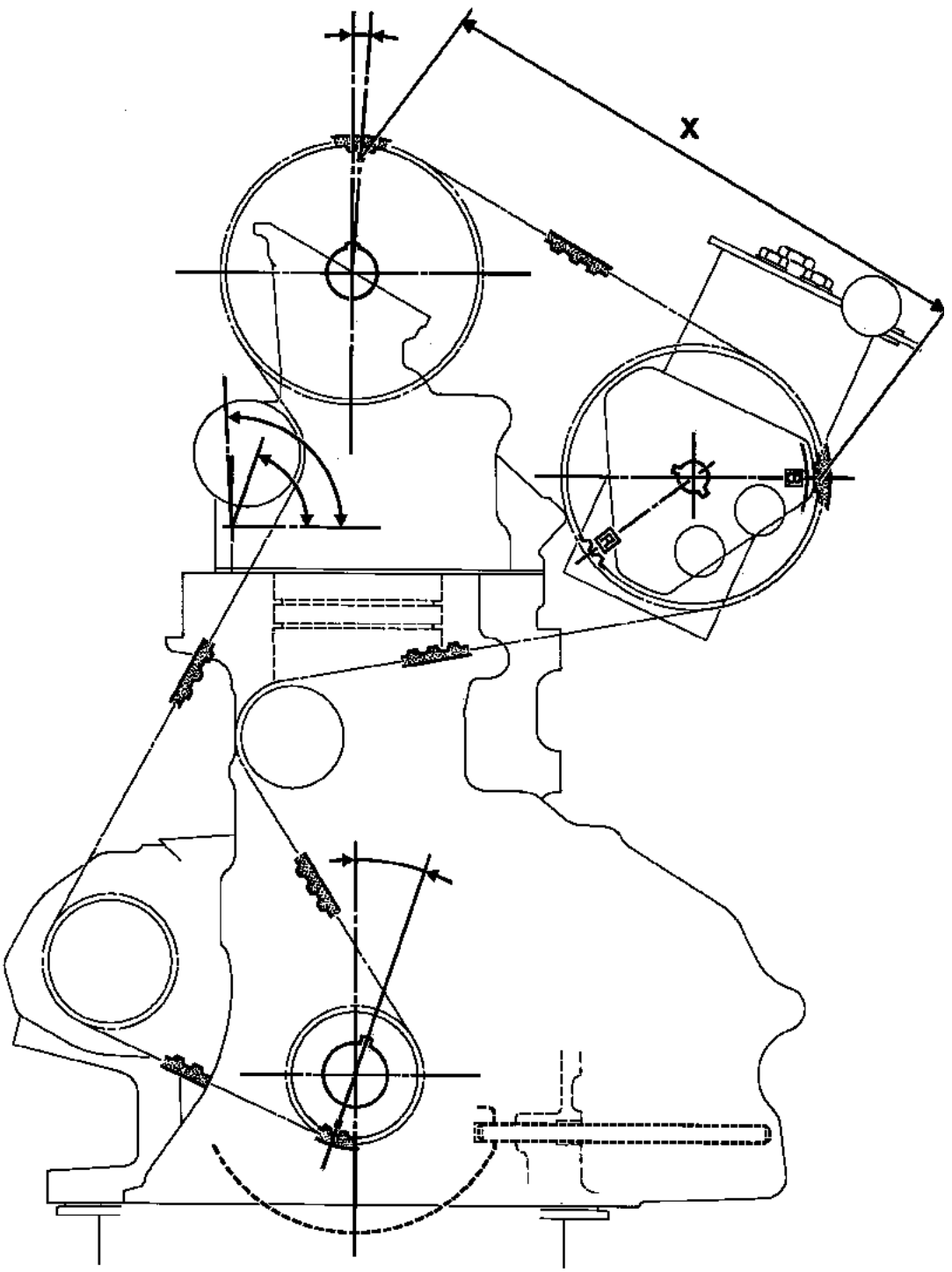
Tighten bolt (1) to **9 daN.m**, tool **Mot. 1359**.

Turn the engine over twice and check the pump timing once more.

If you are unable to set the injection pump, check the setting of the timing.

Align the camshaft marking opposite that on the belt cover. The timing is set correctly if there are **X = 30** teeth on the belt between the camshaft marking and that of the pump pulley.

When the camshaft marking is opposite the belt cover marking, the pump pulley marking is not necessarily horizontal.

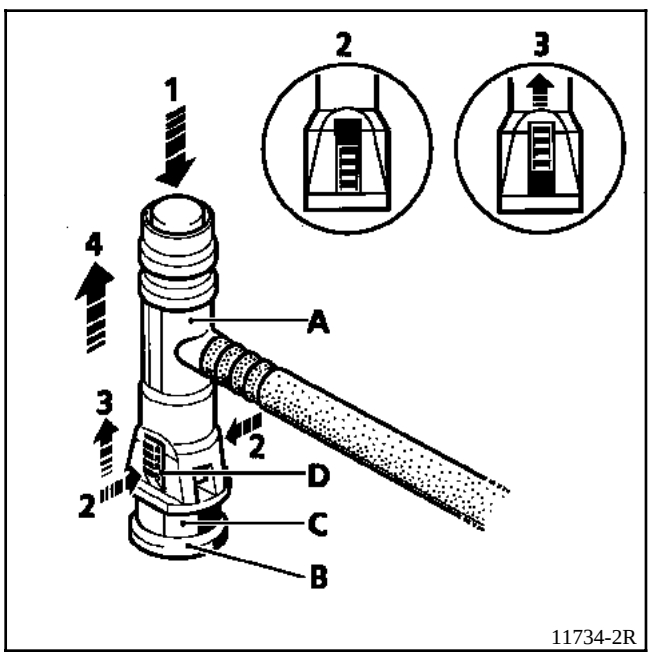


92600R3

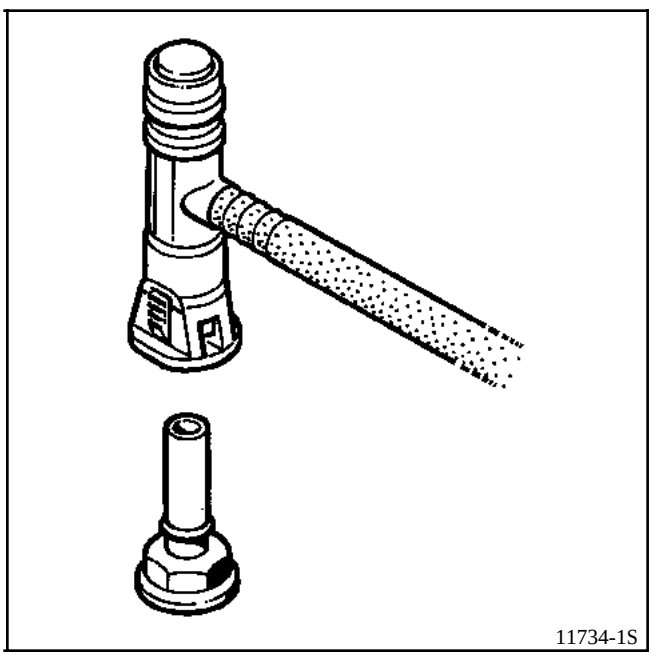
To unlock the pump quick-release union, see below.

The removal - refitting of the diesel fuel supply quick-release union from the injection pump does not require a tool (DO NOT USE PLIERS).

IMPORTANT: the union does not require force to be removed (following the method below, it simply needs to be pulled gently).



11734-2R


11734-1S

1 Push the plastic union (A) on its metallic end (B) in the direction of the arrow (1), to bring it into contact with the 6 sides (C) of end piece (B).

2 Simply hold the notched parts (D), without pushing, whilst maintaining the contact between the plastic union (A) and the 6 sides (C) of end piece (B) in the direction of the arrow (1).

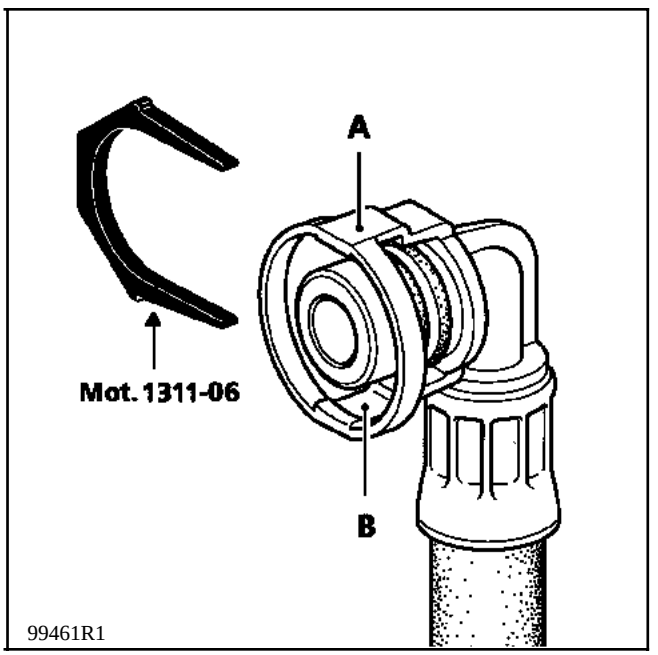
3 Still keeping the plastic union (A) in contact with the metal end piece (B) in the direction of arrow (1), lift the notched parts in the direction of the arrow (3). (A small screwdriver may be used to hold the notched section upright).

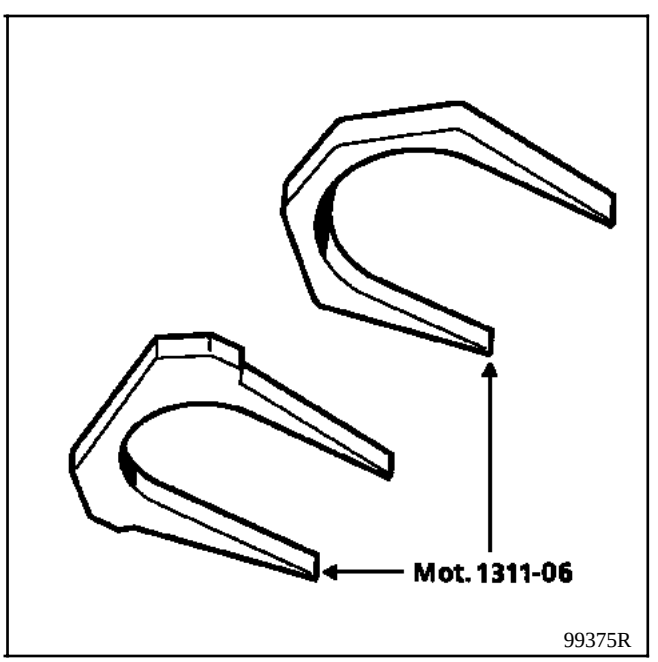
4 Remove the union (A) by gently pulling upwards.

NOTE : it can only be unclipped if the notched section is upright.

To remove the diesel fuel filter unions, insert tool **Mot. 1311-06** between the two branches (A)and (B).

Press on the tool to lift the two retaining clamps, then pull on the union.





IDENTIFICATION

Vehicle	Engine	Alternator	Current
JE0 M05	F9Q 722	VALEO A13 VI 207 VALEO A13 VI 208	120 A

CHECKING

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

Rpm	120 Amps
1500	26 A
4000	94 A
6000	105 A

SPECIAL TOOLING REQUIRED	
Mot. 1273	**Tool for checking belt tension**

REMOVAL

Place the vehicle on a two post lift.

Disconnect the battery and the alternator electrical connections.

Separate the diesel fuel filter from its mounting and move it to one side.

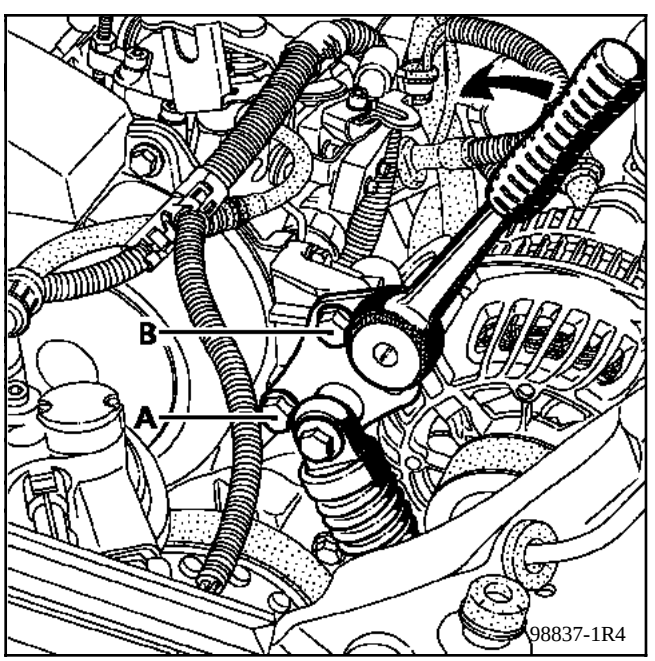
Remove the front right hand wheel arch.

Remove the accessories belt (see section 11-1).

Special notes for vehicles equipped with air conditioning

Before the accessories belt is removed, check the distance between the centres of the bolts of the automatic tensioner (see section 07 "Accessories belt tension").

Slacken bolt (A) then bolt (B), until the shoulder is exceeded, whilst holding the automatic tensioner plate using square drive (example **FACOM J151** ratchet), then slacken the belt by moving the wrench in the direction of the arrow.

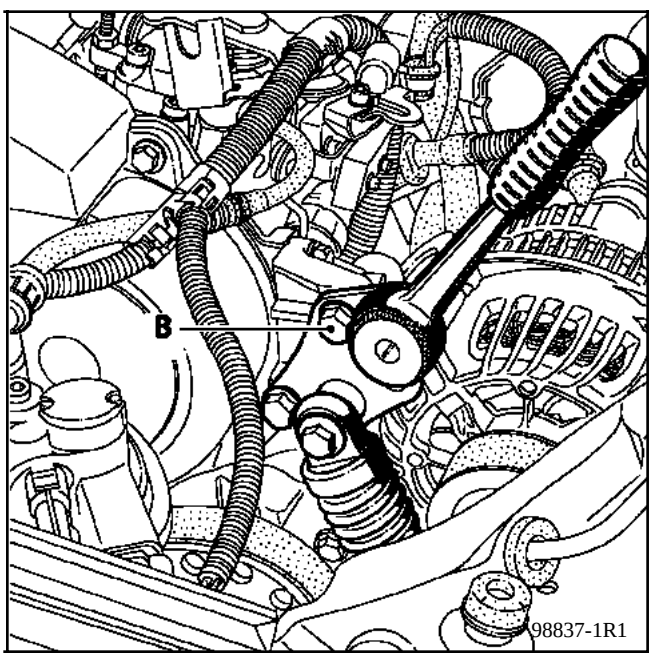


Remove the alternator mountings and remove the alternator.

REFITTING (Special notes)

Refitting is the reverse of removal.

Belt tensioning on vehicles equipped with air conditioning, is carried out by moving the automatic tensioner plate until it stops against the bolt (B), without forcing, using a square drive (example **FACOM J151** ratchet).



For the tensioning value for vehicles without air conditioning, see section **07** "**Accessories belt tension**".

IDENTIFICATION

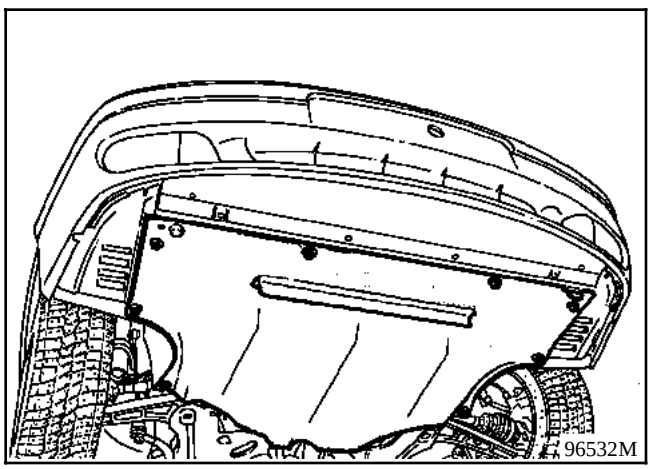
Vehicle	Engine	Starter motor
JE0 M05	F9Q 722	VALEO D7R25 / D6RA P417

REMOVAL

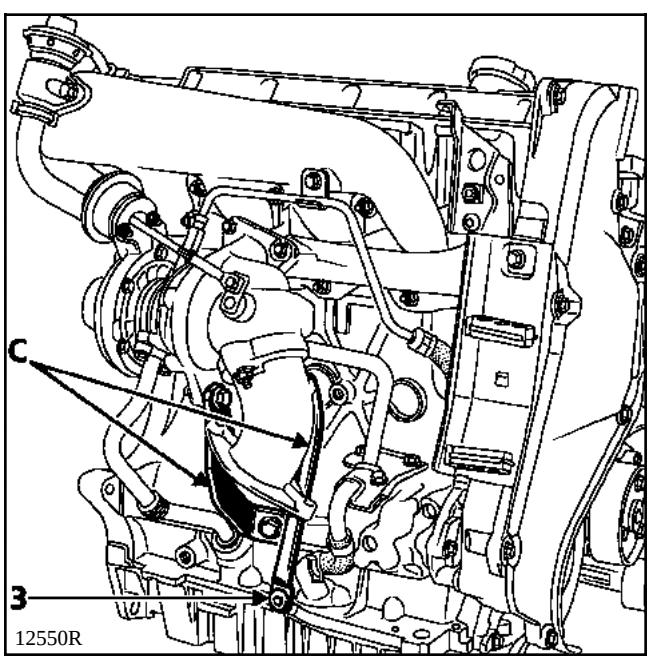
Place the vehicle on a two post lift.

Disconnect the battery.

Remove:
- the front left hand wheel,
- the left hand wheel arch protector,

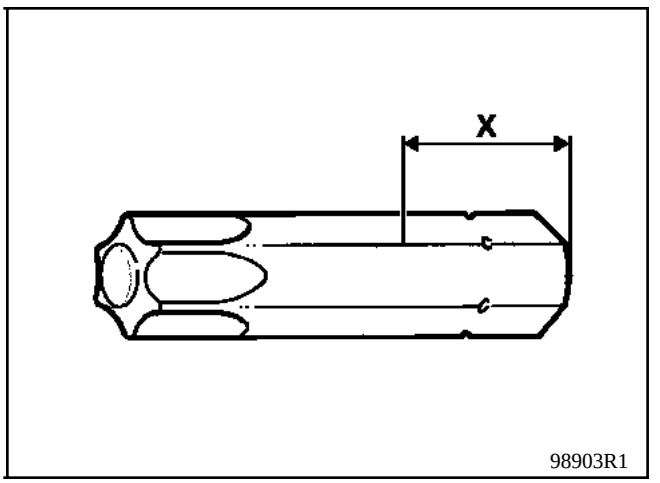

96532M

- the engine undertray,
- the exhaust downpipe,
- the two struts (C).



12550R

NOTE : bolt (3) is removed with a shortened 50 mm torx socket to allow it to pass between the engine block and the transmission, and an 8mm combination wrench.



98903R1

Disconnect the starter motor electrical connections.

Remove:
- the starter motor wiring mounting clip on the oil return pipe mounting,
- the starter motor mounting bolts on the gearbox,
- the starter motor.

REFITTING

Refitting is the reverse of removal.

There is no heater matrix water control valve.

Circulation is continuous in the heater matrices.

FILLING

The two bleed screws on the top of the radiator and the cylinder head coolant pipe housing outlet MUST be opened.

Fill the circuit via the hole in the expansion bottle.

Close the bleed screws as soon as the liquid runs out in a continuous jet.

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

Adjust the level by allowing it to overflow for approximately **4 minutes**.

Close the reservoir.

BLEEDING

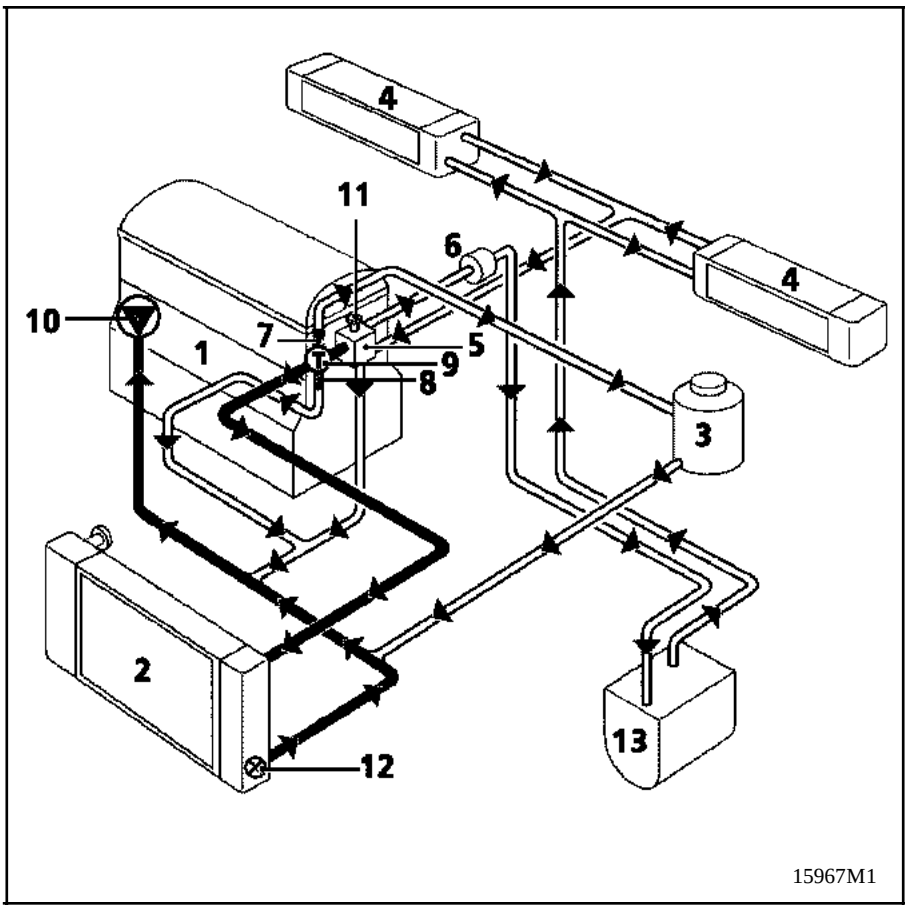
Allow the engine to run for approximately **20 minutes** at **2 500 rpm**, until the fan(s) engage (time required for automatic degassing).

Check that the fluid level is near the "**Maximum**" mark.

DO NOT OPEN THE BLEED SCREW(S) WHEN THE ENGINE IS RUNNING.

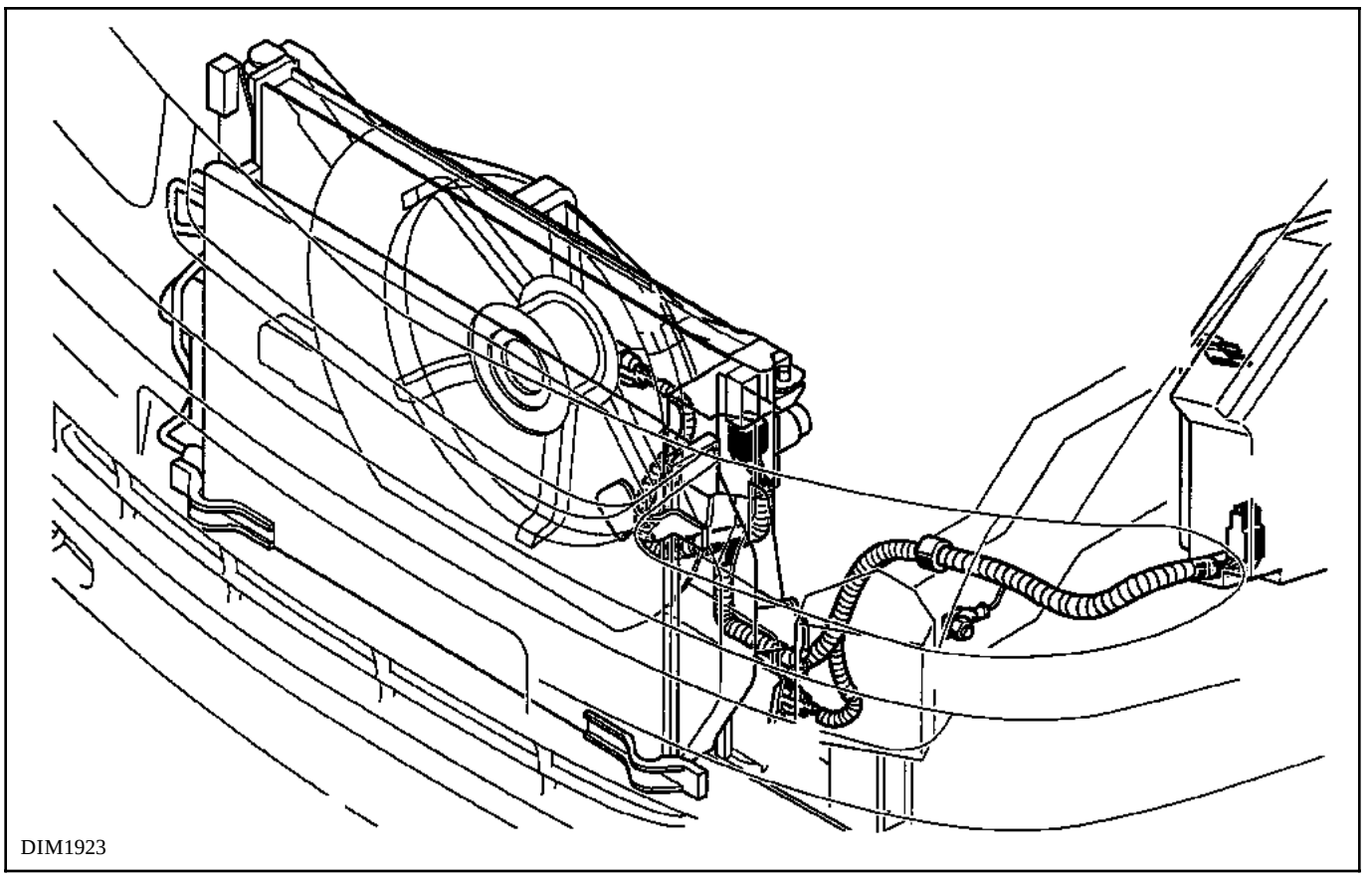
RETIGHTEN THE EXPANSION BOTTLE CAP WHILE THE ENGINE IS WARM.

SPECIFIC COOLING CIRCUIT



1 Engine
2 Radiator
3 "Hot" bottle with degassing after the thermostat
4 Heater matrices
5 Thermostat mounting
6 Thermoplunger mounting
7 Nozzle diameter 3 mm
8 Nozzle diameter 6 mm
9 Thermostat
10 Water pump
11 Bleed screw
12 Temperature switch
13 "Boiler"

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


DIM1923

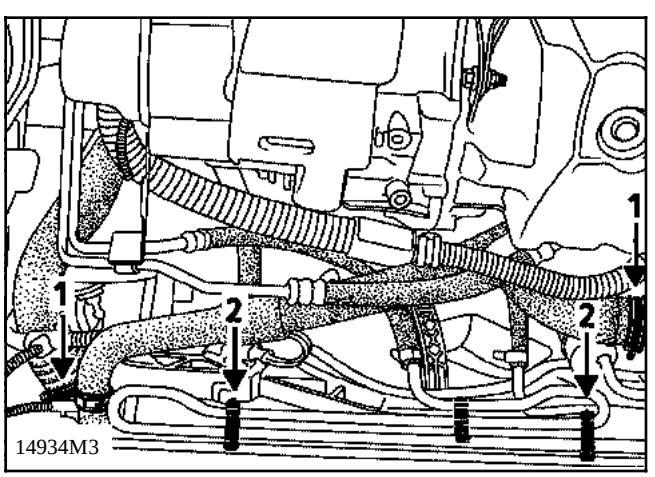
REMOVAL

Put the vehicle on a two post lift.

Disconnect the battery.

Remove:
- the engine undertray,
- the front bumper,
- the radiator grille bar.

Unclip (2) the power assisted steering oil cooler from the bottom of the radiator and rest it on the engine (secure with string if necessary).



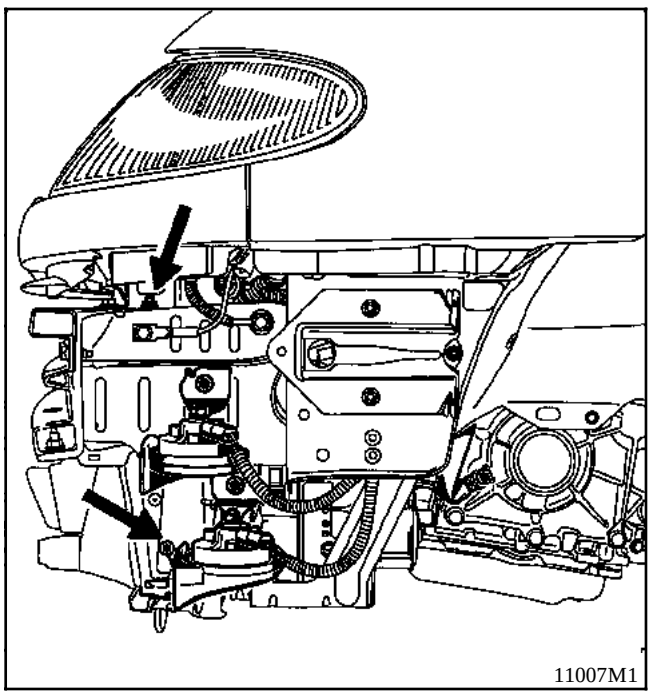
14934M3

Drain the air conditioning circuit if fitted. (see "air conditioning" section and MR 315 § 62)

Disconnect:
- the coolant pipes from the radiator,
- the inlet air pipe unions on the air / air exchanger (1),
- the air conditioning circuit unions on the bottle.

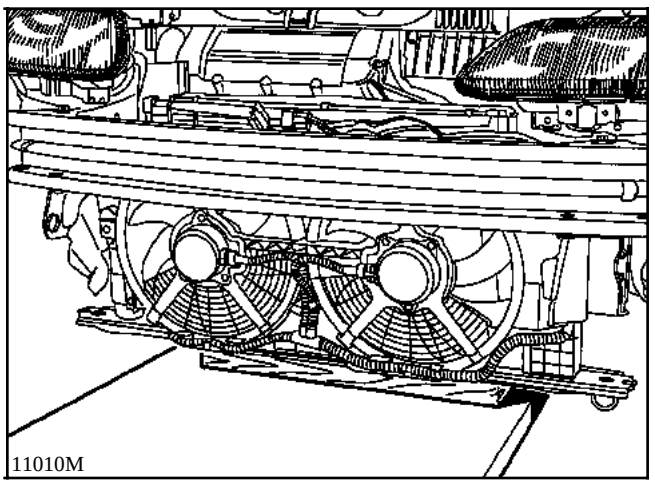
Disconnect the harness for the cooling assembly at the engine connection unit.

Remove the mounting bolts for the radiator convergents and fold them back to remove from below.


11007M1

Remove the sealing cross member from above the radiator (four bolts).

Put the radiator cross member on a table with wooden blocks and release the mountings.


11010M

Remove the two mounting bolts for the cross member on the ends of the side members.

Lift the vehicle while holding the assembly to prevent interference (two persons required).

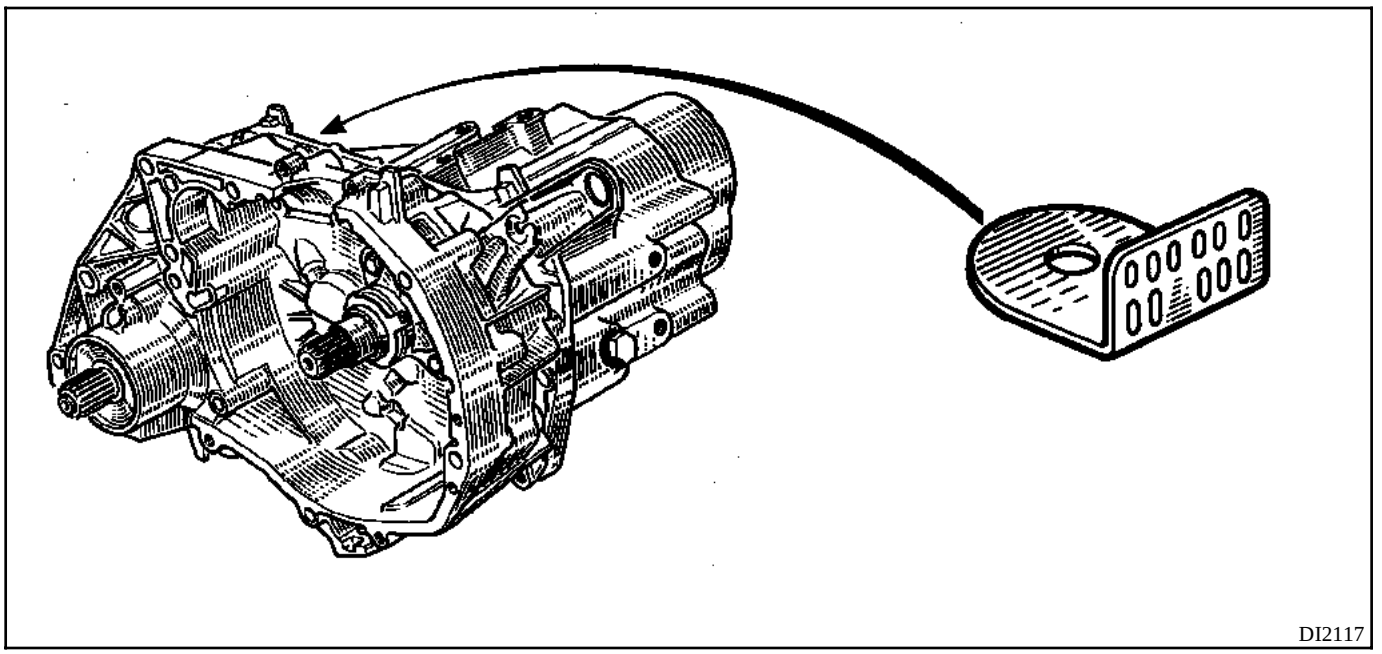
REFITTING

Refitting is the reverse of removal.

Fill the cooling circuit with coolant and the air conditioning circuit with refrigerant if fitted.

The **JE0M** vehicle fitted with the **F9Q** engine has a **JC5** type manual gearbox.

Workshop Repair Manual"B.V. JB - JC" deals with the complete repair of this component.


DI2117

An identification plate on the clutch bellhousing indicates:

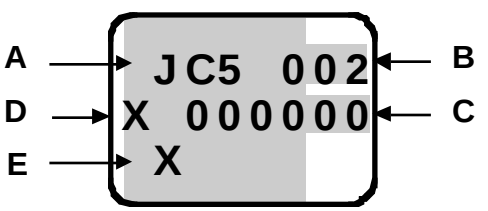
At **A** : the gearbox type

At **B** : the gearbox suffix

At **C** : the fabrication number

At **D** : the factory of fabrication

At **E** : the type of engine assembled with the gearbox



90 775

Suffix	Vehicle	Final drive	Speedo gear	1st	2nd	3rd	4th	5th	Reverse
JC5									
032	JE0 M	15/58	18/22	11/41	21/43	28/37	35/34	42/31	11/39 26

Consumables

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

SPECIAL TOOLING REQUIRED	
T.Av. 476	**Ball joint extractor**
B.Vi. 31-01	**Set of punches**

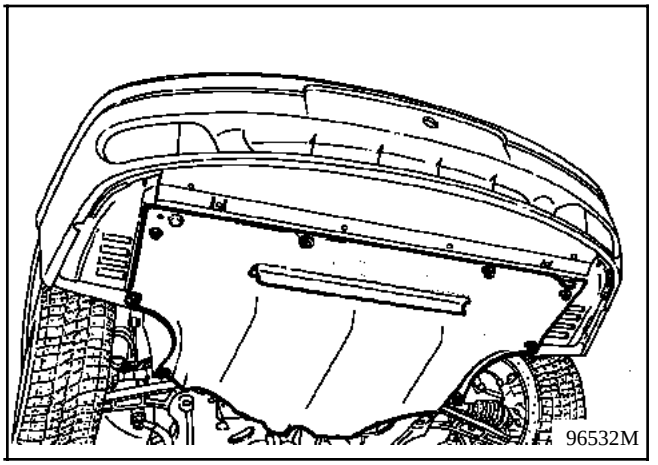
EQUIPMENT REQUIRED

Impact ball joint extractor
Strut type engine support
Component jack
2 post lift safety straps

TIGHTENING TORQUES (in daN.m)	
Drain plug	**2.2**
Brake caliper bolt	**3.5**
Driveshaft gaiter bolt	**2.4**
Lower ball joint nut	**6.5**
Shock absorber base bolt M16 X 200	**20**
Engine tie bar bolt	**5.5**
Bolt at edge of gearbox and on starter	**5**
Front left suspended mounting nut on side member	**7**
Suspended mounting bolt on gearbox	**6**
Rear centre support bolts	**5.5**
Gearbox filler plug	**0.17**
Wheel bolts	**10**

CONSUMABLES

Loctite FRENBLOC :
Brake caliper mounting bolt
RHODORSEAL 5661 :
Ends of driveshaft roll pins


96532M

REMOVAL

Place the vehicle on a two post lift.

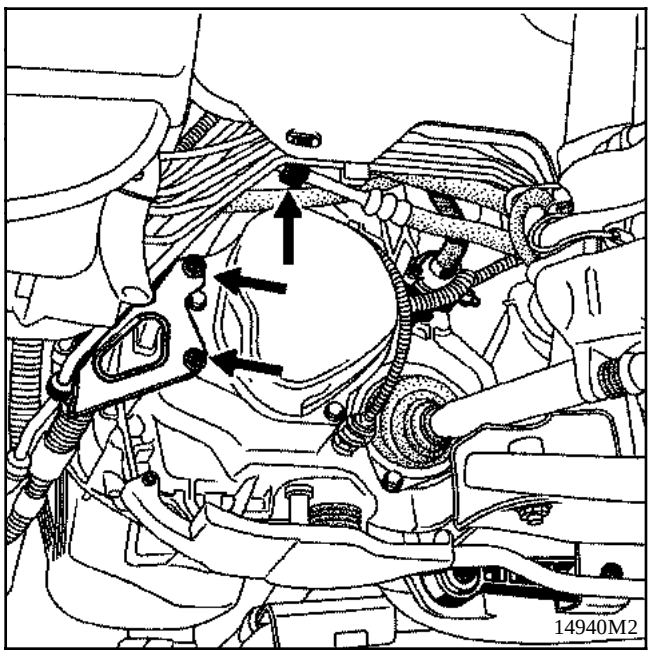
Disconnect the battery.

Remove:
- the engine undertray,
- the front wheels,
- the front left and right hand protectors at the ends of the wheel arches,
- the wheel arch protectors.

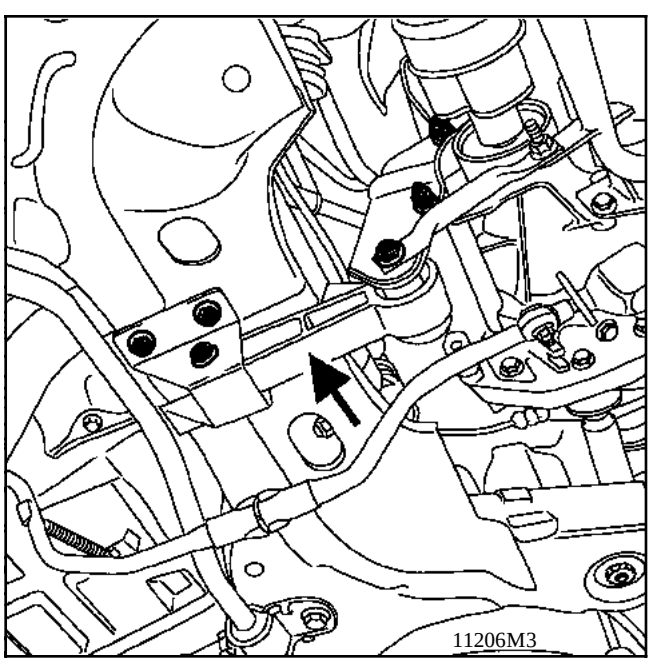
Drain the gearbox.

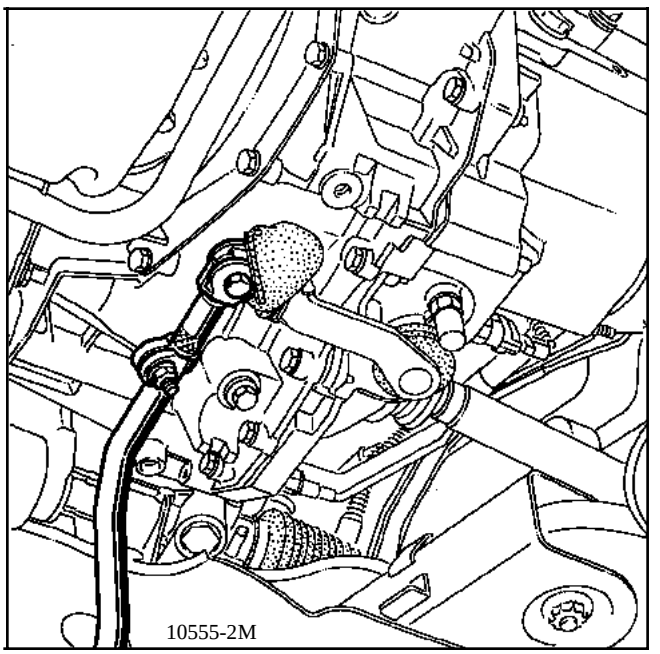
Refit the drain plug with a new seal.

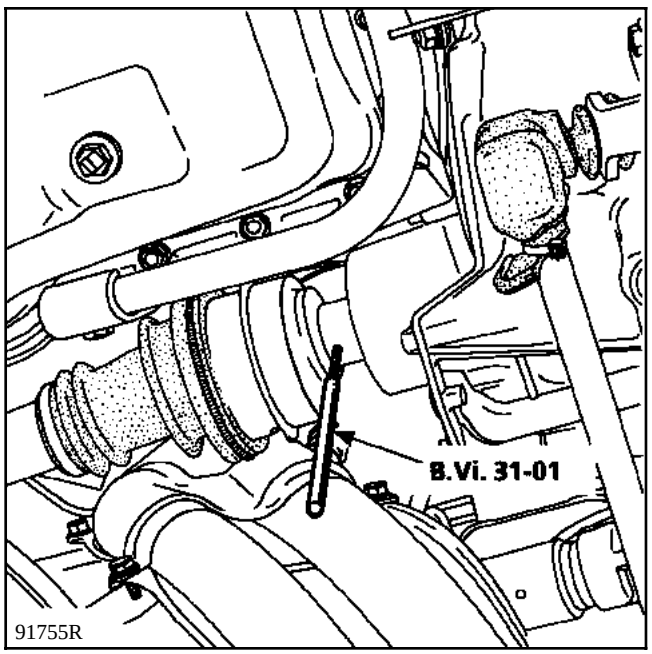
Remove the mounting flanges for the power assisted steering hoses on the engine.



Remove:
- the engine tie bar,
- the gear control (mover the gaiter to one side),
- the right hand driveshaft roll pin.







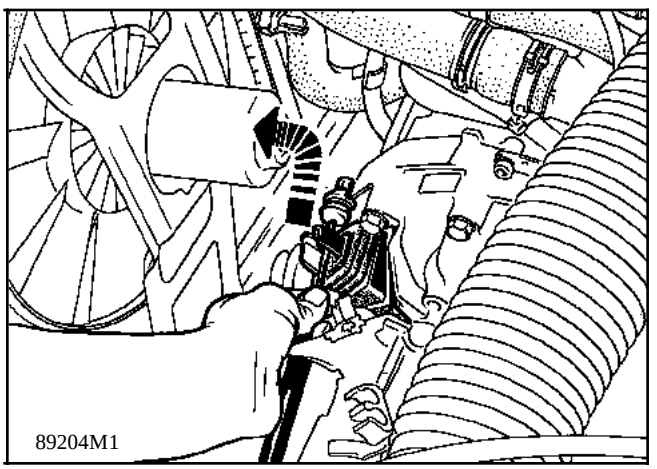
Disconnect:
- the reversing light switch,
- the starter motor wires,
- the speedo cable.

Remove:
- the exhaust pipe outlet,
- the driveshafts (see **MR 315 Section 29**),
- the starter motor (see section 16 starter motor).
- the thermoplungers mounting (without disconnecting it).

In the engine compartment:

Remove:
- the air filter,
- the earth strap at the gearbox end,
- the upper bolts at the edge of the gearbox.

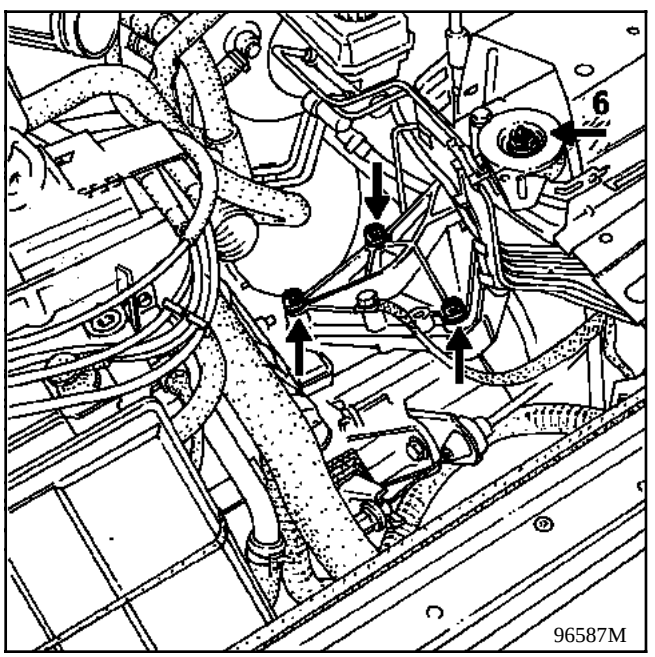
Disconnect:
- the clutch cable,



Support the weight of the engine by fitting a strut or a component jack under the engine block.

Remove the three bolts marked on the gearbox mounting (do not remove the upper nut marked (6)).

Gently tilt the engine and transmission assembly by lifting the vehicle (or lowering the support if a progressive hydraulic system is being used).

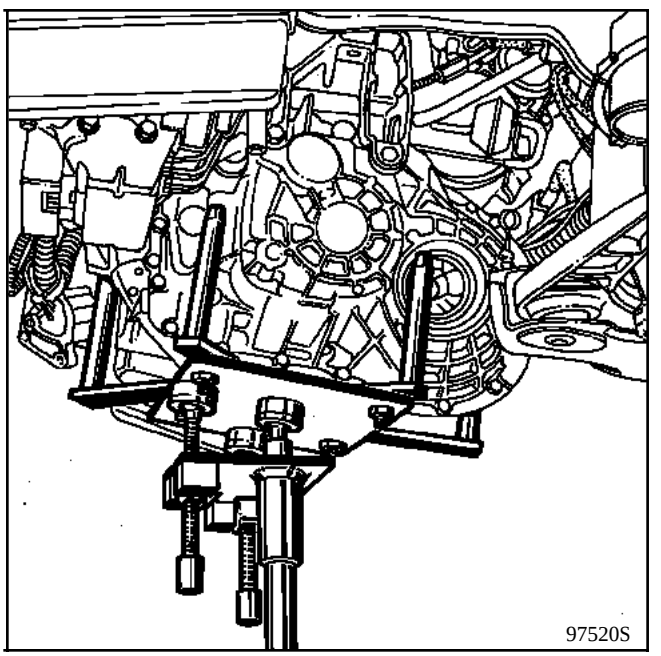


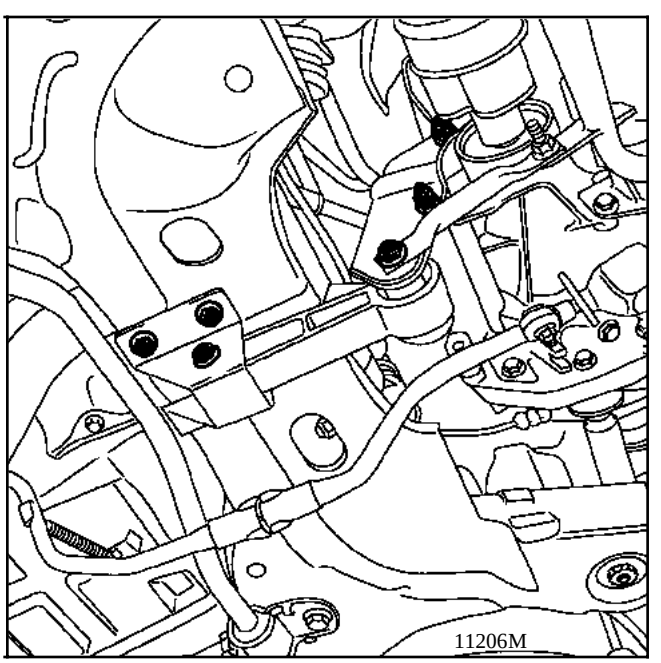
Only remove the nut (6) if the support assembly remains jammed.

Under the vehicle:

Fit the component jack under the gearbox.

Gently lift the gearbox using the component jack and remove the two mounting bolts for the centre rear support. Move this support back as far as possible.

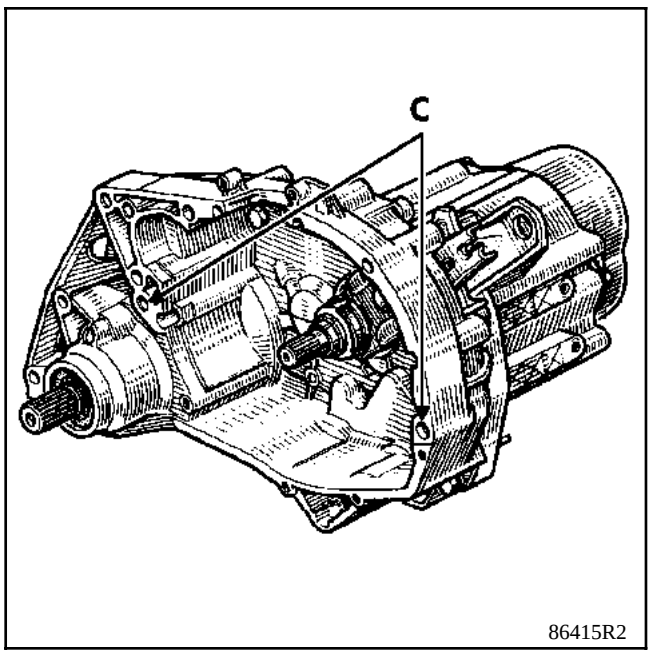




Release the gearbox from the engine and lower it using the component jack, if necessary moving the engine support.

REFITTING (special notes)

Ensure the engine - gearbox centring rings are present at (C).

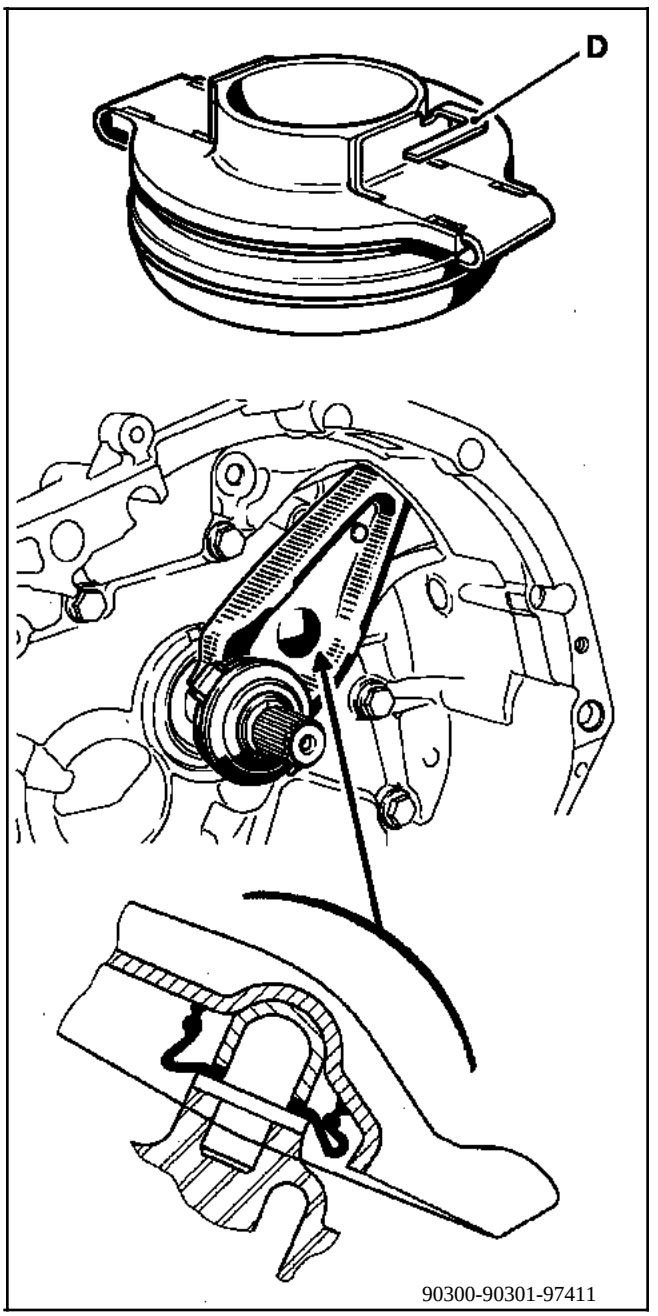


IMPORTANT: do not grease the clutch shaft splines - they are nickel coated.

Lubricate the right hand sunwheel splines with **MOLYKOTE BR2**.

Check the position of the thrust pad, lug (D) should be engaged in the fork.

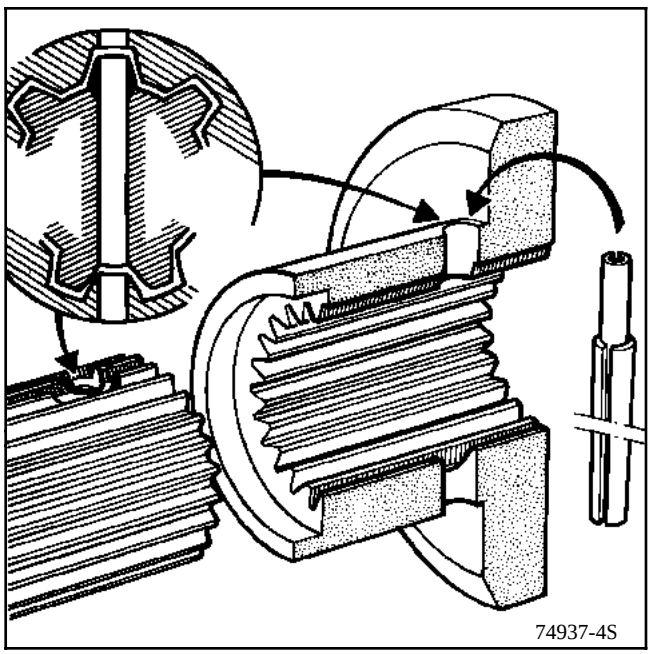
Modification: a gaiter containing grease has been fitted behind the clutch fork.



Use the component jack to reposition the engine and transmission assembly to refit the front left hand engine mounting.

Position the driveshaft in relation to the right hand sunwheel.

Pivot the stub axle carrier, engaging the driveshaft into the sunwheel using an elbowed pin **B. Vi. 31-01** to align the holes.

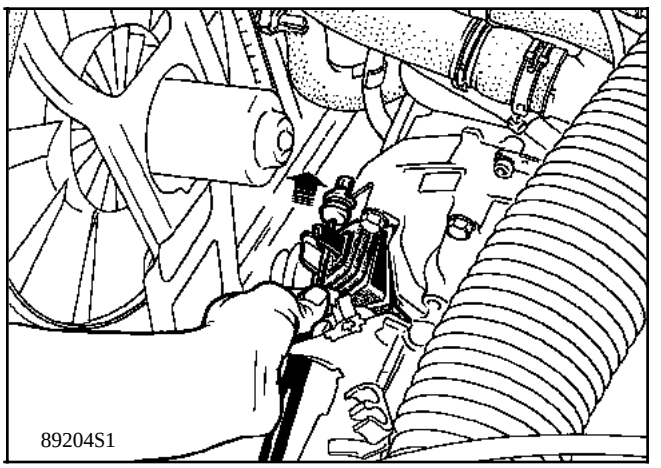


An input chamfer on the sunwheel allows new roll pins to be fitted more easily.

Seal the ends using **RHODORSEAL 5661.**

Pull the cable at the clutch fork on the gearbox.

The cable should have a minimum of **3 cm** "slack".



These checks allow the correct operation of the automatic wear compensation device to be checked.

Renew the brake caliper mounting bolts and torque tighten them.

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

Tighten the nuts and bolts to the correct torque.

Fill the gearbox with oil.

OPERATING PRINCIPLE:

Espace vehicles with the **F9Q** engine are fitted with an option for certain countries (Germany, Scandinavian countries, ...) of an optional additional heating system, comprising a boiler which heats the engine coolant, especially when starting from cold.

The boiler operates when the following three conditions are met:
- engine starting,
- inlet air temperature less than 5 °C,
- coolant temperature less than 75 °C.

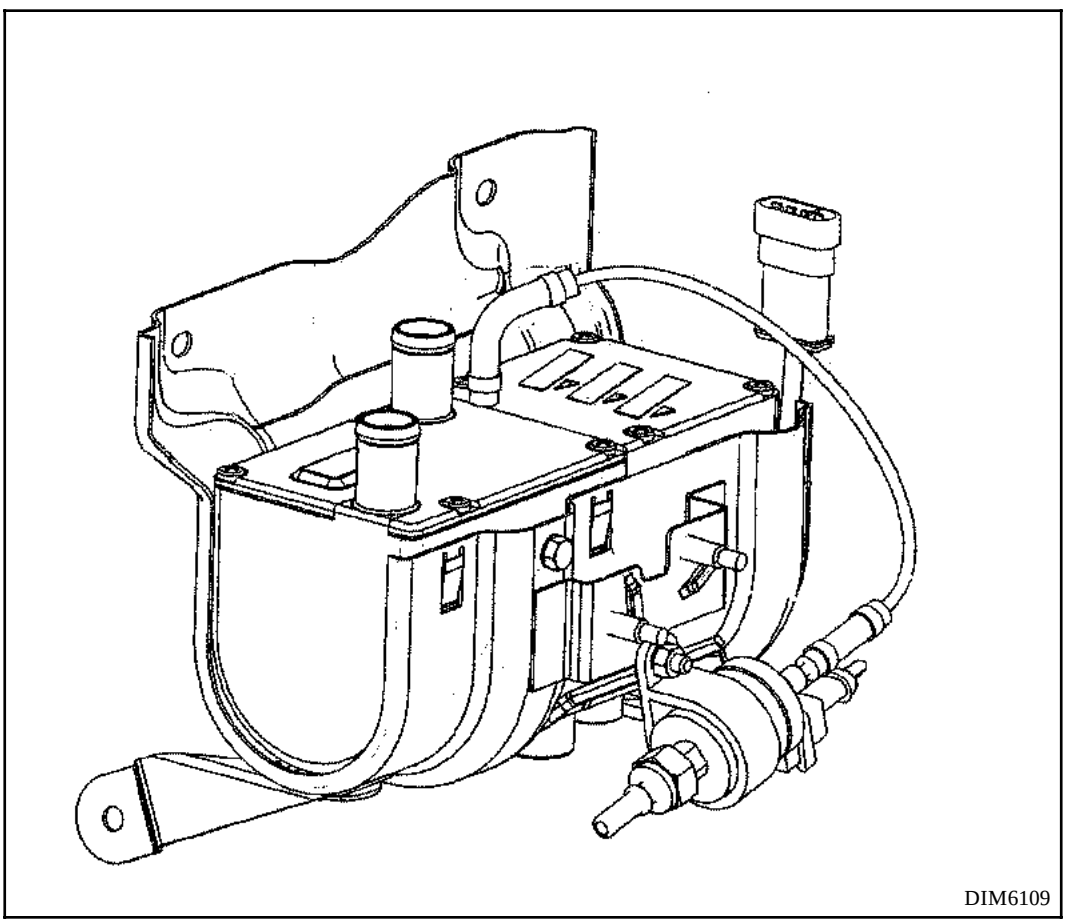
The boiler feed is normally cut when the engine is stopped or the coolant temperature reaches 85 °C.

The temperature is measured inside the boiler.

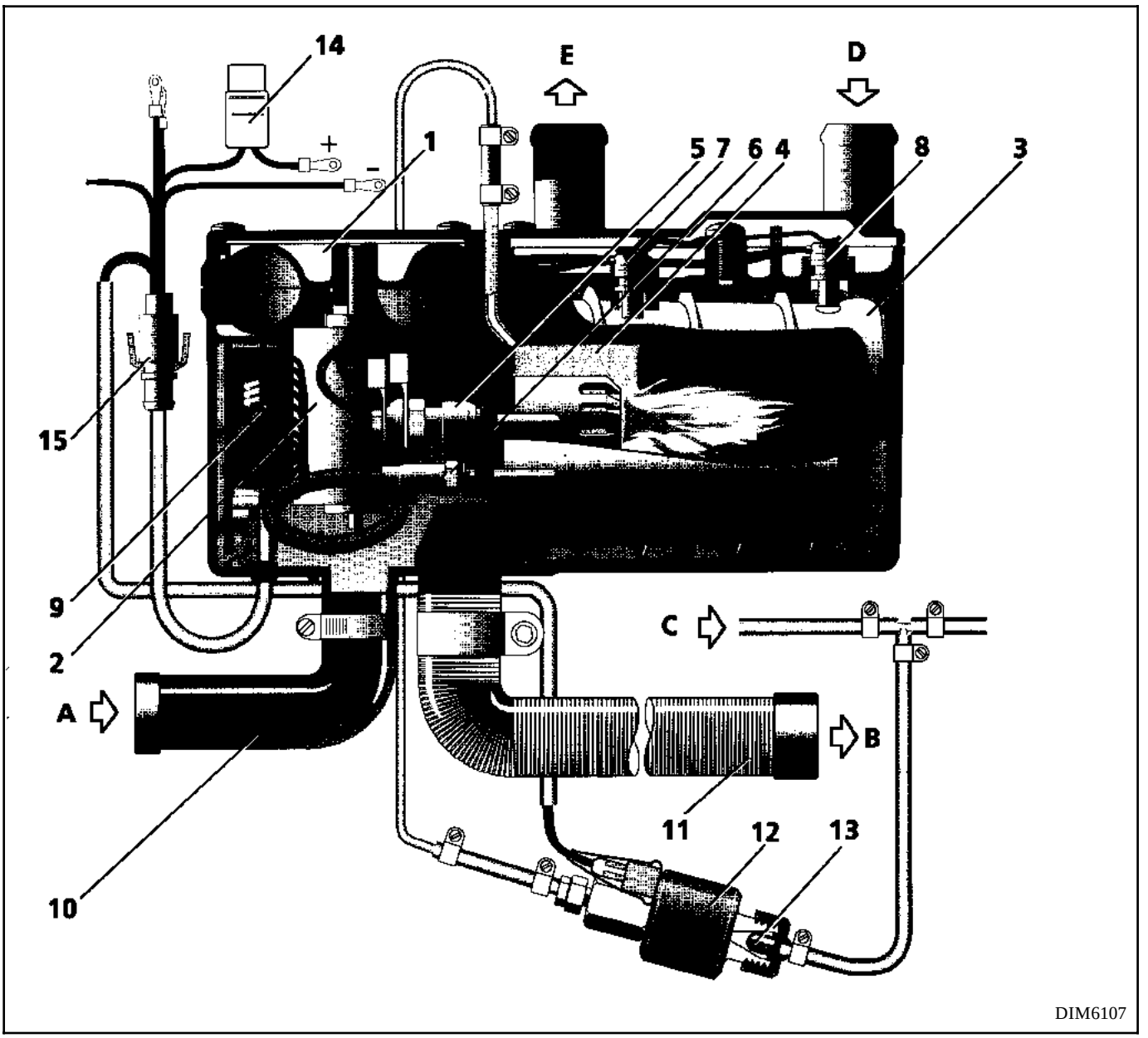
The boiler is operated independently of the driver.

The system has many safety features - see **section 61-3**.

The boiler is connected at the outlet from the thermoplunger unit (see **Sections 13-12** and **61-4**) in the coolant circuit and operates independently of this unit. It is located outside the left hand side member in the front bumper.


DIM6109

DESCRIPTION OF THE D3WZ BOILER



1 Air fan
2 Electric motor
3 Heat exchanger
4 Combustion chamber
5 Ignition plug
6 Flame detector
7 Temperature sensor
8 Overheating switch
9 Control unit
10 Combustion air inlet pipe
11 Burnt gas exhaust pipe
12 Metering pump
13 Fuel filter
14 Main fuse
15 Interface

A Combustion air inlet
B Exhaust gas outlet
C Vehicle fuel circuit
D Coolant inlet (thermoplungers outlet)
E Coolant outlet (to heater matrices)

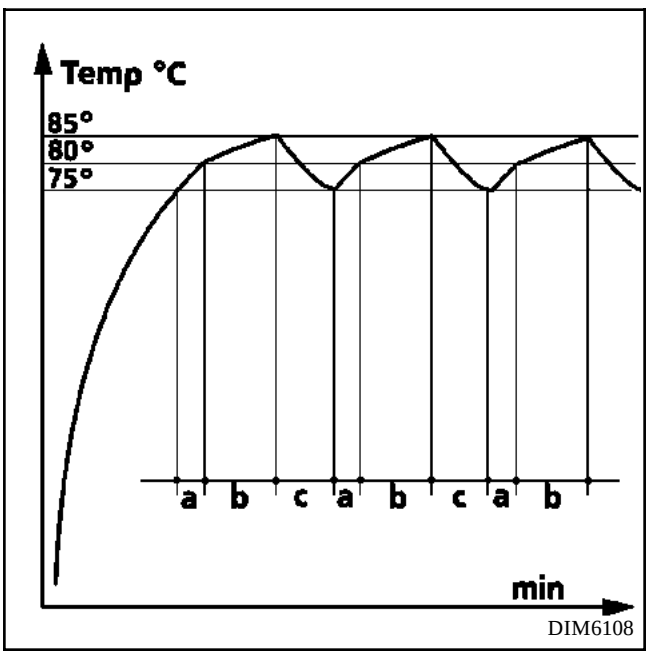
TECHNICAL SPECIFICATIONS

The boiler is fitted with a burner suited to the vehicle fuel type.

It has two operating levels:
1) Slow rate:
Power: **1600 Watts**,
Fuel consumption: **0.2 l/hour**

2) Fast rate:
Power: **3300 Watts**.
Fuel consumption: **0.4 l/hour**

When the engine is started, the boiler operates at the fast rate; the circulation of coolant inside the exchanger is ensured by the vehicle coolant circuit.



- Period a :
  Fast rate.
- Period b :
  Slow rate.
- Period c :
  Boiler off.

Coolant temperature measured inside the boiler.

SAFETY SYSTEMS

The system has several safety devices. It cuts off
- if the difference in coolant temperature measured by the two sensors inside the boiler reaches **15° C**,
- if the coolant temperature reaches **120° C** (different safety device to reading **85°**),
- if the flame detector does not see combustion occurring, (especially the boiler fuel pump),
- if the battery voltage is higher than **16 volts** or less than **10 volts**.

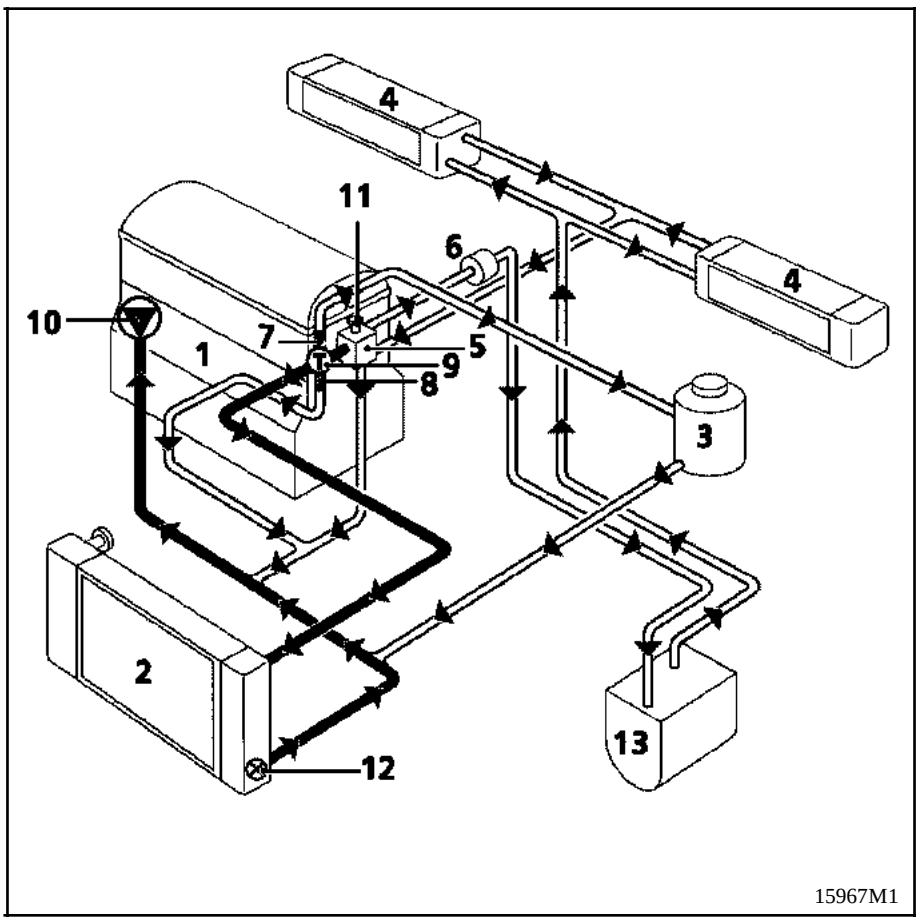
Other safety features:
- if the heating is not operating within **90 seconds** after the fuel feed has begun, starting is repeated. If, during the next **90 seconds**, the system still does not start, the emergency stop is activated,
- if the flame extinguishes by itself during operation, a new start procedure is begun. If, during the **90 seconds**, the system does not start, the emergency stop is activated,
- in the event of overheating (lack of coolant, incorrectly bled cooling circuit...) , the overheating switch operates, the fuel feed is cut and the emergency stop is activated.
  After removing the cause of overheating, the boiler may be restarted after it has cooled down sufficiently.

DISCONNECTION:

To temporarily disconnect the boiler (when carrying out an operation in an enclosed space, listening for noises when cold...), disconnect connector (15) (**section 61-2**).
If possible, check the boiler operates again after reconnection.

The main fuse F 49 (70 A) on the engine connection unit supplies the additional heating system in particular.

SPECIAL HEATING SYSTEM

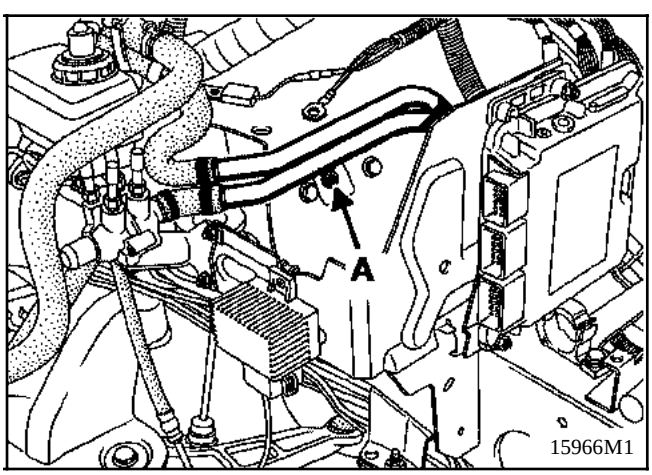


1 Engine
2 Radiator
3 "Hot" bottle with degassing after the thermostat
4 Heater matrix
5 Thermostat mounting
6 Thermoplunger mounting
7 Nozzle diameter 3 mm
8 Nozzle diameter 6 mm
9 Thermostat
10 Water pump
11 Bleed screw
12 Temperature switch
13 "Boiler"

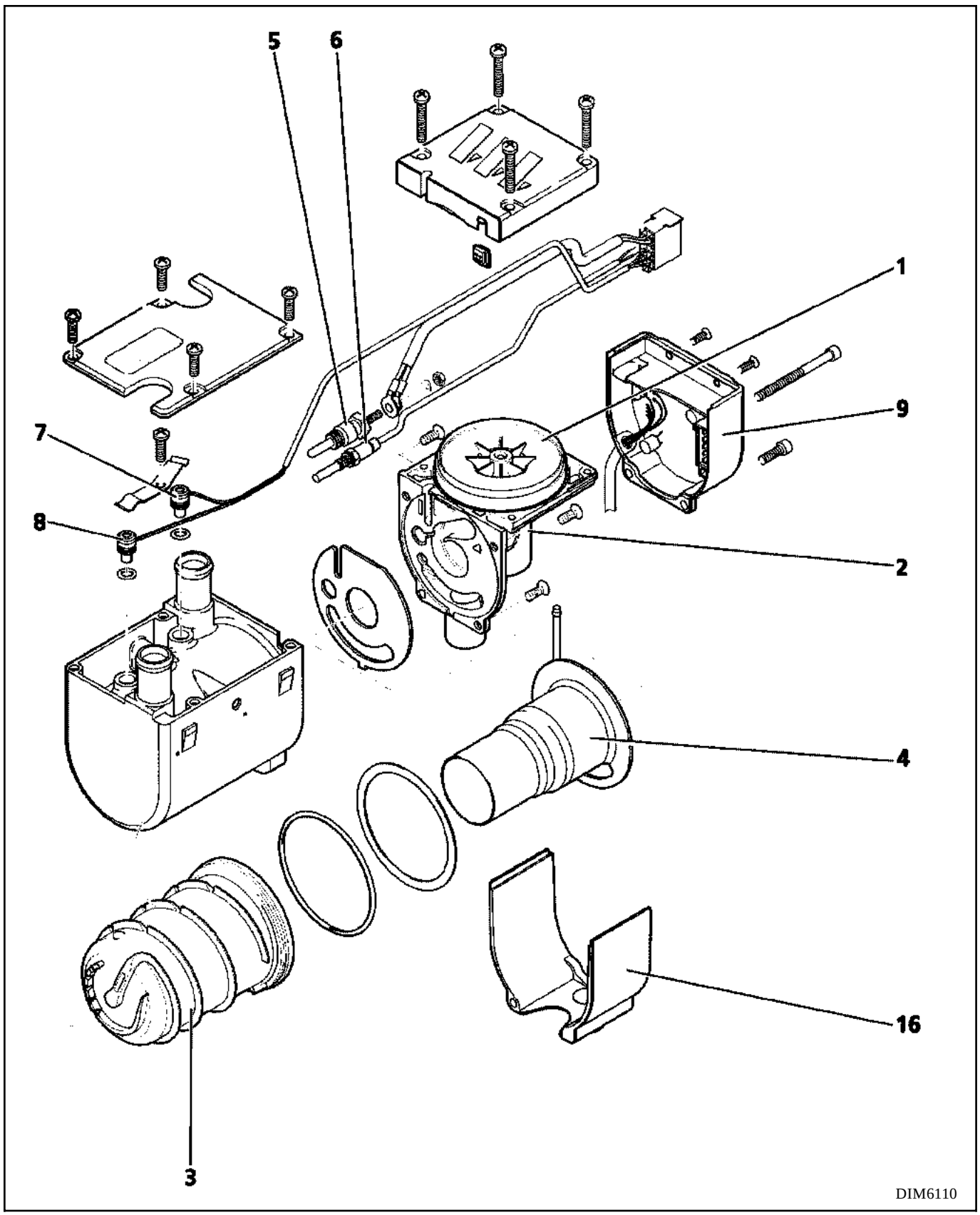
RIGID COOLANT PIPES

These are mounted to the body by bolt (A).

When refitting, tighten this bolt last after refitting and tightening all the clips.



EXPLODED VIEW OF THE BOILER



References identical to diagram in section **61-2** .

MAINTENANCE

The main maintenance operations for this assembly are:
- replacing the ignition plug (5),
- cleaning the filter at the pump inlet (13). (see **section 61-2**)

REMOVING - REFITTING THE COMPONENTS

FUEL PUMP INLET FILTER (13)

Remove the front bumper.

Hold the pump (12) (see **section 61-2**) if it turns and slacken the union covering the filter (13). Clean or replace the filter if there is a combustion fault.

IGNITION PLUG

Disconnect and remove the boiler without draining the cooling circuit (use clamps **Mot. 453-01**).

Remove:
- the cover over the fan (1),
- the control unit (9) and the cover (16),
- the ignition plug (5) after disconnecting it.

FLAME DETECTOR

Disconnect and remove the boiler without draining the cooling circuit (use clamps **Mot. 453-01**).

Remove:
- the cover over the fan (1),
- the control unit (9) and the cover (16).

Disconnect the flame detector by removing the flat terminals from its connector.

Remove the flame detector.
(IMPORTANT: fragile)

COMBUSTION CHAMBER (4) AND EXCHANGER (3)

Remove:
- the flame detector and the plug,
- the wiring for the overheating detector (8) and the temperature sensor (7),
- the fan mounting (1).

Remove the combustion chamber (4) and if necessary the exchanger (3).

FAULT FINDING

If there is a fault, check:
- if there is fuel in the fuel tank,
- if the fuses are intact,
- if the pipes, fluid connections and electrical connections are intact,
- if the combustion air pipes or exhaust gas pipes are blocked (unblock them if necessary).

If combustion produces soot, check:
- if the combustion air pipes or exhaust gas pipes are blocked (unblock them if necessary).
- if the exchanger (3) or the combustion chamber (4) are contaminated ; clean them if necessary,
- if the metering pump flow is correct ;
  To do this:
  - remove the bumper,
  - disconnect the fuel pipe at the electric pump outlet (12), on the other side of the filter (13),
  - connect a pipe to the electric pump to empty into a glass at the same height as the boiler,
  - start the boiler (if necessary shunt the temperature sensor in front of the battery screen). Approximately **40 seconds** later, fuel will arrive and begin to bleed out of the circuit. Switch off the ignition. Drain the glass and start the boiler again, to collect the stabilised flow for, say, **30 seconds**. Switch off the boiler and measure the amount of fuel collected.
    Normal flow: between **6.8 cm^3** and **7.8 cm^3** in **90 seconds** of operation.

REMOVAL

The air conditioning compressor can only be removed after removal of the alternator.
(see section 16).

Quantity of refrigerant fluid **R 134 A**:
720 grammes ± 20